471 US Hwy 250 East, Ashland, OH 44805
PH. 419-207-9400 FAX 419-207-8031

Keen Pump Company, Inc. is pleased to provide this engineered products catalog for your use. Keen Pump strives to provide you with the most current information about our pumps, pump systems, controls, and accessories. Please feel free to review, select, and specify our products. In order to maintain our records to make certain that we have sent you the most up-to-date literature, **Keen Pump asks you to please complete this registration and email or fax to Keen Pump Literature Department to the attention of Kylee Easterday:**

Keen Pump Company, Inc.
471 US Highway 250 East
Ashland, OH 44805
Attn: Kylee Easterday

Phone: 419-207-9400
Fax: 419-903-8031
Email: kylee@keenpump.com

Name____
Title____

Mailing Address_____________________________________
City, State, Zip______________________________________

Phone____
Fax____
Email____

Thank you for your Interest in Keen Pump!

471 US HWY 250 East, Ashland, OH 44805
PH. 419-207-9400 FAX 419-207-8031

January 1, 2020

To: All Keen Pump Co., Inc. Distribution

From: Gregg Keener, President

Re: Keen Pump Engineered Catalog

As KEEN PUMP is constantly working to provide you even more products to sell, we will send supplement pages as new products become ready for release. Feel free to take advantage of our website www.keenpump.com for easy-to-download catalog documents, which will be identical to your hard-bound catalog. The complete catalog is currently available on our website.

Thank you again for all of your business with Keen Pump Co., Inc. It is our hope that this catalog, along with many new sales tools coming your way in 2020, will help your business grow and prosper.

Sincerely,

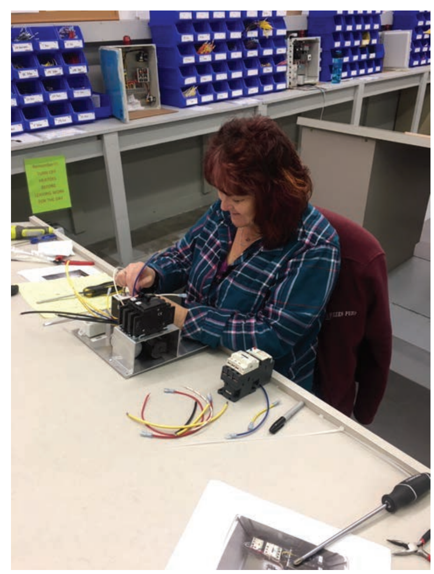
Gregg Keener, President

KEEN PUMP

Thank you for specifying KEEN PUMP COMPANY, INC. for your next wastewater project! Keen Pump is pleased to provide this catalog for your use. Keen Pump is intent on providing you with the most up-to-date information available on our engineered pumps, systems, controls and accessories. You will be able to properly specify any job using our catalogs.

As Keen Pump is constantly working to provide even more products to sell and specify, our literature department will send supplement pages as new products become ready for release. Keen Pump also has this catalog available on a USB flash drive for your convenience. Call your local distributor or Keen Pump direct at 419-207-9400 for a copy. Feel free to visit our website

Providing you with over 200 years of pump experience, Keen Pump can serve you like no other in the industry. Keen Pump offers a wide selection of grinder pumps, solids-handling pumps, sump & sewage pumps, systems and controls for many fluid-handling applications. Ranging in sizes from 1/3hp to 150hp, Keen pumps are in continuous duty around the world. We hope you find this catalog useful!



KEEN PUMP

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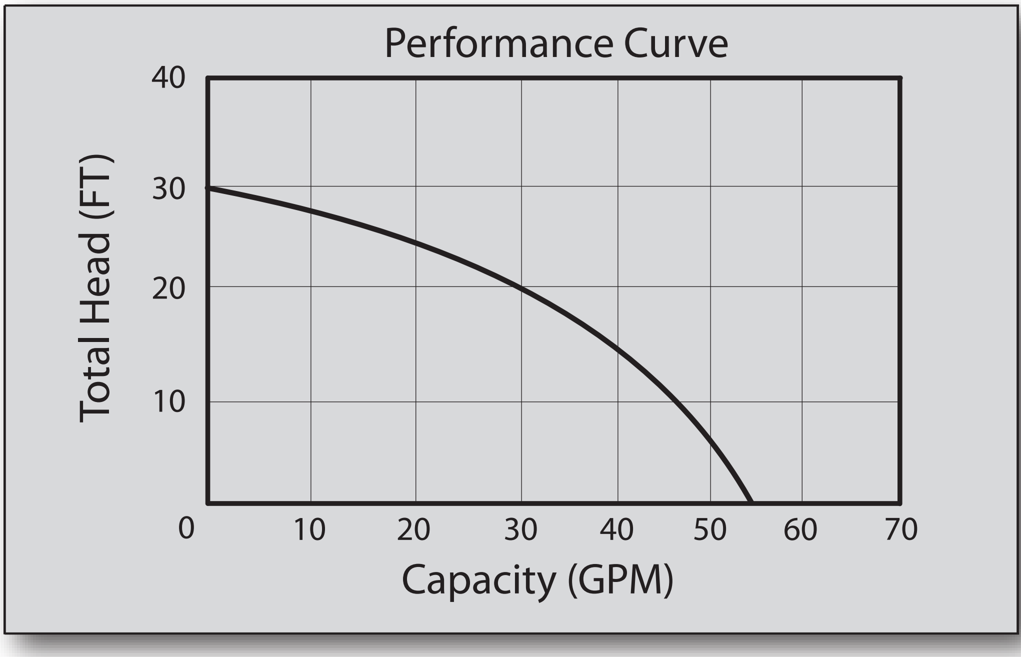
KE33

1/3 HP Effluent Pump

- 1/4″ Solids-Handling
- 1-1/2″ NPT Vertical Discharge
- 3450 RPM
- Dual Mechanical Seals
- Durable, Cast Iron Construction
- Automatic and Manual Models
  - KE33A (Automatic)
  - KE33M (Manual)



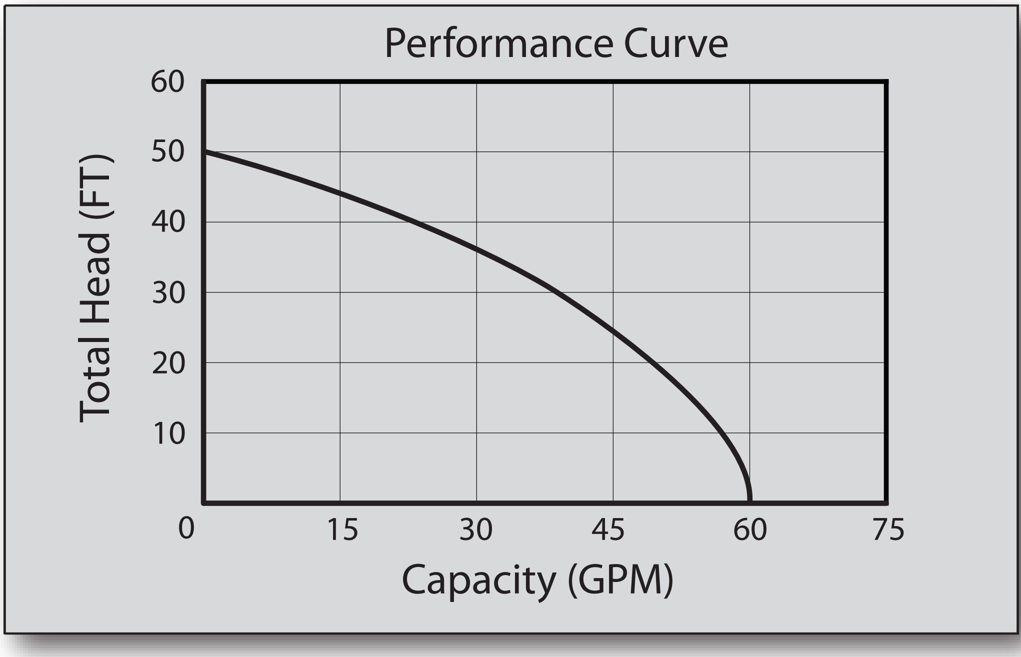
Effluent Pumps

KEEN PUMP

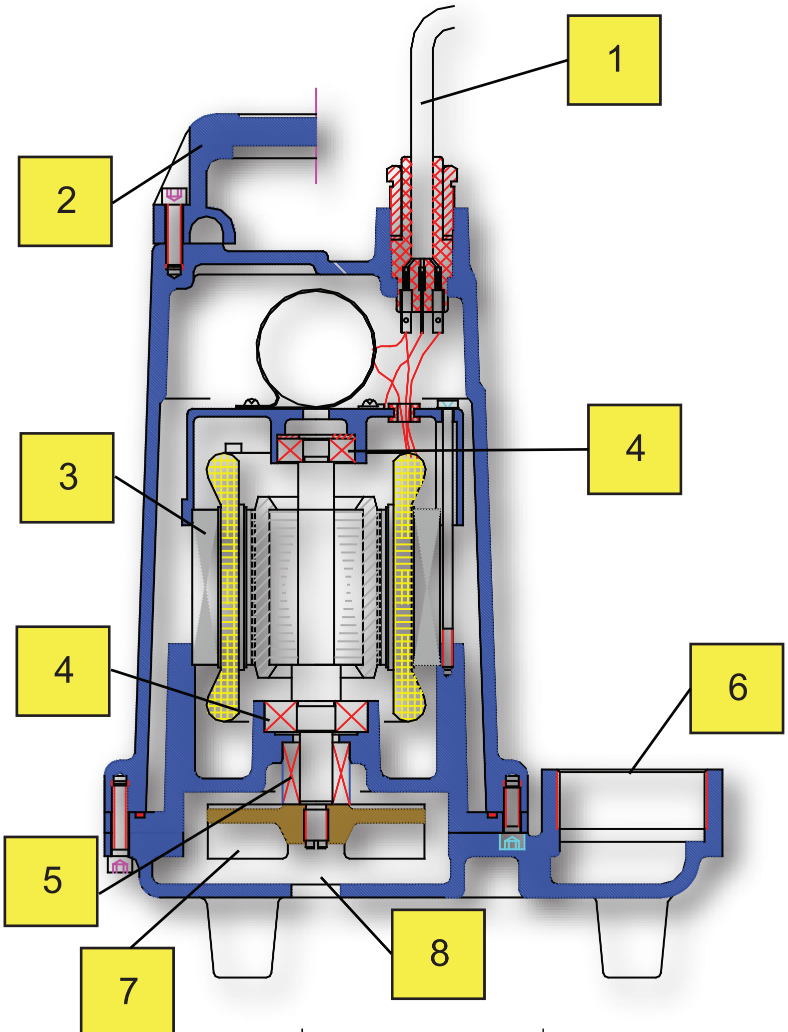
KE5

1/2 HP Effluent Pump

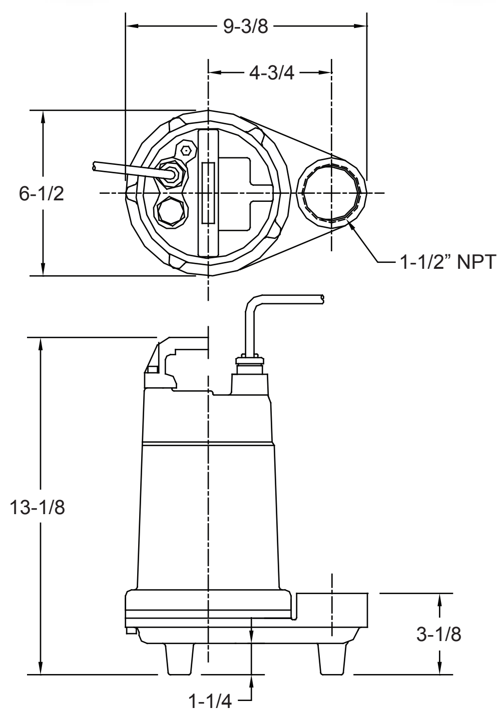
- 3/4" Solids-Handling
- Heavy-Duty Mechanical Seal
- Recessed, Clog-Free Impeller
- Durable, All Cast Iron Construction
- Dependable Operation
- Automatic and Manual Models
  - KE5A (Automatic w/ Piggyback Float Switch)
  - KE5M (Manual)



KE5 Features and Benefits



1. **Power Cord** - 20 ft w/ Plug, UL & CUL, 16 AWG, Type SJTOW.
2. **Castings** - Class 30 ASTM A48, Cast Iron.
3. **Motor** -1/2HP, 115 Volt, 10 Amp, 3450 RPM, Oil-Filled, Class B, 60 Hz
4. **Bearings** - Upper and Lower Ball, Oil-Lubricated.
5. **Shaft Seal** - Silicon Carbide.
6. **Discharge** - 1-1/2" NPT Vertical.
7. **Impeller** - Cast Iron.
8. **Solids-Handling** - Up to 3/4" Dia.
9. *Optional Piggy-Back Float.



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KE5 Specifications

Pump Model – Pump shall be of the submersible centrifugal type, 1/2 HP KEEN KE5 Series. The pump shall easily pass 3/4" diameter solids through the pump end without jamming and exit through the 1-1/2" NPT discharge.

Operating Conditions – The pump shall have a capacity of _______ GPM at a total head of _________ feet, and shall use a motor rated at 1/2 HP and 3450 RPM.

Pump Impeller – Cast iron and threaded on a stainless steel shaft extension. The impeller shall be of the recessed vortex type to provide an unobstructed passage through the volute for the solids.

Pump Housing Construction – All components of the pump construction (cord cap, motor housing, seal plate, volute) shall be cast iron, ASTM A-48, Class 30. There shall not be any composite materials used for any pump components.

Mechanical Seal – The motor shall be protected by a mechanical, Type 21, (silicon carbide) shaft seal. The mechanical seal face shall be lapped to a flatness of one light band. All hardware shall be stainless steel. The elastomer materials shall be nitrile.

Motor – The pump motor shall be of the submersible type, rated 1/2 HP, 3450 RPM. The motor shall be for 60 Hz, 115 volt, single phase operation. The motor shall be of the permanent split capacitor design with an internal start capacitor for high starting torque. Motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class B insulation. Winding housing shall be filled with a clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Air-filled motors which do not have the superior heat dissipating capabilities of oil-filled motors shall not be considered equal.

The motor shall have two heavy duty ball bearings to support the pump shaft, taking radial and thrust loadings. Ball bearings shall be designed for a minimum 50,000 hours B-10 life. The shaft shall be stainless steel, threaded at the impeller.

The motor shall be capable of operating over the full range of the performance curve without overloading. Single phase motors shall have a heat sensor thermostat and overload attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 200 degrees F. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The thermostat shall automatically reset when the motor cools to a safe operating temperature.

Power Cord – The motor power cord shall be 16 AWG SJTOW, 20' length. The cable jacket shall be sealed at the motor entrance by means of a rubber compression washer with concentric ribbing. A compression fitting shall securely hold the cable jacket and compression grommet in place.

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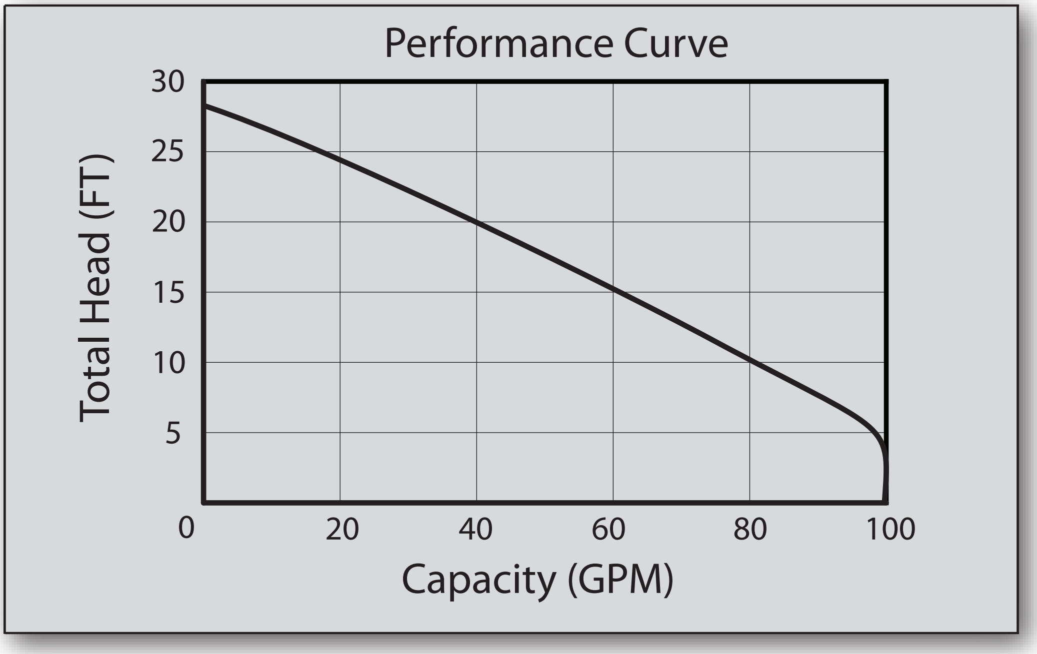
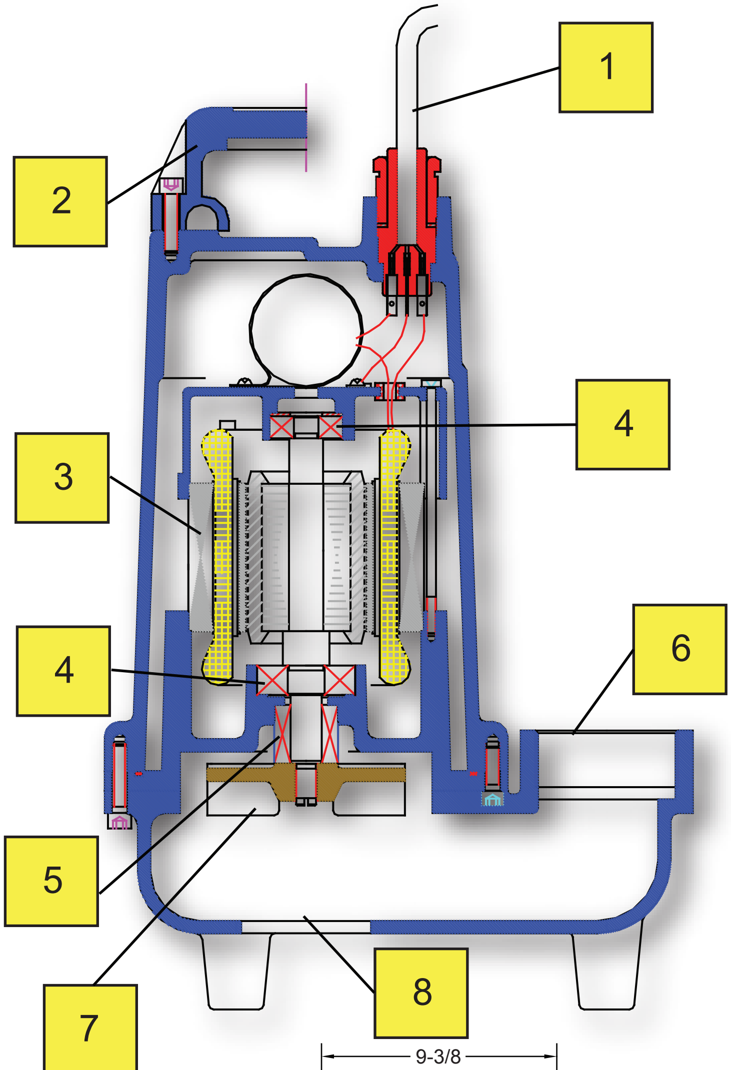
KW5

1/2 HP Sewage Pump

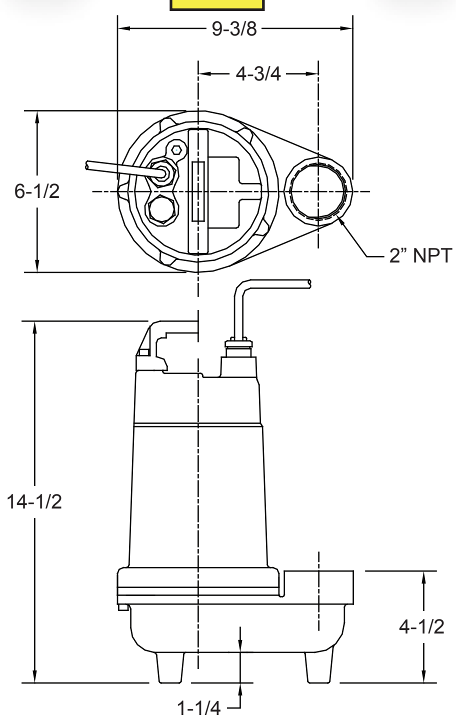
- 2" Solids-Handling
- Heavy-Duty Mechanical Seal
- Recessed, Clog-Free Impeller
- Durable, All Cast Iron Construction
- Dependable Operation
- Automatic and Manual Models
  - KW5A (Automatic w/ Piggyback Float Switch)
  - KW5M (Manual)



KW5 Features and Benefits



1. **Power Cord** - 20 ft w/ Plug, UL & CUL, 16 AWG, Type SJTOW.
2. **Castings** - Class 30 ASTM A48, Cast Iron.
3. **Motor** -1/2HP, 115 Volt, 10 Amp, 3450 RPM, Oil-Filled, Class B, 60 Hz
4. **Bearings** - Upper and Lower Ball, Oil-Lubricated.
5. **Shaft Seal** - Silicon Carbide.
6. **Discharge** - 2" NPT Vertical.
7. **Impeller** - Cast Iron.
8. **Solids-Handling** - Up to 2" Dia.
9. *Optional Piggy-Back Float.



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KW5 Specifications

Pump Model – Pump shall be of the submersible centrifugal type, 1/2 HP KEEN KW5 Series. The pump shall easily pass 2" diameter solids through the pump end without jamming and exit through the 2" NPT discharge.

Operating Conditions – The pump shall have a capacity of _______ GPM at a total head of _________ feet, and shall use a motor rated at 1/2 HP and 3450 RPM.

Pump Impeller – Cast iron and threaded on a stainless steel shaft extension. The impeller shall be of the recessed vortex type to provide an unobstructed passage through the volute for the solids.

Pump Housing Construction – All components of the pump construction (cord cap, motor housing, seal plate, volute) shall be cast iron, ASTM A-48, Class 30. There shall not be any composite materials used for any pump components.

Mechanical Seal – The motor shall be protected by a mechanical, Type 21, (silicon carbide) shaft seal. The mechanical seal face shall be lapped to a flatness of one light band. All hardware shall be stainless steel. The elastomer materials shall be nitrile.

Motor – The pump motor shall be of the submersible type, rated 1/2 HP, 3450 RPM. The motor shall be for 60 Hz, 115 volt, single phase operation. The motor shall be of the permanent split capacitor design with an internal start capacitor for high starting torque. Motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class B insulation. Winding housing shall be filled with a clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Air-filled motors which do not have the superior heat dissipating capabilities of oil-filled motors shall not be considered equal.

The motor shall have two heavy duty ball bearings to support the pump shaft, taking radial and thrust loadings. Ball bearings shall be designed for a minimum 50,000 hours B-10 life. The shaft shall be stainless steel, threaded at the impeller.

The motor shall be capable of operating over the full range of the performance curve without overloading. Single phase motors shall have a heat sensor thermostat and overload attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 200 degrees F. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The thermostat shall automatically reset when the motor cools to a safe operating temperature.

Power Cord – The motor power cord shall be 16 AWG SJTOW, 20' length. The cable jacket shall be sealed at the motor entrance by means of a rubber compression washer with concentric ribbing. A compression fitting shall securely hold the cable jacket and compression grommet in place.

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KE(C)

1 HP EFFLUENT SERIES

High Head Effluent Pump for use in Multi-Pump Collection Systems and STEP Systems!

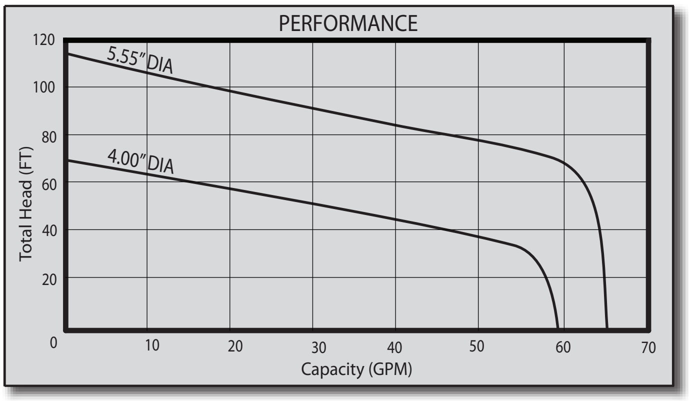
- **1 or 3 PHASE AVAILABLE**
- **RECESSED IMPELLER**
  - Reduces Pump Plugging
- **PERFORMANCE**
  - Up to 65 GPM
  - Up to 115 Feet Shutoff
- **SILICON CARBIDE DUAL SEALS**
  - Viton® Elastomers
- **NO CONTROL PANEL REQUIRED**
  - Internal Start Kit OPTION
- **PRESSED OIL-COOLED MOTOR**
  - Superior Heat Transfer
  - Long Bearing & Seal Life

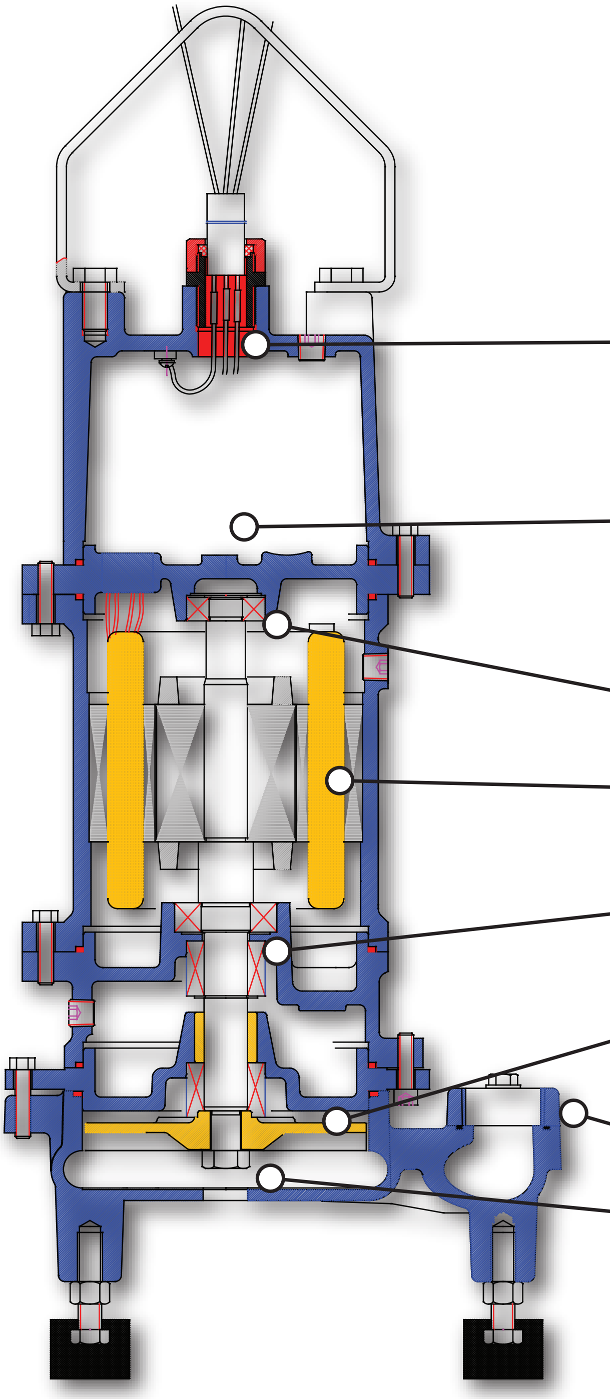
KEEN PUMP®

Features and Benefits

KE(C)

KE102 = 1 Phase, External Start Kit
KE102C = 1 Phase, Internal Start Kit
KE103 = 3 Phase





EPOXY-POTTED CORD ENTRY
- Triple-Barrier Moisture Protection

INTERNAL START KIT
- "C" Model No Panel Req'd

3-BEARING SUPPORT

HIGH-TORQUE MOTOR OIL-COOLED FOR SUPERIOR HEAT DISSIPATION

SUPERIOR DUAL MECHANICAL SEALS - SILICON CARBIDE w/ VITON® ELASTOMERS

RECESSED, VORTEX IMPELLER, DUCTILE IRON
- Allows 100% Performance Curve Operation

REMOVABLE 1-1/2" NPT DISCHARGE FLANGE

PASSES 3/4" SOLIDS

KEEN PUMP®

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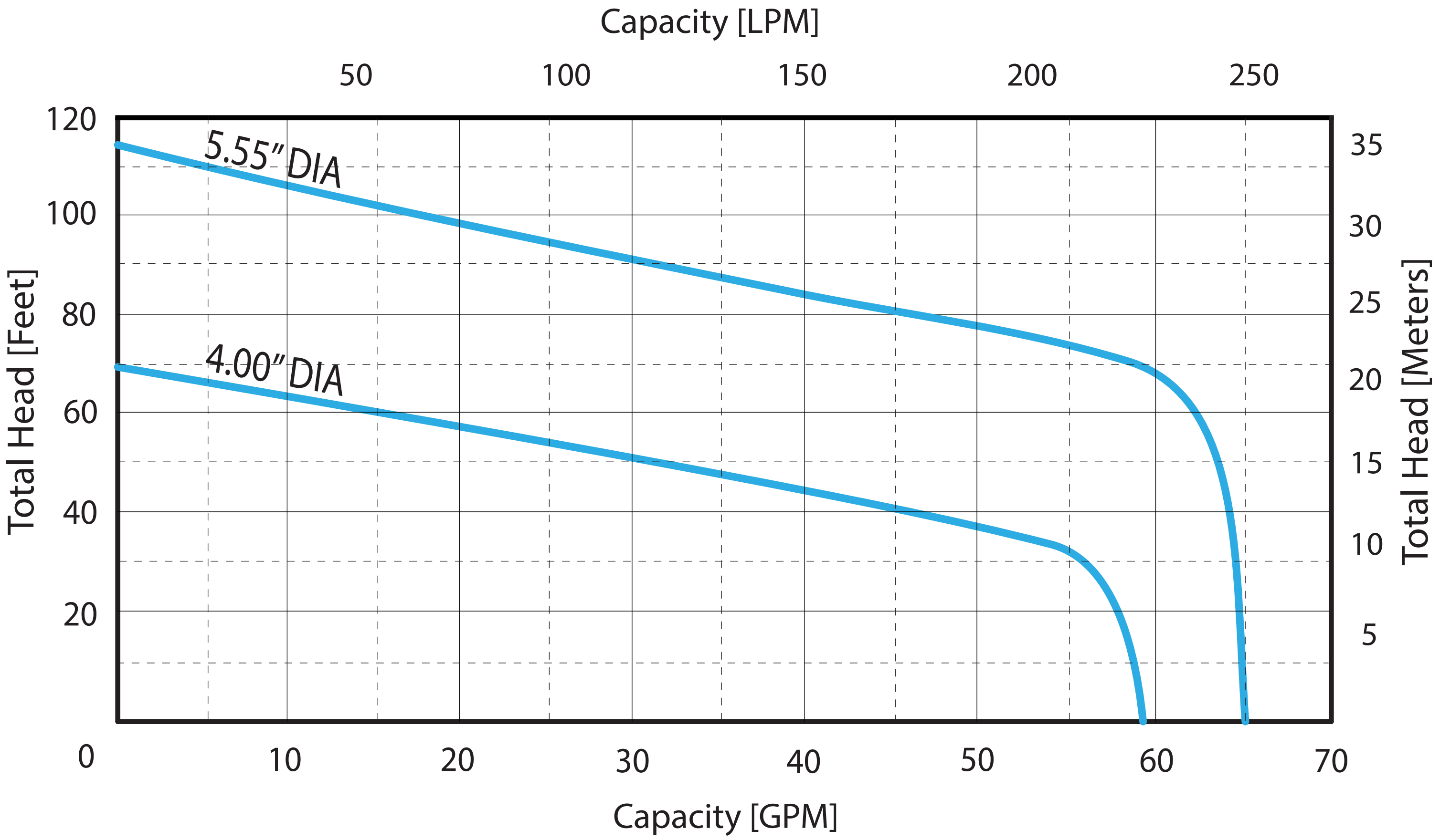
KC0099 07/2018

Section **EFFLUENT**
Date DEC 2016

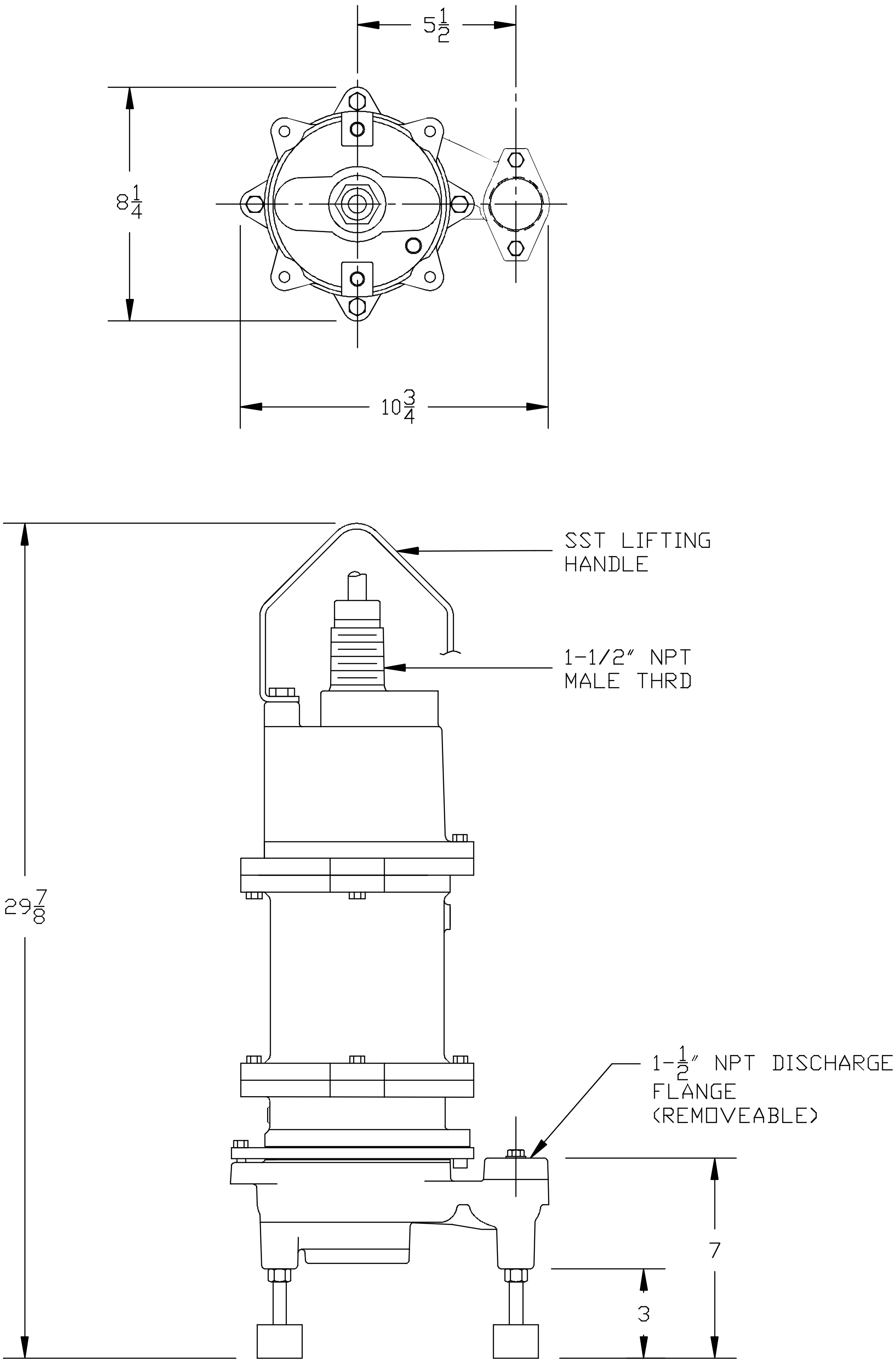
Pump Series	KE102 & 103	1HP RECESSED IMPELLER		
Speed	**3450 RPM**	Discharge	1-1/2"	**STANDARD FLOW**

GPM: ___________ TDH: ___________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

KC0100



KEEN PUMP COMPANY

KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805

PHONE: 419-207-9400
FAX: 419-207-8031

TITLE
KE102/103 1HP EFFLUENT PUMP DIMENSIONS

SCALE		DWG. #	REV.
NTS		KN-16	-
DWG. BY: SE	DATE: 10/02/12		

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE

Section EFFLUENT

Dated July 2018

Pump Model: **KE102(C), KE103**

Physical Data:

Discharge Size	1-1/2" NPT or 2-Bolt Flange Vertical
Impeller Type	Balanced, Recessed Vortex
Power/Control Cable Length	30' Standard
Paint	Blue, Waterborne Acrylic, High Build – (1) One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266ºF (130ºC)
Power Cord ("C" Pump)	12-3 SOOW - 600V, 90º C
Power Cord (1 Phase)	12-5 SOOW - 600V, 90º C
Power Cord (3 Phase)	14-7 SOOW - 600V, 90º C
Std. Third Party Approval	N/A

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35
Impeller	Ductile Iron, ASTM A536, Grade 65-45-12
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Sleeve Bearing	Bronze, Sintered

SPECIFICATIONS

1 HP Effluent Pump Model Nos. KE102(C), KE103

Pump Model – Pump shall be of the centrifugal type, model KE102, KE102C, or KE103 with submersible type motor. Model KE102C shall have internal start components (Start capacitor, Run Capacitor, Start switch). **Pumps not manufactured complete in the USA shall not be considered equal.**

Operating Conditions – The pump shall have a non-overloading maximum capacity of ___GPM, a maximum total dynamic head of ___ feet, and shall use a motor rated at 1 HP and 3450 RPM.

Construction – **All castings must be manufactured and supplied by a domestic source located in the USA.** Major pump components shall be of gray cast iron, ASTM A-48, Class 35, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry acrylic paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with O-rings, designed and constructed to meet FM3615 for Class 1, Division 1, Groups C & D standards. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides (rabbet joint construction) without the requirement of a specific torque limit. All elastomers shall be nitrile. **No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.**

Pump Impeller – Pump impeller shall be ductile iron and threaded onto a stainless steel shaft. The impeller shall be of the recessed vortex type to provide an unobstructed passage through the volute for any solid materials. Impeller must be dynamically balanced to specification ISO 1940G 6.3 standard.

Seals – Type 21, domestic manufactured, dual mechanical seal construction mounted in tandem shall protect the motor. Standard construction of primary seal shall be silicon / carbide with Viton® elastomers. Standard construction of secondary seal shall be silicon / carbide with Viton® elastomers. The seal face shall be lapped to a flatness of one light band. **Lip seal arrangements shall not be considered equal.** An **optional** electrode can be mounted in the seal chamber to detect water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop the motor, but shall act as a warning only, indicating service is required.

Motor – The pump motor construction shall be per NEMA MG-1 1.15 standard and shall be of the submersible type, rated 1 HP, 3450 RPM. The motor shall be for 60 Hz, 208 or 230 volt, single-phase operation. Three-phase operation shall be 208, 230 or 460 volt. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. Start & run capacitors, and starting switch for operating the motor will be found in the control box. Major motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class F insulation. **Any other construction shall not be considered equal**. The stator shall be pressed into the cast iron motor housing. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Maximum skin temperature of motor assembly shall not exceed a T-4 rating per FM3615 standards. **Any motor assembly T-code per FM3615 standard that exceeds a T-4 rating shall be considered not equal.**

Single-phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The overload shall automatically reset when the motor cools to a safe operating temperature.

Three-phase motors contain temperature sensors with (2) two wires for attachment to the control panel.

Internal Start Kit – For Model KE102C, Start/Run capacitors with start switch shall be securely positioned in a dry compartment. A total of (4) bolts quickly removes cord cap for easy servicing.

Bearings / Shaft - The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Bearings shall be designed to an ABEC® System 1 or better.
The upper bearing shall be a Conrad type, single row, deep groove ball bearing designed to adequately handle the required radial loads. The lower bearing shall be a single-row, deep groove ball bearing designed to adequately compensate for the axial loads and radial forces. Bearings shall be designed to deliver a minimum L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

Power Cord – The motor power cord shall be 12 Ga. Type SOOW, UL listed, CSA approved cable. The cable jacket shall be sealed at the motor entrance by means of an agency-approved rubber compression washer and compression nut. An epoxy-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. **Compression fittings with quick disconnect molded pins shall not be considered equal.** Cord shall withstand a pull strain to meet FM requirements.

KW-DS Series

2" / 3" Sewage Pumps

* Up to 2-1/2" Solids-Handling

* Superior Grit-Handling Capability

* Dual Mechanical Seals
  - Silicon Carbide (Lower)
  - Carbon Ceramic (Upper)

* 30' Power Cord
  - 115 & 230 Volt Molded Plug

* Dual Voltage Motors
  - 115 / 230 Volt, 1-Phase
  - 230 / 460 Volt, 3-Phase

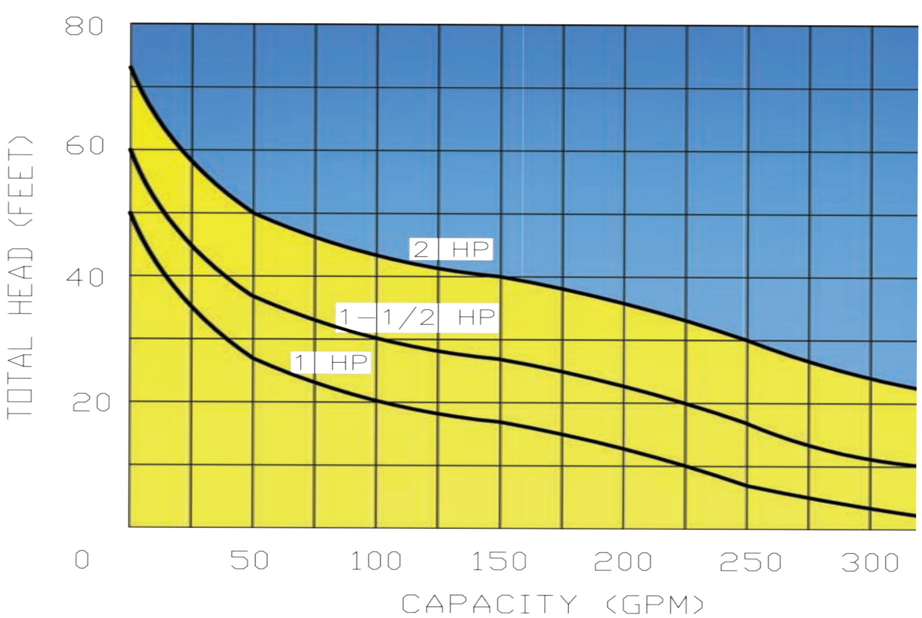
* Stainless Steel Shaft

* Automatic Models Available
  - 115 or 230 Volt Piggyback Float Switch

* Rugged, All Cast Iron Pump Construction

* 3" NPT Discharge
  - 3" x 2" NPT Reducer Bushing Included

* Strong Pump Performance



MODEL NUMBER

KW10M2-21	(1HP,	230V,	1PH)
KW10M2-23	(1HP,	230V,	3PH)
KW10M2-43	(1HP,	460V,	3PH)
KW15M2-21	(1.5HP,	230V,	1PH)
KW15M2-23	(1.5HP,	230V,	3PH)
KW15M2-43	(1.5HP,	460V,	3PH)
KW20M2-21	(2HP,	230V,	1PH)
KW20M2-23	(2HP,	230V,	3PH)
KW20M2-43	(2HP,	460V,	3PH)

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Your Premier Pump Choice

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KW-DS Series

2” / 3” Sewage Pumps

DISCHARGE	**3” NPT, 3” x 2” NPT Reducer**
LIQUID TEMPERATURE	**140° Degrees F. (Intermittent)**
DUAL SHAFT SEALS	**Mechanical Primary (Outboard)------ Silicon Carbide Secondary (Inboard)-- Carbon Ceramic 300 Series Stainless Steel Parts**
HARDWARE	**Buna-N® (Nitrile) Elastomer**
IMPELLER	**Cast Iron**
SOLIDS-HANDLING	**Up to 2-1/2” Diameter**
BEARINGS	**Ball Bearing, Upper & Lower Oil-Lubricated**
POWER CORD	**30’ Lengths (Standard) with Plug**
MOTOR	**Single Phase (115 / 208 / 230 Volt) 1hp / 1.5 hp Single Phase (208 / 230 Volt) 1hp / 1.5hp / 2hp / 3hp Three Phase (230 / 460 Volt) 1.5hp / 2hp**
MOTOR HOUSING	**Cast Iron, ASTM A-48, Class 30**
SHAFT	**Stainless Steel**
SEAL PLATE	**Cast Iron, ASTM A-48, Class 30**
VOLUTE	**Cast Iron, ASTM A-48, Class 30**
HARDWARE	**300 Series Stainless Steel**
SQUARE RINGS	**Buna-N® (Nitrile)**

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Your Premier Pump Choice

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KW-DS Series

2" / 3" Sewage Pumps

Product Specifications

Pump Model – Pump shall be of the submersible centrifugal type, ___ HP KEEN KW_______-DS Series. The pump shall easily pass 2-1/2" diameter solids through the pump end without jamming and exit through the 3" NPT / 2" reducer bushing discharge.

Operating Conditions – The pump shall have a capacity of _______ GPM at a total head of _________ feet, and shall use a motor rated at ___ HP and 3450 RPM.

Pump Impeller – Cast iron, dynamically balanced and keyed on a stainless steel shaft. The impeller shall be of the enclosed, 2-vane type.

Pump Housing Construction – All components of the pump construction (cord cap, motor housing, seal plate, volute) shall be cast iron, ASTM A-48, Class 30. There shall not be any composite materials used for any pump components.

Dual Mechanical Seals – The motor shall be protected by dual mechanical, Type 21 shaft seals. The primary (lower) seal shall be silicon carbide. The secondary (upper) seal shall be carbon ceramic. The seal faces shall be lapped to a flatness of one light band. All hardware shall be stainless steel. The elastomer materials shall be Buna-N.

Motor – The pump motor shall be of the submersible type, rated ____ HP, 3450 RPM. The motor shall be for 60 Hz, ____ volt, _____ phase operation. For single phase, the motor shall be of the permanent split capacitor design with an internal start capacitor for high starting torque. Motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class B insulation. Winding housing shall be filled with a clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Air-filled motors which do not have the superior heat dissipating capabilities of oil-filled motors shall not be considered equal.

The motor shall have two heavy duty ball bearings to support the pump shaft, taking radial and thrust loadings. Ball bearings shall be designed for a minimum 50,000 hours B-10 life. The stator shall be pressed into the motor housing. The shaft shall be hardened steel, keyed at the impeller.

The motor shall be capable of operating over the full range of the performance curve without overloading. Single phase motors shall have a heat sensor thermostat and overload attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 200 degrees F. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The thermostat shall automatically reset when the motor cools to a safe operating temperature.

Power Cord – The motor power cord shall be 12 AWG-3 (single phase) and 12AWG-4 (three phase. Cable length shall be 30'. The cable jacket shall be sealed at the motor entrance by means of a rubber compression washer with concentric ribbing. A stainless steel compression fitting shall securely hold the cable jacket and compression grommet in place.

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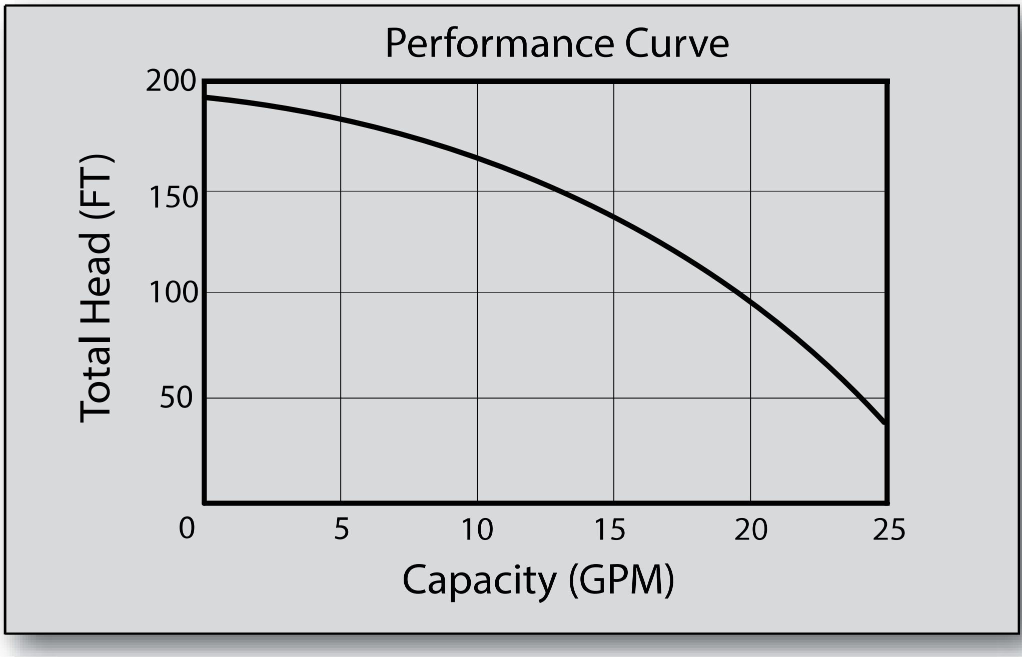
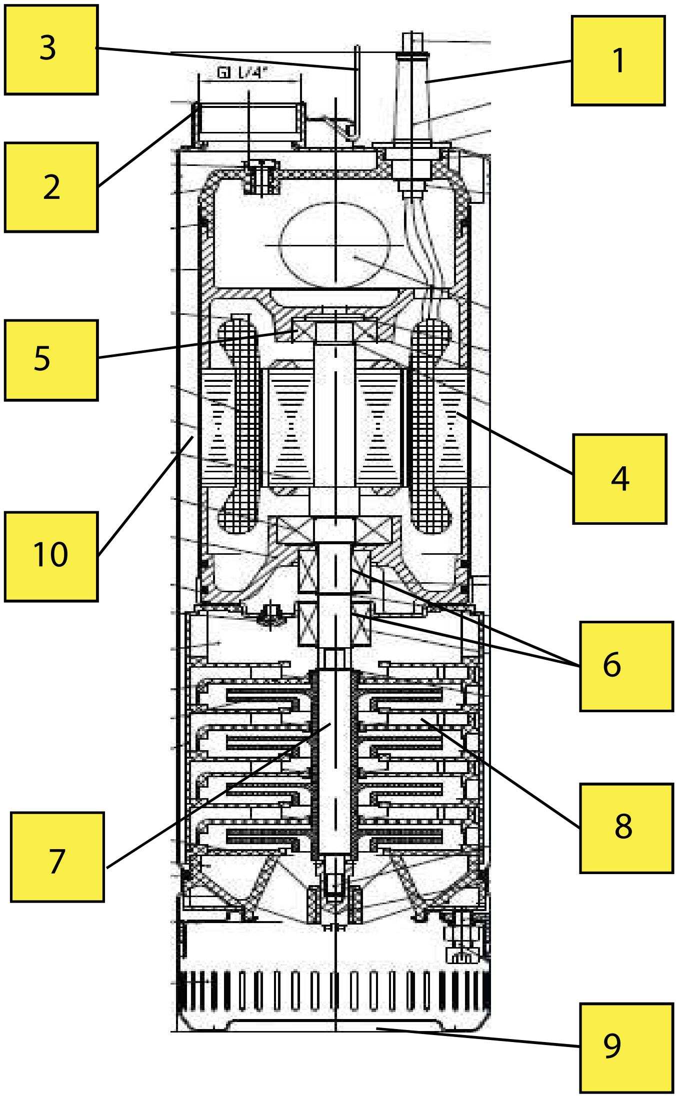
KWSE5

1/2 HP High Head Effluent Pump

- Avaliable In 115 or 230 Volt Versions
  - KWSE5-11 (115v)
  - KWSE5-21 (230v)
- Stainless Steel Construction
  - Top Discharge Head
  - Shell
  - Bottom Suction
- One Piece Design
- Removable Suction Screen for Easy Cleaning
- Standard 10ft Power Cord



KWSE5 Features and Benefits



1. Power Cord - 10 Ft. Standard
2. Discahrge Head - Stainless Steel 1-1/4" NPT
3. Lift Handle -Stainless Steel
4. Motor - Air Filled, Water Cooled, Thermal Overload Protection
5. Bearings - Upper and Lower for Maximum Shaft Support
6. Shaft Seals - Double Mechanical Seal System, Silicon Carbide for Grit Resistance
7. Shaft - One Piece Stainless Steel
8. Pump Staging - Multi-Stage for Higher Pressure. High Impact/Temperature/ Chemical Resistant, Glass Reinforced Resin
9. Inlet - All Stainless Steel Construction Removeable for Easy Cleaning
10. Internal Water Passageway - Flows Past Motor, Keeps Motor Cool

Pump Specifications

KWSE5-11, 115 Volt, 10.5 Amps

KWSE-21, 230 Volts, 6.5 Amps

Weight: 34 LBS

Height: 21-1/2 Inches

Diameter: 5 Inches

Discharge: 1-1/4 NPT

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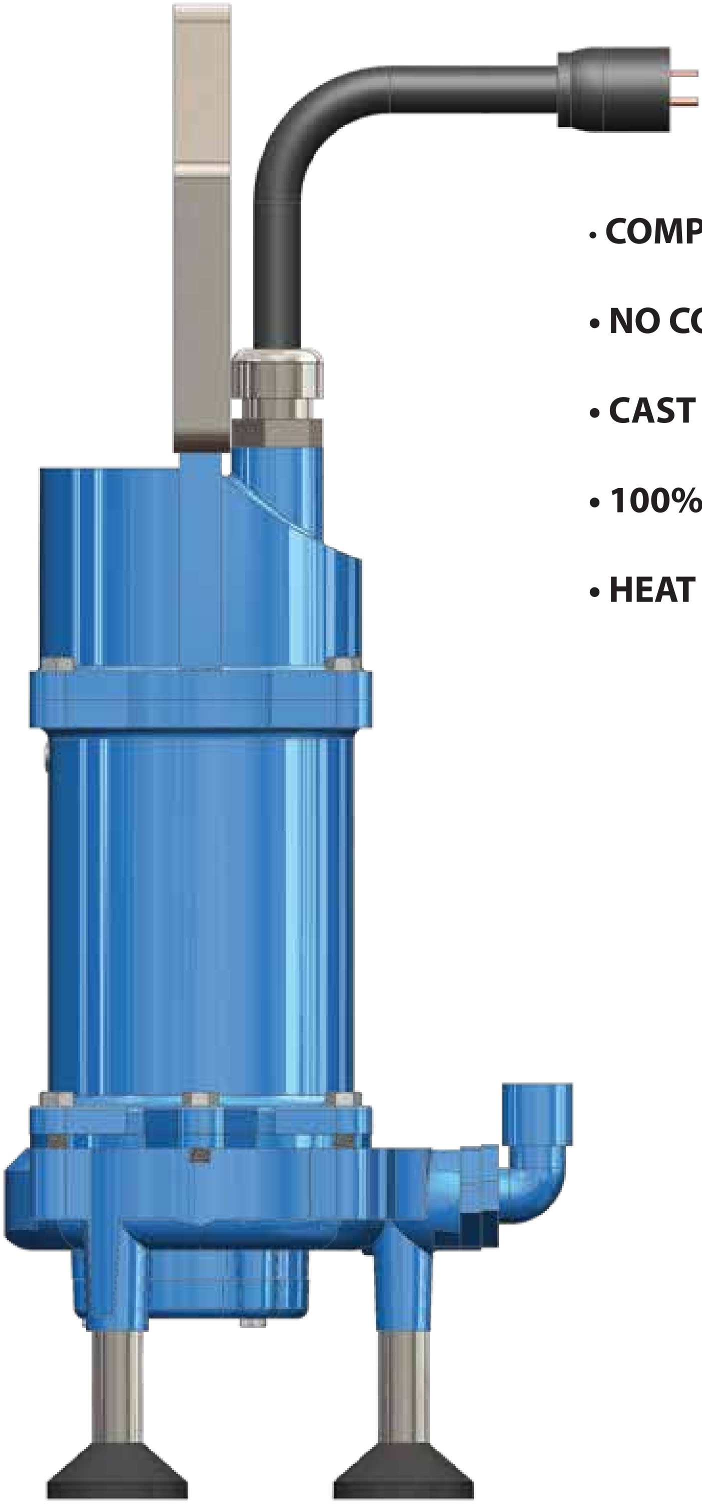
RKG15-11

CENTRIGUGAL GRINDER SERIES



- COMPACT DESIGN EASILY FITS INTO ANY STATION
- NO CONTROL PANEL REQUIRED TO OPERATE PUMP
- CAST IRON PUMP CONSTRUCTION
- 100% SOLID STAINLESS STEEL GRINDER PARTS
- HEAT TREATED AND HARDENED FOR LONG LIFE

Radial Slicer

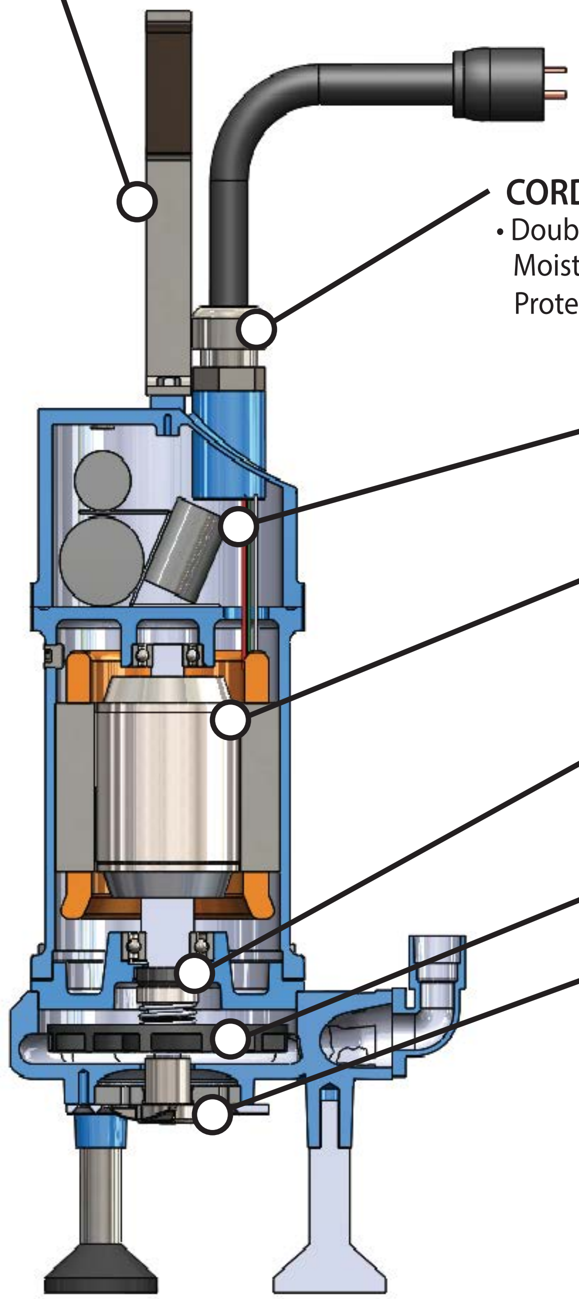
KEEN PUMP®

Features and Benefits

RKG15-11

POWERFUL PERFORMANCE

PRESSURE	FLOW
0 PSI	30 GPM
10 PSI	27 GPM
20 PSI	25 GPM
30 PSI	10 GPM
33 PSI	5 GPM



Convenient stainless steel lifting handle

CORD ENTRY
- Double -Barrier Moisture Protection

INTERNAL START KIT
-No control panel required

HIGH-TORQUE MOTOR OIL-COOLED FOR SUPERIOR HEAT DISSIPATION

SUPERIOR SINGLE MECHANICAL SEAL-
SILICON CARBIDE w/VITON ELASTOMERS

RECESSED, VORTEX DUCTILE IRON IMPELLER

ADVANCED CUTTING SYSTEM
- Highly Efficient Solids-Slicing
- User-Friendly Field Service
- Hardened Stainless Steel

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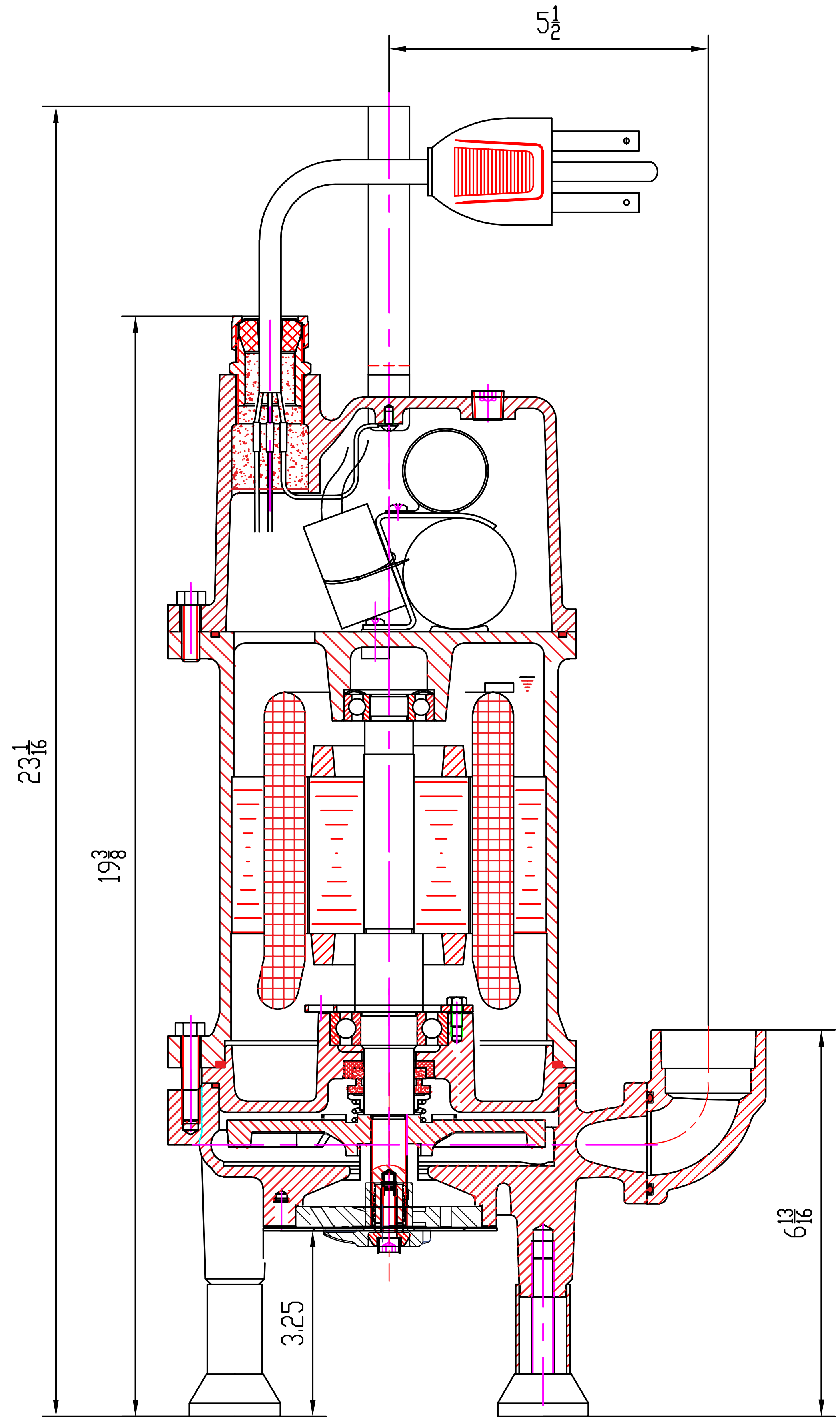

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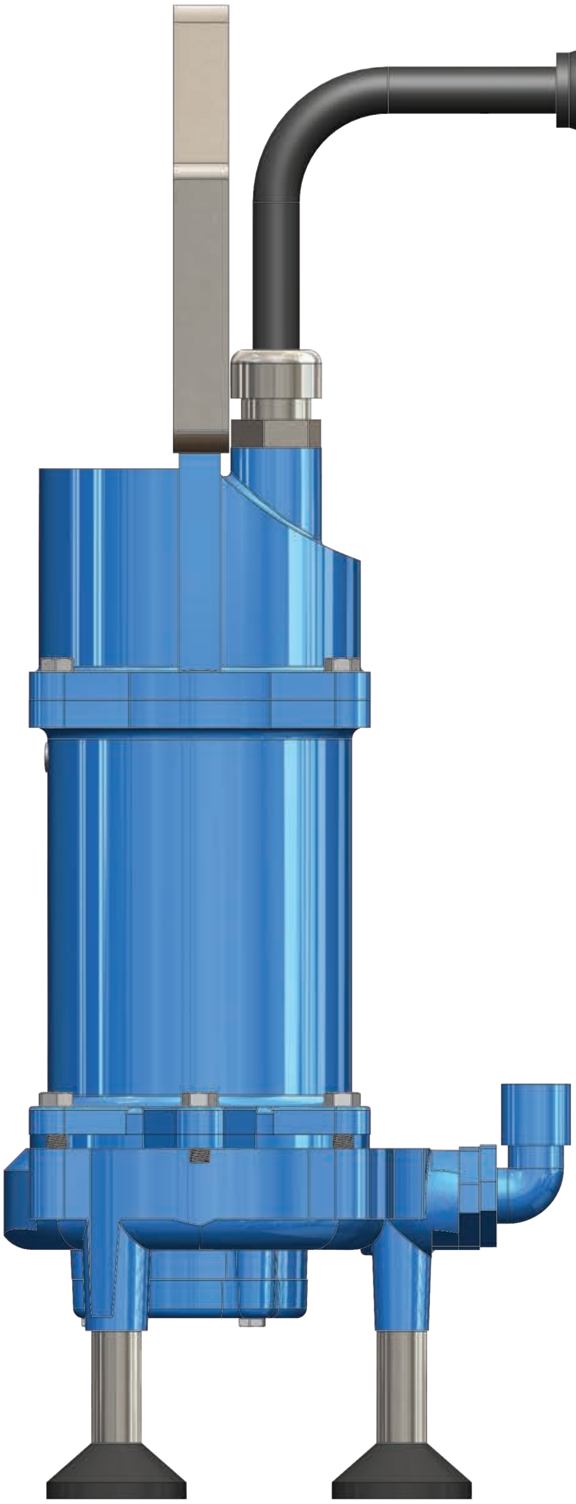
TITLE RKG15-21(C) RKG15-11 DIMENSIONS			
SCALE NTS		DWG. # RKG15_DIM	REV. –
DWG. BY WS	DATE 4/8/21		

RKG15-21C

CENTRIGUGAL GRINDER SERIES



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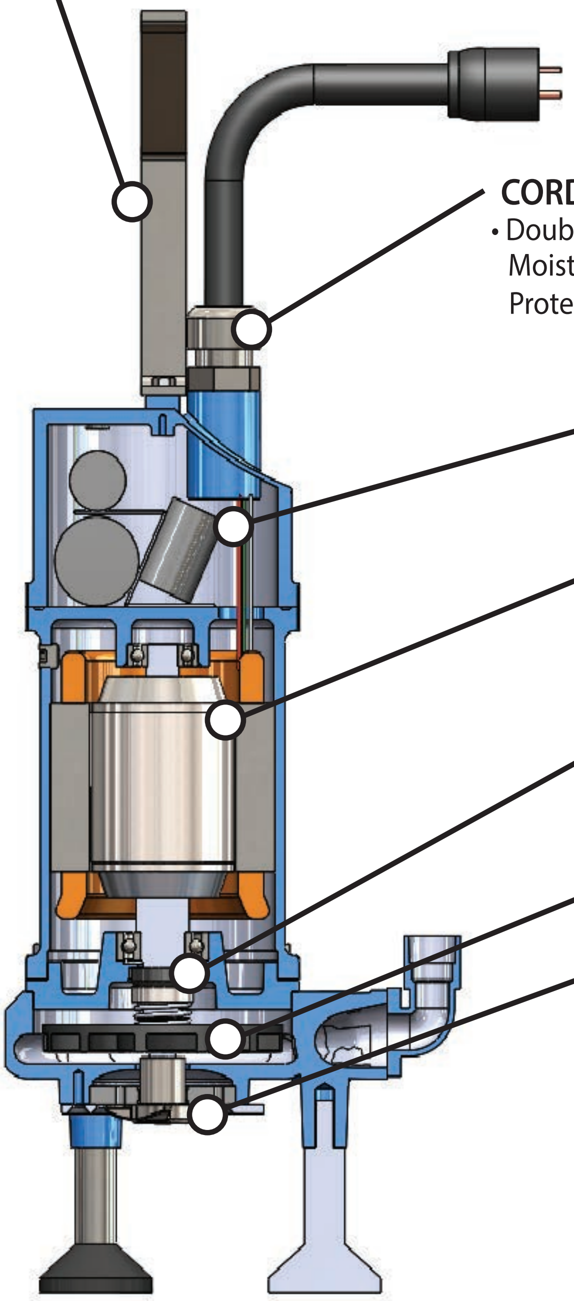
Radial Slicer

Features and Benefits

RKG15-21C

POWERFUL PERFORMANCE

PRESSURE	FLOW
0 PSI	35 GPM
10 PSI	33 GPM
20 PSI	32 GPM
30 PSI	30 GPM
40 PSI	20 GPM
50 PSI	5 GPM



Convenient stainless steel lifting handle

CORD ENTRY
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INTERNAL START KIT
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RKG15-21C 09/2019

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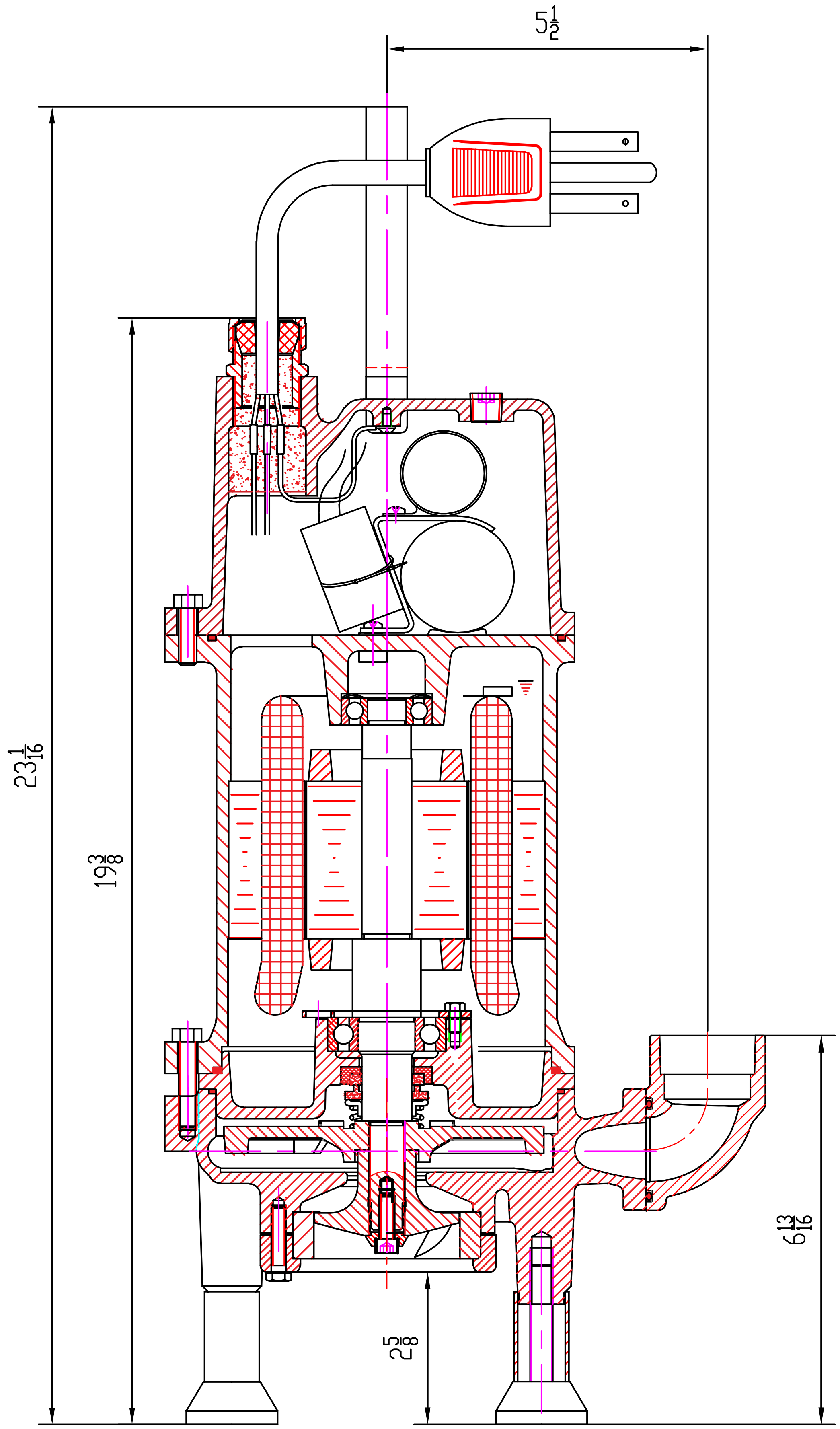

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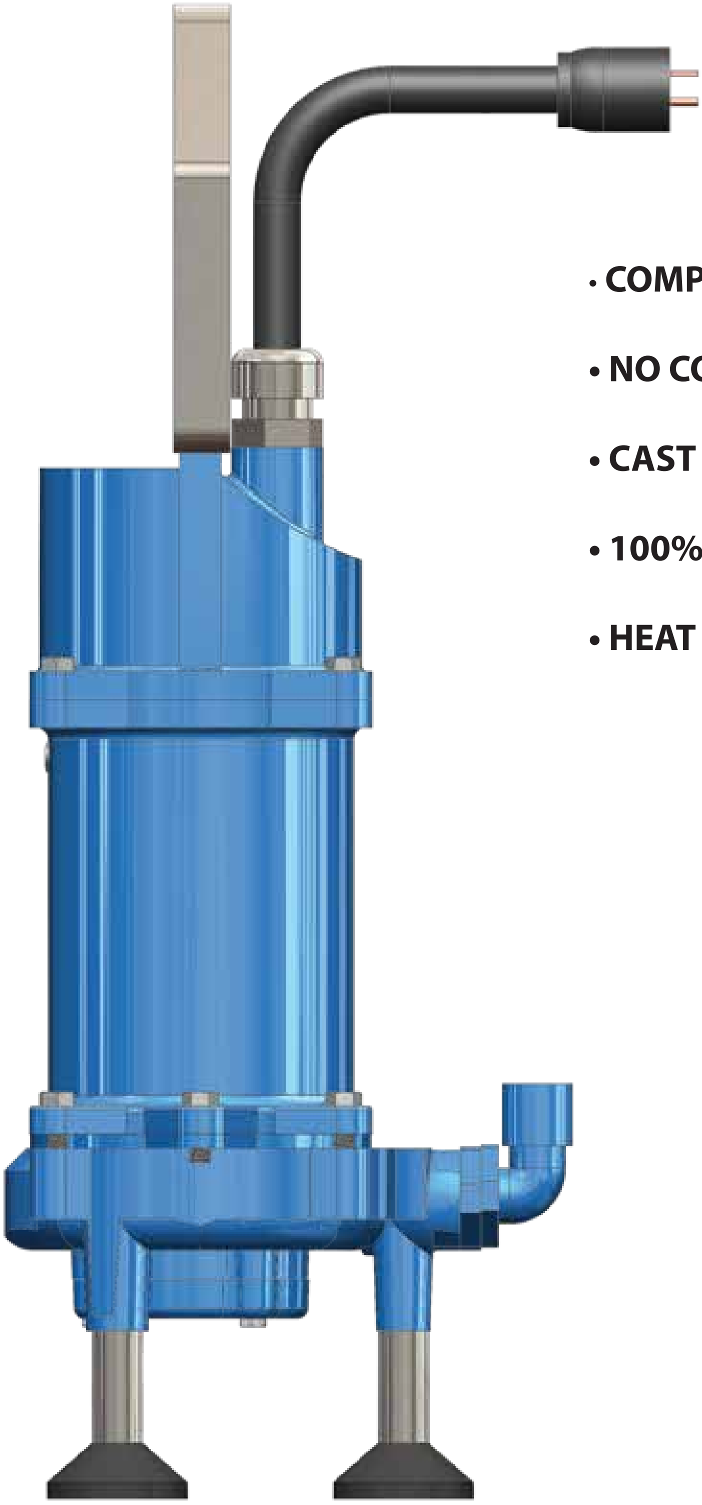
DWG. BY WS	DATE 4/8/21		

RKG15-21YC

CENTRIGUGAL GRINDER SERIES
50 HERTZ MOTOR



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Radial Slicer

KEEN PUMP®

Features and Benefits

RKG15-21YC

POWERFUL PERFORMANCE

PRESSURE	FLOW
0 PSI	35 GPM
10 PSI	33 GPM
20 PSI	32 GPM
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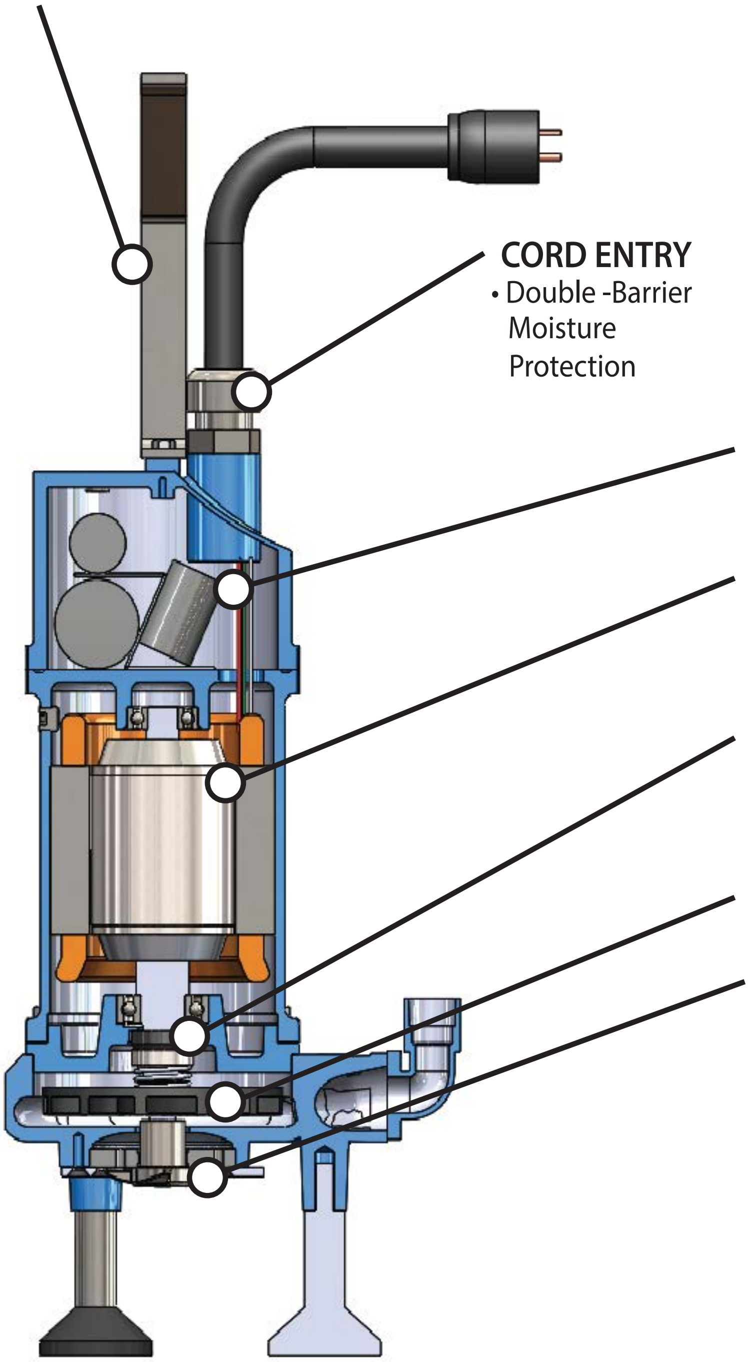

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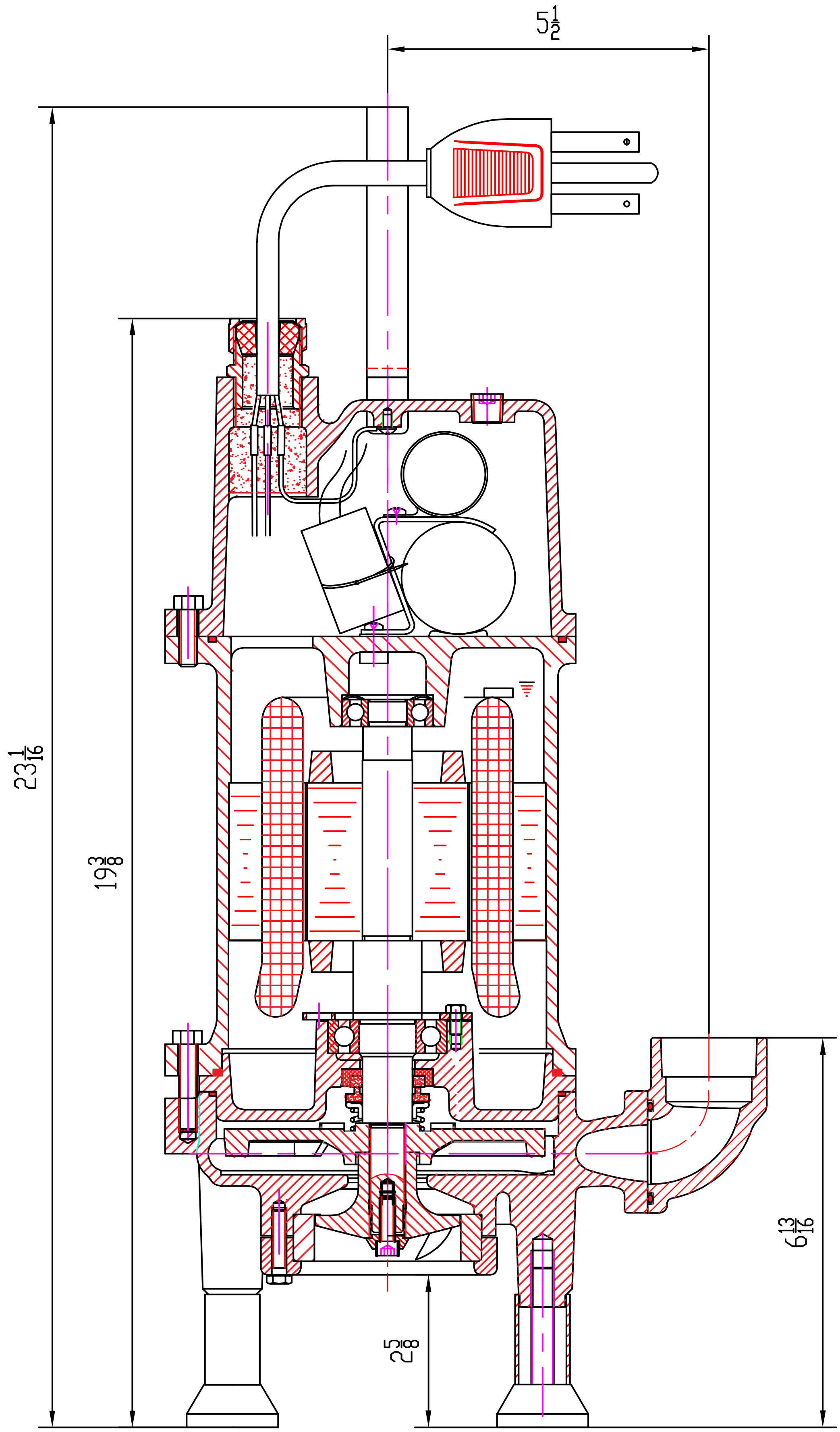

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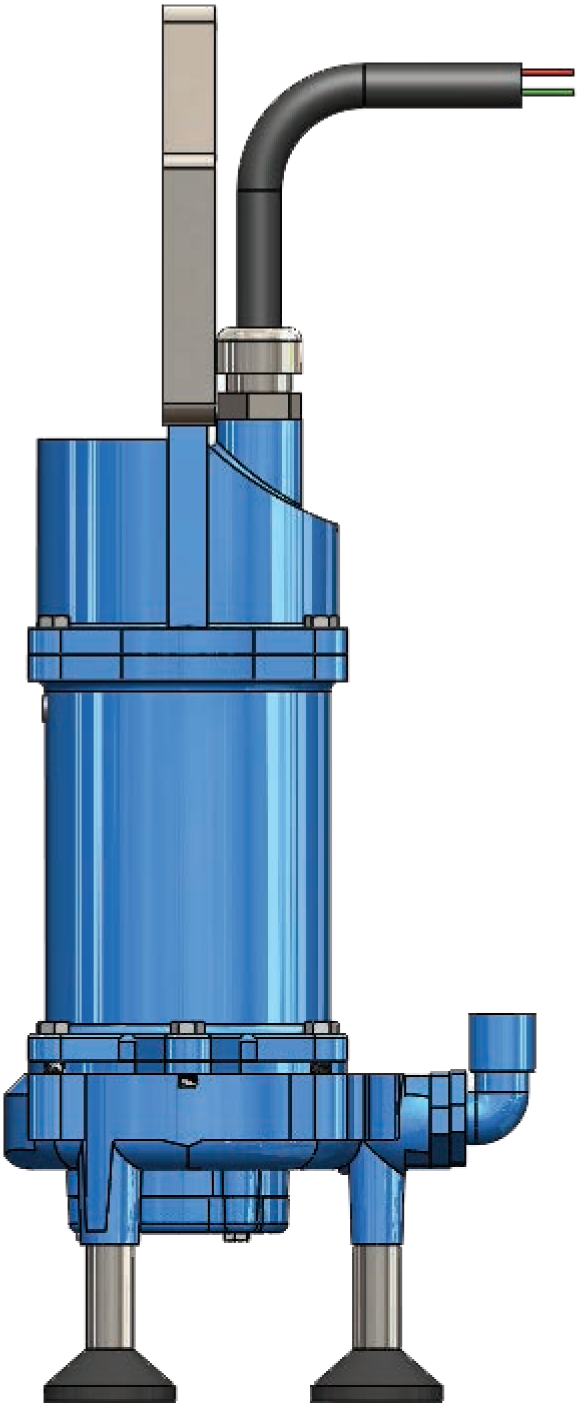
RKG15-21

CENTRIGUGAL GRINDER SERIES



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- 100% SOLID STAINLESS STEEL GRINDER PARTS
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"Radial" Cutter
(STANDARD)

KEEN PUMP®

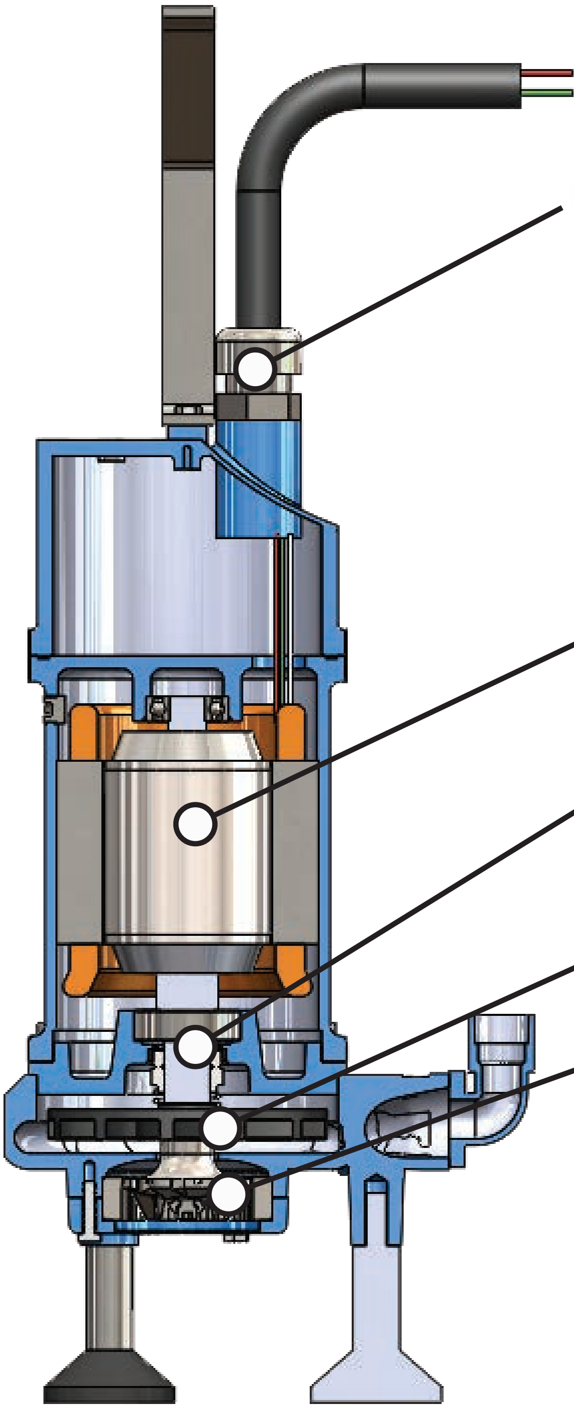
Features and Benefits

RKG15-21

POWERFUL PERFORMANCE

PRESSURE	FLOW
0 PSI	35 GPM
10 PSI	33 GPM
20 PSI	32 GPM
30 PSI	30 GPM
40 PSI	20 GPM
50 PSI	5 GPM

Convenient stainless steel lifting handle



CORD ENTRY
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SUPERIOR DUAL MECHANICAL SEALS - SILICON CARBIDE w/ VITON ELASTOMERS w/ BACK-UP SEAL

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- Highly Efficient Solids-Slicing
- User-Friendly Field Service
- Hardened Stainless Steel

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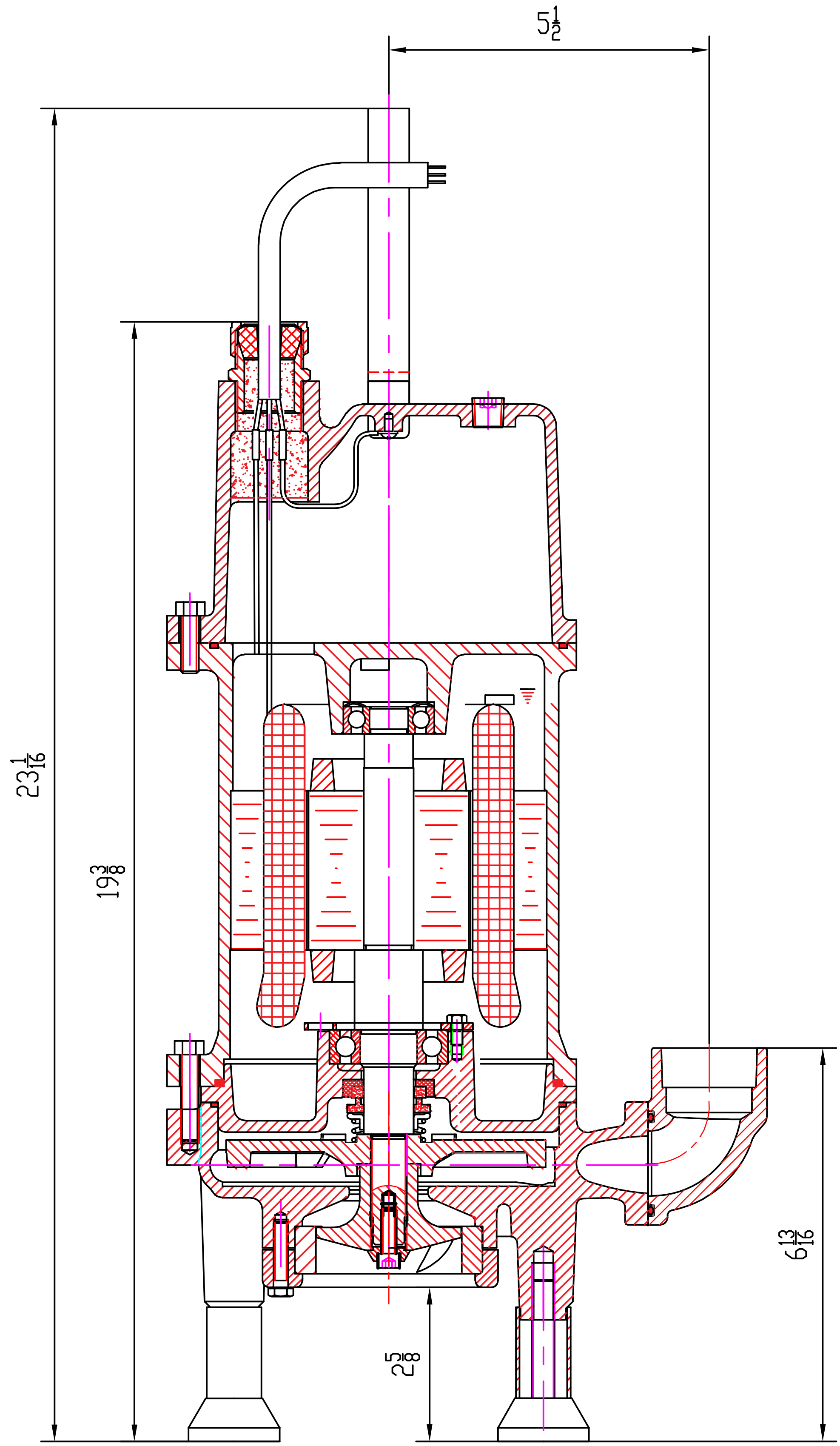

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TITLE RKG15-21 DIMENSIONS		
SCALE NTS	DWG. # RKG15-21_DIM	REV. -
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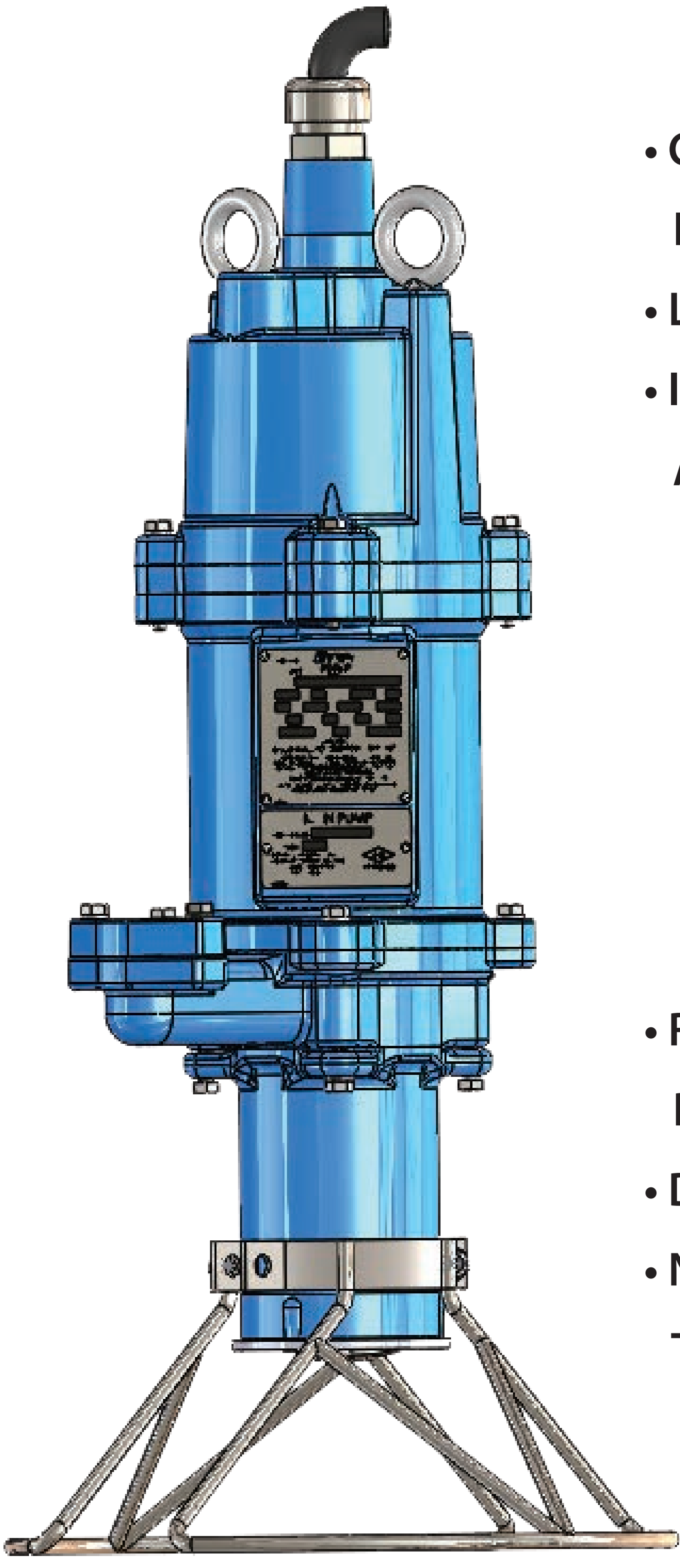
EPCG15-21C(SL)

CENTRIGUGAL GRINDER SERIES



- COMPACT DESIGN FOR EASY INSTALLATION IN ANY STATION
- LIGHT WEIGHT FOR EASY HANDLING
- INDUSTRY BEST STAINLESS STEEL GRINDER ASSEMBLY FOR DEPENDABLE SERVICE

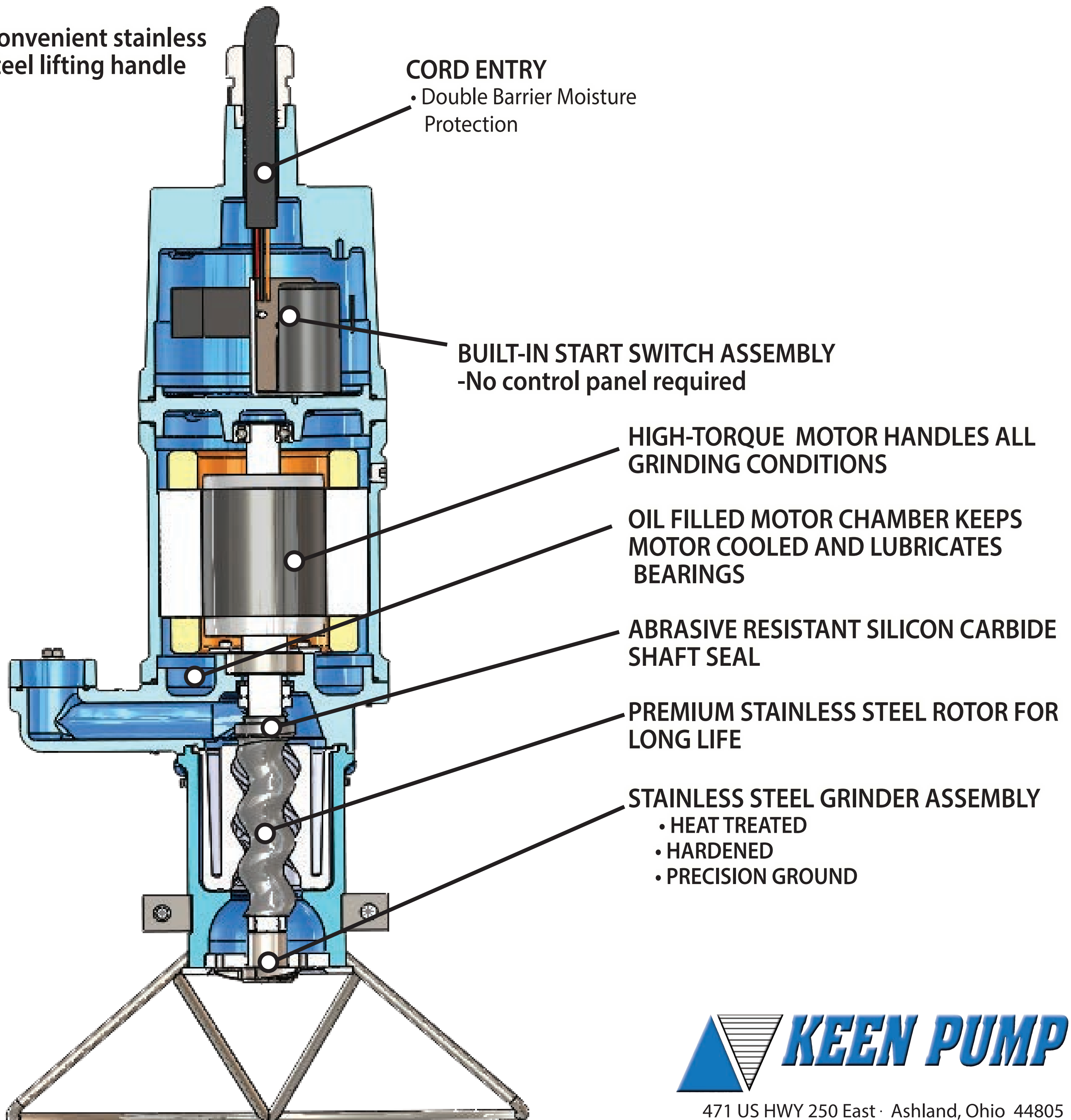
Slicer-Cutter

- RUGGED HIGH-TENSILE IRON PUMP CONSTRUCTION
- DEPENDABLE 50-YEAR PROVEN DESIGN
- NO CONTROL PANEL REQUIRED TO OPERATE THE PUMP

KEEN PUMP®

Features and Benefits

EPCG15-21C(SL)



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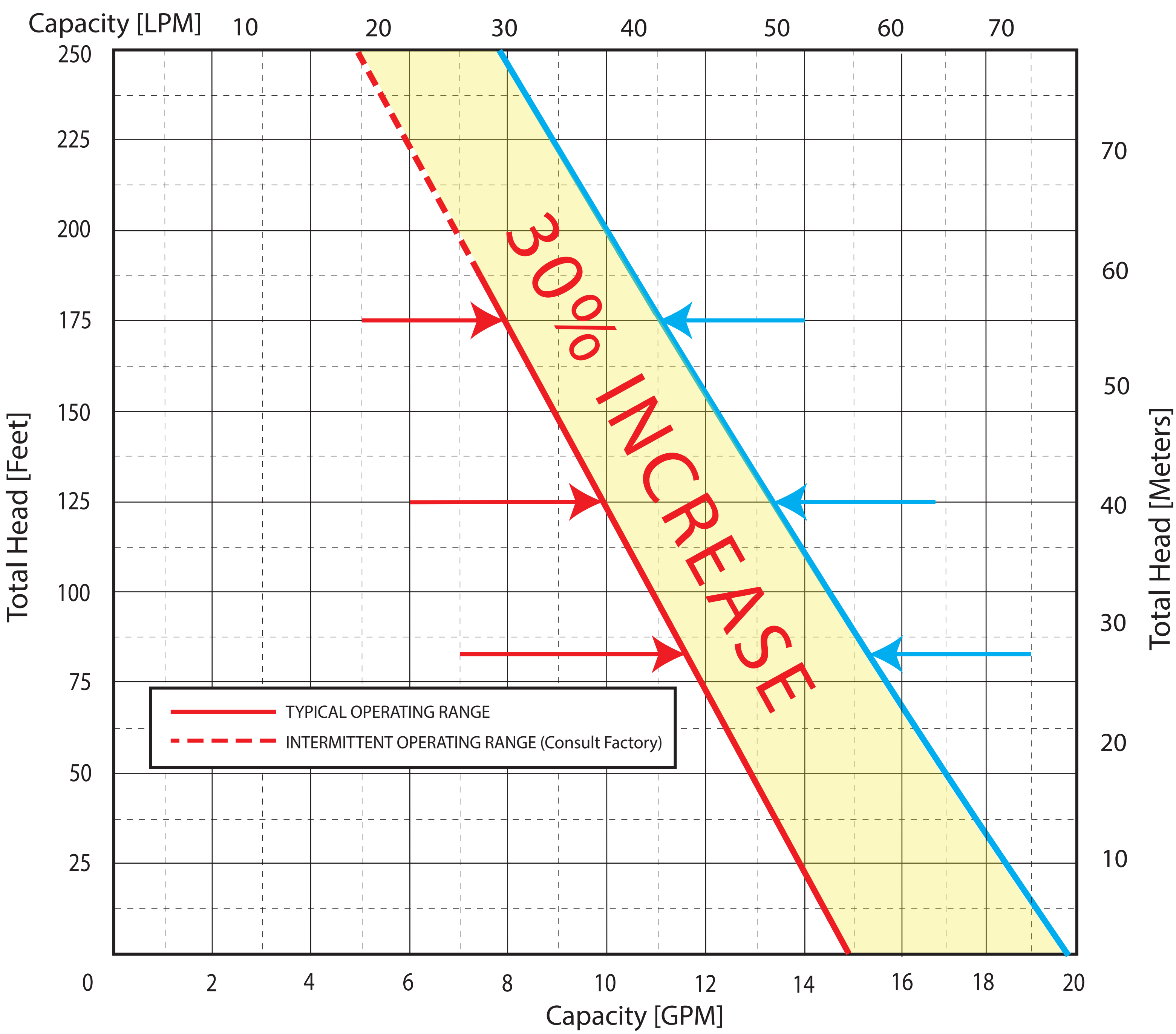
Quality product done FIRST, done RIGHT, done BEST

-New Keen Performance

-Competitor and Prior Performance for Keen Pump

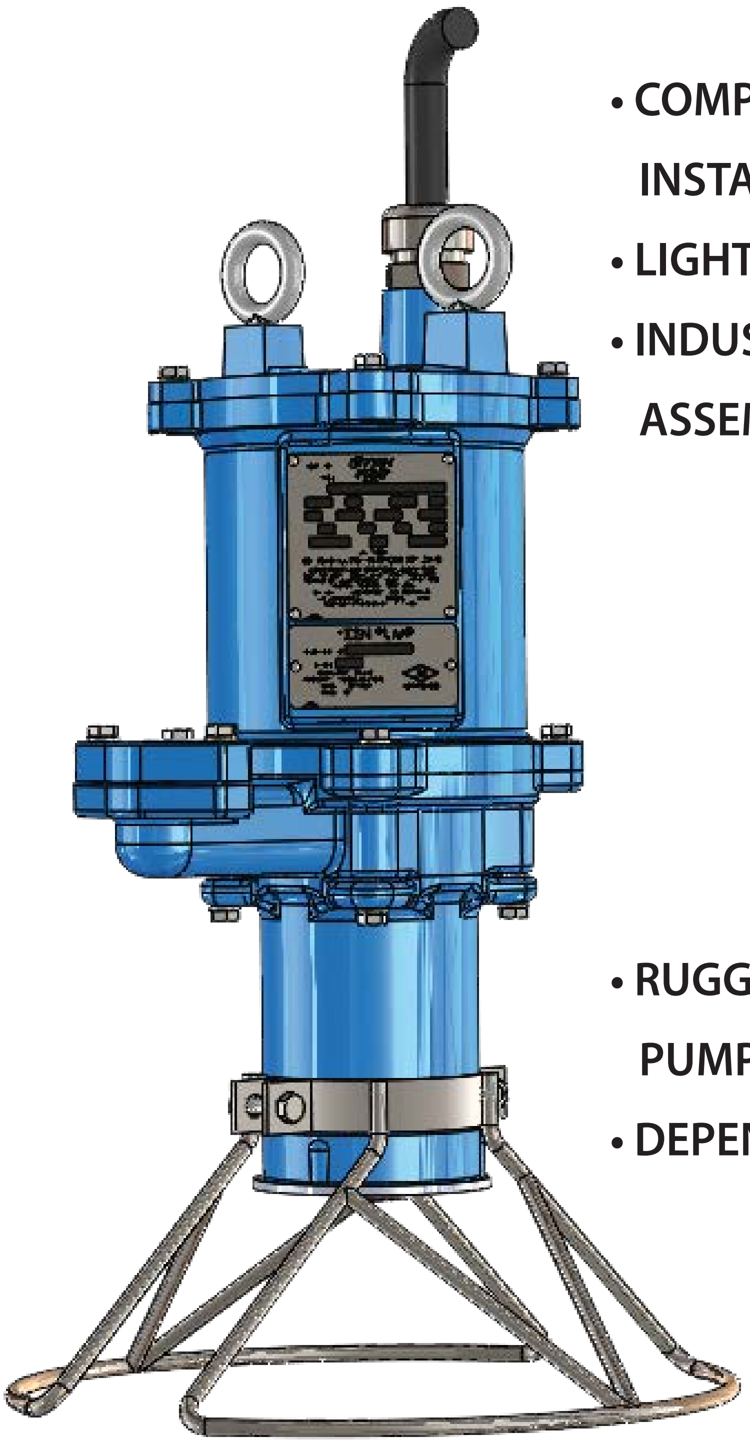
Pump Series	EPCG15-21C(SL)	1HP PROGRESSIVE CAVITY GRINDER		
Speed	1750 RPM	Discharge	1-1/4"	



KEEN PUMP

EPCG15-21(SL)

CENTRIGUGAL GRINDER SERIES



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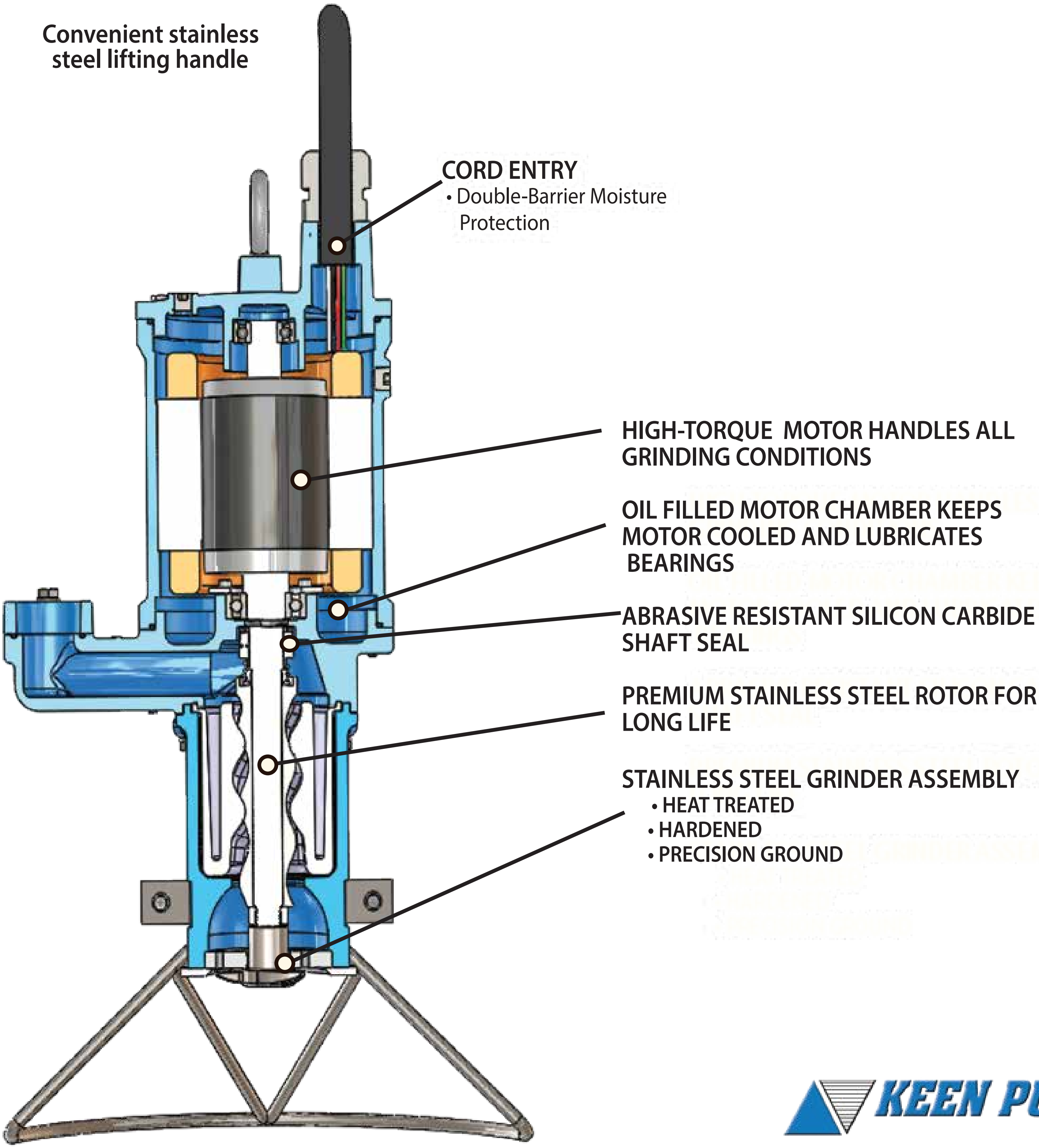
Features and Benefits

EPCG15-21(SL)



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EPCG15-21 09/2019

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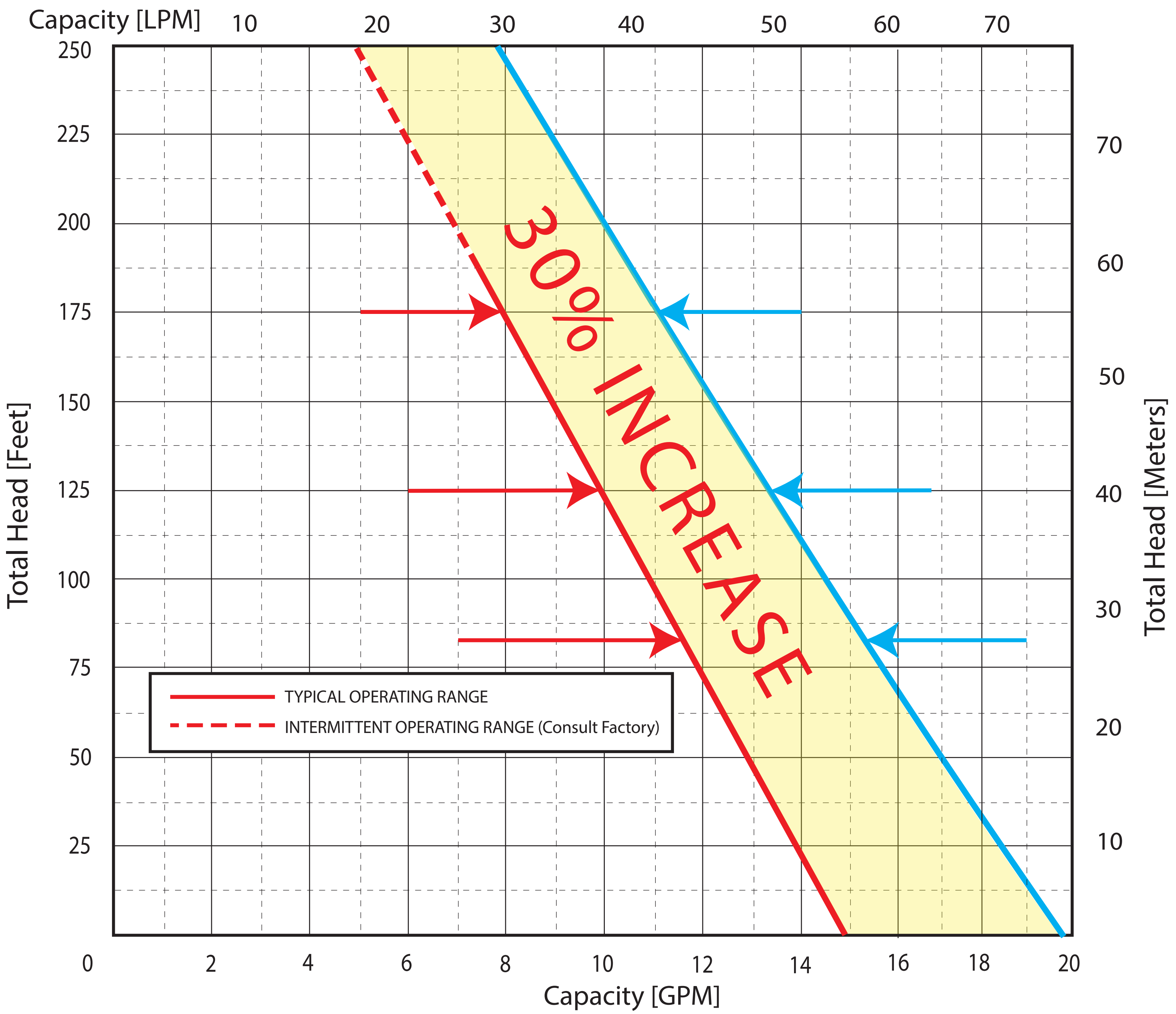
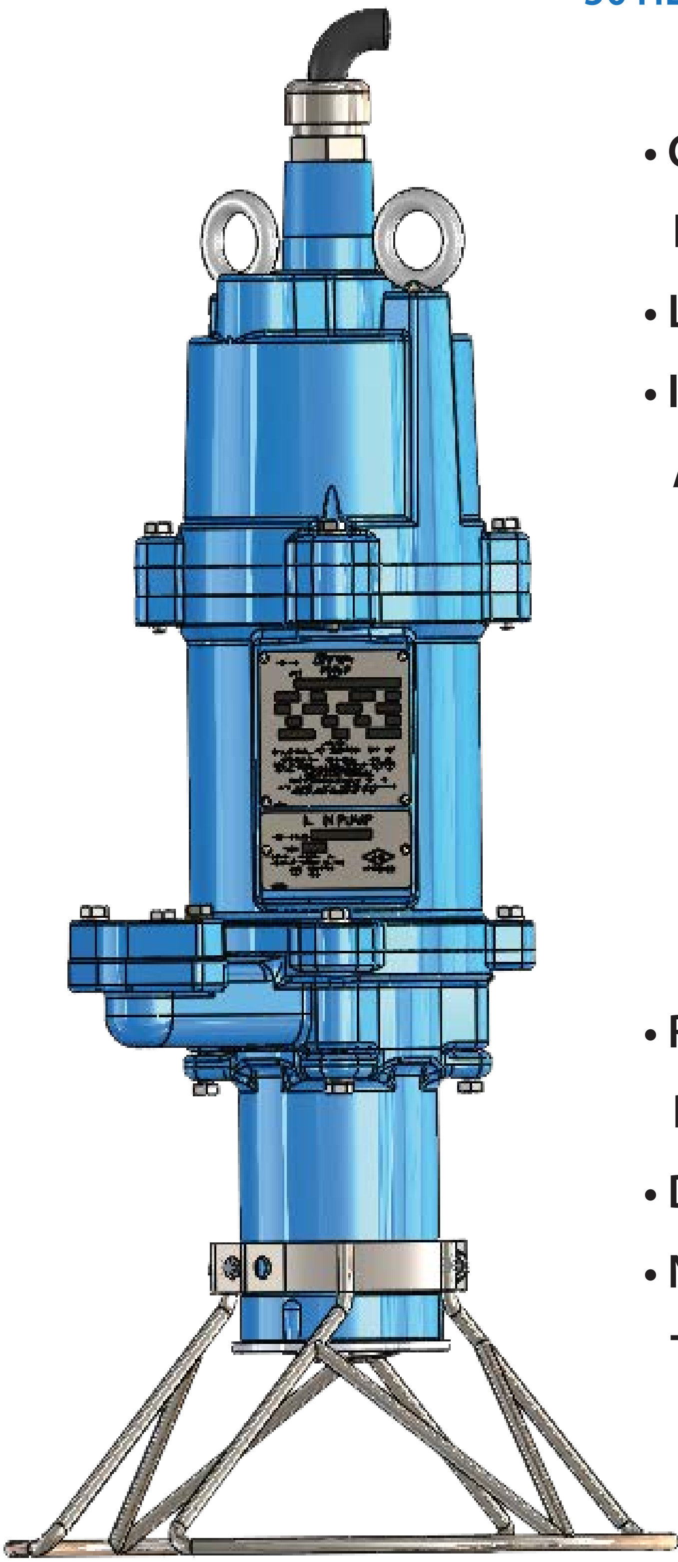


KEEN PUMP

EPCG15-21YC(SL)

CENTRIGUGAL GRINDER SERIES
50 HERTZ MOTOR



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Slicer-Cutter

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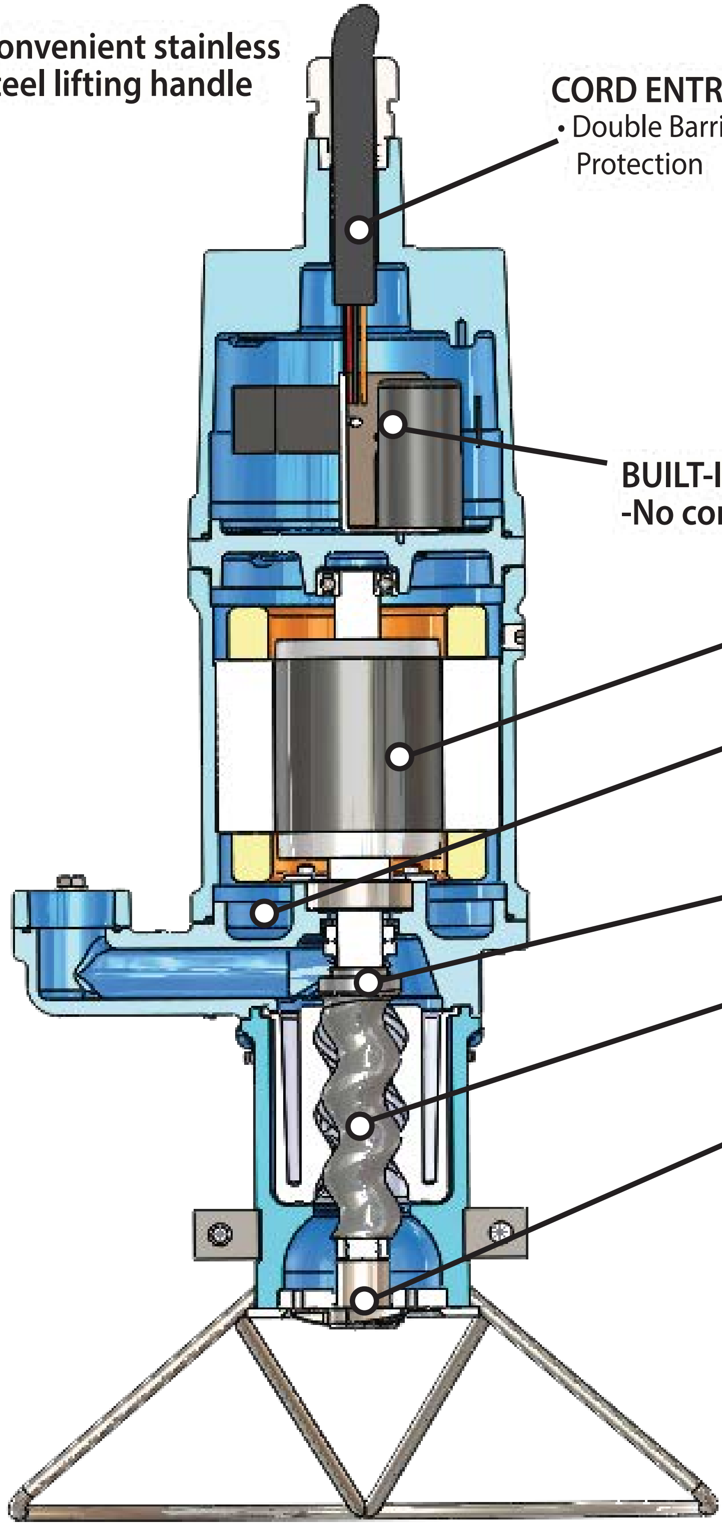
- DEPENDABLE 50-YEAR PROVEN DESIGN
- NO CONTROL PANEL REQUIRED TO OPERATE THE PUMP

KEEN PUMP®

Features and Benefits

EPCG15-21YC(SL)



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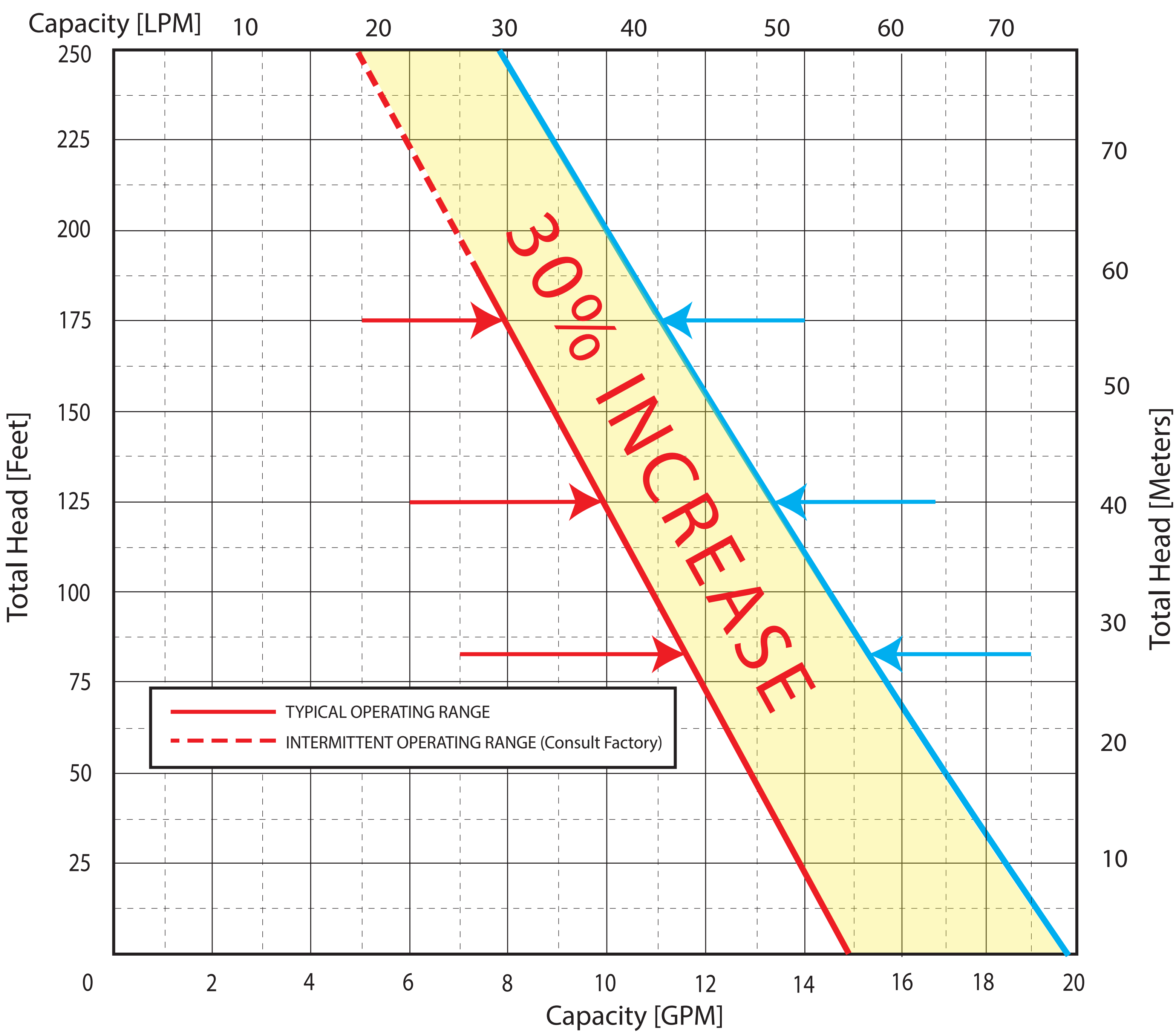

"The **KEEN PUMP DIFFERENCE** is dedication to the highest quality of product and service in our industry along with the best customer care delivered with a sense of warmth, friendliness, individual pride, and company spirit"

KEEN PUMP

KEEN PUMP Grinder Models

Pump Model	HP	Voltage	Phase	Max. Flow (GPM)	Max. Head (TDH)
KPLCG2	1	208/230	1	20	185*
KPCG-21(C)	1	208/230	1	20	185*
KG2-115	2	115	1	20	90
KG2-C	2	208/240	1	47	106
RKG	2	115/230	1	35	115
LCG2	2	208/240	1	47	106
KG2	2	208/240/460	1 or 3	47	106
KFG2	2	208/240/460	1 or 3	68	95
KGS2	2	208/240/460	1 or 3	48	146
KHGS2	2	208/240/460	1 or 3	22	188
KHHG2	2.5	208/240/460	1 or 3	30	160
KHHG2H	2.5	208/240/460	1 or 3	28	225
KG3, 5	3-5	208/230	1 or 3	190	85
KHG3, 5, 7	3-7.5	208/230	1 or 3	108	172
KG10	10	208/230	3	190	160
KGP75	7.5	230/460	3	160	148
KGP100	10	230/460	3	160	188
KGP150	15	230/460	3	160	225

* Maximum Head based on Standard Operating Range
- Add "SL" to Model Number for SLICER Cutters
- (C) Internal Capacitors
- All Models Centrifugal Design EXCEPT KPCG (Progressive Cavity)
- Listed FM3615 for Class 1, Div. 1, Groups C & D Hazardous Locations

KEEN PUMP Designs Your Complete Pump Station

- Custom Engineered
- Unmatched Delivery
- Best Customer Service/Technical Support

KEEN PUMP®

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"KPCG"
1hp Progressive Cavity

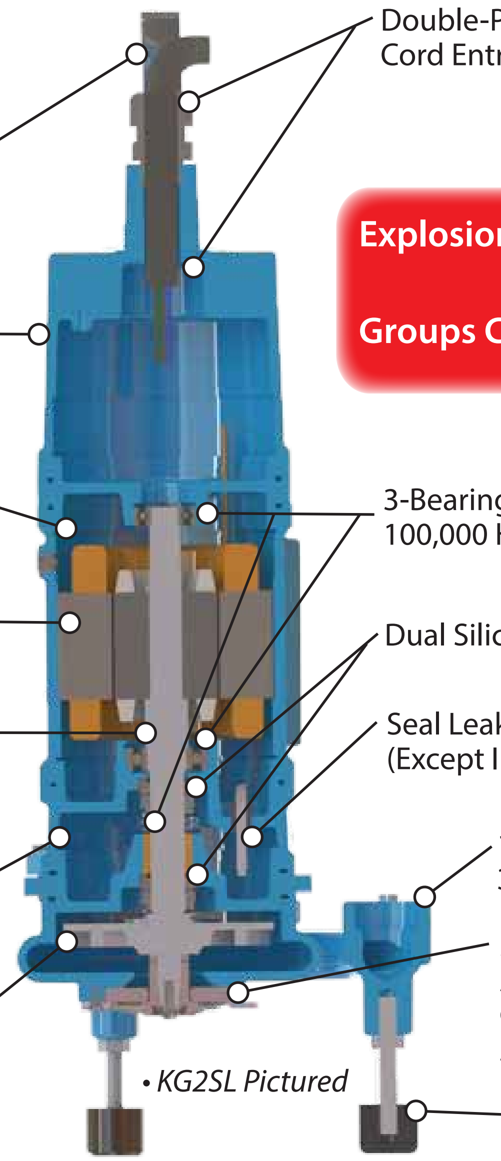
"KG2"
2hp Centrifugal

"RKG"
2hp Centrifugal

Submersible Sewage GRINDERS

K0003 04/22

KEEN PUMP Grinder Pumps...a BETTER Way to Slice Solids!



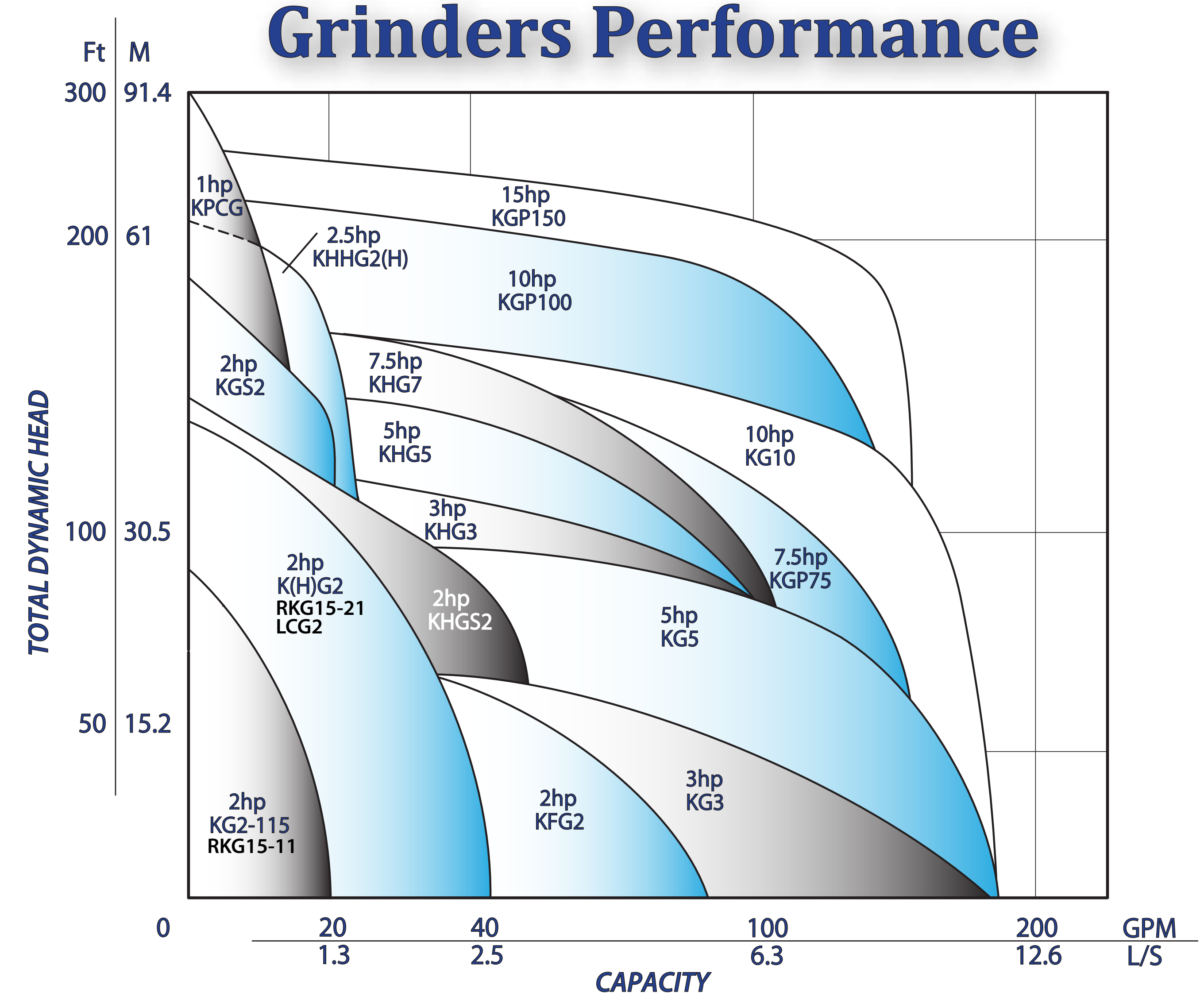
• *KG2SL Pictured*

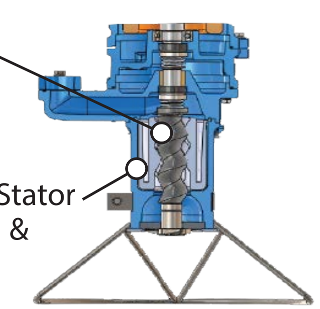
Explosion-Proof | **Class 1, Div.1**

Groups C&D | **FM3615**

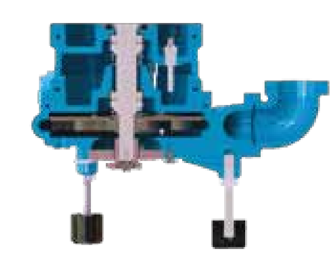
FM APPROVED

Grinders Performance

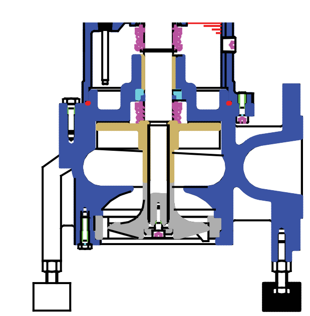




• *KPCGSL Wet End (Progressive Cavity)*



• *KGS2 Wet End (Semi-Open)*



• *KG3 Wet End (3hp Centrifugal)*

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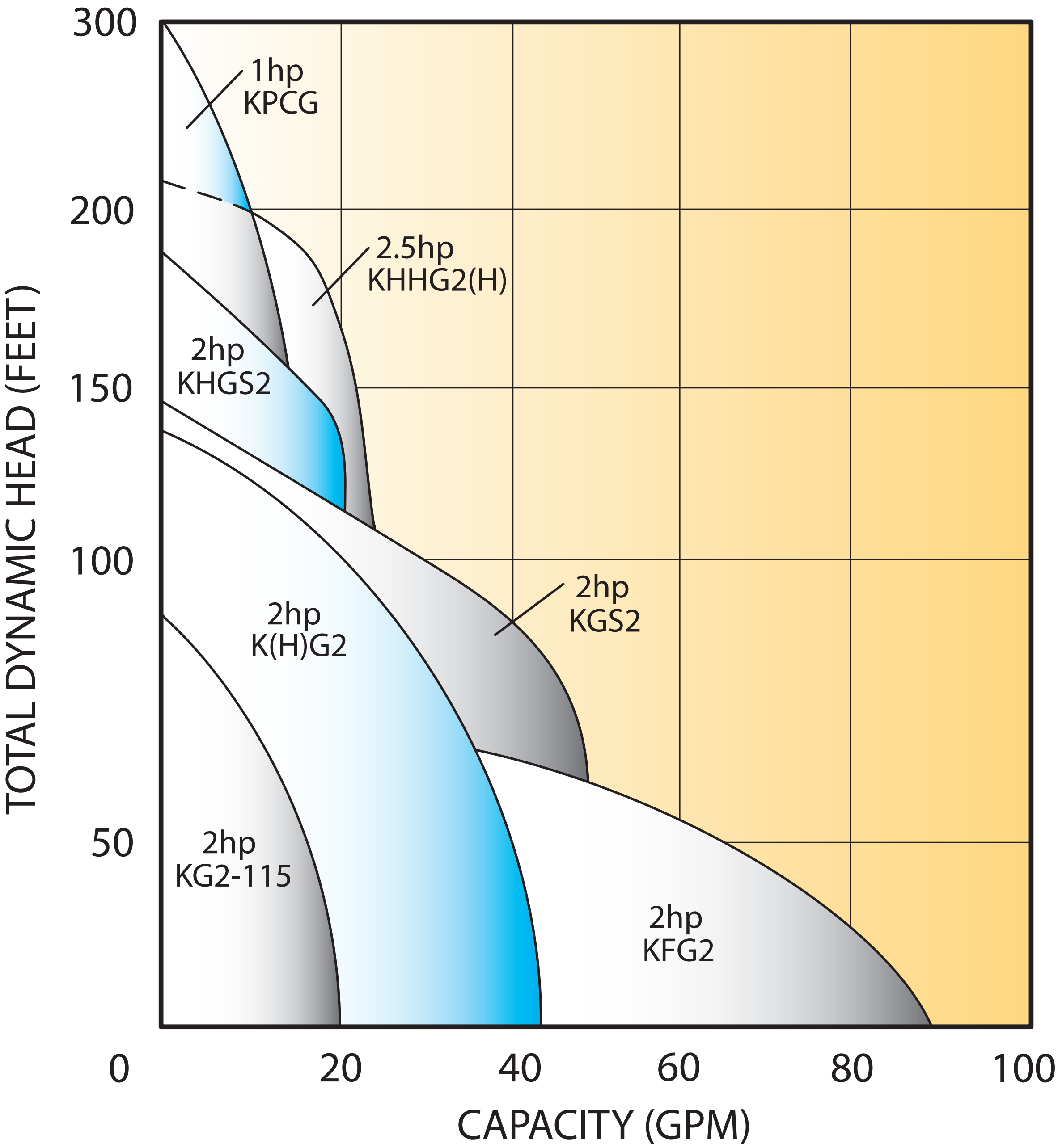
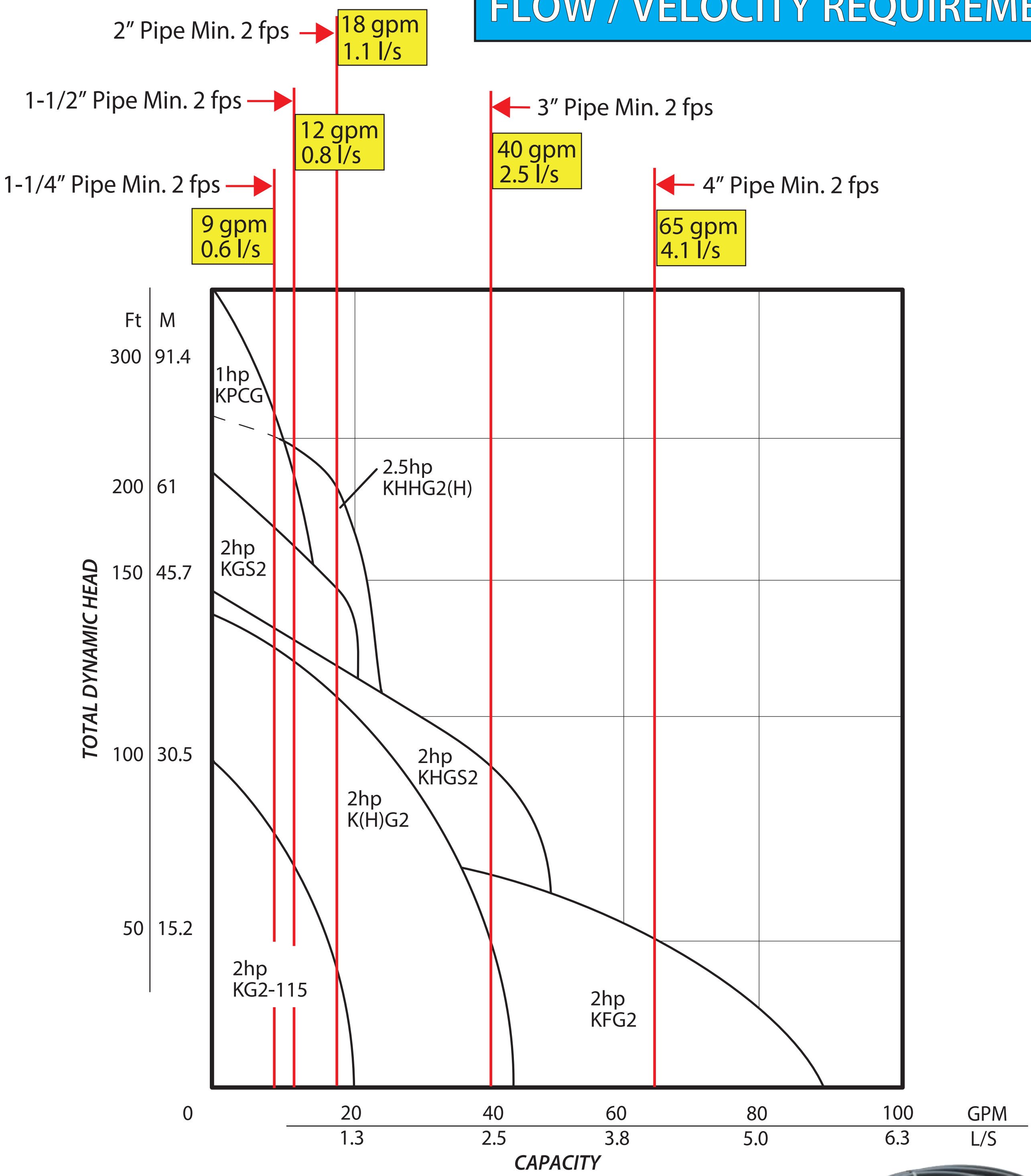
1 HP - 2 HP
Grinder Pump Series



KC0063 01/16

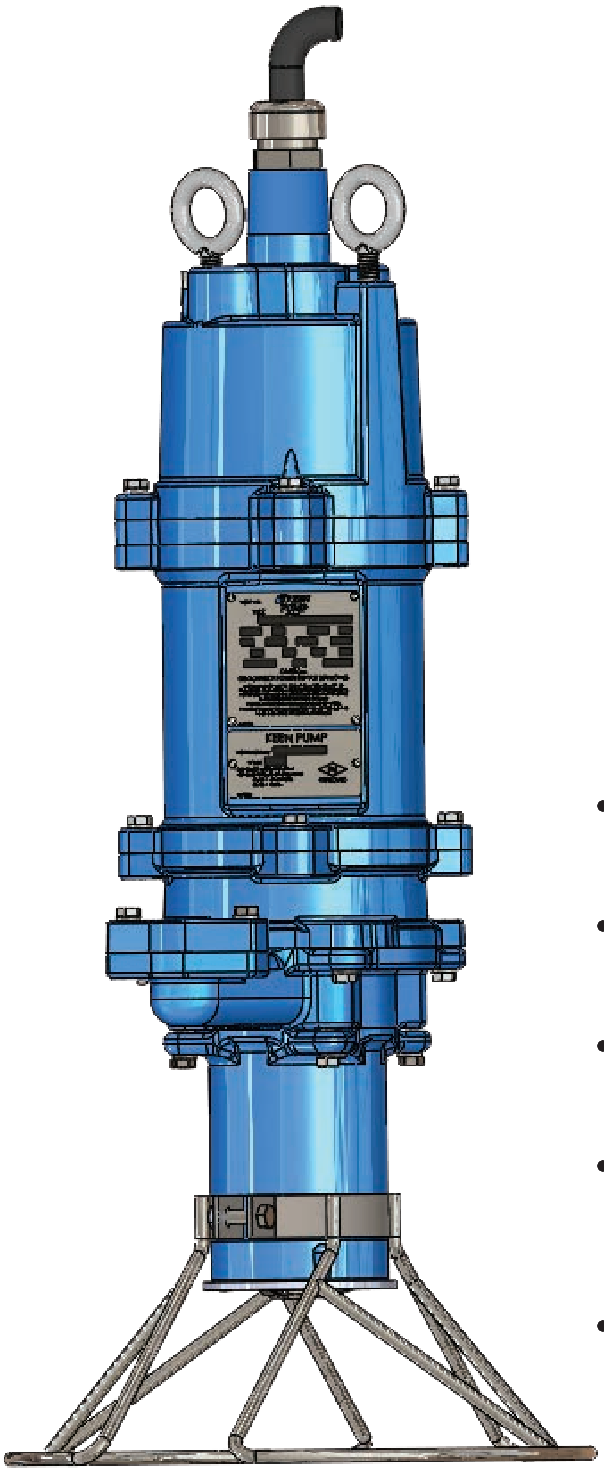
FLOW / VELOCITY REQUIREMENTS



- Minimum GPM based on Pipe HDPE DR11 - Commonly Used for LPS
- Select Largest Pipe to Achieve EFFECTIVE CLEANSING VELOCITY
  2.0 ft/sec minimum daily (SWPA Handbook)

KPCG-(C)

PROGRESSIVE GRINDER SERIES
INTERNAL START COMPONENTS MOUNTED INSIDE PUMP



RELIABLE Slicer Impeller
Pump Includes Internal Capacitor Kit - No Control Panel Required

SUPERIOR Progressive Cavity Grinder Pump Provides Reliable Service for The Low Pressure Sewer Industry!

“Slicer”

FM 3615 APPROVED

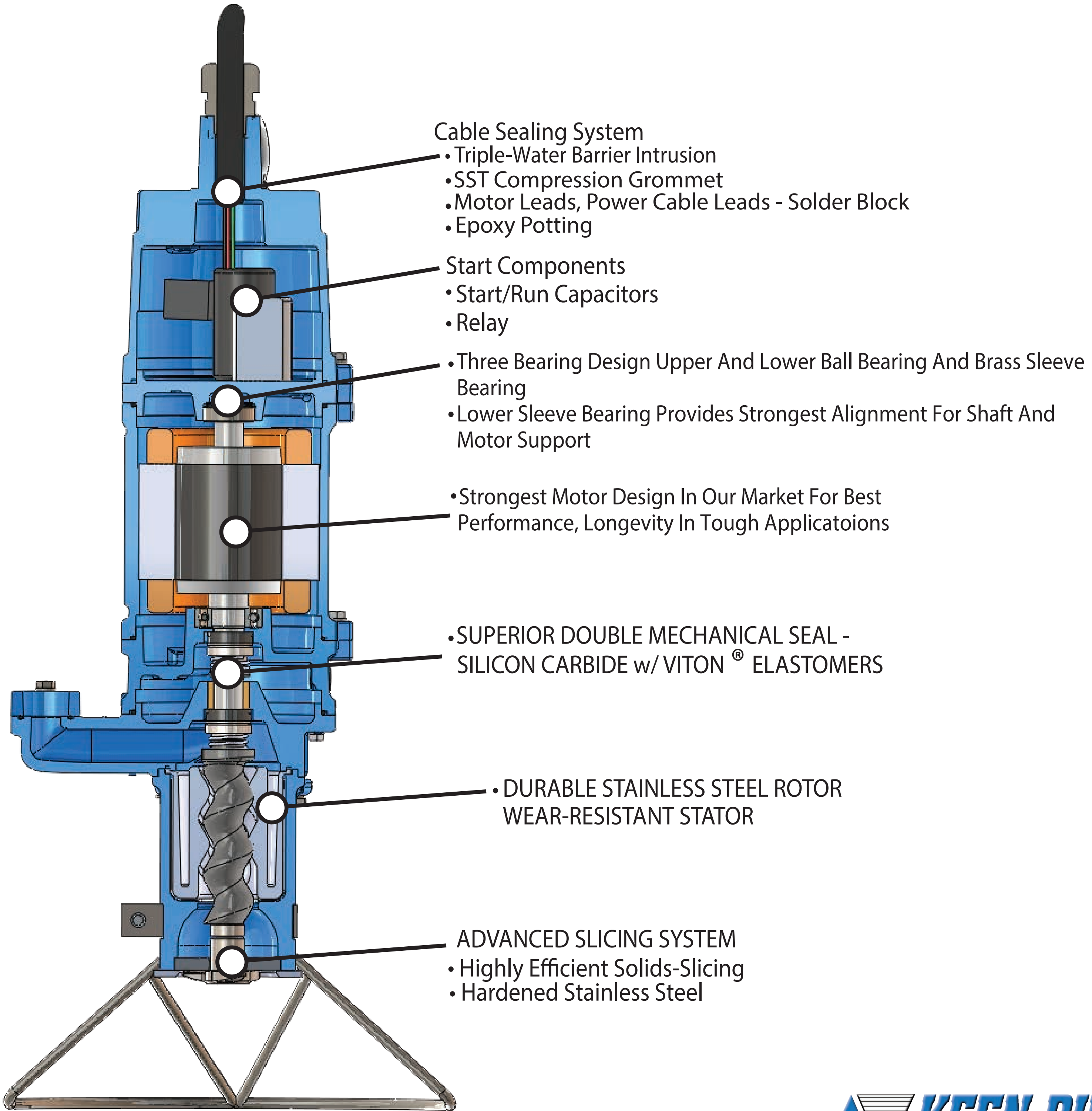
NSF PENDING

- ADVANCED SLICING FOR “FLUSHABLES”
  - Wipes, Floor Pads, Etc.
- NO CONTROL PANEL REQUIRED
  - For Internal Start Configuration If Replacing Competitor Existing Pump
- SILICON CARBIDE SINGLE SEAL
  - Viton® Elastomers
- PRESSED OIL-COOLED MOTOR
  - Superior Heat Transfer
  - Long Bearing & Seal Life
  - Class H Insulation
- HAZARDOUS LOCATION DESIGN
  - True “Explosion-Proof” Service
  - Third Party Quality Standard To Validate Pump Performance And Construction

Features and Benefits

KPCG-(C)

KPCG = External Start Kit - Best Configuration For New Construction
KPCG-C = Internal Start Kit - Replacing Existing Competitor Pump (As Shown Below)
KPCGX = Explosion-Proof - Hazardous Location



KC0017 06/2019

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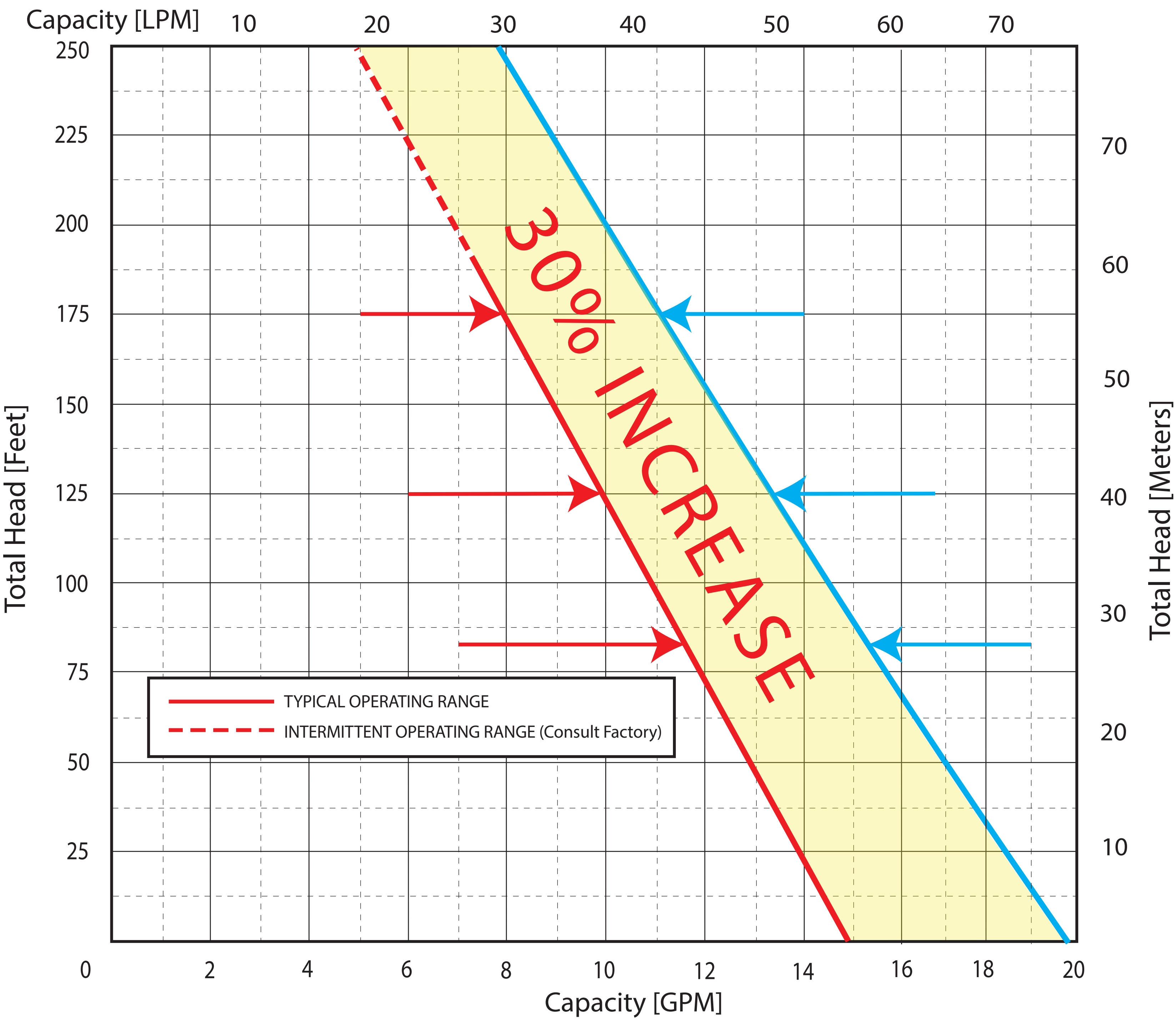
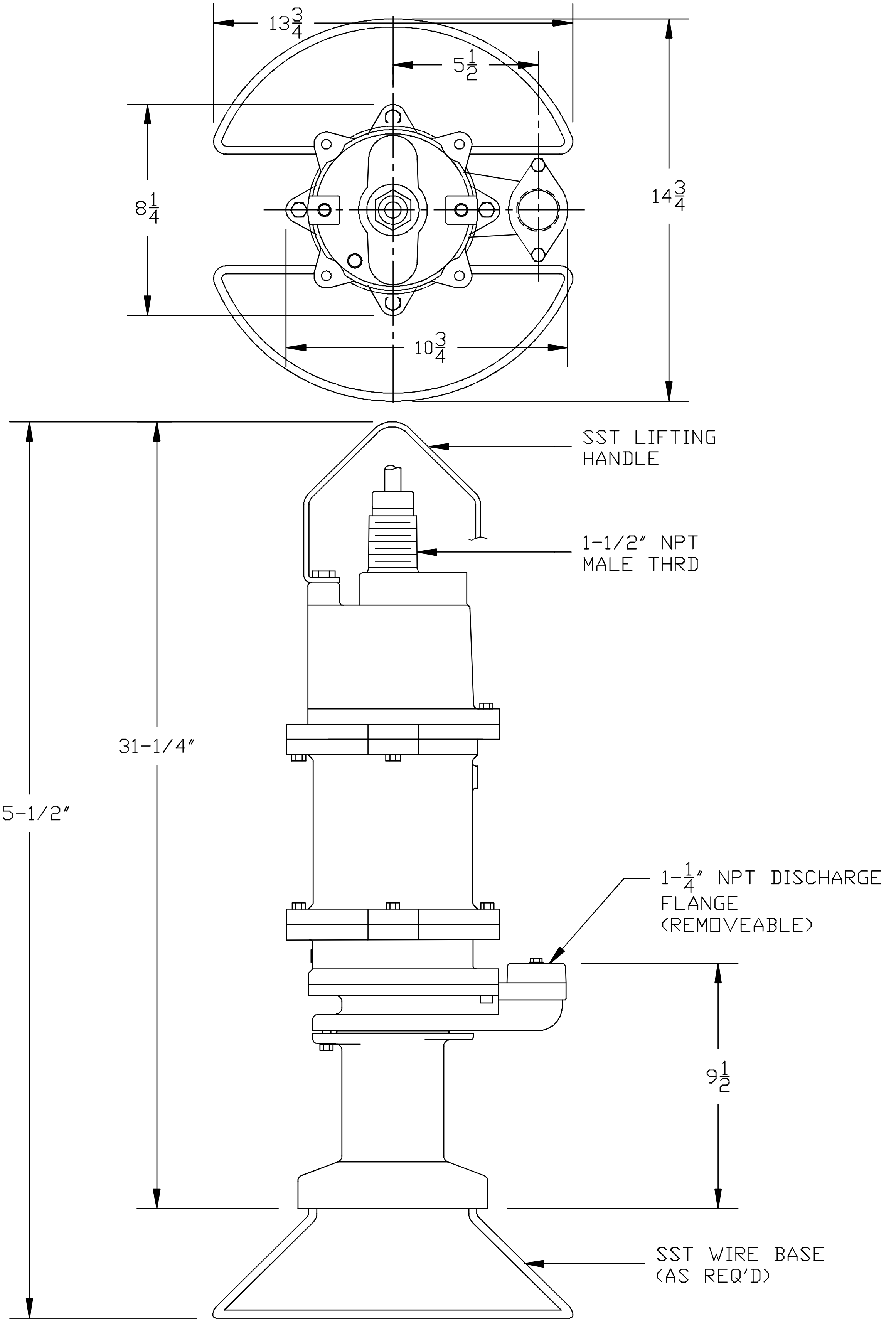
Quality product done FIRST, done RIGHT, done BEST

-New Keen Performance

-Competitor and Prior Performance for Keen Pump

Pump Series	KPCG-(C)		1HP PROGRESSIVE CAVITY GRINDER	
Speed	**1750 RPM**	Discharge	1-1/4”	





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ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE	KPCG 1HP GRINDER PUMP DIMENSIONS
SCALE	NTS
DWG. BY	SE
DATE	01/15/2013
DWG. #	KN-313
REV.	C

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE
C	SE	03/13/2015

Section GRINDER

Dated May 2018

Pump Model: **KPCG(X)-(C), KPCG(X)-(C)SL**

Physical Data:

Discharge Size	1-1/4” NPT or 2-Bolt Flange Vertical
Impeller Type	Progressive Cavity – Rotor w/ Stator
Power/Control Cable Length	30’ Standard
Paint	Blue, Waterborne Acrylic, High Build – (1) One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266ºF (130ºC)
Power Cord “C” Pump	14-3 SOOW - 600V, 90º C
Power Cord (Remote Start Kit)	14-5 SOOW – 600V, 90° C
Std. Third Party Approval	FM 3615

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35
Rotor, Wobble	Stainless Steel
Stator, Full Lobe	EPDM
Stator Liner	Nylon
Shaft	ANSI 400 Stainless Steel
***Opt. Rotating “Axial” Slicer**	440 SST Hardened 58-60 Rockwell C
***Opt. Stationary “Axial” Slicer**	440 SST Hardened 58-60 Rockwell C
Rotating “Radial” Cutter	440 SST Hardened 58-60 Rockwell C
Stationary “Radial” Cutter	440 SST Hardened 58-60 Rockwell C
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Sleeve Bearing	Bronze, Sintered

Pump Model: **KPCG(X)-(C), KPCG(X)-(C)SL**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		266º F (130º C)
Heat Sensor	**Open:**	275º F (135º C) Max. / 257º F (125º C) Min.
	Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			
Internal Start Kit	Start Capacitor = 216 ufd, 250 VAC			
	Run Capacitor = 50 ufd, 370 VAC			

Model "C" Internal Caps (Slicer)	**Model "C"** Internal Caps (Radial Cutter)	HP	Volts	Phase	NEC Code	Service Factor	Full Load Amps	SF Amps	Start Amps	Full Load KW	Full Load KVA
KPCG-01CSL	KPCG-01C	1	208	1	G	1.0	9.0	9.0	40.5	1.87	2.34
KPCG-21CSL	KPCG-21C	1	230	1	G	1.0	8.0	8.0	37.0	1.84	2.30
Model External Caps (Slicer)	**Model** External Caps (Radial Cutter)										
KPCG-01SL	KPCG-01	1	208	1	G	1.0	9.0	9.0	40.5	1.87	2.34
KPCG-21SL	KPCG-21	1	230	1	G	1.0	8.0	8.0	37.0	1.84	2.30

SPECIFICATIONS

1 HP Grinder Pumps Model No. KPCG(X)-C(SL)

Pump Model – Pump shall be of the progressive cavity type, **KPCG(SL)**, with an integrally built-in grinder unit and submersible type motor. **KPCG(X)-C or KPCG(X)-C(SL) Series** pump and motor assembly shall be FM3615 listed for Class 1, Division 1, Groups C & D hazardous location service. **KPCG(X)-C(SL)** shall have internal start components (Start capacitor, Run Capacitor, Start switch). **Pumps not manufactured complete in the USA shall not be considered equal.**

Operating Conditions – The pump shall have a non-overloading maximum capacity of ___GPM, a maximum total dynamic head of ___ feet, and shall use a motor rated at 1 HP and 1750 RPM. The grinder unit shall be capable of macerating all material in typical domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, sanitary wipes, floor pads, small wood, plastic and the like to fine slurry that will easily pass through the pump and 1-1/4” NPT discharge.

Construction – **All castings must be manufactured and supplied by a domestic source located in the USA.** Major pump components shall be of gray cast iron, ASTM A-48, Class 35, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry acrylic paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with O-rings, designed and constructed to meet FM3615 for Class 1, Division 1, Groups C & D standards. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides (rabbet joint construction) without the requirement of a specific torque limit. **No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.**

Rotor - Progressive cavity full lobe rotor to be hardened and polished stainless steel construction.

Stator – Progressive cavity design stator that has a full lobe. Material shall be ethylene propylene synthetic. Stator material to be acceptable for wastewater, having good resistance properties to heat, weather, grease, detergents, and abrasive materials.

Stator Liner - Stator to be encapsulated by stator liner. Liner material shall be high density polyethylene. Liner to stabilize stator when in use, allowing for improved wear resistance and longer stator life.

Radial Cutter Grinder Construction – Provided as a proven cutting method both grinder impeller and shredding ring shall be of 440 stainless steel hardened to 58-60 Rockwell C. The grinder assembly shall consist of a grinder impeller and shredding ring mounted directly below the volute passage. The grinder impeller is threaded to a stainless steel shaft, locked with a stainless steel screw and washer. The shredding ring shall be secured by a retaining ring which is bolted into the cast iron volute for easy removal. All grinding of solids shall be from the action of the grinder impeller against the shredding ring. There shall be 7,400 cuts / second. **Note: Model number to REMOVE “SL” if specifying radial cutter construction**
Ex. KPCG (Standard pump, external capacitors)

OPTIONAL: Slicer Grinder Construction – Maceration is accomplished by a combination of a rotary slicer and stationary slicer plate. Rotary slicer shall consist of (3) blades which protrude away from the inlet. Rotary slicer shall be bolted to shaft within close tolerance of grinding slicer plate. The stationary slicer plate shall consist of engineered-shaped holes for optimum cutting of debris. A slicer plate shall contain grooved slots to eject pump media away from underside of rotary cutter. Slicer plate shall be fastened with countersunk head screws that are flush with surface of plate. **Pumps with protruded or exposed head fasteners shall be considered not equal**. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C.

Seals – Type 21, domestic manufactured, dual mechanical seal construction mounted in tandem, shall protect the motor. Standard construction of primary seal shall be silicon / carbide with Viton® elastomers. Standard construction of secondary seal shall be silicon / carbide with Viton® elastomers. The seal face shall be lapped to a flatness of one light band. **For remote start/run capacitor pumps ONLY**, an electrode shall be mounted in the seal chamber to detect water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop the motor, but shall act as a warning only, indicating service is required. **Lip seal arrangements shall not be considered equal.**

Motor – The pump motor construction shall be per NEMA MG-1 1.15 standard and shall be of the submersible type, rated 1 HP, 1750 RPM. The motor shall be for 60 Hz, either 208 or 230 volt, single-phase operation. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. “C” model pump shall contain both capacitors and start switch housed “internally”, below the cord entry. Start and run capacitors, and starting switch will be found remotely in a control box for standard pump model. Major motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class F insulation. **Any other construction shall not be considered equal**. The stator shall be pressed into the cast iron motor housing. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing.

Single phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation should a control failure cause the pump to run in a dry wet well or any condition that may cause the pump to run outside of the specified operating temperature range.

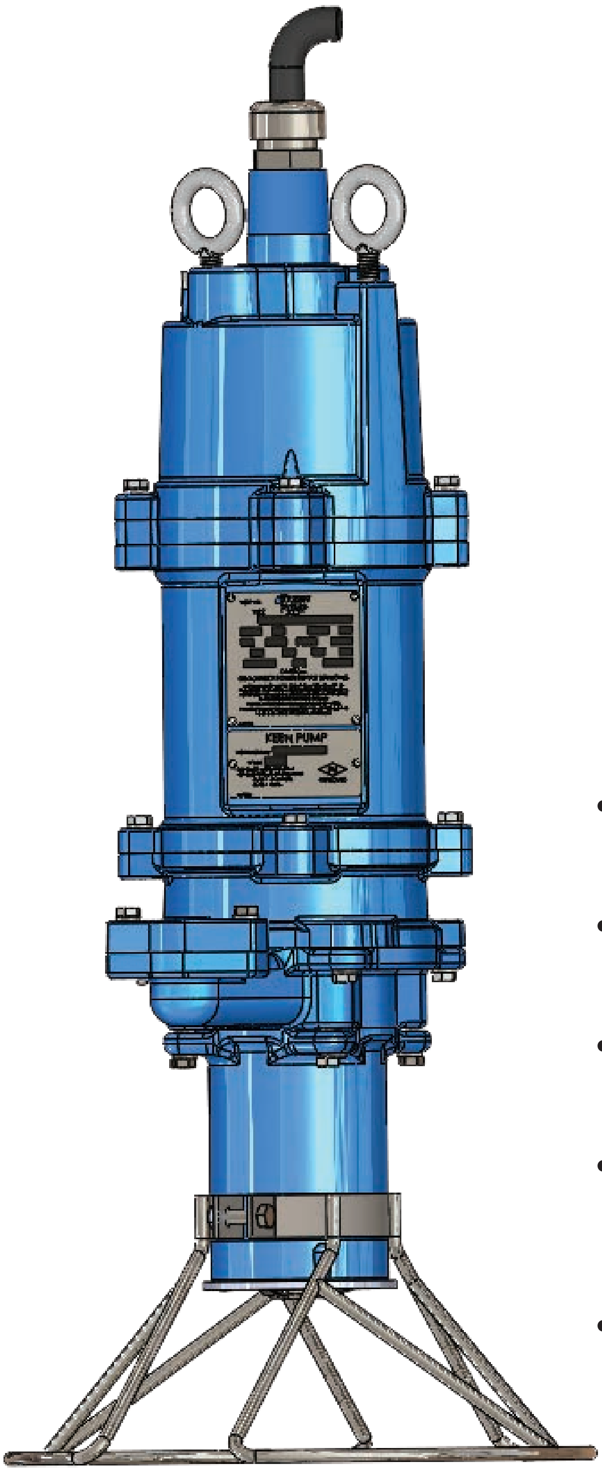
Internal Start Kit (“C” Model Only) – Start/Run capacitor with start switch securely positioned in dry compartment. A total of (4) bolts quickly removes cord cap for easy servicing.

Bearings / Shaft - The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Bearings shall be designed to an ABEC® System 1 or better.
The upper bearing shall be a Conrad type, single-row, deep groove ball bearing designed to adequately handle the required radial loads. The lower bearing shall be a single-row deep groove ball bearing designed to adequately compensate for the axial loads and radial forces. Bearings shall be designed to deliver a minimum L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer’s performance curve. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

Power Cord – The motor power cord shall be 12 Ga. Type SOOW, UL listed, CSA approved cable. The cable jacket shall be sealed at the motor entrance by means of an agency-approved rubber compression washer and compression nut. An epoxy-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. **Compression fittings with quick disconnect molded pins shall not be considered equal.** Cord shall withstand a pull strain to meet FM requirements.

KPCG-(X)

PROGRESSIVE GRINDER SERIES
INTERNAL START COMPONENTS MOUNTED INSIDE PUMP



RELIABLE Slicer Impeller
Pump Includes Internal Capacitor Kit - No Control Panel Required

SUPERIOR Progressive Cavity Grinder Pump Provides Reliable Service for The Low Pressure Sewer Industry!

"Slicer"

FM 3615 APPROVED

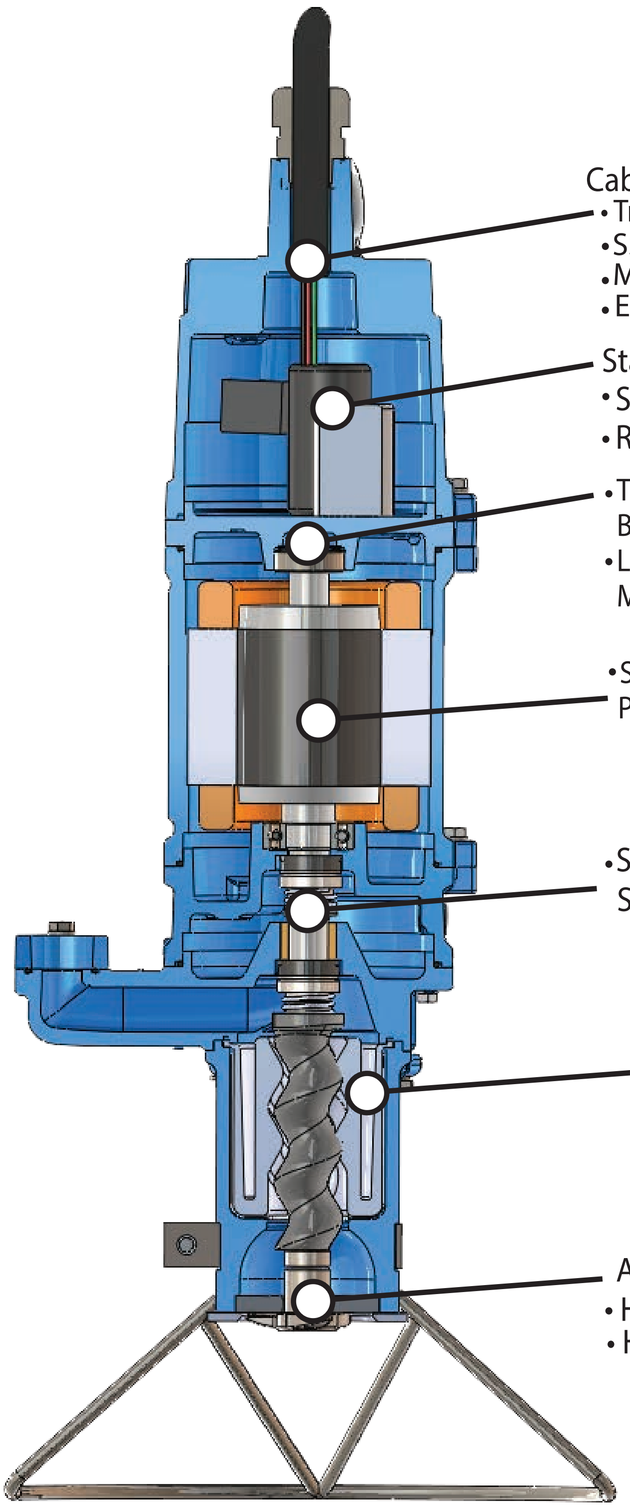
NSF PENDING

- **ADVANCED SLICING FOR "FLUSHABLES"**
  - Wipes, Floor Pads, Etc.
- **NO CONTROL PANEL REQUIRED**
  - For Internal Start Configuration If Replacing Competitor Existing Pump
- **SILICON CARBIDE SINGLE SEAL**
  - Viton® Elastomers
- **PRESSED OIL-COOLED MOTOR**
  - Superior Heat Transfer
  - Long Bearing & Seal Life
  - Class H Insulation
- **HAZARDOUS LOCATION DESIGN**
  - True "Explosion-Proof" Service
  - Third Party Quality Standard To Validate Pump Performance And Construction

Features and Benefits

KPCG-(X)

KPCG = External Start Kit - Best Configuration For New Construction
KPCG-C = Internal Start Kit - Replacing Existing Competitor Pump (As Shown Below)
KPCGX = Explosion-Proof - Hazardous Location



Cable Sealing System
- Triple-Water Barrier Intrusion
- SST Compression Grommet
- Motor Leads, Power Cable Leads - Solder Block
- Epoxy Potting

Start Components
- Start/Run Capacitors
- Relay

- Three Bearing Design Upper And Lower Ball Bearing And Brass Sleeve Bearing
- Lower Sleeve Bearing Provides Strongest Alignment For Shaft And Motor Support

- Strongest Motor Design In Our Market For Best Performance, Longevity In Tough Applicatoions

- SUPERIOR DOUBLE MECHANICAL SEAL - SILICON CARBIDE w/ VITON ® ELASTOMERS

- DURABLE STAINLESS STEEL ROTOR WEAR-RESISTANT STATOR

ADVANCED SLICING SYSTEM
- Highly Efficient Solids-Slicing
- Hardened Stainless Steel

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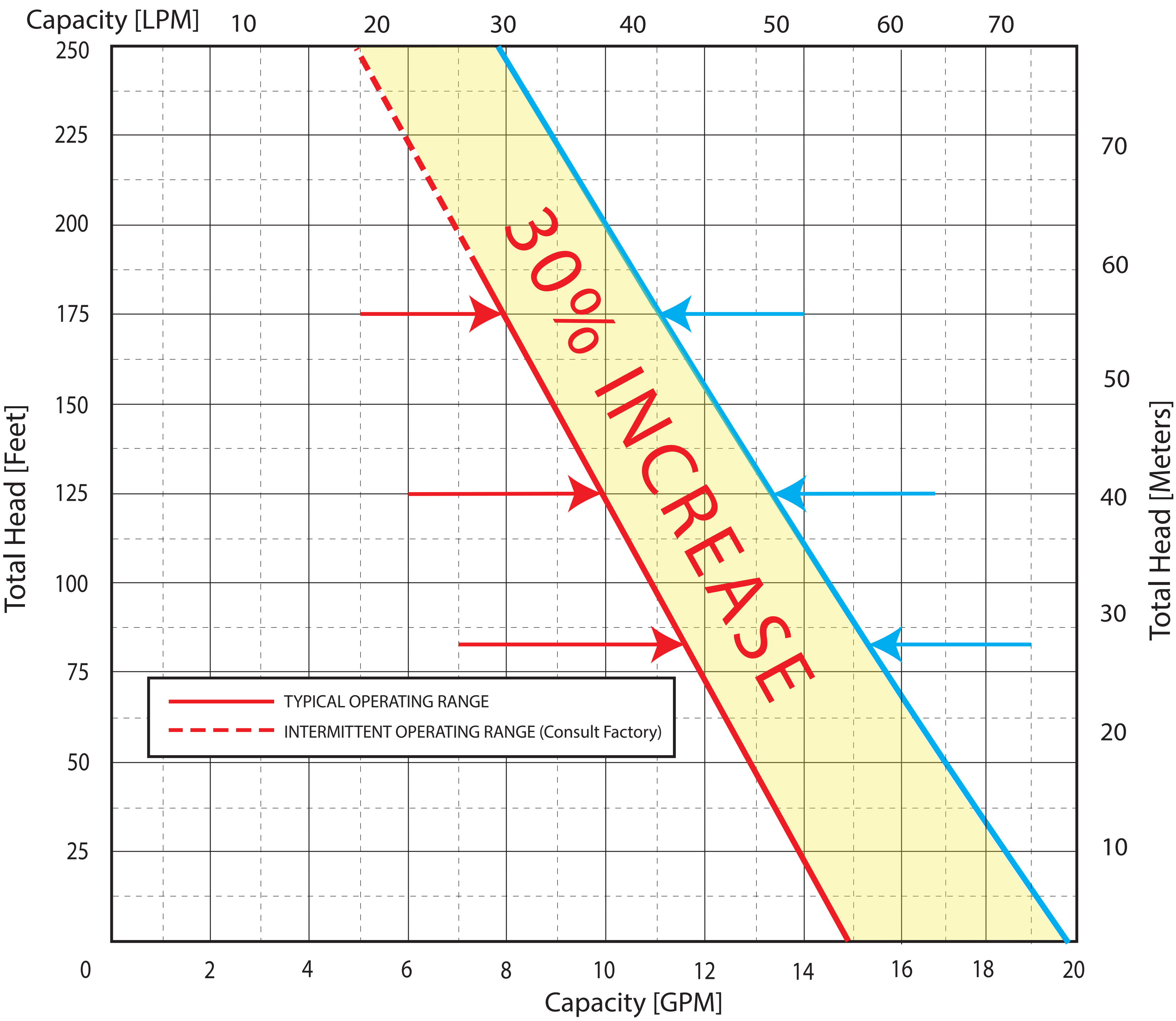
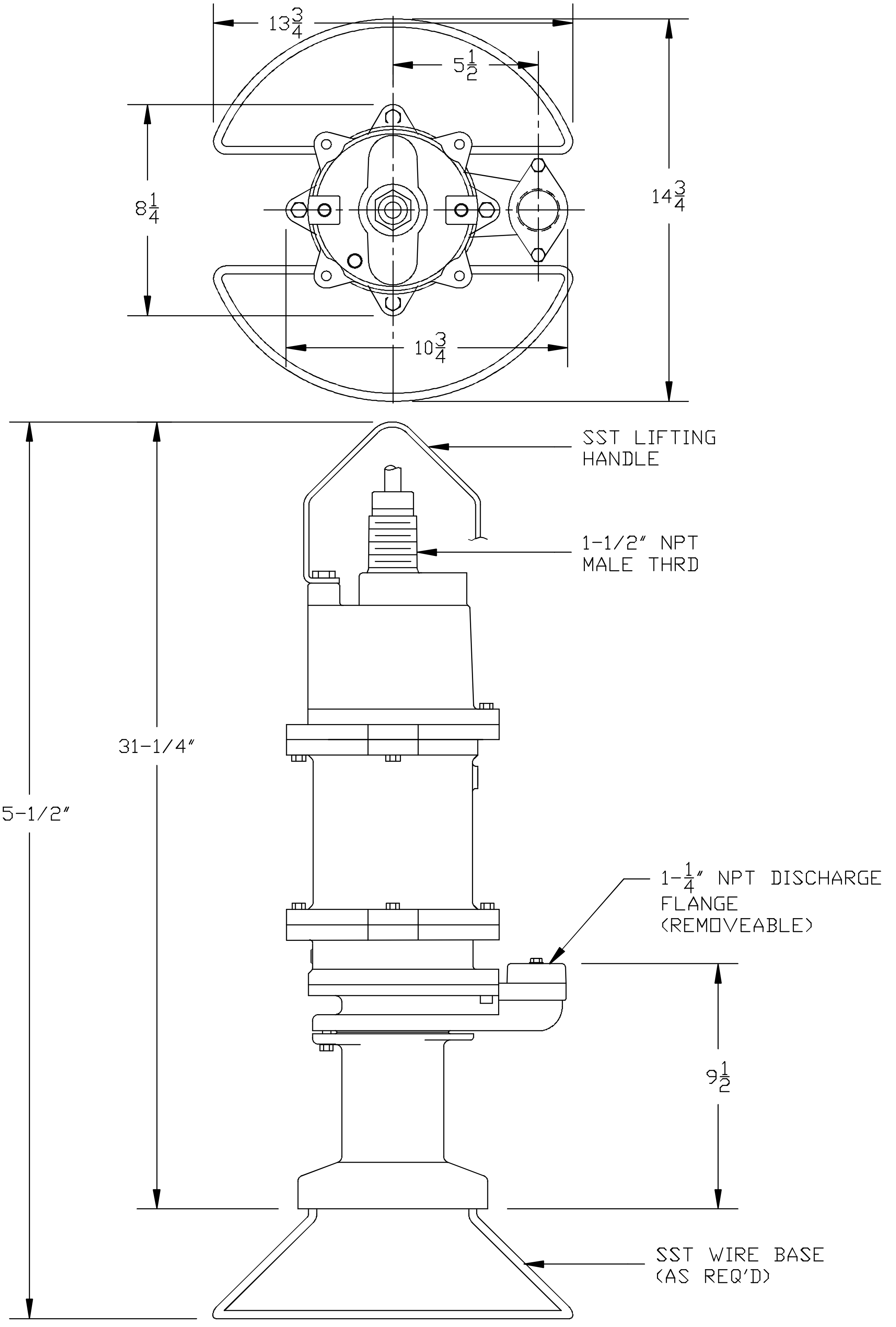
-New Keen Performance

-Competitor and Prior Performance for Keen Pump

Pump Series	KPCG-(X)		1HP PROGRESSIVE CAVITY GRINDER	
Speed	**1750 RPM**	Discharge	1-1/4"	





KEEN PUMP COMPANY

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471E ST ROUTE 250 EAST
ASHLAND, OHIO 44805

PHONE: 419-207-9400
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TITLE
KPCG 1HP GRINDER PUMP DIMENSIONS

SCALE	DATE	DWG. BY	DWG. #	REV.
NTS	01/15/2013	SE	KN-313	C

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE
C	SE	03/13/2015

Section GRINDER

Dated May 2018

Pump Model: **KPCG(X)-(C), KPCG(X)-(C)SL**

Physical Data:

Discharge Size	1-1/4” NPT or 2-Bolt Flange Vertical
Impeller Type	Progressive Cavity – Rotor w/ Stator
Power/Control Cable Length	30’ Standard
Paint	Blue, Waterborne Acrylic, High Build – (1) One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266ºF (130ºC)
Power Cord “C” Pump	14-3 SOOW - 600V, 90º C
Power Cord (Remote Start Kit)	14-5 SOOW – 600V, 90° C
Std. Third Party Approval	FM 3615

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35
Rotor, Wobble	Stainless Steel
Stator, Full Lobe	EPDM
Stator Liner	Nylon
Shaft	ANSI 400 Stainless Steel
***Opt. Rotating “Axial” Slicer**	440 SST Hardened 58-60 Rockwell C
***Opt. Stationary “Axial” Slicer**	440 SST Hardened 58-60 Rockwell C
Rotating “Radial” Cutter	440 SST Hardened 58-60 Rockwell C
Stationary “Radial” Cutter	440 SST Hardened 58-60 Rockwell C
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Sleeve Bearing	Bronze, Sintered

Pump Model: **KPCG(X)-(C), KPCG(X)-(C)SL**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		266º F (130º C)
Heat Sensor	**Open:**	275º F (135º C) Max. / 257º F (125º C) Min.
	Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			
Internal Start Kit	Start Capacitor = 216 ufd, 250 VAC			
	Run Capacitor = 50 ufd, 370 VAC			

Model "C" Internal Caps (Slicer)	**Model "C"** Internal Caps (Radial Cutter)	HP	Volts	Phase	NEC Code	Service Factor	Full Load Amps	SF Amps	Start Amps	Full Load KW	Full Load KVA
KPCG-01CSL	KPCG-01C	1	208	1	G	1.0	9.0	9.0	40.5	1.87	2.34
KPCG-21CSL	KPCG-21C	1	230	1	G	1.0	8.0	8.0	37.0	1.84	2.30
Model External Caps (Slicer)	**Model** External Caps (Radial Cutter)										
KPCG-01SL	KPCG-01	1	208	1	G	1.0	9.0	9.0	40.5	1.87	2.34
KPCG-21SL	KPCG-21	1	230	1	G	1.0	8.0	8.0	37.0	1.84	2.30

KEEN PUMP®

SPECIFICATIONS

1 HP Grinder Pumps — Model No. KPCG(X)-C(SL)

Pump Model – Pump shall be of the progressive cavity type, **KPCG(SL)**, with an integrally built-in grinder unit and submersible type motor. **KPCG(X)-C or KPCG(X)-C(SL) Series** pump and motor assembly shall be FM3615 listed for Class 1, Division 1, Groups C & D hazardous location service. **KPCG(X)-C(SL)** shall have internal start components (Start capacitor, Run Capacitor, Start switch). **Pumps not manufactured complete in the USA shall not be considered equal.**

Operating Conditions – The pump shall have a non-overloading maximum capacity of ___GPM, a maximum total dynamic head of ___ feet, and shall use a motor rated at 1 HP and 1750 RPM. The grinder unit shall be capable of macerating all material in typical domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, sanitary wipes, floor pads, small wood, plastic and the like to fine slurry that will easily pass through the pump and 1-1/4" NPT discharge.

Construction – **All castings must be manufactured and supplied by a domestic source located in the USA.** Major pump components shall be of gray cast iron, ASTM A-48, Class 35, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry acrylic paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with O-rings, designed and constructed to meet FM3615 for Class 1, Division 1, Groups C & D standards. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides (rabbet joint construction) without the requirement of a specific torque limit. **No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.**

Rotor - Progressive cavity full lobe rotor to be hardened and polished stainless steel construction.

Stator – Progressive cavity design stator that has a full lobe. Material shall be ethylene propylene synthetic. Stator material to be acceptable for wastewater, having good resistance properties to heat, weather, grease, detergents, and abrasive materials.

Stator Liner - Stator to be encapsulated by stator liner. Liner material shall be high density polyethylene. Liner to stabilize stator when in use, allowing for improved wear resistance and longer stator life.

Radial Cutter Grinder Construction – Provided as a proven cutting method both grinder impeller and shredding ring shall be of 440 stainless steel hardened to 58-60 Rockwell C. The grinder assembly shall consist of a grinder impeller and shredding ring mounted directly below the volute passage. The grinder impeller is threaded to a stainless steel shaft, locked with a stainless steel screw and washer. The shredding ring shall be secured by a retaining ring which is bolted into the cast iron volute for easy removal. All grinding of solids shall be from the action of the grinder impeller against the shredding ring. There shall be 7,400 cuts / second. **Note: Model number to REMOVE "SL" if specifying radial cutter construction**
Ex. KPCG (Standard pump, external capacitors)

OPTIONAL: Slicer Grinder Construction – Maceration is accomplished by a combination of a rotary slicer and stationary slicer plate. Rotary slicer shall consist of (3) blades which protrude away from the inlet. Rotary slicer shall be bolted to shaft within close tolerance of grinding slicer plate. The stationary slicer plate shall consist of engineered-shaped holes for optimum cutting of debris. A slicer plate shall contain grooved slots to eject pump media away from underside of rotary cutter. Slicer plate shall be fastened with countersunk head screws that are flush with surface of plate. **Pumps with protruded or exposed head fasteners shall be considered not equal**. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C.

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Motor – The pump motor construction shall be per NEMA MG-1 1.15 standard and shall be of the submersible type, rated 1 HP, 1750 RPM. The motor shall be for 60 Hz, either 208 or 230 volt, single-phase operation. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. "C" model pump shall contain both capacitors and start switch housed "internally", below the cord entry. Start and run capacitors, and starting switch will be found remotely in a control box for standard pump model. Major motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class F insulation. **Any other construction shall not be considered equal**. The stator shall be pressed into the cast iron motor housing. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing.

Single phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation should a control failure cause the pump to run in a dry wet well or any condition that may cause the pump to run outside of the specified operating temperature range.

Internal Start Kit ("C" Model Only) – Start/Run capacitor with start switch securely positioned in dry compartment. A total of (4) bolts quickly removes cord cap for easy servicing.

Bearings / Shaft - The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Bearings shall be designed to an ABEC® System 1 or better.
The upper bearing shall be a Conrad type, single-row, deep groove ball bearing designed to adequately handle the required radial loads. The lower bearing shall be a single-row deep groove ball bearing designed to adequately compensate for the axial loads and radial forces. Bearings shall be designed to deliver a minimum L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

Power Cord – The motor power cord shall be 12 Ga. Type SOOW, UL listed, CSA approved cable. The cable jacket shall be sealed at the motor entrance by means of an agency-approved rubber compression washer and compression nut. An epoxy-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. **Compression fittings with quick disconnect molded pins shall not be considered equal.** Cord shall withstand a pull strain to meet FM requirements.

Grinder Pumps

KEEN PUMP

LCG2

CENTRIGUGAL GRINDER SERIES

Centrifugal Grinder Designed For Ease of Service in The Low Pressure Sewer Industry!

- **ADVANCED SLICING FOR "FLUSHABLES"**
  - Wipes, Floor Pads, Etc.
- **CAPACITIES**
  - Up to 43 GPM
  - Up to 106 Feet Shutoff
- **SILICON CARBIDE DUAL SEALS**
- **HEAVY-DUTY PRESSED MOTOR**
- **EXCEPTIONAL KEEN "I.C.E." OIL**
  - Cool Motor - 40% Longer Life
- **COMPACT DESIGN**
  - Low Profile - Lightweight

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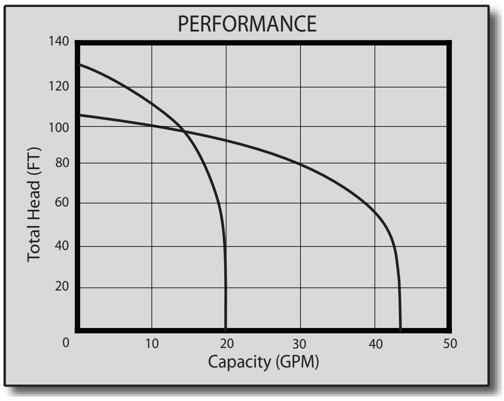
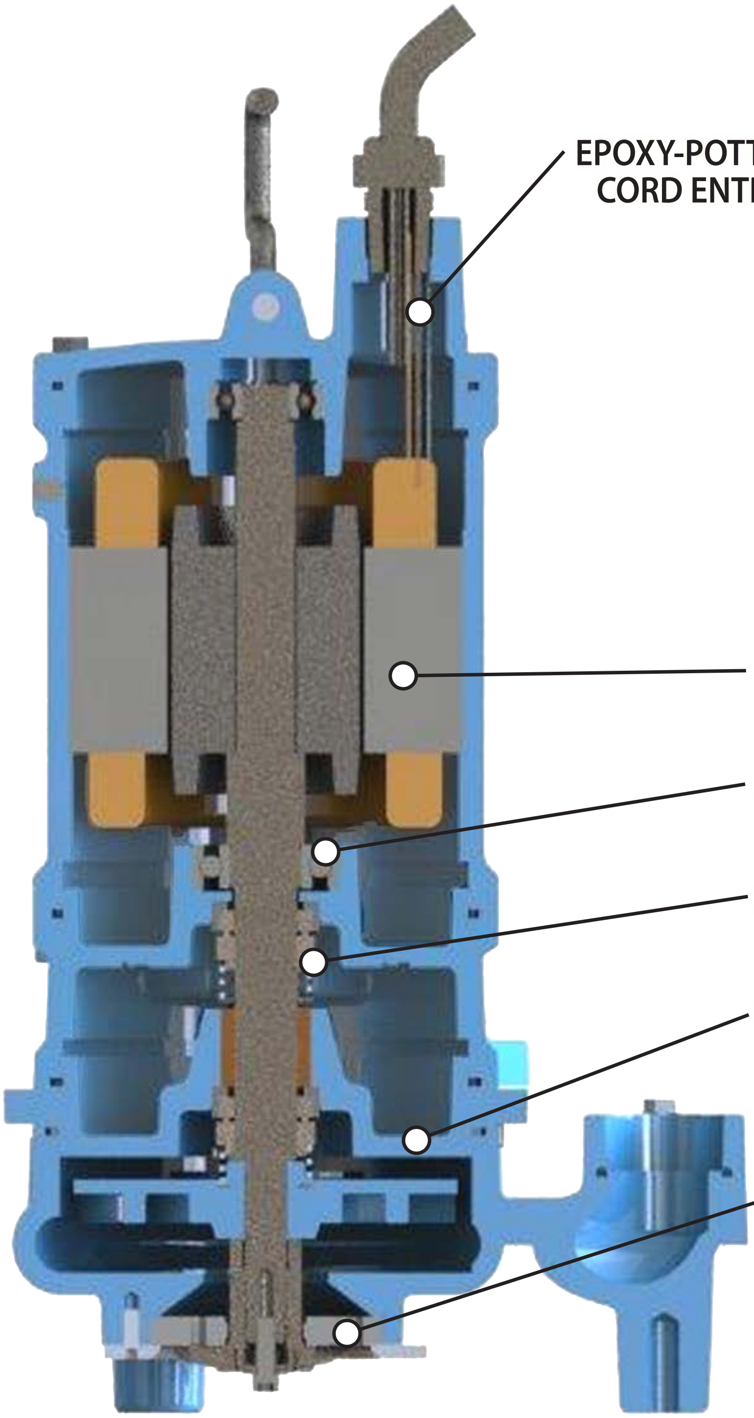
KEEN PUMP®

Features and Benefits

LCG2





"Slicer" Cutter

"Radial" Cutter

EPOXY-POTTED CORD ENTRY

HIGH-TORQUE MOTOR COOLED W/ KEEN "I.C.E." - 40% LONGER LIFE

3-BEARING SUPPORT
- 2-Ball and 1-Lower Sleeve Bearing

SUPERIOR DUAL MECHANICAL SEALS - SILICON CARBIDE

RECESSED, VORTEX IMPELLER, DUCTILE IRON
- Allows 100% Performance Curve Operation

ADVANCED SLICING SYSTEM
- Highly Efficient Solids-Slicing
- Rotary Slicer Protrudes Away from Inlet
- Engineered Plate Optimizes Debris Slicing
- User-Friendly Field Service

*** INTERCHANGEABILITY**
- Axial Slicer or Optional Radial Cutter

KEEN PUMP®

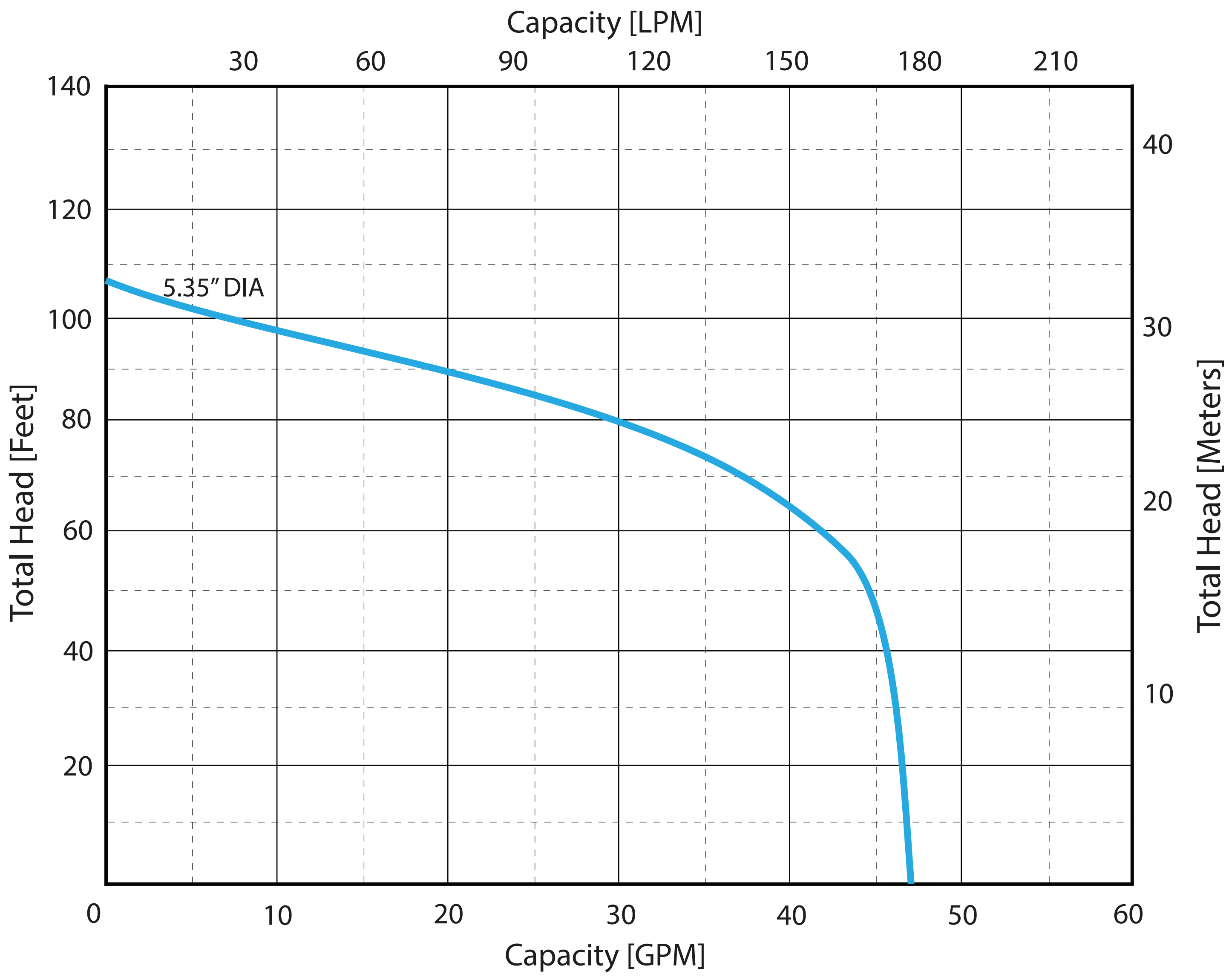
471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

KEEN PUMP®

Section **GRINDER**
Date MAR 2018

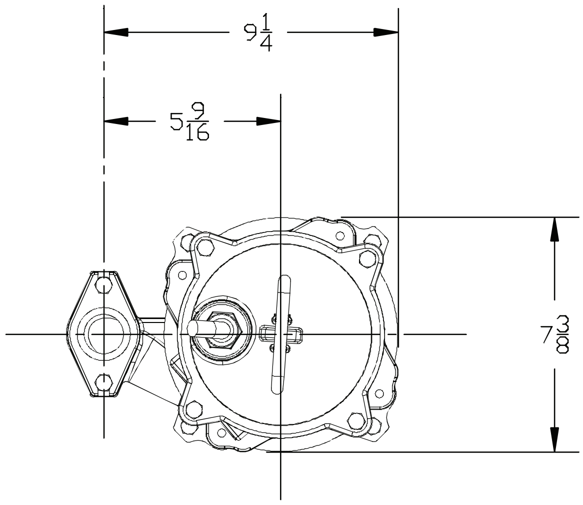
Pump Series	**LCG2**	2HP RECESSED IMPELLER (5.35" Dia.)		
Speed	**3450 RPM**	Discharge	1-1/4"	**STANDARD FLOW**

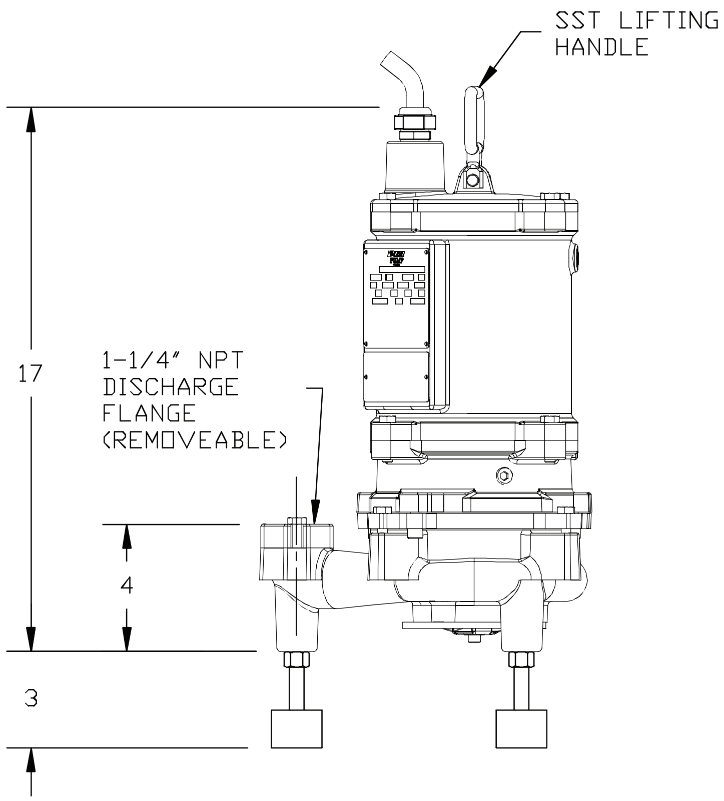
GPM: ___________ TDH: ___________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

KC0084





KEEN PUMP COMPANY

KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805

PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: LCG2 2HP GRINDER PUMP DIMENSIONS			
SCALE: NTS		DWG. #: KN-1101	REV.
DWG. BY: SE	DATE: 08/02/2016		

KEEN PUMP®

Pump Model: **LCG2, LCG2-SL**

Physical Data:

Discharge Size	1-1/4" NPT or 2-Bolt Flange Vertical
Impeller Type	Balanced, Recessed Vortex
Power/Control Cable Length	30' Standard
Paint	Blue, Waterborne Acrylic, High Build – (1) One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266ºF (130ºC)
Power Cord (1 Phase)	12-5 SOOW - 600V, 90º C
Std. Third Party Approval	N/A

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35
Impeller	Ductile Iron, ASTM A536, Grade 65-45-12
Shaft	ANSI 400 Stainless Steel
***Opt. Rotating "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
***Opt. Stationary "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
Rotating "Radial" Cutter (opt.)	440 SST Hardened 58-60 Rockwell C
Stationary "Radial" Cutter (opt.)	440 SST Hardened 58-60 Rockwell C
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Sleeve Bearing	Bronze, Sintered

Pump Model: **LCG2, LCG2-SL**

Thermal Data:

Maximum Liquid	140º F (60º C) Intermittent
Maximum Stator	266º F (130º C)
Heat Sensor **Open:**	275º F (135º C) Max. / 257º F (125º C) Min.
Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point	390º F (199º C)

Electrical Data:

RPM	**3450**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			
External Start Kit	Start Capacitor = 216 ufd, 250 VAC			
	Run Capacitor = 25 ufd, 370 VAC			

Model (Slicer)	**Model** (Radial Cutter)	HP	Volts	Phase	NEC Code	Service Factor	Full Load Amps	SF Amps	Start Amps	Full Load KW	Full Load KVA
LCG2-2081SL	LCG2-2081	2	208	1	G	1.0	20.8	20.8	72.8	4.33	4.33
LCG2-2301SL	LCG2-2301		230				15.5	15.5	54.3	3.56	3.56
LCG2-2401SL	LCG2-2401		240				15.5	15.5	54.3	3.56	3.56

SPECIFICATIONS

2 HP Grinder Pumps Model Nos. LCG2(SL)

Pump Model – Pump shall be of the centrifugal type, **LCG2(SL)**, with an integrally built-in grinder unit and submersible type motor. **Pumps not manufactured complete in the USA shall not be considered equal.**

Operating Conditions – The pump shall have a non-overloading maximum capacity of ___GPM, a maximum total dynamic head of ___ feet, and shall use a motor rated at 2 HP and 3450 RPM. The grinder unit shall be capable of macerating all material in typical domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, sanitary wipes, floor pads, small wood, plastic and the like to fine slurry that will easily pass through the pump and 1-1/4" NPT discharge.

Construction – **All castings must be manufactured and supplied by a domestic source located in the USA.** Major pump components shall be of gray cast iron, ASTM A-48, Class 35, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry acrylic paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with O-rings, designed and constructed to meet FM3615 for Class 1, Division 1, Groups C & D standards. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides (rabbet joint construction) without the requirement of a specific torque limit. **No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.**

Pump Impeller – Pump impeller shall be ductile iron and threaded onto a stainless steel shaft. The impeller shall be of the recessed vortex type to provide an unobstructed passage through the volute for the ground solids. Impeller must be dynamically balanced to specification ISO 1940G 6.3 standard.

Radial Cutter Grinder Construction – Provided as a proven cutting method, both grinder impeller and shredding ring shall be of 440 stainless steel hardened to 58-60 Rockwell C. The grinder assembly shall consist of a grinder impeller and shredding ring mounted directly below the volute passage. The grinder impeller is threaded to a stainless steel shaft, locked with a stainless steel screw and washer. The shredding ring shall be secured by a retaining ring which is bolted into the cast iron volute for easy removal. All grinding of solids shall be from the action of the grinder impeller against the shredding ring. There shall be 24,000 cuts / second. **Note: Model number to REMOVE" SL" if specifying radial cutter construction**
Ex. LCG2 (Standard flow pump).

OPTIONAL: Slicer Grinder Construction – Provided as a proven alternate, maceration is accomplished by a combination of a rotary slicer and stationary slicer plate. Rotary slicer shall consist of (3) blades which protrude away from the inlet. Rotary slicer shall be bolted to shaft within close tolerance of grinding slicer plate. The stationary slicer plate shall consist of engineered-shaped holes for optimum cutting of debris. A slicer plate shall contain grooved slots to eject pump media away from underside of rotary cutter. Slicer plate shall be fastened with countersunk head screws that are flush with surface of plate. **Pumps with protruded or exposed head fasteners shall be considered not equal**. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C.

Seals – Type 21, domestic manufactured, dual mechanical seal construction mounted in tandem, shall protect the motor. Standard construction of primary seal shall be silicon / carbide with Viton® elastomers. Standard construction of secondary seal shall be silicon / carbide with Viton® elastomers. The seal face shall be lapped to a flatness of one light band. **Lip seal arrangements shall not be considered equal.**

Motor – The pump motor construction shall be per NEMA MG-1 1.15 standard and shall be of the submersible type, rated 2 HP, 3450 RPM. The motor shall be for 60 Hz, 208, 230 or 240 volt, single-phase operation. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. Start & run capacitors, and starting switch for operating the motor will be found in the control box. Major motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class F insulation. **Any other construction shall not be considered equal**. The stator shall be pressed into the cast iron motor housing. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Maximum skin temperature of motor assembly shall not exceed a T-4 rating per FM3615 standards. **Any motor assembly T-code per FM3615 standard that exceeds a T-4 rating shall be considered not equal.**

Single-phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The overload shall automatically reset when the motor cools to a safe operating temperature.

Bearings / Shaft - The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Bearings shall be designed to an ABEC® System 1 or better.
The upper bearing shall be a Conrad type, single-row, deep groove ball bearing designed to adequately handle the required radial loads. The lower bearing shall be a single-row deep groove ball bearing designed to adequately compensate for the axial loads and radial forces. Bearings shall be designed to deliver a minimum L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer’s performance curve. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

Power Cord – The motor power cord shall be 12 Ga. Type SOOW, UL listed, CSA approved cable. The cable jacket shall be sealed at the motor entrance by means of an agency-approved rubber compression washer and compression nut. An epoxy-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. **Compression fittings with quick disconnect molded pins shall not be considered equal.** Cord shall withstand a pull strain to meet FM requirements.

KG2-115

CENTRIFUGAL GRINDER SERIES
INTERNAL START COMPOMENTS MOUNTED INSIDE PUMP

RELIABLE Reccessed Impeller
Pump Includes Internal Capacitor Kit
No Control Panel Required

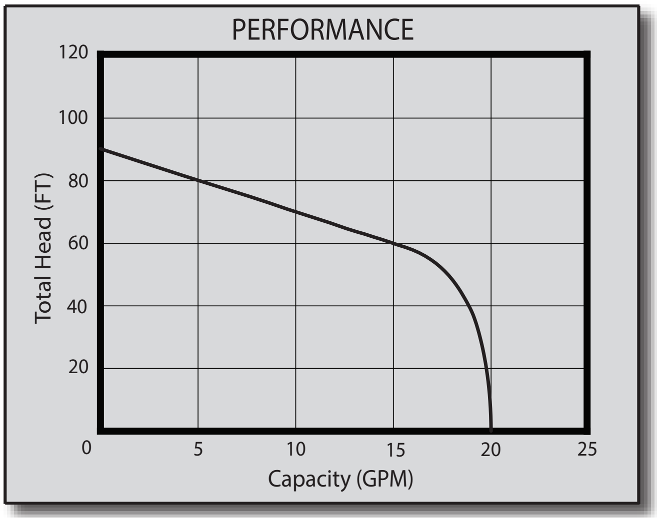
115 VOLT Recessed Impeller Pump for the Low Pressure Sewer Industry!

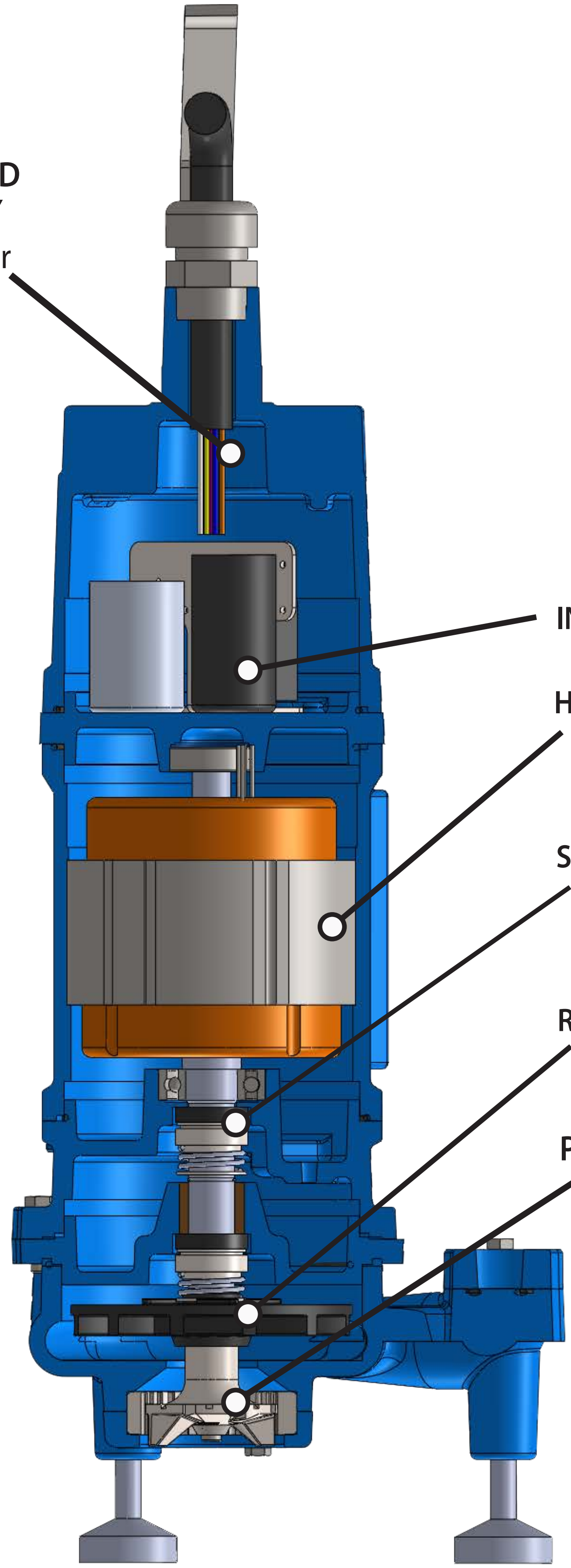
"Radial" Cutter
(STANDARD)

- **PERFORMANCE**
  - Up to 20 GPM
  - Up to 90 Feet Shutoff
- **SILICON CARBIDE DUAL SEALS**
  - Viton® Elastomers
- **NO CONTROL PANEL REQUIRED**
  - Internal Start Kit
  - 115V Power Cord Plug
- **PRESSED OIL-COOLED MOTOR**
  - Superior Heat Transfer
  - Long Bearing & Seal Life

Features and Benefits

KG2-115





EPOXY-POTTED CORD ENTRY
- Triple-Barrier Moisture Protection

INTERNAL CAPACITOR KIT

HIGH-TORQUE MOTOR OIL-COOLED FOR SUPERIOR HEAT DISSIPATION

SUPERIOR DUAL MECHANICAL SEALS - SILICON CARBIDE w/ VITON® ELASTOMERS

RECESSED, VORTEX IMPELLER, DUCTILE IRON
- Allows 100% Performance Curve Operation

PROVEN CUTTING SYSTEM
- Highly Efficient Solids-Grinding
- SST Grinder/Ring Hardened to Rockwell 56-60
- Reversible Grinder Ring Prolongs Service Life
- User-Friendly Field Service

KC0019 02/2017

KEEN PUMP
471 US HWY 250 East Ashland, Ohio 44805
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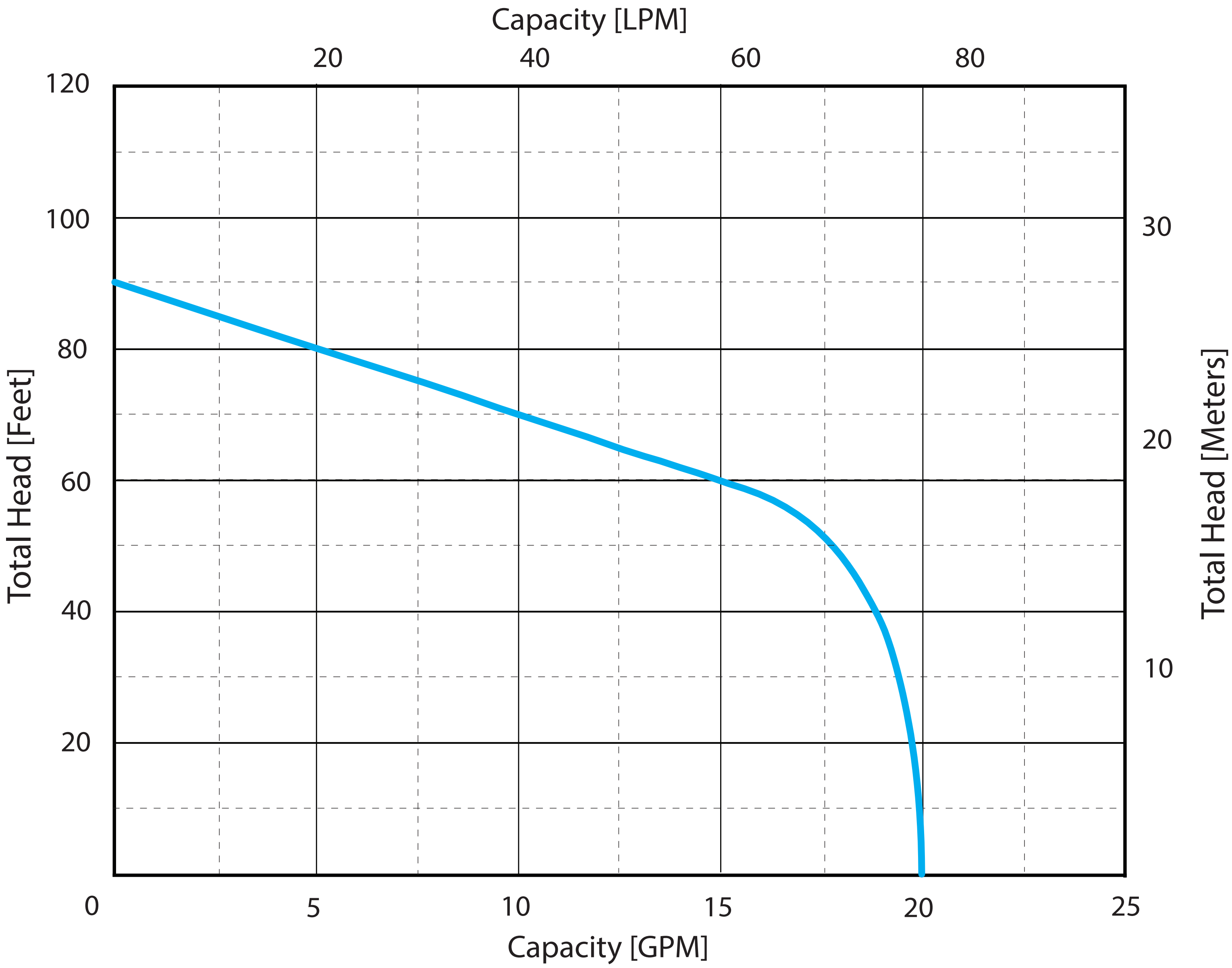
Section GRINDER
Date FEB 2017

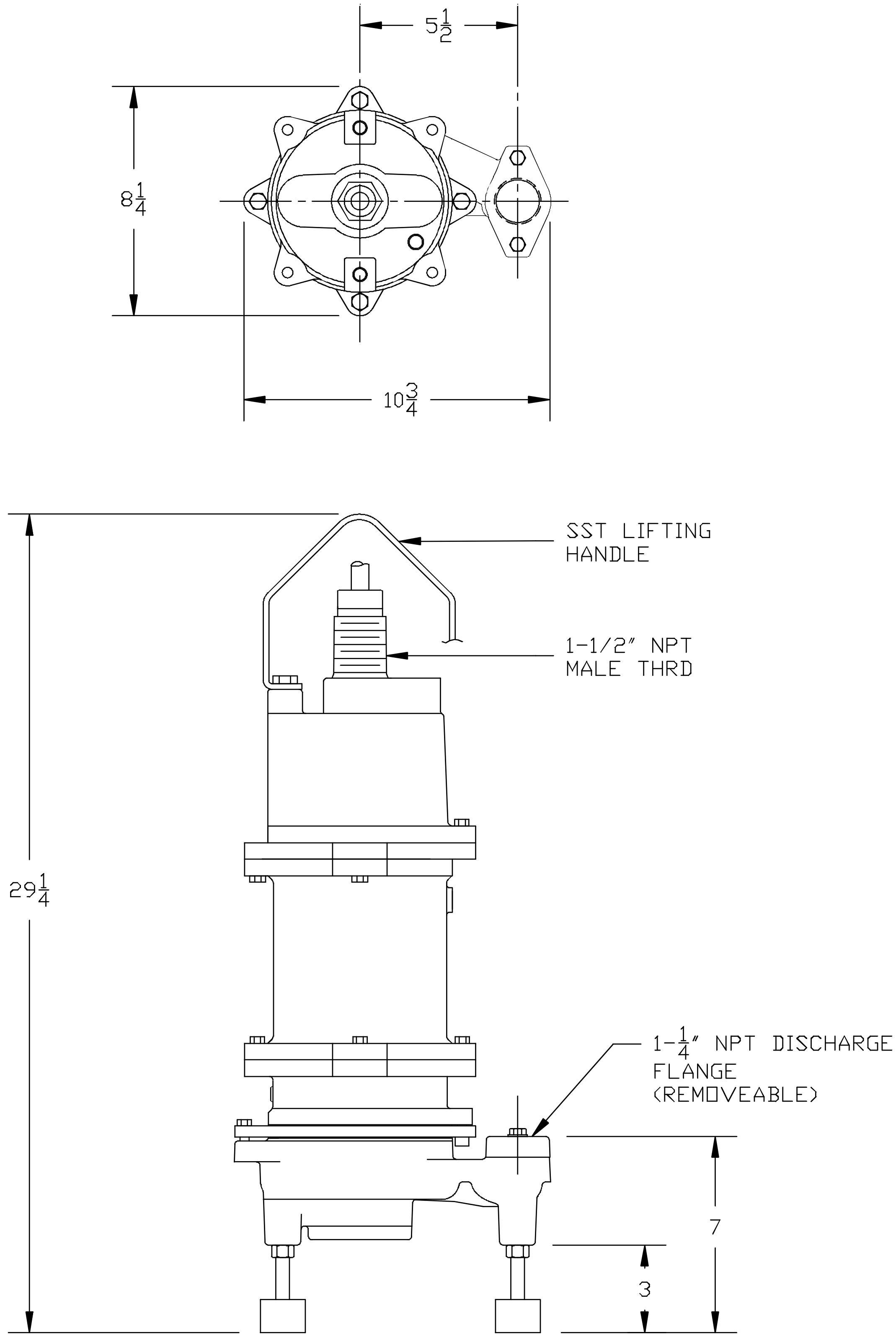
Pump Series	KG2-115	2HP RECESSED IMPELLER (5.00" Dia.)		
Speed	3450 RPM	Discharge	1-1/4"	115 VOLT

GPM: ___________ TDH: ___________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

KC0053



NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

B	SE	12/29/2016
A	SE	02/18/2015
REV	INITIALS	DATE

KEEN PUMP COMPANY

KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: K(F)G(X) 2HP "CENTRIFUGAL" GRINDER PUMP

SCALE	DWG. #	REV.
NTS	KN-19	B

DWG. BY: SE

DATE: 10/02/12

Pump Model: **KG2-115**

Physical Data:

Discharge Size	1-1/4" NPT or 2-Bolt Flange Vertical
Impeller Type	Balanced, Recessed Vortex
Power/Control Cable Length	30' Standard
Paint	Blue, Waterborne Acrylic, High Build – (1) One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266ºF (130ºC)
Power Cord	12-3 SOOW - 600V, 90º C
Std. Third Party Approval	N/A

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35
Impeller	Ductile Iron, ASTM A536, Grade 65-45-12
Shaft	ANSI 400 Stainless Steel
Rotating "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Stationary "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Sleeve Bearing	Bronze, Sintered

KEEN PUMP®

SPECIFICATIONS

2 HP GRINDER PUMPS KG2-115

Pump Model – Pump shall be of the centrifugal type, KG2-115, with an integrally built-in grinder unit and submersible type motor. The grinder unit shall be capable of macerating all material in normal domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, small wood, plastic and the like to a fine slurry that will easily pass through the pump and 1-1/4” NPT discharge.

Operating Conditions – The pump shall have a capacity of _____GPM at a total head of _____Feet, and shall use a motor rated at 2 HP and 3450 RPM.

Construction – Both grinder impellers and shredding ring shall be of 440C stainless steel hardened to 56-60 Rockwell C. The grinder assembly shall consist of a grinder impeller and shredding ring mounted directly below the volute passage. The grinder impeller is threaded to a stainless steel shaft, locked with a screw and washer. The shredding ring shall be pressed into the cast iron volute for easy removal. All grinding of solids shall be from the action of the grinder impeller against the shredding ring. There shall be 7,400 cuts / second.

Pump Impeller – Ductile iron and threaded on a stainless steel shaft. The impeller shall be of the recessed vortex type to provide an unobstructed passage through the volute for the ground solids.

Seals – The motor shall be protected by a dual mechanical seal construction mounted in tandem. The dual mechanical seal face shall be silicon and carbide, lapped to a flatness of one light band.

Motor – The pump shall be of the submersible type, rated 2 HP, 3450 RPM. The motor shall be for 60 HZ, 115 volt, single-phase operation. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. Run capacitor ratings shall not exceed 300 volts. Major operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class F insulations. The stator shall be pressed into the cast iron motor housing. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Air-filled motors, which do not have the superior heat dissipating capabilities of oil-filled motors, shall not be considered equal.

The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Ball bearings shall be designed for a minimum 50,000 hours B-10 life. The stator shall be pressed into the motor housing. The common motor pump and grinder shaft shall be of 416 SST, threaded to take the pump and grinder impeller.

Single-phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The overload shall automatically reset when the motor cools to a safe operating temperature.

Power Cord – The motor power cord shall be 12 Ga. SJOW/SJOWA or SOOW. The cable jacket shall be sealed at the motor entrance by means of a rubber compression washer and compression nut. An epoxy filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. Individual conductor strands shall be soldered within the epoxy seal.

KG(X)2

2HP Dual Seal Grinder Pump, 1 or 3 Phase (Class 1, Div. 1, Groups C & D Hazardous Location)

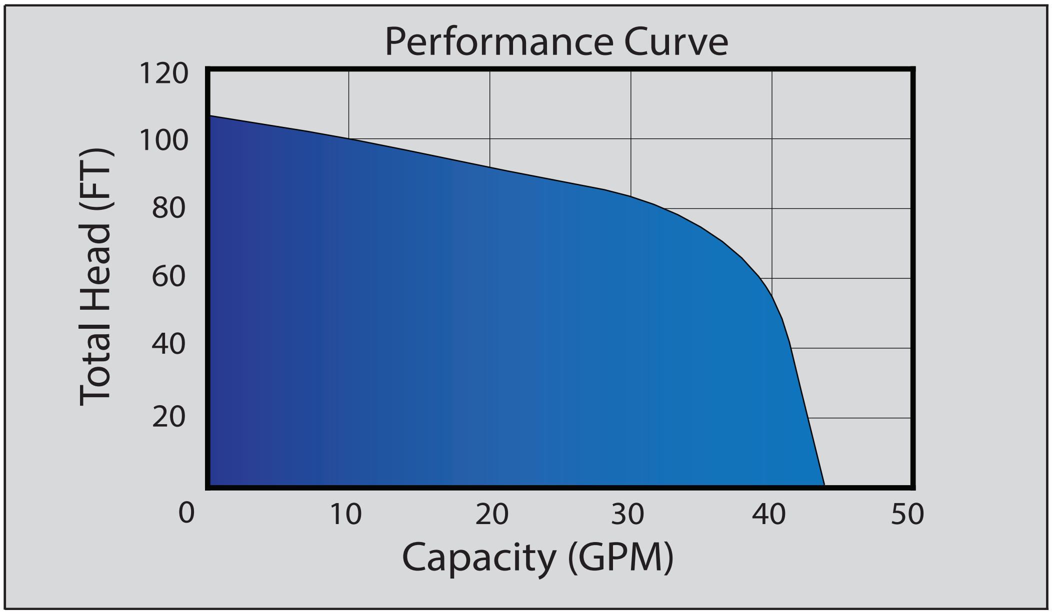
The KEEN PUMP **KG(X)2** series centrifugal grinder pumps easily handle residential, light commercial or industrial sanitary waste, reducing it to a fine slurry. The **KG(X)2** pump is designed for use in pressure sewer applications or any piping network.

The **KG(X)2** grinder pump retrofits into many existing competitor pump installations. The **KG(X)2** pump operates with the same control panel and installation piping / rail system.

The recessed vortex impeller design of the **KG(X)2** grinder pump provides trouble-free, non-overloading operation over the entire performance curve. The **KG(X)2** pump produces capacities to 43 gpm with heads to 106 feet.

The **KG(X)2** series pump features:

- Interchangeable into Competitor Installations
- Dual Silicon-Carbide Shaft Seals
- Pressed-In Motor with Internal Overload Protection
- 3-Bearing Shaft Support
- Internal Moisture Detection
- Strong 2hp Motor, 1 Phase (208, 230 or 240 Volt)
- 3 Phase Motor (208, 230 or 460 Volt)



REV 03/26/15

Features and Benefits

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grip with compression grommet protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if powercable is cut or damaged.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 30 cast iron components.

3. Strong Motor
Powerful high-torque motor for reliable pump operation. Pressed stator securely holds motor and efficiently transfers heat. Class F insulation with overload protection in oil-filled chamber for cool operation and long motor life.

4. 3-Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearing plus additional sleeve bearing in lower seal chamber. Long 50,000 hour B-10 bearing life.

5. Double Mechanical Seal Protection
Dual silicon carbide mechanical shaft seals provide twice the moisture protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials.

6. Moisture Detection
Seal leak probe signals alarm in control panel for scheduled maintenance.

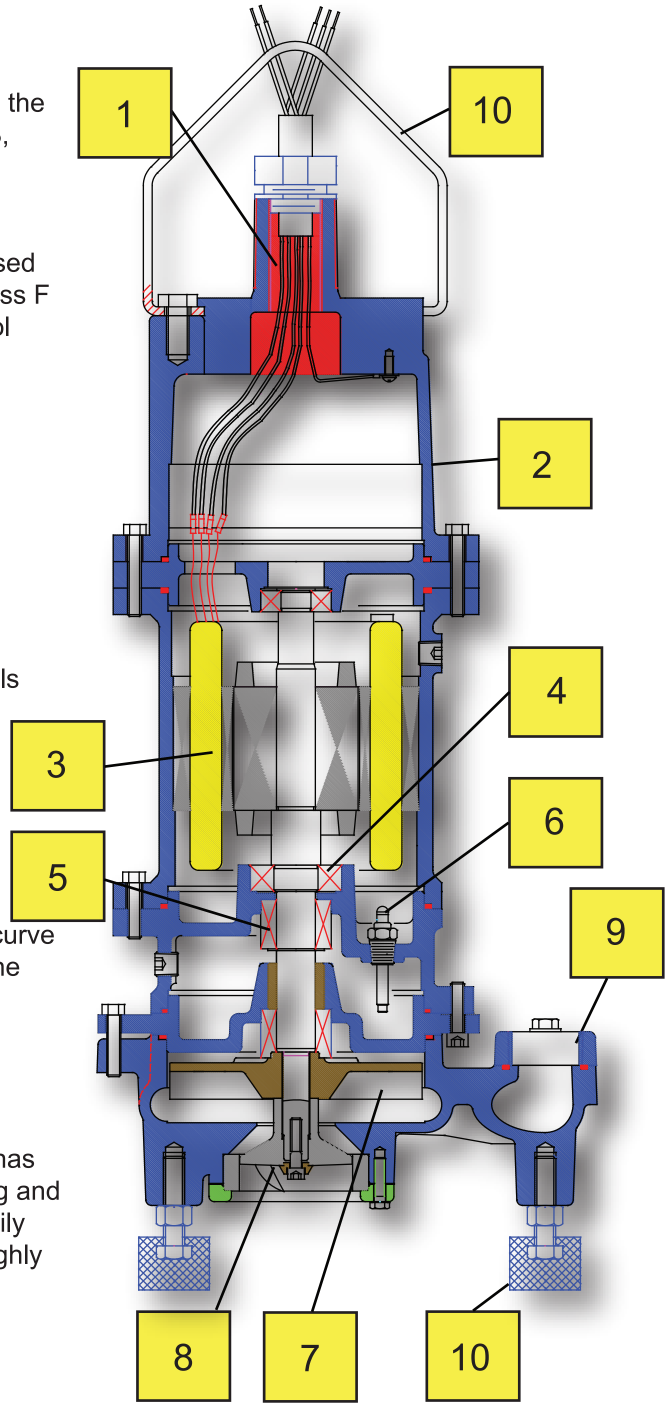
7. Non-Overloading Hydraulic Design
The recessed centrifugal impeller allows 100% performance curve operation from shut-off to maximum flow without damage to the pump or system. The recessed vortex impeller is out of the passageway of fluid flow, eliminating concerns of blockage or wear.

8. Proven Grinder Assembly
Hardened (Rockwell 56-60) stainless steel grinder assembly has 30+ years proven field experience. The reversible grinder ring and grinder impeller effectively reduce solids into a fine slurry, easily passable in a piping system without concerns of clogging. Highly efficient 16,600 cuts/second.

9. Easy Piping Connection
Removable 1-1/4"NPT connection flange for simple and easy connection to discharge piping.

10. Accessories
Stainless steel lifting handle included. Anti-Vibration mounting feet **OPTIONAL.**

2HP Grinder Pump Dual Seal KG(X)2



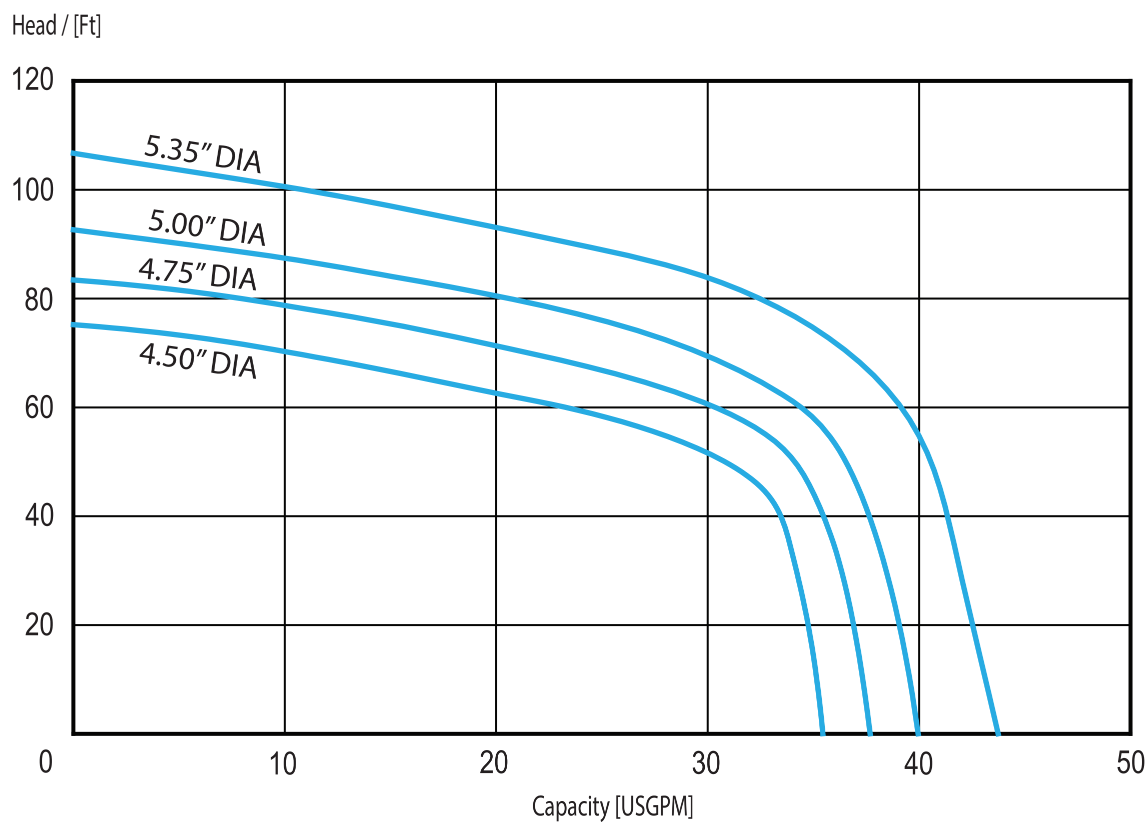
REV 03/26/15

471E State Route 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

2HP SUBMERSIBLE GRINDER PUMP

GENERAL		MOTOR DATA	
Pump Model	**KG(X)2**	HP / Power Supply	2HP / 1 ϕ, 60 Hz
PUMP DATA		Full Load Amps 208V	15.5 Amps
Date	03/26/2015	Start Amps 208V	54 Amps
Discharge Flange	1-1/4" NPT, Vertical	Full Load Amps 230V	12.8 Amps
Grinder Ring	26 Slots	Start Amps 230V	45 Amps
Impeller Type / Std. Dia.	Recessed/ 5.35" Dia.	Start / Run Amp 240V	
Single Phase	START KIT SK-2A includes: Start & Run Capacitors, Relay, and Mounting Hardware	Poles / Rated Speed	2 P / 3450 rpm
		Insulation Class	F Class
		Start Capacitor	216 ufd, 250 VAC
		Run Capacitor	20 ufd, 370 VAC

PERFORMANCE CURVE



MODEL	***HP***	***Phase***	***Volts***
KG(X)2-2001	2	1	208
KG(X)2-2301	2	1	230
KG(X)2-2401	2	1	240

* Performance with clear water and ambient temp 20ºC (68ºF)

Rev. 03/26/15

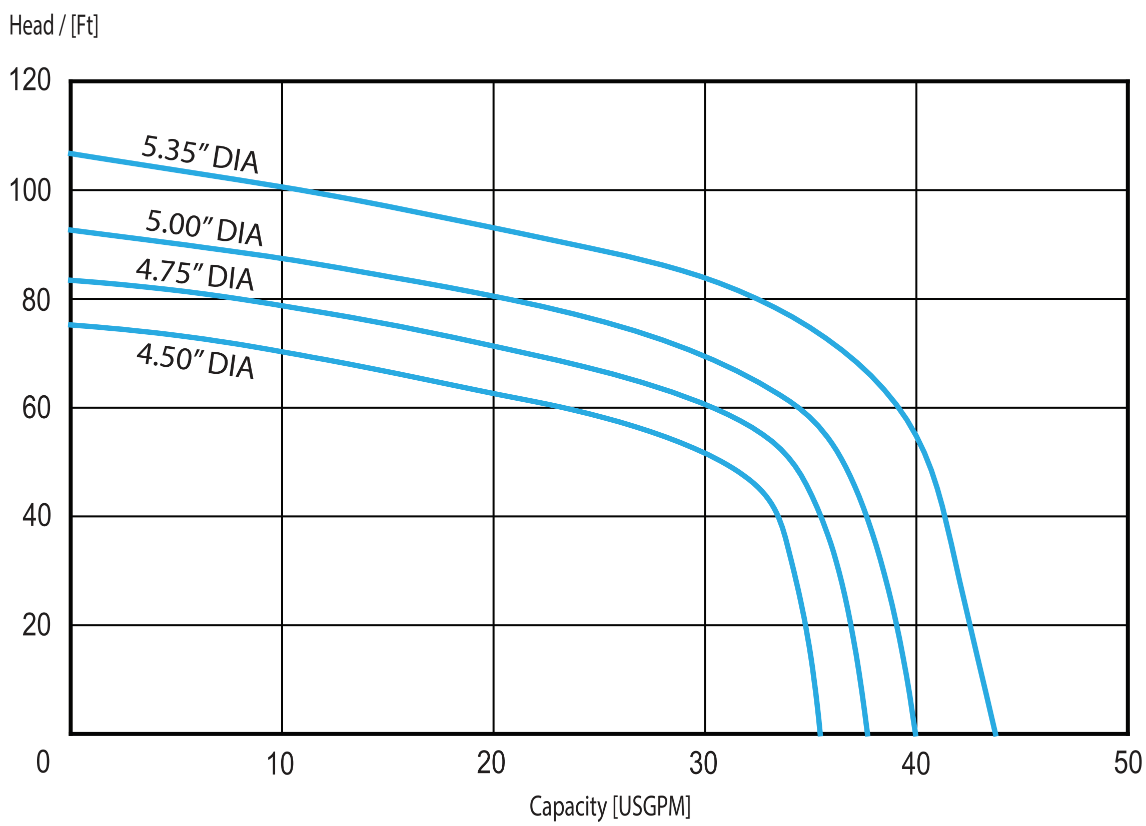
2HP SUBMERSIBLE GRINDER PUMP

GENERAL	
Pump Model	**KG(X)2**
PUMP DATA	
Date	03/26/2015
Discharge Flange	1-1/4" NPT, Vertical
Grinder Ring	26 Slots
Impeller Type / Std. Dia.	Recessed/ 5.35" Dia.

Three Phase

MOTOR DATA	
HP / Power Supply	2HP / 3 ϕ, 60 Hz
Full Load Amps 208V	10 Amps
Start Amps 208V	33 Amps
Full Load Amps 230V	9 Amps
Start Amps 230V	31 Amps
Full Load Amps 460V	4.5 Amps
Start Amps 460V	15 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	F Class

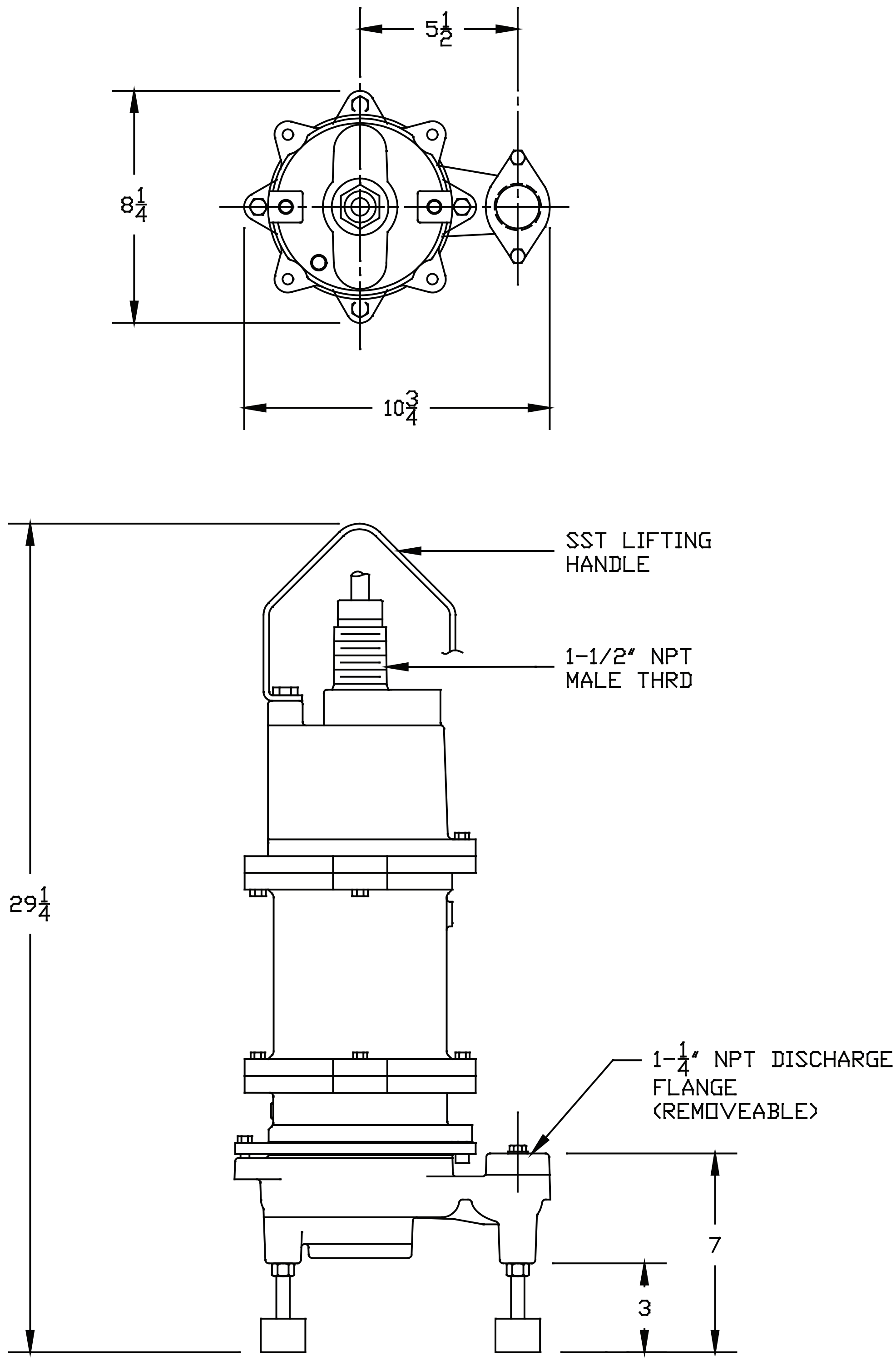
PERFORMANCE CURVE



MODEL	***HP***	***Phase***	***Volts***
KG(X)2-2003	2	3	208
KG(X)2-2303	2	3	230
KG(X)2-4603	2	3	460

* Performance with clear water and ambient temp 20°C (68°F)

Rev. 03/26/15



REV. 02/18/2015

KEEN PUMP COMPANY

KEEN PUMP CO.
471E ST ROUTE 250 EAST
ASHLAND, OHIO 44805

PHONE: 419-207-9400
FAX: 419-207-8031

TITLE K(F/H)GX 2HP GRINDER PUMP DIMENSIONS			
SCALE NTS		**DWG. #** KN-19	**REV.** A
DWG. BY SE	**DATE** 10/02/12		

KHG2

CENTRIGUGAL GRINDER SERIES
(Class 1, Div. 1, Groups C & D Hazardous Location)

ESTABLISHED Recessed Impeller Pump Provides Reliable Service for The Low Pressure Sewer Industry!

"Radial" Cutter
(STANDARD)

"Slicer"
(OPTION)

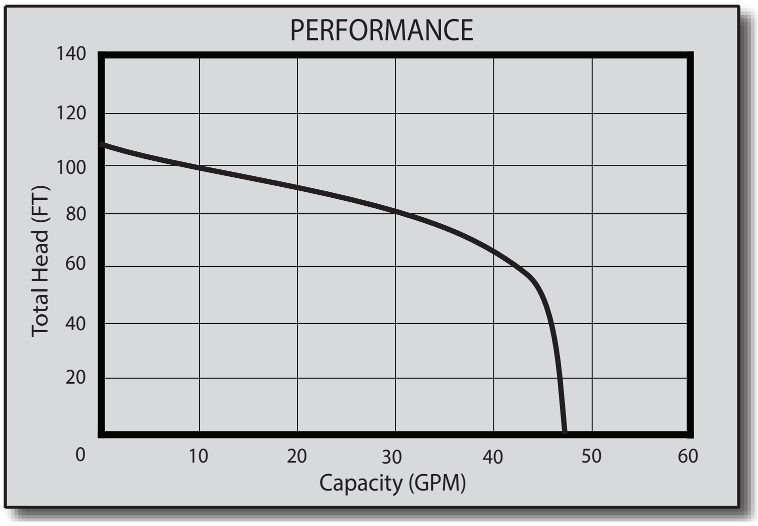
- **PERFORMANCE**
  - Up to 47 GPM
  - Up to 106 Feet Shutoff
- **ADVANCED SLICING FOR "FLUSHABLES"**
  - Wipes, Floor Pads, Etc.
- **SILICON CARBIDE DUAL SEALS**
  - Viton® Elastomers
- **PRESSED OIL-COOLED MOTOR**
  - Superior Heat Transfer
  - Long Bearing & Seal Life
- **HAZARDOUS LOCATION DESIGN**
  - True "Explosion-Proof" Service

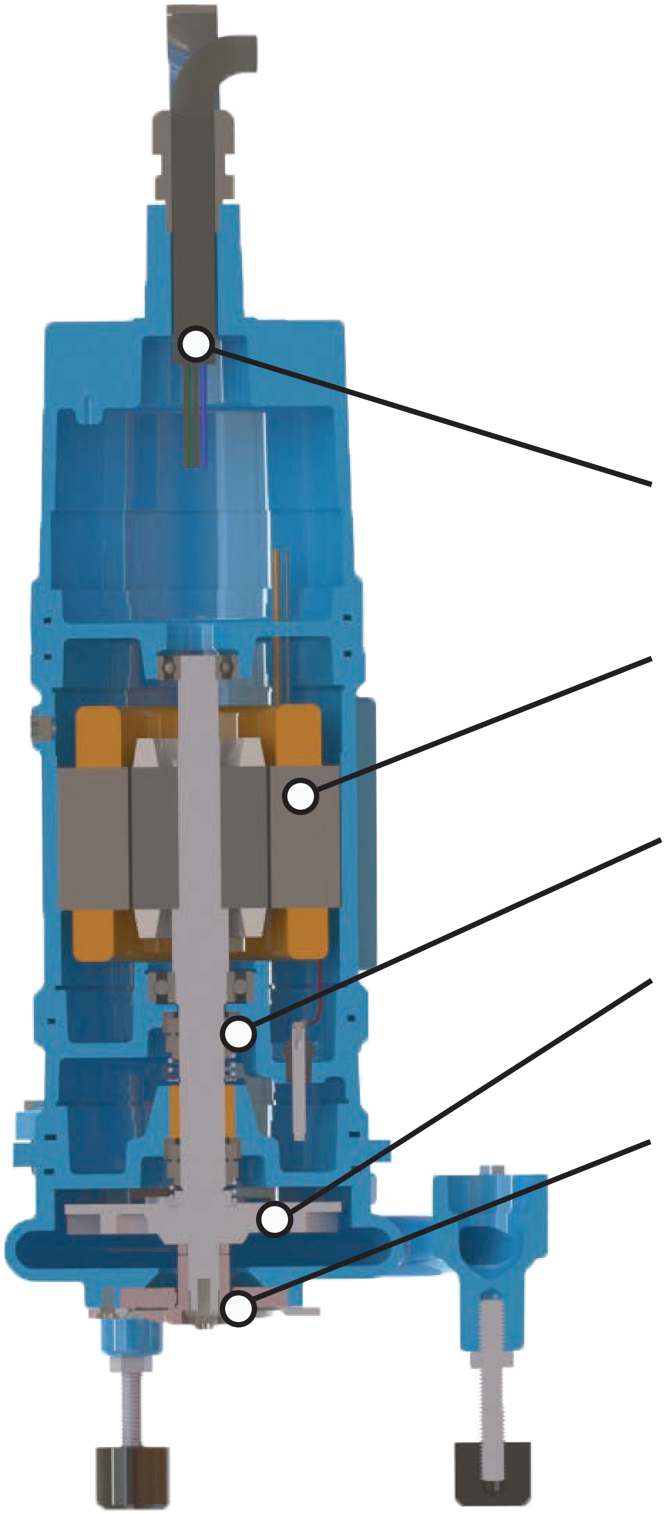
FM APPROVED

Features and Benefits

KHG2

KG2 = Standard
KG2-SL = Slicer Cutting
KG2X = Explosion-Proof
KHG2 = High Head





EPOXY-POTTED CORD ENTRY
- Triple-Barrier Moisture Protection

HIGH-TORQUE MOTOR OIL-COOLED FOR SUPERIOR HEAT DISSIPATION

SUPERIOR DUAL MECHANICAL SEALS - SILICON CARBIDE w/ VITON® ELASTOMERS

RECESSED, VORTEX IMPELLER, DUCTILE IRON
- Allows 100% Performance Curve Operation

ADVANCED CUTTING SYSTEM
- Highly Efficient Solids-Slicing
- User-Friendly Field Service
- Hardened Stainless Steel

INTERCHANGEABILITY
- Radial Cutter or Optional Axial Slicer

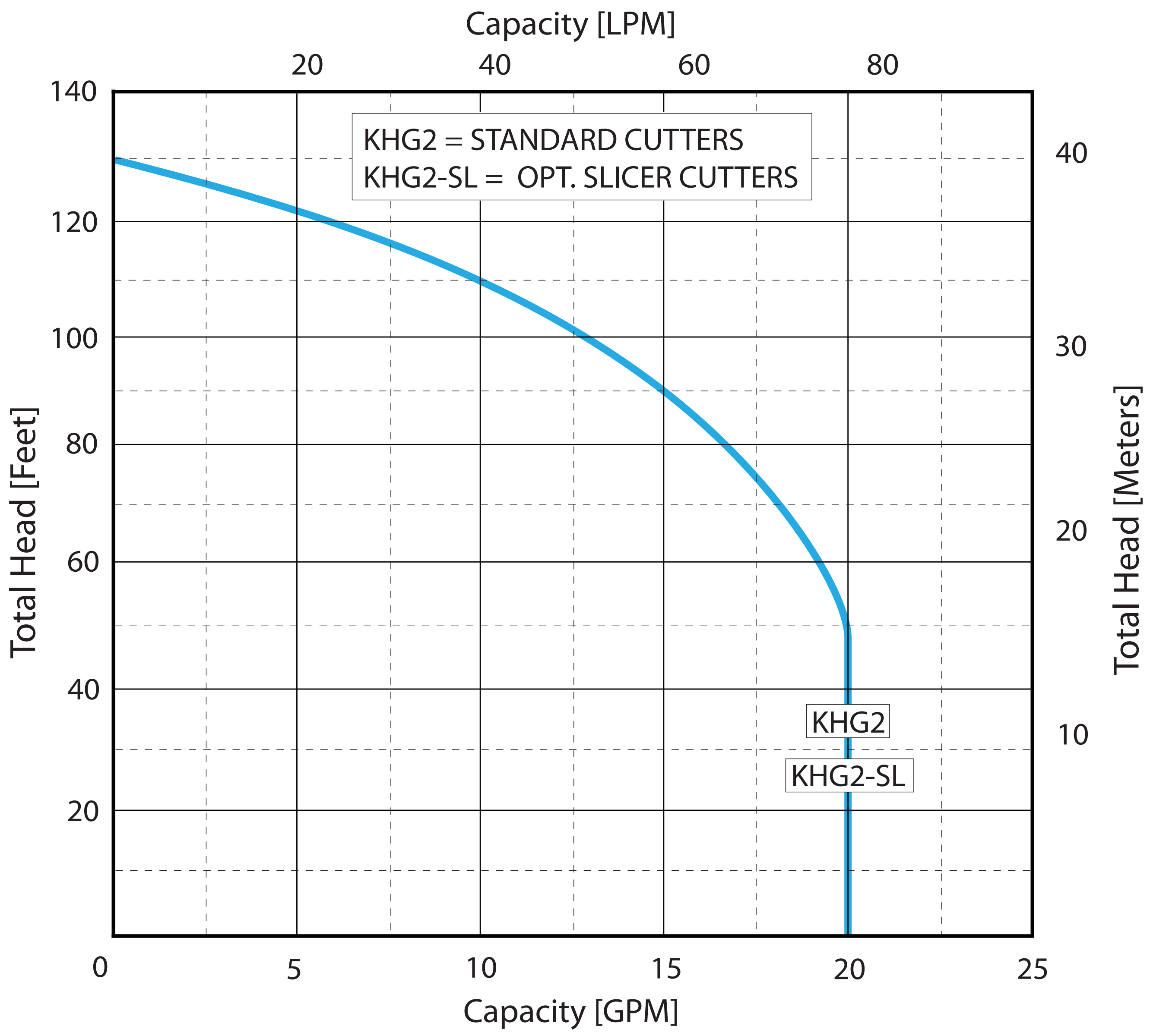
KC0021 06/2019

KEEN PUMP®
471 US HWY 250 East Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

Section	**GRINDER**
Date	SEPT 2017

Pump Series	**KHG2(SL)**	2HP RECESSED IMPELLER (5.63" Dia.)		
Speed	**3450 RPM**	Discharge	1-1/4"	**HIGH HEAD**

GPM: ___________ TDH: ___________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

KC0056

Pump Model: **KHG(X)2, KHG(X)2SL**

Physical Data:

Discharge Size	1-1/4" NPT or 2-Bolt Flange Vertical
Impeller Type	Balanced, Recessed Vortex
Power/Control Cable Length	30' Standard
Paint	Blue, Waterborne Acrylic, High Build – (1) One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266ºF (130ºC)
Power Cord (1 Phase)	12-5 SOOW - 600V, 90º C
Power Cord (3 Phase)	14-7 SOOW – 600V, 90° C
Std. Third Party Approval	FM3615

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 30
Motor Housing	Cast Iron, ASTM A48, Class 30
Bearing Housing	Cast Iron, ASTM A48, Class 30
Volute	Cast Iron, ASTM A48, Class 30
Impeller	Ductile Iron, ASTM A536, Grade 65-45-12
Shaft	ANSI 400 Stainless Steel
***Opt. Rotating "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
***Opt. Stationary "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
Rotating "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Stationary "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Sleeve Bearing	Bronze, Sintered

Pump Model: **KHG(X)2, KHG(X)2SL**

Thermal Data:

Maximum Liquid	140º F (60º C) Intermittent
Maximum Stator	266º F (130º C)
Heat Sensor Open:	275º F (135º C) Max. / 257º F (125º C) Min.
Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point	390º F (199º C)

Electrical Data:

RPM	**3450**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			
External Start Kit	Start Capacitor = 216 ufd, 250 VAC			
	Run Capacitor = 25 ufd, 370 VAC			

Model (Slicer)	**Model** (Radial Cutter)	HP	Volts	Phase	NEC Code	Service Factor	Full Load Amps	SF Amps	Start Amps	Full Load KW	Full Load KVA
KHG2-2081SL	KHG2-2081	2	208	1	G	1.0	20.8	20.8	72.0	4.33	4.33
KHG2-2301SL	KHG2-2301		230				15.5	15.5	54.3	3.72	3.72
KHG2-2401SL	KHG2-2401		240				15.5	15.5	54.3	3.72	3.72
KHG2-2083SL	KHG2-2083	2	208	3	H	1.0	9.5	9.5	33.3	3.42	3.42
KHG2-2303SL	KHG2-2303		230				8.5	8.5	29.8	3.39	3.39
KHG2-4603SL	KHG2-4603		460				4.5	4.5	15.8	3.78	3.78

Pump Model: KHG(X)2C, KHG(X)2-CSL

Physical Data:

Discharge Size	1-1/4" NPT or 2-Bolt Flange Vertical
Impeller Type	Balanced, Recessed Vortex
Power/Control Cable Length	30' Standard
Paint	Blue, Waterborne Acrylic, High Build – (1) One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266ºF (130ºC)
Power Cord	12-3 SOOW - 600V, 90º C
Std. Third Party Approval	FM3615

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 30
Motor Housing	Cast Iron, ASTM A48, Class 30
Bearing Housing	Cast Iron, ASTM A48, Class 30
Volute	Cast Iron, ASTM A48, Class 30
Impeller	Ductile Iron, ASTM A536, Grade 65-45-12
Shaft	ANSI 400 Stainless Steel
***Opt. Rotating "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
***Opt. Stationary "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
Rotating "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Stationary "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Sleeve Bearing	Bronze, Sintered

Pump Model: **KHG(X)2C, KHG(X)2-CSL**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		266º F (130º C)
Heat Sensor	**Open:**	275º F (135º C) Max. / 257º F (125º C) Min.
	Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**3450**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			
Internal Start Kit	Start Capacitor = 216 ufd, 250 VAC			
	Run Capacitor = 25 ufd, 370 VAC			

Model (Slicer)	**Model** (Radial Cutter)	**HP**	**Volts**	**Phase**	**NEC Code**	**Service Factor**	**Full Load Amps**	**SF Amps**	**Start Amps**	**Full Load KW**	**Full Load KVA**
KHG2-2081CSL	KHG2-2081C	2	208	1	G	1.0	20.8	20.8	72.8	4.32	4.32
KHG2-2301CSL	KHG2-2301C		230				15.5	15.5	54.0	3.56	3.56
KHG2-2401CSL	KHG2-2401C		240				15.5	15.5	54.0	3.56	3.56

SPECIFICATIONS

2 HP Grinder Pumps Model Nos. KHG(X)2(SL)

Pump Model – Pump shall be of the centrifugal type, **KHG2(SL)** (High Head) with an integrally built-in grinder unit and submersible type motor. **KHGX2(SL)** series pump and motor assembly shall be FM3615 listed for Class 1, Division 1, Groups C & D hazardous location service. **Pumps not manufactured complete in the USA shall not be considered equal.**

Operating Conditions – The pump shall have a non-overloading maximum capacity of ___GPM, a maximum total dynamic head of ___ feet, and shall use a motor rated at 2 HP and 3450 RPM. The grinder unit shall be capable of macerating all material in typical domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, sanitary wipes, floor pads, small wood, plastic and the like to fine slurry that will easily pass through the pump and 1-1/4” NPT discharge.

Construction – **All castings must be manufactured and supplied by a domestic source located in the USA.** Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry acrylic paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with O-rings, designed and constructed to meet FM3615 for Class 1, Division 1, Groups C & D standards. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides (rabbet joint construction) without the requirement of a specific torque limit. **No secondary sealing compounds, elliptical O-rings, grease, or other devices shall be used.**

Pump Impeller – Pump impeller shall be ductile iron and threaded onto a stainless steel shaft. The impeller shall be of the recessed vortex type to provide an unobstructed passage through the volute for the ground solids. Impeller must be dynamically balanced to specification ISO 1940G 6.3 standard.

Radial Cutter Grinder Construction – Provided as a proven cutting method, both grinder impeller and shredding ring shall be of 440 stainless steel hardened to 58-60 Rockwell C. The grinder assembly shall consist of a grinder impeller and shredding ring mounted directly below the volute passage. The grinder impeller is threaded to a stainless steel shaft, locked with a stainless steel screw and washer. The shredding ring shall be secured by a retaining ring which is bolted into the cast iron volute for easy removal. All grinding of solids shall be from the action of the grinder impeller against the shredding ring. There shall be 24,000 cuts / second. **Note: Model number to REMOVE “SL” if specifying radial cutter construction**
Ex. KG2 (Standard flow pump, non-explosion proof).

OPTIONAL: Slicer Grinder Construction – Maceration is accomplished by a combination of a rotary slicer and stationary slicer plate. Rotary slicer shall consist of (3) blades which protrude away from the inlet. Rotary slicer shall be bolted to shaft within close tolerance of grinding slicer plate. The stationary slicer plate shall consist of engineered-shaped holes for optimum cutting of debris. A slicer plate shall contain grooved slots to eject pump media away from underside of rotary cutter. Slicer plate shall be fastened with countersunk head screws that are flush with surface of plate. **Pumps with protruded or exposed head fasteners shall be considered not equal**. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C.

Seals – Type 21, domestic manufactured, dual mechanical seal construction mounted in tandem, shall protect the motor. Standard construction of primary seal shall be silicon / carbide with Viton® elastomers. Standard construction of secondary seal shall be silicon / carbide with Viton® elastomers. The seal face shall be lapped to a flatness of one light band. Dual electrodes with 330k ohm resistor shall be mounted in the seal chamber to detect water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop the motor, but shall act as a warning only, indicating service is required. **Lip seal arrangements shall not be considered equal.**

Motor – The pump motor construction shall be per NEMA MG-1 1.15 standard and shall be of the submersible type, rated 2 HP, 3450 RPM. The motor shall be for 60 Hz, 208, 230 or 240 volt, single-phase operation. Three-phase operation shall be 208, 230 or 460 volt. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. Start & run capacitors, and starting switch for operating the motor will be found in the control box. Major motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class F insulation. **Any other construction shall not be considered equal**. The stator shall be pressed into the cast iron motor housing. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Maximum skin temperature of motor assembly shall not exceed a T-4 rating per FM3615 standards. **Any motor assembly T-code per FM3615 standard that exceeds a T-4 rating shall be considered not equal.**

Single-phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The overload shall automatically reset when the motor cools to a safe operating temperature.

Three-phase motors contain temperature sensors with (2) two wires for attachment to the control panel.

Bearings / Shaft - The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Bearings shall be designed to an ABEC® System 1 or better.
The upper bearing shall be a Conrad type, single-row, deep groove ball bearing designed to adequately handle the required radial loads. The lower bearing shall be a single-row, deep groove ball bearing designed to adequately compensate for the axial loads and radial forces. Bearings shall be designed to deliver a minimum L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

Power Cord – The motor power cord shall be 12 Ga. Type SOOW, UL listed, CSA approved cable. The cable jacket shall be sealed at the motor entrance by means of an agency-approved rubber compression washer and compression nut. An epoxy-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. **Compression fittings with quick disconnect molded pins shall not be considered equal.** Cord shall withstand a pull strain to meet FM requirements.

KEEN PUMP

KG2C

CENTRIGUGAL GRINDER SERIES
INTERNAL START COMPONENS MOUNTED INSIDE PUMP
(Class 1, Div. 1, Groups C & D Hazardous Location)

RELIABLE Recessed Impeller Pump Includes Internal Capacitor Kit - No Control Box Required!

"Radial" Cutter
(STANDARD)

"Slicer"
(OPTION)

- **PERFORMANCE**
  - Up to 47 GPM
  - Up to 106 Feet Shutoff
- **ADVANCED SLICING FOR "FLUSHABLES"**
  - Wipes, Floor Pads, Etc.
- **SILICON CARBIDE DUAL SEALS**
  - Viton® Elastomers
- **PRESSED OIL-COOLED MOTOR**
  - Superior Heat Transfer
  - Long Bearing & Seal Life
- **HAZARDOUS L OC ATION DESIGN**
  - True "Explosion-Proof" Service

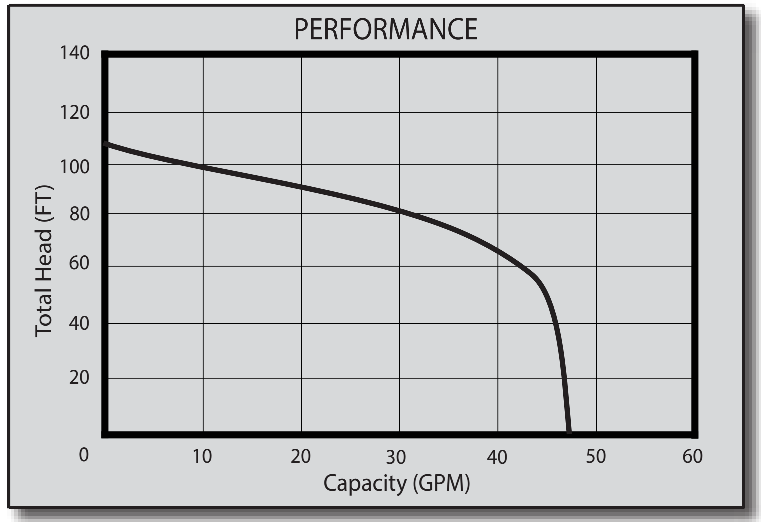
FM APPROVED

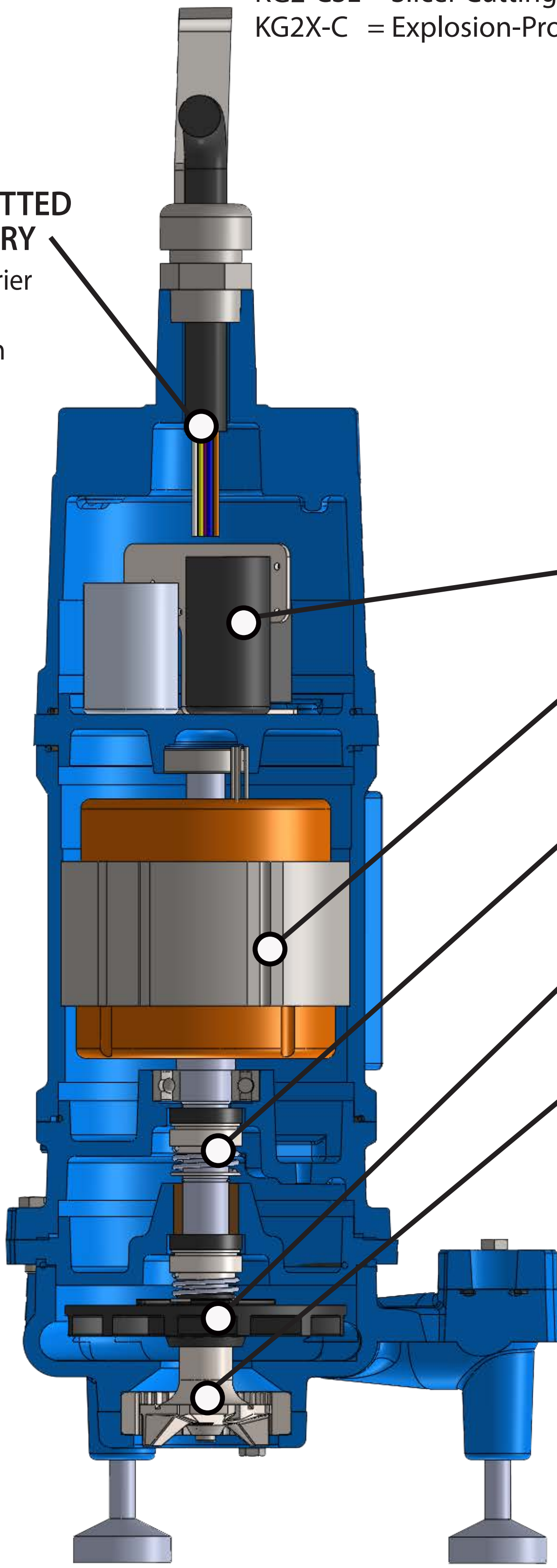
KEEN PUMP

Features and Benefits

KG2C

KG2-C = Standard
KG2-CSL = Slicer Cutting
KG2X-C = Explosion-Proof





EPOXY-POTTED CORD ENTRY
- Triple-Barrier Moisture Protection

INTERNAL START COMPONENTS

HIGH-TORQUE MOTOR OIL-COOLED FOR SUPERIOR HEAT DISSIPATION

SUPERIOR DUAL MECHANICAL SEALS - SILICON CARBIDE w/ VITON® ELASTOMERS

RECESSED, VORTEX IMPELLER, DUCTILE IRON
- Allows 100% Performance Curve Operation

ADVANCED CUTTING SYSTEM
- Highly Efficient Solids-Slicing
- User-Friendly Field Service
- Hardened Stainless Steel

INTERCHANGEABILITY
- Radial Cutter or Optional Axial Slicer

KEEN PUMP®

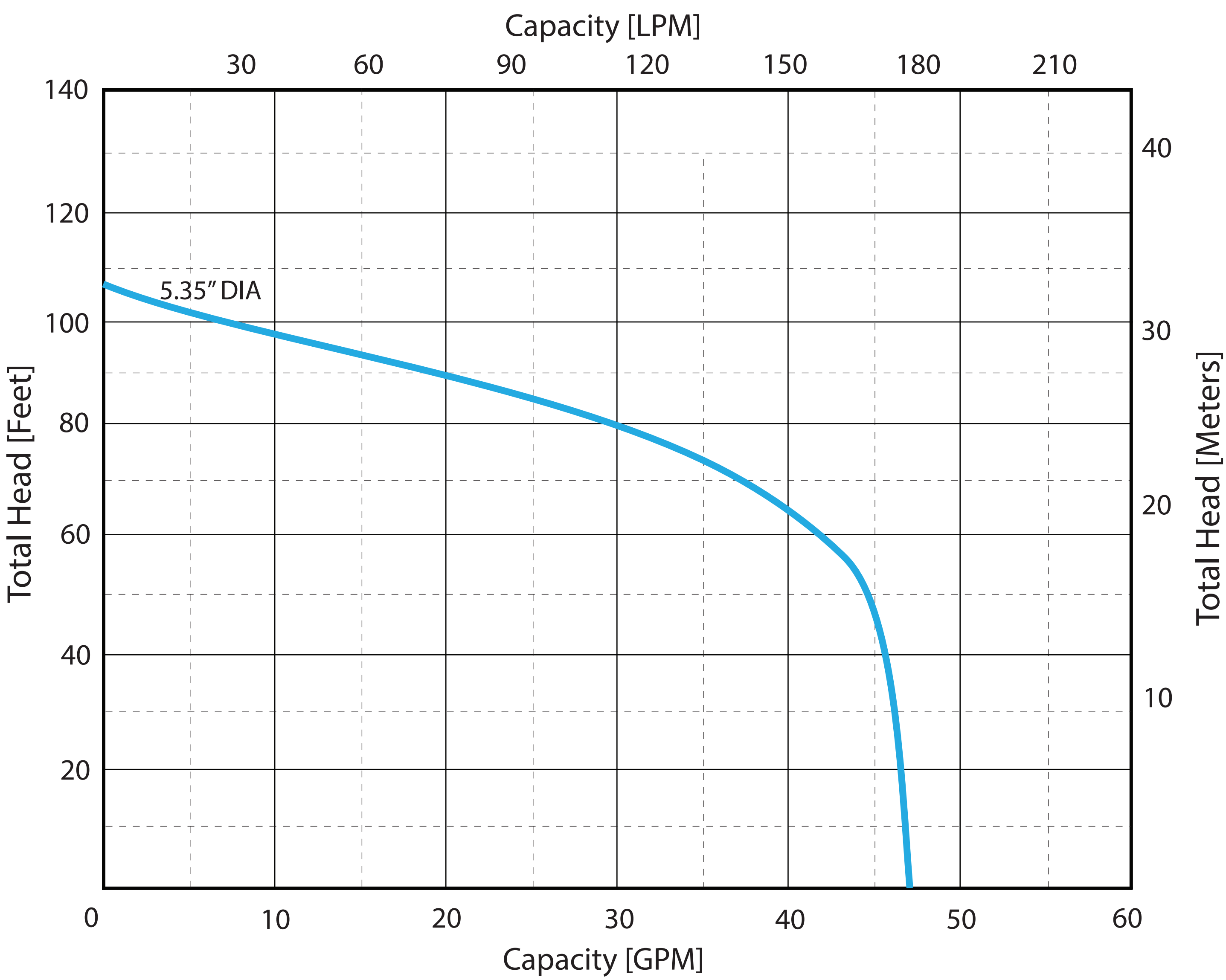
KC0020 06/2019

471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

Section	**GRINDER**	
Date	MAR 2018	

Pump Series	**KG2C**		2HP RECESSED IMPELLER (5.35" Dia.)	
Speed	**3450 RPM**	Discharge	1-1/4"	**STANDARD FLOW**

GPM: ___________ TDH: ___________



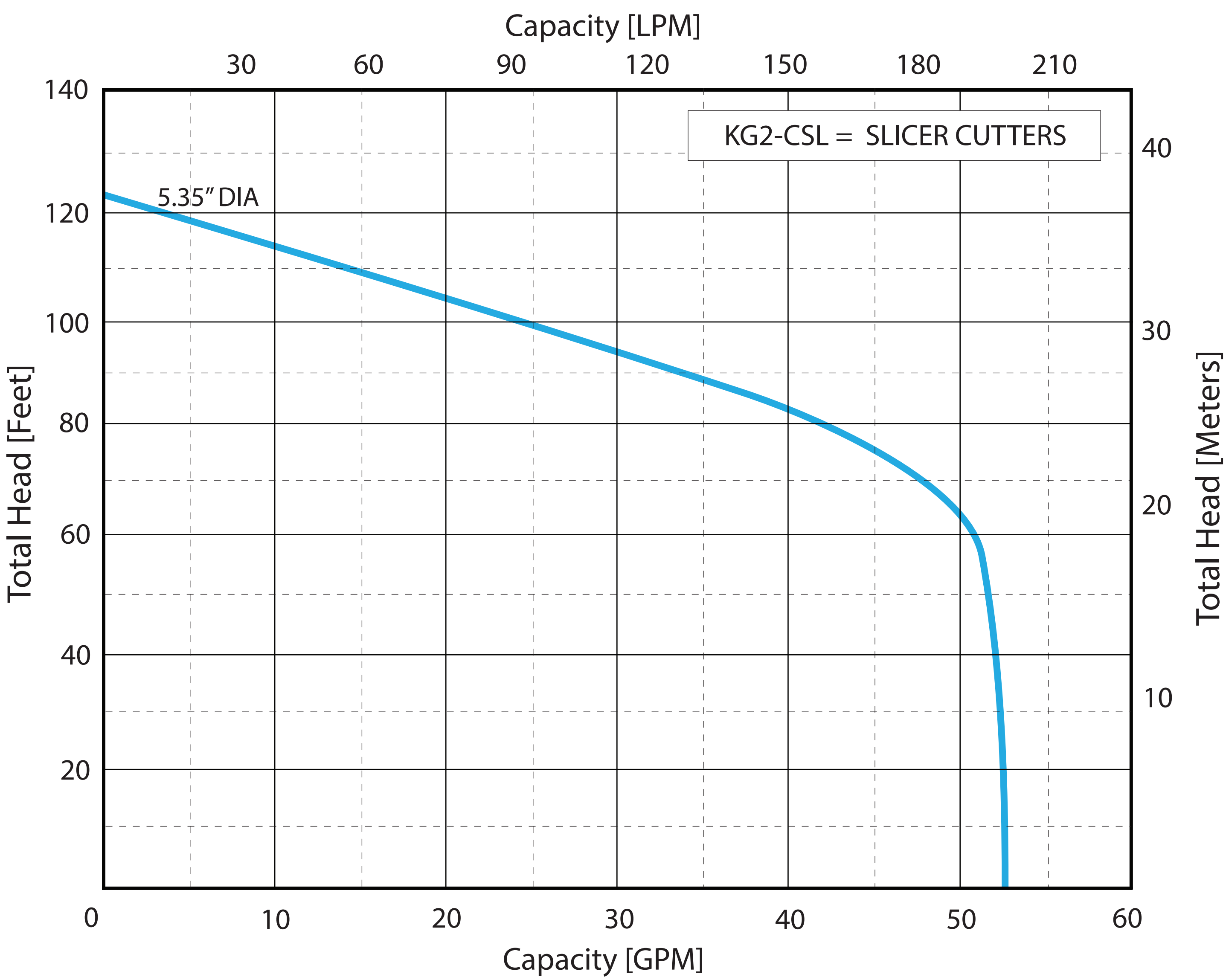
The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

KC0057

	Section	GRINDER
	Date	FEB 2017

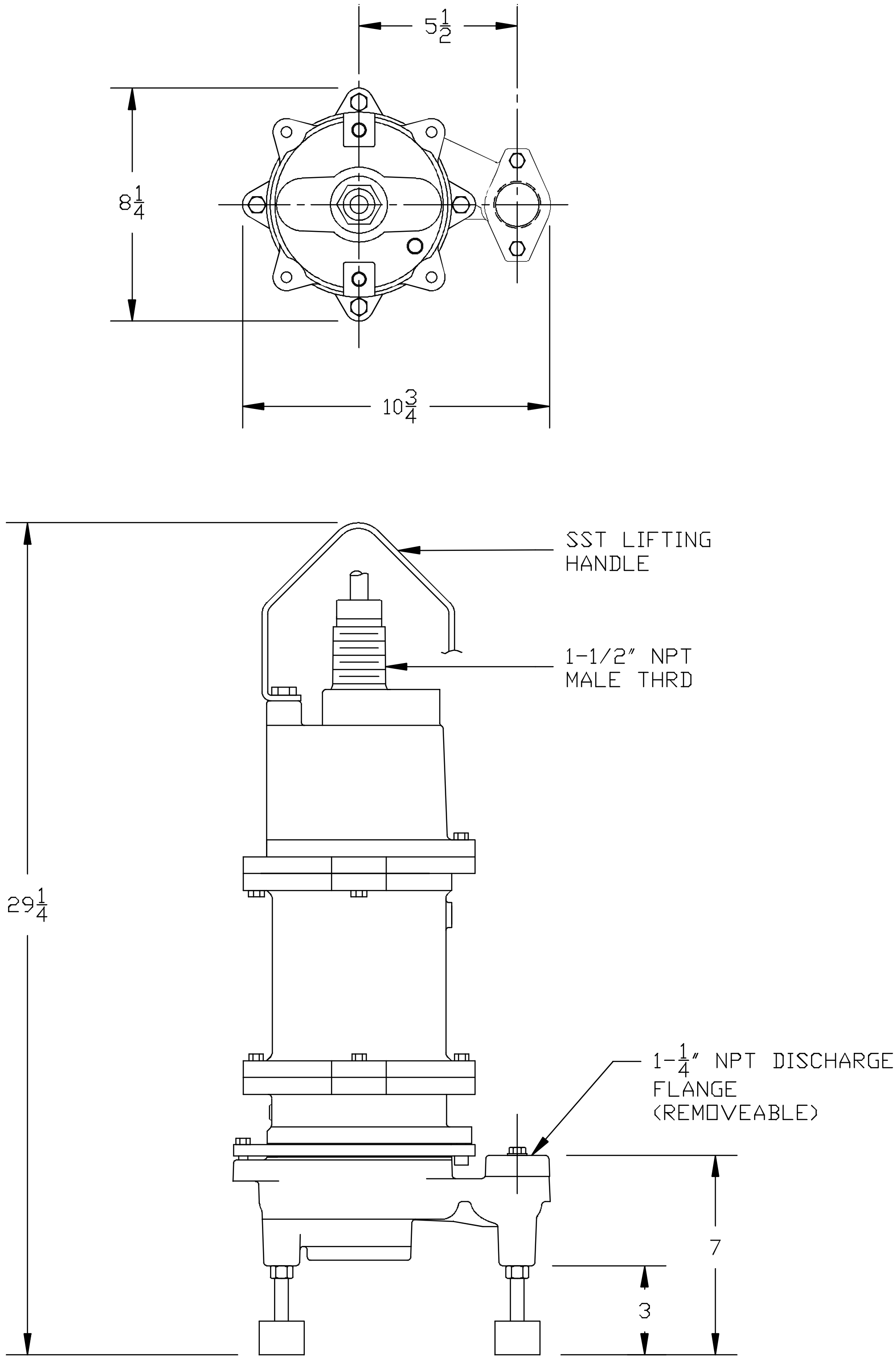
Pump Series	KG2-CSL	2HP RECESSED IMPELLER (5.35" Dia.)		
Speed	3450 RPM	Discharge	1-1/4"	STANDARD FLOW

GPM: ___________ TDH: ___________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

KC0104



NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

B	SE	12/29/2016
A	SE	02/18/2015
REV	INITIALS	DATE

KEEN PUMP COMPANY

KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805

PHONE: 419-207-9400
FAX: 419-207-8031

TITLE K(F)G(X) 2HP "CENTRIFUGAL" GRINDER PUMP			
SCALE NTS		DWG. # KN-19	REV. B
DWG. BY SE	DATE 10/02/12		

Pump Model: **KG(X)2C, KG(X)2-CSL**

Physical Data:

Discharge Size	1-1/4” NPT or 2-Bolt Flange Vertical
Impeller Type	Balanced, Recessed Vortex
Power/Control Cable Length	30’ Standard
Paint	Blue, Waterborne Acrylic, High Build – (1) One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266ºF (130ºC)
Power Cord	12-3 SOOW - 600V, 90º C
Std. Third Party Approval	FM3615

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35
Impeller	Ductile Iron, ASTM A536, Grade 65-45-12
Shaft	ANSI 400 Stainless Steel
***Opt. Rotating “Axial” Slicer**	440 SST Hardened 58-60 Rockwell C
***Opt. Stationary “Axial” Slicer**	440 SST Hardened 58-60 Rockwell C
Rotating “Radial” Cutter	440 SST Hardened 58-60 Rockwell C
Stationary “Radial” Cutter	440 SST Hardened 58-60 Rockwell C
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Sleeve Bearing	Bronze, Sintered

KEEN PUMP®

SPECIFICATIONS

2 HP Grinder Pumps Model Nos. KG(X)2-C(SL)

Pump Model – Pump shall be of the centrifugal type, **KG2-C(SL)** with an integrally built-in grinder unit and submersible type motor. **KG(X)2-C(SL) Series** pump and motor assembly shall be FM3615 listed for Class 1, Division 1, Groups C & D hazardous location service. All models shall have internal start components (Start capacitor, Run Capacitor, Start Switch). **Pumps not manufactured complete in the USA shall not be considered equal.**

Operating Conditions – The pump shall have a non-overloading maximum capacity of ___GPM, a maximum total dynamic head of ___ feet, and shall use a motor rated at 2 HP and 3450 RPM. The grinder unit shall be capable of macerating all material in typical domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, sanitary wipes, floor pads, small wood, plastic and the like to fine slurry that will easily pass through the pump and 1-1/4" NPT discharge.

Construction – **All castings must be manufactured and supplied by a domestic source located in the USA.** Major pump components shall be of gray cast iron, ASTM A-48, Class 35, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry acrylic paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with O-rings, designed and constructed to meet FM3615 for Class 1, Division 1, Groups C & D standards. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides (rabbet joint construction) without the requirement of a specific torque limit. **No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.**

Pump Impeller – Pump impeller shall be ductile iron and threaded onto a stainless steel shaft. The impeller shall be of the recessed vortex type to provide an unobstructed passage through the volute for the ground solids. Impeller must be dynamically balanced to specification ISO 1940G 6.3 standard.

Radial Cutter Grinder Construction – Provided as a proven cutting method, both grinder impeller and shredding ring shall be of 440 stainless steel hardened to 58-60 Rockwell C. The grinder assembly shall consist of a grinder impeller and shredding ring mounted directly below the volute passage. The grinder impeller is threaded to a stainless steel shaft, locked with a stainless steel screw and washer. The shredding ring shall be secured by a retaining ring which is bolted into the cast iron volute for easy removal. All grinding of solids shall be from the action of the grinder impeller against the shredding ring. There shall be 16,600 cuts / second. **Note: Model number to REMOVE "SL" if specifying radial cutter construction**
Ex. KG2-C (Standard flow pump, non-explosion proof).

OPTIONAL: Slicer Grinder Construction – Maceration is accomplished by a combination of a rotary slicer and stationary slicer plate. Rotary slicer shall consist of (3) blades which protrude away from the inlet. Rotary slicer shall be bolted to shaft within close tolerance of grinding slicer plate. The stationary slicer plate shall consist of engineered-shaped holes for optimum cutting of debris. A slicer plate shall contain grooved slots to eject pump media away from underside of rotary cutter. Slicer plate shall be fastened with countersunk head screws that are flush with surface of plate. **Pumps with protruded or exposed head fasteners shall be considered not equal**. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C.

Seals – Type 21, domestic manufactured, dual mechanical seal construction mounted in tandem, shall protect the motor. Standard construction of primary seal shall be silicon / carbide with Viton® elastomers. Standard construction of secondary seal shall be silicon / carbide with Viton® elastomers. The seal face shall be lapped to a flatness of one light band. **Lip seal arrangements shall not be considered equal.**

Motor – The pump motor construction shall be per NEMA MG-1 1.15 standard and shall be of the submersible type, rated 2 HP, 3450 RPM. The motor shall be for 60 Hz, 208, 230 or 240 volt, single-phase operation. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. Start & run capacitors, and electronic relay for operating the motor will be found in the pump cord cap. Major motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class F insulation. **Any other construction shall not be considered equal**. The stator shall be pressed into the cast iron motor housing. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Maximum skin temperature of motor assembly shall not exceed a T-4 rating per FM3615 standards. **Any motor assembly T-code per FM3615 standard that exceeds a T-4 rating shall be considered not equal.**

Single phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well or any condition that may cause the pump to run outside of the specified operating temperature range.

Internal Start Kit – Start/Run capacitor with start switch securely positioned in dry compartment. A total of (4) bolts quickly removes cord cap for easy servicing.

Bearings / Shaft - The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Bearings shall be designed to an ABEC® System 1 or better.
The upper bearing shall be a Conrad type, single-row, deep groove ball bearing designed to adequately handle the required radial loads. The lower bearing shall be a single-row, deep groove ball bearing designed to adequately compensate for the axial loads and radial forces. Bearings shall be designed to deliver a minimum
L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

Power Cord – The motor power cord shall be 12 Ga. Type SOOW, UL listed, CSA approved cable. The cable jacket shall be sealed at the motor entrance by means of an agency-approved rubber compression washer and compression nut. An epoxy-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. **Compression fittings with quick disconnect molded pins shall not be considered equal.** Cord shall withstand a pull strain to meet FM requirements.

KFG2

CENTRIGUGAL GRINDER SERIES
(Class 1, Div. 1, Groups C & D Hazardous Location)

High Flow Recessed Impeller Pump Provides Reliable Service for The Low Pressure Sewer Industry!

"Radial" Cutter
(STANDARD)

"Slicer"
(OPTION)

- **HIGH FLOW PERFORMANCE**
  - Up to 68 GPM
  - Up to 95 Feet Shutoff
- **ADVANCED SLICING FOR "FLUSHABLES"**
  - Wipes, Floor Pads, Etc.
- **SILICON CARBIDE DUAL SEALS**
  - Viton® Elastomers
- **PRESSED OIL-COOLED MOTOR**
  - Superior Heat Transfer
  - Long Bearing & Seal Life
- **HAZARDOUS LOCATION DESIGN**
  - True "Explosion-Proof" Service

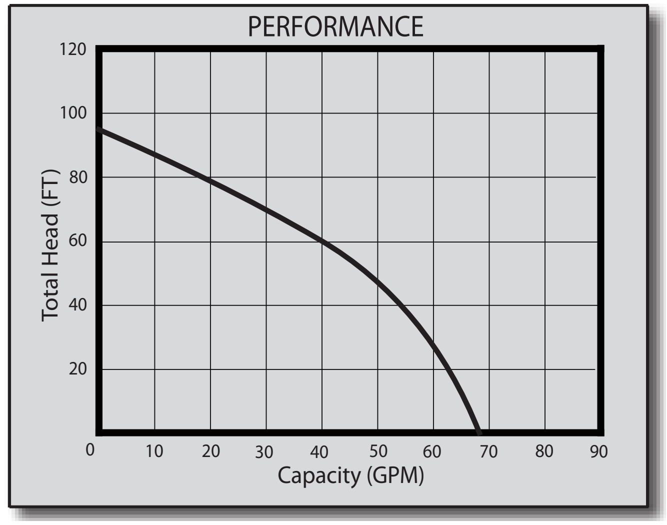
FM

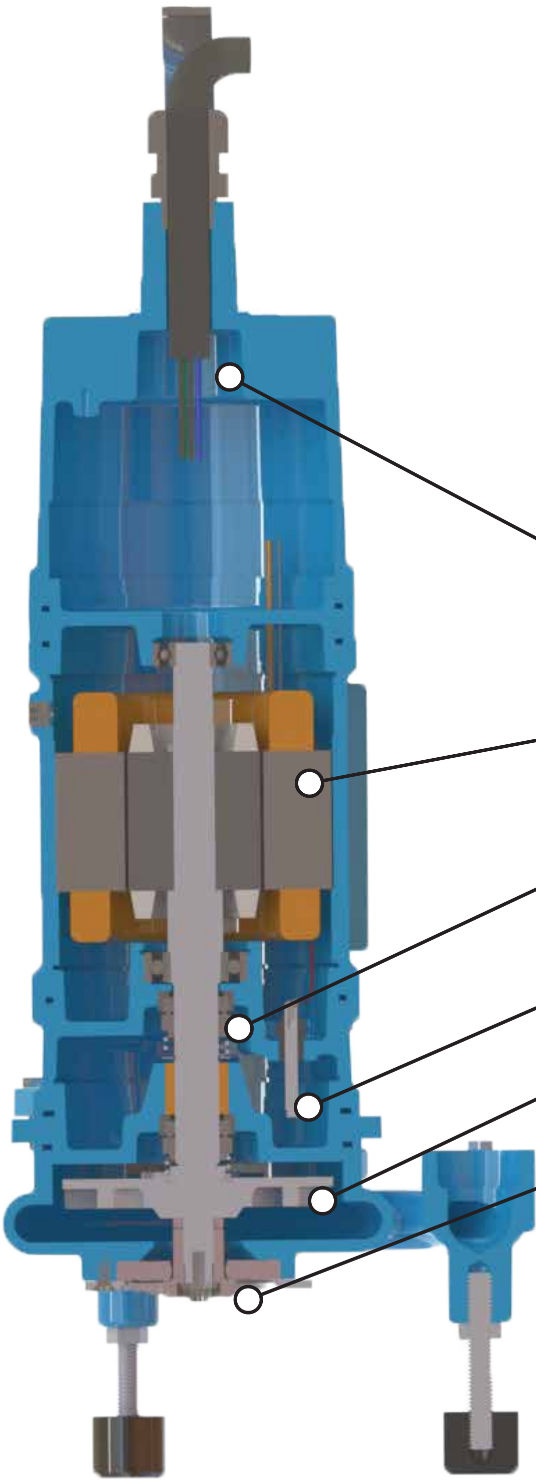
KEEN PUMP

Features and Benefits

KFG2

KFG2 = Standard
KFG2-SL = Slicer Cutting
KFGX2 = Explosion-Proof





EPOXY-POTTED CORD ENTRY
- Triple-Barrier Moisture Protection

HIGH-TORQUE MOTOR OIL-COOLED FOR SUPERIOR HEAT DISSIPATION

SUPERIOR DUAL MECHANICAL SEALS - SILICON CARBIDE w/ VITON® ELASTOMERS

SEAL LEAK DETECTION

RECESSED, VORTEX IMPELLER, DUCTILE IRON
- Allows 100% Performance Curve Operation

ADVANCED CUTTING SYSTEM
- Highly Efficient Solids-Slicing
- User-Friendly Field Service
- Hardened Stainless Steel

INTERCHANGEABILITY
- Radial Cutter or Optional Axial Slicer

KC0022 06/2019

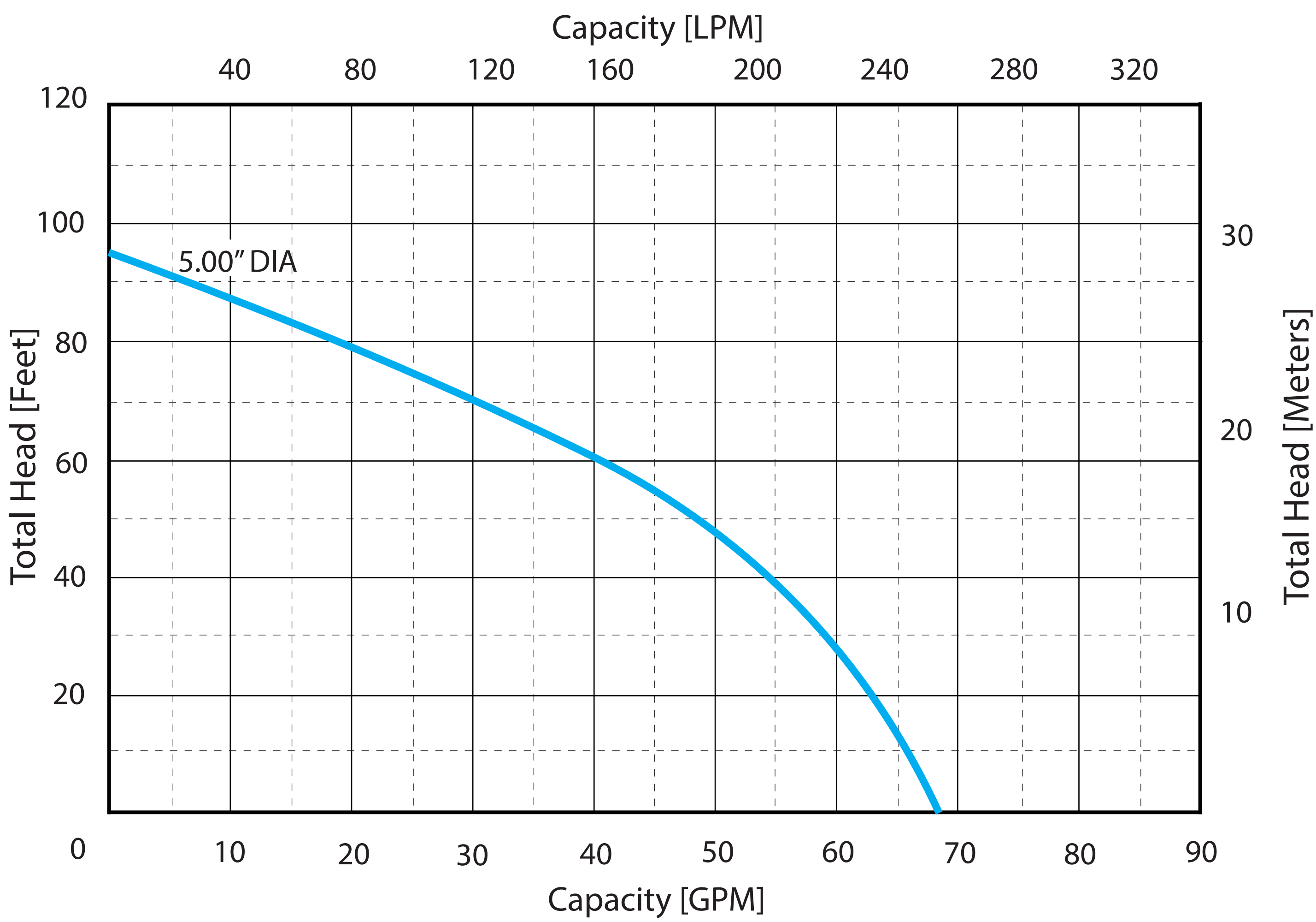
KEEN PUMP
471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

Section **GRINDER**
Date MAR 2018

Pump Series	**KFG2**	2HP RECESSED IMPELLER (5.00" Dia.)

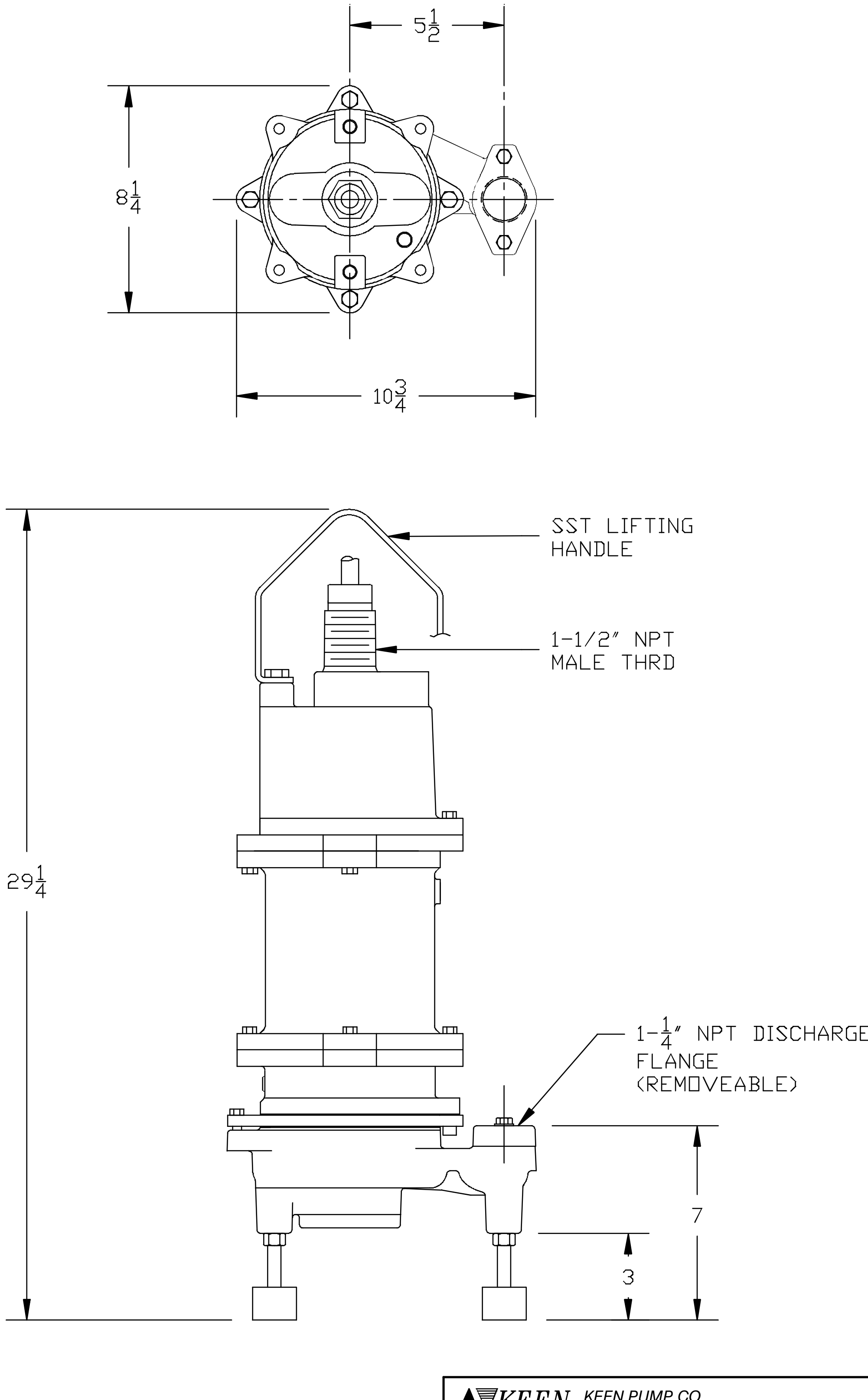
Speed	**3450 RPM**	Discharge	1-1/4"	**HIGH FLOW**

GPM: ___________ TDH: ___________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

KC0054



NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

B	SE	12/29/2016
A	SE	02/18/2015
REV	INITIALS	DATE

KEEN PUMP COMPANY
KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: K(F)G(X) 2HP "CENTRIFUGAL" GRINDER PUMP			
SCALE: NTS		DWG. #: KN-19	REV.: B
DWG. BY: SE	DATE: 10/02/12		

Pump Model: **KFG(X)2, KFG(X)2-SL**

Physical Data:

Discharge Size	1-1/4" NPT or 2-Bolt Flange Vertical
Impeller Type	Balanced, Recessed Vortex
Power/Control Cable Length	30' Standard
Paint	Blue, Waterborne Acrylic, High Build – (1) One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266ºF (130ºC)
Power Cord (1 Phase)	12-5 SOOW - 600V, 90º C
Power Cord (3 Phase)	14-7 SOOW – 600V, 90° C
Std. Third Party Approval	FM3615

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35
Impeller	Ductile Iron, ASTM A536, Grade 65-45-12
Shaft	ANSI 400 Stainless Steel
***Opt. Rotating "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
***Opt. Stationary "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
Rotating "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Stationary "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Sleeve Bearing	Bronze, Sintered

SPECIFICATIONS

2 HP Grinder Pumps Model Nos. K(F)G(X)2(SL)

Pump Model – Pump shall be of the centrifugal type, **KG2(SL)** (Standard Flow) or **KFG2(SL)** (High Flow) with an integrally built-in grinder unit and submersible type motor. **KGX2(SL) or KFGX2(SL)** series pump and motor assembly shall be FM3615 listed for Class 1, Division 1, Groups C & D hazardous location service. **Pumps not manufactured complete in the USA shall not be considered equal.**

Operating Conditions – The pump shall have a non-overloading maximum capacity of ___GPM, a maximum total dynamic head of ___ feet, and shall use a motor rated at 2 HP and 3450 RPM. The grinder unit shall be capable of macerating all material in typical domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, sanitary wipes, floor pads, small wood, plastic and the like to fine slurry that will easily pass through the pump and 1-1/4” NPT discharge.

Construction – **All castings must be manufactured and supplied by a domestic source located in the USA.** Major pump components shall be of gray cast iron, ASTM A-48, Class 35, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry acrylic paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with O-rings, designed and constructed to meet FM3615 for Class 1, Division 1, Groups C & D standards. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides (rabbet joint construction) without the requirement of a specific torque limit. **No secondary sealing compounds, elliptical O-rings, grease, or other devices shall be used.**

Pump Impeller – Pump impeller shall be ductile iron and threaded onto a stainless steel shaft. The impeller shall be of the recessed vortex type to provide an unobstructed passage through the volute for the ground solids. Impeller must be dynamically balanced to specification ISO 1940G 6.3 standard.

Radial Cutter Grinder Construction – Provided as a proven cutting method, both grinder impeller and shredding ring shall be of 440 stainless steel hardened to 58-60 Rockwell C. The grinder assembly shall consist of a grinder impeller and shredding ring mounted directly below the volute passage. The grinder impeller is threaded to a stainless steel shaft, locked with a stainless steel screw and washer. The shredding ring shall be secured by a retaining ring which is bolted into the cast iron volute for easy removal. All grinding of solids shall be from the action of the grinder impeller against the shredding ring. There shall be 24,000 cuts / second. **Note: Model number to REMOVE “SL” if specifying radial cutter construction**
Ex. KG2 (Standard flow pump, non-explosion proof).

OPTIONAL: Slicer Grinder Construction – Maceration is accomplished by a combination of a rotary slicer and stationary slicer plate. Rotary slicer shall consist of (3) blades which protrude away from the inlet. Rotary slicer shall be bolted to shaft within close tolerance of grinding slicer plate. The stationary slicer plate shall consist of engineered-shaped holes for optimum cutting of debris. A slicer plate shall contain grooved slots to eject pump media away from underside of rotary cutter. Slicer plate shall be fastened with countersunk head screws that are flush with surface of plate. **Pumps with protruded or exposed head fasteners shall be considered not equal**. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C.

Seals – Type 21, domestic manufactured, dual mechanical seal construction mounted in tandem, shall protect the motor. Standard construction of primary seal shall be silicon / carbide with Viton® elastomers. Standard construction of secondary seal shall be silicon / carbide with Viton® elastomers. The seal face shall be lapped to a flatness of one light band. Dual electrodes with 330k ohm resistor shall be mounted in the seal chamber to detect water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop the motor, but shall act as a warning only, indicating service is required. **Lip seal arrangements shall not be considered equal.**

Motor – The pump motor construction shall be per NEMA MG-1 1.15 standard and shall be of the submersible type, rated 2 HP, 3450 RPM. The motor shall be for 60 Hz, 208, 230 or 240 volt, single-phase operation. Three-phase operation shall be 208, 230 or 460 volt. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. Start & run capacitors, and starting switch for operating the motor will be found in the control box. Major motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class F insulation. **Any other construction shall not be considered equal**. The stator shall be pressed into the cast iron motor housing. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Maximum skin temperature of motor assembly shall not exceed a T-4 rating per FM3615 standards. **Any motor assembly T-code per FM3615 standard that exceeds a T-4 rating shall be considered not equal.**

Single-phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The overload shall automatically reset when the motor cools to a safe operating temperature.

Three-phase motors contain temperature sensors with (2) two wires for attachment to the control panel.

Bearings / Shaft - The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Bearings shall be designed to an ABEC® System 1 or better.
The upper bearing shall be a Conrad type, single-row, deep groove ball bearing designed to adequately handle the required radial loads. The lower bearing shall be a single-row, deep groove ball bearing designed to adequately compensate for the axial loads and radial forces. Bearings shall be designed to deliver a minimum
L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

Power Cord – The motor power cord shall be 12 Ga. Type SOOW, UL listed, CSA approved cable. The cable jacket shall be sealed at the motor entrance by means of an agency-approved rubber compression washer and compression nut. An epoxy-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. **Compression fittings with quick disconnect molded pins shall not be considered equal.** Cord shall withstand a pull strain to meet FM requirements.

K(F)G2-HZ

CENTRIGUGAL GRINDER SERIES
(Class 1, Div. 1, Groups C & D Hazardous Location)

Horizontal Discharge Recessed Impeller Provides Replacement for The Low Pressure Sewer Industry!

"Radial" Cutter
(STANDARD)

"Slicer"
(OPTION)

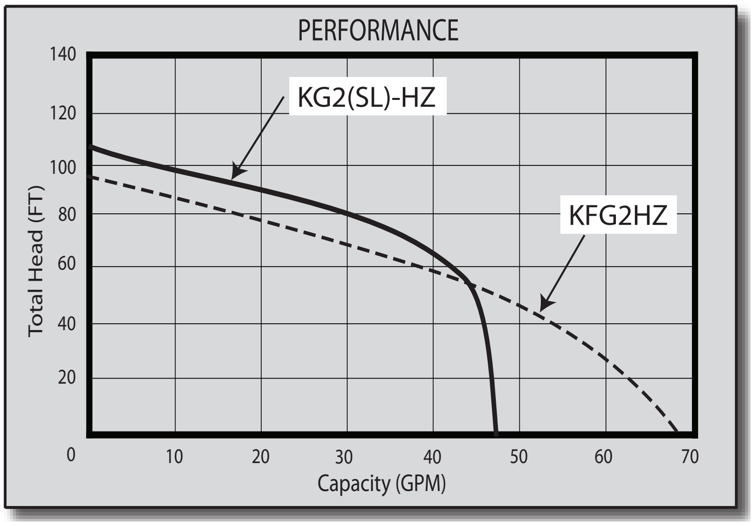
- **PERFORMANCE**
  - Up to 68 GPM
  - Up to 106 Feet Shutoff
- **ADVANCED SLICING FOR "FLUSHABLES"**
  - Wipes, Floor Pads, Etc.
- **SILICON CARBIDE DUAL SEALS**
  - Viton® Elastomers
- **PRESSED OIL-COOLED MOTOR**
  - Superior Heat Transfer
  - Long Bearing & Seal Life
- **HAZARDOUS LOCATION DESIGN**
  - True "Explosion-Proof" Service

FM

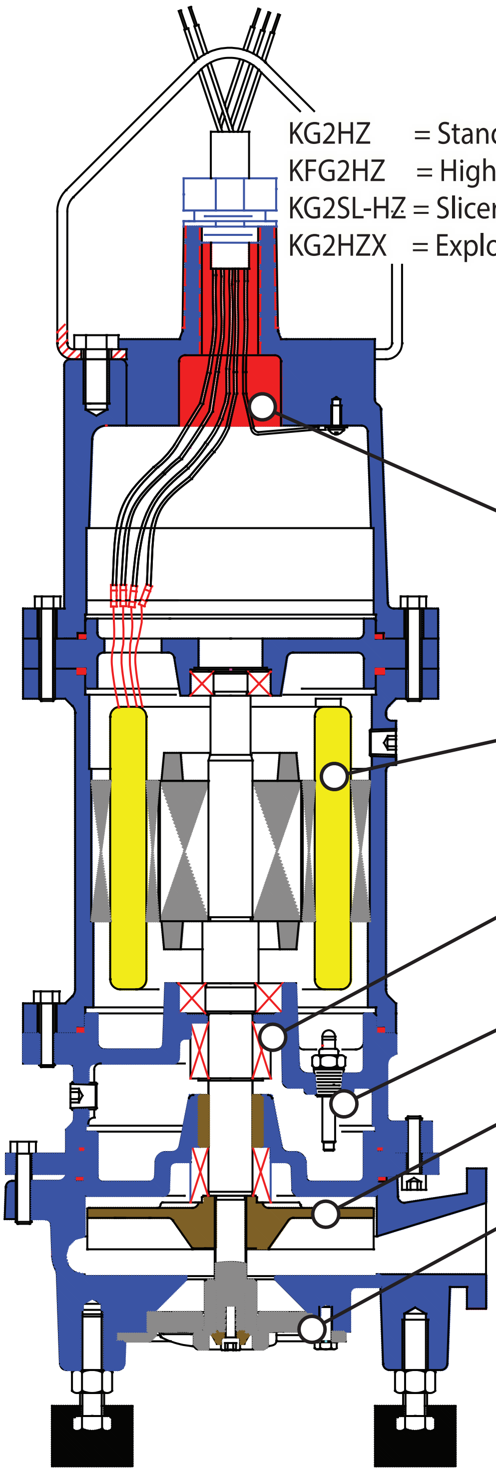
KEEN PUMP®

Features and Benefits

K(F)G2-HZ



KG2HZ = Standard
KFG2HZ = High Flow
KG2SL-HZ = Slicer Cutting
KG2HZX = Explosion-Proof



EPOXY-POTTED CORD ENTRY
- Triple-Barrier Moisture Protection

HIGH-TORQUE MOTOR OIL-COOLED FOR SUPERIOR HEAT DISSIPATION

SUPERIOR DUAL MECHANICAL SEALS - SILICON CARBIDE w/ VITON® ELASTOMERS

SEAL LEAK DETECTION

RECESSED, VORTEX IMPELLER, DUCTILE IRON
- Allows 100% Performance Curve Operation

ADVANCED CUTTING SYSTEM
- Highly Efficient Solids-Slicing
- User-Friendly Field Service
- Hardened Stainless Steel

INTERCHANGEABILITY
- Radial Cutter or Optional Axial Slicer

KEEN PUMP®
471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

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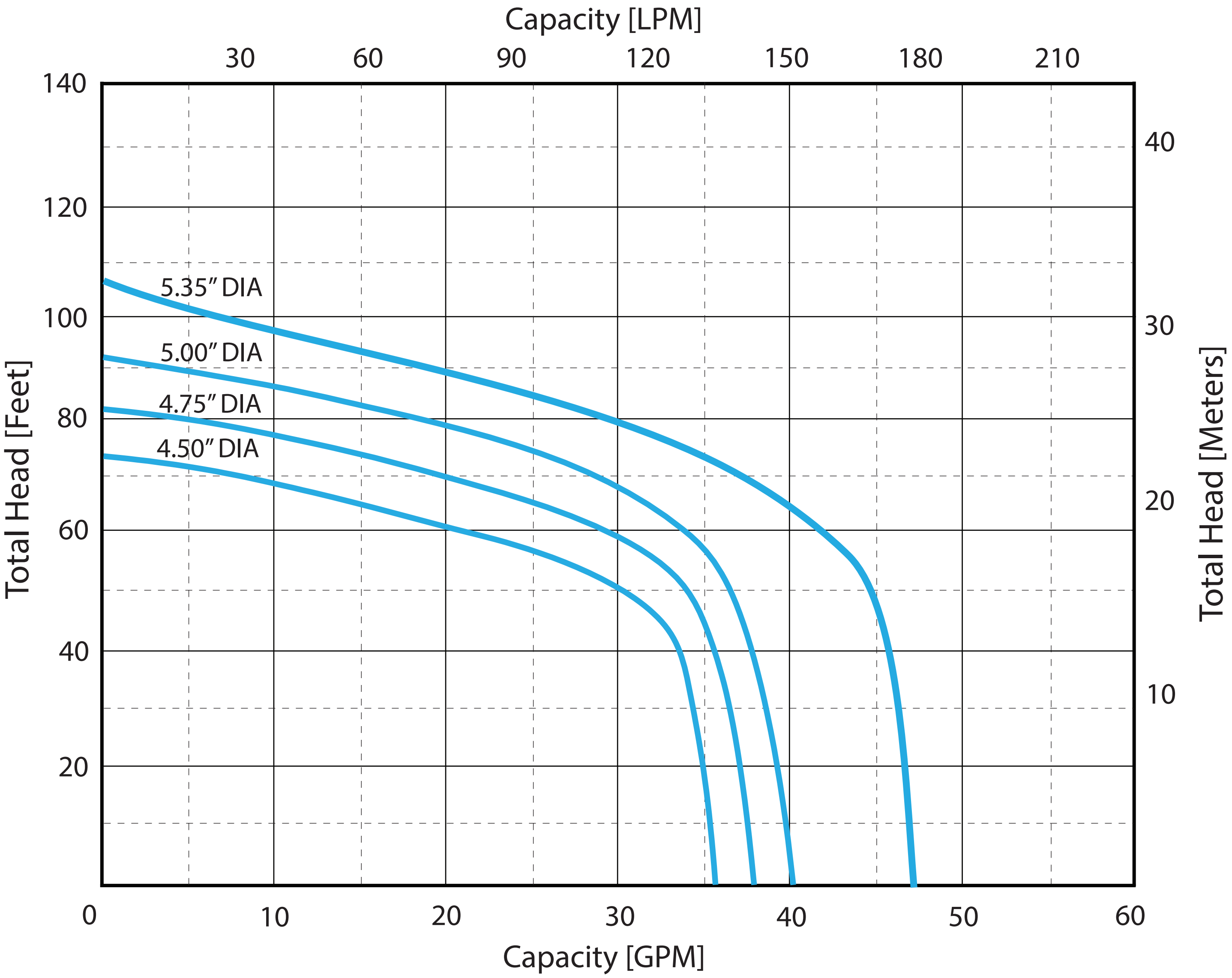
Section **GRINDER**
Date MAR 2018

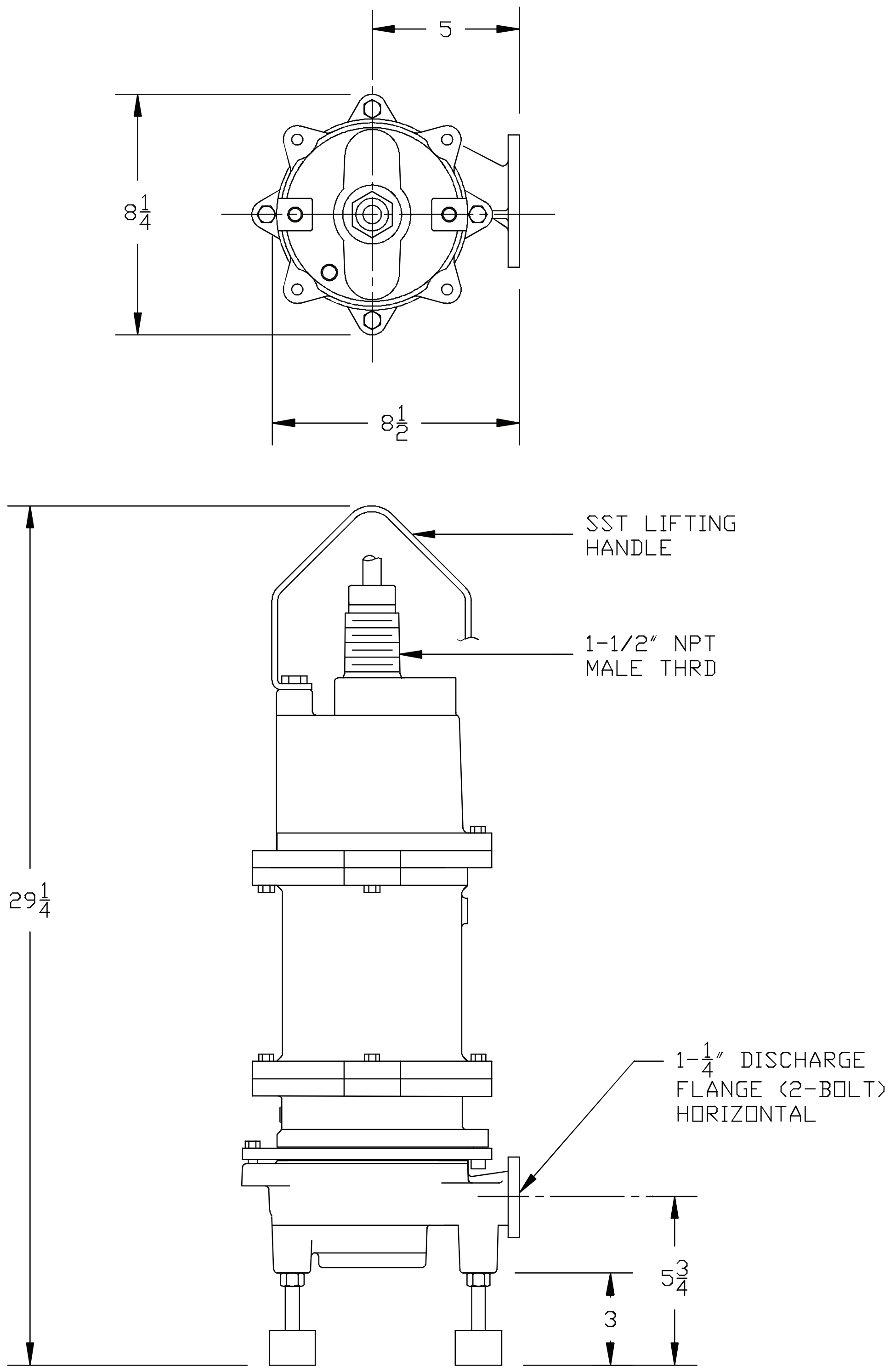
Pump Series	KG2HZ		2HP RECESSED IMPELLER (5.35" Dia.)	
Speed	3450 RPM	Discharge	1-1/4"	HORIZONTAL DISCHARGE

GPM: ___________ TDH: ___________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

KC0059



KEEN PUMP COMPANY

KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: KG(X)2HZ 2HP HORIZONTAL GRINDER DIMENSIONS

SCALE	DWG. #	REV.
NTS	KN-873	B

DWG. BY	DATE
SE	03/12/2014

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE
B	SE	03/26/2015
A	SE	02/18/2015

Pump Model: **K(F)G(X)2HZ, K(F)G(X)2SL-HZ**

Physical Data:

Discharge Size	2-Bolt Flange Horizontal
Impeller Type	Balanced, Recessed Vortex
Power/Control Cable Length	30' Standard
Paint	Blue, Waterborne Acrylic, High Build – (1) One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266ºF (130ºC)
Power Cord (1 Phase)	12-5 SOOW - 600V, 90º C
Power Cord (3 Phase)	14-7 SOOW – 600V, 90° C
Std. Third Party Approval	FM3615

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35
Impeller	Ductile Iron, ASTM A536, Grade 65-45-12
Shaft	ANSI 400 Stainless Steel
***Opt. Rotating "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
***Opt. Stationary "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
Rotating "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Stationary "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Sleeve Bearing	Bronze, Sintered

KEEN PUMP®

SPECIFICATIONS

2 HP Grinder Pumps Model Nos. KG(X)2HZ(SL)

Pump Model – Pump shall be of the centrifugal type, **KG2HZ(SL)** (Horizontal Discharge), with an integrally built-in grinder unit and submersible type motor. **KGX2HZ(SL)** (Horizontal Discharge) series pump and motor assembly shall be FM3615 listed for Class 1, Division 1, Groups C & D hazardous location service. **Pumps not manufactured complete in the USA shall not be considered equal.**

Operating Conditions – The pump shall have a non-overloading maximum capacity of ___GPM, a maximum total dynamic head of ___ feet, and shall use a motor rated at 2 HP and 3450 RPM. The grinder unit shall be capable of macerating all material in typical domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, sanitary wipes, floor pads, small wood, plastic and the like to fine slurry that will easily pass through the pump and horizontal 1-1/4" NPT discharge (2-bolt flange).

Construction – **All castings must be manufactured and supplied by a domestic source located in the USA.** Major pump components shall be of gray cast iron, ASTM A-48, Class 35, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry acrylic paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with O-rings, designed and constructed to meet FM3615 for Class 1, Division 1, Groups C & D standards. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides (rabbet joint construction) without the requirement of a specific torque limit. **No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.**

Pump Impeller – Pump impeller shall be ductile iron and threaded onto a stainless steel shaft. The impeller shall be of the recessed vortex type to provide an unobstructed passage through the volute for the ground solids. Impeller must be dynamically balanced to specification ISO 1940G 6.3 standard.

Radial Cutter Grinder Construction – Provided as a proven cutting method, both grinder impeller and shredding ring shall be of 440 stainless steel hardened to 58-60 Rockwell C. The grinder assembly shall consist of a grinder impeller and shredding ring mounted directly below the volute passage. The grinder impeller is threaded to a stainless steel shaft, locked with a stainless steel screw and washer. The shredding ring shall be secured by a retaining ring which is bolted into the cast iron volute for easy removal. All grinding of solids shall be from the action of the grinder impeller against the shredding ring. There shall be 24,000 cuts / second. **Note: Model number to REMOVE "SL" if specifying radial cutter construction**
Ex. KG2-HZ (Standard pump, non-explosion proof).

OPTIONAL: Slicer Grinder Construction – Maceration is accomplished by a combination of a rotary slicer and stationary slicer plate. Rotary slicer shall consist of (3) blades which protrude away from the inlet. Rotary slicer shall be bolted to shaft within close tolerance of grinding slicer plate. The stationary slicer plate shall consist of engineered-shaped holes for optimum cutting of debris. A slicer plate shall contain grooved slots to eject pump media away from underside of rotary cutter. Slicer plate shall be fastened with countersunk head screws that are flush with surface of plate. **Pumps with protruded or exposed head fasteners shall be considered not equal**. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C.

Seals – Type 21, domestic manufactured, dual mechanical seal construction mounted in tandem, shall protect the motor. Standard construction of primary seal shall be silicon / carbide with Viton® elastomers. Standard construction of secondary seal shall be silicon / carbide with Viton® elastomers. The seal face shall be lapped to a flatness of one light band. Dual electrodes with 330k ohm resistor shall be mounted in the seal chamber to detect water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop the motor, but shall act as a warning only, indicating service is required. **Lip seal arrangements shall not be considered equal.**

Motor – The pump motor construction shall be per NEMA MG-1 1.15 standard and shall be of the submersible type, rated 2 HP, 3450 RPM. The motor shall be for 60 Hz, 208, 230 or 240 volt, single-phase operation. Three-phase operation shall be 208, 230 or 460 volt. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. Start & run capacitors, and starting switch for operating the motor will be found in the control box. Major motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class F insulation. **Any other construction shall not be considered equal**. The stator shall be pressed into the cast iron motor housing. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Maximum skin temperature of motor assembly shall not exceed a T-4 rating per FM3615 standards. **Any motor assembly T-code per FM3615 standard that exceeds a T-4 rating shall be considered not equal.**

Single-phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation should a control failure cause the pump to run in a dry wet well. The overload shall automatically reset when the motor cools to a safe operating temperature.

Three-phase motors contain temperature sensors with (2) two wires for attachment to the control panel.

Bearings / Shaft - The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Bearings shall be designed to an ABEC® System 1 or better.
The upper bearing shall be a Conrad type, single-row, deep groove ball bearing designed to adequately handle the required radial loads. The lower bearing shall be a single-row, deep groove ball bearing designed to adequately compensate for the axial loads and radial forces. Bearings shall be designed to deliver a minimum L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

Power Cord – The motor power cord shall be 12 Ga. Type SOOW, UL listed, CSA approved cable. The cable jacket shall be sealed at the motor entrance by means of an agency-approved rubber compression washer and compression nut. An epoxy-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. **Compression fittings with quick disconnect molded pins shall not be considered equal.** Cord shall withstand a pull strain to meet FM requirements.

Grinder Pumps

KHHG2(H)

CENTRIGUGAL GRINDER SERIES
(Class 1, Div. 1, Groups C & D Hazardous Location)

Heavy-Duty Recessed Impeller Pump Provides Reliable Service for The Low Pressure Sewer Industry!

- **HIGH PERFORMANCE GRINDERS**
- **HIGH FLOW & HIGH HEAD**
  - Up to 30 GPM
  - Up to 225 Feet Shutoff
- **SILICON CARBIDE DUAL SEALS**
  - Viton® Elastomers
- **HEAVY-DUTY PRESSED MOTOR**
- **EXCEPTIONAL KEEN "I.C.E." OIL**
  - Cool Motor = 400% Longer Life
- **HAZARDOUS LOCATION DESIGN**
  - True "Explosion-Proof" Service

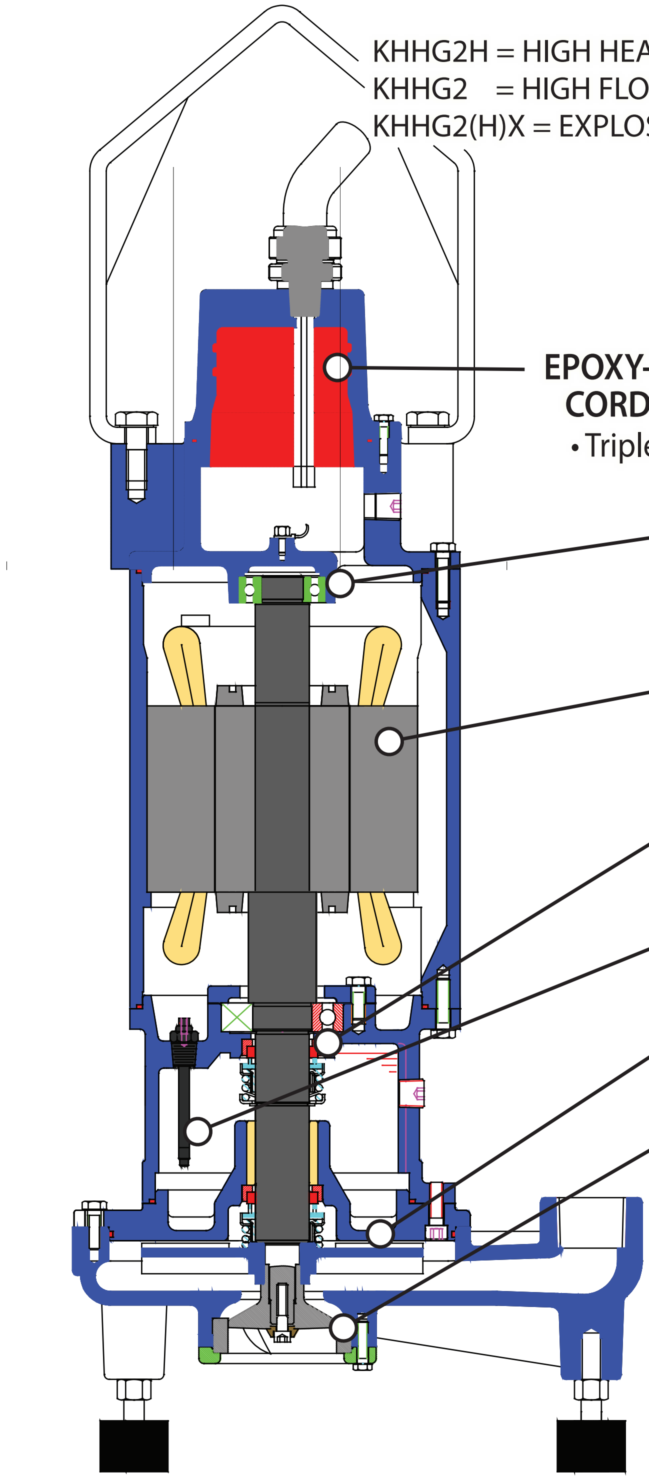
FM

www.keenpump.com

KEEN PUMP®

Features and Benefits

KHHG2(H)



KHHG2H = HIGH HEAD
KHHG2 = HIGH FLOW
KHHG2(H)X = EXPLOSION PROOF

EPOXY-POTTED CORD ENTRY
- Triple-Barrier Moisture Protection

3-BEARING SUPPORT
- Upper/Lower Ball Bearing
- Additional Lower Sleeve Bearing

HIGH-TORQUE MOTOR COOLED W/ KEEN "I.C.E." = 400% LONGER LIFE

SUPERIOR DUAL MECHANICAL SEALS - SILICON CARBIDE w/ VITON® ELASTOMERS

SEAL LEAK DETECTION

RECESSED, VORTEX IMPELLER, DUCTILE IRON
- Allows 100% Performance Curve Operation

PROVEN GRINDER ASSEMBLY
- Highly Efficient Solids-Cutting
- Hardened SST (Rockwell 56-60)
- Reversible Grinder Ring
- User-Friendly Field Service

KEEN PUMP®

471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

KC0040 01/2017

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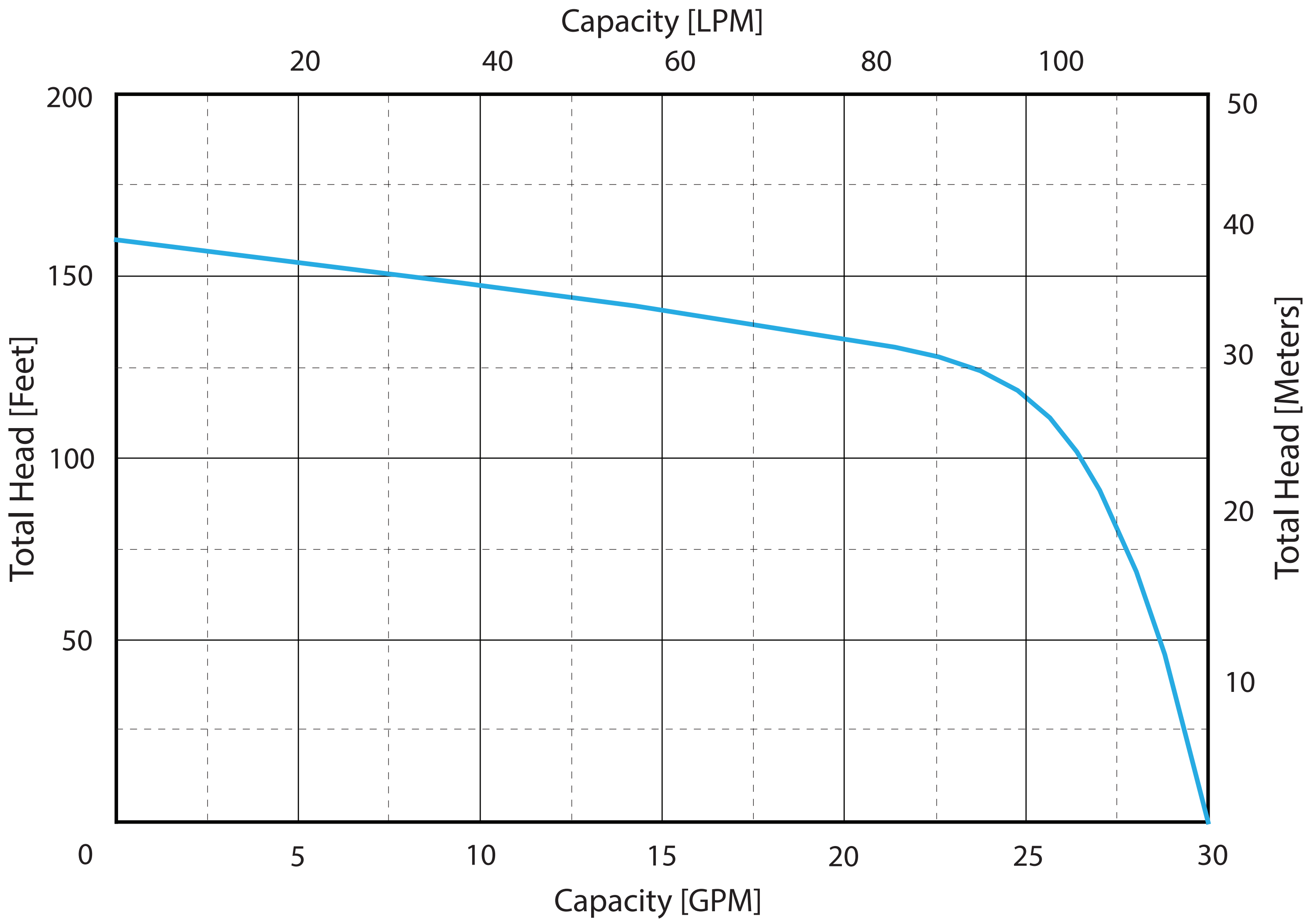
Section **GRINDER**
Date JAN 2016

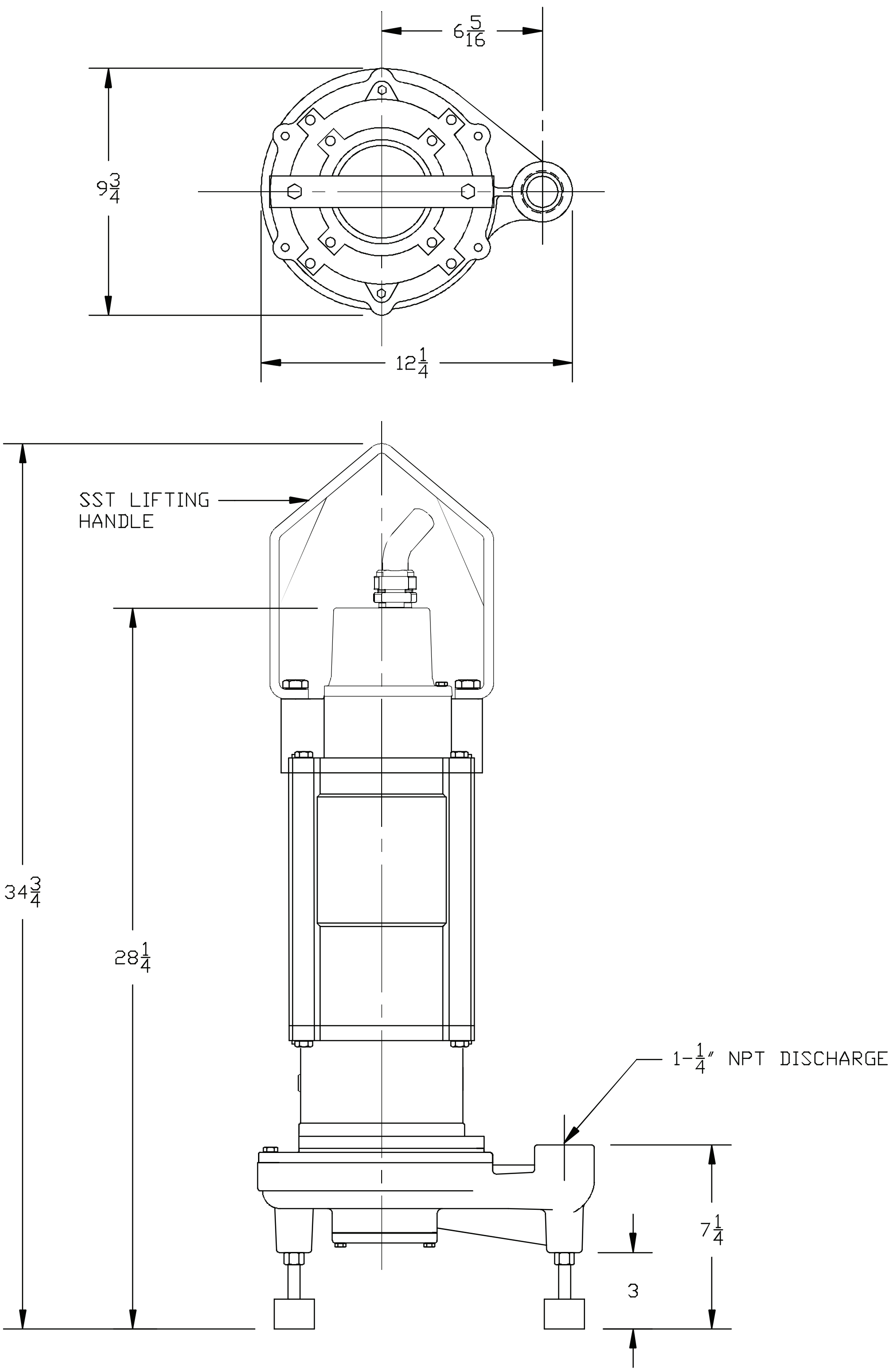
Pump Series	KHHG2	2HP RECESSED IMPELLER		
Speed	3450 RPM	Discharge	1-1/4"	HIGH FLOW

GPM: ___________ TDH: ___________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

KC0051



KEEN PUMP COMPANY
KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE KHHG2(H) 2HP GRINDER PUMP OUTLINE

SCALE	DWG. #	REV.
NTS	KN-21	B

DWG. BY	DATE
SE	01/27/2014

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE
B	SE	01/05/2017
A	SE	03/26/2015

Section GRINDER

Dated May 2018

Pump Model: **KHHG2(H)(X)**

Physical Data:

Discharge Size	1-1/4” NPT Vertical
Impeller Type	Balanced, Recessed Vortex
Power/Control Cable Length	40’ Standard
Paint	Blue, Waterborne Acrylic, High Buifld – (1) One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266ºF (130ºC)
Power Cord (1 Phase)	10-4 SOOW - 600V, 90º C
Power Cord (3 Phase)	10-4 SOOW - 600V, 90° C
Control Cord	18-5 SOOW - 600V, 90° C
Std. Third Party Approval	FM3615

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35
Impeller	Ductile Iron, ASTM A536, Grade 65-45-12
Shaft	ANSI 400 Stainless Steel
Rotating “Radial” Cutter	440 SST Hardened 58-60 Rockwell C
Stationary “Radial” Cutter	440 SST Hardened 58-60 Rockwell C
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Sleeve Bearing	Bronze, Sintered

Pump Model: **KHHG2(H)(X)**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		266º F (130º C)
Heat Sensor	**Open:**	275º F (135º C) Max. / 257º F (125º C) Min.
	Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**3450**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			
External Start Kit	Start Capacitor = 300 ufd, 250 VAC			
	Run Capacitor = 30 ufd, 370 VAC			

Model High Flow (Radial Cutter)	HP	Volts	Phase	NEC Code	Service Factor	Full Load Amps	SF Amps	Start Amps	Full Load KW	Full Load KVA
KHHG2-2001	2	208	1	G	1.0	28.0	28.0	100.0	4.95	7.00
KHHG2-2301		230				25.0	25.0	89.0	4.89	7.18
KHHG2-2003	2	208	3	H	1.0	21.0	21.0	105.0	6.43	7.56
KHHG2-2303		230				18.0	18.0	90.0	6.10	7.17
KHHG2-4603		460				9.0	9.0	45.0	6.10	7.17
Model High Head (Radial Cutter)										
KHHG2H-2001	2	208	1	G	1.0	42.0	42.0	148.0	7.43	8.74
KHHG2H-2301		230				40.0	40.0	142.0	7.82	9.20
KHHG2H-2003	2	208	3	H	1.0	29.0	29.0	106.0	8.88	10.45
KHHG2H-2303		230				25.0	25.0	88.0	8.47	9.96
KHHG2H-4603		460				12.5	12.5	44.0	8.47	9.96

SPECIFICATIONS

2HP Grinder Pumps — Model Nos. KHHG(X)2(H)

Pump Model – Pump shall be of the centrifugal type, **KHHG(X)2(H)** (High Head and High Performance), with an integrally built-in grinder unit and submersible type motor. **KHHG(X)2(H)** series pump and motor assembly shall be FM3615 listed for Class 1, Division 1, Groups C & D hazardous location service.

Operating Conditions – The pump shall have a non-overloading maximum capacity of ___GPM, a maximum total dynamic head of ___ feet, and shall use a motor rated at 2 HP and 3450 RPM. The grinder unit shall be capable of macerating all material in typical domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, sanitary wipes, floor pads, small wood, plastic and the like to fine slurry that will easily pass through the pump and 1-1/4" NPT discharge.

Construction – Major pump components shall be of gray cast iron, ASTM A-48, Class 35, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry acrylic paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with O-rings, designed and constructed to meet FM3615 for Class 1, Division 1, Groups C & D standards. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides (rabbet joint construction) without the requirement of a specific torque limit. **No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.**

Pump Impeller – Pump impeller shall be ductile iron and threaded onto a stainless steel shaft. The impeller shall be of the recessed vortex type to provide an unobstructed passage through the volute for the ground solids. Impeller must be dynamically balanced to specification ISO 1940G 6.3 standard.

Radial Cutter Grinder Construction – Provided as a proven cutting method, both grinder impeller and shredding ring shall be of 440 stainless steel hardened to 58-60 Rockwell C. The grinder assembly shall consist of a grinder impeller and shredding ring mounted directly below the volute passage. The grinder impeller is threaded to a stainless steel shaft, locked with a stainless steel screw and washer. The shredding ring shall be secured by a retaining ring which is bolted into the cast iron volute for easy removal. All grinding of solids shall be from the action of the grinder impeller against the shredding ring. There shall be 27,000 cuts / second.

Seals – Type 21, domestic manufactured, dual mechanical seal construction mounted in tandem, shall protect the motor. Standard construction of primary seal shall be silicon / carbide with Viton® elastomers. Standard construction of secondary seal shall be silicon / carbide with Viton® elastomers. The seal face shall be lapped to a flatness of one light band. Dual electrodes with resistor shall be mounted in the seal chamber to detect water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop the motor, but shall act as a warning only, indicating service is required. **Lip seal arrangements shall not be considered equal.**

Motor – The pump motor construction shall be per NEMA MG-1 1.15 standard and shall be of the submersible type, rated 2 HP, 3450 RPM. The motor shall be for 60 Hz, 208, 230 or 240 volt, single-phase operation. Three-phase operation shall be 208, 230 or 460 volt. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. Start & run capacitors, and starting switch for operating the motor will be found in the control box. Major motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class F insulation. **Any other construction shall not be considered equal**. The stator shall be pressed into the cast iron motor housing. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Maximum skin temperature of motor assembly shall not exceed a T-4 rating per FM3615 standards. **Any motor assembly T-code per FM3615 standard that exceeds a T-4 rating shall be considered not equal.**

KEEN I.C.E. oil ensures industry-low operating temperatures. **KEEN I.C.E**. oil is a synthetic blend with wear-additives, specifically engineered for submersible pump motors. **Air-filled motors, which do not have the superior heat dissipating capabilities of oil-filled motors, shall not be considered equal.**

Single-phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The overload shall automatically reset when the motor cools to a safe operating temperature.

Three-phase motors contain temperature sensors with (2) two wires for attachment to the control panel.

Bearings / Shaft - The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Bearings shall be designed to an ABEC® System 1 or better.
The upper bearing shall be a Conrad type, single-row, deep groove ball bearing designed to adequately handle the required radial loads. The lower bearing shall be a single-row, deep groove ball bearing designed to adequately compensate for the axial loads and radial forces. Bearings shall be designed to deliver a minimum
L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer’s performance curve. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

Power Cord – The motor power cord shall be 10 Ga. Type SOOW, UL listed, CSA approved cable. The control cord shall be 18 Ga. The cable jacket shall be sealed at the motor entrance by means of an agency-approved rubber compression washer and compression nut. An epoxy-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. **Compression fittings with quick disconnect molded pins shall not be considered equal.** Cord shall withstand a pull strain to meet FM requirements.

KEEN PUMP

KGS(X)2

FM APPROVED

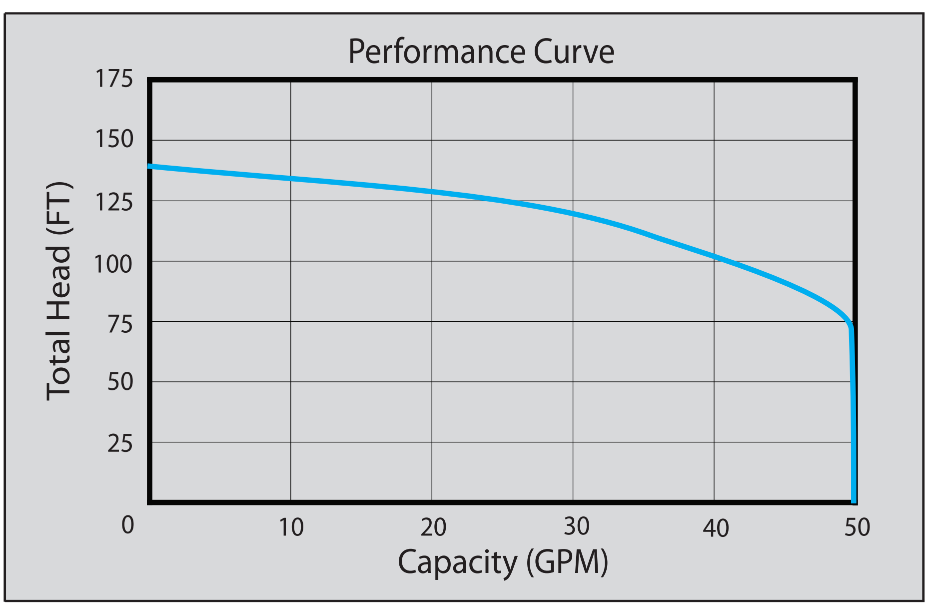
2HP Semi-Open Centrifugal Grinder (Class 1, Div. 1, Groups C & D Hazardous Location)

The KEEN PUMP **KGS(X)2** series centrifugal pumps easily handle residential, light commercial or industrial waste, reducing it to a fine slurry. The **KGS(X)2** pump is designed for use in pressure sewer applications or any piping network.

The **KGS(X)2** grinder pump retrofits into many exisiting competitive pump installations. The **KGS(X)2** pump operates with the same control panel and installation piping/rail system. The **KGS(X)2** produces up to 38 GPM with Heads to 138 feet!

The **KGS(X)2** series pump features:

- BOTH High Head and High Flow Capability!
- Class 1, Division 1 "Explosion-proof" Construction
- True Anti-Wicking Ability w/ Potted Cord Cap
- Dual Silicon-Carbide Mechanical Seals
- Dual Seal Leak Detection
- 3-Bearing Shaft Support
- Durable 2hp Motor Design
- Optional "Slicer" Plate Cutting Design!



REV 04/07/15

Features and Benefits

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grip with compression grommet protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if powercable is cut or damaged. O-Ring for additional sealing.

2. Heavy-Duty Castings
Minimal amount of parts required for servicing. Heavy-duty ASTM A48, Class 30 cast iron components.

3. Strong Motor
Powerful high-torque motor for reliable pump operation. Pressed in stator securely holds motor and efficiently transfers heat. Class F insulation with overload protection in oil-filled chamber for cool operation and long motor life.

3a. Oil
KEEN I.C.E. ensures industry-low operating temperatures. Synthetic blend with wear-additives, specifically engineered for submersible pump motors.

4. 3-Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearing plus additional sleeve bearing in lower seal chamber. Long 50,000 hour B-10 bearing life.

5. Double Mechanical Seal Protection
Dual silicon carbide mechanical shaft seals provide twice the moisture protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials.

6. Moisture Detection
Seal leak probe signals alarm in control panel for scheduled maintenance.

7. Semi-Open Hydraulic Design
SST impeller with pump-out vanes on back shroud to prevent pump media from entering seal cavity. Impeller threaded to shaft.

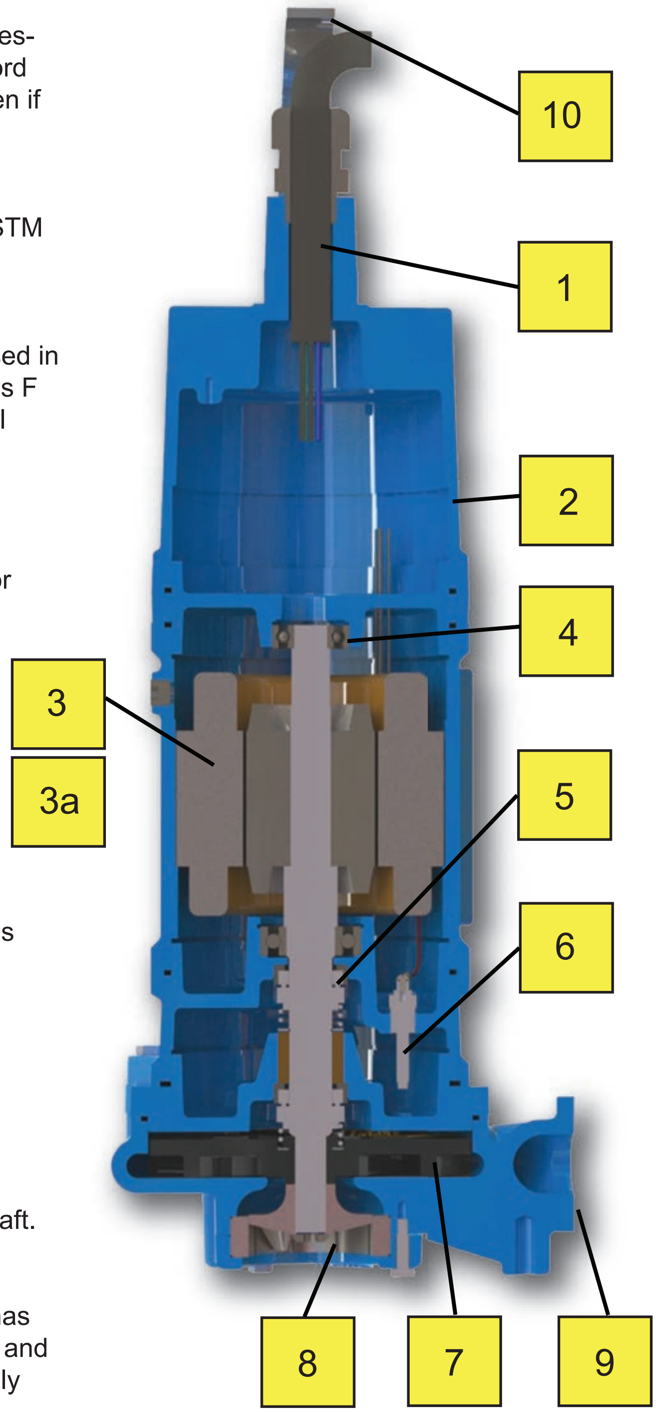
8. Proven Grinder Assembly
Hardened (Rockwell 58-60) stainless steel grinder assembly has 30+ years proven field experience. The reversible grinder ring and grinder impeller effectively reduce solids into a fine slurry, easily passable in a piping system without concerns of clogging.

9. Dual Option Piping Connection
Removable 1-1/4"NPT connection "vertical" flange for simple and easy connection to discharge piping. *Optional "horizontal", 2-bolt flange built into volute casting for replacement applications.

10. Accessories
Stainless steel lifting handle included. Anti-vibration mounting feet **OPTIONAL.**

2HP Grinder Pump Semi-Open KGS(X)2

FM APPROVED



NOT SHOWN: Mounting Feet, Removable Elbow, Optional Slicer Cutting Mechanism

KEEN PUMP

471E State Route 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

REV 04/07/15

KEEN PUMP

2HP SUBMERSIBLE GRINDER PUMP

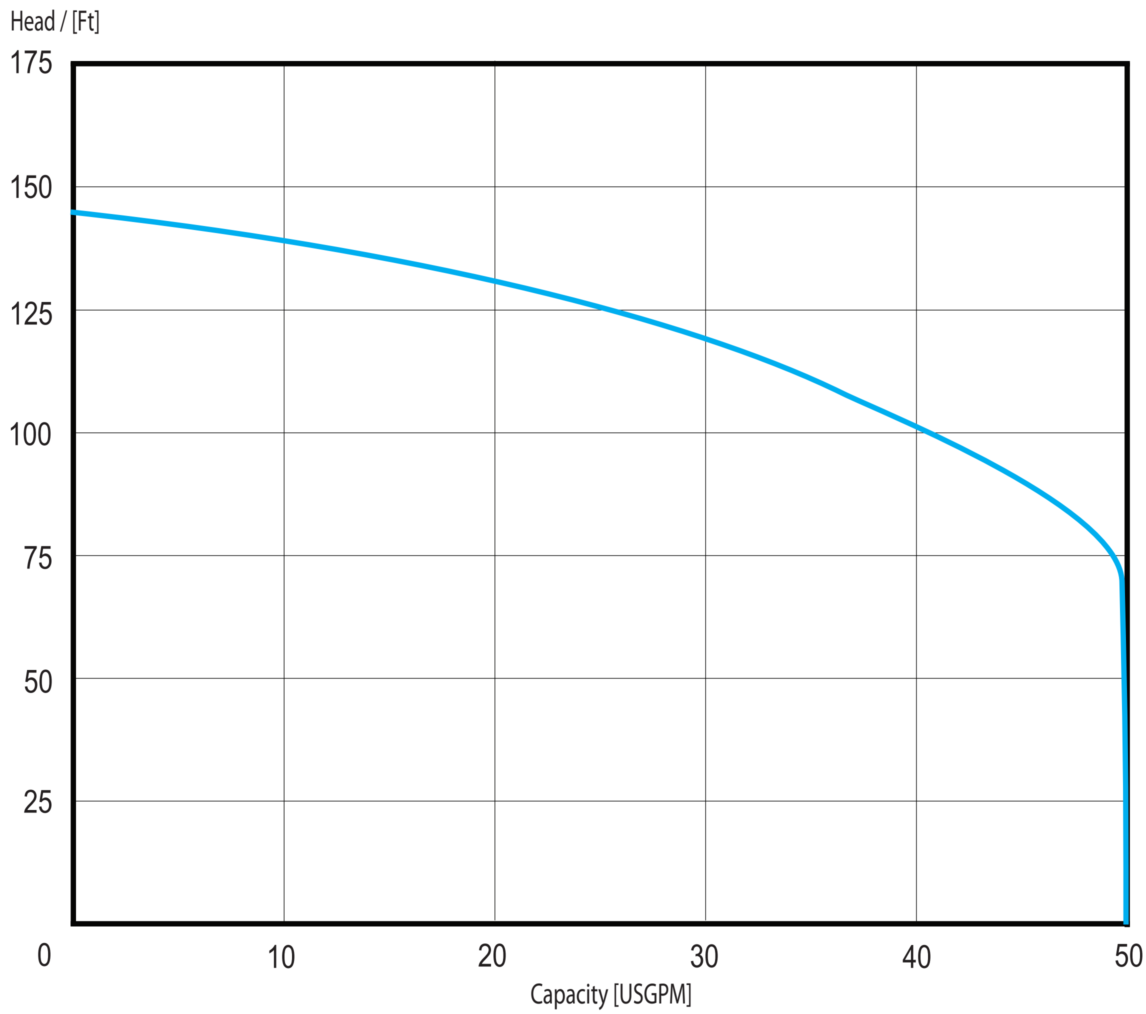
GENERAL	
Pump Model	KGS(X)2
PUMP DATA	
Date	03/26/2015
Discharge Flange	1-1/4" NPT, Horizontal or Vertical
Grinder Construction	Stainless Steel
Grinder Hardness	58 - 60 Rockwell
Impeller Type	Semi - Open

Single Phase

START KIT SK-2A includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	2HP / 1 ϕ, 60 Hz
Full Load Amps 208V	Call Factory
Start Amps 208V	Call Factory
Full Load Amps 230V	Call Factory
Start Amps 230V	Call Factory
Start / Run Amps 240V	Call Factory
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	F Class
Start Capacitor	216 ufd, 250 VAC
Run Capacitor	20 ufd, 370 VAC

PERFORMANCE CURVE



MODEL	HP	Phase	Volts
KGS(X)2-2001	2	1	208
KGS(X)2-2301	2	1	230
KGS(X)2-2401	2	1	240

* Performance with clear water and ambient temp 20°C (68°F)

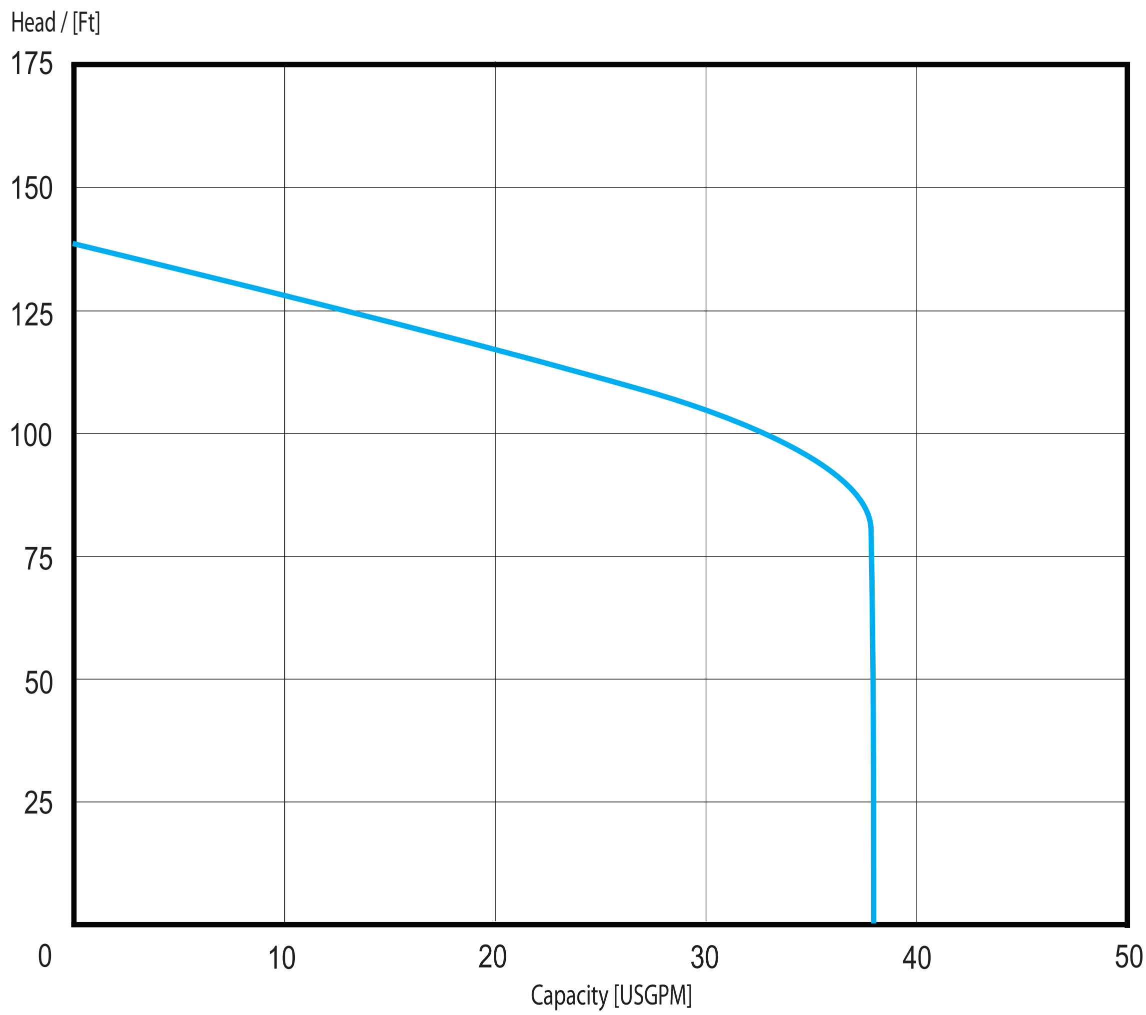
Rev. 04/07/15

KEEN PUMP

2HP SUBMERSIBLE GRINDER PUMP

GENERAL		MOTOR DATA	
Pump Model	**KGS(X)2**	HP / Power Supply	2HP / 3 ϕ, 60 Hz
PUMP DATA		Full Load Amps 208V	Call Factory
Date	03/26/2015	Start Amps 208V	Call Factory
Discharge Flange	1-1/4" NPT, Horizontal or Vertical	Full Load Amps 230V	Call Factory
Grinder Construction	Stainless Steel	Start Amps 230V	Call Factory
Grinder Hardness	58 - 60 Rockwell	Full Load Amps 460V	Call Factory
Impeller Type	Semi - Open	Start Amps 460V	Call Factory
Three Phase		Poles / Rated Speed	2 P / 3450 rpm
		Insulation Class	F Class

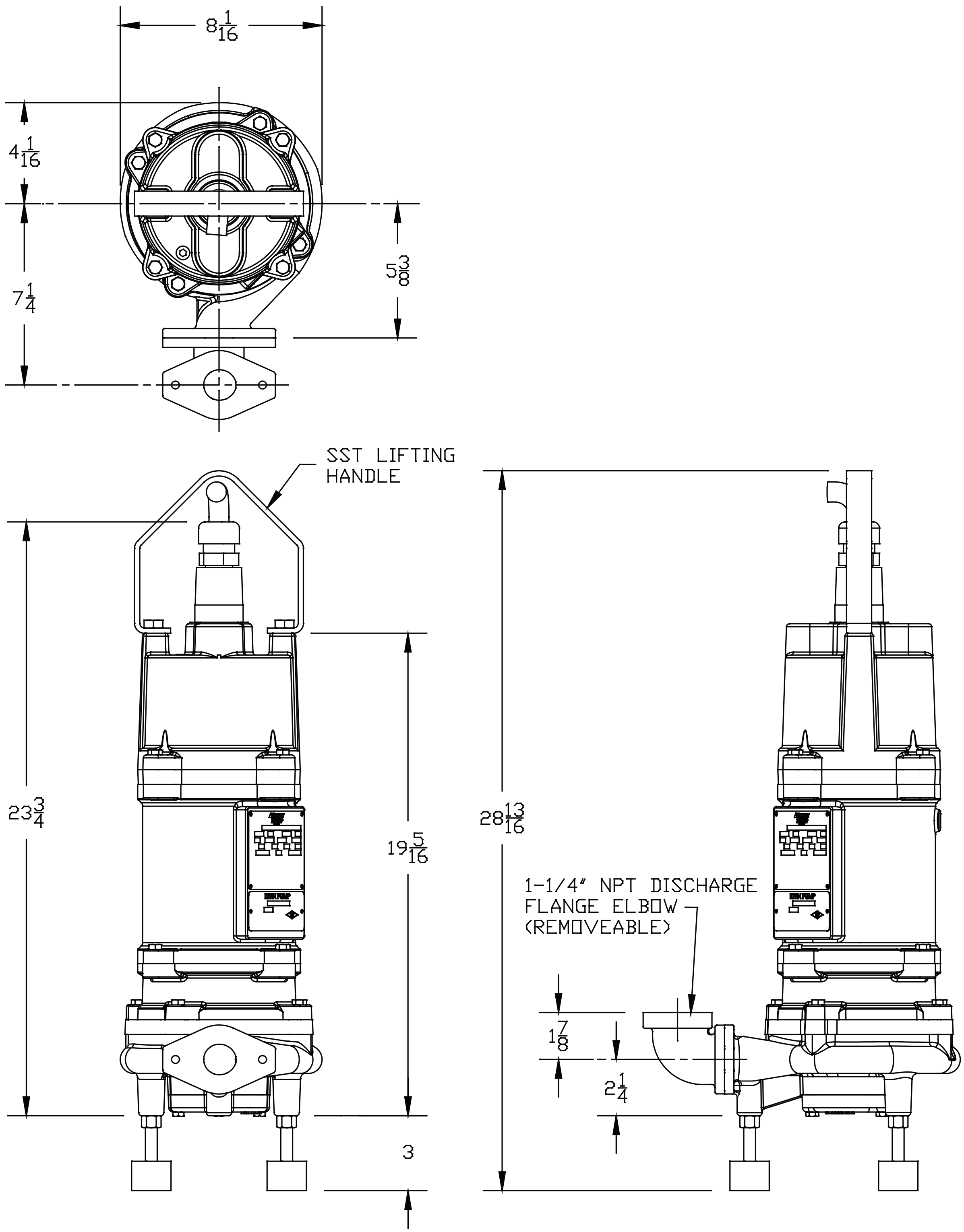
PERFORMANCE CURVE



MODEL	***HP***	***Phase***	***Volts***
KGS(X)2-2003	2	3	208
KGS(X)2-2303	2	3	230
KGS(X)2-4603	2	3	460

* Performance with clear water and ambient temp 20ºC (68ºF)

Rev. 04/07/15



KEEN PUMP
471E ST ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE K(H)GS(X)2 2HP GRINDER PUMP DIMENSIONS			
SCALE NTS		DWG. # KN-964	REV. –
DWG. BY SE	DATE 01/26/2015		

Grinder Pumps

K(H)GSL2-C

SEMI-OPEN GRINDER SERIES
(Class 1, Div. 1, Groups C & D Hazardous Location)

1-Stage High Performance Grinder Pump Provides Reliable Service for The Low Pressure Sewer Industry!

"Radial" Cutter
(STANDARD)

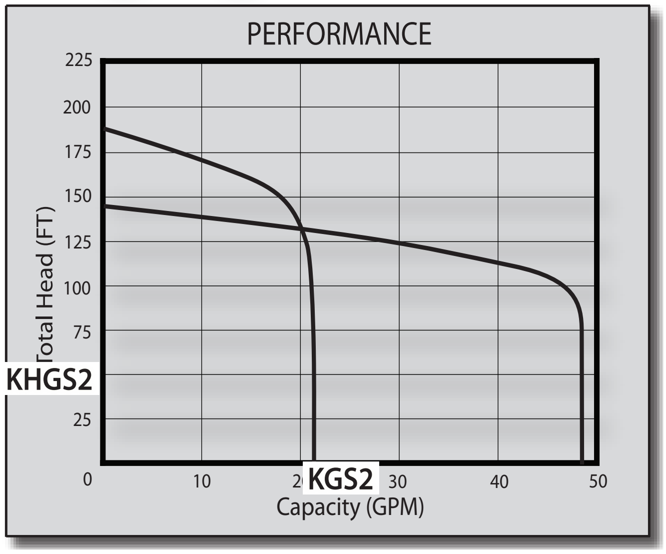
"Slicer"
(OPTION)

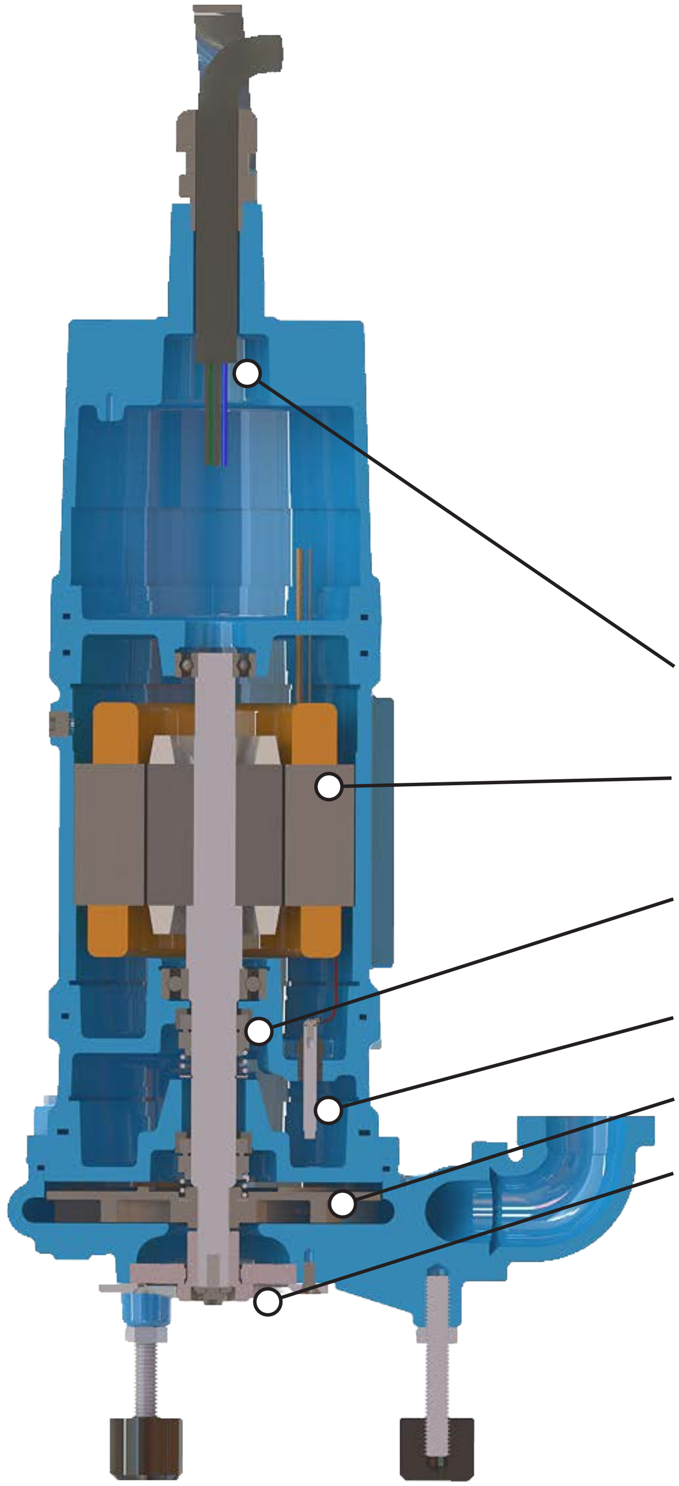
- **HIGH FLOW & HIGH HEAD**
  - Up to 48 GPM
  - Up to 188 Feet Shutoff
- **ADVANCED SLICING FOR "FLUSHABLES"**
  - Wipes, Floor Pads, Etc.
- **SILICON CARBIDE DUAL SEALS**
  - Viton® Elastomers
- **PRESSED OIL-COOLED MOTOR**
  - Superior Heat Transfer
  - Long Bearing & Seal Life
- **HAZARDOUS LOCATION DESIGN**
  - True "Explosion-Proof" Service

K(H)GSL2-C

Features and Benefits

KGS2 = High Flow Cutter
KHGSL2 = High Head Slicer
KHGSX2 = Explosion-Proof





EPOXY-POTTED CORD ENTRY
- Triple-Barrier Moisture Protection

HIGH-TORQUE MOTOR OIL-COOLED FOR SUPERIOR HEAT DISSIPATION

SUPERIOR DUAL MECHANICAL SEALS - SILICON CARBIDE w/ VITON® ELASTOMERS

SEAL LEAK DETECTION

1-STAGE STAINLESS STEEL IMPELLER

ADVANCED CUTTING SYSTEM
- Highly Efficient Solids-Slicing
- User-Friendly Field Service
- Hardened Stainless Steel

INTERCHANGEABILITY
- Radial Cutter or Optional Axial Slicer

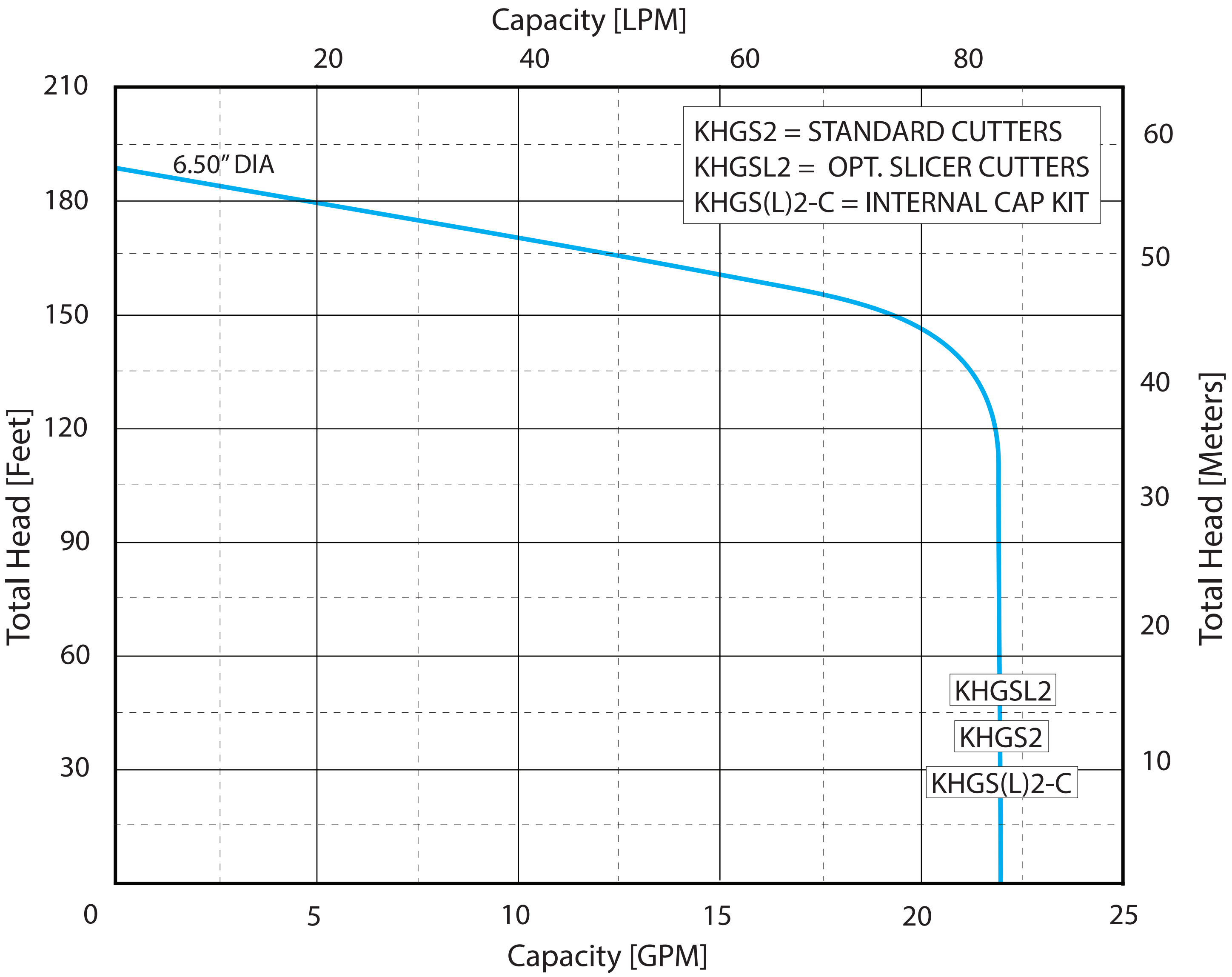
KEEN PUMP®

471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

Section GRINDER
Date APR 2017

Pump Series	**KHGS2**	2HP SEMI-OPEN CENTRIFUGAL (6.50" Dia.)		
Speed	**3450 RPM**	Discharge	1-1/4"	**HIGH HEAD**

GPM: ___________ TDH: ___________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

KC0028

Section GRINDER

Dated May 2018

Pump Model: **KGS(X)2, KGSL(X)2, KHGS(X)2, KHGSL(X)2**

Physical Data:

Discharge Size	1-1/4" NPT or 2-Bolt Flange Vertical *Optional Horizontal 2-Bolt Flange
Impeller Type	Balanced, Semi-Open
Power/Control Cable Length	30' Standard
Paint	Blue, Waterborne Acrylic, High Build – (1) One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266ºF (130ºC)
Power Cord (1 Phase)	10-5 SOOW - 600V, 90º C
Power Cord (3 Phase)	14-7 SOOW - 600V, 90° C
Std. Third Party Approval	FM3615

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35
Impeller	300 Series Stainless Steel
Shaft	ANSI 400 Stainless Steel
***Opt. Rotating "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
***Opt. Stationary "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
Rotating "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Stationary "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Sleeve Bearing	Bronze, Sintered

Section GRINDER

Dated May 2018

Pump Model: **KGS(X)2, KGSL(X)2, KHGS(X)2, KHGSL(X)2**

Thermal Data:

Maximum Liquid	140º F (60º C) Intermittent
Maximum Stator	266º F (130º C)
Heat Sensor Open:	275º F (135º C) Max. / 257º F (125º C) Min.
Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point	390º F (199º C)

Electrical Data:

RPM	**3450**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			
External Start Kit	Start Capacitor = 216 ufd, 250 VAC			
	Run Capacitor = 50 ufd, 370 VAC			

Model High Flow (Slicer)	**Model** High Flow (Radial Cutter)	**HP**	**Volts**	**Phase**	**NEC Code**	**Service Factor**	**Full Load Amps**	**SF Amps**	**Start Amps**	**Full Load KW**	**Full Load KVA**
KGSL2-2081	KGS2-2081	2	208	1	G	1.0	22.6	22.6	113.0	4.52	4.52
KGSL2-2401	KGS2-2401		240				19.7	19.7	99.5	4.76	4.78
KGSL2-2083	KGS2-2083	2	208	3	H	1.0	10.7	10.7	50.5	3.36	1.94
KGSL2-2303	KGS2-2303		230				9.7	9.7	78.5	3.36	1.94
KGSL2-4603	KGS2-4603		460				6.1	6.1	30.5	2.12	2.81
Model High Head (Slicer)	**Model** High Head (Radial Cutter)										
KHGSL2-2081	KHGS2-2081	2	208	1	G	1.0	26.5	26.5	92.8	5.51	5.51
KHGSL2-2401	KHGS2-2401		240				24.5	24.5	85.8	5.88	5.88
KHGSL2-2083	KHGS2-2083	2	208	3	H	1.0	11.9	11.9	59.5	4.37	5.46
KHGSL2-2303	KHGS2-2303		230				11.9	11.9	59.5	4.37	5.46
KHGSL2-4603	KHGS2-4601		460				6.4	6.4	32.0	5.01	2.95

SPECIFICATIONS

2 HP Grinder Pumps Model Nos. K(H)GSL(X)2

Pump Model – Pump shall be of the semi-open, centrifugal type, **KGSL2** (High Flow) or **KHGSL2** (High Head), with an integrally built-in grinder unit and submersible type motor. **KGSLX2 or KHGSLX2 Series** pump and motor assembly shall be FM3615 listed for Class 1, Division 1, Groups C & D hazardous location service. **Pumps not manufactured complete in the USA shall not be considered equal.**

Operating Conditions – The pump shall have a non-overloading maximum capacity of ___GPM, a maximum total dynamic head of ___ feet, and shall use a motor rated at 2 HP and 3450 RPM. The grinder unit shall be capable of macerating all material in typical domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, sanitary wipes, floor pads, small wood, plastic and the like to fine slurry that will easily pass through the pump and 1-1/4" NPT discharge.

Construction – **All castings must be manufactured and supplied by a domestic source located in the USA.** Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry enamel paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with O-rings, designed and constructed to meet FM3615 for Class 1, Division 1, Groups C & D standards. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides (rabbet joint construction) without the requirement of a specific torque limit. **No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.**

Pump Impeller – Pump impeller shall be 300 series stainless steel and threaded onto an AISI 416 stainless steel shaft. The impeller shall be of the semi-open type to provide an unobstructed passage through the volute for the ground solids. Impeller must be dynamically balanced to specification ISO 1940G 6.3 standard.

Slicer Grinder Construction – Maceration is accomplished by a combination of a rotary slicer and stationary slicer plate. Rotary slicer shall consist of (3) blades which protrude away from the inlet. Rotary slicer shall be bolted to shaft within close tolerance of grinding slicer plate. The stationary slicer plate shall consist of engineered-shaped holes for optimum cutting of debris. A slicer plate shall contain grooved slots to eject pump media away from underneath rotary cutter. Slicer plate shall be fastened with countersunk head screws that are flush with surface of plate. **Pumps with protruded or exposed head fasteners shall be considered not equal**. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C.

OPTIONAL: Radial Cutter Grinder Construction – Provided as an alternate and proven cutting method, both grinder impeller and shredding ring shall be of 440 stainless steel hardened to 58-60 Rockwell C. The grinder assembly shall consist of a grinder impeller and shredding ring mounted directly below the volute passage. The grinder impeller is threaded to a stainless steel shaft, locked with a stainless steel screw and washer. The shredding ring shall be secured by a retaining ring which is bolted into the cast iron volute for easy removal. All grinding of solids shall be from the action of the grinder impeller against the shredding ring. There shall be 24,000 cuts / second. **Note: Model number to REMOVE "L" if specifying radial cutter construction Ex. KGS2 (High flow pump, non-explosion proof).**

<u>**Seals**</u> **–** Type 21, domestic manufactured, dual mechanical seal construction mounted in tandem, shall protect the motor. Standard construction of primary seal shall be silicon / carbide. Standard construction of secondary seal shall be silicon / carbide. The seal face shall be lapped to a flatness of one light band. Dual electrodes with 330k ohm resistor shall be mounted in the seal chamber to detect water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop the motor, but shall act as a warning only, indicating service is required. **Lip seal arrangements shall not be considered equal.**

<u>**Motor**</u> **–** The pump motor construction shall be per NEMA MG-1 1.15 standard and shall be of the submersible type, rated 2 HP, 3450 RPM. The motor shall be for 60 Hz, 208 or 240 volt, single-phase operation. Three-phase operation shall be 208, 230 or 460 volt. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. Start & run capacitors, and electronic relay for operating the motor will be found in the control box. Major motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class F insulation. **Any other construction shall not be considered equal**. The stator shall be pressed into the cast iron motor housing. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Maximum skin temperature of motor assembly shall not exceed a T-4 rating per FM3615 standards. **Any motor assembly T-code per FM3615 standard that has lesser than a T-4 rating, shall be considered not equal.**

KEEN I.C.E. oil ensures industry-low operating temperatures. **KEEN I.C.E**. oil is a synthetic blend with wear-additives, specifically engineered for submersible pump motors. **Air-filled motors, which do not have the superior heat dissipating capabilities of oil-filled motors, shall not be considered equal.**

Single-phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The overload shall automatically reset when the motor cools to a safe operating temperature.

Three-phase motors contain temperature sensors with (2) two wires for attachment to the control panel.

<u>**Bearings / Shaft**</u> **-** The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Bearings shall be designed to an ABEC® System 1 or better.
The upper bearing shall be a Conrad type, single row, deep groove ball bearing designed to adequately handle the required radial loads. The lower bearing shall be a single-row angular contact ball bearing designed to adequately compensate for the axial loads and radial forces. Bearings shall be designed to deliver a minimum L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

<u>**Power Cord**</u> **–** The motor power cord shall be 10 Ga. Type SOOW, UL listed, CSA approved cable. The cable jacket shall be sealed at the motor entrance by means of an agency-approved rubber compression washer and compression nut. An epoxy-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. **Compression fittings with quick disconnect molded pins shall not be considered equal.** Cord shall withstand a pull strain to meet FM requirements.

Grinder Pumps

KEEN PUMP

K(H)GS2

SEMI-OPEN GRINDER SERIES
(Class 1, Div. 1, Groups C & D Hazardous Location)

1-Stage High Performance Grinder Pump Includes Internal Capacitor Kit - No Control Box Required!

"Radial" Cutter
(STANDARD)

"Slicer"
(OPTION)

- **HIGH FLOW & HIGH HEAD**
  - Up to 48 GPM
  - Up to 188 Feet Shutoff
- **ADVANCED SLICING FOR "FLUSHABLES"**
  - Wipes, Floor Pads, Etc.
- **SILICON CARBIDE DUAL SEALS**
  - Viton® Elastomers
- **PRESSED OIL-COOLED MOTOR**
  - Superior Heat Transfer
  - Long Bearing & Seal Life

FM APPROVED

- **HAZARDOUS LOCATION DESIGN**
  - True "Explosion-Proof" Service

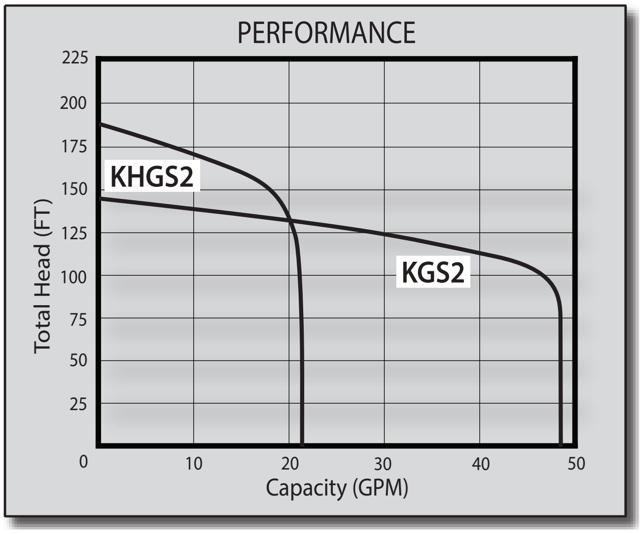
www.keenpump.com

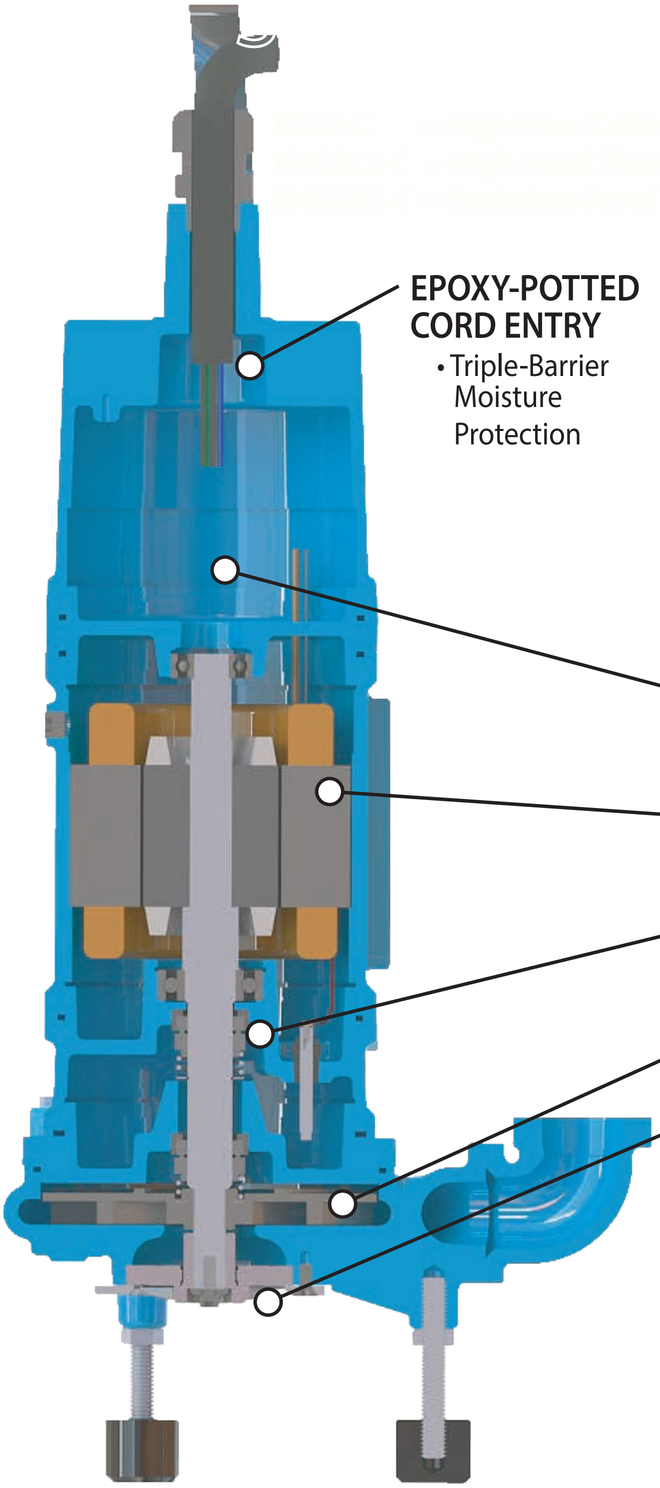
KEEN PUMP®

Features and Benefits

K(H)GS2

KGS2-C = High Flow Cutter
KHGSL2-C = High Head Slicer
KHGSX2-C = Explosion-Proof





EPOXY-POTTED CORD ENTRY
- Triple-Barrier Moisture Protection

INTERNAL START KIT
- No Panel Required

HIGH-TORQUE MOTOR OIL-COOLED FOR SUPERIOR HEAT DISSIPATION

SUPERIOR DUAL MECHANICAL SEALS - SILICON CARBIDE w/ VITON® ELASTOMERS

1-STAGE STAINLESS STEEL IMPELLER

ADVANCED CUTTING SYSTEM
- Highly Efficient Solids-Slicing
- User-Friendly Field Service
- Hardened Stainless Steel

INTERCHANGEABILITY
- Radial Cutter or Optional Axial Slicer

KC0025 04/2017

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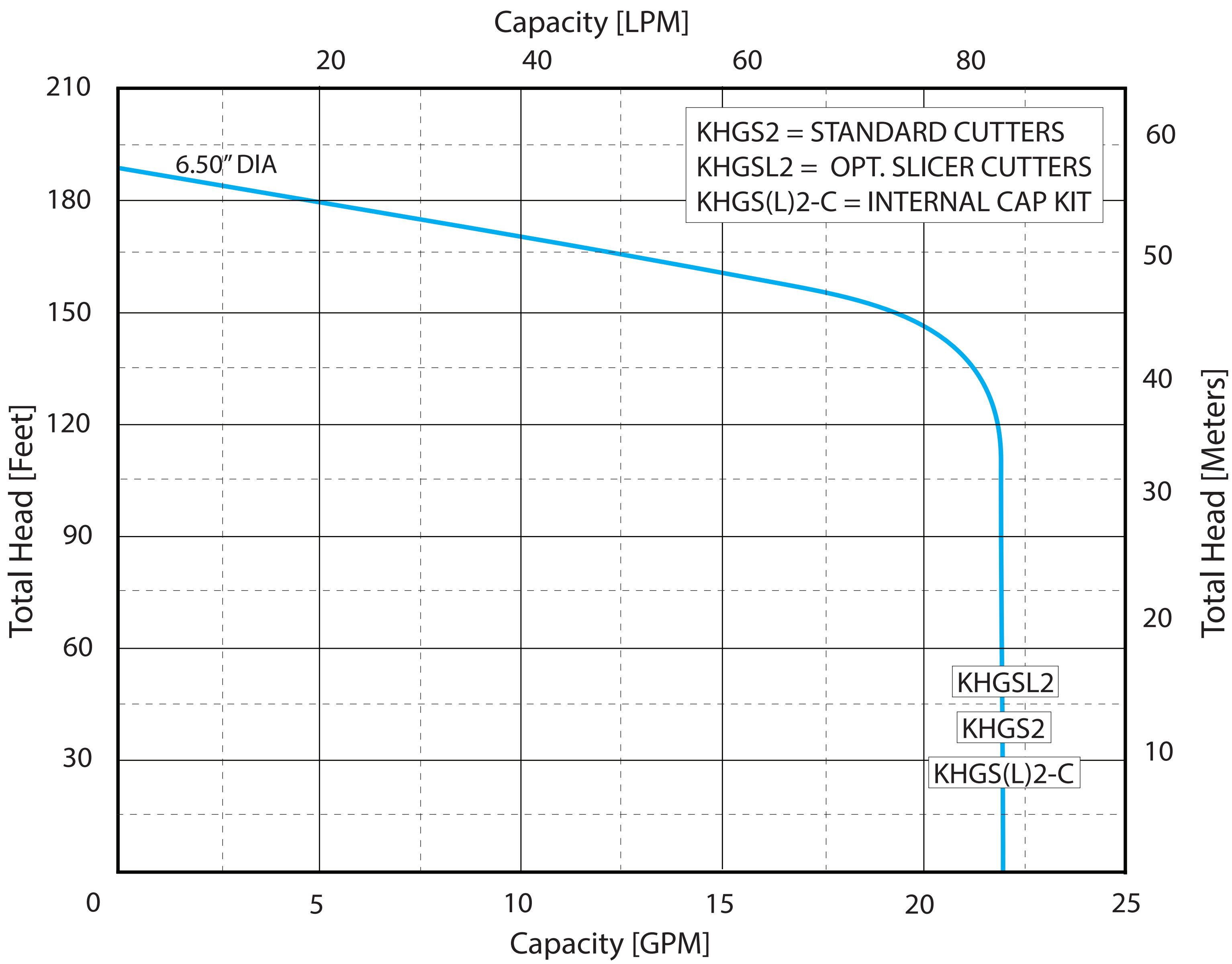
KEEN PUMP®

Section **GRINDER**
Date APR 2017

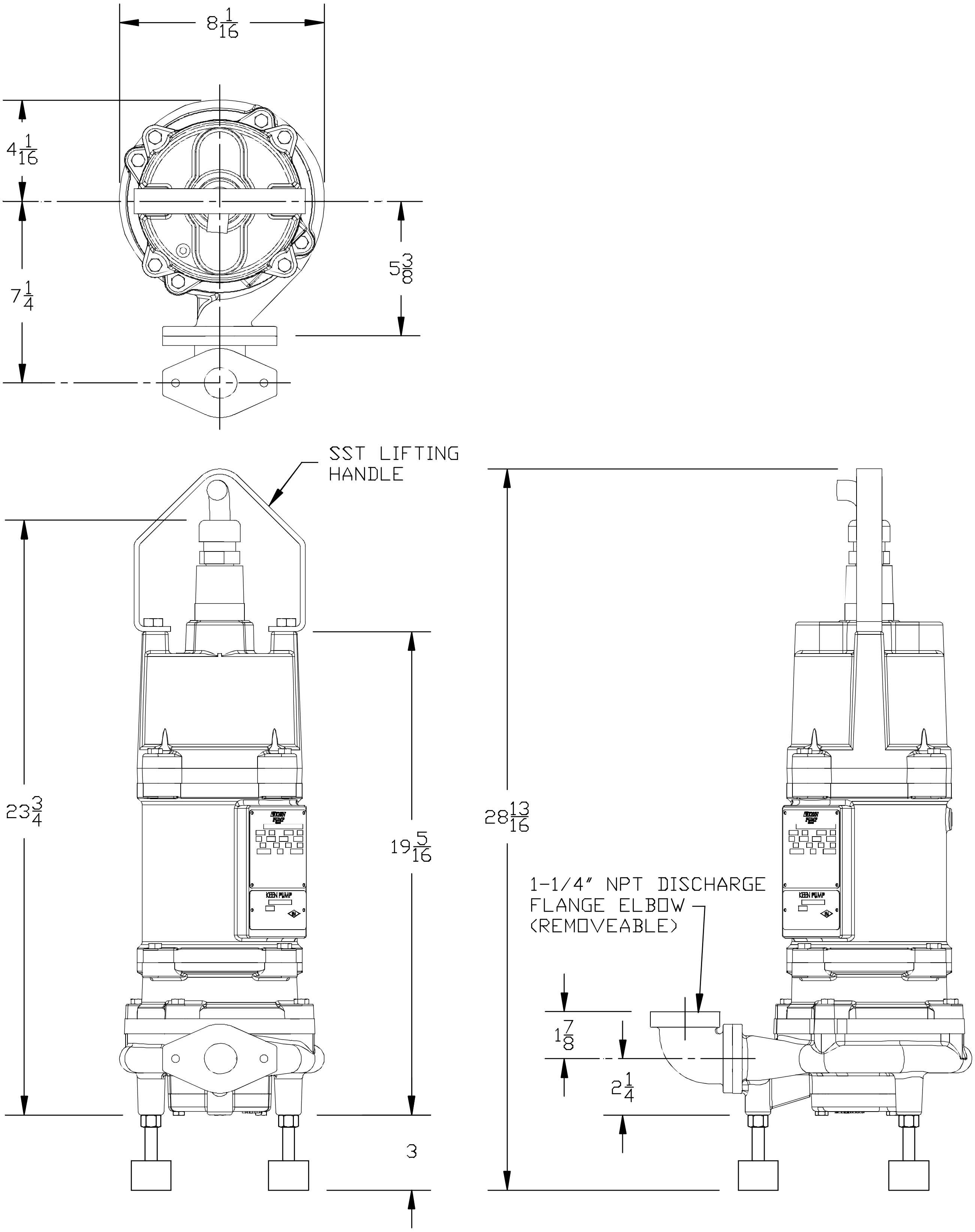
Pump Series	**KHGS2**	2HP SEMI-OPEN CENTRIFUGAL (6.50" Dia.)		
Speed	**3450 RPM**	Discharge	1-1/4"	**HIGH HEAD**

GPM: ___________ TDH: ___________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

KC0028



KEEN PUMP COMPANY

KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE K(H)GS(L)X2 2HP GRINDER PUMP DIMENSIONS			
SCALE NTS		DWG. # KN-964	REV.
DWG. BY SE	DATE 01/27/2015		

Pump Model: **KGS(X)2-C, KGSL(X)2-C, KHGS(X)2-C, KHGSL(X)2-C**

Physical Data:

Discharge Size	1-1/4" NPT or 2-Bolt Flange Vertical *Optional Horizontal 2-Bolt Flange
Impeller Type	Balanced, Semi-Open
Power/Control Cable Length	30' Standard
Paint	Blue, Waterborne Acrylic, High Build – (1) One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266ºF (130ºC)
Power Cord	10-3 SOOW - 600V, 90º C
Std. Third Party Approval	FM3615

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35
Impeller	300 Series Stainless Steel
Shaft	ANSI 400 Stainless Steel
***Opt. Rotating "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
***Opt. Stationary "Axial" Slicer**	440 SST Hardened 58-60 Rockwell C
Rotating "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Stationary "Radial" Cutter	440 SST Hardened 58-60 Rockwell C
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing 100,000 Hours, L-10
Sleeve Bearing	Bronze, Sintered

Pump Model: **KGS(X)2-C, KGSL(X)2-C, KHGS(X)2-C, KHGSL(X)2-C**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		266º F (130º C)
Heat Sensor	**Open:**	275º F (135º C) Max. / 257º F (125º C) Min.
	Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**3450**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			
Internal Start Kit	Start Capacitor = 216 ufd, 250 VAC			
	Run Capacitor = 50 ufd, 370 VAC			

Model High Flow (Slicer)	**Model** High Flow (Radial Cutter)	**HP**	**Volts**	**Phase**	**NEC Code**	**Service Factor**	**Full Load Amps**	**SF Amps**	**Start Amps**	**Full Load KW**	**Full Load KVA**
KGSL2-2081C	KGS2-2081C	2	208	1	G	1.0	22.6	22.6	113.0	4.52	4.52
KGSL2-2401C	KGS2-2401C		240				19.7	19.7	99.5	4.76	4.78
Model High Head (Slicer)	**Model** High Head (Radial Cutter)										
KHGSL2-2081C	KHGS2-2081C	2	208	1	G	1.0	26.5	26.5	92.8	5.51	5.51
KHGSL2-2401C	KHGS2-2401C		240				24.5	24.5	85.8	5.88	5.88

SPECIFICATIONS

2 HP Grinder Pumps Model Nos. K(H)GSL(X)2-C

Pump Model – Pump shall be of the semi-open, centrifugal type, **KGSL2-C** (High Flow) or **KHGSL2-C** (High Head), with an integrally built-in grinder unit and submersible type motor. **KGSLX2-C or KHGSLX2-C Series** pump and motor assembly shall be FM3615 listed for Class 1, Division 1, Groups C & D hazardous location service. All models shall have internal start components (Start capacitor, Run Capacitor, Start Switch). **Pumps not manufactured complete in the USA shall not be considered equal.**

Operating Conditions – The pump shall have a non-overloading maximum capacity of ___GPM, a maximum total dynamic head of ___ feet, and shall use a motor rated at 2 HP and 3450 RPM. The grinder unit shall be capable of macerating all material in typical domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, sanitary wipes, floor pads, small wood, plastic and the like to fine slurry that will easily pass through the pump and 1-1/4” NPT discharge.

Construction – **All castings must be manufactured and supplied by a domestic source located in the USA.** Major pump components shall be of gray cast iron, ASTM A-48, Class 35, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry acrylic paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with O-rings, designed and constructed to meet FM3615 for Class 1, Division 1, Groups C & D standards. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides (rabbet joint construction) without the requirement of a specific torque limit. **No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.**

Pump Impeller – Pump impeller shall be 300 series stainless steel and threaded onto an AISI 416 stainless steel shaft. The impeller shall be of the semi-open type to provide an unobstructed passage through the volute for the ground solids. Impeller must be dynamically balanced to specification ISO 1940G 6.3 standard.

Radial Cutter Grinder Construction – Provided as a proven cutting method, both grinder impeller and shredding ring shall be of 440 stainless steel hardened to 58-60 Rockwell C. The grinder assembly shall consist of a grinder impeller and shredding ring mounted directly below the volute passage. The grinder impeller is threaded to a stainless steel shaft, locked with a stainless steel screw and washer. The shredding ring shall be secured by a retaining ring which is bolted into the cast iron volute for easy removal. All grinding of solids shall be from the action of the grinder impeller against the shredding ring. There shall be 16,600 cuts / second. **Note: Model number to REMOVE “L” if specifying radial cutter construction**
Ex. KGS2-C (High flow pump, non-explosion proof).

OPTIONAL: Slicer Grinder Construction – Maceration is accomplished by a combination of a rotary slicer and stationary slicer plate. Rotary slicer shall consist of (3) blades which protrude away from the inlet. Rotary slicer shall be bolted to shaft within close tolerance of grinding slicer plate. The stationary slicer plate shall consist of engineered-shaped holes for optimum cutting of debris. A slicer plate shall contain grooved slots to eject pump media away from underside of rotary cutter. Slicer plate shall be fastened with countersunk head screws that are flush with surface of plate. **Pumps with protruded or exposed head fasteners shall be considered not equal**. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C.

Seals – Type 21, domestic manufactured, dual mechanical seal construction mounted in tandem, shall protect the motor. Standard construction of primary seal shall be silicon / carbide with Viton® elastomers. Standard construction of secondary seal shall be silicon / carbide with Viton® elastomers. The seal face shall be lapped to a flatness of one light band. **Lip seal arrangements shall not be considered equal.**

Motor – The pump motor construction shall be per NEMA MG-1 1.15 standard and shall be of the submersible type, rated 2 HP, 3450 RPM. The motor shall be for 60 Hz, 208, 230 or 240 volt, single-phase operation. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. Start & run capacitors, and starting switch for operating the motor will be found in the pump cord cap. Major motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class F insulation. **Any other construction shall not be considered equal**. The stator shall be pressed into the cast iron motor housing. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Maximum skin temperature of motor assembly shall not exceed a T-4 rating per FM3615 standards. **Any motor assembly T-code per FM3615 standard that exceeds a T-4 rating shall be considered not equal.**

Single phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well or any condition that may cause the pump to run outside of the specified operating temperature range.

Internal Start Kit – Start/Run capacitor with start switch securely positioned in dry compartment. A total of (4) bolts quickly removes cord cap for easy servicing.

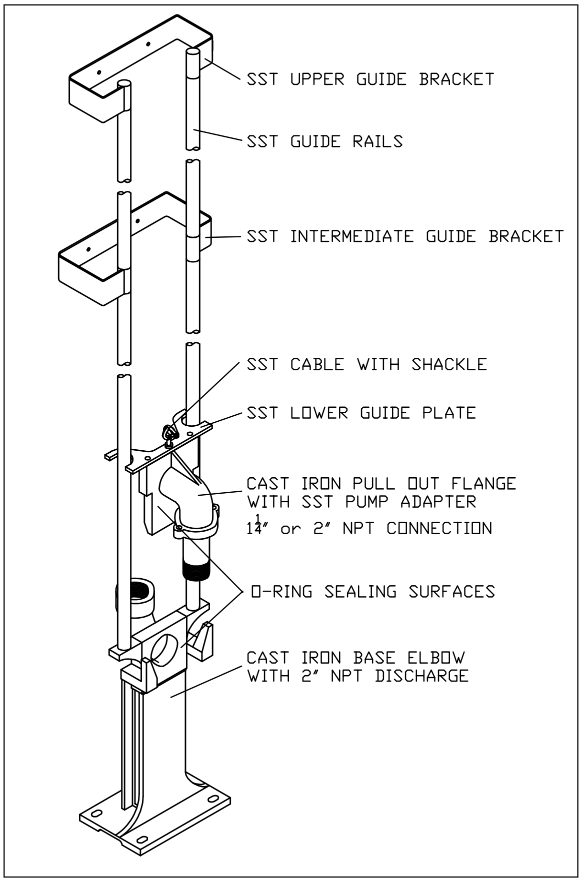
Bearings / Shaft - The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Bearings shall be designed to an ABEC® System 1 or better.
The upper bearing shall be a Conrad type, single-row, deep groove ball bearing designed to adequately handle the required radial loads. The lower bearing shall be a single-row, deep groove ball bearing designed to adequately compensate for the axial loads and radial forces. Bearings shall be designed to deliver a minimum
L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

Power Cord – The motor power cord shall be 10 Ga. Type SOOW, UL listed, CSA approved cable. The cable jacket shall be sealed at the motor entrance by means of an agency-approved rubber compression washer and compression nut. An epoxy-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. **Compression fittings with quick disconnect molded pins shall not be considered equal.** Cord shall withstand a pull strain to meet FM requirements.

Rail Systems

KL1 & KL1CV

KEEN 2hp Grinder Liftout



"KL1"

"KL1CV"

- **1-1/4" NPT Pump Connection**
- **2" NPT Female Vertical Discharge**
- **3/4" or 1" Guide Rails**
- **Stress-Free Rail System**
- **Durable Cast Iron Base and Lift-Out Flange**
- **Stainless Steel Pump Adapter**
- **Stainless Steel Guide Plate**

- Base elbow provides quick and easy installation and removal of vertical discharge 1 or 2HP Grinder Pumps
- Quick-connect stainless steel pump adapters
- Taper-base arms support liftout elbow and pump
- Positive O-ring sealing face
- Automatic sealing pulls mating faces together
- Carries 100% pump load - no stress on rails

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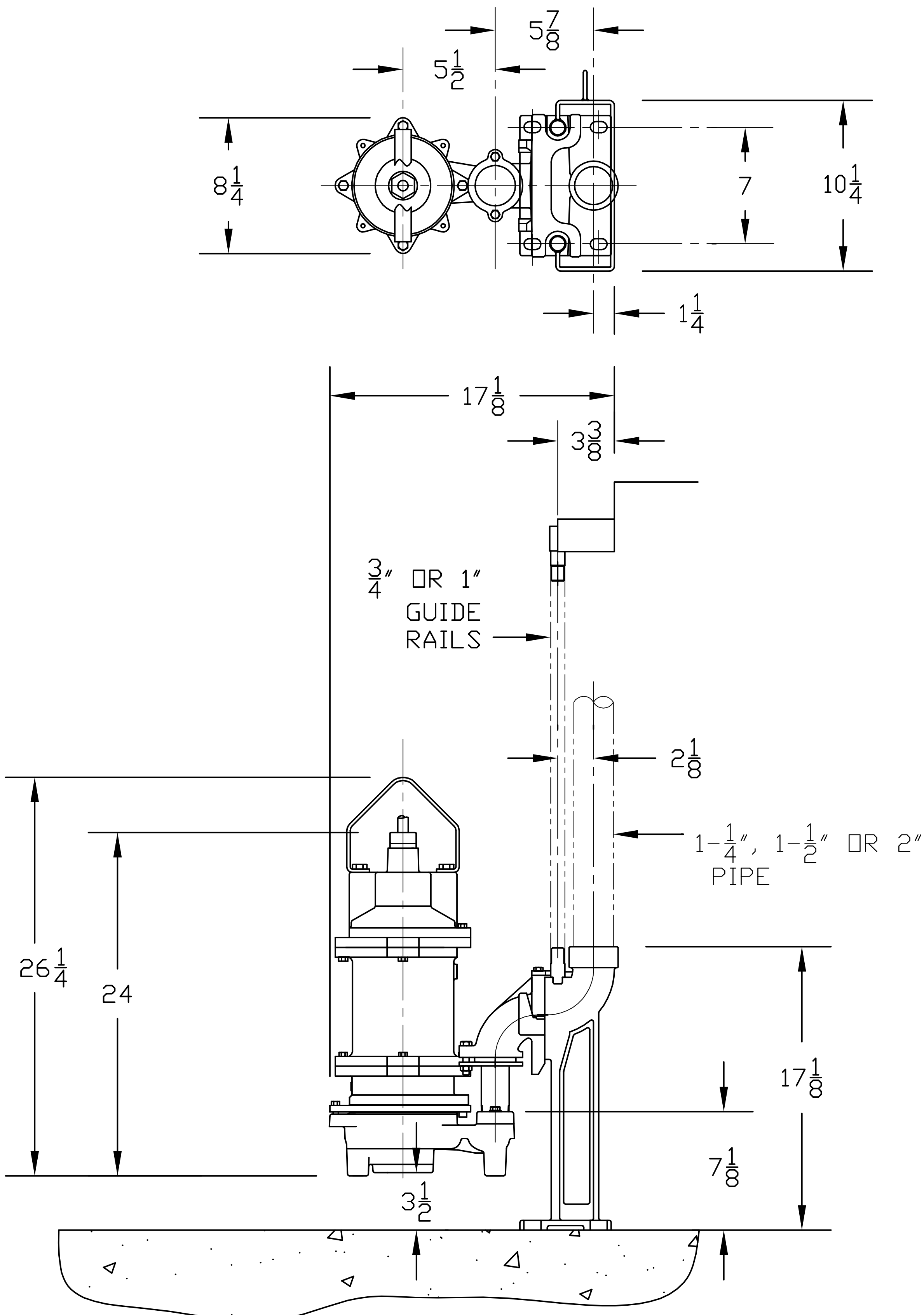


KEEN PUMP COMPANY

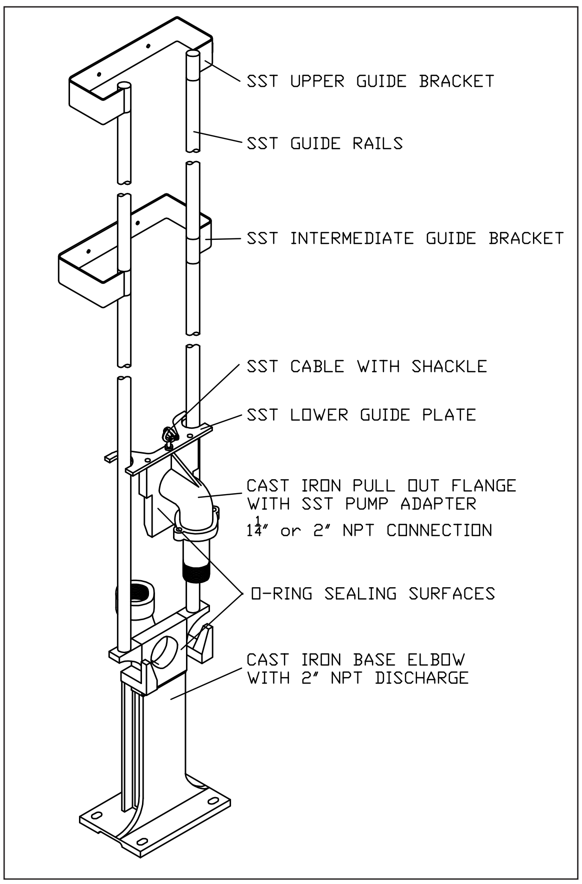
KEEN PUMP CO.
471E ST ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE KG2 2HP GRINDER "KL1" LIFTOUT DIMENSIONS			
SCALE NTS		DWG. # KN-20	REV. –
DWG. BY SE	DATE 10/02/12		

KEEN PUMP

KL2

KEEN 2" Sewage Pump Liftout




"KL2"

- **2" NPT Pump Connection**
- **2" NPT Female Vertical Discharge**
- **3/4" or 1" Guide Rails**
- **Stress-Free Rail System**
- **Durable Cast Iron Base and Lift-Out Flange**
- **Stainless Steel Pump Adapter**
- **Stainless Steel Guide Plate**

- Base elbow provides quick and easy installation and removal of vertical discharge 2" Sewage Pumps
- Quick-connect stainless steel pump adapters
- Taper-base arms support liftout elbow and pump
- Positive O-ring sealing face
- Automatic sealing pulls mating faces together
- Carries 100% pump load - no stress on rails

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Competitor RETROFITS

KEEN PUMP

E-ONE

• Free-Standing 1 or 2HP Grinders

MYERS KMR

• Liftout Check Valve 2HP Grinders

E-ONE

• Suspended System 1-2HP Grinders

BARNES ECO TANK

• Suspended v.2 2HP Grinders

• Straddled Rails 2HP Grinders

BARNES C CHANNEL

• Channel Liftout 2HP Grinders

LIBERTY ABS

• Horizontal Discharge 2HP Grinders

• Custom Dry-Pit Replacements

HYDROMATIC

• Straddled Rails 4" & 6" Solids-Handling

Please note: Customer may be required to supply existing pump for proper engineered replacement

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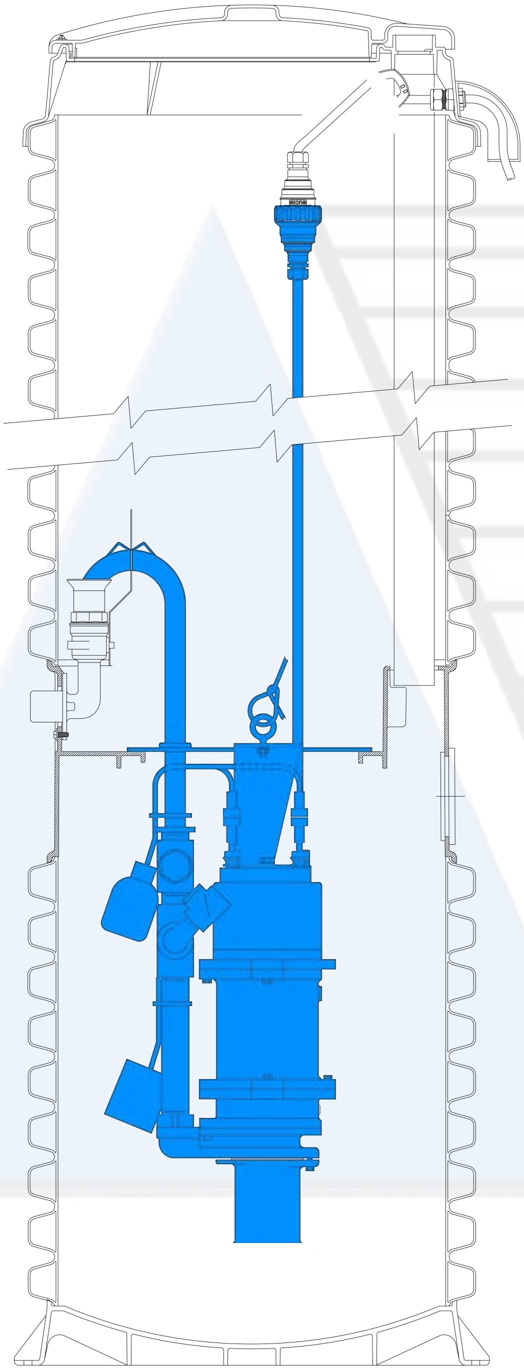
KC0092 01/22

KEEN PUMP®
PROUDLY BUILT IN AMERICA

KEEN e/One® Replacement



KPCG-21CTSL
Progressive Cavity

KG2-2301CSL
Centrifugal

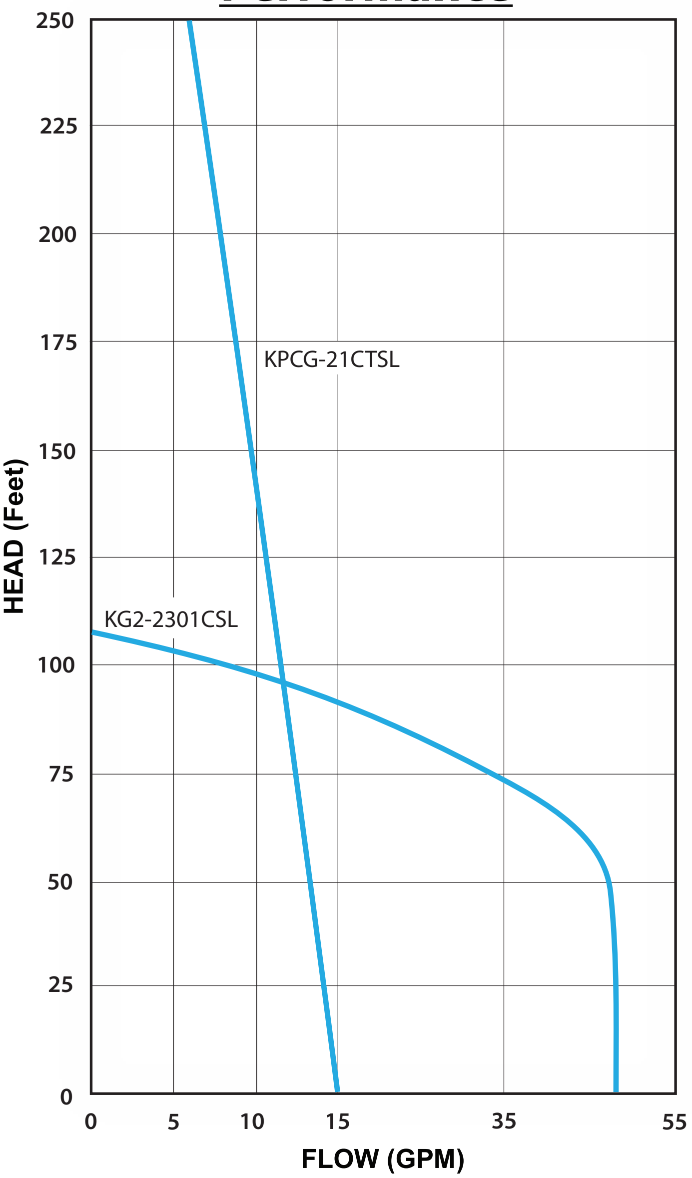
Model	Pump	HP	Volts	Amps	Hertz	Weight
KER	KG2-2301CSL	2	230	15.5	60	130
KER-PC	KPCG-21CTSL	1	208/230	8.0	60	135

"EQD" (2000 Series) **-OR-**

"EQD" (Extreme Series)

"KER-PC" SHOWN

Performance



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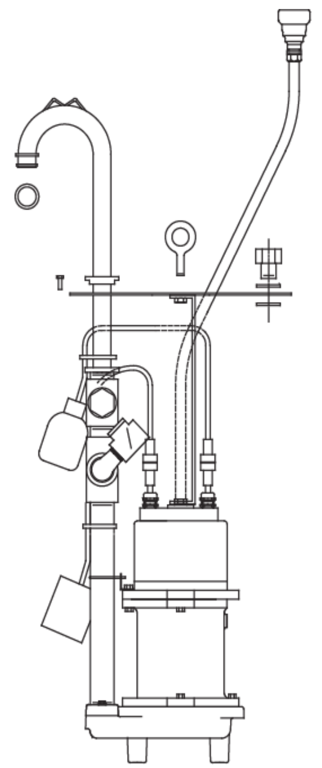
“KER” Keen e/One® Replacement Packages

KEEN PUMP

“KER” “KER-0001”

KER - Replaces GP Series
2010/2012/2014/2015/2016

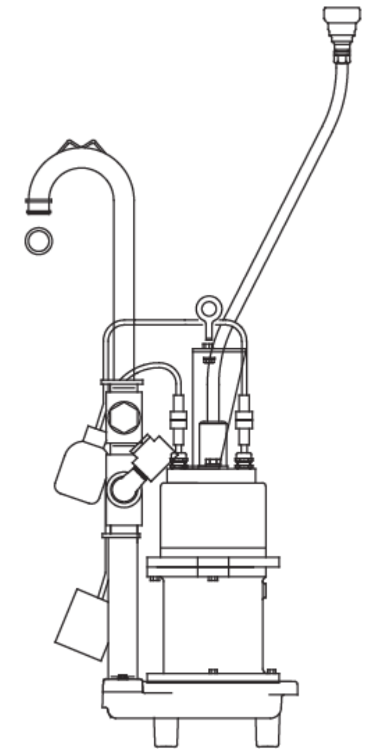
KER-0001 - Replaces D Series
DH/R-071/151/152/272/502



“KER-0002” “KER-0003”

KER-0002 - Replaces GP Series
2010/2012/2014/2015/2016

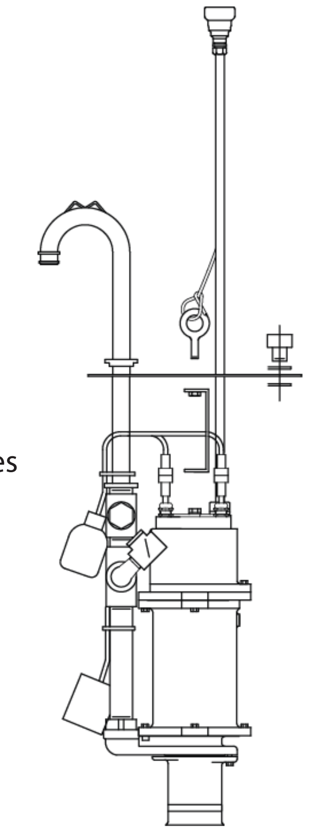
KER-0003 - Replaces D Series
DH/R-071/151/152/272/502

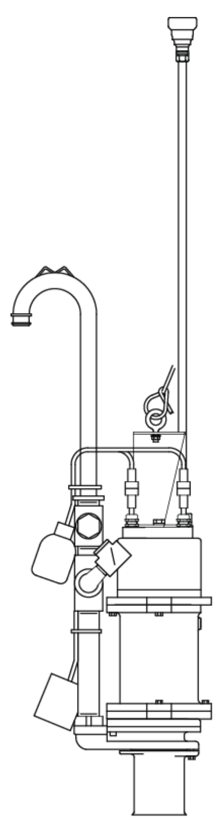


“KER-PC” “KERPC-0001”

KER-PC - Replaces GP Series
2010/2012/2014/2015/2016

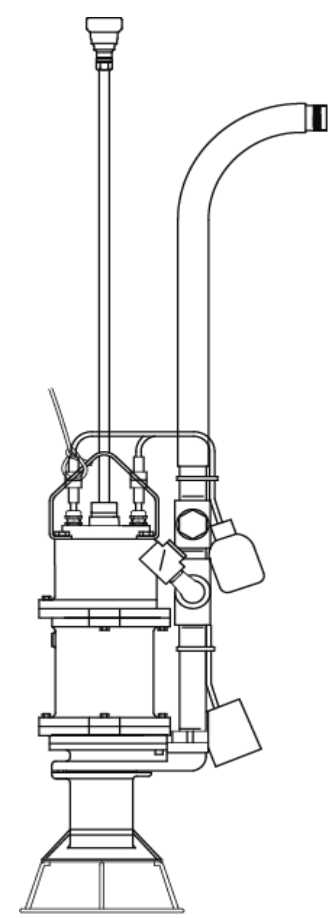
KERPC-0001 - Replaces D Series
DH/R-071/151/152/272/502





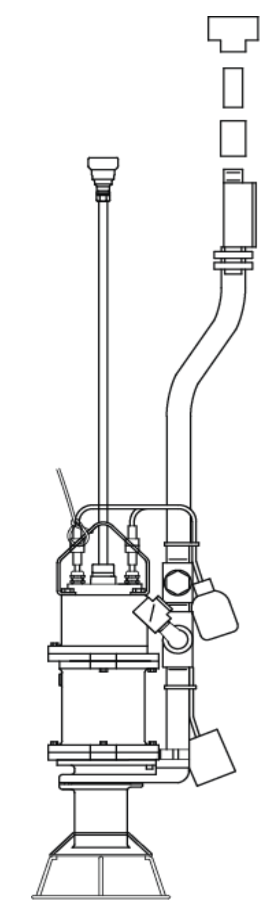
“KERPC-0002”

KERPC-0002 - Replaces GP Series
2010/2012/2014/2015/2016



“KERPC-0007”

KERPC-0007 - Replaces
Gatorgrinder GH091



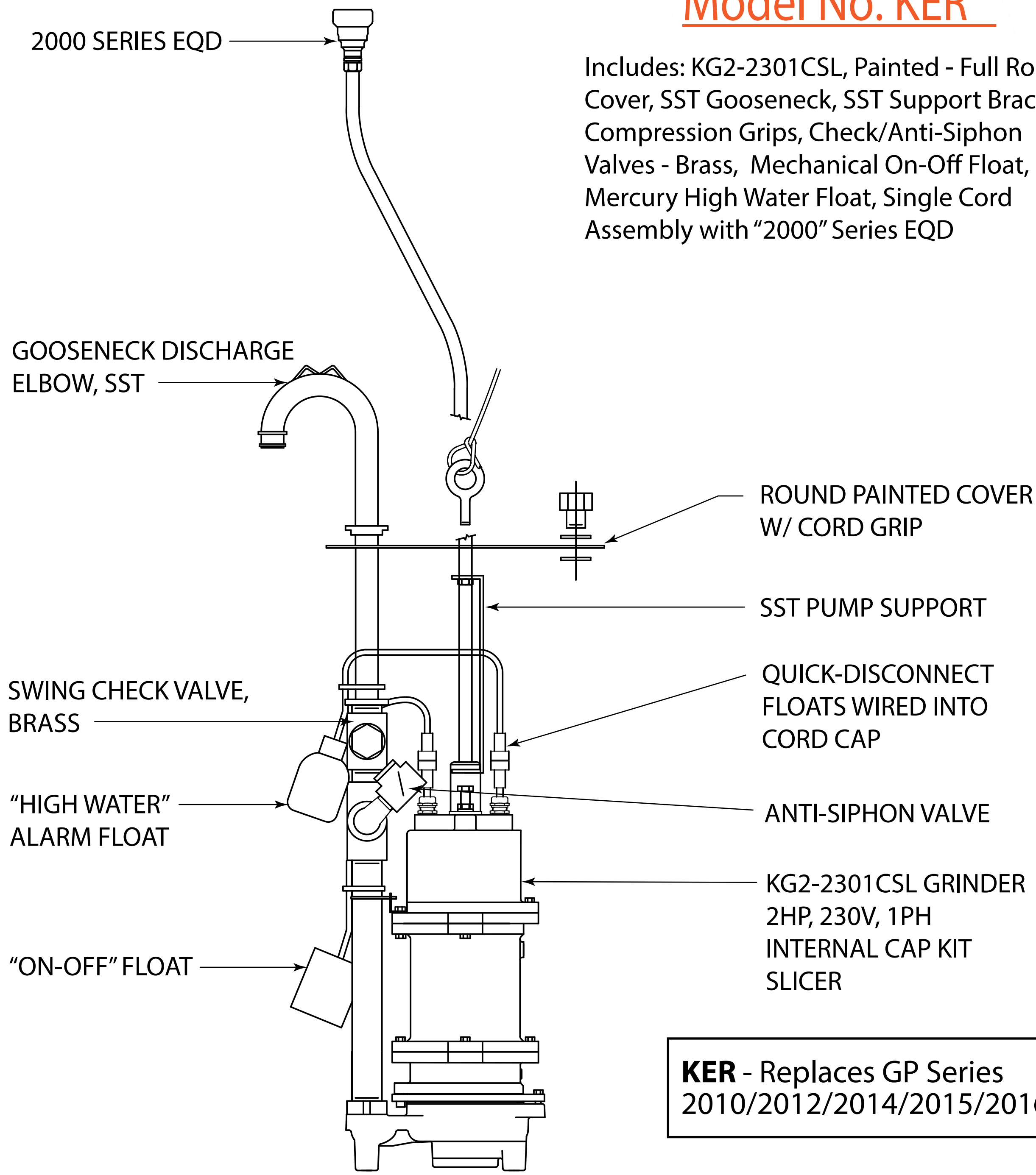
“KERPC-0008”

KERPC-0008 - Replaces W Series
WH/R-101/231/471/472/482/483
/484/W-FIBERGLASS

KEEN e/One® Replacement

Model No. KER

Includes: KG2-2301CSL, Painted - Full Round Cover, SST Gooseneck, SST Support Brackets, Compression Grips, Check/Anti-Siphon Valves - Brass, Mechanical On-Off Float, Mercury High Water Float, Single Cord Assembly with "2000" Series EQD

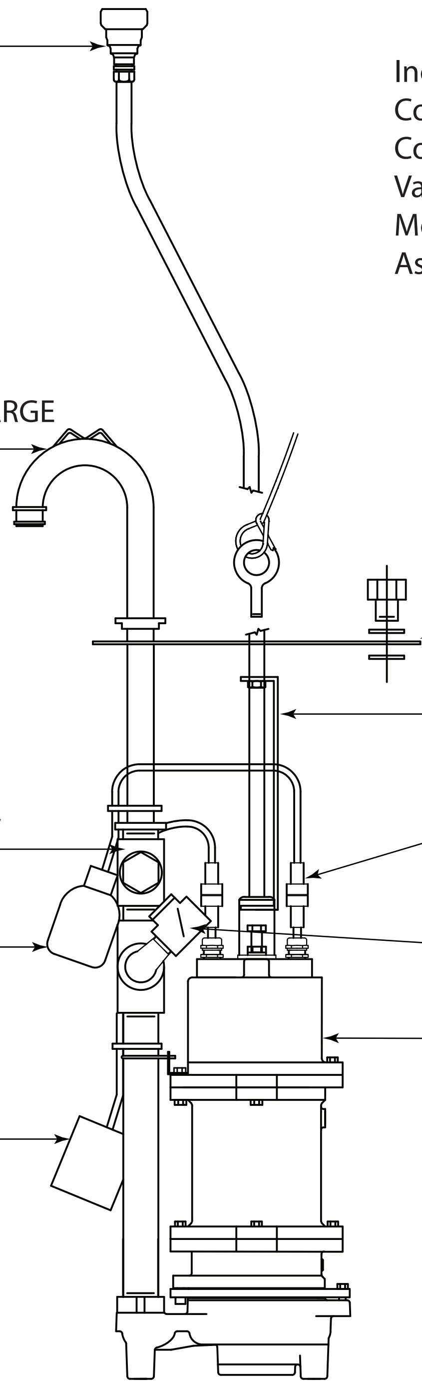


KER - Replaces GP Series 2010/2012/2014/2015/2016

KEEN e/One® Replacement

Model No. KER-0001

Includes: KG2-2301CSL, Painted - Full Round Cover, SST Gooseneck, SST Support Brackets, Compression Grips, Check/Anti-Siphon Valves - Brass, Mechanical On-Off Float, Mercury High Water Float, Single Cord Assembly with "Extreme" Series EQD



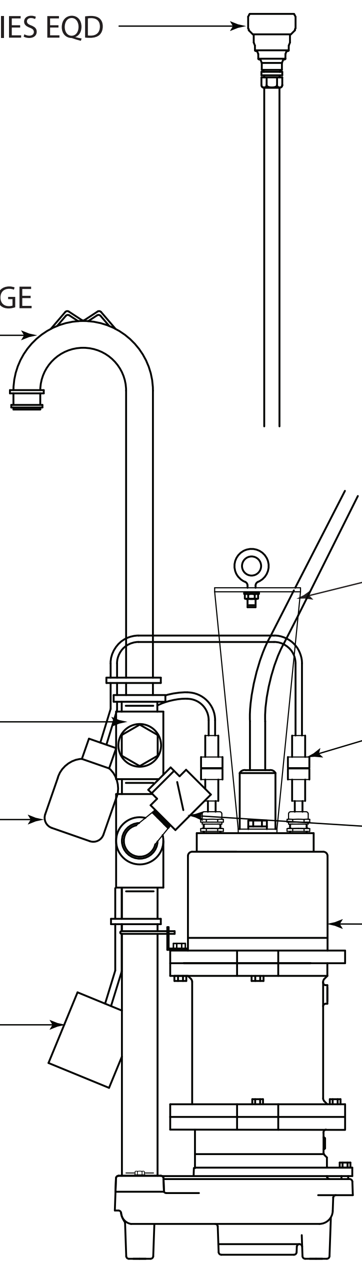
KER-0001 - Replaces D Series DH/R-071/151/152/272/502

KEEN PUMP®

KEEN e/One® Replacement

Model No. KER-0002

Includes: KG2-2301CSL, Stainless Steel "Open" Cover Support, SST Gooseneck, Check/Anti-Siphon Valves - Brass, Mechanical On-Off Float, Mercury High Water Float, Single Cord Assembly with "2000" Series EQD



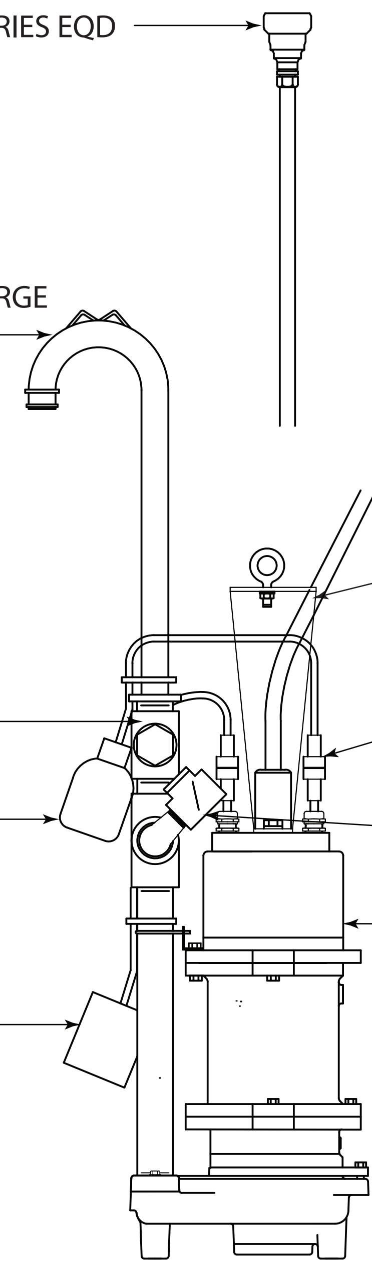
KER-0002 - Replaces GP Series 2010/2012/2014/2015/2016

KEEN PUMP®

KEEN e/One® Replacement

Model No. KER-0003

Includes: KG2-2301CSL, Stainless Steel "Open" Cover Support, SST Gooseneck, Check/Anti-Siphon Valves - Brass, Mechanical On-Off Float, Mercury High Water Float, Single Cord Assembly with "Extreme" Series EQD

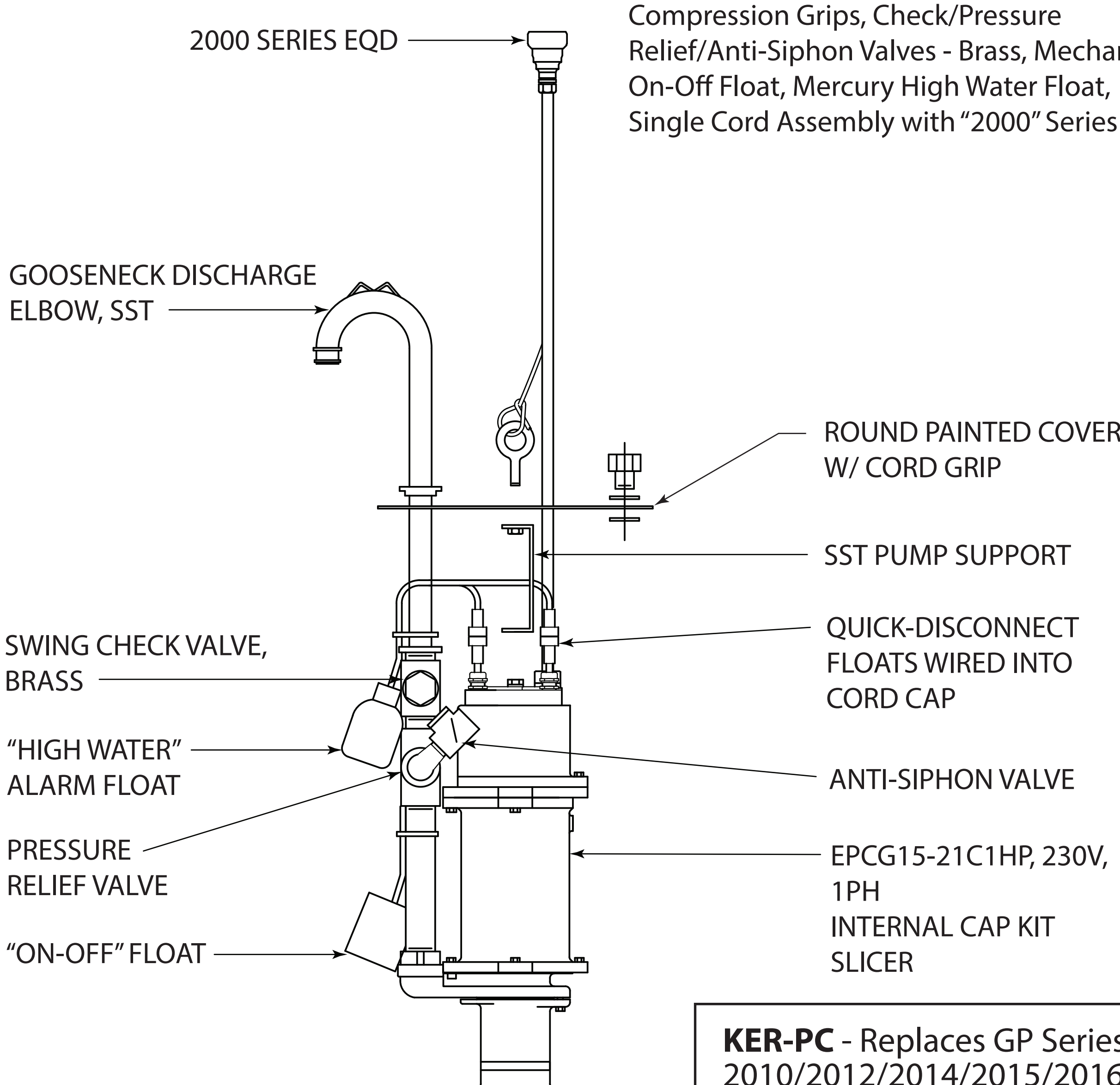


KER-0003 - Replaces D Series DH/R-071/151/152/272/502

KEEN e/One® Replacement

Model No. KER-PC

Includes: EPCG15-21C, Painted - Full Round Cover, SST Gooseneck, SST Support Brackets, Compression Grips, Check/Pressure Relief/Anti-Siphon Valves - Brass, Mechanical On-Off Float, Mercury High Water Float, Single Cord Assembly with "2000" Series EQD

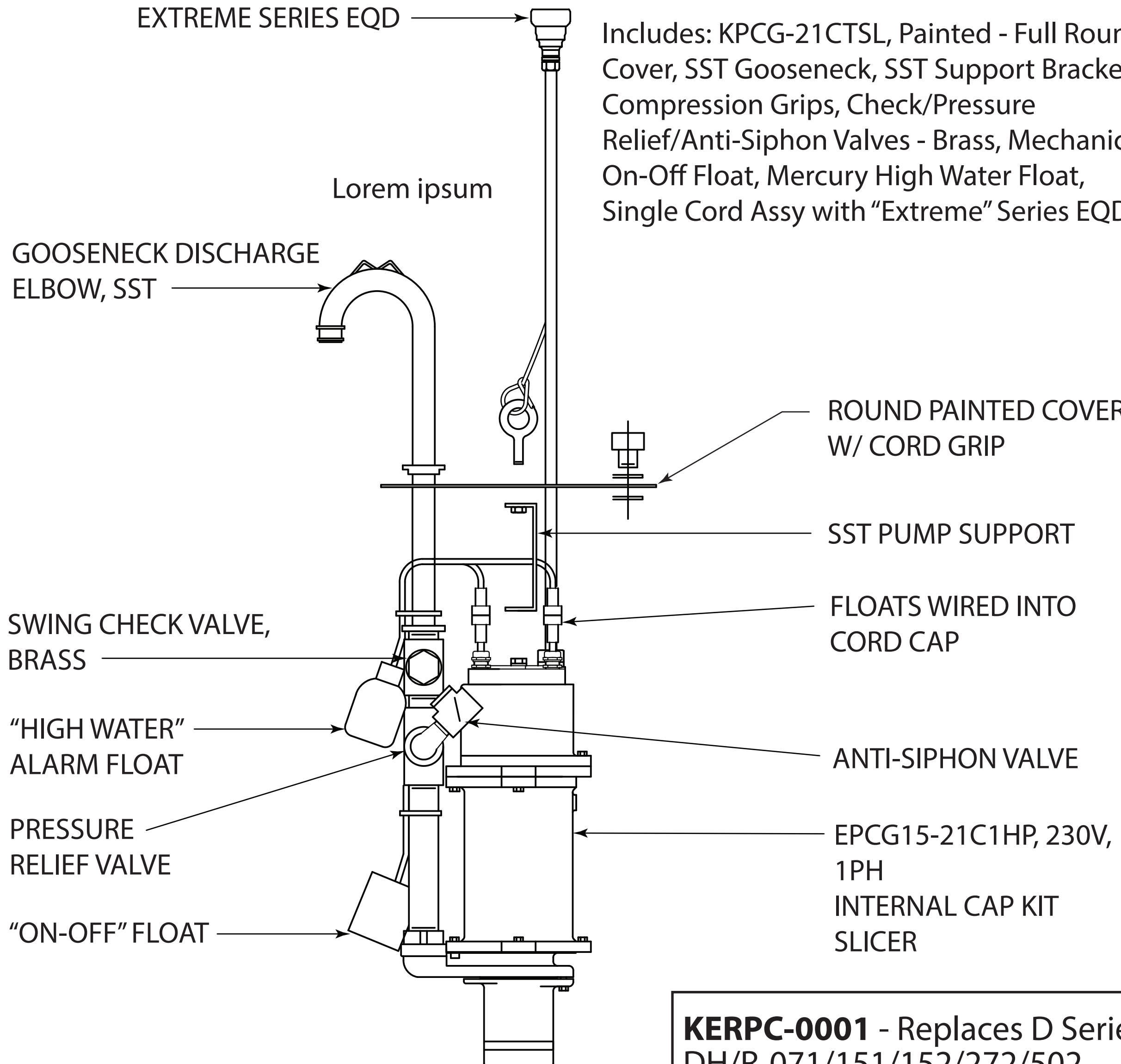


KER-PC - Replaces GP Series 2010/2012/2014/2015/2016

KEEN e/One® Replacement

Model No. KERPC-0001

Includes: KPCG-21CTSL, Painted - Full Round Cover, SST Gooseneck, SST Support Brackets, Compression Grips, Check/Pressure Relief/Anti-Siphon Valves - Brass, Mechanical On-Off Float, Mercury High Water Float, Single Cord Assy with "Extreme" Series EQD

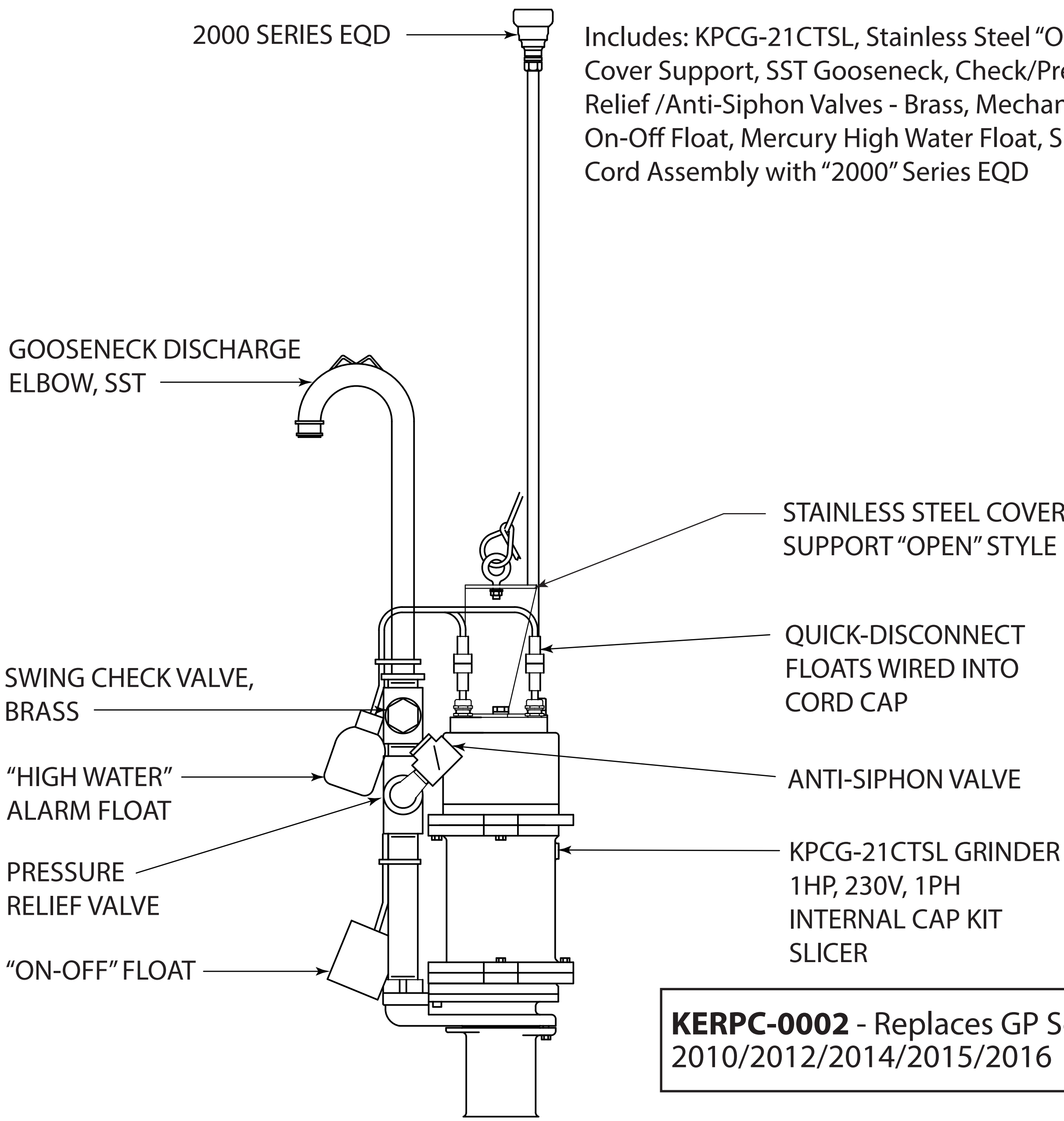


KERPC-0001 - Replaces D Series DH/R-071/151/152/272/502

KEEN e/One® Replacement

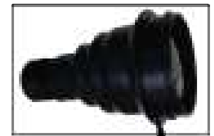
Model No. KERPC-0002

Includes: KPCG-21CTSL, Stainless Steel "Open" Cover Support, SST Gooseneck, Check/Pressure Relief /Anti-Siphon Valves - Brass, Mechanical On-Off Float, Mercury High Water Float, Single Cord Assembly with "2000" Series EQD

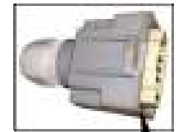


KERPC-0002 - Replaces GP Series 2010/2012/2014/2015/2016

* BLUE WIRE
- USE ON ALL KPCG PUMPS
- USE ON ALL "MDI" ORDERS
- DO NOT USE ON K(H)G2 PUMPS EXCEPT MDI

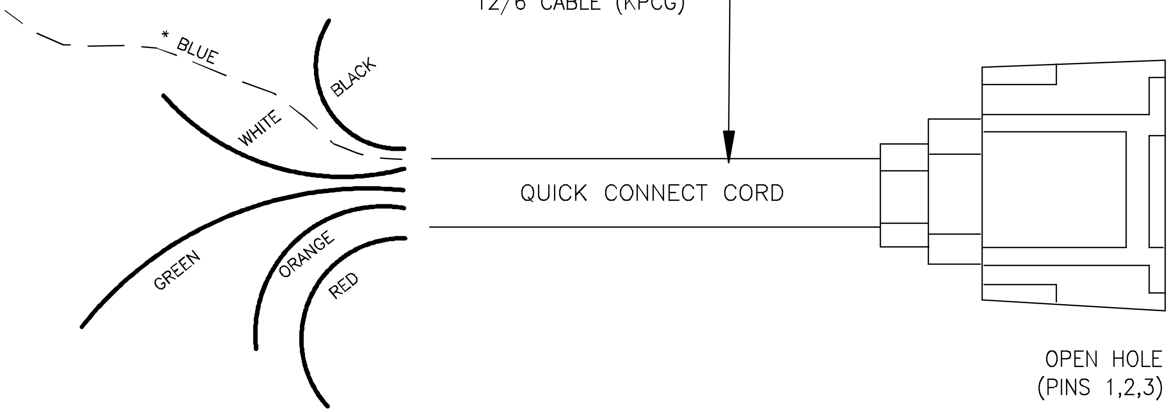


ROUND EQD HOUSING
"EXTREME"



EQD HOUSING
"2000 SERIES"

12/5 CABLE (KHG2)
12/6 CABLE (KPCG)



METAL INSERT
(PINS 4,5,6)

6 PIN CONNECTOR

OPEN HOLE
(PINS 1,2,3)

1 - *BLUE
2 - BLACK
3 - WHITE
4 - GREEN
5 - ORANGE
6 - RED

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

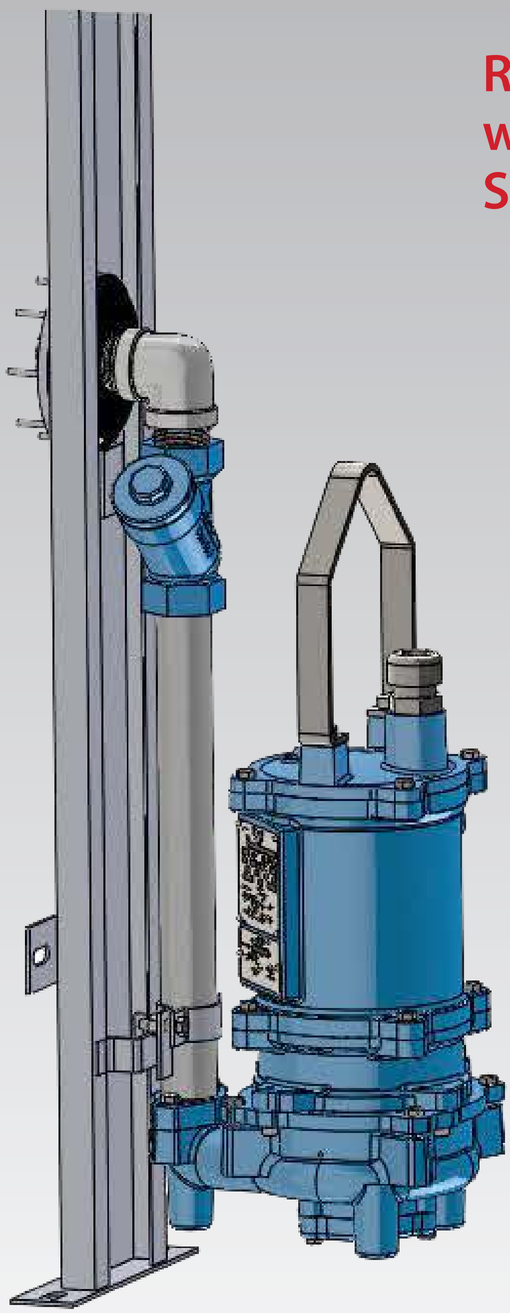
REV	INITIALS	DATE
A	SE	11/23/2018

KEEN PUMP COMPANY
KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

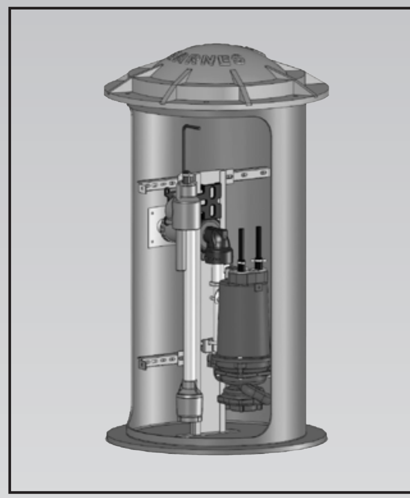
TITLE			
DIAGRAM, KER/KER-PC WIRING, FLOATS WIRED INTO PUMP			
SCALE: NTS		DWG. #: KN-1240	REV.: A
DWG. BY: SE	DATE: 11/23/2018		

KEEN PUMP

“KBR-CH” KEEN / “C” Rail®
Replacement



Replace Any Exisiting “C” Rail System with a KEEN PUMP Centrifugal or Semi-Open 2hp Grinder Pump!



FEATURES:

- Superior Quality, All Stainless Steel “C” Rail System
- Liftout Designed To Match Existing System
- Dimensionally The Same
- Stainless Steel Piping And All Connection Fittings To “C” Rail System
- Easy, Dependable “Slide-In” Pump Installation
- Available With A Variety of High Head or Flow Grinder Pumps

www.keenpump.com

“KBR” KEEN / “C” Rail® Replacement

2HP CENTRIFUGAL GRINDER
- KG2
- KHG2
- KFG2

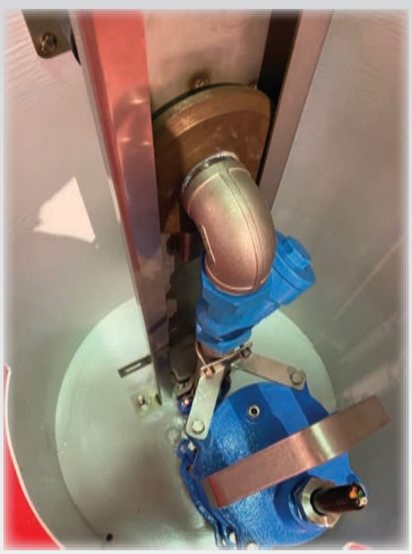
Heads to 188 Ft
Flows to 68 GPM

2HP SEMI-OPEN GRINDER
- KGS2
- KHGS2

MODEL NO. “KBR-CH-KG”

MODEL NO. “KBR-CH-KHGS”

PUMP ASSEMBLY INCLUDES:
- Stainless Steel Disc
- Stainless Steel Lower Bracket Assembly
- Stainless Steel U-Bolt/Bracket
- Stainless Steel Pipe/Fittings
- Cast Iron Ball Check Valve



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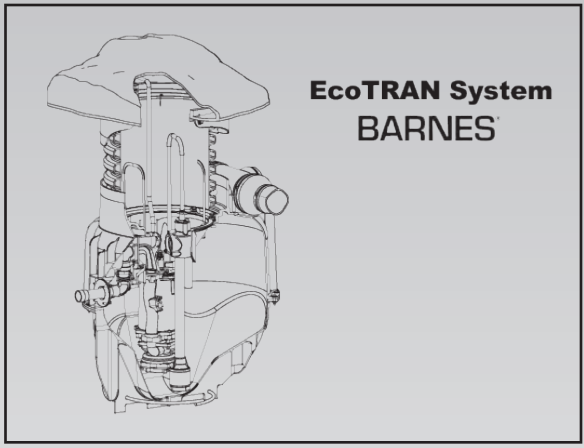
419.207.9400 fax 419.207.8031
www.keenpump.com

KEEN PUMP

"KBR" KEEN / EcoTRAN®
Replacement

Replace Any Exisiting EcoTRAN System with a KEEN PUMP Centrifugal 2hp Grinder Pump!



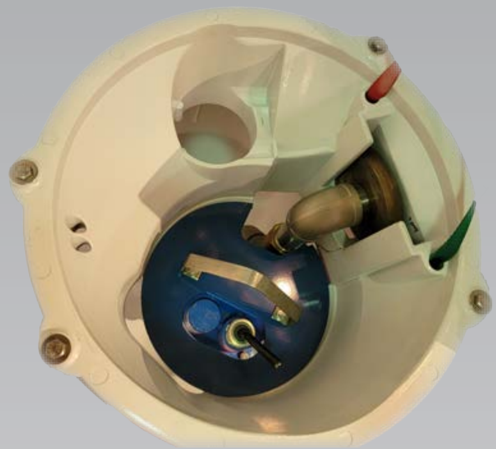
FEATURES:

- Direct, Drop-In Package Assembly
- Fits Into Existing Tank And Pipe Dimensions
- Compact Design Easy To Handle And Install
- Pump Operates With Existing Control Panel
- Stainless Steel Slide-In Flange
- Rugged, Corrosion-Resistant Piping
- Reliable, Dependable Service

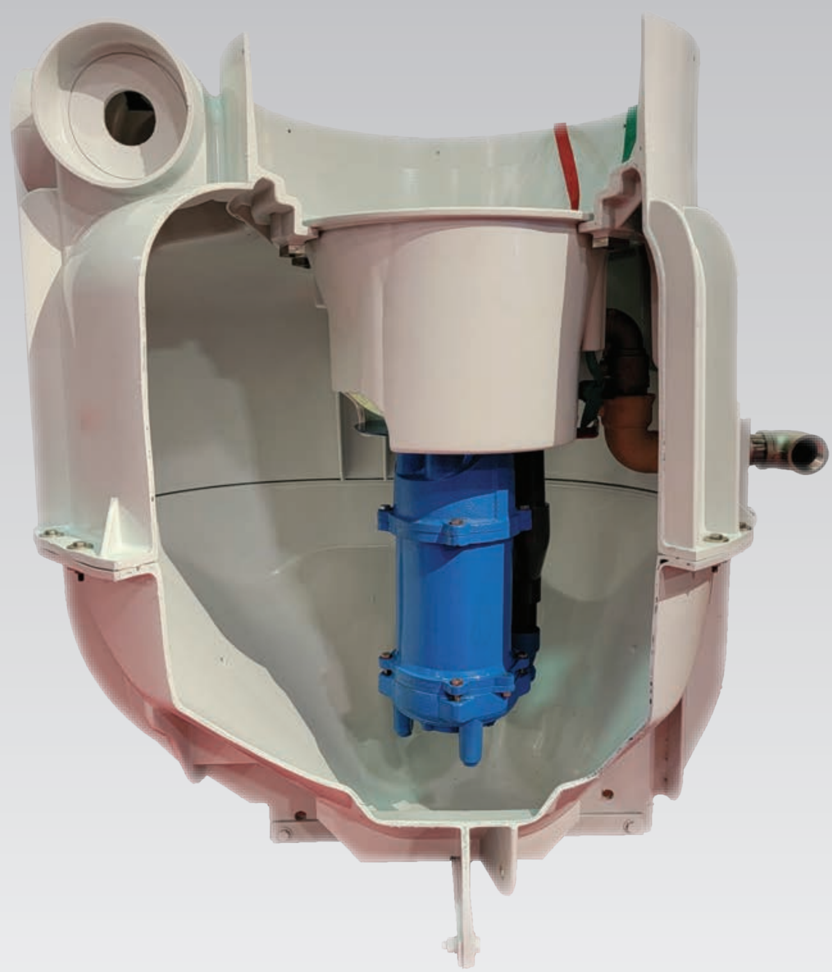
www.keenpump.com

“KBR” KEEN / EcoTRAN® Replacement

Keen Pump is the lead competitor of Retrofits!



Simple Pipe Assembly
- One Size Pipe Assembly
- SST Discharge Flange
- Brass Swing Check Valve



Float Pole Assembly
- Narrow Angle Control Duty
- Fully Assembled and Ready to Drop into Basin

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K0013 05/22

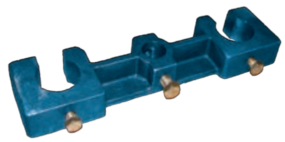
Replacement Kit

KMR-RWG

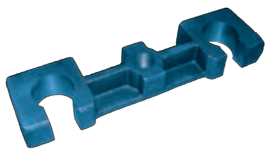
KEEN 2hp Grinder Liftout Replacement

(Fits Any Keen Pump 2hp Centrifugal Grinder)

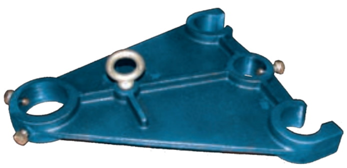
***Part No.* : K-RWG-CASE**
Description: Discharge Case, C.I.



***Part No.* : K-RWG-THD**
Description: Top Holddown, C.I.



***Part No.* : K-RWG-BHD**
Description: Bottom Holddown, C.I.



***Part No.* : K-RWG-GUIDE**
Description: Guide Plate, C.I.

***Part No.* : K-RWG-YOKE**
Description: Rail Yoke, C.I.

***Part No.* : K-RWG-SEAL**
Description: Seal Sleeve-Guide, C.I.

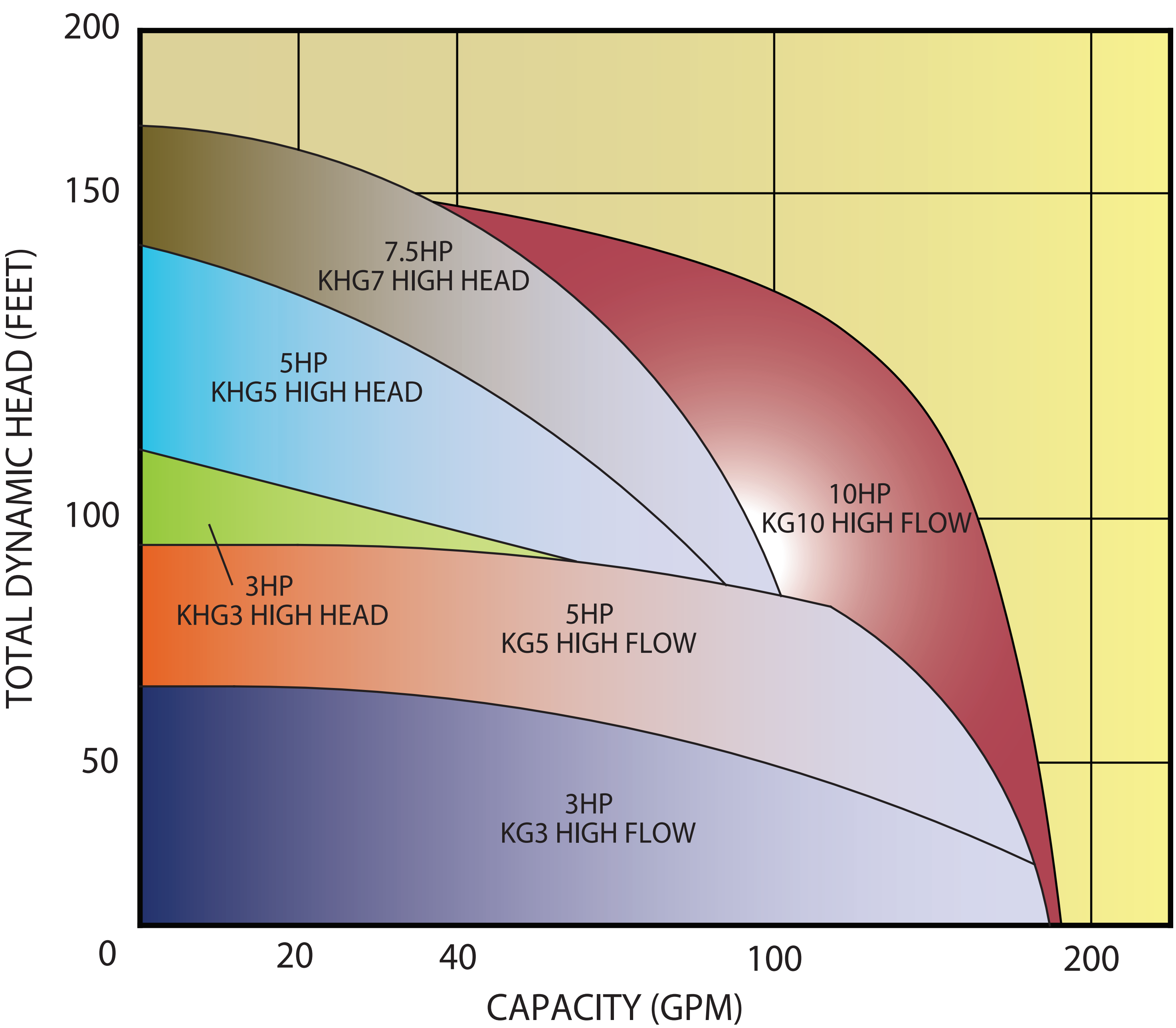
(Pump Not Included)

***Part No.* : KMR-RWGB**
Description: Lift-out Discharge /Rail Kit

Includes: K-RWG-GUIDE, K-RWG-SEAL, 1-1/4" SST Pipe & Fittings, 1-1/4" Brass Swing Check Valve, Seal O-rings, Set Screws, Lifting Eye-bolt

KEEN PUMP
471E State Route 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

3 HP - 10 HP
Grinder Pump Series



KEEN PUMP

KG(X)3

FM APPROVED

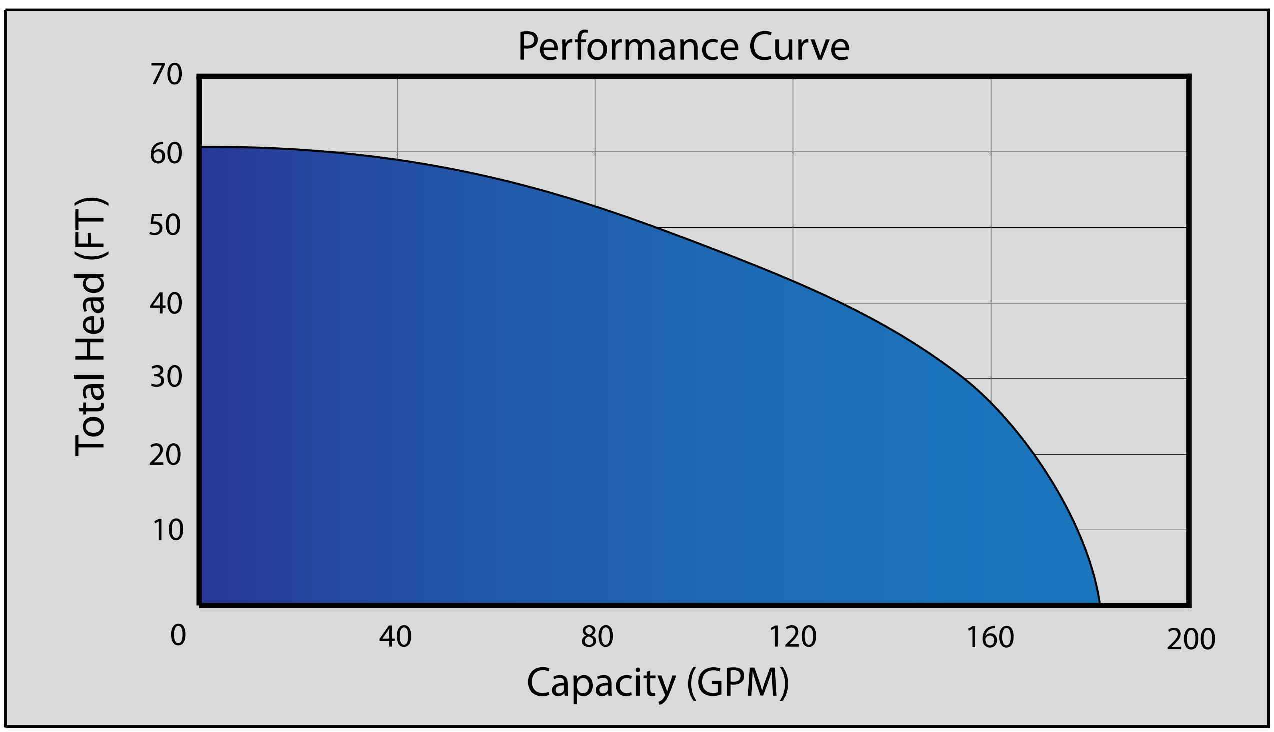
3HP High Flow Grinder Pump
(Class 1, Div. 1, Groups C & D Hazardous Location)

The KEEN PUMP **KG(X)3** series centrifugal grinder pumps easily handle residential, commercial or industrial sanitary waste, reducing it to a fine slurry. The **KG(X)3** pump is designed for use in pressure sewer applications or any piping network.

The recessed vortex impeller design of the **KG(X)3** grinder pump provides trouble-free, non-overloading operation over the entire performance curve. The modular design provides quick and easy serviceability. The hardened stainless steel grinder assembly provides many years of dependable operation.

The **KG(X)3** series pump features:

- Interchangeable with Competitor Installations
- Dual Silicon-Carbide Mechanical Shaft Seals w/ Viton® Elastomers
- Pressed-In Motor with Internal Overload Protection
- 3-Bearing Shaft Support (Upper / Lower / Sleeve)
- Internal Moisture Detection
- Strong Motor, 1-Phase (208/230) Volt or 3-Phase (208/230/460) Volt



Features and Benefits

3HP Grinder Pump High Flow KG(X)3

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grip with compression grommet protects outer cord jacket **(FM Explosion-Proof)** or Heavy-duty molded compression grommet protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 35 cast iron components.

3. Strong Motor
Powerful high-torque motor for reliable pump operation. Pressed stator securely holds motor and efficiently transfers heat. Class F insulation with overload protection in oil-filled chamber for cool operation and long motor life.

4. 3-Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearing plus additional sleeve bearing in lower seal chamber. Long 100,000 hour L-10 bearing life.

5. Double Mechanical Seal Protection
Dual silicon carbide mechanical shaft seals w/ Viton® elastomers provide twice the moisture protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials.

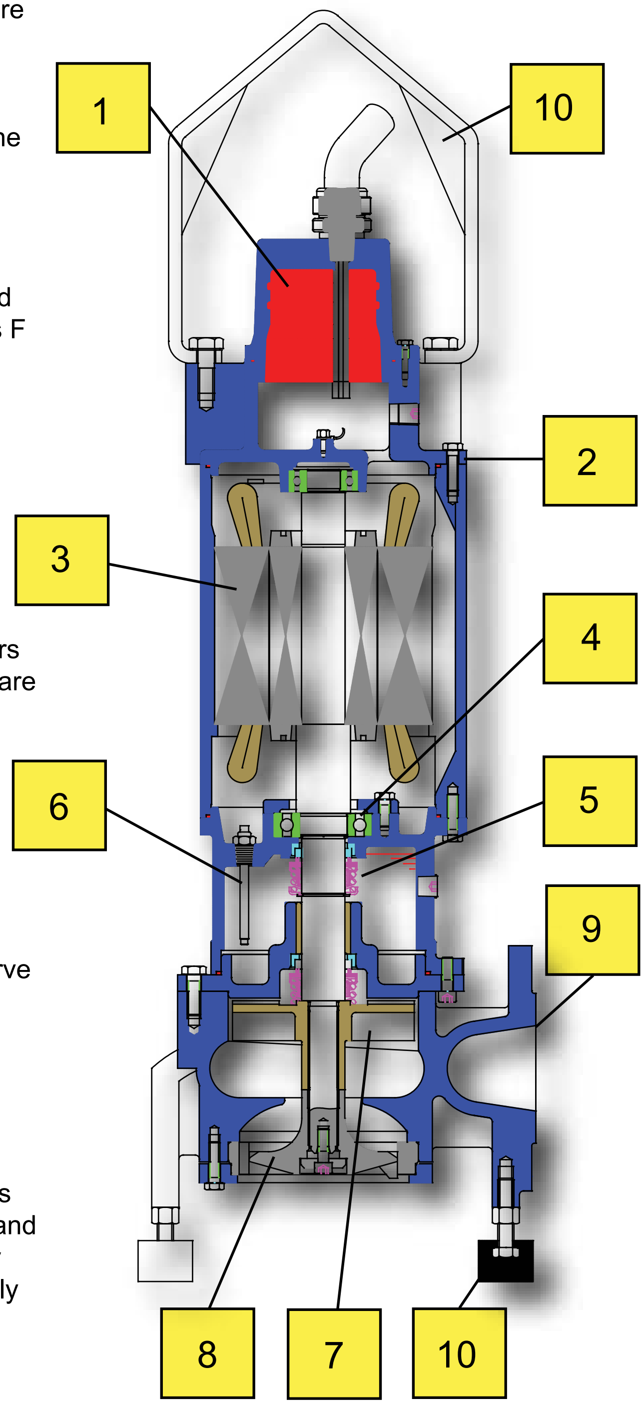
6. Moisture Detection
Dual Seal leak probe signals alarm in control panel for scheduled maintenance.

7. Non-Overloading Hydraulic Design
The recessed centrifugal impeller allows 100% performance curve operation from shut-off to maximum flow without damage to the pump or system. The recessed vortex impeller is out of the passageway of fluid flow, eliminating concerns of blockage or wear.

8. Proven Grinder Assembly
Hardened (Rockwell 56-60) stainless steel grinder assembly has 30+ years proven field experience. The reversible grinder ring and grinder impeller effectively reduce solids into a fine slurry, easily passable in a piping system without concerns of clogging. Highly efficient 17,250 cuts/second.

9. Versatile Flange Connection
Combination 2-1/2" and 3" horizontal flange. Industry-standard ANSI Class 125 dimensions.

10. Accessories
Stainless steel lifting handle included. Anti-vibration nylon mounting feet **OPTIONAL.**



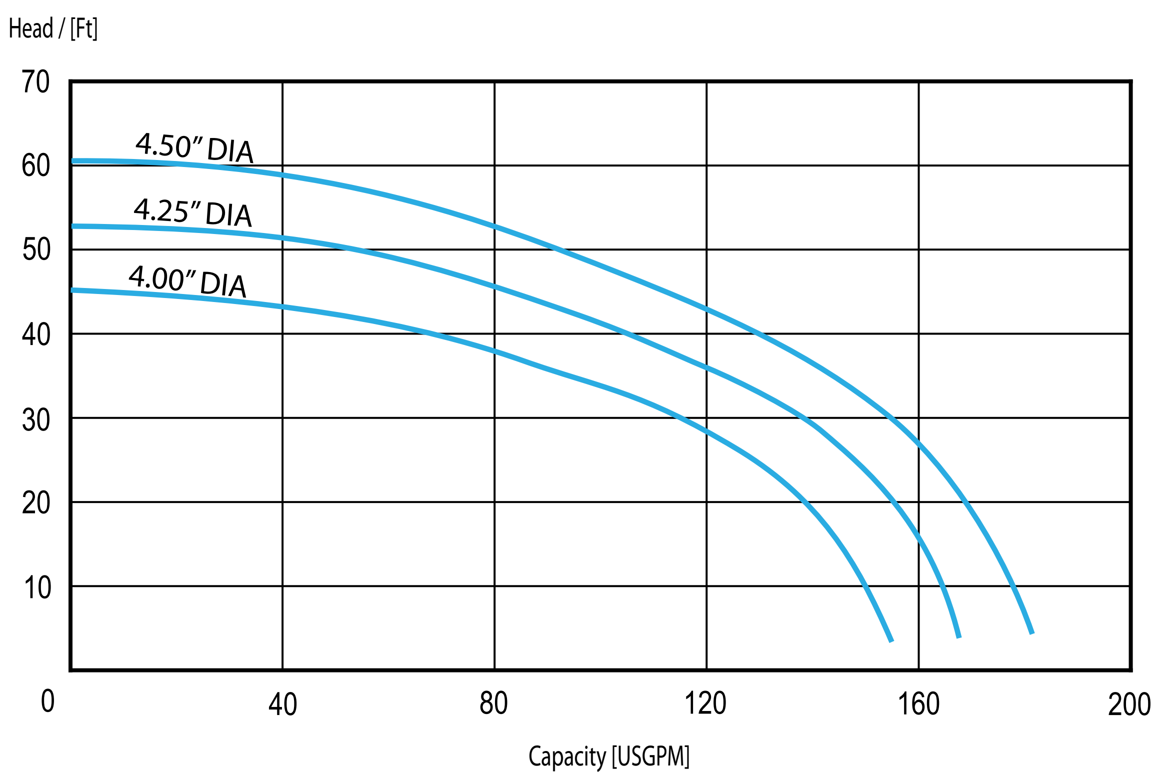
KEEN PUMP
471 US Hwy 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

KEEN PUMP

3HP SUBMERSIBLE GRINDER PUMP

GENERAL		MOTOR DATA	
Pump Model	KG(X)3	HP / Power Supply	3HP / 1 ϕ, 60 Hz
PUMP DATA		Full Load Amps 208V	37 Amps
Date	03/06/2017	Start Amps 208V	185 Amps
Discharge Flange	2-1/2 & 3" ANSI Horizontal	Full Load Amps 230V	34 Amps
Grinder Ring	25 Slots	Start Amps 230V	170 Amps
Impeller Type / Std. Dia.	Recessed / 4.50"	Poles / Rated Speed	2 P / 3450 rpm
Single Phase	START KIT SK-5 includes: Start & Run Capacitors, Start Relay and Mounting Hardware	Insulation Class	F Class
		Start Capacitor	300 ufd, 250 VAC
		Run Capacitor	30 ufd, 370 VAC

PERFORMANCE CURVE



MODEL	***HP***	***Phase***	***Volts***
KG(X)3-2081	3	1	208
KG(X)3-2301	3	1	230

* Performance with clear water and ambient temp 20ºC (68ºF)

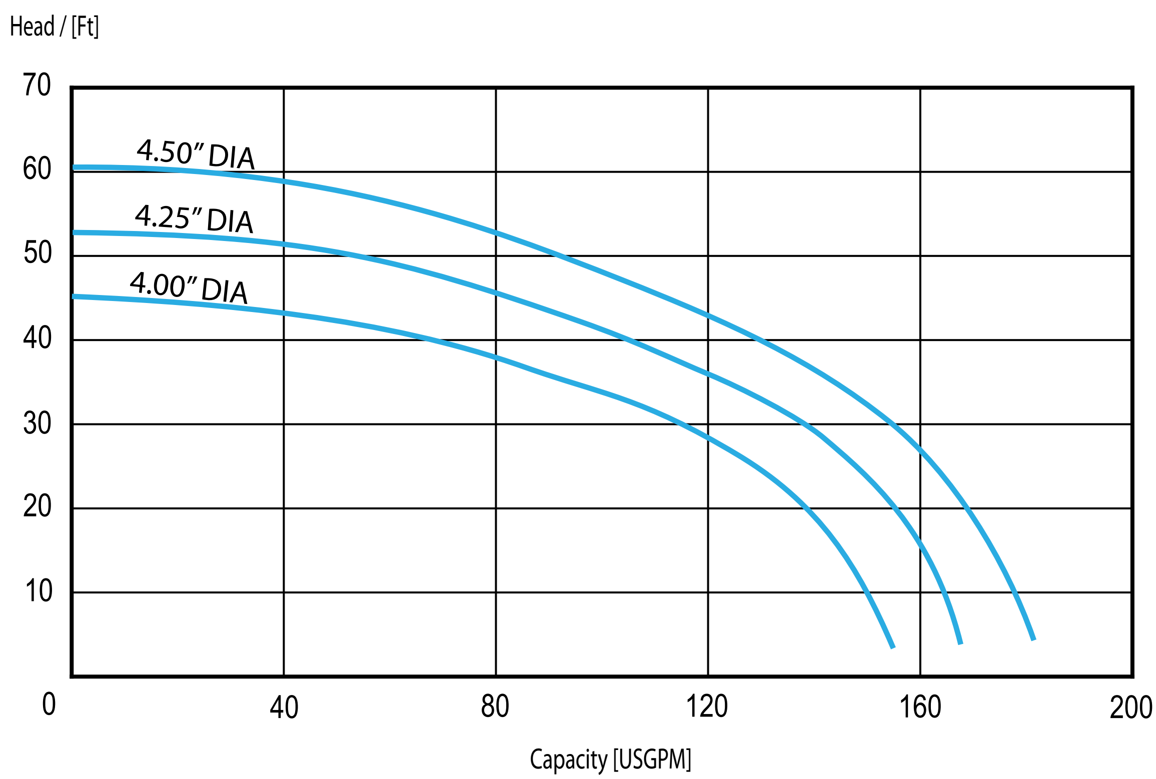
Rev. 11/2018

KEEN PUMP

3HP SUBMERSIBLE GRINDER PUMP

GENERAL		MOTOR DATA	
Pump Model	**KG(X)3**	HP / Power Supply	3HP / 3 ϕ, 60 Hz
PUMP DATA		Full Load Amps 208V	21 Amps
Date	03/06/2017	Start Amps 208V	105 Amps
Discharge Flange	2-1/2 & 3" ANSI Horizontal	Full Load Amps 230V	18 Amps
Grinder Ring	25 Slots	Start Amps 230V	90 Amps
Impeller Type / Std. Dia.	Recessed / 4.50"	Full Load Amps 460V	9 Amps
Three Phase		Start Amps 460V	45 Amps
		Poles / Rated Speed	2 P / 3450 rpm
		Insulation Class	F Class

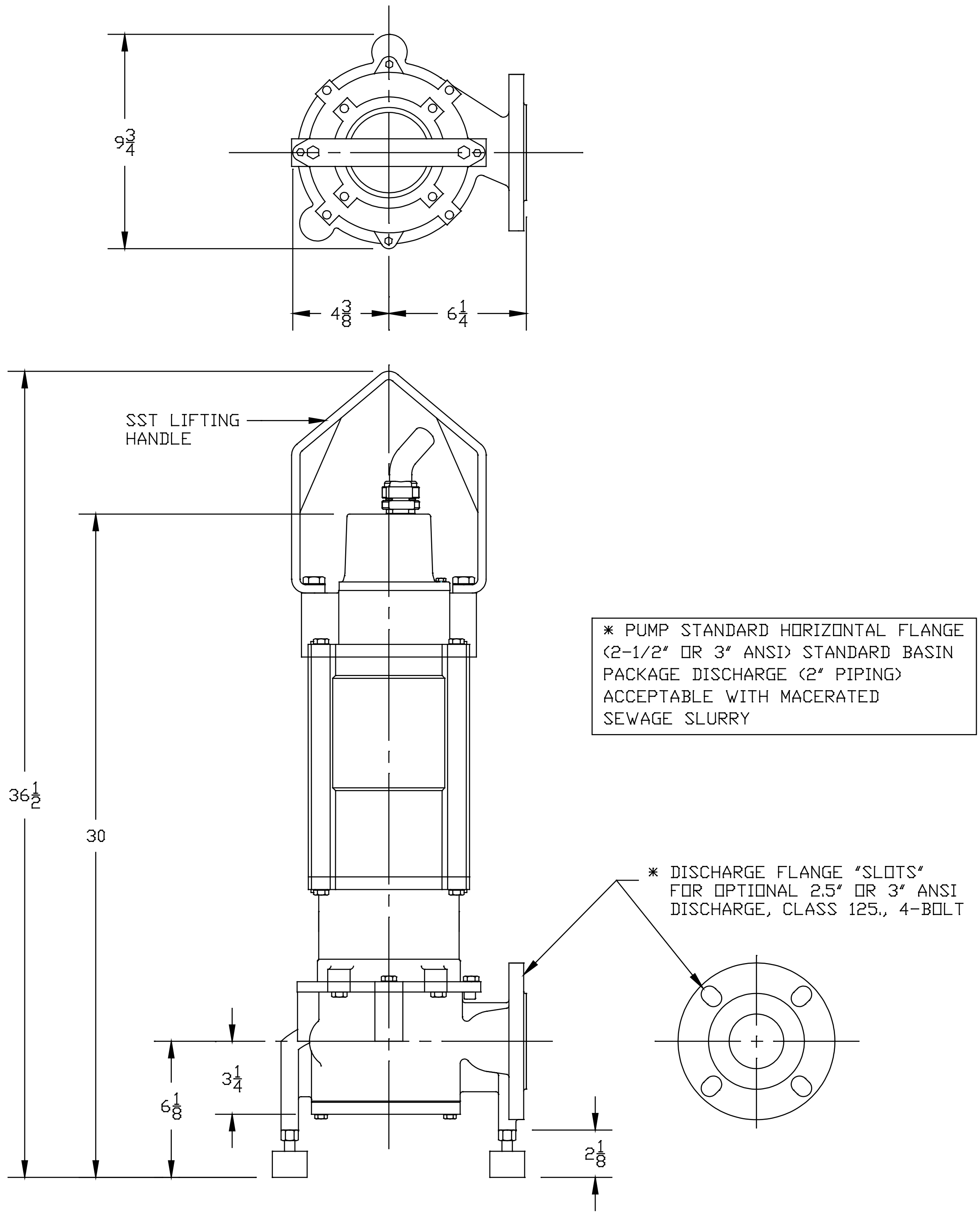
PERFORMANCE CURVE



MODEL	***HP***	***Phase***	***Volts***
KG(X)3-2083	3	3	208
KG(X)3-2303	3	3	230
KG(X)3-4603	3	3	460

* Performance with clear water and ambient temp 20°C (68°F)

Rev. 11/2018



NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE
B	SE	01/06/2017
A	SE	03/26/2015

KEEN PUMP COMPANY

KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805

PHONE: 419-207-9400
FAX: 419-207-8031

TITLE 3-7.5HP HIGH FLOW/HIGH HEAD GR. PUMP DIMENSIONS

SCALE	DWG. BY	DATE	DWG. #	REV.
NTS	SE	01/27/2014	KN-28	B

KHG(X)3

FM APPROVED

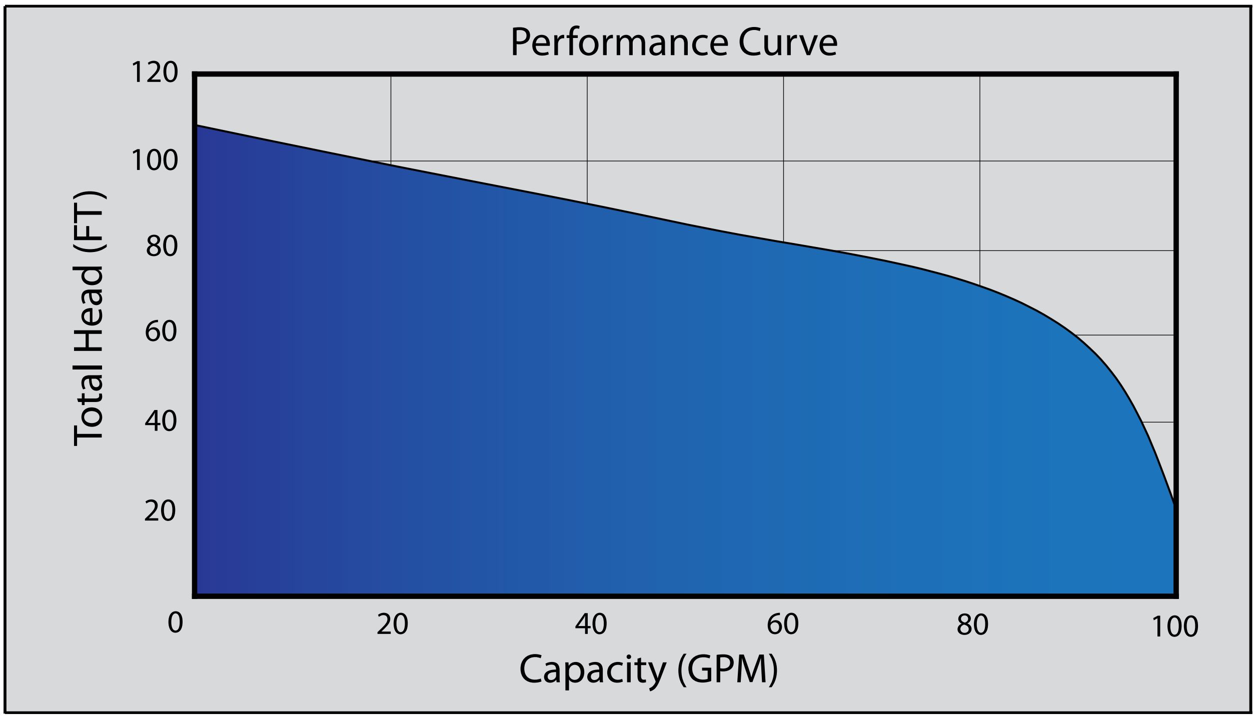
3HP High Head Grinder Pump, 1 or 3 Phase (Class 1, Div. 1, Groups C & D Hazardous Location)

The KEEN PUMP **KHG(X)3** series centrifugal grinder pumps easily handle residential, commercial or industrial sanitary waste, reducing it to a fine slurry. The **KHG(X)3** pump is designed for use in pressure sewer applications or any piping network.

The recessed vortex impeller design of the **KHG(X)3** grinder pump provides trouble-free, non-overloading operation over the entire performance curve. The modular design provides quick and easy serviceability. The hardened stainless steel grinder assembly provides many years of dependable operation.

The **KHG(X)3** series pump features:

- Interchangeable with Competitor Installations
- Dual Silicon-Carbide Mechanical Shaft Seals w/ Viton® Elastomers
- Pressed-In Motor with Internal Overload Protection
- 3-Bearing Shaft Support (Upper / Lower / Sleeve)
- Internal Moisture Detection
- Strong Motor, 1-Phase (208/230) Volt or 3-Phase (208/230/460) Volt



REV 04/2018

Features and Benefits

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grip with compression grommet protects outer cord jacket **(FM Explosion-Proof)** or Heavy-duty molded compression grommet protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 35 cast iron components.

3. Strong Motor
Powerful high-torque motor for reliable pump operation. Pressed stator securely holds motor and efficiently transfers heat. Class F insulation with overload protection in oil-filled chamber for cool operation and long motor life.

4. 3-Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearing plus additional sleeve bearing in lower seal chamber. Long 100,000 hour L-10 bearing life.

5. Double Mechanical Seal Protection
Dual silicon carbide mechanical shaft seals w/ Viton® Elastomers provide twice the moisture protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials.

6. Moisture Detection
Dual Seal leak probe signals alarm in control panel for scheduled maintenance.

7. Non-Overloading Hydraulic Design
The recessed centrifugal impeller allows 100% performance curve operation from shut-off to maximum flow without damage to the pump or system. The recessed vortex impeller is out of the passageway of fluid flow, eliminating concerns of blockage or wear.

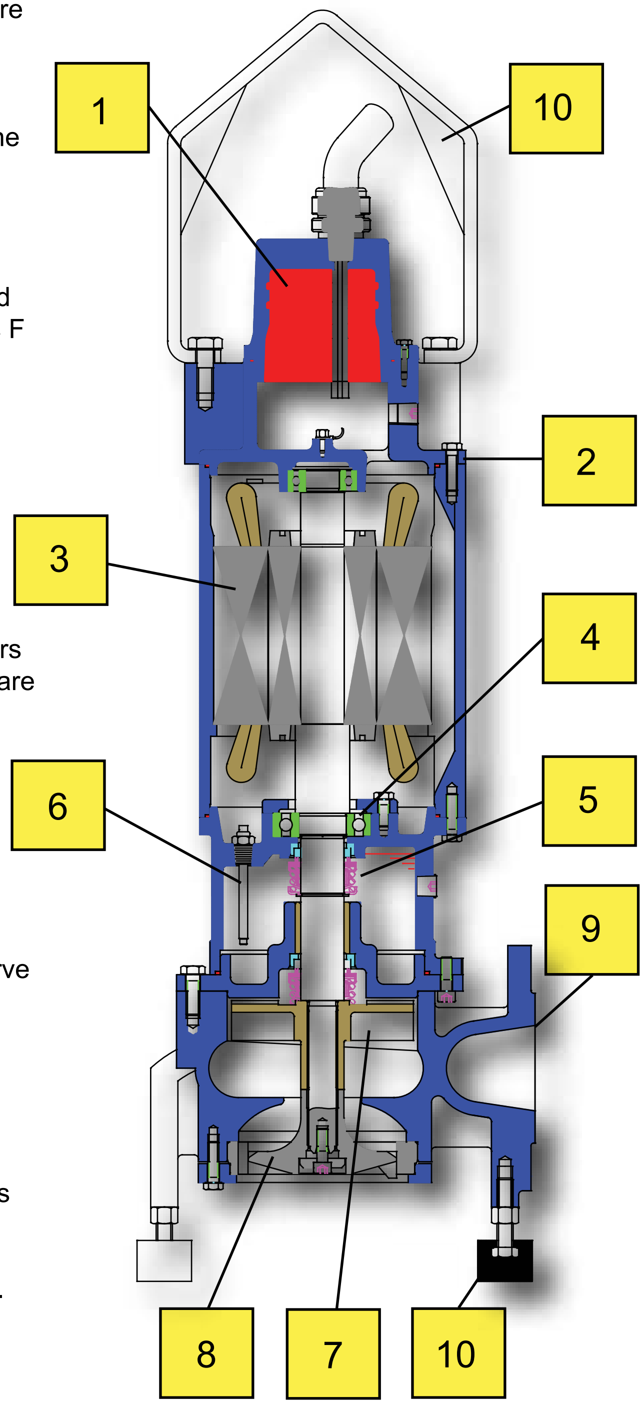
8. Proven Grinder Assembly
Hardened (Rockwell 56-60) stainless steel grinder assembly has 30+ years proven field experience. The reversible grinder ring and grinder impeller effectively reduce solids into a fine slurry, easily passable in a piping system without concerns of clogging. Highly
efficient 12,400 cuts/second.

9. Versatile Flange Connection
Combination 2-1/2" and 3" horizontal flange. Industry-standard ANSI Class 125 dimensions.

10. Accessories
Stainless steel lifting handle included. Anti-vibration nylon

3HP Grinder Pump High Head KHG(X)3

FM APPROVED



KEEN PUMP

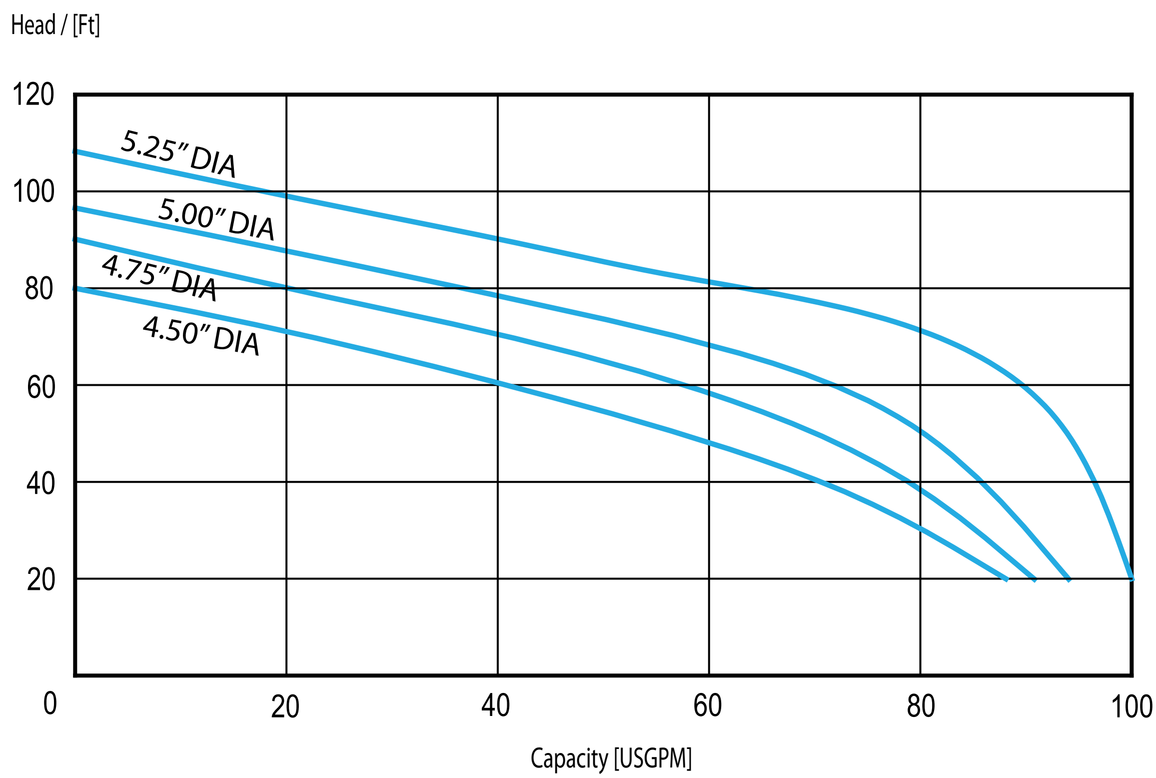
471 US Hwy 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

KEEN PUMP

3HP SUBMERSIBLE GRINDER PUMP

GENERAL		MOTOR DATA	
Pump Model	**KHG(X)3**	HP / Power Supply	3HP / 1 ϕ, 60 Hz
PUMP DATA		Full Load Amps 208V	27 Amps
Date	01/06/2017	Start Amps 208V	135 Amps
Discharge Flange	2-1/2 & 3" ANSI Horizontal	Full Load Amps 230V	25 Amps
Grinder Ring	25 Slots	Start Amps 230V	125 Amps
Impeller Type / Std. Dia.	Recessed / 5.25"	Poles / Rated Speed	2 P / 3450 rpm
Single Phase	START KIT SK-5 includes: Start & Run Capacitors, Relay, and Mounting Hardware	Insulation Class	F Class
		Start Capacitor	300 ufd, 250 VAC
		Run Capacitor	30 ufd, 370 VAC

PERFORMANCE CURVE



MODEL	***HP***	***Phase***	***Volts***
KHG(X)3-2081	3	1	208
KHG(X)3-2301	3	1	230

* Performance with clear water and ambient temp 20°C (68°F)

Rev. 11/2018

KEEN PUMP

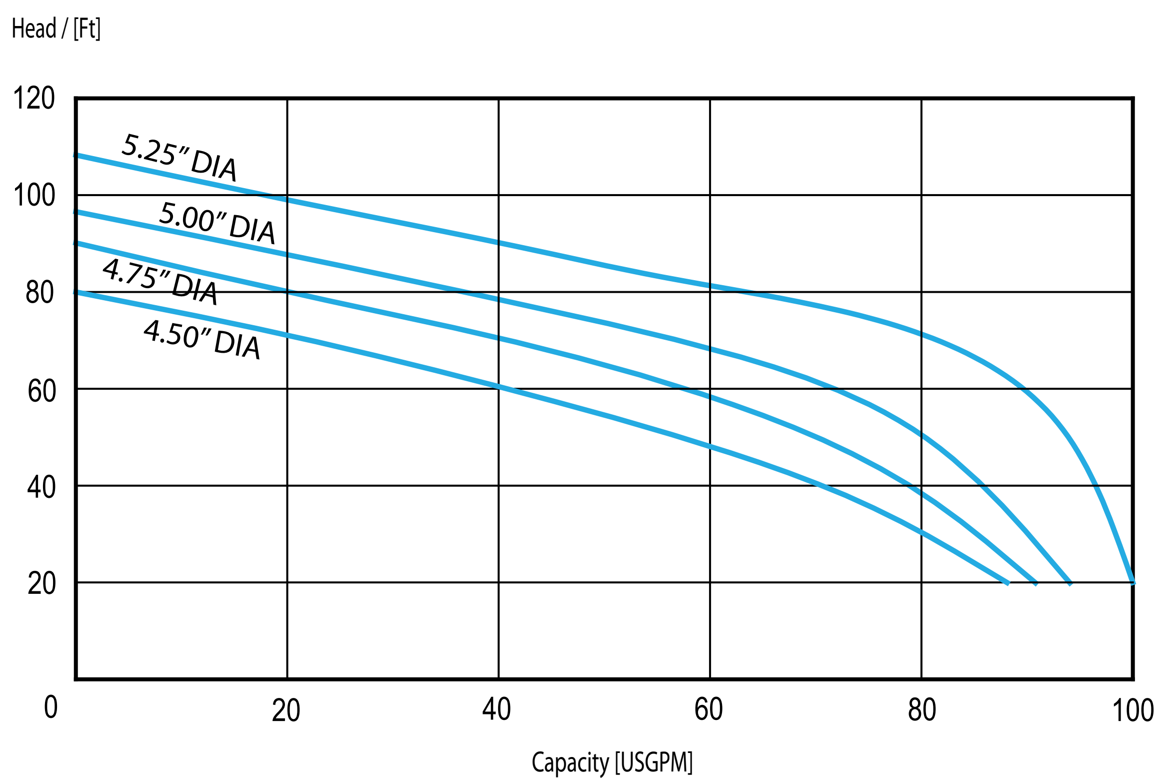
3HP SUBMERSIBLE GRINDER PUMP

GENERAL	
Pump Model	KHG(X)3
PUMP DATA	
Date	01/06/2017
Discharge Flange	2-1/2 & 3" ANSI Horizontal
Grinder Ring	25 Slots
Impeller Type / Std. Dia.	Recessed / 5.25"

Three Phase

MOTOR DATA	
HP / Power Supply	3HP / 3 ϕ, 60 Hz
Full Load Amps 208V	21 Amps
Start Amps 208V	105 Amps
Full Load Amps 230V	18 Amps
Start Amps 230V	90 Amps
Full Load Amps 460V	9 Amps
Start Amps 460V	45 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	F Class

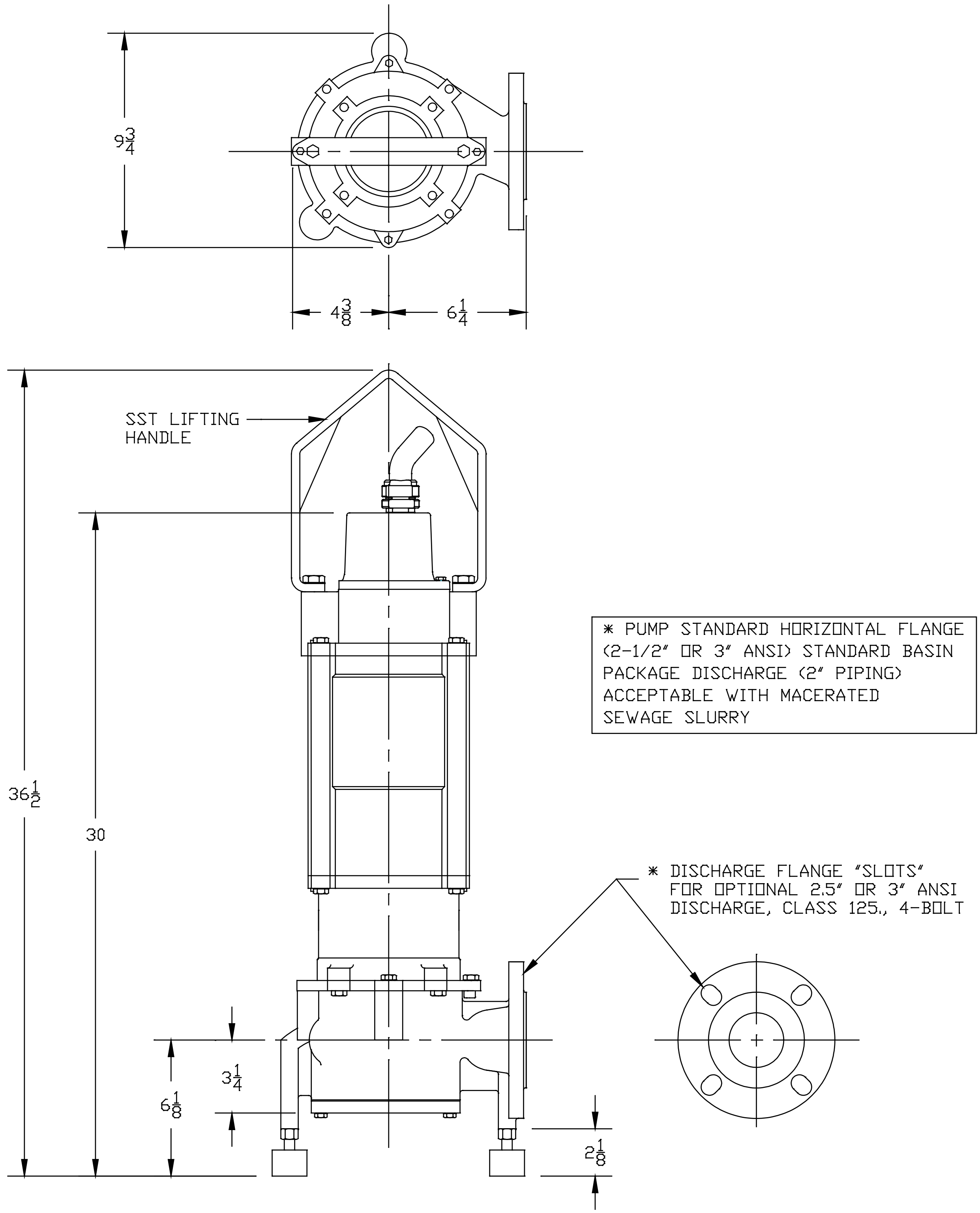
PERFORMANCE CURVE



MODEL	***HP***	***Phase***	***Volts***
KHG(X)3-2083	3	3	208
KHG(X)3-2303	3	3	230
KHG(X)3-4603	3	3	460

* Performance with clear water and ambient temp 20°C (68°F)

Rev. 11/2018



NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE
B	SE	01/06/2017
A	SE	03/26/2015

KEEN PUMP COMPANY
KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE
3-7.5HP HIGH FLOW/HIGH HEAD GR. PUMP DIMENSIONS

SCALE	DWG. BY	DATE	DWG. #	REV.
NTS	SE	01/27/2014	KN-28	B

KG(X)5

FM APPROVED

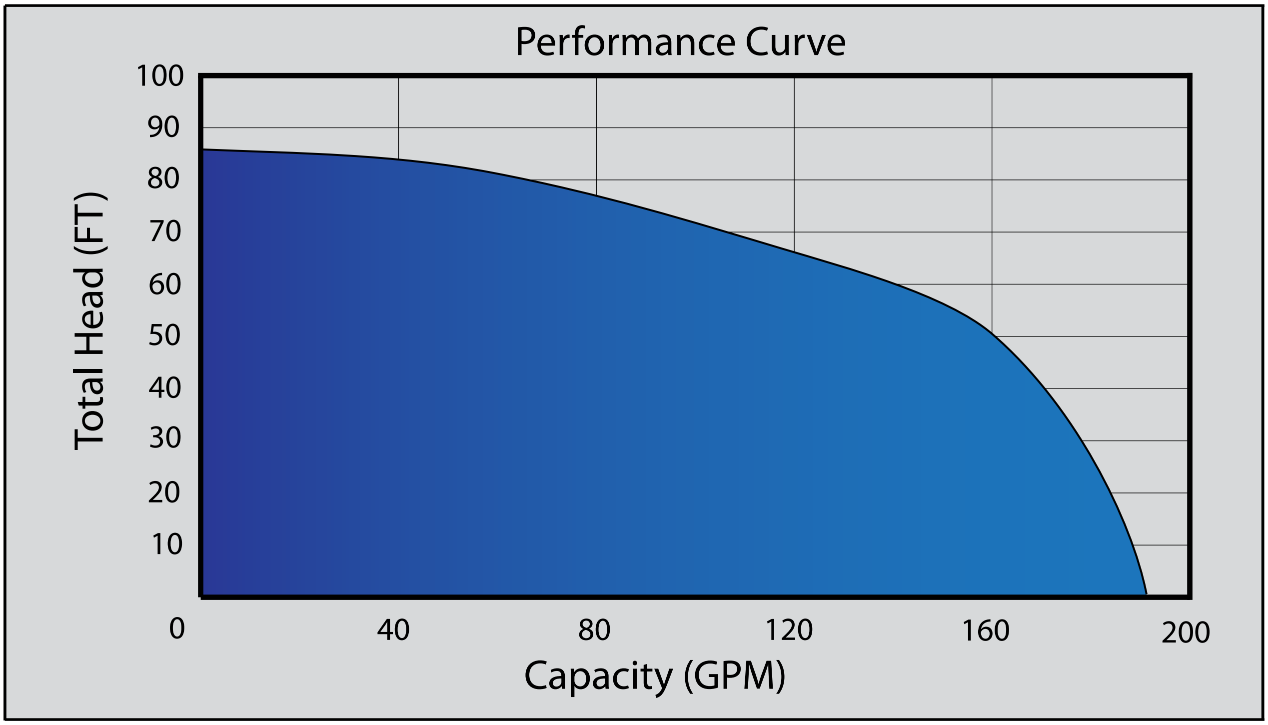
5HP High Flow Grinder Pump
(Class 1, Div. 1, Groups C & D Hazardous Location)

The KEEN PUMP **KG(X)5** series centrifugal grinder pumps easily handle residential, commercial or industrial sanitary waste, reducing it to a fine slurry. The **KG(X)5** pump is designed for use in pressure sewer applications or any piping network.

The recessed vortex impeller design of the **KG(X)5** grinder pump provides trouble-free, non-overloading operation over the entire performance curve. The modular design provides quick and easy serviceability. The hardened stainless steel grinder assembly provides many years of dependable operation.

The **KG(X)5** series pump features:

- Interchangeable with Competitor Installations
- Dual Silicon-Carbide Mechanical Shaft Seals w/ Viton® Elastomers
- Pressed-In Motor with Internal Overload Protection
- 3-Bearing Shaft Support (Upper / Lower / Sleeve)
- Internal Moisture Detection
- Strong Motor, 1-Phase (208/230) Volt or 3-Phase (208/230/460) Volt



REV 04/2018

Features and Benefits

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grip with compression grommet protects outer cord jacket **(FM Explosion-Proof)** or Heavy-duty molded compression grommet protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 35 cast iron components.

3. Strong Motor
Powerful high-torque motor for reliable pump operation. Pressed stator securely holds motor and efficiently transfers heat. Class F insulation with overload protection in oil-filled chamber for cool operation and long motor life.

4. 3-Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearing plus additional sleeve bearing in lower seal chamber. Long 100,000 hour L-10 bearing life.

5. Double Mechanical Seal Protection
Dual silicon carbide mechanical shaft seals w/ Viton® elastomers provide twice the moisture protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials.

6. Moisture Detection
Dual Seal leak probe signals alarm in control panel for scheduled maintenance.

7. Non-Overloading Hydraulic Design
The recessed centrifugal impeller allows 100% performance curve operation from shut-off to maximum flow without damage to the pump or system. The recessed vortex impeller is out of the passageway of fluid flow, eliminating concerns of blockage or wear.

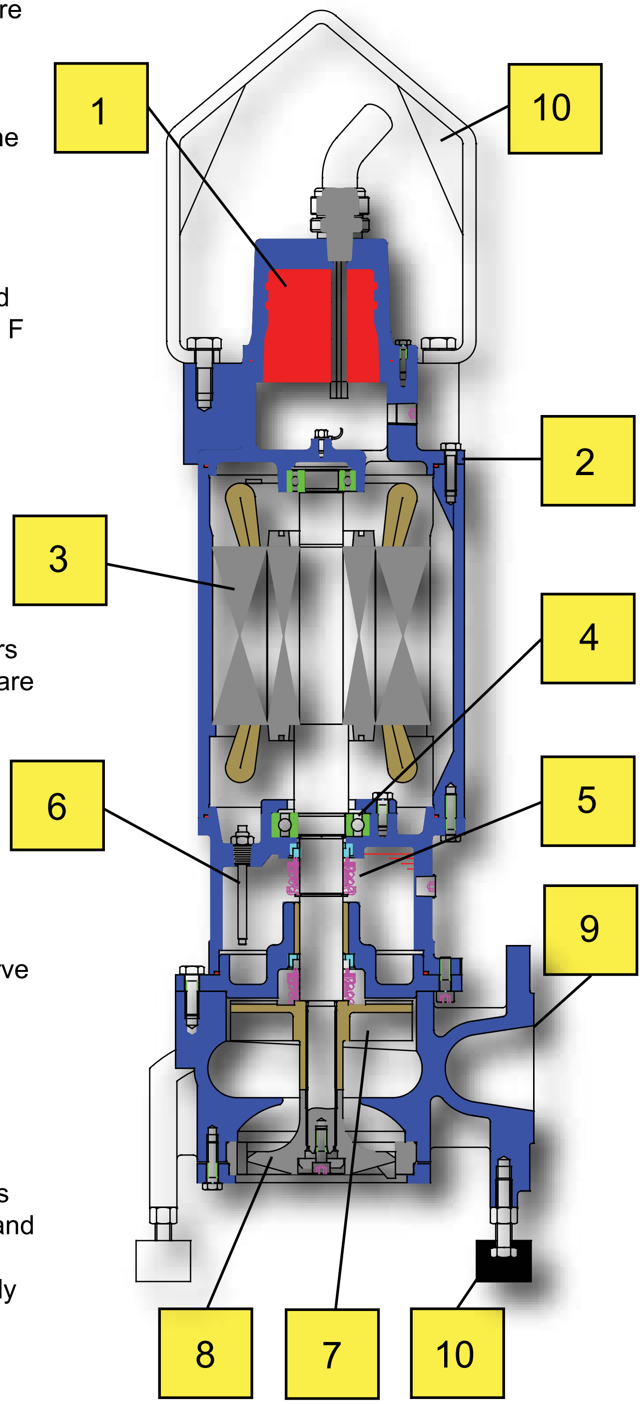
8. Proven Grinder Assembly
Hardened (Rockwell 56-60) stainless steel grinder assembly has 30+ years proven field experience. The reversible grinder ring and grinder impeller effectively reduce solids into a fine slurry, easily passable in a piping system without concerns of clogging. Highly efficient 17,250 cuts/second.

9. Versatile Flange Connection
Combination 2-1/2" and 3" horizontal flange. Industry-standard ANSI Class 125 dimensions.

10. Accessories
Stainless steel lifting handle included. Anti-vibration nylon mounting feet **OPTIONAL.**

5HP Grinder Pump High Flow KG(X)5

FM APPROVED



KEEN PUMP

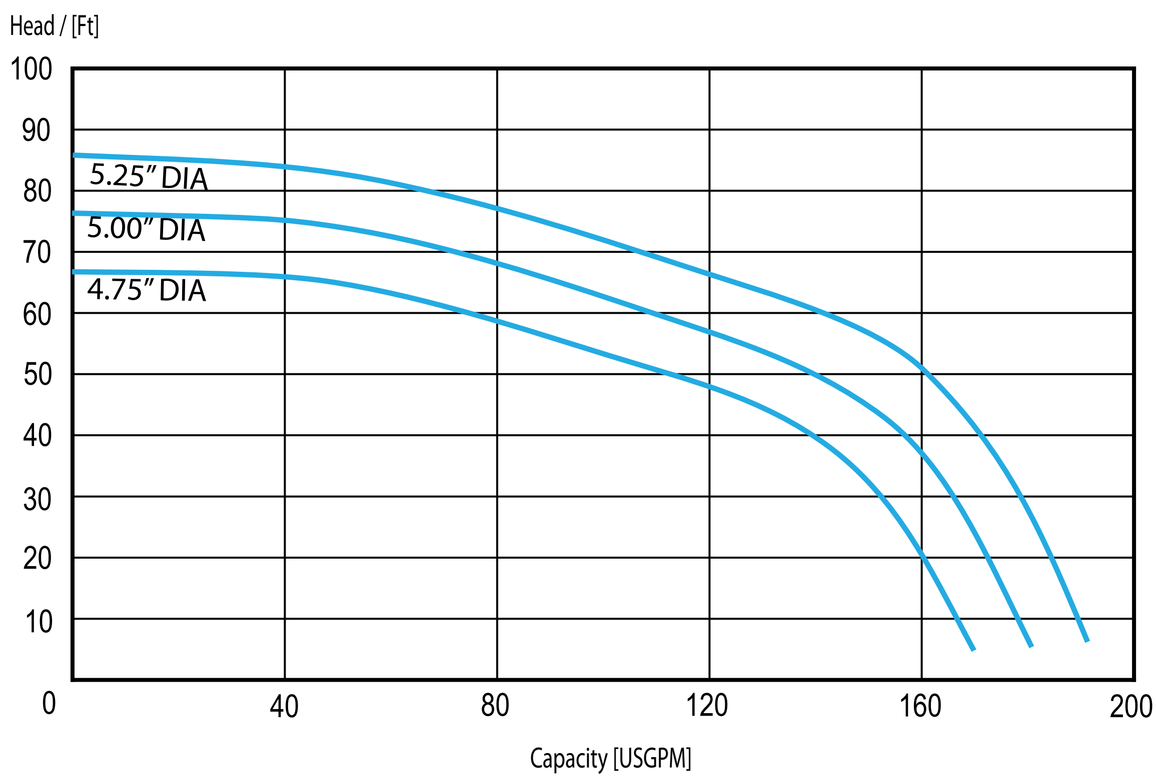
471 US Hwy 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

KEEN PUMP

5HP SUBMERSIBLE GRINDER PUMP

GENERAL	KG(X)5	MOTOR DATA	
Pump Model		HP / Power Supply	5HP / 1 ϕ, 60 Hz
PUMP DATA		Full Load Amps 208V	44 Amps
Date	03/06/2017	Start Amps 208V	220 Amps
Discharge Flange	2-1/2 & 3” ANSI Horizontal	Full Load Amps 230V	40 Amps
Grinder Ring	25 Slots	Start Amps 230V	200 Amps
Impeller Type / Std. Dia.	Recessed / 5.25”	Poles / Rated Speed	2 P / 3450 rpm
Single Phase	START KIT SK-5 includes: Start & Run Capacitors, Relay, and Mounting Hardware	Insulation Class	F Class
		Start Capacitor	300 ufd, 250 VAC
		Run Capacitor	30 ufd, 370 VAC

PERFORMANCE CURVE



MODEL	HP	Phase	Volts
KG(X)5-2081	5	1	208
KG(X)5-2301	5	1	230

* Performance with clear water and ambient temp 20ºC (68ºF)

Rev. 11/2018

KEEN PUMP

5HP SUBMERSIBLE GRINDER PUMP

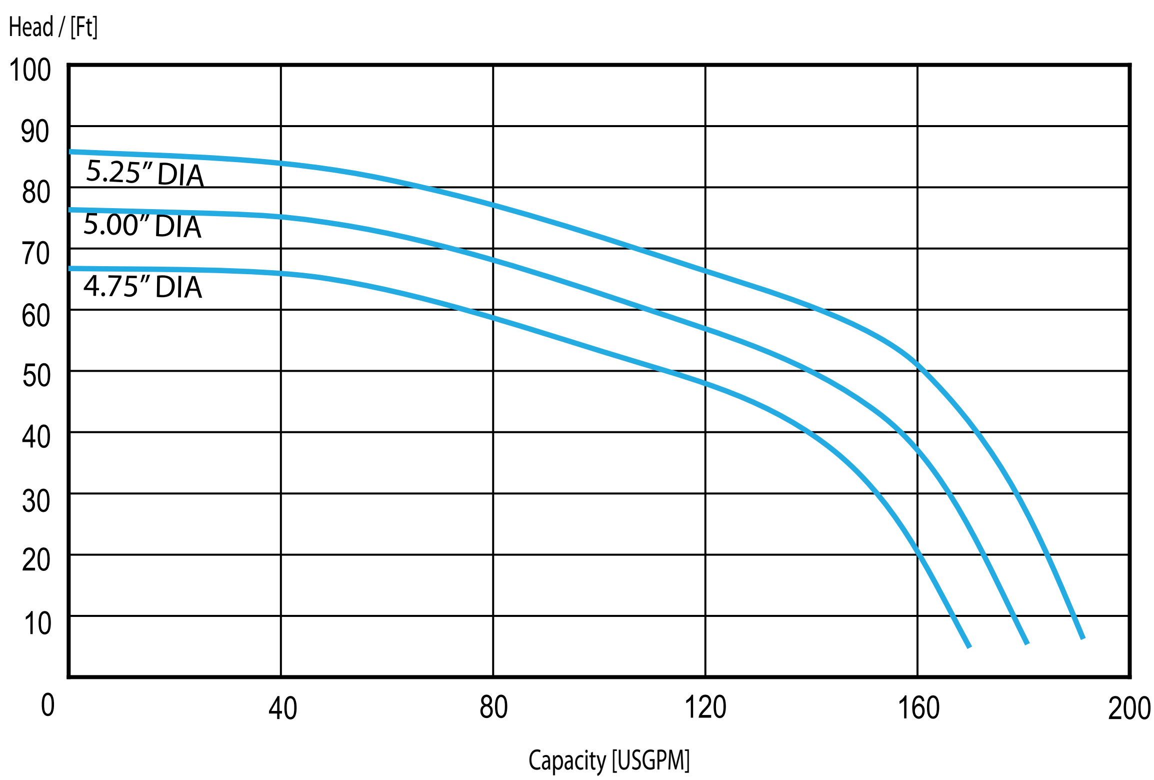
GENERAL	
Pump Model	**KG(X)5**

PUMP DATA	
Date	03/06/2017
Discharge Flange	2-1/2 & 3" ANSI Horizontal
Grinder Ring	25 Slots
Impeller Type / Std. Dia.	Recessed / 5.25"

Three Phase

MOTOR DATA	
HP / Power Supply	5HP / 3 ϕ, 60 Hz
Full Load Amps 208V	29 Amps
Start Amps 208V	145 Amps
Full Load Amps 230V	25 Amps
Start Amps 230V	125 Amps
Full Load Amps 460V	13 Amps
Start Amps 460V	65 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	F Class

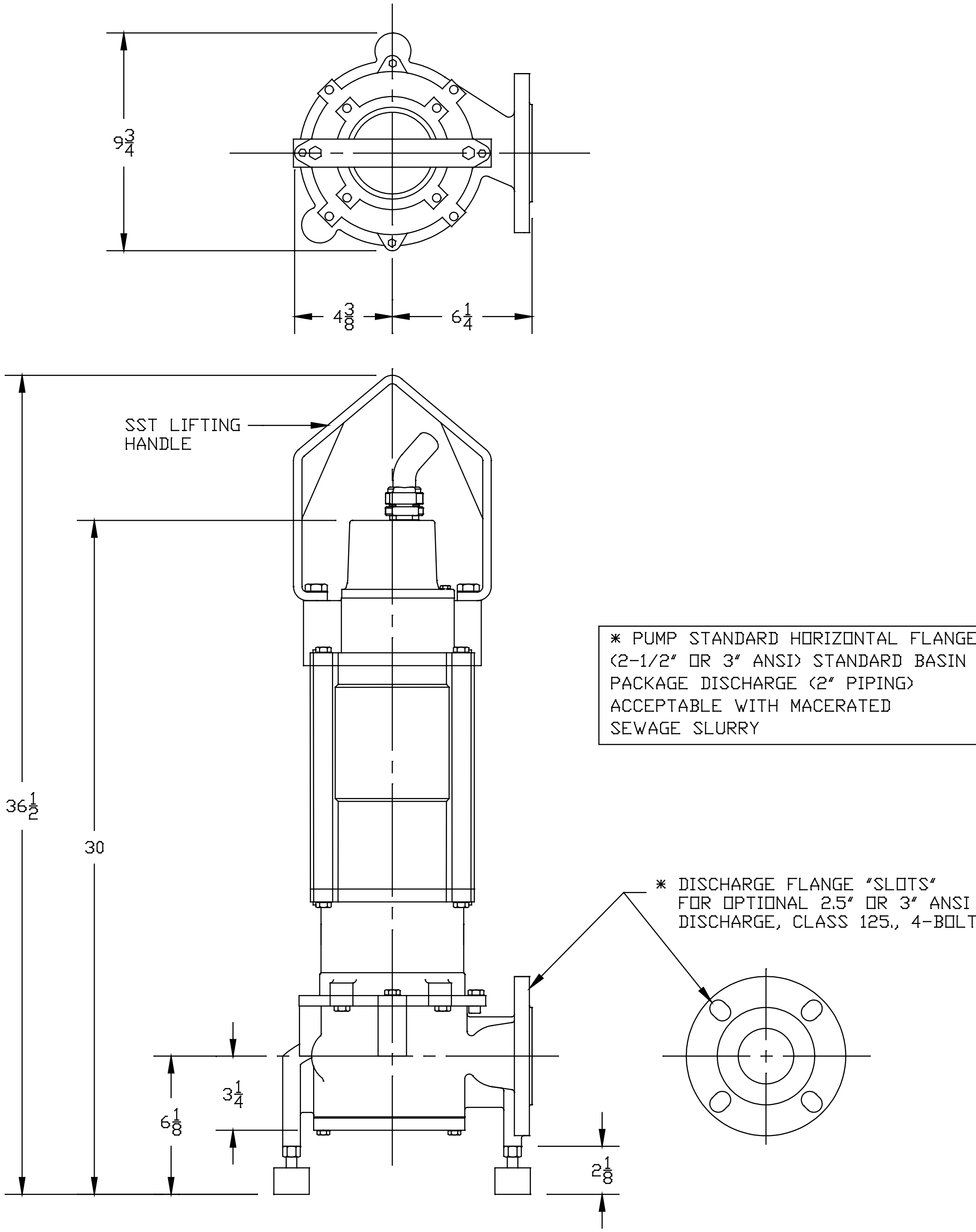
PERFORMANCE CURVE



MODEL	***HP***	***Phase***	***Volts***
KG(X)5-2083	5	3	208
KG(X)5-2303	5	3	230
KG(X)5-4603	5	3	460

* Performance with clear water and ambient temp 20°C (68°F)

Rev. 11/2018



* PUMP STANDARD HORIZONTAL FLANGE (2-1/2" OR 3" ANSI) STANDARD BASIN PACKAGE DISCHARGE (2" PIPING) ACCEPTABLE WITH MACERATED SEWAGE SLURRY

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE
B	SE	01/06/2017
A	SE	03/26/2015

KEEN PUMP COMPANY

KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805

PHONE: 419-207-9400
FAX: 419-207-8031

TITLE	3-7.5HP HIGH FLOW/HIGH HEAD GR. PUMP DIMENSIONS
SCALE	NTS
DWG. BY	SE
DATE	01/27/2014
DWG. #	KN-28
REV.	B

Grinder Pumps

KEEN PUMP®

KHG(X)5

FM APPROVED

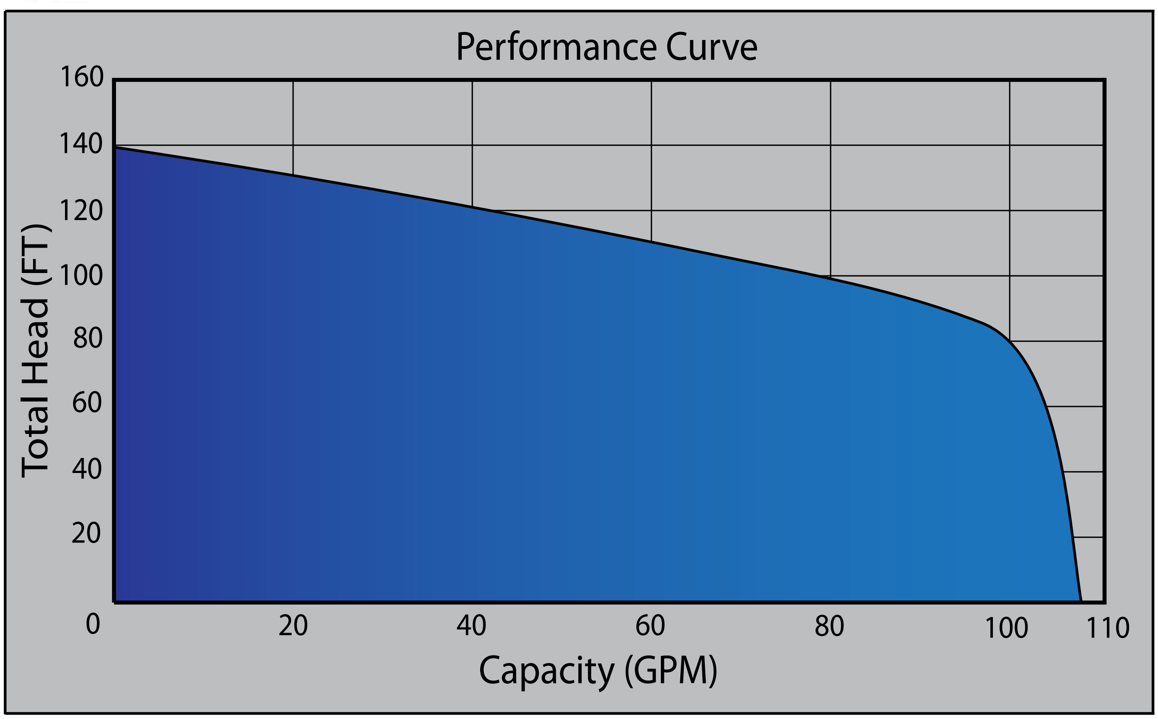
5HP High Head Grinder Pump, 1 or 3 Phase
(Class 1, Div. 1, Groups C & D Hazardous Location)

The KEEN PUMP **KHG(X)5** series centrifugal grinder pumps easily handle residential, commercial or industrial sanitary waste, reducing it to a fine slurry. The **KHG(X)5** pump is designed for use in pressure sewer applications or any piping network.

The recessed vortex impeller design of the **KHG(X)5** grinder pump provides trouble-free, non-overloading operation over the entire performance curve. The modular design provides quick and easy serviceability. The hardened stainless steel grinder assembly provides many years of dependable operation.

The **KHG(X)5** series pump features:

- Interchangeable with Competitor Installations
- Dual Silicon-Carbide Mechanical Shaft Seals w/ Viton® Elastomers
- Pressed-In Motor with Internal Overload Protection
- 3-Bearing Shaft Support (Upper / Lower / Sleeve)
- Internal Moisture Detection
- Strong Motor, 1-Phase (208/230) Volt or 3-Phase (208/230/460) Volt



Features and Benefits

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grip with compression grommet protects outer cord jacket **(FM Explosion-Proof)** or Heavy-duty molded compression grommet protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 35 cast iron components.

3. Strong Motor
Powerful high-torque motor for reliable pump operation. Pressed stator securely holds motor and efficiently transfers heat. Class F insulation with overload protection in oil-filled chamber for cool operation and long motor life.

4. 3-Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearing plus additional sleeve bearing in lower seal chamber. Long 100,000 hour L-10 bearing life.

5. Double Mechanical Seal Protection
Dual silicon carbide mechanical shaft seals w/ Viton® Elastomers provide twice the moisture protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials.

6. Moisture Detection
Dual Seal leak probe signals alarm in control panel for scheduled maintenance.

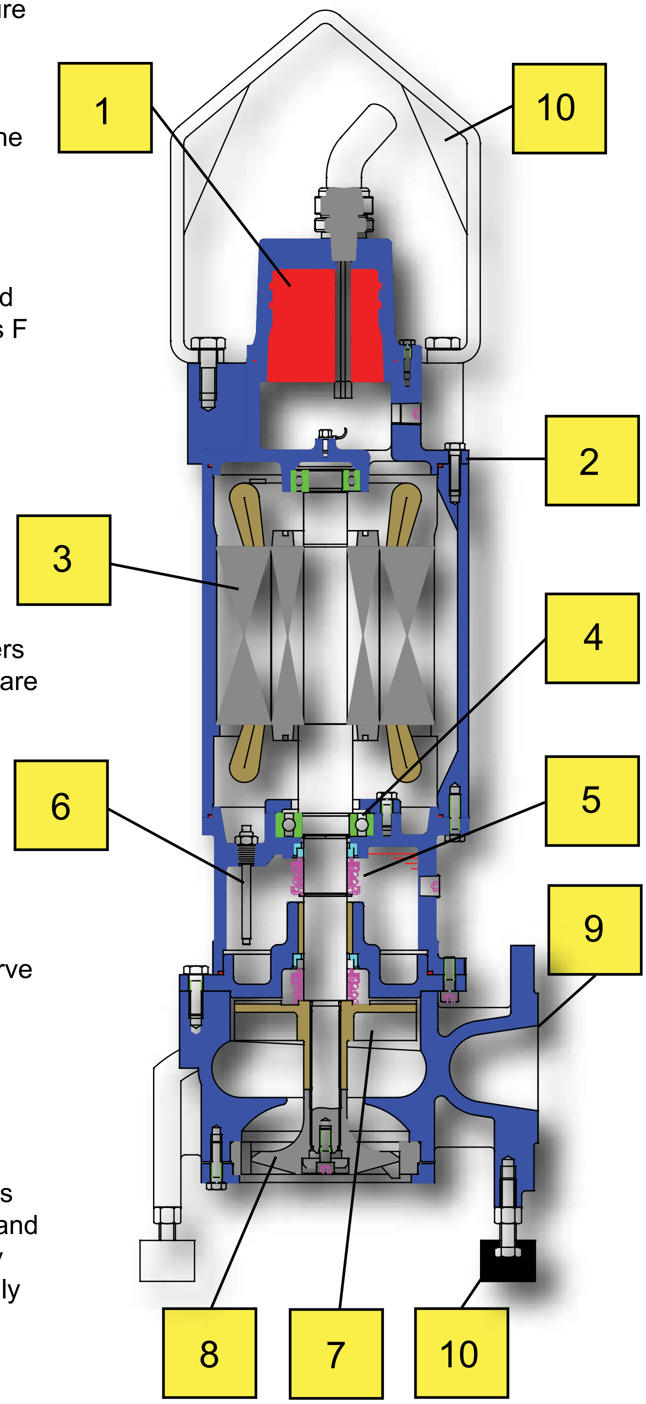
7. Non-Overloading Hydraulic Design
The recessed centrifugal impeller allows 100% performance curve operation from shut-off to maximum flow without damage to the pump or system. The recessed vortex impeller is out of the passageway of fluid flow, eliminating concerns of blockage or wear.

8. Proven Grinder Assembly
Hardened (Rockwell 56-60) stainless steel grinder assembly has 30+ years proven field experience. The reversible grinder ring and grinder impeller effectively reduce solids into a fine slurry, easily passable in a piping system without concerns of clogging. Highly efficient 12,400 cuts/second.

9. Versatile Flange Connection
Combination 2-1/2" and 3" horizontal flange. Industry-standard ANSI Class 125 dimensions.

10. Accessories
Stainless steel lifting handle included. Anti-vibration nylon mounting feet **OPTIONAL.**

5HP Grinder Pump High Head KHG(X)5



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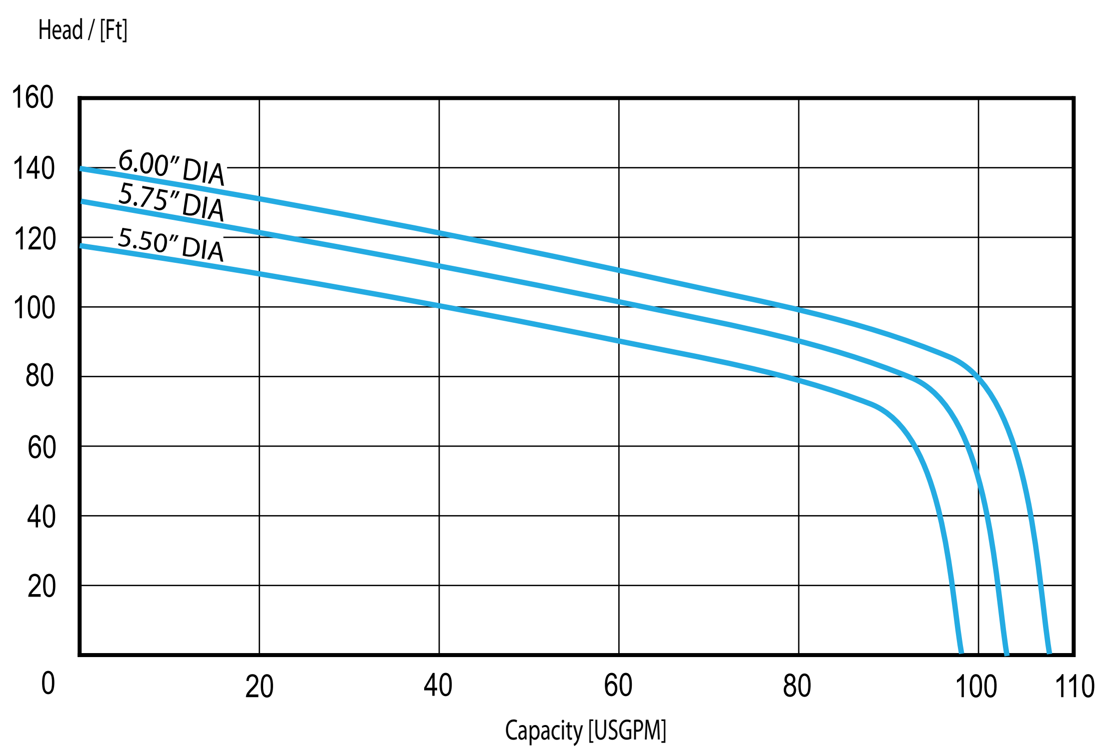
KEEN PUMP®

5HP SUBMERSIBLE GRINDER PUMP

GENERAL	KHG(X)5	MOTOR DATA	
Pump Model		HP / Power Supply	5HP / 1 ϕ, 60 Hz
PUMP DATA		Full Load Amps 208V	40 Amps
Date	09/27/2017	Start Amps 208V	144 Amps
Discharge Flange	2-1/2 & 3” ANSI Horizontal	Full Load Amps 230V	34 Amps
Grinder Ring	25 Slots	Start Amps 230V	122 Amps
Impeller Type / Std. Dia.	Recessed / 6.00”	Poles / Rated Speed	2 P / 3450 rpm
Single Phase	START KIT SK-5 includes: Start & Run Capacitors, Relay, and Mounting Hardware	Insulation Class	F Class
		Start Capacitor	300 ufd, 250 VAC
		Run Capacitor	30 ufd, 370 VAC

PERFORMANCE CURVE



MODEL	***HP***	***Phase***	***Volts***
KHG(X)5-2081	5	1	208
KHG(X)5-2301	5	1	230

* Performance with clear water and ambient temp 20ºC (68ºF)

Rev. 11/2018

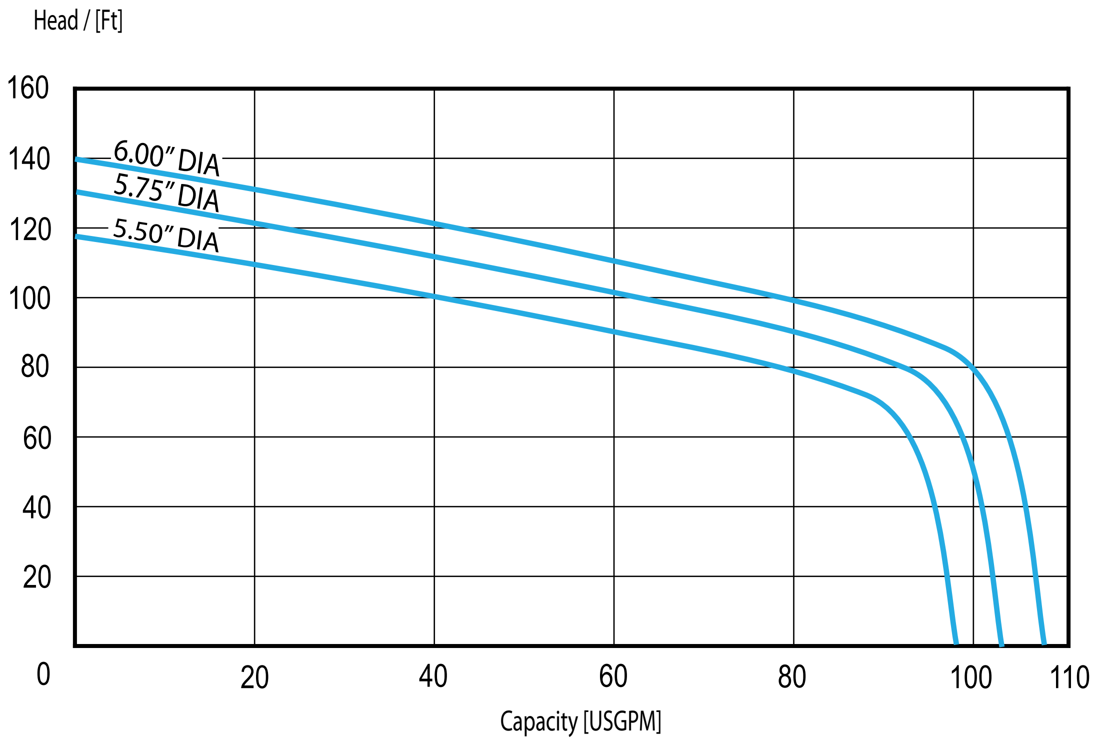
KEEN PUMP®

5HP SUBMERSIBLE GRINDER PUMP

GENERAL		MOTOR DATA	
Pump Model	KHG(X)5	HP / Power Supply	5HP / 3 ϕ, 60 Hz
PUMP DATA		Full Load Amps 208V	29 Amps
Date	12/7/2017	Start Amps 208V	120 Amps
Discharge Flange	2-1/2 & 3" ANSI Horizontal	Full Load Amps 230V	25 Amps
Grinder Ring	25 Slots	Start Amps 230V	102 Amps
Impeller Type / Std. Dia.	Recessed / 6.00"	Full Load Amps 460V	13 Amps
		Start Amps 460V	54 Amps
		Poles / Rated Speed	2 P / 3450 rpm
		Insulation Class	F Class

Three Phase

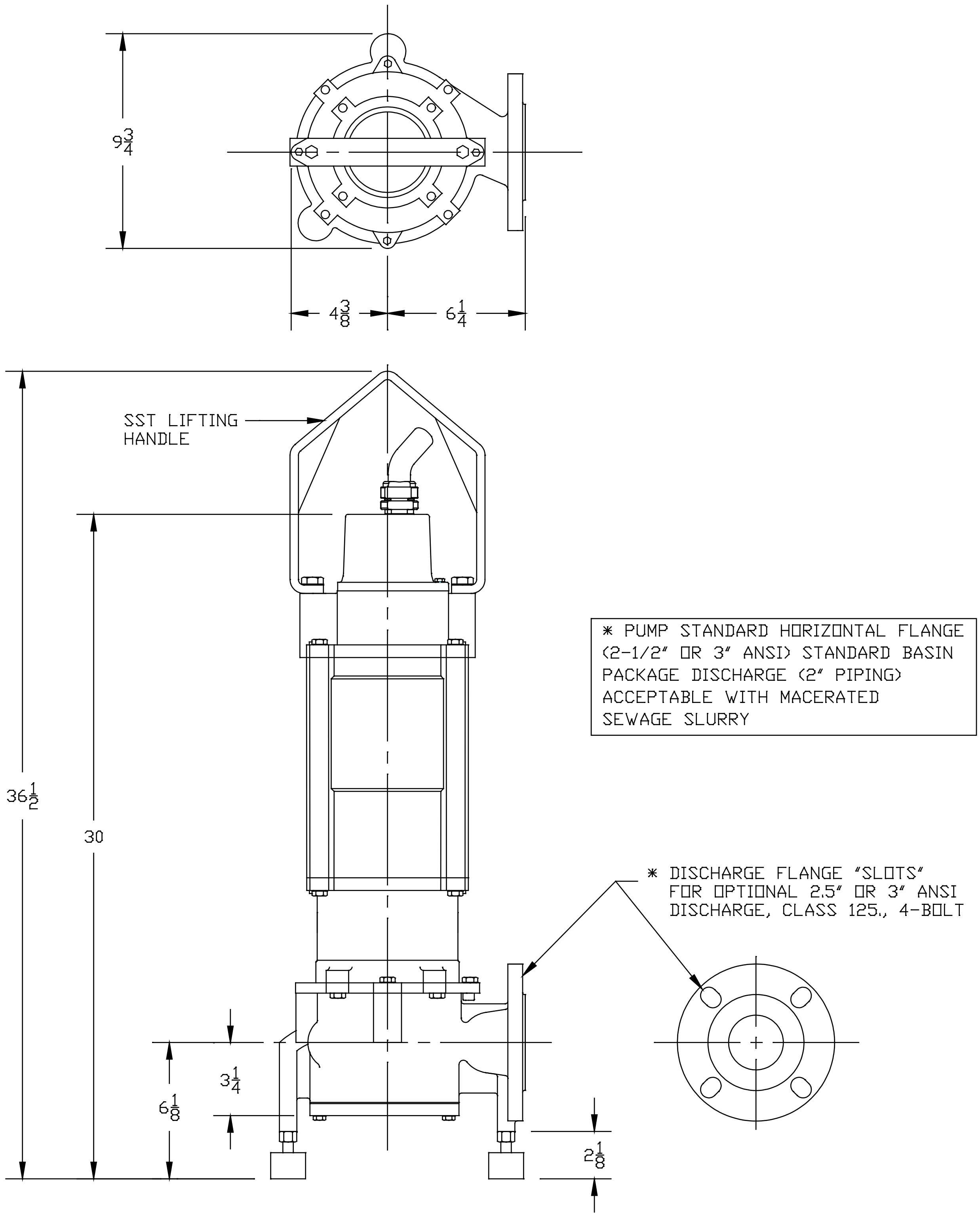
PERFORMANCE CURVE



MODEL	HP	Phase	Volts
KHG(X)5-2083	5	3	208
KHG(X)5-2303	5	3	230
KHG(X)5-4603	5	3	460

* Performance with clear water and ambient temp 20ºC (68ºF)

Rev. 11/2018



KEEN PUMP COMPANY
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PHONE: 419-207-9400
FAX: 419-207-8031

TITLE 3-7.5HP HIGH FLOW/HIGH HEAD GR. PUMP DIMENSIONS			
SCALE NTS		DWG. # KN-28	REV. B
DWG. BY SE	DATE 01/27/2014		

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

B	SE	01/06/2017
A	SE	03/26/2015
REV	INITIALS	DATE

KHG(X)7

FM APPROVED

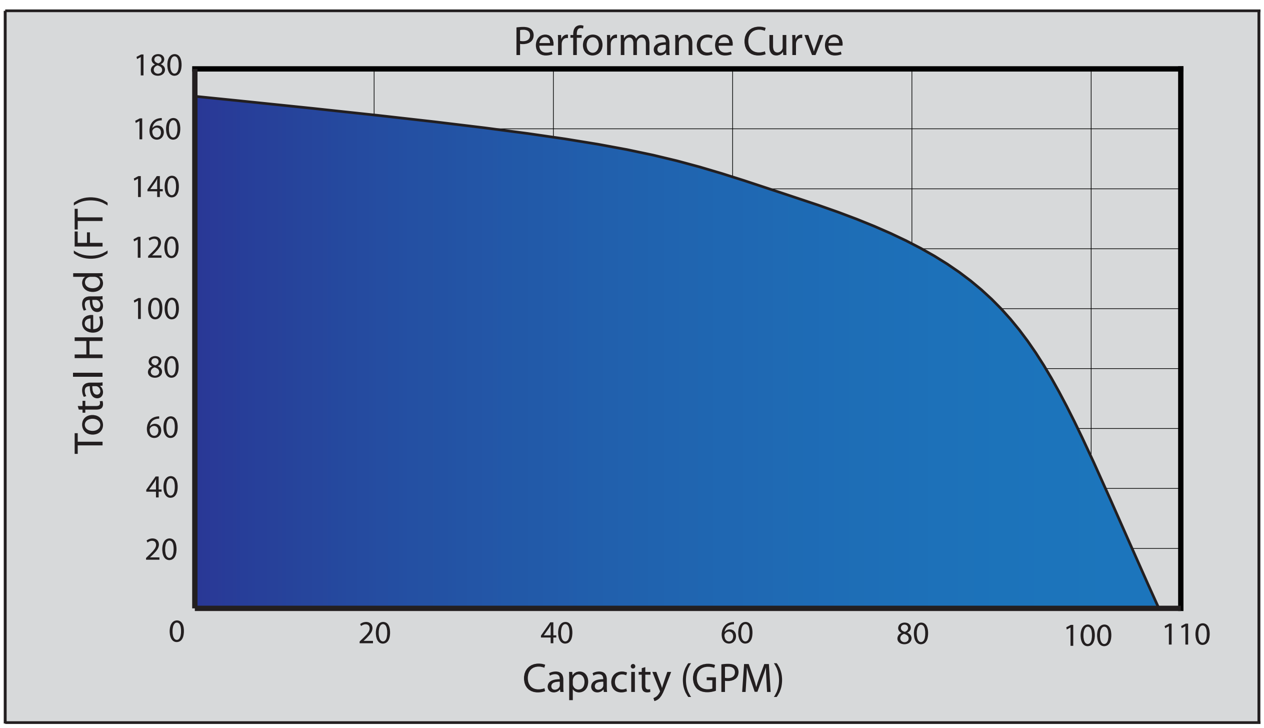
7.5HP High Head Grinder Pump, 1 or 3 Phase (Class 1, Div. 1, Groups C & D Hazardous Location)

The KEEN PUMP **KHG(X)7** series centrifugal grinder pumps easily handle residential, commercial or industrial sanitary waste, reducing it to a fine slurry. The **KHG(X)7** pump is designed for use in pressure sewer applications or any piping network.

The recessed vortex impeller design of the **KHG(X)7** grinder pump provides trouble-free, non-overloading operation over the entire performance curve. The modular design provides quick and easy serviceability. The hardened stainless steel grinder assembly provides many years of dependable operation.

The **KHG(X)7** series pump features:

- Interchangeable with Competitor Installations
- Dual Silicon-Carbide Mechanical Shaft Seals w/ Viton® Elastomers
- Pressed-In Motor with Internal Overload Protection
- 3-Bearing Shaft Support (Upper / Lower / Sleeve)
- Internal Moisture Detection
- Strong Motor, 1-Phase (208/230) V or 3-Phase (208/230/460) Volt



7.5HP Grinder Pump High Head KHG(X)7

FM APPROVED

Features and Benefits

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grip with compression grommet protects outer cord jacket **(FM Explosion-Proof)** or Heavy-duty molded compression grommet protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 35 cast iron components.

3. Strong Motor
Powerful high-torque motor for reliable pump operation. Pressed stator securely holds motor and efficiently transfers heat. Class F insulation with overload protection in oil-filled chamber for cool operation and long motor life.

4. 3-Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearing plus additional sleeve bearing in lower seal chamber. Long 100,000 hour L-10 bearing life.

5. Double Mechanical Seal Protection
Dual silicon carbide mechanical shaft seals w/ Viton® Elastomers provide twice the moisture protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials.

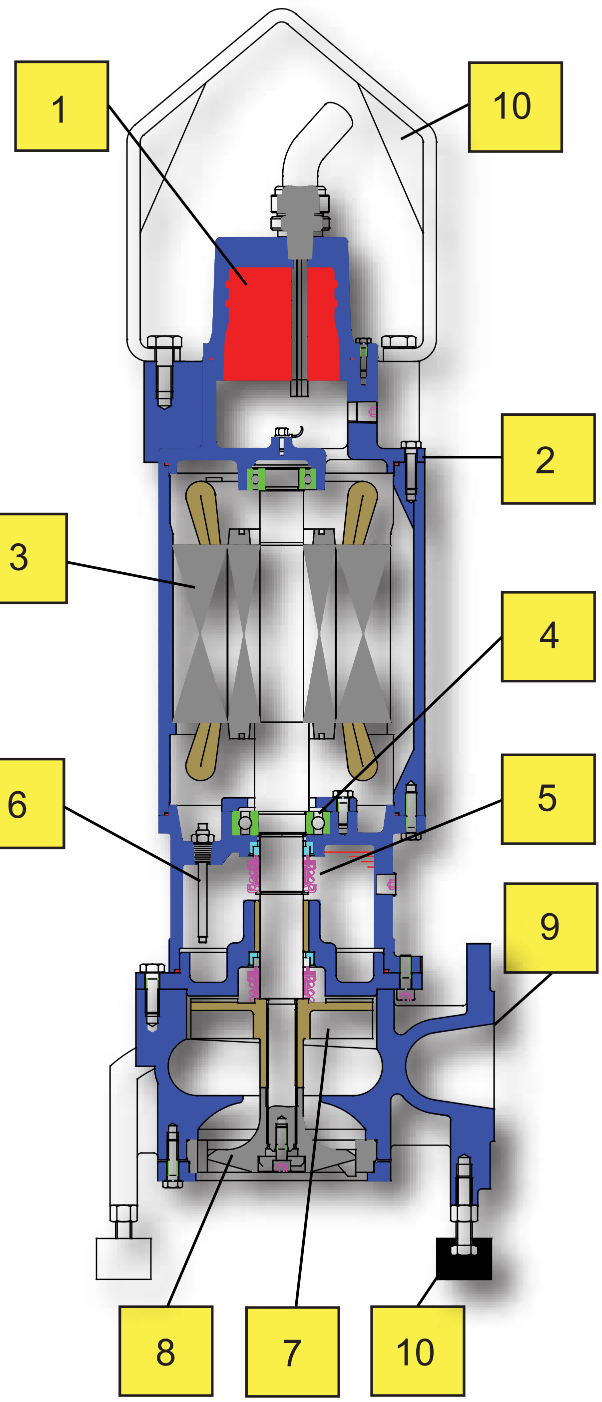
6. Moisture Detection
Dual Seal leak probe signals alarm in control panel for scheduled maintenance.

7. Non-Overloading Hydraulic Design
The recessed centrifugal impeller allows 100% performance curve operation from shut-off to maximum flow without damage to the pump or system. The recessed vortex impeller is out of the passageway of fluid flow, eliminating concerns of blockage or wear.

8. Proven Grinder Assembly
Hardened (Rockwell 56-60) stainless steel grinder assembly has 30+ years proven field experience. The reversible grinder ring and grinder impeller effectively reduce solids into a fine slurry, easily passable in a piping system without concerns of clogging. Highly efficient 12,400 cuts/second.

9. Versatile Flange Connection
Combination 2-1/2" and 3" horizontal flange. Industry-standard ANSI Class 125 dimensions.

10. Accessories
Stainless steel lifting handle included. Anti-vibration nylon mounting feet **OPTIONAL.**



KEEN PUMP

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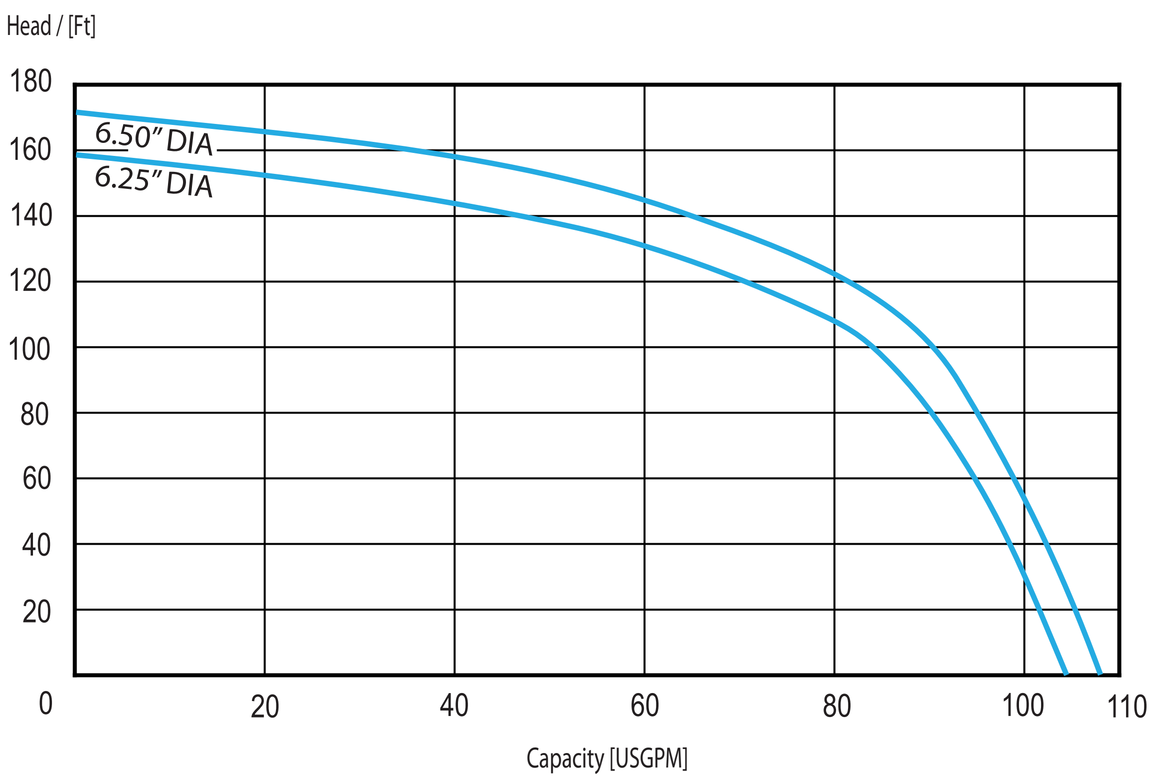
7.5HP SUBMERSIBLE GRINDER PUMP

GENERAL	KHG(X)7	MOTOR DATA	
Pump Model		HP / Power Supply	7.5HP / 1 ϕ, 60 Hz
PUMP DATA		Full Load Amps 208V	52 Amps
Date	10/16/2017	Start Amps 208V	260 Amps
Discharge Flange	2-1/2 & 3" ANSI Horizontal	Full Load Amps 230V	47 Amps
Grinder Ring	25 Slots	Start Amps 230V	235 Amps
Impeller Type / Std. Dia.	Recessed / 6.50"	Poles / Rated Speed	2 P / 3450 rpm
Single Phase	START KIT SK-7 includes: Start & Run Capacitors, Relay, and Mounting Hardware	Insulation Class	F Class
		Start Capacitor	300 ufd, 250 VAC
		Run Capacitor	30 ufd, 370 VAC

PERFORMANCE CURVE



MODEL	***HP***	***Phase***	***Volts***
KHG(X)7-2081	7.5	1	208
KHG(X)7-2301	7.5	1	230

* Performance with clear water and ambient temp 20ºC (68ºF)

Rev. 11/2018

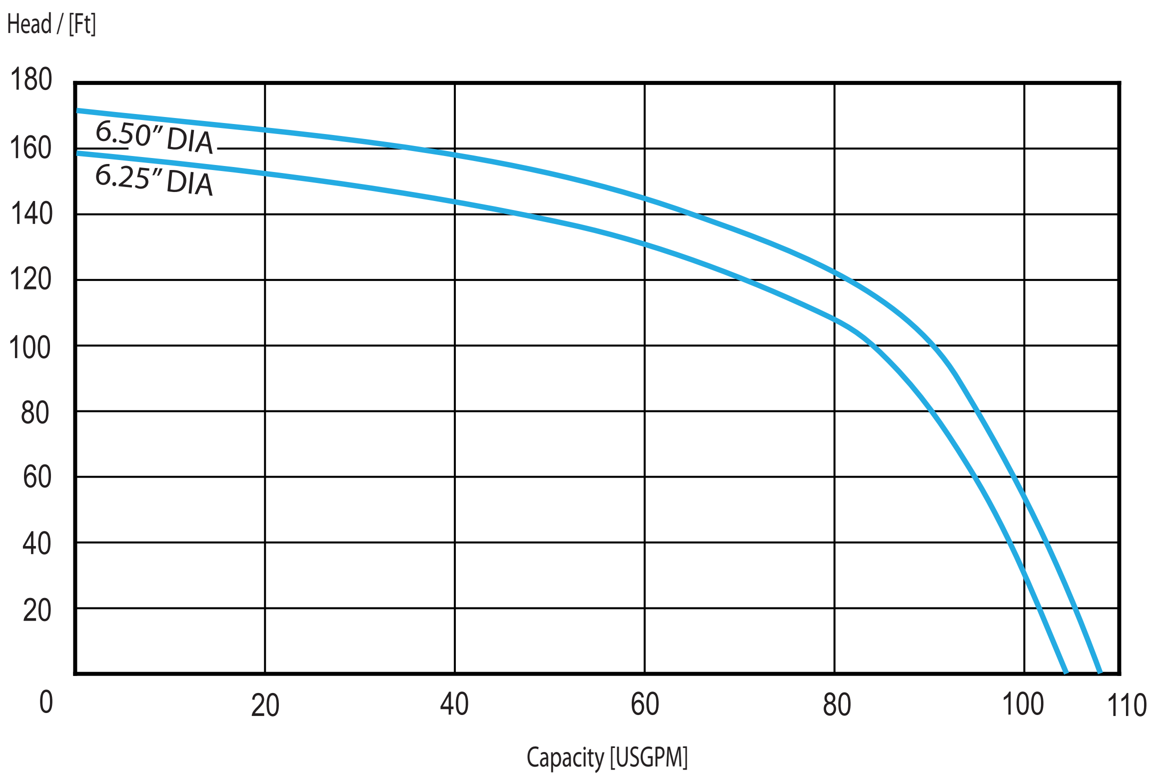
KEEN PUMP

7.5HP SUBMERSIBLE GRINDER PUMP

GENERAL		MOTOR DATA	
Pump Model	KHG(X)7	HP / Power Supply	7.5HP / 3 ϕ, 60 Hz
PUMP DATA		Full Load Amps 208V	37 Amps
Date	10/16/2017	Start Amps 208V	185 Amps
Discharge Flange	2-1/2 & 3" ANSI Horizontal	Full Load Amps 230V	32 Amps
Grinder Ring	25 Slots	Start Amps 230V	160 Amps
Impeller Type / Std. Dia.	Recessed / 6.50"	Full Load Amps 460V	16 Amps
		Start Amps 460V	80 Amps
		Poles / Rated Speed	2 P / 3450 rpm
		Insulation Class	F Class

Three Phase

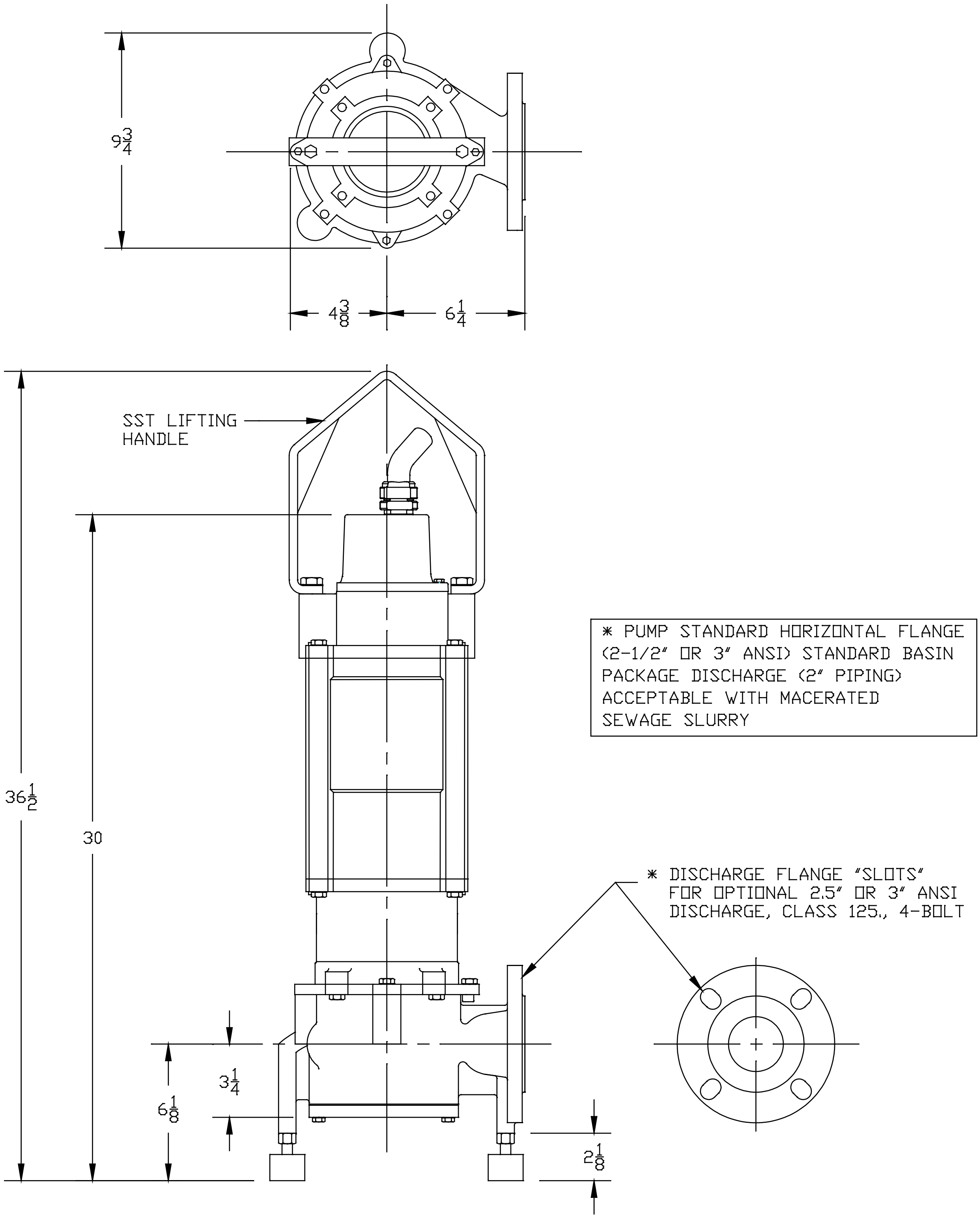
PERFORMANCE CURVE



MODEL	***HP***	***Phase***	***Volts***
KHG(X)7-2083	7.5	3	208
KHG(X)7-2303	7.5	3	230
KHG(X)7-4603	7.5	3	460

* Performance with clear water and ambient temp 20ºC (68ºF)

Rev. 11/2018



NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

B	SE	01/06/2017
A	SE	03/26/2015
REV	INITIALS	DATE

KEEN PUMP COMPANY
KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE 3-7.5HP HIGH FLOW/HIGH HEAD GR. PUMP DIMENSIONS

SCALE NTS

DWG. # KN-28

REV. B

DWG. BY SE

DATE 01/27/2014

KEEN PUMP

KG(X)10

FM APPROVED

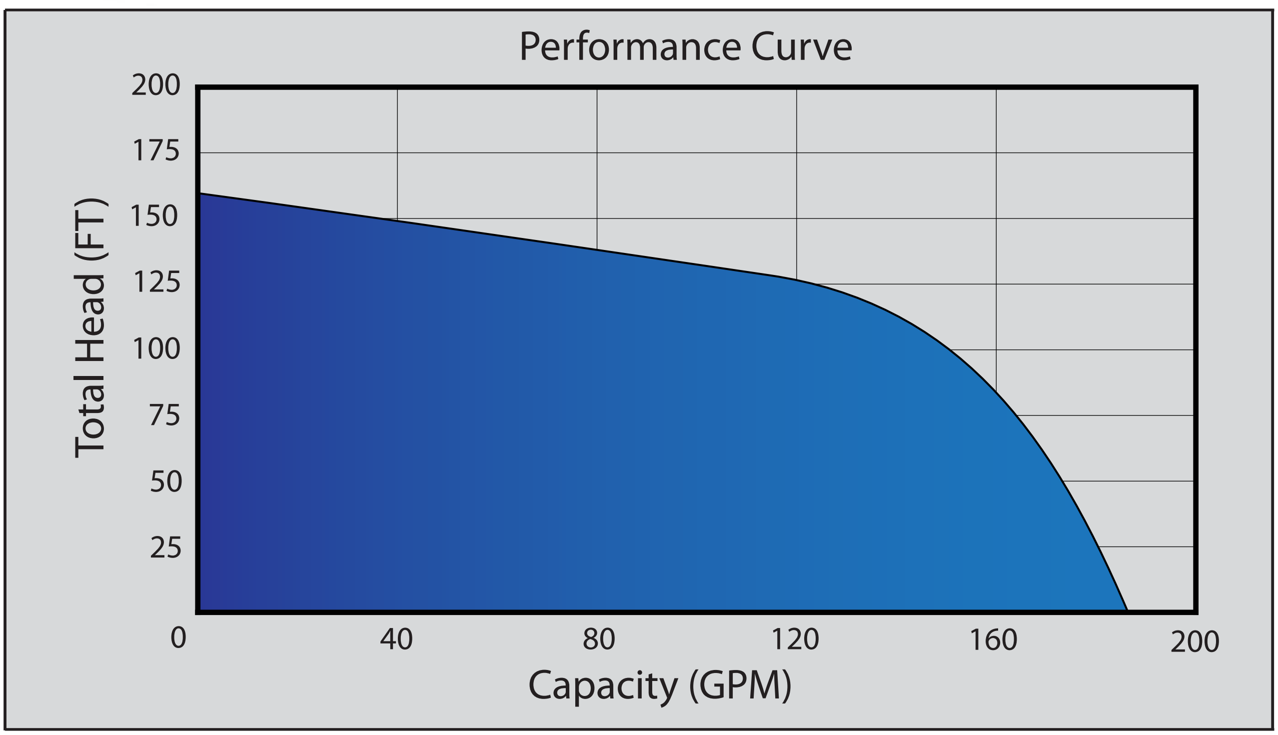
10HP High Flow Grinder Pump
(Class 1, Div. 1, Groups C & D Hazardous Location)

The KEEN PUMP **KG(X)10** series centrifugal grinder pumps easily handle residential, commercial or industrial sanitary waste, reducing it to a fine slurry. The **KG(X)10** pump is designed for use in pressure sewer applications or any piping network.

The recessed vortex impeller design of the **KG(X)10** grinder pump provides trouble-free, non-overloading operation over the entire performance curve. The modular design provides quick and easy serviceability. The hardened stainless steel grinder assembly provides many years of dependable operation.

The **KG(X)10** series pump features:

- Interchangeable with Competitor Installations
- Dual Silicon-Carbide Mechanical Shaft Seals w/ Viton® Elastomers
- Pressed-In Motor with Internal Overload Protection
- 3-Bearing Shaft Support (Upper / Lower / Sleeve)
- Internal Moisture Detection
- Strong Motor 230/460 volt, 3-Phase



REV 04/2018

Features and Benefits

10HP Grinder Pump High Flow KG(X)10

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grip with compression grommet protects outer cord jacket **(FM Explosion-Proof)** or Heavy-duty molded compression grommet protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 35 cast iron components.

3. Strong Motor
Powerful high-torque motor for reliable pump operation. Pressed stator securely holds motor and efficiently transfers heat. Class F insulation with overload protection in oil-filled chamber for cool operation and long motor life.

4. 3-Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearing plus additional sleeve bearing in lower seal chamber. Long 100,000 hour L-10 bearing life.

5. Double Mechanical Seal Protection
Dual silicon carbide mechanical shaft seals w/ Viton® Elastomers provide twice the moisture protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials.

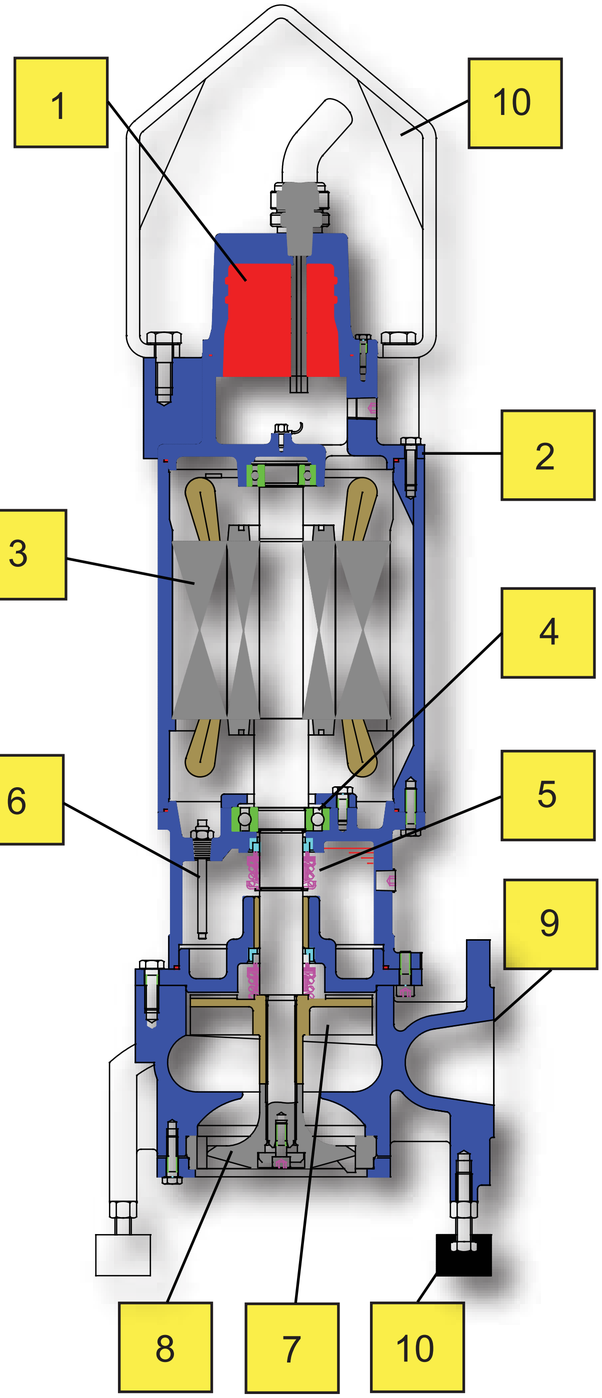
6. Moisture Detection
Dual Seal leak probe signals alarm in control panel for scheduled maintenance.

7. Non-Overloading Hydraulic Design
The recessed centrifugal impeller allows 100% performance curve operation from shut-off to maximum flow without damage to the pump or system. The recessed vortex impeller is out of the passageway of fluid flow, eliminating concerns of blockage or wear.

8. Proven Grinder Assembly
Hardened (Rockwell 56-60) stainless steel grinder assembly has 30+ years proven field experience. The reversible grinder ring and grinder impeller effectively reduce solids into a fine slurry, easily passable in a piping system without concerns of clogging. Highly efficient 17,250 cuts/second.

9. Versatile Flange Connection
Combination 2-1/2" and 3" horizontal flange. Industry-standard ANSI Class 125 dimensions.

10. Accessories
Stainless steel lifting handle included. Anti-vibration nylon mounting feet **OPTIONAL.**



KEEN PUMP
471 US HWY 250 East · Ashland, Ohio 44805
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www.keenpump.com

KEEN PUMP

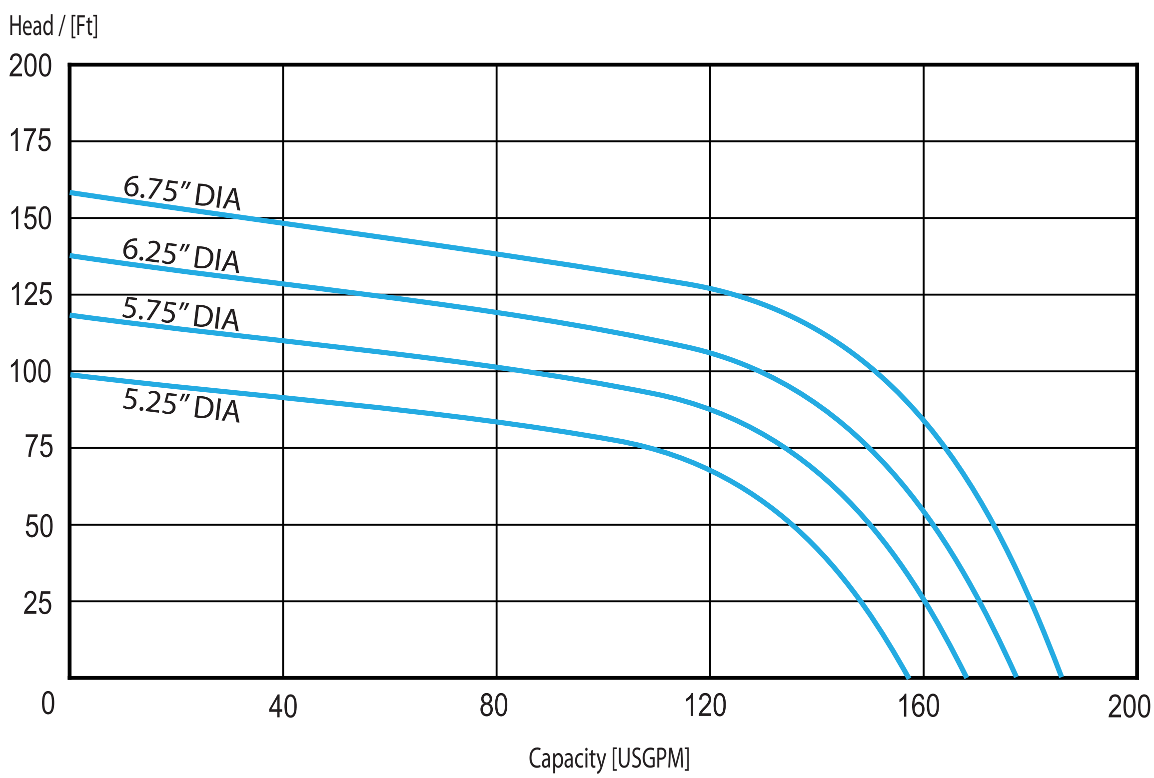
10HP SUBMERSIBLE GRINDER PUMP

GENERAL	
Pump Model	**KG(X)10**
PUMP DATA	
Date	07/08/2015
Discharge Flange	2-1/2 & 3" ANSI Horizontal
Grinder Ring	25 Slots
Impeller Type / Std. Dia.	Recessed / 6.75"

Three Phase

MOTOR DATA	
HP / Power Supply	10HP / 3 ϕ, 60 Hz
Full Load Amps 230V	40 Amps
Start Amps 230V	135 Amps
Full Load Amps 460V	20 Amps
Start Amps 460V	75 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	F Class

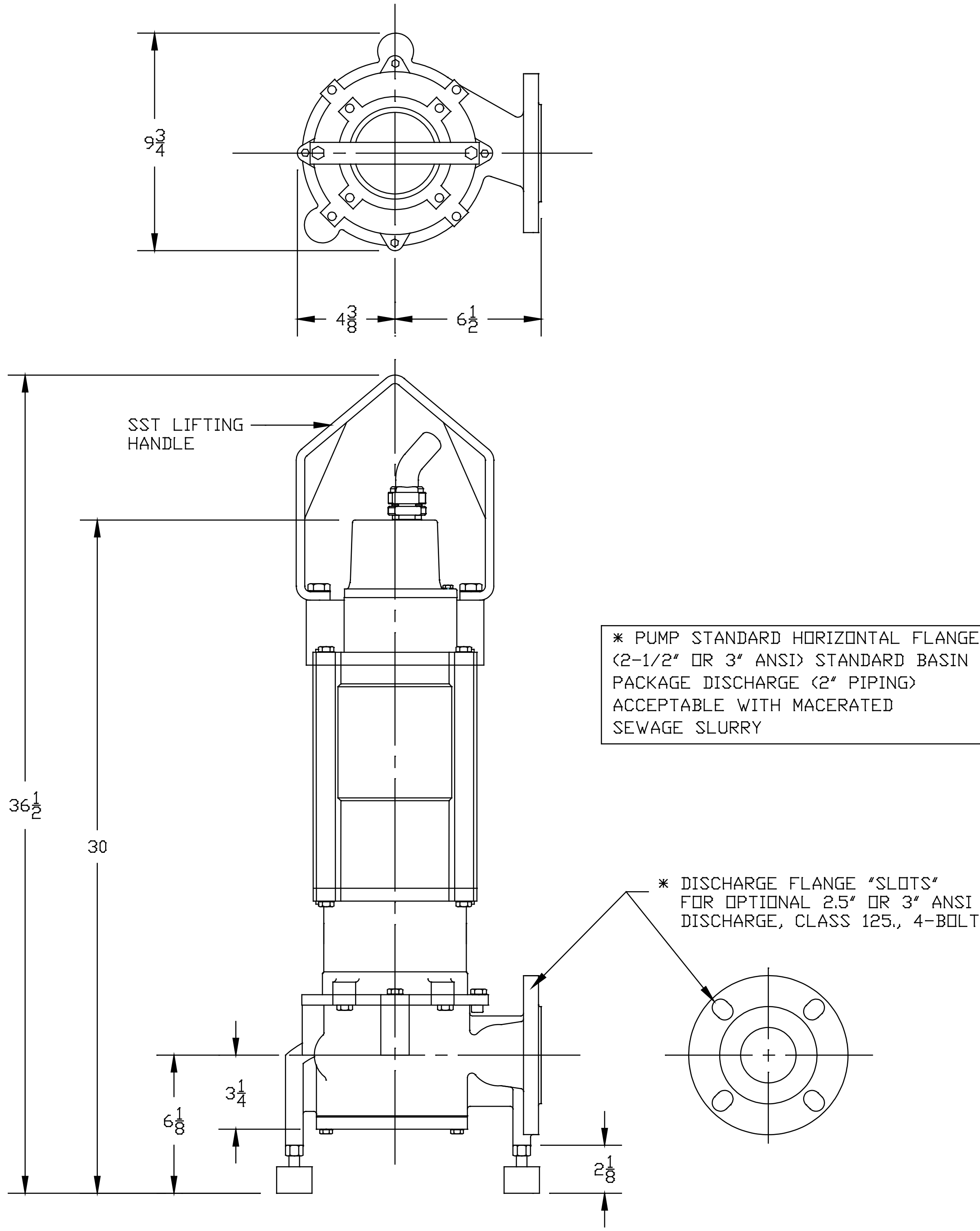
PERFORMANCE CURVE



MODEL	***HP***	***Phase***	***Volts***
KG(X)10-2303	10	3	230
KG(X)10-4603	10	3	460

* Performance with clear water and ambient temp 20°C (68°F)

Rev. 07/08/15



* PUMP STANDARD HORIZONTAL FLANGE (2-1/2" OR 3" ANSI) STANDARD BASIN PACKAGE DISCHARGE (2" PIPING) ACCEPTABLE WITH MACERATED SEWAGE SLURRY

* DISCHARGE FLANGE "SLOTS" FOR OPTIONAL 2.5" OR 3" ANSI DISCHARGE, CLASS 125., 4-BOLT

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE
D	SE	01/06/2017

KEEN PUMP COMPANY

KEEN PUMP CO.
471 US HWY 250 EAST
ASHLAND, OHIO 44805

PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: KG10 10HP HIGH FLOW GRINDER PUMP DIMENSIONS			
SCALE: NTS		DWG. #: KN-670	REV.: D
DWG. BY: SE	DATE: 01/03/2013		

SPECIFICATIONS

3 & 5 HP Grinder Pumps KG(X)3, KG(X)5

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, single and three-phase, designed for wet well submersible grinder pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality grinder pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® L (Single-Phase) or NEMA® B (Three-Phase) squirrel cage design.

2.3. The stator is to be press-fit in watertight, oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing.

2.6. Proprietary **KEEN I.C.E**. oil ensures industry-low operating temperatures. **KEEN I.C.E**. oil is a synthetic blend with wear-additives, specifically engineered for submersible pump motors.

2.7. Submersible motor design:

2.7.1. ________ Horsepower

2.7.2. ________ RPM

2.7.3. ________ Voltage

2.7.4. ________ Phase

2.7.5. ________ Frequency

2.7.6. 1.20 Service Factor

2.8. Insulation system of the submersible motor design shall be of Class F as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 311º F (155º C). To include:

2.8.1. The stator windings shall be constructed of material to meet the Class F insulation system.

2.8.2. The insulation varnish in the system must be applied in a dip and bake manner.

2.8.3. Stator lead material must meet or exceed Class F insulation system.

2.8.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.

2.8.4.1. The thermal limiting devices shall be attached to each phase winding.

2.8.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.9. Operation of the motor shall be designed for:

2.9.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class B operating temperature rise of 176º F (80º C).

2.9.2. Capable of 10 evenly spaced starts per hour.

2.9.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.00.

2.9.3.1. Acceptable voltage variation is +/- 10%.

2.9.3.2. Acceptable frequency variation is +/- 5%.

2.9.3.3. Voltage unbalance must not exceed 1% as defined per NEMA MG-1 12.45.

2.9.3.4. Current unbalance must not exceed 5%.

2.9.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Grey Cast Iron Class 35.

3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.

3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet or rubber compression grommet.

3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.

3.3. All bolted connections in the cord entry construction shall be:

3.3.1. Secured with 304 stainless steel fasteners.

3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 30 foot.

3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible grinder pump.

3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.

3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.

4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.

4.3. Inboard and outboard seal construction shall be of the following material:

4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.

4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.

4.3.3. Elastomers shall be constructed of Viton® materials.

4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.

4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.

4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over-filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.

4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

4.8. Class 1, Division 1, explosion-proof models shall contain an additional line bearing seal constructed of bronze, CDA836 material, and is mounted in the lower seal housing.

4.9. The line bearing seal will minimize shaft deflection and serve as the flame path for the motor assembly.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a two-bearing system design.

5.2.1. The upper bearing shall be a Conrad type, single row, deep groove ball bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a Conrad type, single row, deep groove ball bearing designed to adequately handle the required radial loads.

5.3. The bearings shall be designed to deliver a minimum L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.

7.2. The design shall be one-piece, 10-vane, vortex flow and dynamically balanced to ISO 1940 G6.3.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be threaded to the pump shaft.

7.4.1. All wetted fasteners shall be of a corrosion resistant stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

8.0 GRINDING MECHANISM

8.1. The grinder assembly shall consist of a single rotating grinding cutter and stationary grinding ring secured to the inlet of the volute case.

8.1.1. The rotating grinding cutter shall be threaded onto the pump shaft and secured with a washer and bolt.

8.1.2. The stationary grinding ring shall be secured in place with a metal clamping ring.

8.2. Both the stationary and rotating grinding mechanisms shall be removable without disassembling the pump.

8.3. No adjustment or shimming grinder assembly shall be necessary.

8.4. The grinder components shall be constructed of a martensitic AISI 440C stainless steel hardened to 56-60C Rockwell.

8.5. The grinder mechanism shall be capable of producing 17,250 cuts/second.

9.0 VOLUTE CASE

9.1. Material shall be ASTM® A48 class 35 gray cast iron.

9.2. Design shall be a single piece and a modified constant velocity.

9.3. Constructed of smooth passage ways large enough that any macerated solid can enter the impeller.

9.4. The discharge is to be of a horizontal centerline configuration.

9.5. The discharge is to be 2-1/2" or 3" ANSI® standard Class 125, 4-bolt configuration.

KEEN PUMP®

SPECIFICATIONS

Submersible Sewage Grinder Pumps KHG(X)3,5,7

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, single and three-phase, designed for wet well submersible grinder pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality grinder pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® L (Single-Phase) or NEMA® B (Three-Phase) squirrel cage design.

2.3. The stator is to be press-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing.

2.6. Proprietary **KEEN I.C.E**. oil ensures industry-low operating temperatures. **KEEN I.C.E**. oil is a synthetic blend with wear-additives, specifically engineered for submersible pump motors.

2.7. Submersible motor design:

2.7.1. ________ Horsepower

2.7.2. ________ RPM

2.7.3. ________ Voltage

2.7.4. ________ Phase

2.7.5. ________ Frequency

2.7.6. 1.20 Service Factor

2.8. Insulation system of the submersible motor design shall be of Class F as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 311º F (155º C). To include:

2.8.1. The stator windings shall be constructed of material to meet the Class F insulation system.

2.8.2. The insulation varnish in the system must be applied in a dip and bake manner.

2.8.3. Stator lead material must meet or exceed Class F insulation system.

2.8.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.

2.8.4.1. The thermal limiting devices shall be attached to each phase winding.

2.8.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.9. Operation of the motor shall be designed for:

2.9.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class B operating temperature rise of 176º F (80º C).

2.9.2. Capable of 10 evenly spaced starts per hour.

2.9.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.00.

2.9.3.1. Acceptable voltage variation is +/- 10%.

2.9.3.2. Acceptable frequency variation is +/- 5%.

2.9.3.3. Voltage unbalance must not exceed 1% as defined per NEMA MG-1 12.45.

2.9.3.4. Current unbalance must not exceed 5%.

2.9.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.

3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.

3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet or rubber compression grommet.

3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.

3.3. All bolted connections in the cord entry construction shall be:

3.3.1. Secured with 304 stainless steel fasteners.

3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 30 foot.

3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible grinder pump.

3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.

3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.

4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.

4.3. Inboard and outboard seal construction shall be of the following material:

4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.

4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.

4.3.3. Elastomers shall be constructed of Viton® materials.

4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.

4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.

4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over-filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.

4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

4.8. Class 1, Division 1, explosion-proof models shall contain an additional line bearing seal constructed of bronze, CDA836 material, and is mounted in the lower seal housing.

4.9. The line bearing seal will minimize shaft deflection and serve as the flame path for the motor assembly.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.
5.2. Each pump shall be constructed with a two-bearing system design.
5.2.1. The upper bearing shall be a Conrad type, single row, deep groove ball bearing designed to adequately handle the required radial loads.
5.2.2. The lower bearing shall be a Conrad type, single row, deep groove ball bearing designed to adequately handle the required radial loads.
5.3. The bearings shall be designed to deliver a minimum L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer’s performance curve.
5.4. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).
6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 grey cast iron shall be unacceptable.
7.2. The design shall be one-piece, 10-vane, vortex flow and dynamically balanced to ISO 1940 G6.3.
7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.
7.4. The impeller shall be threaded to the pump shaft.
7.4.1. All wetted fasteners shall be of a corrosion resistant stainless steel material.
7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

8.0 GRINDING MECHANISM

8.1. The grinder assembly shall consist of a single rotating grinding cutter and stationary grinding ring secured to the inlet of the volute case.
8.1.1. The rotating grinding cutter shall be threaded onto the pump shaft and secured with a washer and bolt.
8.1.2. The stationary grinding ring shall be secured in place with a metal clamping ring.
8.2. Both the stationary and rotating grinding mechanisms shall be removable without disassembling the pump.
8.3. No adjustment or shimming grinder assembly shall be necessary.
8.4. The grinder components shall be constructed of a martensitic AISI 440C stainless steel hardened to 56-60C Rockwell.
8.5. The grinder mechanism shall be capable of producing 12,400 cuts/second.

9.0 VOLUTE CASE

9.1. Material shall be ASTM® A48 class 35 gray cast iron.
9.2. Design shall be a single piece and a modified constant velocity.
9.3. Constructed of smooth passage ways large enough that any macerated solid can enter the impeller.
9.4. The discharge is to be of a horizontal centerline configuration.
9.5. The discharge is to be 2-1/2” or 3” ANSI® standard Class 125, 4-bolt configuration.

SPECIFICATIONS

10 HP Grinder Pumps KG(X)10

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, single and three-phase, designed for wet well submersible grinder pump applications in water and sewage.
1.2. The intent of this specification is to define submersible premium quality grinder pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.
1.3. This specification covers sewage wet well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® L (Single-Phase) or NEMA® B (Three-Phase) squirrel cage design.
2.3. The stator is to be press-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing.
2.6. Proprietary **KEEN I.C.E**. oil ensures industry-low operating temperatures. **KEEN I.C.E**. oil is a synthetic blend with wear-additives, specifically engineered for submersible pump motors.
2.7. Submersible motor design:
2.7.1. ________ Horsepower
2.7.2. ________ RPM
2.7.3. ________ Voltage
2.7.4. ________ Phase
2.7.5. ________ Frequency
2.7.6. 1.20 Service Factor
2.8. Insulation system of the submersible motor design shall be of Class F as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 311º F (155º C). To include:
2.8.1. The stator windings shall be constructed of material to meet the Class F insulation system.
2.8.2. The insulation varnish in the system must be applied in a dip and bake manner.
2.8.3. Stator lead material must meet or exceed Class F insulation system.
2.8.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
2.8.4.1. The thermal limiting devices shall be attached to each phase winding.
2.8.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.
2.9. Operation of the motor shall be designed for:
2.9.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class B operating temperature rise of 176º F (80º C).
2.9.2. Capable of 10 evenly spaced starts per hour.
2.9.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.00.
2.9.3.1. Acceptable voltage variation is +/- 10%.

2.9.3.2. Acceptable frequency variation is +/- 5%.
2.9.3.3. Voltage unbalance must not exceed 1% as defined per NEMA MG-1 12.45.
2.9.3.4. Current unbalance must not exceed 5%.
2.9.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.
2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.
3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet or rubber compression grommet.
3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.
3.3. All bolted connections in the cord entry construction shall be:
3.3.1. Secured with 304 stainless steel fasteners.
3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 30 foot.
3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible grinder pump.
3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
4.3. Inboard and outboard seal construction shall be of the following material:
4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.
4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.
4.3.3. Elastomers shall be constructed of Viton® materials.
4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.
4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over-filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.
4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.
4.8. Class 1, Division 1, explosion-proof models shall contain an additional line bearing seal constructed of bronze, CDA836 material, and is mounted in the lower seal housing.

4.9. The line bearing seal will minimize shaft deflection and serve as the flame path for the motor assembly.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.
5.2. Each pump shall be constructed with a two-bearing system design.
5.2.1. The upper bearing shall be a Conrad type, single row, deep groove ball bearing designed to adequately handle the required radial loads.
5.2.2. The lower bearing shall be a Conrad type, single row, deep groove ball bearing designed to adequately handle the required radial loads.
5.3. The bearings shall be designed to deliver a minimum L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.
5.4. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).
6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 grey cast iron shall be unacceptable.
7.2. The design shall be one-piece, 10-vane, vortex flow and dynamically balanced to ISO 1940 G6.3.
7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.
7.4. The impeller shall be threaded to the pump shaft.
7.4.1. All wetted fasteners shall be of a corrosion resistant stainless steel material.
7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

8.0 GRINDING MECHANISM

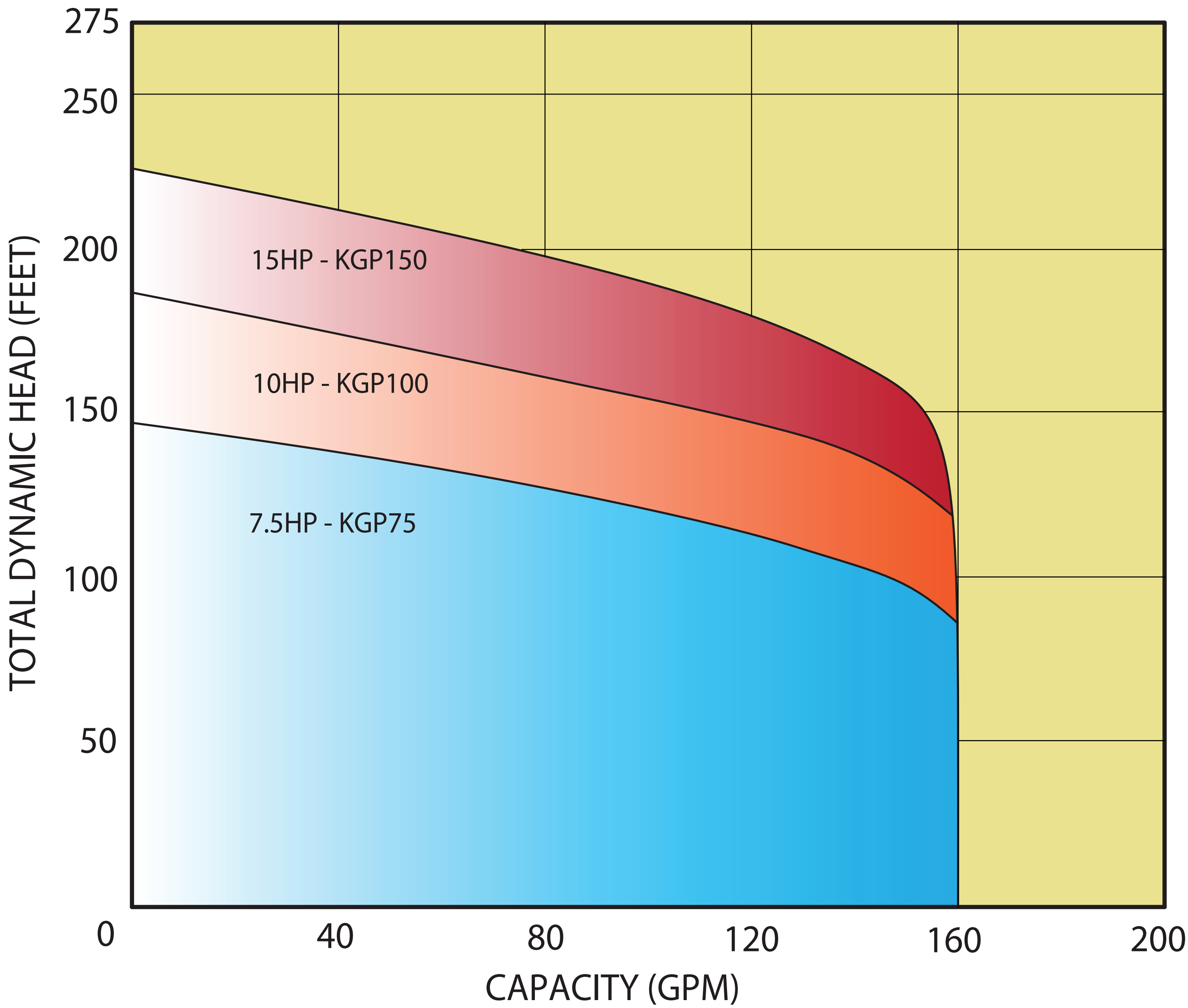
8.1. The grinder assembly shall consist of a single rotating grinding cutter and stationary grinding ring secured to the inlet of the volute case.
8.1.1. The rotating grinding cutter shall be threaded onto the pump shaft and secured with a washer and bolt.
8.1.2. The stationary grinding ring shall be secured in place with a metal clamping ring.
8.2. Both the stationary and rotating grinding mechanisms shall be removable without disassembling the pump.
8.3. No adjustment or shimming grinder assembly shall be necessary.
8.4. The grinder components shall be constructed of a martensitic AISI 440C stainless steel hardened to 56-60C Rockwell.
8.5. The grinder mechanism shall be capable of producing 17,250 cuts/second.

9.0 VOLUTE CASE

9.1. Material shall be ASTM® A48 class 35 gray cast iron.
9.2. Design shall be a single piece and a modified constant velocity.
9.3. Constructed of smooth passage ways large enough that any macerated solid can enter the impeller.
9.4. The discharge is to be of a horizontal centerline configuration.
9.5. The discharge is to be 2-1/2" or 3" ANSI® standard Class 125, 4-bolt configuration.

KEEN PUMP

7.5 HP - 15 HP Grinder Pump Series



KEEN PUMP

KGP(X)

FM

(PENDING)

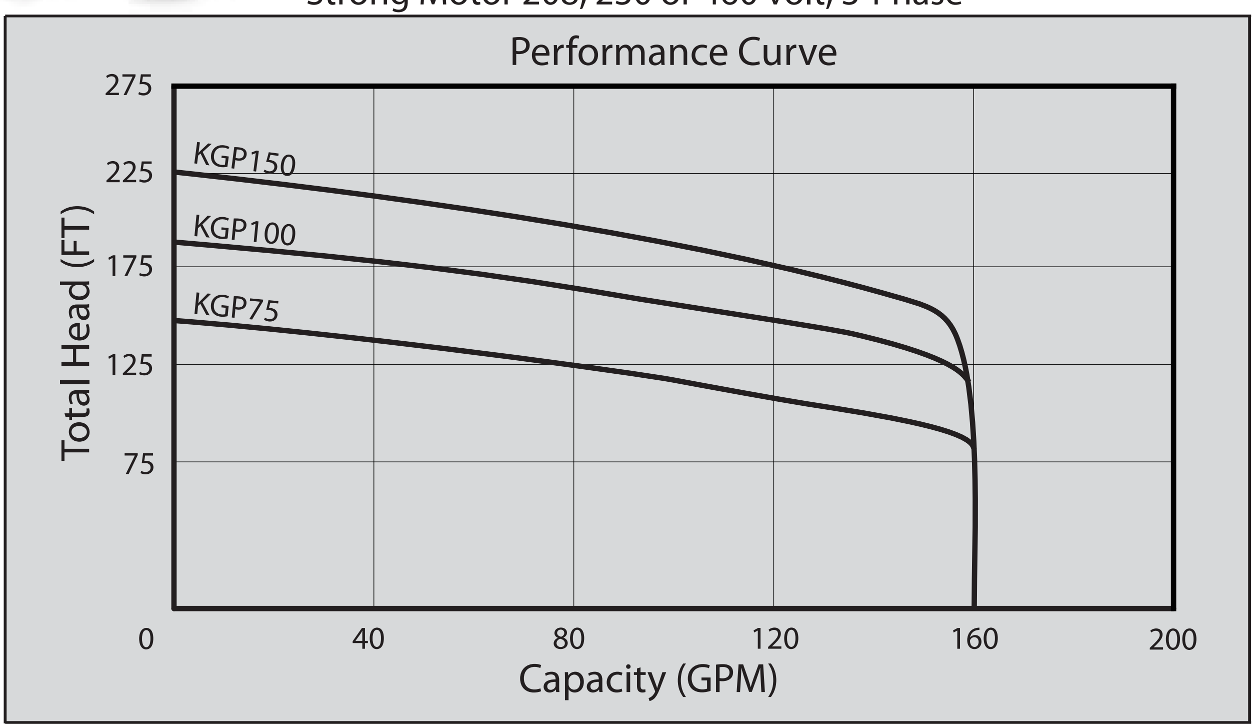
7.5 - 15HP Grinder Pump, 3 Phase
(Class 1, Div. 1, Groups C & D Hazardous Location)

The KEEN PUMP **KGP(X)** series centrifugal grinder pumps are designed for municipal, commercial or industrial applications. The **KGP(X)** pump is also designed for use in pressure sewer applications or any piping network with long discharge distances or high heads.

The recessed vortex impeller design of the **KGP(X)** grinder pump provides trouble-free, non-overloading operation over the entire performance curve. The modular design provides quick and easy serviceability. The hardened stainless steel grinder assembly provides many years of dependable operation.

The **KGP(X)** series pump features:

- Interchangeable with Competitor Installations
- Dual Silicon-Carbide Mechanical Shaft Seals w/ Viton® Elastomers
- Slip-Fit Motor with Internal Overload Protection
- 3-Bearing Shaft Support (Upper / Lower / Sleeve)
- Internal Moisture Detection
- Strong Motor 208, 230 or 460 volt, 3-Phase



Rev. 04/2018

Features and Benefits

7.5-15HP Grinder Pump KGP(X)75/100/150

FM (PENDING)

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grips with compression grommets protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged. 40' UL power & control cords. Additional sealing is accomplished by wire terminal plate, separating cord cap from motor housing.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 35 cast iron components.

3. Strong Motor (U.S. Motor Manufacturer)
Powerful high-torque motor for strong pumping.
208/230/460 Volt, 3-phase. Slip-Fit stator efficiently transfers heat to cast housing. Class H construction with overload protection in oil-filled chamber for cool operation and long motor life. Inverter-duty capable for VFD / soft start operation.

3a. Oil
Proprietary Keen oil ensures industry-low operating temperatures.

4. Solid Bearing Support
Two-bearing design featuring high load-rated angular contact for 100,000 hour B-10 life.

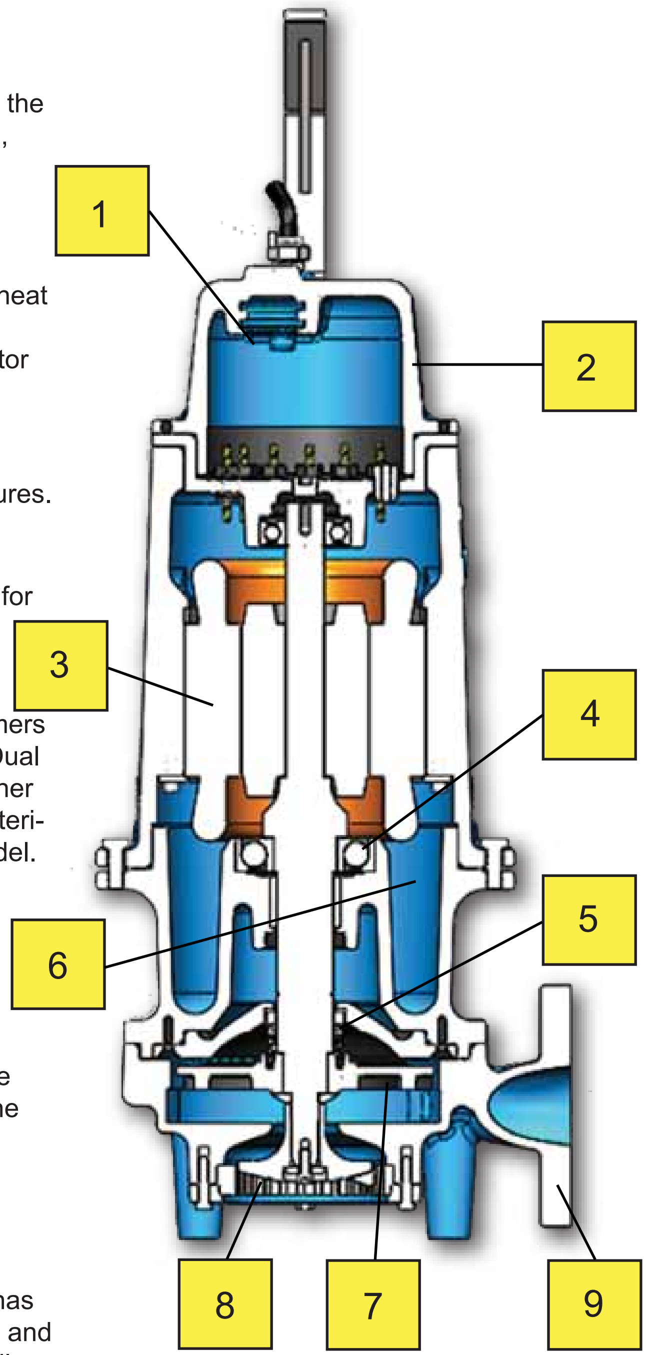
5. Severe Duty Dual Mechanical Seals
Dual silicon carbide mechanical shaft seals w/ Viton® Elastomers provide twice the moisture and grit protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials. ** Additional bronze labyrinth seal for explosion-proof model.

6. Moisture Detection
Seal leak probe signals alarm in control panel for scheduled maintenance.

7. Non-Overloading Hydraulic Design
Recessed centrifugal impeller allows 100% performance curve operation from shut-off to maximum flow without damage to the pump or system. The recessed, vortex impeller is out of the passageway of fluid flow, eliminating concerns of blockage or wear.

8. Proven Grinder Assembly
Hardened (Rockwell 58-60) stainless steel grinder assembly has 30+ years proven field experience. The reversible grinder ring and grinder impeller effectively reduce solids into a fine slurry, easily passable in a piping system without concerns of clogging. Highly efficient 17,250 cuts/secon.

9. Standard Flange Connection
2-1/2" / 3" Horizontal, Class 125 ANSI discharge flange. Industry standard, 4-bolt pattern.



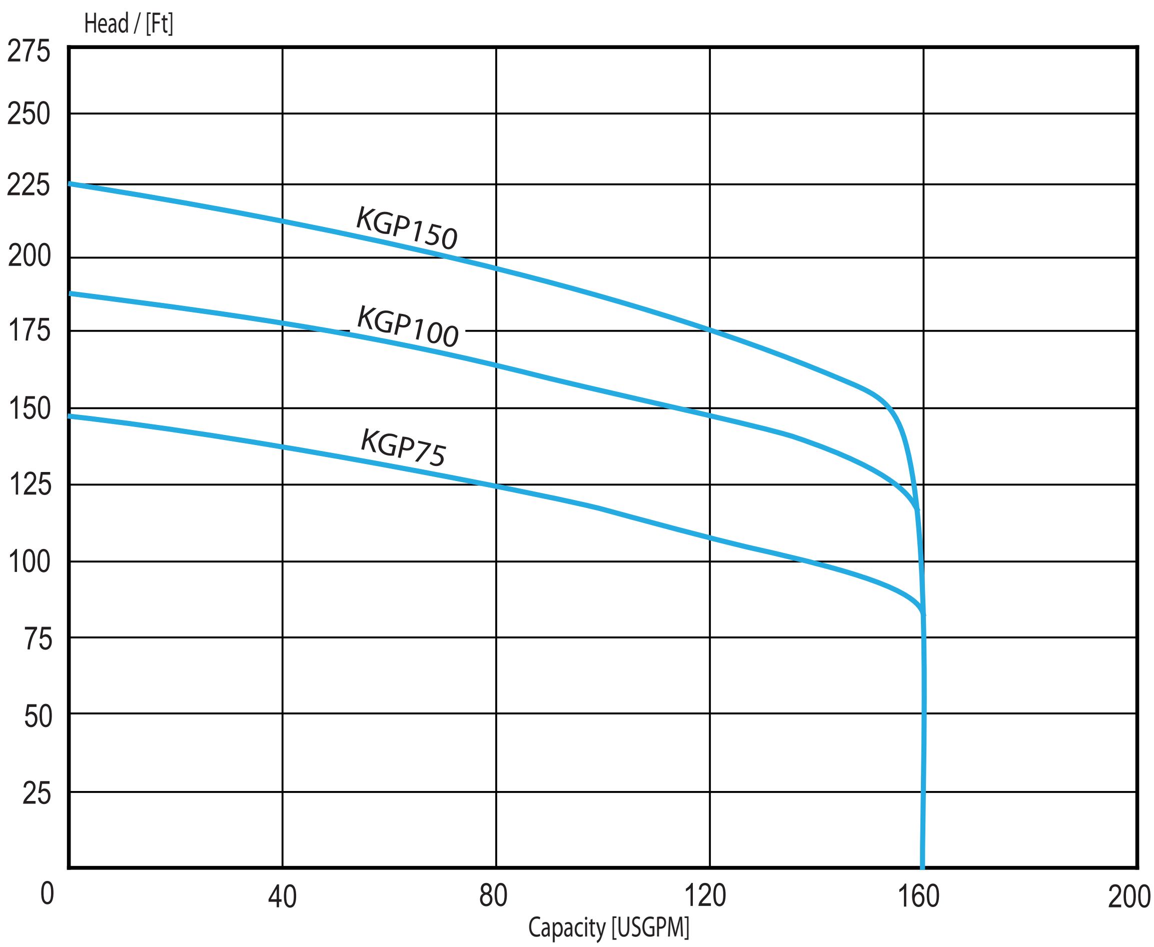
KEEN PUMP

471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

KEEN PUMP

GENERAL	KGP(X)75/100/150	MOTOR DATA	
Pump Model		HP / Power Supply	7.5-15HP / 3 ϕ, 60 Hz
PUMP DATA		Poles / Rated Speed	2 P / 3450 rpm
Date	01/09/2017	Insulation Class	H Class
Discharge Flange	2-1/2 & 3" ANSI Horizontal	Full Load Amps	See Chart
Grinder Ring	Hardened SST		
Impeller Type / Std. Dia.	Recessed / As Shown		

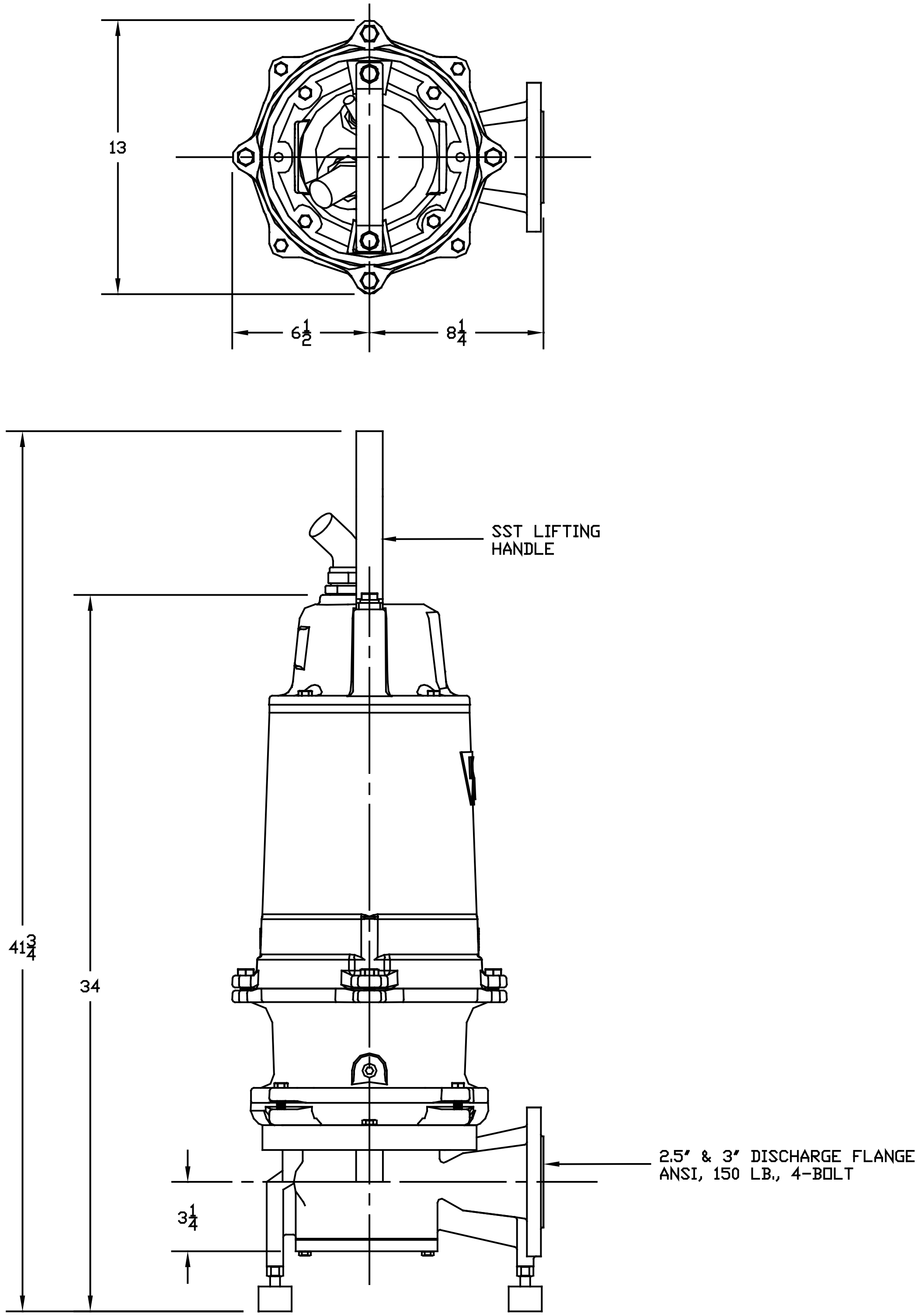
PERFORMANCE CURVE



Models	Electrical Data			
	HP	Volts	Phase	Full Load Amps
KGP(X)75-03	7.5	208	3	39.8
KGP(X)75-23	7.5	230	3	34.5
KGP(X)75-43	7.5	460	3	17.3
KGP(X)100-03	10	208	3	55.6
KGP(X)100-23	10	230	3	48.5
KGP(X)100-43	10	460	3	24.3
KGP(X)150-03	15	208	3	68.5
KGP(X)150-23	15	230	3	59.5
KGP(X)150-43	15	460	3	29.8

* Performance with clear water and ambient temp 20ºC (68ºF)

Rev. 01/2017



KEEN PUMP COMPANY
KEEN PUMP CO.
471E STATE ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

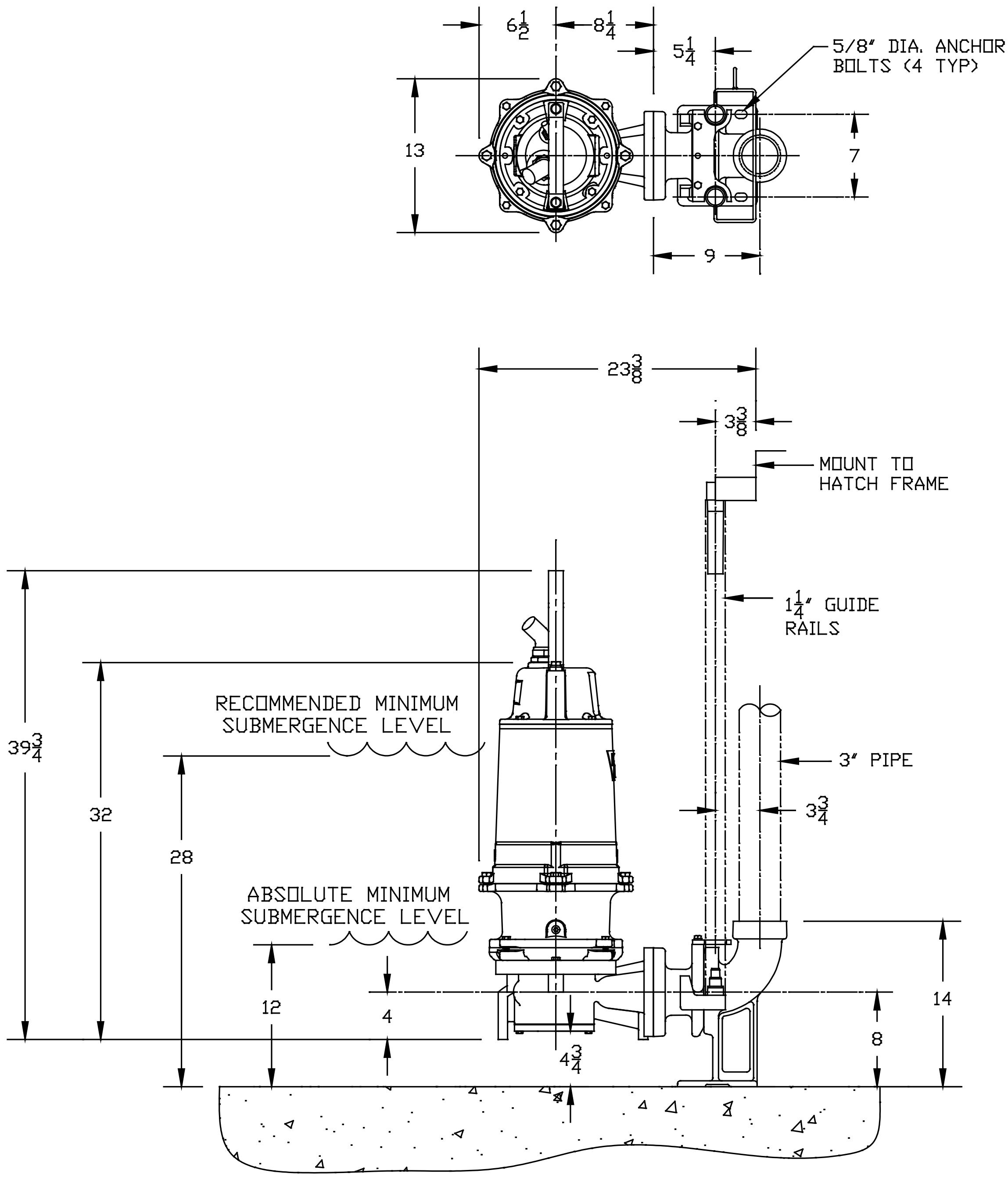
TITLE KGP75-150 7.5-15HP GRINDER PUMP OUTLINE			
SCALE NTS		DWG. # KN-919	REV. -
DWG. BY SE	DATE 06/10/2014		

KEEN PUMP

Section **GRINDERS**
Date **MAR 2015**

Pump Series	**KGP**	SUBMERSIBLE GRINDER PUMPS

LIFTOUT DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Discharge flange 3" NPT.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Dimensions may vary due to normal manufacturing tolerances.
5. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: KGP Liftout Dimensions

Pump Model: **KGP**

Physical Data:

Discharge Size	ANSI 2-1/2 / 3” Horizontal
Impeller Type	Balanced, Recessed
Power/Control Cable Length	40’ Standard
Paint	Blue, Waterborne Acrylic, High-build – One Coat, Corrosion-Resistant, Air-Dried

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H
Service Factor	1.0
NEMA Design Type	B (3Ø)
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	356ºF (180ºC)
Power Cord Type	SOOW - 600V, 90º C; Type W - 2000V, 90º C
Control Cord Type	16-4 or 18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35
Impeller	Ductile Iron, ASTM A536, 60-40-18
Shaft	ANSI 400 Stainless Steel
Rotating Cutter	440 SST Hardened 58-60 Rockwell C
Stationary Cutter	440 SST Hardened 58-60 Rockwell C
Inboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Outboard Mechanical Seal	Silicon Carbide / Silicon Carbide, Viton® Elastomers
Fasteners	ANSI 18-8 or 304 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Single Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

Pump Model: **KGP – 3450 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		356º F (180º C)
Heat Sensor	**Open:**	275º F (135º C) Max. / 257º F (125º C) Min.
	Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**3450**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
7.5	208	3	K	1.0	39.8	39.8	206.6	10.8	75.2	14.1
	230				34.5	34.5	186.1			
	460				17.3	17.3	93.0			
	575				13.9	13.9	74.4			
10	208	3	H	1.0	55.6	55.6	206.6	15.5	78.3	19.4
	230				48.5	48.5	186.1			
	460				24.3	24.3	93.0			
	575				19.4	19.4	74.4			
15	208	3	F	1.0	68.5	68.5	286.1	19.8	82.8	24.1
	230				59.5	59.5	257.8			
	460				29.8	29.8	128.9			
	575				23.9	23.9	103.1			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
7.5	3	75	73	67	58	80	75	69	59
10	3	77	76	73	65	83	81	75	65
15	3	80	78	74	62	76	74	69	59

KEEN PUMP®

SPECIFICATIONS

7.5 - 15HP Grinder Pumps KGP(X)75-150

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, three-phase, designed for wet well submersible grinder pump applications in water and sewage.
1.2. The intent of this specification is to define submersible premium quality grinder pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.
1.3. This specification covers sewage wet well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing.
2.6. Proprietary **KEEN I.C.E**. oil ensures industry-low operating temperatures. **KEEN I.C.E**. oil is a synthetic blend with wear-additives, specifically engineered for submersible pump motors.
2.7. Submersible motor design:
   2.7.1. ________ Horsepower
   2.7.2. ________ RPM
   2.7.3. ________ Voltage
   2.7.4. ________ Phase
   2.7.5. ________ Frequency
   2.7.6. 1.20 Service Factor
2.8. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 311º F (155º C). To include:
   2.8.1. The stator windings shall be constructed of material to meet the Class H insulation system.
   2.8.2. The insulation varnish in the system must be applied in a dip and bake manner.
   2.8.3. Stator lead material must meet or exceed Class H insulation system.
   2.8.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.
      2.8.4.1. The thermal limiting devices shall be attached to each phase winding.
      2.8.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.
2.9. Operation of the motor shall be designed for:
   2.9.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class B operating temperature rise of 176º F (80º C).
   2.9.2. Capable of 15 evenly spaced starts per hour.
   2.9.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.

2.9.3.1. Acceptable voltage variation is +/- 10%.
2.9.3.2. Acceptable frequency variation is +/- 5%.
2.9.3.3. Voltage unbalance must not exceed 1% as defined per NEMA MG-1 12.45.
2.9.3.4. Current unbalance must not exceed 5%.

2.9.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.10. All bolted connections in the submersible motor construction shall be:
2.10.1. Secured with 304 stainless steel fasteners.
2.10.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

2.11. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.

3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.
3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.
3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.
3.2.3. Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing by PBT encapsulated terminal studs.

3.3. All bolted connections in the cord entry construction shall be:
3.3.1. Secured with 304 stainless steel fasteners.
3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.

3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible grinder pump.

3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.

3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.

4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.

4.3. Inboard and outboard seal construction shall be of the following material:
4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.
4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.
4.3.3. Elastomers shall be constructed of Viton® materials.
4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.

4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.

4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over-filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.

4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

4.8. Class 1, Division 1, explosion-proof models shall contain an additional labyrinth seal constructed of bronze, CDA836 material, and is mounted in the bearing housing above the inboard seal to allow for access to both inboard and outboard seal without disturbing the motor assembly.

4.9. The labyrinth seal will minimize shaft deflection and serve as the flame path for the motor assembly.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a two-bearing system design.

5.2.1. The upper bearing shall be a Conrad type, single row, deep groove ball bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a single-row angular contact ball bearing designed to adequately compensate for the axial loads and radial forces.

5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 grey cast iron shall be unacceptable.

7.2. The design shall be one-piece, 10-vane, vortex flow and dynamically balanced to ISO 1940 G6.3.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.

7.4.1. All wetted fasteners shall be of a corrosion resistant stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

8.0 GRINDING MECHANISM

8.1. The grinder assembly shall consist of a single rotating grinding cutter and stationary grinding ring secured to the inlet of the volute case.

8.1.1. The rotating grinding cutter shall be threaded onto the pump shaft and secured with a washer and bolt.

8.1.2. The stationary grinding ring shall be secured in place with a metal clamping ring.

8.2. Both the stationary and rotating grinding mechanisms shall be removable without disassembling the pump.

8.3. No adjustment or shimming grinder assembly shall be necessary.

8.4. The grinder components shall be constructed of a martensitic AISI 440C stainless steel hardened to 56-60C Rockwell.

8.5. The grinder mechanism shall be capable of producing 17,250 cuts/second.

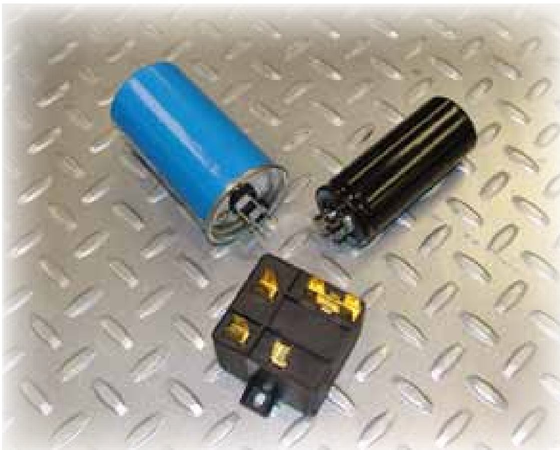
9.0 VOLUTE CASE

9.1. Material shall be ASTM® A48 class 35 gray cast iron.
9.2. Design shall be a single piece and a modified constant velocity.
9.3. Constructed of smooth passage ways large enough that any solid can enter the impeller.
9.4. The discharge is to be of a horizontal centerline configuration.
9.5. The discharge is to be 2-1/2" or 3" ANSI® standard Class 125, 4-bolt configuration.

Pump Service Kits

Start Kits (Panel)

(Includes Start Capacitor, Run Capacitor, Start Relay)



KIT	*PUMP*
• SK-2A	K(F/H)G2-2001 / 2301
• SK-KPC	KPCG-21
• SK-KGS	K(H)GS2-2001 / 2301
• SK-KG5	KHHG2(H)-2001 / 2301 K(H)G3/5-2001 / 2301
• SK-KG7	K(H)G7-2001 / 2301
• SK-K0173	K3/4RN(30/50)M2-21
• SK-K0170	K3/4RN(30/50)M4-21
• SK-K0170	K3/4VN(30/50)M4-21
• SK-K0172	K3/4RN75M4-21
• SK-K0172	K3/4VN75M4-21
• SK-K0178	K3/4RN75M6-21
• SK-K0178	K3/4VN75M6-21

Consult Factory for Additional Available Kits

Grinder Cutter Kits

(Includes Grinding Impeller, Stationary Cutter Ring, Impeller Screw and Washer)

KIT	*PUMP*
• 2CA	KG2
• 2CAH	KG2-115, KHG2
• 2CAHH	KHHG2, KHHG2H
• 2CAF	KFG2
• 2CAM	* Myers WG, WGL *
• 5CA	KG3, 5, 103
• 5CAH	KHG3, 5, 7.5

Consult Factory for Additional Available Kits

Service Kits

(Includes Upper & Lower Bearings, Upper & Lower Seals, Gaskets and O-rings)

KIT	*PUMP*
• PK-KG1	KG2, KHG2, KFG2 (Prior to 1/1/13)
• PKX-KG1	KG2, KHG2, KFG2 (After 1/1/13)
• PK-KG25	KHHG2, KHHG2H
• PK-KG5	K(H)G-3, 5, 7.5, 103
• PK-SHN	K3R/VN, K4R/VN
• PK-SHB	K4RB, K4VB, K6VB

Consult Factory for Additional Available Kits

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REV 07/15/16

KEEN PUMP has the MOST Options for your Low Pressure Sewer Project utilizing Centrifugal, Semi-Open Centrifugal and Semi-Positive Displacement (Progressing Cavity) Technologies.

KEEN PUMP can tailor your system's hydraulics to match our superior grinder pump product offering!

2hp Centrifugal
- Heads up to 130 feet
- Flows up to 52 GPM
- Dual Silicon-Carbide Seals
- Epoxy-Potted Cable Entry
- Heavy-Duty Pressed Motor
- Grinder or Slicer Cutting Options
- FM Listing for Hazardous Location

2hp Semi-Open, Centrifugal
- Heads up to 188 feet
- Flows up to 48 GPM
- Dual Silicon-Carbide Seals
- Epoxy-Potted Cable Entry
- Heavy-Duty Pressed Motor
- Grinder or Slicer Cutting Options
- FM Listing for Hazardous Location

1hp Semi-Positive Displacement (Progressing Cavity)
- Highest Heads Capability
- Flows up to 15 GPM
- Dual Silicon-Carbide Seals
- Epoxy-Potted Cable Entry
- Heavy-Duty Pressed Motor
- Grinder or Slicer Cutting Options
- FM Listing for Hazardous Location

KEEN PUMP is dedicated to producing a quality product, delivered on time, backed by reliable service, at a reasonable price. We back up our product with the BEST warranty. **KEEN PUMP** knows pumps, systems and controls!

Contact **KEEN PUMP** today for a free hydraulic system analysis to see if you can save money on your next project!

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K0017 12/17

KEEN Pressure Sewer Solution

...for Your Site

KEEN PUMP

What is a Pressure Sewer System?

• A sanitary sewer system utilizing a network of grinder pumps to transport wastewater through small diameter pipe to a collection and treatment system.

• A grinder pump is a submersible pump designed to reduce wastewater particulate to a slurry through the use of a grinding mechanism.

Pressure Sewers Provide an Economical Solution to Challenging Environmental Conditions Such as...

- Rocky Soil
- Hilly Terrain
- Shallow Bedrock
- High Water Tables
- Long Flat Terrain
- Slow Growth Areas
- Existing Structures and Roads

Complete Package w/ Rail System

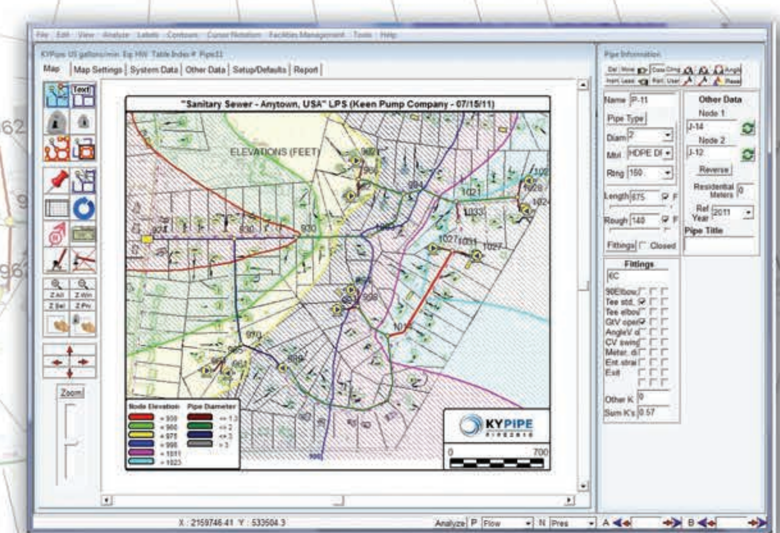
Complete Package w/ Stand / Flex Hose

Decentralized Wastewater System

KEEN PUMP offers communities a superior alternative to expensive gravity sanitary sewer systems. **KEEN PUMP** designs your unique project with proven technology to create a flexible, cost-effective package that can be installed in phases or full build out.

The **KEEN PUMP** wastewater system is vastly superior to gravity-fed or septic systems. Utilizing the **KEEN PUMP** system provides you the freedom to build anywhere without regard for soil type, elevation, or distance to the nearest treatment facility.

The Keen Pump Low Pressure Sewer Advantage



Best in class hydraulic modeling software based on actual topography of the site for most efficient collection system!

Keen Pump will assist you in:

- Designing your entire Pressure System
- Properly sizing your Pipe and Equipment
- Future System Build-Out

The Most Advanced Hydraulic System Design

- Input raster/vector file of footprint into software
- Calculate head based on pipe size, elevation and peak flow

- Determine best product based on required head and flow
- Actual "snapshot" of flows, velocities, and pressures

KEEN PUMP

BASIN PACKAGE SYSTEMS

COMPLETE TURNKEY PACKAGES

* Pre-assembled
* Ready for Installation
* Quick, Easy, Convenient

BASINS

- Diameters to 120”
- Lengths to 30’

SYSTEMS

- Simplex
- Duplex
- Triplex
- Valve Boxes

PACKAGES

- Pumps
- Controls
- Junction Box
- Floats
- Rail System
- Special Piping

BASIN PACKAGES

The Industry Leader in custom engineered packaged systems

KEEN PUMP®

1.1. PACKAGE SYSTEM

1.2. Fiberglass Basin

1.2.1.1. Basin – The diameters and depths shall be based on the system layout.

	Dia.	Depth	Invert Ht	Discharge HT	Volume	Qty

1.2.1.2. Basin shall be made from a fiberglass reinforced polyester resin. Resins used shall be of commercial grade polyester and shall be evaluated as a laminate test or determined by previous service to be acceptable for the intended environment. The reinforcing material shall be a commercial grade of glass fiber having a coupling agent to provide a suitable bond between the glass reinforcement and the resin. The manufacturer may supply either (continuous strand, chopped-strand, continuous mat and/or non-continuous mat) or (non-continuous glass strands having fiber lengths from 0.5 to 2.0 inches). The completed material shall be inert and acceptable to the environment. The basin shall be water-tight.

1.2.1.3. Inner Surface – The inner surface shall be smooth and resin rich, free of cracks, exposed fibers, porosity and crazing.

1.2.1.4. Exterior Surface – The exterior surface shall be relatively smooth with no exposed fibers or sharp projections. If a pigment is added, color should be relatively equal throughout. Foreign inclusions, dry spots, pinholes or pits, de-laminations, large dimples not meeting thickness requirements, and air bubbles are not acceptable.

1.2.1.5. Tank Wall – Wall thickness shall vary with the basin height to provide the aggregate strength necessary to meet the tensile and flexural physical properties requirements. The basin wall laminate must be designed to withstand wall collapse or buckling based on:

A. Wall thickness (see prior statement)
B. Hydrostatic pressure (62.4 lbs per square foot)
C. Saturated soil weight (120 lbs per cubic foot)
D. Soil Modulus (700 lbs per square foot)
E. Pipe stiffness values as specified (ASTM D3753)

Tank wall laminate must be constructed to withstand or exceed (2) two times the actual imposed loading on any depth of basin.

1.2.1.6. Tank Bottom – The basin bottom shall be of sufficient thickness to withstand applicable hydrostatic uplift pressure. In saturated conditions, the center deflection of the empty basin bottom shall be less than 3/8” (elastic deflection) and shall not interfere with bottom pump mounting requirements. Any mounting studs, plates, or cap screws in tank bottom shall be stainless steel and resin covered except for threads. Any inserts shall be stainless steel or brass and resin covered except for threads.

1.2.1.7. Tank Collar (Anti-Flotation) – A means to counteract buoyancy forces shall be provided on the tank bottom in the form of a ring, and shall extend a minimum of 2” beyond the O. D. of the basin wall. Wall and collar should be blended with a radius not to exceed 1 ½” beyond wall O.D.

1.2.1.8. Top Flange – The top flange shall be parallel to the tank bottom/collar and perpendicular to the tank wall. Corrosion resistant inserts shall be embedded in the top flange for securing the basin cover. The inserts shall be totally encapsulated to prevent turning (minimum turning torque shall not be less than 30 foot/lbs.) pullout.

1.2.1.9. **Basin Cover**

Alum access cover shall be provided for each installation. The cover shall be constructed with a minimum thickness of ¼ tread plate. The cover shall include access door. The cover surface shall have a non-skid design. Cover shall be bolted to the basin with stainless steel cap screws. All basin covers are designed for 300 psf loading. Design of cover allows for basin to be mounted flush with ground.

1.2.1.9.1. Optional steel covers with solid or access hatch design as required.

1.2.1.9.2. Optional 2” mushroom vent for cover shall be supplied. Note: If inlet pipe is connected to vent stack in house, vent on basin cover is not required.

1.2.2. **KL1-CV Rail Assemblies**

1.2.2.1. Each Keen Pump Co. lift-out system shall consist of a ductile iron discharge base, stainless steel pump guide plate and cast iron elbow/check valve. All exposed nuts, bolts, and fasteners shall be 300 series stainless steel.

1.2.2.2. Discharge elbow shall be 1 ¼” X 2” NPT and shall be integral to the base assembly.

1.2.2.3. The elbow/check valve shall attach to the pump with provided threaded adapter. A downward sliding motion of the pump and guide plate on the guide rails shall cause the unit to be automatically connected and sealed to the base. The discharge flange o-ring seal shall be leak proof at all operating pressures.

1.2.2.4. Two guide rail pipes shall be used to guide the pump from the top of basin to the discharge base connection. The guide rails shall be either 3/4” or 1” schedule 40 stainless steel pipe. The weight of the pump shall bear solely on the discharge base and not on the guide rails. Rail systems which require additional support directly below pump which might interfere with the flow of solids into the pump suction will not be considered equal. The guide rails shall be firmly attached to either a wall support or the access hatch frame. Systems deeper than 16 feet shall require an intermediate guide for each 16 feet of basin depth.

1.2.2.5. An adequate length of 1/4”, 300 series stainless steel lifting chain shall be supplied for removing the pump. The chain shall be of sufficient length and strength for easy removal.

1.2.3. **Piping**

1.2.3.1. Discharge piping shall be 1-1/4" PVC Schedule 80 and shall connect to the stationary discharge base assembly and terminate at a 1-1/2" NPT flange (with a reducing bushing) mounted on the basin at the height shown in the plans.

A. Standard flange: Manifold 1-1/2" NPT, stainless steel.
B. Optional flange: Dual 1-1/4" NPT, stainless steel flanges.

1.2.4. Check Valves

1.2.4.1. The lift-out check valve (typ 2) shall be of the ball type with a corrosion resistant neoprene ball. The ball shall be the only moving part and shall move automatically out of the path of flow, thus providing an unobstructed smooth flow through the valve body. Upon pump shut-off the ball shall automatically roll to the closed position to provide a positive seal against back pressure or back flow.

1.2.5. Shutoff Valves

1.2.5.1. The schedule 80 PVC true union ball type shutoff valve (typ 2) shall be furnished and installed as an integral part of the internal pipe assembly. If the discharge depth is more than 2 feet from the surface, a stainless steel handle extension shall be supplied. Handle is attached to the valve stem and is supported near the top of basin within reach for service personnel.

1.2.6. **Anti-Siphon Valves (Optional)**

1.2.6.1. The basin assembly shall include a PVC riser pipe for acceptance of an anti-siphon valve which may be factory installed or field installed.

1.2.6.2. The riser pipe shall extend from the pump discharge between the check valve and the ball valve to within two feet of the surface of the basin. The riser shall be capped.

1.2.6.3. An anti-siphon valve kit shall be supplied to easily assemble to the riser pipe. The valve assembly shall include all materials required to complete the assembly.

1.2.6.4. The anti-siphon valve shall mount horizontally, shall be made of PVC and will not interfere with pump removal and installation.

1.2.7. Inlet Flange

1.2.7.1. A one-piece, flexible basin inlet fitting for 4" SCH 40 plastic pipe shall be shipped loose for field installation. Optional fittings include:

A. 4" SDR35
B. 6" SCH40
C. 6" SDR35
D. 4",6" or 8" Cast iron Caulking Hub

Junction Box (As Req'd)

1.2.7.2. A U.L. listed, Type 6 junction box shall be provided. Junction box shall be formed from corrosion resistant, flame retardant thermoplastic. The enclosure shall be of adequate thickness and properly reinforced to provide good mechanical strength. The junction box shall have a fully gasketed, hinged cover that is held in place by four (4) stainless steel screws. The hinged cover shall prevent dropping the cover into the basin during service.

1.2.7.3. An adequate number of sealing-type cord grips shall be supplied for incoming pump and level control cords. The cord grips shall be made of non-corrosive material such as PVC or nylon, and shall make an effective seal around the wire jacket.

1.2.7.4. The junction box shall have a PVC solvent weld socket with an integral 2” NPT pipe for attaching basin conduit hub. The hub shall be made of a corrosion resistant material and shall be of adequate size to accommodate the number of wires required for pump and level control operation.

1.2.7.5. The incoming wires shall be sealed by external means, (supplied by others), so that condensation from the conduit or groundwater will not enter the enclosure. The interior of the enclosure shall be of adequate size to accommodate the wires and connections for pump and level control operation.

1.2.7.6. The wires (supplied by others) running between the control panel and the junction box shall be color-coded and fastened to the pump and level controls by means of adequately sized and insulated twist lock or crimp connectors.

1.3. ELECTRICAL CONTROL PANEL AND APPURTENANCES

1.3.1. Control Panel Model / General Construction

1.3.1.1.Control Panel specs as required.

1.3.2. Level Controls

1.3.2.1.**Float Switch Control Operation**

1.3.2.1.1. The control panel shall provide terminal strip inputs for: pumps off, lead pump on, lag pump on and alarm float controls.

1.3.2.2.**Float Controls**

1.3.2.2.1.1.Duplex control panel operation shall be automatically controlled by (4) mercury or non-mercury level controls. Float switches shall control off, on and alarm functions.

1.3.2.2.1.2.Float switch shall be capable of operating at temperatures between 32 and 170 degrees F. Float switches shall activate and deactivate between 5 degrees above horizontal and 5 degrees below horizontal. Float switch shall be constructed with a polypropylene outer shell for durability and resistance to wastewater environment. Outer shell shall be filled with polyurethane foamed interior to provide best buoyancy, water tight integrity and protect the mercury switch.

1.3.2.2.1.3.Float switches shall be of normally open type.

1.3.2.2.1.4.Float switch cables shall be made of chlorinated polyethylene, type SJOOW, 18 AWG, 2-wire type. Float switch contacts and shall be capable of handling 10 amps at 115 VAC or 3 amps at 240 VAC.

1.3.2.2.1.5. Float switch shall be third party safety listed by cUL,US and shall be capable of operating intrinsic safe relays.

1.3.2.2.1.6. Float switches shall have an external zinc plated cast iron weight. Weight shall be of the split design and shall be easily adjustable for tether length. Float switch weights made of heavy metals which may contaminate the waste flow stream shall not be acceptable.

1.3.2.3. **Redundant Off Circuitry (Optional)** The control panel shall provide terminal strip inputs for a redundant off float switch. Float switches shall be of the normally closed type for redundant off.

2. EXECUTION

2.1. START-UP INSTRUCTION SERVICES

2.1.1. The pump supplier and/or manufactures rep shall provide two (2) days of start-up instruction and training for the service personnel responsible for the long term maintenance and servicing of the grinder pumping system. The training shall address all aspects of installation, start-up, troubleshooting, operation, maintenance, and repair of the grinder units including all electrical components. The training sessions shall include complete review of installation, operation and maintenance manuals, as well as actual field instruction. The Training sessions shall be coordinated with the pump manufacturer, engineer and the authority's personnel. The training sessions shall be scheduled two (2) weeks in advance to allow for adequate notification to all parties involved in the start-up and training.

2.1.2. Extended training can be arranged for an additional fee.

2.1.3. The contractor shall make certain that all the grinder pumps systems are ready for start up/activation prior to the notification and scheduling of such.

2.1.4. Prior to the arrival of the manufacturer's representative, the contractor is required to have the cover to the grinder pump station unbolted and ready for removal. Contractor must provide a minimum of 70 gallons of water supplied into the basin for start-up procedures.

2.1.5. Power will be supplied to the control panel and grinder pump system.

2.1.6. Upon completion of start-up testing, the contractor shall replace the cover to the grinder pump system and fasten securely to prevent any water infiltration.

2.1.7. Contractor shall be responsible for any personnel and/or material necessary for the manufacturer's representative to complete the start-up and testing phase of the project, including, but not limited to, water source at each station, labor personnel to remove and replace cover, etc..

2.2. QUALITY ASSURANCE

2.2.1. The grinder pump shall have an industry standard commercial test which consists of a run test, Hi Pot test, Hermetic leak decay test.

2.2.2. Panel Test

2.2.3. Basin Test

2.2.4. Manufacture must have a Quality Assurance Manual

2.3. DELIVERY, STORAGE AND HANDLING

2.3.1. The manufacturer shall furnish and deliver assembled grinder pump stations to the contractor or owner. Simplex units, containing one grinder pump and all necessary parts and equipment, shall be installed in polyethylene or fiberglass reinforced polyester tanks for outside installations. All equipment shall be factory installed, except for externally mounted control panel, gravity sewer inlet hubs and pump assembly, which are to be installed in the field. Each simplex or duplex grinder pump unit shall be complete, consisting of a basin, basin cover, grinder pump, quick disconnect rail system, check valve, junction box, start-stop level controls, motor high temperature shutoff, motor seal leak alarm, high water alarm, pump motor failure, alarm loss of power, all internal wiring terminating into the junction box, shutoff valve and discharge piping. In addition, an external alarm and pump control panel is to be provided for the unit.

2.3.2. The pump supplier shall provide six (6) (XX) copies of Installation, Operations and Maintenance Manuals to the Authority.

2.3.3. All tanks 96” tall and shorter shall ship vertically up right. The tanks shall ship with the covers bolted and attached. For shipping reasons, units taller than 96” shall ship horizontally and mounted to a skid.

2.3.4. All packaged tank assemblies will include all the necessary equipment to make a complete turnkey system ready for installation except the grinder pump and control panel.

2.3.5. For ease of handling and storage, grinder pump and control panel shall ship mounted on wooden pallet.

2.3.6. Upon receipt of packaged tank assemblies, the contractor or owner will visually inspect to make certain the freight carrier has successfully transported the equipment with no damage. It is the responsibility of the contractor or owner to reject any or all damaged equipment prior to signing the delivery slip. FOB factory.

2.3.7. Handling and unloading the basin assemblies shall be the responsibility of the contractor or owner. Lifting devices such as chain is prohibited.

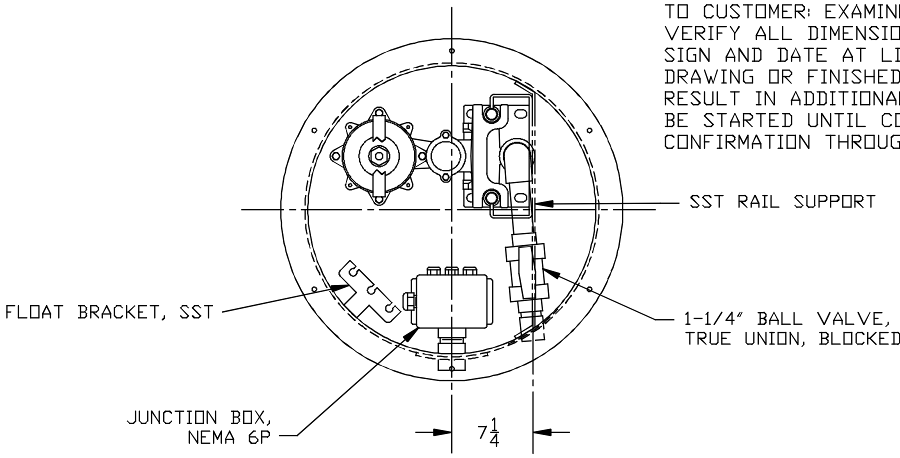
2.3.8. The basin assemblies, grinder pumps and control panels will be stored in a controlled environment to prevent weather conditions from damaging equipment.

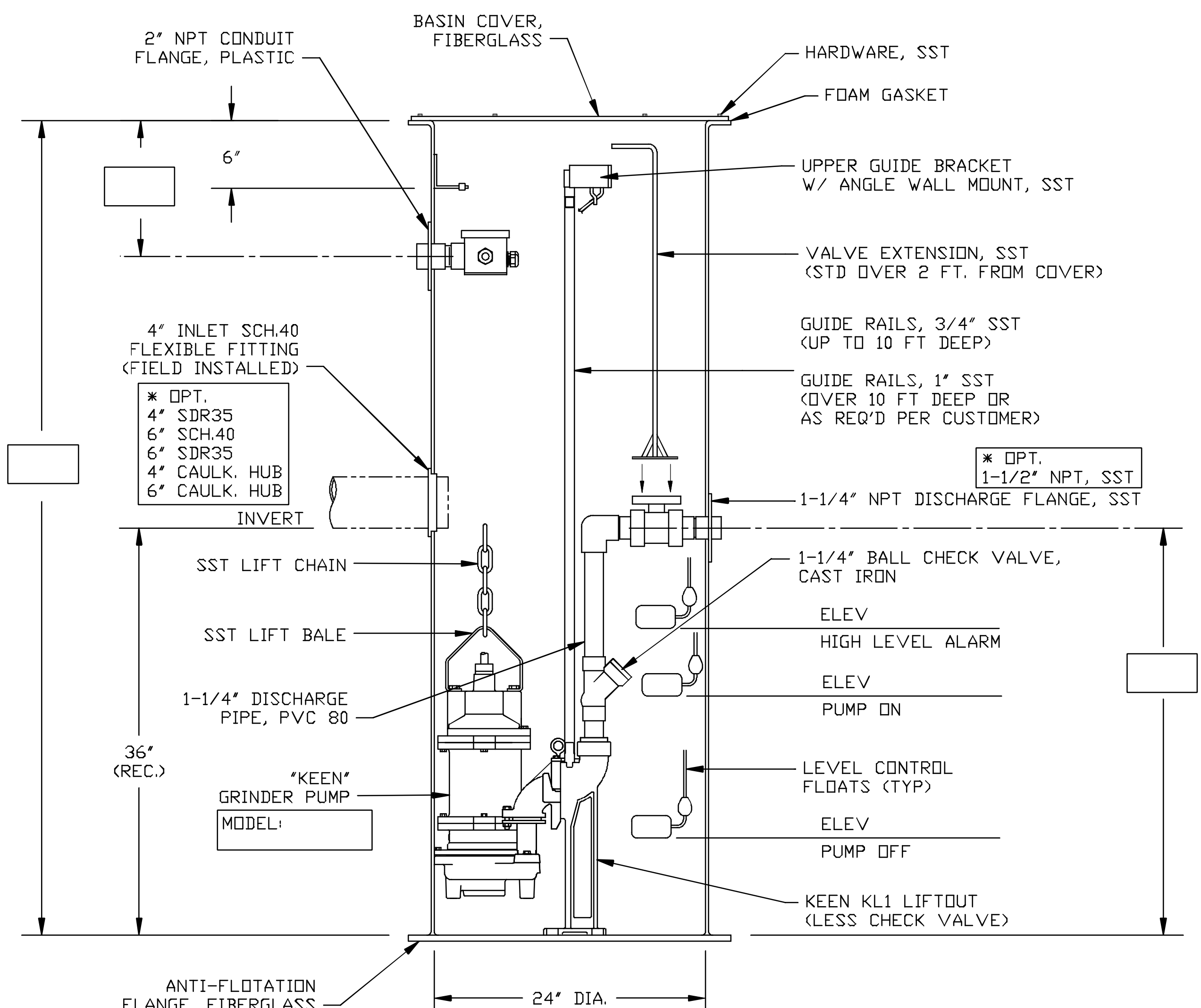
2HP GRINDER 24" BASIN KL1 FG COVER (REF ONLY)

APPROVED BY: ________________

DATE: ________________

TO CUSTOMER: EXAMINE THIS DRAWING CAREFULLY.
VERIFY ALL DIMENSIONS, LOCATIONS, AND ELEVATIONS FOR ACCURACY.
SIGN AND DATE AT LINE. ANY MODIFICATIONS OR CHANGES TO THIS DRAWING OR FINISHED PRODUCT, AFTER IT HAS BEEN SIGNED, MAY RESULT IN ADDITIONAL CHARGES AND SHIPPING DELAYS. NO JOB WILL BE STARTED UNTIL CONFIRMATION THROUGH SIGNATURE.
CONFIRMATION THROUGH SIGNATURE RELEASES ORDER FOR PRODUCTION.





NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

A	DLM	EC014-042, 10-29-14
REV	INITIALS	DATE

KEEN PUMP COMPANY

KEEN PUMP CO.
471E ST. ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: BASIN ASSY; 24"DIA., ALL 1&2HP GR., SIM., KL1, FG COVER

SCALE	DWG. #	REV.
NTS	KN-644	A

DWG. BY	DATE
S. ETZEL	01/27/11

2HP GRINDER 24" BASIN KL1 ALUM COVER (REF ONLY)

APPROVED BY: ________________

DATE: ________________

TO CUSTOMER: EXAMINE THIS DRAWING CAREFULLY.
VERIFY ALL DIMENSIONS, LOCATIONS, AND ELEVATIONS FOR ACCURACY.
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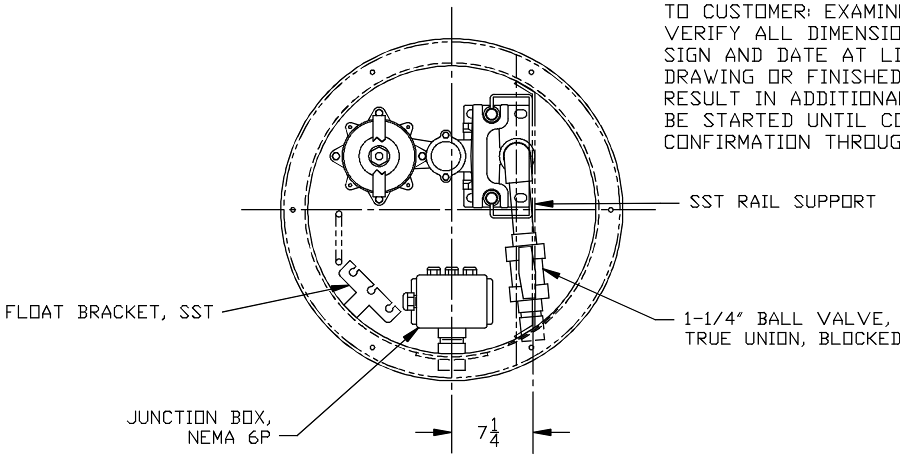

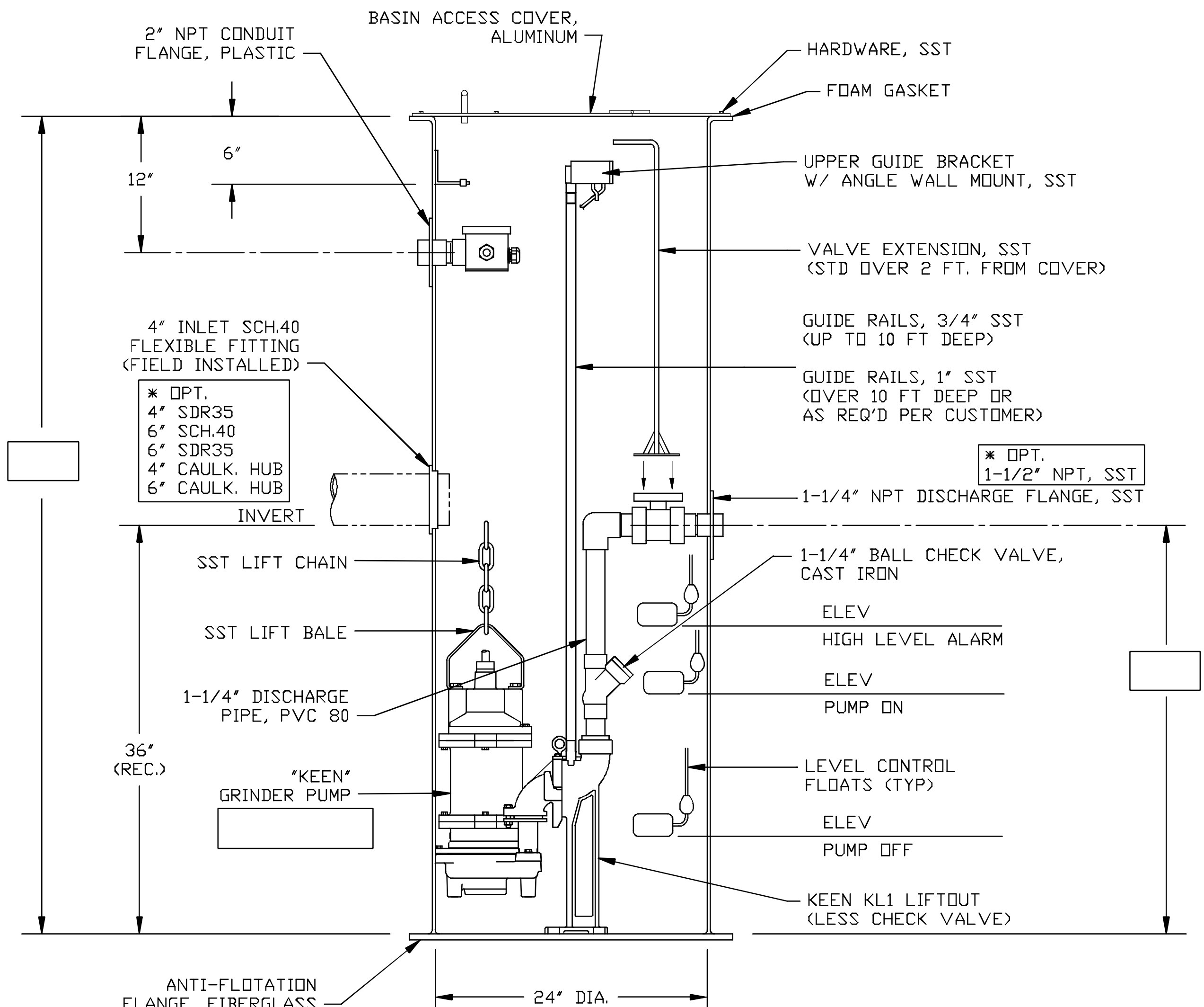

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE

KEEN PUMP COMPANY
KEEN PUMP CO.
471E ST. ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: BASIN ASSY; 24"DIA., ALL 1&2HP GR., SIM., KL1, ALUM. ACCESS CVR.

SCALE	DWG. #	REV.
NTS	KN-672	-

DWG. BY	DATE
S. ETZEL	01/08/13

2HP GRINDER 24" BASIN KL1CV FG COVER (REF ONLY)

APPROVED BY: ________________

DATE: ________________

TO CUSTOMER: EXAMINE THIS DRAWING CAREFULLY.
VERIFY ALL DIMENSIONS, LOCATIONS, AND ELEVATIONS FOR ACCURACY.
SIGN AND DATE AT LINE. ANY MODIFICATIONS OR CHANGES TO THIS DRAWING OR FINISHED PRODUCT, AFTER IT HAS BEEN SIGNED, MAY RESULT IN ADDITIONAL CHARGES AND SHIPPING DELAYS. NO JOB WILL BE STARTED UNTIL CONFIRMATION THROUGH SIGNATURE.
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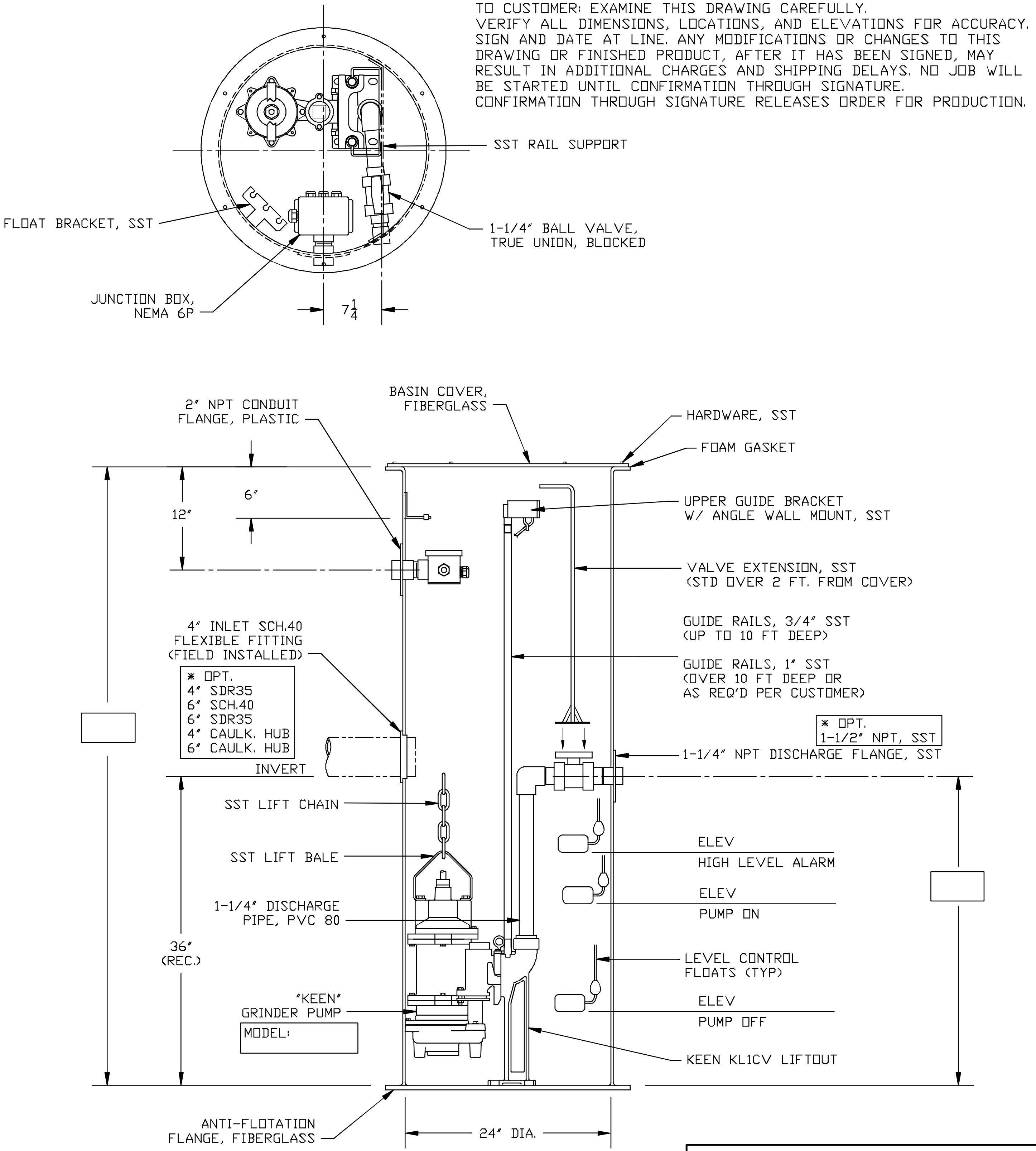

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY		
REV	INITIALS	DATE

KEEN PUMP COMPANY
KEEN PUMP CO.
471E ST. ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: BASIN ASSY; 24"DIA., ALL 1&2HP GR., SIM., KL1CV, FG CVR.			
SCALE: NTS		DWG. #: KN-277	REV.: -
DWG. BY: S. ETZEL	DATE: 01/27/11		

2HP GRINDER 24" BASIN KL1CV ALUM COVER (REF ONLY)

APPROVED BY: ________________

DATE: ________________

TO CUSTOMER: EXAMINE THIS DRAWING CAREFULLY.
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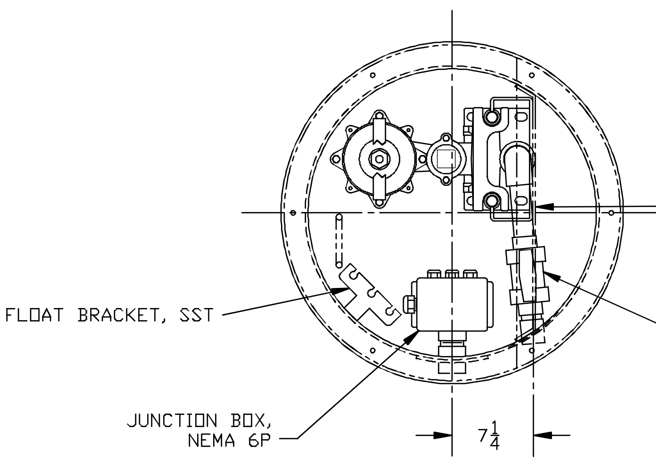

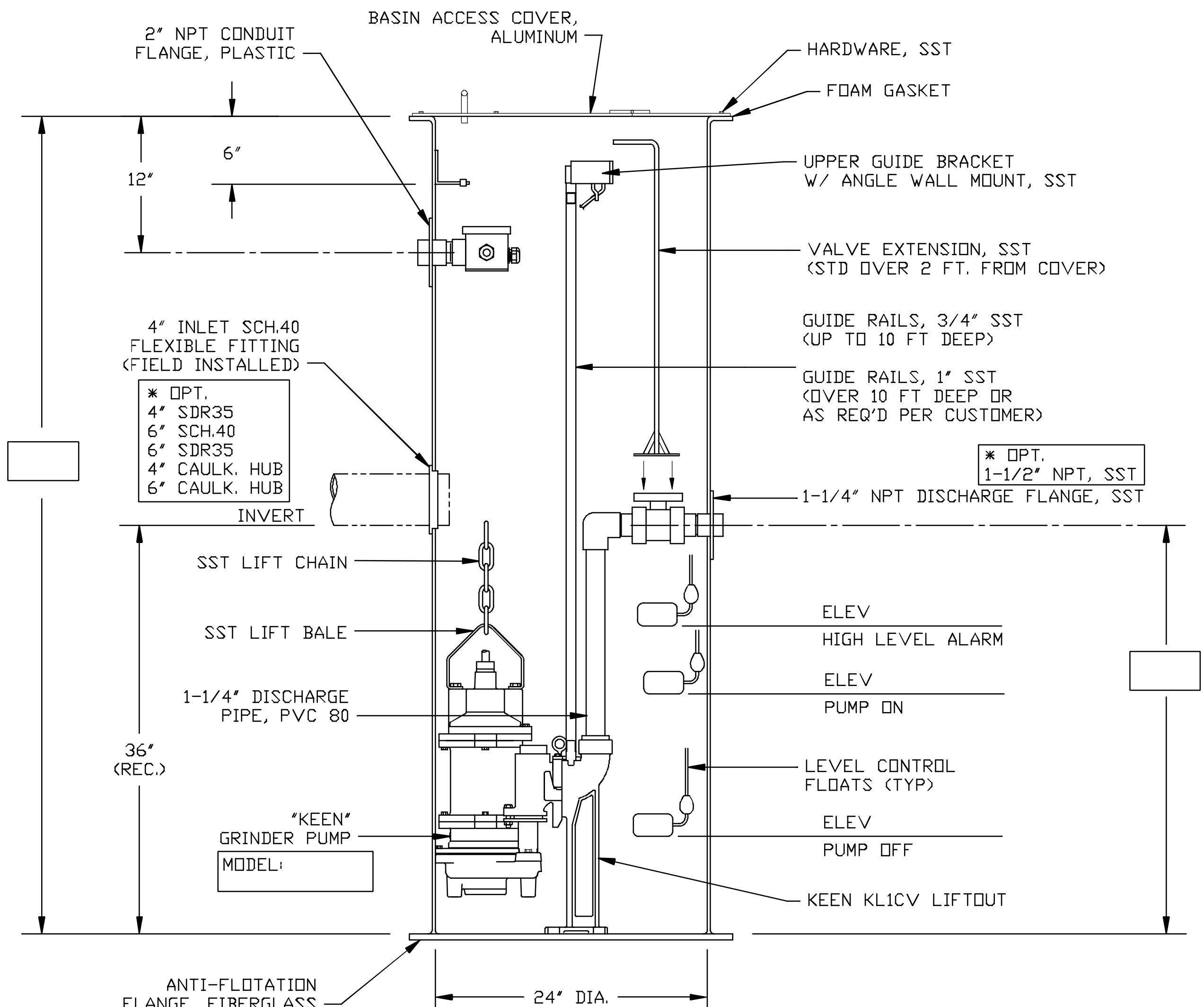

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE

KEEN PUMP COMPANY

KEEN PUMP CO.
471E ST. ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: BASIN ASSY; 24"DIA., ALL 1&2HP GR., SIM., KL1CV, ALUM. ACCESS CVR.

SCALE	DWG. BY	DATE	DWG. #	REV.
NTS	S. ETZEL	01/08/13	KN-668	-

2HP GRINDER 30" BASIN KL1CV ALUM COVER (REF ONLY)

APPROVED BY: ________________

DATE: ________________

TO CUSTOMER: EXAMINE THIS DRAWING CAREFULLY.
VERIFY ALL DIMENSIONS, LOCATIONS, AND ELEVATIONS FOR ACCURACY.
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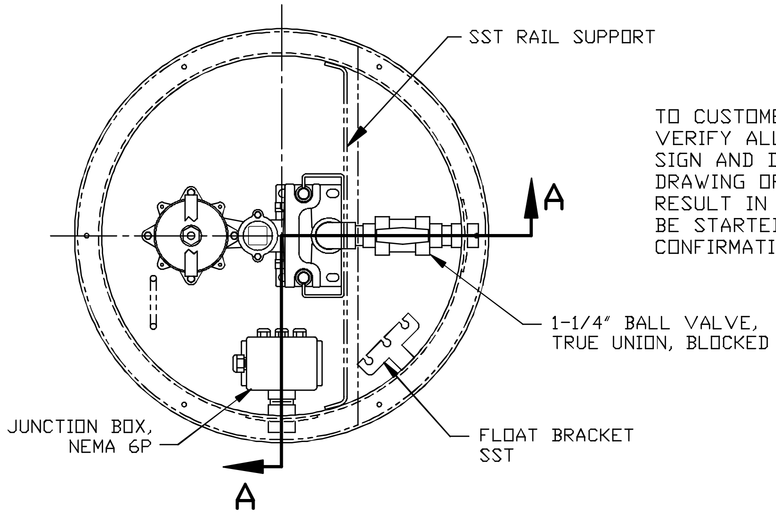

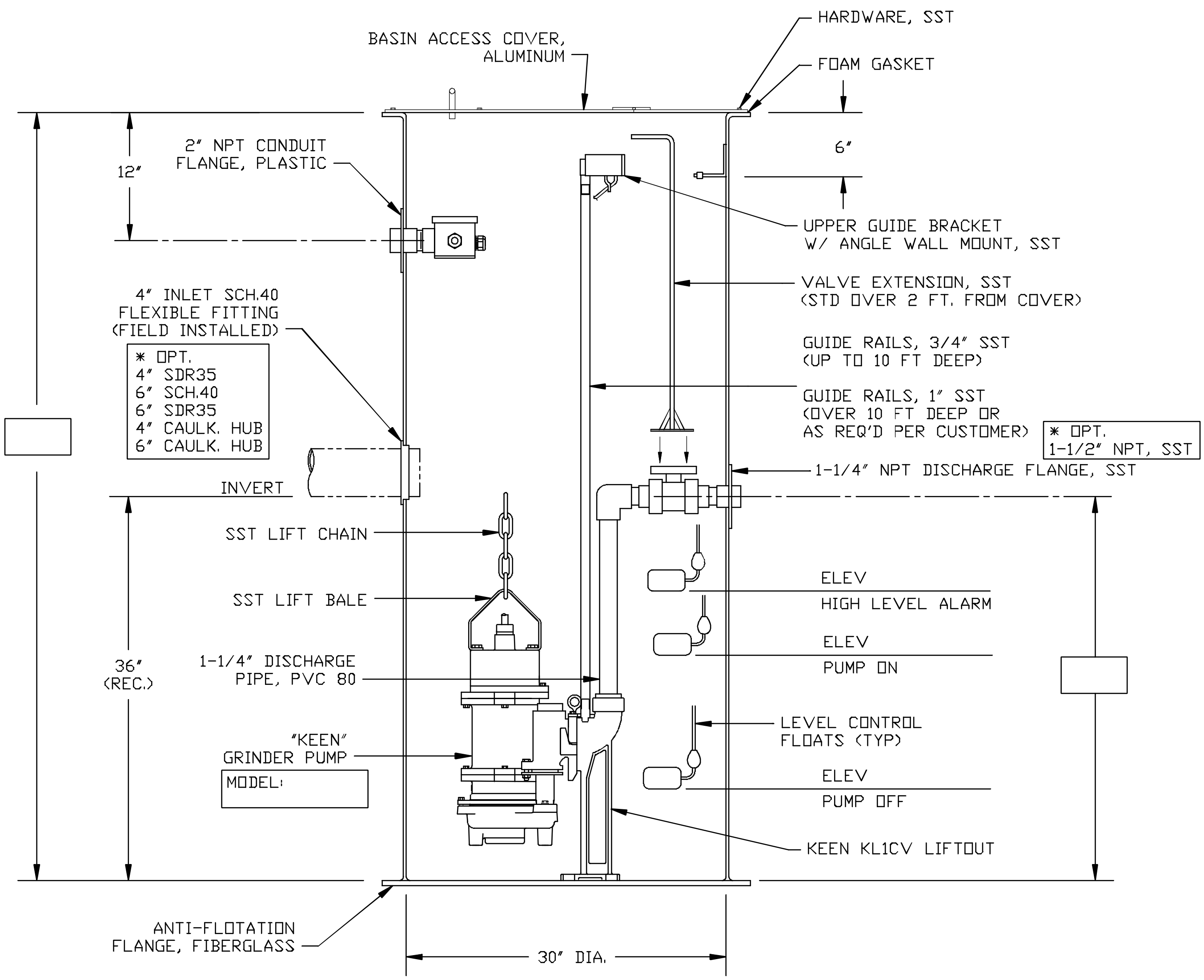

SECTION A-A

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE

KEEN PUMP COMPANY
KEEN PUMP CO.
471E ST. ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: BASIN ASSY; 30"DIA., ALL 1&2HP GR., SIM., KL1CV, ALUM. ACCESS CVR.

SCALE	DWG. #	REV.
NTS	KN-669	-

DWG. BY	DATE
SE	01/02/13

2HP GRINDER 30" BASIN KL1 ALUM COVER (REF ONLY)

APPROVED BY: _________________

DATE: _________________

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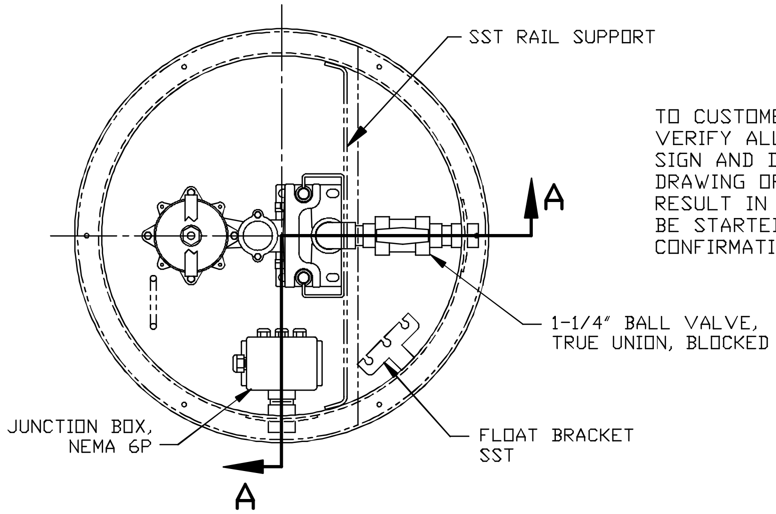

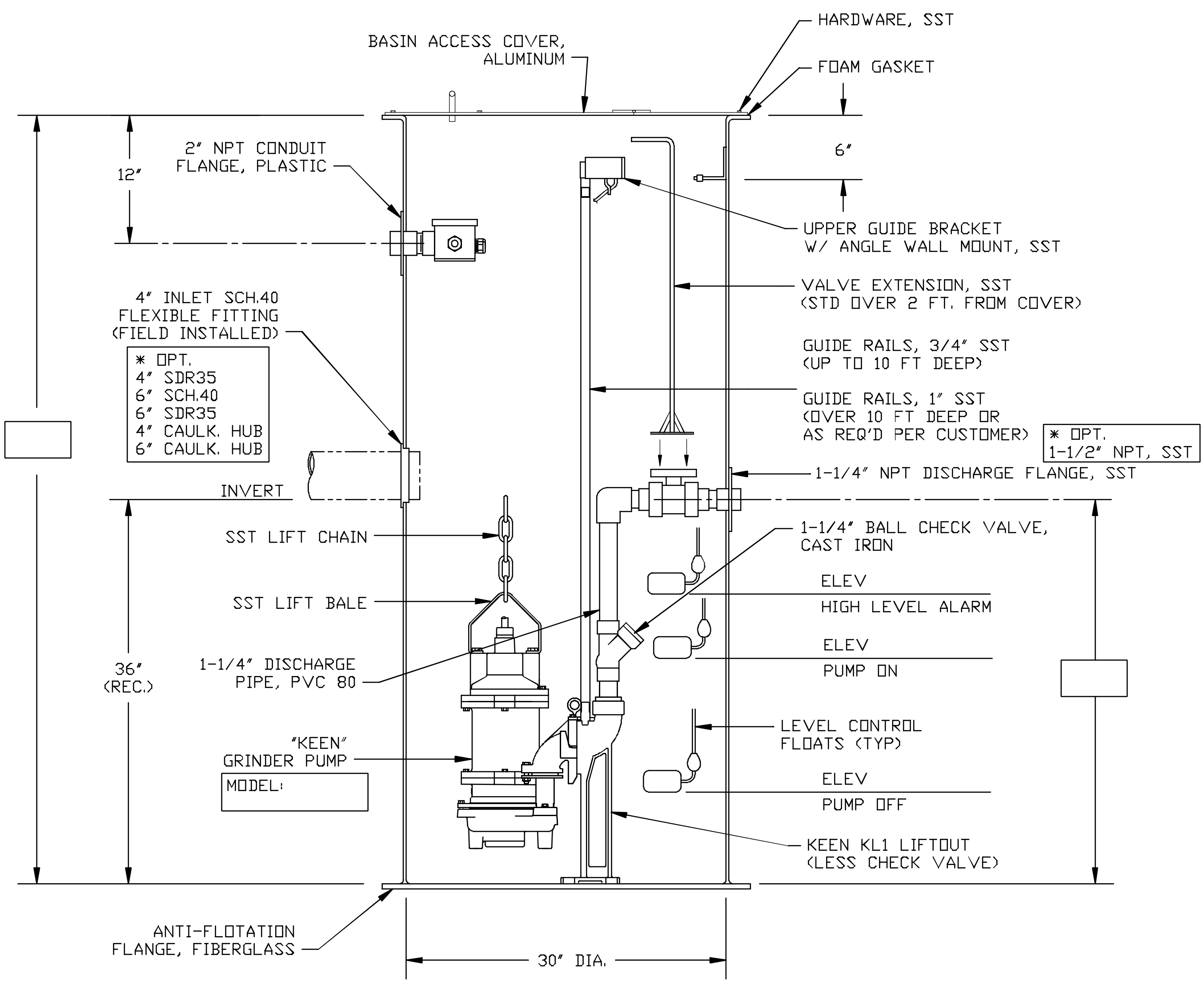

SECTION A-A

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY		
REV	INITIALS	DATE

KEEN PUMP COMPANY
KEEN PUMP CO.
471E ST. ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE			
BASIN ASSY; 30"DIA., ALL 1&2HP GR., SIM., KL1, ALUM. CVR.			
SCALE: NTS		DWG. #: KN-673	REV.: -
DWG. BY: SE	DATE: 01/08/13		

2HP GRINDER 30" BASIN KL1 FG COVER (REF ONLY)

APPROVED BY: ________________

DATE: ________________

TO CUSTOMER: EXAMINE THIS DRAWING CAREFULLY.
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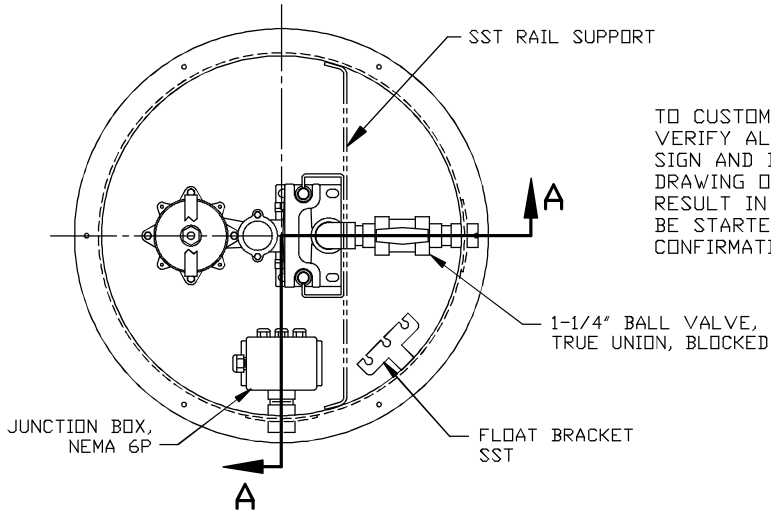
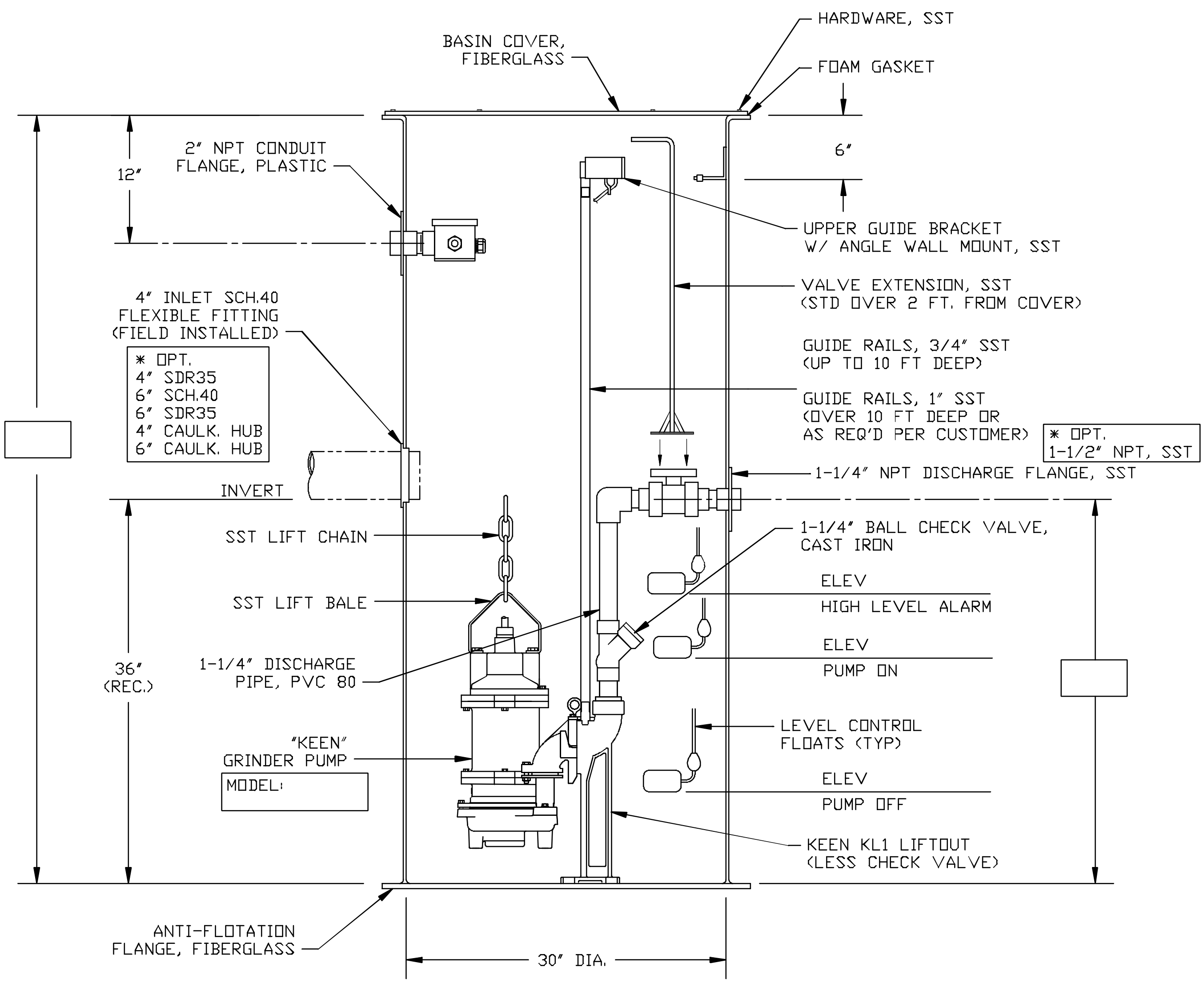




SECTION A-A

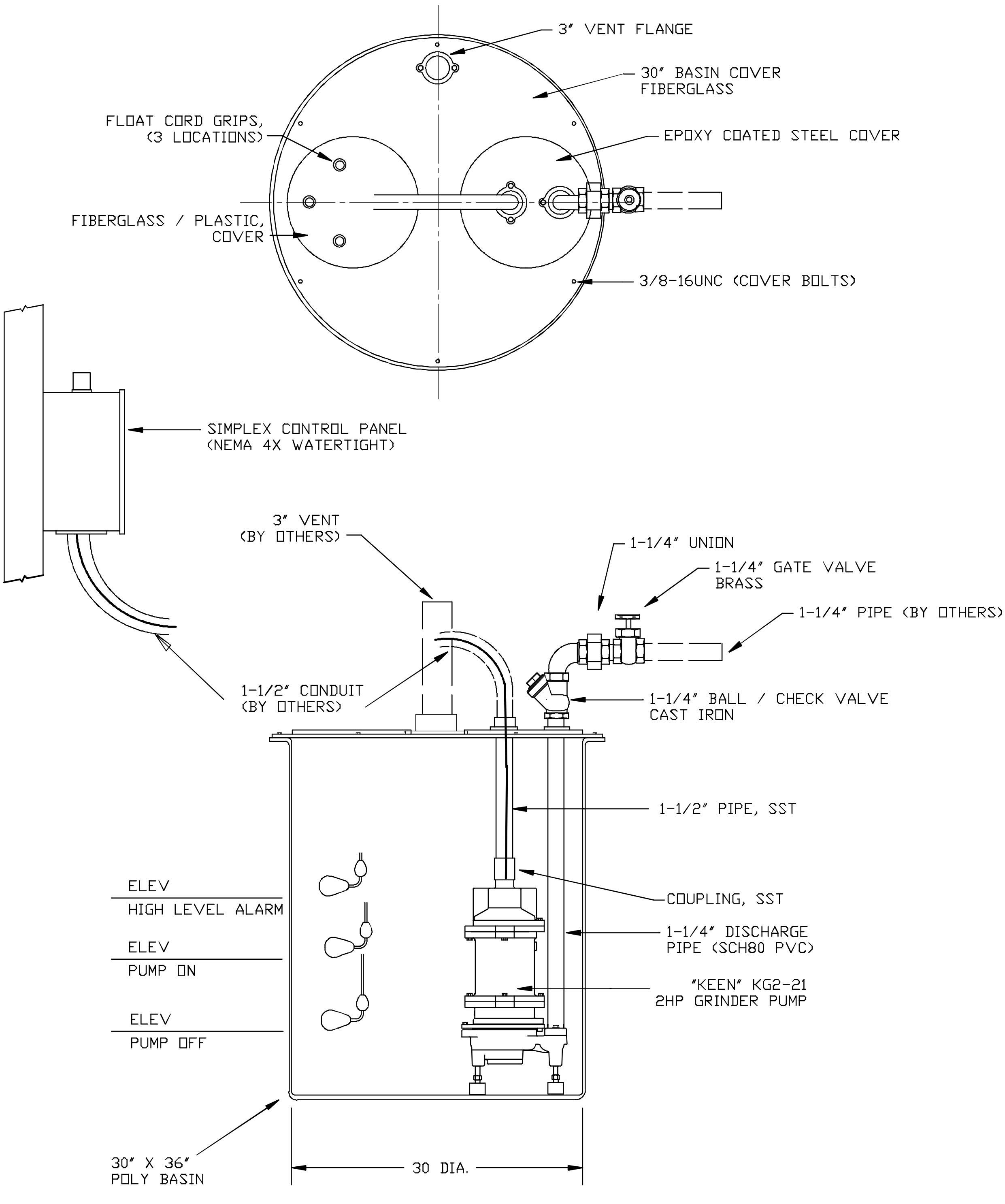
NOTE: ALL DIMENSIONS FOR REFERENCE ONLY		
REV	INITIALS	DATE

KEEN PUMP COMPANY

KEEN PUMP CO.
471E ST. ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

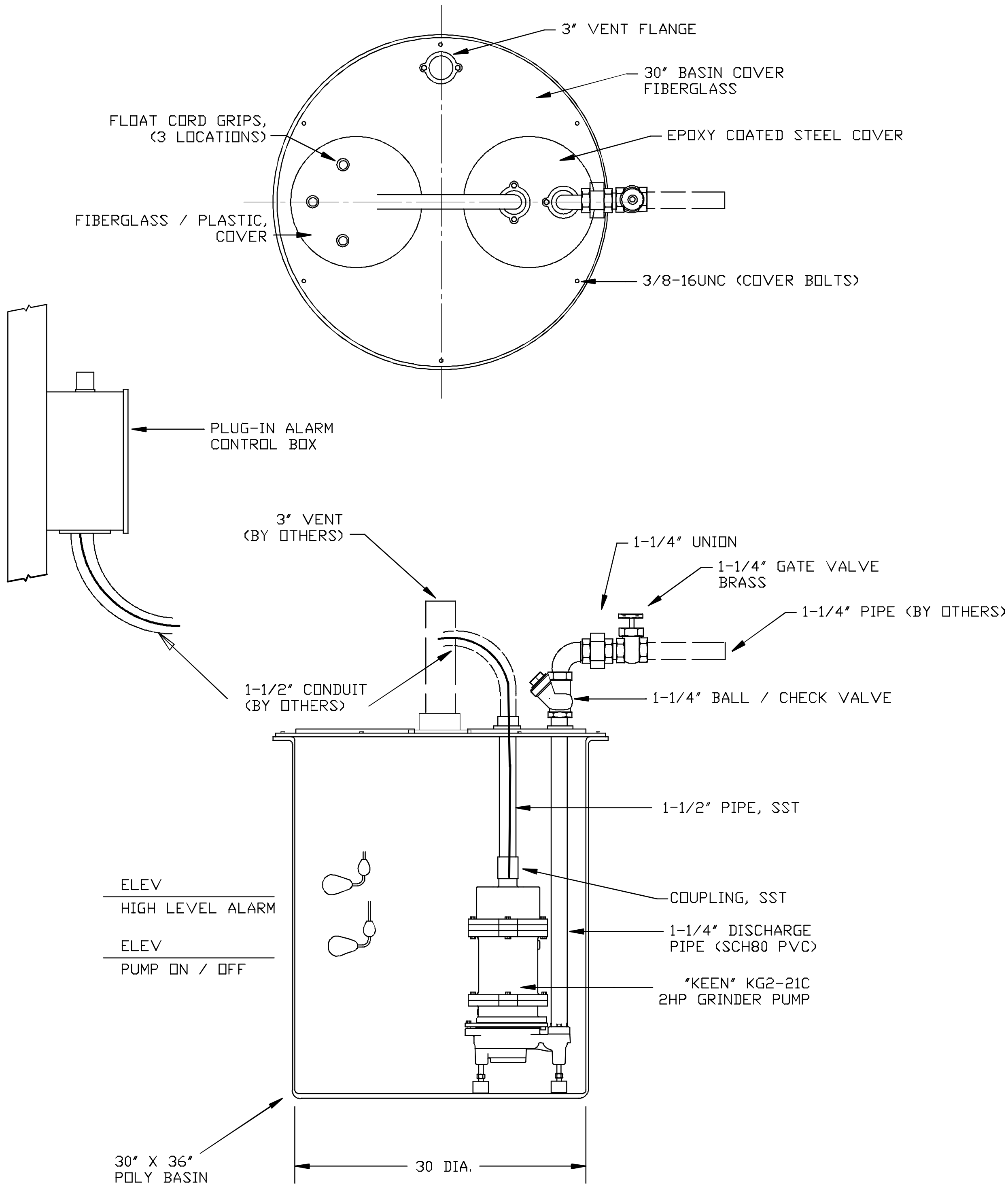
TITLE		
BASIN ASSY; 30"DIA., ALL 1&2HP GR., SIM., KL1, FG. COVER		
SCALE: NTS	DWG. #: KN-671	REV.: -
DWG. BY: SE	DATE: 01/02/13	

2HP GRINDER 30" BASIN INDOOR UNIT (REF ONLY)



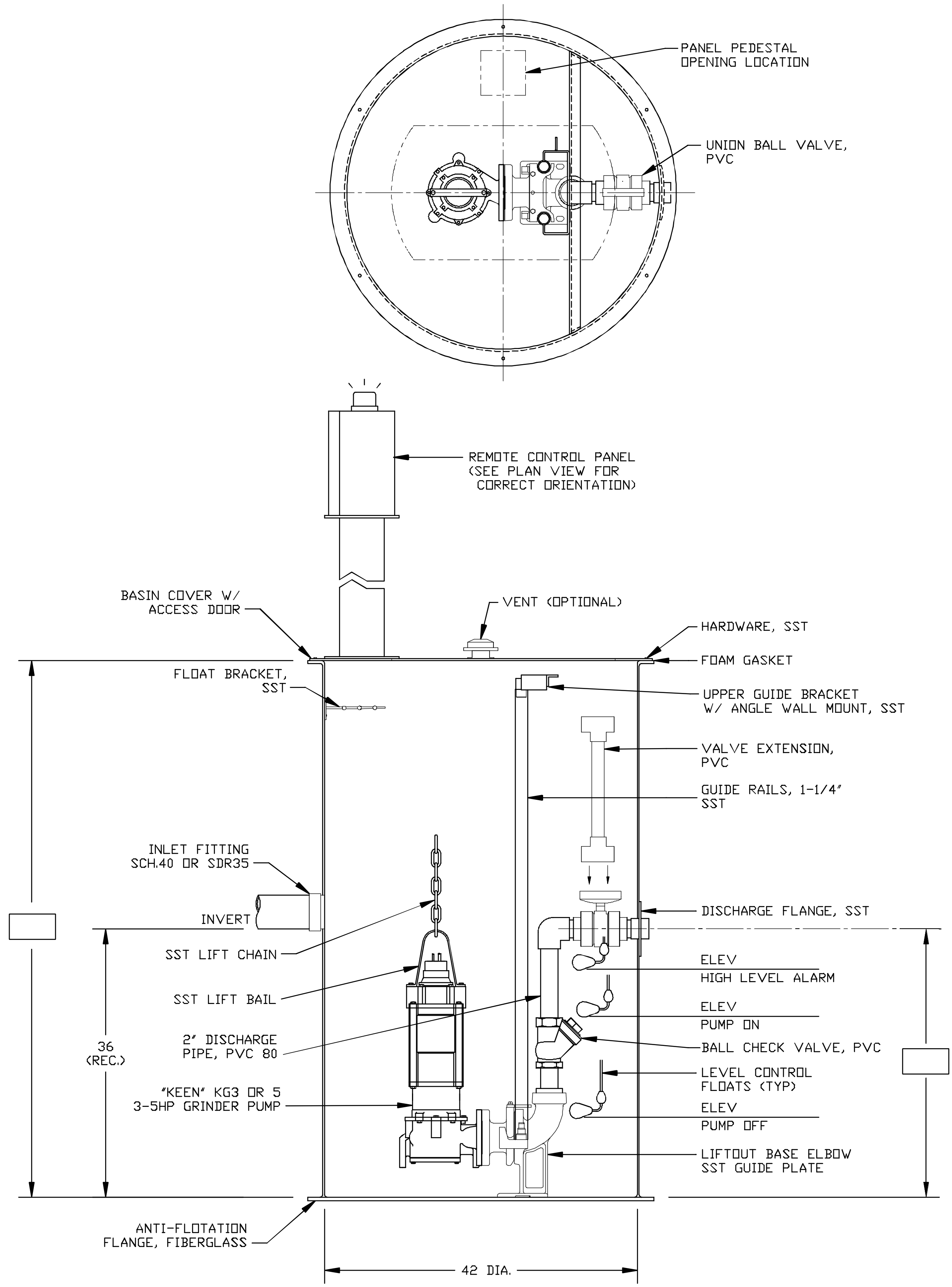
KEEN PUMP COMPANY	KEEN PUMP CO. 471E ST ROUTE 250 EAST ASHLAND, OHIO 44805	PHONE: 419-207-9400 FAX: 419-207-8031
TITLE INDOOR BASIN; 30" DIA x 36", KG2-21 GRINDER PUMP		
SCALE NTS	DWG. # KN-INDOOR-1	REV. -
DWG. BY SE	DATE 10/13/12	

2HP GRINDER INTERNAL CAPACITORS 30" BASIN INDOOR UNIT (REF ONLY)



KEEN PUMP COMPANY	KEEN PUMP CO. 471E ST ROUTE 250 EAST ASHLAND, OHIO 44805	PHONE: 419-207-9400 FAX: 419-207-8031
TITLE INDOOR BASIN; 30" DIA x 36", KG2-21C GRINDER PUMP		
SCALE NTS	DWG. # KN-INDOOR-2	REV. -
DWG. BY SE	DATE 10/13/12	

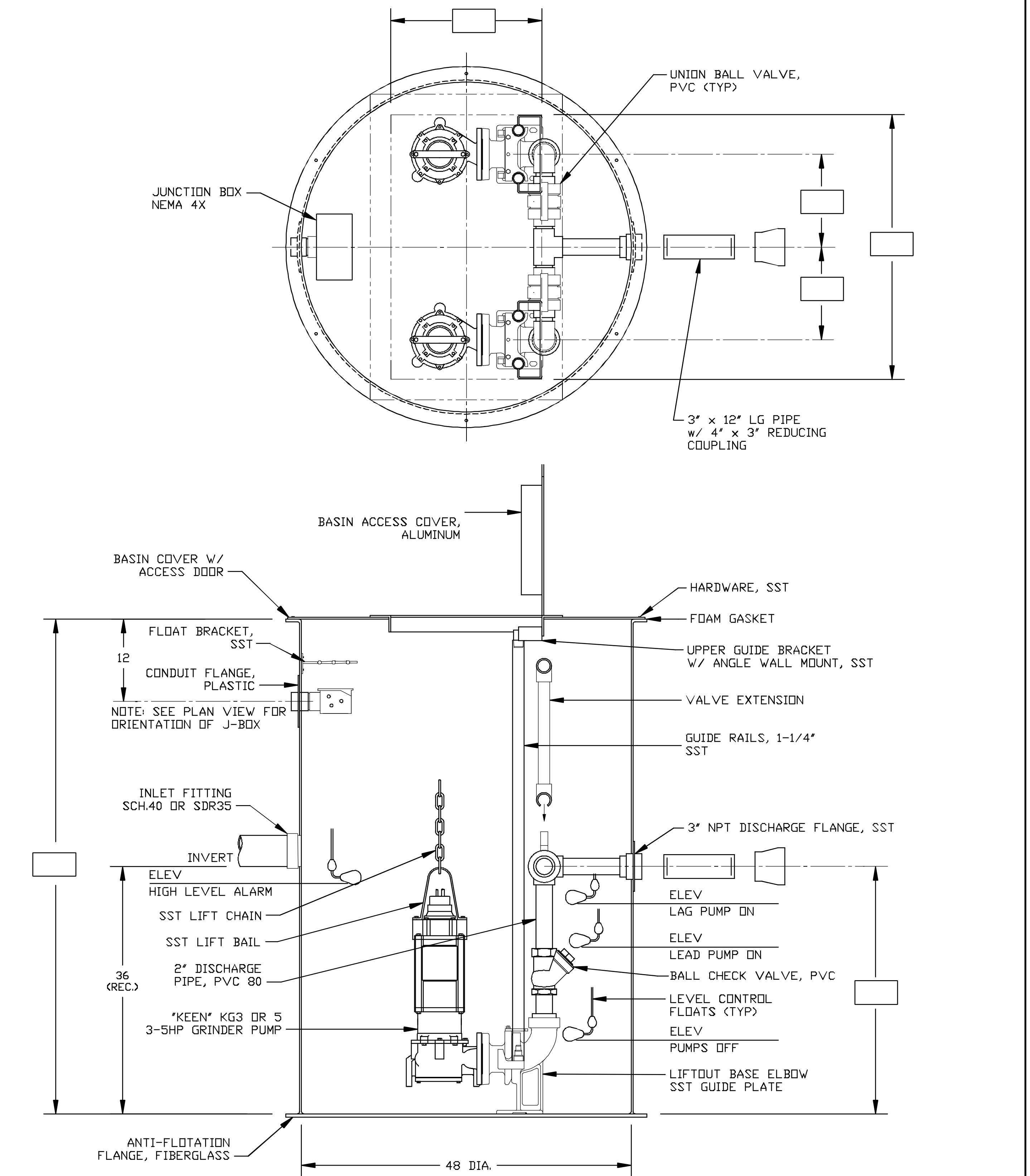
3-7.5HP GRINDER 42" BASIN KL3H ALUM COVER (REF ONLY)



KEEN PUMP COMPANY
KEEN PUMP CO.
1661 CLEVELAND AVE.
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: BASIN;42" DIA., KG3&5 GR. W/ RAILS, SIMPLEX, DIRECT PANEL			
SCALE: NTS		DWG. #: KN-47	REV.: -
DWG. BY: F. YUHASZ	DATE: 10/30/08		

3-7.5HP GRINDER 48" BASIN (DUPLEX) KL3H ALUM COVER (REF ONLY)

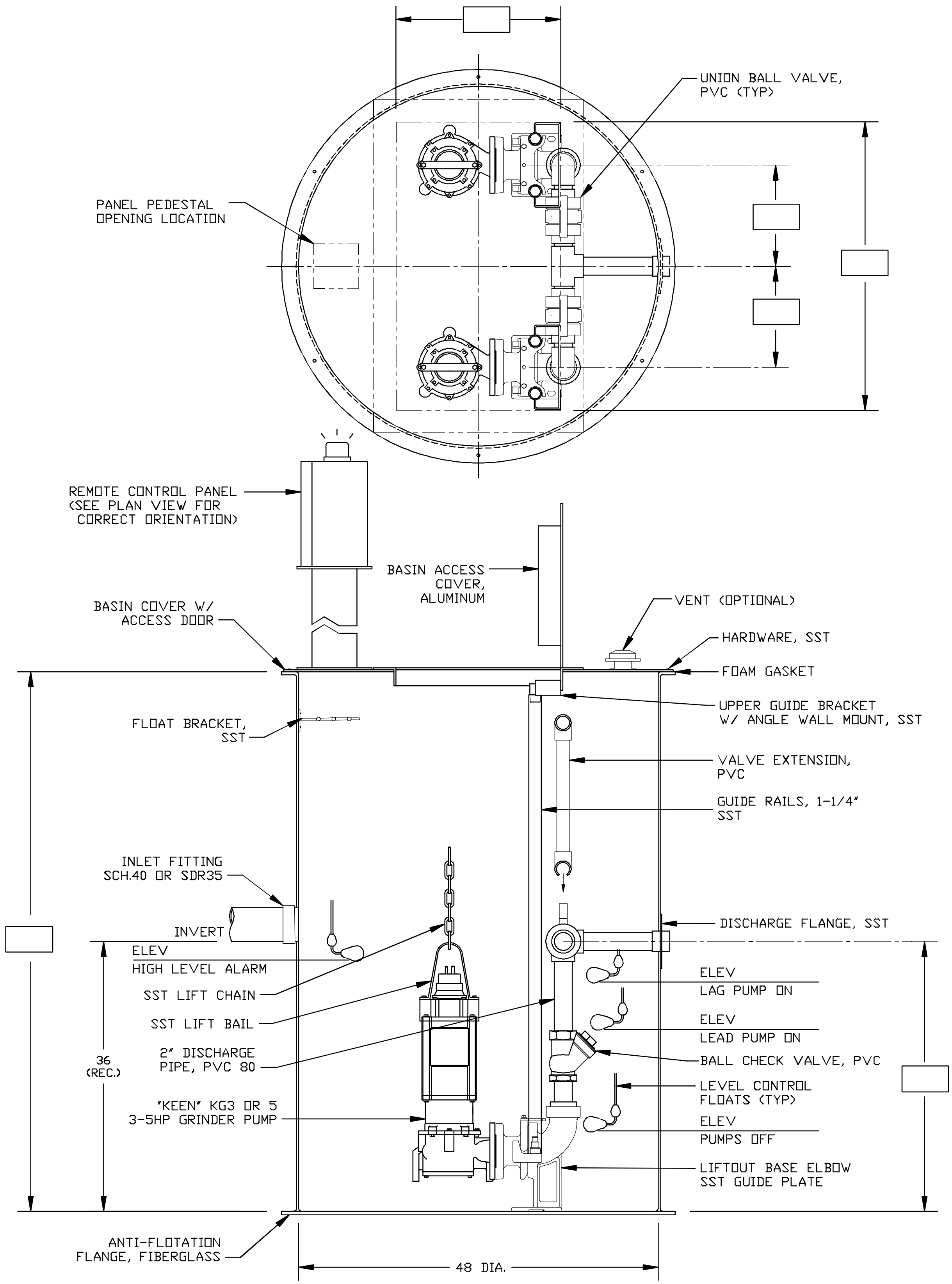


KEEN PUMP COMPANY

KEEN PUMP CO.
1661 CLEVELAND AVE.
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE BASIN; 48" DIA., KG3&5 GR. W/ RAILS, DUPLEX, MANIFOLD, JBOX			
SCALE NTS		DWG. # KN-52	REV. -
DWG. BY F. YUHASZ	DATE 11/01/08		

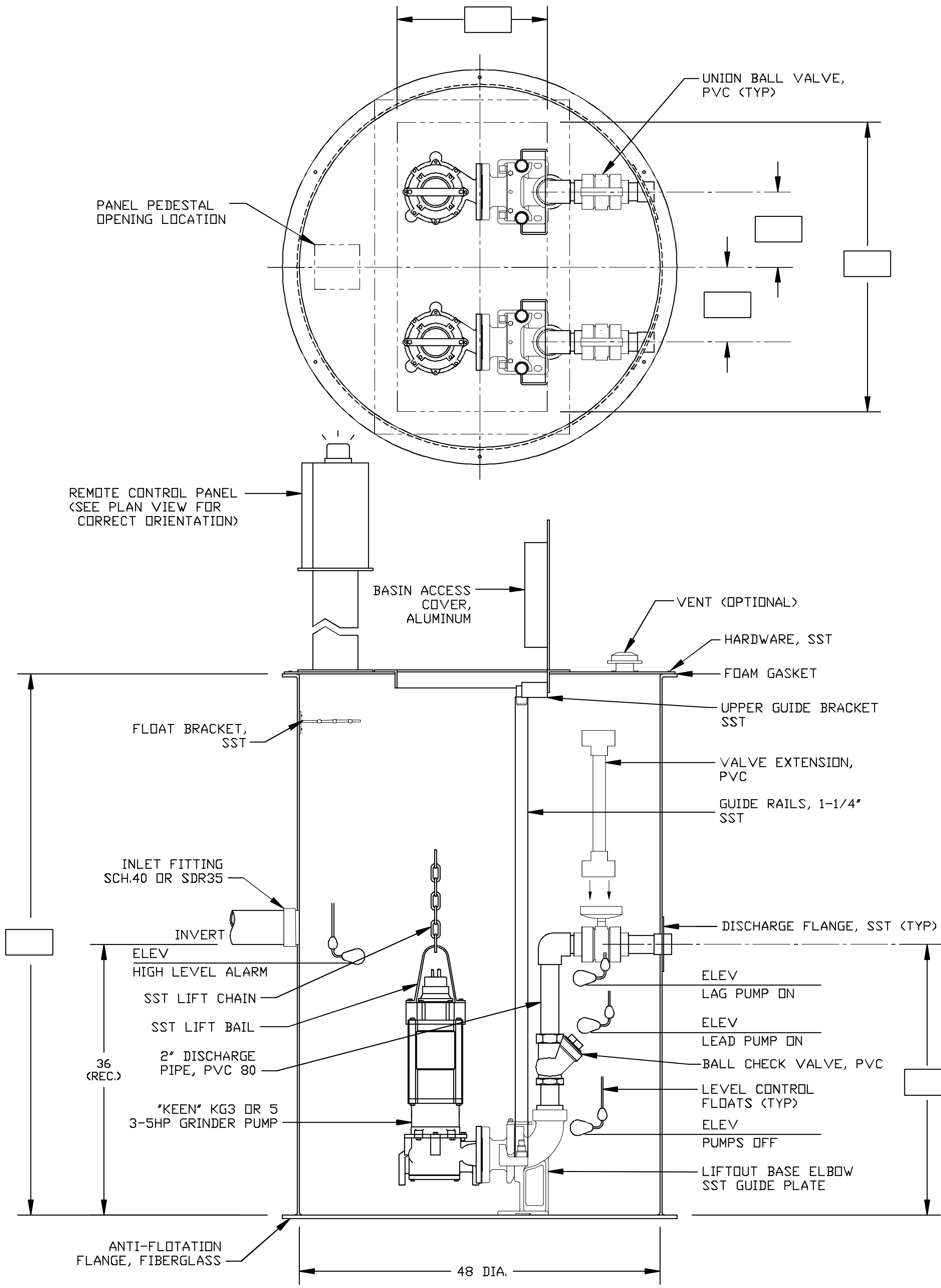
3-7.5HP GRINDER 48" BASIN (DUPLEX) KL3H ALUM COVER (REF ONLY)



KEEN PUMP COMPANY
KEEN PUMP CO.
1661 CLEVELAND AVE.
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

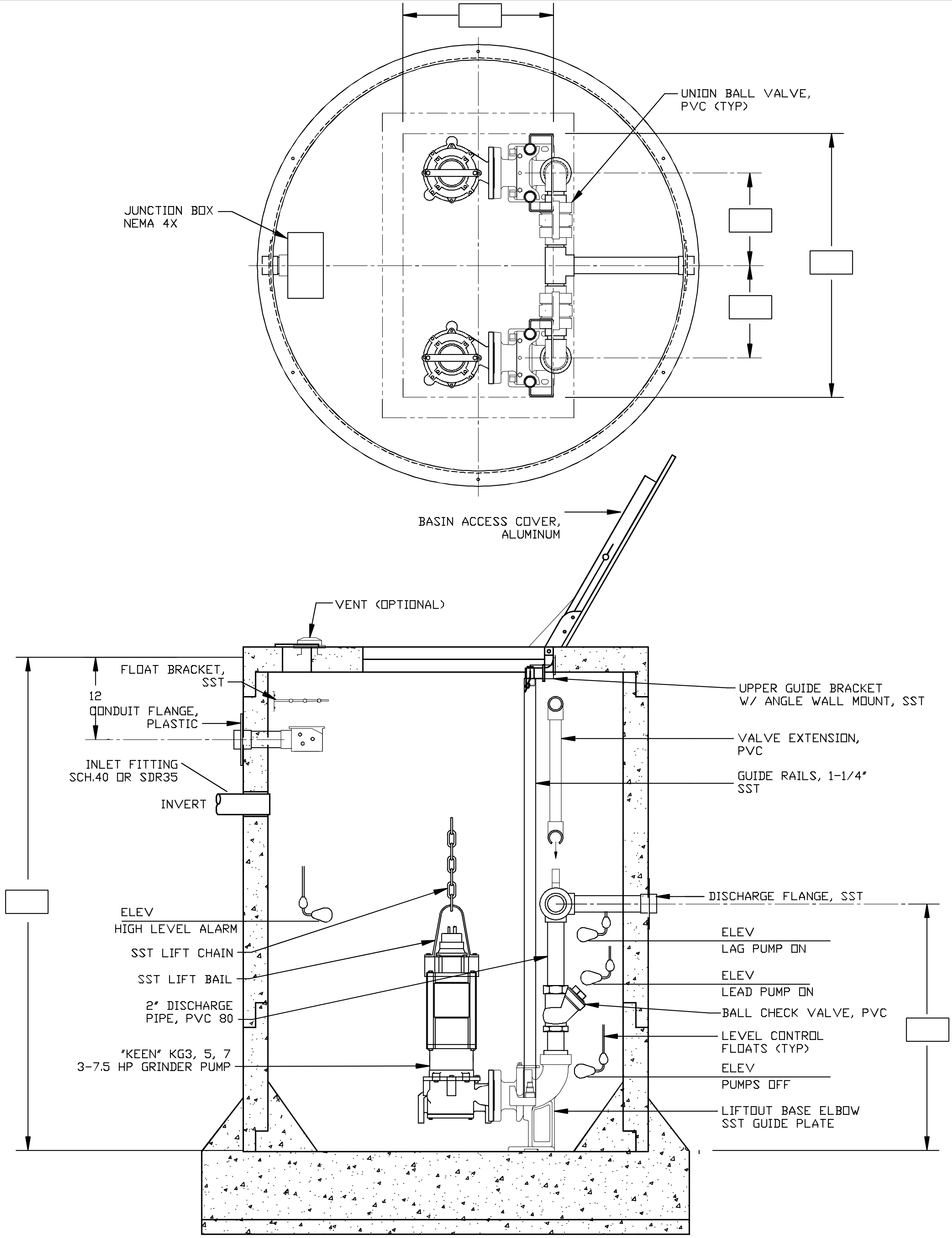
TITLE		
BASIN; 48" DIA., KG3&5 GR. W/ RAILS, DUPLEX, MANIFOLD, DIRECT		
SCALE: NTS	DWG. #: KN-58	REV.: -
DWG. BY: F. YUHASZ / DATE: 11/02/08		

3-7.5HP GR. 48" BASIN (DUPLEX) KL3H PARALLEL DISCH (REF ONLY)



KEEN PUMP COMPANY	KEEN PUMP CO. 1661 CLEVELAND AVE. ASHLAND, OHIO 44805	PHONE: 419-207-9400 FAX: 419-207-8031
TITLE BASIN; 48" DIA., KG3&5 GR. W/ RAILS, DUPLEX, DUAL DIS., DIRECT		
SCALE NTS	DWG. # KN-70	REV. -
DWG. BY F. YUHASZ	DATE 11/10/08	

3-7.5HP GRINDER CONCRETE BASIN (DUPLEX) KL3H (REF ONLY)



KEEN PUMP CO.
1661 CLEVELAND AVE.
ASHLAND, OHIO 44805

PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: CONCRETE DUPLEX BASIN PACKAGE, 3 - 7.5 HP GRINDERS			
SCALE: NTS		DWG. #: KN-KG5	REV.: –
DWG. BY: F. YUHASZ	DATE: 11/02/08		

KEEN PUMP COMPANY, INC.

471 E State Route 250 East, Ashland, OH 44805
Phone: 419-207-9400 Fax: 419-207-8031

Limited 3 – Year Warranty

During the time periods and subject to the conditions hereinafter set forth, Keen Pump will repair or replace to the original user or consumer, any portion of your new Keen product which proves defective due to defective materials or workmanship of Keen Pump. Contact your closest authorized Keen Pump representative or distributor for warranty service. At all times, Keen Pump shall have and possess the sole right and option to determine whether to repair or replace defective equipment, parts or components. Damage caused by acts of GOD or conditions beyond the control of Keen Pump is not covered by this warranty.

WARRANTY PERIOD:
36 months from date of manufacture.
Start-up reports may be required to support warranty claims. Warranty effective only if Keen Pump supplied or authorized control panels are used. Single phase pumps must utilize Keen Pump supplied start components.

THIS WARRANTY WILL NOT APPLY:

(1) To defects or malfunctions resulting from failure to properly install, operate or maintained the product in accordance with printed instructions provided.
(2) To failures resulting from abuse, accident or negligence.
(3) To normal maintenance services and the parts used in conjunction with such service.
(4) To products which are not installed in accordance with applicable local codes, ordinances and good trade practices.
(5) The product is used for purposes other than for what is was designed and manufactured.
(6) If 3 phase motors are installed on a single phase power supply using a phase converter or if 3 phase power is supplied by only two transformers, making an open Delta system.

WARRANTY EXCLUSIONS:
Keen Pump specifically disclaims the implied warranties of merchantability and fitness for a particular purpose after the termination of the warranty period set forth herein. No warranties or representations at any time made by any representatives of Keen Pump shall vary or expand the provision hereof.

LIABILITY LIMITATION:
In no event shall Keen Pump be liable or responsible for consequential, incidental or special damages resulting from or related in any manner to any Keen Pump product or parts thereof. Personal injury and/or property damage may result from improper installation. Keen Pump disclaims all liability, including liability under this warranty, for improper installation. Keen Pump recommends following the instructions in the installation manual. When in doubt, consult a professional. Some states do no allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

LABOR, ETC., COSTS:
Keen Pump shall in no event be responsible or liable for the cost of field labor or other charges incurred by any customer in removing and/or reaffixing any Keen Pump product, part or component thereof.

RETURNED OR REPLACED COMPONENTS:
Any item to be replaced under this Warranty must be returned to Keen Pump, or such other place as Keen Pump may designate, freight prepaid.

This warranty gives you specific legal rights and other rights which may vary from state to state.

In the absence of suitable proof of this purchase date, the effective date of this warranty will be based upon the date of manufacture. Example: 0105 = Month-Year = January, 2005.

"The **KEEN PUMP DIFFERENCE** is dedication to the highest quality of product and service in our industry along with the best customer care delivered with a sense of warmth, friendliness, individual pride, and company spirit"

KEEN PUMP®

KEEN PUMP Models

Pump Model	Horsepower	Impeller	Max. Flow (GPM)	Max. Head (TDH)
K3RN FM	1 - 10	Vor-	625	71
K4RN FM	1 - 10	Vortex	600	67
K3RH FM	3 - 7.5	Vor-	275	90
K4RH FM	7.5 - 15	Vortex	540	94
K3VN FM	1 - 10	Enclosed	700	76
K4VN FM	1 - 10	Enclosed	690	75
K4RP	3 - 20	Vortex	750	125
K4VP	3 - 20	Enclosed	1200	118
K4RB FM	3 - 60	Vortex	1400	275
K4VB FM	3 - 60	Enclosed	1675	183
K6VB FM	3 - 60	Enclosed	2250	155
K4VK	50 - 150	Enclosed	2060	268
K8VK	15 - 150	Enclosed	3800	175
K12VK	15 - 150	Enclosed	7700	125
K14VK	15 - 150	Enclosed	7700	125

- FM Listed FM3615 for Class 1, Div. 1, Groups C & D Hazardous Locations

KEEN PUMP Designs Your Complete Pump Station

- Custom Engineered
- Unmatched Delivery
- Best Customer Service/Technical Support

KEEN PUMP®

471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

K0004 08/18

Submersible Sewage SOLIDS-HANDLING

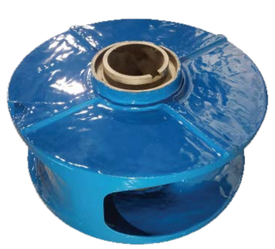
KEEN PUMP Solids-Handling Pumps...a COOLER Way to Move Solids!

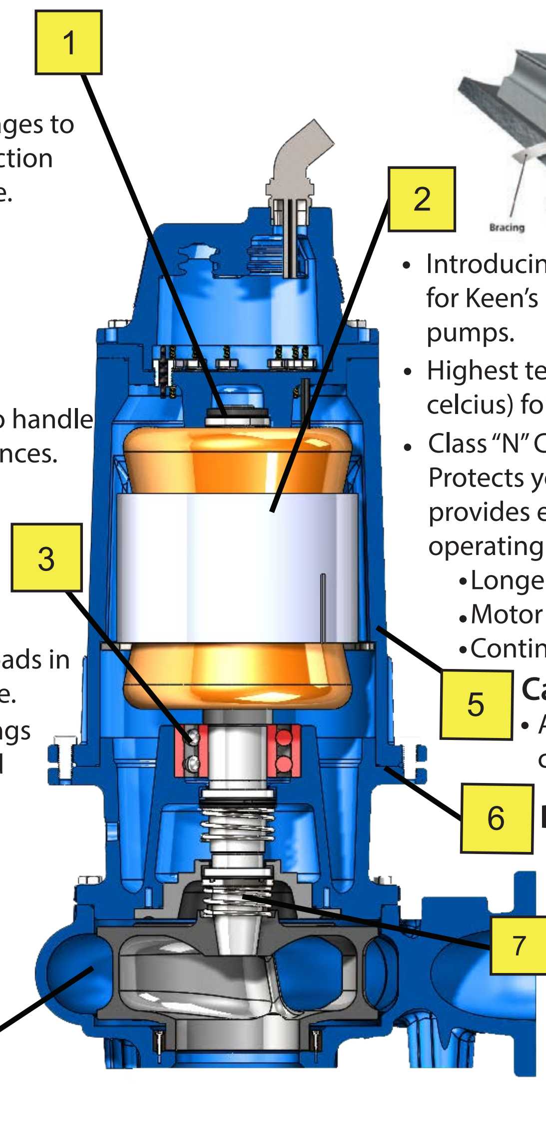
Keen Pump's Bearing Protection Program

- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.
- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.

Double Row Bearings

- Heavy Duty Bearings to handle the toughest performances.
- High Pressures
- High Flows
- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.



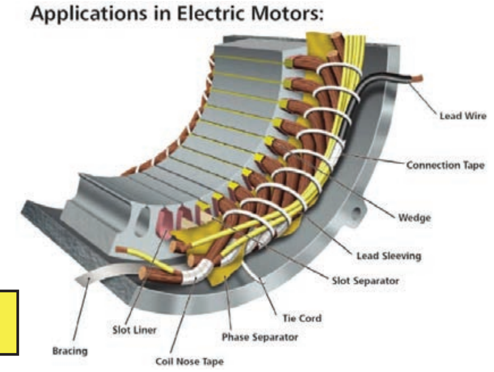


Ceramic Coating

The ultimate indestructable ceramic coated impellers and volutes for Keen's Solids Handling pumps. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

Heavy Duty Motor

Applications in Electric Motors:



- Introducing New Premium Class "N" Motors for Keen's Large Grinders and Solids Handling pumps.
- Highest temperature construction (200 degrees celcius) for motors
- Class "N" Construction is the best in the industry. Protects your motor from over heating and provides extended motor life. Motors are operating at higher teperatures due to:
  - Longer run times
  - Motor housing not submerged
  - Continuous

Castings

- ASTM - Class 35 high tensile strength castings.

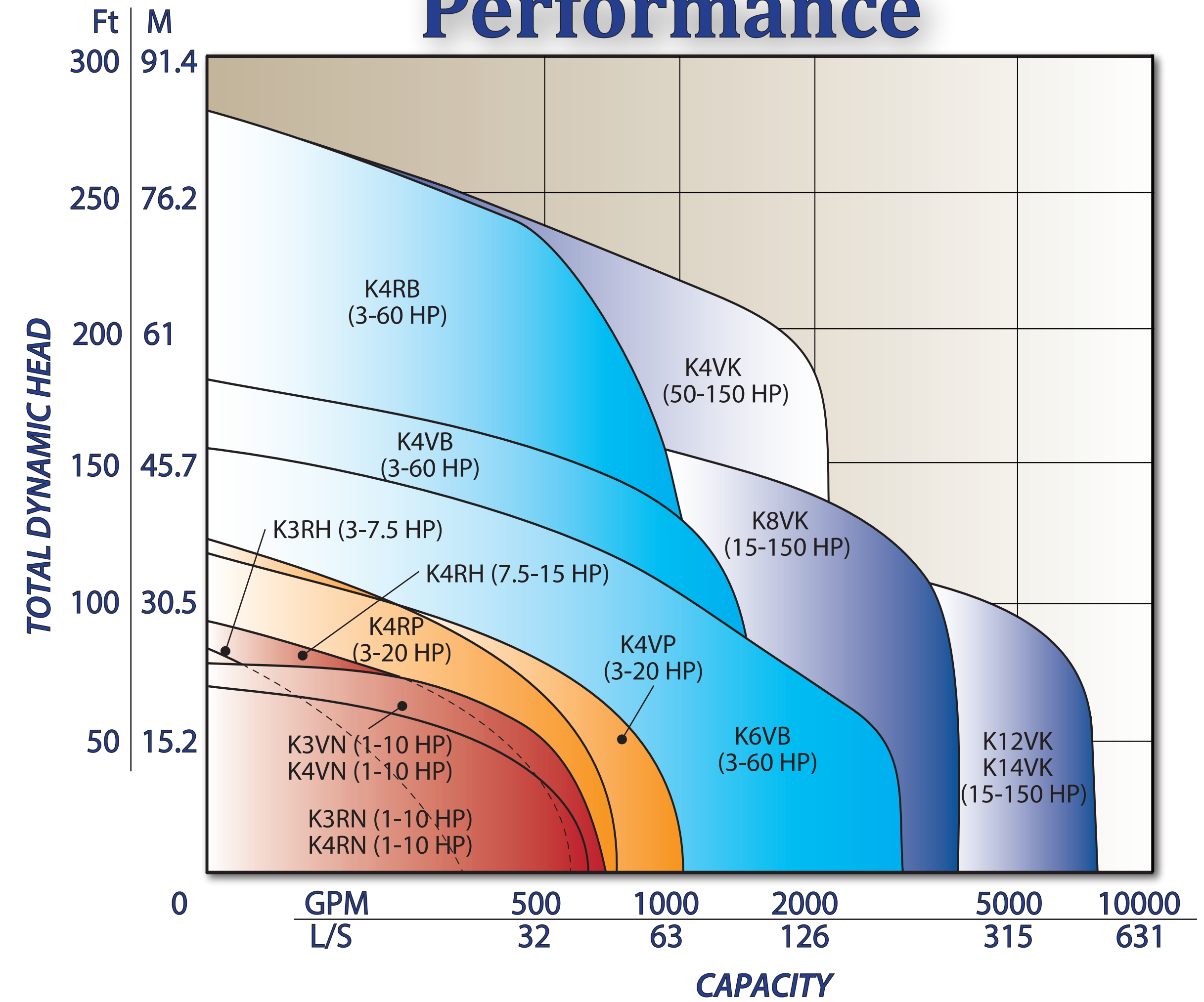
Durable Powder Coat Finish

- Holds up to the toughest environmental conditions.

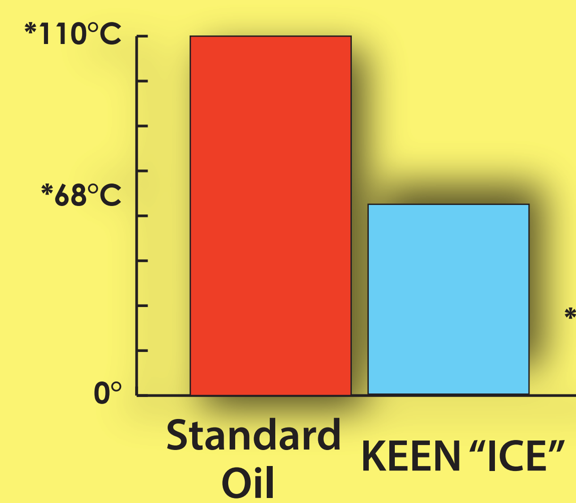
Dual Shaft Seals

- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

Performance



Decrease Heat...Increase Motor Life 8x!
...it's that simple!



Up to 38% Decrease in Running Temp vs Other Manufacturers!

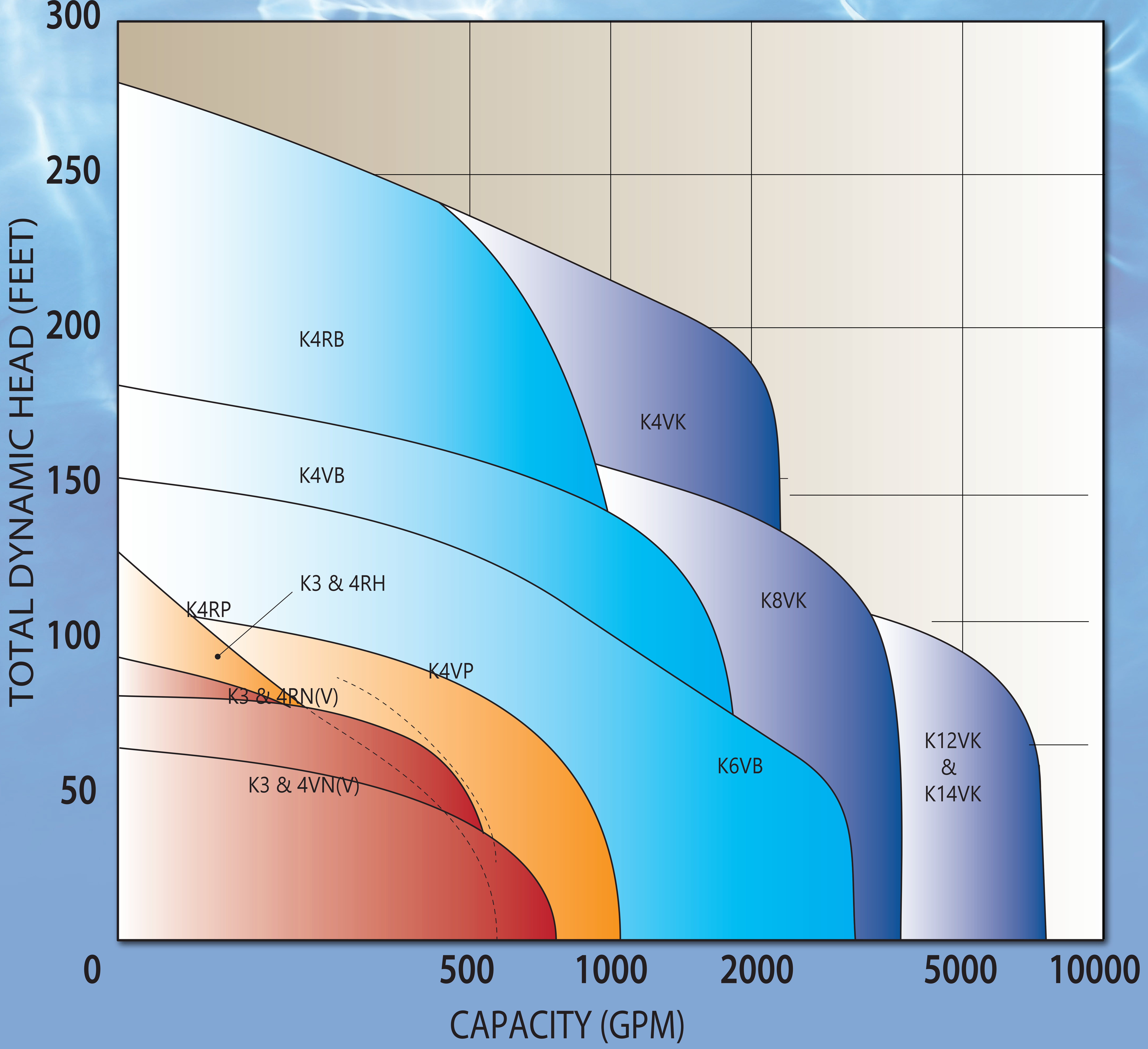
* Temps Shown for Reference Only

Note: KEEN "I.C.E." is a PROPRIETARY, synthetic blend, low-viscosity oil, specifically designed for cooling KEEN submersible pumps.

www.keenpump.com

1 HP - 150 HP

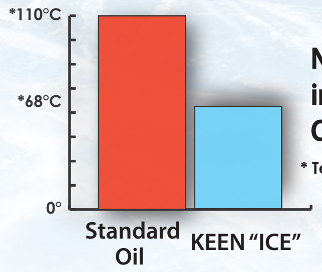
Solids-Handling Series



KEEN I.C.E.

Intensified Cooling Effect!

Decrease Heat...Increase Motor Life 8x!
...it's that simple!



Nearly 40% Decrease in Running Temp vs Other Manufacturers!

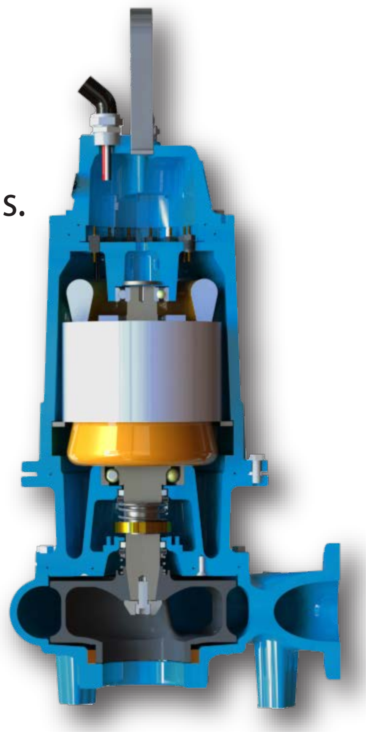
* Temps Shown for Reference Only

Note: KEEN "I.C.E." is a PROPRIETARY, synthetic blend, low-viscosity oil, specifically designed for cooling KEEN submersible pumps.

- Used in ALL KEEN Submersible Solids-Handling Products!
- Best Heat Transfer
- Transfers Heat 40% Faster vs. Standard Dielectric Oil
- Coolest Operating Pumps
- Nearly 40% Decrease in Running Temperature vs Other Mfgs.
- Ultra-Low Viscosity Allows Faster Turnover
- Viscosities 65% Lower vs Standard Dielectric Oil
- Locks out Airborne Moisture Contamination

FM APPROVED

- High Dielectric Strength Passes all FM Criteria!
- Promotes Longer Pump Life!
- Promotes Higher Efficiencies!
- Promotes Reduced Energy Consumption!



KEEN PUMP

KC0030 02/2017

3” Discharge – Recessed Impeller

2.5” Solids Handling

3450 & 1750 & 1150 RPM

This section contains the following material:

1. **Pump Family Curves & Technical Data**
   - K3RN
   - K3RH

2. **Individual Performance Curves**
   - K3RN
   - K3RH

3. **Dimensional Drawings**
   Pump
   Lift-Out & Base Elbow
   Wet Well Installations
   - K3RN
   - K3RH

Ashland, Ohio 44805
Phone: 419-207-9400

3” Recessed Impeller Pumps

Model Number Identification Chart

K 3 RN 50 - 21 M 2 Y

Keen Pump — K

Discharge Size: — 3
3 = 3”
4 = 4”

Pump Model — RN

Horsepower (HP x 10) — 50
30 = 3 HP
50 = 5 HP
75 = 7-1/2 HP
100 = 10 HP

Voltage/Phase — 21
01 = 208/1
21 = 230/1
03 = 208/3
23 = 230/3
43 = 460/3
53 = 575/3

Manual Pump Operation — M

Speed — 2
2 = 3450 RPM
4 = 1750 RPM
6 = 1150 RPM

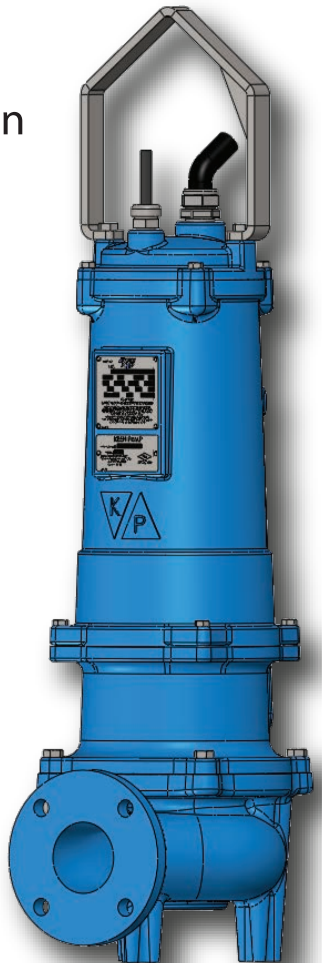
Frequency — Y
Blank = 60 Hz
Y = 50 Hz

K3RN(X)

FM APPROVED

3" Submersible, Recessed Impeller
(Class 1, Div. 1, Groups C & D Hazardous Location)

Optional :
All Stainless
Steel Construction



CERAMIC COATED RECESSED IMPELLER
- Superior Abrasion Resistance
- Allows The Pump To Operate Better In Any Pressure Or Flow Condition

CERAMIC COATED VOLUTE
- Holds Up to Wear On Inside of Volute Casting Case

STANDARD MOTOR CONSTRUCTION
- Class H Laminations (Standard)

MOTOR GROUND RING PROTECTION
- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

DOUBLE ROW LOWER BEARINGS
- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates

BEST MOTOR CONSTRUCTION
- OPTIONAL Class "N" (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

CAPABILITIES:
- Flows-------------------------------------- to 625 GPM
- Heads------------------------------------- to 71 Feet
- HP Range------------------------------- 1 - 10 HP
- Voltage / Phase Options------------- 208/230V, 1 Phase - 208/230/460 V, 3 Phase
- Discharge Connections-------------- 3" ANSI Class 125 Horizontal Flange
- Motor Speeds------------------------- 1150 / 1750 RPM
- Solids-Handling----------------------- 2.5"
- Impeller--------------------------------- Recessed, Vortex
- Motor Service Factor---------------- 1.20

Features and Benefits

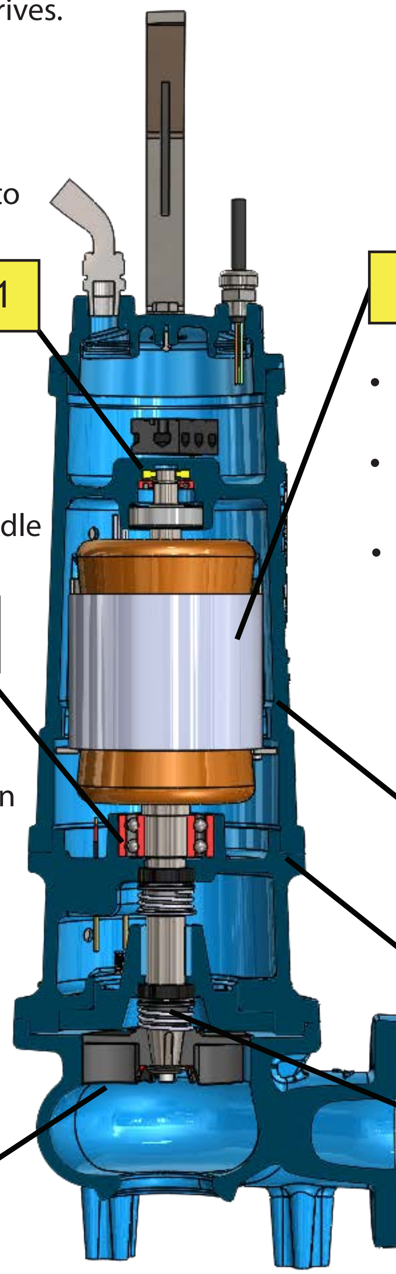
K3RN(X)

Keen Pump's Bearing Protection Program

- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.
- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.

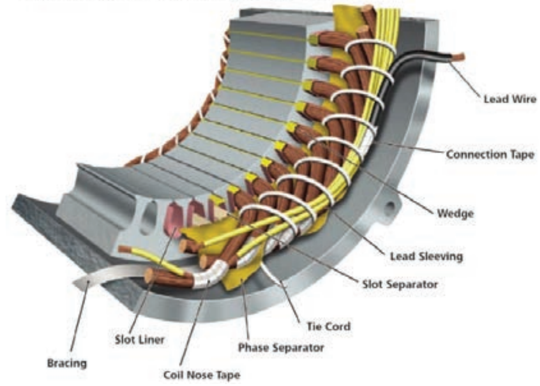
Double Row Bearings

- Heavy Duty Bearings to handle the toughest performances.
- High Pressures
- High Flows
- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.



Heavy Duty Motor

Applications in Electric Motors:



- OPTIONAL Class "N" Motors for Keen's Solids Handling pumps.
- Highest temperature construction (200 degrees celcius) for motors
- Class "N" Construction is the best in the industry. Protects your motor from over heating and provides extended motor life. Motors are operating at higher teperatures due to:
  - Longer run times
  - Motor housing not submerged
  - Continuous

Castings

- ASTM - Class 35 high tensile strength castings.

Durable Powder Coat Finish

- Holds up to the toughest environmental conditions.

Dual Shaft Seals

- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

Ceramic Coating - Impeller and Volute Casting

The ultimate indestructable ceramic coated impellers and volutes for Keen's Solids Handling pumps. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

KEEN PUMP®

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419.207.9400 fax 419.207.8031
www.keenpump.com

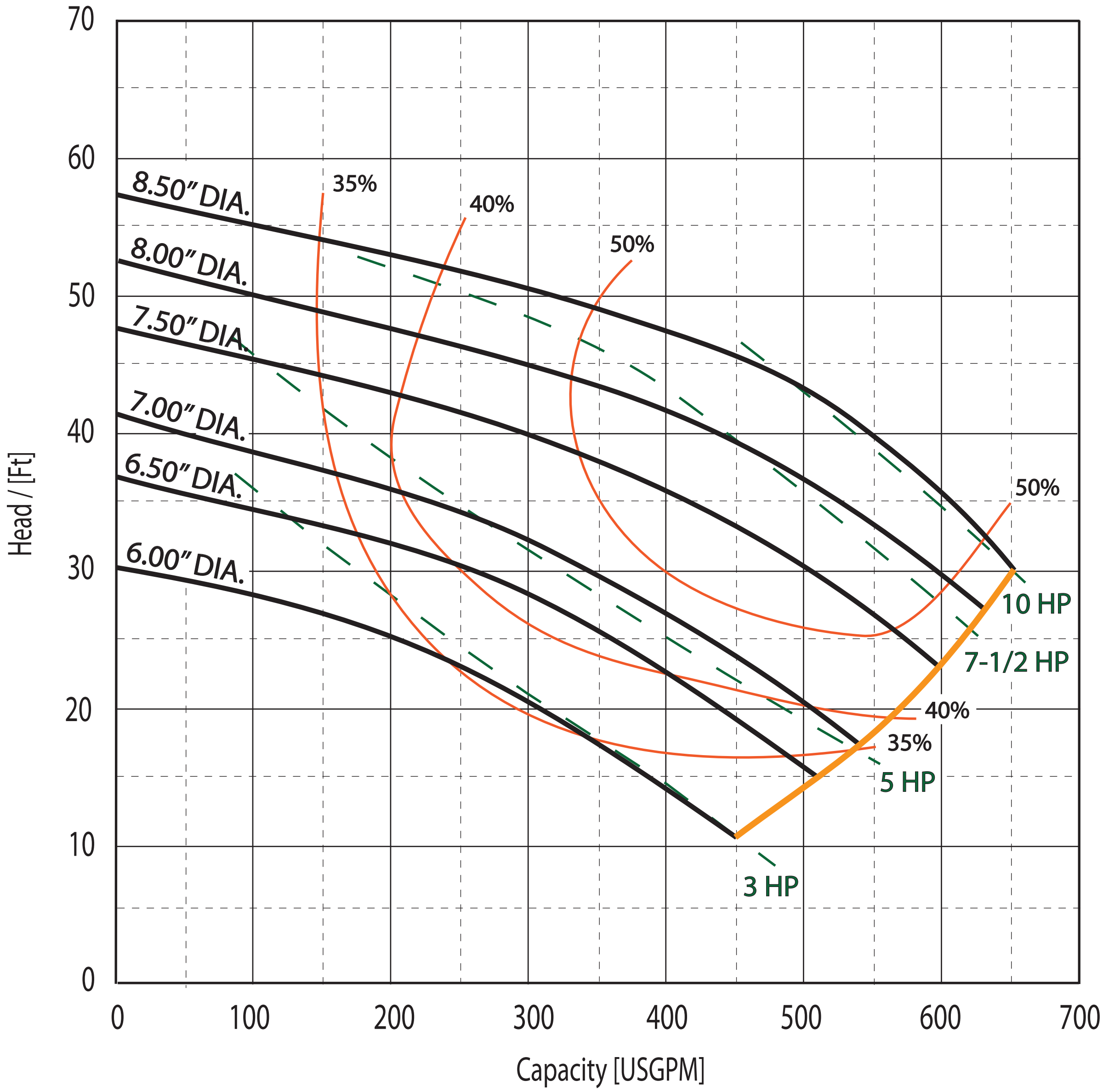
File : K3RN CUTS
Rev. 03/2022

KEEN PUMP

Section **VORTEX**
Date Nov. 2021

Pump Series	**K3RN**		3″ SUBMERSIBLE SEWAGE PUMPS		
Speed	**1750 RPM**	Discharge	**3″**	Solids	**3″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

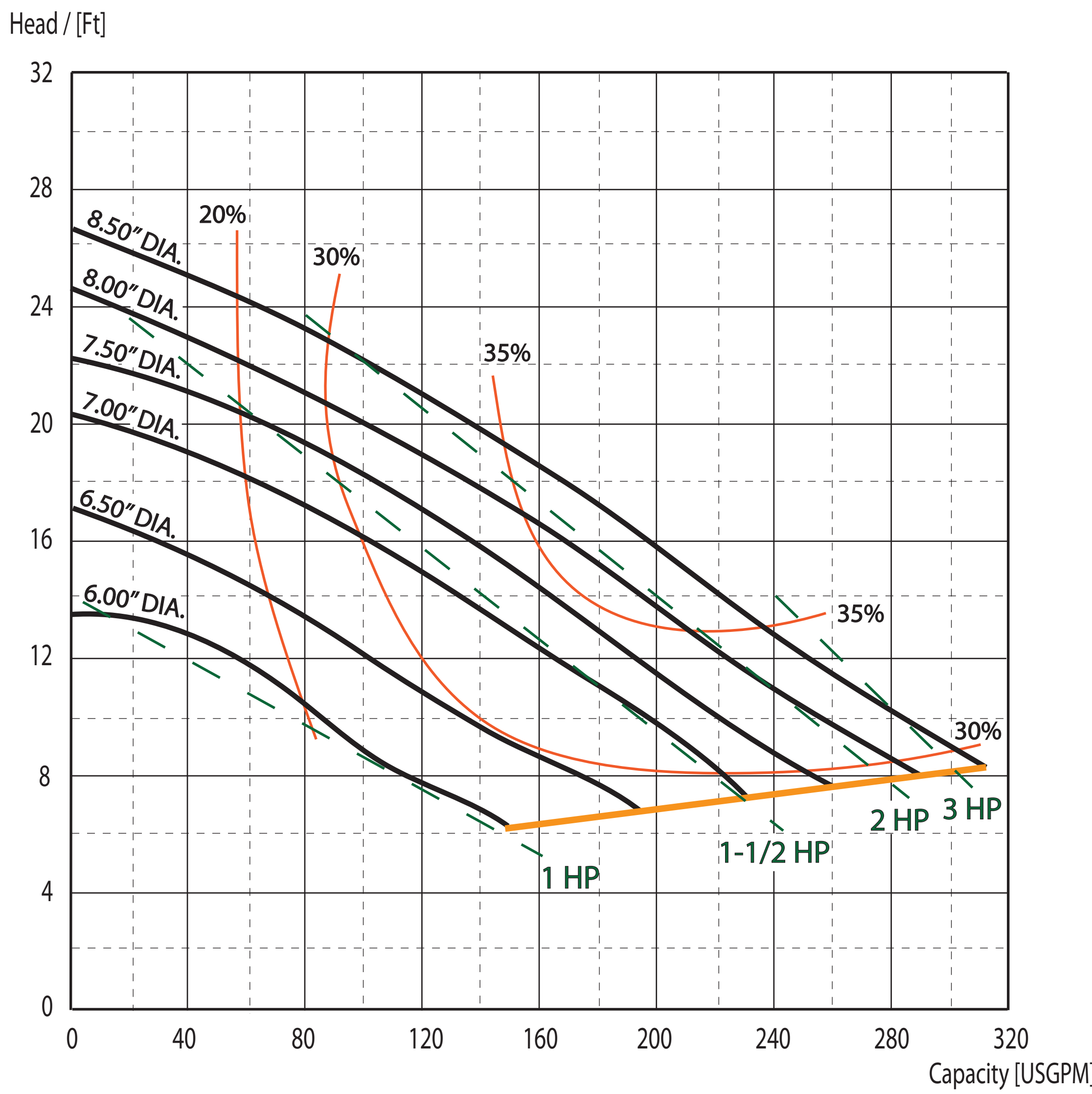
File: K3RN_1750_CAT

KEEN PUMP

Section	**VORTEX**
Date	Nov. 2021

Pump Series	**K3RN**	3″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1150 RPM**	Discharge	**3″**	Solids	**3″**

GPM: __________ TDH: __________



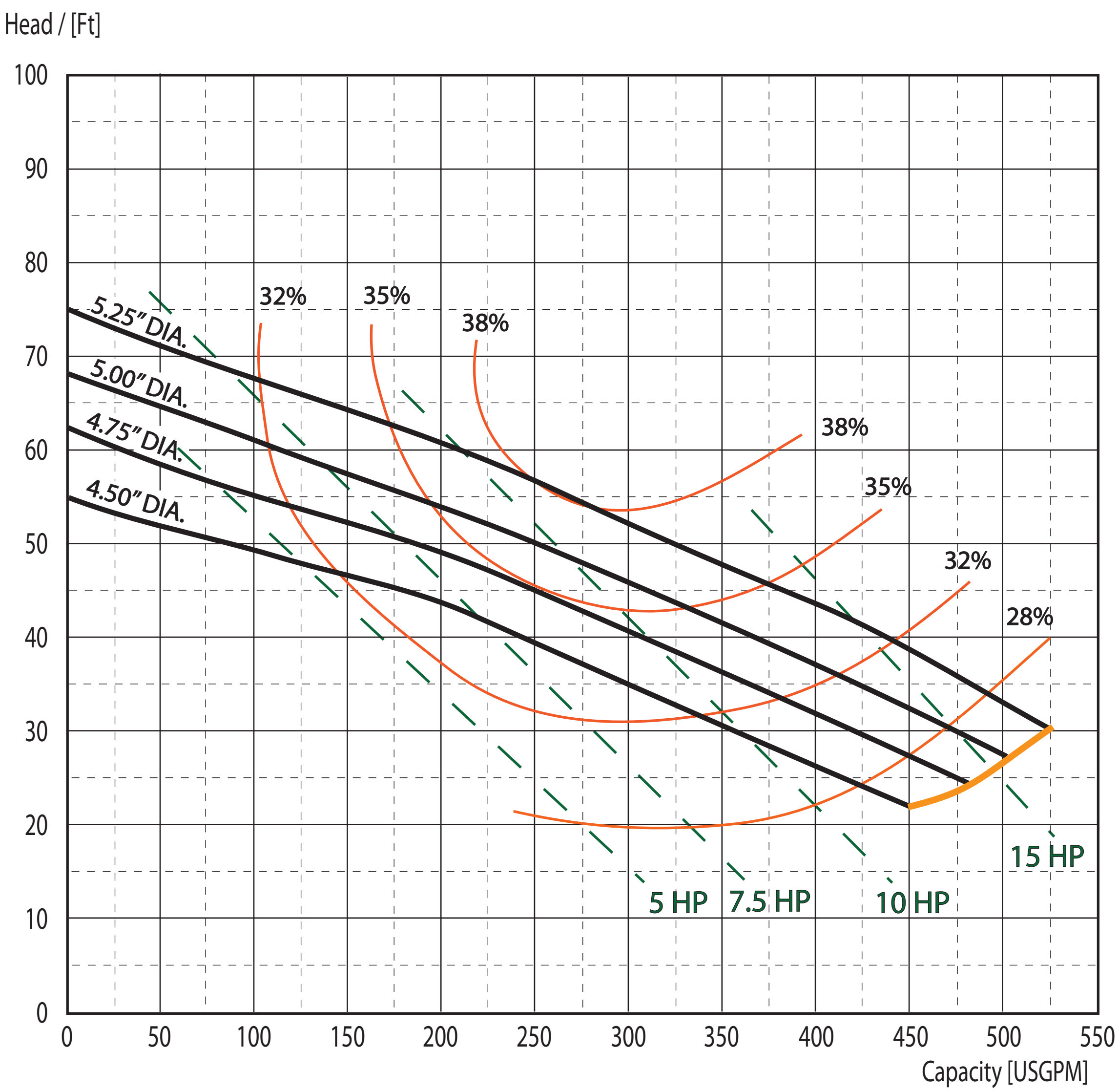
The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K3RN_1150_CAT

Section	**VORTEX**
Date	Nov. 2021

Pump Series	**K3RN**	3″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**3450 RPM**	Discharge	**3″**	Solids	**3″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

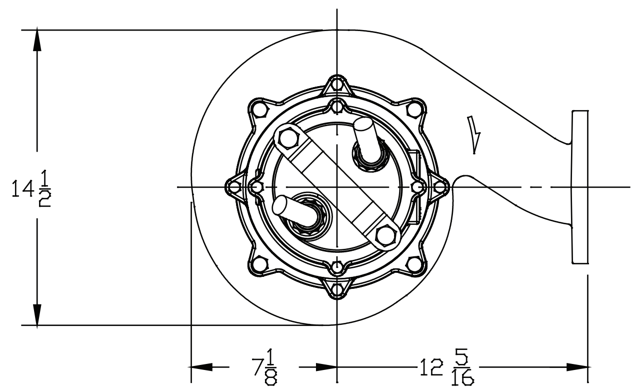
File: K3RN_3450_CAT

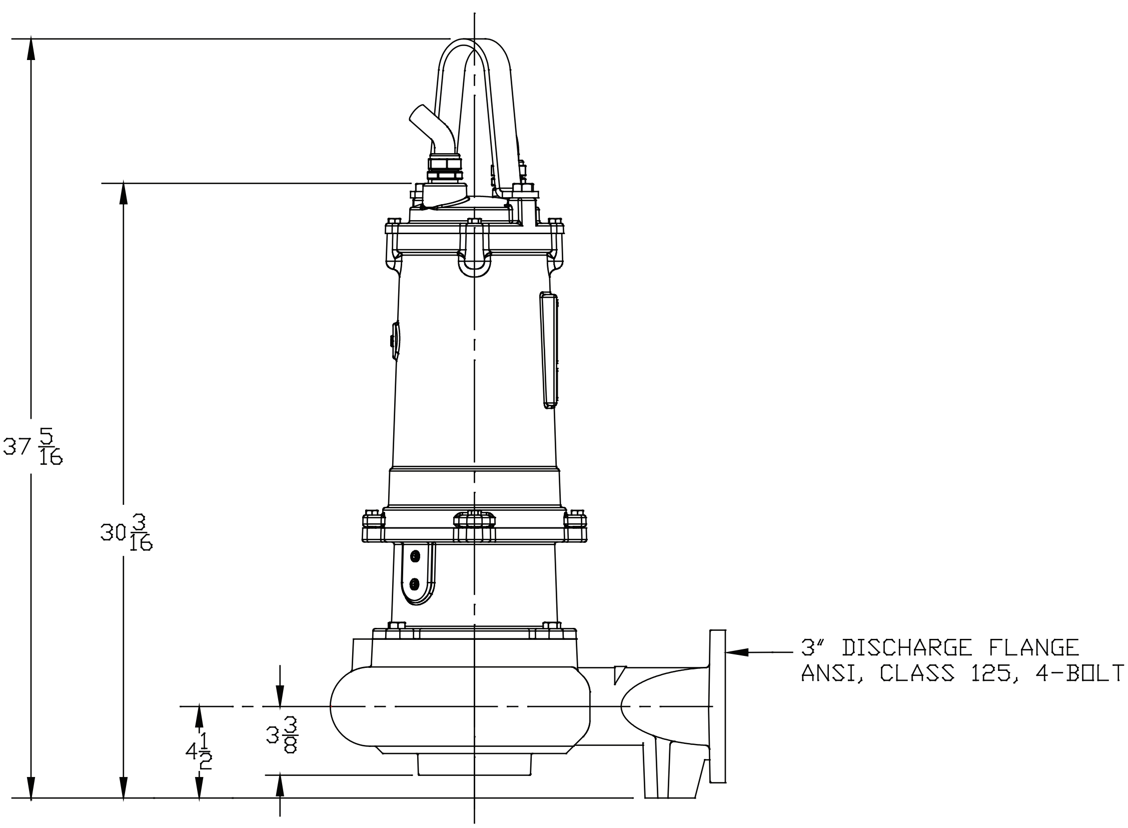
Section VORTEX
Date NOV 2016

Pump Series	K3RN	3″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

4 & 6 POLE





Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

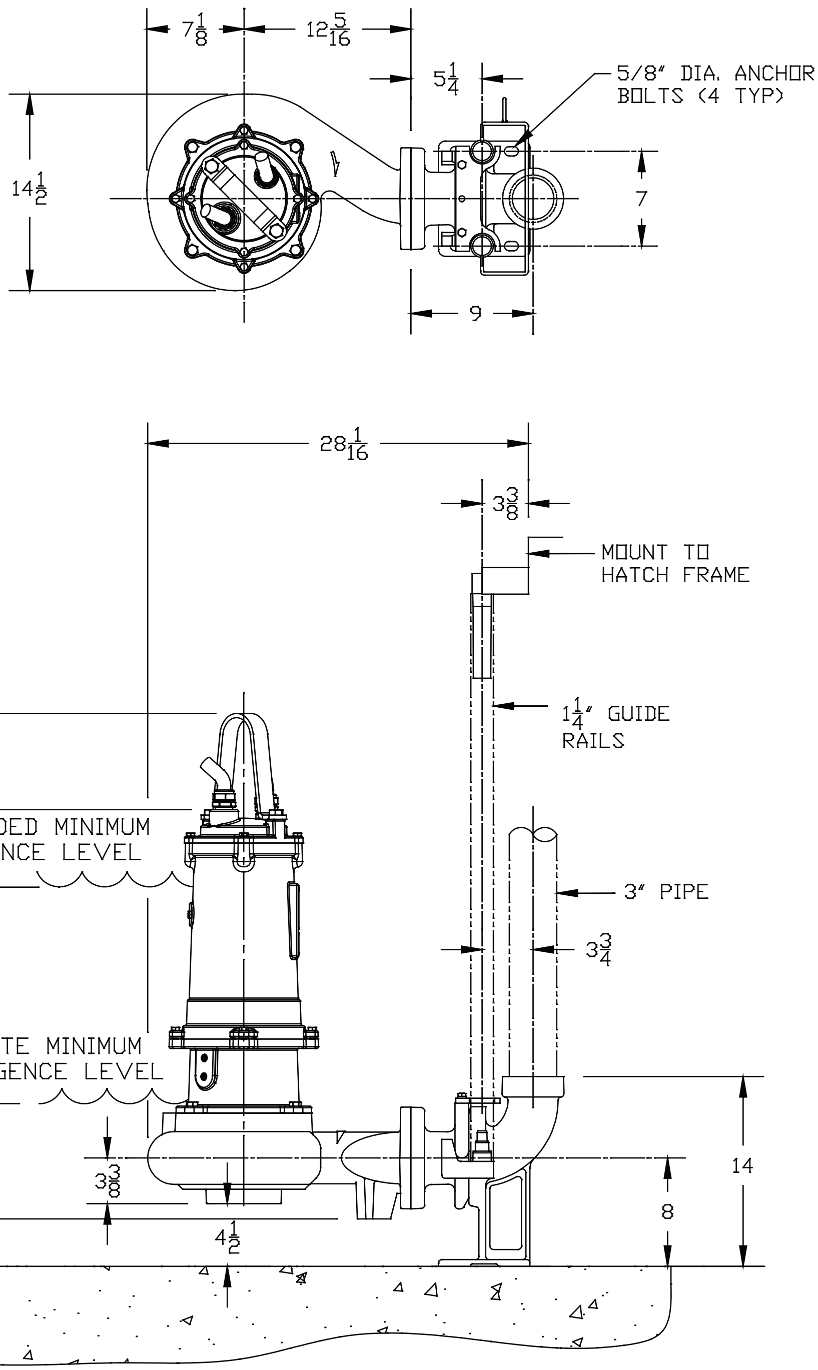
File: K3RN Dimensions

Section VORTEX
Date NOV 2016

Pump Series	K3RN	3″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

4 & 6 POLE



Notes:
1. All dimensions in inches unless noted.
2. Discharge flange 3″ NPT.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Dimensions may vary due to normal manufacturing tolerances.
5. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

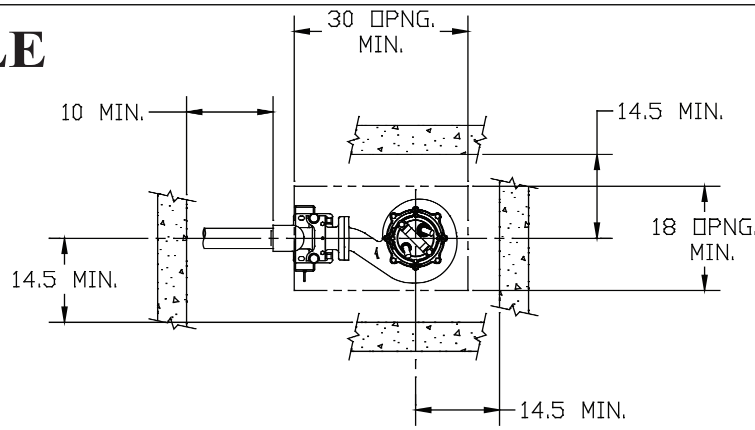
File: K3RN Liftout Dimensions

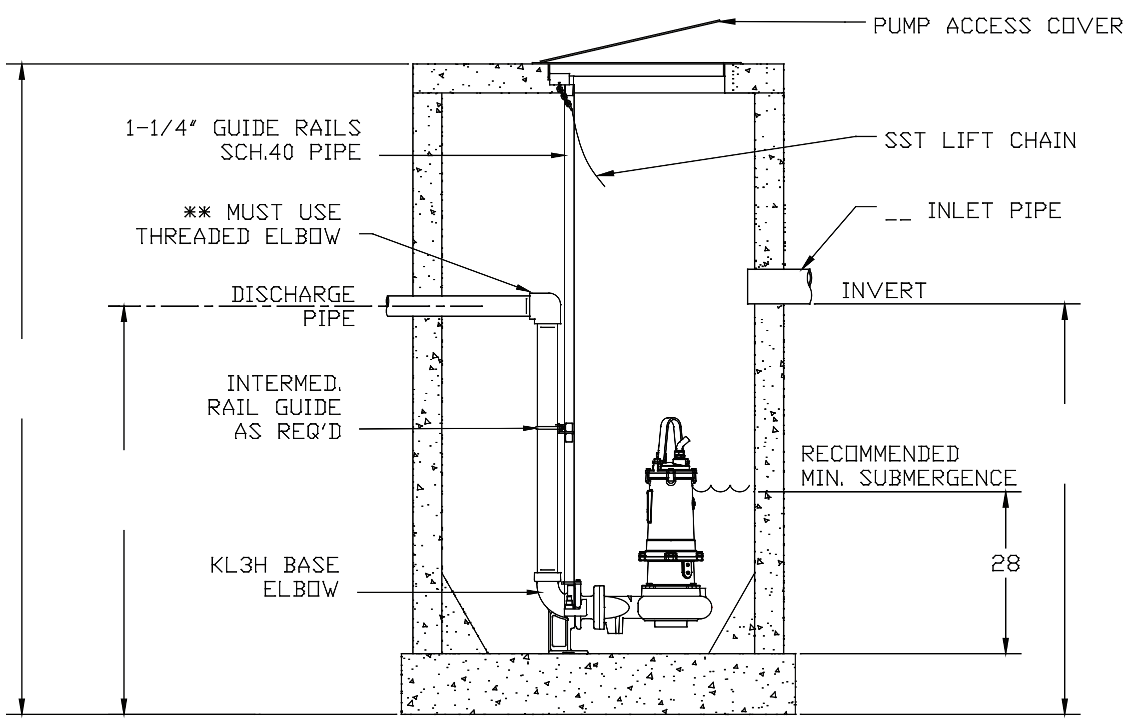
Section VORTEX
Date NOV 2016

Pump Series	K3RN	3″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA

4 & 6 POLE





Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K3RN Install Dimensions

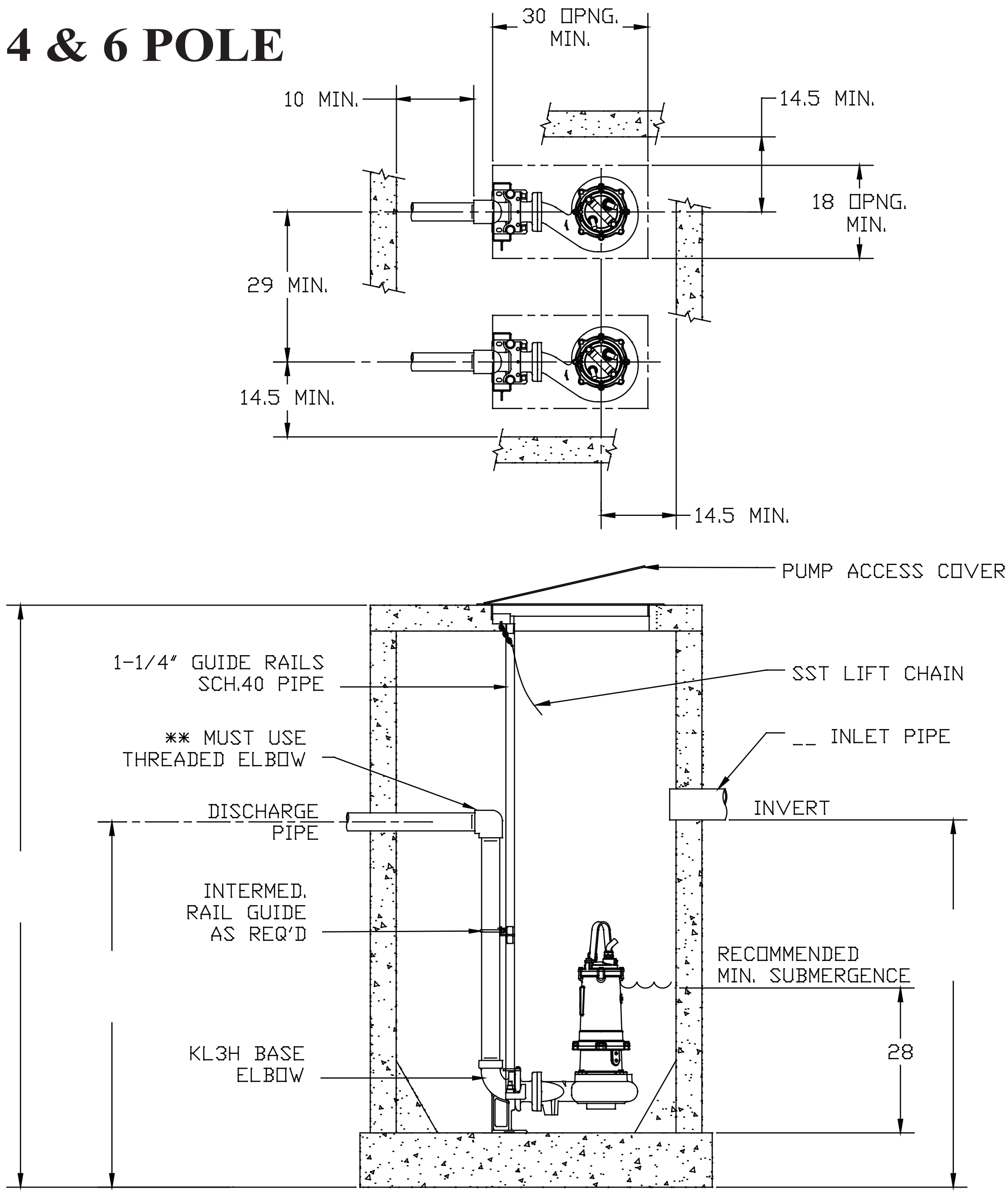
KEEN PUMP®

Section VORTEX
Date NOV 2016

Pump Series	K3RN	3″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA

4 & 6 POLE



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K3RN Install Dimensions

Pump Model: **K3RN**

Physical Data:

Discharge Size	ANSI 3″ Horizontal
Solids Size	2.5″
Impeller Type	Balanced, Recessed, 8 Vane
Power/Control Cable Length	40′ Standard
Paint	Blue, Powder Coated – Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392° F (200°C) - **Optional**
Power Cord Type	SOOW - 600V, 90º C; Type W - 2000V, 90º C
Control Cord Type	18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Line Bearing	Bronze, CDA 836

Pump Model: **K3RN – 1150 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C)
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1150**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
1	208	1	H	1.2	9.6	11.5	33.6	2.0	7.0	2.6
	230				8.6	10.4	30.3			
1	208	3	J	1.2	6.6	7.9	21.0	1.7	7.6	2.1
	230				6.2	7.4	18.9			
	460				3.1	3.7	9.5			
2	208	1	H	1.2	18.9	22.7	66.2	13.8	5.1	5.1
	230				17.0	20.4	59.6			
2	208	3	G	1.2	9.9	11.9	34.7	2.8	12.5	3.5
	230				8.9	10.7	31.2			
	460				4.5	5.4	15.6			
3	208	1	F	1.0	22.7	22.7	79.5	4.7	16.5	6.1
	230				20.5	20.5	71.6			
3	208	3	G	1.0	14.3	14.3	50.1	4.1	18.0	6.0
	230				12.9	12.9	45.1			
	460				6.4	6.4	22.5			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				Power Factor %			
HP	Phase	Service Factor Load	100% Load	75% Load	50% Load	Service Factor Load	100% Load	75% Load	50% Load
1	1	81	81	80	76	75	73	66	57
1	3	83	82	81	77	75	72	67	61
2	1	84	83	82	78	76	74	70	62
2	3	84	84	83	79	78	76	71	60
3	1	86	85	84	80	75	70	64	54
3	3	86	86	85	81	79	78	71	59

Pump Model: **K3RN – 1750 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C)
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
3	208	1	E	1.2	26.2	31.4	66.9	4.0	13.9	5.2
	230				23.8	28.6	60.2			
3	208	3	H	1.2	16.3	19.6	57.1	4.6	20.6	5.8
	230				14.7	17.6	51.4			
	460				7.3	8.8	25.7			
5	208	1	F	1.2	37.1	44.5	129.9	7.7	26.9	10.0
	230				33.4	40.1	116.9			
5	208	3	F	1.2	26.2	31.4	73.9	6.0	26.5	7.5
	230				23.8	28.6	66.5			
	460				11.9	14.3	33.3			
7.5	208	3	F	1.2	32.1	38.5	112.4	9.1	40.4	11.3
	230				28.9	34.7	101.2			
	460				14.5	17.4	50.6			
10	208	3	E	1.0	38.5	38.5	134.8	11.0	48.5	13.6
	230				34.7	34.7	121.4			
	460				17.3	17.3	60.7			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
3	1	85	85	85	77	87	83	79	70
3	3	86	86	85	79	81	80	79	71
5	1	88	88	89	82	86	83	76	62
5	3	89	89	88	82	79	76	71	60
7.5	3	89	89	88	82	75	70	64	54
10	3	90	90	89	83	79	78	71	59

SPECIFICATIONS

Solids-Handling Pumps K3RN

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, both single and poly-phase, designed for wet well submersible pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

1.4 The motor assembly shall be built, designed, and assembled to comply with FM3615 standards for Class 1 Div. 1, Group C & D construction

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.

2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.

2.6. Submersible motor design:

- 2.6.1. _________ Horsepower
- 2.6.2. _________ RPM
- 2.6.3. _________ Voltage
- 2.6.4. _________ Phase
- 2.6.5. _________ Frequency
- 2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356º F (180º C). To include:

- 2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.
- 2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.
- 2.7.3. Stator lead material must meet or exceed Class H insulation system.
- 2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.
  - 2.7.4.1. The thermal limiting devices shall be attached to each phase winding.
  - 2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.8. Operation of the motor shall be designed for:

- 2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class H operating temperature rise of 311º F (155º C).
- 2.8.2. Capable of 15 evenly spaced starts per hour.
- 2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
  - 2.8.3.1. Acceptable voltage variation is +/- 10%.
  - 2.8.3.2. Acceptable frequency variation is +/- 5%.

2.1.1.1. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
2.1.1.2. Current unbalance must not exceed 5%.
2.1.2. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.2. All bolted connections in the submersible motor construction shall be:
2.2.1. Secured with 304 stainless steel fasteners.
2.2.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
2.3. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.
3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.
3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.
3.3. All bolted connections in the cord entry construction shall be:
3.3.1. Secured with 304 stainless steel fasteners.
3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.
3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.
3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
4.3. Inboard and outboard seal construction shall be of the following material:
4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.
4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.
4.3.3. Elastomers shall be constructed of Viton®.
4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.
4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.
4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a three-bearing design.

5.2.1. The upper bearing shall be a Conrad type, single row Radial, ball bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing
designed to adequately compensate for the axial loads and radial forces.

5.2.3. An additional sleeve bearing shall be constructed of SAE 841 material and is mounted directly above the lower seal to take radial loads and act as flame path for seal chamber.

5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 50,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.

7.2. The design shall be one-piece, 10-vane (3450) or 8-vane (1750 & 1150), vortex flow and dynamically balanced to ISO 1940 G6.3.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.

7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.

8.2. Design shall be a single piece and a modified constant velocity.

8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.

8.4. The discharge is to be of a centerline discharge configuration.

8.5. The discharge is to be 3" ANSI® standard Class 125, 4-bolt configuration.

8.6. Horizontal discharge is standard if specifying K3RN model.

8.7. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

K3RH(X)

3" Submersible, Recessed Impeller
(Class 1, Div. 1, Groups C & D Hazardous Location)

FM APPROVED

Optional :
All Stainless Steel Construction

CERAMIC COATED RECESSED IMPELLER
- Superior Abrasion Resistance
- Allows The Pump To Operate Better In Any Pressure Or Flow Condition

CERAMIC COATED VOLUTE
- Holds Up to Wear On Inside of Volute Casting Case

STANDARD MOTOR CONSTRUCTION
- Class H Laminations (Standard)

MOTOR GROUND RING PROTECTION
- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

DOUBLE ROW LOWER BEARINGS
- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates

BEST MOTOR CONSTRUCTION
- OPTIONAL Class "N" (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

CAPABILITIES:
- Flows-------------------------------------- to 275 GPM
- Heads------------------------------------- to 97 Feet
- HP Range-------------------------------- 3 - 7.5 HP
- Voltage / Phase Options------------- 208/230 V, 1 Phase - 208/230/460 V, 3 Phase
- Discharge Connections-------------- 3" ANSI Class 125 Horizontal Flange
- Motor Speeds--------------------------- 3450 RPM
- Solids-Handling------------------------ 2.5"
- Impeller---------------------------------- Recessed, Vortex
- Motor Service Factor----------------- 1.20

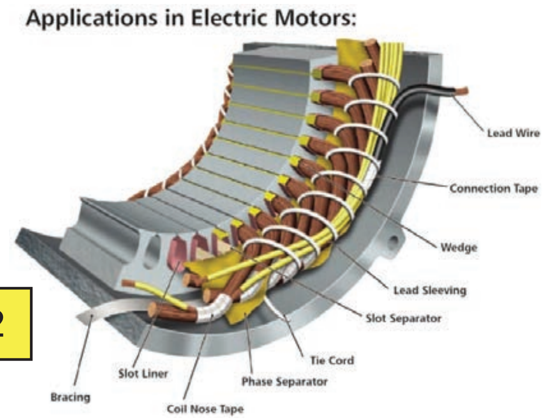
Features and Benefits

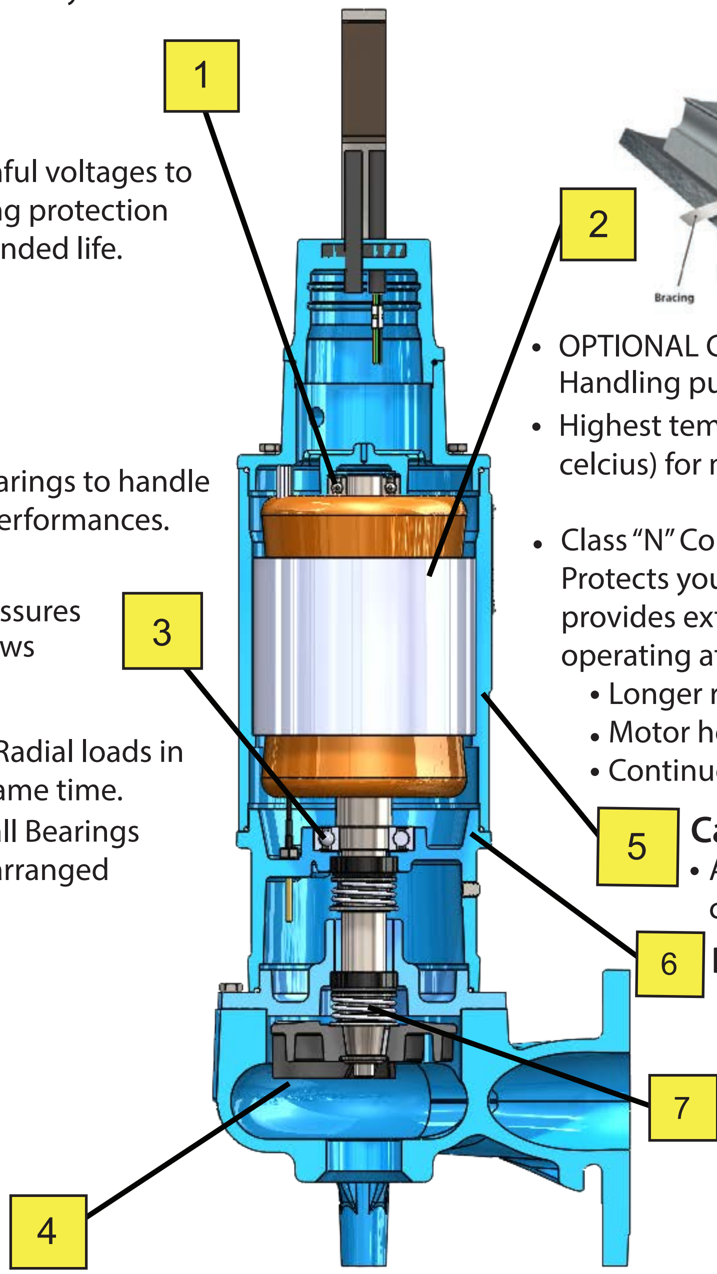
K3RH(X)

Keen Pump's Bearing Protection Program

- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.
- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.

Heavy Duty Motor





- OPTIONAL Class "N" Motors for Keen's Solids Handling pumps.
- Highest temperature construction (200 degrees celcius) for motors
- Class "N" Construction is the best in the industry. Protects your motor from over heating and provides extended motor life. Motors are operating at higher teperatures due to:
  - Longer run times
  - Motor housing not submerged
  - Continuous

Double Row Bearings

- Heavy Duty Bearings to handle the toughest performances.
- High Pressures
- High Flows
- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.

Castings

- ASTM - Class 35 high tensile strength castings.

Durable Powder Coat Finish

- Holds up to the toughest environmental conditions.

Dual Shaft Seals

- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

Ceramic Coating - Impeller and Volute Casting

The ultimate indestructable ceramic coated impellers and volutes for Keen's Solids Handling pumps. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

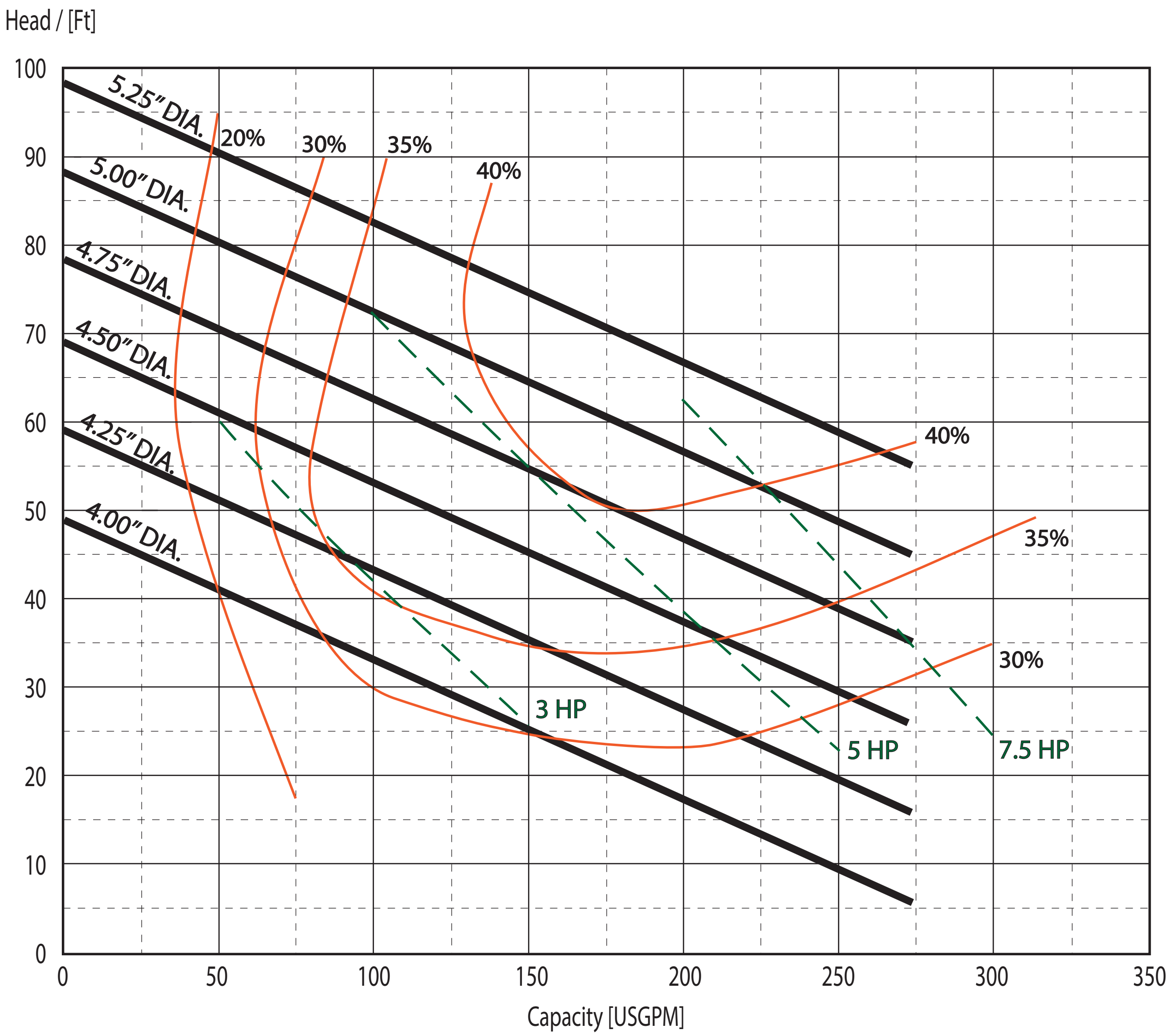
KEEN PUMP®

471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

Section ENCLOSED
Date Nov. 2021

Pump Series	K3RH		3″ SUBMERSIBLE SEWAGE PUMPS		
Speed	**3450 RPM**	Discharge	**3″**	Solids	**2.5″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

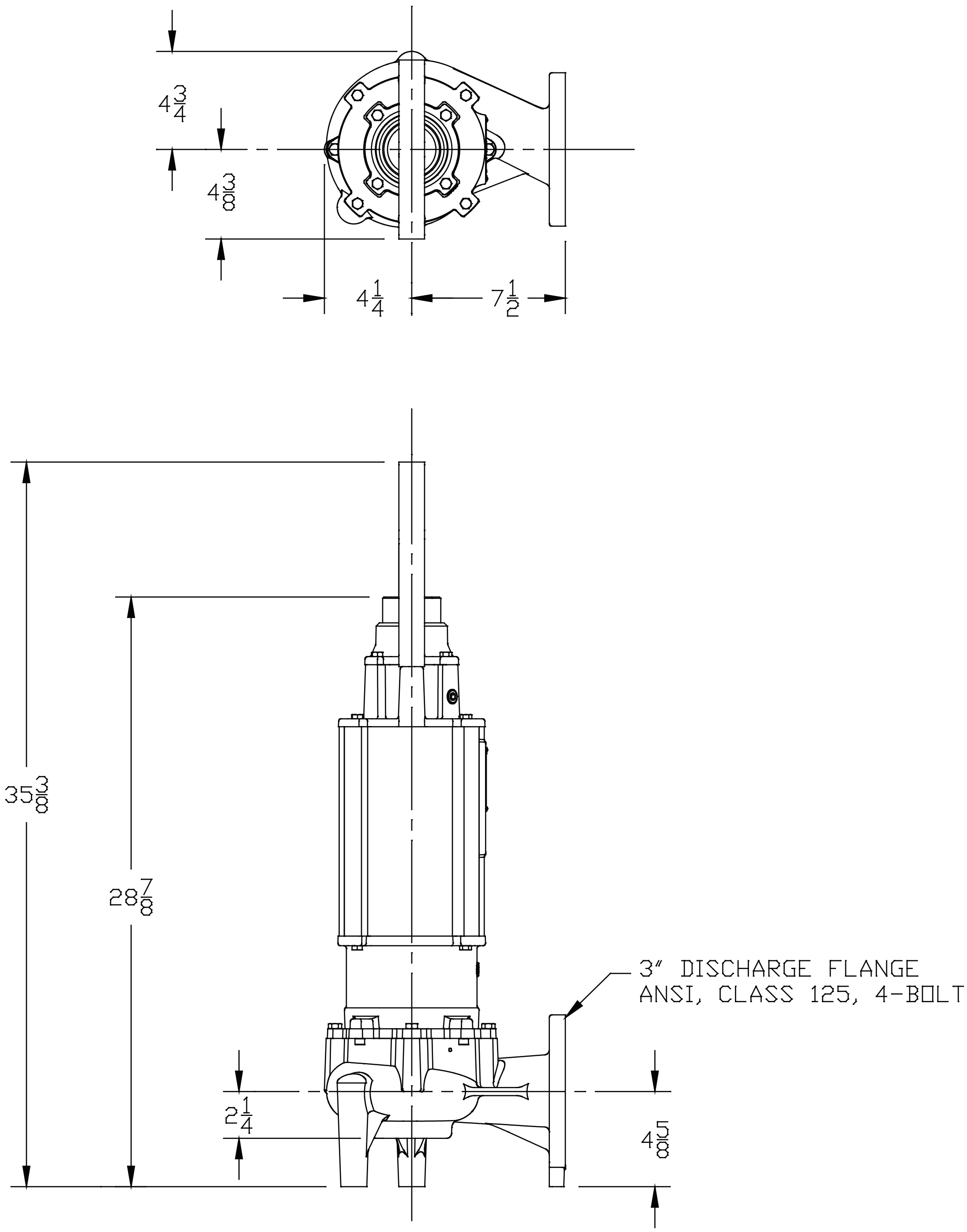
File: K3RH_3450

KEEN PUMP®

Section **VORTEX**
Date **JUNE 2015**

Pump Series	**K3RH**	3″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

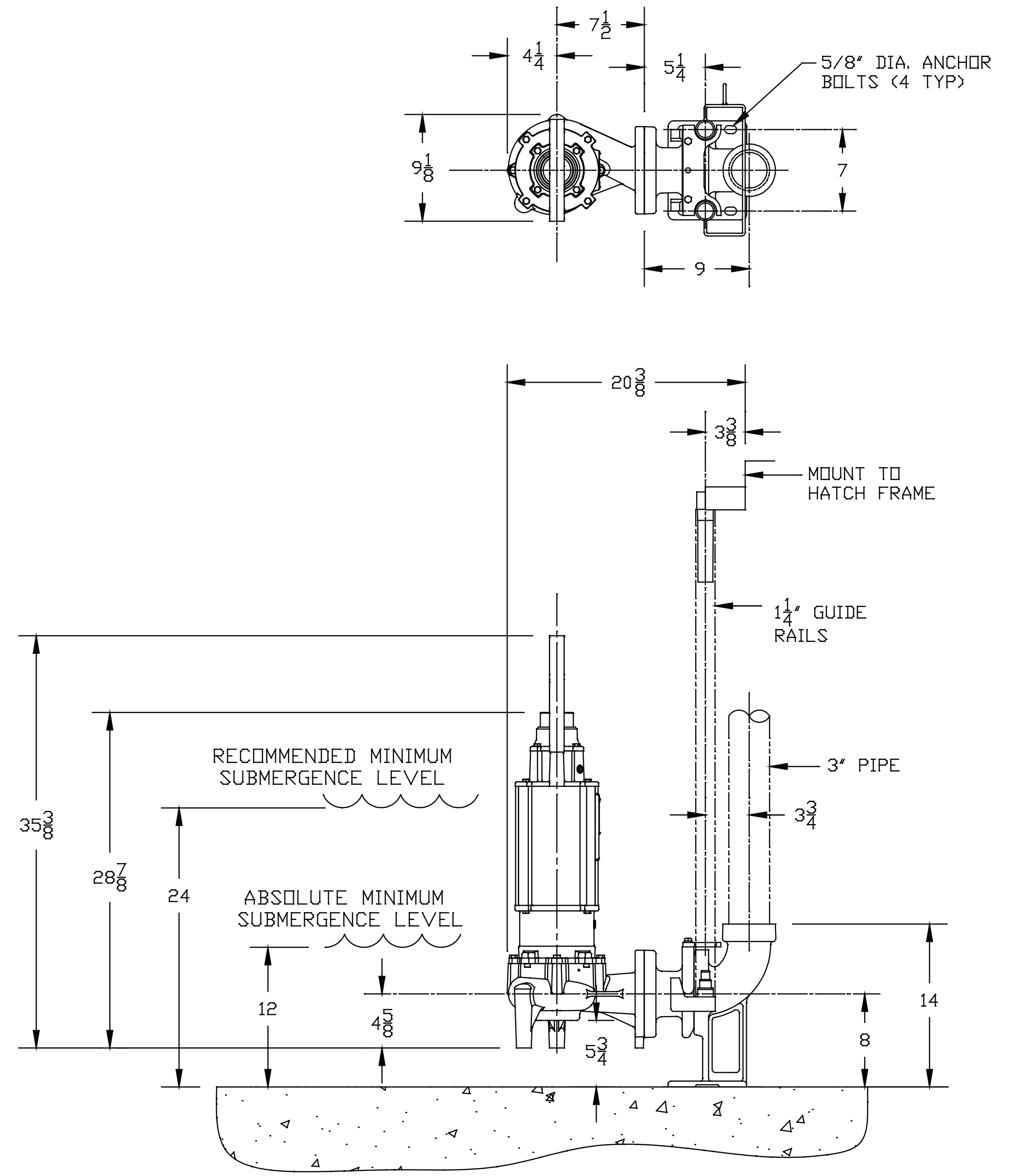


Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K3RH Dimensions

Pump Series	K3RH	3″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

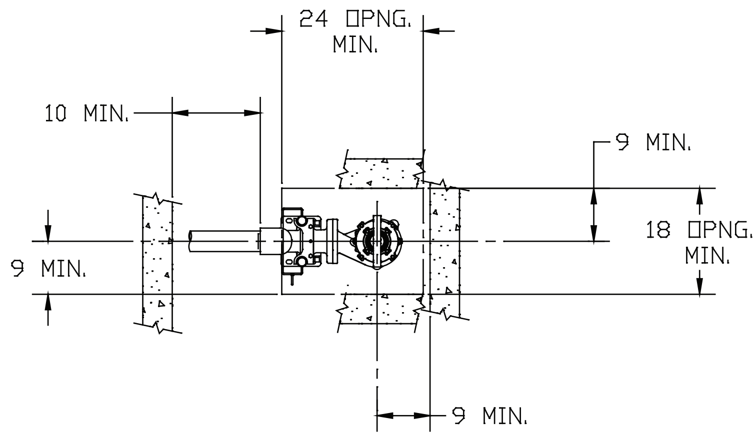


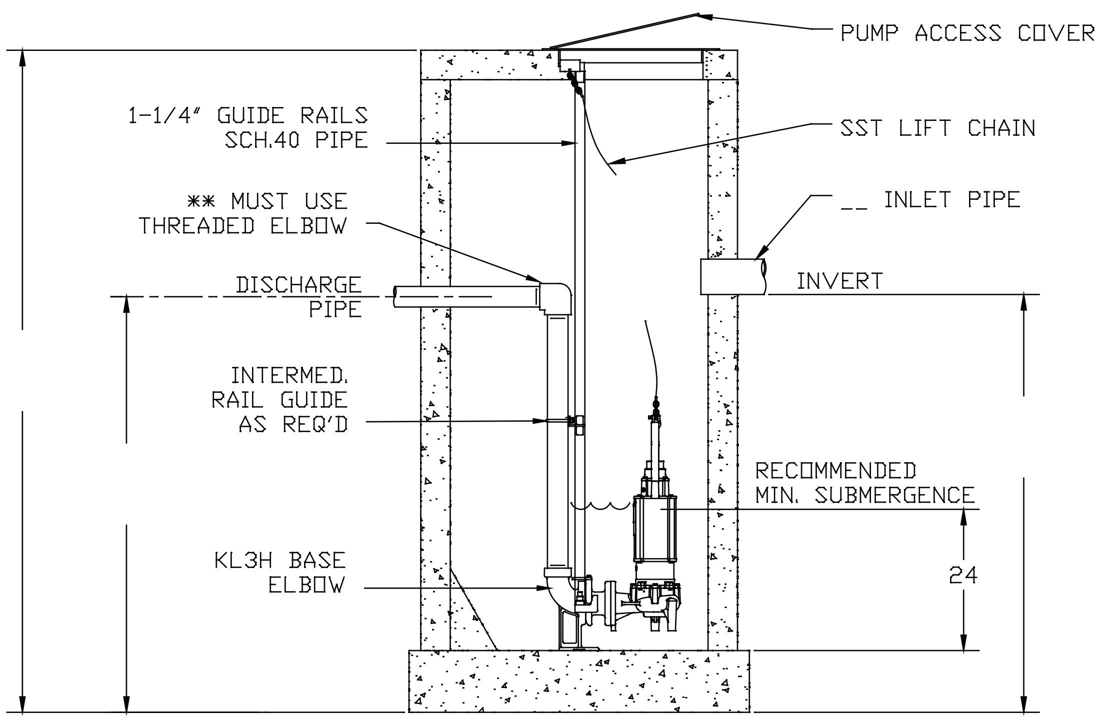
Notes:
1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K3RH Liftout Dimensions

Pump Series	K3RH	3″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



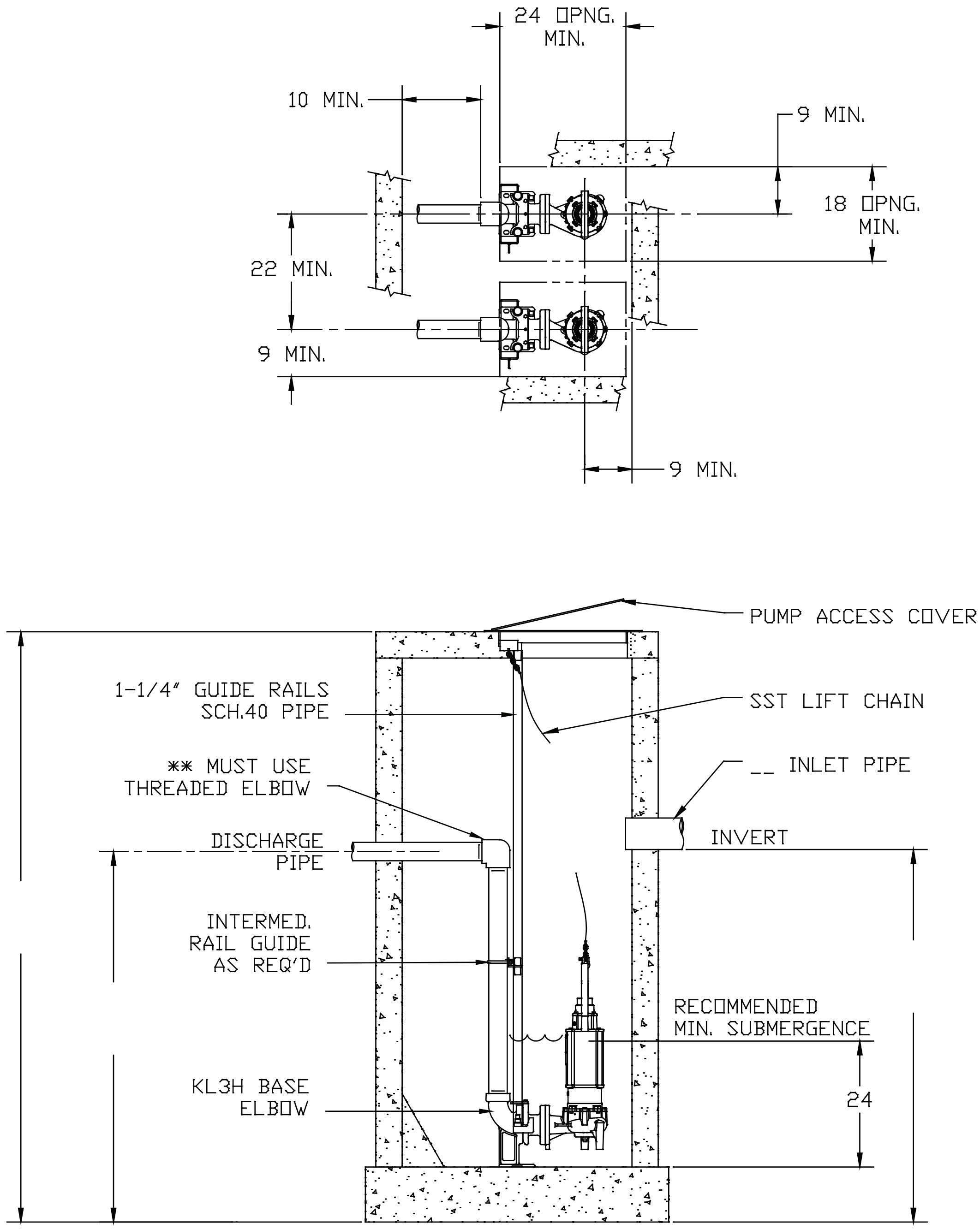


Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K3RH Install Dimensions

Pump Series	K3RH	3″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

Pump Model: **K3RH**

Physical Data:

Discharge Size	ANSI 3 ” Horizontal
Solids Size	2.5”
Impeller Type	Balanced, Recessed, 10-Vane
Power/Control Cable Length	40’ Standard
Paint	Blue, Powder Coated – Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components
Motor Protection	Thermal Sensors Embedded in the Windings
M aximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	SOOW - 600V, 90º C; Type W - 2000V, 90º C
Control Cord Type	18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Impeller	Ductile Iron, ASTM A536, 60-4 0-18 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Line Bearing	Bronze, CDA 836

Pump Model: **K3RH – 3450 RPM**

Thermal Data:

Maximum Liquid	140º F (60º C) Intermittent
Maximum Stator	311º F (155º C)
Heat Sensor Open:	257º F (125º C) Max. / 239º F (115º C) Min.
Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point	390º F (199º C)

Electrical Data:

RPM	**3450**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
3	208	1	H	1.2	20.9	25.1	93.1	5.5	19.3	7.2
	230				18.9	22.7	84.7			
3	208	3	E	1.2	17.0	19.0	51.6	3.1	13.8	4.1
	230				15.0	17.0	46.9			
	460				7.5	8.5	23.4			
5	208	1	F	1.2	34.2	41.1	144.3	7.5	26.3	9.8
	230				30.9	37.1	126.4			
5	208	3	G	1.2	20.0	24.0	77.4	6.3	27.9	9.3
	230				18.0	22.0	69.7			
	460				9.0	11.0	34.8			
7.5	208	3	E	1.2	35.0	38.0	150.3	8.3	36.7	7.3
	230				33.0	36.0	131.8			
	460				16.5	18.0	66.2			

SPECIFICATIONS

Solids-Handling Pumps K3RH

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, both single and poly-phase, designed for wet well submersible pump applications in water and sewage.
1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.
1.3. This specification covers sewage wet well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.
1.4 The motor assembly shall be built, designed, and assembled to comply with FM 3615 standards for Class 1, Div. 1, Group C & D construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.
2.6. Submersible motor design:
2.6.1. _________Horsepower
2.6.2. _________RPM
2.6.3. _________Voltage
2.6.4. _________Phase
2.6.5. _________Frequency
2.6.6. 1.20 Service Factor
2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356ºF (180º C). To include:
2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.
2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.
2.7.3. Stator lead material must meet or exceed Class H insulation system.
2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.
2.7.4.1. The thermal limiting devices shall be attached to each phase winding.
2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.
2.8. Operation of the motor shall be designed for:
2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311º F (155º C).
2.8.2. Capable of 15 evenly spaced starts per hour.
2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.

2.1.1.1. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
2.1.1.2. Current unbalance must not exceed 5%.
2.1.2. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.2. All bolted connections in the submersible motor construction shall be:
2.2.1. Secured with 304 stainless steel fasteners.
2.2.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
2.3. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.
3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.
3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.
3.3. All bolted connections in the cord entry construction shall be:
3.3.1. Secured with 304 stainless steel fasteners.
3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.
3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.
3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
4.3. Inboard and outboard seal construction shall be of the following material:
4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.
4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.
4.3.3. Elastomers shall be constructed of Viton®.
4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.
4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.
4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a three-bearing design.

5.2.1. The upper bearing shall be a Conrad type, single row, Radial ball bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately compensate for the axial loads and radial forces.

5.2.3. An additional sleeve bearing shall be constructed of SAE 841 material and is mounted directly above the lower seal to take radial loads and act as flame path for seal chamber.

5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 50,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.

7.2. The design shall be one-piece, 10-vane (3450), vortex flow and dynamically balanced to ISO 1940 G6.3.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.

7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® class 35, A48 gray cast iron.

8.2. Design shall be a single piece and a modified constant velocity.

8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.

8.4. The discharge is to be of a centerline discharge configuration.

8.5. The discharge is to be 3" ANSI® standard Class 125, 4-bolt configuration.

8.6. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

Section VORTEX
Dated MAR 2022

4” Discharge – Recessed Impeller

3” Solids Handling

3450 & 1750 & 1150 RPM

This section contains the following material:

1. **Pump Family Curves & Technical Data**	• K4RH • K4RN • K4RP • K4RB
2. **Individual Performance Curves**	• K4RH • K4RN • K4RP • K4RB
3. **Dimensional Drawings** Pump Lift-Out & Base Elbow Wet Well Installations	• K4RH • K4RN • K4RP • K4RB

Ashland, Ohio 44805
Phone: 419-207-9400

4” Recessed Impeller Pumps

Model Number Identification Chart

K 4 RN 50 - 21 M 2 Y

Keen Pump

Discharge Size:
- 3 = 3”
- 4 = 4”

Pump Model

Horsepower (HP x 10)
- 30 = 3 HP
- 50 = 5 HP
- 75 = 7-1/2 HP
- 100 = 10 HP
- 150 = 15 HP
- 200 = 20 HP
- 250 = 25 HP
- 300 = 30 HP
- 400 = 40 HP
- 500 = 50 HP

Voltage/Phase
- 01 = 208/1
- 21 = 230/1
- 03 = 208/3
- 23 = 230/3
- 43 = 460/3
- 53 = 575/3

Manual Pump Operation

Speed
- 2 = 3450 RPM
- 4 = 1750 RPM
- 6 = 1150 RPM

Frequency
- Blank = 60 Hz
- Y = 50 Hz

Solids-Handling Pumps

KEEN PUMP®

K4RH(X)

FM APPROVED

4" Submersible, Recessed Impeller
(Class 1, Div. 1, Groups C & D Hazardous Location)

Optional :
All Stainless Steel Construction

CERAMIC COATED RECESSED IMPELLER
- Will Not Wear Out
- Superior Abrasion Resistance
- Allows The Pump To Operate In Any Pressure Or Flow Condition

CERAMIC COATED VOLUTE
- Holds Up to Wear On Inside of Volute Casting Case

STANDARD MOTOR CONSTRUCTION
- Class H Laminations (Standard)

MOTOR GROUND RING PROTECTION
- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

DOUBLE ROW LOWER BEARINGS
- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates

BEST MOTOR CONSTRUCTION
- OPTIONAL Class "N" (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

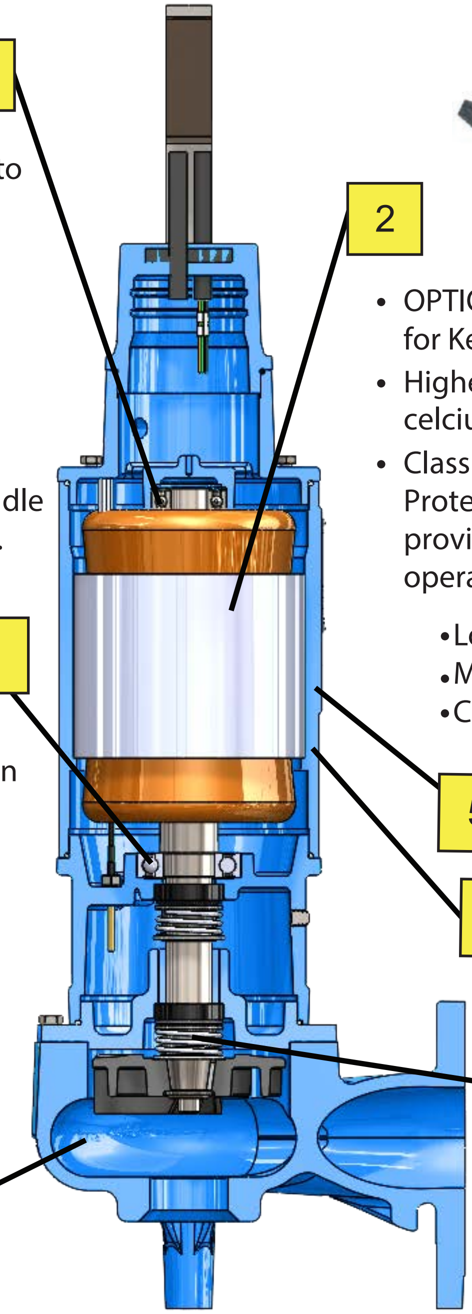
CAPABILITIES:
- Flows-------------------------------------- to 540 GPM
- Heads------------------------------------- to 94 Feet
- HP Range-------------------------------- 3 - 7.5 HP
- Voltage / Phase Options------------- 208/230 V, 1 Phase - 208/230/460 V, 3 Phase
- Discharge Connections-------------- 4" ANSI Class 125 Horizontal Flange
- Motor Speeds--------------------------- 3450 RPM
- Solids-Handling------------------------ 3"
- Impeller---------------------------------- Recessed, Vortex
- Motor Service Factor----------------- 1.20

Features and Benefits

K4RH(X)

Keen Pump's Bearing Protection Program

- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.
- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.



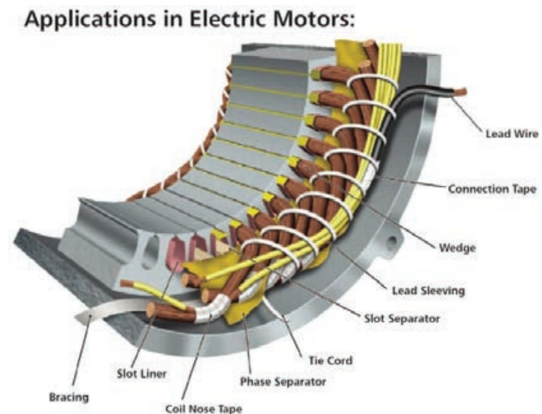
Double Row Bearings

- Heavy Duty Bearings to handle the toughest performances.
  - High Pressures
  - High Flows
- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.

Ceramic Coating - Impeller and Volute Casting

The ultimate indestructable ceramic coated impellers and volutes for Keen's Solids Handling pumps. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

Heavy Duty Motor



- OPTIONAL Class "N" Motors for Keen's Solids Handling pumps.
- Highest temperature construction (200 degrees celcius) for motors
- Class "N" Construction is the best in the industry. Protects your motor from over heating and provides extended motor life. Motors are operating at higher temperatures due to:
  - Longer run times
  - Motor housing not submerged
  - Continuous

Castings

- ASTM - Class 35 high tensile strength castings.

Durable Powder Coat Finish

- Holds up to the toughest environmental conditions.

Dual Shaft Seals

- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

KEEN PUMP®

471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

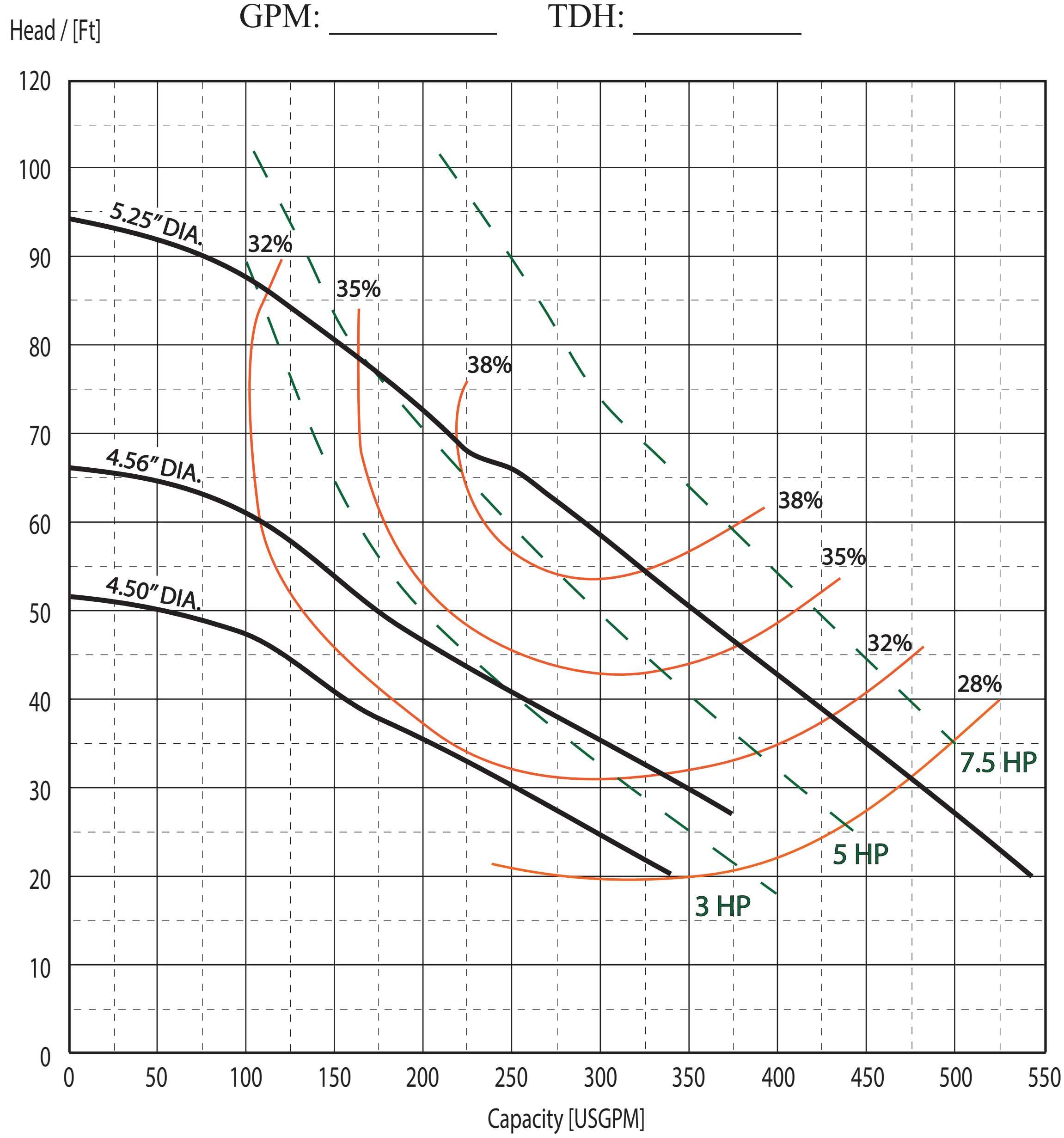
File : K3RH CUTS
Rev. 03/2022

KEEN PUMP

Section **VORTEX**
Date Nov. 2021

Pump Series	K4RH	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	3450 RPM	Discharge	4″	Solids	3″

GPM: __________ TDH: __________

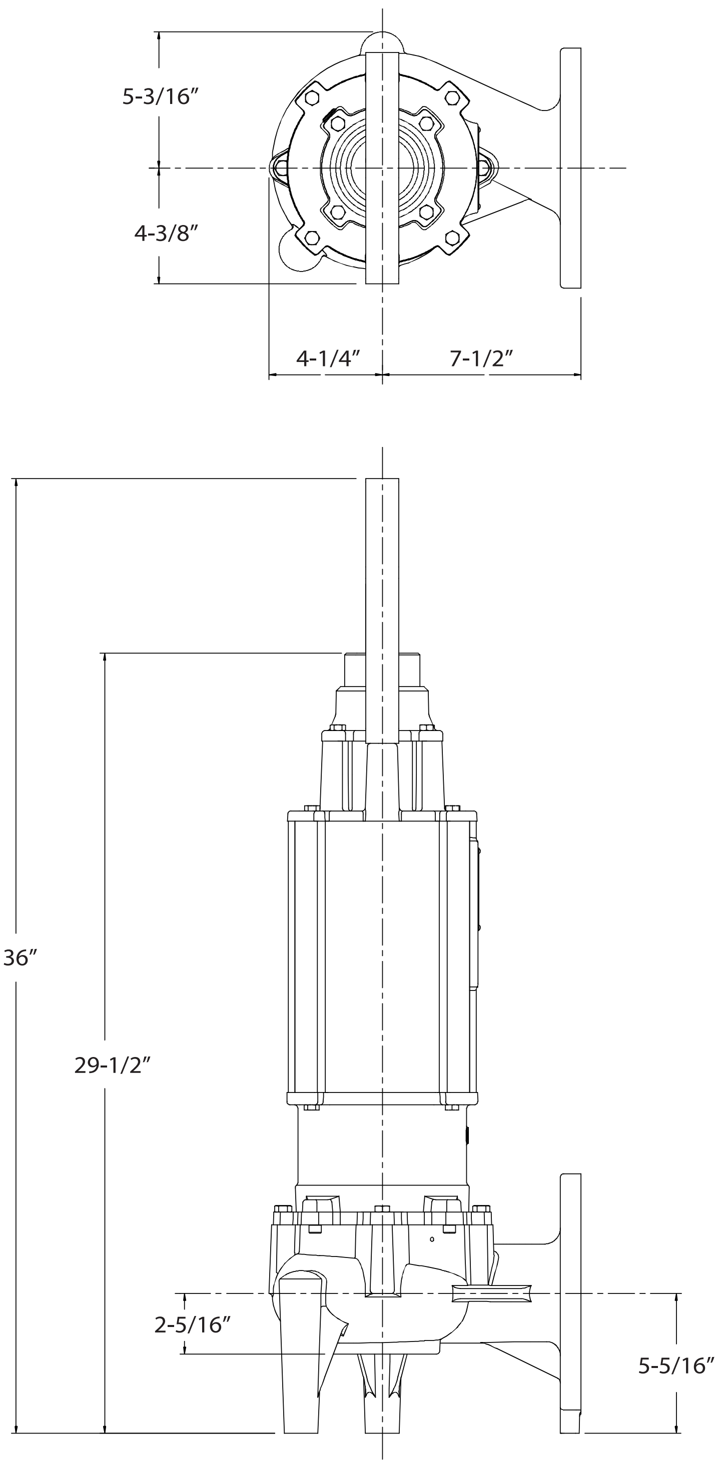


The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K4RH_3450

Pump Series	K4RH	4″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



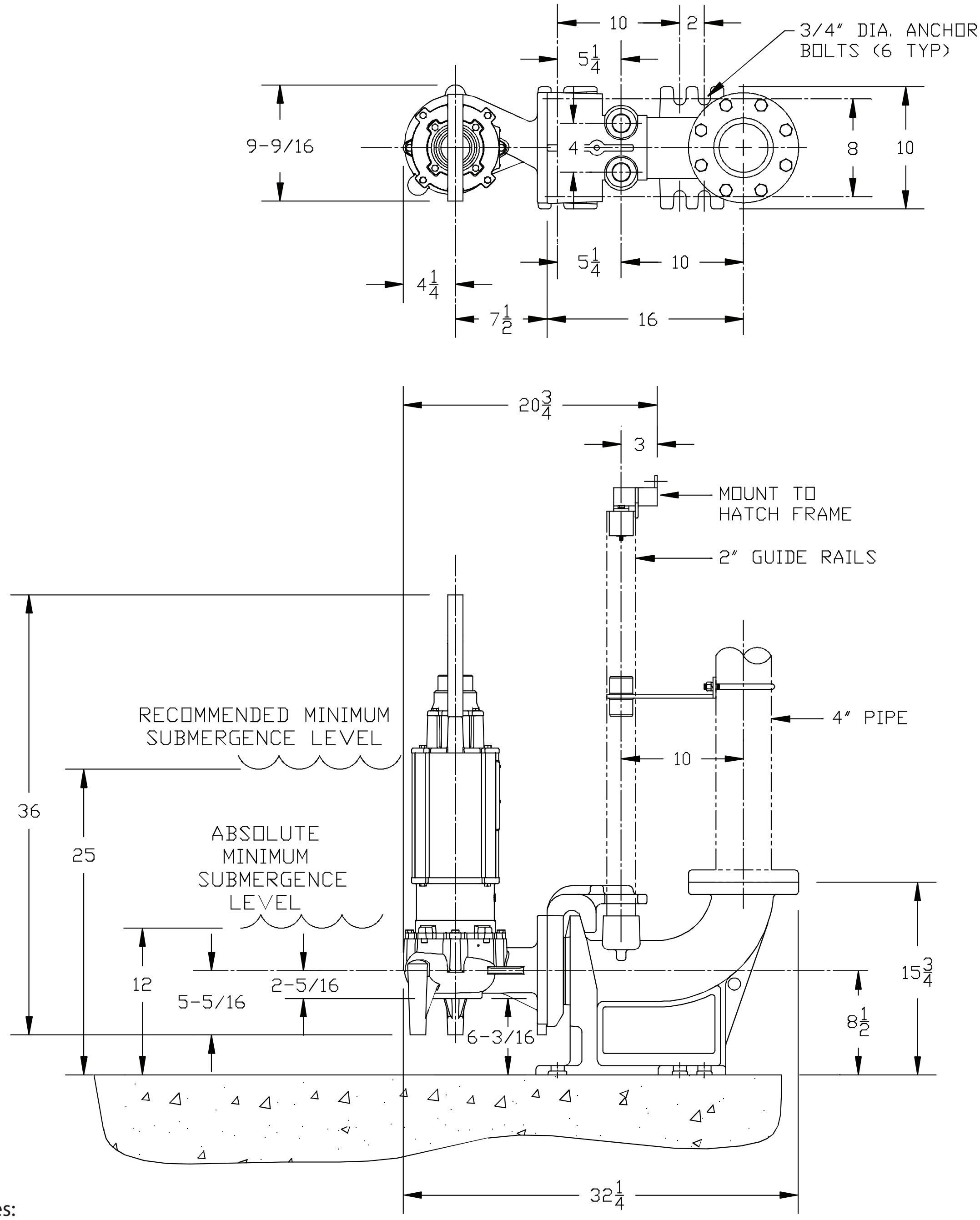
Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4RH Dimensions

Section **VORTEX**
Date **MAR 2015**

Pump Series	**K4RH**	4″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



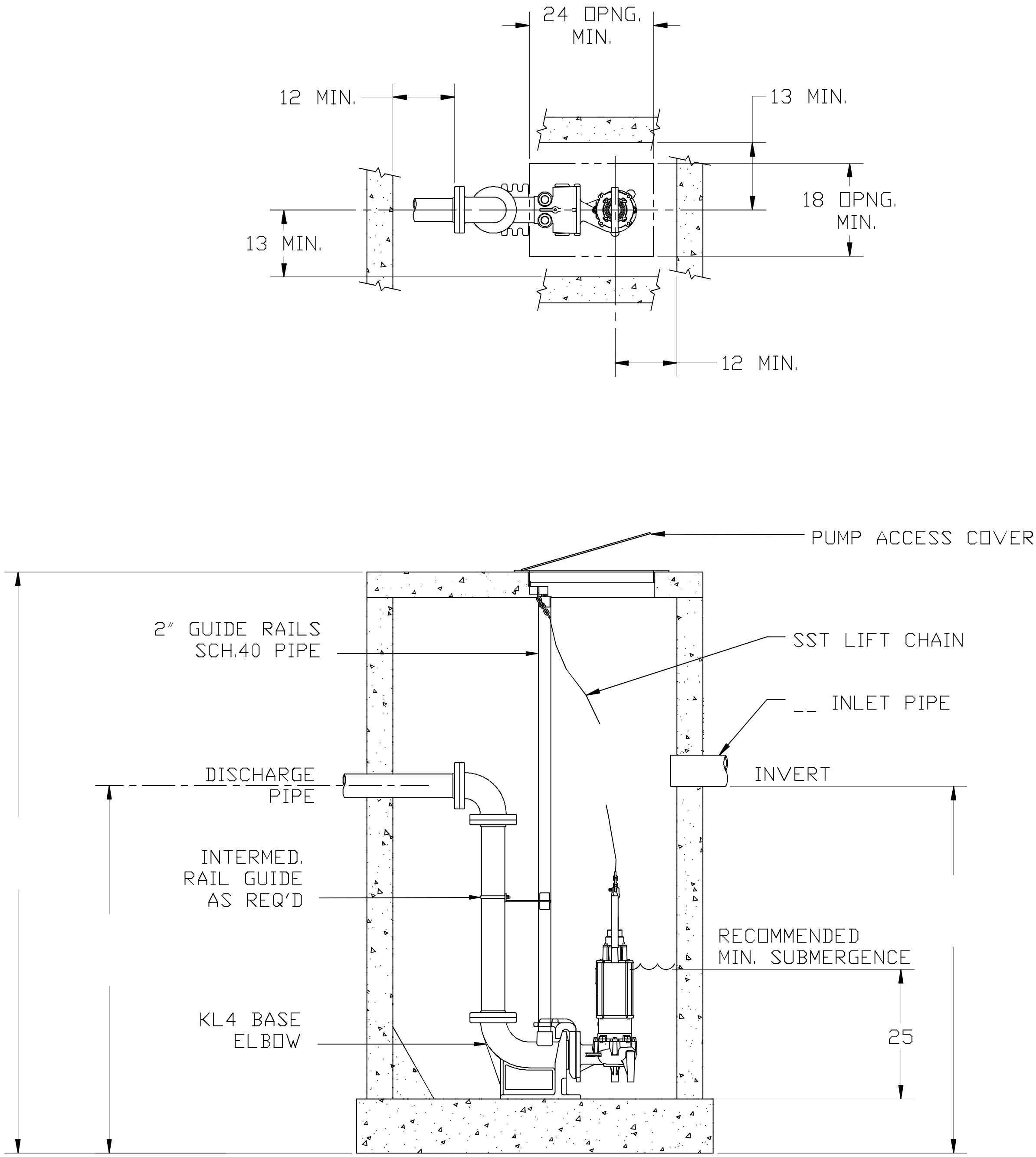
Notes:
1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4RH Liftout Dimensions

Section VORTEX
Date MAR 2015

Pump Series	K4RH	4″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

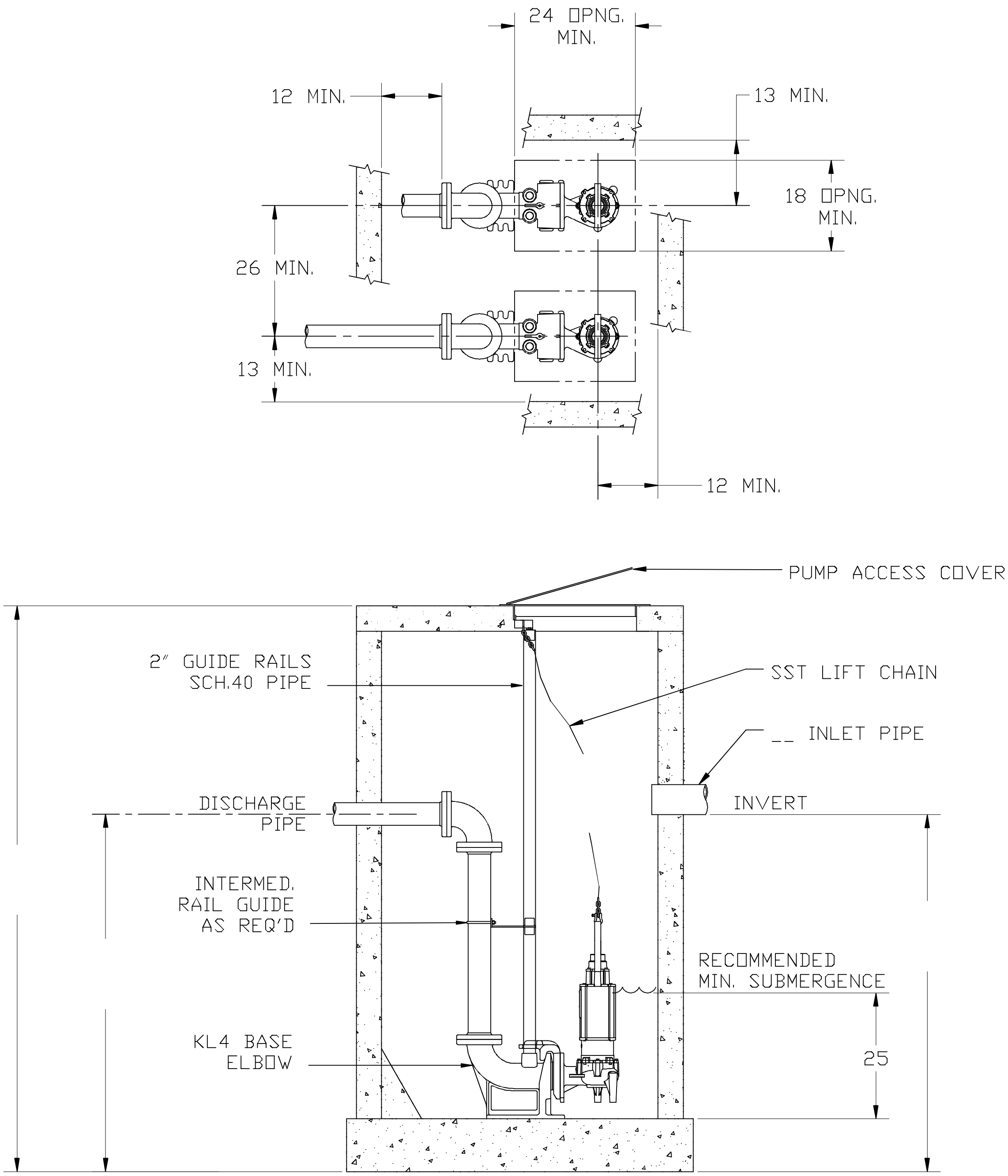
File: K4RH Install Dimensions

KEEN PUMP

Section	VORTEX
Date	MAR 2015

Pump Series	K4RH	4″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4RH Install Dimensions

Pump Model: **K4RH**

Physical Data:

Discharge Size	ANSI 4″ Horizontal
Solids Size	3″
Impeller Type	Balanced, Vortex, 10-Vane
Power/Control Cable Length	40′ Standard
Paint	Blue, Powder Coated – Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	SOOW - 600V, 90º C; Type W - 2000V, 90º C
Control Cord Type	18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Line Bearing	Bronze, CDA 836

Pump Model: **K4RH – 3450 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**3450**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
7.5	230	1	L	1.2	32.5	39.0	113.8	7.5	26.3	9.8
7.5	208	3	L	1.2	22.1	26.5	77.4	6.3	27.9	9.3
	230				19.9	23.9	69.7			
	460				10.0	11.9	34.8			
10	208	3	J	1.2	29.1	34.9	101.9	8.3	36.7	7.3
	230				26.2	31.5	91.8			
	460				13.1	15.7	45.9			
15	208	3	J	1.2	45.2	54.2	158.2	12.8	56.9	7.6
	230				44.1	48.9	142.5			
	460				22.1	24.4	71.3			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
7.5	1	65	65	64	59	86	83	76	62
7.5	3	78	78	75	70	79	76	71	60
10	3	75	76	75	70	79	78	71	59
15	3	74	76	74	68	78	77	72	58

SPECIFICATIONS

Solids-Handling Pumps K4RH

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, both single and poly-phase, designed for wet well submersible pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

1.4 The motor assembly shall be built, designed, and assembled to comply with FM 3615 standards for Class 1, Div. 1, Group C & D construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.

2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.

2.6. Submersible motor design:

2.6.1. ________ Horsepower
2.6.2. ________ RPM
2.6.3. ________ Voltage
2.6.4. ________ Phase
2.6.5. ________ Frequency
2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356º F (180º C). To include:

2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.

2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.

2.7.3. Stator lead material must meet or exceed Class H insulation system.

2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.

2.7.4.1. The thermal limiting devices shall be attached to each phase winding.

2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.8. Operation of the motor shall be designed for:

2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311º F (155º C).

2.8.2. Capable of 15 evenly spaced starts per hour.

2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.

2.8.3.1. Acceptable voltage variation is +/- 10%.

2.8.3.2. Acceptable frequency variation is +/- 5%.

2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
2.8.3.4. Current unbalance must not exceed 5%.
2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:
2.9.1. Secured with 304 stainless steel fasteners.
2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.
3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.
3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.
3.3. All bolted connections in the cord entry construction shall be:
3.3.1. Secured with 304 stainless steel fasteners.
3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.
3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.
3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
4.3. Inboard and outboard seal construction shall be of the following material:
4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.
4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.
4.3.3. Elastomers shall be constructed of Viton®.
4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.
4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.
4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a three-bearing design.

5.2.1. The upper bearing shall be a Conrad type, single row Radial bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a Conrad type, single row, deep groove ball bearing designed to adequately compensate for the axial loads and radial forces.

5.2.3. An additional sleeve bearing shall be constructed of SAE 841 material and is mounted directly above the lower seal to take radial loads and act as flame path for seal chamber.

5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 50,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.

7.2. The design shall be one-piece, 10-vane (3450), vortex flow and dynamically balanced to ISO 1940 G6.3.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.

7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.

8.2. Design shall be a single piece and a modified constant velocity.

8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.

8.4. The discharge is to be of a centerline discharge configuration.

8.5. The discharge is to be 4" ANSI® standard Class 125, 8-bolt configuration.

8.6. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

K4RN(X)

FM APPROVED

4" Submersible, Recessed Impeller
(Class 1, Div. 1, Groups C & D Hazardous Location)

Optional :
All Stainless
Steel Construction

CERAMIC COATED RECESSED IMPELLER
- Superior Abrasion Resistance
- Allows The Pump To Operate Better In Any Pressure Or Flow Condition

CERAMIC COATED VOLUTE
- Holds Up to Wear On Inside of Volute Casting Case

STANDARD MOTOR CONSTRUCTION
- Class H Laminations (Standard)

MOTOR GROUND RING PROTECTION
- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

DOUBLE ROW LOWER BEARINGS
- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates

BEST MOTOR CONSTRUCTION
- OPTIONAL Class "N" (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

CAPABILITIES:
- Flows-- to 600 GPM
- Heads--------------------------------------- to 67 Feet
- HP Range--------------------------------- 1 - 10 HP
- Voltage / Phase Options------------- 208/230 V, 1 Phase - 208/230/460 V, 3 Phase
- Discharge Connections-------------- 4" ANSI Class 125 Horizontal Flange
- Motor Speeds--------------------------- 1150 / 1750 RPM
- Solids-Handling------------------------ 3"
- Impeller--------------------------------- Recessed, Vortex
- Motor Service Factor----------------- 1.20`

Features and Benefits

K4RN(X)

Keen Pump's Bearing Protection Program

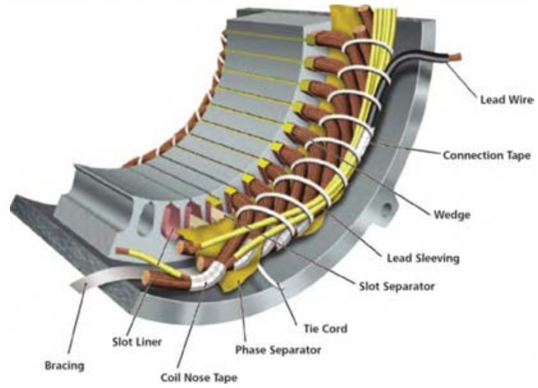
- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.

1

- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.

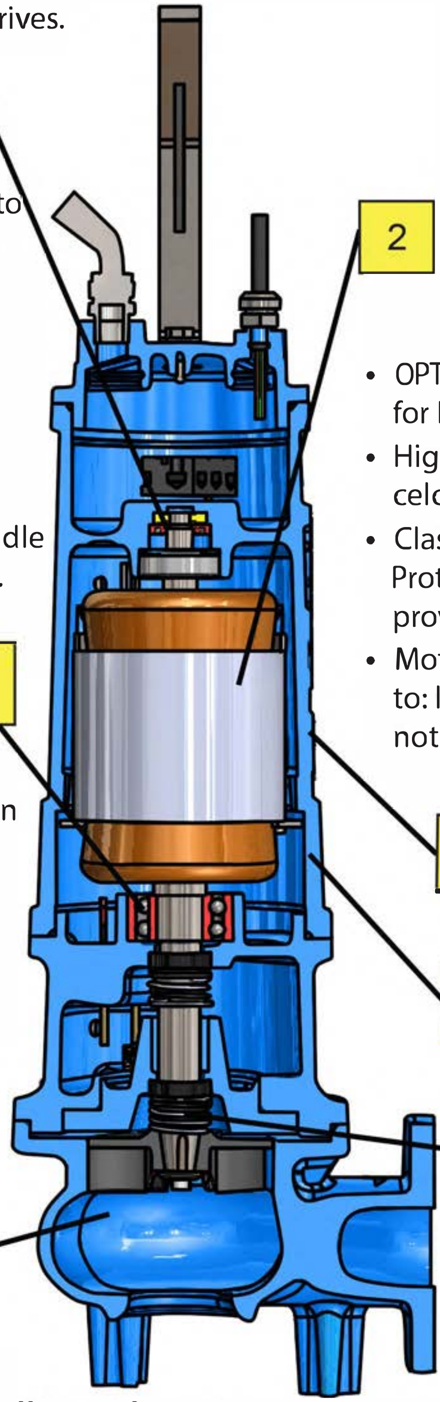
Heavy Duty Motor

Applications in Electric Motors:



2

- OPTIONAL Class "N" Motors for Keen's Solids Handling pumps.
- Highest temperature construction (200 degrees celcius) for motors
- Class "N" Construction is the best in the industry. Protects your motor from over heating and provides extended motor life.
- Motors are running hotter than ever before due to: longer run times, rapid cycling, motor housing not submerged, and running on VFD drives.



Double Row Bearings

- Heavy Duty Bearings to handle the toughest performances.

3

- High Pressures
- High Flows

- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.

5

Castings

- ASTM - Class 35 high tensile strength castings.

6

Durable Powder Coat Finish

- Holds up to the toughest environmental conditions.

7

Dual Shaft Seals

- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

4

Ceramic Coating - Impeller and Volute Casting

The ultimate indestructible ceramic coated impellers and volutes for Keen's Solids Handling pumps. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

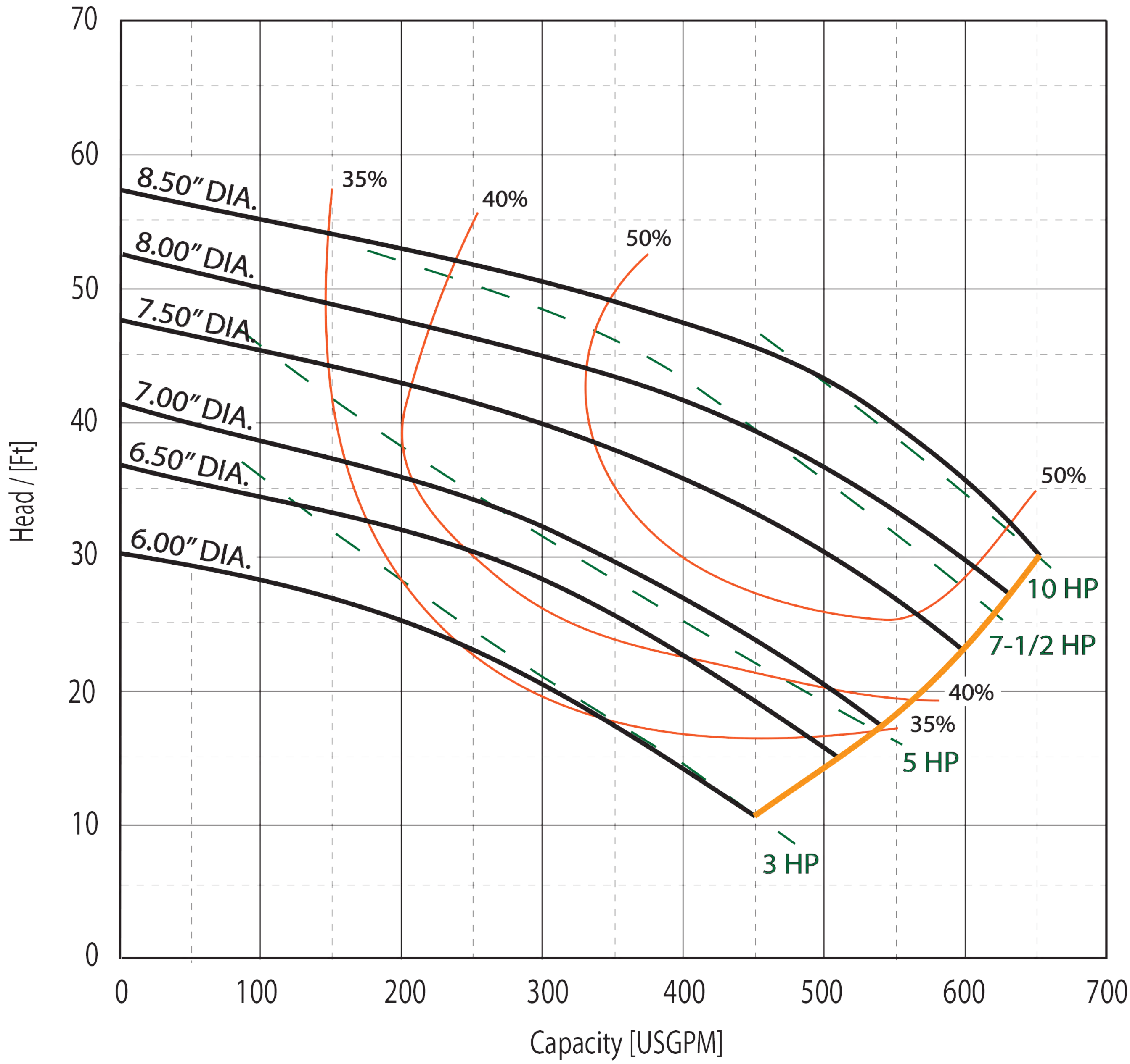
KEEN PUMP

471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

File : K4RN Cuts
Rev. 03/2022

Pump Series	K4RN	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1750 RPM**	Discharge	**4″**	Solids	**3″**

GPM: ____________ TDH: ____________



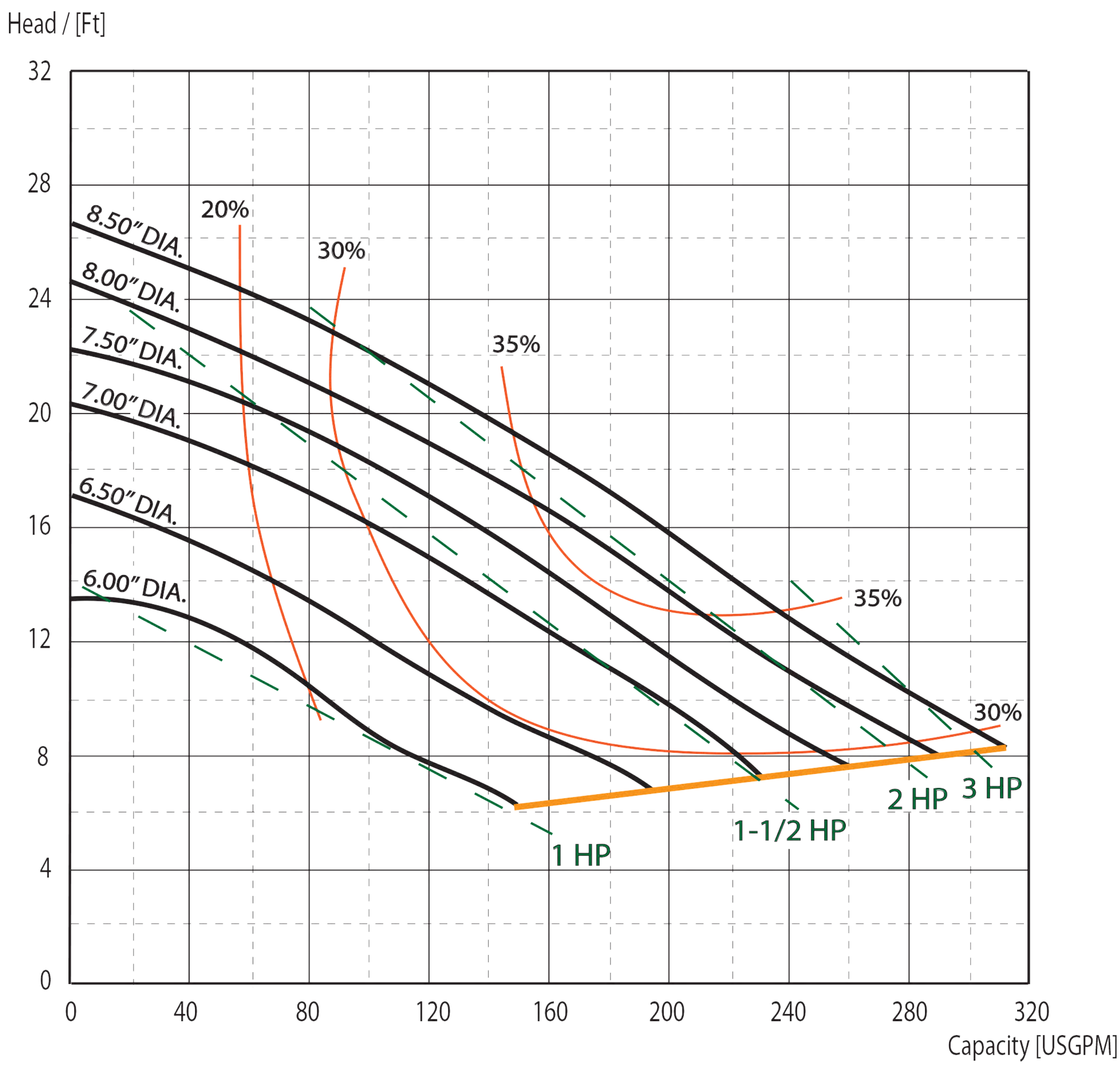
The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

KEEN PUMP

Section **VORTEX**
Date Nov. 2021

Pump Series	**K4RN**	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1150 RPM**	Discharge	**4″**	Solids	**3″**

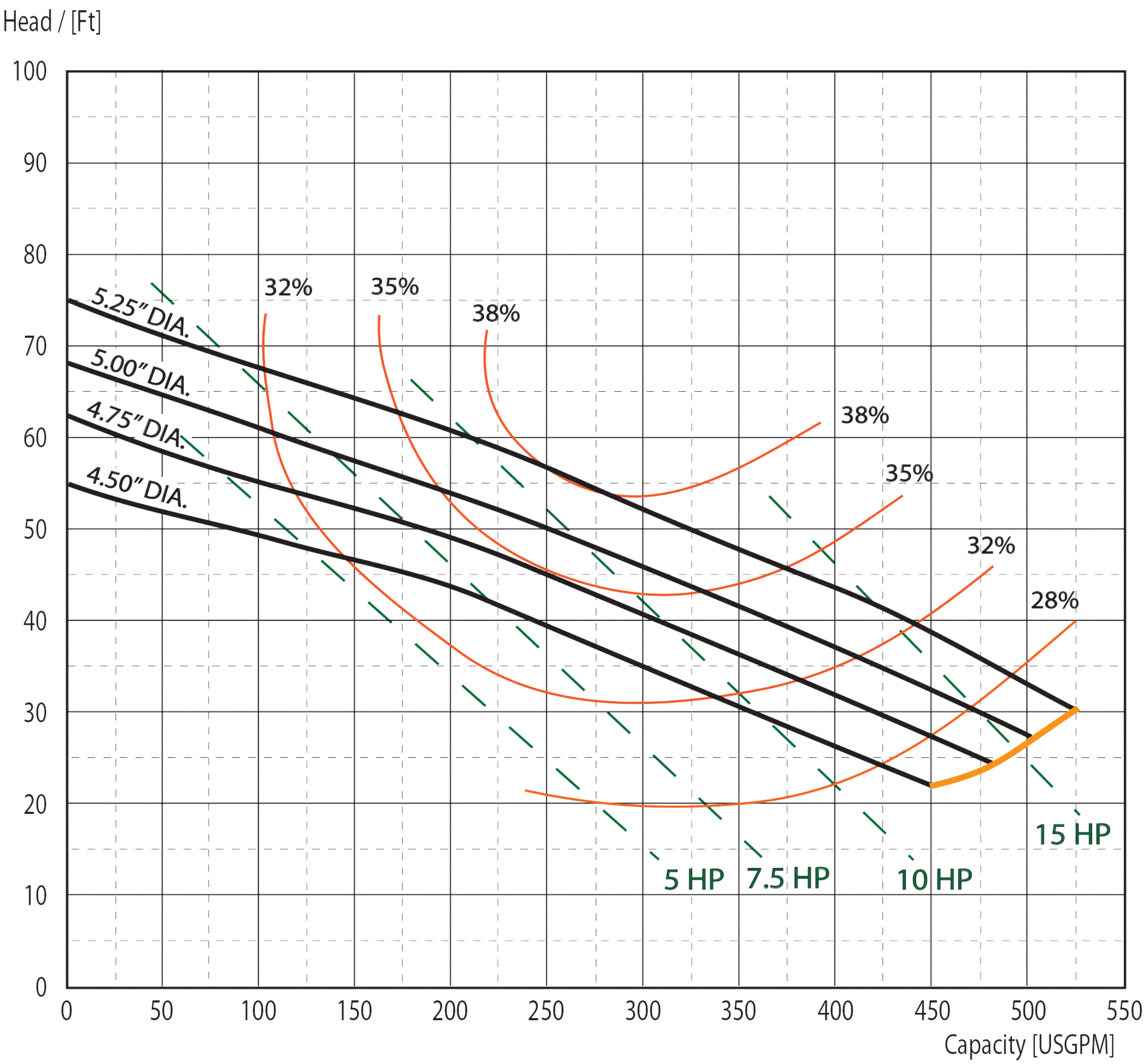
GPM: ___________ TDH: ___________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

Pump Series	K4RN		4″ SUBMERSIBLE SEWAGE PUMPS		
Speed	3450 RPM	Discharge	4″	Solids	3″

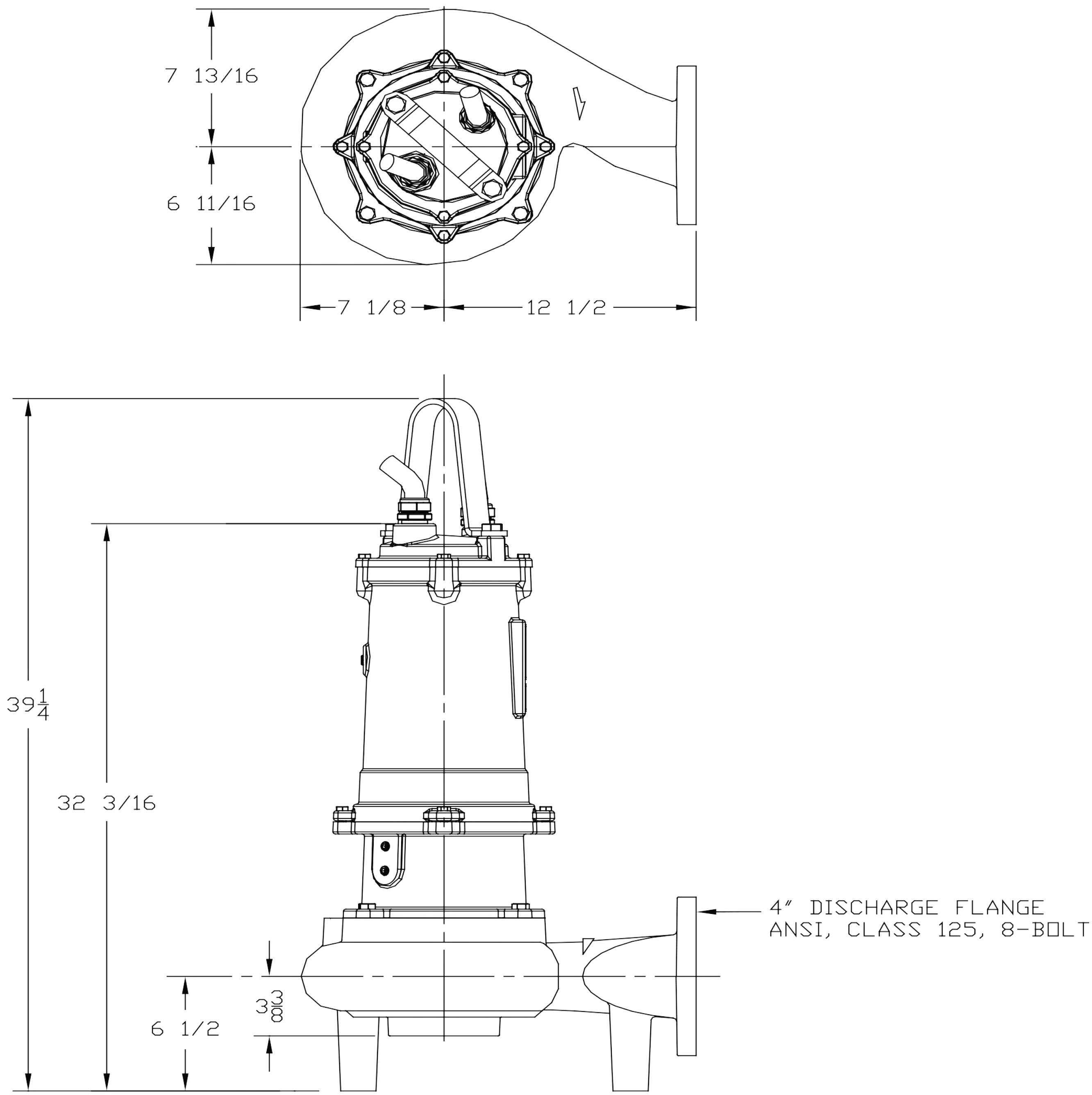
GPM: ___________ TDH: ___________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

Pump Series	K4RN	4″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

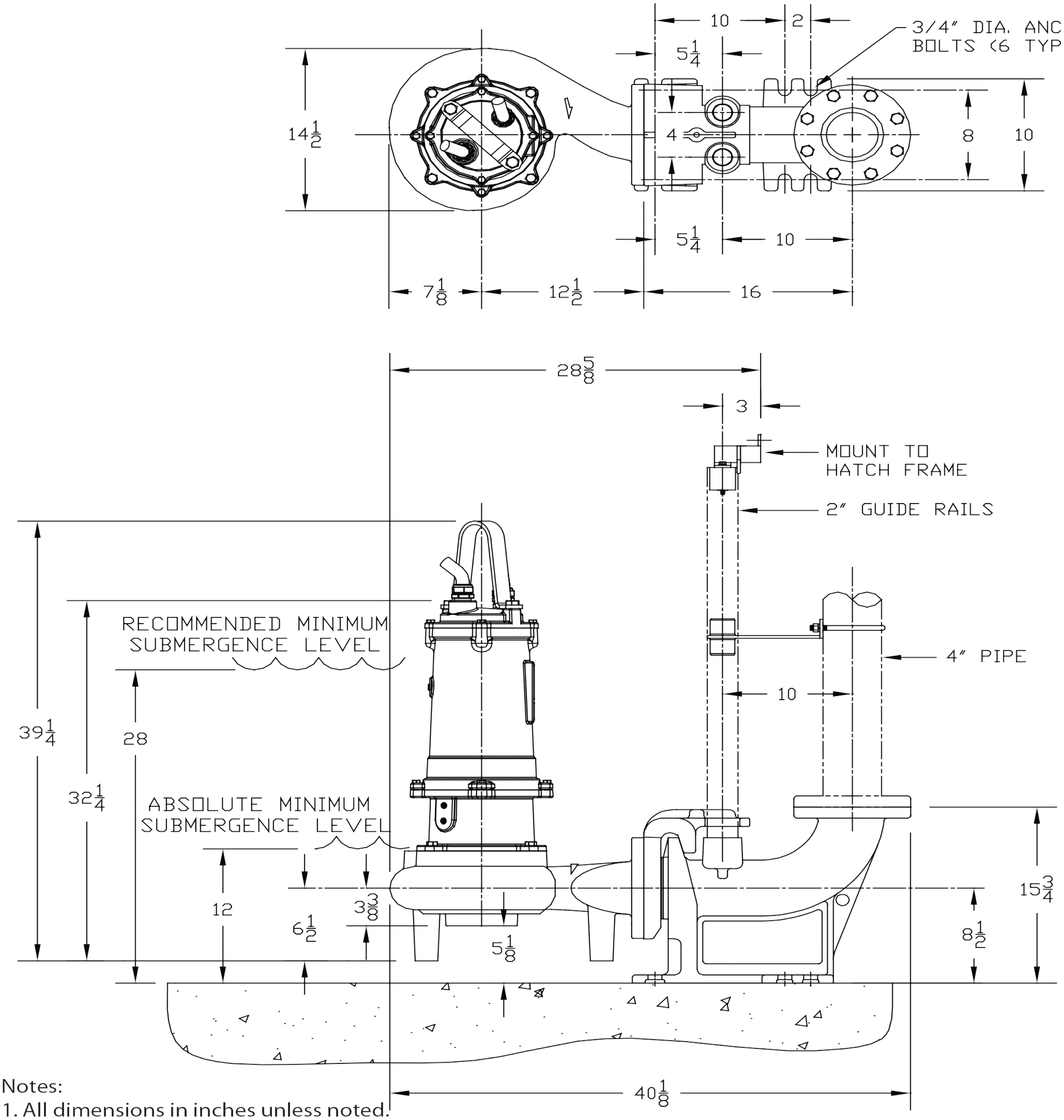


Note: All dimensions in inches unless noted.
Pump shown 1150 & 1750 RPM.
Dimensions may vary due to normal manufacturing tolerances.

File: K4RNM4&6 Dimensions

Pump Series	K4RN	4″ SUBMERSIBLE SEWAGE PUMPS

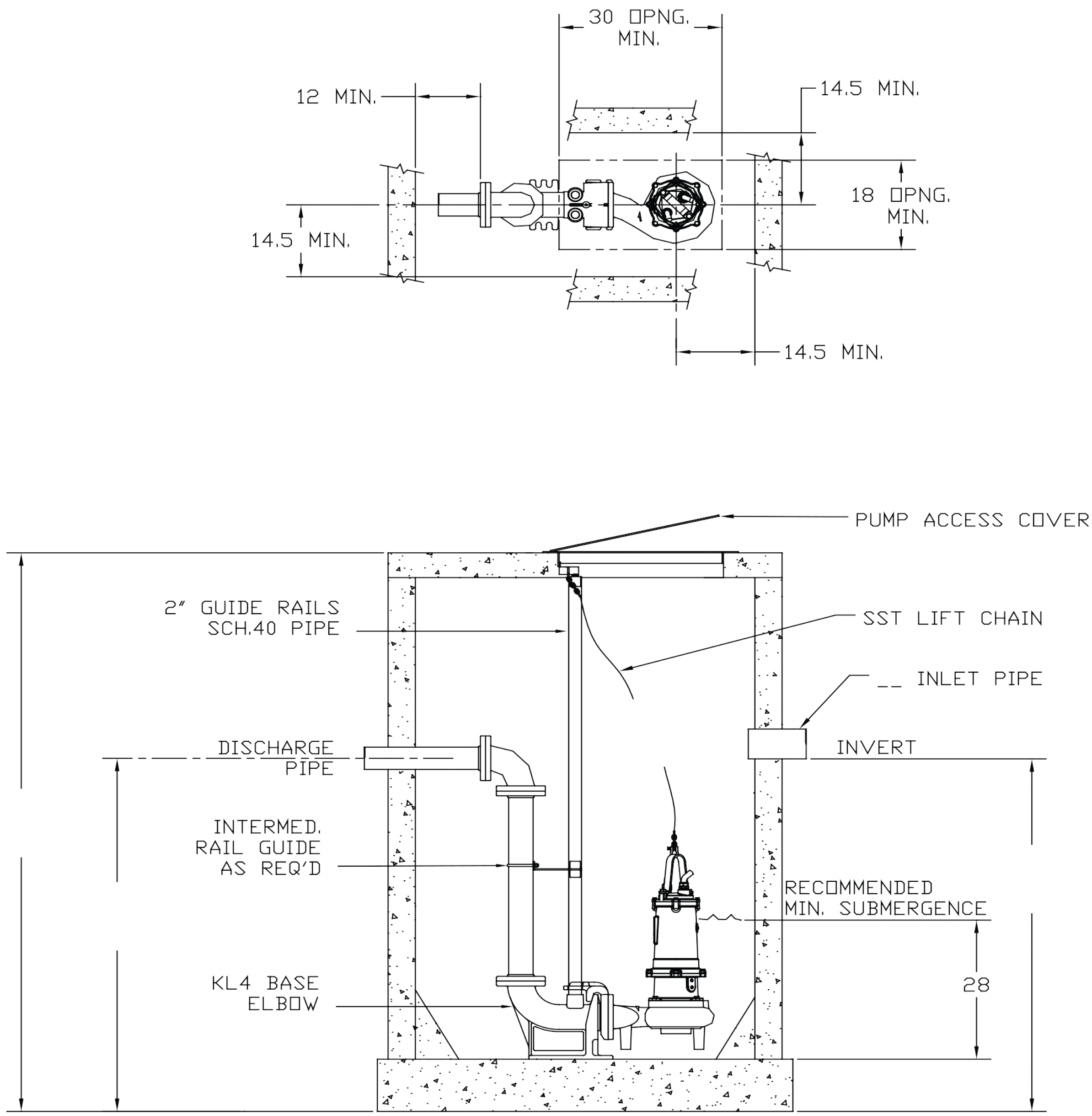
LIFTOUT DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Pump shown 1150 & 1750 RPM.
3. Discharge flange ANSI Class 125 unless noted.
4. Absolute minimum and recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. Dimensions may vary due to normal manufacturing tolerances.
7. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

Pump Series	K4RN	4″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA

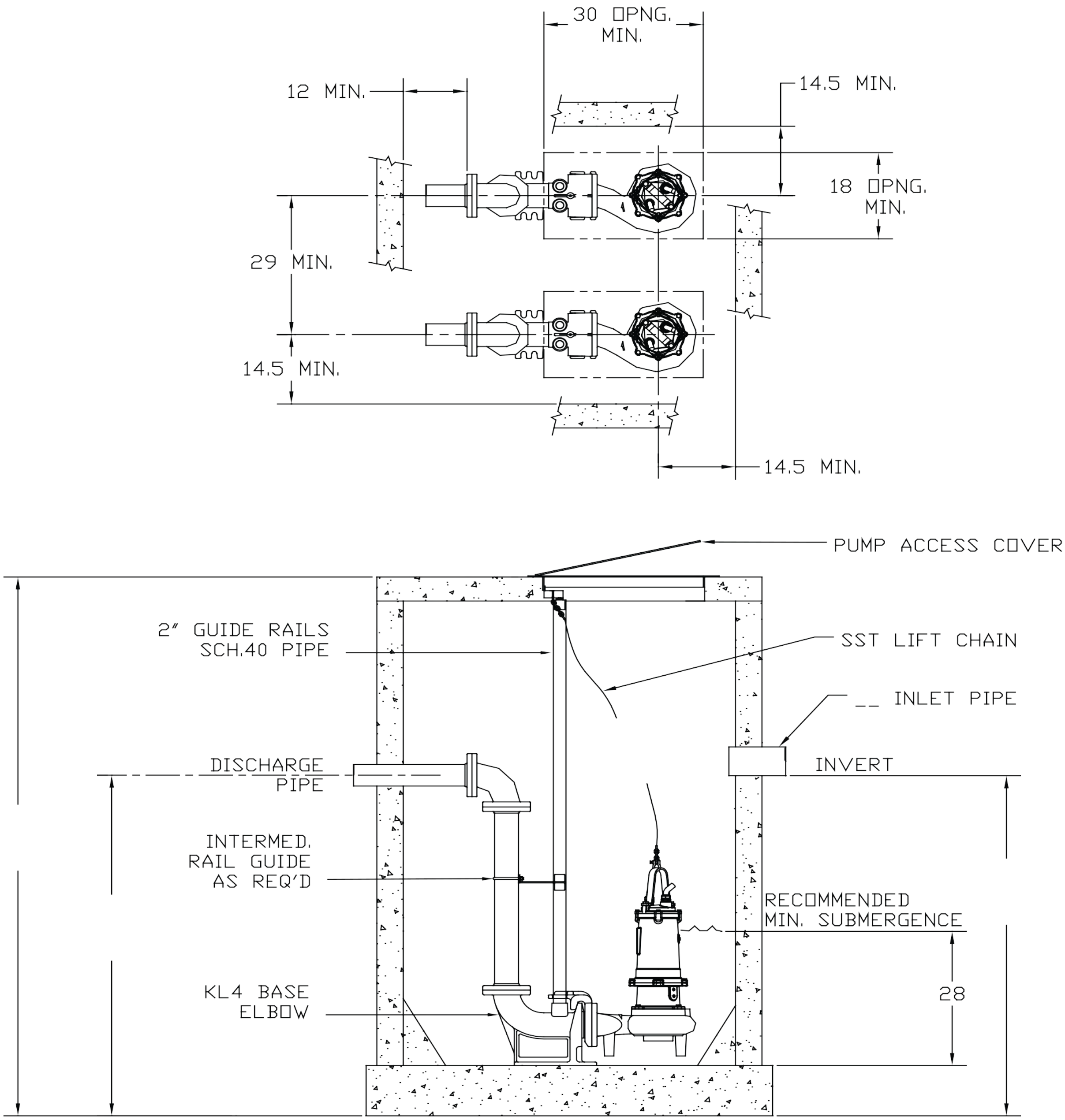


Notes:
1. All dimensions in inches unless noted.
2. Pump shown 1150 & 1750 RPM.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. Dimensions may vary due to normal manufacturing tolerances.
7. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4RNM4&6 Install Dimensions

Pump Series	K4RN	4″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Pump shown 1150 & 1750 RPM.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. Dimensions may vary due to normal manufacturing tolerances.
7. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

Pump Model: **K4RN**

Physical Data:

Discharge Size	ANSI 4" Horizontal
Solids Size	3"
Impeller Type	Balanced, Recessed, 8 Vane
Power/Control Cable Length	40' Standard
Paint	Blue, Powder Coated– Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	Type W - 2000V, 90° C
Control Cord Type	18-5 - SOOW - 600V, 90° C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Line Bearing	Bronze, CDA 836

Pump Model: **K4RN – 1750 RPM**

Thermal Data:

Maximum Liquid	140° F (60° C)
Maximum Stator	311° F (155° C)
Heat Sensor **Open:**	257° F (125° C) Max. / 239° F (115° C) Min.
Closed:	194° F (90° C) Max. / 119° F (48° C) Min.
Oil Flash Point	390° F (199° C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
3	208	1	E	1.2	19.1	22.9	66.9	4.0	13.9	5.2
	230				17.2	20.6	60.2			
3	208	3	H	1.2	16.3	19.6	57.1	4.6	20.6	5.8
	230				14.7	17.6	51.4			
	460				7.3	8.8	25.7			
5	208	1	F	1.2	37.1	44.5	129.9	7.7	26.9	10.0
	230				33.4	40.1	116.9			
5	208	3	F	1.2	21.1	25.3	73.9	6.0	26.5	7.5
	230				19.0	22.8	66.5			
	460				9.5	11.4	33.3			
7.5	208	3	F	1.2	32.1	38.5	112.4	9.1	40.4	11.3
	230				28.9	34.7	101.2			
	460				14.5	17.4	50.6			
10	208	3	E	1.0	38.5	38.5	134.8	11.0	48.5	13.6
	230				34.7	34.7	121.4			
	460				17.3	17.3	60.7			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
3	1	66	66	64	56	87	83	79	70
3	3	71	70	69	63	81	80	79	71
5	1	65	65	64	59	86	83	76	62
5	3	78	78	75	70	79	76	71	60
7.5	3	77	76	74	69	75	70	64	54
10	3	75	76	75	70	79	78	71	59

Pump Model: **K4RN – 1150 RPM**

Thermal Data:

Maximum Liquid	140° F (60° C)
Maximum Stator	311° F (155° C)
Heat Sensor Open:	257° F (125° C) Max. / 239° F (115° C) Min.
Closed:	194° F (90° C) Max. / 119° F (48° C) Min.
Oil Flash Point	390° F (199° C)

Electrical Data:

RPM	**1150**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
1	208	1	H	1.2	9.6	11.5	33.6	2.0	7.0	2.6
	230				8.6	10.4	30.3			
1	208	3	J	1.2	6.6	7.9	21.0	1.7	7.6	2.1
	230				6.2	7.4	18.9			
	460				3.1	3.7	9.5			
2	208	1	H	1.2	18.9	22.7	66.2	13.8	5.1	5.1
	230				17.0	20.4	59.6			
2	208	3	G	1.2	9.9	11.9	34.7	2.8	12.5	3.5
	230				8.9	10.7	31.2			
	460				4.5	5.4	15.6			
3	208	1	F	1.0	22.7	22.7	79.5	4.7	16.5	6.1
	230				20.5	20.5	71.6			
3	208	3	G	1.0	14.3	14.3	50.1	4.1	18.0	6.0
	230				12.9	12.9	45.1			
	460				6.4	6.4	22.5			

Motor Efficiencies & Power Factor

		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
1	1	60	60	59	53	75	73	66	57
1	3	65	62	56	52	75	72	67	61
2	1	63	61	60	50	76	74	70	62
2	3	65	64	60	52	78	76	71	60
3	1	68	65	59	55	75	70	64	54
3	3	65	64	60	57	79	78	71	59

SPECIFICATIONS

Solids-Handling Pumps K4RN

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, both single and poly-phase, designed for wet well submersible pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

1.4. The motor assembly shall be built, designed, and assembled to comply with FM 3615 standards for Class 1, Div. 1, Group C & D construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.

2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.

2.6. Submersible motor design:

- 2.6.1. ________ Horsepower
- 2.6.2. ________ RPM
- 2.6.3. ________ Voltage
- 2.6.4. ________ Phase
- 2.6.5. ________ Frequency
- 2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class F as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 311º F (155º C). To include:

- 2.7.1. The stator windings shall be constructed of material to meet the Class F insulation system.
- 2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.
- 2.7.3. Stator lead material must meet or exceed Class F insulation system.
- 2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
  - 2.7.4.1. The thermal limiting devices shall be attached to each phase winding.
  - 2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.8. Operation of the motor shall be designed for:

- 2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class B operating temperature rise of 176º F (80º C).
- 2.8.2. Capable of 15 evenly spaced starts per hour.
- 2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
  - 2.8.3.1. Acceptable voltage variation is +/- 10%.
  - 2.8.3.2. Acceptable frequency variation is +/- 5%.

2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
2.8.3.4. Current unbalance must not exceed 5%.
2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:
2.9.1. Secured with 304 stainless steel fasteners.
2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.
3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.
3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.
3.3. All bolted connections in the cord entry construction shall be:
3.3.1. Secured with 304 stainless steel fasteners.
3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.
3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.
3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
4.3. Inboard and outboard seal construction shall be of the following material:
4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.
4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.
4.3.3. Elastomers shall be constructed of Viton®.
4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.
4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.
4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.
5.2. Each pump shall be constructed with a three-bearing design.
5.2.1. The upper bearing shall be a Conrad type, single row, Radial bearing designed to adequately handle the required radial loads.
5.2.2. The lower bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately compensate for the axial loads and
5.2.3. radial forces.
An additional sleeve bearing shall be constructed of SAE 841 material and is mounted directly above the lower seal to take radial loads and act as flame path for seal chamber.
5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 50,000 hours when operation is within the limitations of the manufacturer’s performance curve.
5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).
6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
7.2. The design shall be one-piece, 10-vane (3450) or 8-vane (1750 & 1150), vortex flow and dynamically balanced to ISO 1940 G6.3.
7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.
7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.
7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.
8.2. Design shall be a single piece and a modified constant velocity.
8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.
8.4. The discharge is to be of a centerline discharge configuration.
8.5. The discharge is to be 4” ANSI® standard Class 125, 8-bolt configuration. Horizontal
8.6. discharge is standard if specifying K4RN model.
8.7. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

KEEN PUMP®

K4RP(X)

FM
(PENDING)

4” Submersible, Recessed Impeller
(Class 1, Div. 1, Groups C & D Hazardous Location)

Optional :
All Stainless
Steel Construction

CERAMIC COATED RECESSED IMPELLER
- Superior Abrasion Resistance
- Allows The Pump To Operate Better In Any Pressure Or Flow Condition

CERAMIC COATED VOLUTE
- Holds Up to Wear On Inside of Volute Casting Case

STANDARD MOTOR CONSTRUCTION
- Class H Laminations (Standard)

MOTOR GROUND RING PROTECTION
- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

DOUBLE ROW LOWER BEARINGS
- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates

BEST MOTOR CONSTRUCTION
- OPTIONAL Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

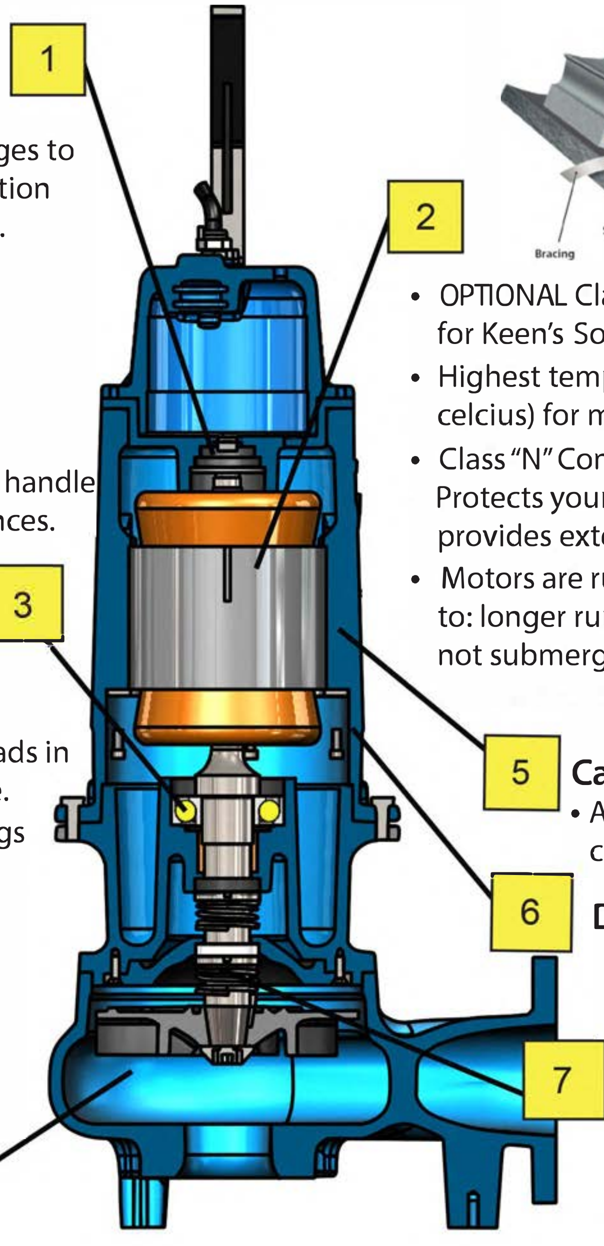
CAPABILITIES:
- Flows-------------------------------------- to 750 GPM
- Heads-------------------------------------- to 135 Feet
- HP Range--------------------------------- 3 - 20 HP
- Voltage / Phase Options------------- 208/230/460/575V, 3-Phase or 208/230V, 1-Phase
- Discharge Connections-------------- 4” ANSI Class 125 Horizontal Flange
- Motor Speeds--------------------------- 1150 / 1750 / 3450 RPM
- Solids-Handling------------------------ 3”
- Impeller---------------------------------- Recessed, Vortex
- Motor Service Factor----------------- 1.20

Features and Benefits

K4RP(X)

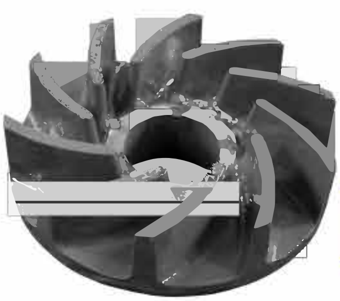
Keen Pump's Bearing Protection Program

- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.
- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.



Double Row Bearings

- Heavy Duty Bearings to handle the toughest performances.
- High Pressures
- High Flows
- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.



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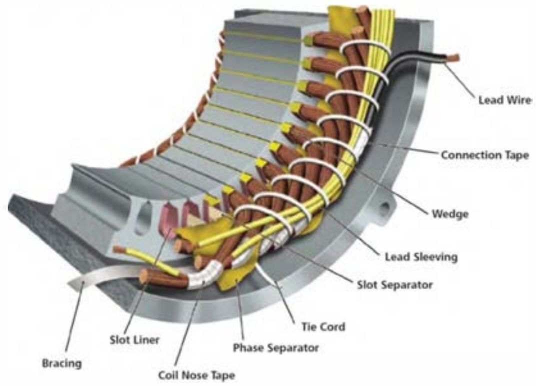
Heavy Duty Motor

Applications in Electric Motors:



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Dual Shaft Seals

- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

KEEN PUMP®

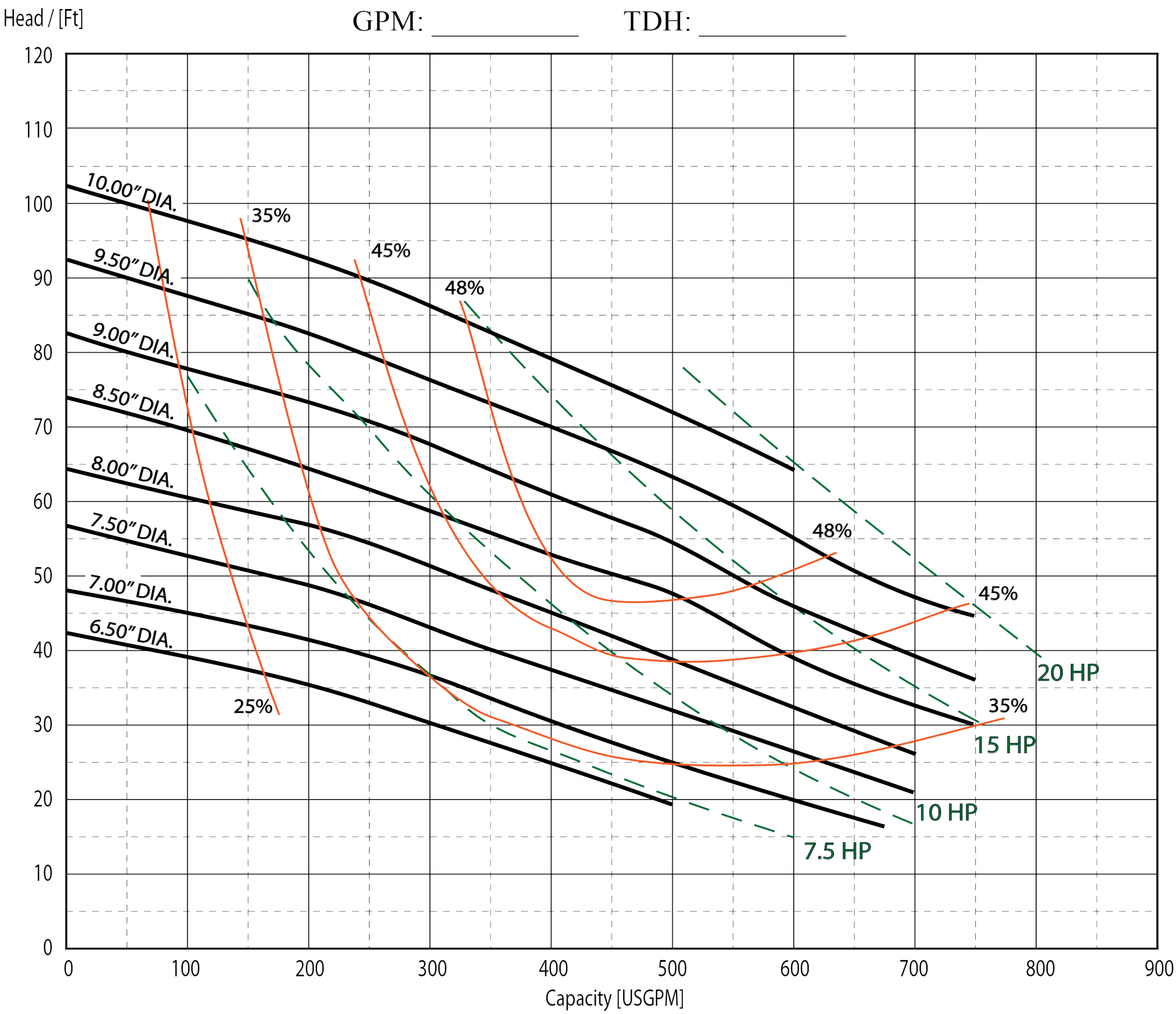
471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

KEEN PUMP

Section VORTEX
Date Nov. 2021

Pump Series	K4RP	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	1750 RPM	Discharge	4″	Solids	3″

GPM: ___________ TDH: ___________



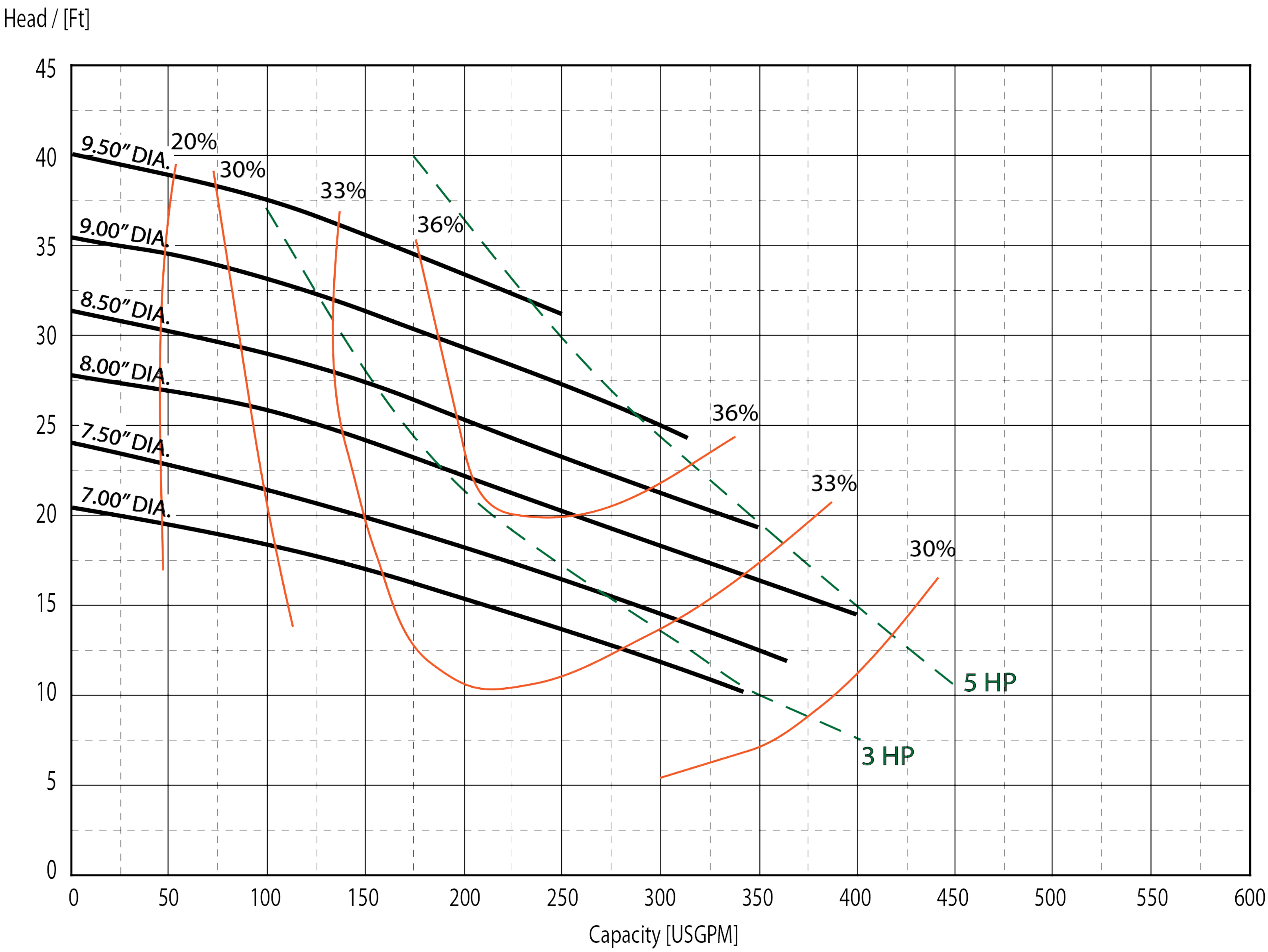
The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

KEEN PUMP

Section **VORTEX**
Date Nov. 2021

Pump Series	K4RP	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	1150 RPM	Discharge	4″	Solids	3″

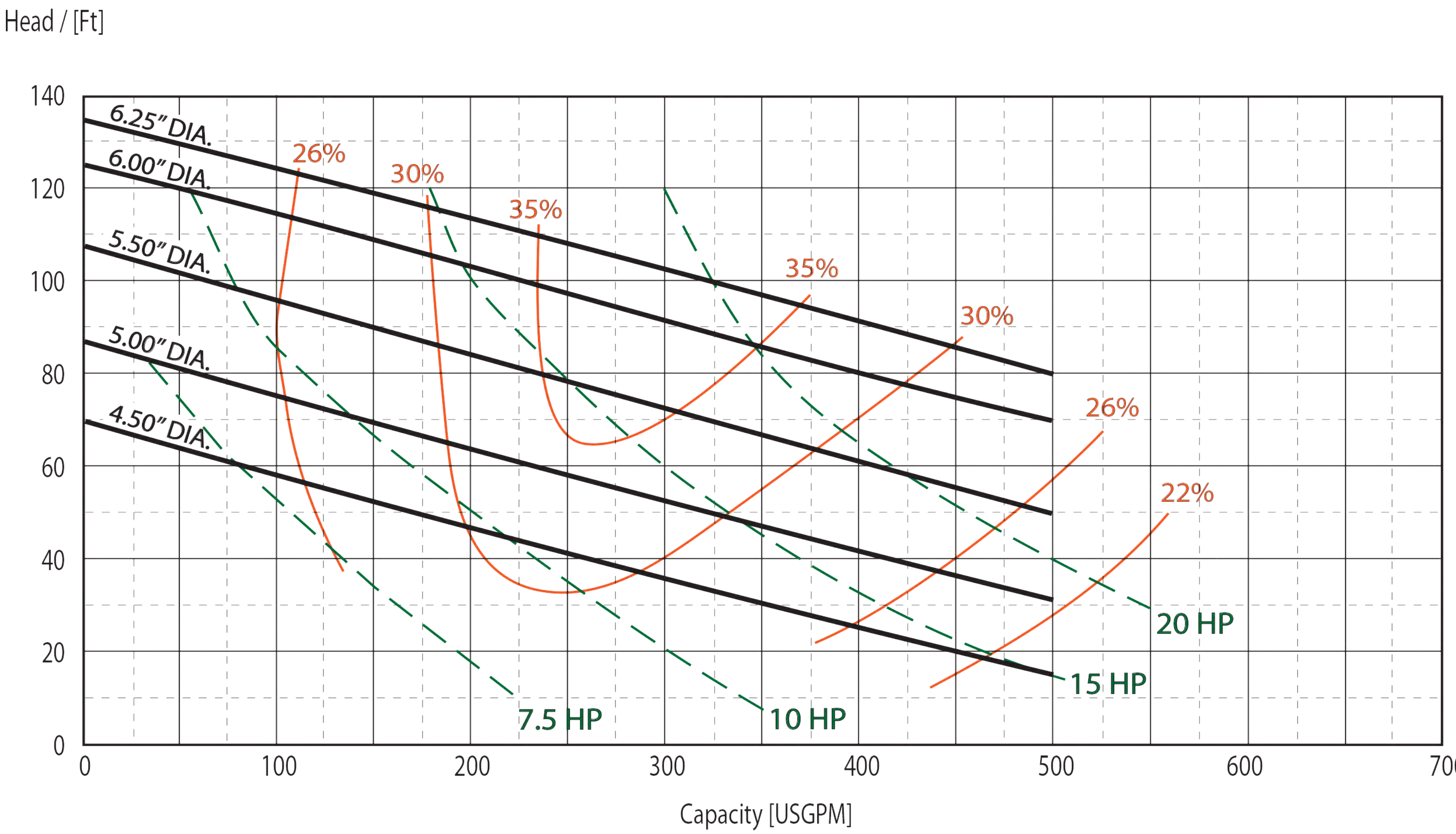
GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

Pump Series	**K4RP**	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**3450 RPM**	Discharge	**4″**	Solids	**3″**

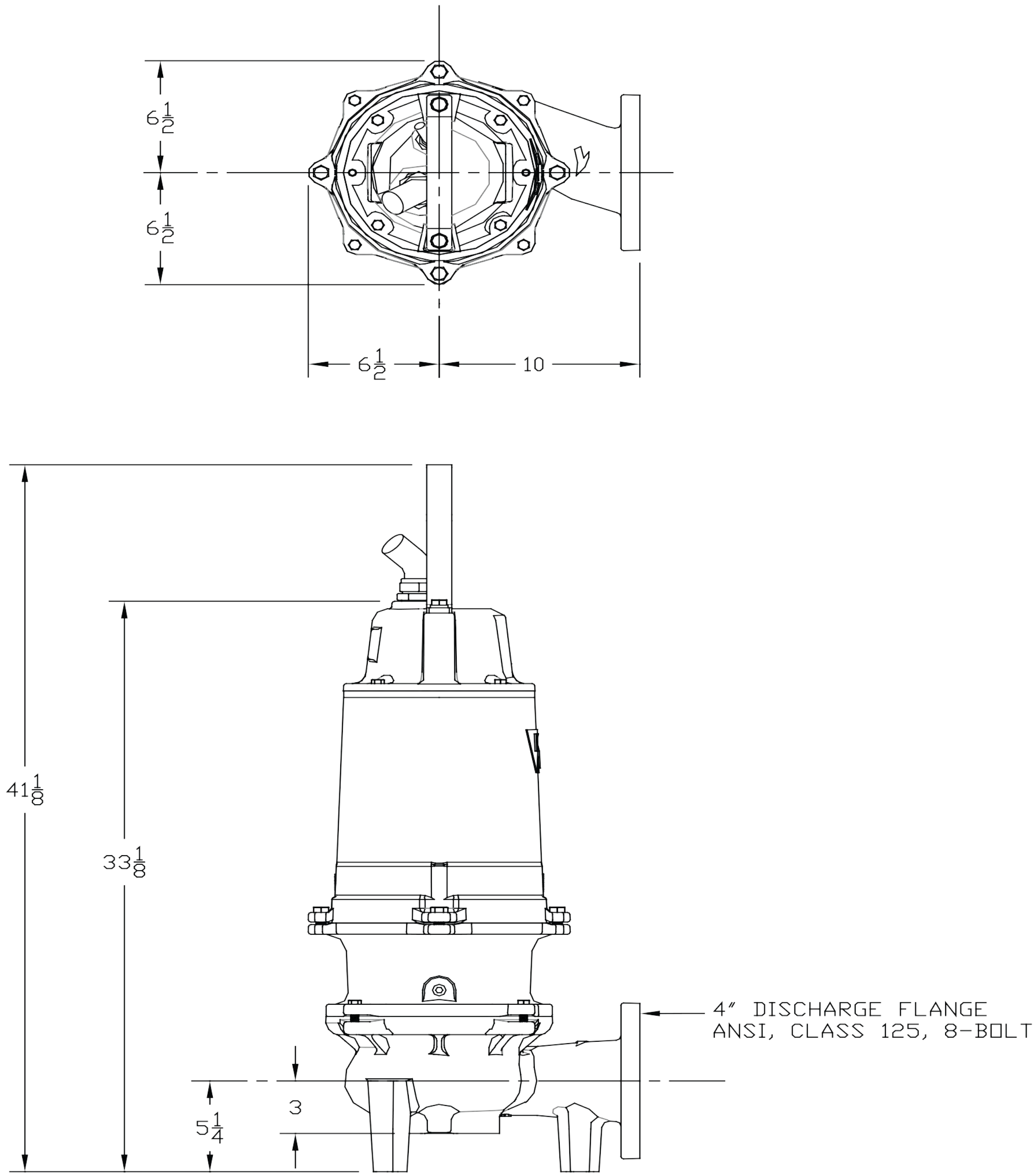
GPM: ___________ TDH: ___________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

Pump Series	K4RP (3450)	4″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

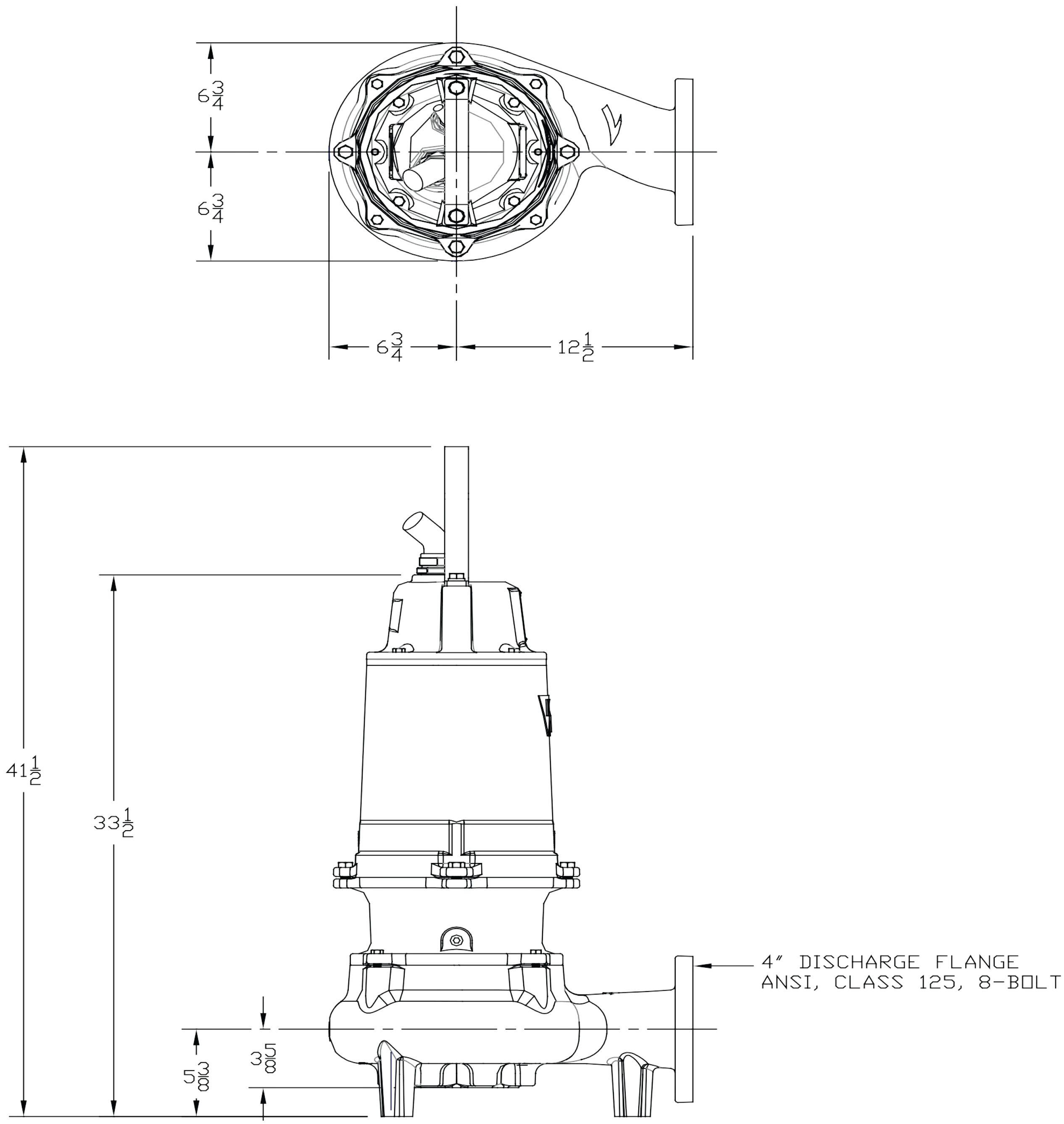


Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4RPM2 Dimensions

Pump Series	K4RP (1150 & 1750)	4″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

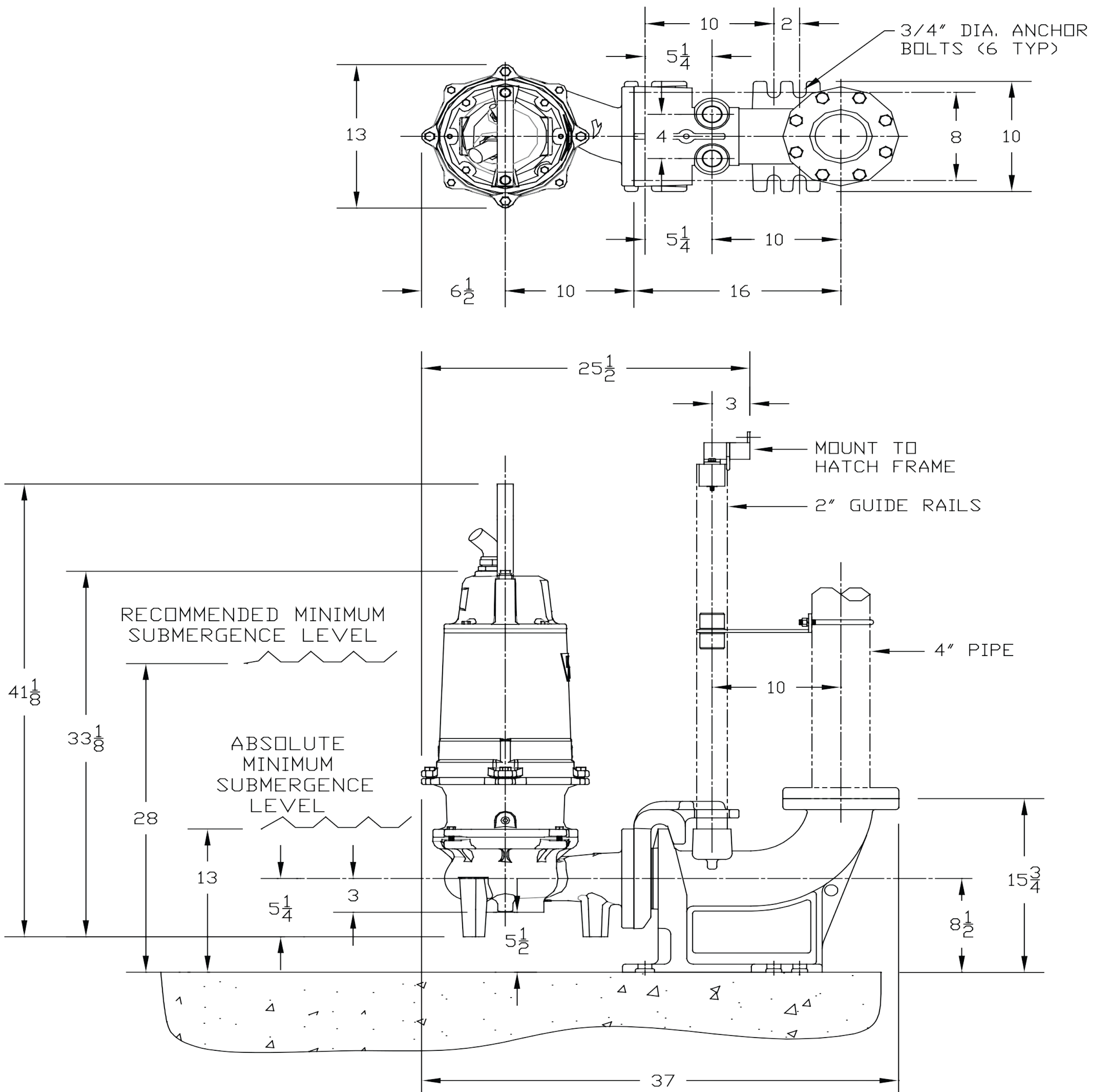


Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4RPM4&M6 Dimensions

Pump Series	K4RP (3450)	4″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

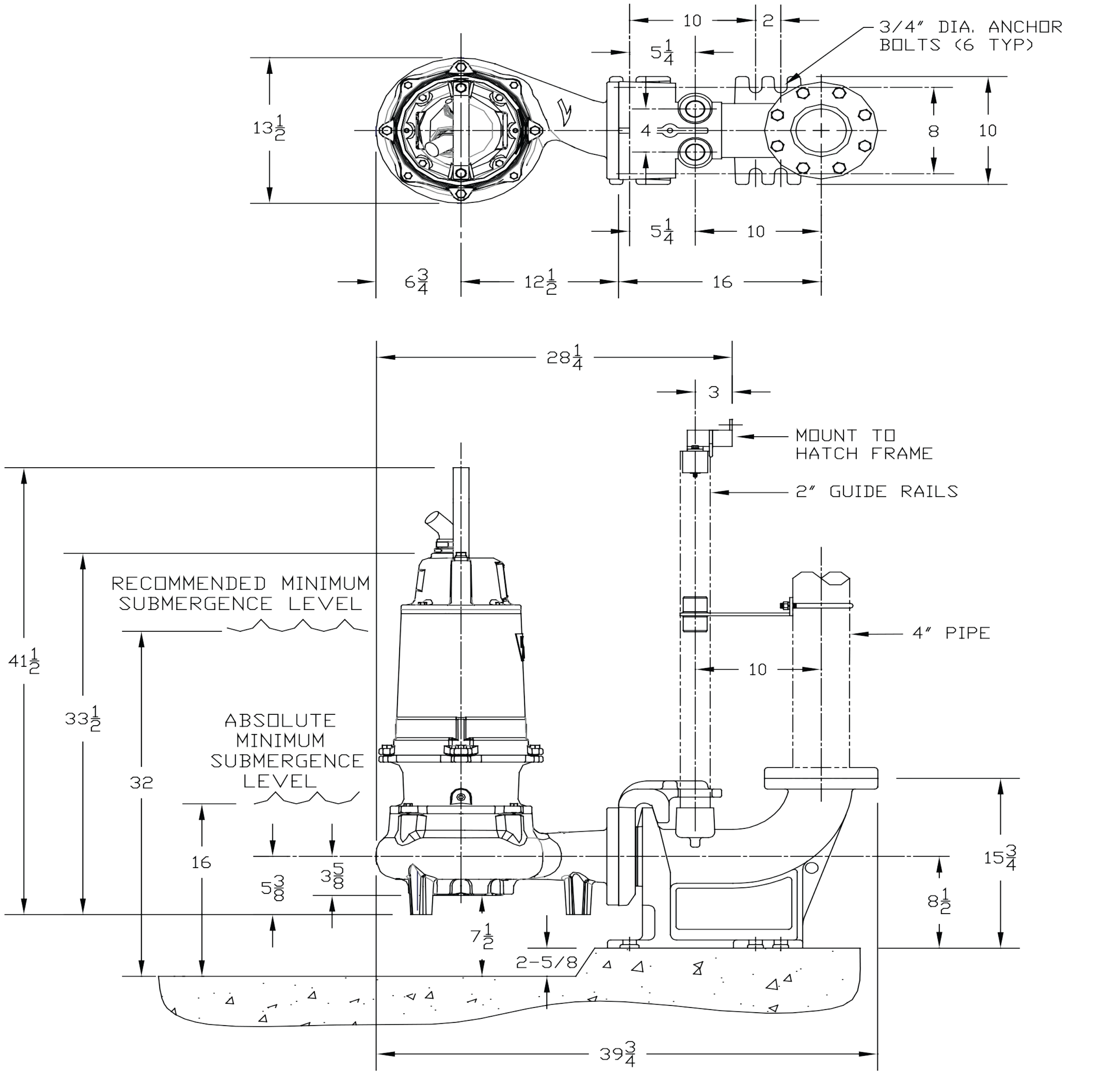
File: K4RPM2 Liftout Dimensions

KEEN PUMP®

Section VORTEX
Date SEPT 2014

Pump Series	K4RP (1150 & 1750)	4″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

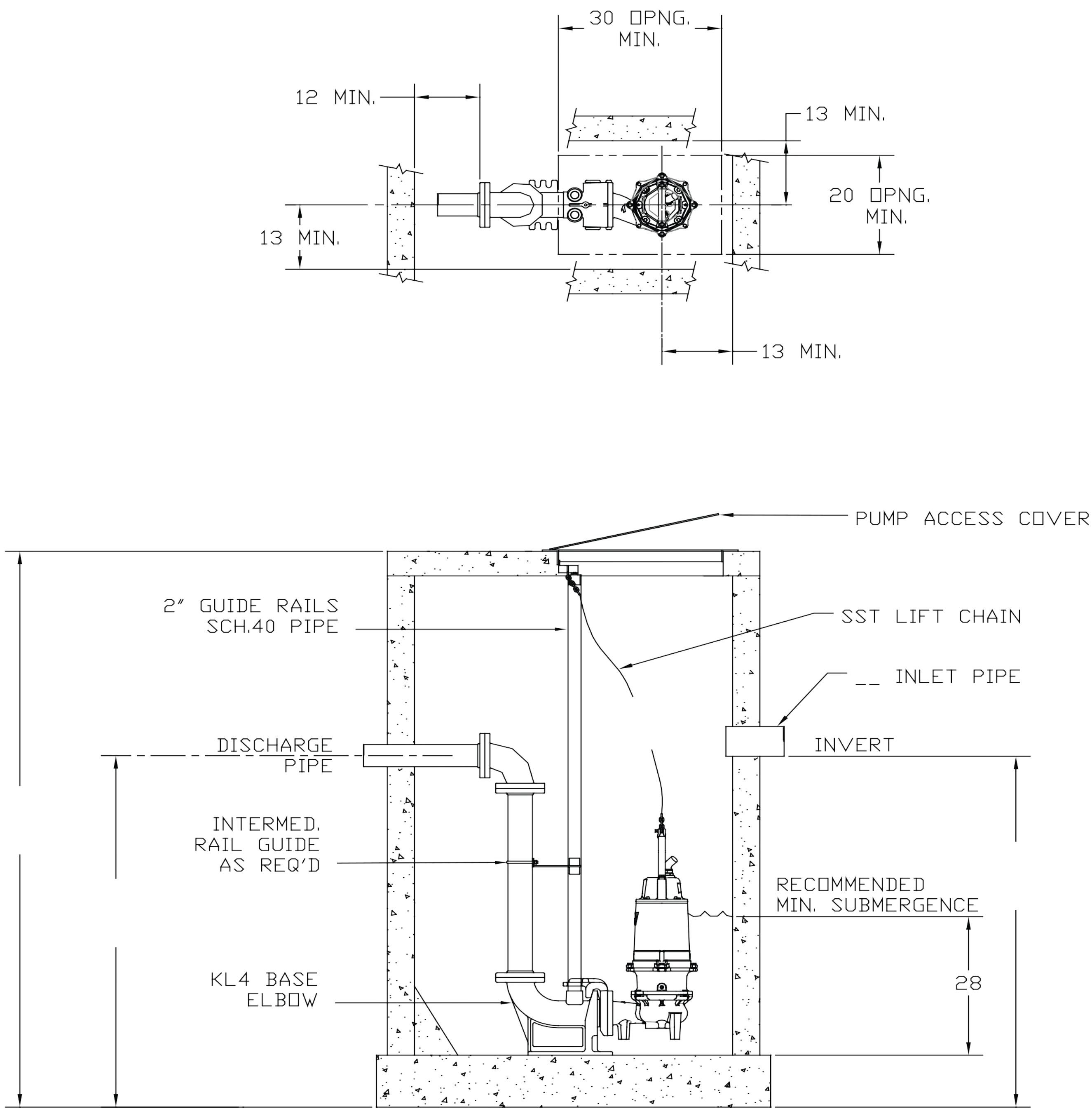


Notes:
1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4RPM4&M6 Liftout Dimensions

Pump Series	K4RP (3450)	4″ SUBMERSIBLE SEWAGE PUMPS

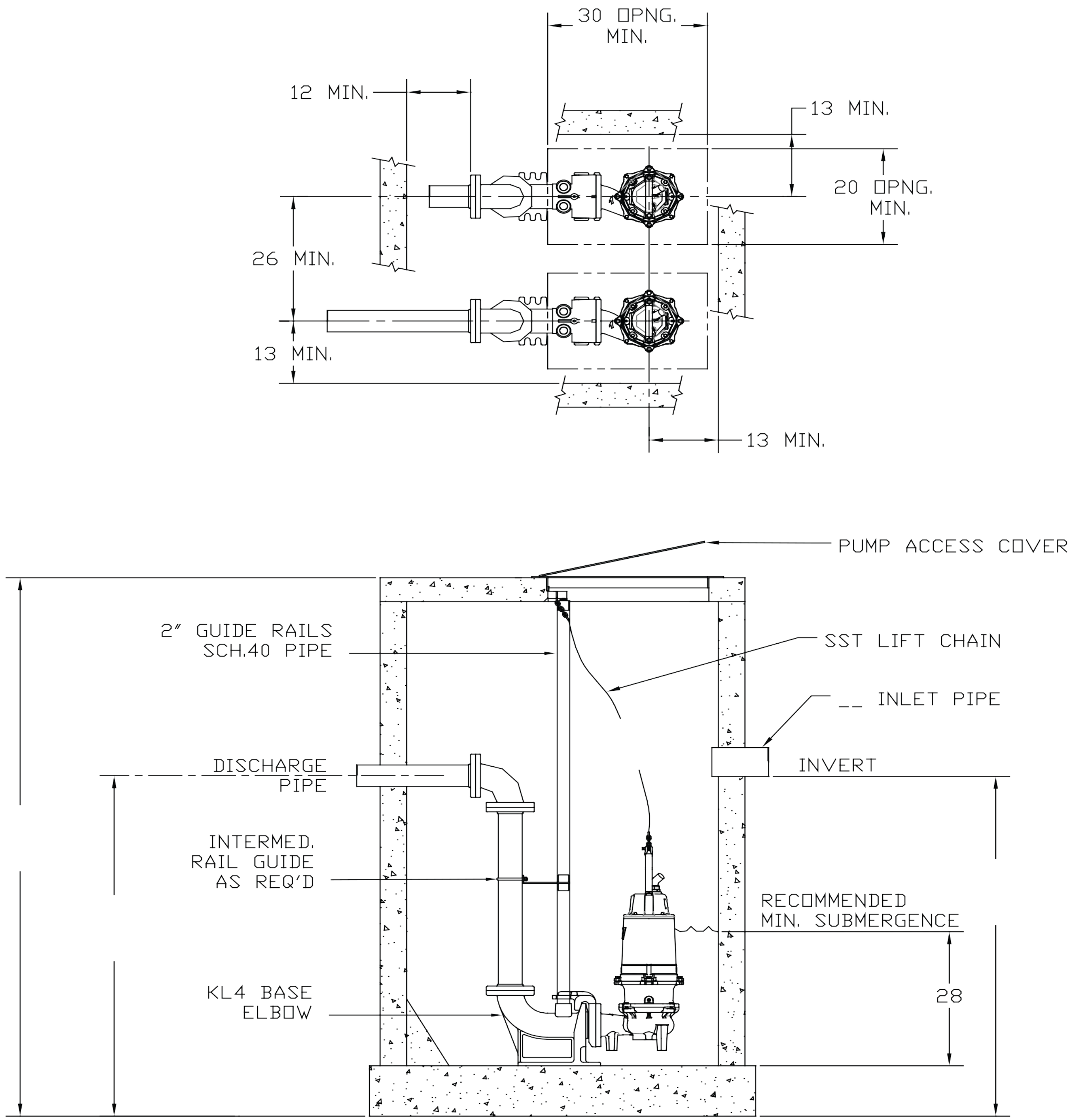
SIMPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

Pump Series	K4RP (3450)	4″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA

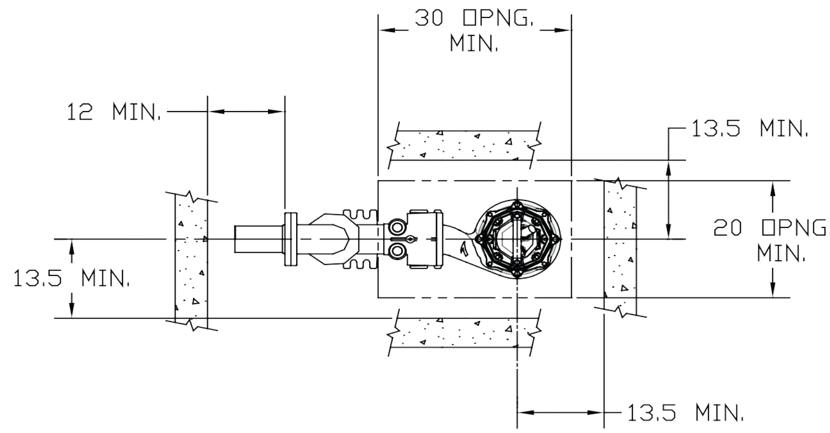


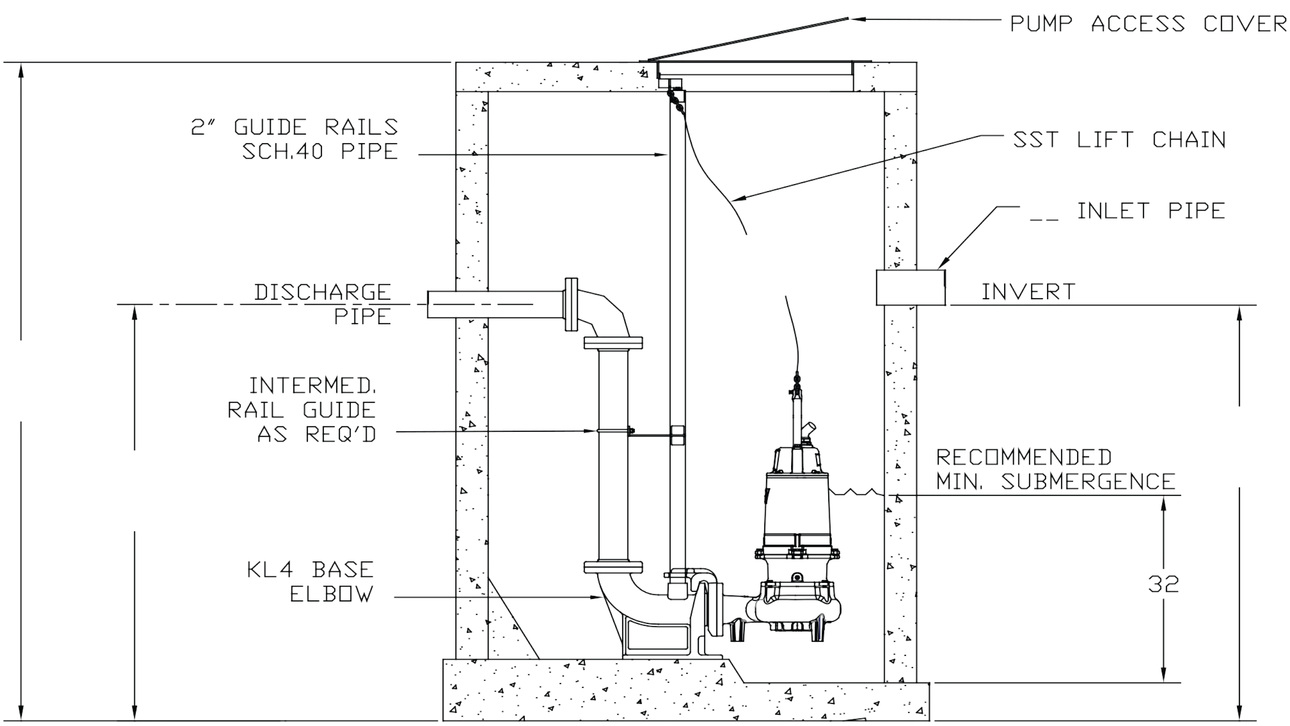
Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4RPM2 Install Dimensions

Pump Series	K4RP (1150 & 1750)	4″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



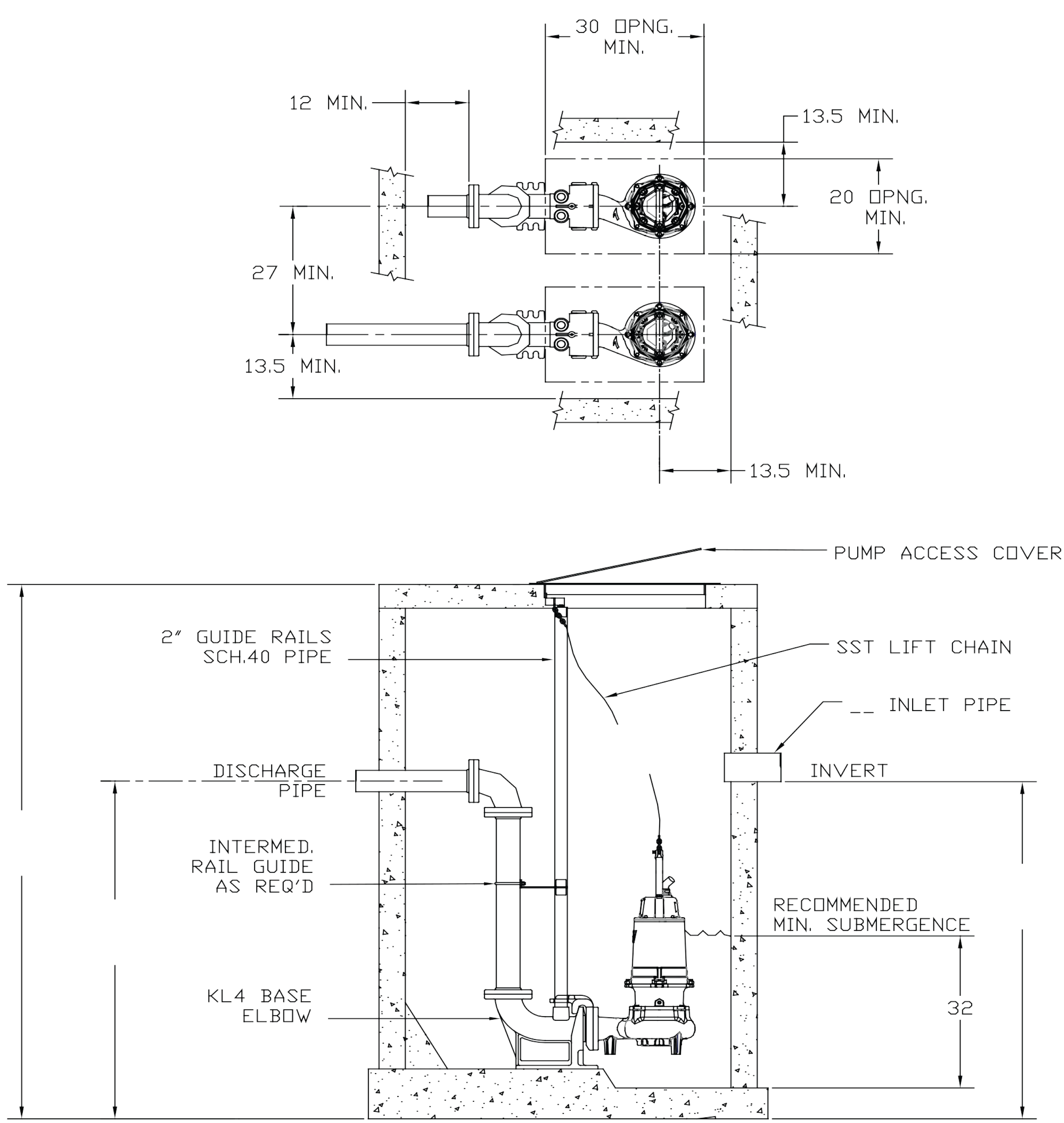


Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4RPM4&M6 Install Dimensions

Pump Series	K4RP (1150 & 1750)	4″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

Pump Model: **K4RP**

Physical Data:

Discharge Size	ANSI 4″ Horizontal
Solids Size	3″
Impeller Type	Balanced, Recessed
Power/Control Cable Length	40′ Standard
Paint	Blue, Powder Coated – Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components if Applicable
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	Type W - 2000V, 90° C
Control Cord Type	18-5 - SOOW - 600V, 90° C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

Pump Model: **K4RP – 1750 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		356º F (180º C)
Heat Sensor	**Open:**	275º F (135º C) Max. / 257º F (125º C) Min.
	Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
5	208	1	C	1.2	26.2	31.4	91.7	5.4	19.1	7.1
	230				22.8	28.3	82.6			
5	208	3	J	1.2	21.6	25.9	129.5	6.9	39.3	7.7
	230				19.3	23.2	116.8			
	460				9.6	11.5	58.1			
	575				7.7	9.2	46.5			
7.5	230	1	D	1.2	37.1	44.5	129.9	8.6	30.0	11.1
7.5	208	3	G	1.2	25.4	30.5	129.5	8.2	46.5	9.1
	230				22.9	27.5	116.8			
	460				11.4	13.7	58.1			
	575				9.1	10.9	46.5			
10	208	3	H	1.2	35.1	42.1	179.0	11.3	64.0	12.5
	230				31.6	37.9	161.2			
	460				15.7	18.8	80.1			
	575				12.5	15.0	63.8			
15	208	3	H	1.2	54.2	65.0	276.4	17.5	99.2	19.4
	230				48.9	58.7	249.4			
	460				24.4	29.3	124.4			
	575				19.4	23.3	98.9			

Pump Model: **K4RP – 1150 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		356º F (180º C)
Heat Sensor	**Open:**	275º F (135º C) Max. / 257º F (125º C) Min.
	Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1150**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
3	208	3	L	1.2	16.0	19.2	99.5	5.2	35.7	5.7
	230				14.4	17.3	89.6			
	460				7.2	8.6	44.8			
	575				5.8	6.9	35.8			
5	208	3	J	1.2	19.5	23.4	99.5	6.3	35.7	7.0
	230				17.6	21.1	89.6			
	460				8.8	10.5	44.8			
	575				7.0	8.4	35.8			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				Power Factor %			
HP	Phase	Service Factor Load	100% Load	75% Load	50% Load	Service Factor Load	100% Load	75% Load	50% Load
3	3	80	78	75	68	61	56	48	39
5	3	81	81	80	76	72	69	62	51

Pump Model: **<u>K4RP – 3450 RPM</u>**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		356º F (180º C)
Heat Sensor	**Open:**	275º F (135º C) Max. / 257º F (125º C) Min.
	Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**3450**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
7.5	208	3	J	1.2	29.4	35.3	206.6	9.5	75.2	7.2
	230				26.5	31.8	186.1			
	460				13.2	15.9	93.0			
	575				10.6	12.7	74.4			
10	208	3	J	1.2	40.5	48.6	206.6	13.1	75.2	7.4
	230				36.5	43.8	186.1			
	460				18.2	21.9	93.0			
	575				14.6	17.5	74.4			
15	208	3	H	1.2	56.1	67.3	286.1	18.2	102.8	11.9
	230				50.5	60.6	257.8			
	460				25.3	30.3	128.9			
	575				20.2	24.3	103.1			
20	230	3	H	1.0	60.6	60.6	287.9	19.9	102.8	16.1
	460				30.3	30.3	143.9			

SPECIFICATIONS

Solids-Handling Pumps K4RP

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, three-phase, designed for wet well and dry well submersible pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well and dry well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

1.4. The motor assembly shall be built, designed, and assembled to comply with FM 3615 for Class 1, Div. 1, Group C & D construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.

2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.

2.6. Submersible motor design:

2.6.1. ________ Horsepower
2.6.2. ________ RPM
2.6.3. ________ Voltage
2.6.4. ________ Phase
2.6.5. ________ Frequency
2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356º F (180º C). To include:

2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.

2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.

2.7.3. Stator lead material must meet or exceed Class H insulation system.

2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.

2.7.4.1. The thermal limiting devices shall be attached to each phase winding.

2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.8. Operation of the motor shall be designed for:

2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311ºF (155º C). 2.8.2. Capable of 15 evenly spaced starts per hour.

2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.

2.8.3.1. Acceptable voltage variation is +/- 10%.
2.8.3.2. Acceptable frequency variation is +/- 5%.
2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
2.8.3.4. Current unbalance must not exceed 5%.
2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:
2.9.1. Secured with 304 stainless steel fasteners.
2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.
3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.
3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.
3.2.3. Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
3.3. All bolted connections in the cord entry construction shall be:
3.3.1. Secured with 304 stainless steel fasteners.
3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.
3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.
3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
4.3. Inboard and outboard seal construction shall be of the following material:
4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.
4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.
4.3.3. Elastomers shall be constructed of Viton®.
4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.
4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.

4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.
4.8. Class 1, Division 1, explosion-proof models will be included with an additional labyrinth seal constructed of bronze, CDA836 material, and is mounted directly above the pump seal plate to take radial loads and act as a flame path for seal chamber.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.
5.2. Each pump shall be constructed with a two-bearing system design.
5.2.1. The upper bearing shall be a Conrad type, single row Radial ball bearing designed to adequately handle the required radial loads.
5.2.2. The lower bearing shall be a Conrad type, single row, angular contact ball bearing designed to adequately compensate for the axial loads and radial forces.
5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.
5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).
6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
7.2. The design shall be one-piece, 10-vane (3450) or 8-vane (1750 & 1150), vortex flow and dynamically balanced to ISO 1940 G6.3.
7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.
7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.
7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.
8.2. Design shall be a single piece and a modified constant velocity.
8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.
8.4. The discharge is to be of a horizontal centerline configuration.
8.5. The discharge is to be 4" ANSI® standard Class 125, 8-bolt configuration.
8.6. The inside of volute case shall be ceramic coated. Ceramic coating must be a two part component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

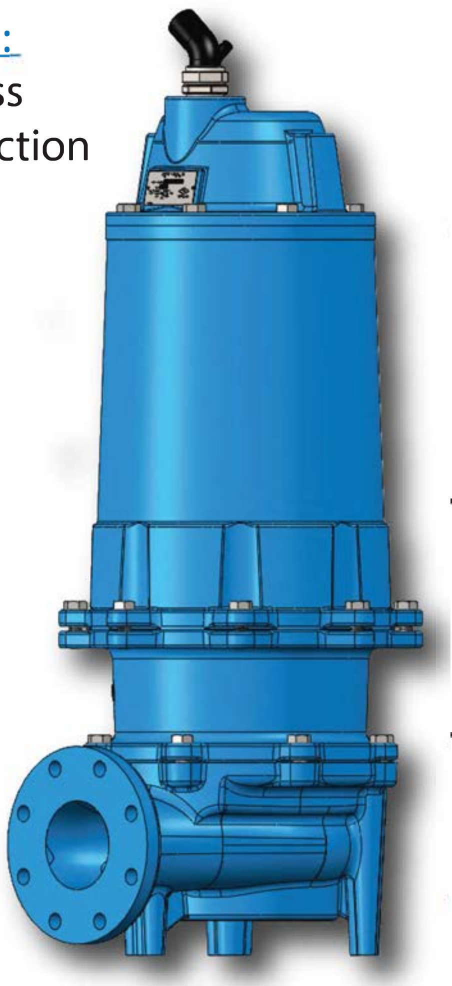
KEEN PUMP®

K4RB(X)

FM APPROVED

4" Submersible, Recessed Impeller
(Class 1, Div. 1, Groups C & D Hazardous Location)

Optional :
All Stainless
Steel Construction



CERAMIC COATED RECESSED IMPELLER
- Superior Abrasion Resistance
- Allows The Pump To Operate Better In Any Pressure Or Flow Condition

CERAMIC COATED VOLUTE
- Holds Up to Wear On Inside of Volute Casting Case

STANDARD MOTOR CONSTRUCTION
- Class H Laminations (Standard)

MOTOR GROUND RING PROTECTION
- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

DOUBLE ROW LOWER BEARINGS
- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates

BEST MOTOR CONSTRUCTION
- OPTIONAL Class "N" (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

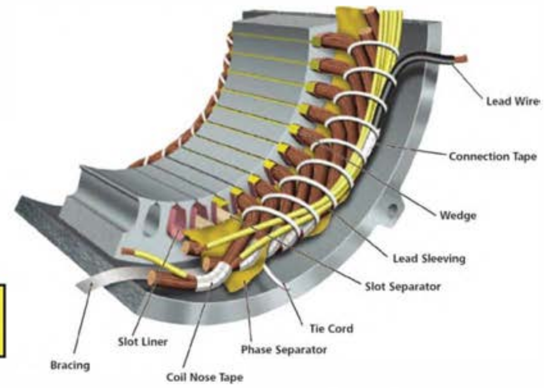
CAPABILITIES:
- Flows------------------------------------- to 1400 GPM
- Heads------------------------------------- to 275 Feet
- HP Range--------------------------------- 3 - 60 HP
- Voltage / Phase Options------------- 208 / 230 / 460 / 575V, 3 Phase
- Discharge Connections-------------- 4" ANSI Class 125 Horizontal Flange
- Motor Speeds--------------------------- 1150 / 1750 / 3450 RPM
- Solids-Handling----------------------- 3"
- Impeller----------------------------------- Recessed, Vortex
- Motor Service Factor---------------- 1.20

Features and Benefits

K4RB(X)

Heavy Duty Motor

Applications in Electric Motors:



- OPTIONAL Class "N" Motors for Keen's Solids Handling pumps.
- Highest temperature construction (200 degrees celcius) for motors
- Class "N" Construction is the best in the industry. Protects your motor from over heating and provides extended motor life.
- Motors are running hotter than ever before due to: longer run times, rapid cycling, motor housing not submerged, and running on VFD drives.

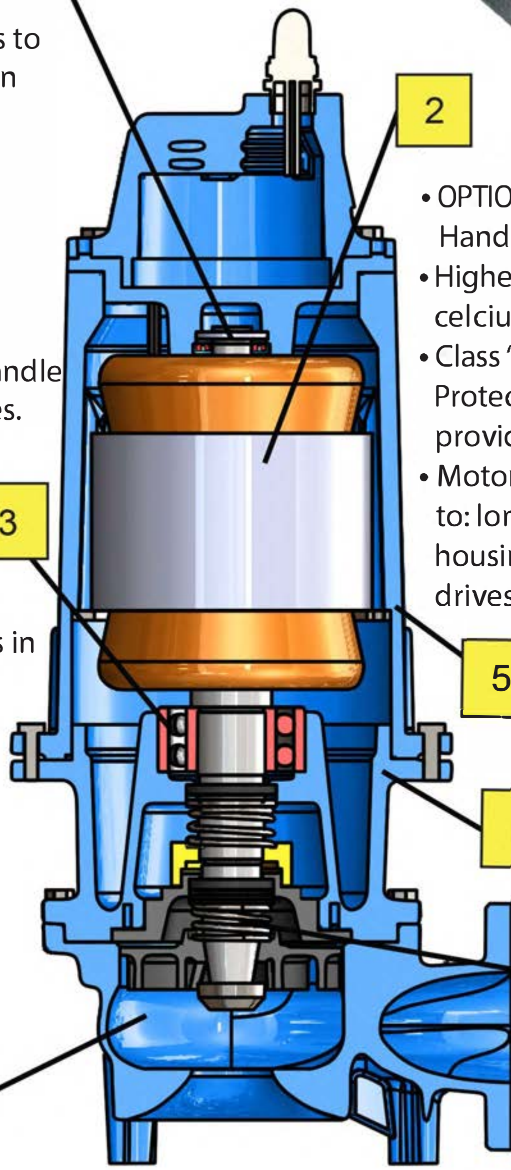
Keen Pump's Bearing Protection Program

- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.

1

- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.

2



Double Row Bearings

- Heavy Duty Bearings to handle the toughest performances.

- High Pressures
- High Flows

3

- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.

5 Castings

- ASTM - Class 35 high tensile strength castings.

6 Durable Powder Coat Finish

- Holds up to the toughest environmental conditions.

7 Dual Shaft Seals

- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

4

Ceramic Coating - Impeller and Volute Casting

The ultimate indestructable ceramic coated impellers and volutes for Keen's Solids Handling pumps. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

KEEN PUMP®

471 US Hwy 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

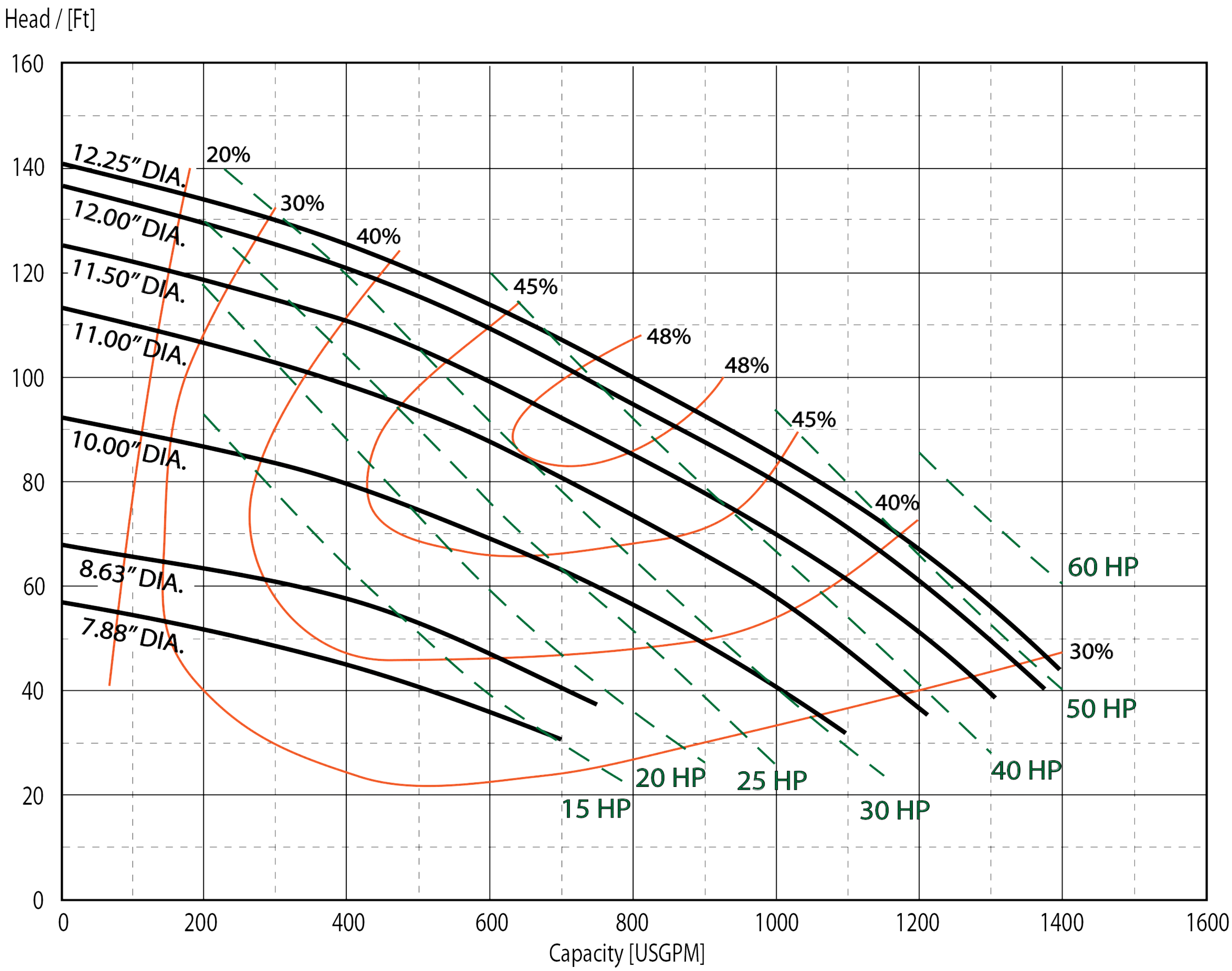
File : K4RB CUTS
Rev. 03/2022

KEEN PUMP

Section **VORTEX**
Date Nov. 2021

Pump Series	K4RB	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	1750 RPM	Discharge	4″	Solids	3″

GPM: ___________ TDH: ___________



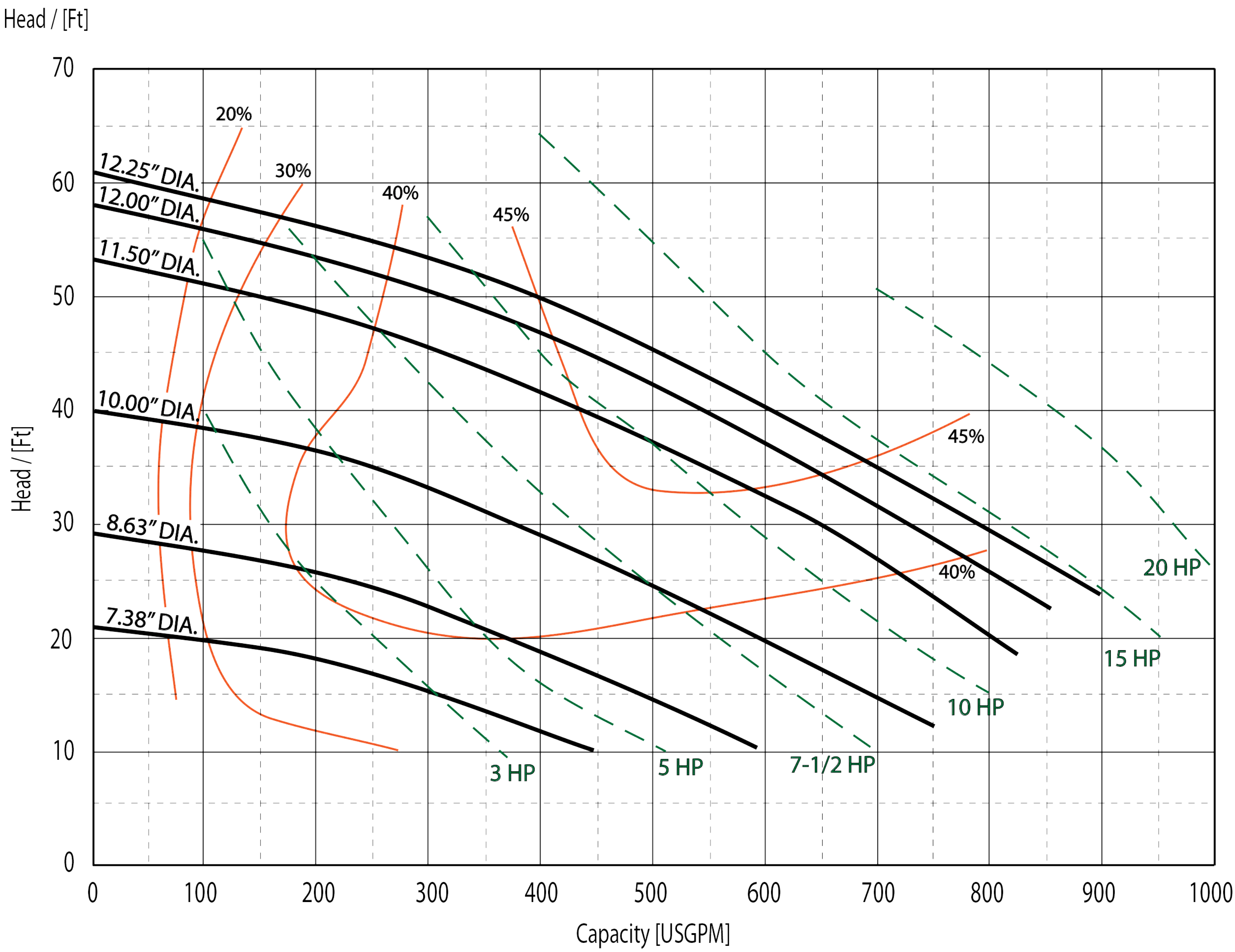
The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

KEEN PUMP

Section **VORTEX**
Date Nov. 2021

Pump Series	**K4RB**		4″ SUBMERSIBLE SEWAGE PUMPS		
Speed	**1150 RPM**	Discharge	**4″**	Solids	**3″**

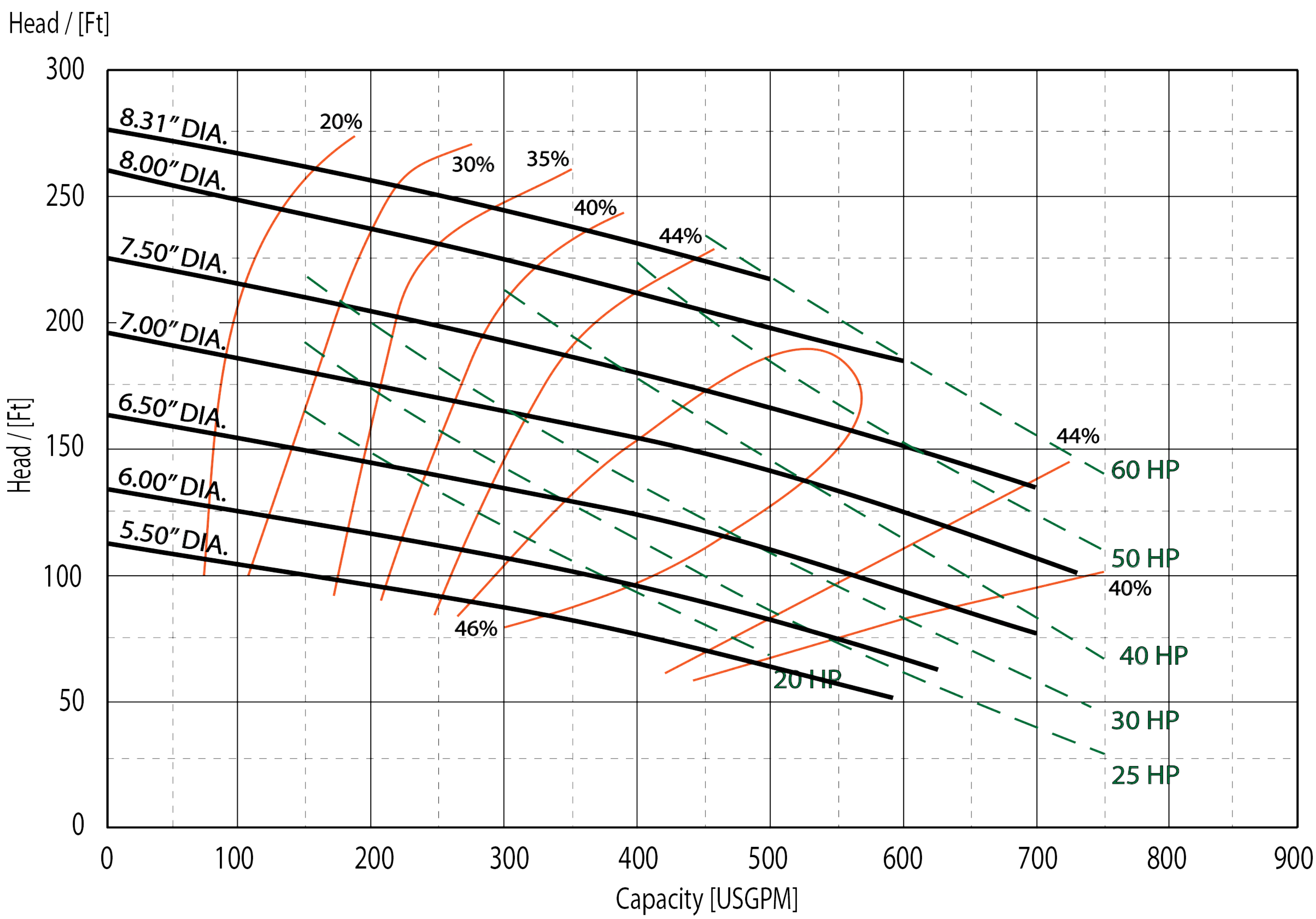
GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

Pump Series	K4RB		4″ SUBMERSIBLE SEWAGE PUMPS		
Speed	3450 RPM	Discharge	4″	Solids	3″

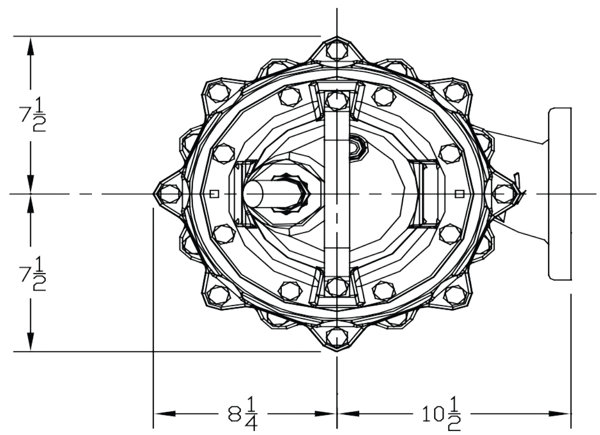
GPM: __________ TDH: __________

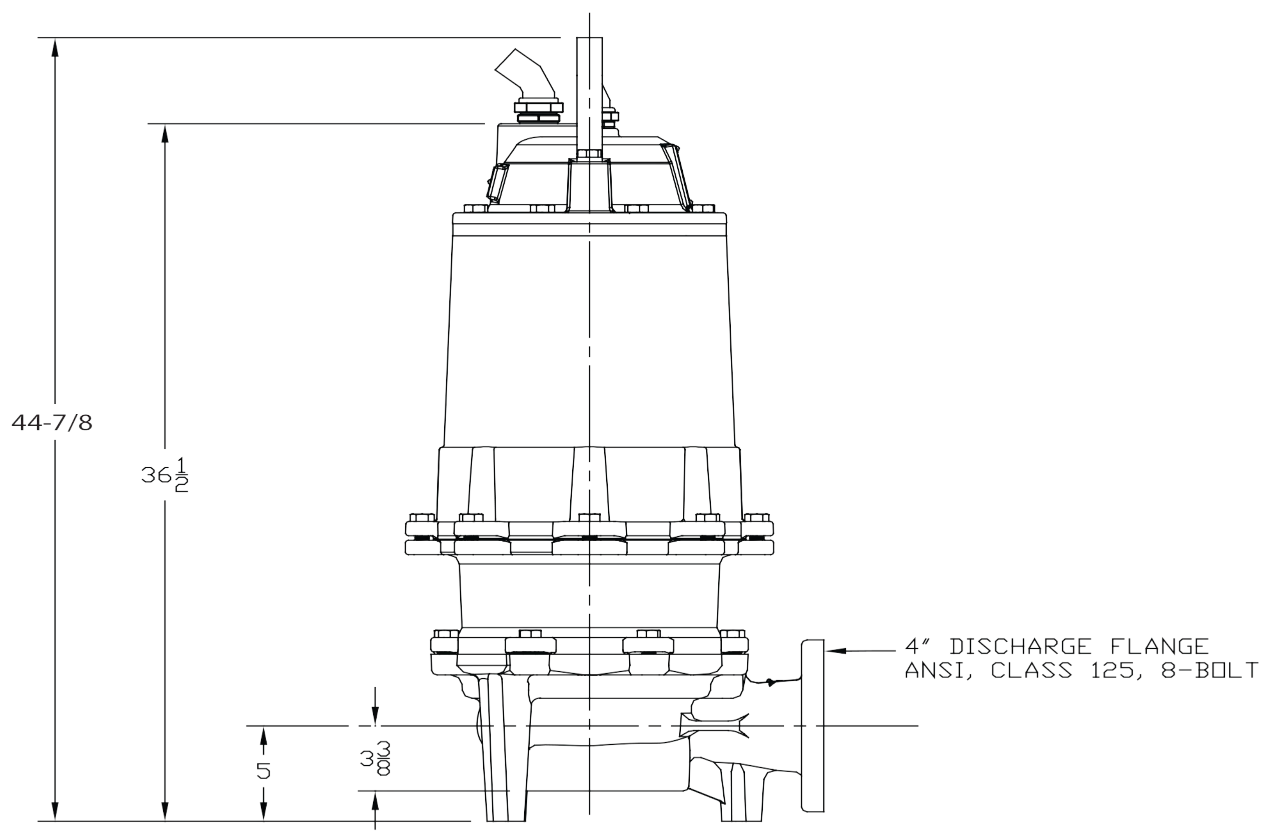


The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

Pump Series	K4RB (3450)	4″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



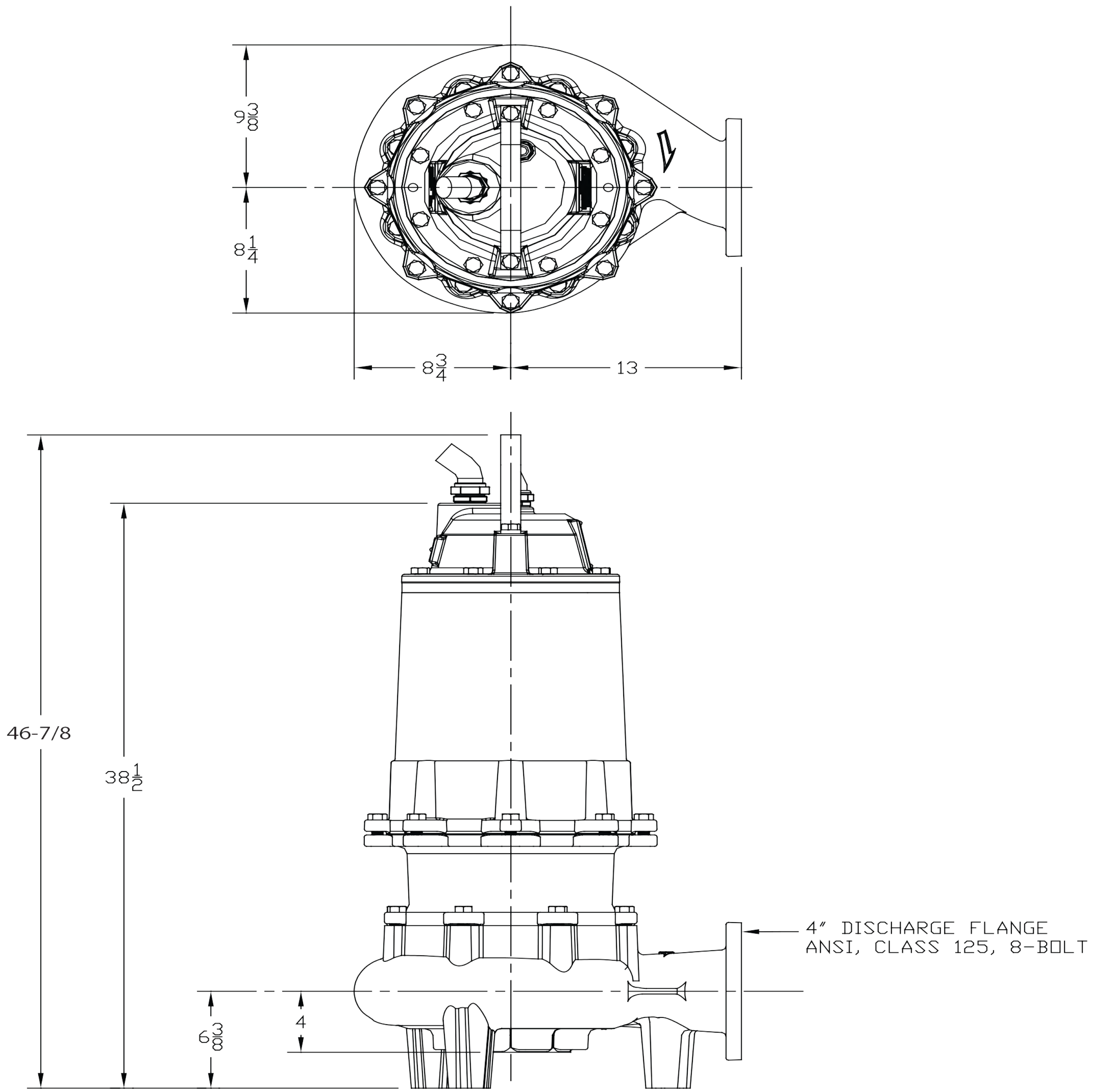


Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4RBM2 Dimensions

Pump Series	K4RB (1150&1750)	4″ SUBMERSIBLE SEWAGE PUMPS

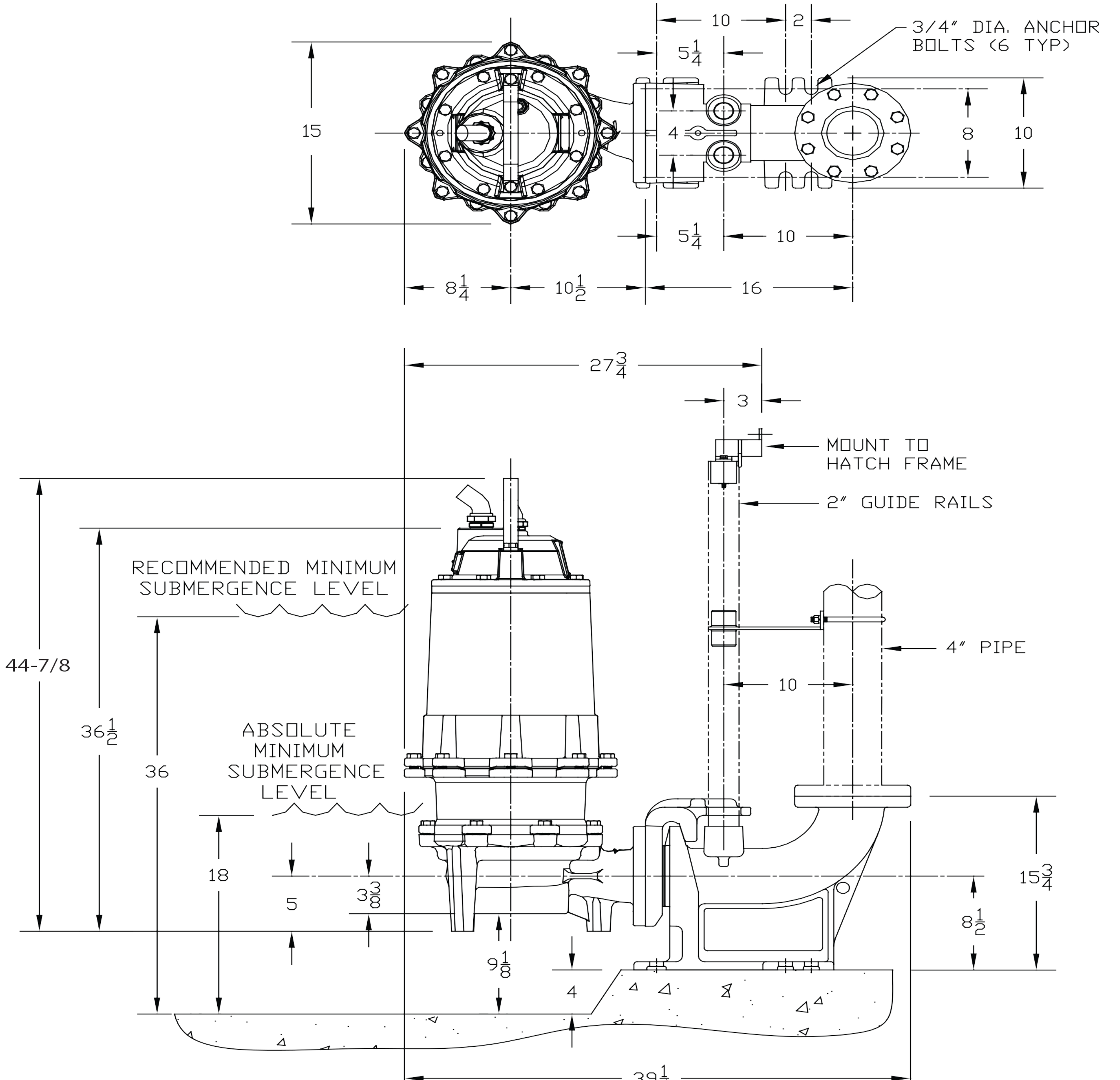
DIMENSIONAL DATA



Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

Pump Series	K4RB (3450)	4" SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

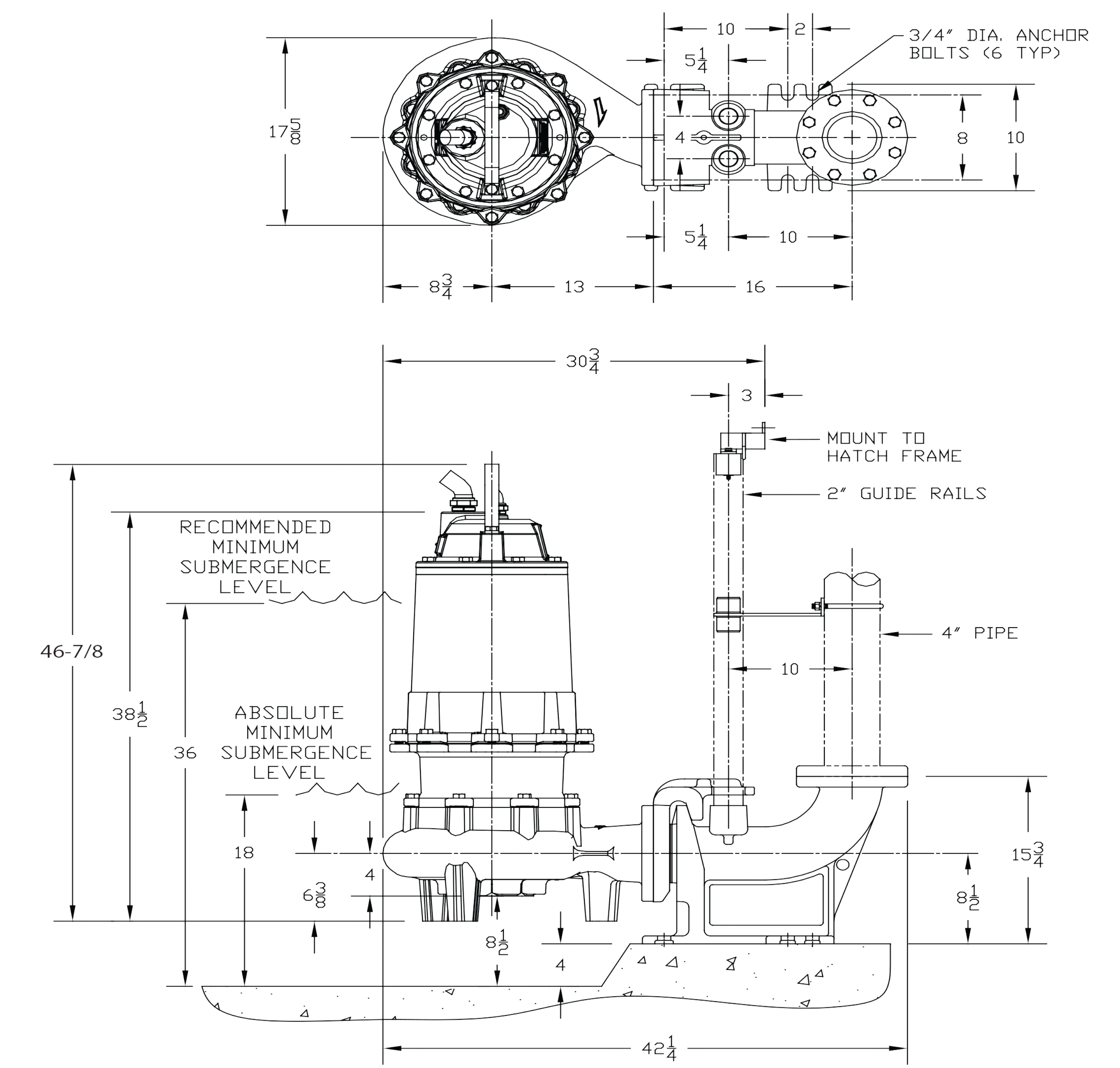


Notes:
1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4RBM2 Liftout Dimensions

Pump Series	K4RB (1150&1750)	4″ SUBMERSIBLE SEWAGE PUMPS

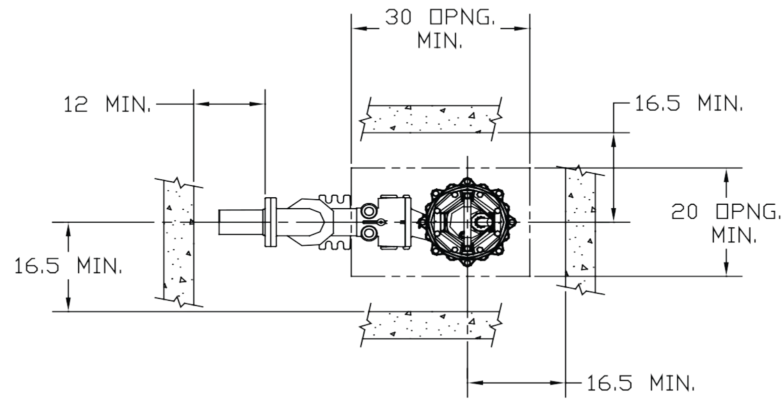
LIFTOUT DIMENSIONAL DATA

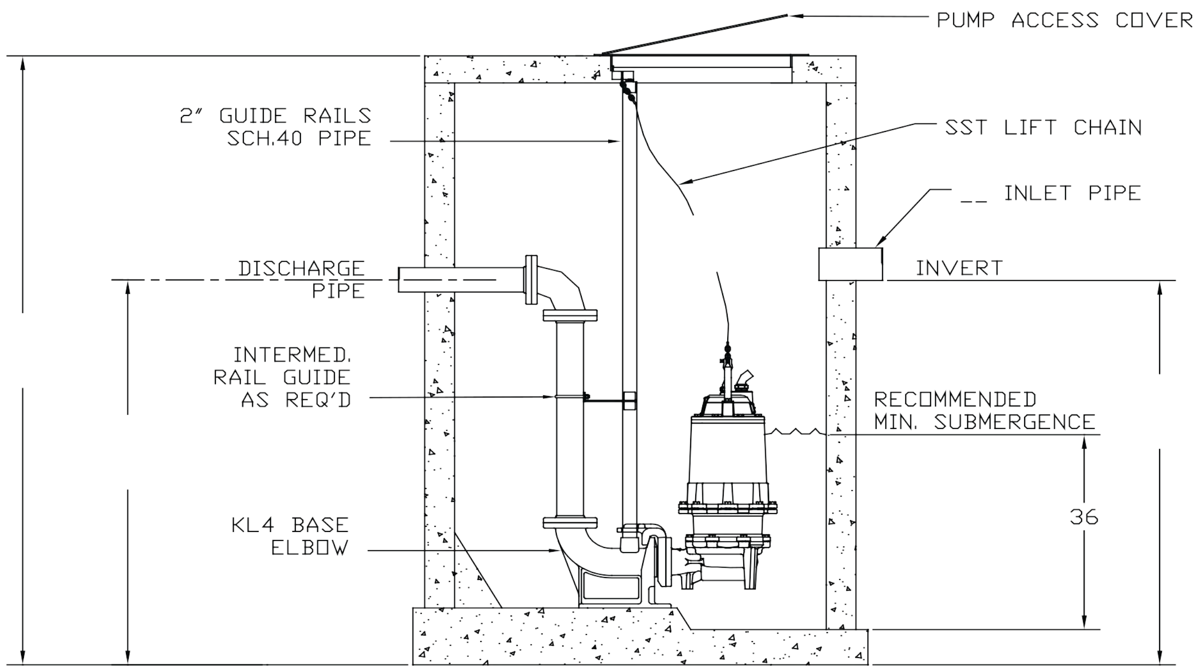


Notes:
1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

Pump Series	K4RB (3450)	4″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



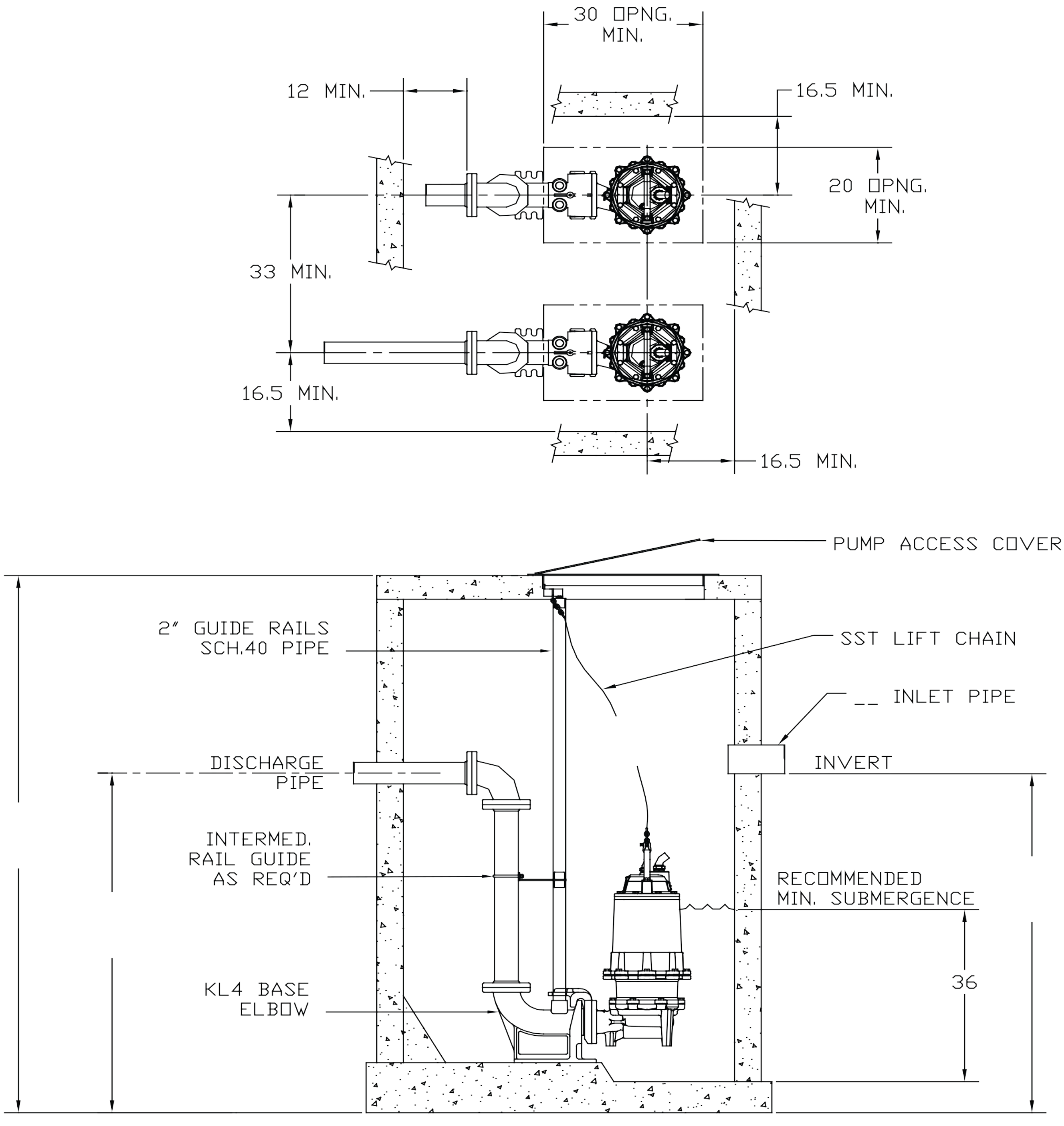


Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4RBM2 Install Dimensions

Pump Series	K4RB (3450)	4″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA

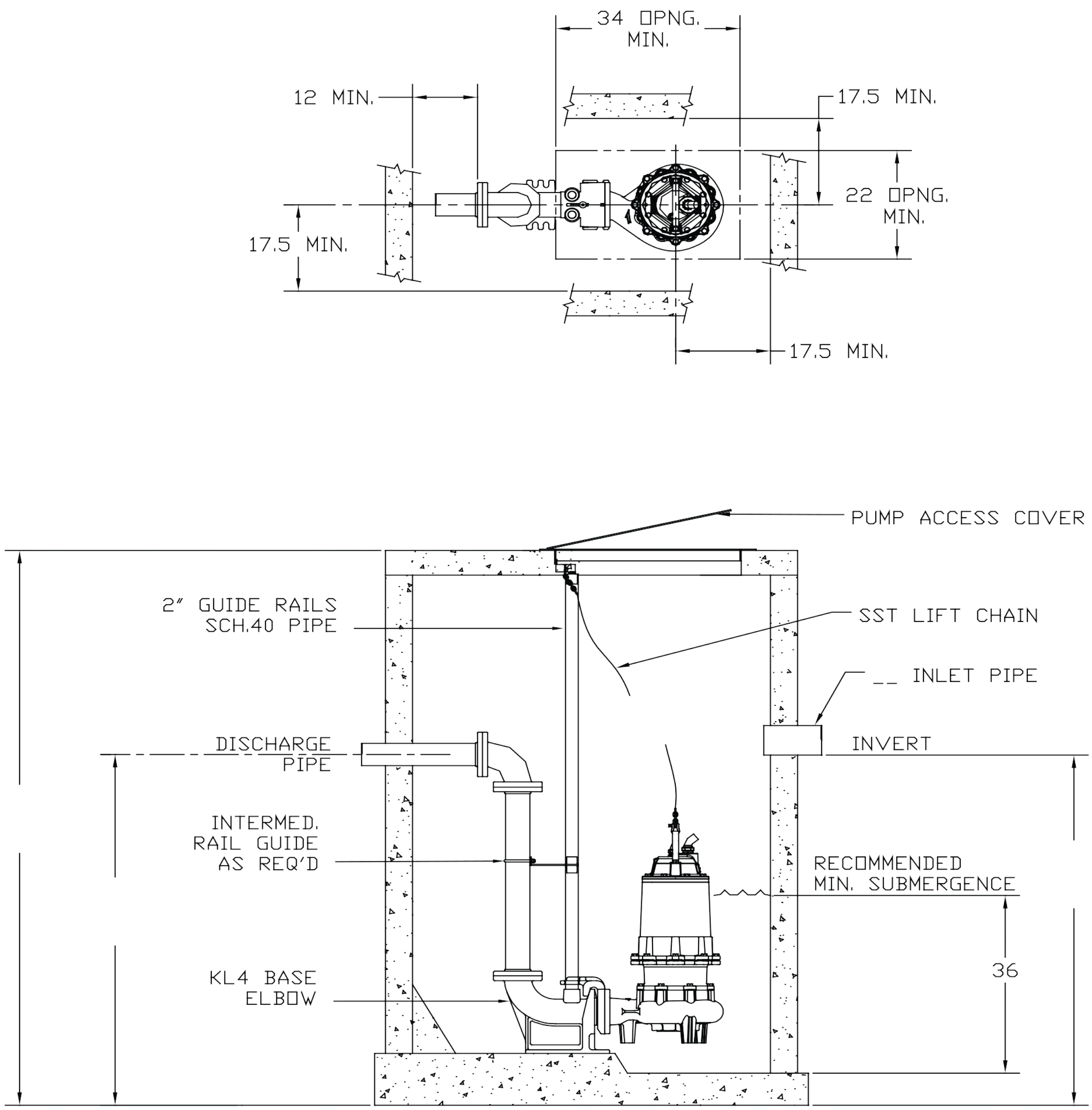


Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4RBM2 Install Dimensions

Pump Series	K4RB (1150&1750)	4″ SUBMERSIBLE SEWAGE PUMPS

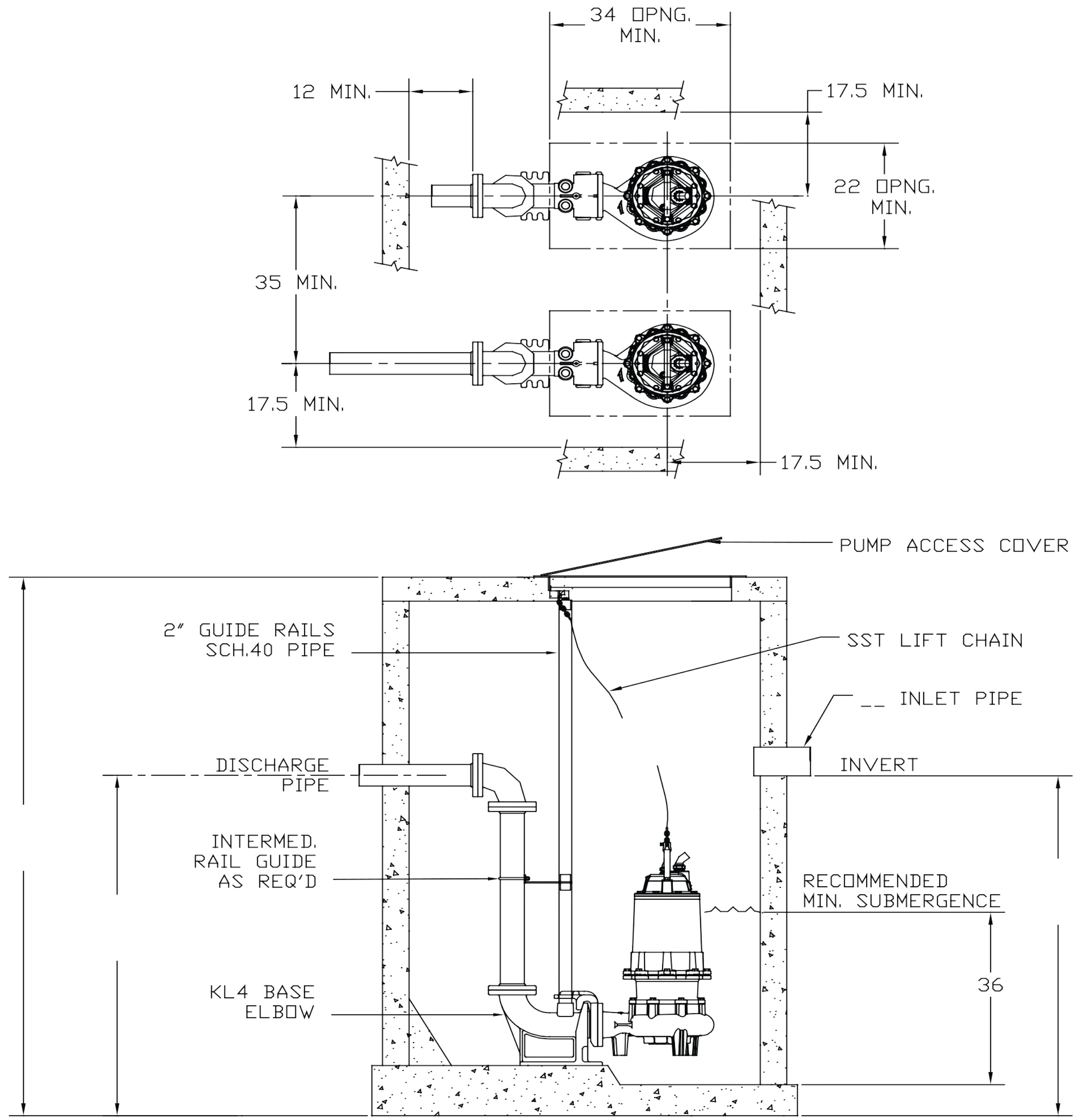
SIMPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

Pump Series	K4RB (1150&1750)	4″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

Pump Model: **K4RB**

Physical Data:

Discharge Size	ANSI 4″ Horizontal
Solids Size	3″
Impeller Type	Balanced, Recessed, 10 Vane (3450) / 8 Vane (1750 & 1150)
Power/Control Cable Length	40′ Standard
Paint	Blue, Powder Coated– Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components if Applicable
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	Type W - 2000V, 90° C
Control Cord Type	18-5 - SOOW - 600V, 90° C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

Pump Model: **K4RB – 1750 RPM**

Thermal Data:

Maximum Liquid	140º F (60º C) Intermittent
Maximum Stator	311º F (155º C)
Heat Sensor **Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point	390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
15	208	3	H	1.2	50.8	61.0	277.2	16.5	99.7	18.3
	230				45.8	54.9	249.7			
	460				22.9	27.5	124.9			
	575				18.3	22.0	99.9			
20	208	3	E	1.2	69.3	83.2	277.2	22.4	99.7	25.0
	230				62.4	74.9	249.7			
	460				31.2	37.5	124.9			
	575				25.0	30.0	99.9			
25	208	3	G	1.2	78.5	94.2	417.6	25.5	150.3	28.3
	230				70.7	84.9	376.2			
	460				35.4	42.4	188.1			
	575				28.3	33.9	150.5			
30	208	3	F	1.2	104.4	125.3	417.6	33.8	150.3	37.6
	230				94.1	112.9	376.2			
	460				47.0	56.4	188.1			
	575				37.6	45.1	150.5			
40	208	3	E	1.2	135.6	162.7	542.4	43.9	195.1	48.8
	230				122.2	146.6	488.6			
	460				61.1	73.3	244.3			
	575				48.9	58.6	195.5			
50	230	3	D	1.2	135.2	162.3	540.9	48.6	215.8	54.0
	460				67.6	81.1	270.5			
	575				54.1	64.9	216.4			

Pump Model: **K4RB – 1150 RPM**

Thermal Data:

Maximum Liquid	140° F (60° C) Intermittent
Maximum Stator	311° F (155° C)
Heat Sensor Open:	257° F (125° C) Max. / 239° F (115° C) Min.
Closed:	194° F (90° C) Max. / 119° F (48° C) Min.
Oil Flash Point	390° F (199° C)

Electrical Data:

RPM	1150			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
5	208	3	J	1.2	19.6	23.5	100.0	6.4	36.0	7.0
	230				17.7	21.2	90.1			
	460				8.8	10.6	45.0			
	575				7.1	8.5	36.0			
7.5	208	3	K	1.2	27.3	32.8	176.0	8.9	63.3	9.8
	230				24.6	29.5	158.5			
	460				12.3	14.8	79.3			
	575				9.8	11.8	63.4			
10	208	3	G	1.2	34.5	41.4	176.0	11.2	63.3	12.4
	230				31.1	37.3	158.5			
	460				15.5	18.6	79.3			
	575				12.4	14.9	63.4			
15	208	3	K	1.2	48.2	57.8	339.2	15.6	122.5	17.4
	230				43.4	52.1	305.5			
	460				21.7	26.1	152.8			
	575				17.4	20.8	122.2			
20	208	3	G	1.2	66.5	79.8	339.2	21.6	122.5	24.0
	230				59.9	71.9	305.5			
	460				30.0	35.9	152.8			
	575				24.0	28.8	122.2			

Pump Model: **K4RB – 1750 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	1750			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
15	208	3	H	1.2	50.8	61.0	277.2	16.5	99.7	18.3
	230				45.8	54.9	249.7			
	460				22.9	27.5	124.9			
	575				18.3	22.0	99.9			
20	208	3	E	1.2	69.3	83.2	277.2	22.4	99.7	25.0
	230				62.4	74.9	249.7			
	460				31.2	37.5	124.9			
	575				25.0	30.0	99.9			
25	208	3	G	1.2	78.5	94.2	417.6	25.5	150.3	28.3
	230				70.7	84.9	376.2			
	460				35.4	42.4	188.1			
	575				28.3	33.9	150.5			
30	208	3	F	1.2	104.4	125.3	417.6	33.8	150.3	37.6
	230				94.1	112.9	376.2			
	460				47.0	56.4	188.1			
	575				37.6	45.1	150.5			
40	208	3	E	1.2	135.6	162.7	542.4	43.9	195.1	48.8
	230				122.2	146.6	488.6			
	460				61.1	73.3	244.3			
	575				48.9	58.6	195.5			
50	230	3	D	1.2	135.2	162.3	540.9	48.6	215.8	54.0
	460				67.6	81.1	270.5			
	575				54.1	64.9	216.4			

SPECIFICATIONS

Solids-Handling Pumps K4RB

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, three-phase, designed for wet well and dry well submersible pump applications in water and sewage.
1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.
1.3. This specification covers sewage wet well and dry well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.
1.4. The motor assembly shall be built, designed, and assembled to comply with FM 3615 standards for Class 1, Div. 1, Group C & D construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.
2.6. Submersible motor design:
2.6.1. ________ Horsepower
2.6.2. ________ RPM
2.6.3. ________ Voltage
2.6.4. ________ Phase
2.6.5. ________ Frequency
2.6.6. 1.20 Service Factor
2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356º F (180º C). To include:
2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.
2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.
2.7.3. Stator lead material must meet or exceed Class H insulation system.
2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.
2.7.4.1. The thermal limiting devices shall be attached to each phase winding.
2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.
2.8. Operation of the motor shall be designed for:
2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311º F (155º C).
2.8.2. Capable of 15 evenly spaced starts per hour.
2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
2.8.3.1. Acceptable voltage variation is +/- 10%.
2.8.3.2. Acceptable frequency variation is +/- 5%.

2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.

2.8.3.4. Current unbalance must not exceed 5%.

2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:

2.9.1. Secured with 304 stainless steel fasteners.

2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.

3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.

3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.

3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.

3.2.3. Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.

3.3. All bolted connections in the cord entry construction shall be:

3.3.1. Secured with 304 stainless steel fasteners.

3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.

3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.

3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.

3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.

4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.

4.3. Inboard and outboard seal construction shall be of the following material:

4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.

4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.

4.3.3. Elastomers shall be constructed of Viton®.

4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.

4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.

4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.

4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

4.8. Class 1, Division 1, explosion-proof models will be included with an additional labyrinth seal constructed of bronze, CDA836 material, and is mounted directly above the pump seal plate to take radial loads and act as a flame path for seal chamber.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a two-bearing system design.

5.2.1. The upper bearing shall be a Conrad type, single row Radial ball bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a Conrad type, single row, angular contact ball bearing designed to adequately compensate for the axial loads and radial forces.

5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.

7.2. The design shall be one-piece, 10-vane (3450) or 8-vane (1750 & 1150), vortex flow and dynamically balanced to ISO 1940 G6.3.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.

7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.

8.2. Design shall be a single piece and a modified constant velocity.

8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.

8.4. The discharge is to be of a horizontal centerline configuration.

8.5. The discharge is to be 4" ANSI® standard Class 125, 8-bolt configuration.

8.6. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

Section SOLIDS-HANDLING
Dated MAR 2015

3” Discharge – 2-Vane Enclosed Impeller

3” Solids Handling

1750 & 1150 RPM

This section contains the following material:

1. **Pump Family Curves & Technical Data**	• K3VN
2. **Individual Performance Curves**	• K3VN
3. **Dimensional Drawings** Pump Lift-Out & Base Elbow Wet Well Installations	• K3VN

Ashland, Ohio 44805
Phone: 419-207-9400

3” Solids-Handling Pumps

Model Number Identification Chart

K 3 VN 50 - 21 M 2 Y

Keen Pump

Discharge Size:
- 3 = 3”
- 4 = 4”

Pump Model

Horsepower (HP x 10)
- 30 = 3 HP
- 50 = 5 HP
- 75 = 7-1/2 HP
- 100 = 10 HP
- 150 = 15 HP
- 200 = 20 HP
- 250 = 25 HP
- 300 = 30 HP
- 400 = 40 HP
- 500 = 50 HP

Voltage/Phase
- 01 = 208/1
- 21 = 230/1
- 03 = 208/3
- 23 = 230/3
- 43 = 460/3
- 53 = 575/3

Manual Pump Operation

Speed
- 2 = 3450 RPM
- 4 = 1750 RPM
- 6 = 1150 RPM

Frequency
- Blank = 60 Hz
- Y = 50 Hz

K3VN(X)

3” Submersible, Enclosed Impeller
(Class 1, Div. 1, Groups C & D Hazardous Location)

Optional :
All Stainless
Steel Construction

CERAMIC COATED VORTEX IMPELLER

- Superior Abrasion Resistance
- Allows The Pump To Operate Better In Any Pressure Or Flow Condition

CERAMIC COATED VOLUTE

- Holds Up to Wear On Inside of Volute Casting Case

STANDARD MOTOR CONSTRUCTION

- Class H Laminations (Standard)

MOTOR GROUND RING PROTECTION

- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

DOUBLE ROW LOWER BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates

BEST MOTOR CONSTRUCTION

- OPTIONAL Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

CAPABILITIES:

- Flows-------------------------------------- to 700 GPM
- Heads-------------------------------------- to 76 Feet
- HP Range--------------------------------- 1 - 10 HP
- Voltage / Phase Options------------- 208/230 V, 1 Phase - 208/230/460 V, 3 Phase
- Discharge Connections-------------- 3” ANSI Class 125 Horizontal Flange
- Motor Speeds--------------------------- 1150 / 1750 RPM
- Solids-Handling------------------------ 2.5”
- Impeller---------------------------------- Balanced, Enclosed, 2-Vane
- Motor Service Factor----------------- 1.20

Features and Benefits

K3VN(X)

Keen Pump's Bearing Protection Program

- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.

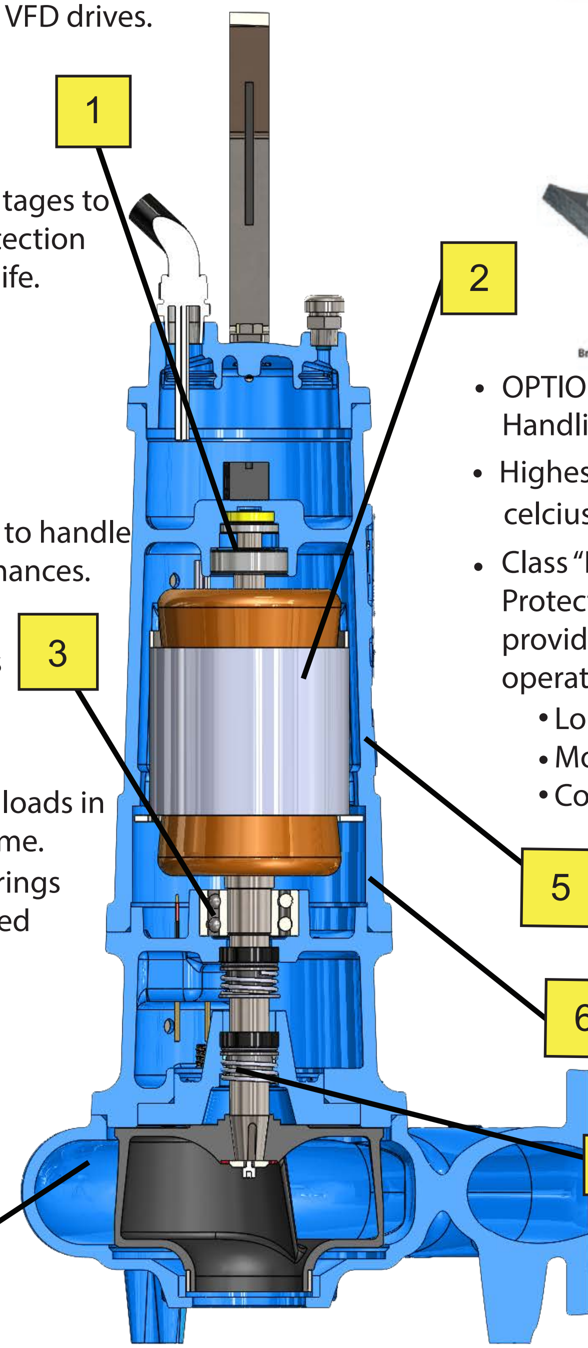
- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.

Double Row Bearings

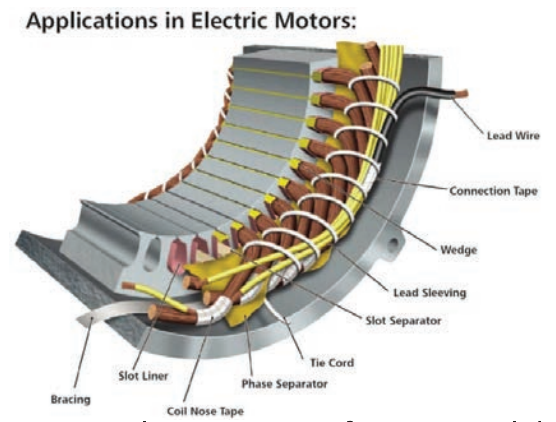
- Heavy Duty Bearings to handle the toughest performances.

- High Pressures
- High Flows

- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.



Heavy Duty Motor



- OPTIONAL Class "N" Motors for Keen's Solids Handling pumps.
- Highest temperature construction (200 degrees celcius) for motors
- Class "N" Construction is the best in the industry. Protects your motor from over heating and provides extended motor life. Motors are operating at higher teperatures due to:
  - Longer run times
  - Motor housing not submerged
  - Continuous

Castings

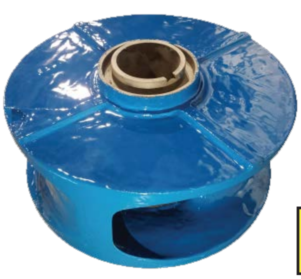
- ASTM - Class 35 high tensile strength castings.

Durable Powder Coat Finish

- Holds up to the toughest environmental conditions.

Dual Shaft Seals

- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.



Ceramic Coating - Impeller and Volute Casting

The ultimate indestructable ceramic coated impellers and volutes for Keen's Solids Handling pumps. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

KEEN PUMP

471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

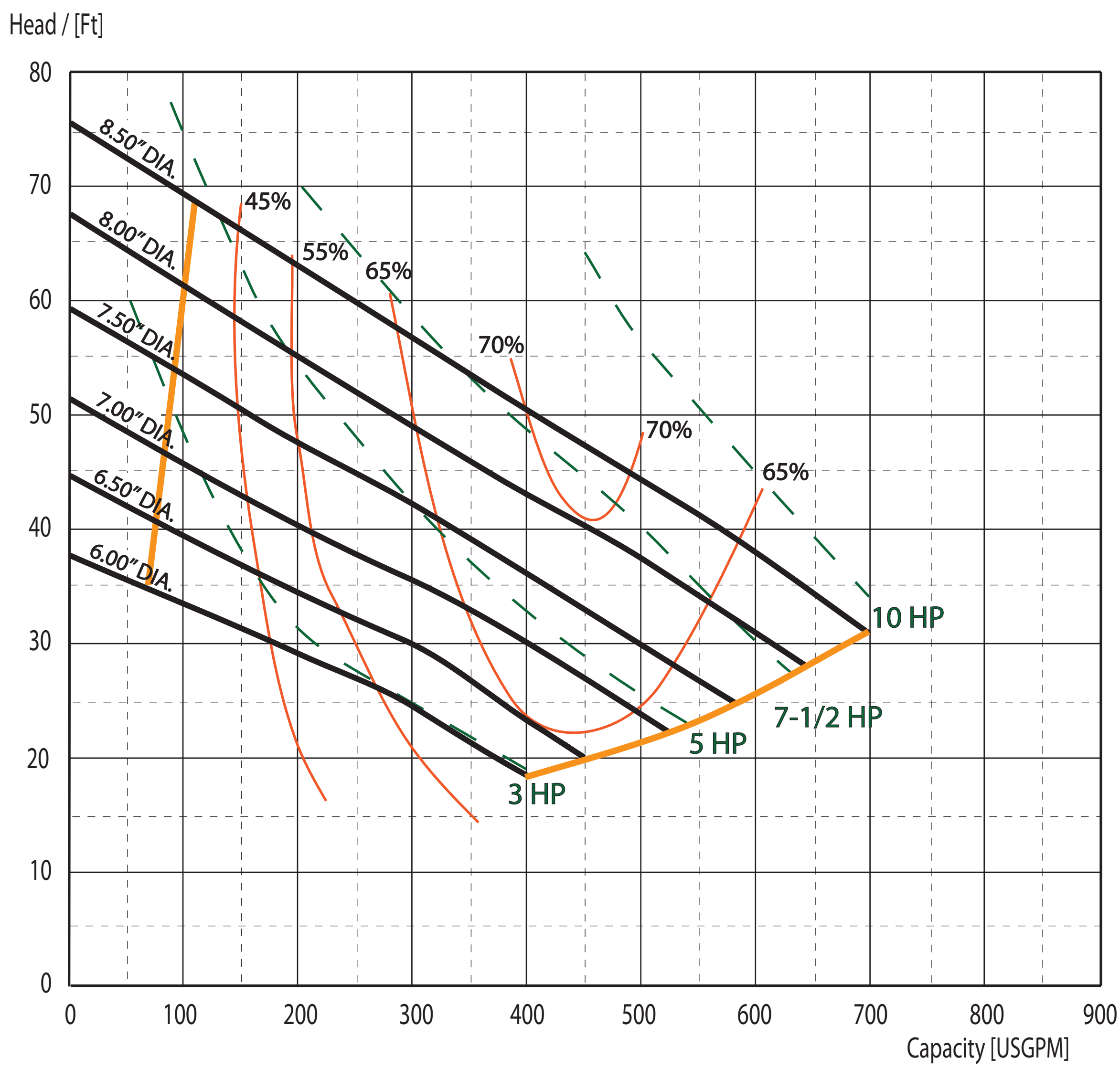
File : K3VN CUTS
Rev. 03/2022

KEEN PUMP

Section **ENCLOSED**
Date Nov. 2021

Pump Series	K3VN	3″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1750 RPM**	Discharge	**3″**	Solids	**3″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

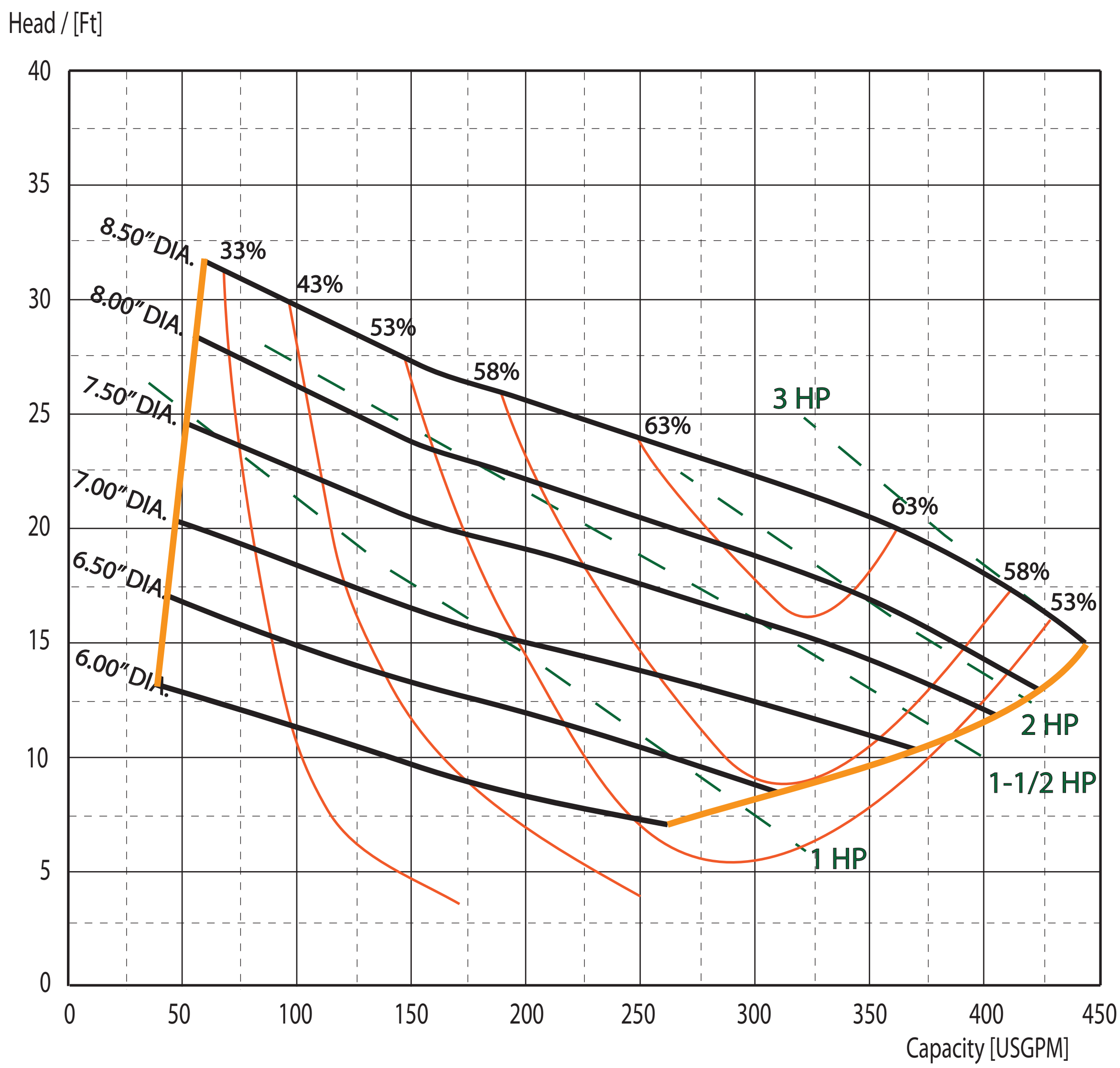
File: K3VN_1750

KEEN PUMP

Section	**ENCLOSED**
Date	Nov. 2021

Pump Series	**K3VN**	3″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1150 RPM**	Discharge	**3″**	Solids	**3″**

GPM: __________ TDH: __________



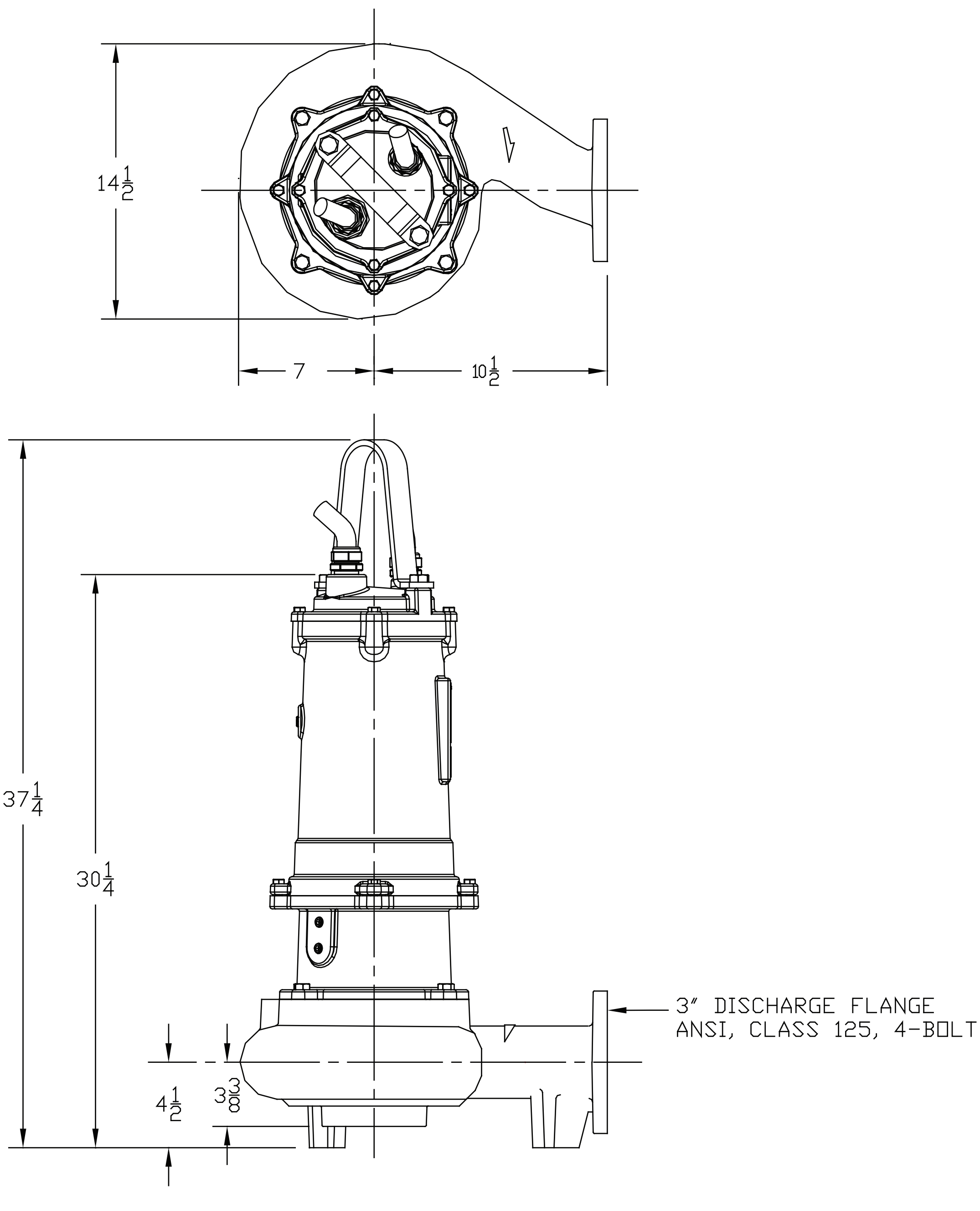
The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K3VN_1150_CAT

Section ENCLOSED
Date MAR 2015

Pump Series	K3VN	3″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

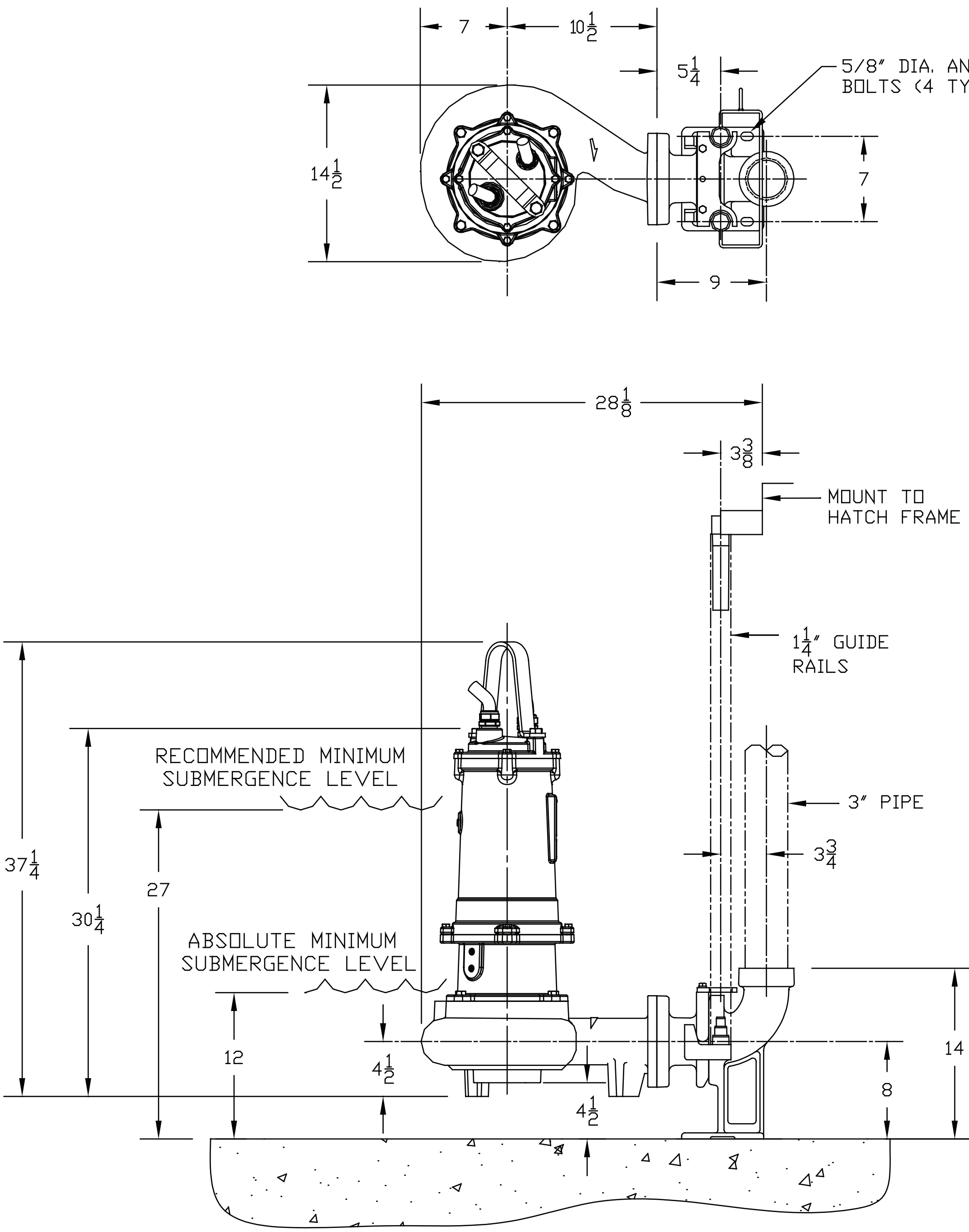
File: K3VN Dimensions

KEEN PUMP

Section ENCLOSED
Date MAR 2015

Pump Series	K3VN	3″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



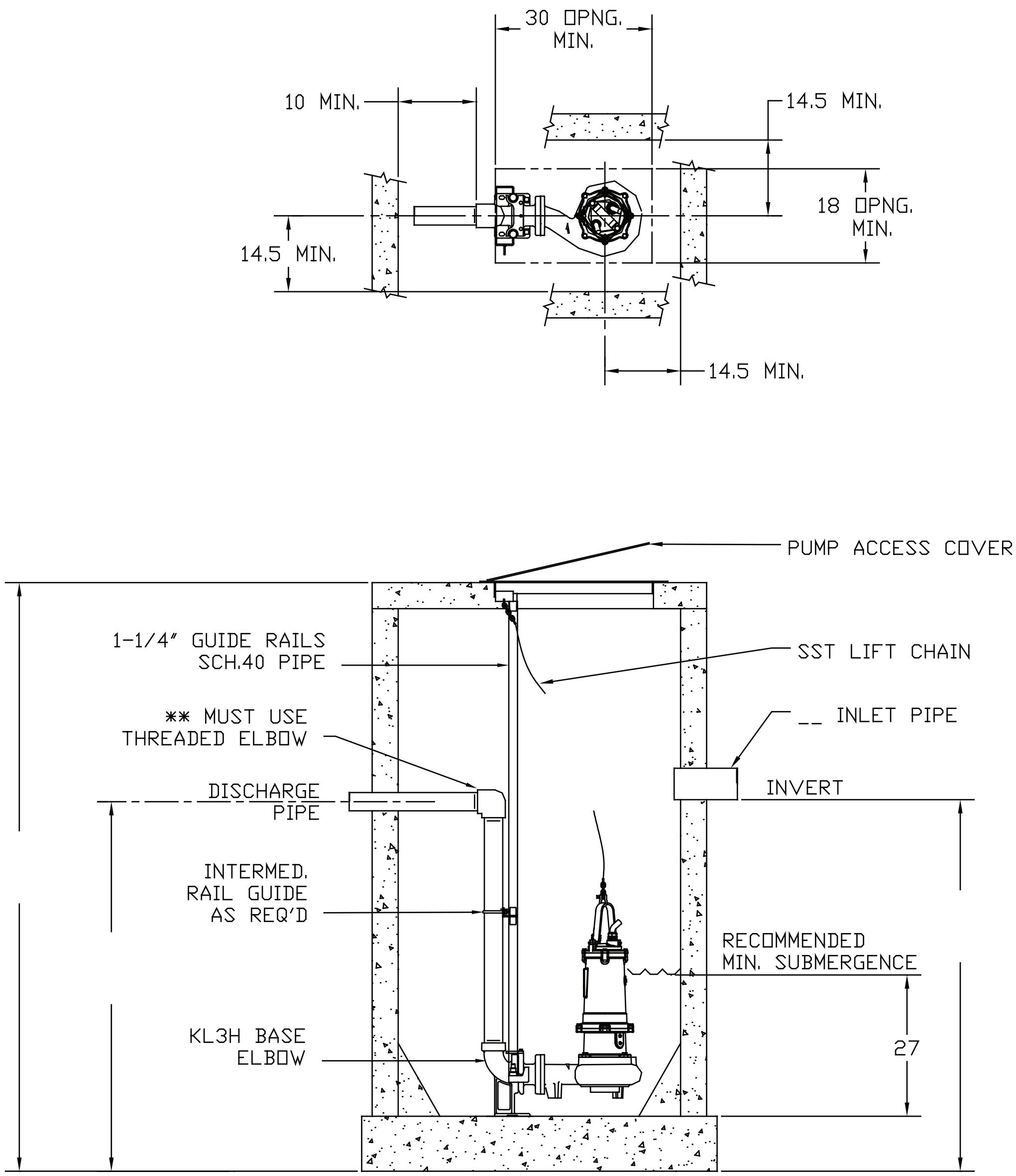
Notes:
1. All dimensions in inches unless noted.
2. Discharge flange 3″ NPT.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Dimensions may vary due to normal manufacturing tolerances.
5. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K3VN Liftout Dimensions

Section **ENCLOSED**
Date **MAR 2015**

Pump Series	K3VN	3″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA

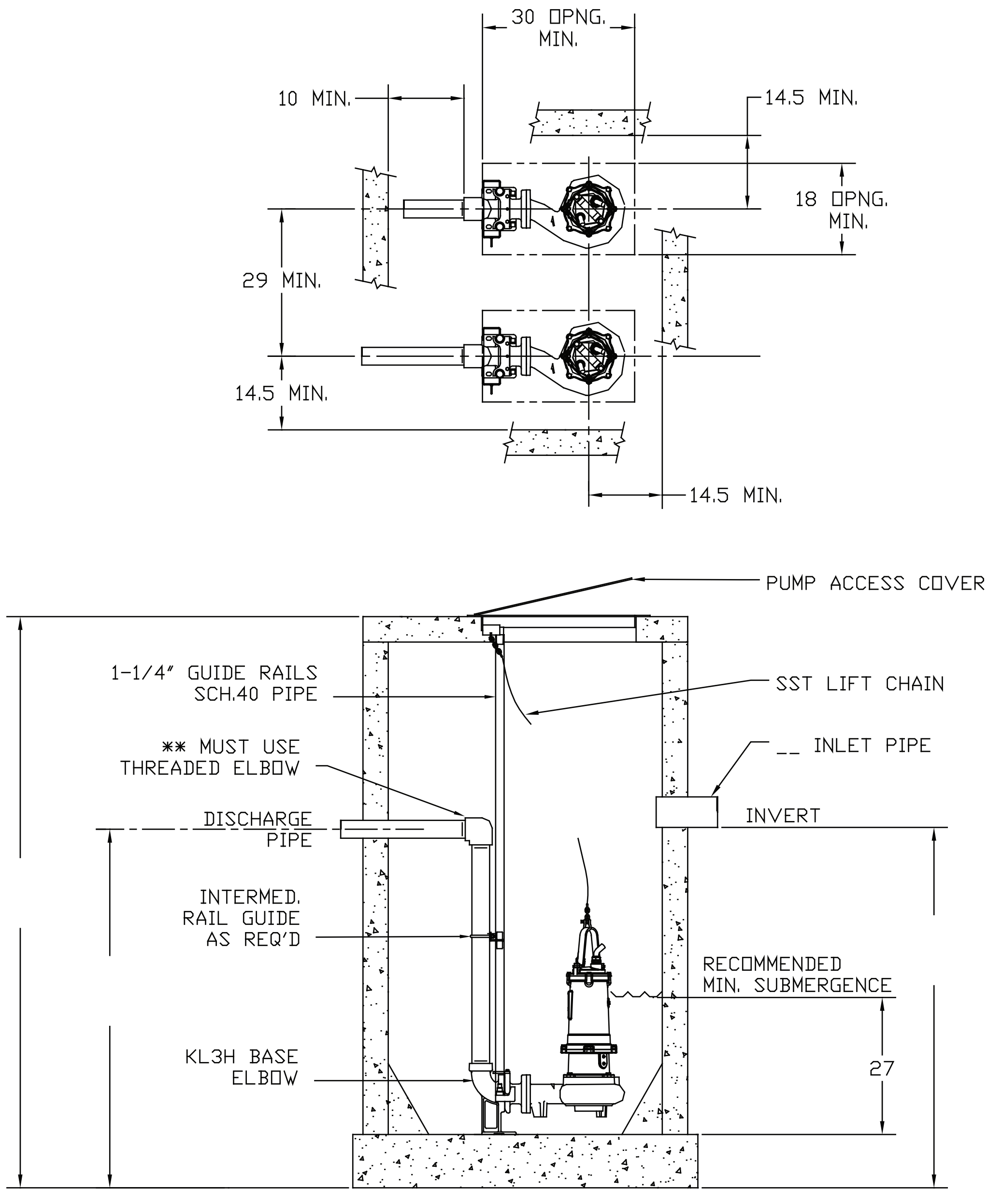


Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used
   limited to 2X larger maximum.

File: K3VN Install Dimensions

Pump Series	K3VN	3″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

Pump Model: **K3VN**

Physical Data:

Discharge Size	ANSI 3″ Horizontal
Solids Size	2.5″
Impeller Type	Balanced, Enclosed, 2 Vane
Power/Control Cable Length	40′ Standard
Paint	Blue, Powder Coated – Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) **- Optional**
Power Cord Type	Type W - 2000V, 90º C
Control Cord Type	18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Volute Wear Ring	Bronze, CDA 836
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Line Bearing	Bronze, CDA 836

Pump Model: **K3VN – 1750 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C)
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
3	208	1	E	1.2	26.2	31.4	77.0	4.0	13.9	5.2
	230				23.8	28.6	77.0			
3	208	3	H	1.2	16.3	19.6	71.4	4.6	20.6	5.8
	230				14.7	17.6	58.8			
	460				7.3	8.8	29.4			
5	208	1	F	1.2	37.1	44.5	130.0	7.7	26.9	10.0
	230				33.4	40.1	130.0			
5	208	3	F	1.2	26.2	31.4	84.4	6.0	26.5	7.5
	230				23.8	28.6	76.0			
	460				11.9	14.3	38.0			
7.5	230	1	F	1.2	40.1	48.0	130.0	7.7	26.9	10.0
7.5	208	3	F	1.2	32.1	38.5	131.4	9.1	40.4	11.3
	230				28.9	34.7	121.4			
	460				14.5	17.4	60.7			
10	208	3	E	1.0	38.5	38.5	161.7	11.0	48.5	13.6
	230				34.7	34.7	138.8			
	460				17.3	17.3	69.4			

Motor Efficiencies & Power Factor

		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
3	1	66	66	64	56	87	83	79	70
3	3	71	70	69	63	81	80	79	71
5	1	65	65	64	59	86	83	76	62
5	3	78	78	75	70	79	76	71	60
7.5	3	77	76	74	69	75	70	64	54
10	3	75	76	75	70	79	78	71	59

SPECIFICATIONS

Solids-Handling Pumps K3VN

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, both single and poly-phase, designed for wet well submersible pump applications in water and sewage.
1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.
1.3. This specification covers sewage wet well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.
1.4. The motor assembly shall be built, designed, and assembled to comply with FM 3615 standards for Class 1, Div. 1, Group C & D construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.
2.6. Submersible motor design:
- 2.6.1. _________ Horsepower
- 2.6.2. _________ RPM
- 2.6.3. _________ Voltage
- 2.6.4. _________ Phase
- 2.6.5. _________ Frequency
- 2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356º F (180º C). To include:
- 2.7.1. The stator windings shall be constructed of material to meet the Class F insulation system.
- 2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.
- 2.7.3. Stator lead material must meet or exceed Class H insulation system.
- 2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.
  - 2.7.4.1. The thermal limiting devices shall be attached to each phase winding.
  - 2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.8. Operation of the motor shall be designed for:
- 2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311º F (155º C).
- 2.8.2. Capable of 15 evenly spaced starts per hour.
- 2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
  - 2.8.3.1. Acceptable voltage variation is +/- 10%.
  - 2.8.3.2. Acceptable frequency variation is +/- 5%.

2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.

2.8.3.4. Current unbalance must not exceed 5%.

2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:

2.9.1. Secured with 304 stainless steel fasteners.

2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.

3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.

3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.

3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.

3.3. All bolted connections in the cord entry construction shall be:

3.3.1. Secured with 304 stainless steel fasteners.

3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.

3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.

3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.

3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.

4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.

4.3. Inboard and outboard seal construction shall be of the following material:

4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.

4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.

4.3.3. Elastomers shall be constructed of Viton®.

4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.

4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.

4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.

4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a three-bearing design.

5.2.1. The upper bearing shall be a Conrad type, single row, Radial ball bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately compensate for the axial loads and radial forces.

5.2.3. An additional sleeve bearing shall be constructed of SAE 841 material and is mounted directly above the lower seal to take radial loads and act as flame path for seal chamber.

5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 50,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.

7.2. The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.

7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.

8.2. Design shall be a single piece and a modified constant velocity.

8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.

8.4. Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.

8.5. The discharge is to be of a centerline discharge configuration.

8.6. The discharge is to be 3" ANSI® standard Class 125, 4-bolt configuration.

8.7. Horizontal discharge is standard if specifying K3VN model.

8.8. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

4" Discharge – 2-Vane Enclosed Impeller

3" Solids Handling

1750 & 1150 & 870 RPM

This section contains the following material:

1. **Pump Family Curves & Technical Data**	• K4VN • K4VP • K4VB • K4VK
2. **Individual Performance Curves**	• K4VN • K4VP • K4VB • K4VK
3. **Dimensional Drawings** Pump Lift-Out & Base Elbow Wet Well Installations	• K4VN • K4VP • K4VB • K4VK

Ashland, Ohio 44805
Phone: 419-207-9400

4" Solids-Handling Pumps

Model Number Identification Chart

K 4 VN 50 - 21 M 2 Y

Keen Pump

Discharge Size:
4 = 4"
6 = 6"

Pump Model

Horsepower (HP x 10)
30 = 3 HP
50 = 5 HP
75 = 7-1/2 HP
100 = 10 HP
150 = 15 HP
200 = 20 HP
250 = 25 HP
300 = 30 HP
400 = 40 HP
500 = 50 HP

Voltage/Phase
01 = 208/1
21 = 230/1
03 = 208/3
23 = 230/3
43 = 460/3
53 = 575/3

Manual Pump Operation

Speed
2 = 3450 RPM
4 = 1750 RPM
6 = 1150 RPM
8 = 870 RPM

Frequency
Blank = 60 Hz
Y = 50 Hz

KEEN PUMP®

K4VN(X)

4" Submersible, Enclosed Impeller
(Class 1, Div. 1, Groups C & D Hazardous Location)

Optional :
All Stainless
Steel Construction

CERAMIC COATED VORTEX IMPELLER
- Superior Abrasion Resistance
- Allows The Pump To Operate Better In Any Pressure Or Flow Condition

CERAMIC COATED VOLUTE
- Holds Up to Wear On Inside of Volute Casting Case

STANDARD MOTOR CONSTRUCTION
- Class H Laminations (Standard)

MOTOR GROUND RING PROTECTION
- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

DOUBLE ROW LOWER BEARINGS
- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates

BEST MOTOR CONSTRUCTION
- OPTIONAL Class "N" (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

CAPABILITIES :

- Flows-------------------------------------- to 690 GPM
- Heads-------------------------------------- to 75 Feet
- HP Range-------------------------------- 1 - 10 HP
- Voltage / Phase Options------------- 208/230 V, 1 Phase - 208/230/460 V, 3 Phase
- Discharge Connections-------------- 4" ANSI Class 125 Horizontal Flange
- Motor Speeds-------------------------- 1150 / 1750 RPM
- Solids-Handling----------------------- 3"
- Impeller---------------------------------- Balanced, Enclosed, 2-Vane
- Motor Service Factor----------------- 1.20

Features and Benefits

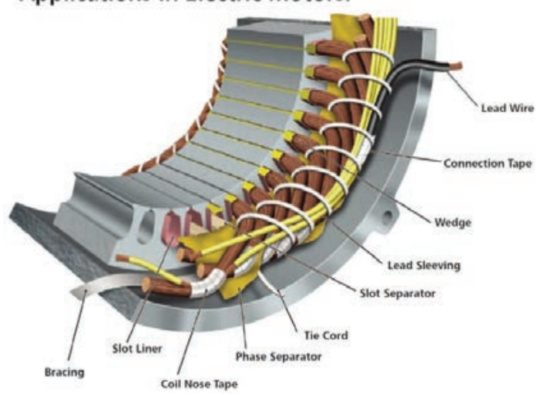
K4VN(X)

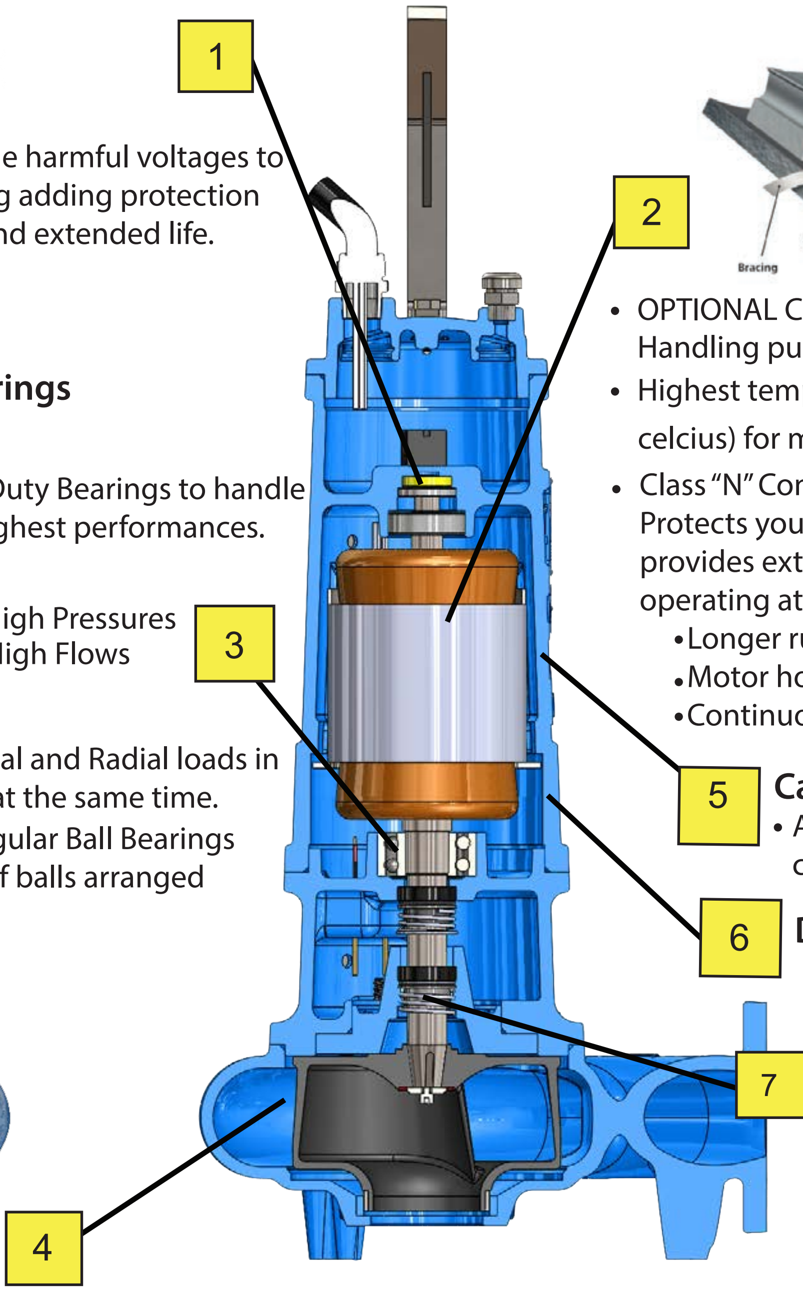
Keen Pump's Bearing Protection Program

- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.
- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.

Heavy Duty Motor

Applications in Electric Motors:





- OPTIONAL Class "N" Motors for Keen's Solids Handling pumps.
- Highest temperature construction (200 degrees celcius) for motors
- Class "N" Construction is the best in the industry. Protects your motor from over heating and provides extended motor life. Motors are operating at higher teperatures due to:
  - Longer run times
  - Motor housing not submerged
  - Continuous

Double Row Bearings

- Heavy Duty Bearings to handle the toughest performances.
- High Pressures
- High Flows
- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.

Castings

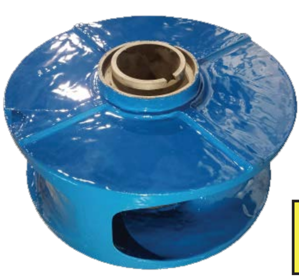
- ASTM - Class 35 high tensile strength castings.

Durable Powder Coat Finish

- Holds up to the toughest environmental conditions.

Dual Shaft Seals

- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.



Ceramic Coating - Impeller and Volute Casting

The ultimate indestructable ceramic coated impellers and volutes for Keen's Solids Handling pumps. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

KEEN PUMP®

471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

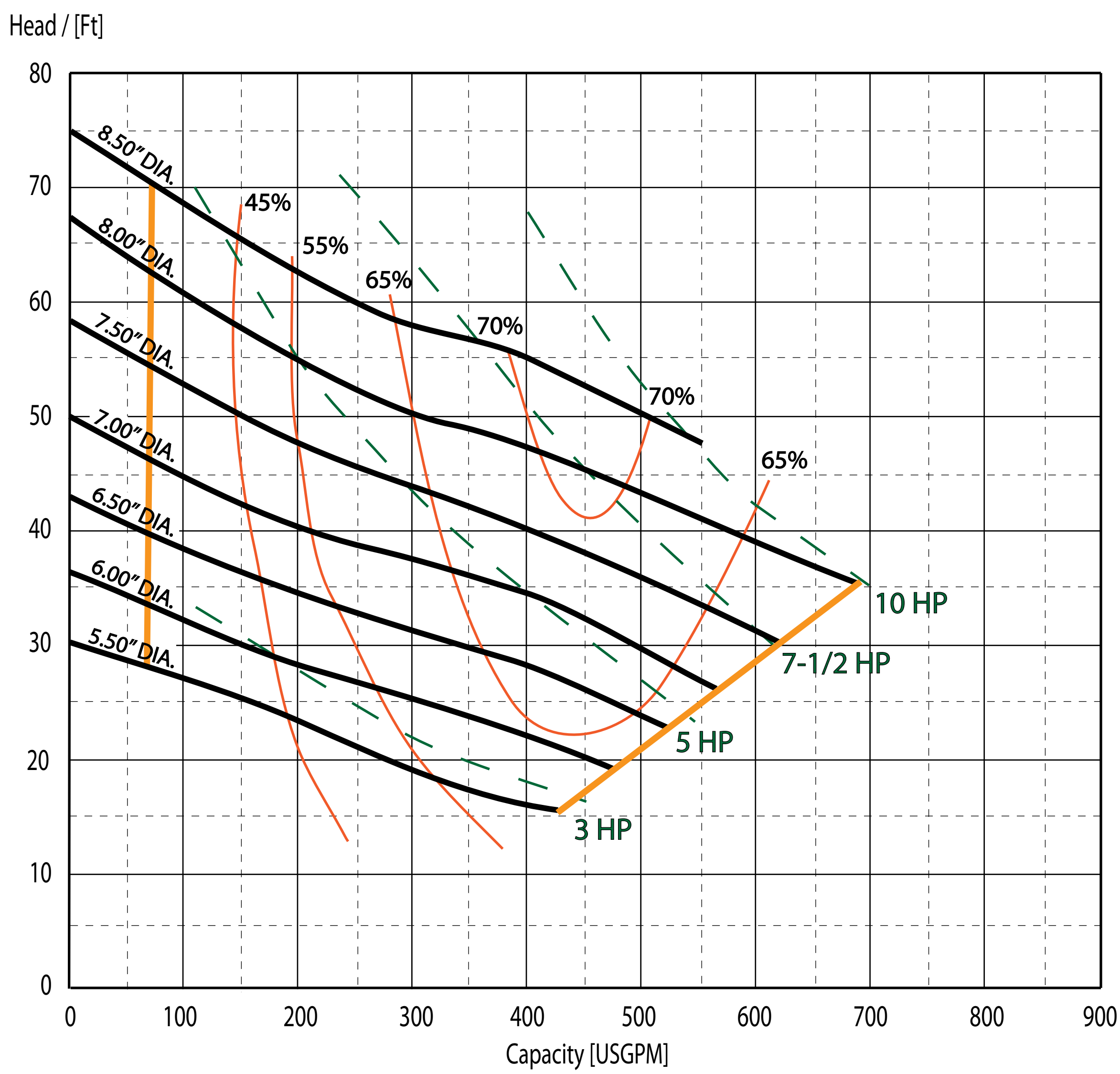
File : K4VN CUTS
Rev. 03/2022

KEEN PUMP

Section	**ENCLOSED**
Date	Nov. 2021

Pump Series	**K4VN**	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1750 RPM**	Discharge	**4″**	Solids	**3″**

GPM: __________ TDH: __________



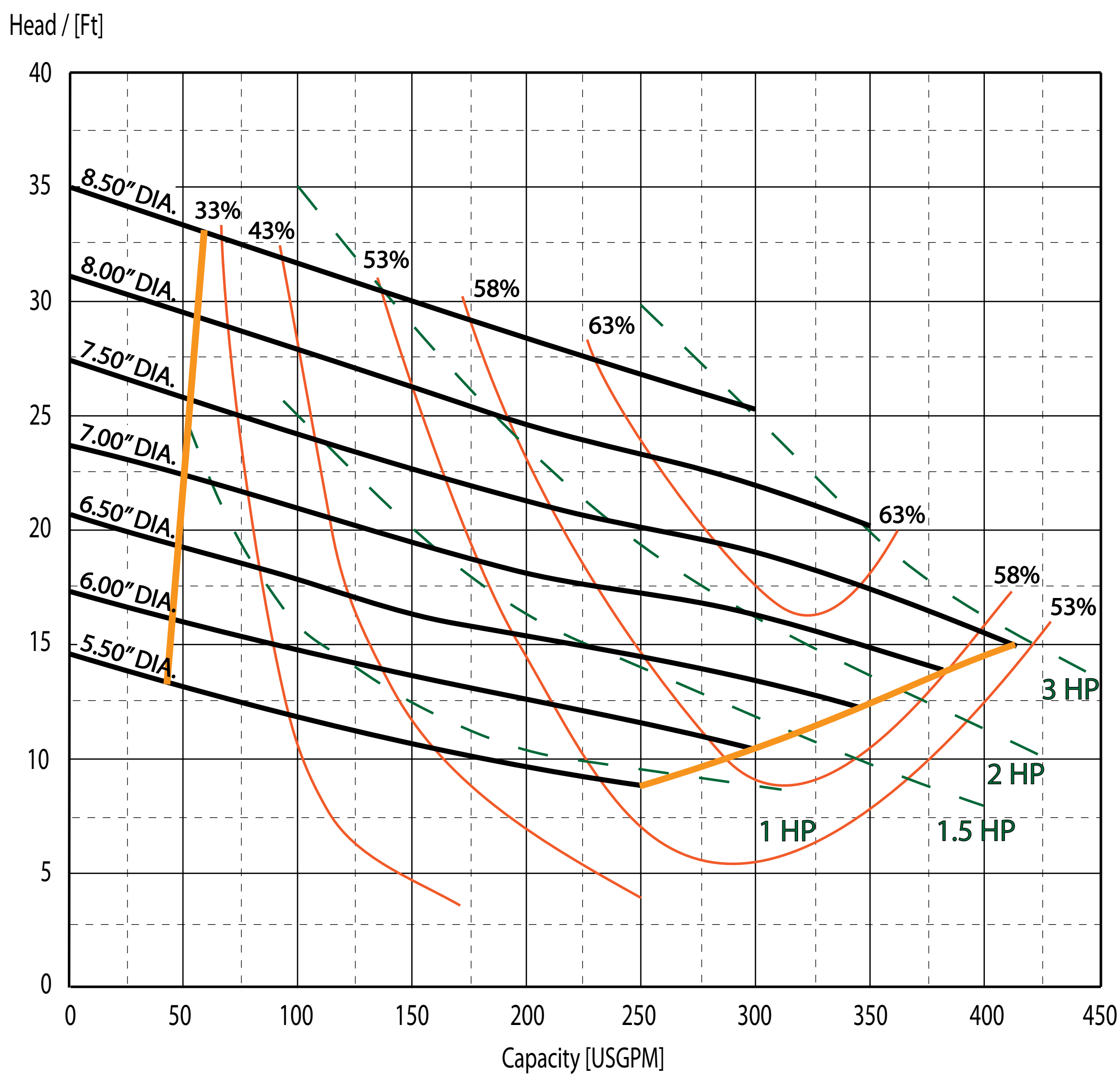
The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K4VN_1750

Section		ENCLOSED
Date		Nov. 2021

Pump Series	K4VN		4″ SUBMERSIBLE SEWAGE PUMPS		
Speed	**1150 RPM**	Discharge	**4″**	Solids	**3″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

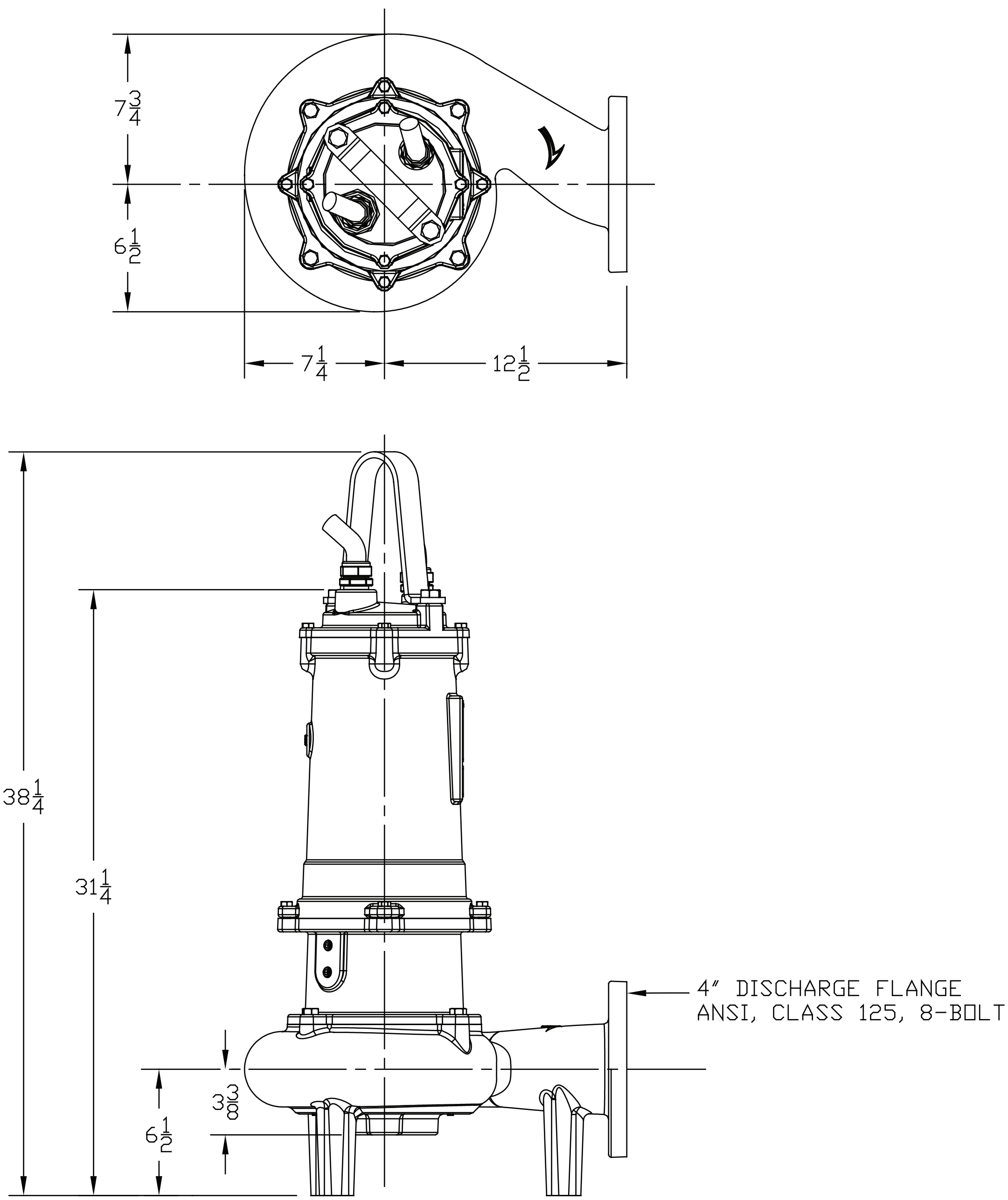
File: K4VN_1150

KEEN PUMP®

Section **ENCLOSED**
Date **JULY 2013**

Pump Series	K4VN	4″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

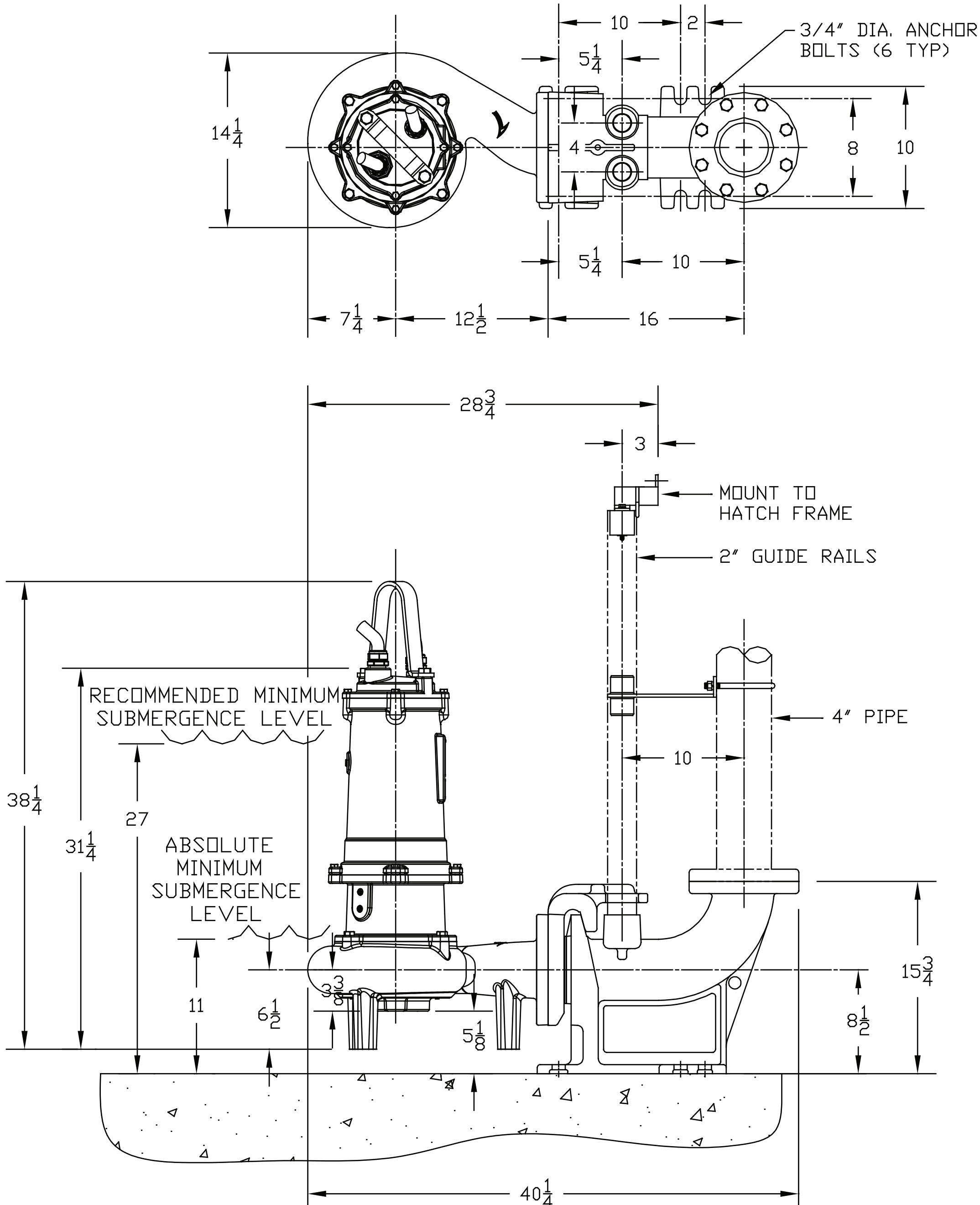
File: K4VN Dimensions

KEEN PUMP®

Section **ENCLOSED**
Date **JULY 2013**

Pump Series	**K4VN**	4″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



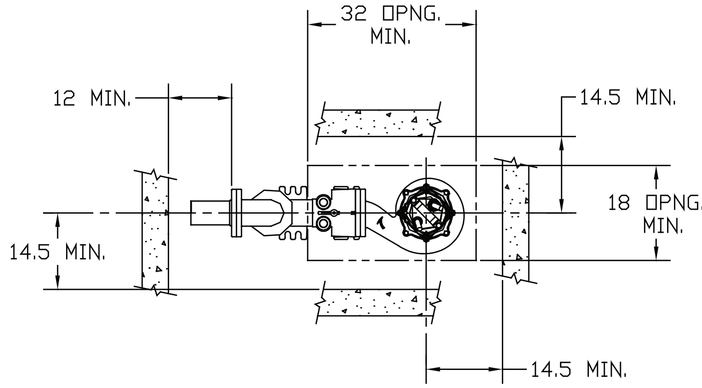
Notes:
1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used Limited to 2X larger maximum.

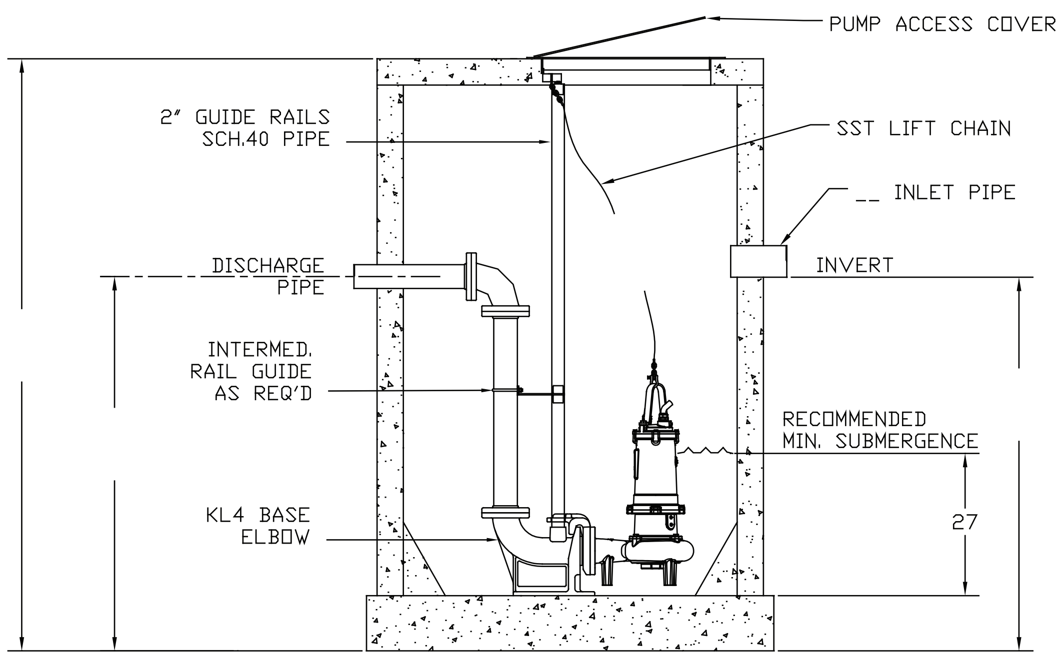
File: K4VN Liftout Dimensions

Section ENCLOSED
Date JULY 2013

Pump Series	K4VN	4″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA





Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used
   Limited to 2X larger maximum.

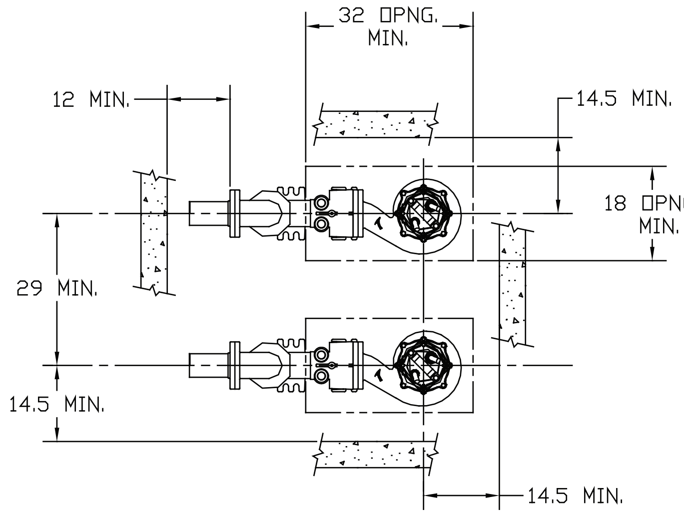
File: K4VN Install Dimensions

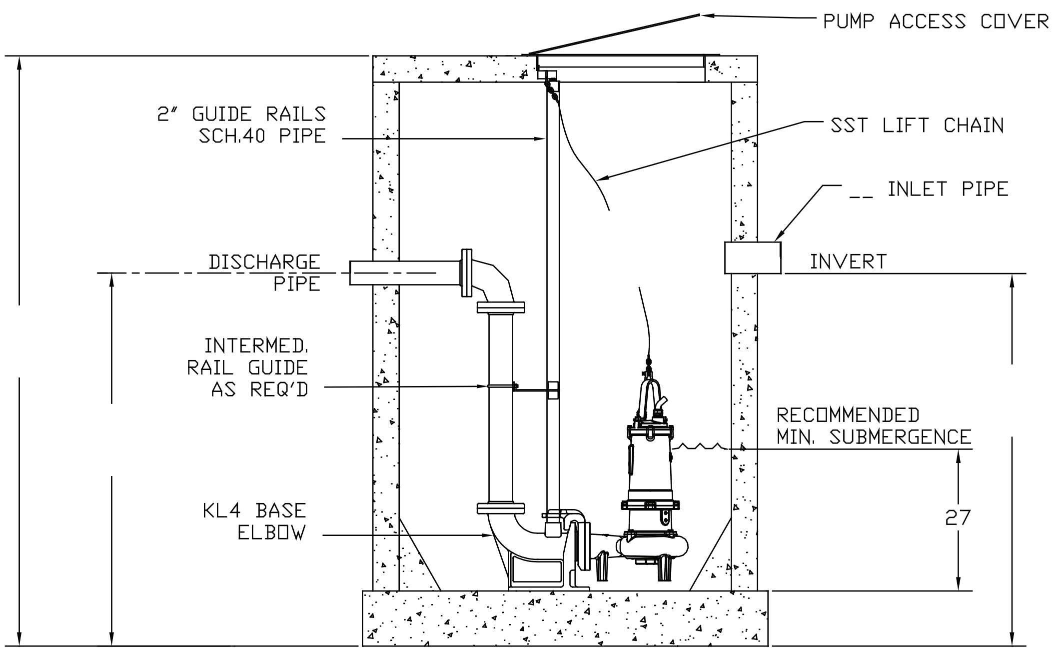
KEEN PUMP®

Section ENCLOSED
Date JULY 2013

Pump Series	K4VN	4″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA





Notes:

1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4VN Install Dimensions

Pump Model: **K4VN**

Physical Data:

Discharge Size	ANSI 4" Horizontal
Solids Size	3"
Impeller Type	Balanced, Enclosed, 2 Vane
Power/Control Cable Length	40' Standard
Paint	Blue, Powder Coated – Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	Type W - 2000V, 90º C
Control Cord Type	18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Volute Wear Ring	Bronze, CDA 836
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Line Bearing	Bronze, CDA 836

Pump Model: **K4VN – 1750 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C)
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
3	208	1	E	1.2	19.1	22.9	66.9	4.0	13.9	5.2
	230				19.0	22.8	60.2			
3	208	3	H	1.2	16.3	19.6	57.1	4.6	20.6	5.8
	230				14.7	17.6	51.4			
	460				7.3	8.8	25.7			
5	208	1	F	1.2	37.1	44.5	37.1	7.7	26.9	10.0
	230				33.4	40.1	33.4			
5	208	3	F	1.2	21.1	25.3	73.9	6.0	26.5	7.5
	230				19.0	22.8	66.5			
	460				11.1	13.3	33.3			
7.5	208	3	F	1.2	32.1	38.5	112.4	9.1	40.4	11.3
	230				28.9	34.7	101.2			
	460				14.5	17.4	50.6			
10	208	3	E	1.0	38.5	38.5	134.8	11.0	48.5	13.6
	230				34.7	34.7	121.4			
	460				17.3	17.3	60.7			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
3	1	66	66	64	56	87	83	79	70
3	3	71	70	69	63	81	80	79	71
5	1	65	65	64	59	86	83	76	62
5	3	78	78	75	70	79	76	71	60
7.5	3	77	76	74	69	75	70	64	54
10	3	75	76	75	70	79	78	71	59

Pump Model: **K4VN – 1150 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C)
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1150**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
1	208	1	H	1.2	9.6	11.5	33.6	2.0	7.0	2.6
	230				8.6	10.4	30.3			
1	208	3	J	1.2	6.6	7.9	21.0	1.7	7.6	2.1
	230				6.2	7.4	18.9			
	460				3.1	3.7	9.5			
2	208	1	H	1.2	18.9	22.7	66.2	13.8	5.1	5.1
	230				17.0	20.4	59.6			
2	208	3	G	1.2	9.9	11.9	34.7	2.8	12.5	3.5
	230				8.9	10.7	31.2			
	460				4.5	5.4	15.6			
3	208	1	F	1.0	22.7	22.7	79.5	4.7	16.5	6.1
	230				20.5	20.5	71.6			
3	208	3	G	1.0	14.3	14.3	50.1	4.1	18.0	6.0
	230				12.9	12.9	45.1			
	460				6.4	6.4	22.5			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
1	1	60	60	59	53	75	73	66	57
1	3	65	62	56	52	75	72	67	61
2	1	63	61	60	50	76	74	70	62
2	3	65	64	60	52	78	76	71	60
3	1	68	65	59	55	75	70	64	54
3	3	65	64	60	57	79	78	71	59

SPECIFICATIONS

Solids-Handling Pumps K4VN

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, both single and three-phase, designed for wet well submersible pump applications in water and sewage.
1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.
1.3. This specification covers sewage wet well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.
2.1. The motor assembly shall be built, designed, and assembled to comply with FM 3615 standards for Class 1, Div. 1, Group C & D construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.
2.6. Submersible motor design:
2.6.1. ________ Horsepower
2.6.2. ________ RPM
2.6.3. ________ Voltage
2.6.4. ________ Phase
2.6.5. ________ Frequency
2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356º F (180º C). To include:
2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.
2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.
2.7.3. Stator lead material must meet or exceed Class H insulation system.
2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.
2.7.4.1. The thermal limiting devices shall be attached to each phase winding.
2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.
2.8. Operation of the motor shall be designed for:
2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311º F (155º C).
2.8.2. Capable of 15 evenly spaced starts per hour.
2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
2.8.3.1. Acceptable voltage variation is +/- 10%.
2.8.3.2. Acceptable frequency variation is +/- 5%.

2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
2.8.3.4. Current unbalance must not exceed 5%.
2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:
2.9.1. Secured with 304 stainless steel fasteners.
2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION
3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.
3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.
3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.
3.3. All bolted connections in the cord entry construction shall be:
3.3.1. Secured with 304 stainless steel fasteners.
3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.
3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.
3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS
4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
4.3. Inboard and outboard seal construction shall be of the following material:
4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.
4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.
4.3.3. Elastomers shall be constructed of Viton®.
4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.
4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.
4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a three-bearing design.

5.2.1. The upper bearing shall be a Conrad type, single row, Radial ball bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately compensate for the axial loads and radial forces.

5.2.3. An additional sleeve bearing shall be constructed of SAE 841 material and is mounted directly above the lower seal to take radial loads and act as flame path for seal chamber.

5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 50,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.

7.2. The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.

7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.

8.2. Design shall be a single piece and a modified constant velocity.

8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.

8.4. Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.

8.5. The discharge is to be of a centerline discharge configuration.

8.6. The discharge is to be 4" ANSI® standard Class 125, 8-bolt configuration.

8.7. Horizontal discharge is standard if specifying K4VN model.

8.8. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

KEEN PUMP®

K4VP(X)

FM

(PENDING)

4" Submersible, Enclosed Impeller
(Class 1, Div. 1, Groups C & D Hazardous Location)

HEAVY DUTY PUMP SERIES
- Handles Aggressive Pumping Applications
- Strong Pumping Capacities to 1200 GPM
- Smooth, Quiet Operation
- Centerline Volute Discharge

STRONG PERFORMANCE
- Non-overloading Performance Curve
- Pump-Out Vanes Prevent Material Build-up
- Positive Pumping Action through Impeller
- Ideal for Higher Flows

LONG SERVICE LIFE
- Dual Silicon Carbide Shaft Seals
- Low Motor Operation Temperatures
- Continuously Lubricated Ball Bearings

LOW MAINTENANCE
- Easily Replaceable Impeller Wear Ring Restores Original Pump Performance
- Unobstructed Impeller Passageway
- Grit-Resistant Silicon Carbide Shaft Seals
- Large, 3" diameter Solids-Handling
- High Service Factor Motor Handles Tough Electrical Operating Conditions

CAPABILITIES:
- Flows-------------------------------------- to 1200 GPM
- Heads------------------------------------ to 118 Feet
- HP Range------------------------------ 3 - 20 HP
- Voltage / Phase Options------------ 208/230/460/575V, 3-Phase or 208/230V, 1-Phase
- Discharge Connections------------- 4" ANSI Class 125 Horizontal Flange
- Motor Speeds------------------------- 1150 / 1750 RPM
- Solids-Handling----------------------- 3"
- Impeller--------------------------------- Balanced, Enclosed, 2-Vane
- Motor Service Factor---------------- 1.20

Rev. 03/2018

K4VP(X)

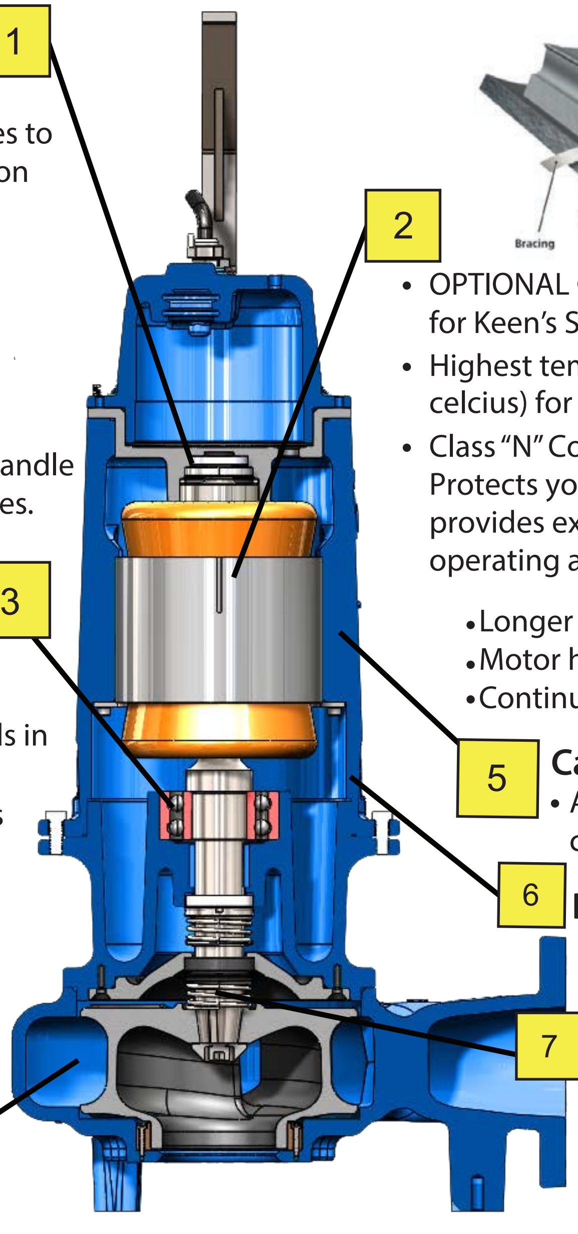
Features and Benefits

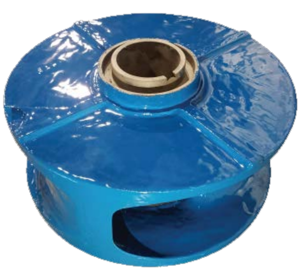
Keen Pump's Bearing Protection Program

- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.
- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.

Double Row Bearings

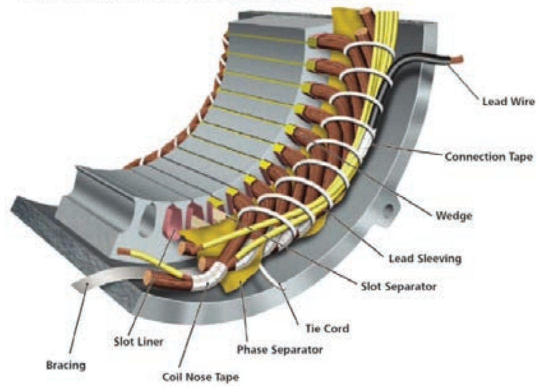
- Heavy Duty Bearings to handle the toughest performances.
- High Pressures
- High Flows
- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.





Heavy Duty Motor

Applications in Electric Motors:



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- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

Ceramic Coating - Impeller and Volute Casting

The ultimate indestructible ceramic coated impellers and volutes for Keen's Solids Handling pumps. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

KEEN PUMP®

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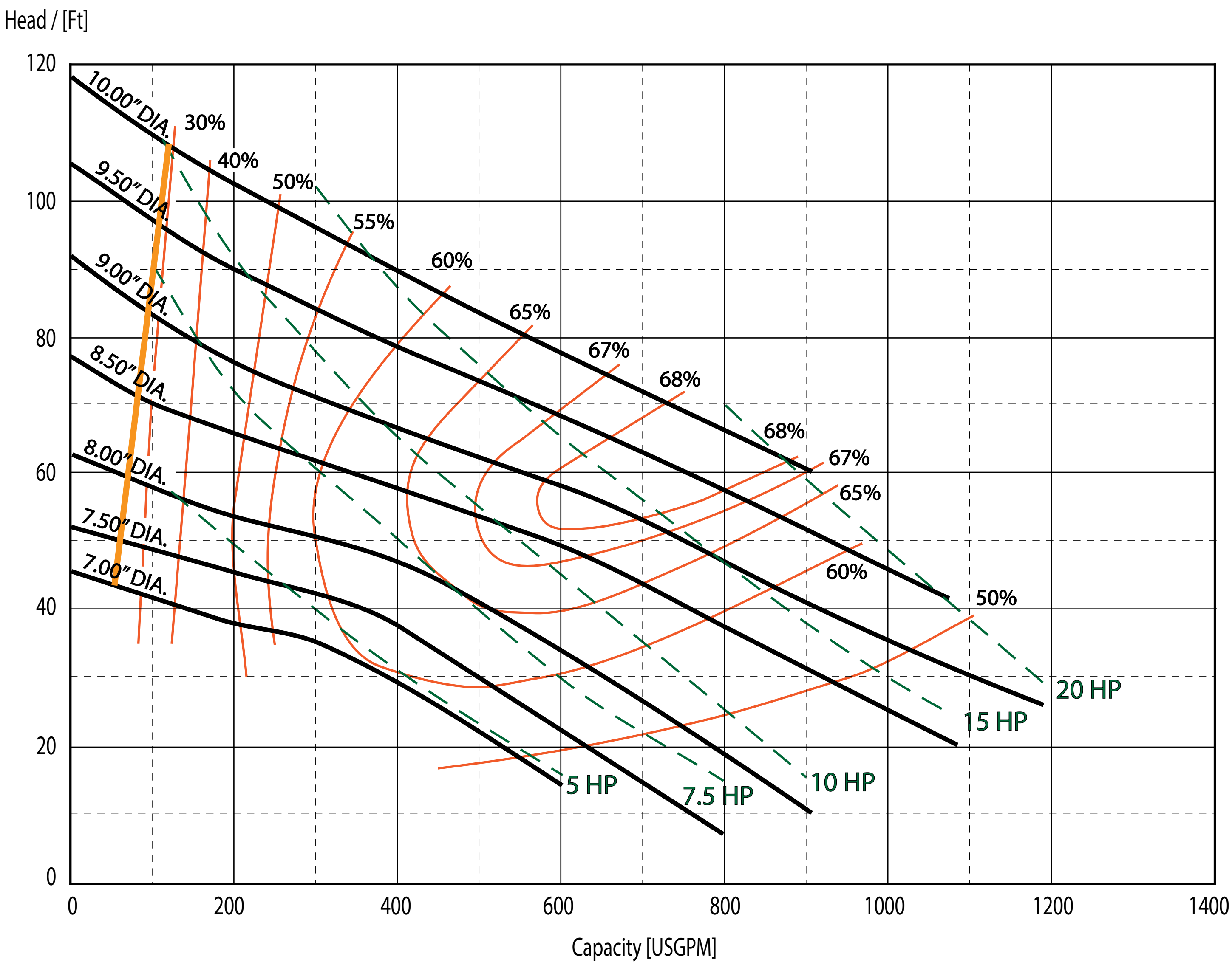
KEEN PUMP

Section **ENCLOSED**
Date Nov. 2021

Pump Series	K4VP	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1750 RPM**	Discharge	**4″**	Solids	**3″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

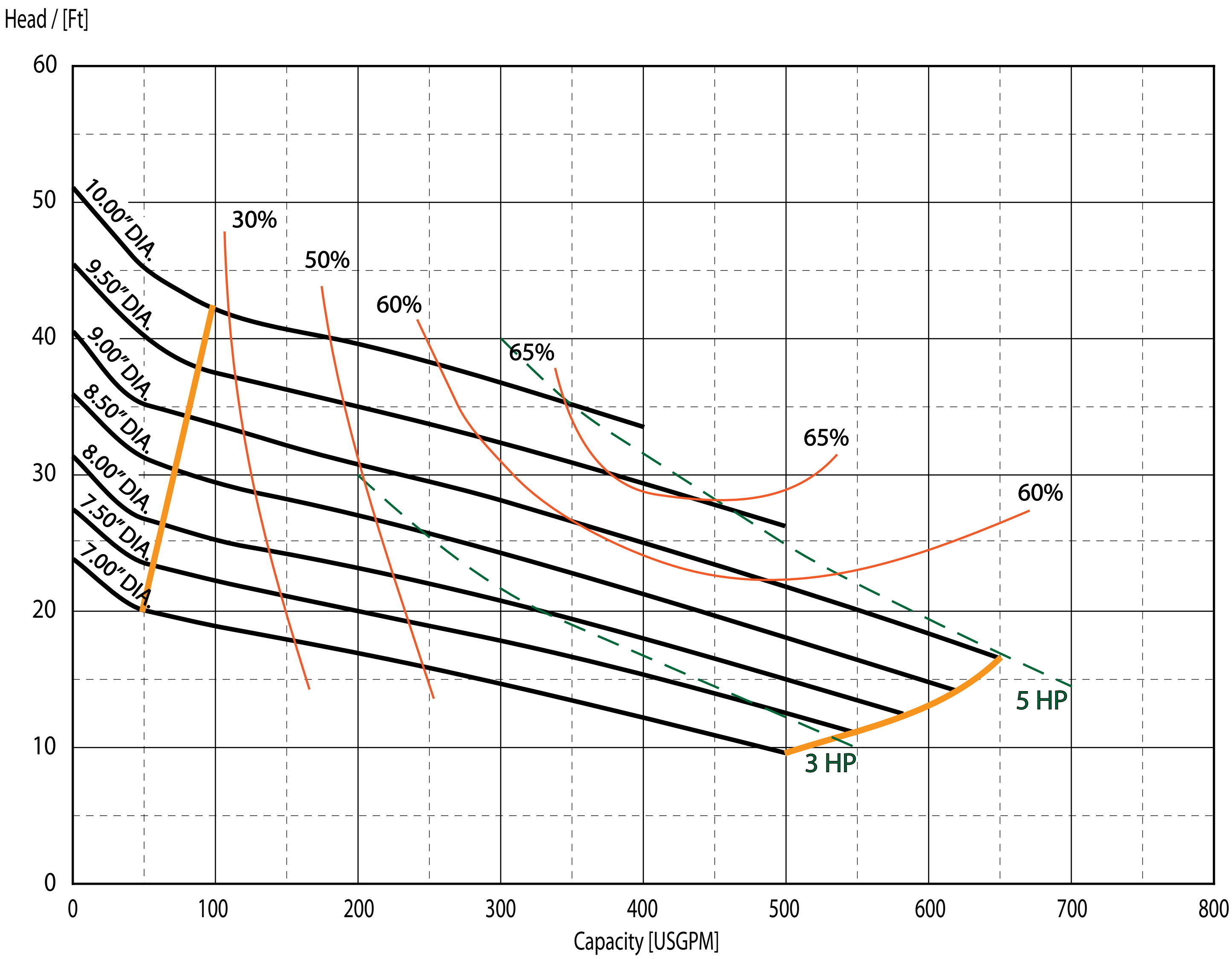
File: K4VP_1750

KEEN PUMP

Section **ENCLOSED**
Date Nov. 2021

Pump Series	**K4VP**	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1150 RPM**	Discharge	**4″**	Solids	**3″**

GPM: __________ TDH: __________



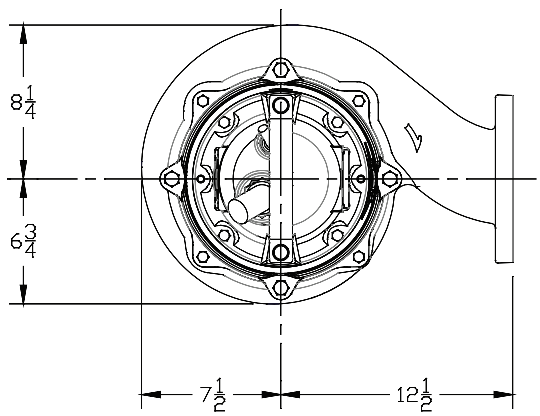
The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

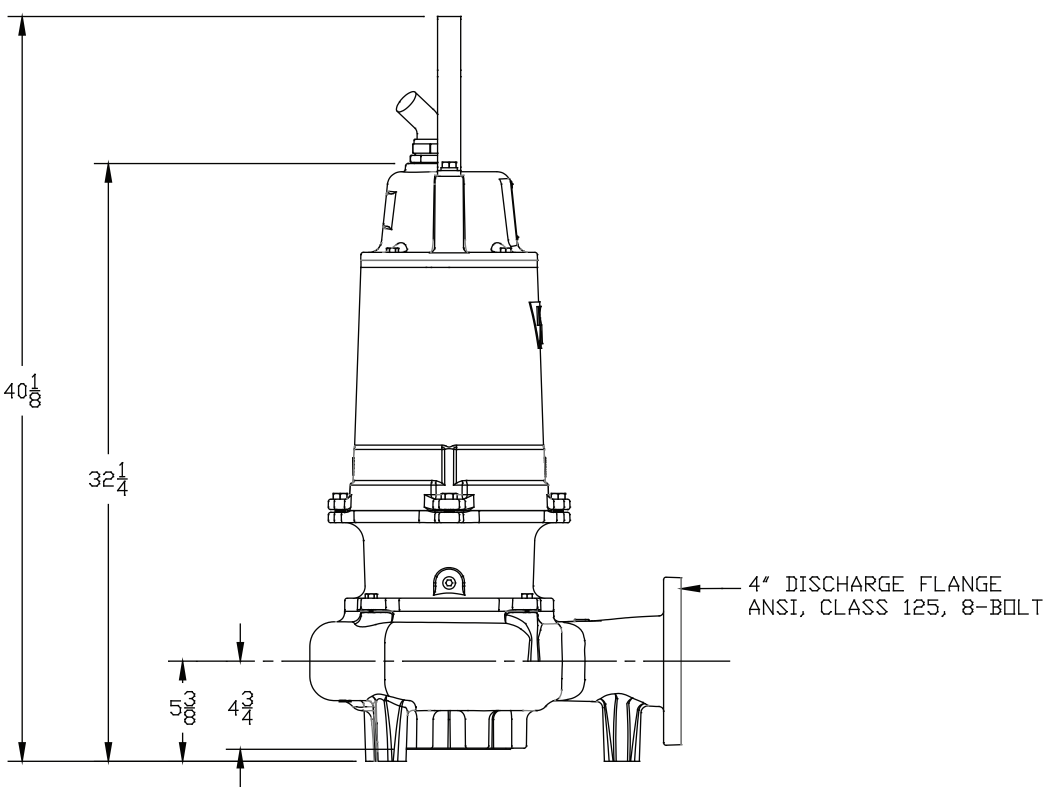
File: K4VP_1150

Section	ENCLOSED
Date	JULY 2016

Pump Series	K4VP	4″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA





Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

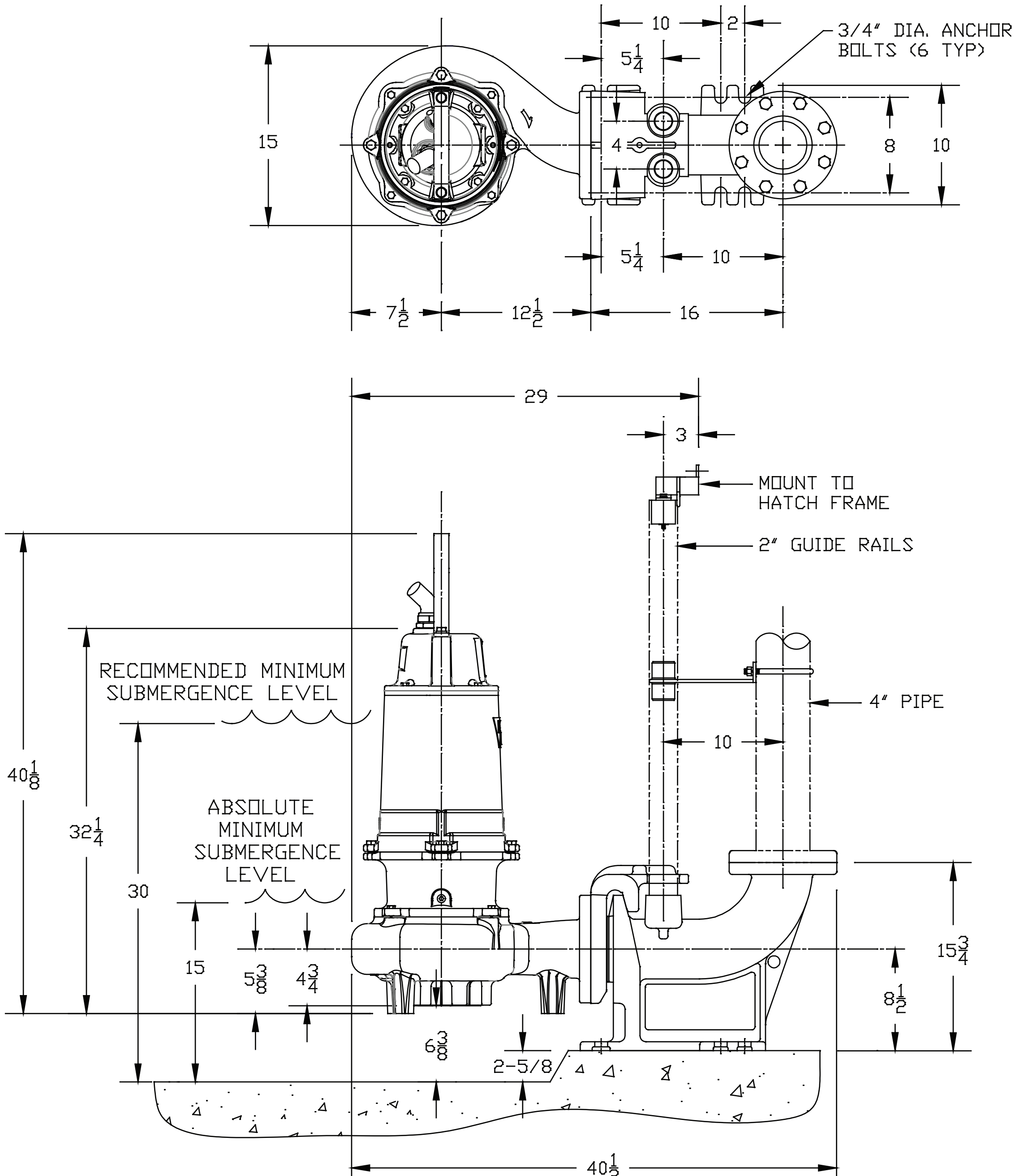
File: K4VP Dimensions

KEEN PUMP®

Section **ENCLOSED**
Date **JULY 2016**

Pump Series	K4VP	4″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



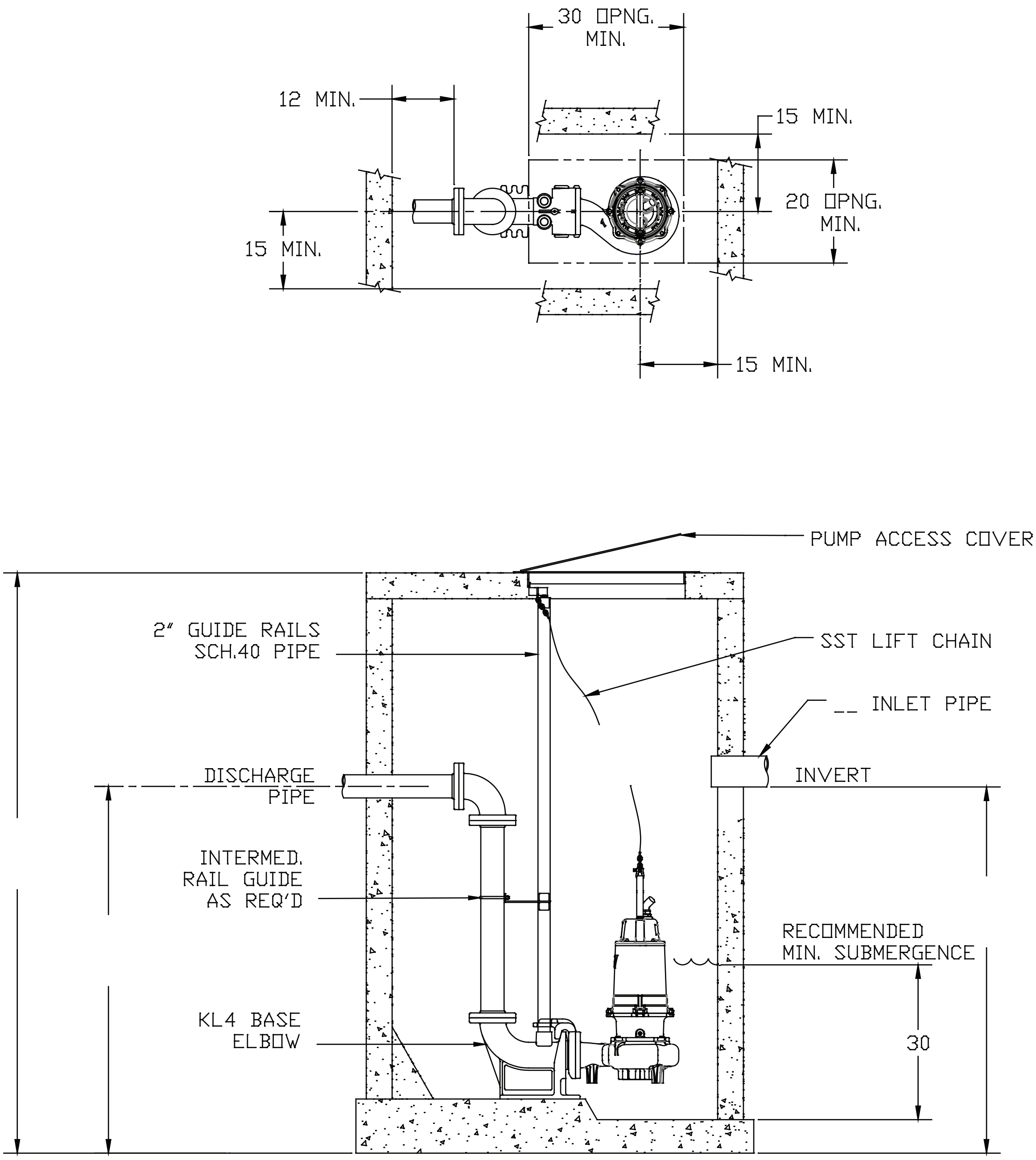
Notes:
1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4VP Liftout Dimensions

Section ENCLOSED
Date JULY 2016

Pump Series	K4VP	4″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

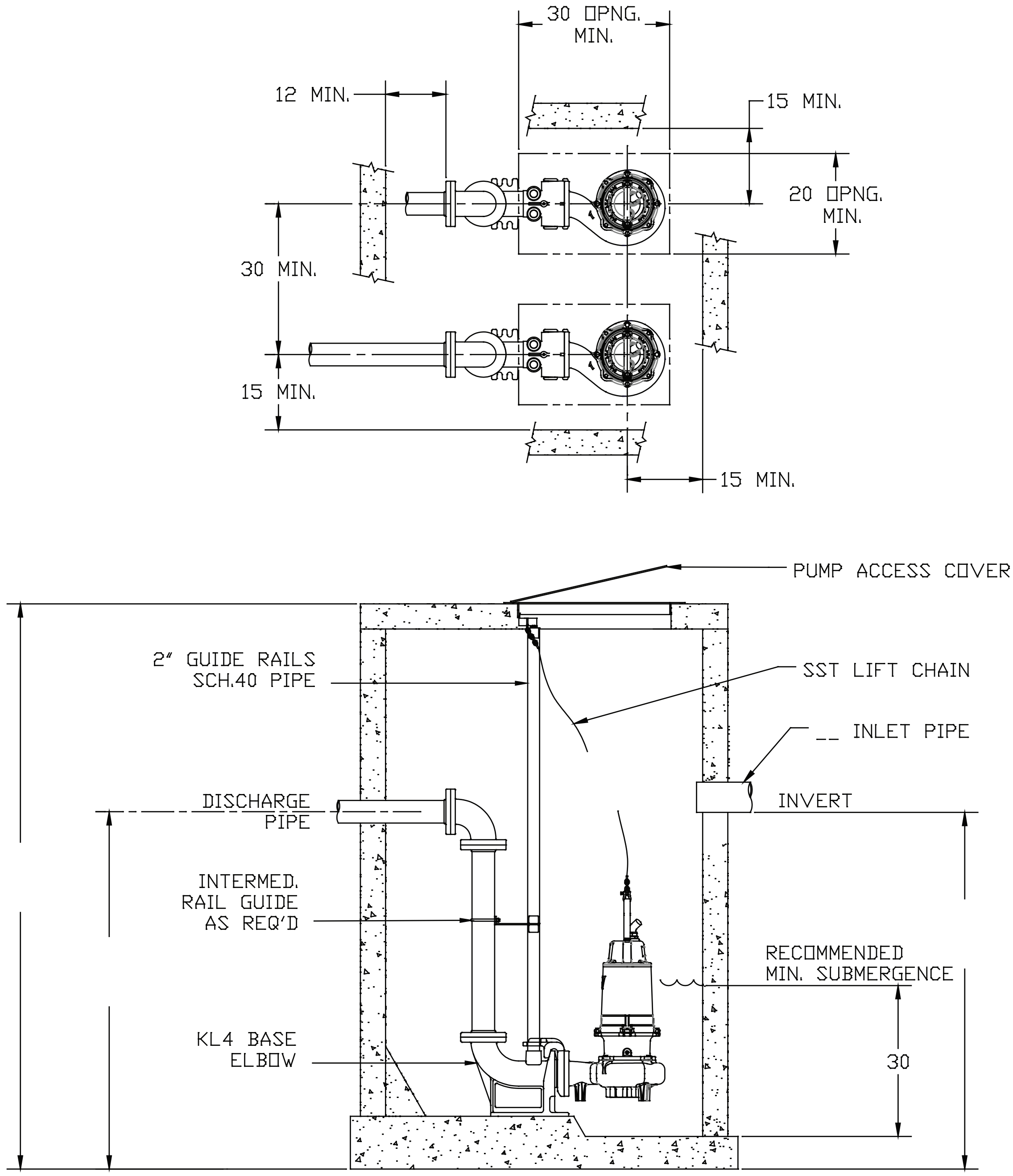
File: K4VP Install Dimensions

KEEN PUMP®

Section **ENCLOSED**
Date **JULY 2016**

Pump Series	K4VP	4″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4VP Install Dimensions

Pump Model: **K4VP**

Physical Data:

Discharge Size	ANSI 4″ Horizontal
Solids Size	3″
Impeller Type	Balanced, Enclosed, 2 Vane
Power/Control Cable Length	40′ Standard
Paint	Blue, Powder Coated – Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components if Applicable
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	Type W - 2000V, 90º C
Control Cord Type	18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Wear Ring	Bronze, CDA 836
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

Pump Model: **K4VP – 1750 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		356º F (180º C)
Heat Sensor	**Open:**	275º F (135º C) Max. / 257º F (125º C) Min.
	Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
5	208	1	C	1.2	26.2	31.4	91.7	5.4	19.1	7.1
	230				22.8	28.3	82.6			
5	208	3	J	1.2	21.6	25.9	129.5	6.9	39.3	7.7
	230				19.3	23.2	116.8			
	460				9.6	11.5	58.1			
	575				7.7	9.2	46.5			
7.5	230	1	D	1.2	37.1	44.5	129.9	8.6	30.0	11.1
7.5	208	3	G	1.2	25.4	30.5	129.5	8.2	46.5	9.1
	230				22.9	27.5	116.8			
	460				11.4	13.7	58.1			
	575				9.1	10.9	46.5			
10	208	3	H	1.2	35.1	42.1	179.0	11.3	64.0	12.5
	230				31.6	37.9	161.2			
	460				15.7	18.8	80.1			
	575				12.5	15.0	63.8			
15	208	3	H	1.2	54.2	65.0	276.4	17.5	99.2	19.4
	230				48.9	58.7	249.4			
	460				24.4	29.3	124.4			
	575				19.4	23.3	98.9			
20	230	3	E	1.0	58.7	58.7	249.4	21.8	99.2	24.1
	460				29.3	29.3	124.4			
	575				23.3	23.3	98.9			

Pump Model: **K4VP – 1150 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		356º F (180º C)
Heat Sensor	**Open:**	275º F (135º C) Max. / 257º F (125º C) Min.
	Closed:	205º F (96º C) Max. / 154º F (68º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1150**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
3	208	3	L	1.2	16.0	19.2	99.5	5.2	35.7	5.7
	230				14.4	17.3	89.6			
	460				7.2	8.6	44.8			
	575				5.8	6.9	35.8			
5	208	3	J	1.2	19.5	23.4	99.5	6.3	35.7	7.0
	230				17.6	21.1	89.6			
	460				8.8	10.5	44.8			
	575				7.0	8.4	35.8			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				Power Factor %			
HP	Phase	Service Factor Load	100% Load	75% Load	50% Load	Service Factor Load	100% Load	75% Load	50% Load
3	3	80	78	75	68	61	56	48	39
5	3	81	81	80	76	72	69	62	51

KEEN PUMP®

SPECIFICATIONS

Solids-Handling Pumps K4VP

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, three-phase, designed for wet well and dry well submersible pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well and dry well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

1.4. The motor shall be built, designed, and assembled to comply with FM 3615 standards for Class 1, Div. 1, Group C & D construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.

2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.

2.6. Submersible motor design:

2.6.1. ________ Horsepower

2.6.2. ________ RPM

2.6.3. ________ Voltage

2.6.4. ________ Phase

2.6.5. ________ Frequency

2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356º F (180º C). To include:

2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.

2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.

2.7.3. Stator lead material must meet or exceed Class H insulation system.

2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.

2.7.4.1. The thermal limiting devices shall be attached to each phase winding.

2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.8. Operation of the motor shall be designed for:

2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311º F (155º C).

2.8.2. Capable of 15 evenly spaced starts per hour.

2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.

2.8.3.1. Acceptable voltage variation is +/- 10%.

2.8.3.2. Acceptable frequency variation is +/- 5%.
2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
2.8.3.4. Current unbalance must not exceed 5%.
2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:
2.9.1. Secured with 304 stainless steel fasteners.
2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.
3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.
3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.
3.2.3. Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
3.3. All bolted connections in the cord entry construction shall be:
3.3.1. Secured with 304 stainless steel fasteners.
3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.
3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.
3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
4.3. Inboard and outboard seal construction shall be of the following material:
4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.
4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.
4.3.3. Elastomers shall be constructed of Viton®.
4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.
4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.
4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

4.8. Class 1, Division 1, explosion-proof models will be included with an additional labyrinth seal constructed of bronze, CDA836 material, and is mounted directly above the pump seal plate to take radial loads and act as a flame path for seal chamber.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a two-bearing system design.

5.2.1. The upper bearing shall be a Conrad type, single row, Radial ball bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a Conrad type, double row, angular contact ball bearing designed to adequately compensate for the axial loads and radial forces.

5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.

7.2. The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.

7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. two coat process must be applied for best erosion and corrosion resistance including high temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.

8.2. Design shall be a single piece and a modified constant velocity.

8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.

8.4. Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.

8.5. The discharge is to be of a horizontal centerline configuration.

8.6. The discharge is to be 4" ANSI® standard Class 125, 8-bolt configuration.

8.7. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

Solids-Handling Pumps

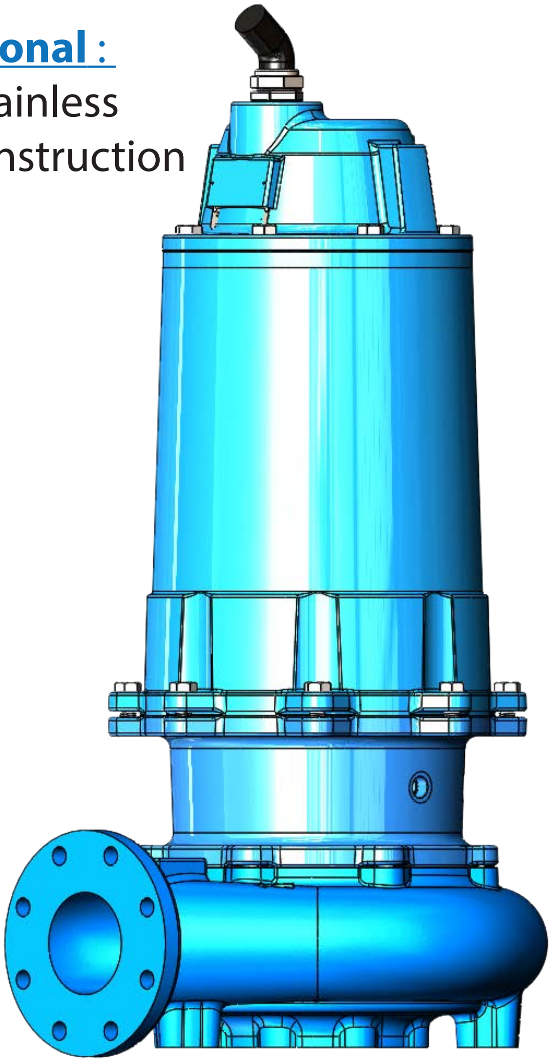
KEEN PUMP®

K4VB(X)

FM

4" Submersible, Enclosed Impeller
(Class 1, Div. 1, Groups C & D Hazardous Location)

Optional :
All Stainless
Steel Construction



CERAMIC COATED VORTEX IMPELLER
- Superior Abrasion Resistance
- Allows The Pump To Operate Better In Any Pressure Or Flow Condition

CERAMIC COATED VOLUTE
- Holds Up to Wear On Inside of Volute Casting Case

STANDARD MOTOR CONSTRUCTION
- Class H Laminations (Standard)

MOTOR GROUND RING PROTECTION
- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

DOUBLE ROW LOWER BEARINGS
- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates

BEST MOTOR CONSTRUCTION
- Class "N" (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Applications

CAPABILITIES:
- Flows-------------------------------------- to 1675 GPM
- Heads------------------------------------- to 183 Feet
- HP Range-------------------------------- 3 - 60 HP
- Voltage / Phase Options------------- 208 / 230 / 460 / 575V, 3 Phase
- Discharge Connections-------------- 4" ANSI Class 125 Horizontal Flange
- Motor Speeds---------------------------- 870 / 1150 / 1750 RPM
- Solids-Handling------------------------ 3-3/16"
- Impeller----------------------------------- Balanced, Enclosed, 2-Vane
- Motor Service Factor----------------- 1.20

Features and Benefits

K4VB(X)

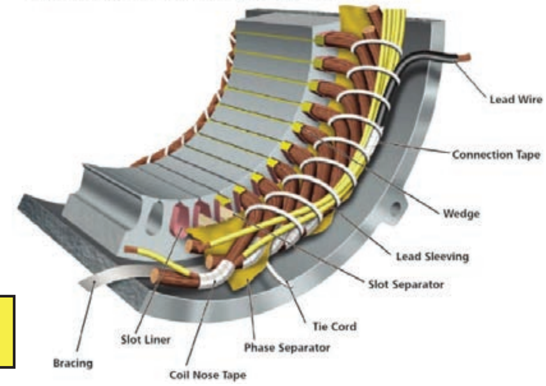
Keen Pump's Bearing Protection Program

- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.

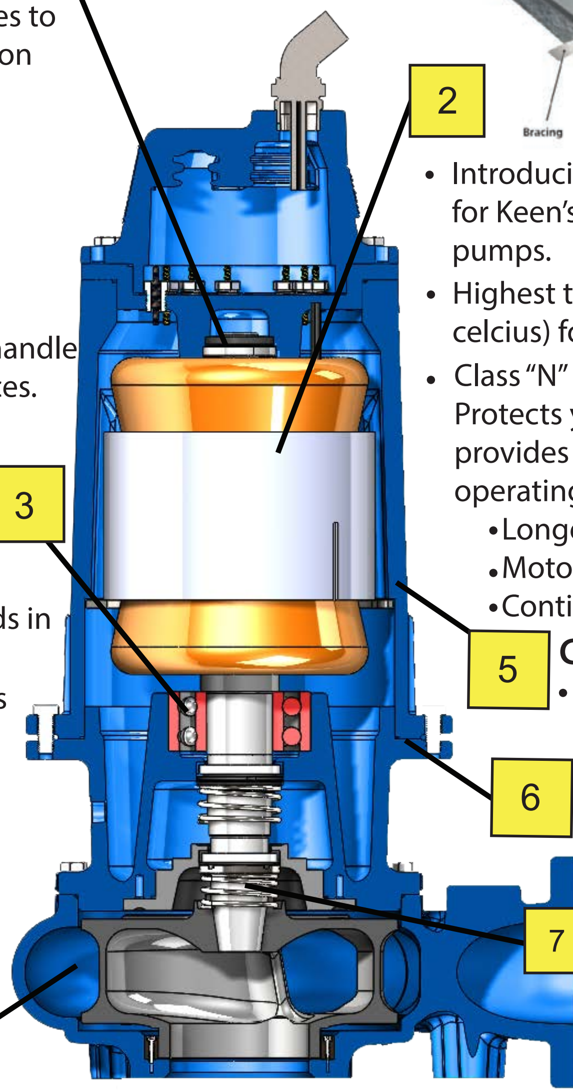
- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.

Heavy Duty Motor

Applications in Electric Motors:



- Introducing New Premium Class "N" Motors for Keen's Large Grinders and Solids Handling pumps.
- Highest temperature construction (200 degrees celcius) for motors
- Class "N" Construction is the best in the industry. Protects your motor from over heating and provides extended motor life. Motors are operating at higher teperatures due to:
  - Longer run times
  - Motor housing not submerged
  - Continuous



Double Row Bearings

- Heavy Duty Bearings to handle the toughest performances.

- High Pressures
- High Flows

- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.

Castings

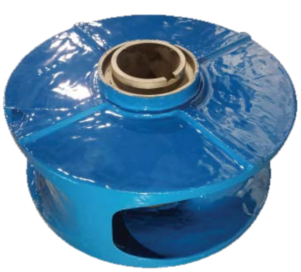
- ASTM - Class 35 high tensile strength castings.

Durable Powder Coat Finish

- Holds up to the toughest environmental conditions.

Dual Shaft Seals

- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.



Ceramic Coating

The ultimate indestructable ceramic coated impellers and volutes for Keen's Solids Handling pumps. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

KEEN PUMP®

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419.207.9400 fax 419.207.8031
www.keenpump.com

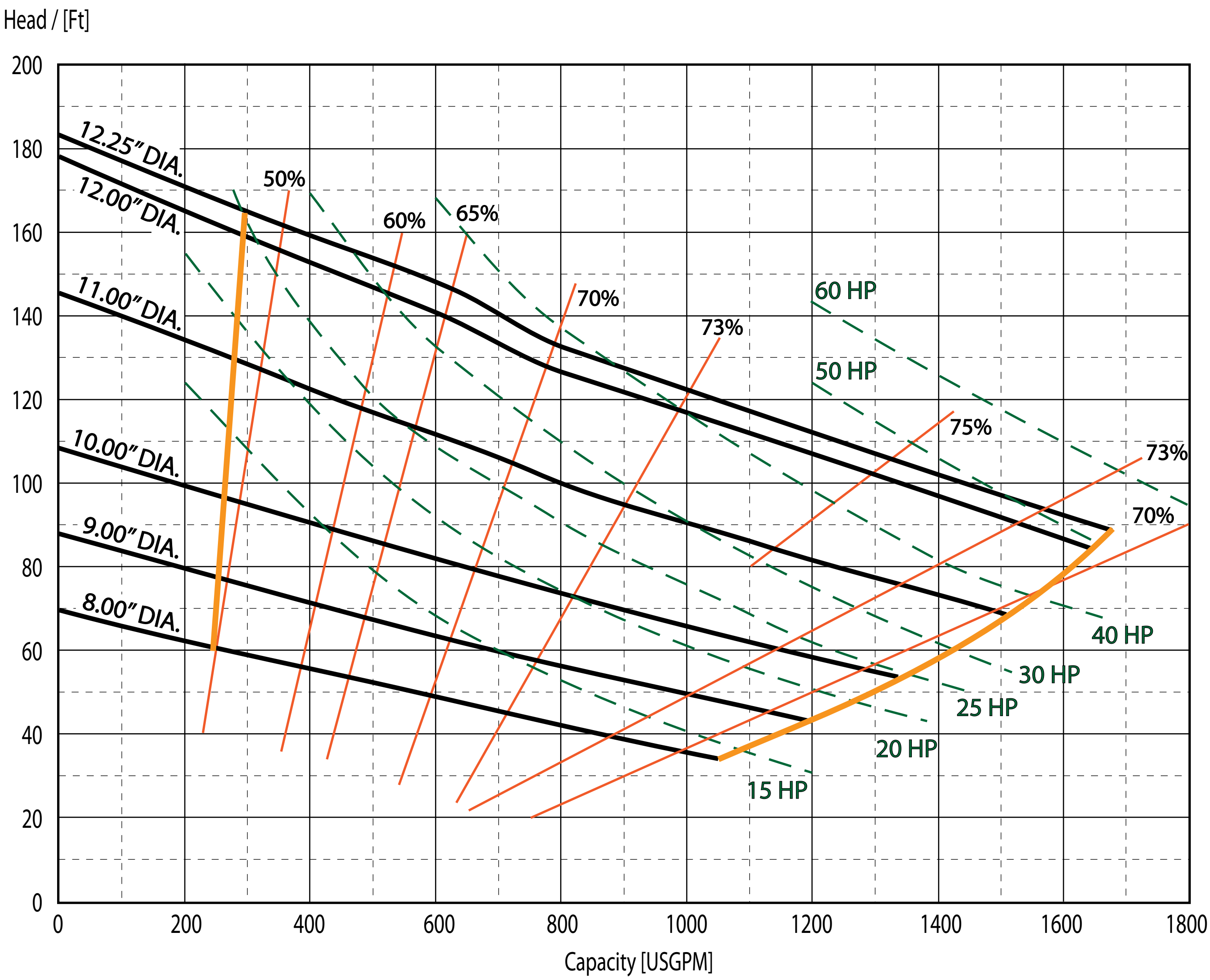
File : K4RB(X) Cuts
Rev. 4/2021

KEEN PUMP

Section **ENCLOSED**
Date Nov. 2021

Pump Series	K4VB	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1750 RPM**	Discharge	**4″**	Solids	**3-3/16″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

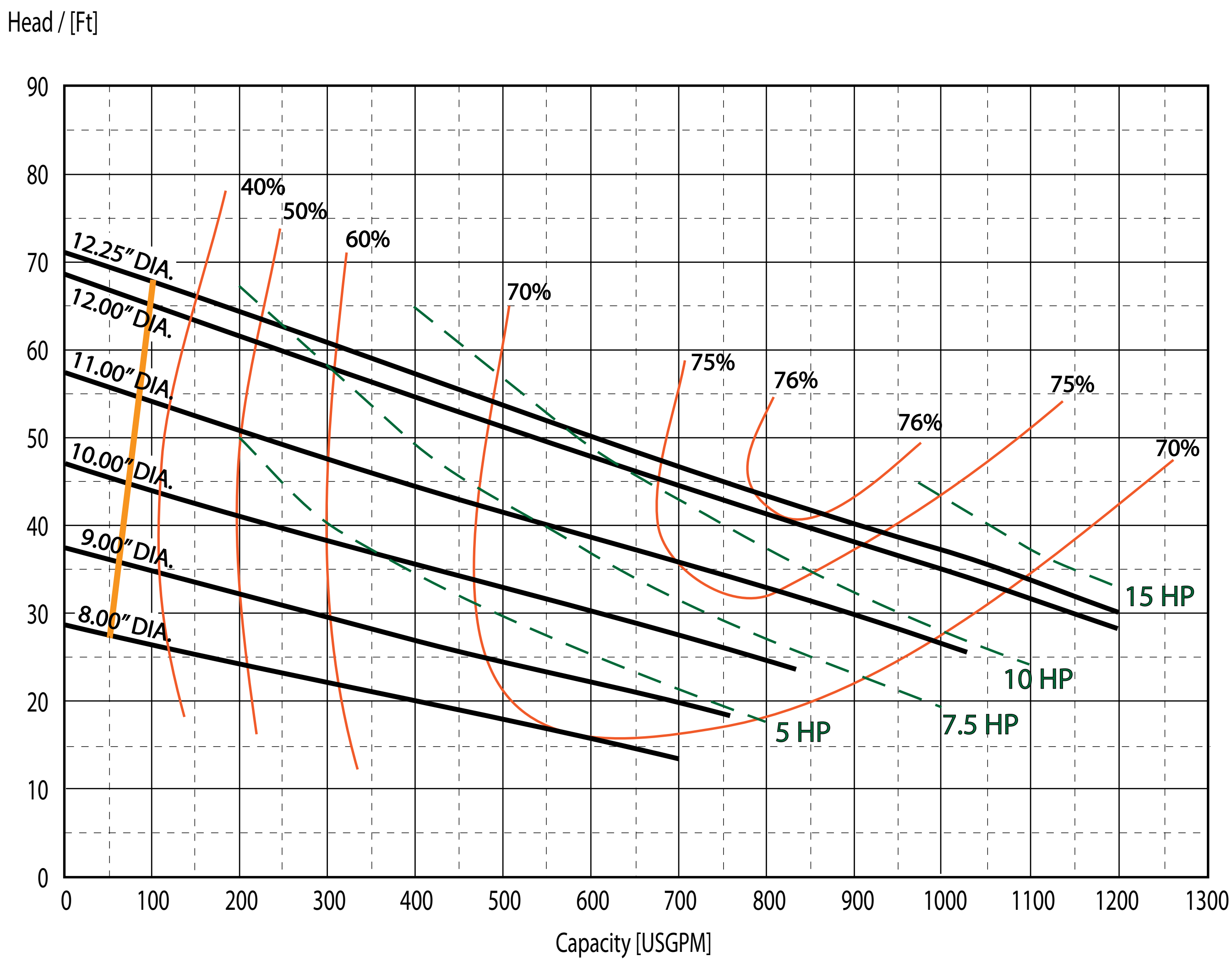
File: K4VB_1750

KEEN PUMP

Section **ENCLOSED**
Date Nov. 2021

Pump Series	**K4VB**		4″ SUBMERSIBLE SEWAGE PUMPS		
Speed	**1150 RPM**	Discharge	**4″**	Solids	**3-3/16″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

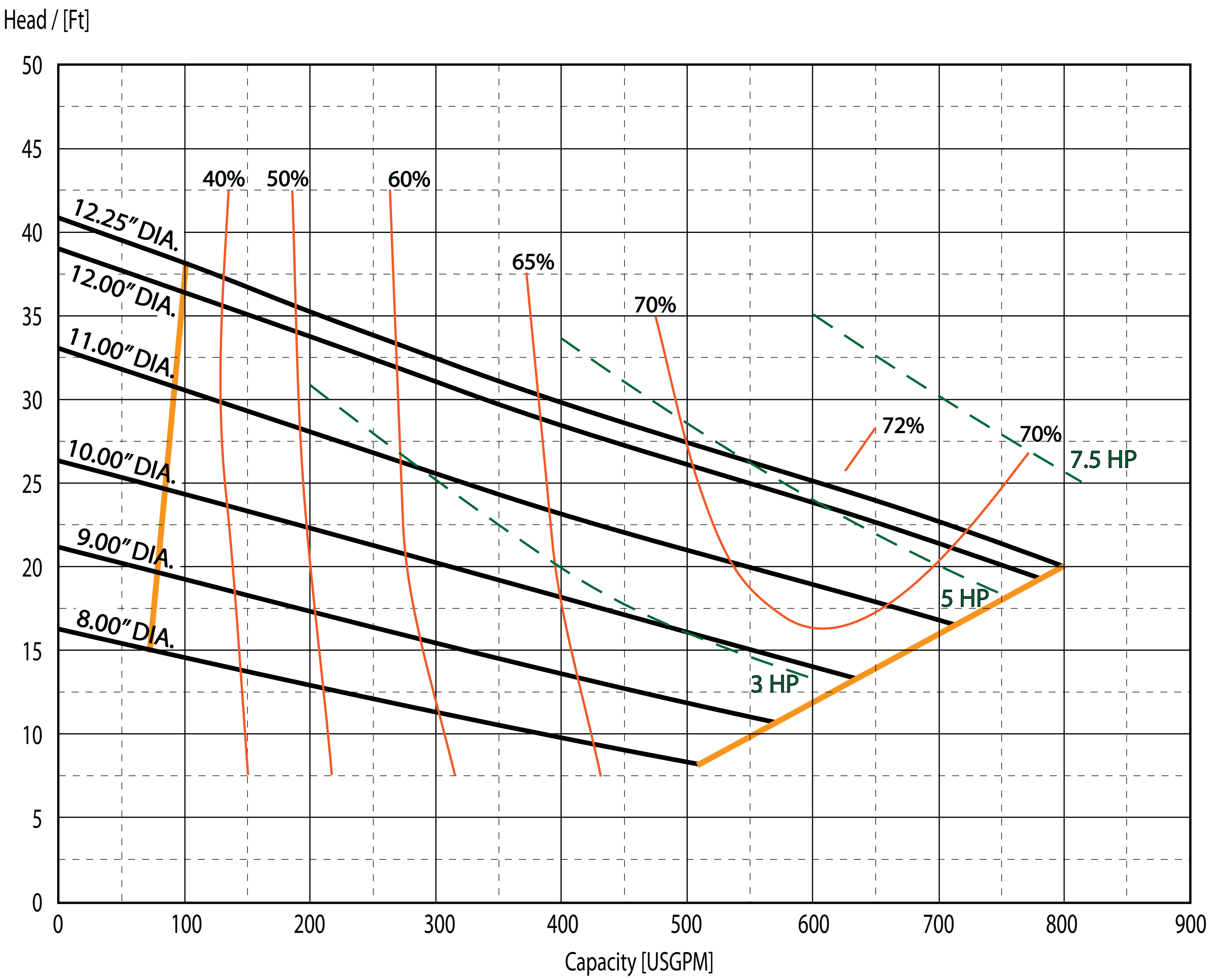
File: K4VB_1150

KEEN PUMP

Section **ENCLOSED**
Date Nov. 2021

Pump Series	K4VB		4″ SUBMERSIBLE SEWAGE PUMPS		
Speed	**870 RPM**	Discharge	**4″**	Solids	**3-3/16″**

GPM: __________ TDH: __________

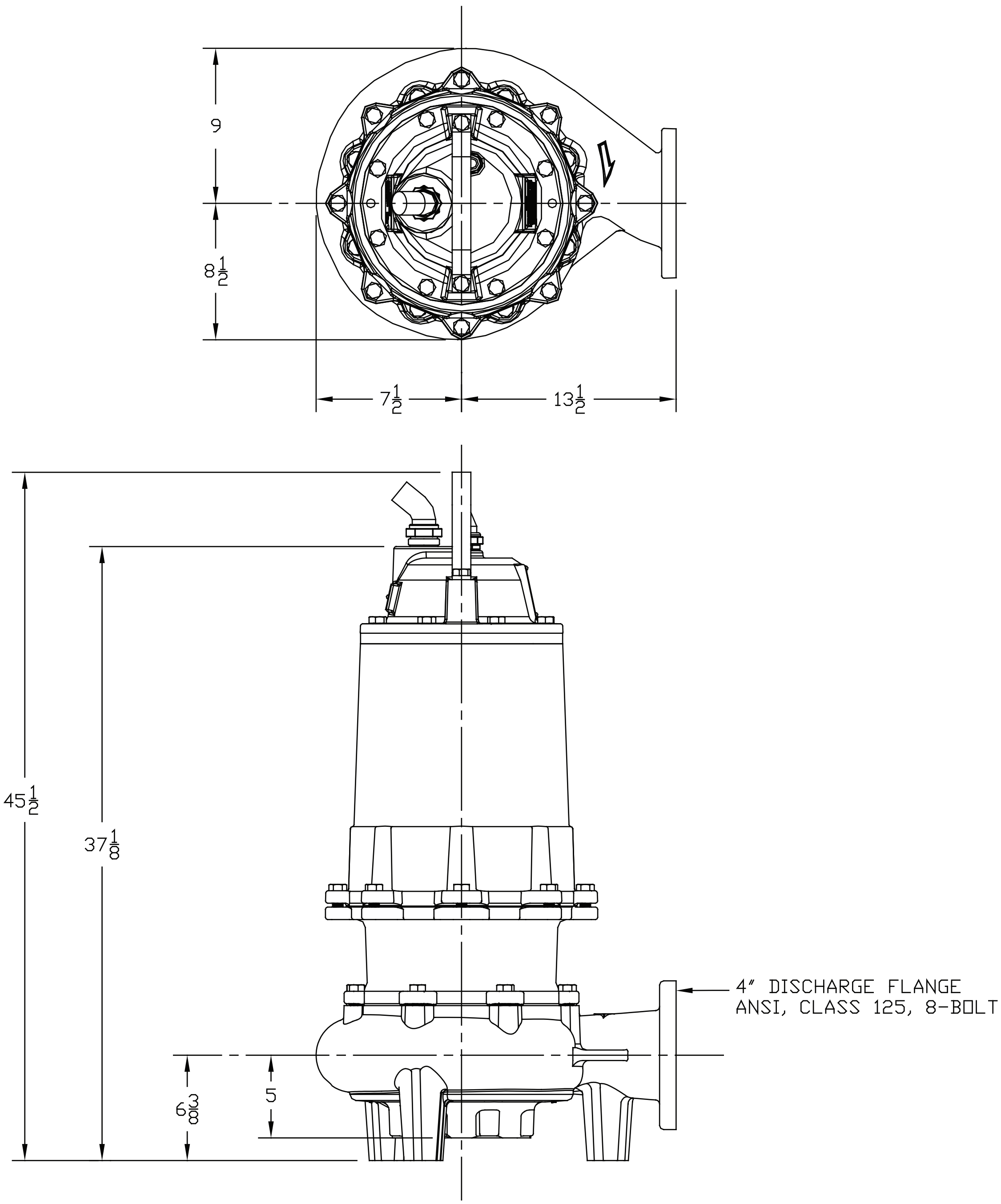


The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

File: K4VB_870

Pump Series	K4VB	4″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

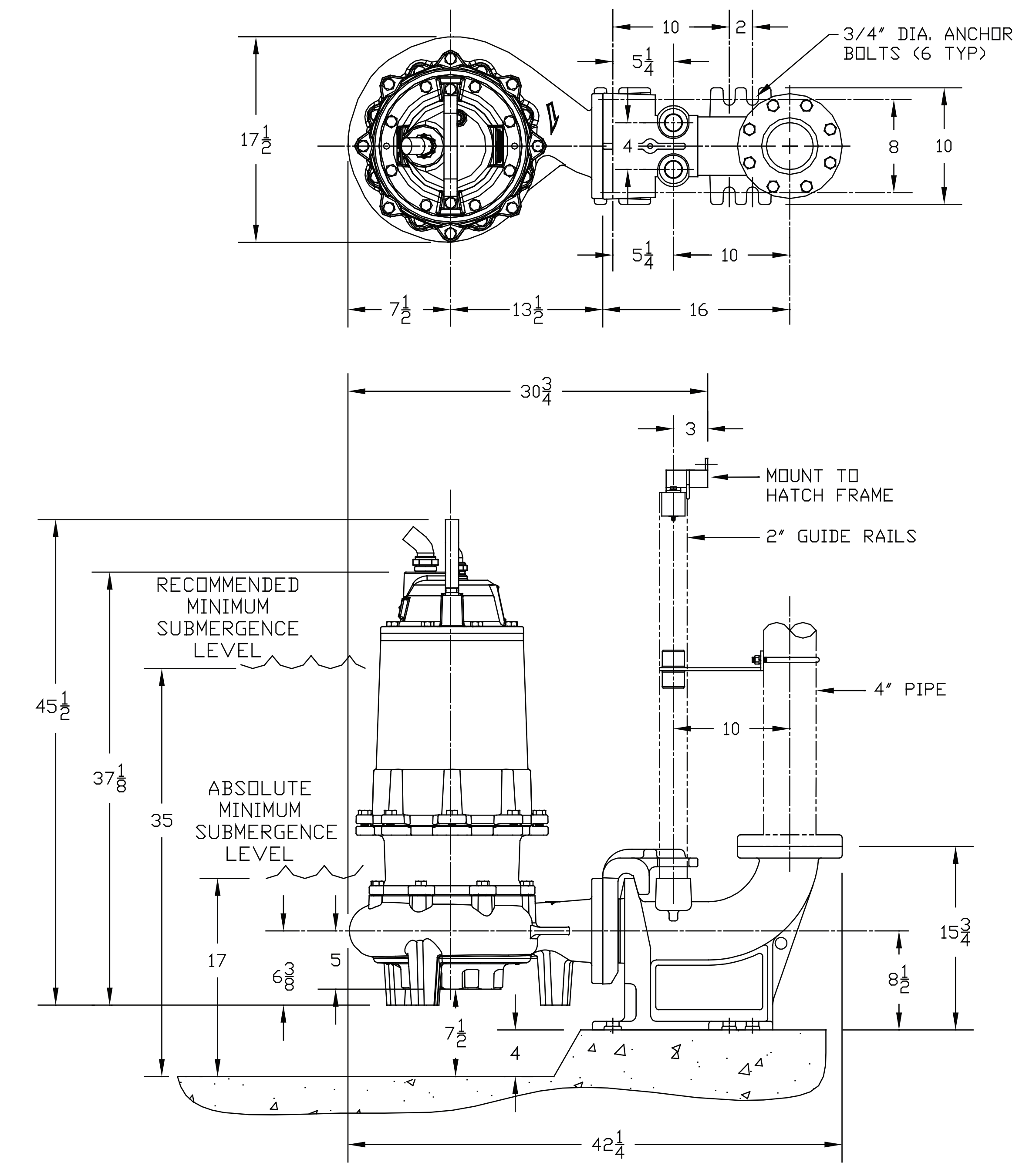


Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4VB Dimensions

Pump Series	K4VB	4″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

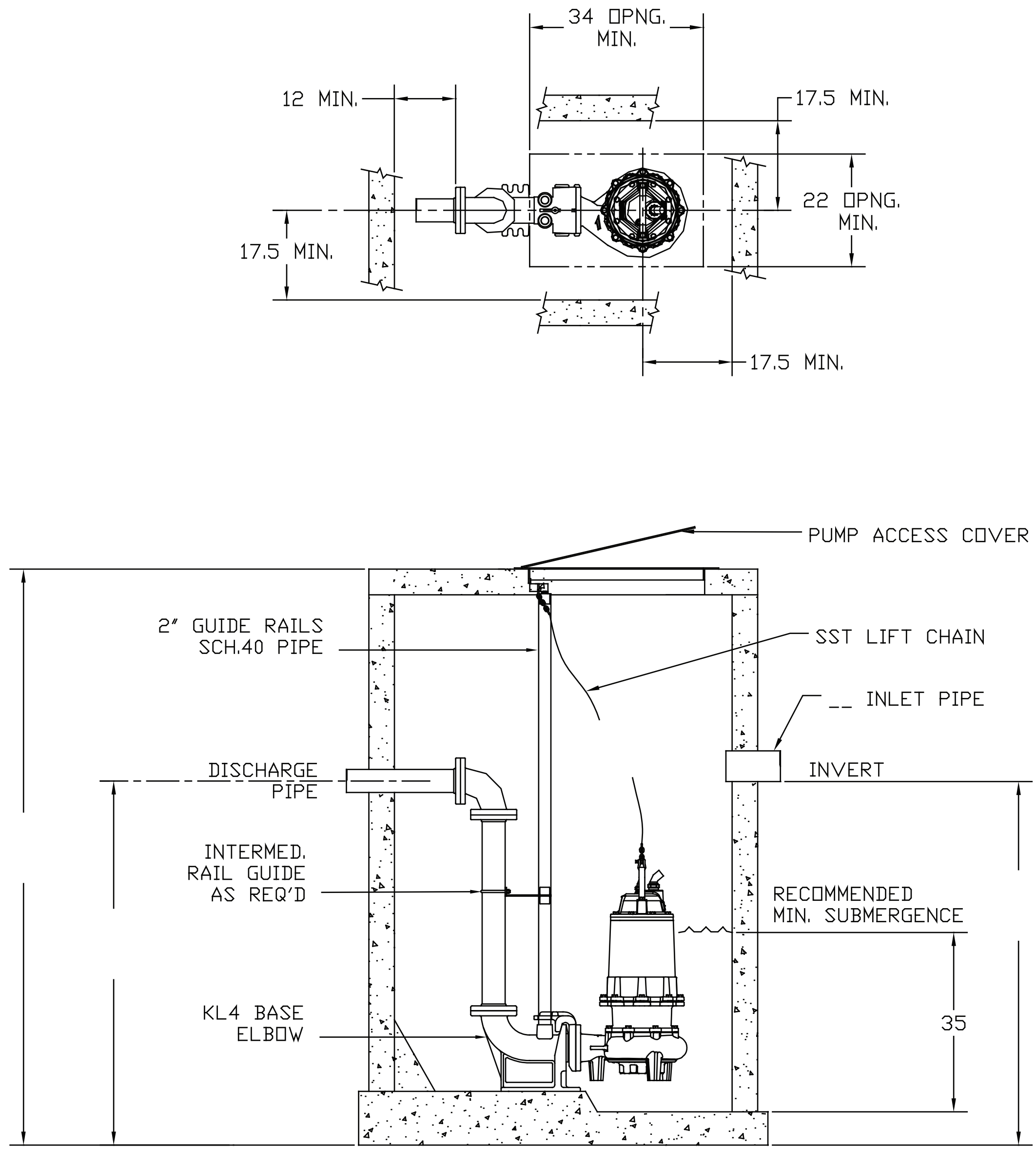


Notes:
1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

Section ENCLOSED
Date JULY 2013

Pump Series	K4VB	4″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA

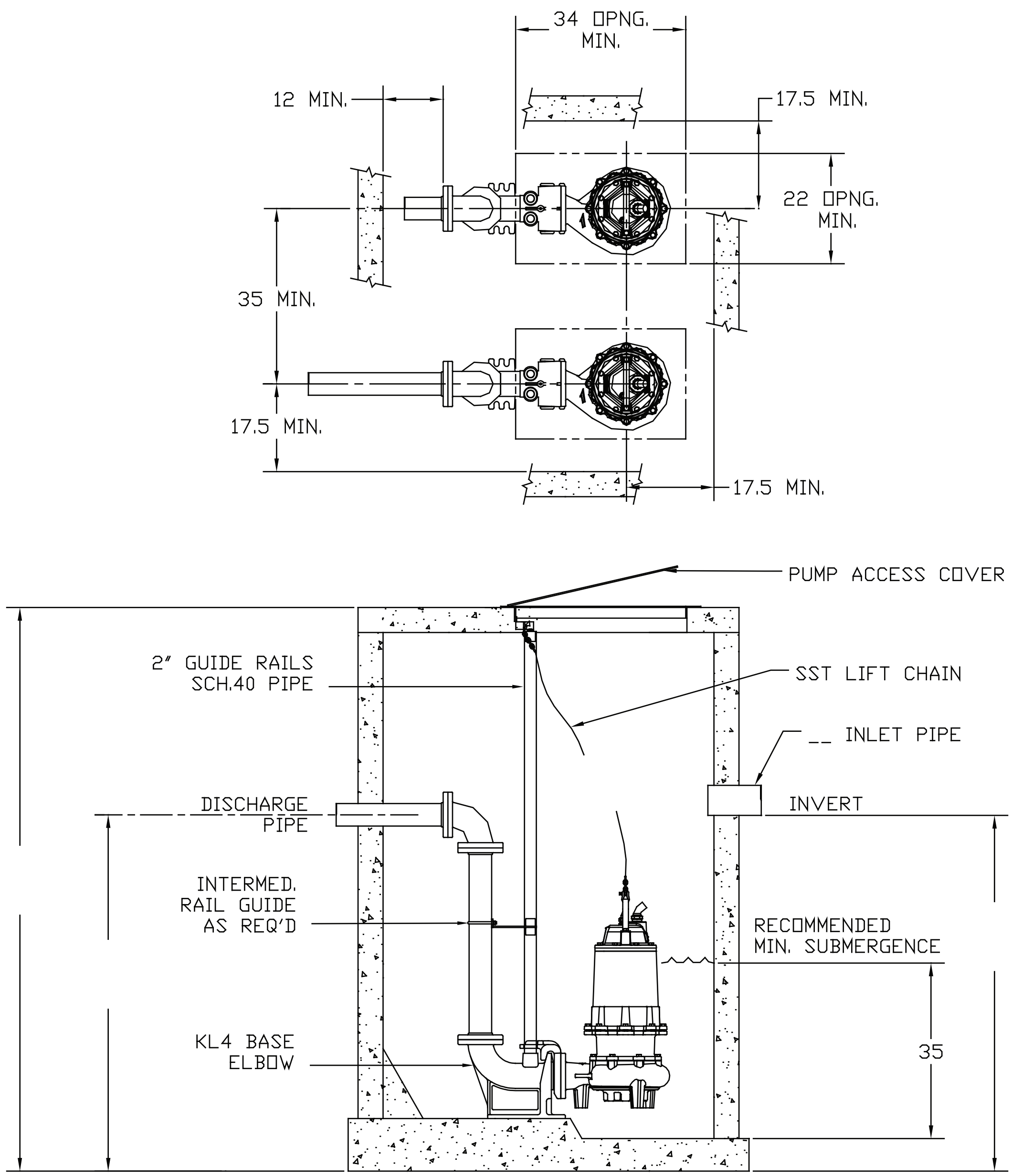


Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4VB Install Dimensions

Pump Series	K4VB	4″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4VB Install Dimensions

Pump Model: **K4VB**

Physical Data:

Discharge Size	ANSI 4” Horizontal
Solids Size	3-3/16”
Impeller Type	Balanced, Enclosed, 2 Vane
Power/Control Cable Length	40’ Standard
Paint	Blue, Water Reducible Enamel, One Coat, Air Dried – Standard

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H
Service Factor	1.2
NEMA Design Type	B (3Ø)
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	311ºF (155ºC)
Power Cord Type	SOOW - 600V, 90º C; Type W - 2000V, 90º C
Control Cord Type	16-4 or 18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coating Inisde
Wear Ring	Bronze, CDA 836
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coating
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Single Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

Pump Model: **<u>K4VB – 1750 RPM</u>**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
15	208	3	H	1.2	53.8	64.6	277.2	16.5	99.7	18.3
	230				48.9	58.7	249.7			
	460				24.5	29.4	124.9			
	575				19.6	23.5	99.9			
20	208	3	E	1.2	69.3	83.2	277.2	22.4	99.7	25.0
	230				62.4	74.9	249.7			
	460				31.2	37.5	124.9			
	575				25.0	30.0	99.9			
25	208	3	G	1.2	78.5	94.2	417.6	25.5	150.3	28.3
	230				70.7	84.9	376.2			
	460				35.4	42.4	188.1			
	575				28.3	33.9	150.5			
30	208	3	F	1.2	104.4	125.3	417.6	33.8	150.3	37.6
	230				94.1	112.9	376.2			
	460				47.0	56.4	188.1			
	575				37.6	45.1	150.5			
40	208	3	E	1.2	135.6	162.7	542.4	43.9	195.1	48.8
	230				122.2	146.6	488.6			
	460				61.1	73.3	244.3			
	575				48.9	58.6	195.5			
50	230	3	D	1.2	135.2	162.3	540.9	48.6	215.8	54.0
	460				67.6	81.1	270.5			
	575				54.1	64.9	216.4			

Pump Model: **K4VB – 1150 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1150**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
5	208	3	J	1.2	19.6	23.5	100.0	6.4	36.0	7.0
	230				17.7	21.2	90.1			
	460				8.8	10.6	45.0			
	575				7.1	8.5	36.0			
7.5	208	3	K	1.2	27.3	32.8	176.0	8.9	63.3	9.8
	230				24.6	29.5	158.5			
	460				12.3	14.8	79.3			
	575				9.8	11.8	63.4			
10	208	3	G	1.2	34.5	41.4	176.0	11.2	63.3	12.4
	230				31.1	37.3	158.5			
	460				15.5	18.6	79.3			
	575				12.4	14.9	63.4			
15	208	3	K	1.2	48.2	57.8	339.2	15.6	122.5	17.4
	230				43.4	52.1	305.5			
	460				21.7	26.1	152.8			
	575				17.4	20.8	122.2			
20	208	3	G	1.2	66.5	79.8	339.2	21.6	122.5	24.0
	230				59.9	71.9	305.5			
	460				30.0	35.9	152.8			
	575				24.0	28.8	122.2			

Pump Model: **K4VB – 870 RPM**

Thermal Data:

Maximum Liquid	140º F (60º C) Intermittent
Maximum Stator	311º F (155º C)
Heat Sensor **Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point	390º F (199º C)

Electrical Data:

RPM	**870**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
3	208	3	N	1.2	16.9	20.3	97.2	5.5	34.9	6.1
	230				15.2	18.3	87.6			
	460				7.6	9.1	43.8			
	575				6.1	7.3	35.0			
5	208	3	H	1.2	24.3	29.2	97.2	7.9	34.9	8.8
	230				21.9	26.3	87.6			
	460				10.9	13.1	43.8			
	575				8.8	10.5	35.0			
7.5	208	3	G	1.2	30.5	36.6	122.0	9.9	43.9	11.0
	230				27.5	33.0	109.9			
	460				13.7	16.5	55.0			
	575				11.0	13.2	44.0			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
3	3	72	71	70	66	73	71	67	59
5	3	83	80	76	69	74	72	67	60
7.5	3	82	81	77	68	74	71	68	61

SPECIFICATIONS

Solids-Handling Pumps K4VB

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, three-phase, designed for wet well and dry well submersible pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well and dry well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.

2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.

2.6. Submersible motor design:

2.6.1. _________ Horsepower

2.6.2. _________ RPM

2.6.3. _________ Voltage

2.6.4. _________ Phase

2.6.5. _________ Frequency

2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 311º F (155º C). To include:

2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.

2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.

2.7.3. Stator lead material must meet or exceed Class H insulation system.

2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.

2.7.4.1. The thermal limiting devices shall be attached to each phase winding.

2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.8. Operation of the motor shall be designed for:

2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class B operating temperature rise of 176º F (80º C).

2.8.2. Capable of 15 evenly spaced starts per hour.

2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.

2.8.3.1. Acceptable voltage variation is +/- 10%.

2.8.3.2. Acceptable frequency variation is +/- 5%.
2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
2.8.3.4. Current unbalance must not exceed 5%.
2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:
2.9.1. Secured with 304 stainless steel fasteners.
2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.
3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.
3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.
3.2.3. Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
3.3. All bolted connections in the cord entry construction shall be:
3.3.1. Secured with 304 stainless steel fasteners.
3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.
3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.
3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
4.3. Inboard and outboard seal construction shall be of the following material:
4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.
4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.
4.3.3. Elastomers shall be constructed of Viton®.
4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.
4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.
4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.
4.8. Class 1, Division 1, explosion-proof models will be included with an additional labyrinth seal constructed of bronze, CDA836 material, and is mounted directly above the pump seal plate to take radial loads and act as a flame path for seal chamber.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.
5.2. Each pump shall be constructed with a two-bearing system design.
5.2.1. The upper bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.
5.2.2. The lower bearing shall be a Conrad type, single row, angular contact ball bearing designed to adequately compensate for the axial loads and radial forces.
5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.
5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).
6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
7.2. The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.
7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.
7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

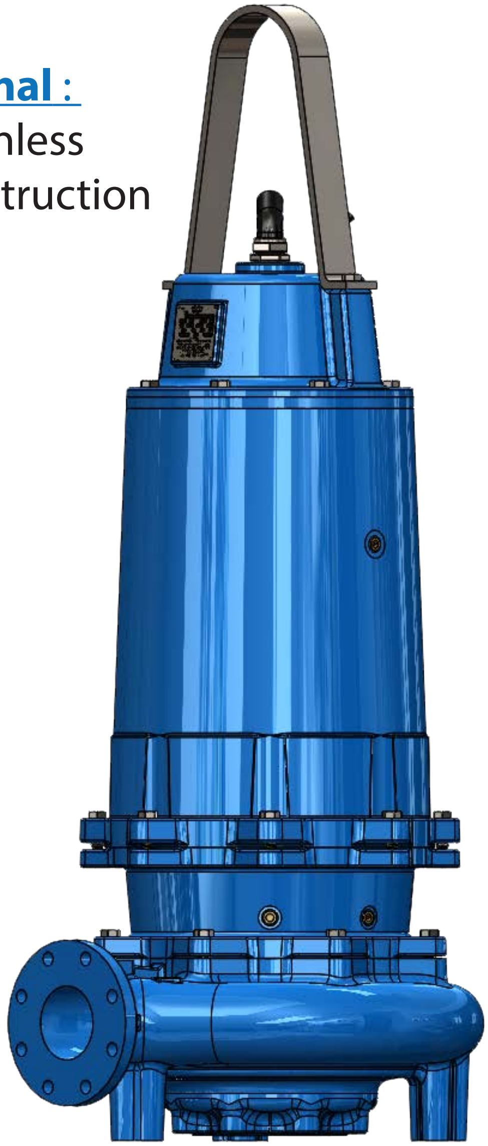
8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.
8.2. Design shall be a single piece and a modified constant velocity.
8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.
8.4. Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.
8.5. The discharge is to be of a horizontal centerline configuration.
8.6. The discharge is to be 4" ANSI® standard Class 125, 8-bolt configuration.
8.7. The inside of volute case shall be ceramic coated. Ceramic coated must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

K4VK

4” Submersible, Enclosed Impeller

Optional :
All Stainless
Steel Construction



CERAMIC COATED VORTEX IMPELLER
- Superior Abrasion Resistance
- Allows The Pump To Operate Better In Any Pressure Or Flow Condition

CERAMIC COATED VOLUTE
- Holds Up to Wear On Inside of Volute Casting Case

STANDARD MOTOR CONSTRUCTION
- Class H Laminations (Standard)

MOTOR GROUND RING PROTECTION
- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

DOUBLE ROW LOWER BEARINGS
- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates

BEST MOTOR CONSTRUCTION
- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Applications

CAPABILITIES:
- Flows-------------------------------------- to 2060 GPM
- Heads------------------------------------- to 268 Feet
- HP Range------------------------------- 50 - 150 HP
- Voltage / Phase Options------------- 460 / 575V, 3 Phase
- Discharge Connections-------------- 4” ANSI Class 125 Horizontal Flange
- Motor Speeds--------------------------- 1750 RPM
- Solids-Handling------------------------ 3”
- Impeller---------------------------------- Balanced, Enclosed, 2-Vane
- Motor Service Factor----------------- 1.20

Features and Benefits

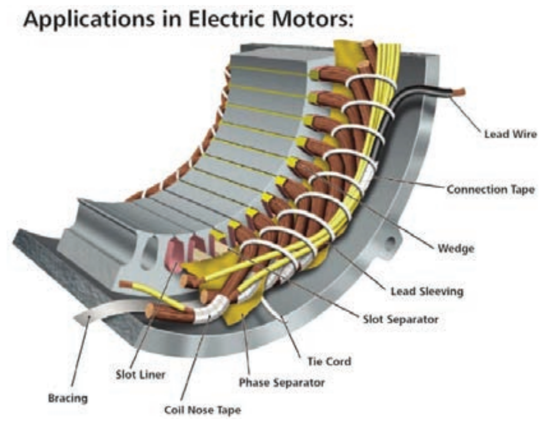
K4VK

Keen Pump's Bearing Protection Program

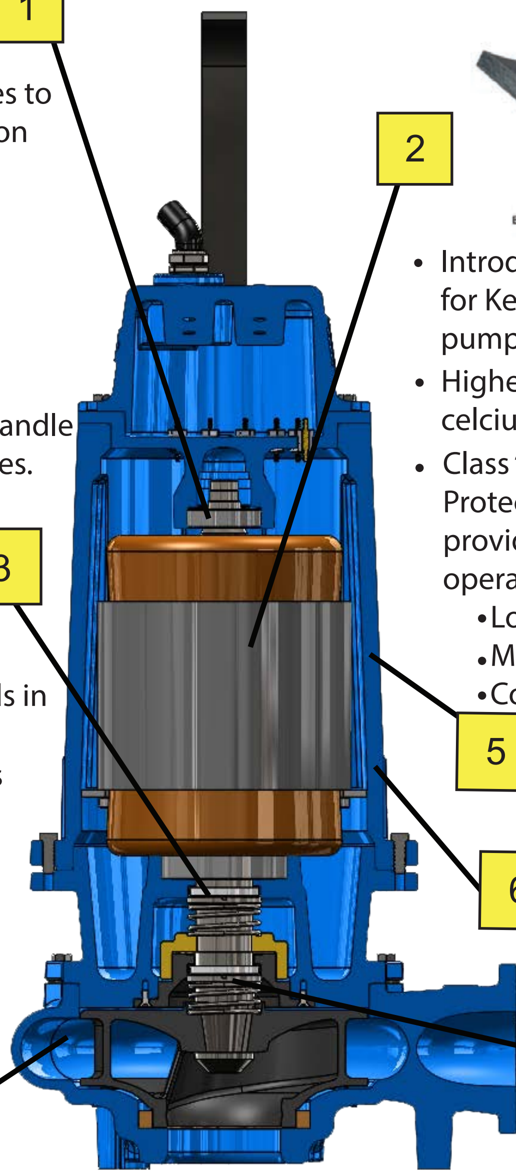
- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.

- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.

Heavy Duty Motor



- Introducing New Premium Class "N" Motors for Keen's Large Grinders and Solids Handling pumps.
- Highest temperature construction (200 degrees celcius) for motors
- Class "N" Construction is the best in the industry. Protects your motor from over heating and provides extended motor life. Motors are operating at higher teperatures due to:
  - Longer run times
  - Motor housing not submerged
  - Continuous



Double Row Bearings

- Heavy Duty Bearings to handle the toughest performances.

- High Pressures
- High Flows

- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.

Castings

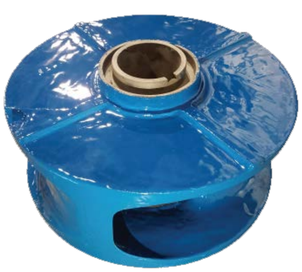
- ASTM - Class 35 high tensile strength castings.

Durable Powder Coat Finish

- Holds up to the toughest environmental conditions.

Dual Shaft Seals

- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.



Ceramic Coating

The ultimate indestructable ceramic coated impellers and volutes for Keen's Solids Handling pumps. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

KEEN PUMP

471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

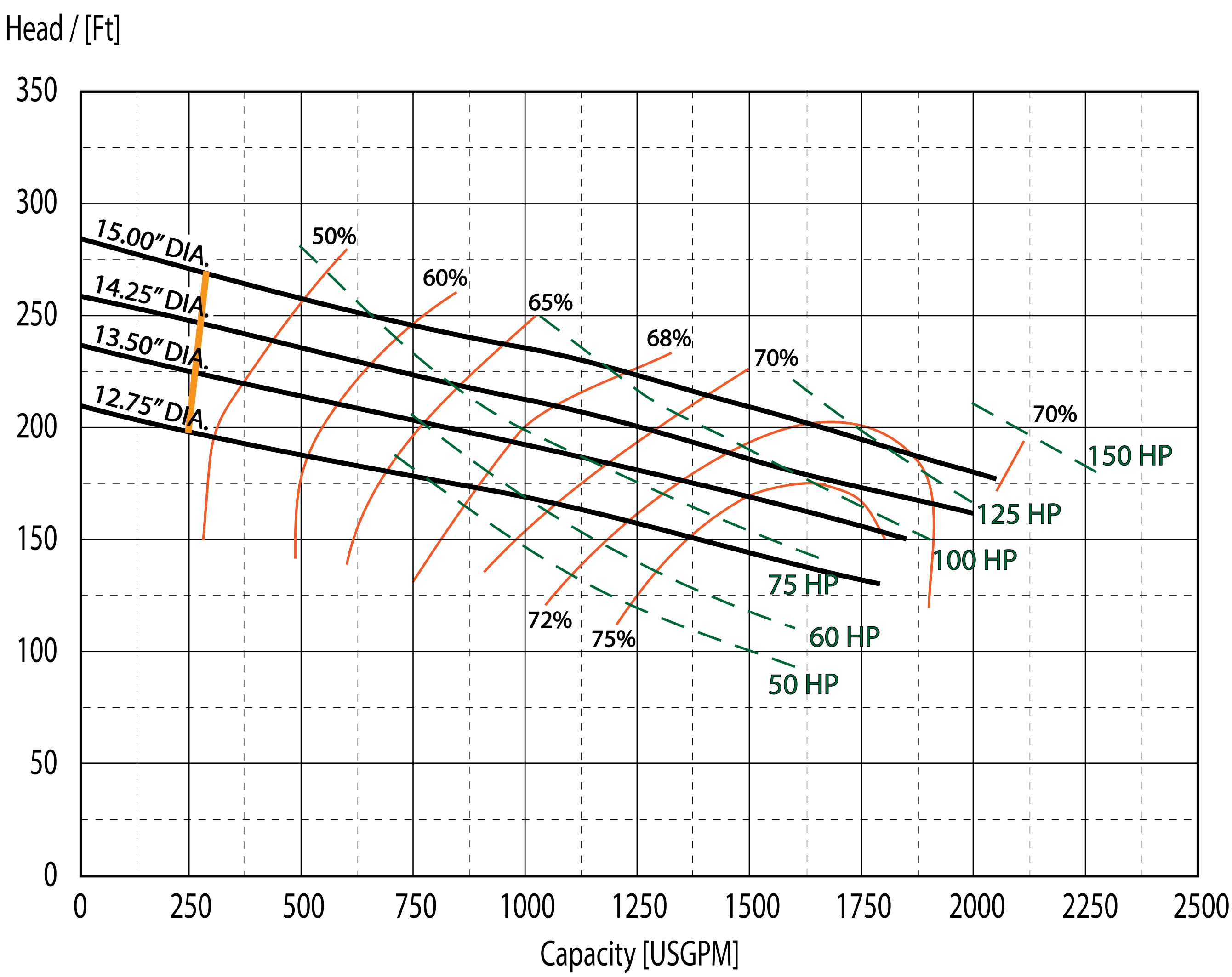
File : K4VK CUTS
Rev. 04/2021

KEEN PUMP

Section **ENCLOSED**
Date Nov. 2021

Pump Series	**K4VK**	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1750 RPM**	Discharge	**4″**	Solids	**3″**

GPM: __________ TDH: __________

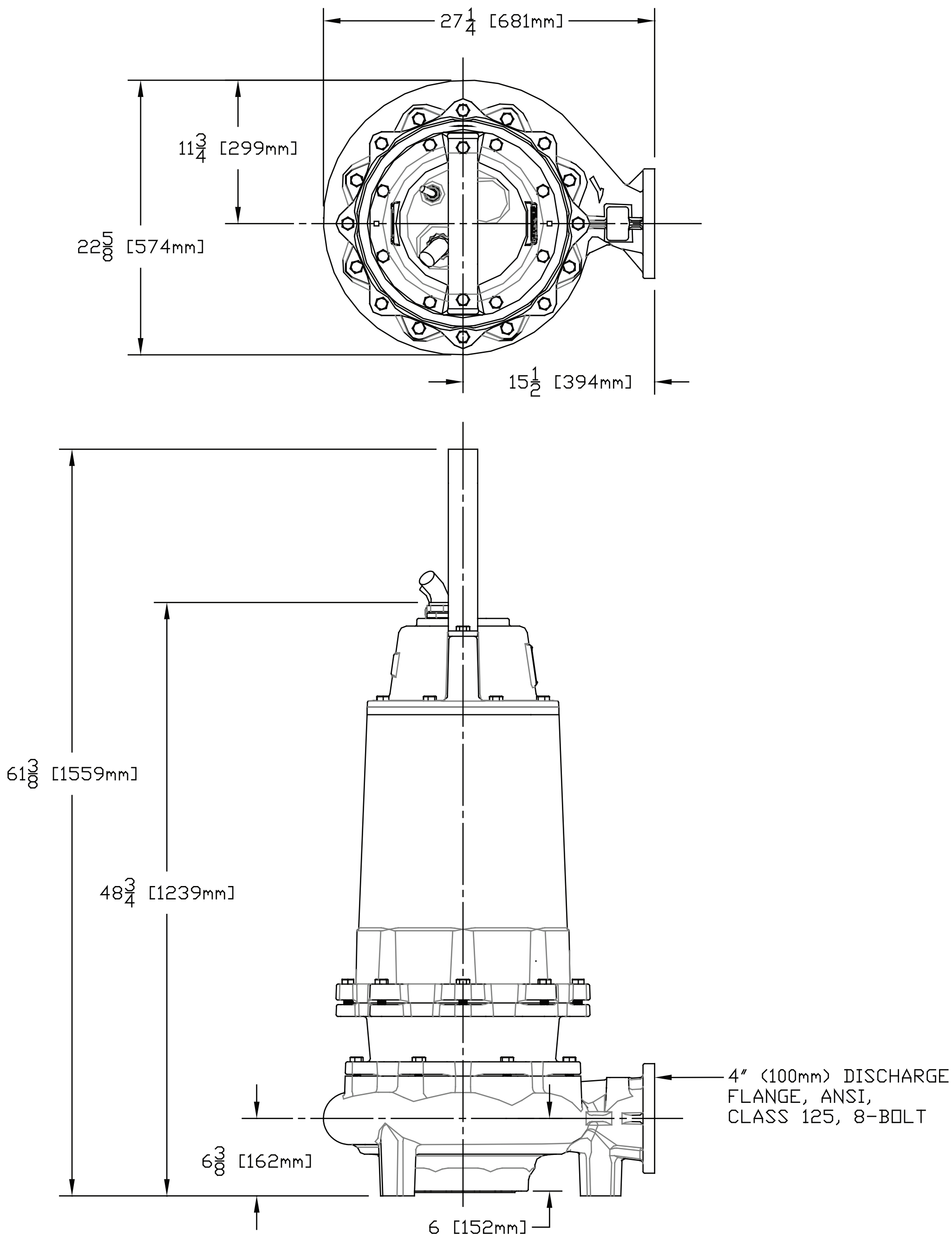


The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K4VK_1750

Pump Series	**K4VK**	4″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

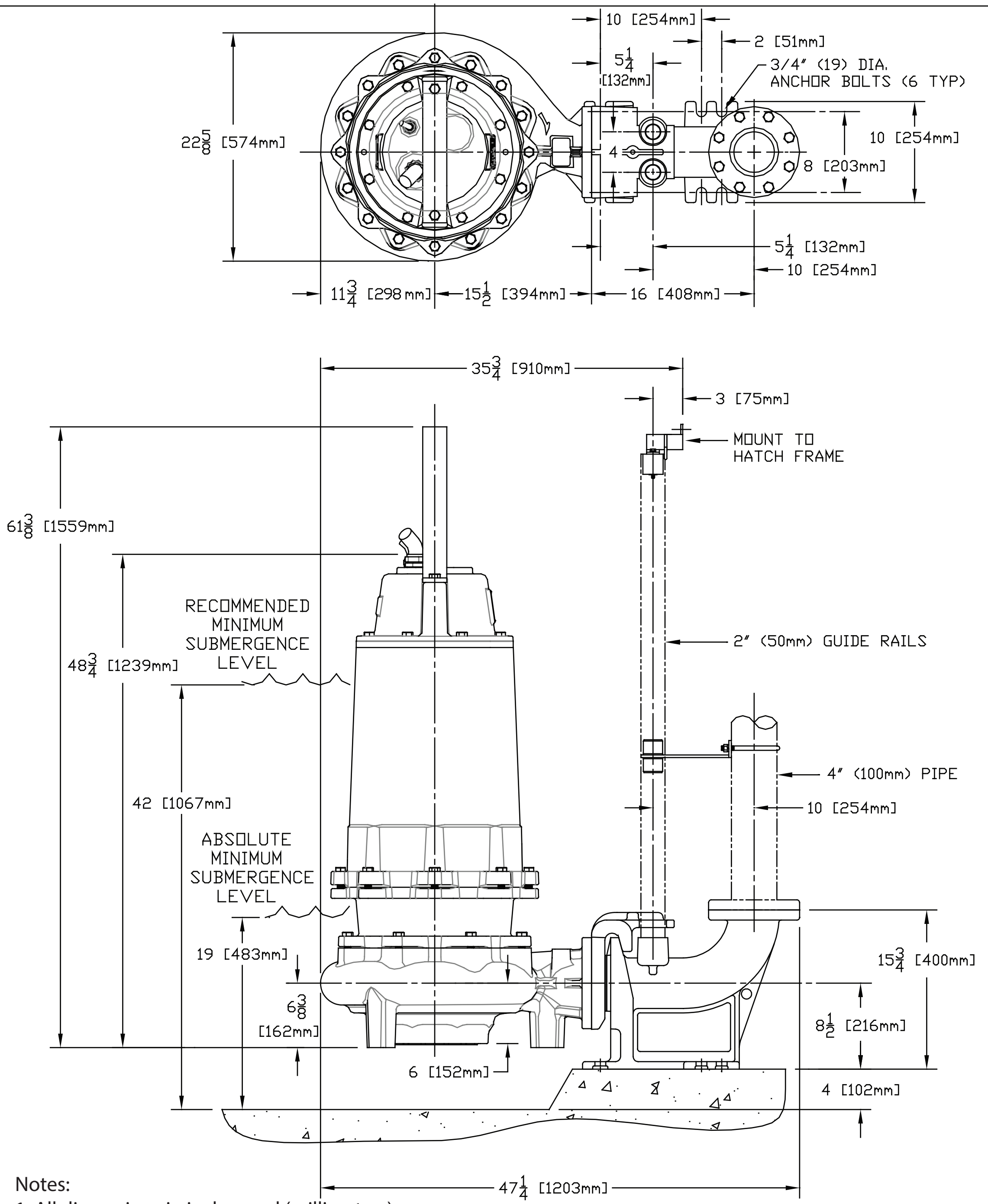


Note: All dimensions in inches and (millimeters).
Dimensions may vary due to normal manufacturing tolerances.

File: K4VK Dimensions

Pump Series	K4VK	4″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

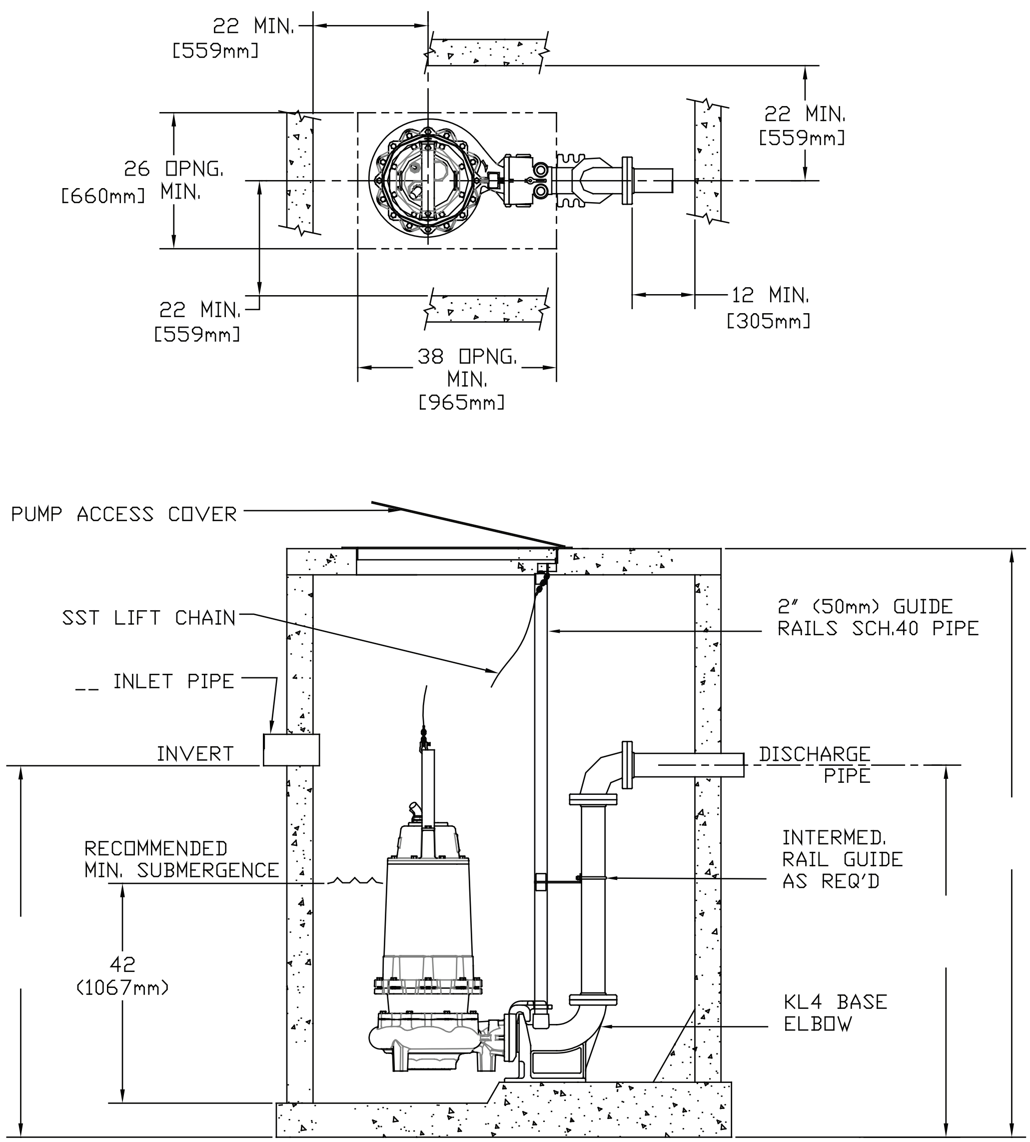


Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4VK Liftout Dimensions

Pump Series	K4VK	4″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA

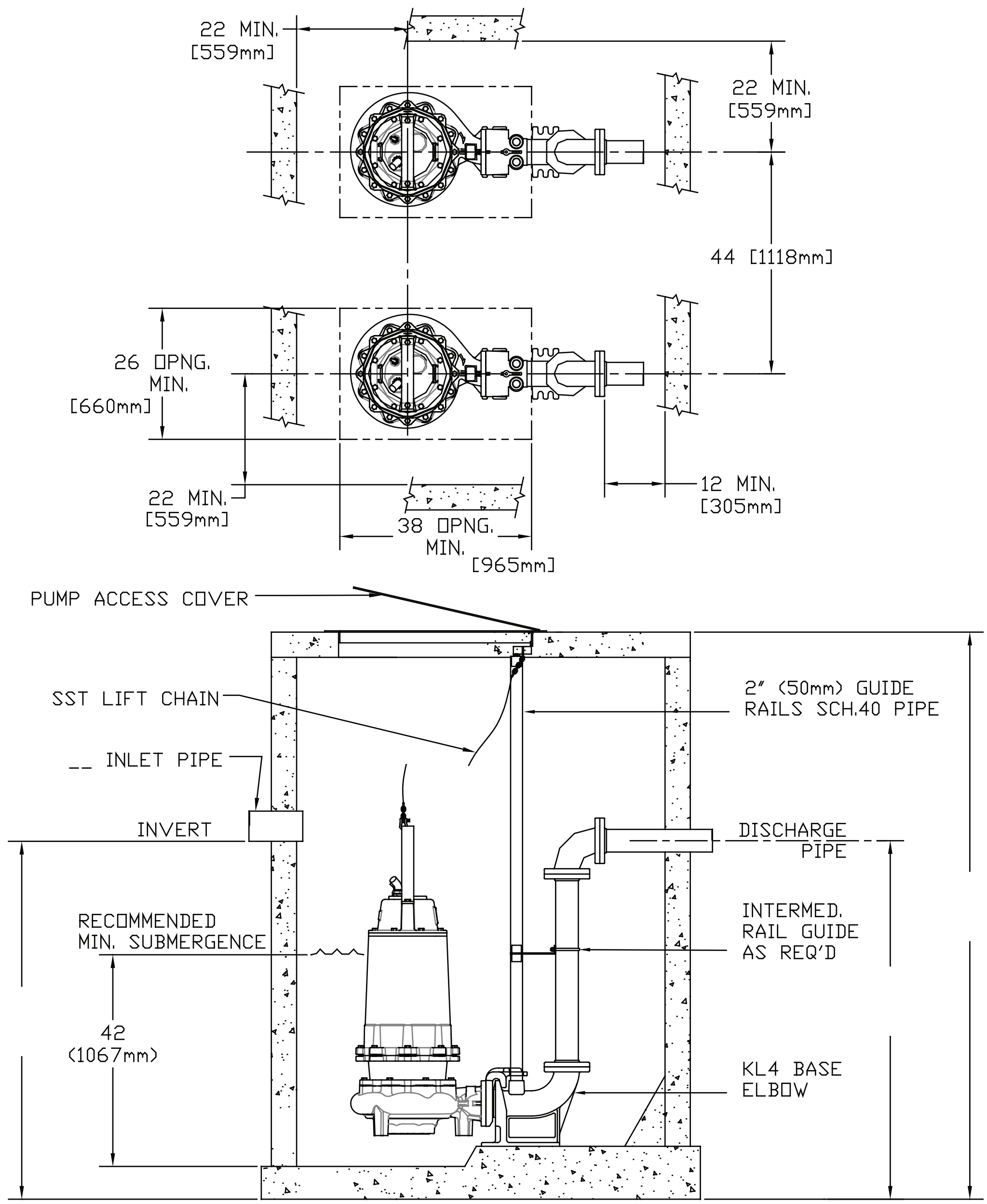


Notes:
1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. Dimensions may vary due to normal manufacturing tolerances.
7. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

Section ENCLOSED
Date NOV 2013

Pump Series	K4VK	4″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. Dimensions may vary due to normal manufacturing tolerances.
7. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4VK Install Dimensions

Pump Model: **K4VK**

Physical Data:

Discharge Size	ANSI 4″ Horizontal
Solids Size	3″
Impeller Type	Balanced, Enclosed, 2 Vane
Power/Control Cable Length	40′ Standard
Paint	Blue, Water Reducible Enamel, One Coat, Air Dried – Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components if Applicable
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	SOOW - 600V, 90º C; Type W - 2000V, 90º C
Control Cord Type	16-4 or 18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coted Inside
Wear Ring	Bronze, CDA 836
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

Pump Model: **K4VK – 1750 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
50	460	3	K	1.2	65.3	78.4	507.7	46.8	404.5	52.0
	575				52.3	62.7	406.2			
60	460	3	H	1.2	75.2	90.3	507.7	53.9	404.5	59.9
	575				60.2	72.2	406.2			
75	460	3	F	1.2	99.5	119.5	507.7	71.4	404.5	79.3
	575				79.6	95.6	406.2			
100	460	3	F	1.2	132.9	159.5	691.0	95.3	550.5	105.9
	575				106.3	127.6	552.8			
125	460	3	G	1.2	172.1	206.5	962.2	123.4	766.5	137.1
	575				137.7	165.2	769.7			
150	460	3	F	1.2	200.5	240.5	962.2	143.7	766.5	159.7
	575				160.4	192.4	769.7			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				Power Factor %			
HP	Phase	Service Factor Load	100% Load	75% Load	50% Load	Service Factor Load	100% Load	75% Load	50% Load
50	3	84	83	79	72	86	83	80	70
60	3	85	84	80	73	87	84	82	74
75	3	83	82	81	74	86	84	81	75
100	3	84	83	80	73	86	86	83	78
125	3	87	86	81	74	87	86	82	78
150	3	87	87	82	75	84	82	80	77

KEEN PUMP®

SPECIFICATIONS

Solids-Handling Pumps K4VK

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, three-phase, designed for wet well and dry well submersible pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well and dry well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.

2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric, KEEN ICE oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.

2.6. Submersible motor design:

2.6.1. ________ Horsepower
2.6.2. ________ RPM
2.6.3. ________ Voltage
2.6.4. ________ Phase
2.6.5. ________ Frequency
2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 311º F (155º C). To include:

2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.

2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.

2.7.3. Stator lead material must meet or exceed Class H insulation system.

2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.

2.7.4.1. The thermal limiting devices shall be attached to each phase winding.

2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.8. Operation of the motor shall be designed for:

2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311º F (155º C).

2.8.2. Capable of 15 evenly spaced starts per hour.

2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.

2.8.3.1. Acceptable voltage variation is +/- 10%.

2.8.3.2. Acceptable frequency variation is +/- 5%.

2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
2.8.3.4. Current unbalance must not exceed 5%.
2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:
2.9.1. Secured with 304 stainless steel fasteners.
2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.
3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.
3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.
3.2.3. Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
3.3. All bolted connections in the cord entry construction shall be:
3.3.1. Secured with 304 stainless steel fasteners.
3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.
3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.
3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
4.3. Inboard and outboard seal construction shall be of the following material:
4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.
4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.
4.3.3. Elastomers shall be constructed of Viton®.
4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.
4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.
4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

4.8. Class 1, Division 1, explosion-proof models will be included with an additional labyrinth seal constructed of bronze, CDA836 material, and is mounted directly above the pump seal plate to take radial loads and act as a flame path for seal chamber.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.
5.2. Each pump shall be constructed with a two-bearing system design.
5.2.1. The upper bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.
5.2.2. The lower bearing shall be a Conrad type, single row, angular contact ball bearing designed to adequately compensate for the axial loads and radial forces.
5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.
5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).
6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
7.2. The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.
7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.
7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.
8.2. Design shall be a single piece and a modified constant velocity.
8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.
8.4. Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.
8.5. The discharge is to be of a horizontal centerline configuration.
8.6. The discharge is to be 4" ANSI® standard Class 125, 8-bolt configuration.
8.7. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

KEEN PUMP

Section SOLIDS-HANDLING
Dated MAR 2015

6” Discharge – 2-Vane Enclosed Impeller

3” Solids Handling

1750 & 1150 & 870 RPM

This section contains the following material:

1. **Pump Family Curves & Technical Data**	• K6VB
2. **Individual Performance Curves**	• K6VB
3. **Dimensional Drawings** Pump Lift-Out & Base Elbow Wet Well Installations	• K6VB

KEEN PUMP
Ashland, Ohio 44805
Phone: 419-207-9400

6” Solids-Handling Pumps

Model Number Identification Chart

K 6 VB 50 - 21 M 2 Y

Keen Pump

Discharge Size:
- 6 = 6”
- 8 = 8”

Pump Model

Horsepower (HP x 10)
- 30 = 3 HP
- 50 = 5 HP
- 75 = 7-1/2 HP
- 100 = 10 HP
- 150 = 15 HP
- 200 = 20 HP
- 250 = 25 HP
- 300 = 30 HP
- 400 = 40 HP
- 500 = 50 HP

Voltage/Phase
- 01 = 208/1
- 21 = 230/1
- 03 = 208/3
- 23 = 230/3
- 43 = 460/3
- 53 = 575/3

Manual Pump Operation

Speed
- 2 = 3450 RPM
- 4 = 1750 RPM
- 6 = 1150 RPM
- 8 = 870 RPM

Frequency
- Blank = 60 Hz
- Y = 50 Hz

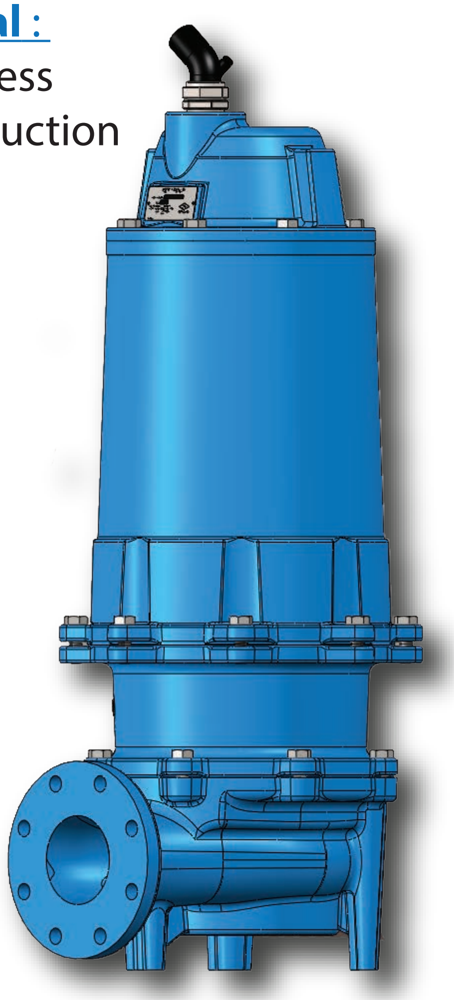
Solids-Handling Pumps

KEEN PUMP

K6VB(X)

6" Submersible, Enclosed Impeller
(Class 1, Div. 1, Groups C & D Hazardous Location)

Optional :
All Stainless
Steel Construction



CERAMIC COATED VORTEX IMPELLER
- Superior Abrasion Resistance
- Allows The Pump To Operate Better In Any Pressure Or Flow Condition

CERAMIC COATED VOLUTE
- Holds Up to Wear On Inside of Volute Casting Case

STANDARD MOTOR CONSTRUCTION
- Class H Laminations (Standard)

MOTOR GROUND RING PROTECTION
- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

DOUBLE ROW LOWER BEARINGS
- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates

BEST MOTOR CONSTRUCTION
- Class "N" (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Applications

CAPABILITIES:
- Flows-------------------------------------- to 2250 GPM
- Heads------------------------------------ to 155 Feet
- HP Range------------------------------- 3 - 60 HP
- Voltage / Phase Options------------- 208 / 230 / 460 / 575V, 3 Phase
- Discharge Connections-------------- 6" ANSI Class 125 Horizontal Flange
- Motor Speeds-------------------------- 870 / 1150 / 1750 RPM
- Solids-Handling----------------------- 3-1/2"
- Impeller---------------------------------- Balanced, Enclosed, 2-Vane
- Motor Service Factor----------------- 1.20

Features and Benefits

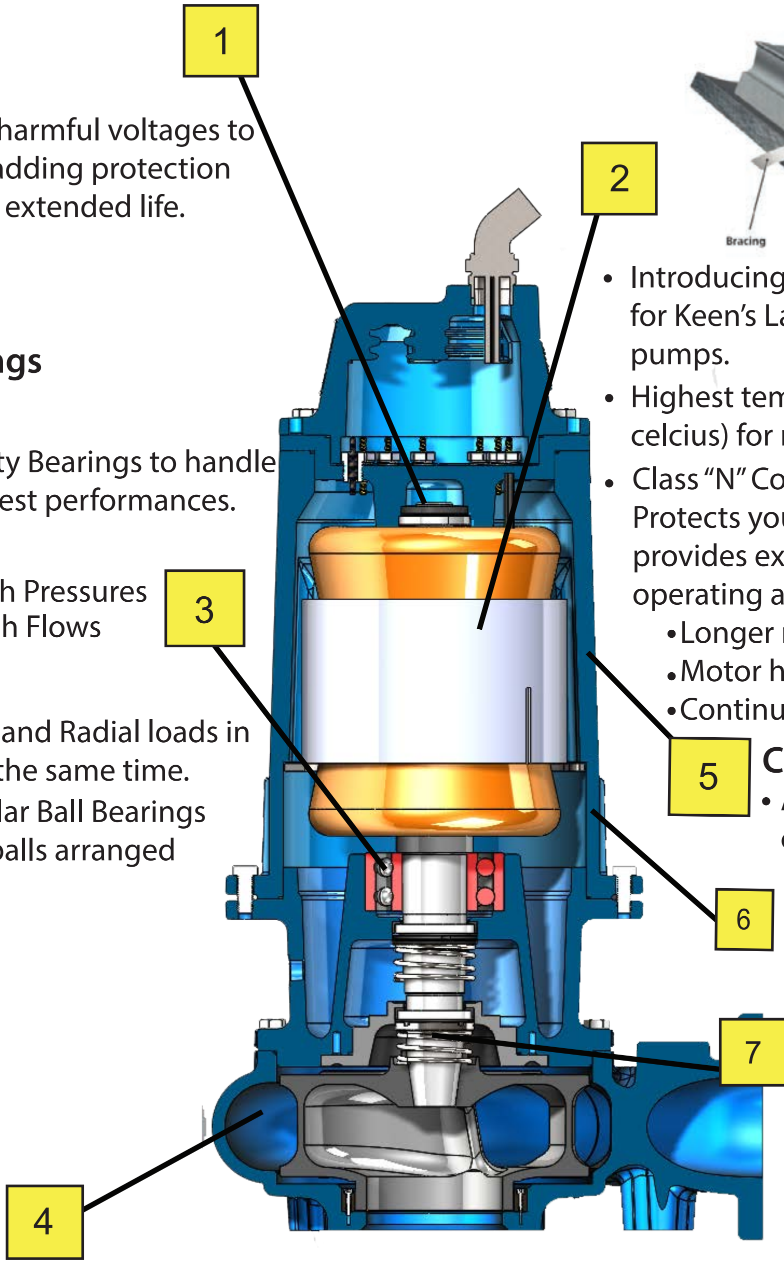
K6VB(X)

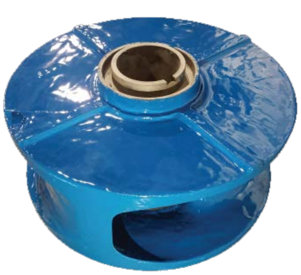
Keen Pump's Bearing Protection Program

- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.
- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.

Double Row Bearings

- Heavy Duty Bearings to handle the toughest performances.
- High Pressures
- High Flows
- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.



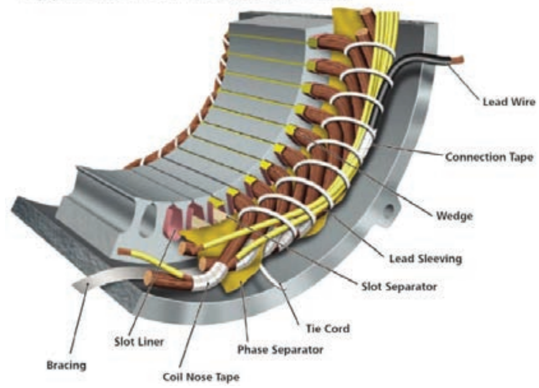


Ceramic Coating

The ultimate indestructable ceramic coated impellers and volutes for Keen's Solids Handling pumps. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

Heavy Duty Motor

Applications in Electric Motors:



- Introducing New Premium Class "N" Motors for Keen's Large Grinders and Solids Handling pumps.
- Highest temperature construction (200 degrees celcius) for motors
- Class "N" Construction is the best in the industry. Protects your motor from over heating and provides extended motor life. Motors are operating at higher teperatures due to:
  - Longer run times
  - Motor housing not submerged
  - Continuous

Castings

- ASTM - Class 35 high tensile strength castings.

Durable Powder Coat Finish

- Holds up to the toughest environmental conditions.

Dual Shaft Seals

- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

KEEN PUMP

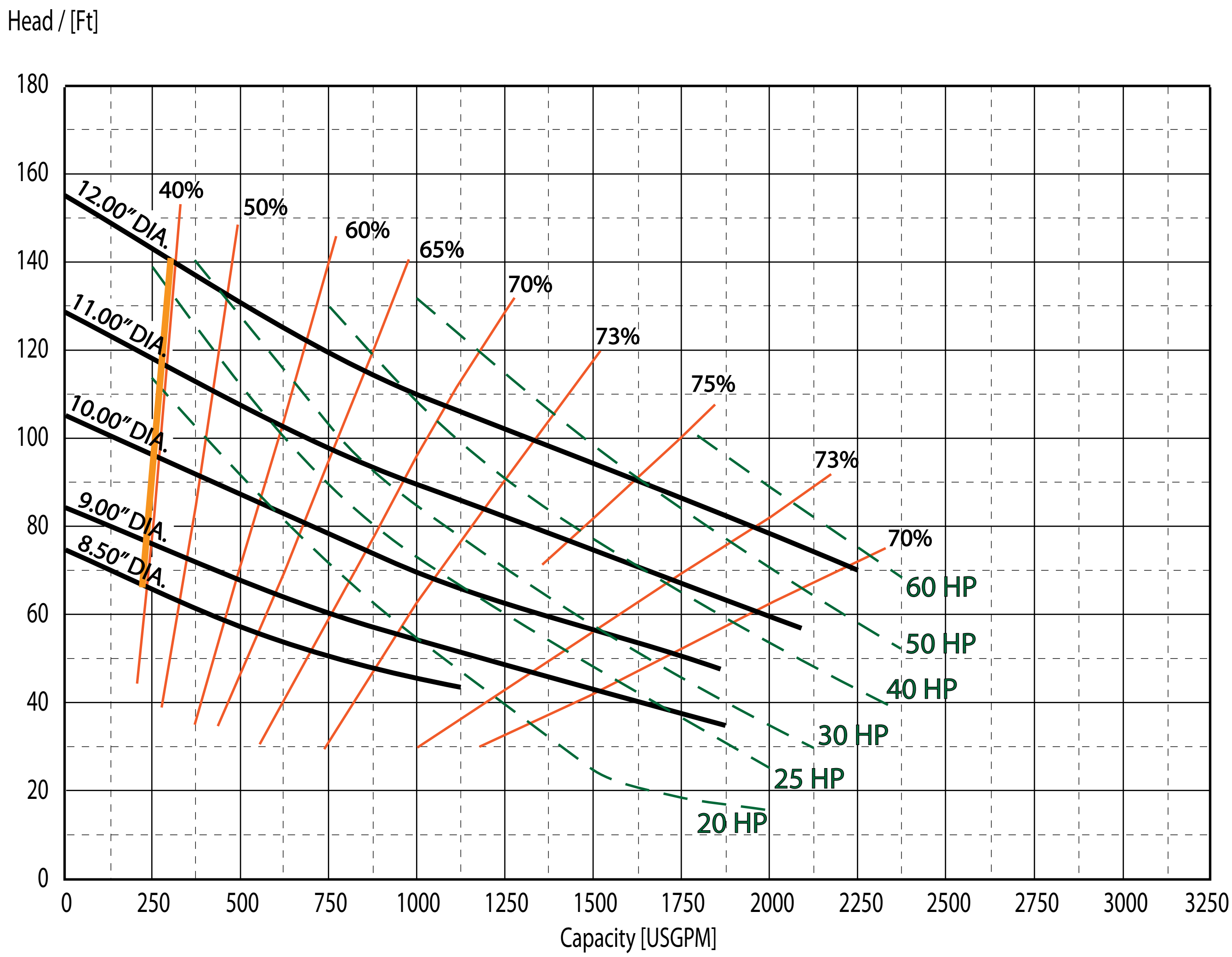
471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

KEEN PUMP

Section **ENCLOSED**
Date Nov. 2021

Pump Series	K6VB	6″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1750 RPM**	Discharge	**6″**	Solids	**3-1/2″**

GPM: __________ TDH: __________



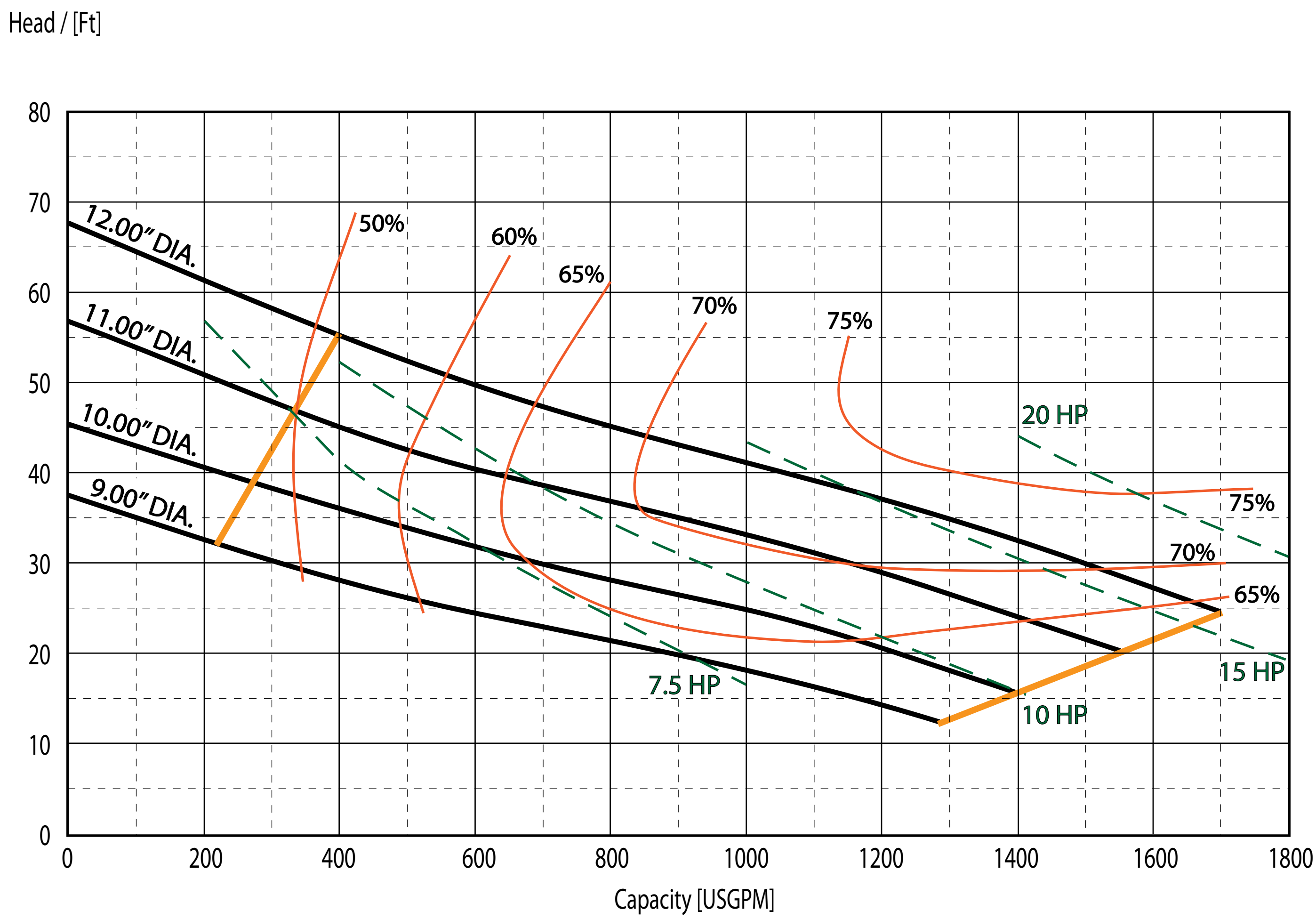
The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K6VB_1750

Section	**ENCLOSED**				
Date	Nov. 2021				

Pump Series	**K6VB**		6″ SUBMERSIBLE SEWAGE PUMPS		
Speed	**1150 RPM**	Discharge	**6″**	Solids	**3-1/2″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

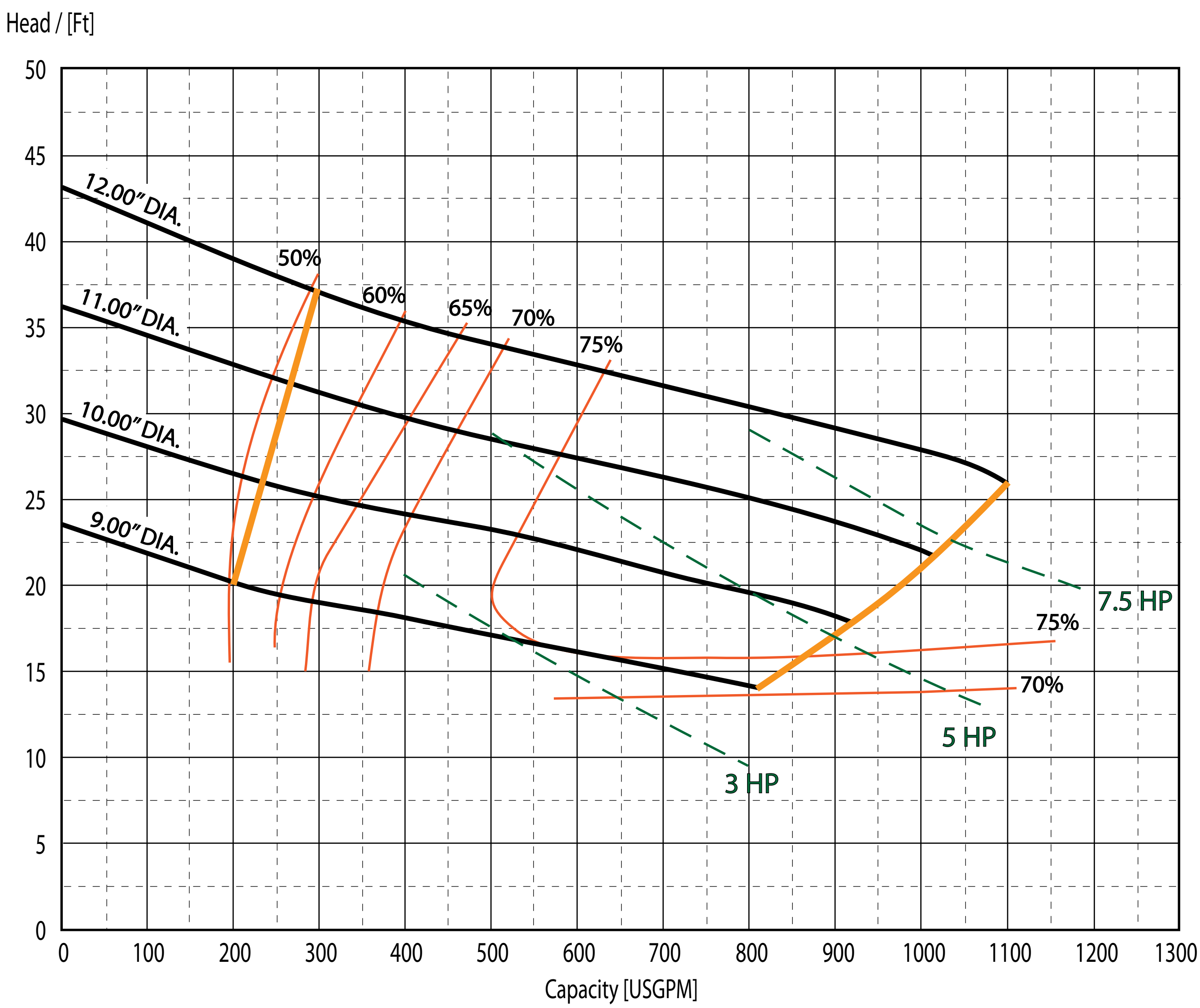
File: K6VB_1150

KEEN PUMP

Section ENCLOSED
Date Nov. 2021

Pump Series	K6VB	6″ SUBMERSIBLE SEWAGE PUMPS			
Speed	870 RPM	Discharge	6″	Solids	3-1/2″

GPM: __________ TDH: __________

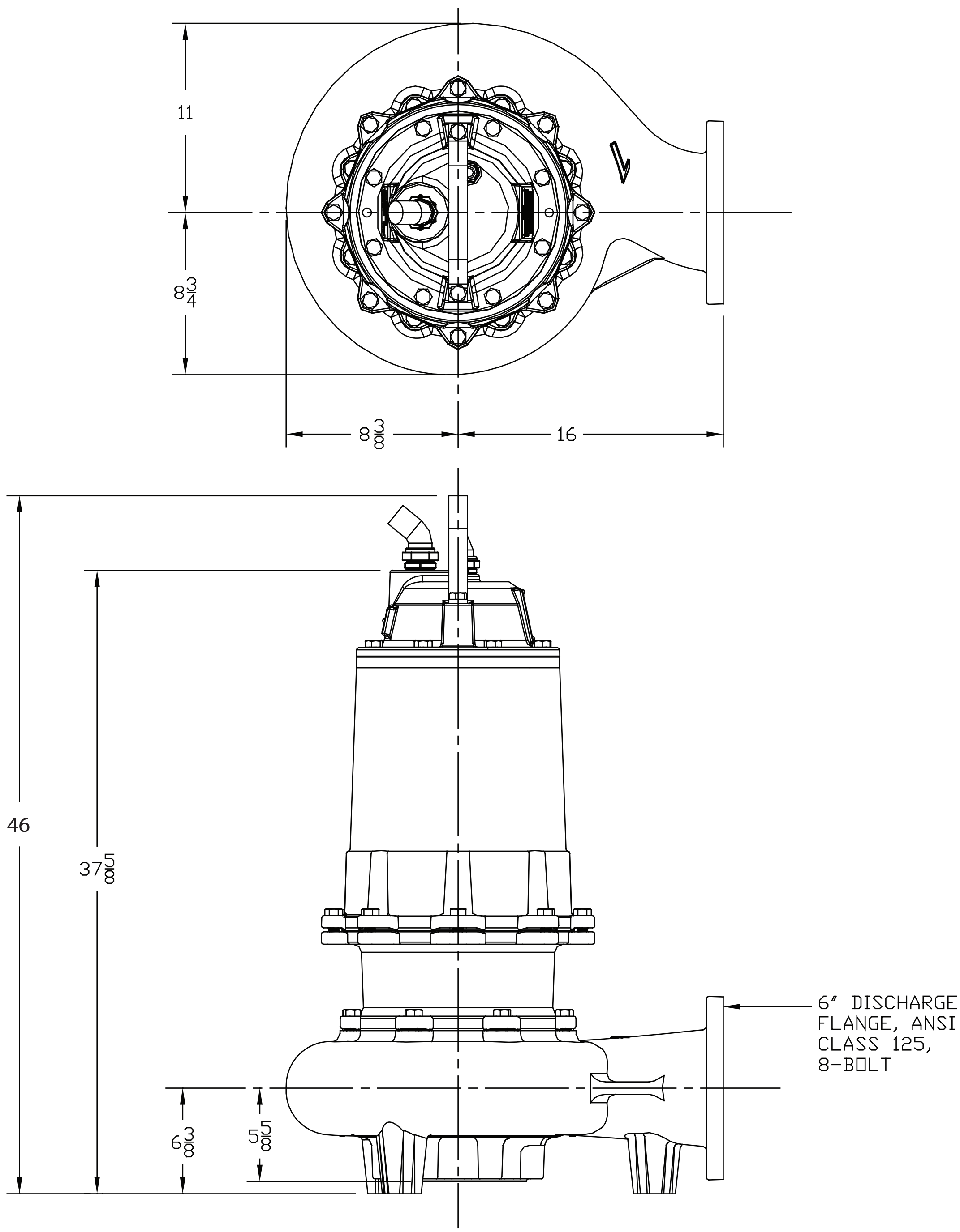


The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

File: K6VB_870

Pump Series	**K6VB**	6″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

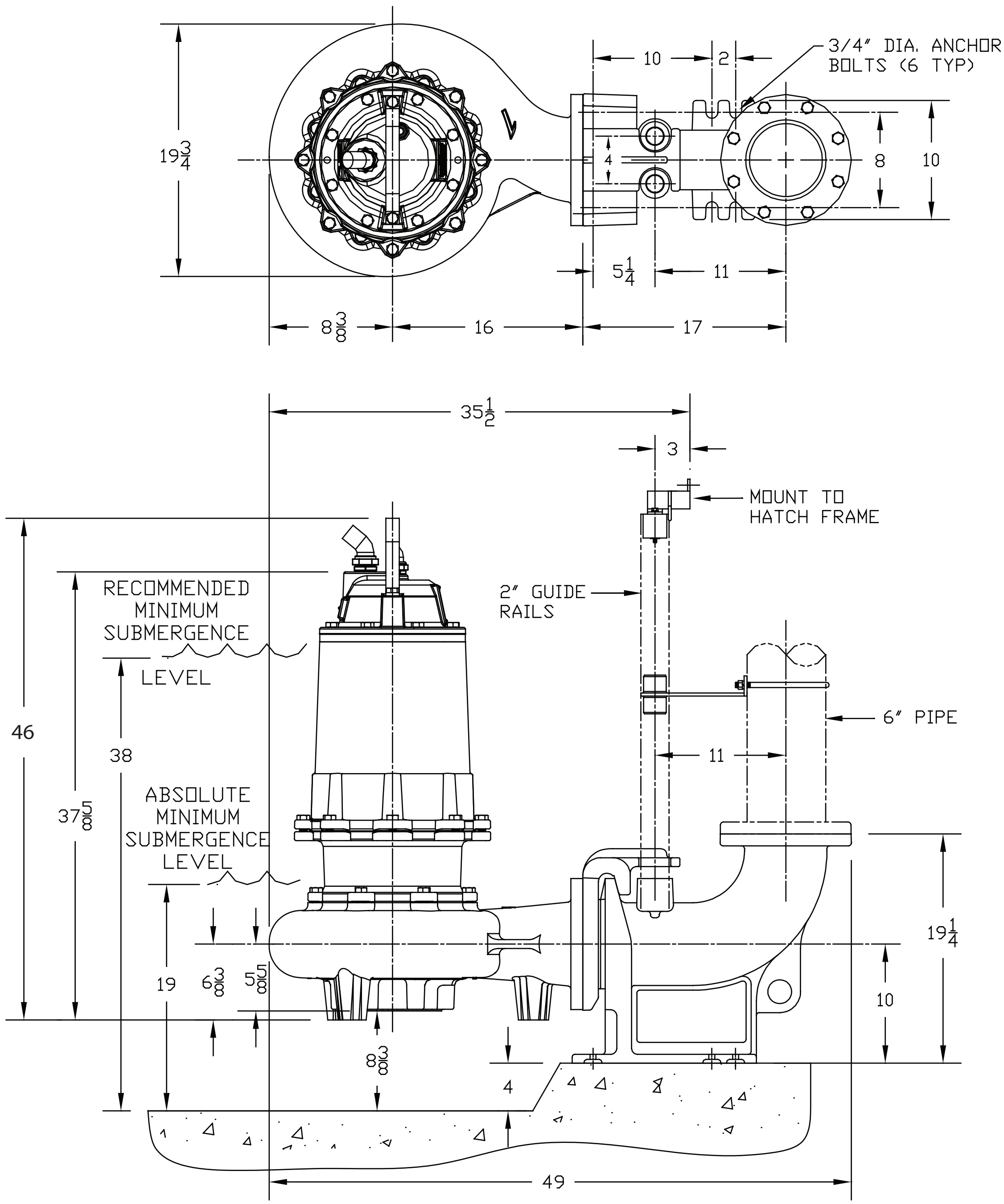


Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K6VB Dimensions

Pump Series	K6VB	6″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



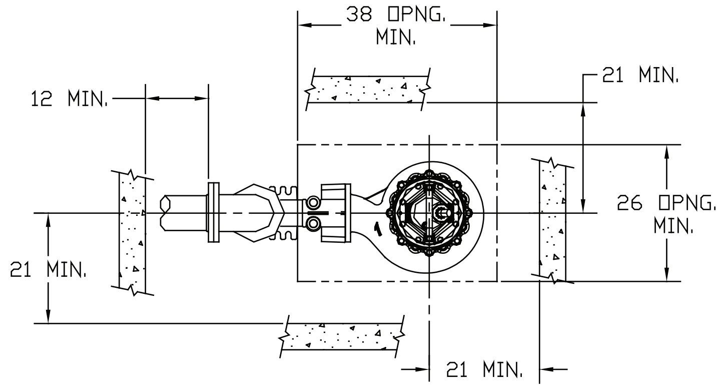
Notes:
1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

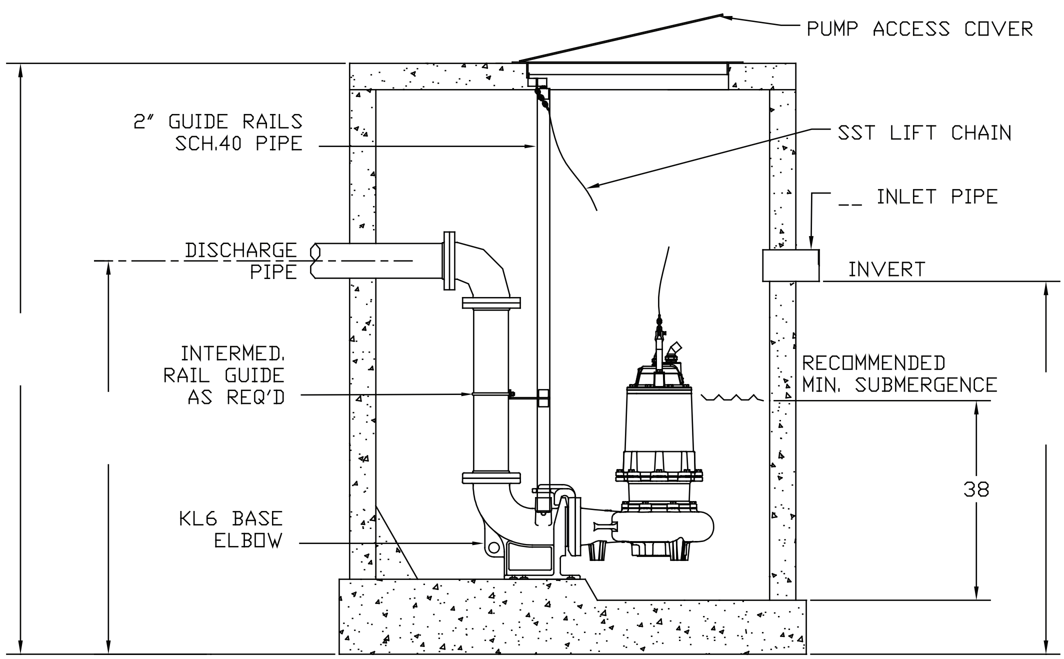
File: K6VB Liftout Dimensions

Section **ENCLOSED**
Date **JULY 2013**

Pump Series	**K6VB**	6″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA





Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

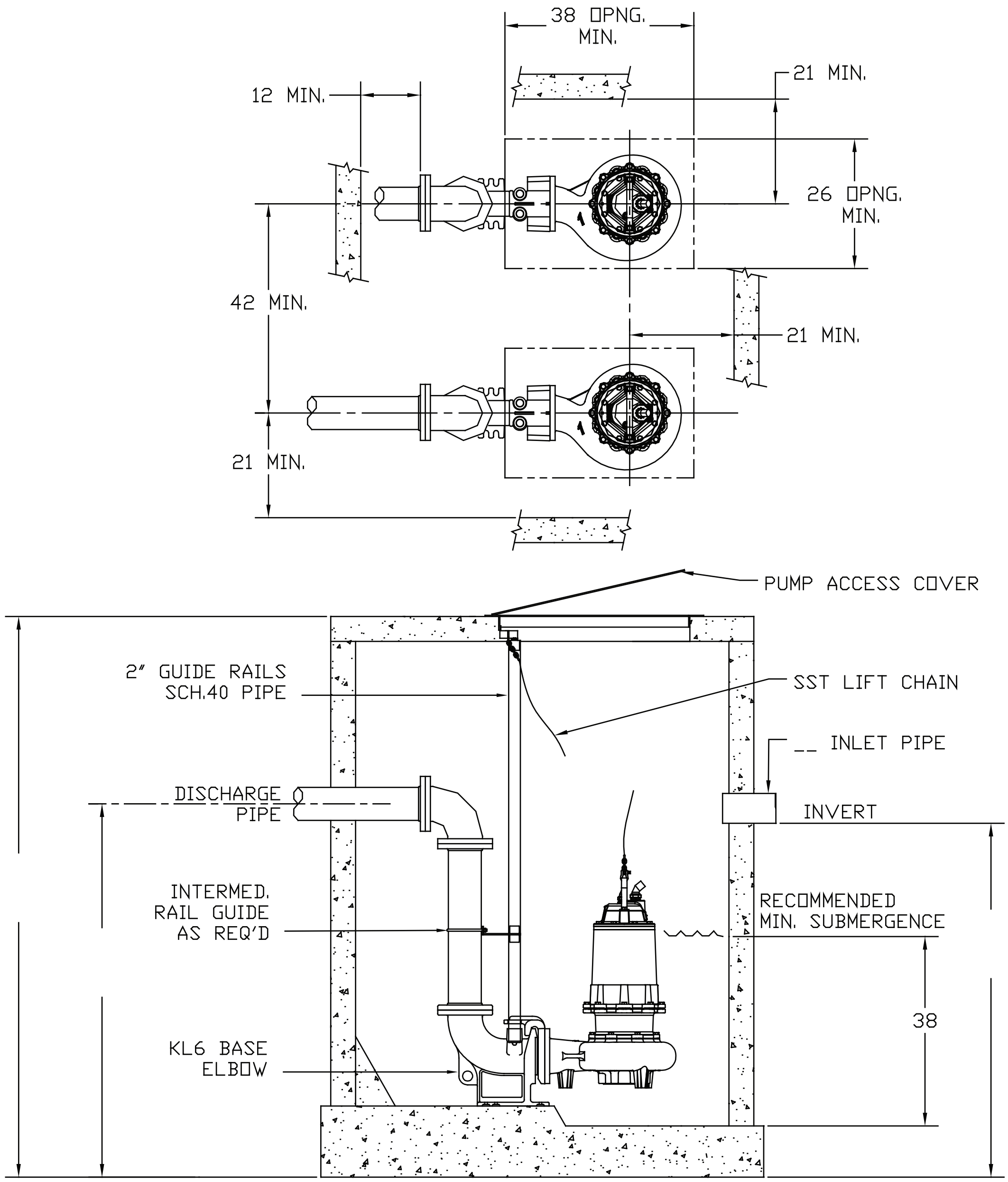
File: K6VB Install Dimensions

KEEN PUMP

Section **ENCLOSED**
Date **JULY 2013**

Pump Series	K6VB	6″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K6VB Install Dimensions

Pump Model: **K6VB**

Physical Data:

Discharge Size	ANSI 6″ Horizontal
Solids Size	3-1/2″
Impeller Type	Balanced, Enclosed, 2 Vane
Power/Control Cable Length	40′ Standard
Paint	Blue, Water Reducible Enamel, One Coat, Air Dried – Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components if Applicable
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	SOOW - 600V, 90º C; Type W - 2000V, 90º C
Control Cord Type	16-4 or 18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Wear Ring	Bronze, CDA 836
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

Pump Model: <u>**K6VB – 1750 RPM**</u>

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
15	208	3	H	1.2	50.8	61.0	277.2	16.5	99.7	18.3
	230				45.8	54.9	249.7			
	460				22.9	27.5	124.9			
	575				18.3	22.0	99.9			
20	208	3	E	1.2	69.3	83.2	277.2	22.4	99.7	25.0
	230				62.4	74.9	249.7			
	460				31.2	37.5	124.9			
	575				25.0	30.0	99.9			
25	208	3	G	1.2	78.5	94.2	417.6	25.5	150.3	28.3
	230				70.7	84.9	376.2			
	460				35.4	42.4	188.1			
	575				28.3	33.9	150.5			
30	208	3	F	1.2	104.4	125.3	417.6	33.8	150.3	37.6
	230				94.1	112.9	376.2			
	460				47.0	56.4	188.1			
	575				37.6	45.1	150.5			
40	208	3	E	1.2	135.6	162.7	542.4	43.9	195.1	48.8
	230				122.2	146.6	488.6			
	460				61.1	73.3	244.3			
	575				48.9	58.6	195.5			
50	230	3	D	1.2	135.2	162.3	540.9	48.6	215.8	54.0
	460				67.6	81.1	270.5			
	575				54.1	64.9	216.4			

KEEN PUMP

Section ENCLOSED
Dated SEP 2014

Pump Model: **K6VB – 1150 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1150**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
5	208	3	J	1.2	19.6	23.5	100.0	6.4	36.0	7.0
	230				17.7	21.2	90.1			
	460				8.8	10.6	45.0			
	575				7.1	8.5	36.0			
7.5	208	3	K	1.2	27.3	32.8	176.0	8.9	63.3	9.8
	230				24.6	29.5	158.5			
	460				12.3	14.8	79.3			
	575				9.8	11.8	63.4			
10	208	3	G	1.2	34.5	41.4	176.0	11.2	63.3	12.4
	230				31.1	37.3	158.5			
	460				15.5	18.6	79.3			
	575				12.4	14.9	63.4			
15	208	3	K	1.2	48.2	57.8	339.2	15.6	122.5	17.4
	230				43.4	52.1	305.5			
	460				21.7	26.1	152.8			
	575				17.4	20.8	122.2			
20	208	3	G	1.2	66.5	79.8	339.2	21.6	122.5	24.0
	230				59.9	71.9	305.5			
	460				30.0	35.9	152.8			
	575				24.0	28.8	122.2			
25	208	3	G	1.0	79.8	79.8	339.2	21.6	122.5	24.0
	230				71.9	71.9	305.5			
	460				35.9	35.9	152.8			

KEEN PUMP

Section ENCLOSED
Dated MAY 2013

Pump Model: **K6VB – 870 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**870**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
3	208	3	N	1.2	16.9	20.3	97.2	5.5	34.9	6.1
	230				15.2	18.3	87.6			
	460				7.6	9.1	43.8			
	575				6.1	7.3	35.0			
5	208	3	H	1.2	24.3	29.2	97.2	7.9	34.9	8.8
	230				21.9	26.3	87.6			
	460				10.9	13.1	43.8			
	575				8.8	10.5	35.0			
7.5	208	3	G	1.2	30.5	36.6	122.0	9.9	43.9	11.0
	230				27.5	33.0	109.9			
	460				13.7	16.5	55.0			
	575				11.0	13.2	44.0			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
3	3	72	71	70	66	73	71	67	59
5	3	83	80	76	69	74	72	67	60
7.5	3	82	81	77	68	74	71	68	61

SPECIFICATIONS

Solids-Handling Pumps K6VB

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, three-phase, designed for wet well and dry well submersible pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well and dry well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.

2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.

2.6. Submersible motor design:

2.6.1. ________ Horsepower
2.6.2. ________ RPM
2.6.3. ________ Voltage
2.6.4. ________ Phase
2.6.5. ________ Frequency
2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356º F (180º C). To include:

2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.

2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.

2.7.3. Stator lead material must meet or exceed Class H insulation system.

2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.

2.7.4.1. The thermal limiting devices shall be attached to each phase winding.

2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.8. Operation of the motor shall be designed for:

2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311º F (155º C).

2.8.2. Capable of 15 evenly spaced starts per hour.

2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.

2.8.3.1. Acceptable voltage variation is +/- 10%.

2.8.3.2. Acceptable frequency variation is +/- 5%.

2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
2.8.3.4. Current unbalance must not exceed 5%.
2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:
2.9.1. Secured with 304 stainless steel fasteners.
2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION
3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.
3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.
3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.
3.2.3. Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
3.3. All bolted connections in the cord entry construction shall be:
3.3.1. Secured with 304 stainless steel fasteners.
3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.
3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.
3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS
4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
4.3. Inboard and outboard seal construction shall be of the following material:
4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.
4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.
4.3.3. Elastomers shall be constructed of Viton®.
4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.
4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.
4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

4.8. Class 1, Division 1, explosion-proof models will be included with an additional labyrinth seal constructed of bronze, CDA836 material, and is mounted directly above the pump seal plate to take radial loads and act as a flame path for seal chamber.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a two-bearing system design.

5.2.1. The upper bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a Conrad type, single row, angular contact ball bearing designed to adequately compensate for the axial loads and radial forces.

5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 420 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.

7.2. The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.

7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.

8.2. Design shall be a single piece and a modified constant velocity.

8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.

8.4. Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.

8.5. Volute to be full, 6" discharge flow design.

8.6. The discharge is to be of a horizontal centerline configuration.

8.7. The discharge is to be 6" ANSI® standard Class 125, 8-bolt configuration.

8.8. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8” Discharge – 2-Vane Enclosed Impeller

4” Solids Handling

1750 & 1150 & 870 RPM

This section contains the following material:

1. **Pump Family Curves & Technical Data**	• K8VK
2. **Individual Performance Curves**	• K8VK
3. **Dimensional Drawings** Pump Lift-Out & Base Elbow Wet Well Installations	• K8VK

KEEN PUMP
Ashland, Ohio 44805
Phone: 419-207-9400

8” Solids-Handling Pumps

Model Number Identification Chart

K 8 VK 50 - 21 M 2 Y

Keen Pump

Discharge Size:
- 6 = 6”
- 8 = 8”

Pump Model

Horsepower (HP x 10)
- 30 = 3 HP
- 50 = 5 HP
- 75 = 7-1/2 HP
- 100 = 10 HP
- 150 = 15 HP
- 200 = 20 HP
- 250 = 25 HP
- 300 = 30 HP
- 400 = 40 HP
- 500 = 50 HP

Voltage/Phase
- 01 = 208/1
- 21 = 230/1
- 03 = 208/3
- 23 = 230/3
- 43 = 460/3
- 53 = 575/3

Manual Pump Operation

Speed
- 2 = 3450 RPM
- 4 = 1750 RPM
- 6 = 1150 RPM
- 8 = 870 RPM

Frequency
- Blank = 60 Hz
- Y = 50 Hz

Solids-Handling Pumps

KEEN PUMP®

K8VK

8" Submersible, Enclosed Impeller

Class 1, Div. 1
Groups C & D
Construction

HEAVY DUTY PUMP SERIES

- Handles Aggressive Pumping Applications
- Strong Pumping Capacities to 3800 GPM
- Smooth, Quiet Operation
- Centerline Volute Discharge

STRONG PERFORMANCE

- Non-Overloading Performance Curve
- Pump-Out Vanes Prevent Material Build-up
- Positive Pumping Action through Impeller
- Ideal for Higher Flows

LONG SERVICE LIFE

- Dual Silicon Carbide Shaft Seals
- Low Motor Operation Temperatures
- Continuously Lubricated Angular Contact Bearings

LOW MAINTENANCE

- Easily Replaceable Impeller Wear Ring Restores Original Pump Performance
- Unobstructed Impeller Passageway
- Grit-Resistant Silicon Carbide Shaft Seals
- Large, 4" diameter Solids-Handling
- High Service Factor Motor Handles Tough Electrical Operating Conditions

CAPABILITIES:

- Flows-------------------------------------- to 3800 GPM
- Heads------------------------------------- to 175 Feet
- HP Range-------------------------------- 15 - 150 HP
- Voltage / Phase Options------------- 208 / 230 / 460 / 575V, 3 Phase
- Discharge Connections-------------- 8" ANSI Class 125 Horizontal Flange
- Motor Speeds------------------------- 870 / 1150 / 1750 RPM
- Solids-Handling----------------------- 4"
- Impeller---------------------------------- Balanced, Enclosed, 2-Vane
- Motor Service Factor----------------- 1.20

Rev. 07/2017

Features and Benefits

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grips with compression grommets protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged. 40' UL power & control cords. Additional sealing accomplished by wire terminal plate, separating cord cap from motor housing.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 35 cast iron components.

3. Strong Motor (U.S. Motor Manufacturer)
Powerful high-torque motor for strong pumping.
208 / 230 / 460 / 575 Volt, 3-phase.
Slip-Fit stator efficiently transfers heat to cast housing. Class H(Class N optional) construction with overload protection in oil-filled chamber for cool operation and long motor life. Inverter-duty capable, for VFD / soft start operation.

3a. Oil
Proprietary Keen oil ensures industry-low operating temperatures.

4. Solid Bearing Support
Two-bearing design featuring high load-rated angular contact bearings for 100,000 hour B-10 life.

5. Severe Duty Dual Mechanical Seals
Dual silicon carbide mechanical shaft seals provide twice the moisture and grit protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials. ** Additional bronze labyrinth seal for explosion-proof model.

6. Moisture Detection
Seal leak probe signals alarm in control panel for scheduled maintenance.

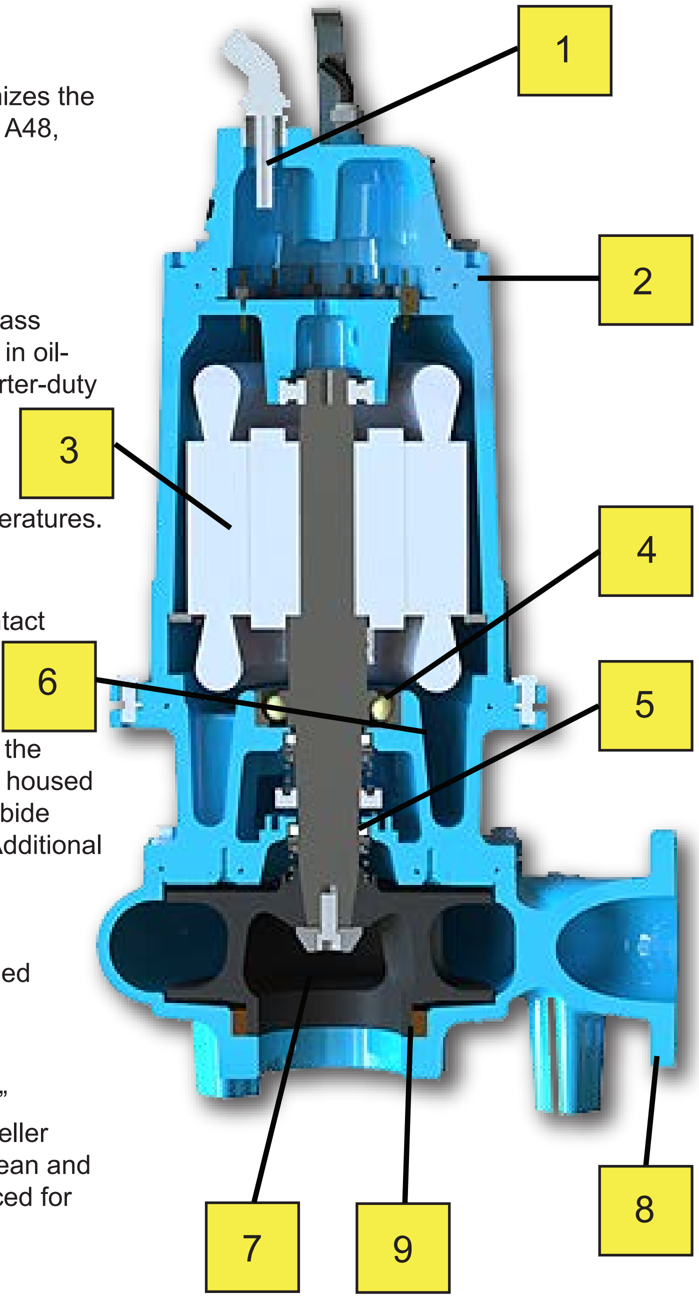
7. High Efficiency Hydraulic Design
Highly efficient enclosed, 2-vane impeller easily passes 4" diameter solids without blockage. Strong, ductile iron impeller features backside pump-out vanes, keeping lower seal clean and pressure-compensated for longer life. Dynamically balanced for smooth, quiet operation and long bearing life.

8. Standard Flange Connection
8" Horizontal, Class 125 ANSI discharge flange. Industry standard, 8-bolt pattern.

9. High Performance Wear Ring
Assists impeller in providing higher performance efficiencies and prevention of recirculation losses. Bronze ring will not corrode or deteriorate from liquid being pumped. Bronze ring reduces wear to stronger ductile iron impeller in sandy or gritty applications. Easily serviceable and replaceable.

K8VK

Class 1, Div. 1 Groups C & D Construction



KEEN PUMP®
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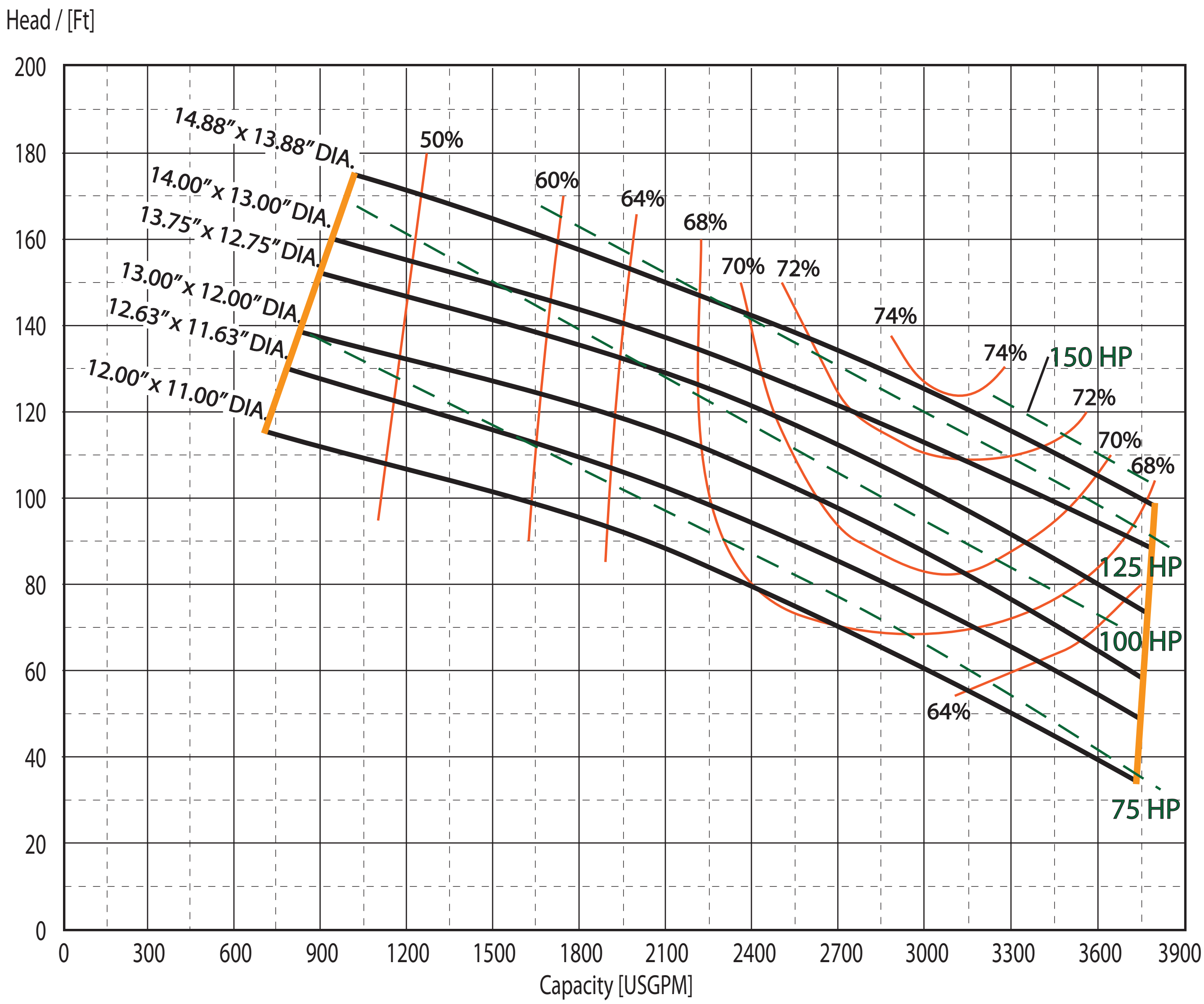
www.keenpump.com

KEEN PUMP

Section **ENCLOSED**
Date Nov. 2021

Pump Series	K8VK	8″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1750 RPM**	Discharge	**8″**	Solids	**4″**

GPM: __________ TDH: __________



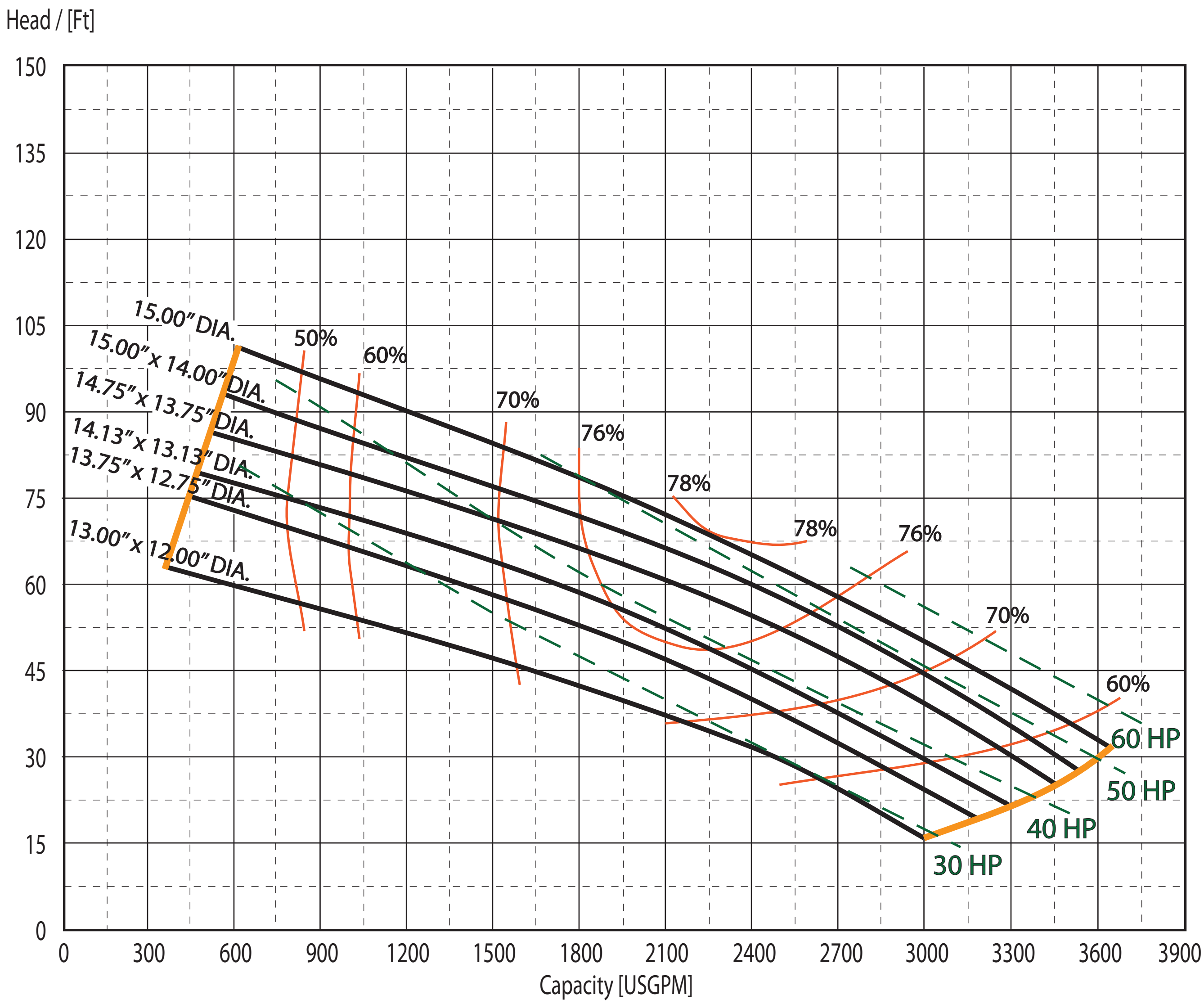
The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K8VK_1750_CAT

Section ENCLOSED
Date Nov. 2021

Pump Series	K8VK	8″ SUBMERSIBLE SEWAGE PUMPS			
Speed	1150 RPM	Discharge	8″	Solids	4″

GPM: __________ TDH: __________



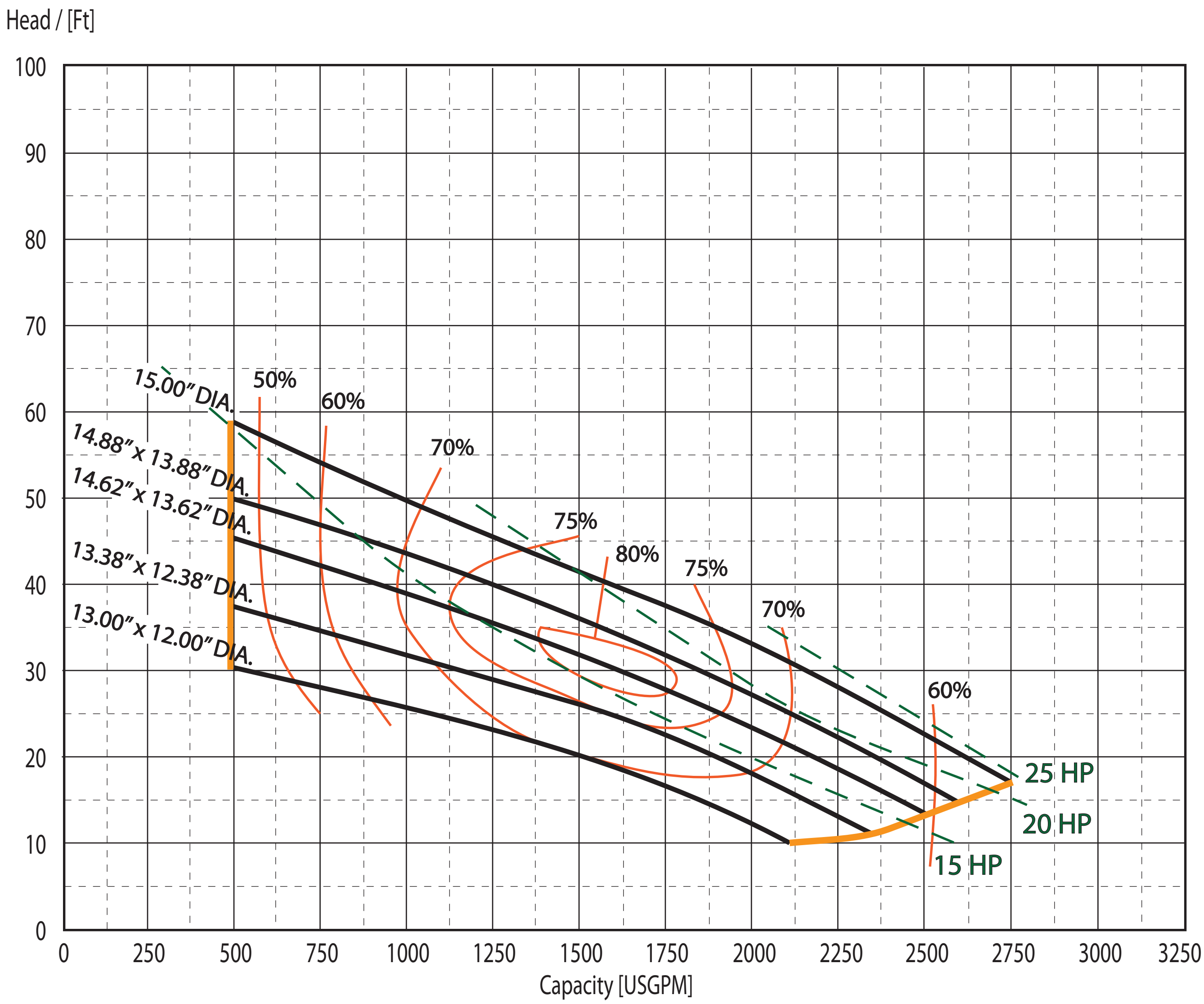
The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K8VK_1150_CAT

Section ENCLOSED
Date Nov. 2021

Pump Series	K8VK	8″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**870 RPM**	Discharge	**8″**	Solids	**4″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

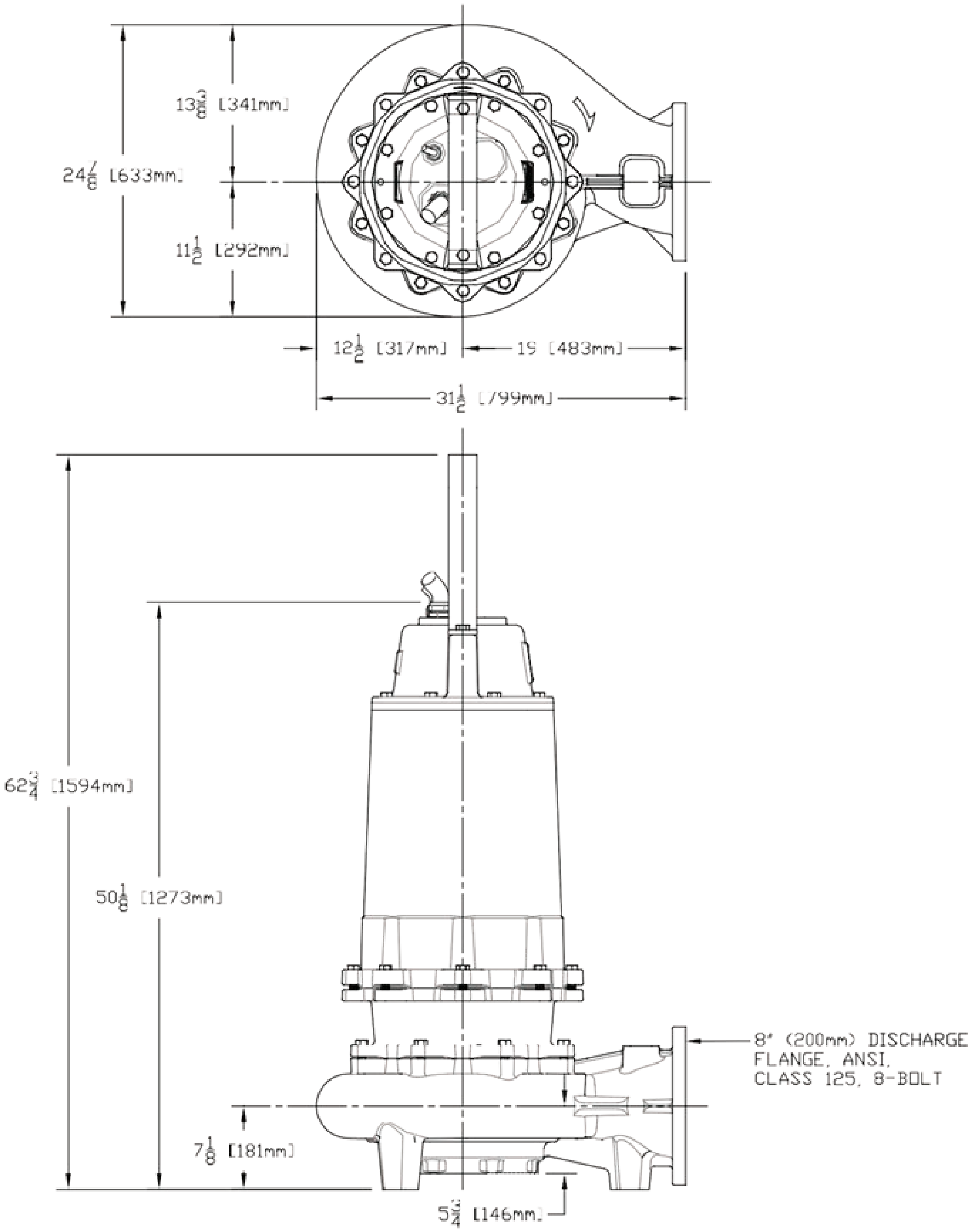
File: K8VK_870_CAT

KEEN PUMP®

Section **ENCLOSED**
Date **NOV 2013**

Pump Series	**K8VK**	8" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



Note: All dimensions in inches and (millimeters).
Dimensions may vary due to normal manufacturing tolerances.

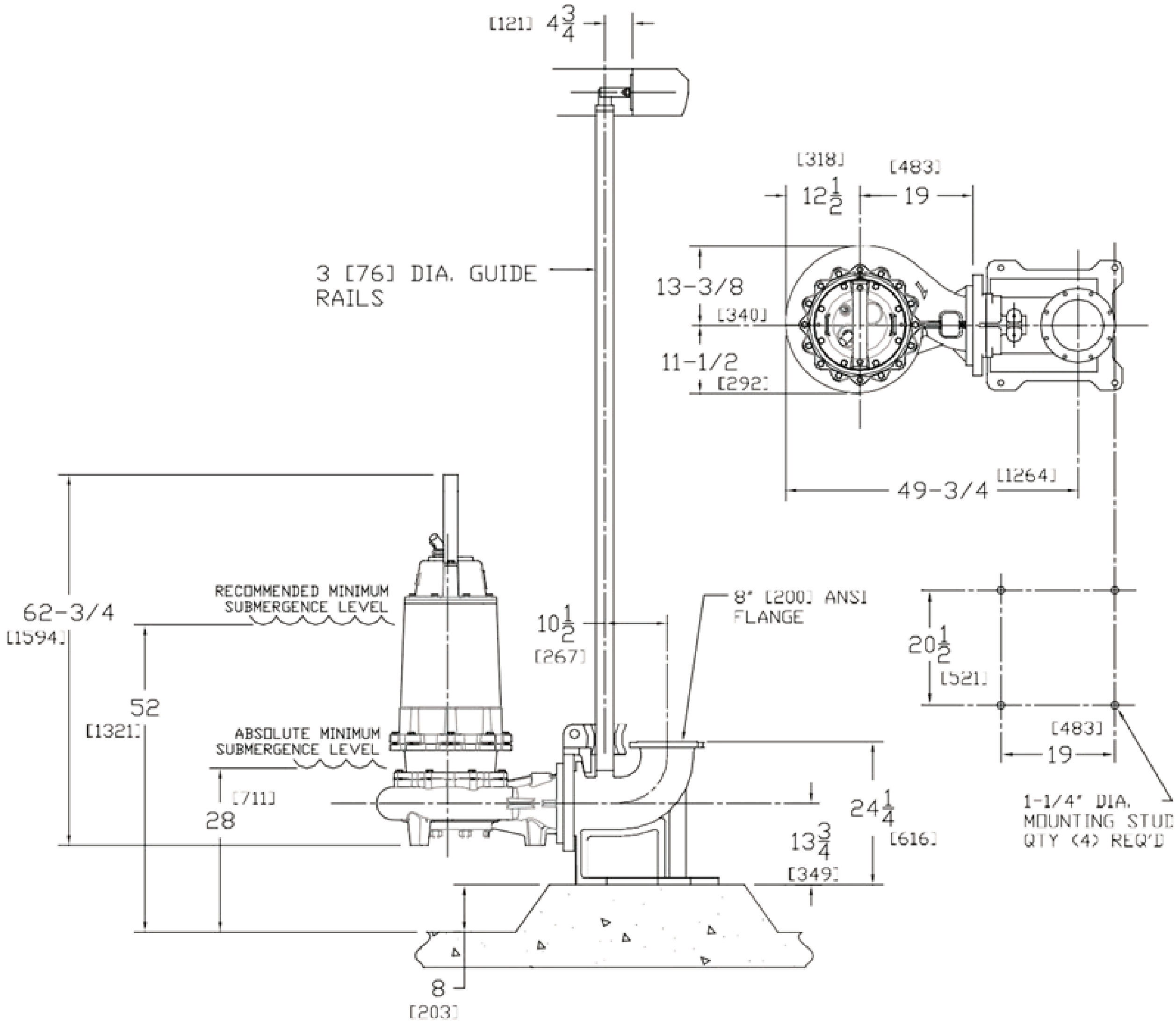
File: K8VK Dimensions

Section ENCLOSED

Date NOV 2013

Pump Series	K8VK	8" SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



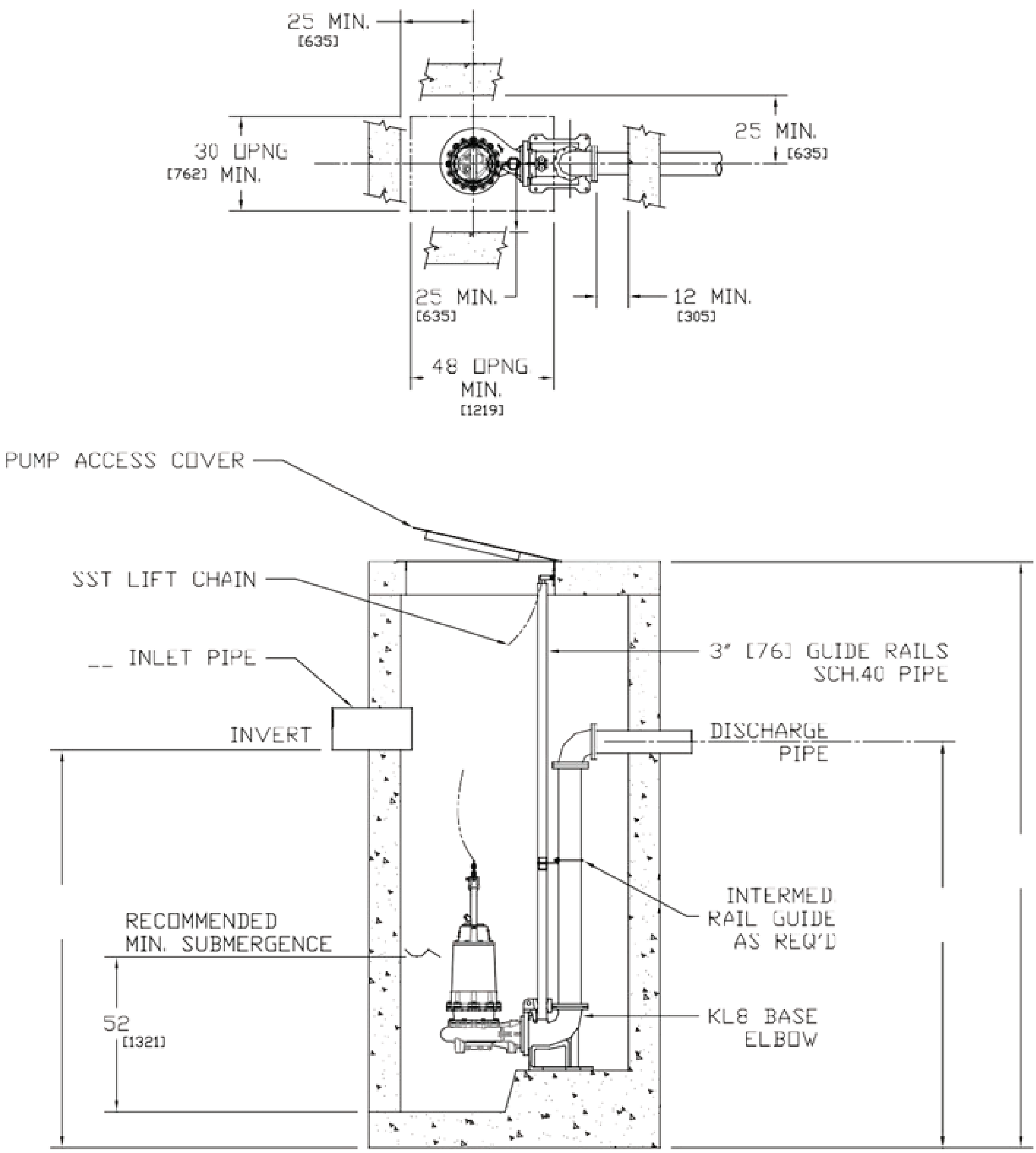
Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be usedlimited to 2X larger maximum.

File: K8VK Liftout Dimensions

Section	ENCLOSED
Date	NOV 2013

Pump Series	K8VK	8" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



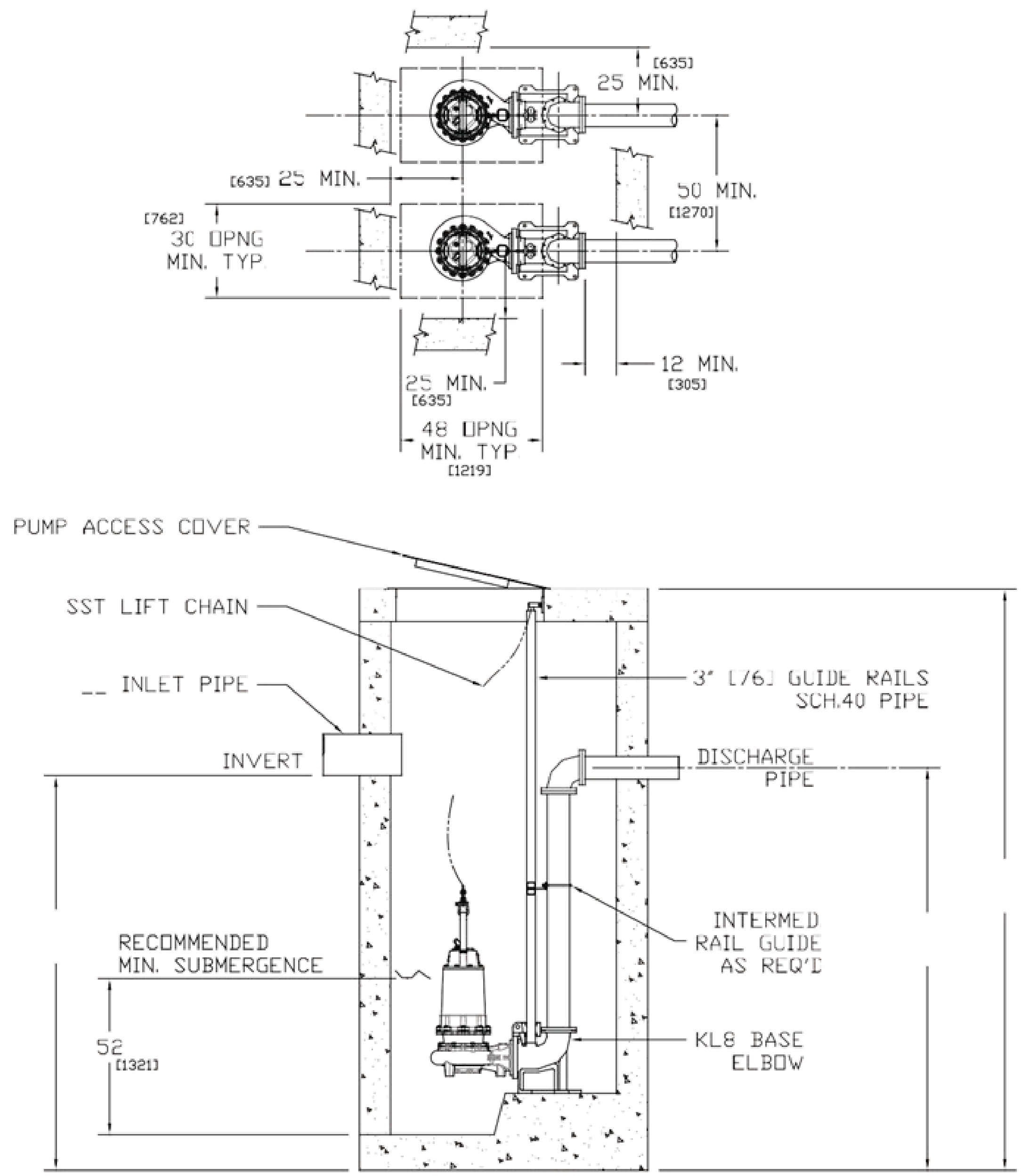
Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be usedlimited to 2X larger maximum.

File: K8VK Install Dimensions

Section ENCLOSED
Date NOV 2013

Pump Series	K8VK	8" SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be usedlimited to 2X larger maximum.

File: K8VK Install Dimensions

Pump Model: **K8VK**

Physical Data:

Discharge Size	ANSI 8″ Horizontal
Solids Size	4″
Impeller Type	Balanced, Enclosed, 2 Vane
Power/Control Cable Length	40′ Standard
Paint	Blue, Water Reducible Enamel, One Coat, Air Dried – Impeller & Inside Volute - Ceramic Coated For Abraison Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components if Applicable
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	SOOW - 600V, 90º C; Type W - 2000V, 90º C
Control Cord Type	16-4 or 18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Wear Ring	Bronze, CDA 836
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

Pump Model: **K8VK – 1750 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
75	460	3	F	1.2	99.5	119.5	507.7	71.4	404.5	79.3
	575				79.6	95.6	406.2			
100	460	3	F	1.2	132.9	159.5	691.0	95.3	550.5	105.9
	575				106.3	127.6	552.8			
125	460	3	G	1.2	172.1	206.5	962.2	123.4	766.5	137.1
	575				137.7	165.2	769.7			
150	460	3	F	1.2	200.5	240.5	962.2	143.7	766.5	159.7
	575				160.4	192.4	769.7			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
75	3	84	83	79	72	86	83	80	70
100	3	85	84	80	73	87	84	82	74
125	3	83	82	81	74	86	84	81	75
150	3	84	83	80	73	86	86	83	78

Section ENCLOSED
Dated MAY 2013

Pump Model: **K8VK – 1150 RPM**

Thermal Data:

Maximum Liquid	140º F (60º C) Intermittent
Maximum Stator	311º F (155º C)
Heat Sensor **Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point	390º F (199º C)

Electrical Data:

RPM	**1150**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
30	208	3	J	1.2	98.3	118.0	651.8	31.9	234.1	35.4
	230				88.6	106.3	587.2			
	460				44.3	53.1	293.6			
	575				35.4	42.5	234.9			
40	208	3	G	1.2	127.8	153.4	651.8	41.4	234.1	45.9
	230				115.1	138.2	587.2			
	460				57.6	69.1	293.6			
	575				46.1	55.3	234.9			
50	208	3	G	1.2	164.8	197.8	840.5	53.3	301.9	59.3
	230				148.5	178.2	575.2			
	460				74.2	89.1	378.6			
	575				59.4	71.3	302.9			
60	460	3	H	1.2	84.5	101.4	507.7	60.6	404.5	67.3
	575				67.6	81.1	406.2			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
30	3	87	85	79	75	83	82	77	70
40	3	85	84	80	76	84	82	79	74
50	3	83	82	81	77	86	81	81	75
60	3	84	83	80	78	86	84	83	78

Pump Model: <u>**K8VK – 870 RPM**</u>

Thermal Data:

Maximum Liquid	140º F (60º C) Intermittent
Maximum Stator	311º F (155º C)
Heat Sensor **Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point	390º F (199º C)

Electrical Data:

RPM	**870**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
15	208	3	K	1.2	54.2	65.0	346.3	17.6	124.5	19.5
	230				48.8	58.6	312.0			
	460				24.4	29.3	156.0			
	575				19.5	23.4	124.8			
20	208	3	G	1.2	67.9	81.5	346.3	22.0	124.5	24.5
	230				61.2	73.4	312.0			
	460				30.6	36.7	156.0			
	575				24.5	29.4	124.8			
25	208	3	H	1.2	82.1	98.5	484.0	26.6	173.9	29.6
	230				74.0	88.8	436.0			
	460				37.0	44.4	218.0			
	575				29.6	35.5	174.4			

Motor Efficiencies & Power Factor

		Motor Efficiency %				Power Factor %			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
15	3	84	83	79	72	76	73	70	64
20	3	85	84	80	73	77	74	72	64
25	3	86	84	81	74	76	74	71	65

SPECIFICATIONS

Solids-Handling Pumps K8VK

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, three-phase, designed for wet well and dry well submersible pump applications in water and sewage.
1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.
1.3. This specification covers sewage wet well and dry well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
2.5. Stator housing shall be filled with clean, high dielectric KEEN ICE oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.
2.6. Submersible motor design:
2.6.1. ________ Horsepower
2.6.2. ________ RPM
2.6.3. ________ Voltage
2.6.4. ________ Phase
2.6.5. ________ Frequency
2.6.6. 1.20 Service Factor
2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356º F (180º C). To include:
2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.
2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.
2.7.3. Stator lead material must meet or exceed Class H insulation system.
2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.
2.7.4.1. The thermal limiting devices shall be attached to each phase winding.
2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.
2.8. Operation of the motor shall be designed for:
2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311º F (155º C).
2.8.2. Capable of 15 evenly spaced starts per hour.
2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
2.8.3.1. Acceptable voltage variation is +/- 10%.
2.8.3.2. Acceptable frequency variation is +/- 5%.

2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.

2.8.3.4. Current unbalance must not exceed 5%.

2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:

2.9.1. Secured with 304 stainless steel fasteners.

2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.

3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.

3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.

3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.

3.2.3. Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.

3.3. All bolted connections in the cord entry construction shall be:

3.3.1. Secured with 304 stainless steel fasteners.

3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.

3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.

3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.

3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.

4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.

4.3. Inboard and outboard seal construction shall be of the following material:

4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.

4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.

4.3.3. Elastomers shall be constructed of Viton®.

4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.

4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.

4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.

4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

4.8. Class 1, Division 1, explosion-proof models will be included with an additional labyrinth seal constructed of bronze, CDA836 material, and is mounted directly above the pump seal plate to take radial loads and act as a flame path for seal chamber.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a two-bearing system design.

5.2.1. The upper bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a Conrad type, single row, angular contact ball bearing designed to adequately compensate for the axial loads and radial forces.

5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.

7.2. The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.

7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature applicaiton.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48, class 35, gray cast iron.

8.2. Design shall be a single piece and a modified constant velocity.

8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.

8.4. Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.

8.5. The discharge is to be of a horizontal centerline configuration.

8.6. The discharge is to be 8" ANSI® standard Class 125, 8-bolt configuration.

8.7. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

12" Discharge – 2-Vane Enclosed Impeller

6" Solids Handling

1750 & 1150 & 870 RPM

This section contains the following material:

1. **Pump Family Curves & Technical Data**	• K12VK
2. **Individual Performance Curves**	• K12VK
3. **Dimensional Drawings** Pump Lift-Out & Base Elbow Wet Well Installations	• K12VK

KEEN PUMP
Ashland, Ohio 44805
Phone: 419-207-9400

12" Solids-Handling Pumps

Model Number Identification Chart

K 12 VK 50 - 21 M 2 Y

Keen Pump

Discharge Size:
- 12 = 12"

Pump Model

Horsepower (HP x 10)
- 30 = 3 HP
- 50 = 5 HP
- 75 = 7-1/2 HP
- 100 = 10 HP
- 150 = 15 HP
- 200 = 20 HP
- 250 = 25 HP
- 300 = 30 HP
- 400 = 40 HP
- 500 = 50 HP

Voltage/Phase
- 01 = 208/1
- 21 = 230/1
- 03 = 208/3
- 23 = 230/3
- 43 = 460/3
- 53 = 575/3

Manual Pump Operation

Speed
- 2 = 3450 RPM
- 4 = 1750 RPM
- 6 = 1150 RPM
- 8 = 870 RPM

Frequency
- Blank = 60 Hz
- Y = 50 Hz

Solids-Handling Pumps

KEEN PUMP®

K12VK

12" Submersible, Enclosed Impeller

Class 1, Div. 1
Groups C & D
Construction

HEAVY DUTY PUMP SERIES

- Handles Aggressive Pumping Applications
- Strong Pumping Capacities to 7700 GPM
- Smooth, Quiet Operation
- Centerline Volute Discharge

STRONG PERFORMANCE

- Non-Overloading Performance Curve
- Pump-Out Vanes Prevent Material Build-up
- Positive Pumping Action through Impeller
- Ideal for Higher Flows

LONG SERVICE LIFE

- Dual Silicon Carbide Shaft Seals
- Low Motor Operation Temperatures
- Continuously Lubricated Angular Contact Bearings

LOW MAINTENANCE

- Easily Replaceable Impeller Wear Ring Restores Original Pump Performance
- Unobstructed Impeller Passageway
- Grit-Resistant Silicon Carbide Shaft Seals
- Large, 6" diameter Solids-Handling
- High Service Factor Motor Handles Tough Electrical Operating Conditions

CAPABILITIES:

- Flows-------------------------------------- to 7700 GPM
- Heads------------------------------------ to 125 Feet
- HP Range------------------------------- 15 - 150 HP
- Voltage / Phase Options------------- 208 / 230 / 460 / 575V, 3 Phase
- Discharge Connections-------------- 12" ANSI Class 125 Horizontal Flange
- Motor Speeds------------------------- 870 / 1150 / 1750 RPM
- Solids-Handling----------------------- 6"
- Impeller--------------------------------- Balanced, Enclosed, 2-Vane
- Motor Service Factor----------------- 1.20

Rev. 07/2017

Features and Benefits

K12VK

Class 1, Div. 1 Groups C & D Construction

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grips with compression grommets protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged. 40' UL power & control cords. Additional sealing accomplished by wire terminal plate, separating cord cap from motor housing.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 35 cast iron components.

3. Strong Motor (U.S. Motor Manufacturer)
Powerful high-torque motor for strong pumping.
208 / 230 / 460 / 575 Volt, 3-phase.
Slip-Fit stator efficiently transfers heat to cast housing. Class H(Class N optional) construction with overload protection in oil-filled chamber for cool operation and long motor life. Inverter-duty capable, for VFD / soft start operation.

3a. Oil
Proprietary Keen oil ensures industry-low operating temperatures.

4. Solid Bearing Support
Two-bearing design featuring high load-rated angular contact bearings for 100,000 hour B-10 life.

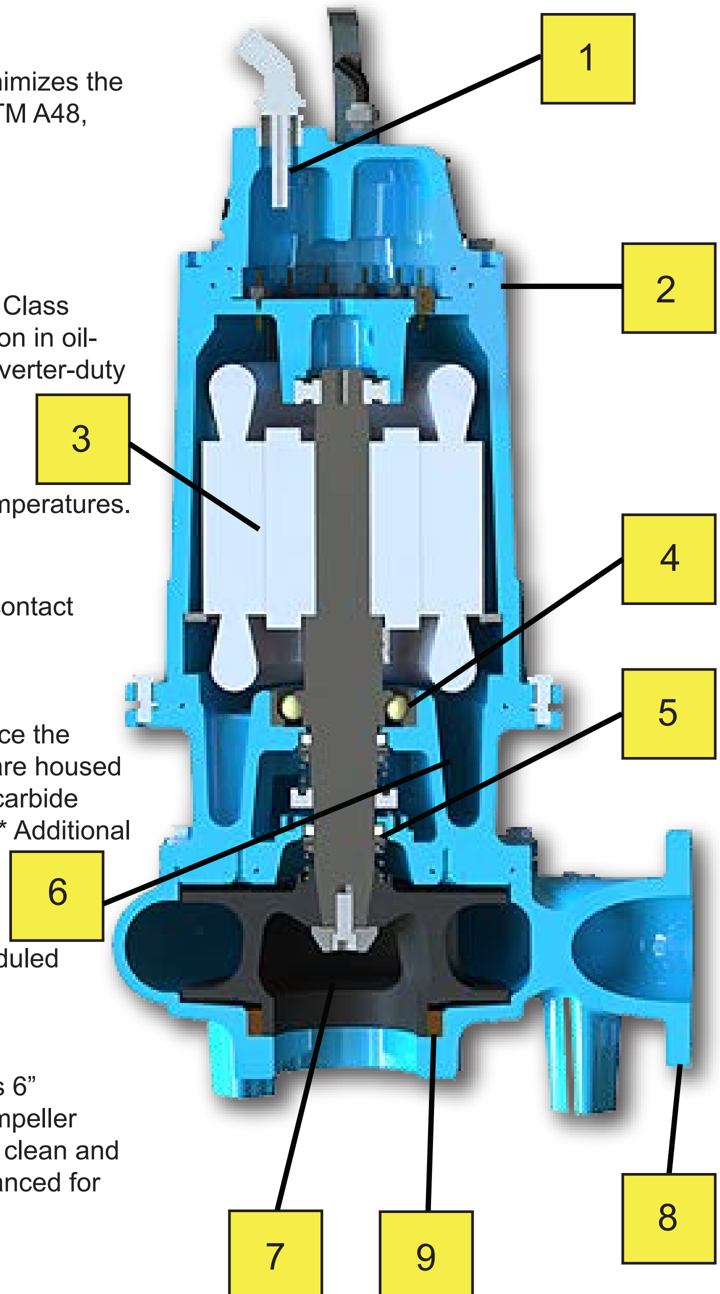
5. Severe Duty Dual Mechanical Seals
Dual silicon carbide mechanical shaft seals provide twice the moisture and grit protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials. ** Additional bronze labyrinth seal for explosion-proof model.

6. Moisture Detection
Seal leak probe signals alarm in control panel for scheduled maintenance.

7. High Efficiency Hydraulic Design
Highly efficient enclosed, 2-vane impeller easily passes 6" diameter solids without blockage. Strong, ductile iron impeller features backside pump-out vanes, keeping lower seal clean and pressure-compensated for longer life. Dynamically balanced for smooth, quiet operation and long bearing life.

8. Standard Flange Connection
12" Horizontal, Class 125 ANSI discharge flange. Industry standard, 12-bolt pattern.

9. High Performance Wear Ring
Assists impeller in providing higher performance efficiencies and prevention of recirculation losses. Bronze ring will not corrode or deteriorate from liquid being pumped. Bronze ring reduces wear to stronger ductile iron impeller in sandy or gritty applications. Easily serviceable and replaceable.



KEEN PUMP®
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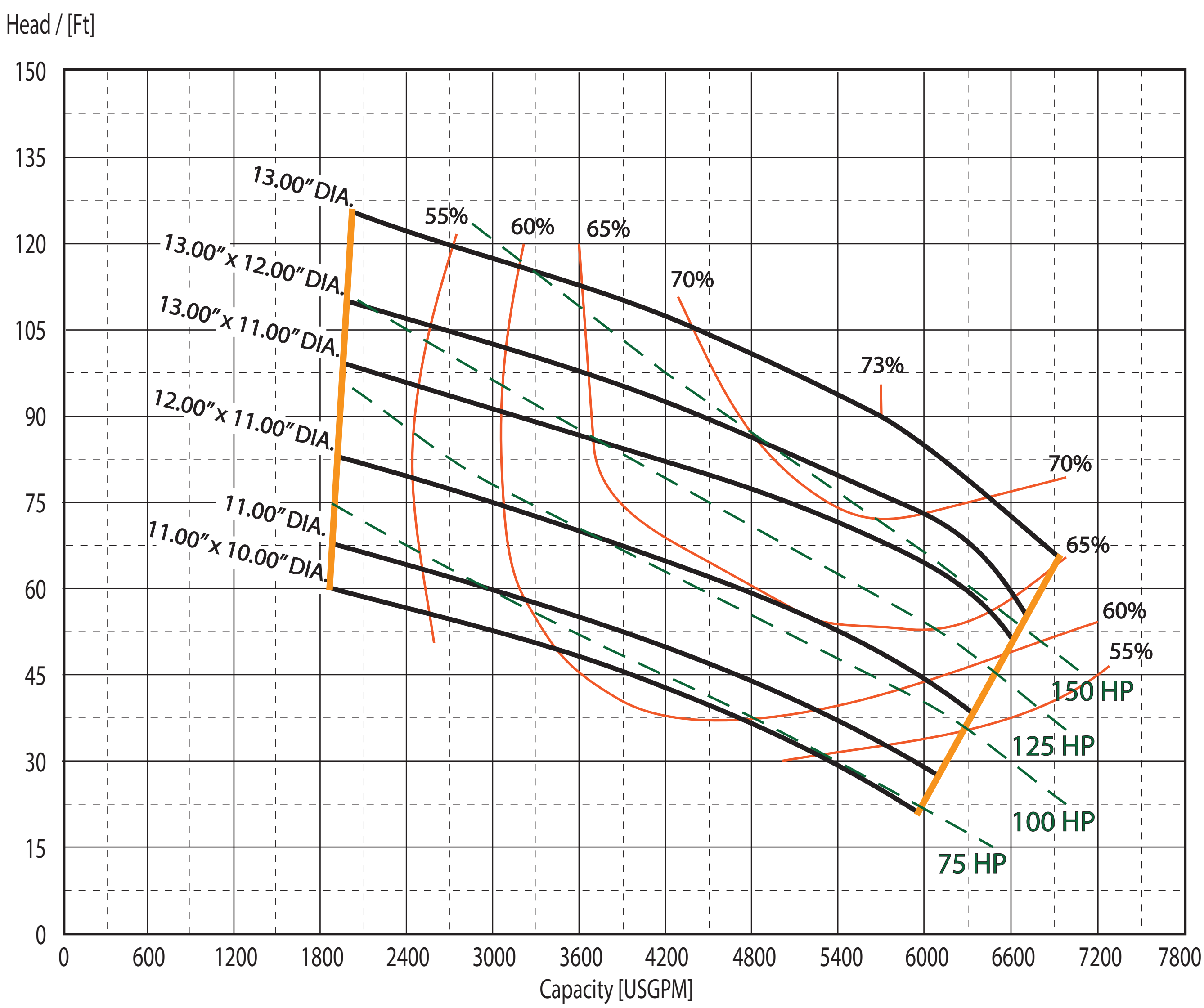
KEEN PUMP

Section	ENCLOSED
Date	Nov. 2021

Pump Series	K12VK	12″ SUBMERSIBLE SEWAGE PUMPS			
Speed	1750 RPM	Discharge	12″	Solids	6″

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K12VK_1750_CAT

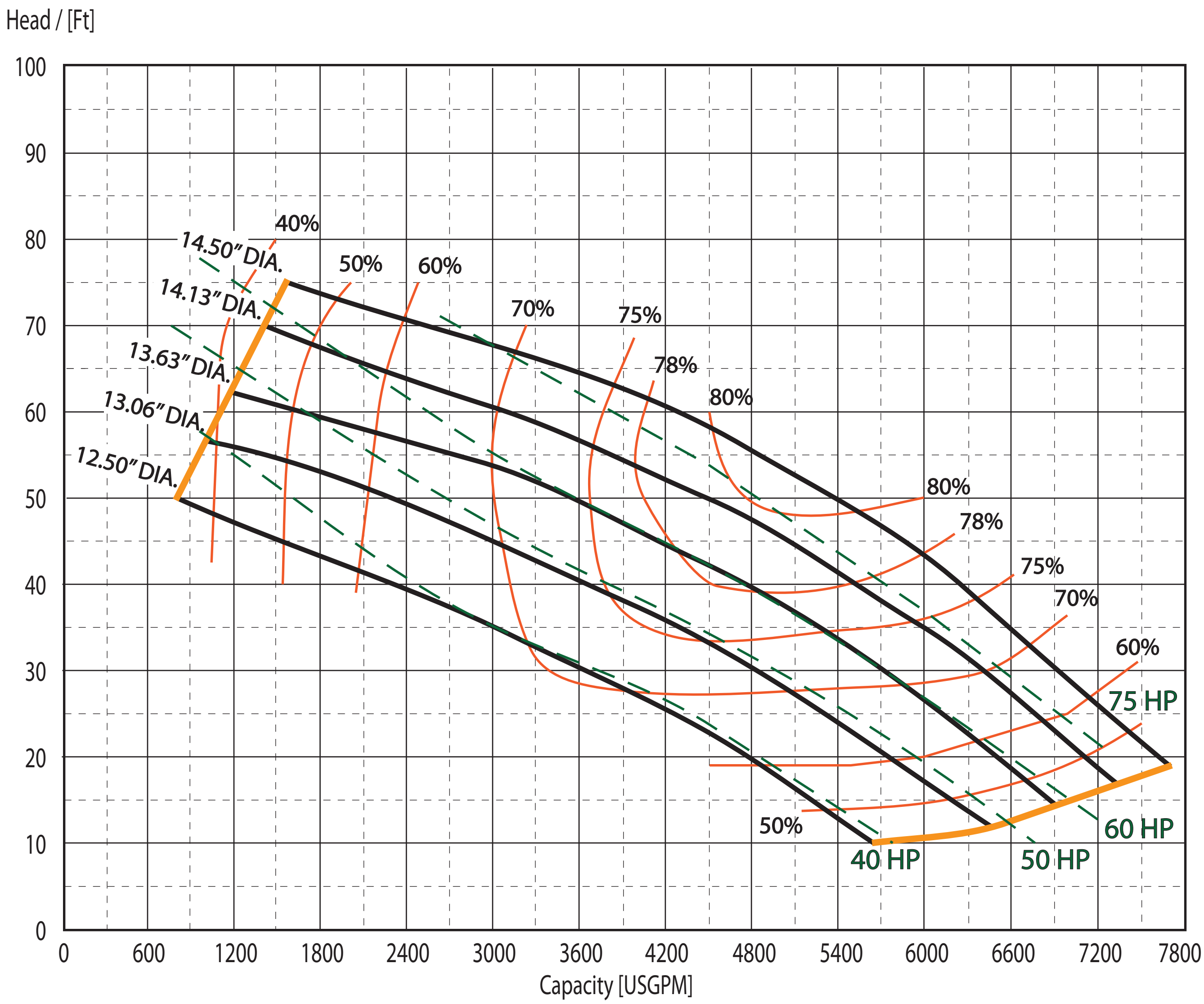
KEEN PUMP

Section **ENCLOSED**

Date Nov. 2021

Pump Series	K12VK	12″ SUBMERSIBLE SEWAGE PUMPS			
Speed	1150 RPM	Discharge	12″	Solids	6″

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

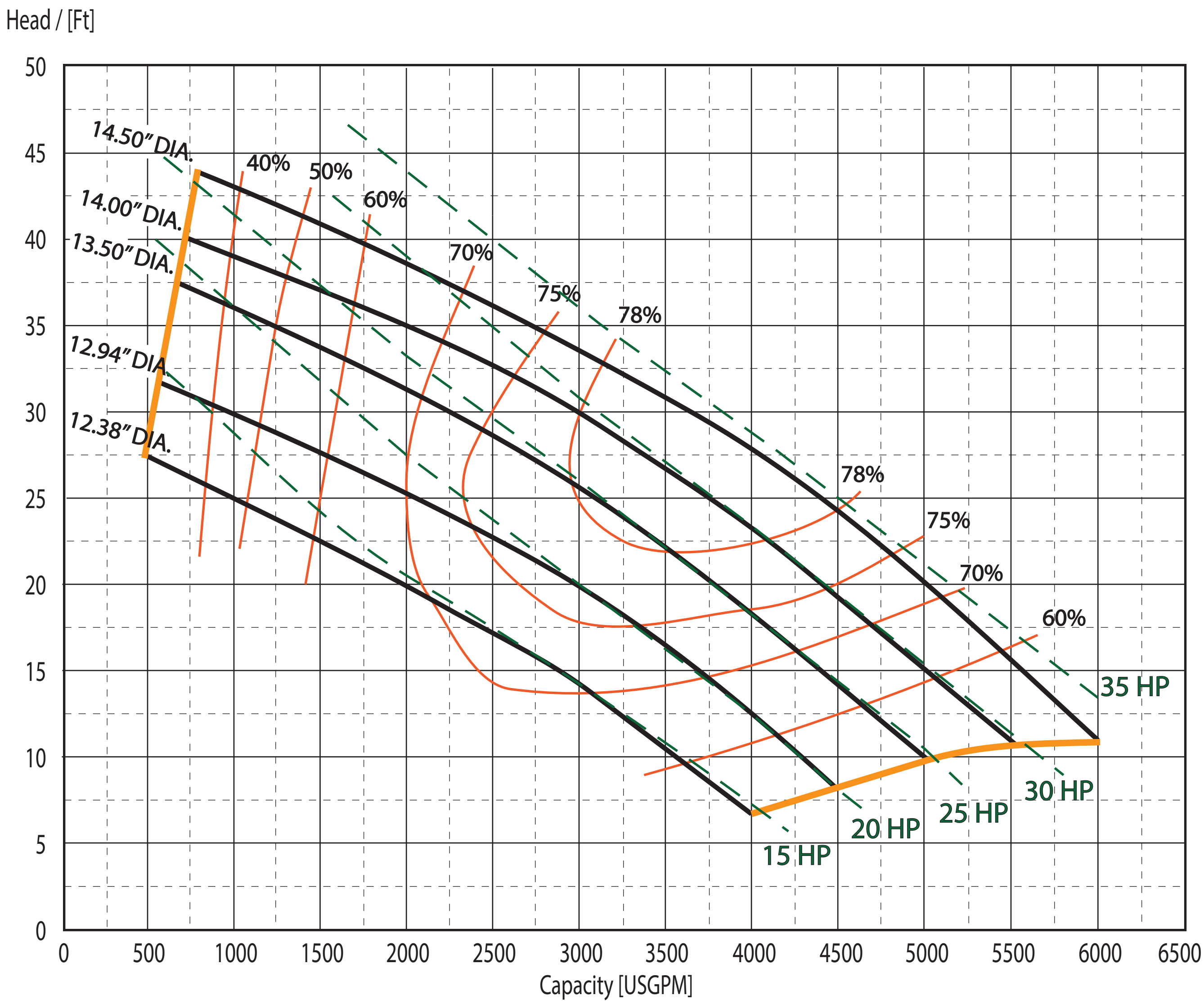
File: K12VK_1150_CAT

Section **ENCLOSED**

Date Nov. 2021

Pump Series	**K12VK**	12″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**870 RPM**	Discharge	**12″**	Solids	**6″**

GPM: __________ TDH: __________



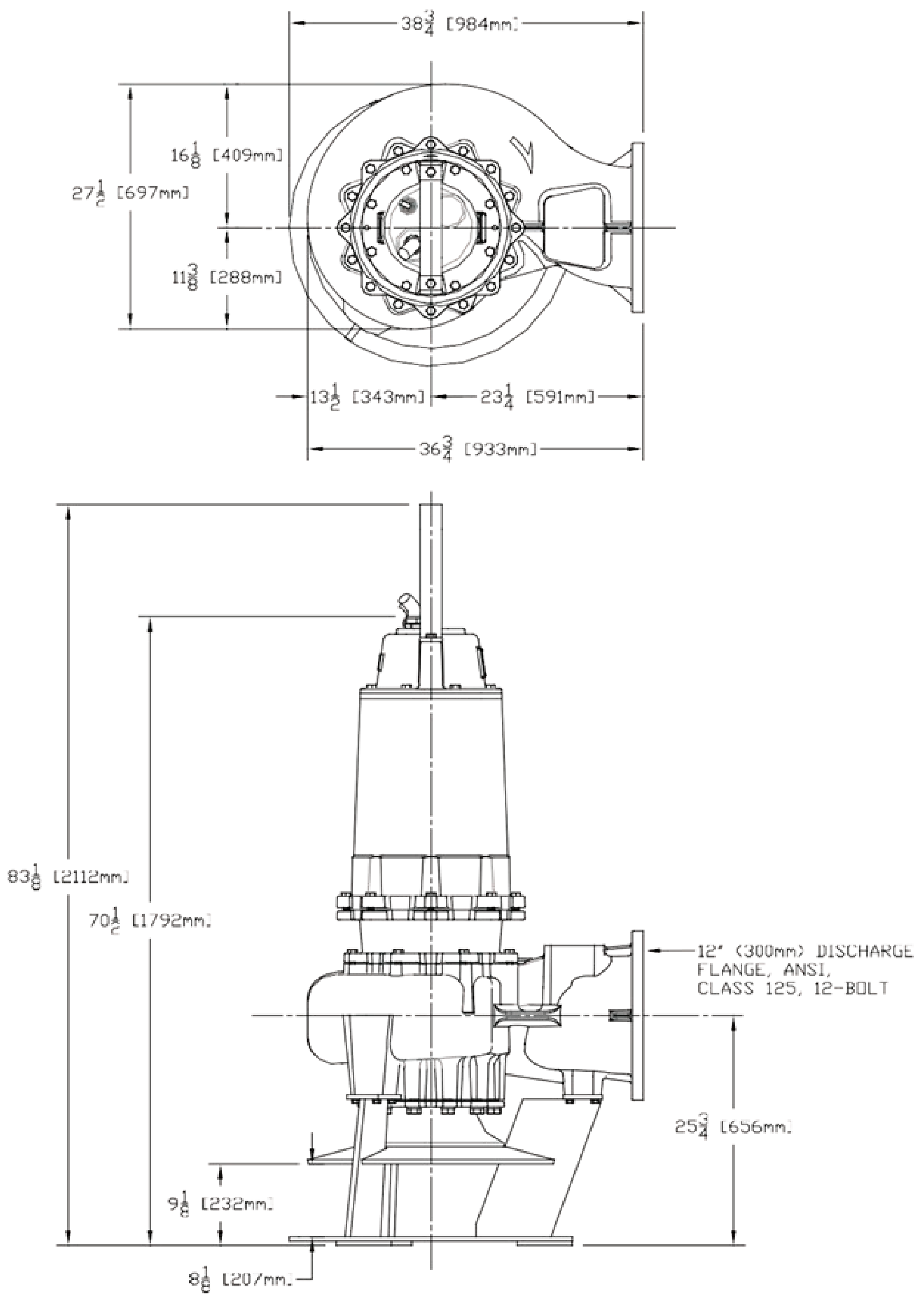
The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K12VK_870_CAT

Section	**ENCLOSED**
Date	**NOV 2013**

Pump Series	K12VK	12" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



Note: All dimensions in inches and (millimeters).
Dimensions may vary due to normal manufacturing tolerances.

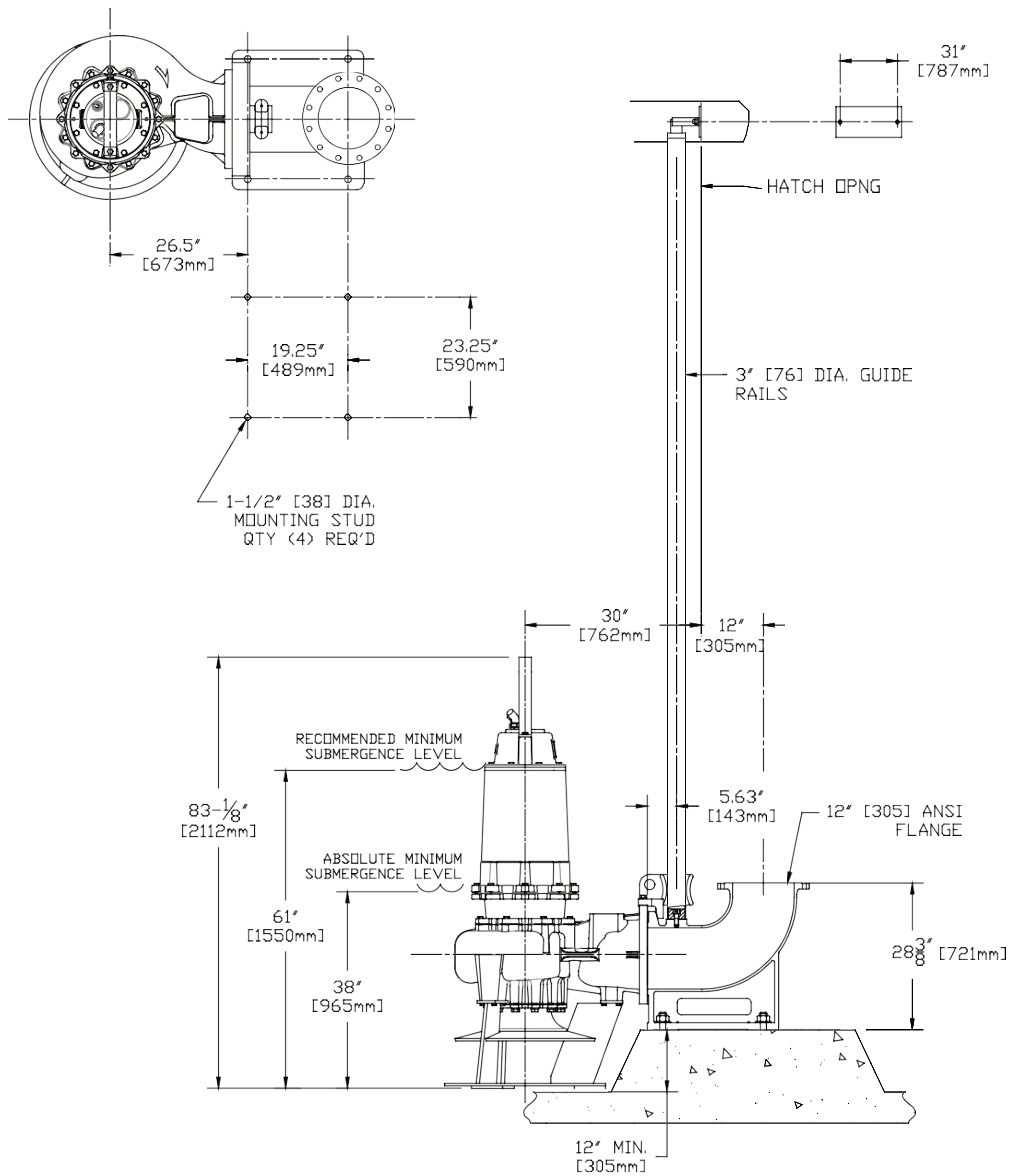
File: K12VK Dimensions

KEEN PUMP®

Section **ENCLOSED**
Date **NOV 2013**

Pump Series	K12VK	12" SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be usedlimited to 2X larger maximum.

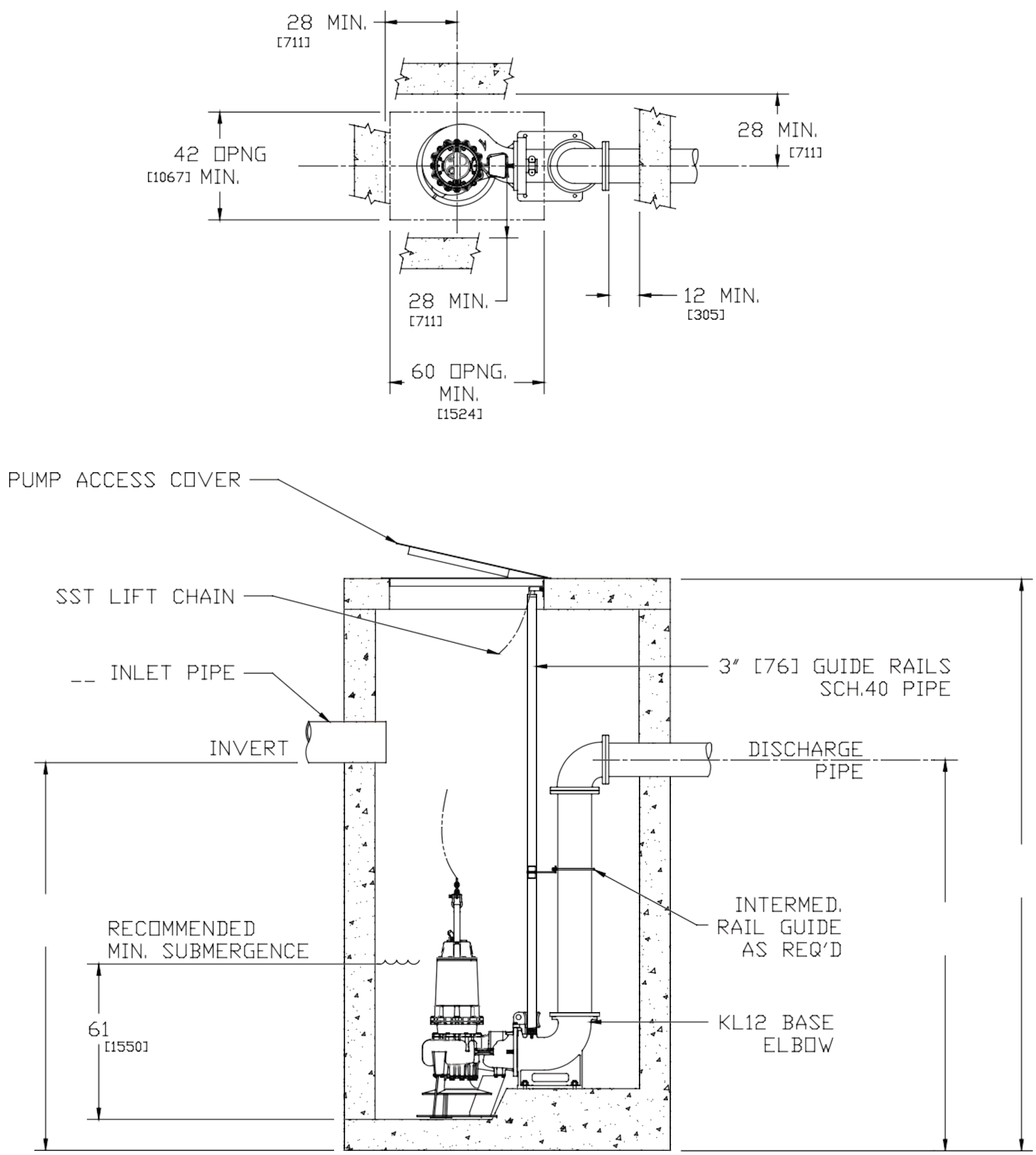
File: K12VK Liftout Dimensions

KEEN PUMP®

Section **ENCLOSED**
Date **NOV 2013**

Pump Series	K12VK	12" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



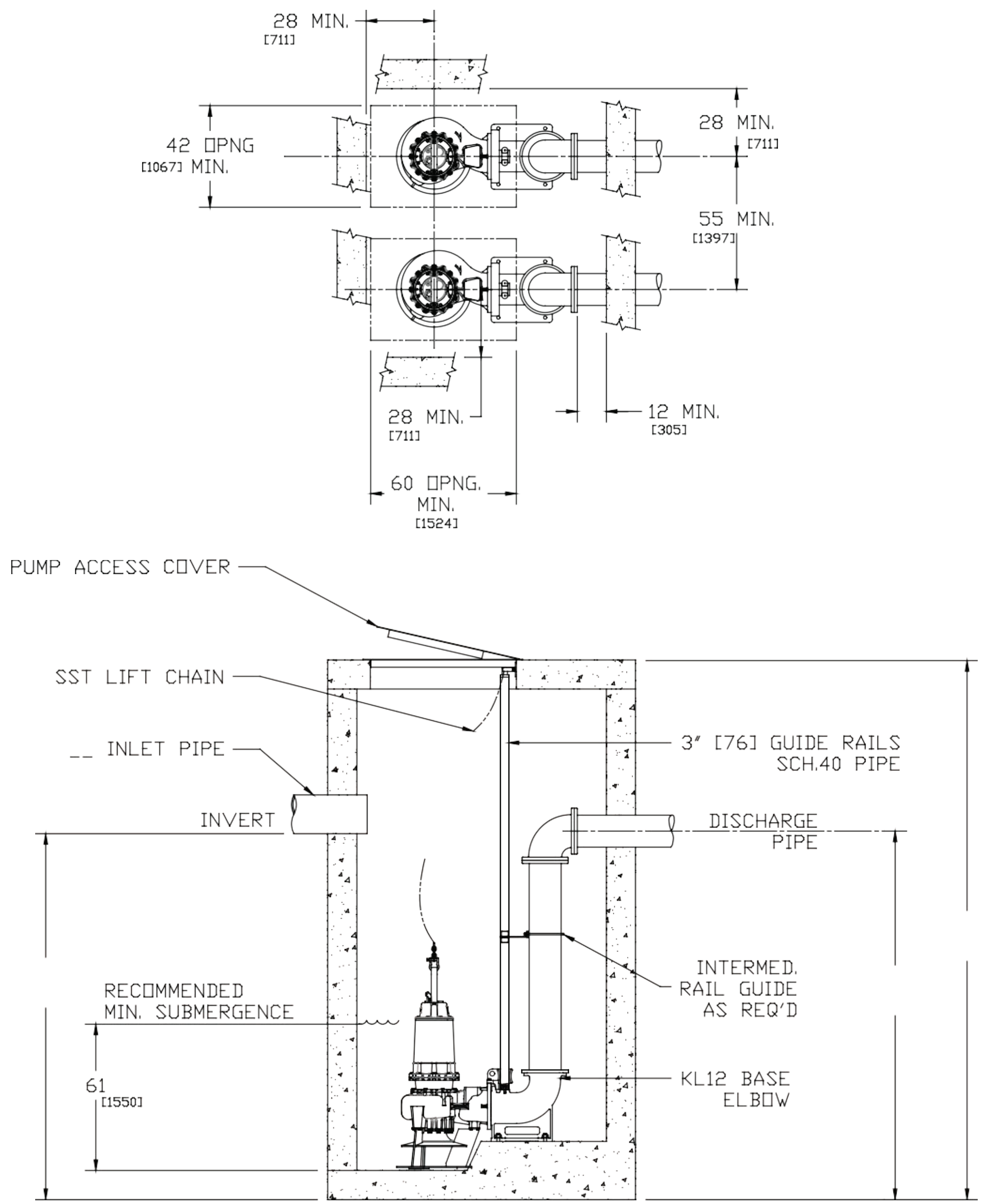
Notes:
1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. Dimensions may vary due to normal manufacturing tolerances.
7. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K12VK Install Dimensions

Section	ENCLOSED
Date	NOV 2013

Pump Series	K12VK	12” SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:

1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. Dimensions may vary due to normal manufacturing tolerances.
7. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K12VK Install Dimensions

Pump Model: **K12VK**

Physical Data:

Discharge Size	ANSI 12″ Horizontal
Solids Size	6″
Impeller Type	Balanced, Enclosed, 2 Vane
Power/Control Cable Length	40′ Standard
Paint	Blue, Water Reducible Enamel, One Coat, Air Dried – Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components if Applicable
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	SOOW - 600V, 90º C; Type W - 2000V, 90º C
Control Cord Type	16-4 or 18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Wear Ring	Bronze, CDA 836
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

Section ENCLOSED
Dated MAY 2013

Pump Model: **K12VK – 1750 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
75	460	3	F	1.2	99.5	119.5	507.7	71.4	404.5	79.3
	575				79.6	95.6	406.2			
100	460	3	F	1.2	132.9	159.5	691.0	95.3	550.5	105.9
	575				106.3	127.6	552.8			
125	460	3	G	1.2	172.1	206.5	962.2	123.4	766.5	137.1
	575				137.7	165.2	769.7			
150	460	3	F	1.2	200.5	240.5	962.2	143.7	766.5	159.7
	575				160.4	192.4	769.7			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				Power Factor %			
HP	Phase	Service Factor Load	100% Load	75% Load	50% Load	Service Factor Load	100% Load	75% Load	50% Load
75	3	84	83	79	72	86	83	80	70
100	3	85	84	80	73	87	84	82	74
125	3	83	82	81	74	86	84	81	75
150	3	84	83	80	73	86	86	83	78

Pump Model: **K12VK – 1150 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1150**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
40	208	3	G	1.2	127.8	153.4	651.8	41.4	234.1	45.9
	230				115.1	138.2	587.2			
	460				57.6	69.1	293.6			
	575				46.1	55.3	234.9			
50	208	3	G	1.2	164.8	197.8	840.5	53.3	301.9	59.3
	230				148.5	178.2	575.2			
	460				74.2	89.1	378.6			
	575				59.4	71.3	302.9			
60	460	3	H	1.2	84.5	101.4	507.7	60.6	404.5	67.3
	575				67.6	81.1	406.2			
75	460	3	F	1.2	99.5	119.5	507.7	71.4	404.5	79.4
	575				79.6	95.6	406.2			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
40	3	85	84	80	76	84	82	79	74
50	3	83	82	81	77	86	81	81	75
60	3	84	83	80	78	86	84	83	78
75	3	84	83	80	73	86	86	83	78

Section ENCLOSED
Dated MAY 2013

Pump Model: **K12VK – 870 RPM**

Thermal Data:

Maximum Liquid	140º F (60º C) Intermittent
Maximum Stator	311º F (155º C)
Heat Sensor **Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point	390º F (199º C)

Electrical Data:

RPM	**870**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
15	208	3	K	1.2	54.2	65.0	346.3	17.6	124.5	19.5
	230				48.8	58.6	312.0			
	460				24.4	29.3	156.0			
	575				19.5	23.4	124.8			
20	208	3	G	1.2	67.9	81.5	346.3	22.0	124.5	24.5
	230				61.2	73.4	312.0			
	460				30.6	36.7	156.0			
	575				24.5	29.4	124.8			
25	208	3	H	1.2	82.1	98.5	484.0	26.6	173.9	29.6
	230				74.0	88.8	436.0			
	460				37.0	44.4	218.0			
	575				29.6	35.5	174.4			
30	208	3	G	1.2	94.9	113.9	484.0	30.8	173.9	34.2
	230				85.5	102.6	436.0			
	460				42.7	51.3	218.0			
	575				34.2	41.0	174.4			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
15	3	84	83	79	72	76	73	70	64
20	3	85	84	80	73	77	74	72	64
25	3	86	84	81	74	76	74	71	65
30	3	87	86	85	81	79	78	73	67

SPECIFICATIONS

Solids-Handling Pumps K12VK

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, three-phase, designed for wet well and dry well submersible pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well and dry well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.

2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric, KEEN ICE oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.

2.6. Submersible motor design:

2.6.1. ________ Horsepower

2.6.2. ________ RPM

2.6.3. ________ Voltage

2.6.4. ________ Phase

2.6.5. ________ Frequency

2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356º F (180º C). To include:

2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.

2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.

2.7.3. Stator lead material must meet or exceed Class H insulation system.

2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.

2.7.4.1. The thermal limiting devices shall be attached to each phase winding.

2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.8. Operation of the motor shall be designed for:

2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311º F (155º C).

2.8.2. Capable of 15 evenly spaced starts per hour.

2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.

2.8.3.1. Acceptable voltage variation is +/- 10%.

2.8.3.2. Acceptable frequency variation is +/- 5%.

2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.

2.8.3.4. Current unbalance must not exceed 5%.

2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:

2.9.1. Secured with 304 stainless steel fasteners.

2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.

3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.

3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.

3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.

3.2.3. Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.

3.3. All bolted connections in the cord entry construction shall be:

3.3.1. Secured with 304 stainless steel fasteners.

3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.

3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.

3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.

3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.

4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.

4.3. Inboard and outboard seal construction shall be of the following material:

4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.

4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.

4.3.3. Elastomers shall be constructed of Viton®.

4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.

4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.

4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.

4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

4.8. Class 1, Division 1, explosion-proof models will be included with an additional labyrinth seal constructed of bronze, CDA836 material, and is mounted directly above the pump seal plate to take radial loads and act as a flame path for seal chamber.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a two-bearing system design.

5.2.1. The upper bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a Conrad type, single row, angular contact ball bearing designed to adequately compensate for the axial loads and radial forces.

5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.

7.2. The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.

7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.

8.2. Design shall be a single piece and a modified constant velocity.

8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.

8.4. Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.

8.5. The discharge is to be of a horizontal centerline configuration.

8.6. The discharge is to be 12" ANSI® standard Class 125, 12-bolt configuration.

8.7. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

14” Discharge – 2-Vane Enclosed Impeller

6” Solids Handling

1750 & 1150 & 870 RPM

This section contains the following material:

1. **Pump Family Curves & Technical Data**	• K14VK
2. **Individual Performance Curves**	• K14VK
3. **Dimensional Drawings** Pump Lift-Out & Base Elbow Wet Well Installations	• K14VK

KEEN PUMP
Ashland, Ohio 44805
Phone: 419-207-9400

14” Solids-Handling Pumps

Model Number Identification Chart

K 14 VK 50 - 21 M 2 Y

Keen Pump

Discharge Size:
14 = 14”

Pump Model

Horsepower (HP x 10)
30 = 3 HP
50 = 5 HP
75 = 7-1/2 HP
100 = 10 HP
150 = 15 HP
200 = 20 HP
250 = 25 HP
300 = 30 HP
400 = 40 HP
500 = 50 HP

Voltage/Phase
01 = 208/1
21 = 230/1
03 = 208/3
23 = 230/3
43 = 460/3
53 = 575/3

Manual Pump Operation

Speed
2 = 3450 RPM
4 = 1750 RPM
6 = 1150 RPM
8 = 870 RPM

Frequency
Blank = 60 Hz
Y = 50 Hz

KEEN PUMP®

K14VK

14” Submersible, Enclosed Impeller

Class 1, Div. 1
Groups C & D
Construction

HEAVY DUTY PUMP SERIES

- Handles Aggressive Pumping Applications
- Strong Pumping Capacities to 7700 GPM
- Smooth, Quiet Operation
- Centerline Volute Discharge

STRONG PERFORMANCE

- Non-Overloading Performance Curve
- Pump-Out Vanes Prevent Material Build-up
- Positive Pumping Action through Impeller
- Ideal for Higher Flows

LONG SERVICE LIFE

- Dual Silicon Carbide Shaft Seals
- Low Motor Operation Temperatures
- Continuously Lubricated Angular Contact Bearings

LOW MAINTENANCE

- Easily Replaceable Impeller Wear Ring Restores Original Pump Performance
- Unobstructed Impeller Passageway
- Grit-Resistant Silicon Carbide Shaft Seals
- Large, 6” diameter Solids-Handling
- High Service Factor Motor Handles Tough Electrical Operating Conditions

CAPABILITIES:

- Flows--------------------------------------- to 7700 GPM
- Heads------------------------------------- to 125 Feet
- HP Range-------------------------------- 15 - 150 HP
- Voltage / Phase Options------------- 208 / 230 / 460 / 575V, 3 Phase
- Discharge Connections-------------- 14” ANSI Class 125 Horizontal Flange
- Motor Speeds-------------------------- 870 / 1150 / 1750 RPM
- Solids-Handling------------------------ 6”
- Impeller---------------------------------- Balanced, Enclosed, 2-Vane
- Motor Service Factor----------------- 1.20

Features and Benefits

K14VK

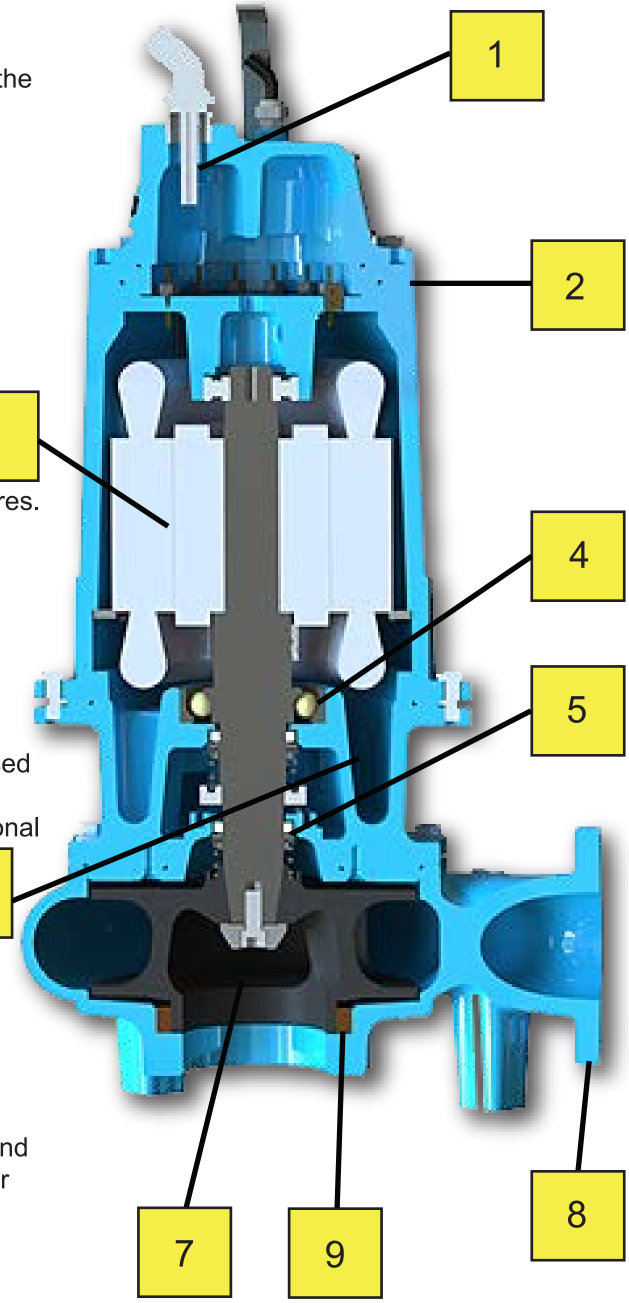
Class 1, Div. 1
Groups C & D
Construction

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grips with compression grommets protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged. 40' UL power & control cords. Additional sealing accomplished by wire terminal plate, separating cord cap from motor housing.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 35 cast iron components.

3. Strong Motor (U.S. Motor Manufacturer)
Powerful high-torque motor for strong pumping.
208 / 230 / 460 / 575 Volt, 3-phase.
Slip-Fit stator efficiently transfers heat to cast housing. Class H(class N optional) construction with overload protection in oil-filled chamber for cool operation and long motor life.
Inverter-duty capable, for VFD / soft start operation.

3a. Oil
Proprietary Keen oil ensures industry-low operating temperatures.



4. Solid Bearing Support
Two-bearing design featuring high load-rated angular contact bearings for 100,000 hour B-10 life.

5. Severe Duty Dual Mechanical Seals
Dual silicon carbide mechanical shaft seals provide twice the moisture and grit protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials. ** Additional bronze labyrinth seal for explosion-proof model.

6. Moisture Detection
Seal leak probe signals alarm in control panel for scheduled maintenance.

7. High Efficiency Hydraulic Design
Highly efficient enclosed, 2-vane impeller easily passes 6" diameter solids without blockage. Strong, ductile iron impeller features backside pump-out vanes, keeping lower seal clean and pressure-compensated for longer life. Dynamically balanced for smooth, quiet operation and long bearing life.

8. Standard Flange Connection
14" Horizontal, Class 125 ANSI discharge flange. Industry standard, 12-bolt pattern.

9. High Performance Wear Ring
Assists impeller in providing higher performance efficiencies and prevention of recirculation losses. Bronze ring will not corrode or deteriorate from liquid being pumped. Bronze ring reduces wear to stronger ductile iron impeller in sandy or gritty applications. Easily serviceable and replaceable.

KEEN PUMP®
471 US HWY 250 East · Ashland, Ohio 44805
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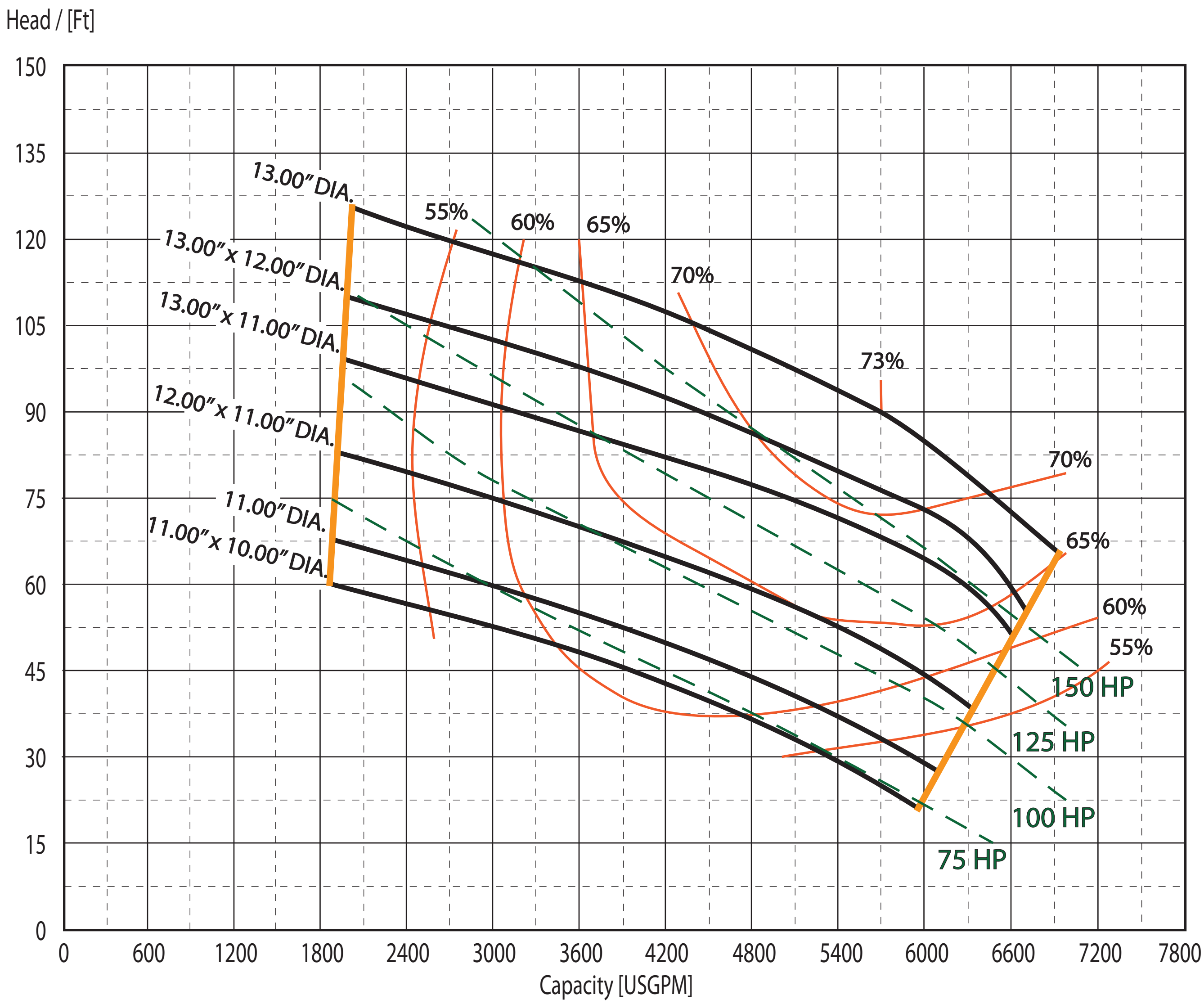
www.keenpump.com

Section	**ENCLOSED**
Date	Nov. 2021

Pump Series	**K14VK**		14″ SUBMERSIBLE SEWAGE PUMPS		
Speed	**1750 RPM**	Discharge	**14″**	Solids	**6″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K14VK_1750_CAT

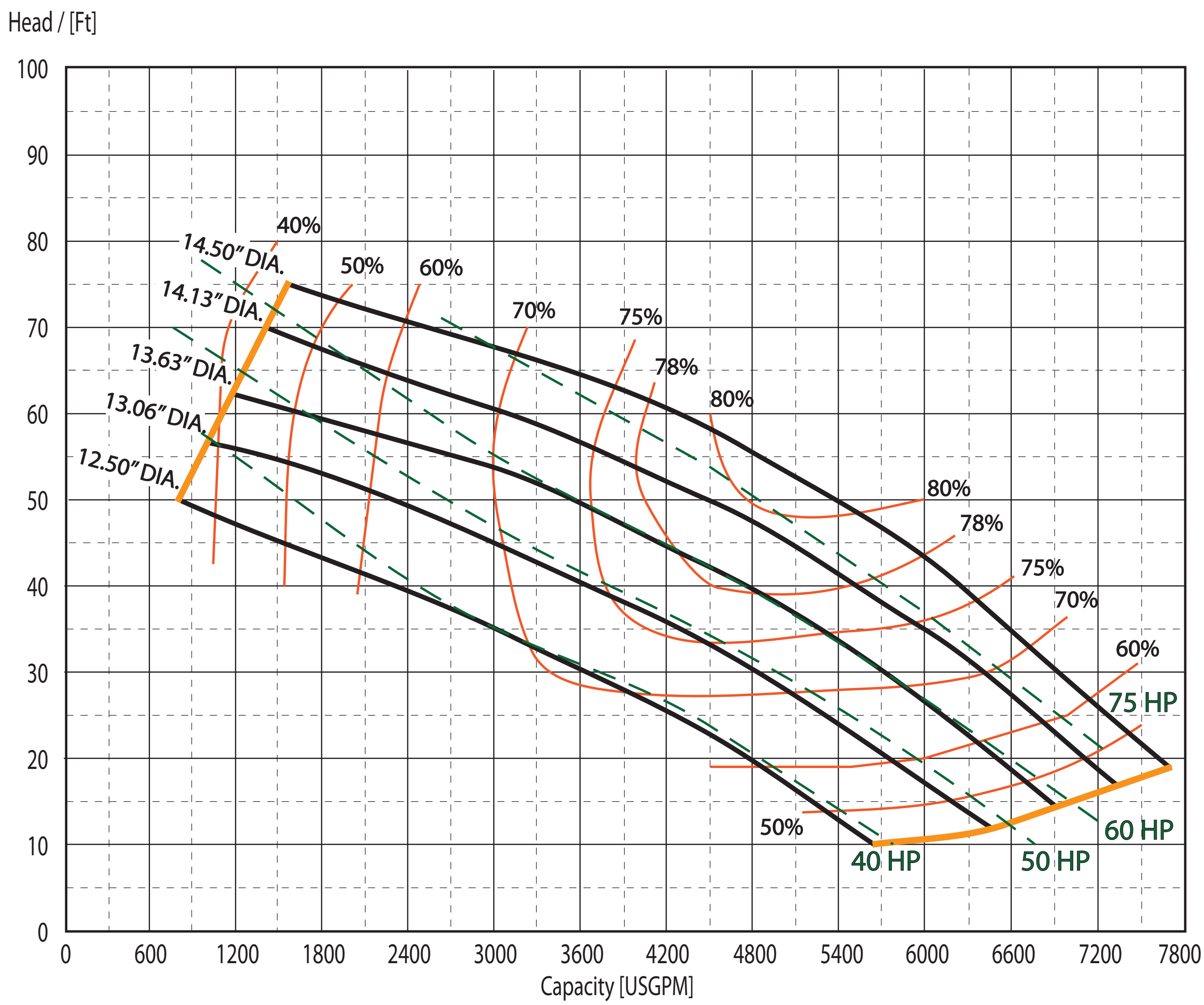
KEEN PUMP

Section **ENCLOSED**

Date Nov. 2021

Pump Series	**K14VK**	14″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1150 RPM**	Discharge	**14″**	Solids	**6″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

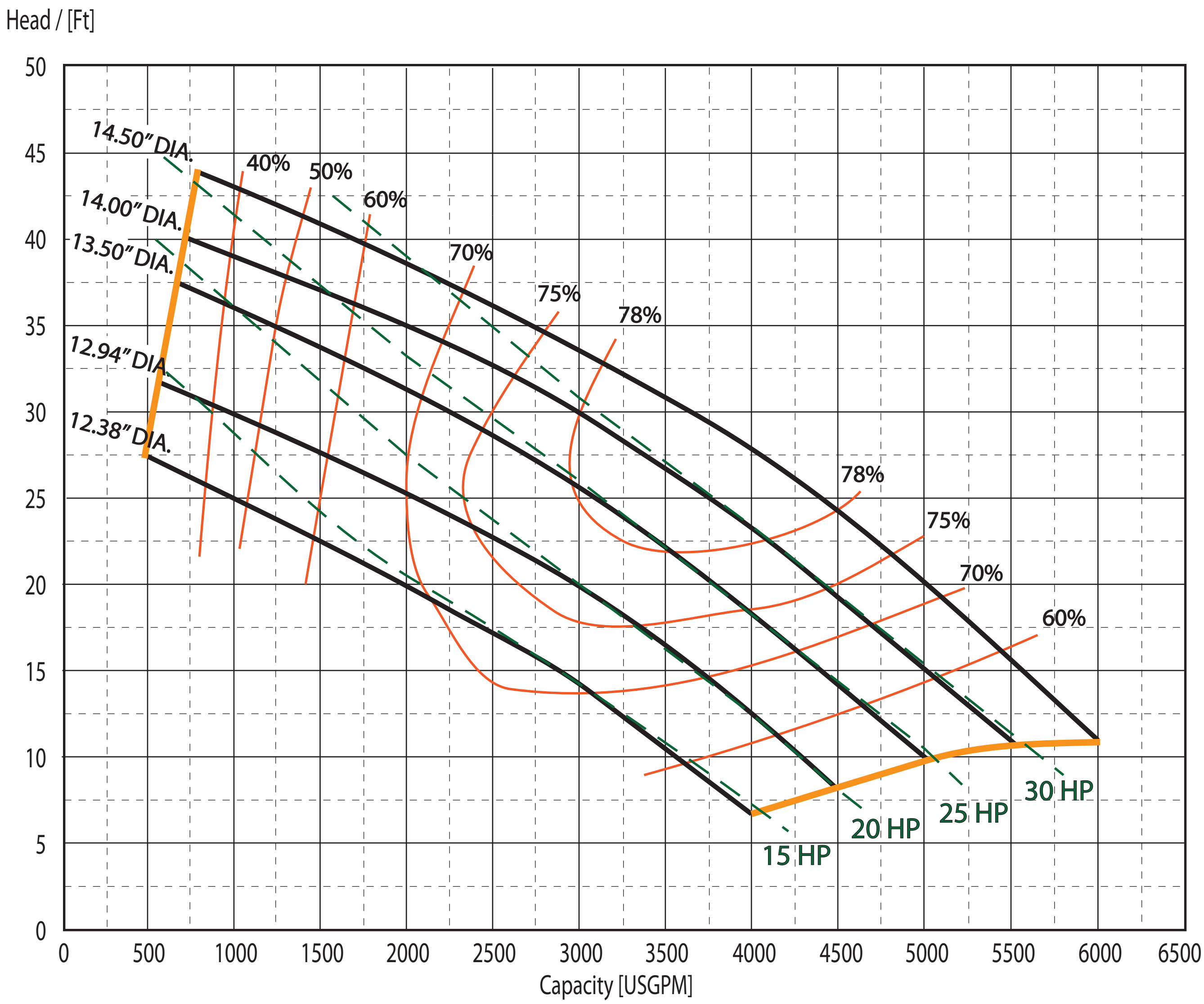
File: K14VK_1150_CAT

KEEN PUMP

Section **ENCLOSED**
Date Nov. 2021

Pump Series	K14VK		14″ SUBMERSIBLE SEWAGE PUMPS		
Speed	870 RPM	Discharge	14″	Solids	6″

GPM: __________ TDH: __________



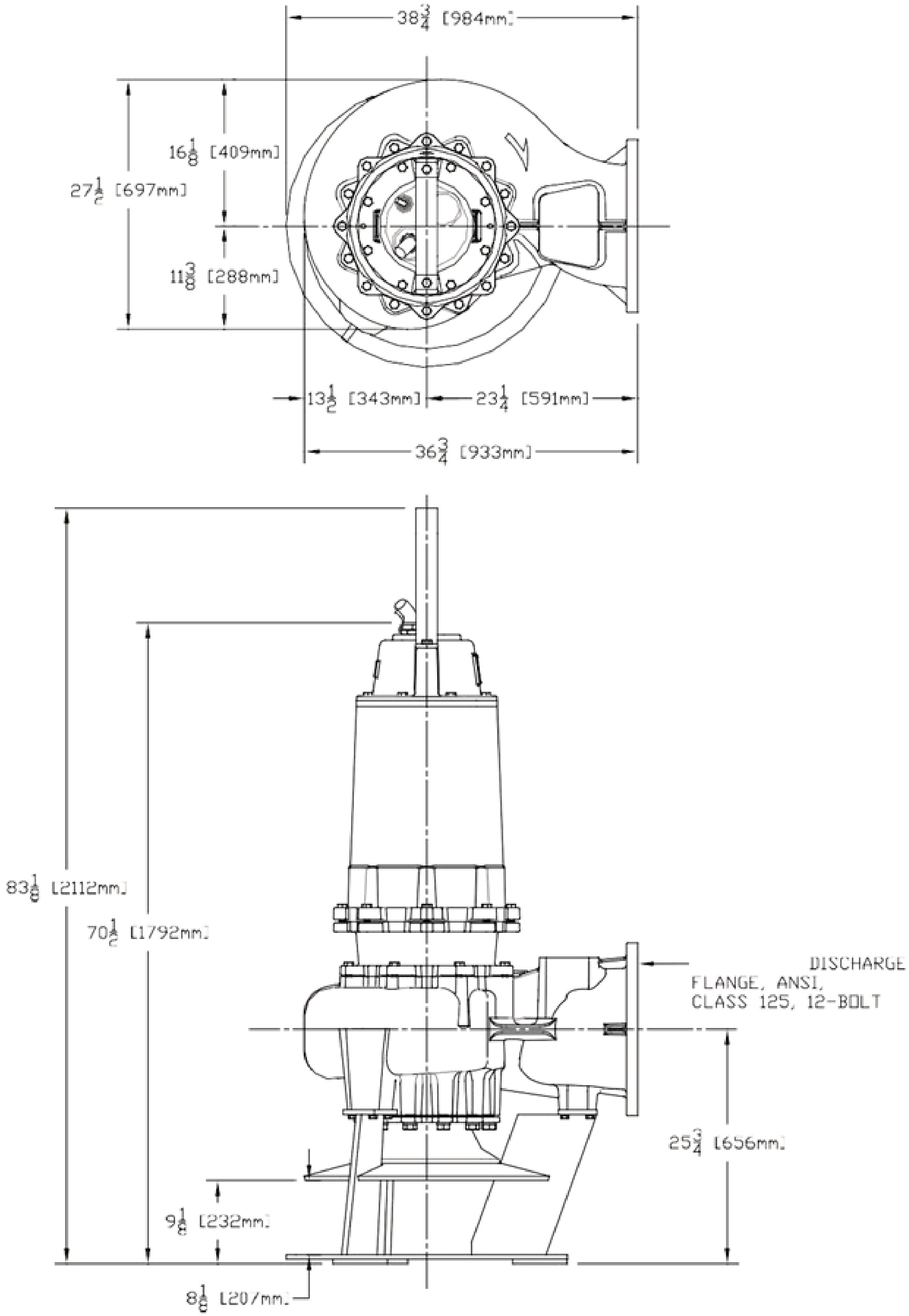
The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K14VK_870_CAT

Section	ENCLOSED
Date	NOV 2013

Pump Series	K14VK	14” SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



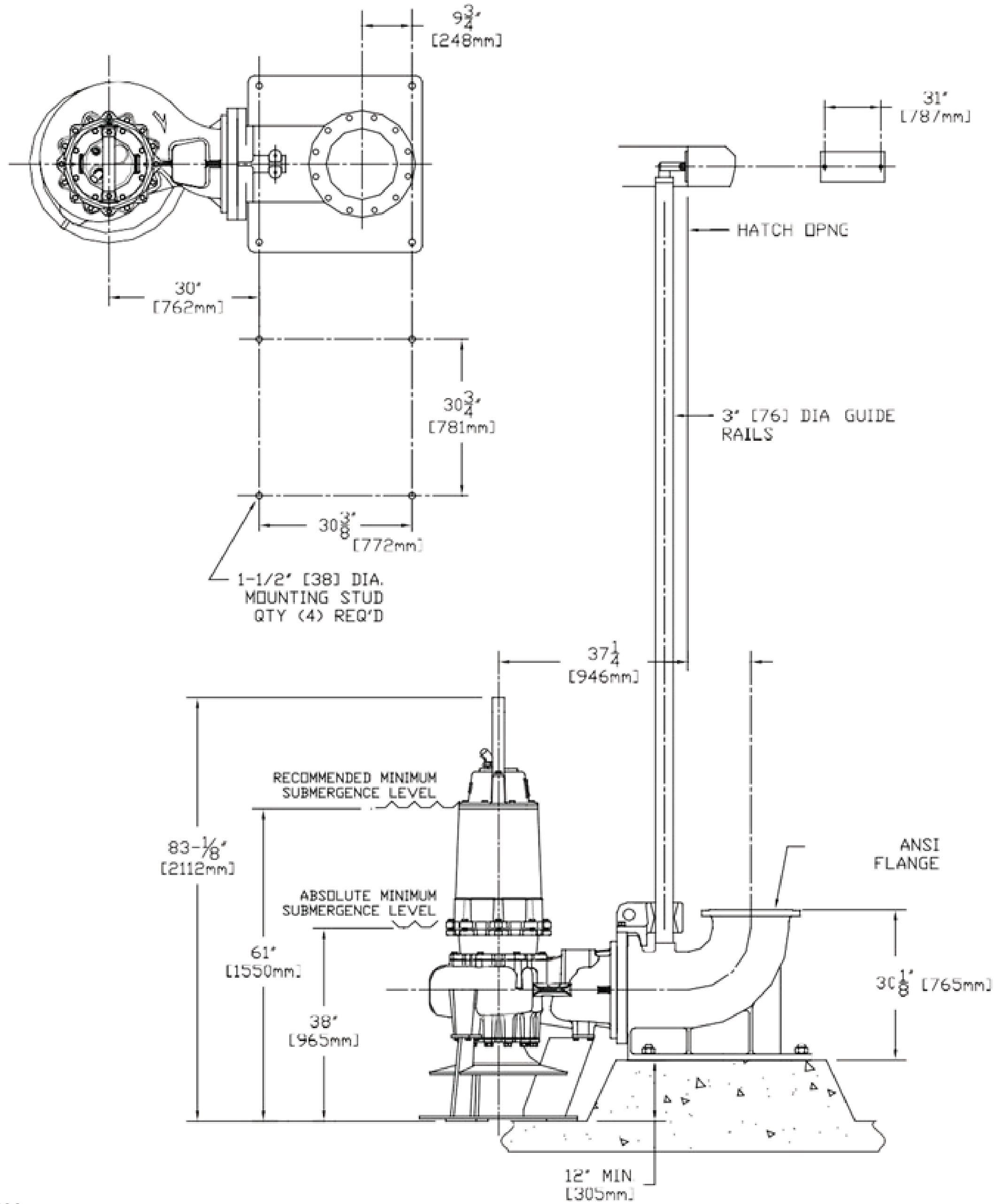
Note: All dimensions in inches and (millimeters).
Dimensions may vary due to normal manufacturing tolerances.

File: K14VK Dimensions

Section ENCLOSED
Date NOV 2013

Pump Series	K14VK	14” SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



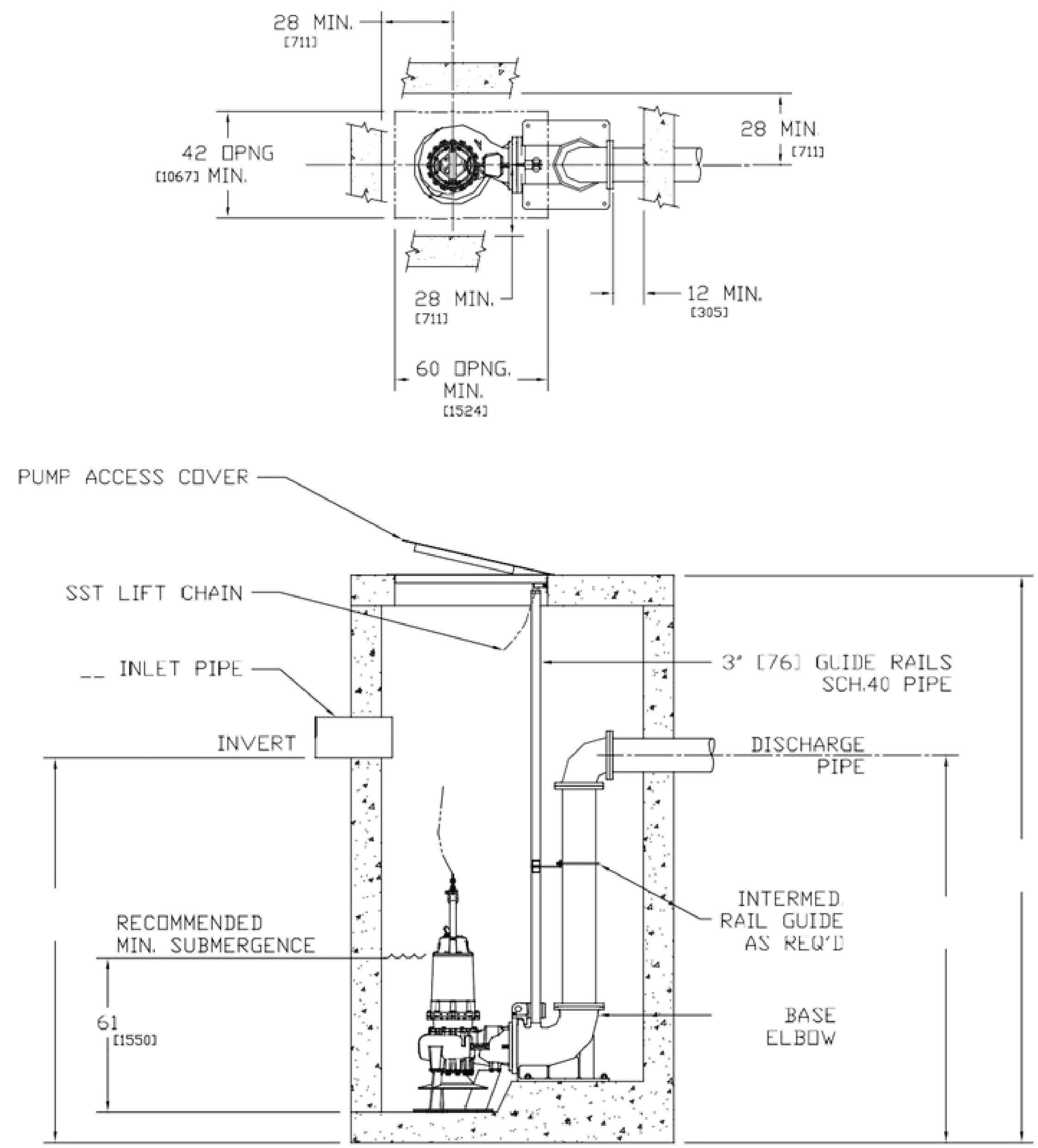
Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K14VK Liftout Dimensions

Section	ENCLOSED
Date	NOV 2013

Pump Series	K14VK	14" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



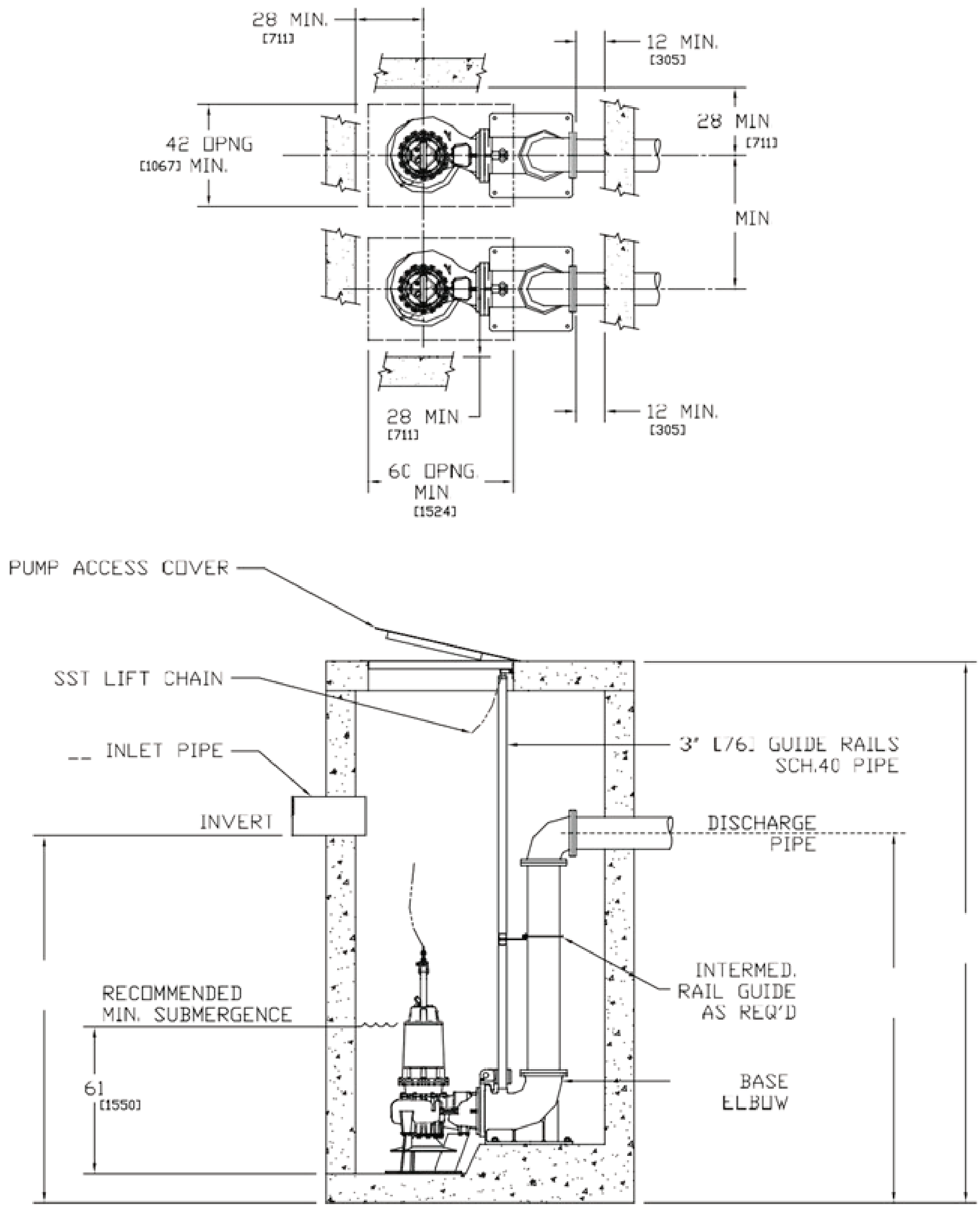
Notes:
1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. Dimensions may vary due to normal manufacturing tolerances.
7. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K14VK Install Dimensions

Section	ENCLOSED
Date	NOV 2013

Pump Series	K14VK	14" SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. Dimensions may vary due to normal manufacturing tolerances.
7. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K14VK Install Dimensions

Pump Model: **K14VK**

Physical Data:

Discharge Size	ANSI 14″ Horizontal
Solids Size	6″
Impeller Type	Balanced, Enclosed, 2 Vane
Power/Control Cable Length	40′ Standard
Paint	Blue, Water Reducible Enamel, One Coat, Air Dried – Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components if Applicable
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	SOOW - 600V, 90º C; Type W - 2000V, 90º C
Control Cord Type	16-4 or 18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Wear Ring	Bronze, CDA 836
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

Pump Model: **K14VK – 1750 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1750**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
75	460	3	F	1.2	99.5	119.5	507.7	71.4	404.5	79.3
	575				79.6	95.6	406.2			
100	460	3	F	1.2	132.9	159.5	691.0	95.3	550.5	105.9
	575				106.3	127.6	552.8			
125	460	3	G	1.2	172.1	206.5	962.2	123.4	766.5	137.1
	575				137.7	165.2	769.7			
150	460	3	F	1.2	200.5	240.5	962.2	143.7	766.5	159.7
	575				160.4	192.4	769.7			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				Power Factor %			
HP	Phase	Service Factor Load	100% Load	75% Load	50% Load	Service Factor Load	100% Load	75% Load	50% Load
75	3	84	83	79	72	86	83	80	70
100	3	85	84	80	73	87	84	82	74
125	3	83	82	81	74	86	84	81	75
150	3	84	83	80	73	86	86	83	78

KEEN PUMP

Section ENCLOSED
Dated MAR 2015

Pump Model: **K14VK – 1150 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	**1150**			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
40	208	3	G	1.2	127.8	153.4	651.8	41.4	234.1	45.9
	230				115.1	138.2	587.2			
	460				57.6	69.1	293.6			
	575				46.1	55.3	234.9			
50	208	3	G	1.2	164.8	197.8	840.5	53.3	301.9	59.3
	230				148.5	178.2	575.2			
	460				74.2	89.1	378.6			
	575				59.4	71.3	302.9			
60	460	3	H	1.2	84.5	101.4	507.7	60.6	404.5	67.3
	575				67.6	81.1	406.2			
75	460	3	F	1.2	99.5	119.5	507.7	71.4	404.5	79.4
	575				79.6	95.6	406.2			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
40	3	85	84	80	76	84	82	79	74
50	3	83	82	81	77	86	81	81	75
60	3	84	83	80	78	86	84	83	78
75	3	84	83	80	73	86	86	83	78

Pump Model: **K14VK – 870 RPM**

Thermal Data:

Maximum Liquid		140º F (60º C) Intermittent
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	870			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	Voltage	Phase	NEC Code	Service Factor	Full Load AMPS	SF Amps	Locked Rotor AMPS	Run KW	Start KVA	Run KVA
15	208	3	K	1.2	54.2	65.0	346.3	17.6	124.5	19.5
	230				48.8	58.6	312.0			
	460				24.4	29.3	156.0			
	575				19.5	23.4	124.8			
20	208	3	G	1.2	67.9	81.5	346.3	22.0	124.5	24.5
	230				61.2	73.4	312.0			
	460				30.6	36.7	156.0			
	575				24.5	29.4	124.8			
25	208	3	H	1.2	82.1	98.5	484.0	26.6	173.9	29.6
	230				74.0	88.8	436.0			
	460				37.0	44.4	218.0			
	575				29.6	35.5	174.4			
30	208	3	G	1.2	94.9	113.9	484.0	30.8	173.9	34.2
	230				85.5	102.6	436.0			
	460				42.7	51.3	218.0			
	575				34.2	41.0	174.4			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				Power Factor %			
HP	Phase	Service Factor Load	100% Load	75% Load	50% Load	Service Factor Load	100% Load	75% Load	50% Load
15	3	84	83	79	72	76	73	70	64
20	3	85	84	80	73	77	74	72	64
25	3	86	84	81	74	76	74	71	65
30	3	87	86	85	81	79	78	73	67

Solids-Handling Pumps K14VK

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, three-phase, designed for wet well and dry well submersible pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well and dry well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.

2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric, KEEN ICE oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.

2.6. Submersible motor design:

2.6.1. ________ Horsepower

2.6.2. ________ RPM

2.6.3. ________ Voltage

2.6.4. ________ Phase

2.6.5. ________ Frequency

2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356º F (180º C). To include:

2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.

2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.

2.7.3. Stator lead material must meet or exceed Class H insulation system.

2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.

2.7.4.1. The thermal limiting devices shall be attached to each phase winding.

2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.8. Operation of the motor shall be designed for:

2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311º F (155º C).

2.8.2. Capable of 15 evenly spaced starts per hour.

2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.

2.8.3.1. Acceptable voltage variation is +/- 10%.

2.8.3.2. Acceptable frequency variation is +/- 5%.

2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.

2.8.3.4. Current unbalance must not exceed 5%.

2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:

2.9.1. Secured with 304 stainless steel fasteners.

2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.

3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.

3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.

3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.

3.2.3. Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.

3.3. All bolted connections in the cord entry construction shall be:

3.3.1. Secured with 304 stainless steel fasteners.

3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.

3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.

3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.

3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.

4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.

4.3. Inboard and outboard seal construction shall be of the following material:

4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.

4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.

4.3.3. Elastomers shall be constructed of Viton®.

4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.

4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.

4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.

4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

4.8. Class 1, Division 1, explosion-proof models will be included with an additional labyrinth seal constructed of bronze, CDA836 material, and is mounted directly above the pump seal plate to take radial loads and act as a flame path for seal chamber.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.
5.2. Each pump shall be constructed with a two-bearing system design.
5.2.1. The upper bearing shall be a Conrad type,double row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.
5.2.2. The lower bearing shall be a Conrad type, single row, angular contact ball bearing designed to adequately compensate for the axial loads and radial forces.
5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.
5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).
6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
7.2. The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.
7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.
7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

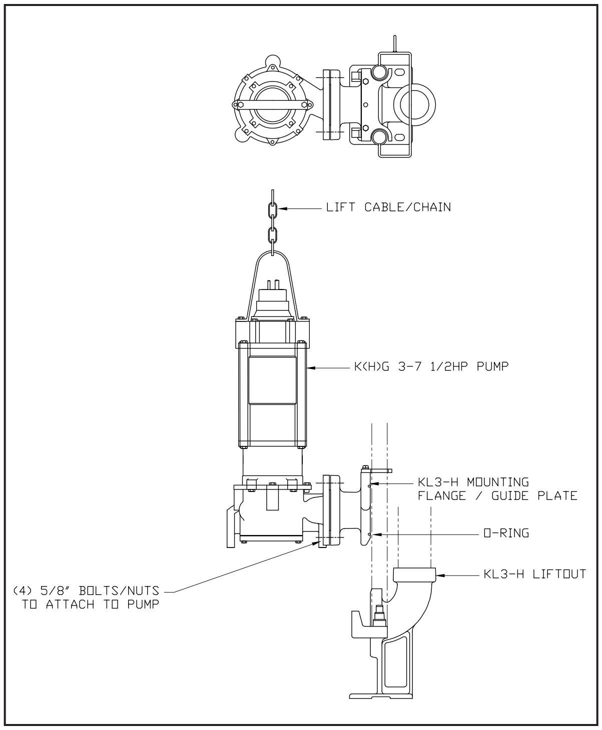
8.0 VOLUTE CASE

8.1. Material shall be ASTM® class 35, A48 gray cast iron.
8.2. Design shall be a single piece and a modified constant velocity.
8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.
8.4. Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.
8.5. The discharge is to be of a horizontal centerline configuration.
8.6. The discharge is to be 14" ANSI® standard Class 125, 12-bolt configuration.
8.7. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

Rail Systems

KL3H

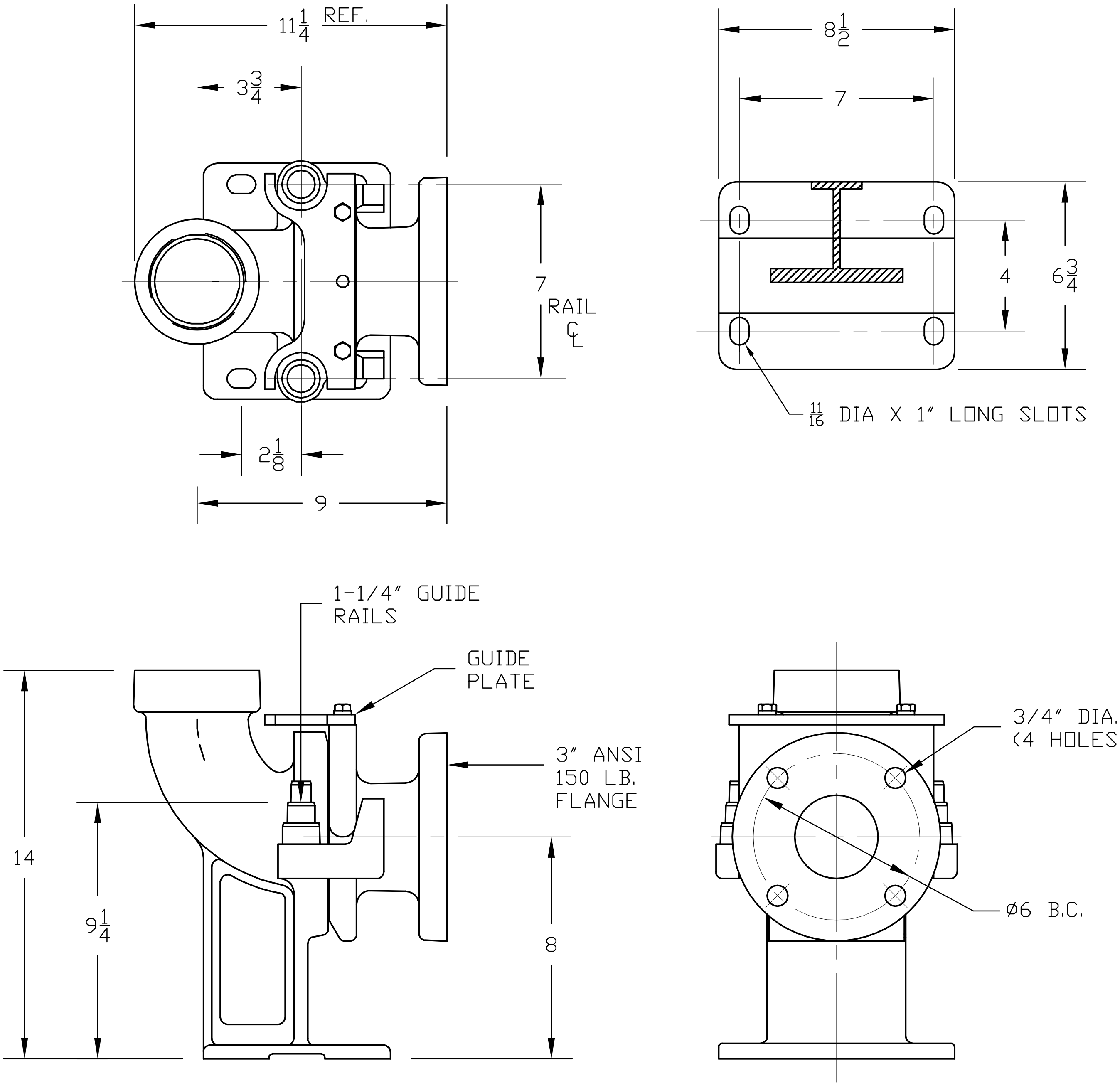
KEEN 3" Horizontal Liftout



- **Horizontal Flange, 3" ANSI, Class 125**
- **3" NPT Female Vertical Discharge**
- **1" or 1-1/4" Guide Rails**
- **Stress-Free Rail System**
- **Durable Cast Iron Base and Lift-Out Flange**
- **Stainless Steel Guide Plate**

- Base elbow provides quick and easy installation and removal of horizontal discharge 1-10HP Pumps
- Taper-base arms support liftout elbow and pump
- Positive O-ring sealing face
- Automatic sealing pulls mating faces together
- Carries 100% pump load - no stress on rails

KEEN PUMP
471E State Route 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com



MATERIAL
ELBOW/FLANGE: CLASS 30 IRON
PAINT: POWDER COAT BLUE
GUIDE PLATE: SST
FASTENERS: SST

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE
A	FY	

KEEN PUMP COMPANY
KEEN PUMP CO.
471E ST ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE
KL3H 3" PUMP LIFTOUT BASE/DISCONNECT

SCALE	DWG. BY	DATE	DWG. #	REV.
NTS	F. YUHASZ	9/03/08	KN-6	A

KL4

KEEN 4" Horizontal Liftout

- **4" Class 125 ANSI Flange (Pump Connection Discharge)**
- **1-1/2" or 2" Guide Rails**
- **Rated for Pumps up to 2,000 lbs.**
- **Dimensionally Interchangeable with Flygt**

- Base elbow provides quick and easy installation and removal of horizontal discharge Pumps up to 2000 lbs.
- Taper-base design supports liftout elbow and pump
- Standard with Buna-N Seal, Break-away Ring
- Optional Metal-to-Metal with SST Break-away Ring
- Optional with Heavy-Duty Gaskets

KEEN PUMP
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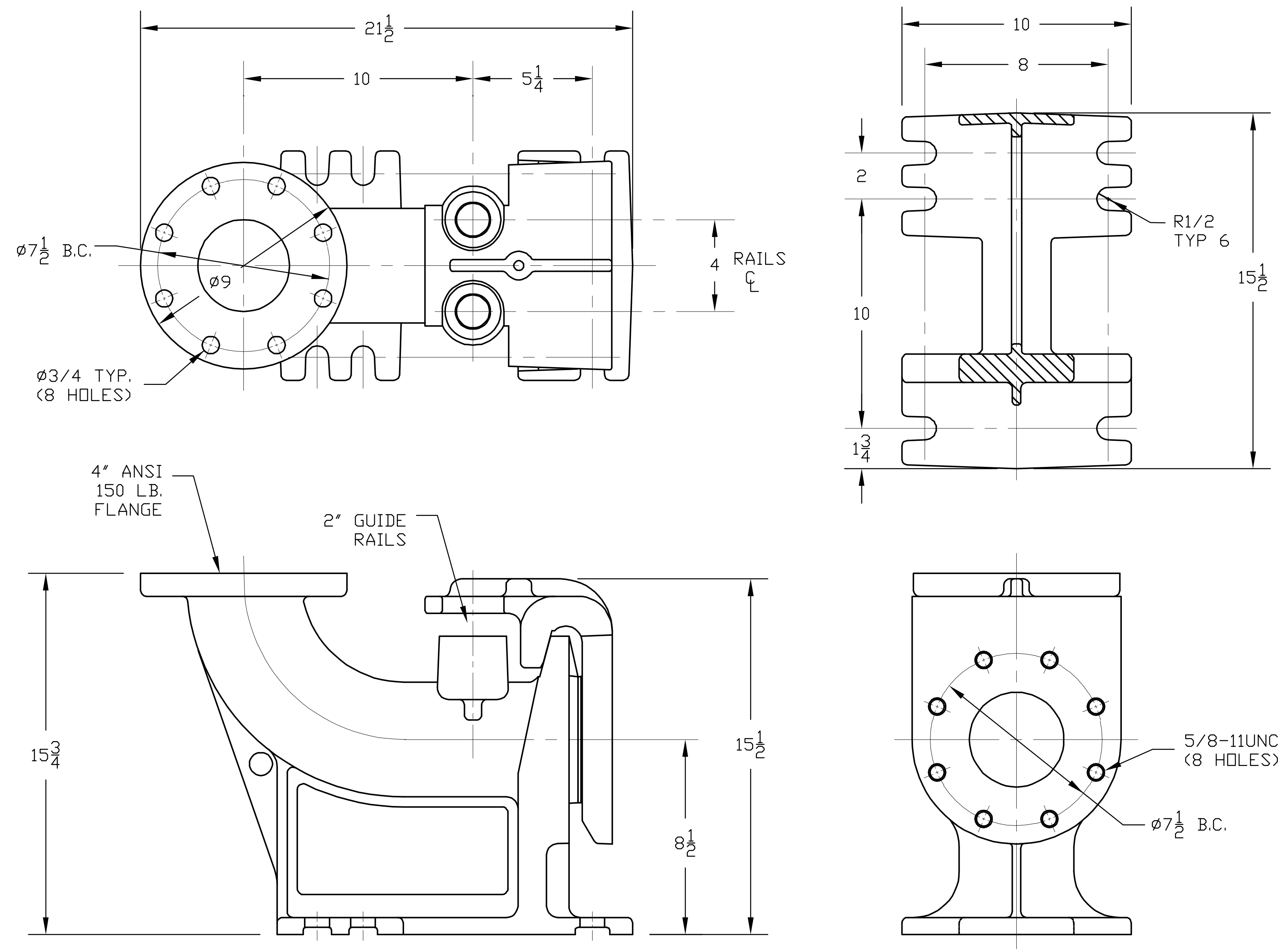


MATERIAL: CLASS 30 IRON
PAINT: POWDER COAT BLUE

KEEN PUMP COMPANY	KEEN PUMP CO. 471E ST ROUTE 250 EAST ASHLAND, OHIO 44805	PHONE: 419-207-9400 FAX: 419-207-8031	
TITLE KL4 4" PUMP LIFTOUT BASE/DISCONNECT			
SCALE NTS		DWG. # KN-3	REV. -
DWG. BY SE	DATE 8/27/11		

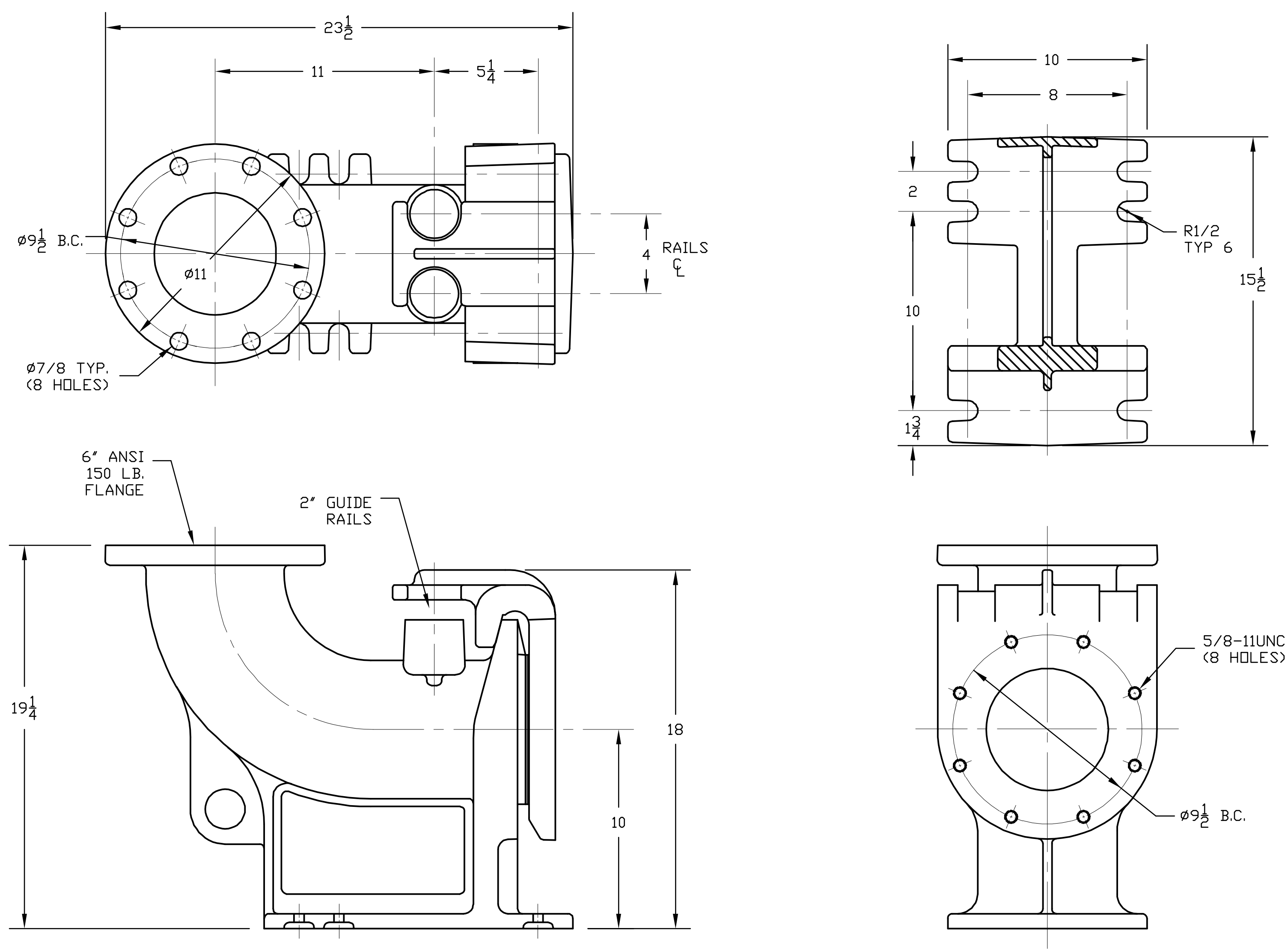
KL6

KEEN 6" Horizontal Liftout

- **6" Class 125 ANSI Flange (Pump Connection Discharge)**
- **1-1/2" or 2" Guide Rails**
- **Rated for Pumps up to 2,000 lbs.**
- **Dimensionally Interchangeable with Flygt**

- Base elbow provides quick and easy installation and removal of horizontal discharge Pumps up to 2000 lbs.
- Taper-base design supports liftout elbow and pump
- Standard with Buna-N Seal, Break-away Ring
- Optional Metal-to-Metal with SST Break-away Ring
- Optional with Heavy-Duty Gaskets

KEEN PUMP
471E State Route 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com



MATERIAL: CLASS 30 IRON
PAINT: POWDER COAT BLUE

KEEN PUMP COMPANY
KEEN PUMP CO.
471E ST ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE			
KL6 6" PUMP LIFTOUT BASE/DISCONNECT			
SCALE: NTS		DWG. #: KN-4	REV.: –
DWG. BY: SE	DATE: 9/01/12		

Rail Systems

KL8-C

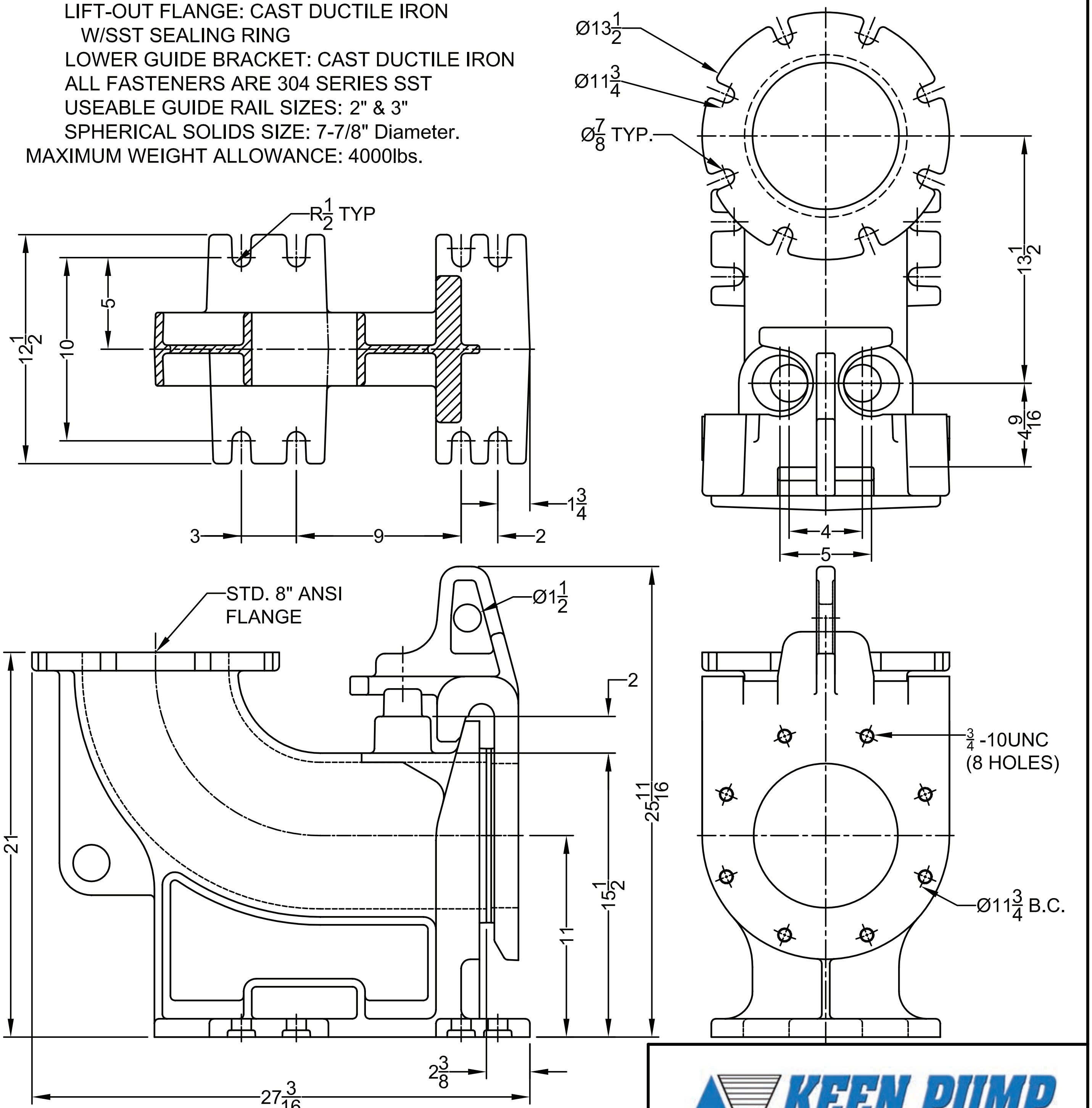
KEEN 8" Horizontal Liftout

- 8" Class 125 ANSI Flange (Pump Connection Discharge)
- 2" or 3" Guide Rails
- Rated for Pumps up to 4,000 lbs.
- Metal-to-Metal Design with SST Breakaway Ring

- Base elbow provides quick and easy installation and removal of horizontal discharge Pumps up to 4000 lbs.
- Taper-base design supports liftout elbow and pump
- Standard with SST Break-away Ring
- Rugged Ductile Iron Construction with Durable Powder Coating

KEEN PUMP
471 US Hwy 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

NOTE: ALL DIMENSIONS ARE IN INCHES.
MATERIALS OF CONSTRUCTION:
BASE ELBOW: CAST DUCTILE IRON
LIFT-OUT FLANGE: CAST DUCTILE IRON
W/SST SEALING RING
LOWER GUIDE BRACKET: CAST DUCTILE IRON
ALL FASTENERS ARE 304 SERIES SST
USEABLE GUIDE RAIL SIZES: 2" & 3"
SPHERICAL SOLIDS SIZE: 7-7/8" Diameter.
MAXIMUM WEIGHT ALLOWANCE: 4000lbs.

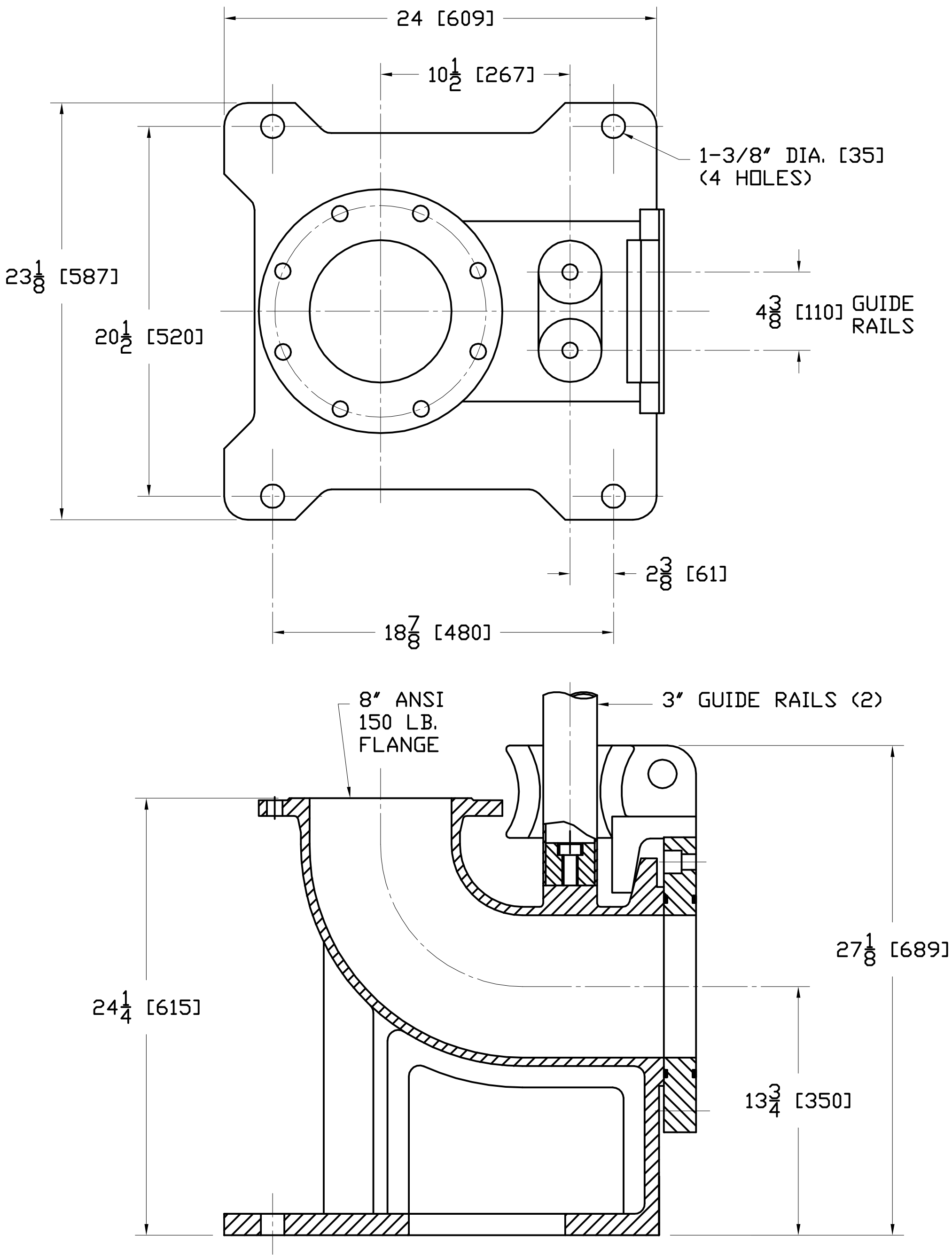


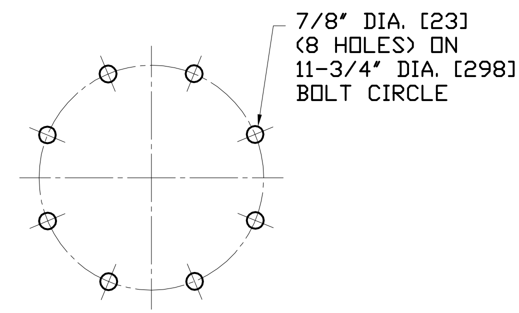
KEEN PUMP

CHANGES		TOLERANCES	DRAWN BY	DATE
F		DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X = ±1/2	SE	02/29/16
E			MATERIAL SPECIFICATION:	
D			AS NOTED	
C				
B				
A				

LIFT-OUT, 8” SPECS/CUT SHEET

SCALE:	PART NO.
1/8	KL8-C





HORIZONTAL FLANGE
(BOLT TO VOLUTE)

MATERIAL: CLASS 30 IRON
PAINT: POWDER COAT BLUE

KEEN PUMP COMPANY
KEEN PUMP CO.
471E ST, ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE			
KL8 8" PUMP LIFTOUT BASE/DISCONNECT			
SCALE: NTS		DWG. #: KN-530	REV.: -
DWG. BY: S. ETZEL	DATE: 04/24/12		

KEEN PUMP **SPECIFICATIONS**

Liftouts KL8 , KL10, KL10, KL12, KL14

GENERAL –The KL__ lift-out assembly facilitates the ease of installing and removing a submersible sewage pump from the hard piping in a pump station.

DIMENSIONS – The KL__ lift-out assembly is designed to attach a __" ANSI Class 125 horizontally flanged pump to vertical __" ANSI Class 125 flanged pipe connection.

CONFIGURATION – The lift-out base elbow assembly shall consist of a base elbow, lift-out flange and upper guide bracket.

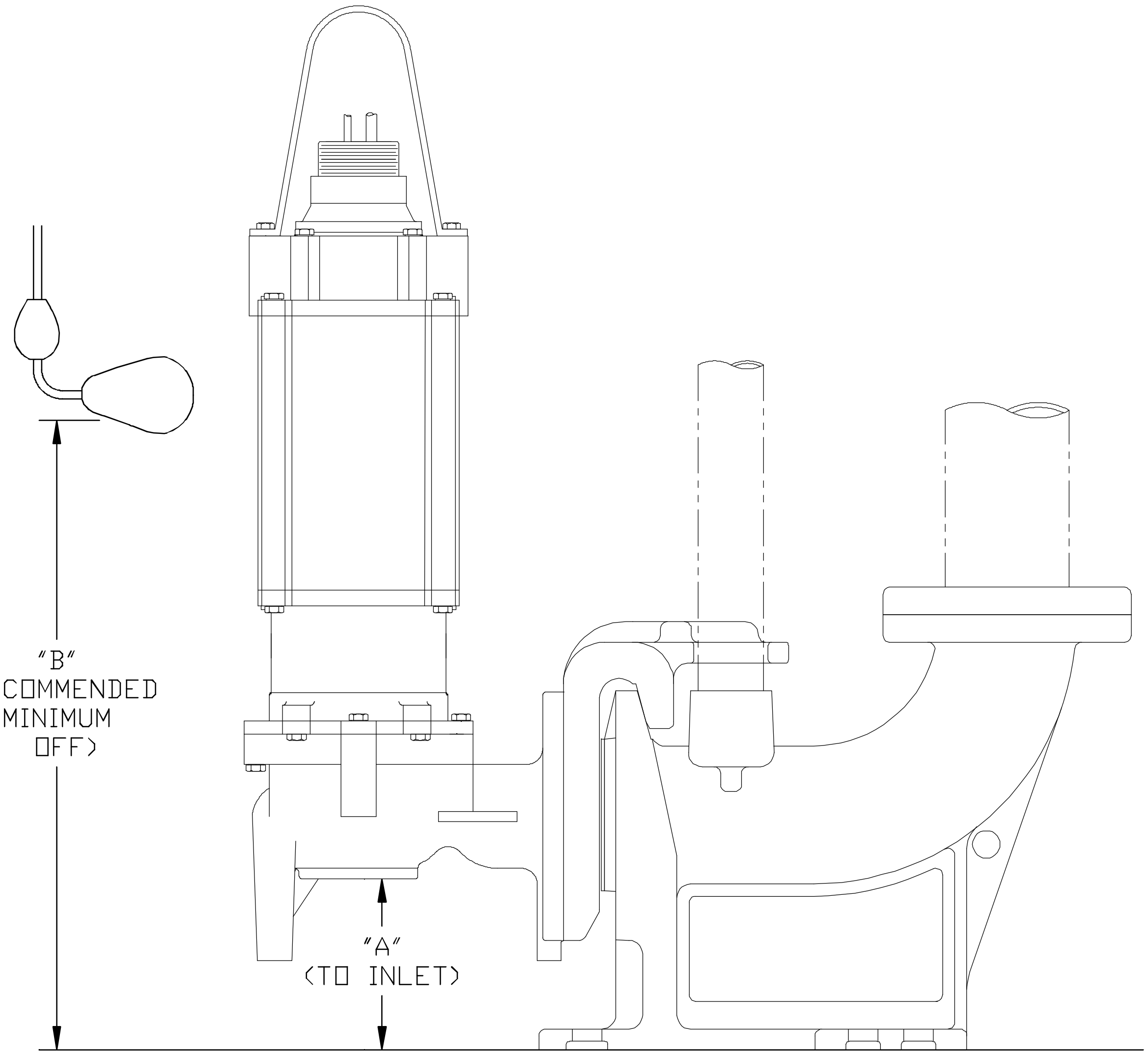
BASE ELBOW – A one-piece, cast iron (ASTM A48-30) machined casting. The discharge shall be vertical, __" ANSI 150# connection, located at an elevation of __" from the floor of the station. The inlet side shall have a horizontal configuration for mating to the lift-out flange portion of the assembly. At the top of the inlet side, cast material shall be positioned to hold the lift-out flange. There shall be (2) machined bosses located on the top surface for (2) guide rail attachment. The base shall have minimum (4) mounting holes, dimensions of (see layout drawing), for securing to the floor of the station. The base shall be held in place with anchored threaded rod, nuts and lockwashers..

LIFT-OUT FLANGE – The lift-out flange assembly shall consist of (2) cast iron (ASTM A48-30) components. The pieces shall be bolted together with stainless steel bolts. The upper component shall provide for a means of guiding and gripping the lift-out assembly around the (2) guide rails. The surfaces around the guide rails shall be convex, preventing the lift-out flange from catching any corners or edges in the removal or installation of the pump. There shall be a cast opening in the upper component for attaching the lift-out chain. The upper component shall positively position the lift-out assembly over the top inlet of the base elbow. The lower component shall bolt to the pump discharge flange, providing the means for removing and installing the pump. The lower component shall have (2) o-rings, one positioned between the pump discharge face and the other between the base elbow inlet. The o-rings shall provide a positive sealing surface and assist in the prevention of the mating surfaces from rusting together.

UPPER GUIDE BRACKET – The bracket shall be stainless steel, Type 304. The upper guide bracket shall securely position the (2) guide rails, maintaining the exact location for proper use of the lift-out flange and pump assembly. The upper guide bracket shall be secured to the wall or bracket provided in the station by means of bolts, nuts and lockwashers.

GUIDE RAILS – (2) 2" or 3" guide rails shall be required for proper operation of the KL base elbow assembly. The guide rails are either provided by the installer or factory, depending upon each project. The length of the guide rails are dependant upon the depth of the station or installation.

COATINGS – Carboline & Tnemac products are available. Coal-Tar epoxies, chemically resistant epoxies & marine coatings.



SUBMERGENCE LEVELS - RAIL MOUNTED PUMPS

PUMP	LIFTOUT MODEL	A BOTTOM OF WELL TO INLET	B "KEEN" RECOMMENDED MINIMUM SUBMERGENCE LEVEL
KE102/103	KL2	3-1/2"	15"
K(F/H)G2	KL1(CV)	3-1/2"	15"
KPCG	KL1(CV)	3-3/4"	19"
K(H)GS2	KL1(CV)	3-3/8"	15"
KHHG2	KL1(CV)	3-1/2"	21"
KHHG2H	KL1(CV)	3-1/2"	21"
KG3,5,7,103	KL3H	4-3/4"	22"
KHG3,5,7	KL3H	5-3/4"	22"
KGP75-150	KL3H	4-3/4"	28"
K3RN	KL3H	5-3/4"	28"
K3VN	KL3H	4-1/2"	27"
K3RH	KL3H	5-3/4"	23"
K4RH	KL4	6-1/4"	24"
K4RN (3450)	KL4	6-1/4"	28"
K4RN (1150/1750)	KL4	5-1/8"	28"
K4VN	KL4	5-1/8"	27"
K4RP (3450)	KL4	5-1/2"	28"
K4RP (1150/1750)	KL4	7-1/2"	32"
K4VP	KL4	7-1/2"	30"
K4RB (3450)	KL4	9-1/8"	36"
K4RB (1750)	KL4	8-1/2"	36"
K4VB	KL4	7-1/2"	35"
K4VK	KL4	6-1/2"	42"
K6VB	KL6	8-3/8"	38"
K8VK	KL8	16"	52"
K12VK	KL12	15-1/2"	61"
K14VK	KL14	15-1/2"	61"

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE
B	SE	10/09/2015
A	SE	03/16/2015

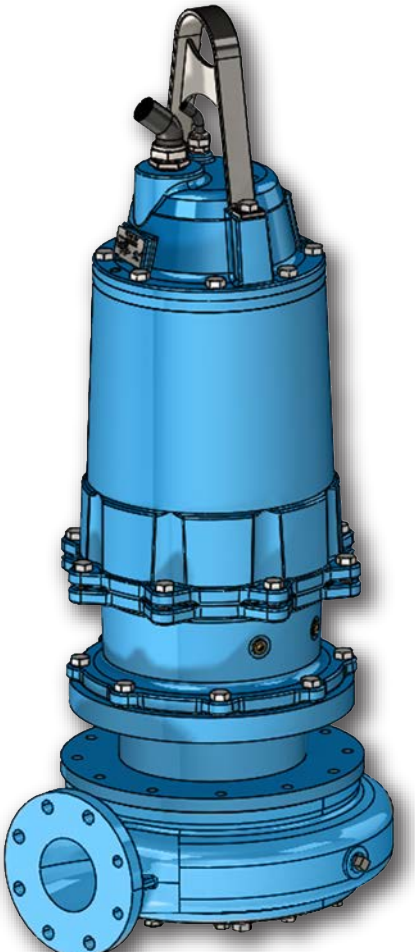
KEEN PUMP
471 US HWY 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: SUBMERGENCE LEVELS - WASTEWATER PUMPS

SCALE	DWG. BY	DATE	DWG. #	REV.
NTS	SE	9/24/2014	KN-903	B

K4/6CH

4"-6" Submersible, Open Impeller
(Class 1, Div. 1, Groups C & D Hazardous Location)



RUGGED, TOUGH, ABRASIVE RESISTANT CONSTRUCTION!

HARDENED IMPELLER
Heat Treated Cast Steel, Open Vanes
Handles the Toughest Materials, Cuts into Pieces
Works Efficiently with Stationary Cutter Bar

HARDENED CUTTER BAR
Heat Treated T1 Tool Steel, 60 Rockwell C Hardness
Easily Adjustable to Maintain Optimal Chopping Performance

RETAINING PLATE
Retains and Adjusts Cutter Bar According to Specific Field Conditions

PATENTED MECHANICAL SEAL SYSTEM
Removes Solids and Abrasives from Seal Area.
Purges Air and Gas Pockets
Triples Seal Life

CAPABILITIES
- **Flows-------------------------------------- to 2000 GPM**
- **Heads------------------------------------- to 165 Feet**
- **HP Range-------------------------------- 15 - 60 HP**
- **Voltage / Phase Options------------- 208 / 230 / 460 / 575V, 3 Phase**
- **Discharge Connections-------------- 4" or 6" ANSI Class 125 Horizontal Flange**
- **Motor Speeds---------------------------1750 RPM**
- **Solids-Handling----------------------- Up to 2"**
- **Impeller---------------------------------- Balanced, Open, 3/4-Vane**
- **Motor Service Factor----------------- 1.20**
- **3rd Party Approval-------------------- FM 3615, Class 1, Div. 1, Groups C & D**

Features and Benefits

K4/6CH

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grips with compression grommets protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged. 40' UL power & control cords. Additional sealing accomplished by wire terminal plate, separating cord cap from motor housing.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 35 cast iron components.

3. Strong Motor (U.S. Motor Manufacturer)
Powerful high-torque motor for strong pumping.
208/230/460/575 Volt, 3-phase.
Slip-Fit stator efficiently transfers heat to cast housing. Class H(class N optional) construction with overload protection in oil-filled chamber for cool operation and long motor life. Inverter-duty capable, for VFD / soft start operation.

3a. Oil
Proprietary Keen oil ensures industry-low operating temperatures.

4. Solid Bearing Support
Two-bearing design featuring high load-rated angular contact bearings for 100,000 hour B-10 life.

5. Severe Duty Dual Mechanical Seals
Provide twice the moisture and grit protection for the motor. Upper seal silicon carbide; * Patented Lower seal System. Tungsten carbide seal handles sand, grit and abrasive materials.

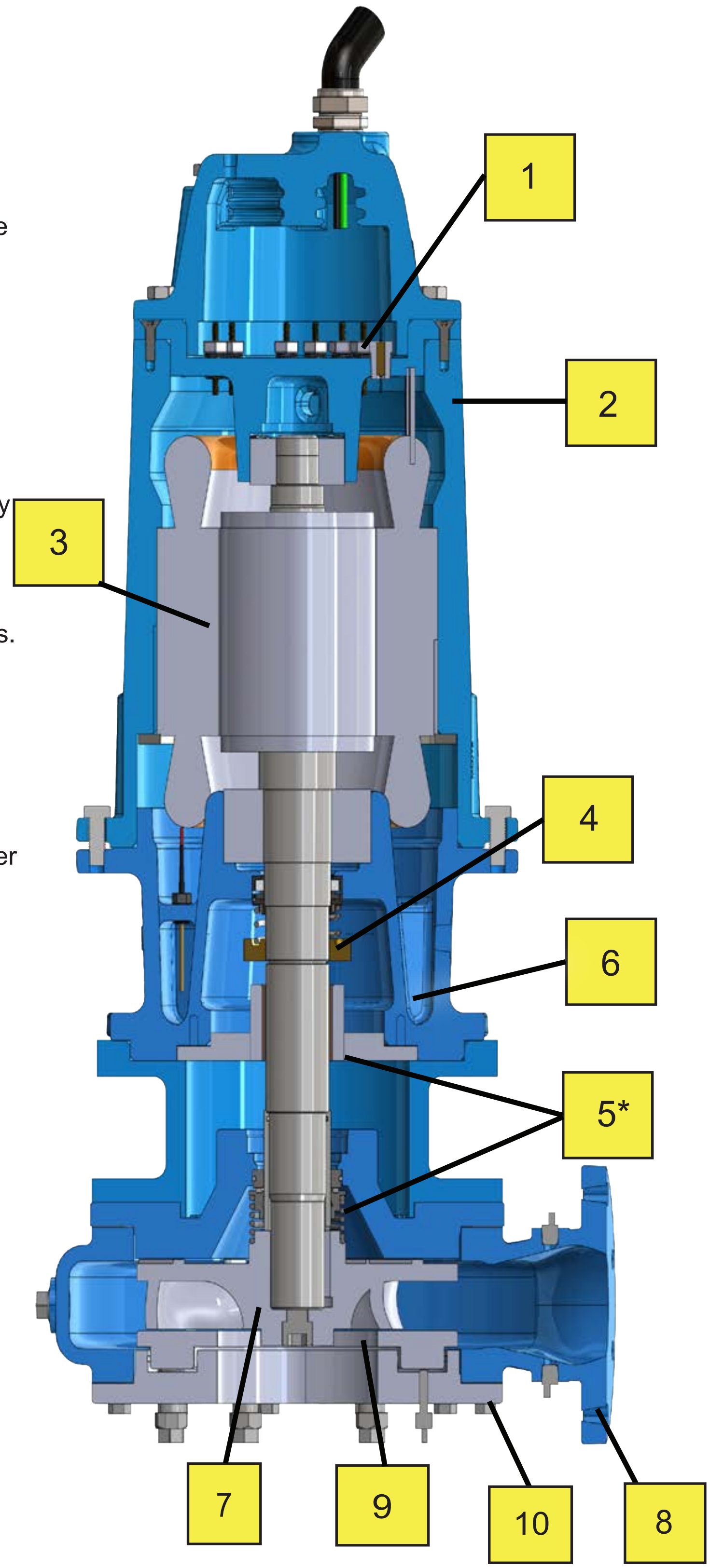
6. Moisture Detection
Seal leak probe signals alarm in control panel for scheduled maintenance.

7. Hydraulic Design
Open, Cast Steel impeller easily passes up to 2" diameter solids without blockage. Strong, heat-treated impeller features backside pump-out vanes, keeping lower seal clean and pressure-compensated for longer life. Dynamically balanced for smooth, quiet operation and long bearing life.

8. Standard Flange Connection
4" Horizontal, Class 125 ANSI discharge flange. Industry standard, 8-bolt pattern, Ductile Iron Casing.

9. High Performance Chopper
Engineered cutter bar ideally suited for chopping all wastewater solids. Bar is field-adjustable and is made of T1 tool steel, heat-treated to minimum 60 Rockwell C hardness. Easily serviceable and replaceable.

10. Chopper Retaining Plate
Retains and adjusts cutter bar according to field conditions.

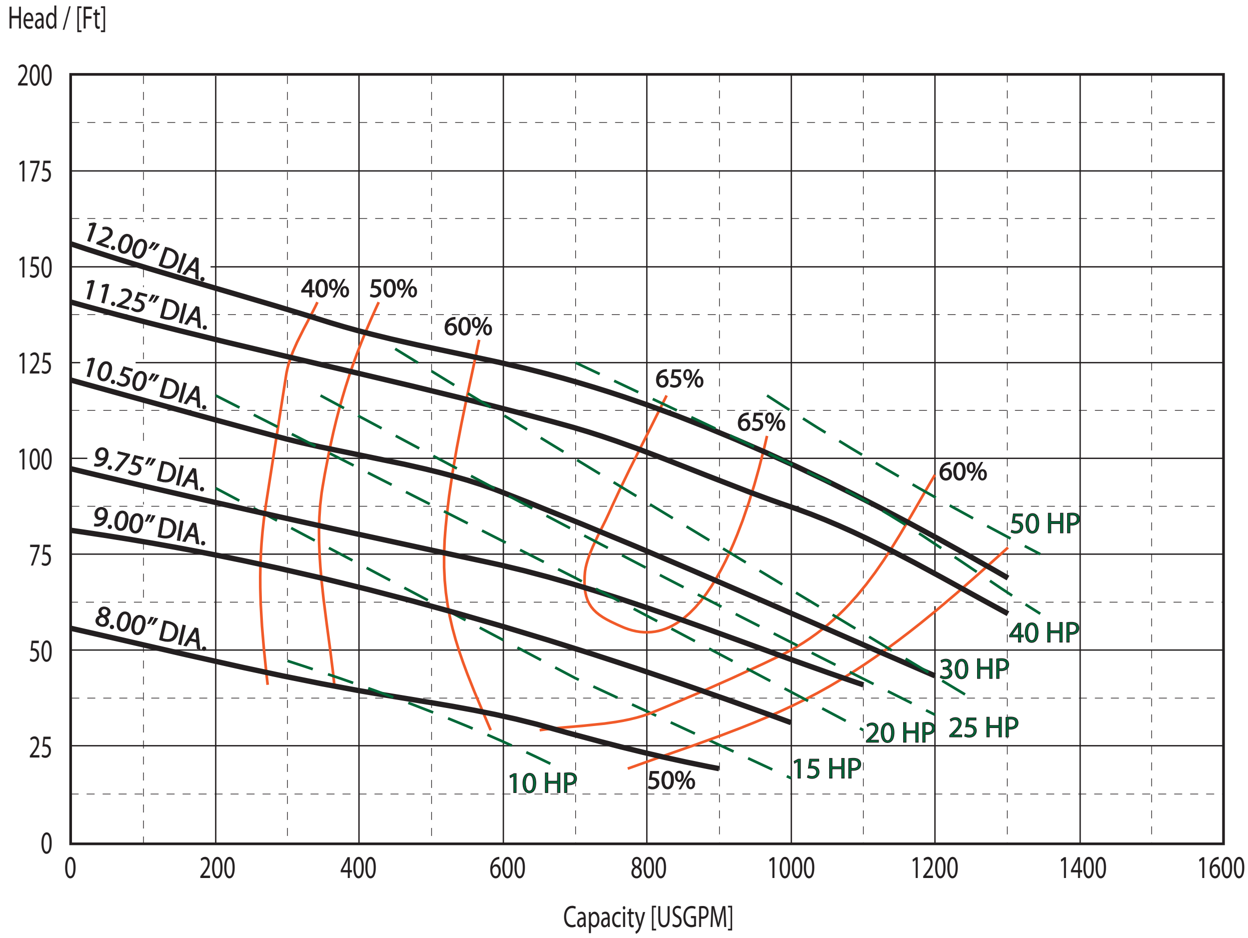


471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

Section *CHOPPER*
Date *Nov. 2021*

Pump Series	K4CH			4″ SUBMERSIBLE SEWAGE PUMPS	
Speed	**1750 RPM**	Discharge	**4″**	Solids	**1.25″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

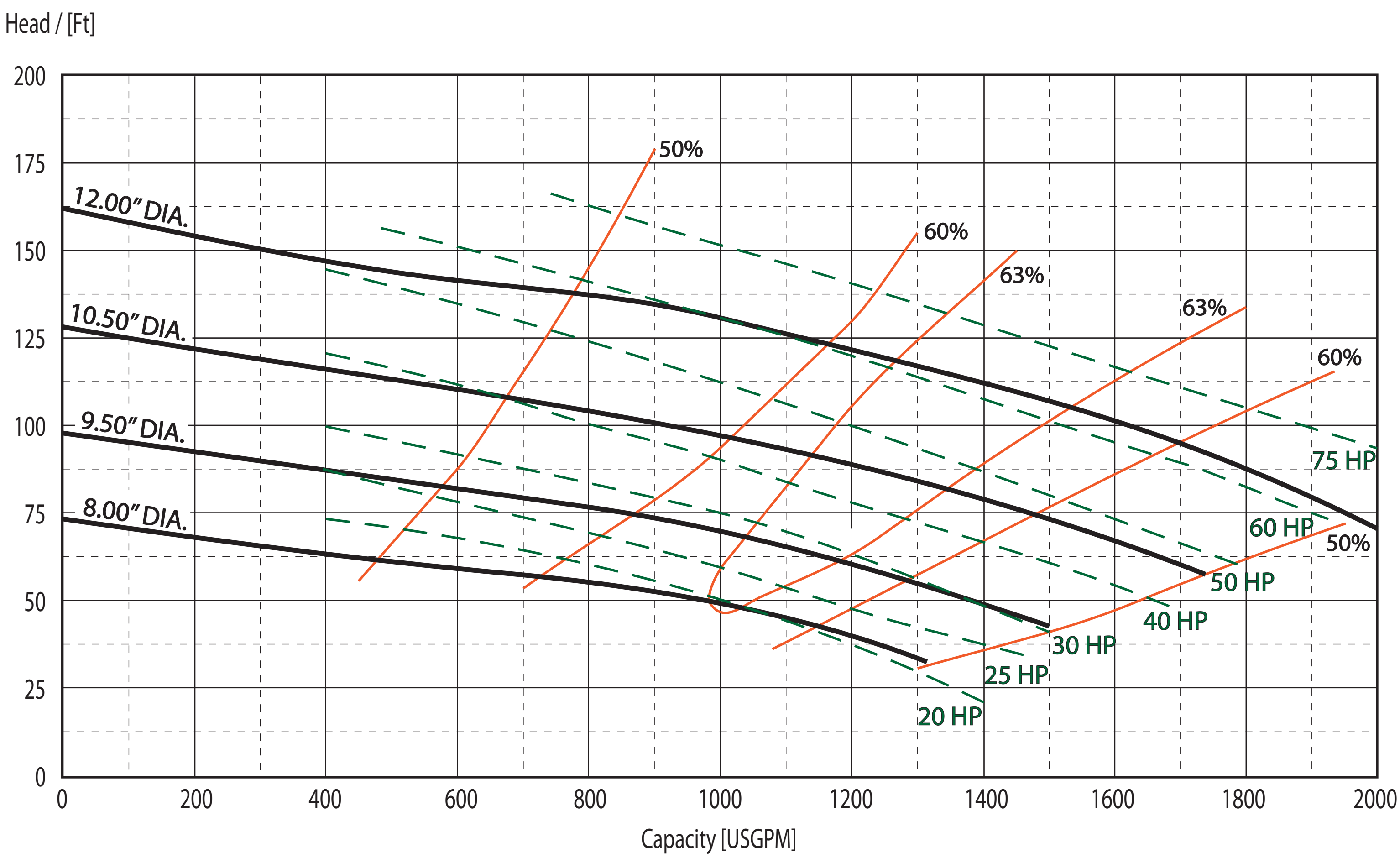
File: K4CH_1750

KEEN PUMP

Section **CHOPPER**
Date Nov. 2021

Pump Series	K6CH	6″ SUBMERSIBLE SEWAGE PUMPS			
Speed	1750 RPM	Discharge	6″	Solids	2.00″

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K6CH_1750

Pump Model: **K4CH**

Physical Data:

Discharge Size	ANSI 4" Horizontal
Solids Size	3-3/16"
Impeller Type	Sime-Open three vane design
Power/Control Cable Length	40' Standard
Paint	Blue, Water Reducible Enamel, One Coat, Air Dried – Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø)
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	SOOW - 600V, 90º C; Type W - 2000V, 90º C
Control Cord Type	16-4 or 18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Wear Ring	Bronze, CDA 836
Impeller	Cast Steel, AISI 8630 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

60	460	3	C	1.0	81.1	81.1	270.5	58.2	215.8	64.6
	575				64.9	64.9	216.4			

Pump Model: **K4CH – 1750 RPM**

Motor Efficiencies & Power Factor									
		Motor Efficiency %				Power Factor %			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
15	3	84	83	79	72	86	83	80	70
20	3	85	84	80	73	87	84	82	74
25	3	87	86	81	74	86	84	81	75
30	3	86	85	80	73	88	86	83	78
40	3	87	86	81	74	87	86	82	78
50	3	87	87	82	75	86	85	80	77
60	3	86	86	85	81	85	84	83	79

Pump Model: **K6CH**

Physical Data:

Discharge Size	ANSI 6” Horizontal
Solids Size	3-1/2”
Impeller Type	Balanced, Enclosed, 2 Vane
Power/Control Cable Length	40’ Standard
Paint	Blue, Water Reducible Enamel, One Coat, Air Dried – Impeller & Inside Volute - Ceramic Coated For Abrasion Resistance

Motor Construction:

Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class H (**Optional** - Class N)
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class H: 356°F (180°C) Class N: 392°F (200°C) - **Optional**
Power Cord Type	SOOW - 600V, 90º C; Type W - 2000V, 90º C
Control Cord Type	16-4 or 18-5 - SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 35
Motor Housing	Cast Iron, ASTM A48, Class 35
Bearing Housing	Cast Iron, ASTM A48, Class 35
Volute	Cast Iron, ASTM A48, Class 35 / Ceramic Coated Inside
Wear Ring	Bronze, CDA 836
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Shaft	ANSI 400 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

60	460	3	C	1.0	81.1	81.1	270.5	58.2	215.8	64.6
	575				64.9	64.9	216.4			

Pump Model: **<u>K6CH – 1750 RPM</u>**

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
15	3	89	88	86	85	91	90	87	85
20	3	89	89	88	87	91	90	88	86
25	3	91	90	89	88	91	90	88	87
30	3	91	90	90	88	92	91	89	87
40	3	92	91	90	88	92	91	90	88
50	3	92	92	91	90	93	92	90	89
60	3	92	92	91	90	94	93	91	90

KEEN PUMP®

SPECIFICATIONS

Solids-Handling Chopper Pumps K4CH

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, three-phase, designed for wet well and dry well submersible pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well and dry well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.

2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.

2.6. Submersible motor design:

2.6.1. ________ Horsepower

2.6.2. ________ RPM

2.6.3. ________ Voltage

2.6.4. ________ Phase

2.6.5. ________ Frequency

2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356º F (180º C). To include:

2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.

2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.

2.7.3. Stator lead material must meet or exceed Class H insulation system.

2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.

2.7.4.1. The thermal limiting devices shall be attached to each phase winding.

2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.8. Operation of the motor shall be designed for:

2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311º F (155º C).

2.8.2. Capable of 15 evenly spaced starts per hour.

2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.

2.8.3.1. Acceptable voltage variation is +/- 10%.

2.8.3.2. Acceptable frequency variation is +/- 5%.

2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
2.8.3.4. Current unbalance must not exceed 5%.
2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:
2.9.1. Secured with 304 stainless steel fasteners.
2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.
3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.
3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.
3.2.3. Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
3.3. All bolted connections in the cord entry construction shall be:
3.3.1. Secured with 304 stainless steel fasteners.
3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.
3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.
3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.
3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
4.3. Inboard and outboard seal construction shall be of the following material:
4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.
4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.
4.3.3. Elastomers shall be constructed of Viton®.
4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.
4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.
4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

4.8. Class 1, Division 1, explosion-proof models will be included with an additional labyrinth seal constructed of bronze, CDA836 material, and is mounted directly above the pump seal plate to take radial loads and act as a flame path for seal chamber.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a two-bearing system design.

5.2.1. The upper bearing shall be a Conrad type, double row, Angular Contact deep groove ball bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a Conrad type, single row, angular contact ball bearing designed to adequately compensate for the axial loads and radial forces.

5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.

7.2. The design shall be one-piece, semi open, three vane design.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.

7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.

8.2. Design shall be a single piece and a modified constant velocity.

8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.

8.4. The discharge is to be of a horizontal centerline configuration.

8.5. The discharge is to be 4" ANSI® standard Class 125, 8-bolt configuration.

8.6. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

KEEN PUMP®

SPECIFICATIONS

Solids-Handling Chopper Pumps K6CH

1.0 SCOPE

1.1. This specification details the mechanical and electrical requirements for squirrel-cage, induction motors, three-phase, designed for wet well and dry well submersible pump applications in water and sewage.

1.2. The intent of this specification is to define submersible premium quality pumps which will provide efficient operation with high mechanical integrity under adverse operating conditions for maximum life and minimum life cycle costs.

1.3. This specification covers sewage wet well and dry well applications defined by the National Electrical Code (NEC®) as class 1, Division 1, hazardous locations section 501-8(a) requiring explosion-proof construction.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

2.1. All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.

2.2. The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.

2.3. The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.

2.4. The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.

2.5. Stator housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Proprietary Keen oil ensures industry-low operating temperatures.

2.6. Submersible motor design:

2.6.1. ________ Horsepower

2.6.2. ________ RPM

2.6.3. ________ Voltage

2.6.4. ________ Phase

2.6.5. ________ Frequency

2.6.6. 1.20 Service Factor

2.7. Insulation system of the submersible motor design shall be of Class H as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 356º F (180º C). To include:

2.7.1. The stator windings shall be constructed of material to meet the Class H insulation system.

2.7.2. The insulation varnish in the system must be applied in a dip and bake manner.

2.7.3. Stator lead material must meet or exceed Class H insulation system.

2.7.4. Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.

2.7.4.1. The thermal limiting devices shall be attached to each phase winding.

2.7.4.2. The thermal limiting devices shall be used in conjunction with and supplemental to external motor overload protection and must be connected to the motor control center.

2.8. Operation of the motor shall be designed for:

2.8.1. Intermittent duty handling pumped media of 140º F (60º C) ambient and shall not exceed NEMA® Class F operating temperature rise of 311º F (155º C).

2.8.2. Capable of 15 evenly spaced starts per hour.

2.8.3. A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.

2.8.3.1. Acceptable voltage variation is +/- 10%.

2.8.3.2. Acceptable frequency variation is +/- 5%.

2.8.3.3. Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.

2.8.3.4. Current unbalance must not exceed 5%.

2.8.4. The horsepower of the motor shall be adequately designed to be non-overloading across the entire pump performance curve, to include pump shut-off and pump run-out.

2.9. All bolted connections in the submersible motor construction shall be:

2.9.1. Secured with 304 stainless steel fasteners.

2.9.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

2.10. The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

3.1. The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.

3.2. Power and control cables shall be secured and sealed to the submersible motor. Construction shall be of a method to provide anti-wicking barriers to the submersible motor.

3.2.1. The outer jacket of the power and control cables shall be sealed with an agency-approved, watertight strain relief cord grip fitted with a nitrile compression grommet.

3.2.2. The connections between the power cable and the stator leads and control cable and the internal motor control leads shall be potted and encapsulated in a two-part epoxy in the cord entry system.

3.2.3. Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.

3.3. All bolted connections in the cord entry construction shall be:

3.3.1. Secured with 304 stainless steel fasteners.

3.3.2. Secured joints in the construction shall be compression fitted with nitrile o-rings.

3.4. The power and control cables shall be recognized by Underwriters Laboratory® (UL) & Canadian Standard Association® (CSA) and will be delivered in a standard length of 40 foot.

3.5. The cord entry housing shall be fitted with a stainless steel lifting bale sized and of adequate design to securely lift the complete construction of the submersible pump.

3.6. The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.

3.7. Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

4.1. Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.

4.2. Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.

4.3. Inboard and outboard seal construction shall be of the following material:

4.3.1. Primary stationary ring shall be constructed of silicon carbide face material.

4.3.2. Primary rotating ring shall be constructed of silicon carbide face material.

4.3.3. Elastomers shall be constructed of Viton®.

4.3.4. Metal components shall be constructed of stainless steel for corrosion resistance.

4.4. The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.

4.5. The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid over-pressuring of the seal.

4.6. The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

4.7. The pump shall be capable of operating in a dry environment without damage to the seal faces.

4.8. Class 1, Division 1, explosion-proof models will be included with an additional labyrinth seal constructed of bronze, CDA836 material, and is mounted directly above the pump seal plate to take radial loads and act as a flame path for seal chamber.

5.0 PUMP BEARINGS

5.1. Bearings shall be designed to an ABEC® System 1 or better.

5.2. Each pump shall be constructed with a two-bearing system design.

5.2.1. The upper bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.

5.2.2. The lower bearing shall be a Conrad type, single row, angular contact ball bearing designed to adequately compensate for the axial loads and radial forces.

5.3. The bearings shall be designed to deliver a minimum B-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve.

5.4. Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

6.1. The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.

6.2. The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.

6.2.1. Pump shaft material crystal structure shall be body centered cubic (bcc).

6.2.2. Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

7.1. Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.

7.2. The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.

7.3. The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.

7.4. The impeller shall be keyed to the pump shaft and retained with a bolt and washer.

7.4.1. All wetted fasteners shall be of a corrosion restraint stainless steel material.

7.5. The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

7.6. Pump impeller shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process must be applied for best erosion and corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

8.1. Material shall be ASTM® A48 class 35, gray cast iron.

8.2. Design shall be a single piece and a modified constant velocity.

8.3. Constructed of smooth passage ways large enough any solid that can enter the impeller.

8.4. Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.

8.5. The discharge is to be of a horizontal centerline configuration.

8.6. The discharge is to be 6" ANSI® standard Class 125, 8-bolt configuration.

8.7. The inside of volute case shall be ceramic coated. Ceramic coating must be a two component, 100% solids liquid polymer composite for surface application and coating component parts. Two coat process be applied for best erosion and corrosion resistance including higher temperature application.

KEEN PUMP®

K4VCH

4" Submersible

Optional :
All Stainless
Steel Construction

HARDENED CUTTING PLATE

- Heat Treated 440 C Stainless Steel
- Handles The Toughest Materials
- Works Efficiently To Chop and Reduce Solid Size

HARDENED CUTTER IMPELLER

- Heat Treated 440 C, Stainless Steel
- Easily Adjustable To Maintain Optimal Choppping Performance

SUPERIOR MOTOR CONSTRUCTION

- Class N Windings (Standard)
- Class "N" (392°F) Highest Temperature
- Motor Will Not Overheat In Continuous Applications

MOTOR GROUND RING PROTECTION

- Allows Motor To Operate On VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

DOUBLE ROW LOWER BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates

CERAMIC COATED PUMP END

CAPABILITIES :

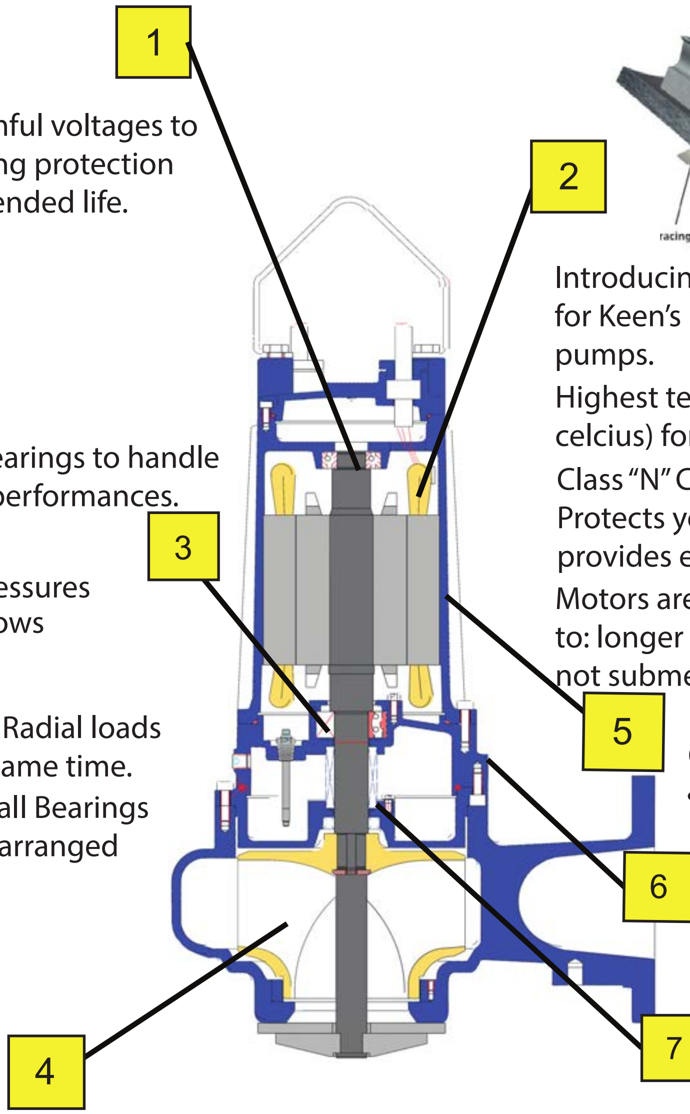
- Flows-------------------------------------- to 625 GPM
- Heads-------------------------------------- to 53 Feet
- HP Range-------------------------------- 7.5 HP
- Voltage / Phase Options------------- 200/230 V, 460 V, 3 Phase
- Discharge Connections-------------- 4" ANSI 150 lb Horizontal Flange
- Motor Speeds--------------------------- 1750 RPM
- Solids-Handling----------------------- Breaks Down To ____
- Impeller----------------------------------- 2-Vane, Enclosed, Dymamically Balanced
- Minimum-------------------------------- 1.15 Motor Service Factor

Features and Benefits

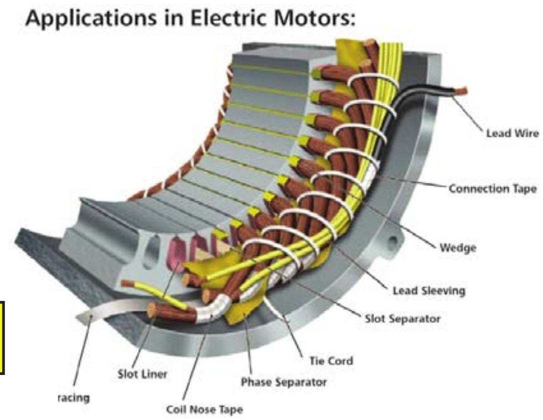
K4VCH

Keen Pump's Bearing Protection Program

- Keen's Motor Grounding Ring protects the motor from harmful shaft voltages produced by VFD drives.
- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.



Heavy Duty Motor



Introducing New Premium Class "N" Motors for Keen's Large Grinders and Solids Handling pumps.

Highest temperature construction (200 degrees celcius) for motors

Class "N" Construction is the best in the industry. Protects your motor from over heating and provides extended motor life.

Motors are running hotter than ever before due to: longer run times, rapid cycling, motor housing not submerged, and running on VFD drives.

Double Row Bearings

- Heavy Duty Bearings to handle the toughest performances.
- High Pressures
- High Flows
- Handles both Axal and Radial loads both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.

Castings

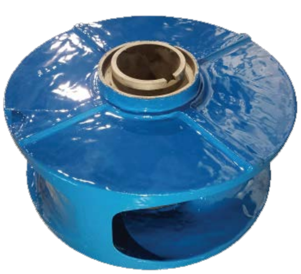
- ASTM - Class 35 high tensile strength castings.

Durable Powder Coat Finish

- Holds up to the toughest environmental conditions.

Dual Shaft Seals

- Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.



Ceramic Coating

The ultimate indestructable ceramic coated impellers and volutes for Keen's Solids Handling pumps. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

KEEN PUMP®

471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

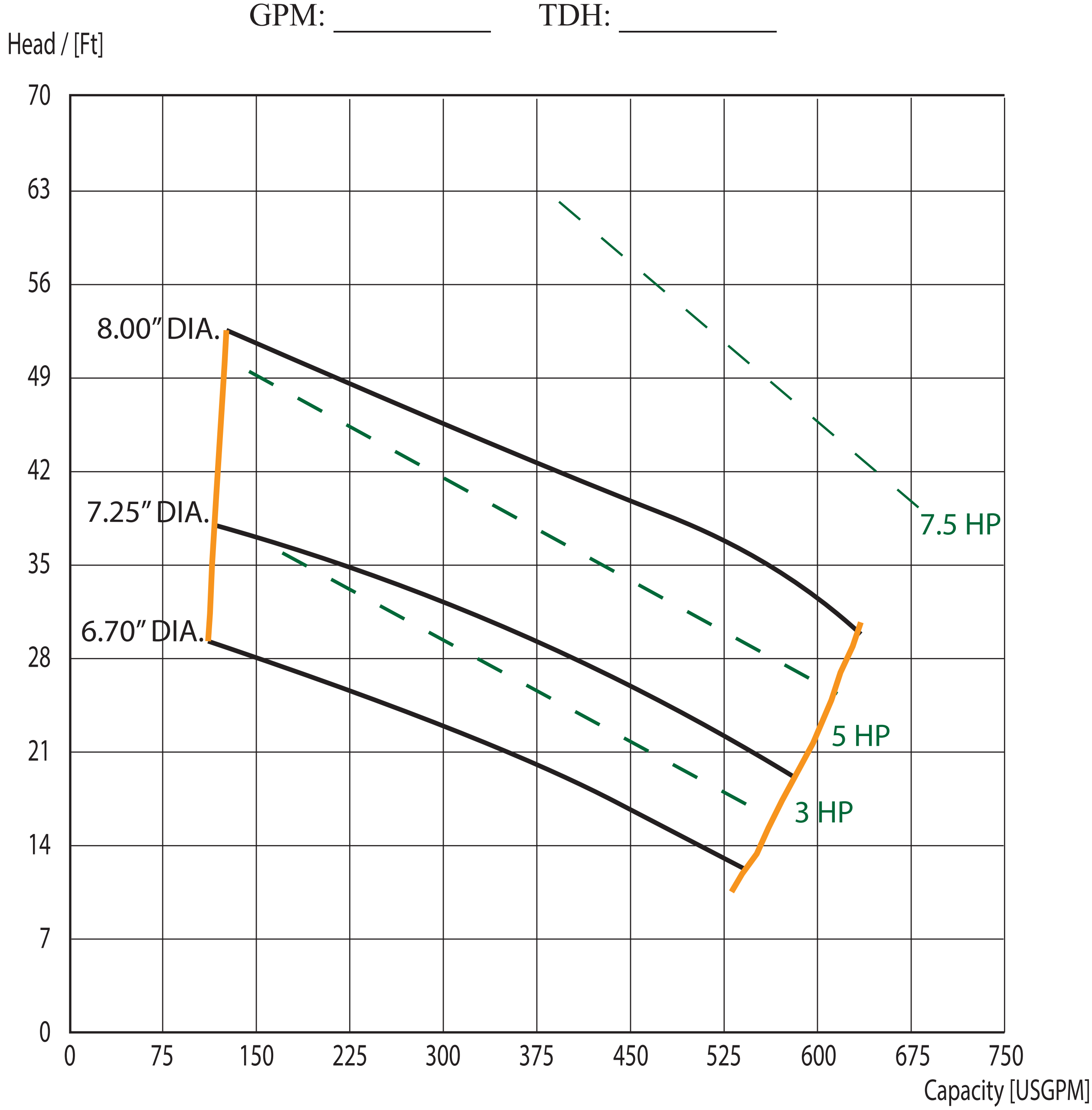
File : K4VCH CUTS
Rev. 12/2021

KEEN PUMP CO.™

Section **ENCLOSED**
Date **OCT 2021**

Pump Series	**K4VCH**	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1750 RPM**	Discharge	**4″**	Solids	**3″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

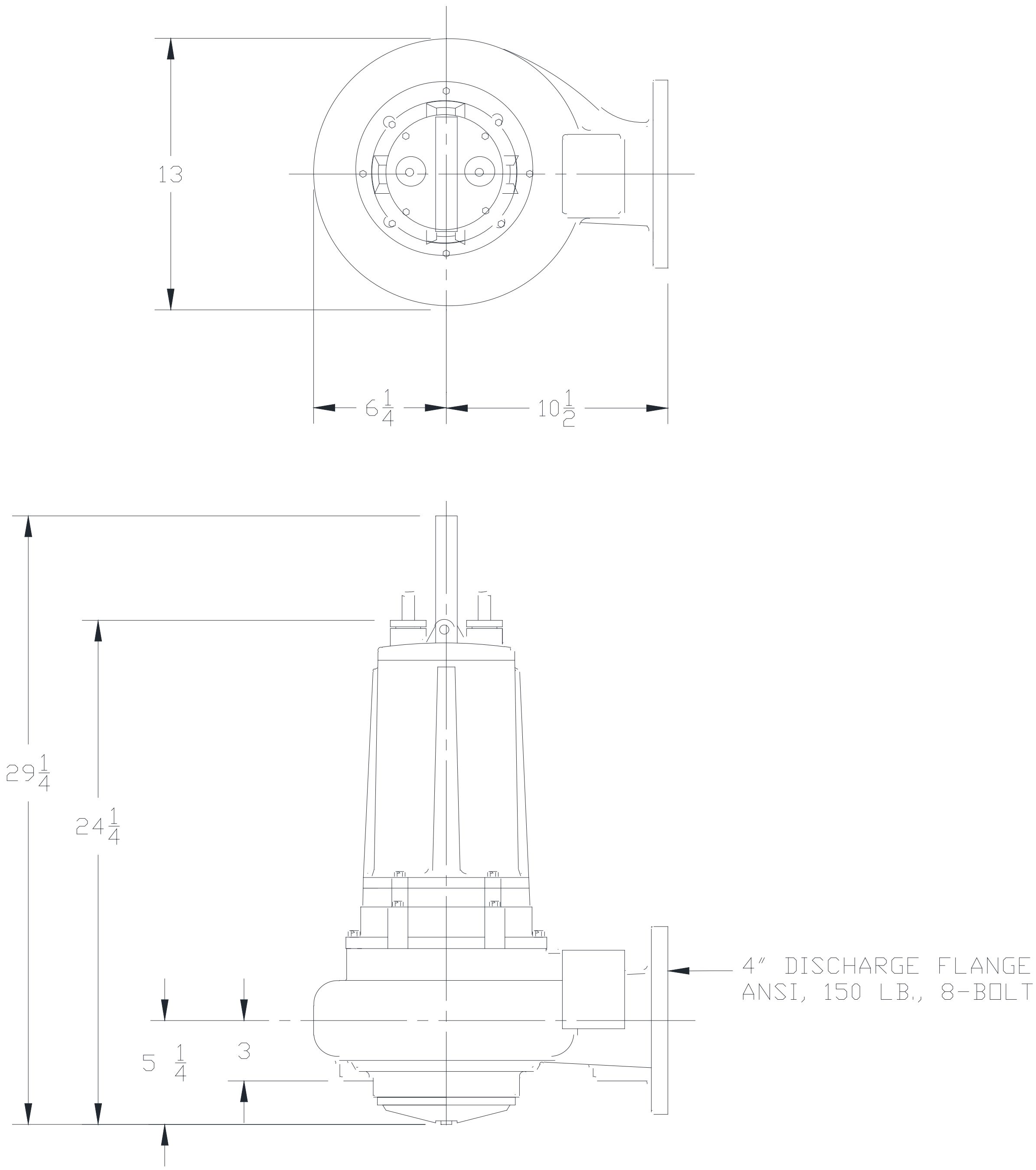
File: K4VCH_1750_CAT

KEEN PUMP CO.™

Section **ENCLOSED**
Date **JANUARY 2013**

Pump Series	**K4V**	4″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4V Dimensions

Pump Model: K4VCH

Thermal Data:

Maximum Liquid		140º F (60º C)
Maximum Stator		392º F (200º C)
Heat Sensor	**Open:**	338º F (170º C)
	Closed:	275º F (135º C)
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	1750			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
3	208	3	L	1.2	16.3	19.6	82.1	4.5	29.5	5.6
	230				14.1	16.9	73.9			
	460				7	8.4	37.1			
	230				34.3	41.2	133.4			
5	208	3	L	1.2	21.1	25.3	109.8	5.8	39.1	7.6
	230				19	22.8	97.4			
	460				9.6	11.5	49.2			
7.5	208	3	K	1.2	32.1	38.5	179.6	8.3	64.2	12.0
	230				30.2	36.2	163.8			
	460				15.1	18.1	78.3			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
3	1	66	66	64	56	87	83	79	70
3	3	71	70	69	63	81	80	79	71
5	1	65	65	64	59	86	83	76	62
5	3	78	78	75	70	79	76	71	60
7.5	3	77	76	74	69	75	70	64	54

SUBMERSIBLE SOLIDS HANDLING PUMP

Series: K3PL-S
1 HP / 1750 RPM
Discharge: 3" (2" optional)
Spherical solids handling: 2"

SPECIFICATIONS

DISCHARGE
3" NPT female, vertical, bolt on flange. 2" discharge flange also available.

LIQUID TEMPERATURE
104°F (40°C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 2 vane, open, with vanes on back side.

Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

HARDWARE
300 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: inboard, single mechanical, oil filled chamber.
Material: silicon carbide, Buna-N elastomer and stainless steel hardware.

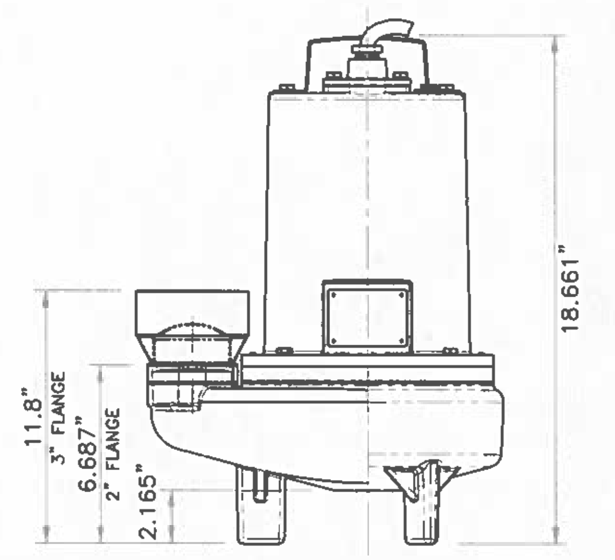
CORD ENTRY
30 ft of neoprene cord SJO 14/3, sealed against moisture.

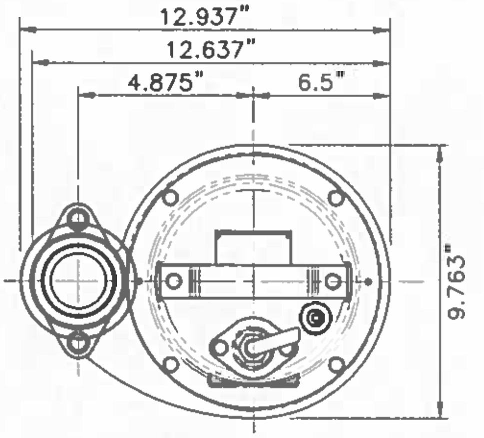
BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

MOTOR
Single phase: NEMA L, permanent split capacitor, 230 volts, 60 Hz, 1750 RPM, oil filled, overload protection in motor.
Three phase: NEMA B, 200/230 & 460 volts, 60 Hz, 1750 RPM, oil filled. Requires overload protection to be included in control panel.

OPTIONAL EQUIPMENT
Additional cord, tungsten carbide seal.

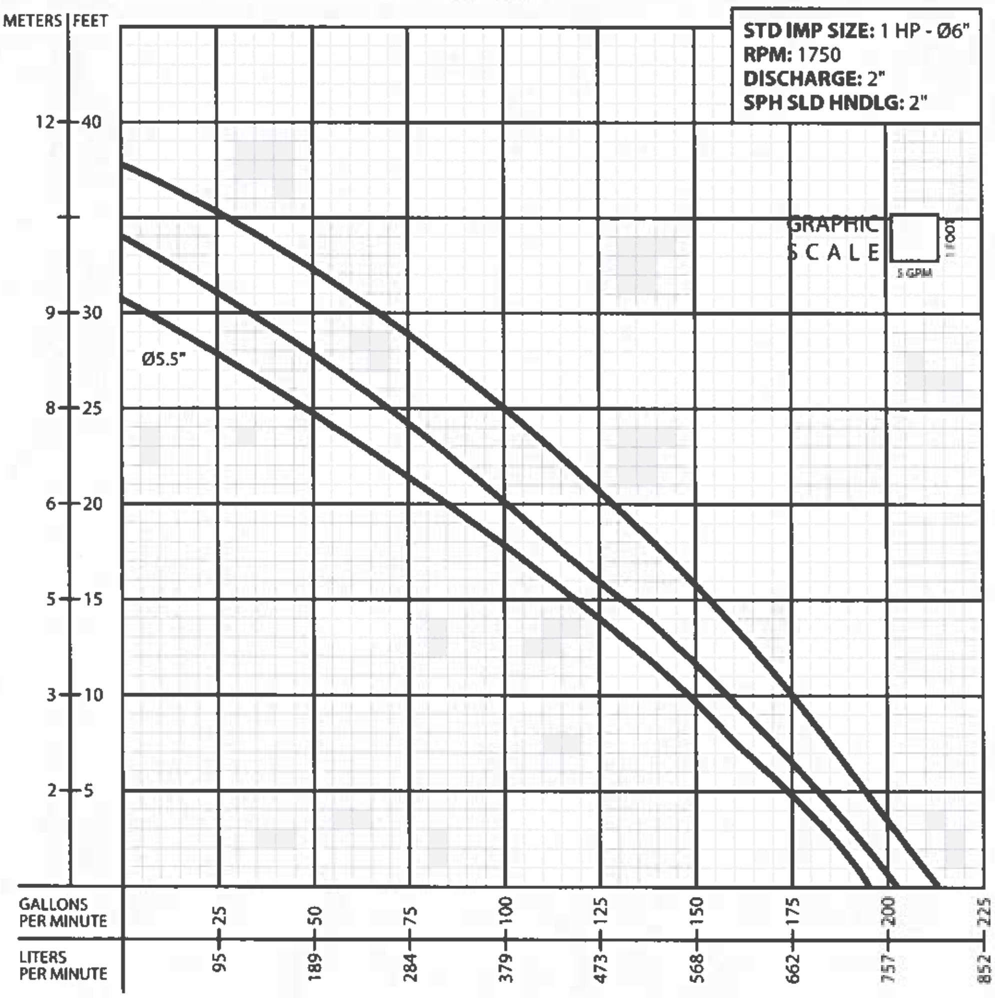
SPECIFICATIONS





MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K3PL10M4-21S	62180508	1	230	1	1750	8.3	17.5	A	14/3	SJO	0.69"	84
K3PL10M4-03S K3PL10M4-23S	62180509	1	200/230	3	1750	6	16	B	14/4	SO	0.75"	82
K3PL10M4-43S	62180510	1	460	3	1750	3	8	B	14/4	SO	0.75"	82

- 2" discharge flange is available for these models, (this change the model to 2BSE-SS).



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

Installation, Operation & Maintenance Manual

Submersible Solids Handling Pumps

K2SE-S & K3PL-S

0.5, 0.75 & 1 HP @ 1750 RPM

0.5 HP

K2SE72S
K2SE73S
K2SE74S
0.75 HP

K3PL10M4-21S
K3PL10M4-03S
K3PL10M4-23S
K3PL10M4-43S
1 HP

IMPORTANT! - Read all instructions in this manual before operating or servicing a pump.

Before installation, read the following instructions carefully. Failure to follow instruction and safety information could cause serious bodily injury, death and/or property damage. Each Keen product is carefully inspected to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

⚠ DANGER **"Danger" indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠ WARNING **"Warning" indicates an imminenty hazardous situation which, if not avoided, MAY result in death or serious injury.**

⚠ CAUTION **"Caution" indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.**

IMPORTANT! - Keen Pumps is not responsible for losses, injury or death resulting from failure to observe these safety precautions, misuse, abuse or misapplication of pumps or equipment.

ALL RETURNED PRODUCTS MUST BE CLEANED, SANITIZED, OR DECONTAMINATED PRIOR TO SHIPMENT, TO INSURE EMPLOYEES WILL NOT BE EXPOSED TO HEALTH HAZARDS IN HANDLING SAID MATERIAL. ALL APPLICABLE LAWS AND REGULATIONS SHALL APPLY.

⚠ WARNING Installation, wiring, and junction connections must be in accordance with the National Electric Code and all applicable state and local codes. Requirements may vary depending on usage and location.

⚠ WARNING Installation and servicing is to be conducted by qualified personnel only.

Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected; the rotating cutter and/or impeller can cause serious injury.

Always wear eye protection when working on pumps. Do not wear loose clothing that may become entangled in moving parts.

⚠ DANGER Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing the pump or any accessory items associated with or near the pump.

⚠ DANGER This pump is not intended for use in swimming pools or water installations where there is human contact with pumped fluid.

⚠ DANGER Risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling any aspect of the pumping system. ***Lock out power and tag.***

⚠ WARNING **Do not** use these pumps in water over 104° F. **Do not** exceed manufacturers recommended maximum performance, as this could cause the motor to overheat.

⚠ DANGER **Do not** lift, carry or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death. **Never** handle connected power cords with wet hands. Use appropriate lifting device.

⚠ WARNING Ground Fault Circuit Interrupter (GFCI) to be used with plug-in type power cord.

⚠ WARNING Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping. Never enter a basin after it has been used.

⚠ DANGER Failure to permanently ground the pump, motor and controls before connecting to power can cause shock, burns or death.

⚠ DANGER These pumps are not to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.

⚠ WARNING The Uniform Plumbing Code (UPC) states that sewage systems shall have an audio and visual alarm that signals a malfunction of the systems, that are required to reduce the potencial for property damage.

IMPORTANT! - Prior to installation, record Model Number, Serial, Amps, Voltage, Phase and HP from pump name plate for the future reference. Also record the Voltage and Current Readings at Startup:

1 Phase Models	
Amps:	Volts:
3 Phase Models	
Amps L1-2:	Volts L1-2:
Amps L2-3:	Volts L2-3:
Amps L3-1:	Volts L3-1:

Model Number: ____________________

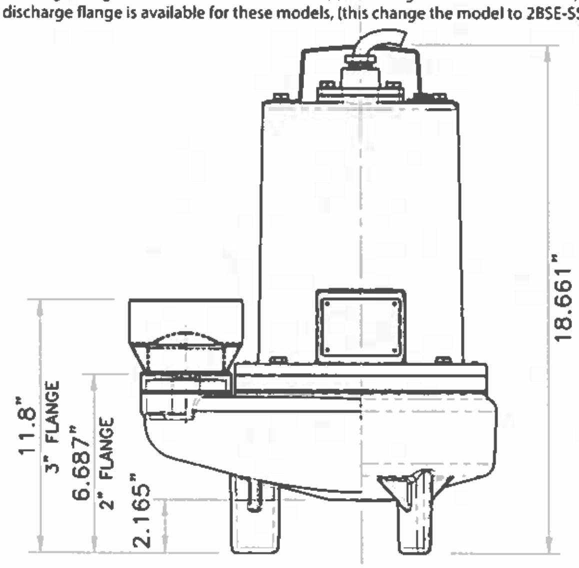
Serial: ____________________

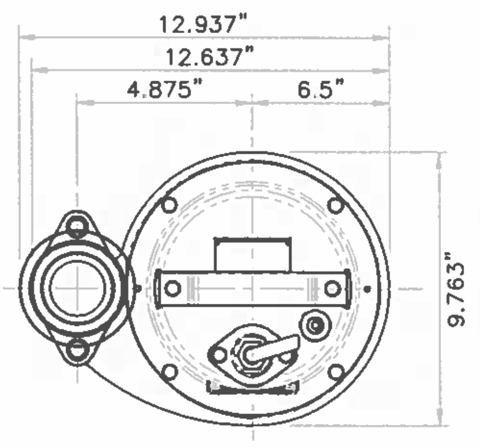
PHASE: __________ HP: __________

DISCHARGE:	2" or 3" NPT female, vertical, bolt on flange.
SPHERICAL SLD HNDLG:	2"
LIQUID TEMPERATURE:	104° F (40° C) max.
VOLUTE:	Cast iron ASTM A-48 class 30.
MOTOR HOUSING:	Cast iron ASTM A-48 class 30.
SEAL PLATE:	Cast iron ASTM A-48 class 30.
IMPELLER:	2 vane, open, with vanes on back side. Cast iron ASTM A-48 class 30.
SHAFT:	416 series stainless steel.
HARDWARE:	300 series stainless steel.
SQUARE RINGS:	Buna-N.
PAINT:	Air dry enamel, water based.
SEAL:	Inboard, single mechanical, oil filled chamber. Silicon carbide, Buna-N elastomer and stainless steel hardware.
CORD ENTRY:	30 ft of neoprene cord SJO 14/3, sealed against moisture.
UPPER BEARING:	Ball, single row, oil lubricated, for radial load.
LOWER BEARING:	Ball, single row, oil lubricated, for radial and thrust load.
MOTOR:	***Single phase:*** NEMA L, permanent split capacitor, oil filled, with overload protection in motor. ***Three phase:*** NEMA B, oil filled. Requires overload protection to be included in control panel.

MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K2SE51S	62180501	0.5	115	1	1750	11.6	18.4	D	14/3	SJO	0.5"	91
K2SE51A	62180501A	0.5	115	1	1750	11.6	18.4	D	14/4	SJO	0.5"	93
K2SE52S	62180502	0.5	200/230	1	1750	5.9	14.9	B	14/3	SJO	0.5"	93
K2SE53S	62180503	0.5	200/230	3	1750	4.6/4.2	9.7/11.1	K	14/3	SJO	0.5"	95
K2SE54S	62180504	0.5	460	3	1750	2.2	5.3	K	14/3	SJO	0.5"	95
K2SE72S	62180505	0.75	230	1	1750	10.5	17.5	D	14/3	SJO	0.5"	95
K2SE73S	62180506	0.75	200/230	3	1750	5.5	16	D	12/4	SJO	0.625"	96
K2SE74S	62180507	0.75	460	3	1750	2.2	8	D	12/4	SJO	0.625"	96
K3PL10M4-21S*	62180508	1	230	1	1750	8.3	17.5	A	14/3	SJO	0.69"	84
K3PL10M4-03S K3PL10M4-23S*	62180509	1	200/230	3	1750	6	16	B	14/4	SO	0.75"	82
K3PL10M4-43S*	62180510	1	460	3	1750	3	8	B	14/4	SO	0.75"	82

- 3" discharge flange is available for these models, (this change the model to K3PL-S).
* 2" discharge flange is available for these models, (this change the model to 2BSE-SS).





▸ Receiving inspection

Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. If the manual is removed from the packaging, do not lose or misplace.

▸ Storage

Any product that is stored for a period longer than six (6) months from the date of purchase should be bench tested prior to installation. A bench test consists of, checking the impeller to assure it is free turning and a run test to assure the motor (and switch if provided) operate properly.

▸ Controls

Manual models require a separate approved pump control device or panel for automatic operation. Be sure the electrical specification of the control selected properly match the electrical specifications of the pump.

▸ Submergence

The pump should always be operated in the submerged condition. The minimum sump liquid level should never be less than above the pump's volute (See Figure 1).

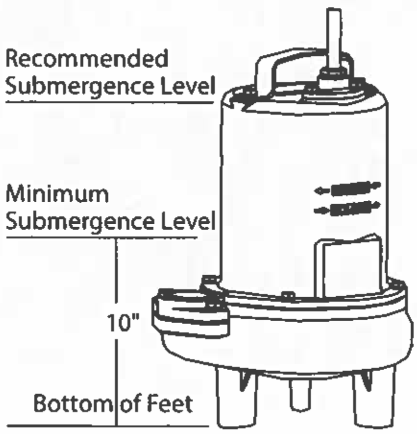


Figure 1

▸ Installation

These pumps are recommended for use in a sump, basin or lift station. The sump, basin or lift station shall be sealed and vented in accordance with local plumbing codes. **This pump is designed to pump sewage, effluent or wastewater, non-explosive and non-corrosive liquids and shall NOT be installed in locations classified as hazardous in accordance with the National Electrical Code (NEC) ANSI/NFPA 70 or Canadian Electric Code (CEC).** The pump should never be installed in a trench, ditch, or hole with a dirt bottom. The legs will sink into the dirt and the suction will become plugged.

The installation should be at a sufficient depth to ensure that all plumbing is below the frost line. If this is not feasible, remove the check valve and size the basin to accommodate
backflow volume.

Pumps are most commonly installed in simplex or duplex stations or basins with a slide rail system (Keen SRC), which allows the pump(s) to be installed or removed without requiring personnel to enter the station, or resting on the basin floor.

▸ Discharge Piping

Discharge piping should be as short as possible and sized no smaller than the pump discharge. **Do not reduce the discharge pipe size below that which is provided on the pump.** Both a check valve and a shut-off valve are recommended for each pump. The check valve is used to prevent backflow into the sump. The shut-off valve is used to manually stop system low during pump servicing.

▸ Liquid Level Controls

The level control(s) should be mounted on the discharge piping, a cable rack or float pole. The level control should have adequate clearance so it cannot hang up in it's swing and that the pump is completely submerged when the level control is in the "Off" mode. The minimum tether is 3.50". By adjusting the cord tether the control level can be changed. One cycle of operation should be observed, so that any potential problems can be corrected.

It is recommended that the level control float should be set to insure that the liquid in the sump never drops below the top of the motor housing or a minimum level of 10 inches above the basin floor.

▸ Electrical Connections

Power cable:

The power cable mounted to the pump must not be modified in any way except for shortening to a specific application. Any splice between the pump and the control panel must be made in accordance with the electric codes. It is recommended that a junction box, if used, be mounted outside the sump or be of at a minimum Nema 4 construction if located within the wet well. **DO NOT USE THE POWER CABLE TO LIFT PUMP.**

Always rely upon a Certified Electrician for installation.

Overload Protection:

Single Phase - The stator in-winding overload protector used is referred to as an inherent overheating protector and operates on the combined effect of temperature and current. This means that the overload protector will trip out and shut the pump off if the windings become too hot, or the load current passing through them becomes too high.

IMPORTANT! - The overload will then automatically reset and start the pump up after the motor cools to a safe temperature. In the event of an overload, the source of this condition should be determined and corrected immediately.

⚠ WARNING DO NOT ALLOW THE PUMP TO CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS.

If current through the temperature sensor exceeds the values listed, an intermediate control circuit relay must be used to reduce the current or the sensor will not work properly.

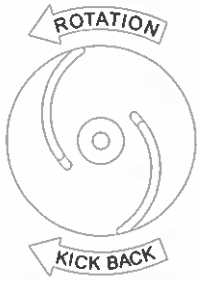
Temperature sensor electrical ratings		
Volts	Continuous amps	Starting amps
110-120	3	30
220 - 240	1.5	15
440 - 480	0.75	7.5
600	0.6	6

Wire Size:
If longer power cable is required consult a qualified electrician for proper wire size.

▸ Pre-Operation

1. **Check Voltage and Phase** - Compare the voltage and phase information stamped on the pump name plate.

2. **Check Pump Rotation** - Improper motor rotation can result in poor pump performance and can damage the motor and/or pump. Check rotation on three phase units by momentarily applying power and observe the "kickback".



Bottom of Pump

Kickback should always be in a counter-clockwise direction as viewed from motor end or opposite to impeller rotation. Impeller rotation is counter-clockwise as viewed from bottom of pump.

3. **Name Plate** - Record the information from the pump name plate to drawing in front of manual for future reference.

Insulation Test - An insulation (megger) test should be performed on the motor. Before the pump is put into service. The resistance values (ohms) as well as the voltage (volts) and current (amps) should be recorded.

5. **Pump-Down Test** - Be sure pump has been properly wired, lowered into the basin, sump or lift station, check the system by filling with liquid and allowing the pump to operate through its pumping cycle. The time needed to empty the system, or pump-down time along with the volume of water, should be recorded.

▸ Maintenance

No lubrication or maintenance is required. Perform the following checks when pump is removed from operation or when pump performance deteriorates:

a) Inspect motor chamber for oil level and contamination.
b) Inspect impeller and body for excessive build-up or clogging.
c) Inspect motor, bearings and shaft seal for wear or leakage.

▸ Servicing

NOTE: Item numbers in ( ) refer to Figure 5.

Cooling Oil - Anytime the pump is removed from operation, the cooling oil in the motor housing should be checked visually for oil level and contamination. To check oil, set unit upright. Remove pipe plug (34) from housing (3). With a flashlight, visually inspect the oil in the housing (3) to make sure it is clean and clear, light amber in color and free from suspended particles. Milky white oil indicates the presence of water. Oil level should be just above the motor when pump is in vertical position.

Oil Testing

- Drain oil into a clean, dry container by placing pump on it's side, remove pipe plug (34), from housing (3).
- Check oil for contamination using an oil tester with a range to 30 kilovolts breakdown.
- If oil is found to be clean and uncontaminated (measuring above 15 kV breakdown), refill the housing.
- If oil is found to be dirty or contaminated (or measures below 15 kV breakdown), the pump must be carefully inspected for leaks at the shaft seal, cable assembly, square ring and pipe plug, before refilling with oil. To locate the leak, perform a pressure test.

After leak is repaired, dispose of old oil properly, and refill with new oil.

Pressure Test (If oil has been drained) - Remove pipe plug (34) from housing (3). Apply pipe sealant to pressure gauge assembly and tighten into hole. Pressurize motor housing to 10 PSI. Use soap solution around the sealed areas and inspect joints for "air bubbles".

If, after five minutes, the pressure is still holding constant, and no "bubbles" are observed, slowly bleed the pressure and remove the gauge assembly. Replace oil. Leek must be located and repaired if pressure does not hold.

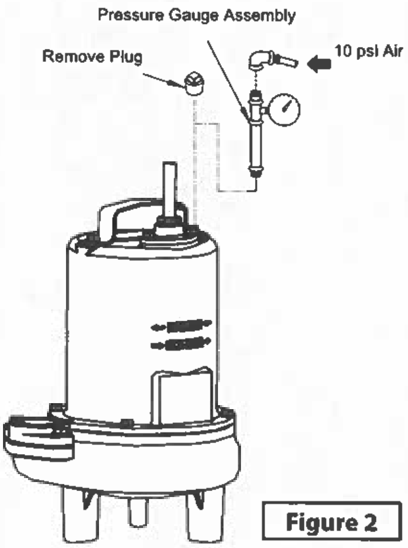


Figure 2

Pressure Test (If oil has NOT been drained) - Oil should be at normal level. Remove pipe plug (34) from housing (3). Apply pipe sealant to pressure gauge assembly and tighten into hole. Pressurize motor housing to 10 PSI. Use soap solution around the sealed areas above the oil level and inspect joints for "air bubbles". For sealed areas below oil level, leeks will seep oil. If, after five minutes, the pressure is still holding constant, and no "bubbles", oil seepage is observed, slowly bleed the pressure and remove the gauge assembly. Replace oil. Leek must be located and repaired if pressure does not hold.

*Pressure builds up extremely fast, increase pressure by "TAPPING" air nozzle. Too much pressure will damage seal. **DO NOT exceed 10 PSI.***

Oil Replacement - Set unit upright and refill with new cooling oil as per table below. Fill to just above motor, but below capacitor as an air space must remain in the top of the housing to compensate for oil expansion. Apply pipe thread compound to threads of pipe plug (34) then assemble to housing (3).

***DO NOT** overfill oil. Overfilling of housing with oil can create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard. Overfilling oil voids warranty.*

Cooling Oil Recommended supplier/Grade	
BP	Enerpar SE100
Conoco	Pale Parafin 22
Mobile	D.T.E. Oil Light
Shell Canadá	Transformer-10
Texaco	Diala-Oil-AX

Disassembly

Impeller and Volute:

1. Disconnect power.

2. Remove capscrews and washers (13), vertically lift motor housing and seal plate assembly from volute (18). Clean out volute if necessary.

3. Inspect gasket (14) and replace if cut or damaged.

4. Clean and examine impeller (16), for cracks or breakage and replace if required. To remove impeller (16), remove impeller nut (17) with a wheel puller, pull impeller straight of shaft and remove key.

5. Remove v-gasket (23) and replace if damaged.

Motor and Capacitor:

6. Position unit upright using blocks or 4" piece of pvc pipe, to avoid resting unit on shaft.

7. Remove wire nut, friction rings and grommet from motor housing (3). Pull cord through and disconnect the wires from the terminals.

8. Disconnect all wires noting where each is connected. There is a number next to each pin for reference on the bottom of the block.

9. Remove screws (12) and lift motor housing (3) from seal plate (15).

10. Remove o-ring (2), replace if damaged

11. Remove motor bolts, lift motor stator assembly from seal plate (15).

12. On Single Phase units only. Check motor capacitor (4) with an Ohm meter by first grounding the capacitor by placing a screwdriver across both terminals and then removing screwdriver. Connect Ohm meter (set on high scale) to terminals. If needle moves to infinity (∞) then drifts back, the capacitor is good. If needle does not move or moves to infinity (∞) and does not drift back, replace capacitor (4).

13. Inspect motor winding for shorts and check resistance values. Check rotor for wear. If rotor or the stator windings are defective, the complete motor must be replaced.

Shaft Seal:
14. Lift motor rotor, shaft, bearing (6), rotating member of seal, washer (7) from seal plate (15). See Figure 3.

15. Remove seal parts from shaft. Examine all seal parts, if seal faces show signs of wear, uneven wear pattern, chips or scratches replace entire seal. **DO NOT interchange seal components, replace the entire shaft seal (24).** If replacing seal, remove stationary from seal plate (15) by prying out with flat screwdriver.

Reassembly

IMPORTANT! - All parts must be clean before reassembly. Handle seal parts with extreme care. DO NOT damage lapped surfaces.

Shaft Seal:
1. To reassemble, clean seal cavity in seal plate (15) and oil.

2. Press seal's stationary member firmly into seal plate (15), use a seal tool or pipe. Nothing should come in contact with the seal face except the seal tool. Be sure the stationary is in straight.

3. Press lower bearing (6) onto shaft.

4. Place seal's (24) retaining ring and spring onto shaft. Lightly oil **(Do not use grease)** shaft and inner surface of bellows.

5. With lapped surface of rotating member facing outward, slide over shaft using a seal tool, being carefull not to damage seal face. Make sure spring is seated in retaining ring and spring is lined up on rotating member and not cocked or resting on bellows tail.

Bearing and Motor:
6. Slide rotor/shaft with bearing (6) and seal parts (24) into seal plate (15) until bearing seats into seal plate. Place stator over rotor, lining up motor bolts with holes in seal plate (15). Insert motor bolts and torque to 17 inch pounds.

7. Lubricate and place square ring (14) into bore on seal plate (15).

8. On Single phase units, connect capacitor (4) to motor wires. See Figure 5. Install ground wire on end bell if removed. Place fiberglass sleeve over motor and ground leads if removed. Pull wires through opening in top of motor housing while lowering motor housing onto seal plate (15).

9. Place socket head screws (31) through seal plate into motor housing and torque to 60 inch pounds.

Impeller and Volute:
10. Install v-gasket (23) and impeller washer (17) over shaft, and into seal plate (15).

11. Install impeller (16) by cleaning the threads with thread locking compound cleaner. Apply removable Loctite® 609 or equivalent to shaft threads. Screw impeller onto shaft hand tight while using a screwdriver in the slot at the end of the shaft to hold it stationary. Rotate impeller to check for binding.

12. Place gasket (19) onto volute (18).

13. Lower motor housing and seal plate assembly onto volute (18). Apply thread locking compound to capscrews and with washers place through motor housing, into volute and torque to 11 ft. lbs.

Cable Assembly:
14. Check power cord (1) for cracks or damage and replace if required. Insert one friction ring, grommet, one friction ring, and gland nut into motor housing (3) or conduit box and cable assembly (1) and torque wire nut to 15 ft. lbs.

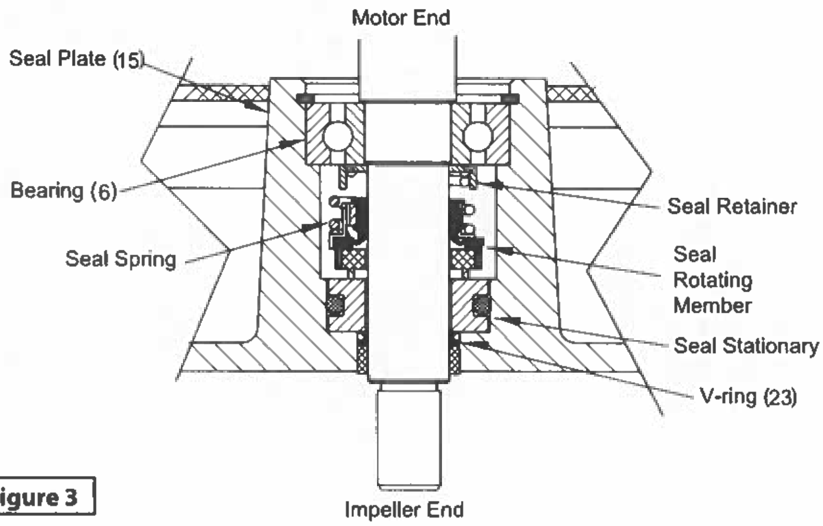
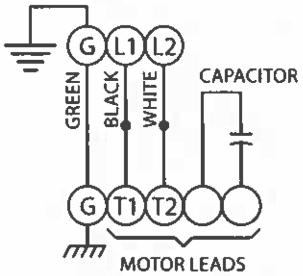
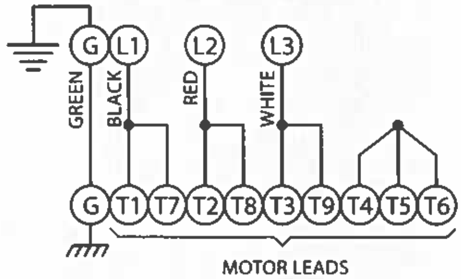


Figure 3

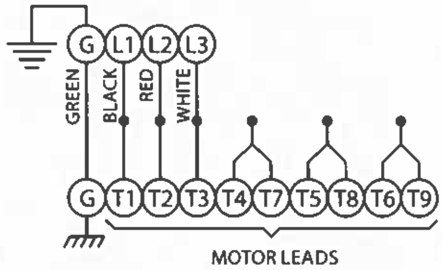
SINGLE-PHASE 115/230V AC
POWER CORD 3x14



THREE-PHASE 208/230V AC
POWER CORD 4x12



THREE-PHASE 460V AC
POWER CORD 4x12

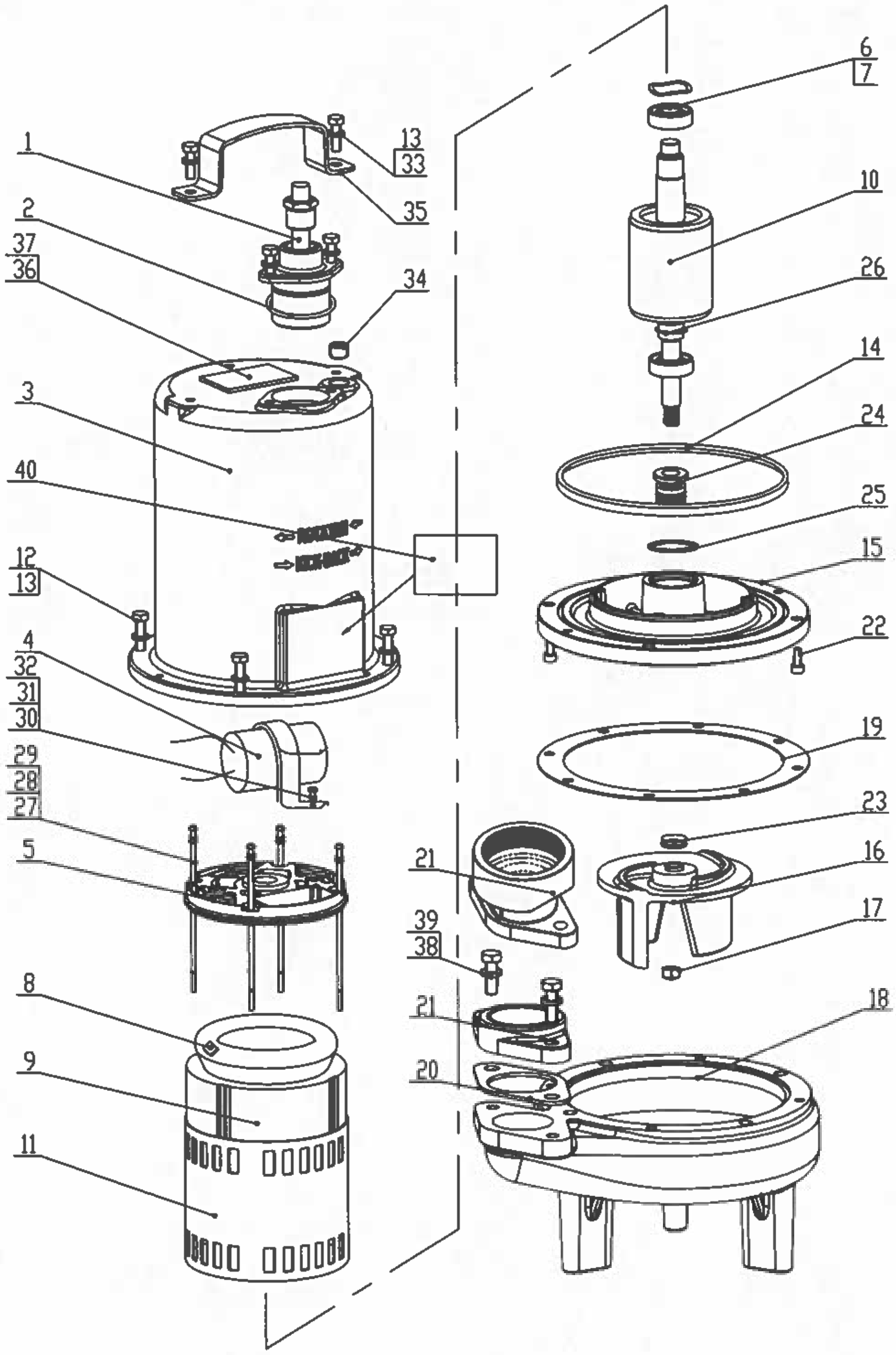


Single phase 115 - 230 VAC	
Cable	# motor line
Green	Green
Black	1
White	2
Female terminal	Capacitor
Male terminal	Capacitor

Three phase, 230 VAC	
Cable	# motor line
Green	Green
Black	1 & 7
Red	2 & 8
White	3 & 9
	4, 5 & 6 together

Three phase, 460 VAC	
Cable	# motor line
Green	Green
Black	1
Red	2
White	3
	4 & 7 together
	5 & 8 together
	6 & 9 together

Figure 5



For Repair Part Please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

ITEM	DESCRIPTION	QTY.	MATERIAL
1	CABLE ASSEMBLY (14AWG-3)	1	SOW
2	O-RING Ø45 x 3.1	1	NBR 40
3	PUMP BODY	1	HT200
4	CAPACITOR 30μ F/300V 90°C	1	ALUMINIUM
5	UPPER BEARING PLATE	1	ZL102
6	BEARING 6203	2	-
7	WAVE WASHER	39	65Mn
8	TEMPERATURE PROTECTOR	1	-
9	STATOR	1	-
10	ROTOR COMPONENT	1	-
11	STATOR COMPONENT	1	-
12	HEX. HEAD BOLT 5/16"-18UNC x 4"	4	SS 304
13	SPRING WASHER	8	SS 304
14	LOWER BEARING PLATE O-RING Ø192 x Ø199 x 35	1	NBR 40
15	LOWER BEARING PLATE	1	HT200
16	IMPELLER Ø131.5	1	HT200
17	THIN NUT 1/2"-20 UNF	1	2Cr13
18	CASING	1	HT200
19	CASING SEALING WASHER	1	RUBBER
20	DISCHARGE SEALING WASHER	1	NBR 40
22	HEX. SOCKET CAP SCREWS 1/4"-20UNC x 28	2	SS 304
23	"V" SHAPE RING	1	NBR 40
24	MECHANICAL SEAL Ø31.8 x Ø15.9 x 32.5	1	SiC/SiC
25	ELLASTIC COLLAR 40	1	65Mn
26	ELLASTIC COLLAR 17	1	65Mn
27	LENGTHEN BOLT #8-32 x 140	4	Q235A
28	FLAT WASHER 4	4	Q235A
29	SPRING WASHER 4	4	65Mn
30	CAPACITOR CLAMP	1	08F
31	CROSS RECESSED PAN HEAD SCREW M4 x 8	2	Q235A
32	GROUND LEAD	1	-
33	HEX. BOLT 5/16"-18UNC x 25	4	SS 304
34	HEX. SOCKET PIPE PLUG 3/8"-18 NPT	1	SS 304
35	HANDLE	1	SS 304
36	NAME PLATE	1	SS 304
37	NAIL FOR NAME PLATE Ø2 x 4	4	Cu
38	HEX. HEAD BOLT 3/8"-16UNC x 22	2	SS 304
39	SPRING WASHER 10	2	SS 304
40	TRADEMARK SIGN	1	SS 304

For Repair Part Please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Risk of electric shock. Always disconnect the pump from the power source before handling inspections or repairs.

SYMPTOM	POSSIBLE CAUSE	
A) Pump will not run.	Poor electrical connection, blown fuse, tripped breaker or other interruption of power; improper power supply.	(1)
	Motor or switch inoperative.	(2)
	Float movement restricted.	(3)
	Switch will not activate pump of is defective.	(4)
	Defective motor.	(5)
	Insufficient liquid level.	(6)
B) Pump will not turn off.	Float movement restricted.	(2)
	Switch will not activate pump or is defective.	(3)
	Ecessive inflow or pump not properly seized for application.	(6)
	Pump may be air locked causing pump not to flow.	(11)
	The switch is in manual position.	(16)
C) Pump hums but dosen´t run.	Incorrect low voltage.	(1)
	The impeller is jammed or the shaft is loose, worn or damaged, or inlet plugged.	(10)

CORRECTIVE ACTION
(1) Check all electrical connections for security. Have electrician measure current in motor leads, if current is within ± 20% of locked rotor Amps, impeller is probably locked. If current is 0, overload may be tripped. Remove power, allow pump to cool, then re-check current.
(2) Reposition pump or clean basin as required to provide adaquate clearance for float.
(3) Disconnect level control. Set ohmmeter for a low rang, such as 100 ohms full scale and connect to level control leads. Actuate level control manually and check to see that ohmmeter shows zero ohms for closed switch and full scale for open switch. (Float Switch)
(4) Replace according to the manual.
(5) Make sure liquid level is above the pump.
(6) Re-check all sizing calculations to determine proper pump size.
(7) Check discharge line for restrictions, verifying proper operation of valves, including ice if line passes through or into cold areas.
(8) Remove and examine check valve and verify that operates well.

NOTE: Keen Pumps assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Keen Pumps or its authorized service centers, automatically voids warranty.

SYMPTOM	POSSIBLE CAUSE	
D) Pump delivers insufficient capacity.	Incorrect low voltage.	(1)
	Discharge restricted.	(7)
	Check valve is partially closed or installed backward.	(8)
	Shut-off valve closed.	(9)
	The impeller is jammed or the shaft is loose, worn or damaged, or inlet plugged.	(10)
	Pump may be air locked casuing pump not to flow.	(11)
	Pumprunning backwards.	(12)
E) The pump turns on and off very frequently (more than usual).	Check valve is partially closed or installed backward.	(8)
	fixtures are leaking.	(13)
	Groundwater is entering basin.	
F) The pump goes off and on regardless of the switch and activates the thermal overload protector . **CAUTION!**, the pump may start unexpectedly. Disconnect power supply.	Wiring or electrical current is inappropriate.	(1)
	The total dynamic charge is below the recommended minimum.	(6)
	Impeller is jammed or bounds near the pump body.	(10)
	Excessive water temperature (internal protection only).	(14)
G) Pump operates noisily or vibrates excessively.	Worn bearings, the motor shaft bent.	(4)
	Obstruction in the cavity of the impeller or is impaired.	(10)
	Impeller rotation is incorrect.	(12)
	Piping attachments to build dtructure too loose or rigid.	(15)

CORRECTIVE ACTION
(9) Open the valve.
(10) Check the impeller so that it rotates freely. Clean the cavity of the impeller and the suction of the pump body by removing any obstructions.
(11) Loosen union slightly to allow trapped air to escape. Verify that turn-off level of switch is set so that the suction is always flooded. Clean vent hole.
(12) Check rotation. If power supply is three phase, reverse any two of three power supply leads to ensure proper impeller rotation.
(13) Repair fixtures as required to eliminate leakage.
(14) Check the temperature of the liquid to be pumped, which must not exceed 160 ° F (71 ° C).
(15) Replace portion of discharge pipe with flexible connector or tighten existing piping..
(17) Check for leaks around basin inlet and outlets.

NOTE: Keen Pumps assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Keen Pumps or its authorized service centers, automatically voids warranty.

KEEN PUMPS
FACTORY WARRANTY

Keen Pumps warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for 18 months from date of manufacture or 12 months from installation date whichever occurs first. This warranty gives you specific legal rights, which vary from state to state.

This warranty is a limited warranty, and no warranty related claims of any nature whatsoever shall be made against Keen Pumps, until the ultimate consumer or his/her successor notifies us in writing of the defect and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station as instructed by Keen Pumps. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE. PRODUCT SHALL BE EITHER REPLACED OR REPAIRED AT THE ELECTION OF KEEN PUMPS. Guarantees relating to performance specifications provided in addition to the foregoing material and workmanship warranties on a product manufactured by Keen Pumps, if any, are subject to possible factory testing. Any additional guarantees, in the nature of certified performance specifications or time frame must be in writing and such writing must be signed by our authorized factory manager at time of order placement and/or at time of quotation.

Due to inaccuracies in field testing and should a conflict arises between the results of field testing conducted by or for the user, Keen Pumps reserves the right to have the product returned to our factory for additional testing.

This warranty shall not apply when damage is caused by (1) improper installation, (2) improper voltage, (3) lightning, (4) excessive sand or other abrasive material, (5) corrosion build-up due to excessive chemical content or (6) uncontrollable acts of god. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective pumps, parts or systems. Keen Pumps will not accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY. No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.

IMPORTANT!

If you have a claim under the provision of the warranty, contact Keen Pumps or your authorized Keen Pumps Distributor:
www.keenpump.com

KEEN PUMP®

SPECIFICATIONS

Submersible Solids Handling Pump Series: **K3PL-S**

General:
Furnish and install a quantity of _____ Keen® Pumps submersible sewage pump(s), Model K3PL____S, ____ HP, ____ RPM, ____ phase, 60 Hz, ____ volts, with a 3 inch vertical bolt-on discharge flange connection. Each pump shall be capable of delivering the following performance, ____ U.S. GPM at ____ ft total dynamic head, with a shut off head of _____ ft TDH minimum.

Pump Design:
The centrifugal sewage pump(s) shall be capable of handling 2.5 inch diameter spherical solids of raw, unscreened domestic sewage consisting of water, fibrous materials. The pump(s) shall be capable of handling liquids with temperatures to 104 °F continuous, and shall be capable of running dry for extended periods.

Pump Construction:
Castings: The volute, seal plates, impeller and motor housing shall be constructed of ASTM A-48 class 30 cast iron.

Coating/Hardware: Exterior surfaces shall be painted with a water based air dry enamel. All exposed hardware shall be 300 series stainless steel.

Gaskets: All gaskets shall be of the compression square ring type eliminating critical slip fits and the possibility of damage during service associated with sliding o-ring sealing arrangements.

Impeller: The impeller shall be of 2 vane, open type, solid handling design with pump out vanes on the back side. Impellers shall be capable of being trimmed to meet specific performance characteristics. The impeller shall be dynamically balanced to ISO G6.3 specifications.

Mechanical seal: A dual seal arrangement shall consist of a Buna-N exclusion seal and a single mechanical design operating in an oil-filled seal cavity. The seal shall be constructed of Silicon carbide faces, 300 series stainless steel hardware, and all elastomer parts to be of Buna-N. The seal shall be commercially available and not a manufacturers proprietary design.

Motor: Design shall be of the split capacitor design for single phase units. The pump shall be designed to be non-overloading throughout the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability.

The motor windings shall be of Class B insulation and operate in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of time without damage due to the heat being generated. The used dielectric oil must be disposed of as non-hazardous waste. The motor shall meet the standard NEMA L for single phase and NEMA B for three phase.

Thermal Protection: All single phase motors shall have thermal protection with automatic reset. Three phase motors shall be equipped with a thermal switch embedded in the stator windings and require external overload protection in the control panel.

Shaft: The pump shaft shall be of a one-piece design and shall be of 416 stainless steel.

Bearings: The lower bearing shall be of the single row ball type to accept radial and thrust loads, and the upper bearing of the single ball type for radial loads. Bearings shall operate in an oil bath atmosphere for superior life.

Power Cord: All pump(s) except 1.5 & 2 HP, 3 phase, shall be equipped with ____ ft of type SOW cord. The cord shall enter a cast iron terminal box assembly that is bolted to the motor housing and sealed with a Buna-N o-ring. The incoming lead wires shall be spliced in the terminal box. After splicing, the terminal box shall be filled with epoxy to seal the outer cable jacket and the individual strands to prevent water from entering the motor housing. Additional sealing and strain relief shall utilize a secondary pressure grommet at point of cable entry. 1.5 & 2 HP, 3 phase pump(s) shall be equipped with ____ ft of type SOW cord. The outer cord shall have an epoxy filled heat shrink tube to prevent water from entering the motor housing. Terminal connectors shall connect the incoming lead wires with the motor lead wires. Additional sealing and strain relief shall utilize a secondary pressure grommet at point of cable entry.

Tests and inspections: Shall be performed by the pump manufacture.

1. A ground continuity check and motor chamber shall be Hi-potted to test for electrical integrity.
2. Check that motor voltage and frequency matches name plate.
3. The pump shall be pressurized and a air leak test is performed to ensure the integrity of the motor housing.
4. The pump is submerged and operated to determine the unit meets hydraulic performance requirements.

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING PUMP

Series: K3PL-S
1.5 & 2 HP / 1750 RPM
Discharge: 3"
Spherical solids handling: 2 1/2"

DISCHARGE
3" NPT female, vertical, bolt on flange.

LIQUID TEMPERATURE
104 °F (40 °C).

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 2 vane, open, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

HARDWARE
300 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: inboard, single mechanical, oil filled chamber.
Material: silicon carbide, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord SJO 14/3, sealed against moisture.

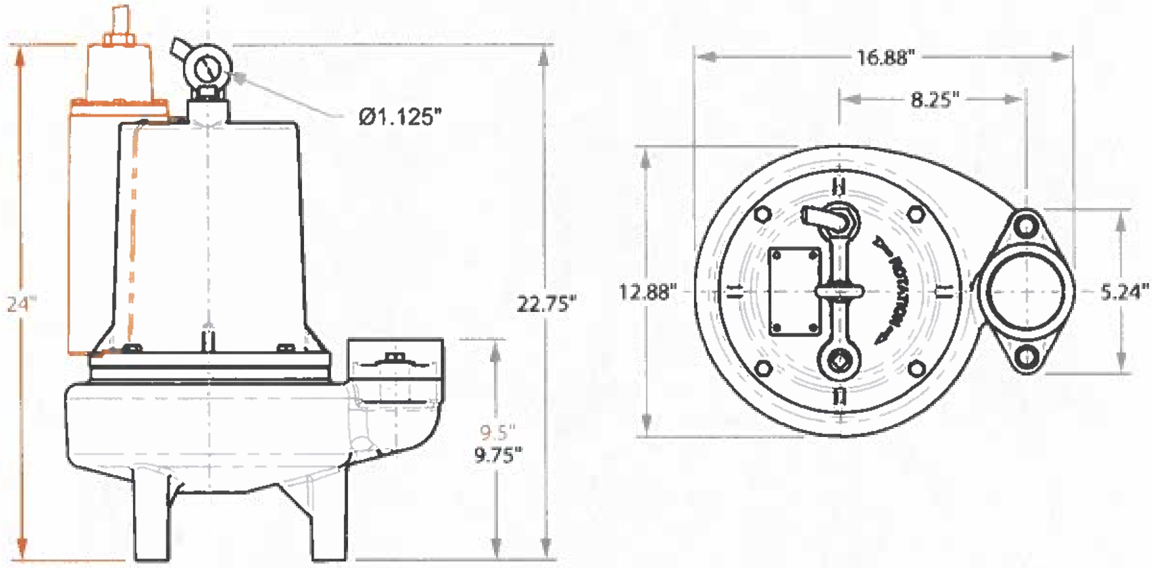
BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

MOTOR
Single phase: NEMA L, permanent split capacitor, 200/230 volts, 60 Hz, 1750 RPM, oil filled, with overload protection in motor.
Three phase: NEMA B, 200/230 & 460 volts, 60 Hz, 1750 RPM, oil filled. Requires overload protection to be included in control panel.

OPTIONAL EQUIPMENT
Additional cord.

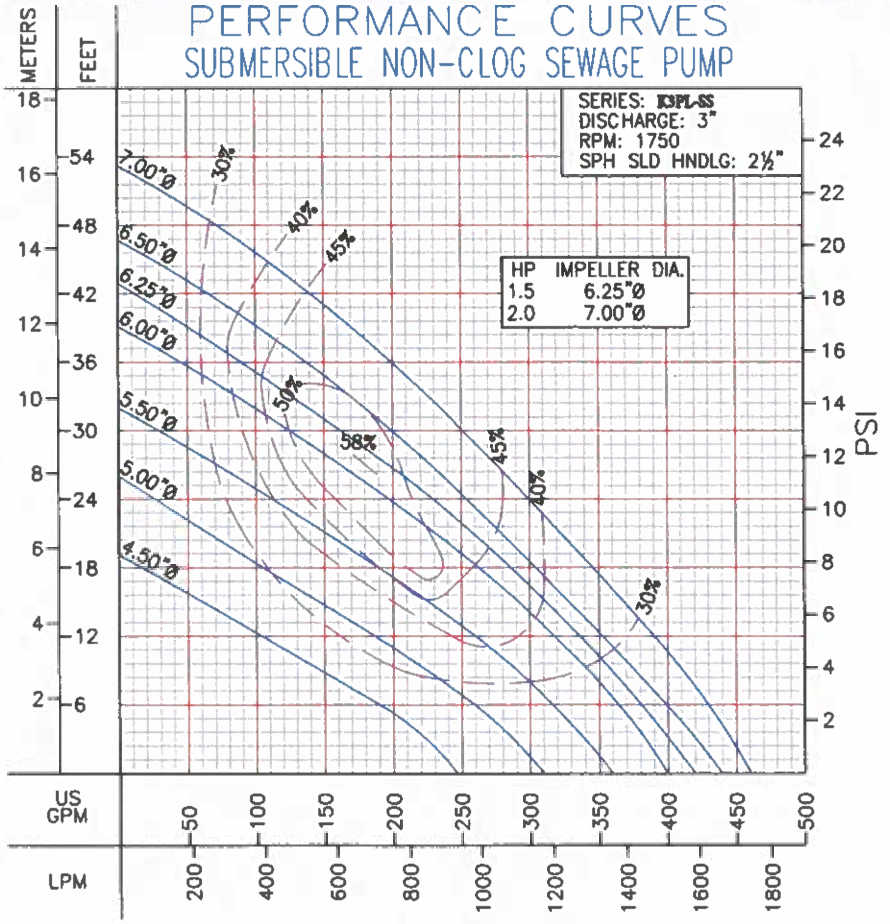
SPECIFICATIONS

SPECIFICATIONS



MODEL	PART No.	HP	VOLTS	PHASE	MAX. AMPS.	LOCKED ROTOR AMPS.	NEMA CODE	CORD SIZE	CORD TYPE	CORD LENGTH	WEIGHT (pounds)
K3PL15M4-21S	62170010	1.5	200/230	1	12.6	23	B	10/3	SJO	25'	225
K3PL15M4-03S K3PL15M4-23S	62170011		200/230	3	11.6	36	H/L	10/4		25'	207
K3PL15M4-43S	62170012		460	3	5.8	17.5	L	10/4		25'	207
K3PL20M4-21S	62170013	2	200/230	1	14.5	29	B	10/3	SJO	25'	229
K3PL20M4-03S K3PL20M4-23S	62170014		200/230	3	14	50.8	J/M	10/4		25'	207
K3PL20M4-43S	62170015		460	3	7	25.4	M	10/4		25'	207

PERFORMANCE CURVES
SUBMERSIBLE NON-CLOG SEWAGE PUMP



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

Installation, Operation & Maintenance Manual

Submersible Solids Handling Pumps

K3PL-SS series

1.5, 2 & 3 HP @ 1750 RPM

K3PL15M4-21S
K3PL15M4-03S
K3PL15M4-23S
K3PL15M4-43S
K3PL20M4-21S
K3PL20M4-03S
K3PL20M4-23S
K3PL20M4-43S
1.5-2 HP

K3PL30M4-21S
K3PL30M4-03S
K3PL30M4-23S
K3PL30M4-43S
3 HP

IMPORTANT! - Read all instructions in this manual before operating or servicing a pump.

Before installation, read the following instructions carefully. Failure to follow instruction and safety information could cause serious bodily injury, death and/or property damage. Each Keen product is carefully inspected to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

⚠ DANGER **"Danger" indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠ WARNING **"Warning" indicates an imminenty hazardous situation which, if not avoided, MAY result in death or serious injury.**

⚠ CAUTION **"Caution" indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.**

IMPORTANT! - Keen Pumps is not responsible for losses, injury or death resulting from failure to observe these safety precautions, misuse, abuse or misapplication of pumps or equipment.

ALL RETURNED PRODUCTS MUST BE CLEANED, SANITIZED, OR DECONTAMINATED PRIOR TO SHIPMENT, TO INSURE EMPLOYEES WILL NOT BE EXPOSED TO HEALTH HAZARDS IN HANDLING SAID MATERIAL. ALL APPLICABLE LAWS AND REGULATIONS SHALL APPLY.

⚠ WARNING Installation, wiring, and junction connections must be in accordance with the National Electric Code and all applicable state and local codes. Requirements may vary depending on usage and location.

⚠ WARNING Installation and servicing is to be conducted by qualified personnel only.

Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected; the rotating cutter and/or impeller can cause serious injury.

Always wear eye protection when working on pumps. Do not wear loose clothing that may become entangled in moving parts.

⚠ DANGER Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing the pump or any accessory items associated with or near the pump.

⚠ DANGER This pump is not intended for use in swimming pools or water installations where there is human contact with pumped fluid.

⚠ DANGER Risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling any aspect of the pumping system. ***Lock out power and tag.***

⚠ WARNING **Do not** use these pumps in water over 104° F. **Do not** exceed manufacturers recommended maximum performance, as this could cause the motor to overheat.

⚠ DANGER **Do not** lift, carry or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death. **Never** handle connected power cords with wet hands. Use appropriate lifting device.

⚠ WARNING Ground Fault Circuit Interrupter (GFCI) to be used with plug-in type power cord.

⚠ WARNING Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping. Never enter a basin after it has been used.

⚠ DANGER Failure to permanently ground the pump, motor and controls before connecting to power can cause shock, burns or death.

⚠ DANGER These pumps are not to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.

⚠ WARNING The Uniform Plumbing Code (UPC) states that sewage systems shall have an audio and visual alarm that signals a malfunction of the systems, that are required to reduce the potencial for property damage.

IMPORTANT! - Prior to installation, record Model Number, Serial, Amps, Voltage, Phase and HP from pump name plate for the future reference. Also record the Voltage and Current Readings at Startup:

1 Phase Models	
Amps:	Volts:
3 Phase Models	
Amps L1-2:	Volts L1-2:
Amps L2-3:	Volts L2-3:
Amps L3-1:	Volts L3-1:

Model Number: ____________________

Serial: ____________

PHASE: ______ HP: ______________

DISCHARGE: 3" NPT female, vertical, bolt on flange.

SPHERICAL SLD HNDLG: 2½"

LIQUID TEMPERATURE: 104° F (40° C) max.

VOLUTE: Cast iron ASTM A-48 class 30.

MOTOR HOUSING: Cast iron ASTM A-48 class 30.

SEAL PLATE: Cast iron ASTM A-48 class 30.

IMPELLER: 2 vane, open, with vanes on back side. Cast iron ASTM A-48 class 30.

SHAFT: 416 series stainless steel.

HARDWARE: 300 series stainless steel.

SQUARE RINGS: Buna-N.

PAINT: Air dry enamel, water based.

SEAL: Inboard, single mechanical, oil filled chamber. Silicon carbide, Buna-N elastomer and stainless steel hardware.

CORD ENTRY: 25 ft of neoprene cord SJO 14/3, sealed against moisture.

UPPER BEARING: Ball, single row, oil lubricated, for radial load.

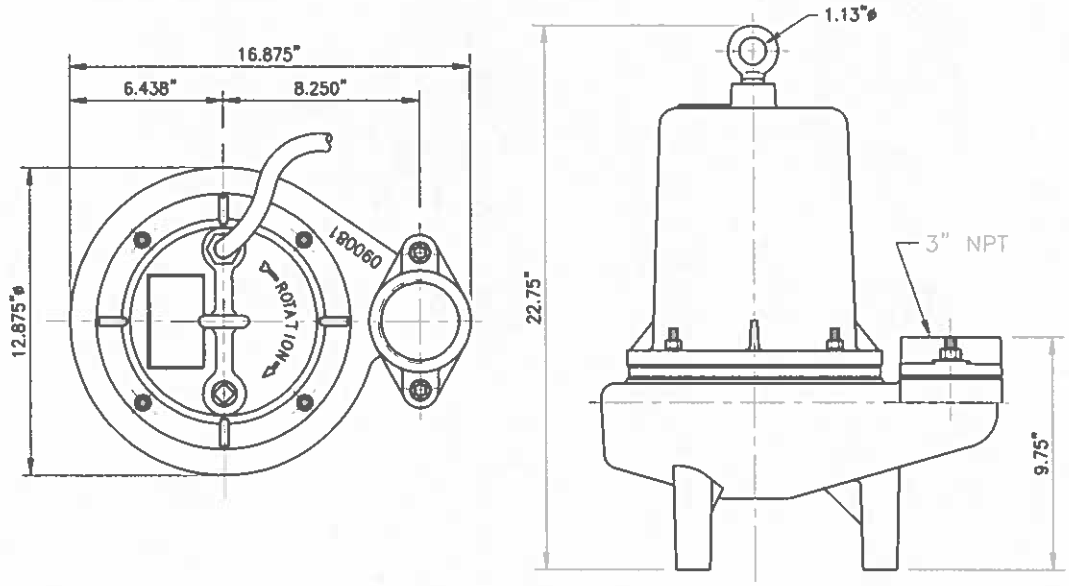
LOWER BEARING: Ball, single row, oil lubricated, for radial and thrust load.

MOTOR: ***Single phase:*** NEMA L, permanent split capacitor, oil filled, with overload protection in motor.

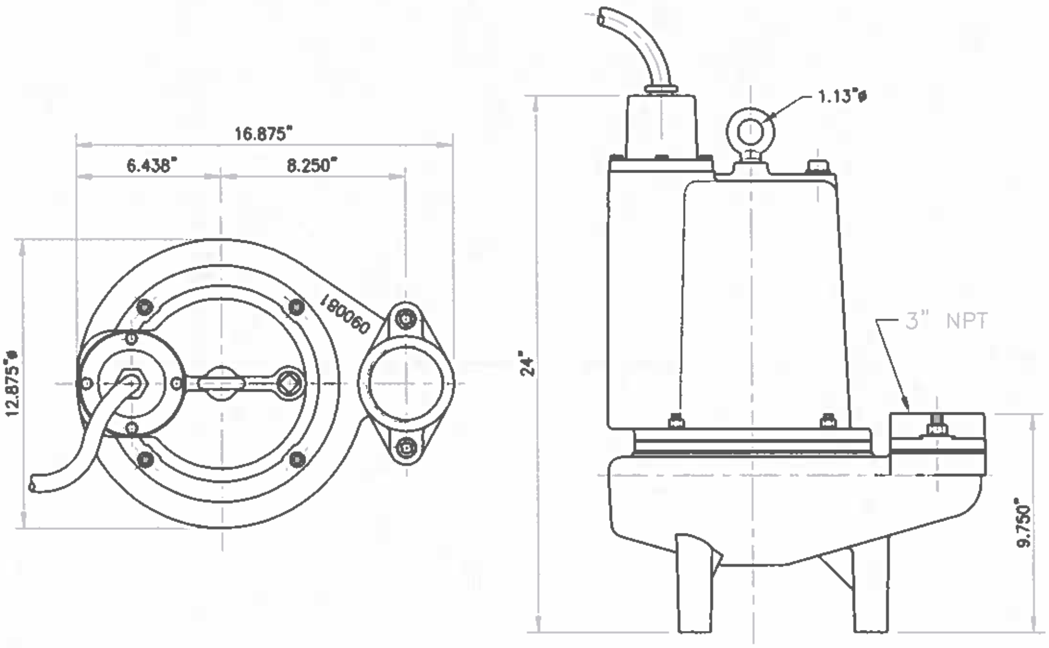
Three phase: NEMA B, oil filled. Requires overload protection to be included in control panel.

MODEL	HP	VOLTS	PHASE	RPM	MAX. AMPS.	LOCKED ROTOR AMPS.	NEMA CODE	CORD SIZE	CORD TYPE	CORD LENGTH	WEIGHT (pounds)
K3PL15M4-21S	1.5	200/230	1	1750	12.6	23	B	10/3	SJO	25'	225
K3PL15M4-03S K3PL15M4-23S		200/230	3		11.6	36	H/L	10/4			207
K3PL15M4-43S		460	3		5.8	17.5	L	10/4			207
K3PL20M4-21S	2	200/230	1		14.5	29	B	10/3	SJO	25'	229
K3PL20M4-03S K3PL20M4-23S		200/230	3		14	50.8	J/M	10/4			207
K3PL20M4-43S		460	3		7	25.4	M	10/4			207
K3PL30M4-21S	3	200/230	1		28	59	A	10/4	SJO	25'	226
K3PL30M4-03S K3PL30M4-23S		200/230	3		19	56	D	10/4			233
K3PL30M4-43S		460	3		9	28	D	10/4			233

K3PL15M4-03S
K3PL15M4-23S
K3PL15M4-43S
K3PL20M4-03S
K3PL20M4-23S
K3PL20M4-43S



K3PL15M4-21S
K3PL20M4-21S
K3PL30M4-21S
K3PL30M4-03S
K3PL30M4-23S
K3PL30M4-43S



▸ Receiving inspection

Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. If the manual is removed from the packaging, do not lose or misplace.

▸ Storage

Any product that is stored for a period longer than six (6) months from the date of purchase should be bench tested prior to installation. A bench test consists of, checking the impeller to assure it is free turning and a run test to assure the motor (and switch if provided) operate properly.

▸ Controls

Manual models require a separate approved pump control device or panel for automatic operation. Be sure the electrical specification of the control selected properly match the electrical specifications of the pump.

▸ Submergence

The pump should always be operated in the submerged condition. The minimum sump liquid level should never be less than above the pump's volute (See Figure 1).

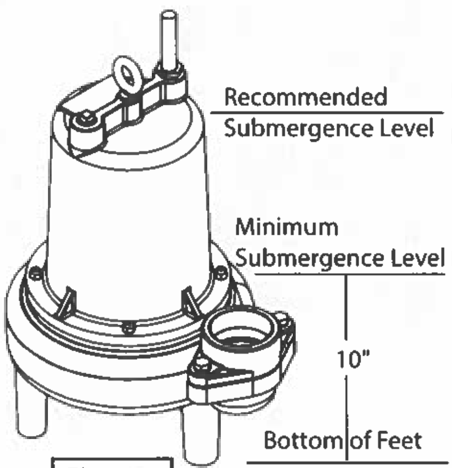


Figure 1

▸ Installation

These pumps are recommended for use in a sump, basin or lift station. The sump, basin or lift station shall be sealed and vented in accordance with local plumbing codes. **This pump is designed to pump sewage, effluent or wastewater, non-explosive and non-corrosive liquids and shall NOT be installed in locations classified as hazardous in accordance with the National Electrical Code (NEC) ANSI/NFPA 70 or Canadian Electric Code (CEC).** The pump should never be installed in a trench, ditch, or hole with a dirt bottom. The legs will sink into the dirt and the suction will become plugged.

The installation should be at a sufficient depth to ensure that all plumbing is below the frost line. If this is not feasible, remove the check valve and size the basin to accommodate backflow volume.

Pumps are most commonly installed in simplex or duplex stations or basins with a slide rail system (Keen SRC), which allows the pump(s) to be installed or removed without requiring personnel to enter the station, or resting on the basin floor.

▸ Discharge Piping

Discharge piping should be as short as possible and sized no smaller than the pump discharge. **Do not reduce the discharge pipe size below that which is provided on the pump.** Both a check valve and a shut-off valve are recommended for each pump. The check valve is used to prevent backflow into the sump. The shut-off valve is used to manually stop system low during pump servicing.

▸ Liquid Level Controls

The level control(s) should be mounted on the discharge piping, a cable rack or float pole. The level control should have adequate clearance so it cannot hang up in it's swing and that the pump is completely submerged when the level control is in the "Off" mode. By adjusting the cord tether the control level can be changed. One cycle of operation should be observed, so that any potential problems can be corrected.

It is recommended that the level control float should be set to insure that the liquid in the sump never drops below the top of the motor housing or a minimum level of 10 inches above the basin floor.

▸ Electrical Connections

Power cable:

The power cable mounted to the pump must not be modified in any way except for shortening to a specific application. Any splice between the pump and the control panel must be made in accordance with the electric codes. It is recommended that a junction box, if used, be mounted outside the sump or be of at a minimum Nema 4 construction if located within the wet well. **DO NOT USE THE POWER CABLE TO LIFT PUMP.**

Always rely upon a Certified Electrician for installation.

Overload Protection:

Single Phase - The stator in-winding overload protector used is referred to as an inherent overheating protector and operates on the combined effect of temperature and current. This means that the overload protector will trip out and shut the pump off if the windings become too hot, or the load current passing through them becomes too high.

IMPORTANT! **-** The overload will then automatically reset and start the pump up after the motor cools to a safe temperature. In the event of an overload, the source of this condition should be determined and corrected immediately.

⚠ WARNING DO NOT ALLOW THE PUMP TO CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS.

If current through the temperature sensor exceeds the values listed, an intermediate control circuit relay must be used to reduce the current or the sensor will not work properly.

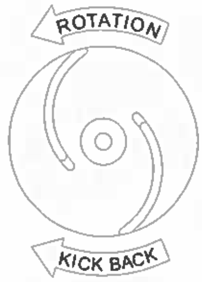
TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
110-120	3.00	30.0
220-240	1.50	15.0
440-480	0.75	7.5
600	0.60	6.0

Wire Size:
If longer power cable is required consult a qualified electrician for proper wire size.

▸ Pre-Operation

1. **Check Voltage and Phase -** Compare the voltage and phase information stamped on the pump name plate.

2. **Check Pump Rotation -** Improper motor rotation can result in poor pump performance and can damage the motor and/or pump. Check rotation on three phase units by momentarily applying power and observe the "kickback".



Bottom of Pump

Kickback should always be in a counter-clockwise direction as viewed from motor end or opposite to impeller rotation. Impeller rotation is counter-clockwise as viewed from bottom of pump.

3. **Name Plate -** Record the information from the pump name plate to drawing in front of manual for future reference.

Insulation Test - An insulation (megger) test should be performed on the motor. Before the pump is put into service. The resistance values (ohms) as well as the voltage (volts) and current (amps) should be recorded.

5. **Pump-Down Test -** Be sure pump has been properly wired, lowered into the basin, sump or lift station, check the system by filling with liquid and allowing the pump to operate through its pumping cycle. The time needed to empty the system, or pump-down time along with the volume of water, should be recorded.

▸ Maintenance

No lubrication or maintenance is required. Perform the following checks when pump is removed from operation or when pump performance deteriorates:

a) Inspect motor chamber for oil level and contamination.
b) Inspect impeller and body for excessive build-up or clogging.
c) Inspect motor, bearings and shaft seal for wear or leakage.

▸ Servicing

NOTE: Item numbers in ( ) refer to Figures 6 through 13.

Cooling Oil - Anytime the pump is removed from operation, the cooling oil in the motor housing should be checked visually for oil level and contamination. To check oil, set unit upright. Remove pipe plug (20) from housing (4). With a flashlight, visually inspect the oil in the housing (4) to make sure it is clean and clear, light amber in color and free from suspended particles. Milky white oil indicates the presence of water. Oil level should be just above the motor when pump is in vertical position.

Oil Testing

- Drain oil into a clean, dry container by placing pump on it's side, remove pipe plug (20), from housing (4).
- Check oil for contamination using an oil tester with a range to 30 kilovolts breakdown.
- If oil is found to be clean and uncontaminated (measuring above 15 kV breakdown), refill the housing.
- If oil is found to be dirty or contaminated (or measures below 15 kV breakdown), the pump must be carefully inspected for leaks at the shaft seal, cable assembly, square ring and pipe plug, before refilling with oil. To locate the leak, perform a pressure test.

After leak is repaired, dispose of old oil properly, and refill with new oil.

Pressure Test (If oil has been drained) - Remove pipe plug (20) from housing (4). Apply pipe sealant to pressure gauge assembly and tighten into hole. Pressurize motor housing to 10 P.S.I. Use soap solution around the sealed areas and inspect joints for "air bubbles".

If, after five minutes, the pressure is still holding constant, and no "bubbles" are observed, slowly bleed the pressure and remove the gauge assembly. Replace oil. Leek must be located and repaired if pressure does not hold.

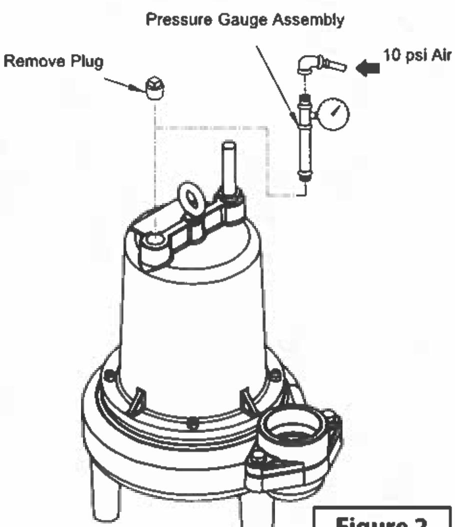


Figure 2

Pressure Test (If oil has NOT been drained) - Oil should be at normal level. Remove pipe plug (20) from housing (4). Apply pipe sealant to pressure gauge assembly and tighten into hole. Pressurize motor housing to 10 PSI. Use soap solution around the sealed areas above the oil level and inspect joints for "air bubbles". For sealed areas below oil level, leeks will seep oil. If, after five minutes, the pressure is still holding constant, and no "bubbles", oil seepage is observed, slowly bleed the pressure and remove the gauge assembly. Replace oil. Leek must be located and repaired if pressure does not hold.

Pressure builds up extremely fast, increase pressure by "TAPPING" air nozzle. Too much pressure will damage seal. ***DO NOT exceed 10 PSI.***

Oil Replacement - Set unit upright and refill with new cooling oil as per table below. Fill to just above motor, but below capacitor as an air space must remain in the top of the housing to compensate for oil expansion. Apply pipe thread compound to threads of pipe plug (20) then assemble to housing (4).

DO NOT *overfill oil. Overfilling of housing with oil can create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard. Overfilling oil voids warranty.*

Cooling Oil Recommended Supplier/Grade	
BP	Enerpar SE100
Conoco	Pale Parafin 22
Mobile	D.T.E. Oil Light
Shell Canada	Transformer-10
Texaco	Diala-Oil-AX

Disassembly

Impeller and Volute:

1. Disconnect power.

2. Remove hex nuts (9), vertically lift motor housing and seal plate assembly from volute (1). Clean out volute if necessary.

3. Inspect o-ring (19) and replace if cut or damaged.

4. Clean and examine impeller (2), for cracks or breakage and replace if required. To remove impeller (2), remove impeller nut (12) and washer (13). With a wheel puller, pull impeller straight of shaft and remove key (14).

5. Remove washer (15) and v-gasket (16) and remove if damaged.

Power Cord - K3PL-SS (1.5 - 2 HP, 3 PH)

6. Remove gland nut (23), friction ring (24), grommet (25) and friction ring (24) from motor housing (4). Pull cord through and disconnect the wires from the terminals (28).

Power Cord - K3PL-SS (1.5 - 2 HP, 1 PH) and K3PL-SS (3 HP) 7. Remove cap screws (36) and washers (37), lift conduit box and cable assy (33) from motor housing (4). Disconnect the wires from the terminals (28). Remove o-ring (35) replace if damaged.

Motor and Capacitor:

8. Remove screws (17) and lift motor housing (4) from seal plate (3).

9. Remove o-ring (18), replace if damaged.

10. Remove motor bolts, lift motor stator assembly from seal plate (3).

11. On Single Phase units only. Check motor capacitor (34) with an Ohm meter by first grounding the capacitor by placing a screwdriver across both terminals and then removing screwdriver. Connect Ohm meter (set on high scale) to terminals. If needle moves to infinity (∞) then drifts back, the capacitor is good. If needle does not move or moves to infinity (∞) and does not drift back, replace capacitor (34).

12. Inspect motor winding for shorts and check resistance values. Check rotor for wear. If rotor or the stator windings are defective, the complete motor must be replaced.

Shaft Seal:

13. Unscrew conduit bushing (29) from seal plate (3) and lift motor rotor, shaft, bearing (8), rotating member of seal (6), washer (30) and conduit bushing (29) from seal plate (3). See Figure 3.

14. Remove seal parts (6) from shaft. Examine all seal parts, if seal faces show signs of wear, uneven wear pattern, chips or scratches replace entire seal. **DO NOT interchange seal components, replace the entire shaft seal (6).** If replacing seal, remove stationary from seal plate (3) by prying out with flat screwdriver.

▸ Reassembly

⚠ ***IMPORTANT! - All parts must be clean before reassembly. Handle seal parts with extreme care. DO NOT damage lapped surfaces.***

Shaft Seal:

1. To reassemble, clean seal cavity in seal plate (3) and oil.

2. Press seal's (6) stationary member firmly into seal plate (3), use a seal tool or pipe. Nothing should come in contact with the seal face except the seal tool. Be sure the stationary is in straight.

3. Place conduit bushing (29) and washer (30) onto shaft. Press lower bearing (8) onto shaft.

4. Place seal's (6) retaining ring and spring onto shaft. Lightly oil **(Do not use grease)** shaft and inner surface of bellows.

5. With lapped surface of rotating member facing outward, slide over shaft using a seal tool, being carefull not to damage seal face. Make sure spring is seated in retaining ring and spring is lined up on rotating member and not cocked or resting on bellows tail.

6. Slide rotor/shaft with bearing (8) and seal parts (6) into seal plate (3) until bearing seats into seal plate and tighten conduit bushing (29) into seal plate (3). Place stator over rotor, lining up motor bolts with holes in seal plate (3). Insert motor bolts and torque to 17 inch pounds.

7. On Single phase units, connect capacitor (34) to motor wires. See Figure 5.

8. **On models K3PL-SS (1.5 - 2 HP, 3 Ph),** Place gland nut (23), one friction ring (24), grommet (25) and one friction ring (24) onto cord (22) and slide cord through hole in motor housing (4) (See Figure 4). Make wire connections per Figure 5.

9. **On models K3PL-SS (1.5 - 2 HP, 1 Ph) and K3PL-SS (3 HP),** place all motor leads above motor. Place o-ring (18) on seal plate (3) and lower motor housing (4) onto seal plate (3).

10. Place socket head screws (17) through seal plate into motor housing and torque to 60 inch pounds.

11. Install v-gasket (16) and impeller washer (15) over shaft, and into seal plate (3).

12. Install impeller (2) by appling a thin film of oil to motor shaft and slide impeller straight onto shaft, keeping keyways lined up. Drive key (14) into keyway.

13. Place washer (13) and impeller nut (12) onto shaft and torque to 40 ft. lbs. Rotate impeller to check for binding.

14. Place o-ring (19) onto volute (1).

15. Lower motor housing and seal plate assembly onto volute (1). Apply thread locking compound to studs (9) and place hex nuts (10) onto studs and torque to 24 ft. lbs.

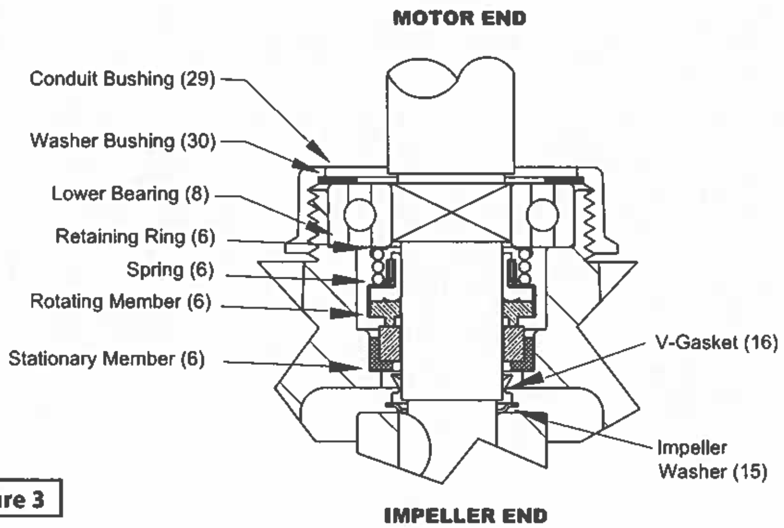


Figure 3

Models - K3PL-SS (1.5 - 2 HP, 1 Ph) and K3PL-SS (3 HP)

16. Pull wires through large opening in motor housing (4) and connect wires with cord (22) in Conduit box (33) per schematic in Figure 5.

17. Refill with cooling oil and place o-ring (35) and conduit box (33) onto motor housing (4). Place cap screws (36) and washers (37) through conduit box into motor housing and tighten to 16 ft. lbs.

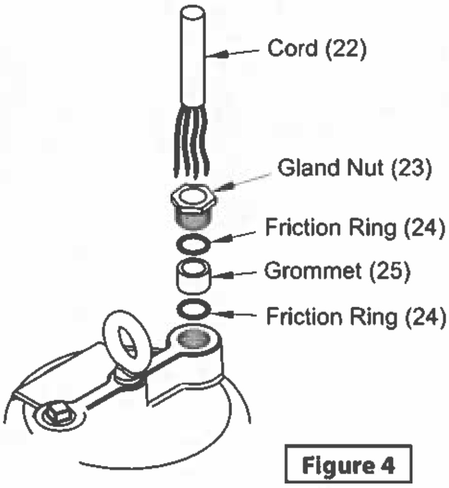


Figure 4

Cable Assembly:

18. For ALL Models - Check power cord (22) for cracks or damage and replace if required. Insert one friction ring (24), grommet (25), one friction ring (24), and gland nut (23) into motor housing (4) or conduit box and cable assembly (33) and torque gland nut (23) to 15 ft. lbs.

19. On models **K3PL-SS (1.5 - 2 HP, 1 Ph) and K3PL-SS (3 HP)**, refill with cooling oil and replace pipe plug (20).

SINGLE-PHASE 115/230V AC
POWER CORD 3x14

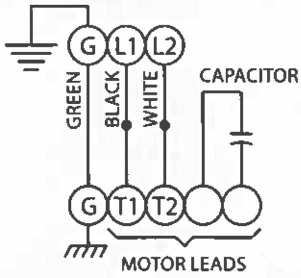


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1
White	2
Flag terminal	Capacitor
Flag terminal	Capacitor

THREE-PHASE 460V AC
POWER CORD 4x12

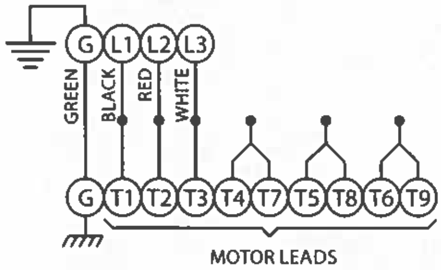


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1
Red	2
White	3
	4 and 7 together
	5 and 8 together
	6 and 9 together

THREE-PHASE 208/230V AC
POWER CORD 4x12

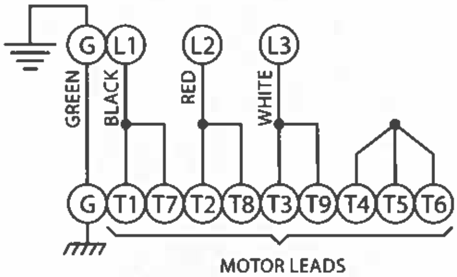
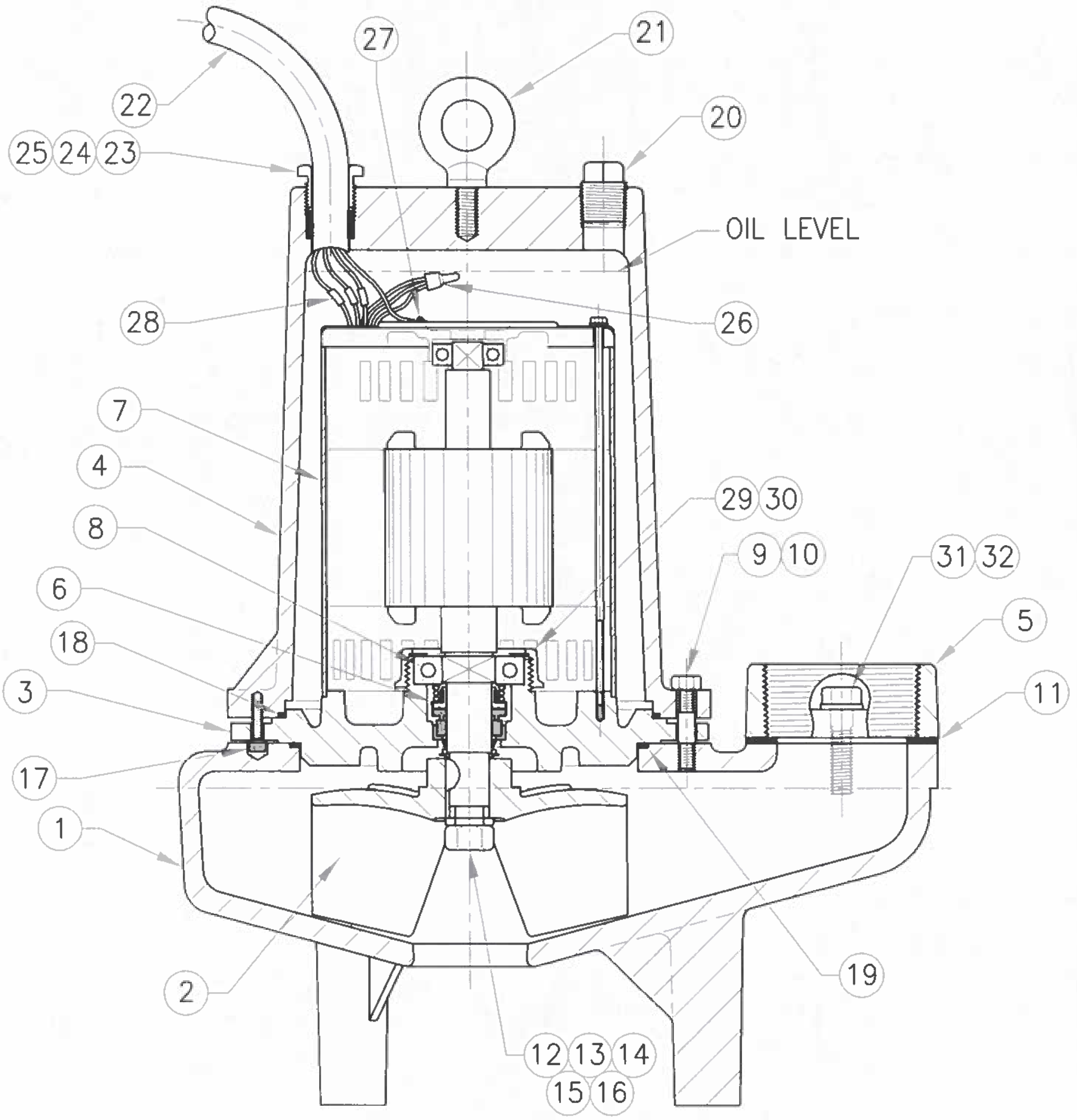


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1 and 7
Red	2 and 8
White	3 and 9
	4, 5 and 6 together

Figure 8

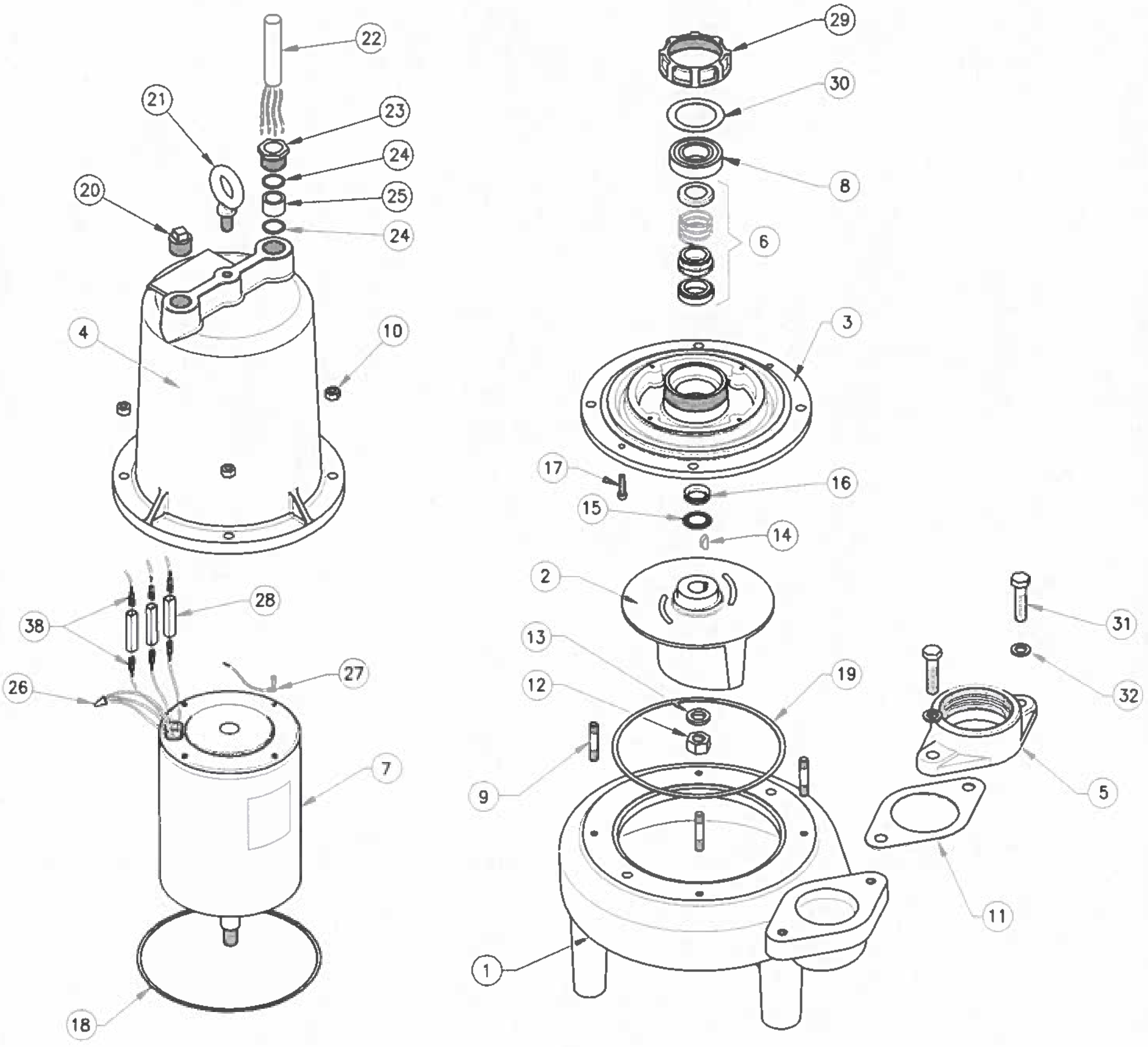
▸ **K3PL15M4-03S, K3PL15M4-23S, K3PL15M4-43S, K3PL20M4-03S, K3PL20M4-23S, K3PL20M4-43S**



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Figure 9

▸ **K3PL15M4-03S, K3PL15M4-23S, K3PL15M4-43S, K3PL20M4-03S, K3PL20M4-23S, K3PL20M4-43S**



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

▸ K3PL15M4-03S. K3PL15M4-23S, K3PL15M4-43S, K3PL20M4-03S, K3PL20M4-23S, K3PL20M4-43S

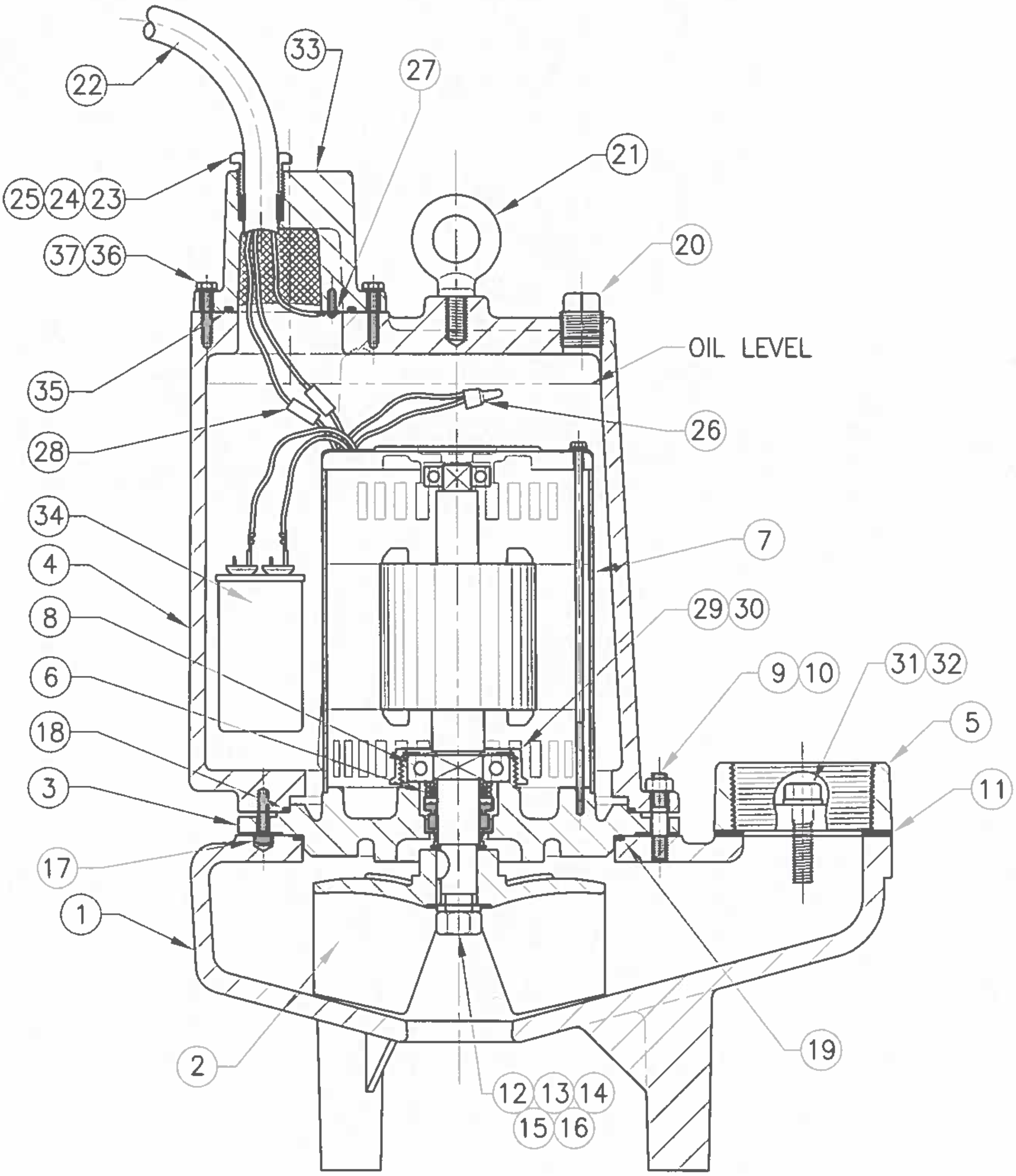
ITEM	QTY.		DESCRIPTION	PART No.
1	1		Volute	03090034
2	1	■	Impeller 6.25"Ø (For K3PL15M4-03/23S & K3PL15M4-43S)	03140029B
			Impeller 7.00"Ø (For K3PL20M4-03/23S & K3PL20M4-43S)	03140029
3	1		Seal Plate	03180012
4	1		Motor Housing	03100002
5	1		Discharge Flange	03060014
6	1	▲	Shaft Seal - Silicon Carbide	31030152
7	1	■	Motor 2 hp, 230/460 V, 3 ph	40040005
8	1	▲	Ball Bearing	31020010
9	4	◆	Stud 3/8"-16UNC x 2" lg. SS # 33824	91010374
10	4	◆	Hex Nut 3/8"-16UNC SS # 18927	91010433
11	1	▲	Discharge Gasket	92010125
12	1	▲	Impeller Nut 5/8"-18UNF, SS # 38132	91010442
13	1	▲	Washer 5/8" SS # 70320	91010063
14	1	▲	Shaft Key	91010111
15	1	▲	Washer Impeller # 62641	91010051
16	1	▲	V-Gasket # 61829	92010112
17	2	◆	Socket Head Cap Screw ¼"-20UNC x 1" lg. SS	91010392
18	1	▲	Gasket Housing - Seal Plate # 33730	92010083
20	1	◆	Pipe Plug ¾" NPT	93010148
21	1	◆	Eye Bolt ½"-13UNC x 1.0" lg.	91010406
-	1	■	Power Cable Assy. (*) Includes 22, 23, 24, & 25	-
22	1	*	Power Cable, 25 Feet, 10/4 SOW	31030003
23	1	*	Hex Head Plug	30400903
24	2	*	Friction Ring # 54746	91010055
25	1	*	Grommet # 514	92010001
26			Wire Connector # 1921	94010012
	1		For K3PL15M4-03/23S & K3PL20M4-03/23S	-
	3		For K3PL15M4-43S & K3PL20M4-43S	-
27	1	◆	Eye terminal 3/16"	94010043
28	3		Terminal Connector	94010027
29	1	▲	Conduit Bushing # 53749	31190021
30	1	▲	Washer Bushing # 53756	91010054
31	2	◆	Screw ½"-13UNC x 1¾" lg., SS	91010364
32	2	◆	Lockwasher ½" SS	91010062
38	6		Female Connector	94010041
39	1.50 gal.	◆	Oil Motor Housing	31010031

◆ = Aquire standard hardware locally.
▲ = Overhaul Kit.
■ = Supplied as individual items.

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Figure 10

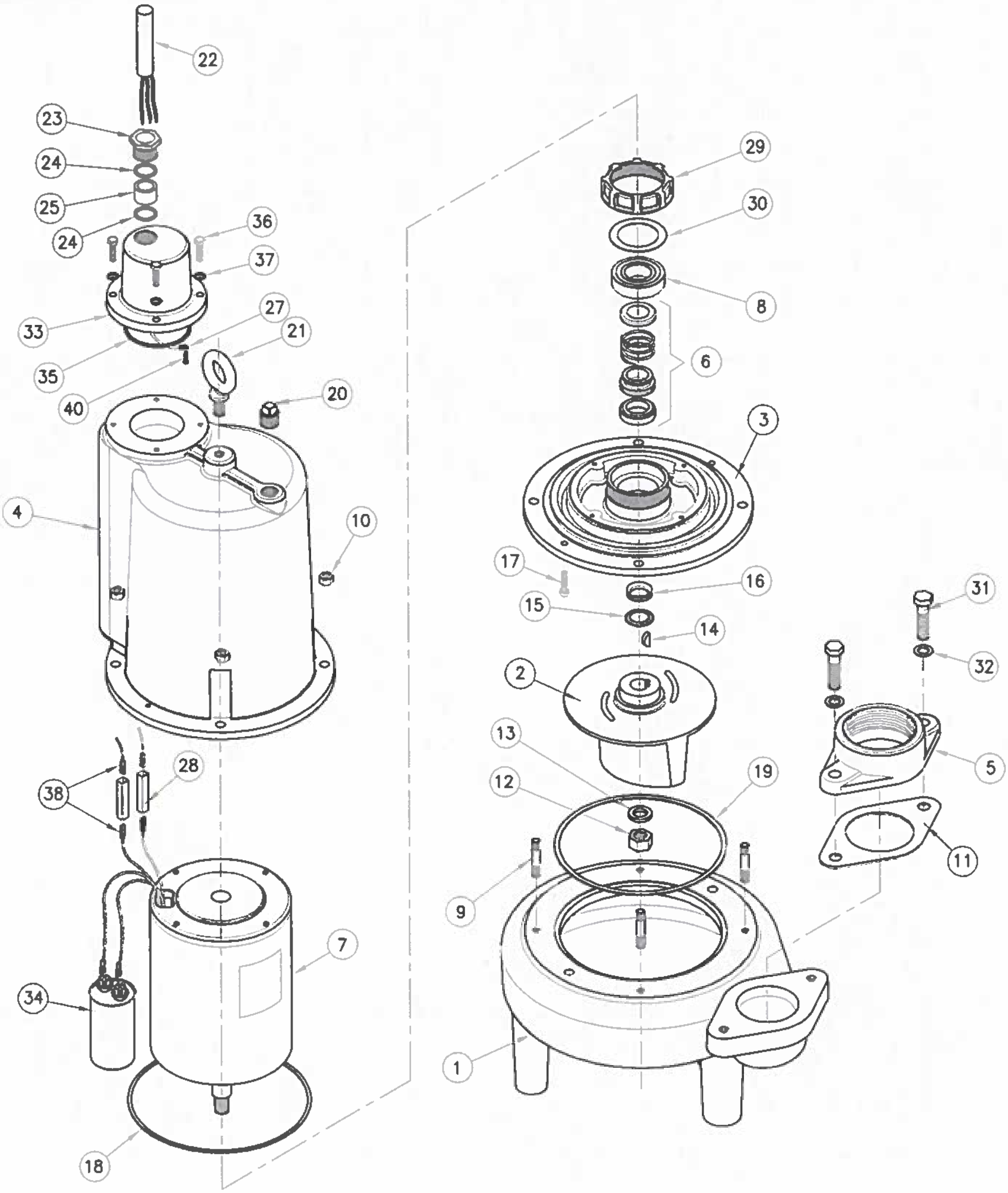
- K3PL15M4-21S, K3PL20M4-21S, K3PL30M4-21S



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Figure 11

▸ **K3PL15M4-21S, K3PL20M4-21S, K3PL30M4-21S**



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

▸ K3PL15M4-21S, K3PL20M4-21S, K3PL30M4-21S

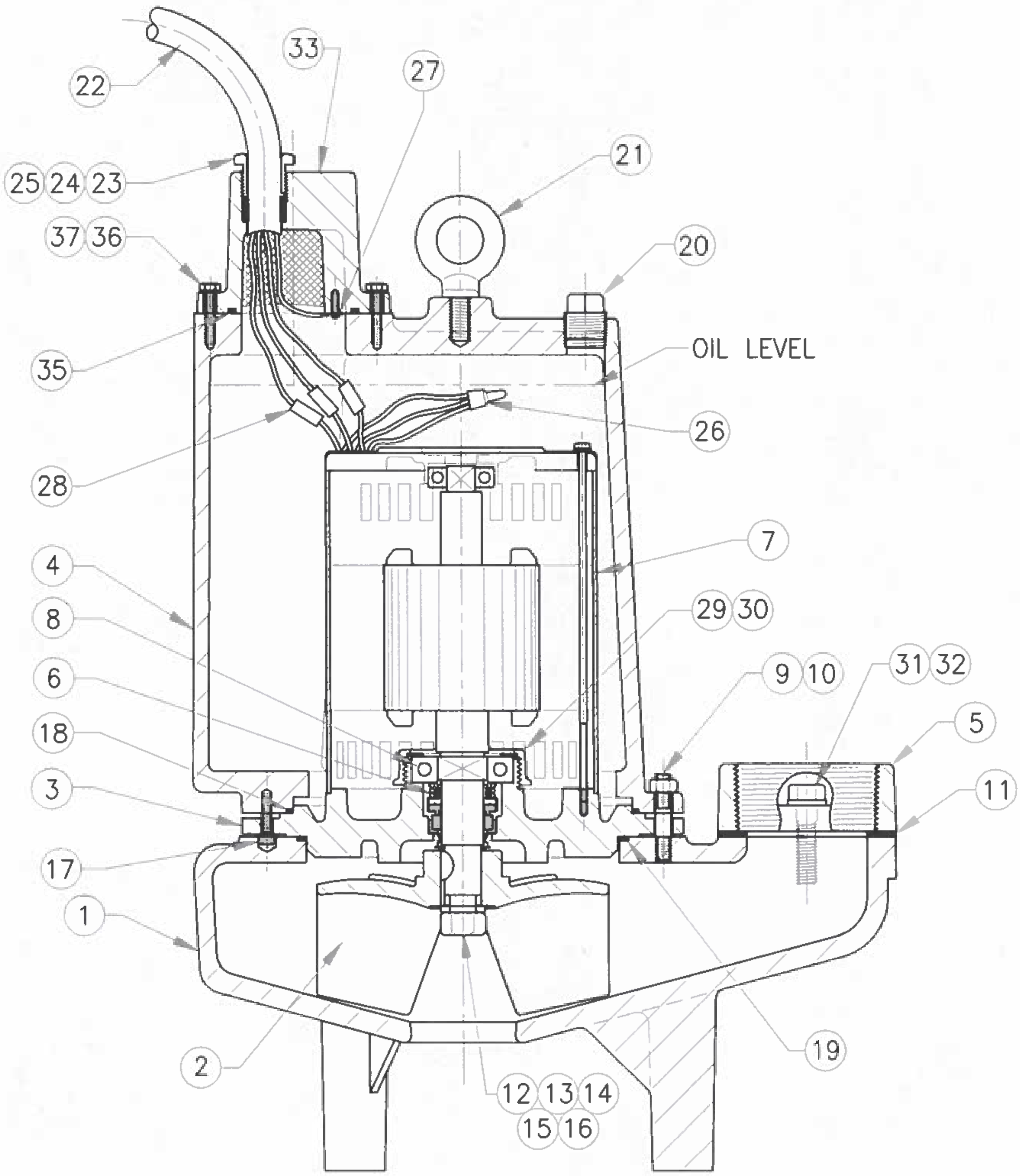
ITEM	QTY.		DESCRIPTION	PART No.
1	1		Volute	03090034
2	1	■	Impeller 6.25"Ø (For K3PL15M4-21S)	03140029B
			Impeller 7.00"Ø (For K3PL20M4-21S)	03140029
			Impeller 7.50"Ø (For K3PL30M4-21S)	03140093
3	1		Seal Plate	03180012
4	1		Motor Housing	03100009
5	1		Discharge Flange	03060014
6	1	▲	Shaft Seal - Silicon Carbide	31030152
7	1	■	Motor 3hp, 230 V, 1 ph	40040061
8	1	▲	Ball Bearing	31020010
9	4	◆	Stud 3/8"-16UNC x 2" lg. SS # 33824	91010374
10	4	◆	Hex Nut 3/8"-16UNC SS # 18927	91010433
11	1	▲	Discharge Gasket	92010125
12	1	▲	Impeller Nut 5/8"-18UNF, SS # 38132	91010442
13	1	▲	Washer 5/8" SS # 70320	91010063
14	1	▲	Shaft Key	91010111
15	1	▲	Washer Impeller # 62641	91010051
16	1	▲	V-Gasket # 61829	92010112
17	2	◆	Socket Head Cap Screw ¼"-20UNC x 1" lg. SS	91010392
18	1	▲	Gasket Housing - Seal Plate # 33730	92010083
19	1	▲	Gasket Volute - Seal Plate # 27269	92010082
20	1	◆	Pipe Plug ½" NPT	93010150
21	1	◆	Eye Bolt ½"-13UNC x 1.0" lg.	91010406
-	1	■	Conduit Box & Cable Assembly (*)	-
			Includes: 22, 23, 24, 25, 27 & 33	
22	1	*	Power Cable, 25 Feet, 10/3 SOW	31030007
23	1	*	Hex Head Plug	30400902
24	2	*	Friction Ring # 51450	91010056
25	1	*	Grommet # 51451	92010007
26	2		Wire connector	94010011
27	1	◆	Eye terminal 3/16"	94010043
28	2		Terminal Connector	94010027
29	1	▲	Conduit Bushing # 53749	31190021
30	1	▲	Washer Bushing # 53756	91010054
31	2	◆	Screw ½"-13UNC x 1¾" lg., SS	91010364
32	2	◆	Lockwasher ½" SS	91010062
33	1		Conduit box & Cable Assembly	03100010
34	1		Capacitor 45MFD 370V	31030038
35	1		O-Ring	92010063
36	4		Cap screw ¼"-20UNC x 1.00" lg. SS	91010342
37	4		Lockwasher ¼" SS	91010066
38	4		Female Connector	94010041
39	1.85 gal.	◆	Oil Motor Housing	31010031
40	1		Pan Head Screw 6-32 x 3/8" lg.	91010408

◆ = Aquire standard hardware locally.
▲ = Overhaul Kit.
■ = Supplied as individual items.

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Figure 12

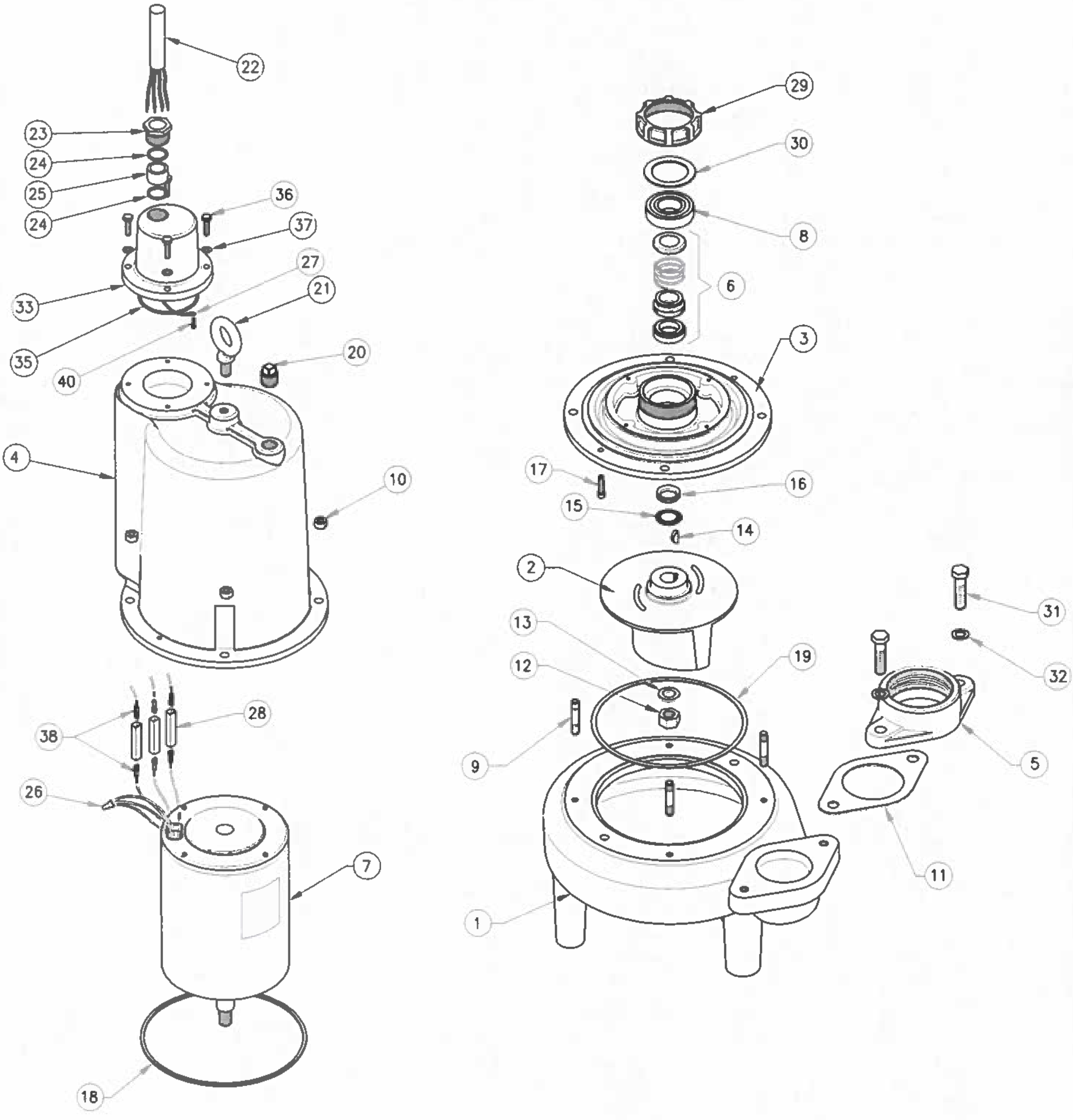
▸ **K3PL30M4-03S, K3PL30M4-23S, K3PL30M4-43S**



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Figure 13

▸ **K3PL30M4-03S, K3PL30M4-23S, K3PL30M4-43S**



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

▸ K3PL30M4-03S, K3PL30M4-23S, K3PL30M4-43S

ITEM	QTY.		DESCRIPTION	PART No.
1	1		Volute	03090034
2	1	■	Impeller7.50"Ø(For K3PL30M4-03/23S&K3PL30M4-43S)	03140093
3	1		Seal Plate	03180012
4	1		Motor Housing	03100009
5	1		Discharge Flange	03060014
6	1	▲	Shaft Seal - Silicon Carbide	31030152
7	1	■	Motor 3hp, 230/460 V, 3 ph	40040006
8	1	▲	Ball Bearing	31020010
9	4	◆	Stud 3/8"-16UNC x 2" lg. SS # 33824	91010374
10	4	◆	Hex Nut 3/8"-16UNC SS # 18927	91010433
11	1	▲	Discharge Gasket	92010125
12	1	▲	Impeller Nut 5/8"-18UNF, SS # 38132	91010442
13	1	▲	Washer 5/8" SS # 70320	91010063
14	1	▲	Shaft Key	91010111
15	1	▲	Washer Impeller # 62641	91010051
16	1	▲	V-Gasket # 61829	92010112
17	2	◆	Socket Head Cap Screw ¼"-20UNC x 1" lg. SS	91010392
18	1	▲	Gasket Housing - Seal Plate # 33730	92010083
19	1	▲	Gasket Volute - Seal Plate # 27269	92010082
20	1	◆	Pipe Plug ½" NPT	93010150
21	1	◆	Eye Bolt ½"-13UNC x 1.0" lg.	91010406
22	1	*	Power Cable, 25 Feet, 10/4 SOW	31030003
23	1	*	Hex Head Plug	30400903
24	2	*	Friction Ring # 54746	91010055
25	1	*	Grommet # 514	92010001
26			Wire connector	94010012
	1		For K3PL30M4-03/23S	-
	3		For K3PL30M4-43S	-
27	1	◆	Eye terminal 3/16"	94010043
28	3		Terminal Connector	94010027
29	1	▲	Conduit Bushing # 53749	31190021
30	1	▲	Washer Bushing # 53756	91010054
31	2	◆	Screw ½"-13UNC x 1¾" lg., SS	91010364
32	2	◆	Lockwasher ½" SS	91010062
33	1		Conduit box & Cable Assembly	03100010
35	1		O-Ring	92010063
36	4		Cap screw ¼"-20UNC x 1.00" lg. SS	91010342
37	4		Lockwasher ¼" SS	91010066
38	6		Female Connector	94010041
39	1.85 gal.	◆	Oil Motor Housing	31010031
40	1		Pan Head Screw 6-32 x 3/8" lg.	91010408

◆ = Aquire standard hardware locally.
▲ = Overhaul Kit.
■ = Supplied as individual items.

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Risk of electric shock. Always disconnect the pump from the power source before handling inspections or repairs.

<table>
<tr><th>Symptom</th><th>Possible Cause(s)</th><th>Corrective Action</th></tr>
<tr><td>Pump will not run</td><td>1. Poor electrical connection, blown fuse, tripped breaker or other interruption of power; improper power supply
2. Motor or switch inoperative (go to manual operation)
2a. Float movement restricted
2b. Switch will not activate pump or is defective
2c. Defective motor
3. Insufficient liquid level</td><td rowspan="7">1. Check all electrical connections for security. Have electrician measure current in motor leads, if current is within ± 20% of locked rotor Amps, impeller is probably locked. If current is 0, overload may be tripped. Remove power, allow pump to cool, then re-check current.
2a. Reposition pump or clean basin as required to provide adaquate clearance for float
2b. Disconnect level control. Set ohmmeter for a low rang, such as 100 ohms full scale and connect to level control leads. Actuate level control manually and check to see that ohmmeter shows zero ohms for closed switch and full scale for open switch. (Float Switch)
2c. Check winding insulation (Megger Test) and winding resistance. If check is outside of range, dry and re-check. If still defective, replace per service instructions.
3. Make sure liquid level is above the pump
4. Re-check all sizing calculations to determine proper pump size.
5. Check discharge line for restrictions, including ice if line passes through or into cold areas.
6. Remove and examine check valve for proper installation and freedom of operation
7. Open valve
8. Check impeller for freedom of operation, security and condition. Clean impeller cavity and inlet of any obstruction
Loosen union slightly to allow trapped air to escape. Verify that turn-off level of switch is set so that the suction is always flooded. Clean vent hole
10. Check rotation. If power supply is three phase, reverse any two of three power supply leads to ensure proper impeller rotation
11. Repair fixtures as required to eliminate leakage
12. Check pump temperature limits and fluid temperature
13. Replace portion of discharge pipe with flexible connector or tighten existing piping.
14. Turn to automatic position
15. Check for leaks around basin inlet and outlets</td></tr>
<tr><td>Pump will not turn off</td><td>2a. Float movement restricted
2b. Switch will not activate pump or is defective
4. Excessive inflow or pump not properly sized for application
9. Pump may be air locked causing pump not to flow
14. H-O-A switch on panel is in "HAND" position</td></tr>
<tr><td>Pump hums but doesn't run</td><td>1. Incorrect low voltage
8. Impeller jammed or loose on shaft, or inlet plugged</td></tr>
<tr><td>Pump delivers insufficient capacity</td><td>1. Incorrect low voltage
4. Excessive inflow or pump not properly sized for application
5. Discharge restricted
6. Check valve partially closed or installed backwards
7. Shut-off valve closed
8. Impeller jammed or loose on shaft, or inlet plugged
9. Pump may be air locked causing pump not to flow
10. Piping fixtures leaking or discharge before the</td></tr>
<tr><td>when fixtures are not in use</td><td>6. Check valve partially closed or installed backwards
15. Ground water entering basin</td></tr>
<tr><td>Pump shuts off and turns on independent of switch, (trips thermal overload protector). CAUTION! Pump may start unexpectedly. Disconnect power supply.</td><td>1. Incorrect low voltage
4. Excessive inflow or pump not properly sized for application
8. Impeller jammed or loose on shaft, or inlet plugged
12. Excessive water temperature (internal protection only)</td></tr>
<tr><td>Pump operates noisily or vibrates excessively</td><td>2c. Worn bearings, motor shaft bent
5. Debris in impeller cavity or broken impeller
10. Pump running backwards
13. Piping attachments to building structure too loose or rigid</td></tr>
</table>

NOTE: Keen Pumps assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Keen Pumps or its authorized service centers, automatically voids warranty.

KEEN PUMPS
FACTORY WARRANTY

Keen Pumps warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for 18 months from date of manufacture or 12 months from installation date whichever occurs first. This warranty gives you specific legal rights, which vary from state to state.

This warranty is a limited warranty, and no warranty related claims of any nature whatsoever shall be made against Keen Pumps, until the ultimate consumer or his/her successor notifies us in writing of the defect and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station as instructed by Keen Pumps. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE. PRODUCT SHALL BE EITHER REPLACED OR REPAIRED AT THE ELECTION OF KEEN PUMPS. Guarantees relating to performance specifications provided in addition to the foregoing material and workmanship warranties on a product manufactured by Keen Pumps, if any, are subject to possible factory testing. Any additional guarantees, in the nature of certified performance specifications or time frame must be in writing and such writing must be signed by our authorized factory manager at time of order placement and/or at time of quotation. Due to inaccuracies in field testing and should a conflict arises between the results of field testing conducted by or for the user, Keen Pumps reserves the right to have the product returned to our factory for additional testing.

This warranty shall not apply when damage is caused by (1) improper installation, (2) improper voltage, (3) lightning, (4) excessive sand or other abrasive material, (5) corrosion build-up due to excessive chemical content or (6) uncontrollable acts of god. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective pumps, parts or systems. Keen Pumps will not accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY. No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.

IMPORTANT!
If you have a claim under the provision of the warranty, contact Keen Pumps or your authorized Keen Pumps Distributor:
www.keenpump.com

KEEN PUMP®

KEEN PUMP®

SPECIFICATIONS
Submersible Solids Handling Pump
Series: K3PL -S

General:
Furnish and install a quantity of _____ Keen® Pumps submersible sewage pump(s), Model K3PL____S, ____ HP, ____ RPM, ____ phase, 60 Hz, _____ volts, with a 3 inch vertical bolt-on discharge flange connection. Each pump shall be capable of delivering the following performance, ____ U.S. GPM at ____ ft total dynamic head, with a shut off head of ____ ft TDH minimum.

Pump Design:
The centrifugal sewage pump(s) shall be capable of handling 2.5 inch diameter spherical solids of raw, unscreened domestic sewage consisting of water, fibrous materials. The pump(s) shall be capable of handling liquids with temperatures to 104 °F continuous, and shall be capable of running dry for extended periods.

Pump Construction:
Castings: The volute, seal plates, impeller and motor housing shall be constructed of ASTM A-48 class 30 cast iron.

Coating/Hardware: Exterior surfaces shall be painted with a water based air dry enamel. All exposed hardware shall be 300 series stainless steel.

Gaskets: All gaskets shall be of the compression square ring type eliminating critical slip fits and the possibility of damage during service associated with sliding o-ring sealing arrangements.

Impeller: The impeller shall be of 2 vane, open type, solid handling design with pump out vanes on the back side. Impellers shall be capable of being trimmed to meet specific performance characteristics. The impeller shall be dynamically balanced to ISO G6.3 specifications.

Mechanical seal: A dual seal arrangement shall consist of a Buna-N exclusion seal and a single mechanical design operating in an oil-filled seal cavity. The seal shall be constructed of Silicon carbide faces, 300 series stainless steel hardware, and all elastomer parts to be of Buna-N. The seal shall be commercially available and not a manufacturers proprietary design.

Motor: Design shall be of the split capacitor design for single phase units. The pump shall be designed to be non-overloading throughout the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability.

The motor windings shall be of Class B insulation and operate in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of time without damage due to the heat being generated. The used dielectric oil must be disposed of as non-hazardous waste. The motor shall meet the standard NEMA L for single phase and NEMA B for three phase.

Thermal Protection: All single phase motors shall have thermal protection with automatic reset. Three phase motors shall be equipped with a thermal switch embedded in the stator windings and require external overload protection in the control panel.

Shaft: The pump shaft shall be of a one-piece design and shall be of 416 stainless steel.

Bearings: The lower bearing shall be of the single row ball type to accept radial and thrust loads, and the upper bearing of the single ball type for radial loads. Bearings shall operate in an oil bath atmosphere for superior life.

Power Cord: All pump(s) except 1.5 & 2 HP, 3 phase, shall be equipped with ____ ft of type SOW cord. The cord shall enter a cast iron terminal box assembly that is bolted to the motor housing and sealed with a Buna-N o-ring. The incoming lead wires shall be spliced in the terminal box. After splicing, the terminal box shall be filled with epoxy to seal the outer cable jacket and the individual strands to prevent water from entering the motor housing. Additional sealing and strain relief shall utilize a secondary pressure grommet at point of cable entry. 1.5 & 2 HP, 3 phase pump(s) shall be equipped with ____ ft of type SOW cord. The outer cord shall have an epoxy filled heat shrink tube to prevent water from entering the motor housing. Terminal connectors shall connect the incoming lead wires with the motor lead wires. Additional sealing and strain relief shall utilize a secondary pressure grommet at point of cable entry.

Tests and inspections: Shall be performed by the pump manufacture.

1. A ground continuity check and motor chamber shall be Hi-potted to test for electrical integrity.
2. Check that motor voltage and frequency matches name plate.
3. The pump shall be pressurized and a air leak test is performed to ensure the integrity of the motor housing.
4. The pump is submerged and operated to determine the unit meets hydraulic performance requirements.

SUBMERSIBLE SOLIDS HANDLING PUMP

Series: K3PL-S
3 HP / 1750 RPM
Discharge: 3"
Spherical solids handling: 2 1/2"

DISCHARGE
3" NPT female, vertical, bolt on flange.

LIQUID TEMPERATURE
104 °F (40 °C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 2 vane, open, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

HARDWARE
300 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: inboard, single mechanical, oil filled chamber.
Material: silicon carbide, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord SJO 14/3, sealed against moisture.

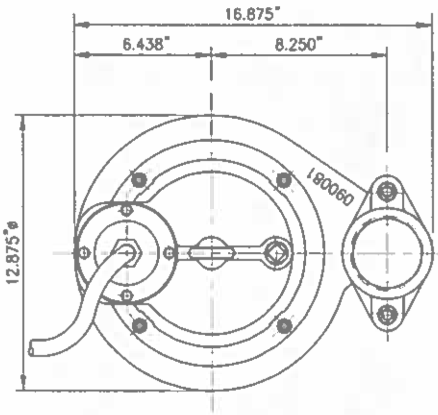
BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

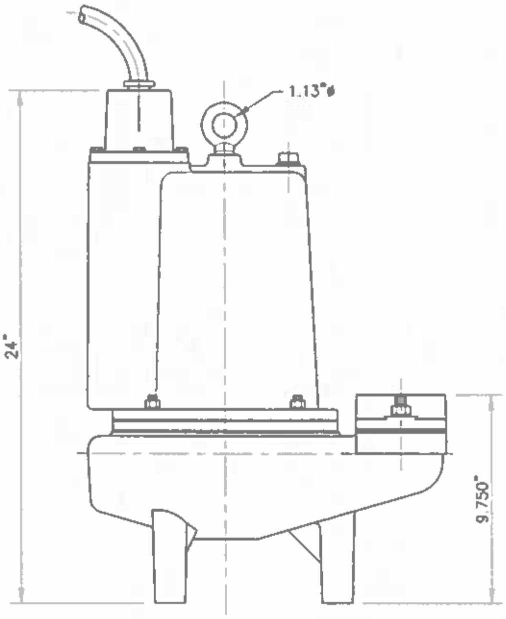
MOTOR
Single phase: permanent split capacitor, 200/230 volts, 60 Hz, 1750 RPM, oil filled, with overload protection in motor.
Three phase: 200/230 & 460 volts, 60 Hz, 1750 RPM, oil filled. Requires overload protection to be included in control panel.

OPTIONAL EQUIPMENT
Additional cord.

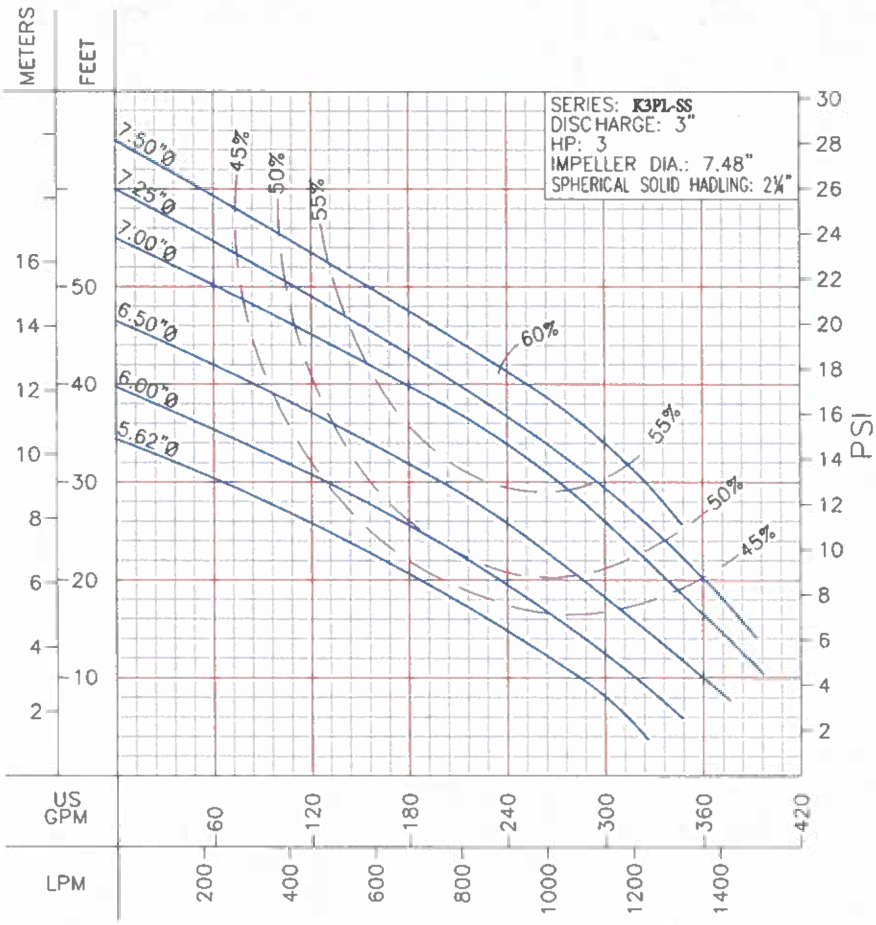
SPECIFICATIONS

SPECIFICATIONS





MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O. D.	WEIGHT (pounds)
K3PL30M4-21S	62170016	3	200/230	1	1750	28	59	A	10/4	SJO	0.69"	170
K3PL30M4-03S K3PL30M4-23S	62170017	3	200/230	3	1750	19	56	D	10/4	SJO	0.75"	170
K3PL30M4 43S	62170018	3	460	3	1750	9	28	D	10/4	SJO	0.75"	170



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

Installation, Operation & Maintenance Manual

Submersible Solids Handling Pumps

K3PL-S series

1.5, 2 & 3 HP @ 1750 RPM

K3PL15M4-21S
K3PL15M4-03S
K3PL15M4-23S
K3PL15M4-43S
K3PL20M4-21S
K3PL20M4-03S
K3PL20M4-23S
K3PL20M4-43S
1.5-2 HP

K3PL30M4-21S
K3PL30M4-03S
K3PL30M4-23S
K3PL30M4-43S
3 HP

IMPORTANT! - Read all instructions in this manual before operating or servicing a pump.

Before installation, read the following instructions carefully. Failure to follow instruction and safety information could cause serious bodily injury, death and/or property damage. Each Keen product is carefully inspected to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

⚠ DANGER **"Danger" indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠ WARNING **"Warning" indicates an imminenty hazardous situation which, if not avoided, MAY result in death or serious injury.**

⚠ CAUTION **"Caution" indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.**

IMPORTANT! - Keen Pumps is not responsible for losses, injury or death resulting from failure to observe these safety precautions, misuse, abuse or misapplication of pumps or equipment.

ALL RETURNED PRODUCTS MUST BE CLEANED, SANITIZED, OR DECONTAMINATED PRIOR TO SHIPMENT, TO INSURE EMPLOYEES WILL NOT BE EXPOSED TO HEALTH HAZARDS IN HANDLING SAID MATERIAL. ALL APPLICABLE LAWS AND REGULATIONS SHALL APPLY.

⚠ WARNING Installation, wiring, and junction connections must be in accordance with the National Electric Code and all applicable state and local codes. Requirements may vary depending on usage and location.

⚠ WARNING Installation and servicing is to be conducted by qualified personnel only.

Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected; the rotating cutter and/or impeller can cause serious injury.

Always wear eye protection when working on pumps. Do not wear loose clothing that may become entangled in moving parts.

⚠ DANGER Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing the pump or any accessory items associated with or near the pump.

⚠ DANGER This pump is not intended for use in swimming pools or water installations where there is human contact with pumped fluid.

⚠ DANGER Risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling any aspect of the pumping system. ***Lock out power and tag.***

⚠ WARNING **Do not** use these pumps in water over 104° F. **Do not** exceed manufacturers recommended maximum performance, as this could cause the motor to overheat.

⚠ DANGER **Do not** lift, carry or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death. **Never** handle connected power cords with wet hands. Use appropriate lifting device.

⚠ WARNING Ground Fault Circuit Interrupter (GFCI) to be used with plug-in type power cord.

⚠ WARNING Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping. Never enter a basin after it has been used.

⚠ DANGER Failure to permanently ground the pump, motor and controls before connecting to power can cause shock, burns or death.

⚠ DANGER These pumps are not to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.

⚠ WARNING The Uniform Plumbing Code (UPC) states that sewage systems shall have an audio and visual alarm that signals a malfunction of the systems, that are required to reduce the potencial for property damage.

IMPORTANT! - Prior to installation, record Model Number, Serial, Amps, Voltage, Phase and HP from pump name plate for the future reference. Also record the Voltage and Current Readings at Startup:

1 Phase Models	
Amps:	Volts:
3 Phase Models	
Amps L1-2:	Volts L1-2:
Amps L2-3:	Volts L2-3:
Amps L3-1:	Volts L3-1:

Model Number: ____________________

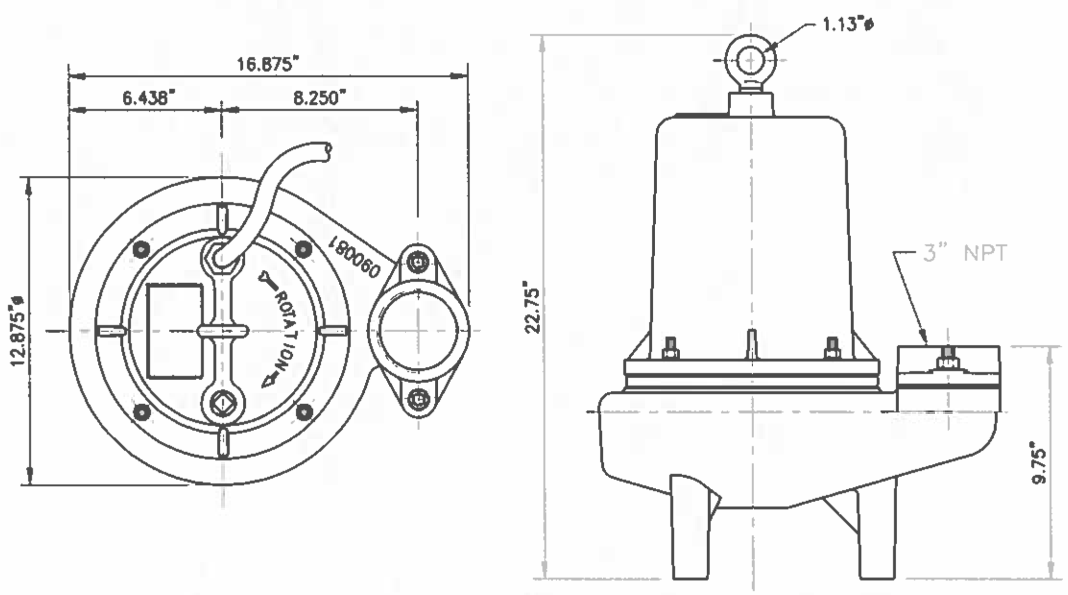
Serial: ____________

PHASE: ______ HP: __________________

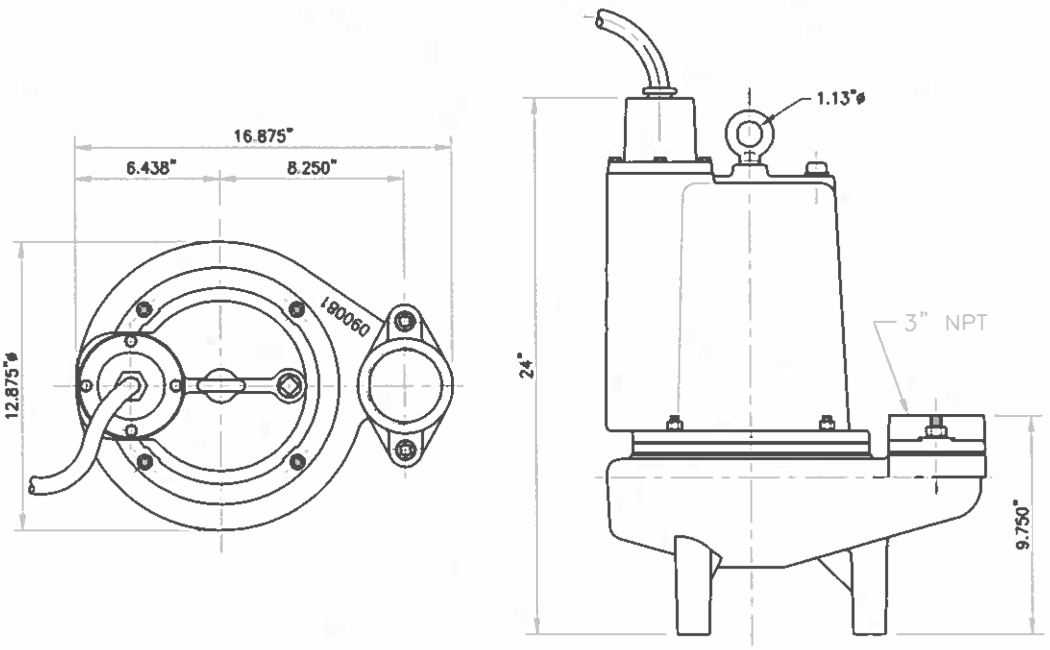
DISCHARGE:	3" NPT female, vertical, bolt on flange.
SPHERICAL SLD HNDLG:	2½"
LIQUID TEMPERATURE:	104° F (40° C) max.
VOLUTE:	Cast iron ASTM A-48 class 30.
MOTOR HOUSING:	Cast iron ASTM A-48 class 30.
SEAL PLATE:	Cast iron ASTM A-48 class 30.
IMPELLER:	2 vane, open, with vanes on back side. Cast iron ASTM A-48 class 30.
SHAFT:	416 series stainless steel.
HARDWARE:	300 series stainless steel.
SQUARE RINGS:	Buna-N.
PAINT:	Air dry enamel, water based.
SEAL:	Inboard, single mechanical, oil filled chamber. Silicon carbide, Buna-N elastomer and stainless steel hardware.
CORD ENTRY:	25 ft of neoprene cord SJO 14/3, sealed against moisture.
UPPER BEARING:	Ball, single row, oil lubricated, for radial load.
LOWER BEARING:	Ball, single row, oil lubricated, for radial and thrust load.
MOTOR:	***Single phase:*** NEMA L, permanent split capacitor, oil filled, with overload protection in motor. ***Three phase:*** NEMA B, oil filled. Requires overload protection to be included in control panel.

MODEL	HP	VOLTS	PHASE	RPM	MAX. AMPS.	LOCKED ROTOR AMPS.	NEMA CODE	CORD SIZE	CORD TYPE	CORD LENGTH	WEIGHT (pounds)
K3PL15M4-21S	1.5	200/230	1	1750	12.6	23	B	10/3	SJO	25'	225
K3PL15M4-03S K3PL15M4-23S		200/230	3		11.6	36	H/L	10/4			207
K3PL15M4-43S		460	3		5.8	17.5	L	10/4			207
K3PL20M4-21S	2	200/230	1		14.5	29	B	10/3	SJO	25'	229
K3PL20M4-03S K3PL20M4-23S		200/230	3		14	50.8	J/M	10/4			207
K3PL20M4-43S		460	3		7	25.4	M	10/4			207
K3PL30M4-21S	3	200/230	1		28	59	A	10/4	SJO	25'	226
K3PL30M4-03S K3PL30M4-23S		200/230	3		19	56	D	10/4			233
K3PL30M4-43S		460	3		9	28	D	10/4			233

K3PL15M4-03S
K3PL15M4-23S
K3PL15M4-43S
K3PL20M4-03S
K3PL20M4-23S
K3PL20M4-43S



K3PL15M4-21S
K3PL20M4-21S
K3PL30M4-21S
K3PL30M4-03S
K3PL30M4-23S
K3PL30M4-43S



▸ Receiving inspection
Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. If the manual is removed from the packaging, do not lose or misplace.

▸ Storage
Any product that is stored for a period longer than six (6) months from the date of purchase should be bench tested prior to installation. A bench test consists of, checking the impeller to assure it is free turning and a run test to assure the motor (and switch if provided) operate properly.

▸ Controls
Manual models require a separate approved pump control device or panel for automatic operation. Be sure the electrical specification of the control selected properly match the electrical specifications of the pump.

▸ Submergence
The pump should always be operated in the submerged condition. The minimum sump liquid level should never be less than above the pump's volute (See Figure 1).

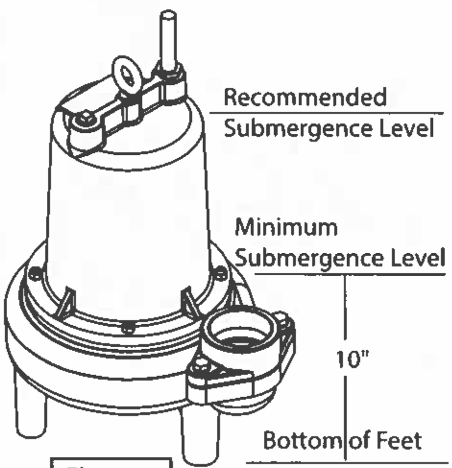


Figure 1

▸ Installation
These pumps are recommended for use in a sump, basin or lift station. The sump, basin or lift station shall be sealed and vented in accordance with local plumbing codes. **This pump is designed to pump sewage, effluent or wastewater, non-explosive and non-corrosive liquids and shall NOT be installed in locations classified as hazardous in accordance with the National Electrical Code (NEC) ANSI/NFPA 70 or Canadian Electric Code (CEC).** The pump should never be installed in a trench, ditch, or hole with a dirt bottom. The legs will sink into the dirt and the suction will become plugged.

The installation should be at a sufficient depth to ensure that all plumbing is below the frost line. If this is not feasible, remove the check valve and size the basin to accommodate backflow volume.

Pumps are most commonly installed in simplex or duplex stations or basins with a slide rail system (Keen SRC), which allows the pump(s) to be installed or removed without requiring personnel to enter the station, or resting on the basin floor.

▸ Discharge Piping
Discharge piping should be as short as possible and sized no smaller than the pump discharge. **Do not reduce the discharge pipe size below that which is provided on the pump.** Both a check valve and a shut-off valve are recommended for each pump. The check valve is used to prevent backflow into the sump. The shut-off valve is used to manually stop system low during pump servicing.

▸ Liquid Level Controls
The level control(s) should be mounted on the discharge piping, a cable rack or float pole. The level control should have adequate clearance so it cannot hang up in it's swing and that the pump is completely submerged when the level control is in the "Off" mode. By adjusting the cord tether the control level can be changed. One cycle of operation should be observed, so that any potential problems can be corrected.

It is recommended that the level control float should be set to insure that the liquid in the sump never drops below the top of the motor housing or a minimum level of 10 inches above the basin floor.

▸ Electrical Connections
Power cable:
The power cable mounted to the pump must not be modified in any way except for shortening to a specific application. Any splice between the pump and the control panel must be made in accordance with the electric codes. It is recommended that a junction box, if used, be mounted outside the sump or be of at a minimum Nema 4 construction if located within the wet well. **DO NOT USE THE POWER CABLE TO LIFT PUMP.**

Always rely upon a Certified Electrician for installation.

Overload Protection:
Single Phase - The stator in-winding overload protector used is referred to as an inherent overheating protector and operates on the combined effect of temperature and current. This means that the overload protector will trip out and shut the pump off if the windings become too hot, or the load current passing through them becomes too high.

IMPORTANT! - The overload will then automatically reset and start the pump up after the motor cools to a safe temperature. In the event of an overload, the source of this condition should be determined and corrected immediately.

⚠ WARNING DO NOT ALLOW THE PUMP TO CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS.

If current through the temperature sensor exceeds the values listed, an intermediate control circuit relay must be used to reduce the current or the sensor will not work properly.

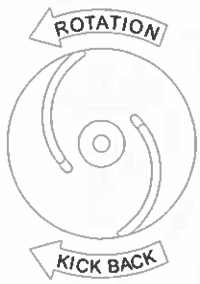
TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
110-120	3.00	30.0
220-240	1.50	15.0
440-480	0.75	7.5
600	0.60	6.0

Wire Size:
If longer power cable is required consult a qualified electrician for proper wire size.

▸ Pre-Operation

1. **Check Voltage and Phase** - Compare the voltage and phase information stamped on the pump name plate.

2. **Check Pump Rotation** - Improper motor rotation can result in poor pump performance and can damage the motor and/or pump. Check rotation on three phase units by momentarily applying power and observe the "kickback".



Bottom of Pump

Kickback should always be in a counter-clockwise direction as viewed from motor end or opposite to impeller rotation. Impeller rotation is counter-clockwise as viewed from bottom of pump.

3. **Name Plate** - Record the information from the pump name plate to drawing in front of manual for future reference.

Insulation Test - An insulation (megger) test should be performed on the motor. Before the pump is put into service. The resistance values (ohms) as well as the voltage (volts) and current (amps) should be recorded.

5. **Pump-Down Test** - Be sure pump has been properly wired, lowered into the basin, sump or lift station, check the system by filling with liquid and allowing the pump to operate through its pumping cycle. The time needed to empty the system, or pump-down time along with the volume of water, should be recorded.

▸ Maintenance

No lubrication or maintenance is required. Perform the following checks when pump is removed from operation or when pump performance deteriorates:

a) Inspect motor chamber for oil level and contamination.
b) Inspect impeller and body for excessive build-up or clogging.
c) Inspect motor, bearings and shaft seal for wear or leakage.

▸ Servicing

NOTE: Item numbers in ( ) refer to Figures 6 through 13.

Cooling Oil - Anytime the pump is removed from operation, the cooling oil in the motor housing should be checked visually for oil level and contamination. To check oil, set unit upright. Remove pipe plug (20) from housing (4). With a flashlight, visually inspect the oil in the housing (4) to make sure it is clean and clear, light amber in color and free from suspended particles. Milky white oil indicates the presence of water. Oil level should be just above the motor when pump is in vertical position.

Oil Testing

- Drain oil into a clean, dry container by placing pump on it's side, remove pipe plug (20), from housing (4).
- Check oil for contamination using an oil tester with a range to 30 kilovolts breakdown.
- If oil is found to be clean and uncontaminated (measuring above 15 kV breakdown), refill the housing.
- If oil is found to be dirty or contaminated (or measures below 15 kV breakdown), the pump must be carefully inspected for leaks at the shaft seal, cable assembly, square ring and pipe plug, before refilling with oil. To locate the leak, perform a pressure test.

After leak is repaired, dispose of old oil properly, and refill with new oil.

Pressure Test (If oil has been drained) - Remove pipe plug (20) from housing (4). Apply pipe sealant to pressure gauge assembly and tighten into hole. Pressurize motor housing to 10 P.S.I. Use soap solution around the sealed areas and inspect joints for "air bubbles".

If, after five minutes, the pressure is still holding constant, and no "bubbles" are observed, slowly bleed the pressure and remove the gauge assembly. Replace oil. Leek must be located and repaired if pressure does not hold.

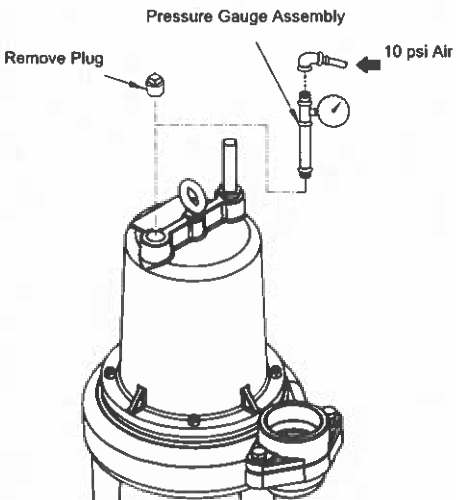


Figure 2

Pressure Test (If oil has NOT been drained) - Oil should be at normal level. Remove pipe plug (20) from housing (4). Apply pipe sealant to pressure gauge assembly and tighten into hole. Pressurize motor housing to 10 PSI. Use soap solution around the sealed areas above the oil level and inspect joints for "air bubbles". For sealed areas below oil level, leeks will seep oil. If, after five minutes, the pressure is still holding constant, and no "bubbles", oil seepage is observed, slowly bleed the pressure and remove the gauge assembly. Replace oil. Leek must be located and repaired if pressure does not hold.

Pressure builds up extremely fast, increase pressure by "TAPPING" air nozzle. Too much pressure will damage seal. ***DO NOT exceed 10 PSI.***

Oil Replacement - Set unit upright and refill with new cooling oil as per table below. Fill to just above motor, but below capacitor as an air space must remain in the top of the housing to compensate for oil expansion. Apply pipe thread compound to threads of pipe plug (20) then assemble to housing (4).

DO NOT overfill oil. Overfilling of housing with oil can create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard. Overfilling oil voids warranty.

Cooling Oil Recommended Supplier/Grade	
BP	Enerpar SE100
Conoco	Pale Parafin 22
Mobile	D.T.E. Oil Light
Shell Canada	Transformer-10
Texaco	Diala-Oil-AX

▸ Disassembly

Impeller and Volute:

1. Disconnect power.

2. Remove hex nuts (9), vertically lift motor housing and seal plate assembly from volute (1). Clean out volute if necessary.

3. Inspect o-ring (19) and replace if cut or damaged.

4. Clean and examine impeller (2), for cracks or breakage and replace if required. To remove impeller (2), remove impeller nut (12) and washer (13). With a wheel puller, pull impeller straight of shaft and remove key (14).

5. Remove washer (15) and v-gasket (16) and remove if damaged.

Power Cord - K3PL-SS (1.5 - 2 HP, 3 PH)

6. Remove gland nut (23), friction ring (24), grommet (25) and friction ring (24) from motor housing (4). Pull cord through and disconnect the wires from the terminals (28).

Power Cord - K3PL-SS (1.5 - 2 HP, 1 PH) and K3PL-SS (3 HP) 7. Remove cap screws (36) and washers (37), lift conduit box and cable assy (33) from motor housing (4). Disconnect the wires from the terminals (28). Remove o-ring (35) replace if damaged.

Motor and Capacitor:

8. Remove screws (17) and lift motor housing (4) from seal plate (3).

9. Remove o-ring (18), replace if damaged.

10. Remove motor bolts, lift motor stator assembly from seal plate (3).

11. On Single Phase units only. Check motor capacitor (34) with an Ohm meter by first grounding the capacitor by placing a screwdriver across both terminals and then removing screwdriver. Connect Ohm meter (set on high scale) to terminals. If needle moves to infinity (∞) then drifts back, the capacitor is good. If needle does not move or moves to infinity (∞) and does not drift back, replace capacitor (34).

12. Inspect motor winding for shorts and check resistance values. Check rotor for wear. If rotor or the stator windings are defective, the complete motor must be replaced.

Shaft Seal:
13. Unscrew conduit bushing (29) from seal plate (3) and lift motor rotor, shaft, bearing (8), rotating member of seal (6), washer (30) and conduit bushing (29) from seal plate (3). See Figure 3.

14. Remove seal parts (6) from shaft. Examine all seal parts, if seal faces show signs of wear, uneven wear pattern, chips or scratches replace entire seal. **DO NOT interchange seal components, replace the entire shaft seal (6).** If replacing seal, remove stationary from seal plate (3) by prying out with flat screwdriver.

▸ Reassembly

⚠ ***IMPORTANT! - All parts must be clean before reassembly. Handle seal parts with extreme care. DO NOT damage lapped surfaces.***

Shaft Seal:
1. To reassemble, clean seal cavity in seal plate (3) and oil.

2. Press seal's (6) stationary member firmly into seal plate (3), use a seal tool or pipe. Nothing should come in contact with the seal face except the seal tool. Be sure the stationary is in straight.

3. Place conduit bushing (29) and washer (30) onto shaft. Press lower bearing (8) onto shaft.

4. Place seal's (6) retaining ring and spring onto shaft. Lightly oil **(Do not use grease)** shaft and inner surface of bellows.

5. With lapped surface of rotating member facing outward, slide over shaft using a seal tool, being carefull not to damage seal face. Make sure spring is seated in retaining ring and spring is lined up on rotating member and not cocked or resting on bellows tail.

6. Slide rotor/shaft with bearing (8) and seal parts (6) into seal plate (3) until bearing seats into seal plate and tighten conduit bushing (29) into seal plate (3). Place stator over rotor, lining up motor bolts with holes in seal plate (3). Insert motor bolts and torque to 17 inch pounds.

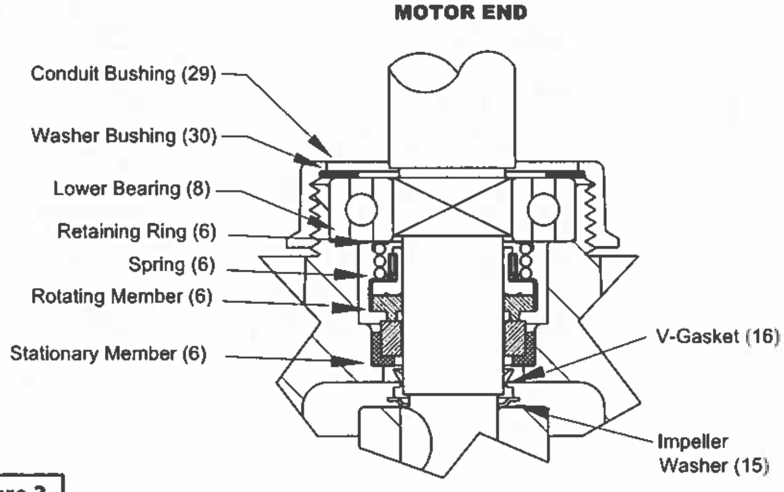


Figure 3

7. On Single phase units, connect capacitor (34) to motor wires. See Figure 5.

8. **On models K3PL-SS (1.5 - 2 HP, 3 Ph),** Place gland nut (23), one friction ring (24), grommet (25) and one friction ring (24) onto cord (22) and slide cord through hole in motor housing (4) (See Figure 4). Make wire connections per Figure 5.

9. **On models K3PL-SS (1.5 - 2 HP, 1 Ph) and K3PL-SS (3 HP),** place all motor leads above motor. Place o-ring
(18) on seal plate (3) and lower motor housing (4) onto seal plate (3).

10. Place socket head screws (17) through seal plate into motor housing and torque to 60 inch pounds.

11. Install v-gasket (16) and impeller washer (15) over shaft, and into seal plate (3).

12. Install impeller (2) by appling a thin film of oil to motor shaft and slide impeller straight onto shaft, keeping keyways lined up. Drive key (14) into keyway.

13. Place washer (13) and impeller nut (12) onto shaft and torque to 40 ft. lbs. Rotate impeller to check for binding.

14. Place o-ring (19) onto volute (1).

15. Lower motor housing and seal plate assembly onto volute (1). Apply thread locking compound to studs (9) and place hex nuts (10) onto studs and torque to 24 ft. lbs.

Models - K3PL-SS (1.5 - 2 HP, 1 Ph) and K3PL-SS (3 HP)

16. Pull wires through large opening in motor housing (4) and connect wires with cord (22) in Conduit box (33) per schematic in Figure 5.

17. Refill with cooling oil and place o-ring (35) and conduit box (33) onto motor housing (4). Place cap screws (36) and washers (37) through conduit box into motor housing and tighten to 16 ft. lbs.

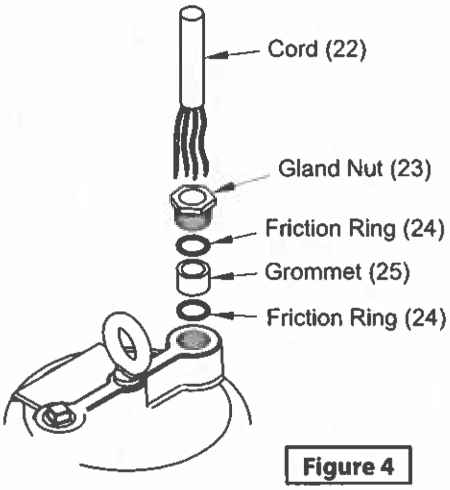


Figure 4

Cable Assembly:

18. For ALL Models - Check power cord (22) for cracks or damage and replace if required. Insert one friction ring (24), grommet (25), one friction ring (24), and gland nut (23) into motor housing (4) or conduit box and cable assembly (33) and torque gland nut (23) to 15 ft. lbs.

19. On models **K3PL-SS (1.5 - 2 HP, 1 Ph) and K3PL-SS (3 HP)**, refill with cooling oil and replace pipe plug (20).

SINGLE-PHASE 115/230V AC
POWER CORD 3x14

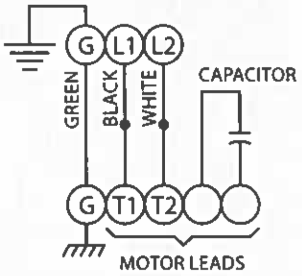


Figure 5

Cable	Motor Lead Number
Green	Green
Black	1
White	2
Flag terminal	Capacitor
Flag terminal	Capacitor

THREE-PHASE 460V AC
POWER CORD 4x12

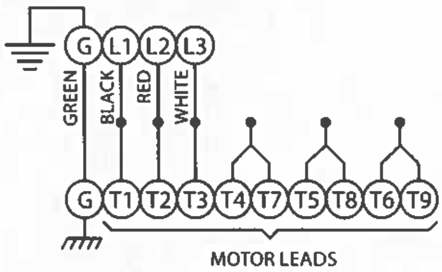


Figure 5

Cable	Motor Lead Number
Green	Green
Black	1
Red	2
White	3
	4 and 7 together
	5 and 8 together
	6 and 9 together

THREE-PHASE 208/230V AC
POWER CORD 4x12

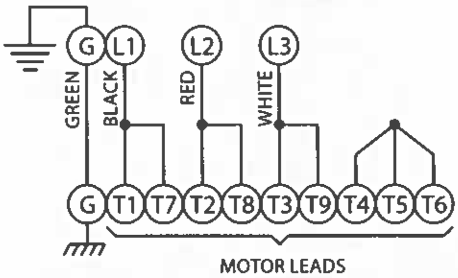
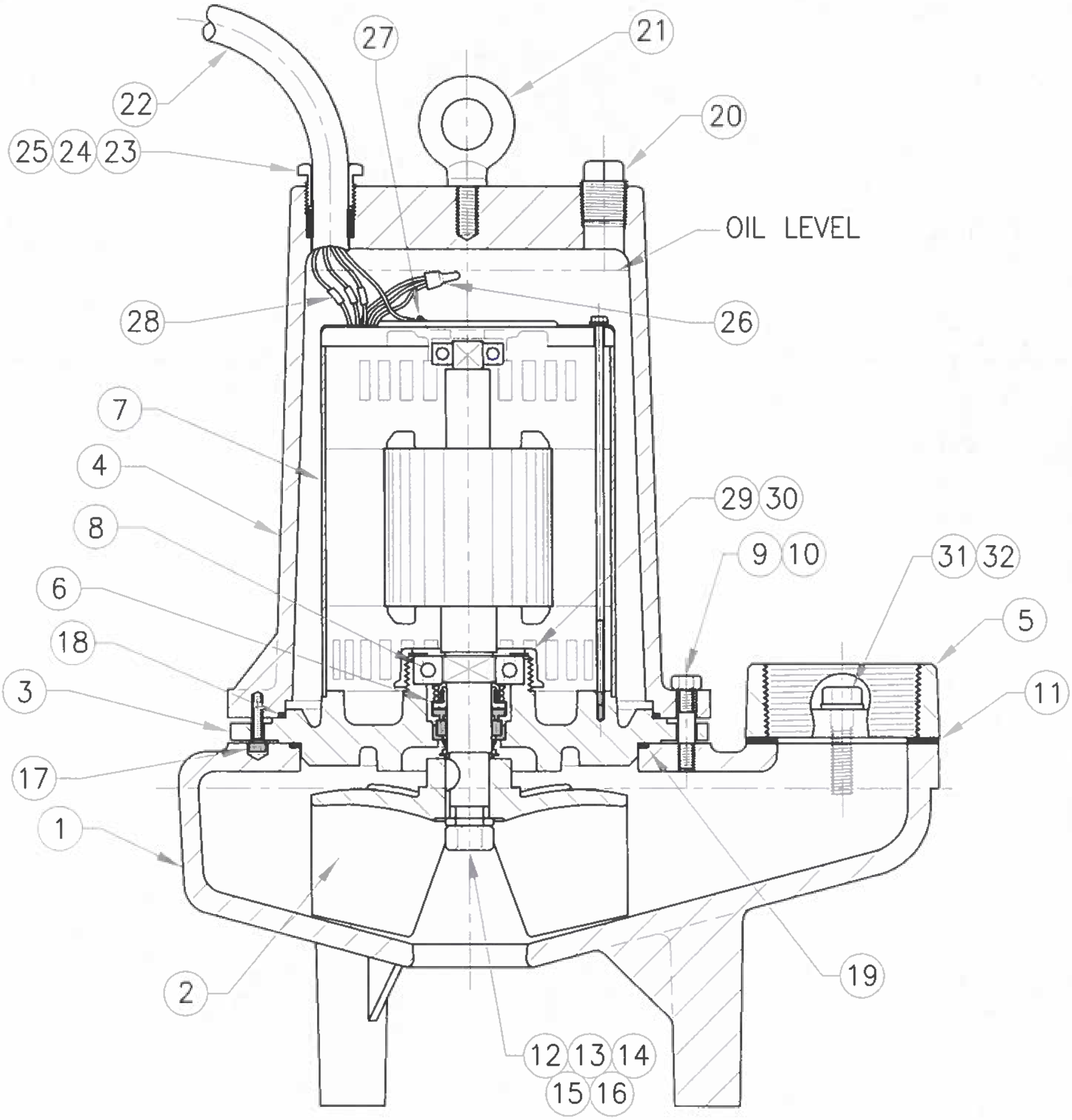


Figure 5

Cable	Motor Lead Number
Green	Green
Black	1 and 7
Red	2 and 8
White	3 and 9
	4, 5 and 6 together

Figure 8

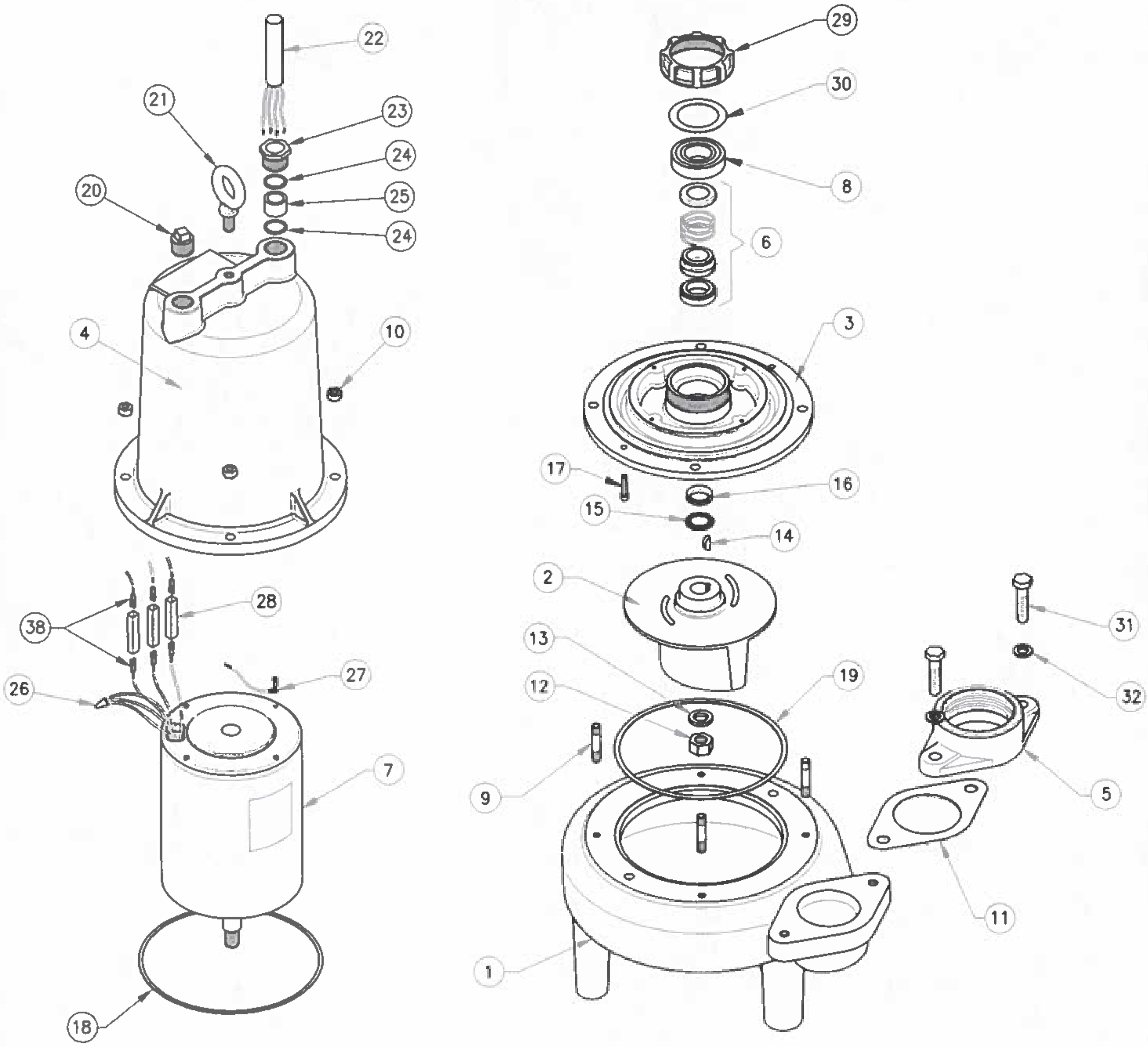
▸ **K3PL15M4-03S, K3PL15M4-23S, K3PL15M4-43S, K3PL20M4-03S, K3PL20M4-23S, K3PL20M4-43S**



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Figure 9

▸ **K3PL15M4-03S, K3PL15M4-23S, K3PL15M4-43S, K3PL20M4-03S, K3PL20M4-23S, K3PL20M4-43S**



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

▸ K3PL15M4-03S, K3PL15M4-23S, K3PL15M4-43S, K3PL20M4-03S, K3PL20M4-23S, K3PL20M4-43S

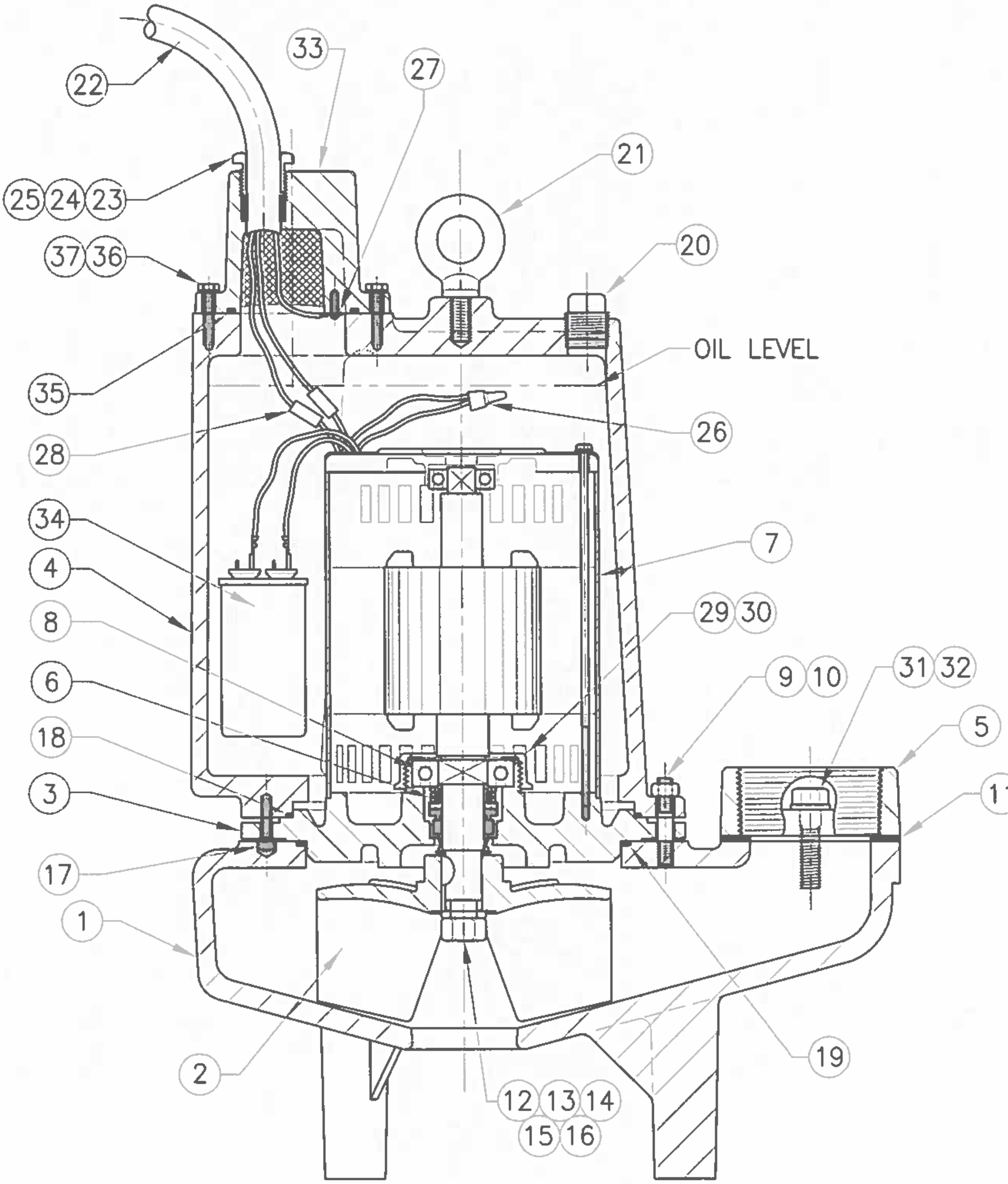
ITEM	QTY.		DESCRIPTION	PART No.
1	1		Volute	03090034
2	1	■	Impeller 6.25"Ø (For K3PL15M4-03/23S & K3PL15M4-43S)	03140029B
			Impeller 7.00"Ø (For K3PL20M4-03/23S & K3PL20M4-43S)	03140029
3	1		Seal Plate	03180012
4	1		Motor Housing	03100002
5	1		Discharge Flange	03060014
6	1	▲	Shaft Seal - Silicon Carbide	31030152
7	1	■	Motor 2 hp, 230/460 V, 3 ph	40040005
8	1	▲	Ball Bearing	31020010
9	4	◆	Stud 3/8"-16UNC x 2" lg. SS # 33824	91010374
10	4	◆	Hex Nut 3/8"-16UNC SS # 18927	91010433
11	1	▲	Discharge Gasket	92010125
12	1	▲	Impeller Nut 5/8"-18UNF, SS # 38132	91010442
13	1	▲	Washer 5/8" SS # 70320	91010063
14	1	▲	Shaft Key	91010111
15	1	▲	Washer Impeller # 62641	91010051
16	1	▲	V-Gasket # 61829	92010112
17	2	◆	Socket Head Cap Screw ¼"-20UNC x 1" lg. SS	91010392
18	1	▲	Gasket Housing - Seal Plate # 33730	92010083
20	1	◆	Pipe Plug ¾" NPT	93010148
21	1	◆	Eye Bolt ½"-13UNC x 1.0" lg.	91010406
-	1	■	Power Cable Assy. (*) Includes 22, 23, 24, & 25	-
22	1	*	Power Cable, 25 Feet, 10/4 SOW	31030003
23	1	*	Hex Head Plug	30400903
24	2	*	Friction Ring # 54746	91010055
25	1	*	Grommet # 514	92010001
26			Wire Connector # 1921	94010012
	1		For K3PL15M4-03/23S & K3PL20M4-03/23S	-
	3		For K3PL15M4-43S & K3PL20M4-43S	-
27	1	◆	Eye terminal 3/16"	94010043
28	3		Terminal Connector	94010027
29	1	▲	Conduit Bushing # 53749	31190021
30	1	▲	Washer Bushing # 53756	91010054
31	2	◆	Screw ½"-13UNC x 1¾" lg., SS	91010364
32	2	◆	Lockwasher ½" SS	91010062
38	6		Female Connector	94010041
39	1.50 gal.	◆	Oil Motor Housing	31010031

◆ = Aquire standard hardware locally.
▲ = Overhaul Kit.
■ = Supplied as individual items.

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Figure 10

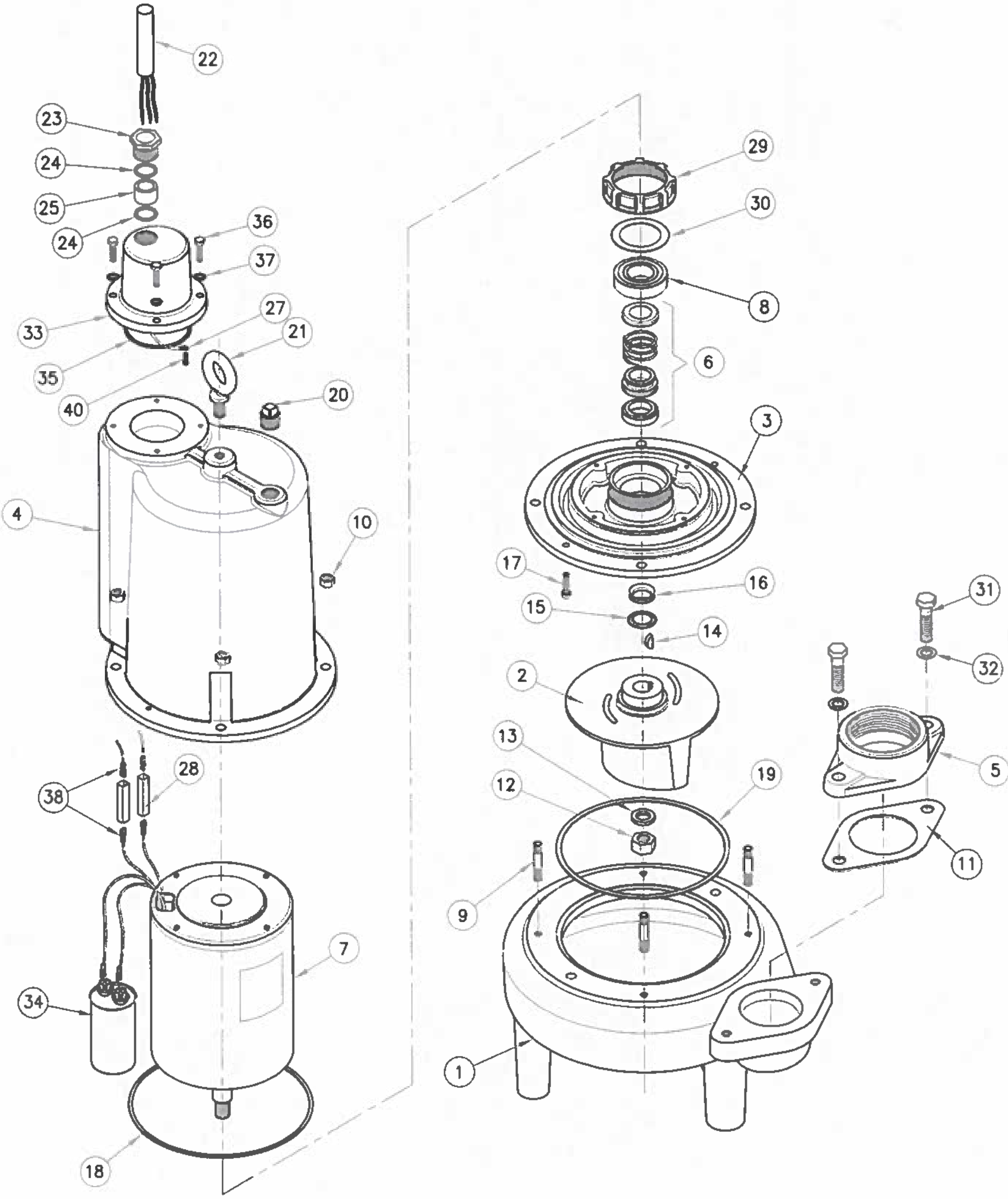
▸ **K3PL15M4-21S, K3PL20M4-21S, K3PL30M4-21S**



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Figure 11

▸ **K3PL15M4-21S, K3PL20M4-21S, K3PL30M4-21S**



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

▸ K3PL15M4-21S, K3PL20M4-21S, K3PL30M4-21S

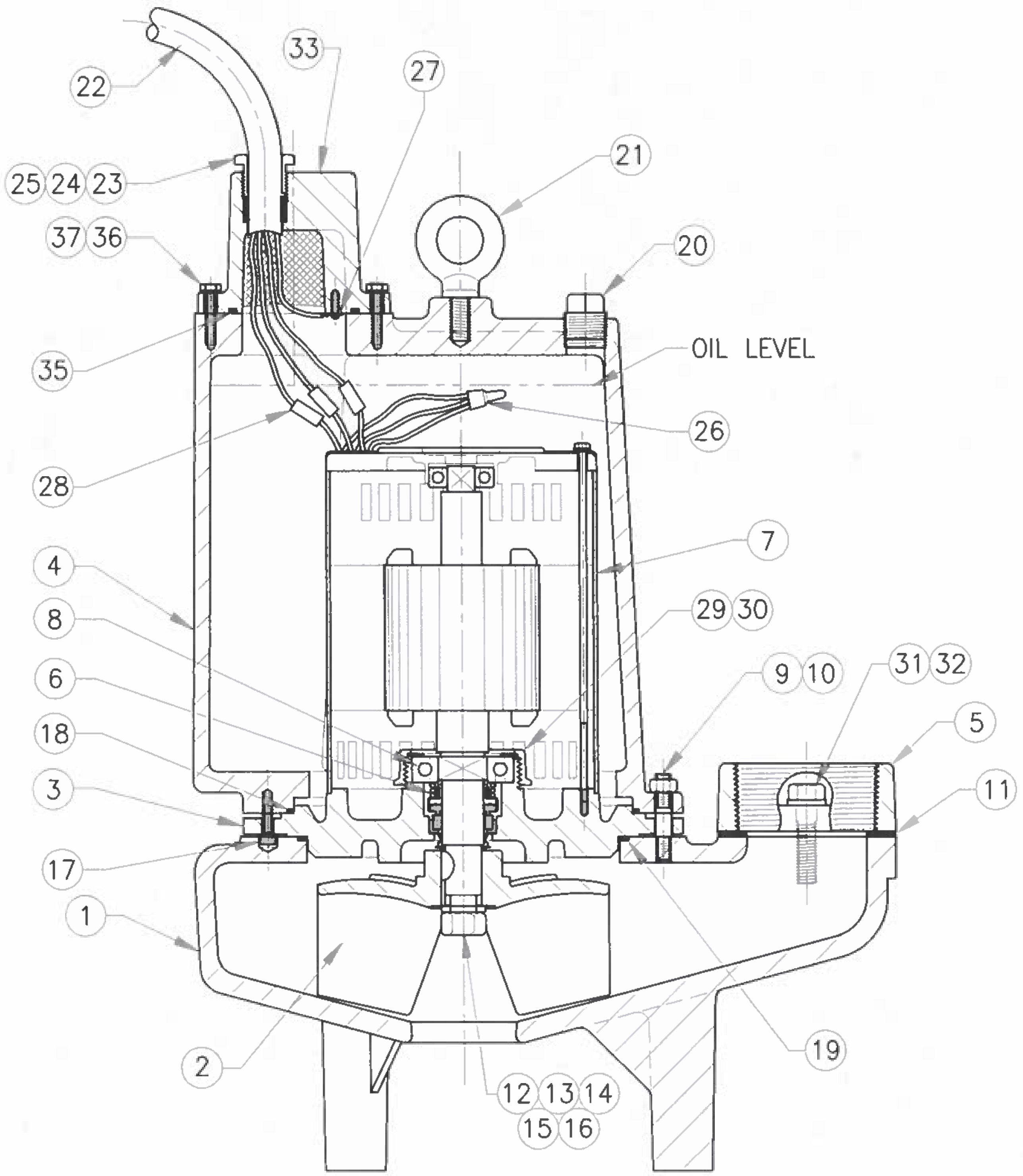
ITEM	QTY.		DESCRIPTION	PART No.
1	1		Volute	03090034
2	1	■	Impeller 6.25"Ø (For K3PL15M4-21S)	03140029B
			Impeller 7.00"Ø (For K3PL20M4-21S)	03140029
			Impeller 7.50"Ø (For K3PL30M4-21S)	03140093
3	1		Seal Plate	03180012
4	1		Motor Housing	03100009
5	1		Discharge Flange	03060014
6	1	▲	Shaft Seal - Silicon Carbide	31030152
7	1	■	Motor 3hp, 230 V, 1 ph	40040061
8	1	▲	Ball Bearing	31020010
9	4	◆	Stud 3/8"-16UNC x 2" lg. SS # 33824	91010374
10	4	◆	Hex Nut 3/8"-16UNC SS # 18927	91010433
11	1	▲	Discharge Gasket	92010125
12	1	▲	Impeller Nut 5/8"-18UNF, SS # 38132	91010442
13	1	▲	Washer 5/8" SS # 70320	91010063
14	1	▲	Shaft Key	91010111
15	1	▲	Washer Impeller # 62641	91010051
16	1	▲	V-Gasket # 61829	92010112
17	2	◆	Socket Head Cap Screw ¼"-20UNC x 1" lg. SS	91010392
18	1	▲	Gasket Housing - Seal Plate # 33730	92010083
19	1	▲	Gasket Volute - Seal Plate # 27269	92010082
20	1	◆	Pipe Plug ½" NPT	93010150
21	1	◆	Eye Bolt ½"-13UNC x 1.0" lg.	91010406
-	1	■	Conduit Box & Cable Assembly (*) Includes: 22, 23, 24, 25, 27 & 33	-
22	1	*	Power Cable, 25 Feet, 10/3 SOW	31030007
23	1	*	Hex Head Plug	30400902
24	2	*	Friction Ring # 51450	91010056
25	1	*	Grommet # 51451	92010007
26	2		Wire connector	94010011
27	1	◆	Eye terminal 3/16"	94010043
28	2		Terminal Connector	94010027
29	1	▲	Conduit Bushing # 53749	31190021
30	1	▲	Washer Bushing # 53756	91010054
31	2	◆	Screw ½"-13UNC x 1¾" lg., SS	91010364
32	2	◆	Lockwasher ½" SS	91010062
33	1		Conduit box & Cable Assembly	03100010
34	1		Capacitor 45MFD 370V	31030038
35	1		O-Ring	92010063
36	4		Cap screw ¼"-20UNC x 1.00" lg. SS	91010342
37	4		Lockwasher ¼" SS	91010066
38	4		Female Connector	94010041
39	1.85 gal.	◆	Oil Motor Housing	31010031
40	1		Pan Head Screw 6-32 x 3/8" lg.	91010408

◆ = Aquire standard hardware locally.
▲ = Overhaul Kit.
■ = Supplied as individual items.

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Figure 12

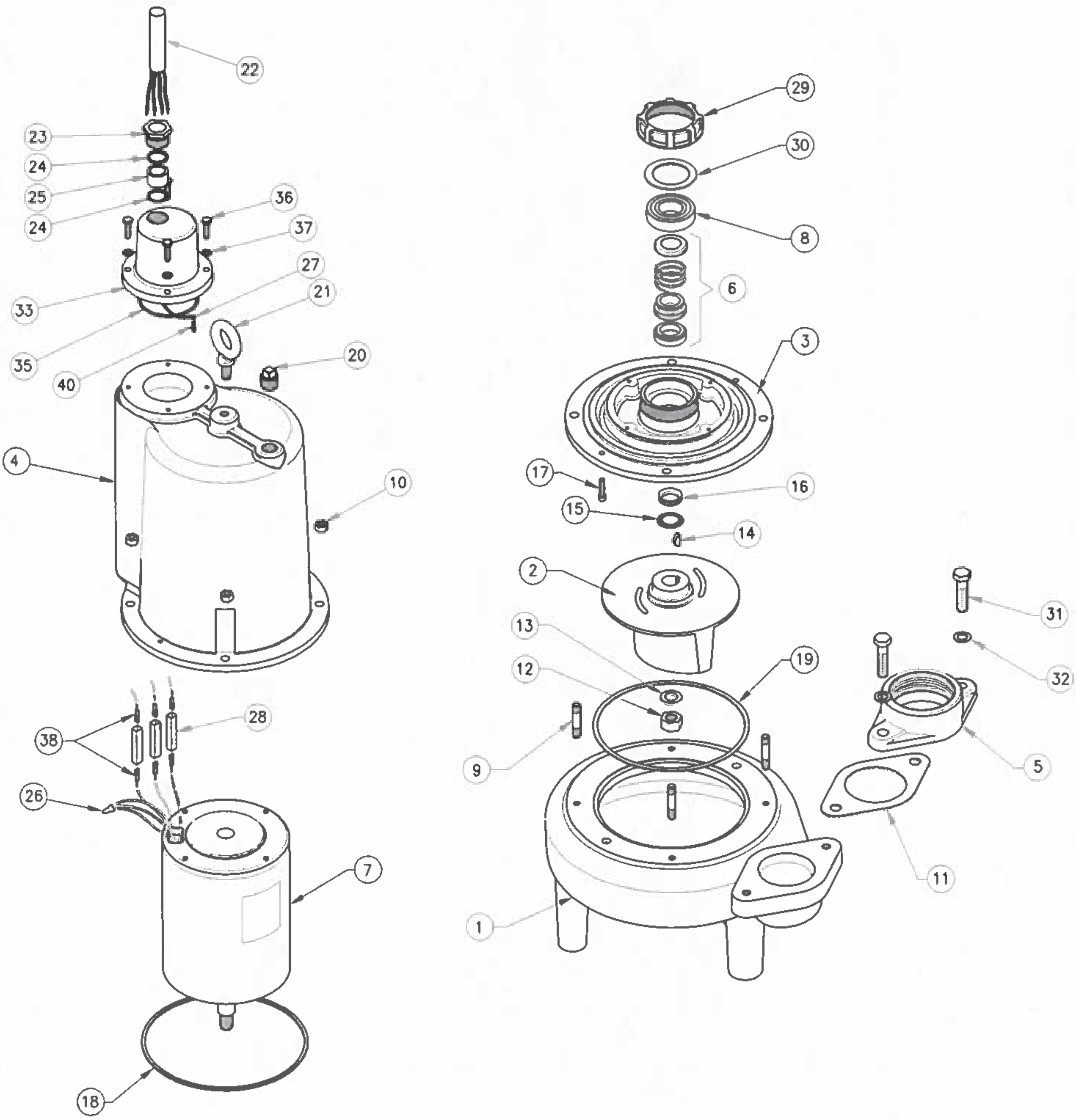
▸ **K3PL30M4-03S, K3PL30M4-23S, K3PL30M4-43S**



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Figure 13

▸ K3PL30M4-03S, K3PL30M4-23S, K3PL30M4-43S



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

▸ K3PL30M4-03S, K3PL30M4-23S, K3PL30M4-43S

ITEM	QTY.		DESCRIPTION	PART No.
1	1		Volute	03090034
2	1	■	Impeller7.50"Ø(For K3PL30M4-03/23S&K3PL30M4-43S)	03140093
3	1		Seal Plate	03180012
4	1		Motor Housing	03100009
5	1		Discharge Flange	03060014
6	1	▲	Shaft Seal - Silicon Carbide	31030152
7	1	■	Motor 3hp, 230/460 V, 3 ph	40040006
8	1	▲	Ball Bearing	31020010
9	4	◆	Stud 3/8"-16UNC x 2" lg. SS # 33824	91010374
10	4	◆	Hex Nut 3/8"-16UNC SS # 18927	91010433
11	1	▲	Discharge Gasket	92010125
12	1	▲	Impeller Nut 5/8"-18UNF, SS # 38132	91010442
13	1	▲	Washer 5/8" SS # 70320	91010063
14	1	▲	Shaft Key	91010111
15	1	▲	Washer Impeller # 62641	91010051
16	1	▲	V-Gasket # 61829	92010112
17	2	◆	Socket Head Cap Screw ¼"-20UNC x 1" lg. SS	91010392
18	1	▲	Gasket Housing - Seal Plate # 33730	92010083
19	1	▲	Gasket Volute - Seal Plate # 27269	92010082
20	1	◆	Pipe Plug ½" NPT	93010150
21	1	◆	Eye Bolt ½"-13UNC x 1.0" lg.	91010406
22	1	*	Power Cable, 25 Feet, 10/4 SOW	31030003
23	1	*	Hex Head Plug	30400903
24	2	*	Friction Ring # 54746	91010055
25	1	*	Grommet # 514	92010001
26			Wire connector	94010012
	1		For K3PL30M4-03/23S	-
	3		For K3PL30M4-43S	-
27	1	◆	Eye terminal 3/16"	94010043
28	3		Terminal Connector	94010027
29	1	▲	Conduit Bushing # 53749	31190021
30	1	▲	Washer Bushing # 53756	91010054
31	2	◆	Screw ½"-13UNC x 1¾" lg., SS	91010364
32	2	◆	Lockwasher ½" SS	91010062
33	1		Conduit box & Cable Assembly	03100010
35	1		O-Ring	92010063
36	4		Cap screw ¼"-20UNC x 1.00" lg. SS	91010342
37	4		Lockwasher ¼" SS	91010066
38	6		Female Connector	94010041
39	1.85 gal.	◆	Oil Motor Housing	31010031
40	1		Pan Head Screw 6-32 x 3/8" lg.	91010408

◆ = Aquire standard hardware locally.
▲ = Overhaul Kit.
■ = Supplied as individual items.

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

⚠ Risk of electric shock. Always disconnect the pump from the power source before handling inspections or repairs.

Symptom	Possible Cause(s)
Pump will not run	1. Poor electrical connection, blown fuse, tripped breaker or other interruption of power; improper power supply 2. Motor or switch inoperative (go to manual operation) 2a. Float movement restricted 2b. Switch will not activate pump or is defective 2c. Defective motor 3. Insufficient liquid level
Pump will not turn off	2a. Float movement restricted 2b. Switch will not activate pump or is defective 4. Excessive inflow or pump not properly sized for application 9. Pump may be air locked causing pump not to flow 14. H-O-A switch on panel is in "HAND" position
Pump hums but doesn't run	1. Incorrect low voltage 8. Impeller jammed or loose on shaft, or inlet plugged
Pump delivers insufficient capacity	1. Incorrect low voltage 4. Excessive inflow or pump not properly sized for application 5. Discharge restricted 6. Check valve partially closed or installed backwards 7. Shut-off valve closed 8. Impeller jammed or loose on shaft, or inlet plugged 9. Pump may be air locked causing pump not to flow 10. Piping fixtures leaking or discharge before the
when fixtures are not in use	6. Check valve partially closed or installed backwards 15. Ground water entering basin
Pump shuts off and turns on independent of switch, (trips thermal overload protector). **CAUTION!** Pump may start unexpectedly. Disconnect power supply.	1. Incorrect low voltage 4. Excessive inflow or pump not properly sized for application 8. Impeller jammed or loose on shaft, or inlet plugged 12. Excessive water temperature (internal protection only)
Pump operates noisily or vibrates excessively	2c. Worn bearings, motor shaft bent 5. Debris in impeller cavity or broken impeller 10. Pump running backwards 13. Piping attachments to building structure too loose or rigid

Corrective Action

1. Check all electrical connections for security. Have electrician measure current in motor leads, if current is within ± 20% of locked rotor Amps, impeller is probably locked. If current is 0, overload may be tripped. Remove power, allow pump to cool, then re-check current.

2a. Reposition pump or clean basin as required to provide adaquate clearance for float

2b. Disconnect level control. Set ohmmeter for a low rang, such as 100 ohms full scale and connect to level control leads. Actuate level control manually and check to see that ohmmeter shows zero ohms for closed switch and full scale for open switch. (Float Switch)

2c. Check winding insulation (Megger Test) and winding resistance. If check is outside of range, dry and re-check. If still defective, replace per service instructions.

3. Make sure liquid level is above the pump
4. Re-check all sizing calculations to determine proper pump size.
5. Check discharge line for restrictions, including ice if line passes through or into cold areas.
6. Remove and examine check valve for proper installation and freedom of operation
7. Open valve
8. Check impeller for freedom of operation, security and condition. Clean impeller cavity and inlet of any obstruction
   Loosen union slightly to allow trapped air to escape. Verify that turn-off level of switch is set so that the suction is always flooded. Clean vent hole
10. Check rotation. If power supply is three phase, reverse any two of three power supply leads to ensure proper impeller rotation
11. Repair fixtures as required to eliminate leakage
12. Check pump temperature limits and fluid temperature
13. Replace portion of discharge pipe with flexible connector or tighten existing piping.
14. Turn to automatic position
15. Check for leaks around basin inlet and outlets

NOTE: Keen Pumps assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Keen Pumps or its authorized service centers, automatically voids warranty.

KEEN PUMPS
FACTORY WARRANTY

Keen Pumps warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for 18 months from date of manufacture or 12 months from installation date whichever occurs first. This warranty gives you specific legal rights, which vary from state to state.

This warranty is a limited warranty, and no warranty related claims of any nature whatsoever shall be made against Keen Pumps, until the ultimate consumer or his/her successor notifies us in writing of the defect and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station as instructed by Keen Pumps. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE. PRODUCT SHALL BE EITHER REPLACED OR REPAIRED AT THE ELECTION OF KEEN PUMPS. Guarantees relating to performance specifications provided in addition to the foregoing material and workmanship warranties on a product manufactured by Keen Pumps, if any, are subject to possible factory testing. Any additional guarantees, in the nature of certified performance specifications or time frame must be in writing and such writing must be signed by our authorized factory manager at time of order placement and/or at time of quotation.
Due to inaccuracies in field testing and should a conflict arises between the results of field testing conducted by or for the user. Keen Pumps reserves the right to have the product returned to our factory for additional testing.

This warranty shall not apply when damage is caused by (1) improper installation, (2) improper voltage, (3) lightning, (4) excessive sand or other abrasive material, (5) corrosion build-up due to excessive chemical content or (6) uncontrollable acts of god. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective pumps, parts or systems. Keen Pumps will not accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY. No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.

IMPORTANT!

If you have a claim under the provision of the warranty, contact Keen Pumps or your authorized Keen Pumps Distributor:
www.keenpump.com

KEEN PUMP®

KEEN PUMP®

SPECIFICATIONS
Submersible Solids Handling Pump
Series: **K3PL-S**

General:
Furnish and install a quantity of _____ Keen® Pumps submersible sewage pump(s), Model K3PL____S, ____ HP, ____ RPM, ____ phase, 60 Hz, ____ volts, with a 3 inch vertical bolt-on discharge flange connection. Each pump shall be capable of delivering the following performance, ____ U.S. GPM at ____ ft total dynamic head, with a shut off head of ____ ft TDH minimum.

Pump Design:
The centrifugal sewage pump(s) shall be capable of handling 2.5 inch diameter spherical solids of raw, unscreened domestic sewage consisting of water, fibrous materials. The pump(s) shall be capable of handling liquids with temperatures to 104 °F continuous, and shall be capable of running dry for extended periods.

Pump Construction:
Castings: The volute, seal plates, impeller and motor housing shall be constructed of ASTM A-48 class 30 cast iron.

Coating/Hardware: Exterior surfaces shall be painted with a water based air dry enamel. All exposed hardware shall be 300 series stainless steel.

Gaskets: All gaskets shall be of the compression square ring type eliminating critical slip fits and the possibility of damage during service associated with sliding o-ring sealing arrangements.

Impeller: The impeller shall be of 2 vane, open type, solid handling design with pump out vanes on the back side. Impellers shall be capable of being trimmed to meet specific performance characteristics. The impeller shall be dynamically balanced to ISO G6.3 specifications.

Mechanical seal: A dual seal arrangement shall consist of a Buna-N exclusion seal and a single mechanical design operating in an oil-filled seal cavity. The seal shall be constructed of Silicon carbide faces, 300 series stainless steel hardware, and all elastomer parts to be of Buna-N. The seal shall be commercially available and not a manufacturers proprietary design.

Motor: Design shall be of the split capacitor design for single phase units. The pump shall be designed to be non-overloading throughout the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability.

The motor windings shall be of Class B insulation and operate in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of time without damage due to the heat being generated. The used dielectric oil must be disposed of as non-hazardous waste. The motor shall meet the standard NEMA L for single phase and NEMA B for three phase.

Thermal Protection: All single phase motors shall have thermal protection with automatic reset. Three phase motors shall be equipped with a thermal switch embedded in the stator windings and require external overload protection in the control panel.

Shaft: The pump shaft shall be of a one-piece design and shall be of 416 stainless steel.

Bearings: The lower bearing shall be of the single row ball type to accept radial and thrust loads, and the upper bearing of the single ball type for radial loads. Bearings shall operate in an oil bath atmosphere for superior life.

Power Cord: All pump(s) except 1.5 & 2 HP, 3 phase, shall be equipped with ____ ft of type SOW cord. The cord shall enter a cast iron terminal box assembly that is bolted to the motor housing and sealed with a Buna-N o-ring. The incoming lead wires shall be spliced in the terminal box. After splicing, the terminal box shall be filled with epoxy to seal the outer cable jacket and the individual strands to prevent water from entering the motor housing. Additional sealing and strain relief shall utilize a secondary pressure grommet at point of cable entry. 1.5 & 2 HP, 3 phase pump(s) shall be equipped with ____ ft of type SOW cord. The outer cord shall have an epoxy filled heat shrink tube to prevent water from entering the motor housing. Terminal connectors shall connect the incoming lead wires with the motor lead wires. Additional sealing and strain relief shall utilize a secondary pressure grommet at point of cable entry.

Tests and inspections: Shall be performed by the pump manufacture.

1. A ground continuity check and motor chamber shall be Hi-potted to test for electrical integrity.
2. Check that motor voltage and frequency matches name plate.
3. The pump shall be pressurized and a air leak test is performed to ensure the integrity of the motor housing.
4. The pump is submerged and operated to determine the unit meets hydraulic performance requirements.

SUBMERSIBLE SOLIDS HANDLING PUMP

Series: K3PL-DS
2 - 5 HP / 1750 RPM
Discharge: 3"
Spherical solids handling: 2 1/2"

DISCHARGE
3", 125lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C) continuous, 140 °F (60 °C) intermittent operation.

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 2 vane, semi-open, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: dual, mechanical, oil filled chamber.
Material: silicon carbide with Viton type 01 outer seal, carbon ceramic with Buna-N type 01 inner seal, with stainless steel hardware.

HARDWARE
300 series stainless steel.

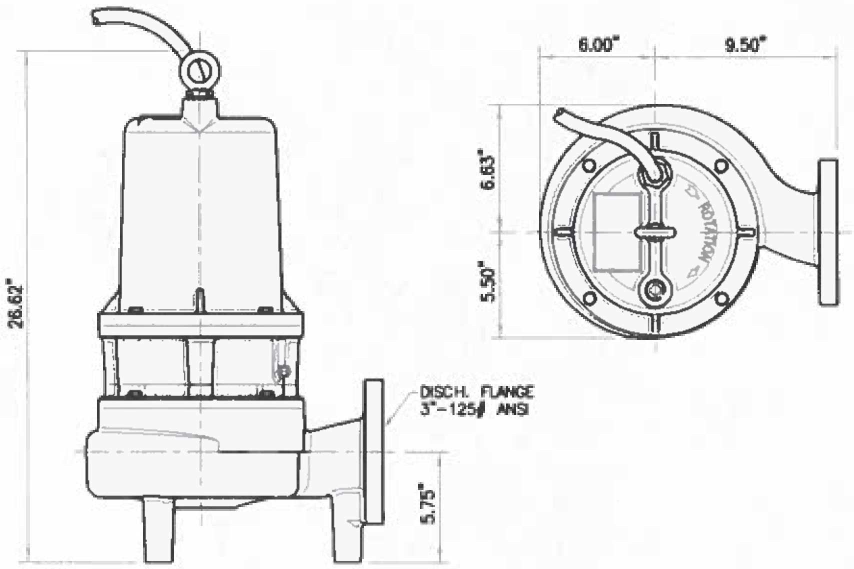
CORD ENTRY
40 ft of cord, epoxy sealed housing with secondary pressure grommet for sealing and strain relief.

MOTOR
NEMA B, three phase, 230 & 460 volts, 60 Hz, 1750 RPM, oil filled, with class F insulation. Requires overload protection to be included in control panel.

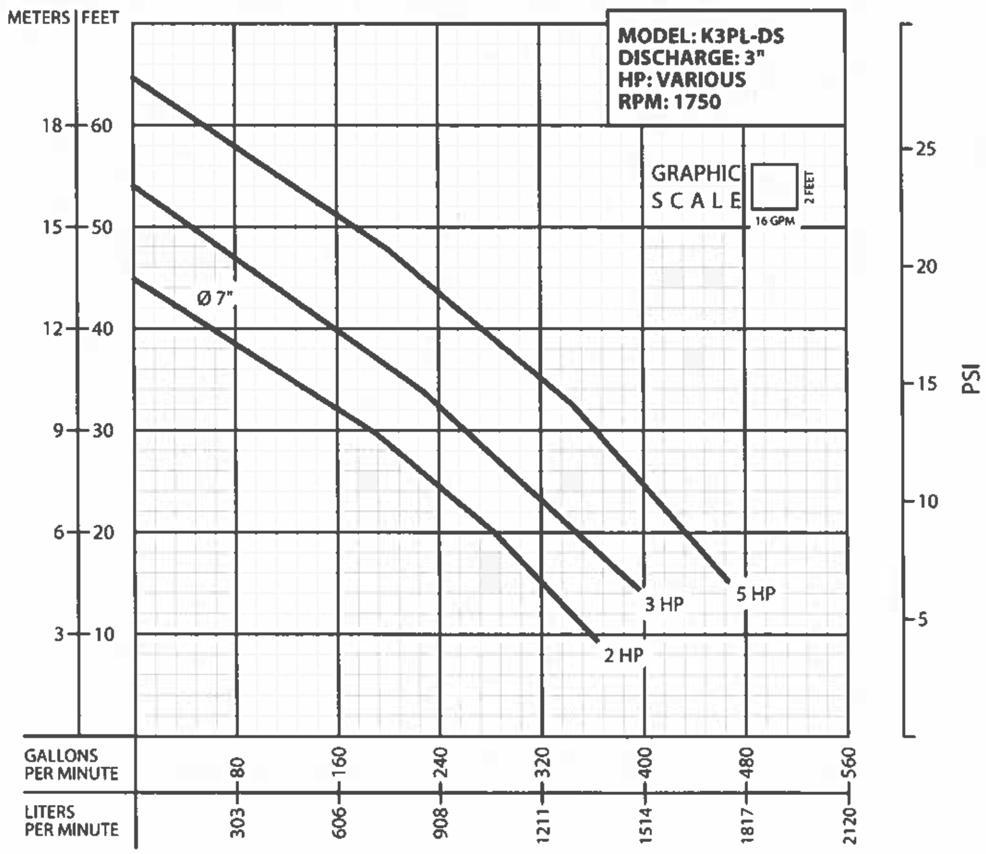
OPTIONAL EQUIPMENT
Additional cord, tungsten carbide seal, slide rail coupling (SRC-3).

SPECIFICATIONS

SPECIFICATIONS



MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	WEIGHT (pounds)
K3PL20M4-23DS	62170161	2	230	3	1750	14.3	40	F	10/4	STOW	194
K3PL20M4-43DS	62170162	2	460	3	1750	7.2	20	F	10/4	STOW	194
K3PL30M4-23DS	62170163	3	230	3	1750	15.9	49.5	H	10/4	STOW	200
K3PL30M4-43DS	62170164	3	460	3	1750	8	24.8	H	10/4	STOW	200
K3PL50M4-23DS	62170165	5	230	3	1750	22.1	63.6	E	10/4	STOW	205
K3PL50M4-43DS	62170166	5	460	3	1750	11	31.8	E	10/4	STOW	205



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

Installation Manual
Submersible Solids
Handling Pumps

K3PL-DS series

2 - 5 HP
@ 1750 RPM

IMPORTANT! - Read all instructions in this manual before operating or servicing a pump.

Before installation, read the following instructions carefully. Failure to follow instruction and safety information could cause serious bodily injury, death and/or property damage. Each Keen product is carefully inspected to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

⚠ DANGER **"Danger" indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠ WARNING **"Warning" indicates an imminenty hazardous situation which, if not avoided, MAY result in death or serious injury.**

⚠ CAUTION **"Caution" indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.**

IMPORTANT! - Keen Pumps is not responsible for losses, injury or death resulting from failure to observe these safety precautions, misuse, abuse or misapplication of pumps or equipment.

ALL RETURNED PRODUCTS MUST BE CLEANED, SANITIZED, OR DECONTAMINATED PRIOR TO SHIPMENT, TO INSURE EMPLOYEES WILL NOT BE EXPOSED TO HEALTH HAZARDS IN HANDLING SAID MATERIAL. ALL APPLICABLE LAWS AND REGULATIONS SHALL APPLY.

⚠ WARNING Installation, wiring, and junction connections must be in accordance with the National Electric Code and all applicable state and local codes. Requirements may vary depending on usage and location.

⚠ WARNING Installation and servicing is to be conducted by qualified personnel only.

Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected; the rotating cutter and/or impeller can cause serious injury.

Always wear eye protection when working on pumps. Do not wear loose clothing that may become entangled in moving parts.

⚠ DANGER Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing the pump or any accessory items associated with or near the pump.

⚠ DANGER This pump is not intended for use in swimming pools or water installations where there is human contact with pumped fluid.

⚠ DANGER Risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling any aspect of the pumping system. ***Lock out power and tag.***

⚠ WARNING **Do not** use these pumps in water over 104° F. **Do not** exceed manufacturers recommended maximum performance, as this could cause the motor to overheat.

⚠ DANGER **Do not** lift, carry or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death. **Never** handle connected power cords with wet hands. Use appropriate lifting device.

⚠ WARNING Ground Fault Circuit Interrupter (GFCI) to be used with plug-in type power cord.

⚠ WARNING Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping. Never enter a basin after it has been used.

⚠ DANGER Failure to permanently ground the pump, motor and controls before connecting to power can cause shock, burns or death.

⚠ DANGER These pumps are not to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.

⚠ WARNING The Uniform Plumbing Code (UPC) states that sewage systems shall have an audio and visual alarm that signals a malfunction of the systems, that are required to reduce the potencial for property damage.

IMPORTANT! - Prior to installation, record Model Number, Serial, Amps, Voltage, Phase and HP from pump name plate for the future reference. Also record the Voltage and Current Readings at Startup:

Model Number: ____________________

Serial: ____________________

Phase: ______ HP: ____________

DISCHARGE: 3", 125lb, flange horizontal.

SPHERICAL SLD HNDLG: 2½"

LIQUID TEMPERATURE: 104° F (40° C) continuos, 140 °F (60 °C) intermittent operation.

VOLUTE: Cast iron ASTM A-48 class 30.

MOTOR HOUSING: Cast iron ASTM A-48 class 30.

SEAL PLATE: Cast iron ASTM A-48 class 30.

IMPELLER: 2 vane, semi-open, with vanes on back side. Cast iron ASTM A-48 class 30.

SHAFT: 416 series stainless steel.

SQUARE RINGS: Buna-N.

PAINT: Air dry enamel, water based.

SEAL: Double, mechanical, oil filled chamber. Silicon carbide with Viton® type 01 outboard, carbon ceramic with Buna-N inboard seal, with stainless steel hardware.

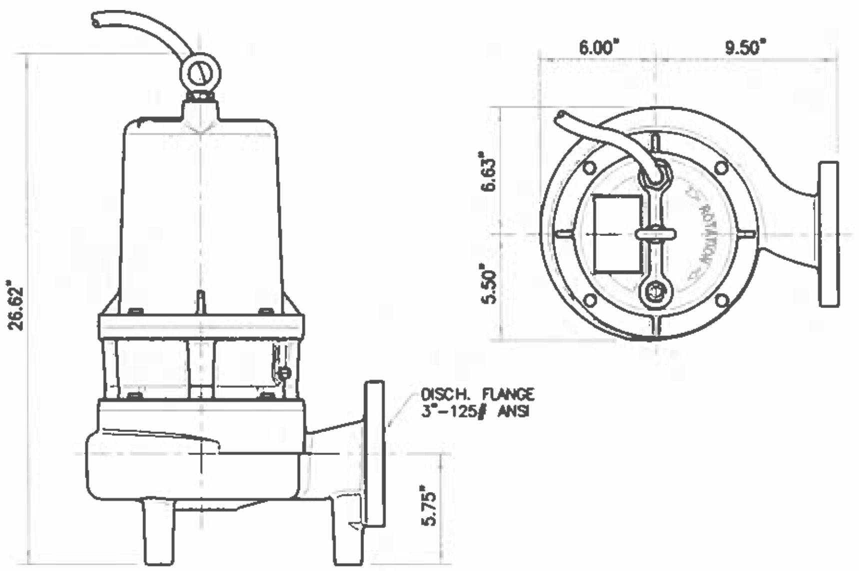
HARDWARE: 300 series stainless steel.

CORD ENTRY: 40 ft of cord, epoxy sealed housing with secondary pressure gromet for sealing and strain relief.

MOTOR: Three phase, NEMA B, oil filled. Requires overload protection to be included in control panel. Class F insulation.

OPTIONAL EQUIPMENT: Additional cord, tungsten carbide seal, slide rail coupling (SRC-3).

MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	WEIGHT (pounds)
K3PL20M4-23DS	62170161	2	230	3	1750	14.3	40	F	10/4	STOW	194
K3PL20M4-43DS	62170162	2	460	3	1750	7.2	20	F	10/4	STOW	194
K3PL30M4-23DS	62170163	3	230	3	1750	15.9	49.5	H	10/4	STOW	200
K3PL30M4-43DS	62170164	3	460	3	1750	8	24.8	H	10/4	STOW	200
K3PL50M4-23DS	62170165	5	230	3	1750	22.1	63.6	E	10/4	STOW	205
K3PL50M4-43DS	62170166	5	460	3	1750	11	31.8	E	10/4	STOW	205



▸ Receiving inspection

Open all cartons and inspect for shipping damage. Report any damage to your supplier or shipping carrier immediately.

Important: Always verify that the pump nameplate Amps, Voltage, Phase and HP ratings match your control panel and power supply.

Many of our sewage pumps are oil-filled. If there are any signs of oil leakage or if the unit has been stored for an extended period, check the oil level in the motor dome and the seal housing, if so equipped.

Check the motor cover oil level through the pipe plug on top of the unit. The motor chamber oil should just cover the motor. Do not overfill, leave room for expansion!

To check the seal housing oil level, where used, lay the unit on its side with the fill plug at 12 o'clock. Remove the plug. The oil should be within 1/2" (13mm) of the top. If low, refill with an ASTM 150 turbine oil. Replace the plug.

You can source oil locally at motor repair shops. Typical oil brands are: Shell Turbo 32, Sunoco Sunvis 932, Texaco Regal R&O 32, Exxon Nuto 32 and Mobil DTE Light.

Check the strain relief nut on power cable strain assemblies. Power cables should be torqued to 75 in/lbs. for #16 cables and 80 in/lbs. for all other cable assemblies. Seal/heat sensor cables, where used, should be torqued to 75 in/ lbs.

Warranty does not cover damage caused by connecting pumps and controls to an incorrect power source (voltage/phase supply).

Record the model numbers and serial numbers from the pumps and control panel on the front of this instruction manual for future reference. Give it to the owner or affix it to the control panel when finished with the installation.

▸ Optional Guide Rail

In many effluent and sewage basins or lift stations it is advisable to install the pump on a guide rail system or on a lift-out adapter to facilitate installation and removal for inspection and/or service. Most codes do not allow personnel to enter a wetwell without the correct protective equipment and training. Guide rails are designed to allow easy removal of the pump without the need for entry into the wetwell or need to disturb piping. The guide rail or liftout adapter should locate the pump opposite the influent opening preventing stagnate areas where solids can settle. The basin or pit must be capable of supporting the weight of the pump and guide rail. The pit floor must be flat.

▸ Piping

Discharge piping should be no smaller than the pump discharge diameter and kept as short as possible, avoiding unnecessary fittings to minimize friction losses.

Install an adequately sized check valve matched to the solids handling capability of the pump to prevent fluid backflow. Backflow can allow the pump to spin backwards and may cause premature seal, bearing, shaft wear. If the pump is turning backwards when it is called on to start the increased torque may cause damage to the pump motor and/or motor shaft.

Install an adequately sized gate valve AFTER the check valve for pump, plumbing and check valve maintenance.

Important - Before pump installation. Drill a 3/16" (4.8mm) relief hole in the discharge pipe. It should be located within the wetwell, 2" (51mm) above the pump discharge but below the check valve. The relief hole allows any air to escape from the casing.

Allowing liquid into the casing will insure that the pump can start when the liquid level rises. Unless a relief hole is provided, a bottom intake pump could "air lock" and will not pump water even though the impeller turns.

All piping must be adequately supported, so as not to impart any piping strain or loads on the pump.

The pit access cover must be of sufficient size to allow for inspection, maintenance and crane or hoist service.

▸ Float Switch Types

There are two basic float switch designs; single-action and wide-angle. Single-action switches operate over a range of 15° so they open and close quickly. Wide-angle floats operate over a 90° swing with the tether length between the float body and the pivot point controlling the On-Off range. The design determines how many floats are required with different systems or controls. Floats may be normally open (NO) for pump down applications or to empty a tank. Normally closed (NC) switches are used to pump up or to fill a tank.
A single-action control switch may be used only with a control panel, never direct connected to a pump. The wide-angle, pump down switches may be used as direct connected pump switches or as control switches.

▸ Setting the float switches

There are no absolute rules for where to set the float switches, it varies from job to job.

Suggested Rules to Follow: All floats should be set below the Inlet pipe!

Off Float: Best: set so free hanging the water level is always above the top of the pump (motor dome). Next Best: set so the water level is not more than 6" below the top of the pump.

On Float: set so the volume of water between the On and Off floats allows pumps of 1.5 HP and under to operate for 1 minute minimum. 2 HP and larger pumps should run a minimum of 2 minutes. Basin technical brochure states the gallons of storage per inch of basin height.

Lag/Alarm Float(s): should be staggered above the Off and On floats. Try to use most of the available storage provided by the basin, save some space for reserve storage capacity. Exact reserve may be called out by local codes. See Diagrams and Charts in Float Switch Chart Section.

▸ Panel wiring diagrams

Our control panels are shipped with instructions and wiring diagrams. Use those instructions in conjunction with this IOM. Electrical installation should be performed only by qualified technicians. Any problem or questions pertaining to another brand control must be referred to that control supplier or manufacturer.

▸ Alarms

We recommend the installation of an alarm on all wastewater pump installations. Many standard control panels come equipped with alarm circuits. If a control panel is not used, a stand alone high liquid level alarm is available. The alarm alerts the owner of a high liquid level in the basin so they can contact the appropriate service personnel to investigate the situation.

▸ Three phase pumps

As a Minimum a Ø3 pump requires a 3 pole circuit breaker/fused circuit, an across the line magnetic starter rated for the pump HP, and ambient compensated Quick Trip Class 10 overloads.

▸ Control Panels

Control panels are available as Simplex (controls 1 pump) or Duplex (controls 2 pumps). Our standard Panels are available with many standard features and can be built with our most popular options. We also custom build panels which offer many more design options. Custom control panels are available in many different configurations. Custom panel quote requests may be forwarded to Customer Service through any authorized distributor.

Our duplex panels feature a solid-state printed circuit board design with standard high level alarm circuits. Other standard features are: an auxiliary dry alarm contact for signaling a remote alarm and float switch position indicator lights. Our Ø3 panels have built-in, adjustable, Class 10 overloads. The adjustable overloads on all our Ø3 panels mean less labor for the installer and no need to order specific overloads. Most panels are in stock for immediate delivery without options.

Always follow wiring schematic of the panel. Failure to wire the seal failure and heat sensor leads correctly may prevent the pump from running or cause nuisance tripping.

▸ Installation

Connect the pump(s) to the guide rail pump adapters or to the discharge piping. Slide rail bases should be anchored to the wetwell floor.

Complete all wiring per the control panel wiring diagrams and NEC, Canadian, state, provincial and/or local codes. This a good time to check for proper rotation of the motors/impellers.

DO NOT PLACE HANDS IN PUMP SUCTION WHILE CHECKING MOTOR ROTATION. TO DO SO WILL CAUSE SEVERE PERSONAL INJURY.

Always verify correct rotation. Correct rotation is indicated on the pump casing. Three phase motors are reversible. It is allowable to bump or jog the motor for a few seconds to check impeller rotation. It is easier to check rotation before installing the pump. Switch any two power leads to reverse rotation.

Lower the pump(s) into the wetwell and check to insure that the floats will operate freely and not contact the piping.

▸ Operation

Once the piping connections are made and checked you can run the pumps.

Control Panel Operation - Fill the wetwell with clear water. Use the pump H-O-A (Hand-Off-Automatic) switches in hand to test the pumps. If they operate well in hand proceed to test Automatic operation. If the pumps run but fail to pump, they are probably air locked, drill the relief holes per the instructions in the Piping Section.

Place Control Panel switch(es) in Automatic position and thoroughly test the operation of the ON, OFF, and Alarm floats by filling the wetwell with clear water.

Important: Failure to provide a Neutral from the power supply to a Ø1, 230 volt Control Panel will not allow the panel control circuit to operate. The Neutral is necessary to complete the 115 volt control circuit.

Check voltage and amperage and record the data on the front of this manual for future reference. Compare the amperage readings to the pump nameplate maximum amperage. If higher than nameplate amperage investigate cause.

Operating the pump off the curve, i.e. with too little head or with high or low voltage will increase amperage. The motor will operate properly with voltage not more than 10% above or below pump nameplate ratings.

Performance within this range will not necessarily be the same as the published performance at the exact rated nameplate frequency and voltage. Correct the problem before proceeding. Three phase unbalance is also a possible cause. See power unbalance and follow the instructions.

Reset the Alarm circuit, place pump switch(es) in the Automatic position and Control Switch in ON position. The system is now ready for automatic operation.

Explain the operation of the pumps, controls and alarms to the end user. Leave the paperwork with the owner or at the control panel if in a dry, secure location.

▸ Float Switch and Panel Chart

The purpose of this chart is to show the required switch quantities and the function of each switch in a typical wastewater system. The quantities required vary depending on the switch type, single-action or wide-angle. Switch quantities also vary by panel type: simplex with and without alarms, and duplex with alarms.

Simplex Panel using single-action switches:

SIMPLEX PANEL WITH ALARM		
SW1	BOTTOM	PUMP OFF
SW2	MIDDLE	PUMP ON
SW3	TOP	ALARM ON/OFF

SIMPLEX PANEL WITH NO ALARM		
SW1	BOTTOM	PUMP OFF
SW2	TOP	PUMP ON

Simplex Panel using wide-angle switches:

SIMPLEX PANEL WITH ALARM		
SW1	BOTTOM	PUMP ON/OFF
SW2	TOP	ALARM ON/OFF

SIMPLEX PANEL WITH NO ALARM		
SW1		PUMP ON/OFF

Duplex Panels using single-action

THREE FLOAT PANEL WIRING		
SW1	BOTTOM	PUMPS OFF
SW2	MIDDLE	1st PUMP ON
SW3	TOP	2nd PUMP & ALARM ON

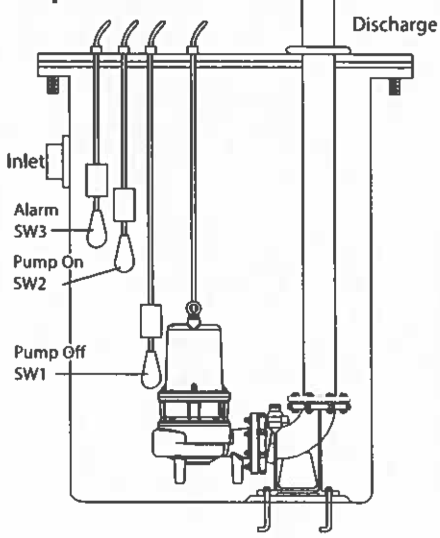
FOUR FLOAT PANEL WIRING		
SW1	BOTTOM	PUMPS OFF
SW2	2nd	1st PUMP ON
SW3	3rd	2nd PUMP ON
SW4	TOP	ALARM ON

Duplex Panels using wide-angle switches:

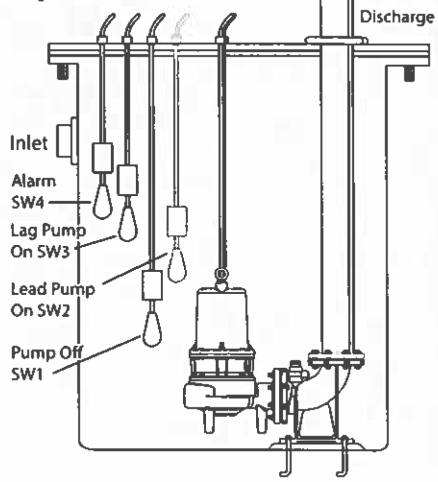
THREE FLOAT PANEL WIRING		
SW1	BOTTOM	1st PUMP ON/BOTH OFF
SW2	TOP	2nd PUMP & ALARM ON

FOUR FLOAT PANEL WIRING		
SW1	BOTTOM	1st PUMP ON/BOTH OFF
SW2	MIDDLE	2nd PUMP ON
SW3	TOP	ALARM ON

Simplex Panel



Duplex Panels



▸ Power Unbalance

A full three phase supply consisting of three individual transformers or one three phase transformer is recommended. "Open" delta or wye connections using only two transformers can be used, but are more likely to cause poor performance, overload tripping or early motor failure due to current unbalance. Check the current in each of the three motor leads and calculate the current unbalance as explained below. If the current unbalance is 2% or less, leave the leads as connected.

If the current unbalance is more than 2%, current readings should be checked on each leg using each of the three possible hook-ups. Roll the motor leads across the starter in the same direction to prevent motor reversal.

To calculate percent of current unbalance:

A. Add the three line amp values together.

B. Divide the sum by three, yielding average current.

C. Pick the amp value which is furthest from the average current (either high or low).

D. Determine the difference between this amp value (furthest from average) and the average.

E. Divide the difference by the average. Multiply the result by 100 to determine percent of unbalance.

Current unbalance should not exceed 5% at service factor load or 10% at rated input load. If the unbalance cannot be corrected by rolling leads, the source of the unbalance must be located and corrected.

If, on the three possible hookups, the leg farthest from the average stays on the same power lead, most of the unbalance is coming from the power source. Contact your local power company to resolve the imbalance.

▸ Insulation Resistance Readings

Normal Ohm and Megohm Values between all leads and ground (see table 1).

Insulation resistance varies very little with rating. Motors of all HP, voltage and phase ratings have similar values of insulation resistance.

Insulation resistance values above are based on readings taken with a megohmmeter with a 500V DC output. Readings may vary using a lower voltage ohmmeter, consult factory if readings are in question.

▸ Engineering Data

Engineering data for specific models may be found in your catalog. Control panel wiring diagrams are shipped with the control panels. Please use the control panel drawings in conjunction with this instruction manual to complete the wiring.

	Hookup 1			Hookup 2			Hookup 3		
Starter Terminals	L1	L2	L3	L1	L2	L3	L1	L2	L3
	⊥ T	⊥ T	⊥ T	⊥ T	⊥ T	⊥ T	⊥ T	⊥ T	⊥ T
Motor Leads	R	B	W	W	R	B	B	W	R
	T3	T1	T2	T2	T3	T1	T1	T2	T3

Example:

Hookup 1	Hookup 2	Hookup 3
T3-R = 51 amps	T2-W = 50 amps	T1-B = 50 amps
T1-B = 46 amps	T3-R = 48 amps	T2-W = 49 amps
T2-W = <u>53</u> amps	T1-B = <u>52</u> amps	T3-R = <u>51</u> amps
Total = 150 amps	Total = 150 amps	Total = 150 amps
÷ 3 = 50 amps	÷ 3 = 50 amps	÷ 3 = 50 amps
− 46 = 4 amps	− 48 = 2 amps	− 49 = 1 amps
4 ÷ 50 = .08 or 8%	2 ÷ 50 = .04 or 4%	1 ÷ 50 = .02 or 2%

Table 1

Condition of Motor and Leads	Ohm Value	Megohm Value
A new motor (without drop cable).	20,000,000 (or more)	20 (or more)
A used motor which can be reinstalled in well.	10,000,000 (or more)	10 (or more)
Motor in well. Readings are for drop cable plus motor.		
New motor.	2,000,000 (or more)	2 (or more)
Motor in good condition.	500,000 - 2,000,000	0.5 - 2
Insulation damage, locate and repair.	Less than 500,000	Less than 0.5

Table 2

PUMP OPERATION			
Minimum Submergence		**Maximum Fluid Temperature**	
Continuous Duty	Fully Submerged	Continuous Operation	104 °F 40 °C
Intermittent Duty	6" Below Top of Motor	Intermittent Operation	140 °F 60 °C

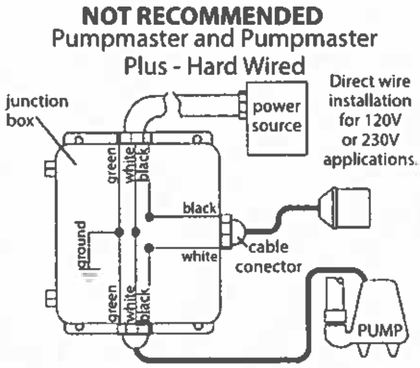


Figure 1

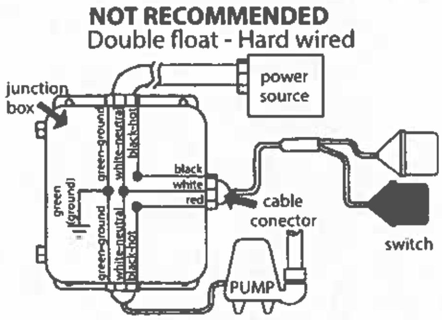


Figure 2

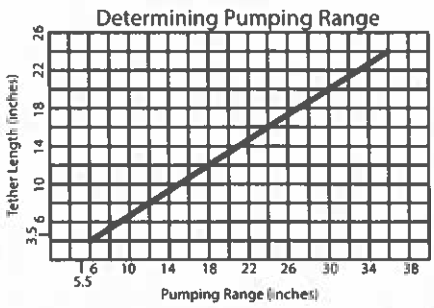


Figure 3

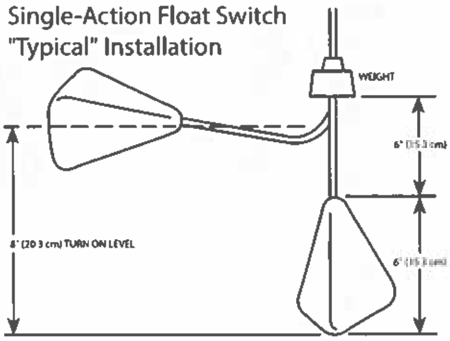


Figure 4

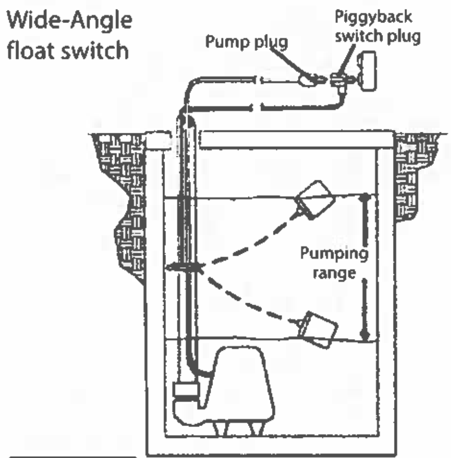


Figure 5

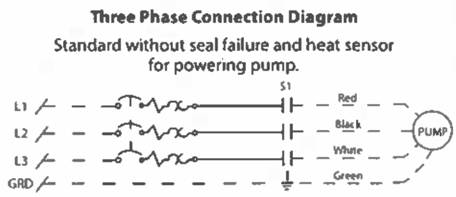


Figure 6

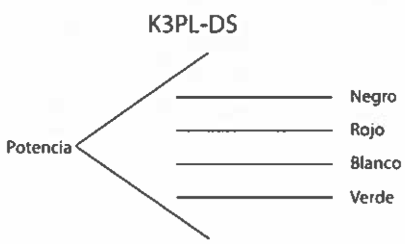
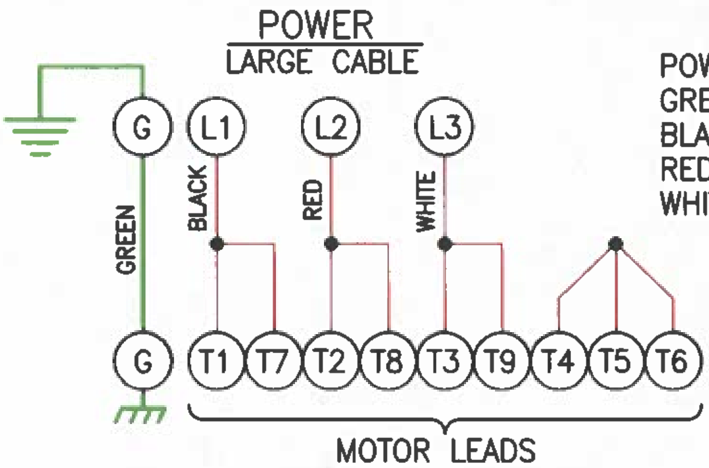


Figure 7

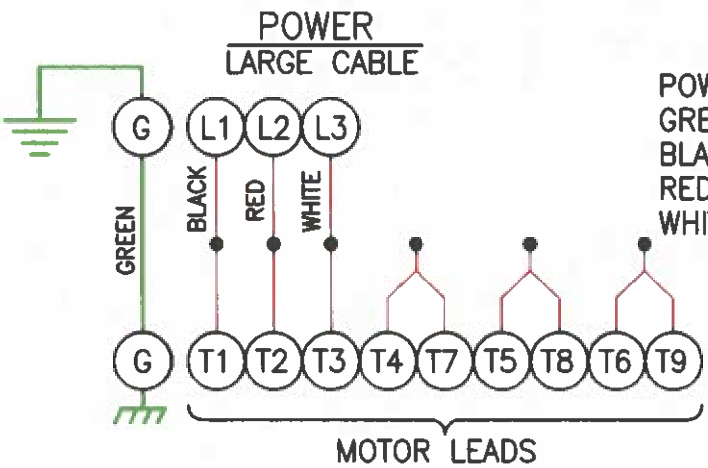
Connections diagrams

THREE PHASE 230 VOLT AC



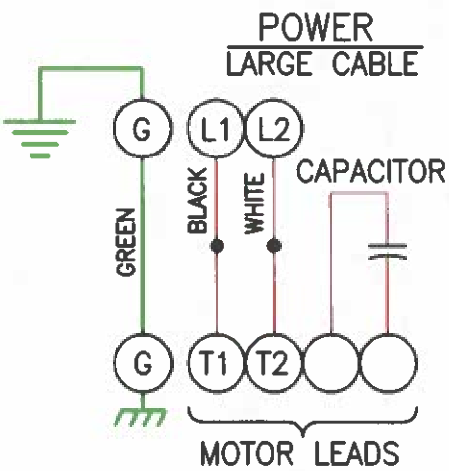
POWER CABLE (30)	MOTOR LEAD NUMBER
GREEN (GROUND)	GREEN
BLACK	1 & 7
RED	2 & 8
WHITE	3 & 9
	4, 5 & 6 TOGETHER

THREE PHASE 460 VOLT AC



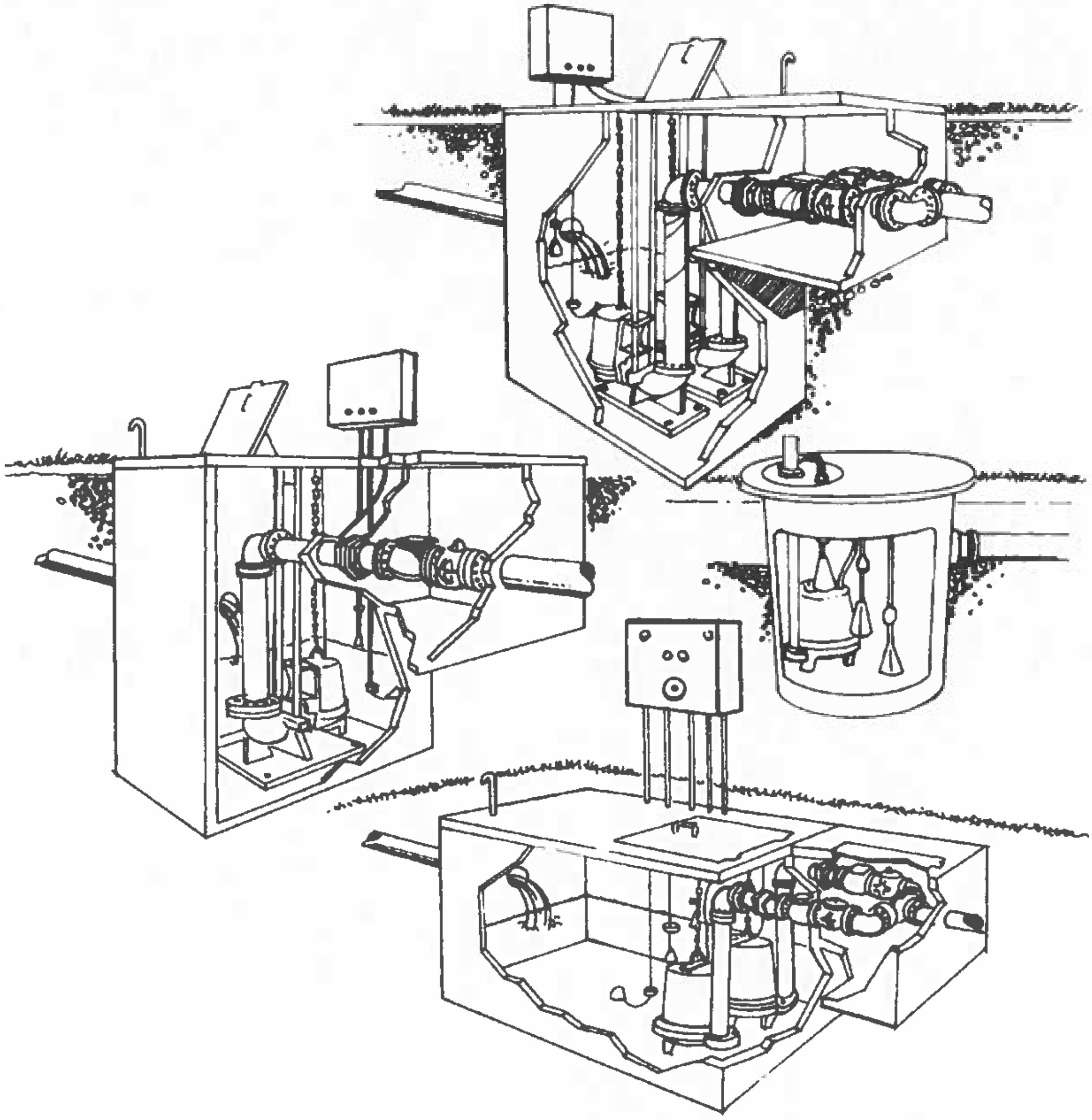
POWER CABLE (30)	MOTOR LEAD NUMBER
GREEN (GROUND)	GREEN
BLACK	1
RED	2
WHITE	3
	4 & 7 TOGETHER
	5 & 8 TOGETHER
	6 & 9 TOGETHER

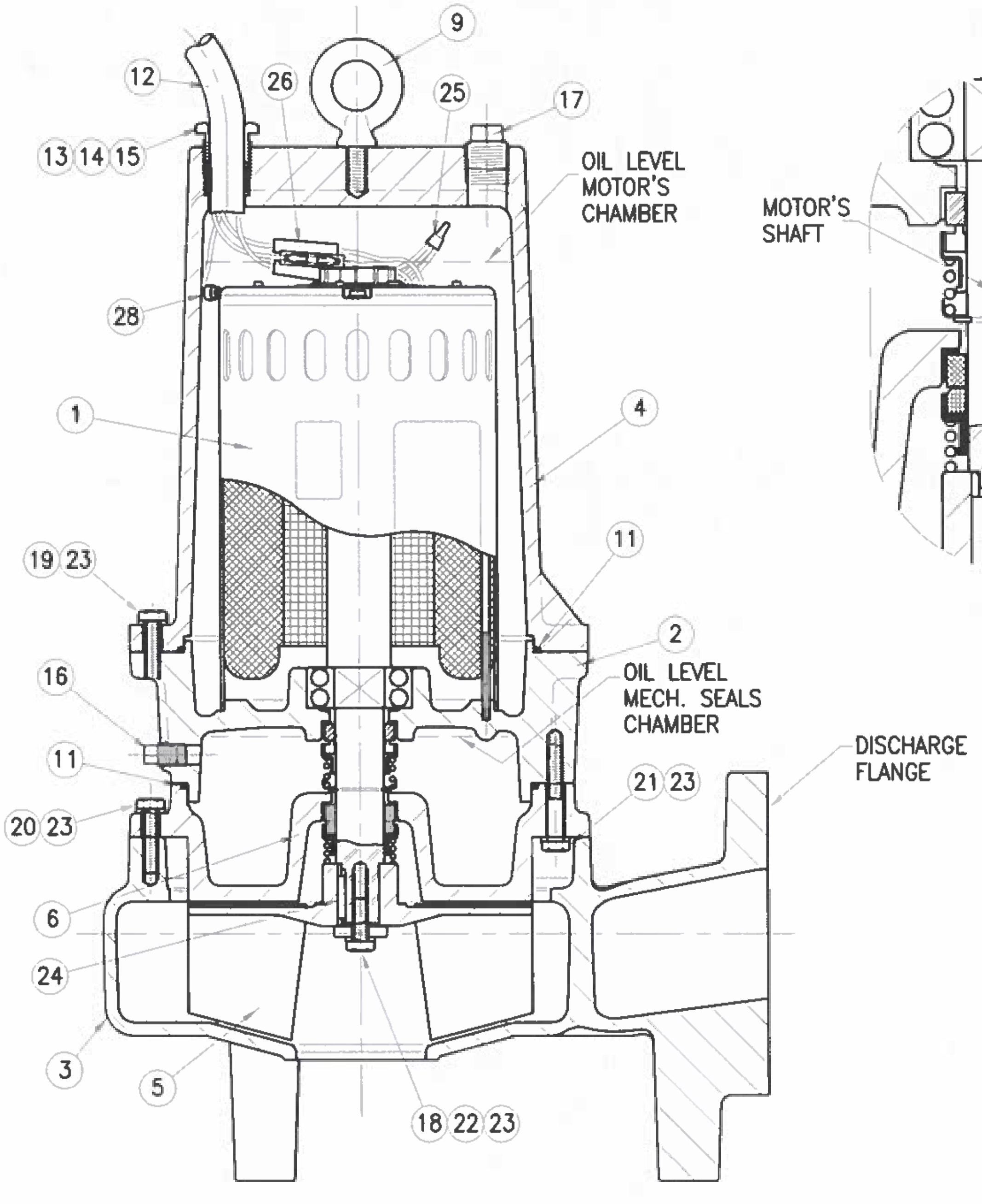
SINGLE PHASE 115/230 VOLT AC

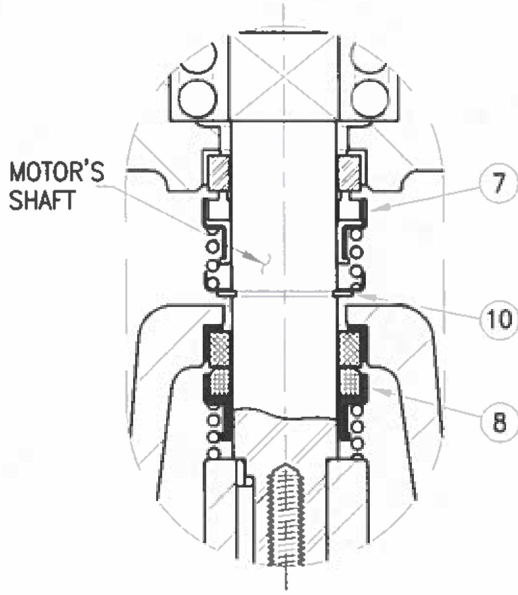


POWER CABLE (30)	MOTOR LEAD NUMBER
GREEN (GROUND)	GREEN
BLACK	1
WHITE	2
FLAG TERMINAL	CAPACITOR
FLAG TERMINAL	CAPACITOR

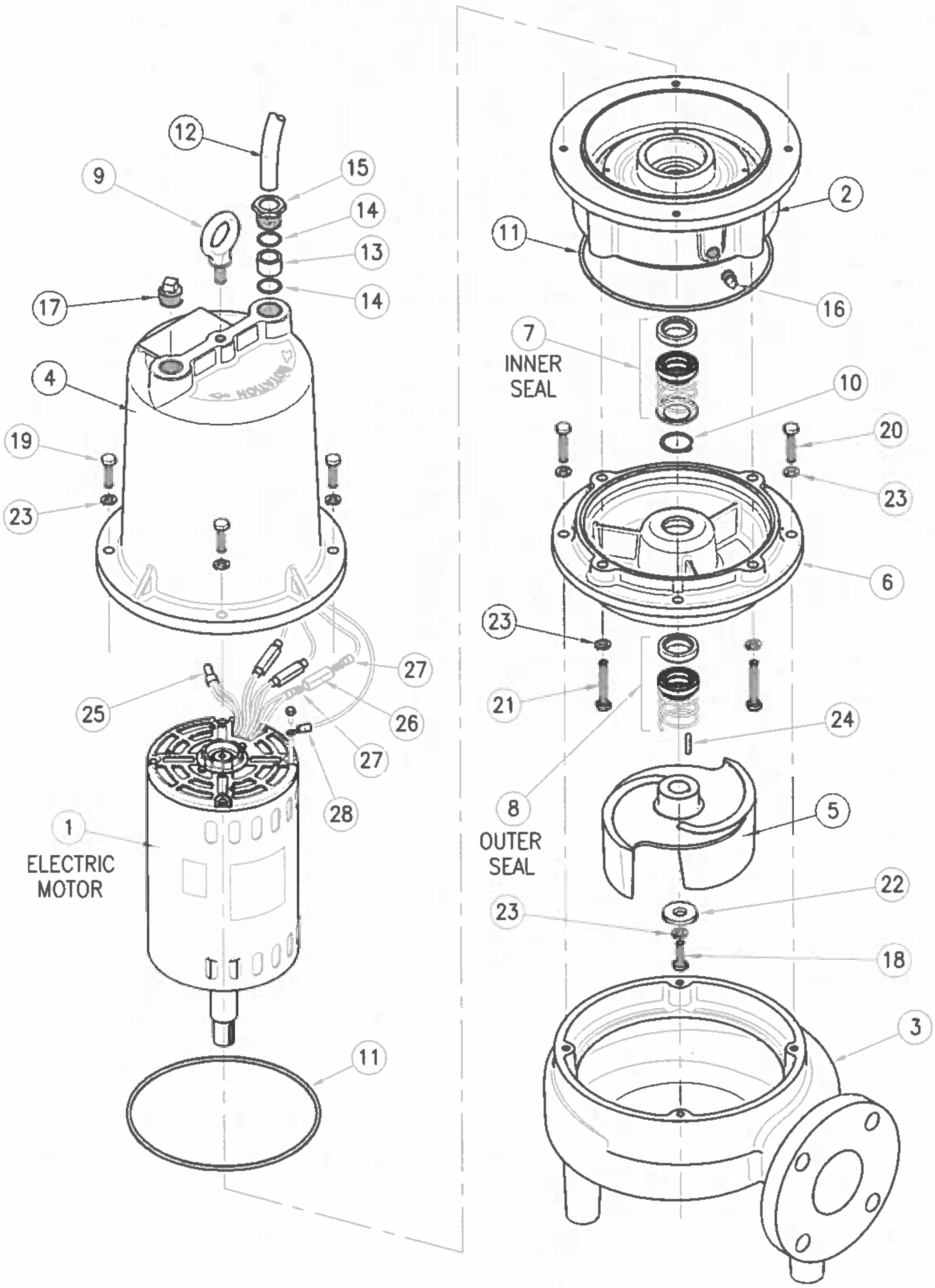
Typical Installations







For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

ITEM	PART #	DESCRIPTION	QTY.
1		Electric motor	
	40040068	7.5 HP, 3 ph, 230/460 V, frame 56Z	1
	40040066	3 HP, 3 ph, 230/460 V, frame 56Z	
2	03040027	Bearing housing	1
3	03090096	Body	1
4	03100002	Motor housing	1
5		Impeller	
	03140094	Diameter 8.000", for 7.5 HP	1
	03140094B	Diameter 7.250", for 5 HP	
	03140094C	Diameter 7.000", for 3 HP	
6	03180030	Seal plate	1
7	31030211	Mechanical seal Ø1⅛" (Carbon/Ceramic/Buna/SS)	1
8	31030137	Mechanical seal Ø1⅛" (Silicon/Silicon/Viton/SS)	1
9	91010406	Handle	1
10	31010017	Retaining ring # 5100-112	1
11	92010083	Gasket # 33730	2
12	31030003	Power cable 4 x 10" (12.40 meters)	1
13	92010001	Grommet # 514	1
14	91010055	Washer # 54746	2
15	30400903	Hex head plug SE103-3SE	1
16	93010143	Pipe plug 1/4"	1
17	93010148	Pipe plug 3/4"	1
18	91010345C	Screw 3/8" x 1 1/4" SS	1
19	91010345C	Screw 3/8" x 1¼" SS	4
20	91010346	Screw 3/8" x 1½" SS	4
21	91010347C	Screw 3/8" x 2¼" SS	4
22	30400426B	Impeller washer	1
23	91010061	Spring washer 3/8" SS	13
24	30400631	Keyway 3/16"x1⅛"	1
25		Wire connector #1921	
	94010012	For 230 volts	1
		For 460 volts	3
26	94010027	Connector	3
27	94010041	Female terminal	6
28	94010043	Terminal	1
	31010031	DTE. Oil light	12 L
	99210007	Data plate	1
	99230102	Rivet SS # 001628	4

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Risk of electric shock. Always disconnect the pump from the power source before handling inspections or repairs.

SYMPTOM	POSSIBLE CAUSE(s)	CORRECTIVE ACTION
Motor not running. **Note**: If circuit breaker "OPENS" repeatedly, **DO NOT** reset. Call qualified electrician.	Pump impeller binding or jammed.	Allow motor to cool. Insure minimum pump submergence. Clear debris from casing and impeller.
	Motor thermal protector tripped.	Determine cause, call a qualified electrician.
	Open circuit breaker or blown fuse.	
	Power cable is damaged.	Check motor amp draw. If two or more times higher than listed on pump nameplate, impeller is locked, motor bearings or shaft is damaged. Clear debris from casing and impeller, consult with dealer. Resistance between power leads and ground should read infinity. If any reading is incorrect, call a qualified electrician.
	No neutral wire connected to control panel.	
	Inadequate electrical connection in control panel.	Inspect control panel wiring. Call a qualified electrician.
Note: Check the pump in manual mode first to confirm operation. If pump operates, the automatic control or wiring is at fault. If pump does nos operate, see above.	Defective liquid level switch.	With switch disconnected, check continuity while activating liquid level switch. Replace switch, as required.
	Insufficient liquid level to activate controls.	Allow liquid level to rise 3" to 4" (76 mm - 101 mm) above turn-on level.
	Liquid level cords tangled.	Untangle cords and insure free operation.
Pump will not turn off.	Liquid level cords tangled.	Untangle cords and insure free operation.
	Pump is air locked.	Shut off pump for approximately one minute, then restart. Repeat until air lock clears. If air locking persists in a system with a check valve, a 3/16" (4.8 mm) hole may be drilled in the discharge pipe approximately 2" (51 mm) above the discharge connection.
	Influent flow is matching pump's discharge capacity.	Larger pump may be required.
Little or no liquid delivered by pump.	Check valve installed backwards, plugged or stuck closed.	Check flow arrow on valve and check valve operation.
	Excessive system head.	Consult with dealer.
	Pump inlet plugged.	Inspect and clear as required.
	Improper voltage or wired incorrectly.	Check pump rotation, voltage and wiring. Consult with qualified electrician.
	Pump is air locked.	See recommended action, above.
	Impeller is worn or damaged.	Inspect impeller, replace as required.
	Liquid level controls defective or improperly positioned.	Inspect, readjust or replace as required.
Little or no liquid delivered by pump.	Discharge check valve inoperative.	Inspect, repair or replace as required.
	Sewage containment area too small.	Consult with dealer.
	Liquid level controls defective or improperly positioned.	Inspect, readjust or replace as required.
	Influent excessive for this size pump.	Consult with dealer.

NOTE: Keen Pumps assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Keen Pumps or its authorized service centers, automatically voids warranty.

KEEN PUMPS
FACTORY WARRANTY

Keen Pumps warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for 18 months from date of manufacture or 12 months from installation date whichever occurs first. This warranty gives you specific legal rights, which vary from state to state.

This warranty is a limited warranty, and no warranty related claims of any nature whatsoever shall be made against Keen Pumps, until the ultimate consumer or his/her successor notifies us in writing of the defect and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station as instructed by Keen Pumps. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE. PRODUCT SHALL BE EITHER REPLACED OR REPAIRED AT THE ELECTION OF KEEN PUMPS. Guarantees relating to performance specifications provided in addition to the foregoing material and workmanship warranties on a product manufactured by Keen Pumps, if any, are subject to possible factory testing. Any additional guarantees, in the nature of certified performance specifications or time frame must be in writing and such writing must be signed by our authorized factory manager at time of order placement and/or at time of quotation.
Due to inaccuracies in field testing and should a conflict arises between the results of field testing conducted by or for the user, Keen Pumps reserves the right to have the product returned to our factory for additional testing.

This warranty shall not apply when damage is caused by (1) improper installation, (2) improper voltage, (3) lightning, (4) excessive sand or other abrasive material, (5) corrosion build-up due to excessive chemical content or (6) uncontrollable acts of god. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective pumps, parts or systems. Keen Pumps will not accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY. No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.

IMPORTANT!

If you have a claim under the provision of the warranty, contact Keen Pumps or your authorized Keen Pumps Distributor:
www.keenpump.com

KEEN PUMP®

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING PUMP

Series: K4PL-S
3 & 5 HP / 1750 RPM
Discharge: 4"
Spherical solids handling: 3"

SPECIFICATIONS

DISCHARGE
4", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 2 vane, open, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

HARDWARE
300 stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: inboard, single mechanical, oil filled chamber.
Material: silicon carbide, Buna-N elastomer and stainless steel hardware.

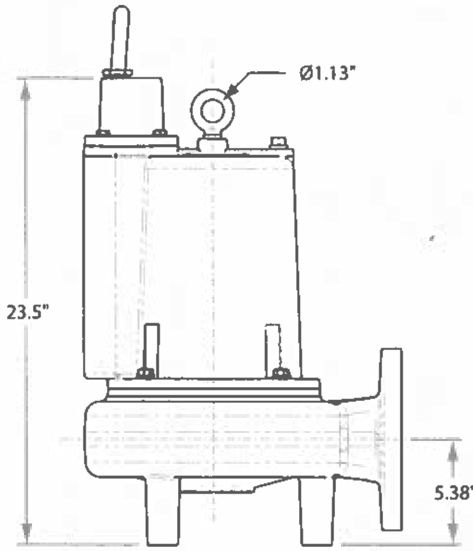
CORD ENTRY
40 ft of neoprene cord SO 10/4, sealed against moisture.

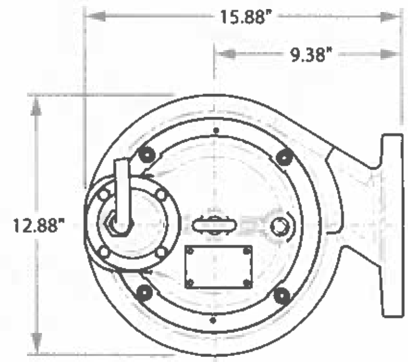
BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

MOTOR
Single phase: NEMA L, permanent split capacitor, 200/230 volts, 60 Hz, 1750 RPM, oil filled, overload protection in motor.
Three phase: NEMA B, 208/230 & 460 volts, 60 Hz, 1750 RPM, oil filled. Requires overload protection to be included in control panel.

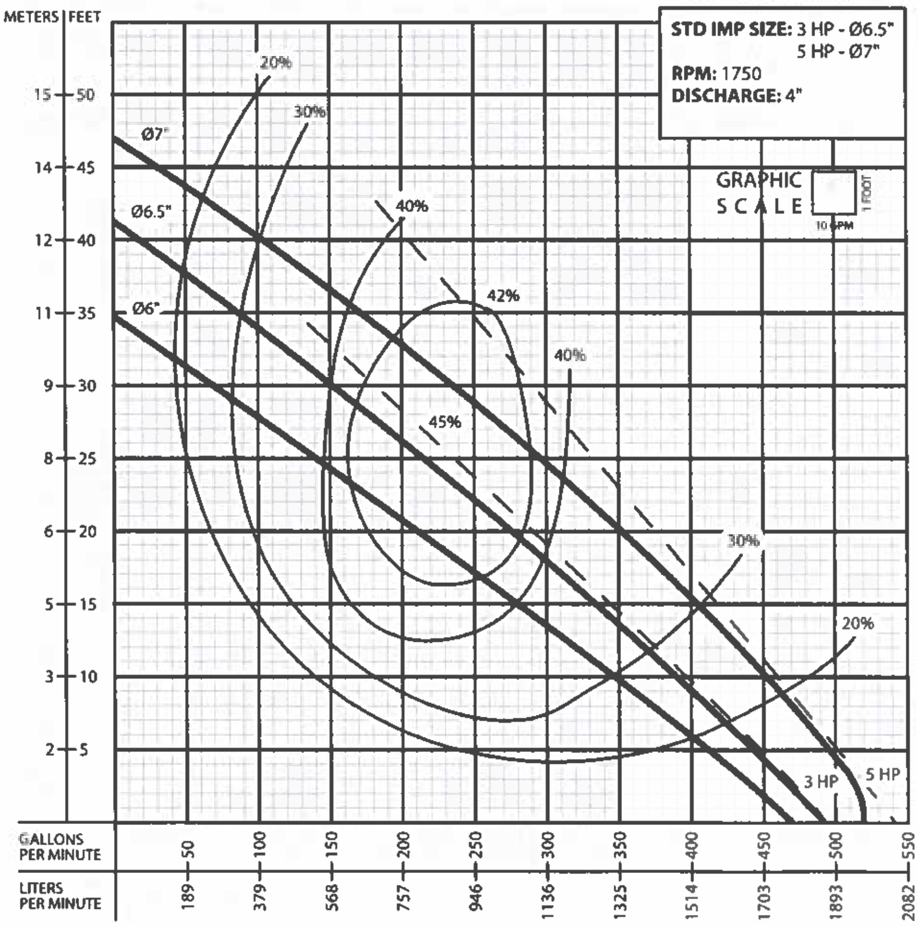
OPTIONAL EQUIPMENT
Additional cord, slide rail coupling (SRC-4).

SPECIFICATIONS





MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K4PL30M4-21S	62170101	3	200/230	1	1750	18.5	23	D	10/4	SO	0.75"	201
K4PL30M4-03S K4PL30M4-23S	62170102	3	208/230	3	1750	15	44	D	10/4	SO	0.75"	201
K4PL30M4-43S	62170103	3	460	3	1750	7.5	22	D	10/4	SO	0.75"	201
K4PL50M4-21S	62170104	5	200/230	1	1750	28	56	D	10/4	SO	0.75"	201
K4PL50M4-03S K4PL50M4-23S	62170105	5	208/230	3	1750	19	56	D	10/4	SO	0.75"	201
K4PL50M4-43S	62170106	5	460	3	1750	9.5	28	D	10/4	SO	0.75"	201



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

Installation, Operation & Maintenance Manual
Submersible Solids Handling Pumps

K4PL-SS SERIES

3 & 5 HP
@ 1750 RPM

IMPORTANT! - Read all instructions in this manual before operating or servicing a pump.

Before installation, read the following instructions carefully. Failure to follow instruction and safety information could cause serious bodily injury, death and/or property damage. Each Keen product is carefully inspected to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

⚠ DANGER **"Danger" indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠ WARNING **"Warning" indicates an imminenty hazardous situation which, if not avoided, MAY result in death or serious injury.**

⚠ CAUTION **"Caution" indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.**

IMPORTANT! - Keen Pumps is not responsible for losses, injury or death resulting from failure to observe these safety precautions, misuse, abuse or misapplication of pumps or equipment.

ALL RETURNED PRODUCTS MUST BE CLEANED, SANITIZED, OR DECONTAMINATED PRIOR TO SHIPMENT, TO INSURE EMPLOYEES WILL NOT BE EXPOSED TO HEALTH HAZARDS IN HANDLING SAID MATERIAL. ALL APPLICABLE LAWS AND

⚠ WARNING Installation, wiring, and junction connections must be in accordance with the National Electric Code and all applicable state and local codes. Requirements may vary depending on usage and location.

⚠ WARNING Installation and servicing is to be conducted by qualified personnel only.

Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected; the rotating cutter and/or impeller can cause serious injury.

Always wear eye protection when working on pumps. Do not wear loose clothing that may become entangled in moving parts.

⚠ DANGER Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing the pump or any accessory items associated with or near the pump.

⚠ DANGER This pump is not intended for use in swimming pools or water installations where there is human contact with pumped fluid.

⚠ DANGER Risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling any aspect of the pumping system. ***Lock out power and tag.***

⚠ WARNING **Do not** use these pumps in water over 104° F. **Do not** exceed manufacturers recommended maximum performance, as this could cause the motor to overheat.

⚠ DANGER **Do not** lift, carry or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death. **Never** handle connected power cords with wet hands. Use appropriate lifting device.

⚠ WARNING Ground Fault Circuit Interrupter (GFCI) to be used with plug-in type power cord.

⚠ WARNING Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping. Never enter a basin after it has been used.

⚠ DANGER Failure to permanently ground the pump, motor and controls before connecting to power can cause shock, burns or death.

⚠ DANGER These pumps are not to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.

⚠ WARNING The Uniform Plumbing Code (UPC) states that sewage systems shall have an audio and visual alarm that signals a malfunction of the systems, that are required to reduce the potencial for property damage.

IMPORTANT! - Prior to installation, record Model Number, Serial, Amps, Voltage, Phase and HP from pump name plate for the future reference. Also record the Voltage and Current Readings at Startup:

1 Phase Models	
Amps:	Volts:
3 Phase Models	
Amps L1-2:	Volts L1-2:
Amps L2-3:	Volts L2-3:
Amps L3-1:	Volts L3-1:

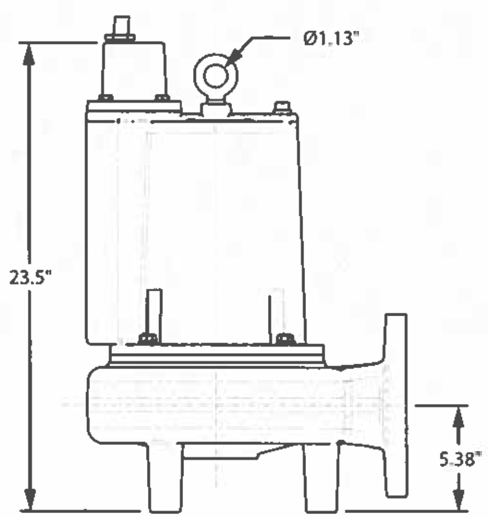
Model Number: ______________________

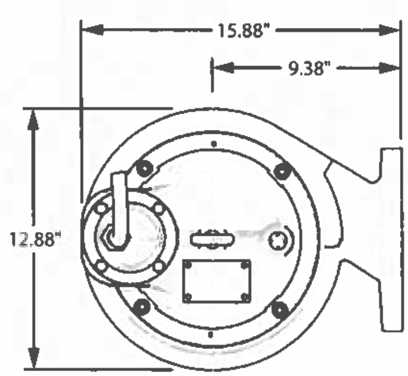
Serial: ____________

PHASE: ______ HP: ________________

DISCHARGE:	4", 125lb, flange horizontal.
SPHERICAL SLD HNDLG:	3"
LIQUID TEMPERATURE:	104° F (40° C) max.
VOLUTE:	Cast iron ASTM A-48 class 30.
MOTOR HOUSING:	Cast iron ASTM A-48 class 30.
SEAL PLATE:	Cast iron ASTM A-48 class 30.
IMPELLER:	2 vane, open, with vanes on back side. Cast iron ASTM A-48 class 30.
SHAFT:	416 series stainless steel.
SQUARE RINGS:	Buna-N.
PAINT:	Air dry enamel, water based.
SEAL:	Inboard single mechanical, oil filled chamber. Silicon carbide, Buna-N elastomer and stainless steel hardware.
HARDWARE:	300 series stainless steel.
CORD ENTRY:	40 ft of neoprene cord SJO 14/3, sealed against moisture.
UPPER BEARING:	Ball, single row, oil lubricated, for radial load.
LOWER BEARING:	Ball, single row, oil lubricated, for radial and thrust load.
MOTOR:	***Single phase:*** NEMA L, permanent split capacitor, oil filled, with overload protection in motor. ***Three phase:*** NEMA B, oil filled. Requires overload protection to be included in control panel.
OPTIONAL EQUIPMENT:	Additional cord, slide rail coupling (SRC-4).

MODEL	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K4PL30M4-21S	3	200/230	1	1750	18.5	23	D	10/4	SO	0.75"	201
K4PL30M4-03S K4PL30M4-23S	3	208/230	3	1750	15	44	D	10/4	SO	0.75"	201
K4PL30M4-43S	3	460	3	1750	7.5	22	D	10/4	SO	0.75"	201
K4PL50M4-21S	5	200/230	1	1750	28	56	D	10/4	SO	0.75"	201
K4PL50M4-03S/ K4PL50M4-23S	5	208/230	3	1750	19	56	D	10/4	SO	0.75"	201
K4PL50M4-43S	5	460	3	1750	9.5	28	D	10/4	SO	0.75"	201





▸ Receiving inspection
Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. If the manual is removed from the packaging, do not lose or misplace.

▸ Storage
Any product that is stored for a period longer than six (6) months from the date of purchase should be bench tested prior to installation. A bench test consists of, checking the impeller to assure it is free turning and a run test to assure the motor (and switch if provided) operate properly.

▸ Controls
Manual models require a separate approved pump control device or panel for automatic operation. Be sure the electrical specification of the control selected properly match the electrical specifications of the pump.

▸ Submergence
The pump should always be operated in the submerged condition. The minimum sump liquid level should never be less than above the pump's volute (See Figure 1).

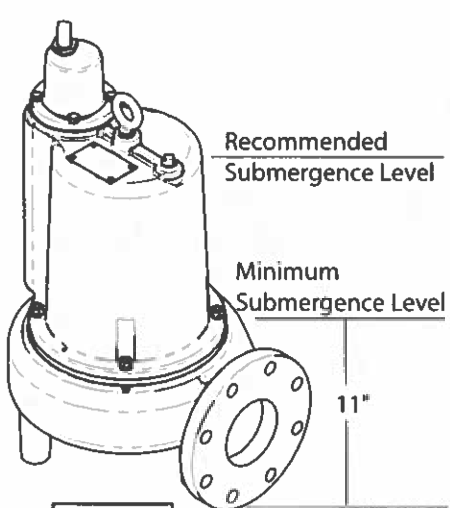


Figure 1

▸ Installation
These pumps are recommended for use in a sump, basin or lift station. The sump, basin or lift station shall be sealed and vented in accordance with local plumbing codes. **This pump is designed to pump sewage, effluent or wastewater, non-explosive and non-corrosive liquids and shall NOT be installed in locations classified as hazardous in accordance with the National Electrical Code (NEC) ANSI/NFPA 70 or Canadian Electric Code (CEC).** The pump should never be installed in a trench, ditch, or hole with a dirt bottom. The legs will sink into the dirt and the suction will become plugged.

The installation should be at a sufficient depth to ensure that all plumbing is below the frost line. If this is not feasible, remove the check valve and size the basin to accommodate backflow volume.

Pumps are most commonly installed in simplex or duplex stations or basins with a slide rail system (Keen SRC), which allows the pump(s) to be installed or removed without requiring personnel to enter the station, or resting on the basin floor.

▸ Discharge Piping
Discharge piping should be as short as possible and sized no smaller than the pump discharge. **Do not reduce the discharge pipe size below that which is provided on the pump.** Both a check valve and a shut-off valve are recommended for each pump. The check valve is used to prevent backflow into the sump. The shut-off valve is used to manually stop system low during pump servicing.

▸ Liquid Level Controls
The level control(s) should be mounted on the discharge piping, a cable rack or float pole. The level control should have adequate clearance so it cannot hang up in it's swing and that the pump is completely submerged when the level control is in the "Off" mode. By adjusting the cord tether the control level can be changed. One cycle of operation should be observed, so that any potential problems can be corrected.

It is recommended that the level control float should be set to insure that the liquid in the sump never drops below the top of the motor housing or a minimum level of 10 inches above the basin floor.

▸ Electrical Connections
Power cable:
The power cable mounted to the pump must not be modified in any way except for shortening to a specific application. Any splice between the pump and the control panel must be made in accordance with the electric codes. It is recommended that a junction box, if used, be mounted outside the sump or be of at a minimum Nema 4 construction if located within the wet well. **DO NOT USE THE POWER CABLE TO LIFT PUMP.**

Always rely upon a Certified Electrician for installation.

Overload Protection:
Single Phase - The stator in-winding overload protector used is referred to as an inherent overheating protector and operates on the combined effect of temperature and current. This means that the overload protector will trip out and shut the pump off the windings become too hot, or the load current passing through them becomes too high.

IMPORTANT! - The overload will then automatically reset and start the pump up after the motor cools to a safe temperature. In the event of an overload, the source of this condition should be determined and corrected immediately.

⚠ WARNING DO NOT ALLOW THE PUMP TO CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS.

If current through the temperature sensor exceeds the values listed, an intermediate control circuit relay must be used to reduce the current or the sensor will not work properly.

TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
110-120	3.00	30.0
220-240	1.50	15.0
440-480	0.75	7.5
600	0.60	6.0

Wire Size:
If longer power cable is required consult a qualified electrician for proper wire size.

▸ Pre-Operation

1. **Check Voltage and Phase** - Compare the voltage and phase information stamped on the pump name plate.

2. **Check Pump Rotation** - Improper motor rotation can result in poor pump performance and can damage the motor and/or pump. Check rotation on three phase units by momentarily applying power and observe the "kickback".

Bottom of Pump

Kickback should always be in a counter-clockwise direction as viewed from motor end or opposite to impeller rotation. Impeller rotation is counter-clockwise as viewed from bottom of pump.

3. **Name Plate** - Record the information from the pump name plate to drawing in front of manual for future reference.

Insulation Test - An insulation (megger) test should be performed on the motor. Before the pump is put into service. The resistance values (ohms) as well as the voltage (volts) and current (amps) should be recorded.

5. **Pump-Down Test** - Be sure pump has been properly wired, lowered into the basin, sump or lift station, check the system by filling with liquid and allowing the pump to operate through its pumping cycle. The time needed to empty the system, or pump-down time along with the volume of water, should be recorded.

▸ Maintenance

No lubrication or maintenance is required. Perform the following checks when pump is removed from operation or when pump performance deteriorates:

a) Inspect motor chamber for oil level and contamination.
b) Inspect impeller and body for excessive build-up or clogging.
c) Inspect motor, bearings and shaft seal for wear or leakage.

▸ Servicing

NOTE: Item numbers in ( ) refer to Figures 6.

Cooling Oil - Anytime the pump is removed from operation, the cooling oil in the motor housing should be checked visually for oil level and contamination. To check oil, set unit upright. Remove pipe plug (20) from housing (4). With a flashlight, visually inspect the oil in the housing (4) to make sure it is clean and clear, light amber in color and free from suspended particles. Milky white oil indicates the presence of water. Oil level should be just above the motor when pump is in vertical position.

Oil Testing

- Drain oil into a clean, dry container by placing pump on it's side, remove pipe plug (20), from housing (4).
- Check oil for contamination using an oil tester with a range to 30 kV breakdown.
- If oil is found to be clean and uncontaminated (measuring above 15 kV breakdown), refill the housing.
- If oil is found to be dirty or contaminated (or measures below 15 kV breakdown), the pump must be carefully inspected for leaks at the shaft seal, cable assembly, square ring and pipe plug, before refilling with oil. To locate the leak, perform a pressure test.

After leak is repaired, dispose of old oil properly, and reill with new oil.

Pressure Test (If oil has been drained) - remove pipe plug (20) from housing (4). Apply pipe sealant to pressure gauge assembly and tighten into hole. Pressurize motor housing to 10 PSI. Use soap solution around the sealed areas and inspect joints for "air bubbles".

If, after five minutes, the pressure is still holding constant, and no "bubbles" are observed, slowly bleed the pressure and remove the gauge assembly. Replace oil. Leek must be located and repaired if pressure does not hold.

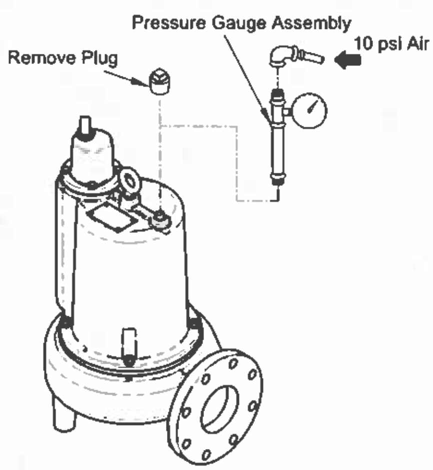


Figure 2

Pressure Test (If oil has NOT been drained) - Oil should be at normal level. Remove pipe plug (20) from housing (4). Apply pipe sealant to pressure gauge assembly and tighten into hole. Pressurize motor housing to 10 PSI. Use soap solution around the sealed areas above the oil level and inspect joints for "air bubbles". For sealed areas below oil level, leeks will seep oil. If, after five minutes, the pressure is still holding constant, and no "bubbles"/oil seepage is observed, slowly bleed the pressure and remove the gauge assembly. Replace oil. Leek must be located and repaired if pressure does not hold.

Pressure builds up extremely fast, increase pressure by "TAPPING" air nozzle. Too much pressure will damage seal. ***DO NOT exceed 10 PSI.***

Oil Replacement - Set unit upright and refill with new cooling oil as per table below. Fill to just above motor, but below capacitor as an air space must remain in the top of the housing to compensate for oil expansion. Apply pipe thread compound to threads of pipe plug (20) then assemble to housing (14).

DO NOT *overfill oil. Overfilling of housing with oil can create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard.*
Overfilling oil voids warranty.

Cooling Oil Recommended Supplier/Grade	
BP	Enerpar SE100
Conoco	Pale Parafin 22
Mobile	D.T.E. Oil Light
Shell Canada	Transformer-10
Texaco	Diala-Oil-AX

▸ Disassembly

Impeller and Volute:

1. Disconnect power.

2. Remove hex nuts (9), vertically lift motor housing and seal plate assembly from volute (1). Clean out volute if necessary.

3. Inspect o-ring (19) and replace if cut or damaged.

4. Clean and examine impeller (2), for cracks or breakage and replace if required. To remove impeller (2), remove impeller nut (12) and washer (13). With a wheel puller, pull impeller straight of shaft and remove key (14).

5. Remove washer (15) and v-gasket (16) and remove if damaged.

6. Remove cap screws (36) and washers (37), lift conduit box and cable assy (33) from motor housing (4). Disconnect the wires from the terminals (28). Remove o-ring (35) replace if damaged.

Motor and Capacitor:

7. Remove screws (17) and lift motor housing (4) from seal plate (3).

8. Remove o-ring (18), replace if damaged.

9. Remove motor bolts, lift motor stator assembly from seal plate (3).

10. On single phase units only, check motor capacitor (34) with an Ohm meter by irst grounding the capacitor by placing a screwdriver across both terminals and then removing screwdriver. Connect Ohm meter (set on high scale) to terminals. If needle moves to infinity (∞) then drifts back, the capacitor is good. If needle does not move or moves to infinity (∞) and does not drift back, replace capacitor (34).

11. Inspect motor winding for shorts and check resistance values. Check rotor for wear. If rotor or the stator windings are defective, the complete motor must be replaced.

Shaft Seal:

12. Unscrew conduit bushing (29) from seal plate (3) and lift motor rotor, shaft, bearing (8), rotating member of seal (6), washer (30) and conduit bushing (29) from seal plate (3). See Figure 3.

13. Remove seal parts (6) from shaft. Examine all seal parts, if seal faces show signs of wear, uneven wear pattern, chips or scratches replace entire seal. **DO NOT interchange seal components, replace the entire shaft seal (6).** If replacing seal, remove stationary from seal plate (3) by prying out with flat screwdriver.

Reassembly

IMPORTANT! - All parts must be clean before reassembly. Handle seal parts with extreme care. DO NOT damage lapped surfaces.

Shaft Seal:

1. To reassemble, clean seal cavity in seal plate (3) and oil.

2. Press seal's (6) stationary member firmly into seal plate (3), use a seal tool or pipe. Nothing should come in contact with the seal face except the seal tool. Be sure the stationary is in straight.

3. Place conduit bushing (29) and washer (30) onto shaft. Press lower bearing (8) onto shaft.

4. Place seal's (6) retaining ring and spring onto shaft. Lightly oil **(Do not use grease)** shaft and inner surface of bellows.

5. With lapped surface of rotating member facing outward, slide over shaft using a seal tool, being carefull not to damage seal face. Make sure spring is seated in retaining ring and spring is lined up on rotating member and not cocked or resting on bellows tail.

Bearing and Motor:

6. Slide rotor/shaft with bearing (8) and seal parts (6) into seal plate (3) until bearing seats into seal plate and tighten conduit bushing (29) into seal plate (3). Place stator over rotor, lining up motor bolts with holes in seal plate (3). Insert motor bolts and torque to 17 inch pounds.

7. On single phase units, connect capacitor (34) to motor wires. See Figure 5.

8. Place all motor leads above motor. Place o-ring (18) on seal plate (3) and lower motor housing (4) onto seal plate (3).

9. Place socket head screws (17) through seal plate into motor housing and torque to 60 inch pounds.

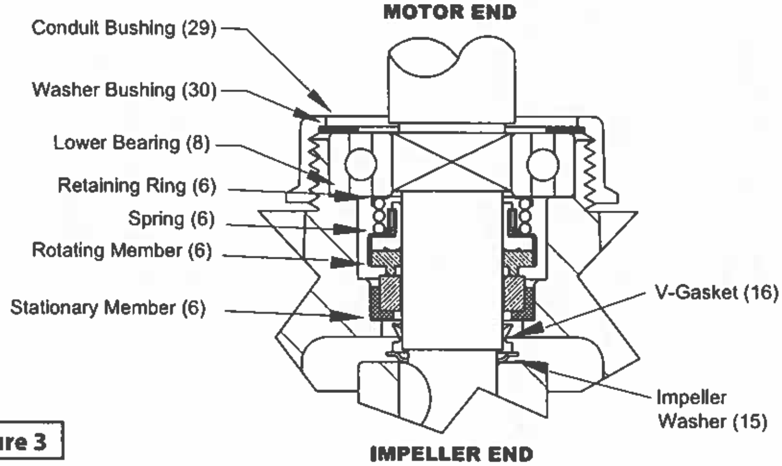


Figure 3

Impeller and Volute:

10. Install v-gasket (16) and impeller washer (15) over shaft, and into seal plate (3).

11. Install impeller (2) by appling a thin film of oil to motor shaft and slide impeller straight onto shaft, keeping keyways lined up. Drive key (14) into keyway.

12. Place washer (13) and impeller nut (12) onto shaft and torque to 40 ft/lbs. Rotate impeller to check for binding.

14. Place o-ring (19) onto volute (1).

15. Lower motor housing and seal plate assembly onto volute (1). Apply thread locking compound to studs(9) and place hex nuts onto studs and torque to 24 ft/lbs.

16. Pull wires through large opening in motor housing (4) an connect wires with cord (22) in Conduit box (33) per schematic in Figure 5.

17. Refill with cooling oil and place o-ring (35) and conduit box (33) onto motor housing (4). Place cap screws (36) and washers (37) through conduit box into motor housing and tighten to 16 ft lbs.

Cable Assembly:

18. Check power cord (22) for cracks or damage and replace if required. Insert one friction ring (24), grommet (25), one friction ring (24), and gland nut (23) into motor housing (4) or conduit box and cable assembly (33) and torque gland nut (23) to 15 ft lbs.

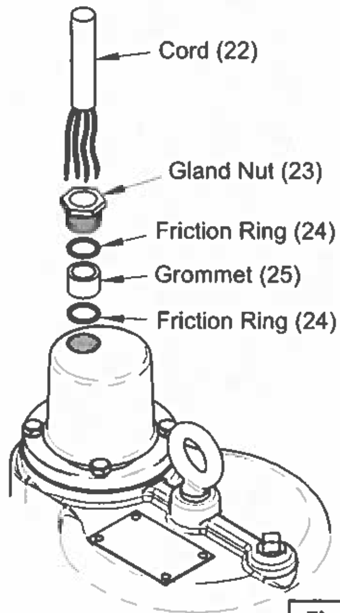


Figure 4

THREE-PHASE 208/230V AC

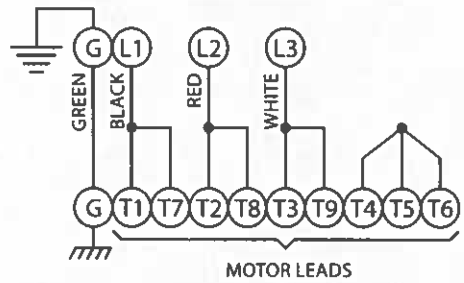


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1 and 7
Red	2 and 8
White	3 and 9
	4, 5 and 6 together

SINGLE-PHASE 200/230V AC

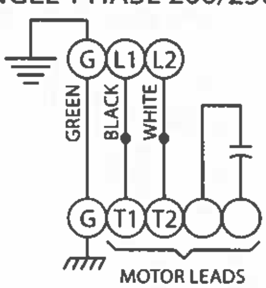


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1
White	2
Flag terminal	Capacitor
Flag terminal	Capacitor

THREE-PHASE 460V AC

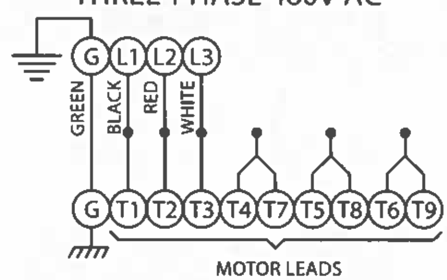
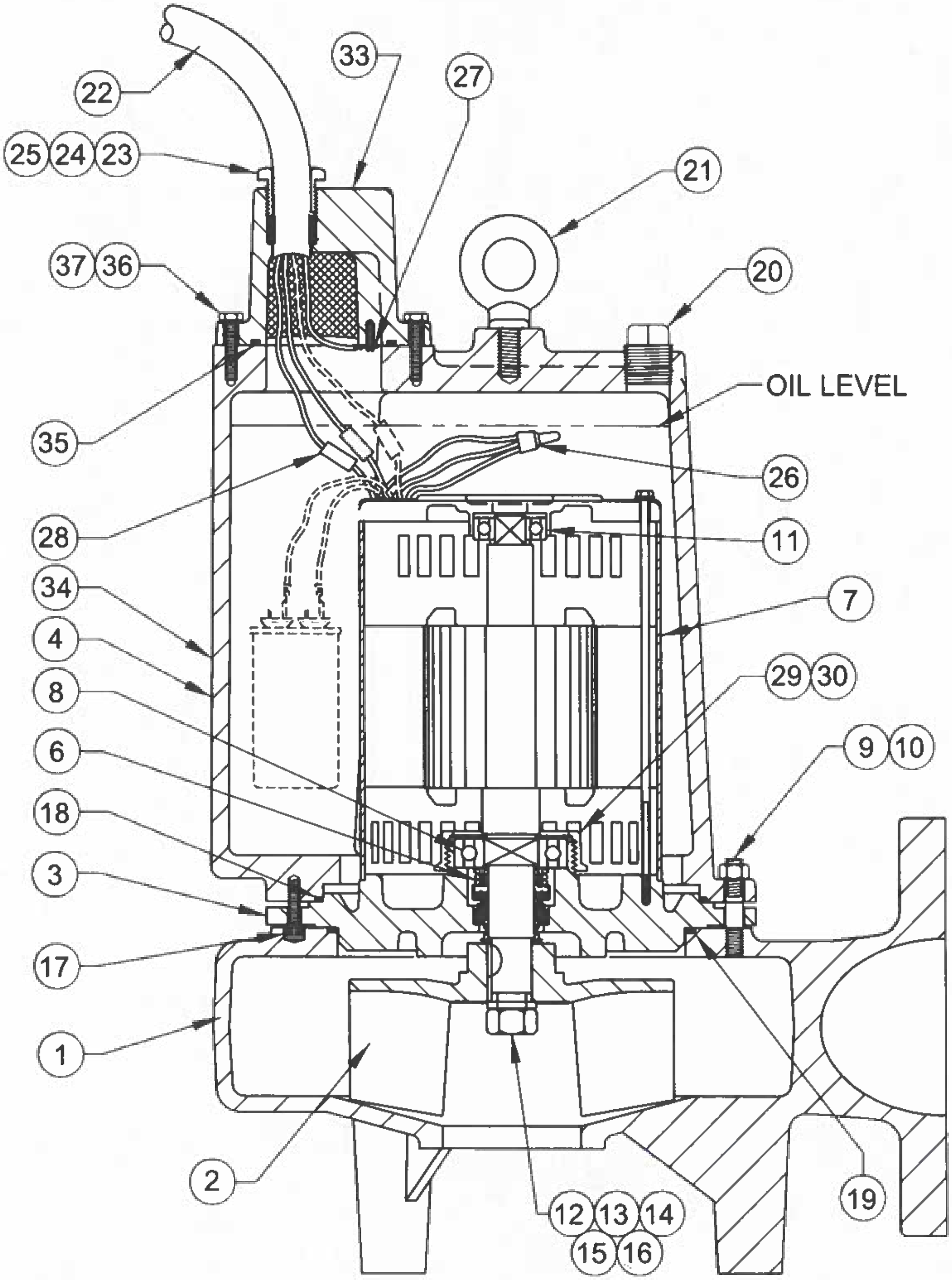


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1
Red	2
White	3
	4 and 7 together
	5 and 8 together
	6 and 9 together

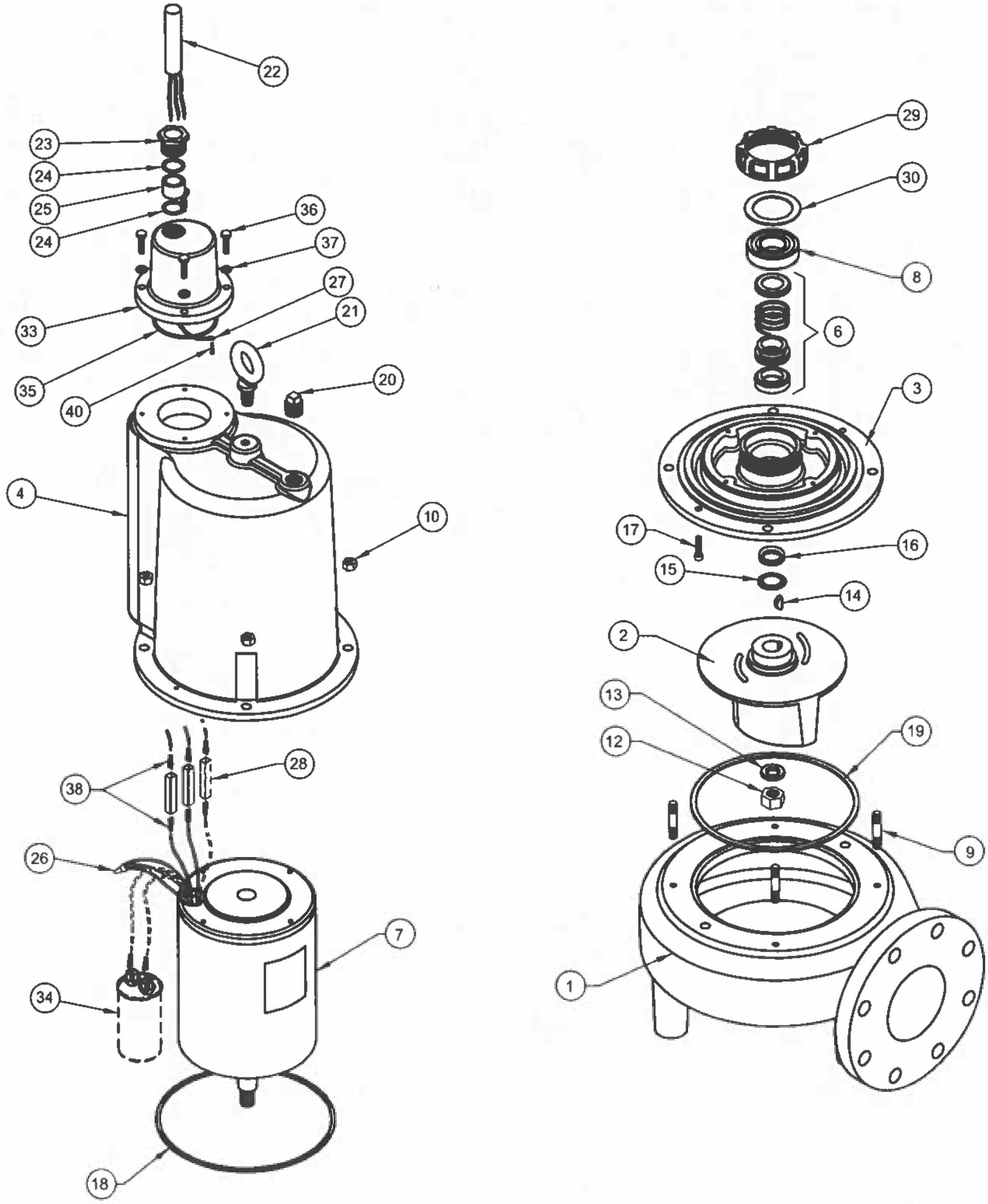
IMPORTANT! - Wire colors may vary. Use identification tag on each lead.

Figure 8



For repair part please supply: Model Number and Serial as shown on name plate, and Part Description and Part Number as shown on Parts List.

Figure 9



For repair part please supply: Model Number and Serial as shown on name plate, and Part Description and Part Number as shown on Parts List.

ITEM	QTY	DESCRIPTION	PART No.	K4PL30M4-21S	K4PL30M4-03S K4PL30M4-23S	K4PL30M4-43S	K4PL50M4-21S	K4PL50M4-03S K4PL50M4-23S	K4PL50M4-43S
1	1	VOLUTE	03090080						
2	1	IMPELLER 7"	03140077				x	x	x
	1	IMPELLER 6½"	03140077B	x	x	x			
3	1	SEAL PLATE	03180012						
4	1	MOTOR HOUSING	03100009						
6	1	MECHANICAL SEAL	31030152						
7	1	MOTOR 3 & 5 HP, THREE PHASE, 208/230 & 460	40040006		x	x		x	x
	1	MOTOR 3 & 5 HP, SINGLE PHASE, 200/230	40040061	x			x		
8	1	BEARING	31020010						
9	4	STUD 3/8" x 2" #33824	91010374						
10	4	LOCKWASHER 3/8" #35792	91010061		x	x		x	x
	4	HEX NUT 3/8" #18927	91010433						
12	1	IMPELLER NUT 5/8", STAINLESS	91010442						
13	1	WASHER 5/8", STAINLESS #70320	91010063						
14	1	SHAFT KEY	91010111						
15	1	IMPELLER WASHER #62641	91010051						
16	1	V-GASKET #61829	92010112						
17	2	SOCKET SCREW 1/4" x 1. 203, STAINLESS #18923	91010392						
18	1	GASKET HOUSING-SEAL PLATE #33730	92010083						
19	1	GASKET VOLUTE-SEAL PLATE #27269	92010082						
20	1	PIPE PLUG 1/2"	93010142						
	40 ft	POWER CABLE 3x10" #34855	31030007	x			x		
	1	GLAND NUT 4x10	30400903		x	x		x	x
24	2	RETAINING RING #54746 4x10	91010055		x	x		x	x
	2	RETAINING RING #51450 4x12	91010056	x			x		
25	1	GROMMET 4X10	92010001		x	x		x	x
	1	GROMMET 3X10	92010007	x			x		
26	1	NYLON CAP #1921	94010012		x			x	
	3	NYLON CAP #1921	94010012			x			x
27	1	EYE TERMINAL 3/16"	94010043						
28	2	TERMINAL CONNECTOR 12/10	94010027						
29	1	CONDUIT BUSHING #53749	31190021						
30	1	WASHER BUSHING #53756	91010054						
33	1	CONDUIT BOX	03100010						
34	1	CAP FOR CAPACITOR	94010011	x			x		
	1	CAPACITOR 45MF 50/60 Hz ±10%	31030038	x			x		
35	1	O-RING	92010063						
36	4	SCREW 1/4" x 1" #02203	91010342						
37	4	LOCKWASHER 1/4"	91010066						
38	4	FEMALE CONNECTOR 12/10 #71363	94010041						
40	1	PAN HD SCREW 3/16" x 1/2"	91010408						

For repair part please supply: Model Number and Serial as shown on name plate, and Part Description and Part Number as shown on Parts List.

Risk of electric shock. Always disconnect the pump from the power source before handling inspections or repairs.

Symptom	Possible Cause(s)	Corrective Action
Pump will not run	1. Poor electrical connection, blown fuse, tripped breaker or other interruption of power; improper power supply 2. Motor or switch inoperative (go to manual operation) 2a. Float movement restricted 2b. Switch will not activate pump or is defective 2c. Defective motor 3. Insufficient liquid level	1. Check all electrical connections for security. Have electrician measure current in motor leads, if current is within ± 20% of locked rotor Amps, impeller is probably locked. If current is 0, overload may be tripped. Remove power, allow pump to cool, then re-check current. 2a. Reposition pump or clean basin as required to provide adaquate clearance for float 2b. Disconnect level control. Set ohmmeter for a low rang, such as 100 ohms full scale and connect to level control leads. Actuate level control manually and check to see that ohmmeter shows zero ohms for closed switch and full scale for open switch. (Float Switch) 2c. Check winding insulation (Megger Test) and winding resistance. If check is outside of range, dry and re-check. If still defective, replace per service instructions. 3. Make sure liquid level is above the pump 4. Re-check all sizing calculations to determine proper pump size. 5. Check discharge line for restrictions, including ice if line passes through or into cold areas. 6. Remove and examine check valve for proper installation and freedom of operation 7. Open valve 8. Check impeller for freedom of operation, security and condition. Clean impeller cavity and inlet of any obstruction Loosen union slightly to allow trapped air to escape. Verify that turn-off level of switch is set so that the suction is always flooded. Clean vent hole 10. Check rotation. If power supply is three phase, reverse any two of three power supply leads to ensure proper impeller rotation 11. Repair fixtures as required to eliminate leakage 12. Check pump temperature limits and fluid temperature 13. Replace portion of discharge pipe with flexible connector or tighten existing piping. 14. Turn to automatic position 15. Check for leaks around basin inlet and outlets
Pump will not turn off	2a. Float movement restricted 2b. Switch will not activate pump or is defective 4. Excessive inflow or pump not properly sized for application 9. Pump may be air locked causing pump not to flow 14. H-O-A switch on panel is in "HAND" position	
Pump hums but doesn't run	1. Incorrect low voltage 8. Impeller jammed or loose on shaft, or inlet plugged	
Pump delivers insufficient capacity	1. Incorrect low voltage 4. Excessive inflow or pump not properly sized for application 5. Discharge restricted 6. Check valve partially closed or installed backwards 7. Shut-off valve closed 8. Impeller jammed or loose on shaft, or inlet plugged 9. Pump may be air locked causing pump not to flow 10. Piping fixtures leaking or discharge before the	
when fixtures are not in use	6. Check valve partially closed or installed backwards 15. Ground water entering basin	
Pump shuts off and turns on independent of switch, (trips thermal overload protector). **CAUTION!** Pump may start unexpectedly. Disconnect power supply.	1. Incorrect low voltage 4. Excessive inflow or pump not properly sized for application 8. Impeller jammed or loose on shaft, or inlet plugged 12. Excessive water temperature (internal protection only)	
Pump operates noisily or vibrates excessively	2c. Worn bearings, motor shaft bent 5. Debris in impeller cavity or broken impeller 10. Pump running backwards 13. Piping attachments to building structure too loose or rigid	

NOTE: Keen Pumps assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Keen Pumps or its authorized service centers, automatically voids warranty.

KEEN PUMPS
FACTORY WARRANTY

Keen Pumps warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for 18 months from date of manufacture or 12 months from installation date whichever occurs first. This warranty gives you specific legal rights, which vary from state to state.

This warranty is a limited warranty, and no warranty related claims of any nature whatsoever shall be made against Keen Pumps, until the ultimate consumer or his/her successor notifies us in writing of the defect and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station as instructed by Keen Pumps. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE. PRODUCT SHALL BE EITHER REPLACED OR REPAIRED AT THE ELECTION OF KEEN PUMPS. Guarantees relating to performance specifications provided in addition to the foregoing material and workmanship warranties on a product manufactured by Keen Pumps, if any, are subject to possible factory testing. Any additional guarantees, in the nature of certified performance specifications or time frame must be in writing and such writing must be signed by our authorized factory manager at time of order placement and/or at time of quotation. Due to inaccuracies in field testing and should a conflict arises between the results of field testing conducted by or for the user, Keen Pumps reserves the right to have the product returned to our factory for additional testing.

This warranty shall not apply when damage is caused by (1) improper installation, (2) improper voltage, (3) lightning, (4) excessive sand or other abrasive material, (5) corrosion build-up due to excessive chemical content or (6) uncontrollable acts of god. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective pumps, parts or systems. Keen Pumps will not accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY. No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.

IMPORTANT!
If you have a claim under the provision of the warranty, contact Keen Pumps or your authorized Keen Pumps Distributor
www.keenpump.com

KEEN PUMP®

KEEN PUMP®

SPECIFICATIONS
Submersible Solids Handling Pump
Series: **K4PL-SS**

General:
Furnish and install a quantity of _____ Keen® Pumps submersible sewage pump(s), Model K4PL____SS, ____ HP, ____ RPM, ____ phase, 60 Hz, ____ volts, with a 4 inch horizontal discharge 125 ANSI discharge flange connection. Each pump shall be capable of delivering the following performance, ____ US GPM at ____ ft total dynamic head, with a shut off head of ____ ft TDH minimum, and ____ % efficiency at ____ US GPM at ____ ft TDH operating point.

Pump Design:
The centrifugal sewage pump(s) shall be capable of handling 3 inch diameter spherical solids of raw, unscreened domestic sewage consisting of water, fibrous materials. The pump(s) shall be capable of handling liquids with temperatures to 104 °F continuous, and shall be capable of running dry for extended periods.

Pump Construction:
Castings: The volute, seal plates, impeller and motor housing shall be constructed of ASTM A-48 class 30 cast iron.

Coating/Hardware: Exterior surfaces shall be painted with a water based air dry enamel. All exposed hardware shall be 300 series stainless steel.

Gaskets: All gaskets shall be of the compression square ring type eliminating critical slip fits and the possibility of damage during service associated with sliding o-ring sealing arrangements.

Impeller: The impeller shall be of 2 vane, open type, solid handling design with pump out vanes on the back side. Impellers shall be capable of being trimmed to meet specific performance characteristics. The impeller shall be dynamically balanced to ISO G6.3 specifications.

Mechanical seal: A dual seal arrangement shall consist of a Buna-N exclusion seal and a single mechanical design operating in an oil-filled seal cavity. The seal shall be constructed of Silicon carbide faces, 300 series stainless steel hardware, and all elastomer parts to be of Buna-N. The seal shall be commercially available and not a manufacturers proprietary design.

Motor: Design shall be of the split capacitor design for single phase units. The pump shall be designed to be non-overloading throughout the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability.

The motor windings shall be of Class B insulation and operate in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of time without damage due to the heat being generated. The used dielectric oil must be disposed of as non-hazardous waste. The motor shall meet the standard NEMA L for single phase and NEMA B for three phase.

Thermal Protection: All single phase motors shall have thermal protection with automatic reset. Three phase motors shall be equipped with a thermal switch embedded in the stator windings and require external overload protection in the control panel.

Shaft: The pump shaft shall be of a one-piece design and shall be of 416 stainless steel.

Bearings: The lower bearing shall be of the single row ball type to accept radial and thrust loads, and the upper bearing of the single ball type for radial loads. Bearings shall operate in an oil bath atmosphere for superior life.

Power Cord: All pump(s) shall be equipped with ____ ft of type SOW cord. The cord shall enter a cast iron terminal box assembly that is bolted to the motor housing and sealed with a Buna-N o-ring. The incoming lead wires shall be spliced in the terminal box. After splicing, the terminal box shall be filled with epoxy to seal the outer cable jacket and the individual strands to prevent water from entering the motor housing. The outer cord shall have an epoxy filled heat shrink tube to prevent water from entering the motor housing. Terminal connectors shall connect the incoming lead wires with the motor lead wires. Additional sealing and strain relief shall utilize a secondary pressure grommet at point of cable entry.

Tests and Inspections: Shall be performed by the pump manufacture.
1. A ground continuity check and motor chamber shall be Hi-potted to test for electrical integrity.
2. Check that motor voltage and frequency matches name plate.
3. The pump shall be pressurized and a air leak test is performed to ensure the integrity of the motor housing.
4. The pump is submerged and operated to determine the unit meets hydraulic performance requirements.

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING PUMP

Series: K4PL-DS
2 - 7.5 HP / 1750 RPM
Discharge: 4"
Spherical solids handling: 3"
Semi-Open Impeller
No moisture detection

DISCHARGE
4", 125lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C) continuous, 140 °F (60 °C) intermittent operation.

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 2 vane, semi-open, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: dual, mechanical, oil filled chamber.
Material: silicon carbide with Viton type 01 outer seal, carbon ceramic with Buna-N type 01 inner seal, with stainless steel hardware.

HARDWARE
300 series stainless steel.

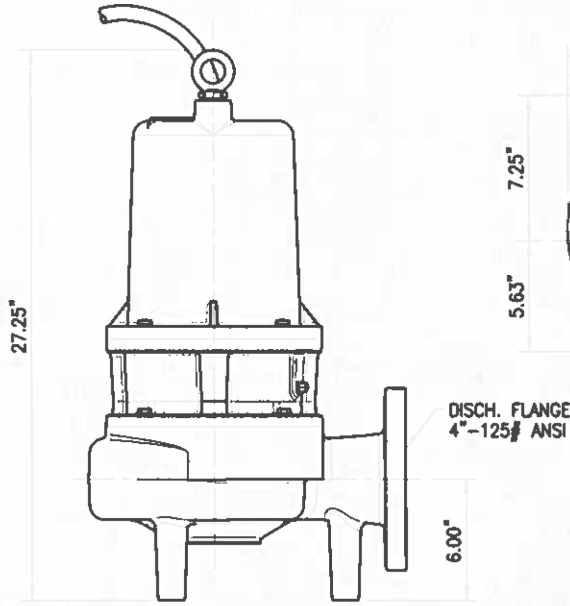
CORD ENTRY
40 ft of cord, epoxy sealed housing with secondary pressure grommet for sealing and strain relief.

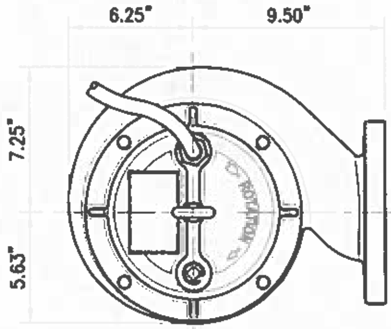
MOTOR
NEMA B, three phase, 230 & 460 volts, 60 Hz, 1750 RPM, oil filled, with class F insulation. Requires overload protection to be included in control panel.

OPTIONAL EQUIPMENT
Additional cord, tungsten carbide seal, slide rail coupling (SRC-4).

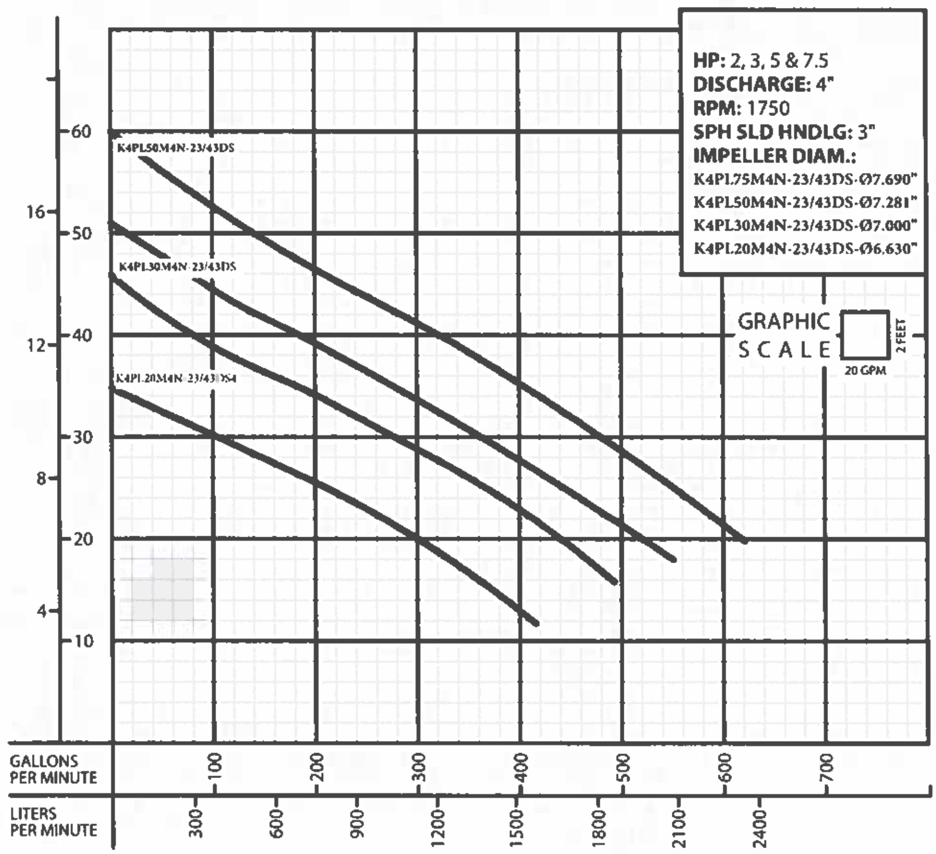
SPECIFICATIONS

SPECIFICATIONS





MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	WEIGHT (pounds)
K4PL20M4N-23DS	62170151	2	230	3	1750	14.3	40	F	10/4	STOW	200
K4PL20M4N-43DS	62170152	2	460	3	1750	7.2	20	F	10/4	STOW	200
K4PL30M4N-23DS	62170153	3	230	3	1750	15.9	49.5	H	10/4	STOW	205
K4PL30M4N-43DS	62170154	3	460	3	1750	8	24.8	H	10/4	STOW	205
K4PL50MN-23DS	62170155	5	230	3	1750	22.1	63.6	E	10/4	STOW	210
K4PL50M4N-43DS	62170156	5	460	3	1750	11	31.8	E	10/4	STOW	210
K4PL75M4N-23DS	62170157	7.5	230	3	1750	24.6	105	G	10/4	STOW	225
K4PL75M4N-43DS	62170158	7.5	460	3	1750	12.3	52.5	G	10/4	STOW	225



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

Installation Manual
Submersible Solids
Handling Pumps

K4PL-DS series

2 - 7.5 HP
@ 1750 RPM

IMPORTANT! - Read all instructions in this manual before operating or servicing a pump.

Before installation, read the following instructions carefully. Failure to follow instruction and safety information could cause serious bodily injury, death and/or property damage. Each Keen product is carefully inspected to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

⚠ DANGER **"Danger" indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠ WARNING **WARNING "Warning" indicates an imminenty hazardous situation which, if not avoided, MAY result in death or serious**

⚠ CAUTION **"Caution" indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.**

IMPORTANT! - Keen Pumps is not responsible for losses, injury or death resulting from failure to observe these safety precautions, misuse, abuse or misapplication of pumps or equipment.

ALL RETURNED PRODUCTS MUST BE CLEANED, SANITIZED, OR DECONTAMINATED PRIOR TO SHIPMENT, TO INSURE EMPLOYEES WILL NOT BE EXPOSED TO HEALTH HAZARDS IN HANDLING SAID MATERIAL. ALL APPLICABLE LAWS AND REGULATIONS SHALL APPLY.

⚠ WARNING Installation, wiring, and junction connections must be in accordance with the National Electric Code and all applicable state and local codes. Requirements may vary depending on usage and location.

⚠ WARNING Installation and servicing is to be conducted by qualified personnel only.

Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected; the rotating cutter and/or impeller can cause serious injury.

Always wear eye protection when working on pumps. Do not wear loose clothing that may become entangled in moving parts.

⚠ DANGER Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing the pump or any accessory items associated with or near the pump.

⚠ DANGER This pump is not intended for use in swimming pools or water installations where there is human contact with pumped fluid.

⚠ DANGER Risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling any aspect of the pumping system. ***Lock out power and tag.***

⚠ WARNING **Do not** use these pumps in water over 104° F. **Do not** exceed manufacturers recommended maximum performance, as this could cause the motor to overheat.

⚠ DANGER **Do not** lift, carry or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death. **Never** handle connected power cords with wet hands. Use appropriate lifting device.

⚠ WARNING Ground Fault Circuit Interrupter (GFCI) to be used with plug-in type power cord.

⚠ WARNING Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping. Never enter a basin after it has been used.

⚠ DANGER Failure to permanently ground the pump, motor and controls before connecting to power can cause shock, burns or death.

⚠ DANGER These pumps are not to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.

⚠ WARNING The Uniform Plumbing Code (UPC) states that sewage systems shall have an audio and visual alarm that signals a malfunction of the systems, that are required to reduce the potencial for property damage.

IMPORTANT! - Prior to installation, record Model Number, Serial, Amps, Voltage, Phase and HP from pump name plate for the future reference. Also record the Voltage and Current Readings at Startup:

Model Number: ____________________

Serial: ____________________

Phase: ______ HP: ____________________

DISCHARGE:	4", 125lb, flange horizontal.
SPHERICAL SLD HNDLG:	3"
LIQUID TEMPERATURE:	104° F (40° C) continuos, 140 °F (60 °C) intermittent operation.
VOLUTE:	Cast iron ASTM A-48 class 30.
MOTOR HOUSING:	Cast iron ASTM A-48 class 30.
SEAL PLATE:	Cast iron ASTM A-48 class 30.
IMPELLER:	2 vane, semi-open, with vanes on back side. Cast iron ASTM A-48 class 30.
SHAFT:	416 series stainless steel.
SQUARE RINGS:	Buna-N.
PAINT:	Air dry enamel, water based.
SEAL:	Double, mechanical, oil filled chamber. Silicon carbide with Viton® type 01 outboard, carbon ceramic with Buna-N inboard seal, with stainless steel hardware.
HARDWARE:	300 series stainless steel.
CORD ENTRY:	40 ft of cord, epoxy sealed housing with secondary pressure gromet for sealing and strain relief.
MOTOR:	Three phase, NEMA B, oil filled. Requires overload protection to be included in control panel. Class F insulation.
OPTIONAL EQUIPMENT:	Additional cord, tungsten carbide seal, slide rail coupling (SRC-4).

MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	WEIGHT (pounds)
K4PL20M4N-23DS	62170151	2	230	3	1750	14.3	40	F	10/4	STOW	200
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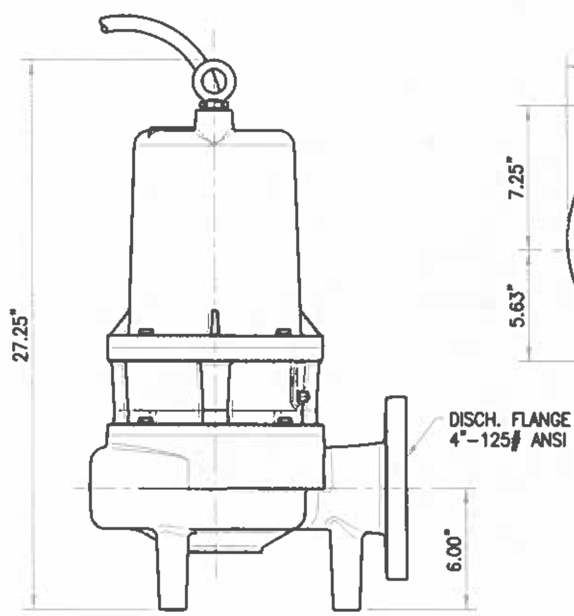
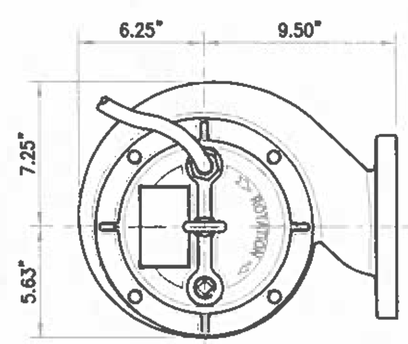




Receiving inspection

Open all cartons and inspect for shipping damage. Report any damage to your supplier or shipping carrier immediately.

Important: Always verify that the pump nameplate Amps, Voltage, Phase and HP ratings match your control panel and power supply.

Many of our sewage pumps are oil-filled. If there are any signs of oil leakage or if the unit has been stored for an extended period, check the oil level in the motor dome and the seal housing, if so equipped.

Check the motor cover oil level through the pipe plug on top of the unit. The motor chamber oil should just cover the motor. Do not overfill, leave room for expansion!

To check the seal housing oil level, where used, lay the unit on its side with the fill plug at 12 o'clock. Remove the plug. The oil should be within 1/2" (13mm) of the top. If low, refill with an ASTM 150 turbine oil. Replace the plug.

You can source oil locally at motor repair shops. Typical oil brands are: Shell Turbo 32, Sunoco Sunvis 932, Texaco Regal R&O 32, Exxon Nuto 32 and Mobil DTE Light.

Check the strain relief nut on power cable strain assemblies. Power cables should be torqued to 75 in/lbs. for #16 cables and 80 in/lbs. for all other cable assemblies. Seal/heat sensor cables, where used, should be torqued to 75 in/lbs.

Warranty does not cover damage caused by connecting pumps and controls to an incorrect power source (voltage/phase supply).

Record the model numbers and serial numbers from the pumps and control panel on the front of this instruction manual for future reference. Give it to the owner or affix it to the control panel when finished with the installation.

Optional Guide Rail

In many effluent and sewage basins or lift stations it is advisable to install the pump on a guide rail system or on a lift-out adapter to facilitate installation and removal for inspection and/or service. Most codes do not allow personnel to enter a wetwell without the correct protective equipment and training. Guide rails are designed to allow easy removal of the pump without the need for entry into the wetwell or need to disturb piping. The guide rail or liftout adapter should locate the pump opposite the influent opening preventing stagnate areas where solids can settle. The basin or pit must be capable of supporting the weight of the pump and guide rail. The pit floor must be flat.

Piping

Discharge piping should be no smaller than the pump discharge diameter and kept as short as possible, avoiding unnecessary fittings to minimize friction losses.

Install an adequately sized check valve matched to the solids handling capability of the pump to prevent fluid backflow. Backflow can allow the pump to spin backwards and may cause premature seal, bearing, shaft wear. If the pump is turning backwards when it is called on to start the increased torque may cause damage to the pump motor and/or motor shaft.

Install an adequately sized gate valve AFTER the check valve for pump, plumbing and check valve maintenance.

Important - Before pump installation. Drill a 3/16" (4.8mm) relief hole in the discharge pipe. It should be located within the wetwell, 2" (51mm) above the pump discharge but below the check valve. The relief hole allows any air to escape from the casing.

Allowing liquid into the casing will insure that the pump can start when the liquid level rises. Unless a relief hole is provided, a bottom intake pump could "air lock" and will not pump water even though the impeller turns.

All piping must be adequately supported, so as not to impart any piping strain or loads on the pump.

The pit access cover must be of sufficient size to allow for inspection, maintenance and crane or hoist service.

Float Switch Types

There are two basic float switch designs; single-action and wide-angle. Single-action switches operate over a range of 15° so they open and close quickly. Wide-angle floats operate over a 90° swing with the tether length between the float body and the pivot point controlling the On-Off range. The design determines how many floats are required with different systems or controls. Floats may be normally open (NO) for pump down applications or to empty a tank. Normally closed (NC) switches are used to pump up or to fill a tank.
A single-action control switch may be used only with a control panel, never direct connected to a pump. The wide-angle, pump down switches may be used as direct connected pump switches or as control switches.

Setting the float switches

There are no absolute rules for where to set the float switches, it varies from job to job.

Suggested Rules to Follow: All floats should be set below the Inlet pipe!

Off Float: Best: set so free hanging the water level is always above the top of the pump (motor dome). Next Best: set so the water level is not more than 6" below the top of the pump.

On Float: set so the volume of water between the On and Off floats allows pumps of 1.5 HP and under to operate for 1 minute minimum. 2 HP and larger pumps should run a minimum of 2 minutes. Basin technical brochure states the gallons of storage per inch of basin height.

Lag/Alarm Float(s): should be staggered above the Off and On floats. Try to use most of the available storage provided by the basin, save some space for reserve storage capacity. Exact reserve may be called out by local codes. See Diagrams and Charts in Float Switch Chart Section.

▸ Panel wiring diagrams

Our control panels are shipped with instructions and wiring diagrams. Use those instructions in conjunction with this IOM. Electrical installation should be performed only by qualified technicians. Any problem or questions pertaining to another brand control must be referred to that control supplier or manufacturer.

▸ Alarms

We recommend the installation of an alarm on all wastewater pump installations. Many standard control panels come equipped with alarm circuits. If a control panel is not used, a stand alone high liquid level alarm is available. The alarm alerts the owner of a high liquid level in the basin so they can contact the appropriate service personnel to investigate the situation.

▸ Three phase pumps

As a Minimum a Ø3 pump requires a 3 pole circuit breaker/fused circuit, an across the line magnetic starter rated for the pump HP, and ambient compensated Quick Trip Class 10 overloads.

▸ Control Panels

Control panels are available as Simplex (controls 1 pump) or Duplex (controls 2 pumps). Our standard Panels are available with many standard features and can be built with our most popular options. We also custom build panels which offer many more design options. Custom control panels are available in many different configurations. Custom panel quote requests may be forwarded to Customer Service through any authorized distributor.

Our duplex panels feature a solid-state printed circuit board design with standard high level alarm circuits. Other standard features are: an auxiliary dry alarm contact for signaling a remote alarm and float switch position indicator lights. Our Ø3 panels have built-in, adjustable, Class 10 overloads. The adjustable overloads on all our Ø3 panels mean less labor for the installer and no need to order specific overloads. Most panels are in stock for immediate delivery without options.

Always follow wiring schematic of the panel. Failure to wire the seal failure and heat sensor leads correctly may prevent the pump from running or cause nuisance tripping.

▸ Installation

Connect the pump(s) to the guide rail pump adapters or to the discharge piping. Slide rail bases should be anchored to the wetwell floor.

Complete all wiring per the control panel wiring diagrams and NEC, Canadian, state, provincial and/or local codes. This a good time to check for proper rotation of the motors/impellers.

DO NOT PLACE HANDS IN PUMP SUCTION WHILE CHECKING MOTOR ROTATION. TO DO SO WILL CAUSE SEVERE PERSONAL INJURY.

Always verify correct rotation. Correct rotation is indicated on the pump casing. Three phase motors are reversible. It is allowable to bump or jog the motor for a few seconds to check impeller rotation. It is easier to check rotation before installing the pump. Switch any two power leads to reverse rotation.

Lower the pump(s) into the wetwell and check to insure that the floats will operate freely and not contact the piping.

▸ Operation

Once the piping connections are made and checked you can run the pumps.

Control Panel Operation - Fill the wetwell with clear water. Use the pump H-O-A (Hand-Off-Automatic) switches in hand to test the pumps. If they operate well in hand proceed to test Automatic operation. If the pumps run but fail to pump, they are probably air locked, drill the relief holes per the instructions in the Piping Section.

Place Control Panel switch(es) in Automatic position and thoroughly test the operation of the ON, OFF, and Alarm floats by filling the wetwell with clear water.

Important: Failure to provide a Neutral from the power supply to a Ø1, 230 volt Control Panel will not allow the panel control circuit to operate. The Neutral is necessary to complete the 115 volt control circuit.

Check voltage and amperage and record the data on the front of this manual for future reference. Compare the amperage readings to the pump nameplate maximum amperage. If higher than nameplate amperage investigate cause.

Operating the pump off the curve, i.e. with too little head or with high or low voltage will increase amperage. The motor will operate properly with voltage not more than 10% above or below pump nameplate ratings.

Performance within this range will not necessarily be the same as the published performance at the exact rated nameplate frequency and voltage. Correct the problem before proceeding. Three phase unbalance is also a possible cause. See power unbalance and follow the instructions.

Reset the Alarm circuit, place pump switch(es) in the Automatic position and Control Switch in ON position. The system is now ready for automatic operation.

Explain the operation of the pumps, controls and alarms to the end user. Leave the paperwork with the owner or at the control panel if in a dry, secure location.

▸ Float Switch and Panel Chart

The purpose of this chart is to show the required switch quantities and the function of each switch in a typical wastewater system. The quantities required vary depending on the switch type, single-action or wide-angle. Switch quantities also vary by panel type: simplex with and without alarms, and duplex with alarms.

Simplex Panel using single-action switches:

SIMPLEX PANEL WITH ALARM		
SW1	BOTTOM	PUMP OFF
SW2	MIDDLE	PUMP ON
SW3	TOP	ALARM ON/OFF

SIMPLEX PANEL WITH NO ALARM		
SW1	BOTTOM	PUMP OFF
SW2	TOP	PUMP ON

Simplex Panel using wide-angle switches:

SIMPLEX PANEL WITH ALARM		
SW1	BOTTOM	PUMP ON/OFF
SW2	TOP	ALARM ON/OFF

SIMPLEX PANEL WITH NO ALARM		
SW1		PUMP ON/OFF

Duplex Panels using single-action

THREE FLOAT PANEL WIRING		
SW1	BOTTOM	PUMPS OFF
SW2	MIDDLE	1st PUMP ON
SW3	TOP	2nd PUMP & ALARM ON

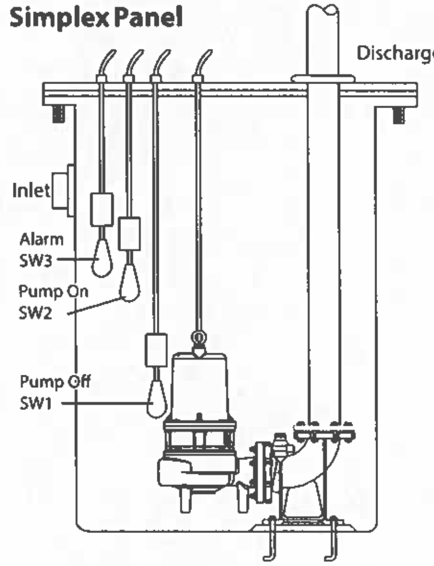
FOUR FLOAT PANEL WIRING		
SW1	BOTTOM	PUMPS OFF
SW2	2nd	1st PUMP ON
SW3	3rd	2nd PUMP ON
SW4	TOP	ALARM ON

Duplex Panels using wide-angle switches:

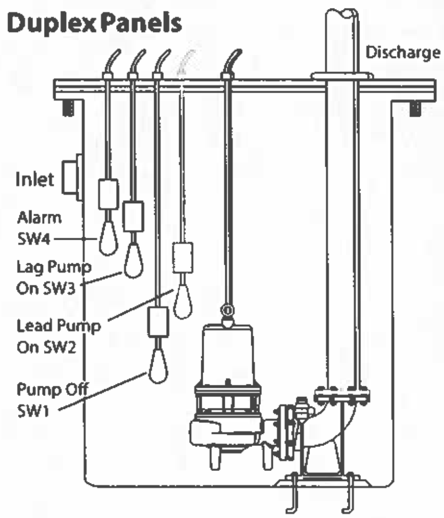
THREE FLOAT PANEL WIRING		
SW1	BOTTOM	1st PUMP ON/BOTH OFF
SW2	TOP	2nd PUMP & ALARM ON

FOUR FLOAT PANEL WIRING		
SW1	BOTTOM	1st PUMP ON/BOTH OFF
SW2	MIDDLE	2nd PUMP ON
SW3	TOP	ALARM ON

Simplex Panel



Duplex Panels



▸ Power Unbalance

A full three phase supply consisting of three individual transformers or one three phase transformer is recommended. "Open" delta or wye connections using only two transformers can be used, but are more likely to cause poor performance, overload tripping or early motor failure due to current unbalance. Check the current in each of the three motor leads and calculate the current unbalance as explained below. If the current unbalance is 2% or less, leave the leads as connected.

If the current unbalance is more than 2%, current readings should be checked on each leg using each of the three possible hook-ups. Roll the motor leads across the starter in the same direction to prevent motor reversal.

To calculate percent of current unbalance:

A. Add the three line amp values together.

B. Divide the sum by three, yielding average current.

C. Pick the amp value which is furthest from the average current (either high or low).

D. Determine the difference between this amp value (furthest from average) and the average.

E. Divide the difference by the average. Multiply the result by 100 to determine percent of unbalance.

Current unbalance should not exceed 5% at service factor load or 10% at rated input load. If the unbalance cannot be corrected by rolling leads, the source of the unbalance must be located and corrected.

If, on the three possible hookups, the leg farthest from the average stays on the same power lead, most of the unbalance is coming from the power source. Contact your local power company to resolve the imbalance.

▸ Insulation Resistance Readings

Normal Ohm and Megohm Values between all leads and ground (see table 1).

Insulation resistance varies very little with rating. Motors of all HP, voltage and phase ratings have similar values of insulation resistance.

Insulation resistance values above are based on readings taken with a megohmmeter with a 500V DC output. Readings may vary using a lower voltage ohmmeter, consult factory if readings are in question.

▸ Engineering Data

Engineering data for specific models may be found in your catalog. Control panel wiring diagrams are shipped with the control panels. Please use the control panel drawings in conjunction with this instruction manual to complete the wiring.

	Hookup 1			Hookup 2			Hookup 3		
Starter Terminals	L1	L2	L3	L1	L2	L3	L1	L2	L3
	⊥ T	⊥ T	⊥ T	⊥ T	⊥ T	⊥ T	⊥ T	⊥ T	⊥ T
Motor Leads	R	B	W	W	R	B	B	W	R
	T3	T1	T2	T2	T3	T1	T1	T2	T3

Example:

Hookup 1	Hookup 2	Hookup 3
T3-R = 51 amps	T2-W = 50 amps	T1-B = 50 amps
T1-B = 46 amps	T3-R = 48 amps	T2-W = 49 amps
T2-W = 53 amps	T1-B = 52 amps	T3-R = 51 amps
Total = 150 amps	Total = 150 amps	Total = 150 amps
÷ 3 = 50 amps	÷ 3 = 50 amps	÷ 3 = 50 amps
– 46 = 4 amps	– 48 = 2 amps	– 49 = 1 amps
4 ÷ 50 = .08 or 8%	2 ÷ 50 = .04 or 4%	1 ÷ 50 = .02 or 2%

Table 1

Condition of Motor and Leads	Ohm Value	Megohm Value
A new motor (without drop cable).	20,000,000 (or more)	20 (or more)
A used motor which can be reinstalled in well.	10,000,000 (or more)	10 (or more)
Motor in well. Readings are for drop cable plus motor.		
New motor.	2,000,000 (or more)	2 (or more)
Motor in good condition.	500,000 - 2,000,000	0.5 - 2
Insulation damage, locate and repair.	Less than 500,000	Less than 0.5

Table 2

PUMP OPERATION			
Minimum Submergence		**Maximum Fluid Temperature**	
Continuous Duty	Fully Submerged	Continuous Operation	104 °F 40 °C
Intermittent Duty	6" Below Top of Motor	Intermittent Operation	140 °F 60 °C

NOT RECOMMENDED
Pumpmaster and Pumpmaster Plus - Hard Wired

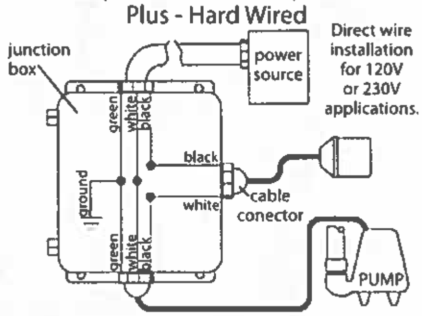


Figure 1

NOT RECOMMENDED
Double float - Hard wired

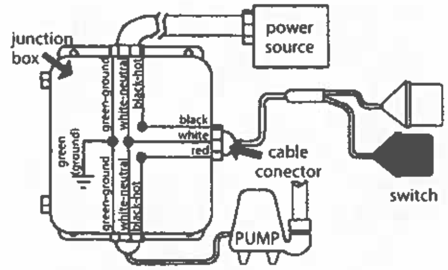


Figure 2

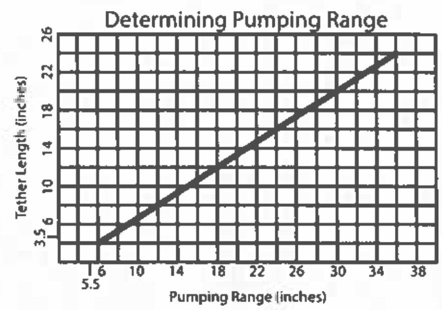


Figure 3

Single-Action Float Switch
"Typical" Installation

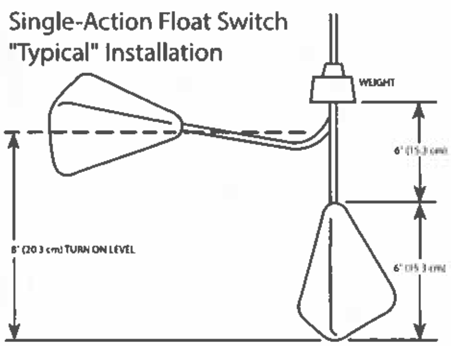


Figure 4

Wide-Angle
float switch

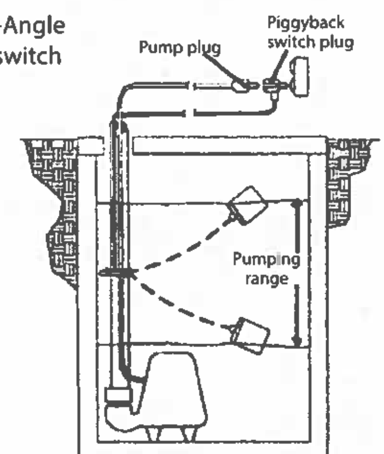


Figure 5

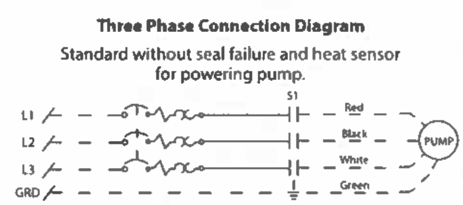


Figure 6

K3PL-DS

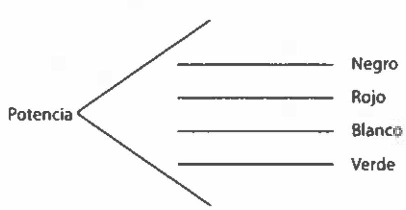
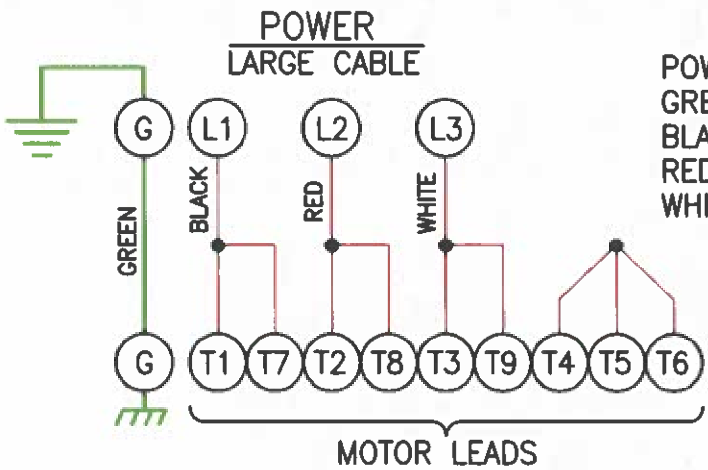


Figure 7

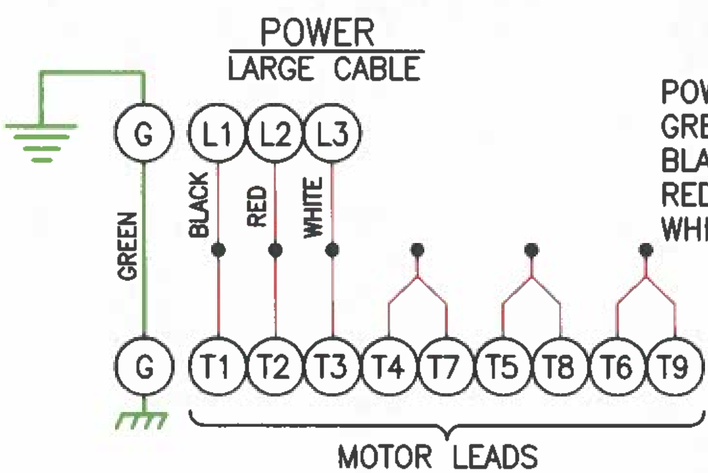
Connections diagrams

THREE PHASE 230 VOLT AC



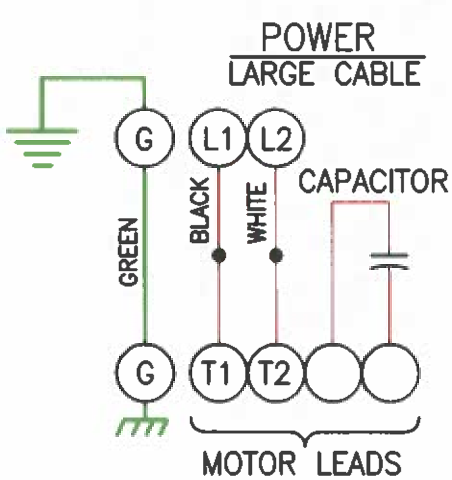
POWER CABLE (30)	MOTOR LEAD NUMBER
GREEN (GROUND)	GREEN
BLACK	1 & 7
RED	2 & 8
WHITE	3 & 9
	4, 5 & 6 TOGETHER

THREE PHASE 460 VOLT AC



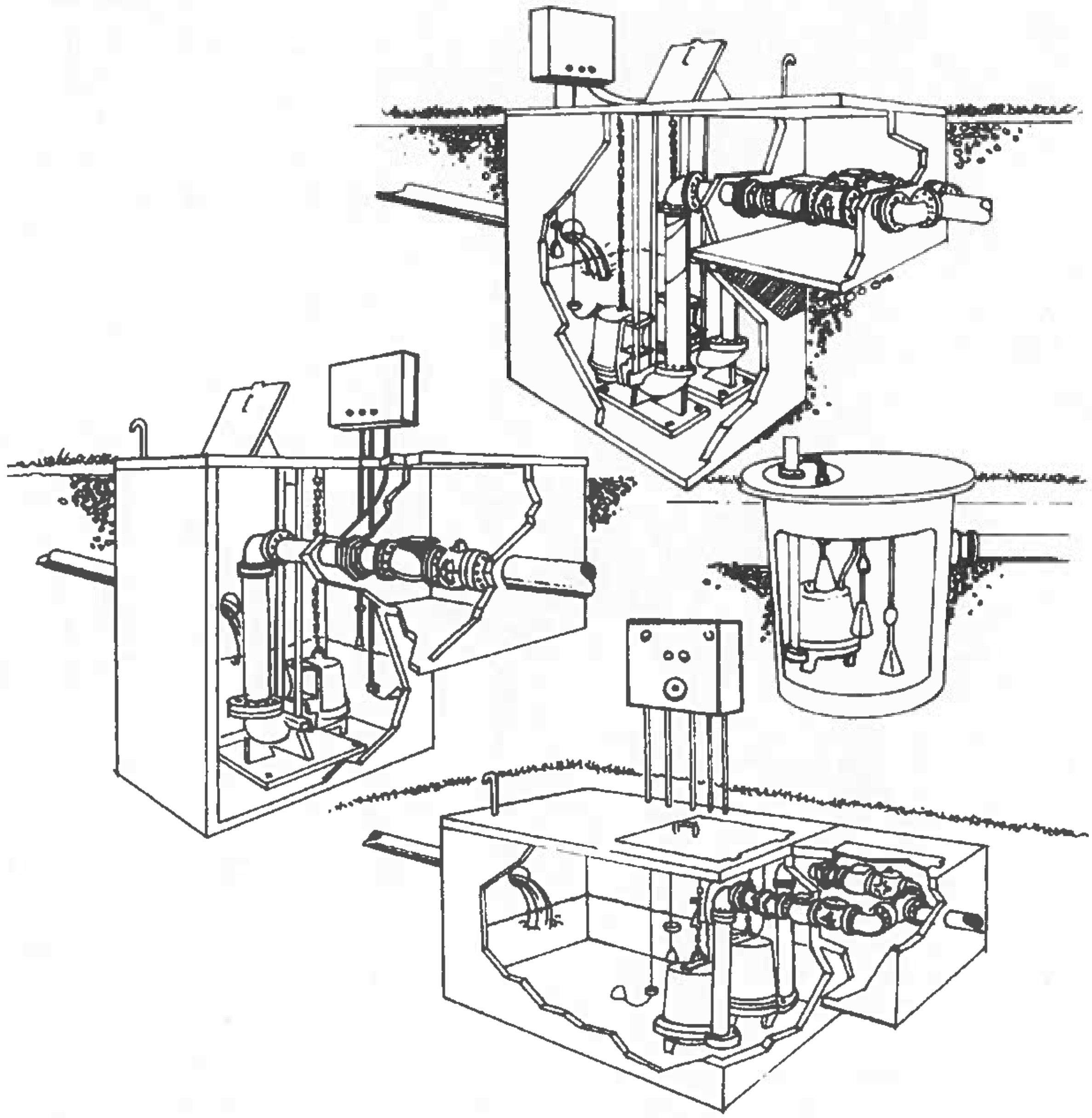
POWER CABLE (30)	MOTOR LEAD NUMBER
GREEN (GROUND)	GREEN
BLACK	1
RED	2
WHITE	3
	4 & 7 TOGETHER
	5 & 8 TOGETHER
	6 & 9 TOGETHER

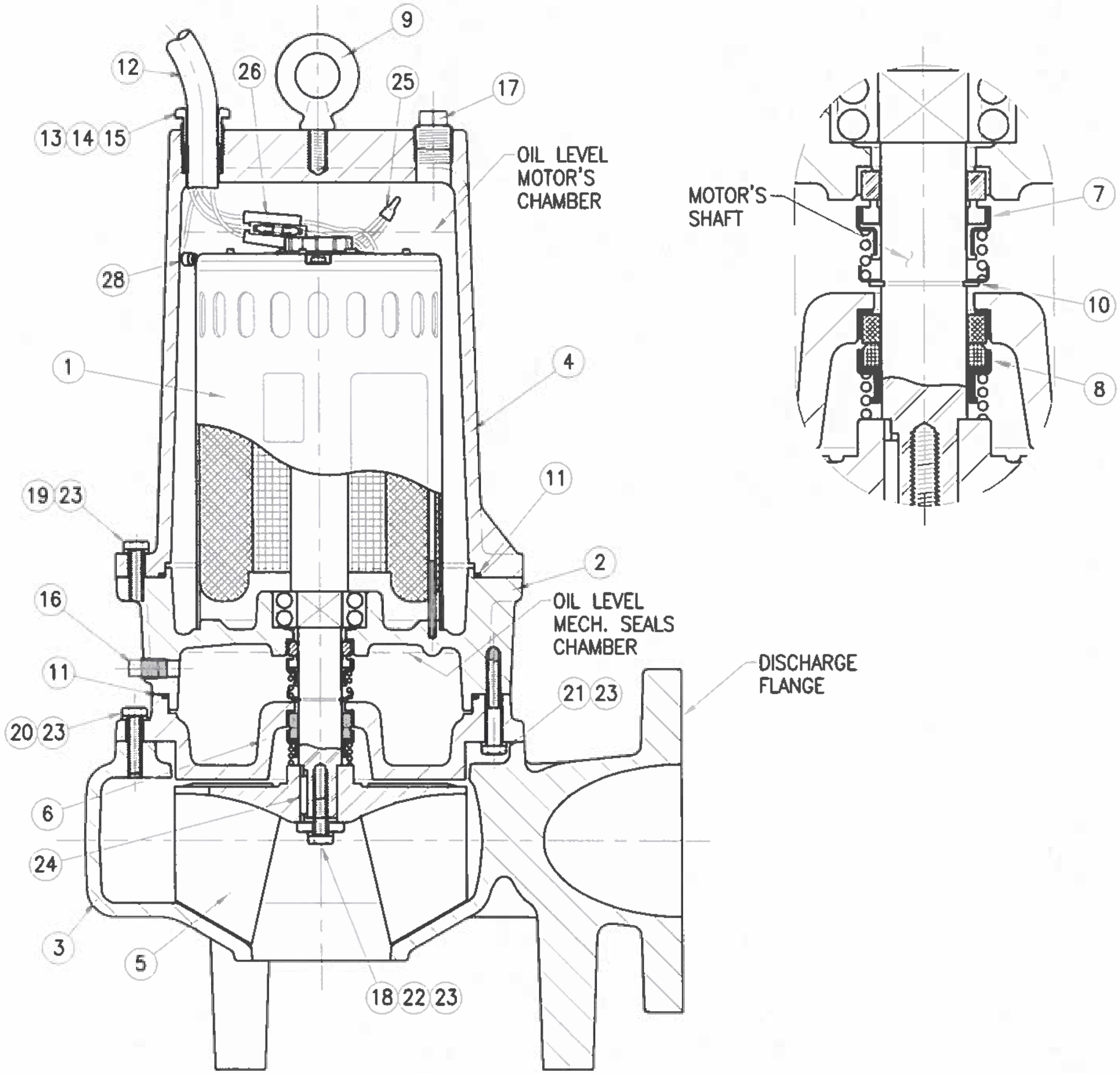
SINGLE PHASE 115/230 VOLT AC



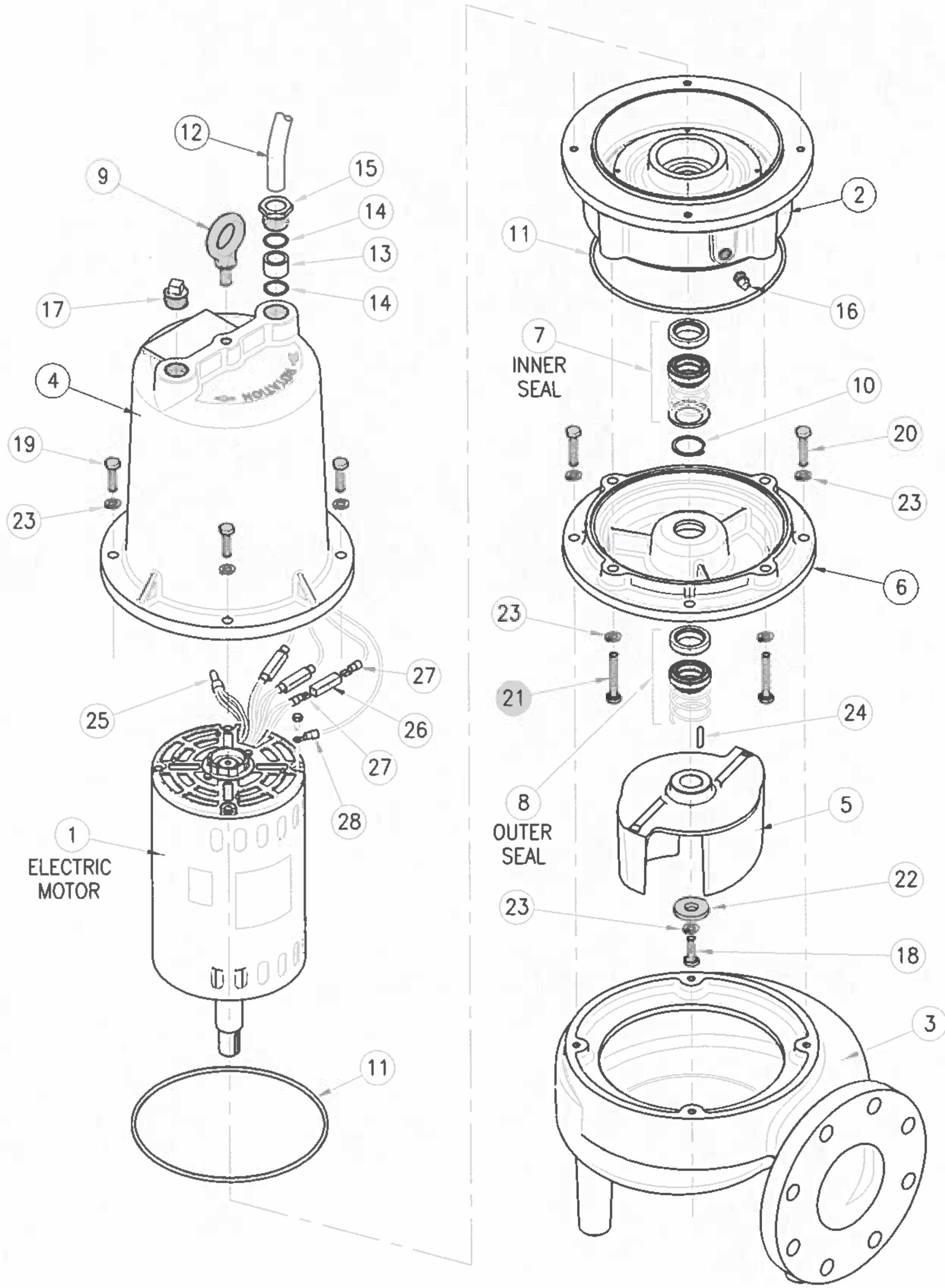
POWER CABLE (30)	MOTOR LEAD NUMBER
GREEN (GROUND)	GREEN
BLACK	1
WHITE	2
FLAG TERMINAL	CAPACITOR
FLAG TERMINAL	CAPACITOR

▸ **Typical Installations**





For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

ITEM	PART #	DESCRIPTION	QTY.
1		Electric motor	
	40040068	7.5 HP, 3 ph, 230/460 V, frame 56Z	1
	40040066	3 HP, 3 ph, 230/460 V, frame 56Z	
2	03040027	Bearing housing	1
3	03090095	Body	1
4	03100002	Motor housing	1
5		Impeller	
	03140088	Diameter 7.690", for 7.5 HP	1
	03140088B	Diameter 7.280", for 5 HP	
	03140088C	Diameter 7.000", for 3 HP	
	03140088D	Diameter 6.630", for 2 HP	
6	03180029	Seal plate	1
7	31030211	Mechanical seal Ø1⅛" (Carbon/Ceramic/Buna/SS)	1
8	31030137	Mechanical seal Ø1⅛" (Silicon/Silicon/Viton/SS)	1
9	91010406	Handle	1
10	31010017	Retaining ring # 5100-112	1
11	92010083	Gasket # 33730	2
12	31030003	Power cable 4 x10 (12.40 meters)	1
13	92010001	Grommet # 514	1
14	91010055	Washer # 54746	2
16	93010143	Pipe plug 1/4"	1
17	93010148	Pipe plug 3/4"	1
18	91010345C	Screw 3/8" x 1¼" SS	1
19	91010345C	Screw 3/8" x 1¼" SS	4
20	91010346	Screw 3/8" x 1½" SS	4
21	91010347C	Screw 3/8" x 2¼" SS	4
22	30400426B	Impeller washer	1
23	91010061	Spring washer 3/8" SS	13
24	30400631	Keyway 3/16"x1-1/8"	1
25		Wire connector #1921	
	94010012	For 230 volts	1
		For 460 volts	3
26	94010027	Connector	3
27	94010041	Female terminal	6
28	94010043	Terminal	1
	31010031	DTE. Oil light	12 L
	99210007	Data plate	1
	99230102	Rivet SS # 001628	4

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Risk of electric shock. Always disconnect the pump from the power source before handling inspections or repairs.

SYMPTOM	POSSIBLE CAUSE(s)	CORRECTIVE ACTION
Motor not running. **Note**: If circuit breaker "OPENS" repeatedly, **DO NOT** reset. Call qualified electrician.	Pump impeller binding or jammed.	Allow motor to cool. Insure minimum pump submergence. Clear debris from casing and impeller.
	Motor thermal protector tripped.	Determine cause, call a qualified electrician.
	Open circuit breaker or blown fuse.	
	Power cable is damaged.	Check motor amp draw. If two or more times higher than listed on pump nameplate, impeller is locked, motor bearings or shaft is damaged. Clear debris from casing and impeller, consult with dealer. Resistance between power leads and ground should read infinity. If any reading is incorrect, call a qualified electrician.
	No neutral wire connected to control panel.	
	Inadequate electrical connection in control panel.	Inspect control panel wiring. Call a qualified electrician.
Note: Check the pump in manual mode first to confirm operation. If pump operates, the automatic control or wiring is at fault. If pump does nos operate, see above.	Defective liquid level switch.	With switch disconnected, check continuity while activating liquid level switch. Replace switch, as required.
	Insufficient liquid level to activate controls.	Allow liquid level to rise 3" to 4" (76 mm - 101 mm) above turn-on level.
	Liquid level cords tangled.	Untangle cords and insure free operation.
Pump will not turn off.	Liquid level cords tangled.	Untangle cords and insure free operation.
	Pump is air locked.	Shut off pump for approximately one minute, then restart. Repeat until air lock clears. If air locking persists in a system with a check valve, a 3/16" (4.8 mm) hole may be drilled in the discharge pipe approximately 2" (51 mm) above the discharge connection.
	Influent flow is matching pump's discharge capacity.	Larger pump may be required.
Little or no liquid delivered by pump.	Check valve installed backwards, plugged or stuck closed.	Check flow arrow on valve and check valve operation.
	Excessive system head.	Consult with dealer.
	Pump inlet plugged.	Inspect and clear as required.
	Improper voltage or wired incorrectly.	Check pump rotation, voltage and wiring. Consult with qualified electrician.
	Pump is air locked.	See recommended action, above.
	Impeller is worn or damaged.	Inspect impeller, replace as required.
	Liquid level controls defective or improperly positioned.	Inspect, readjust or replace as required.
Little or no liquid delivered by pump.	Discharge check valve inoperative.	Inspect, repair or replace as required.
	Sewage containment area too small.	Consult with dealer.
	Liquid level controls defective or improperly positioned.	Inspect, readjust or replace as required.
	Influent excessive for this size pump.	Consult with dealer.

NOTE: Keen Pumps assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Keen Pumps or its authorized service centers, automatically voids warranty.

KEEN PUMPS
FACTORY WARRANTY

Keen Pumps warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for 18 months from date of manufacture or 12 months from installation date whichever occurs first. This warranty gives you specific legal rights, which vary from state to state.

This warranty is a limited warranty, and no warranty related claims of any nature whatsoever shall be made against Keen Pumps, until the ultimate consumer or his/her successor notifies us in writing of the defect and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station as instructed by Keen Pumps. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE. PRODUCT SHALL BE EITHER REPLACED OR REPAIRED AT THE ELECTION OF KEEN PUMPS. Guarantees relating to performance specifications provided in addition to the foregoing material and workmanship warranties on a product manufactured by Keen Pumps, if any, are subject to possible factory testing. Any additional guarantees, in the nature of certified performance specifications or time frame must be in writing and such writing must be signed by our authorized factory manager at time of order placement and/or at time of quotation. Due to inaccuracies in field testing and should a conflict arises between the results of field testing conducted by or for the user, Keen Pumps reserves the right to have the product returned to our factory for additional testing.

This warranty shall not apply when damage is caused by (1) improper installation, (2) improper voltage, (3) lightning, (4) excessive sand or other abrasive material, (5) corrosion build-up due to excessive chemical content or (6) uncontrollable acts of god. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective pumps, parts or systems. Keen Pumps will not accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY. No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.

IMPORTANT!
If you have a claim under the provision of the warranty, contact Keen Pumps or your authorized Keen Pumps Distributor
www.keenpump.com

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K4XPL-DS
5 HP / 1750 RPM
Discharge: 4"
Spherical solids handling: 3"

DISCHARGE
4", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104° F (40° C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 2 vane, open, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

CORD ENTRY
25 ft of cord, epoxy sealed housing with secondary pressure gromet for sealing and strain relief.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, double row, oil lubricated, for radial and thrust load.

MOTOR
NEMA B, three phase, 460 volts, 60 Hz, 1750 RPM, air cooled. Explosion Proof, Class 1, Division 1, Group C & D, insulation Class F. Requires overload protection to be included in control panel.

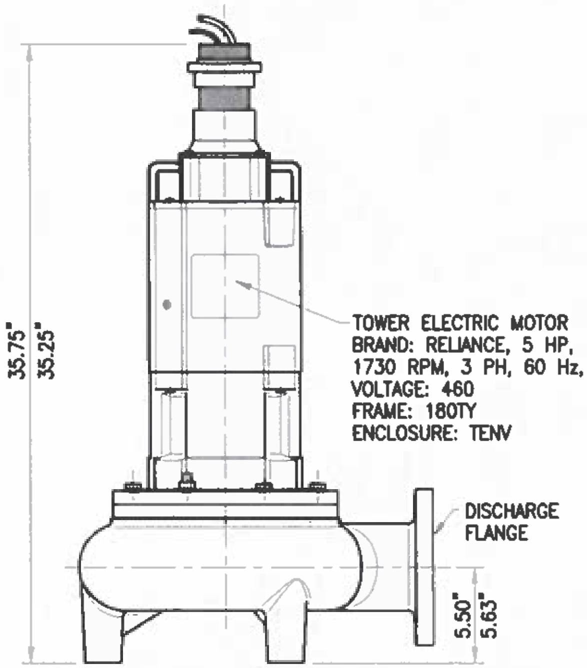
MOISTURE SENSOR
Normally open (N/O) included, requires relay in control panel.

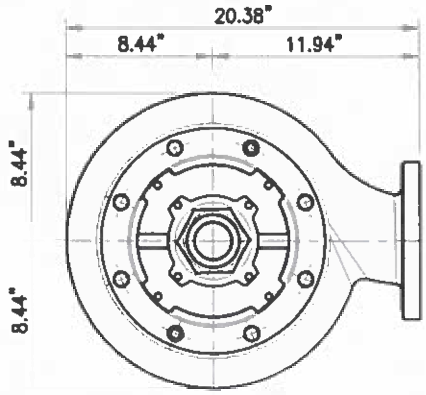
TEMPERATURE SENSOR
Normally closed (N/C) included, requires relay in control panel.

OPTIONAL EQUIPMENT
Additional cord, tungsten carbide seal, slide rail coupling (SRC-4).

SPECIFICATIONS

SPECIFICATIONS

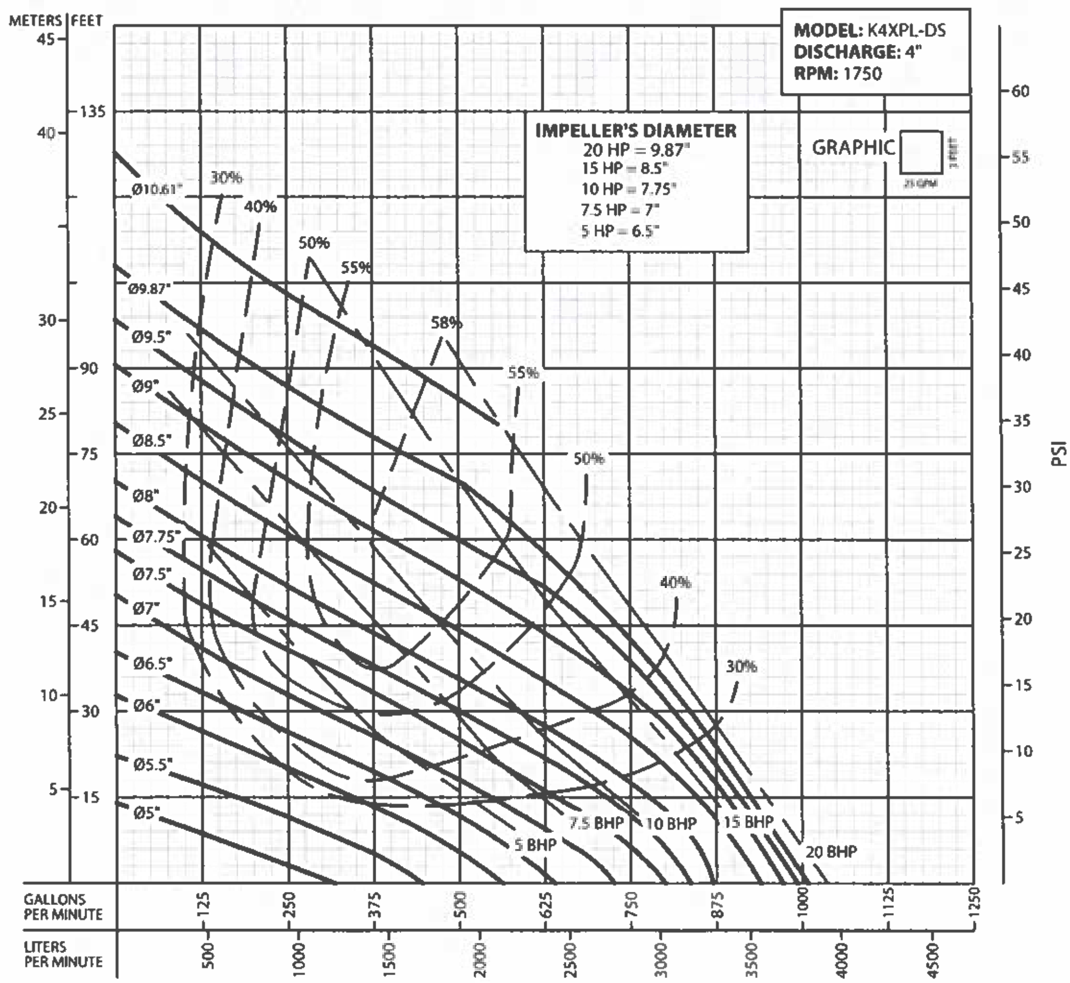




DISCHARGE FLANGE

BRANCH:	4"
RATING:	150 PSI
O.D.:	9.00"
BOLTS:	8
BOLTS SIZE:	.625"
BCD:	7.50"
THICK:	.94"

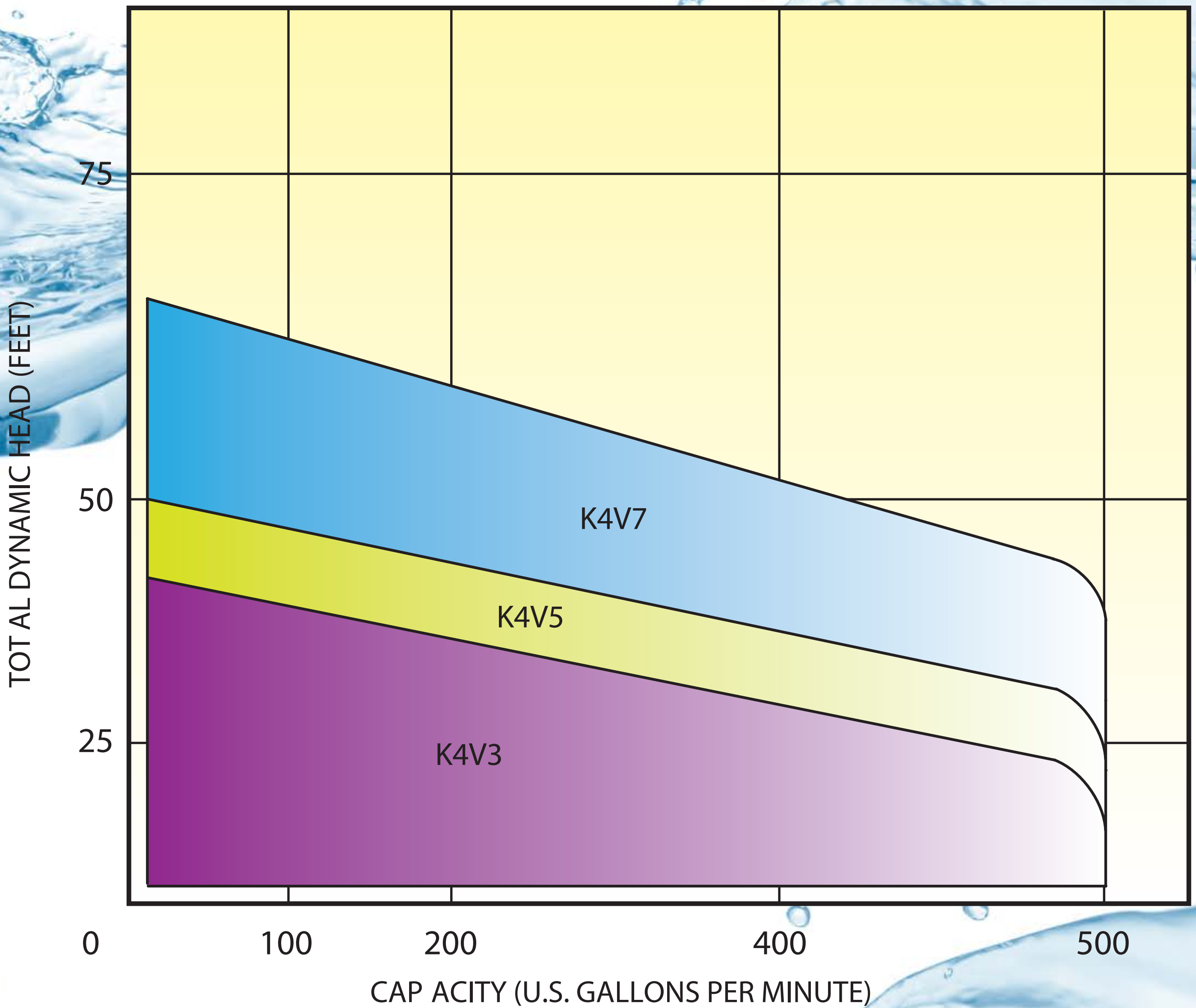
MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	WEIGHT (pounds)
K4XPL50M4-43DS	-	5	460	3	1750	7.4	42.7	H	12/4	SOW	-



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

K4V Non-Clog Pump Series



KEEN PUMP®

471 E State Route 250 East • Ashland, Ohio 44805

Solids-Handling Pumps

K4V

4" Submersible, Enclosed Impeller

2 VANE ENCLOSED IMPELLER

- Efficient operation, non-clogging
- Most energy efficient design
- Pump-out vanes, prevents material build-up
- Pressure balance on shaft seal for long life
- Positive pumping action through impeller

STRONG PERFORMANCE

- Ideal for higher flows, lower heads
- Operate to shut-off head without damage
- Non-overloading performance curve

LONG SERVICE LIFE

- Dual silicon carbide shaft seals
- Low motor operation temperatures
- Continuously lubricated bearings
- Premium ball bearing construction
- Epoxy potted cord entry

LOW MAINTENANCE

- Easily replaceable impeller wear ring restores original pump performance
- Unobstructed impeller passageway
- Grit-resistant silicon carbide shaft seals
- Large, 3" diameter solids handling
- High service factor motor handles tough electrical operating conditions

CAPABILITIES:

- Flows - to 500 GPM
- Heads - to 65 Feet
- HP Range - 1, 1.5, 2, 3, 5, 7.5 HP
- Voltage Options - 200 / 230 / 460 volt, 1 or 3 phase
- Discharge Connections - 4" ANSI 150 lb Horizontal Flange
- Motor Speeds - 1150 / 1750 rpm
- Solids Handling - 3"
- Impeller - 2 Vane, Enclosed, Balanced
- Motor Serice Factor - 1.15

Features and Benefits

K4V

1. Triple Sealed Cable Entrance

Stainless steel strain relief cord grip with compression grommet protects outer cord jacket. Epoxy filled inner cord cap with individually soldered wires provide anti-wicking moisture protection to the motor even if power cable is cut or damaged. 40' U/L power & control cords.

2. Modular Pump Design

Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy duty ASTM A48, Class 30 cast iron components.

3. Strong Motor

Powerful high torque motor for reliable pump operation.
208 / 230 volt, 1-phase
208 / 230 / 460 volt, 3-phase
Pressed stator securely holds motor and efficiently transfers heat. Class F insulation with overload protection in air filled chamber for cool operation and long motor life.

4. Solid Bearing Support

Motor / Pump shaft securely held with upper and lower ball bearings rated for long 50,000 hour B-10 life.

5. Severe Duty Dual Mechanical Seals

Dual silicon carbide mechanical shaft seals provide twice the moisture and grit protection for the motor. Dual seals are housed in a secondary oil filled seal chamber. Tougher silicon carbide seals better handles sand, grit and abrasive materials.

6. Moisture Detection

Seal leak probe signals alarm in control panel for scheduled maintenance.

7. High Efficiency Hydraulic Design

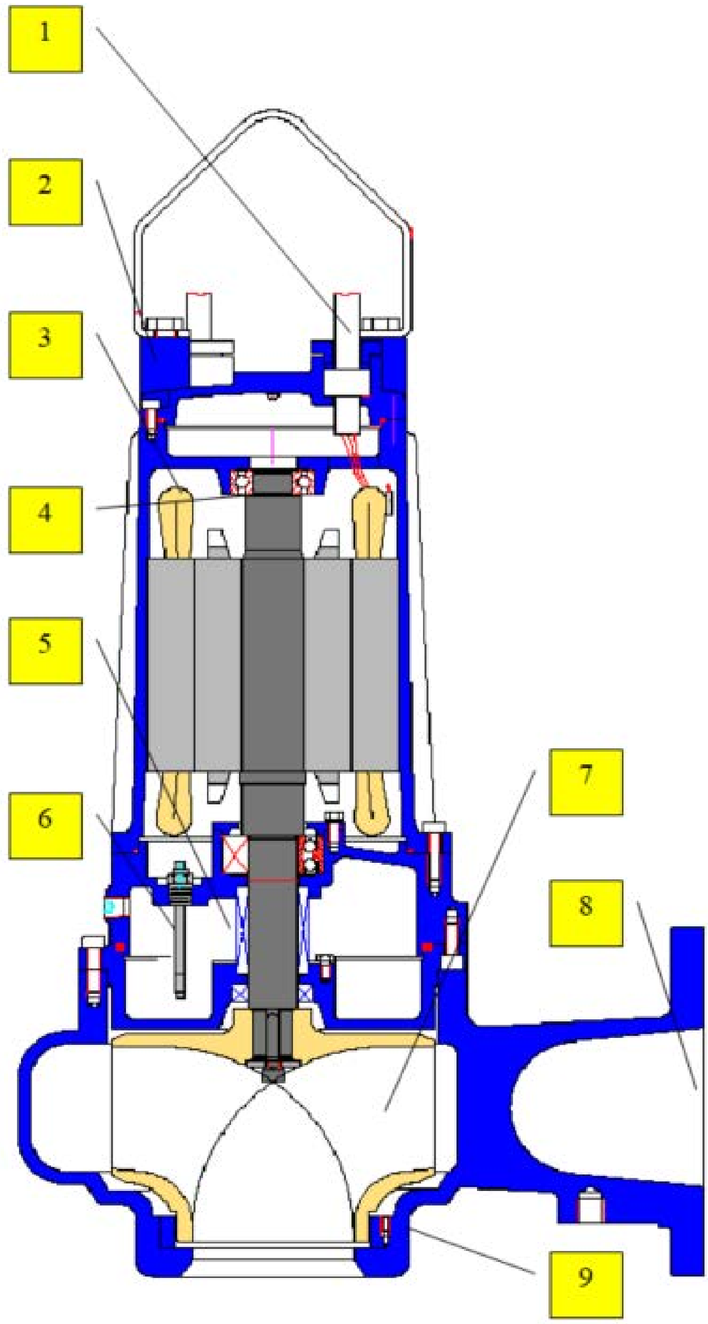
Highly efficient enclosed 2 vane impeller easily passes 3" diameter solids without blockage. The strong ductile iron impeller features backside pump out vanes, keeping the lower mechanical seal clean and pressure compensated for longer life. Dynamically balanced for smooth quiet operation and long bearing life.

8. 4" Discharge Flange

4" horizontal, 125# ANSI discharge flange.
Industry standard, 8-bolt pattern.

9. High Performance Wear Ring

Assists impeller in providing higher performance efficiencies and prevention of recirculation losses. Bronze ring will not corrode or deteriorate from liquid being pumped. Bronze ring reduces wear to stronger ductile iron impeller in sandy or gritty applications. Easily serviceable and replaceable.



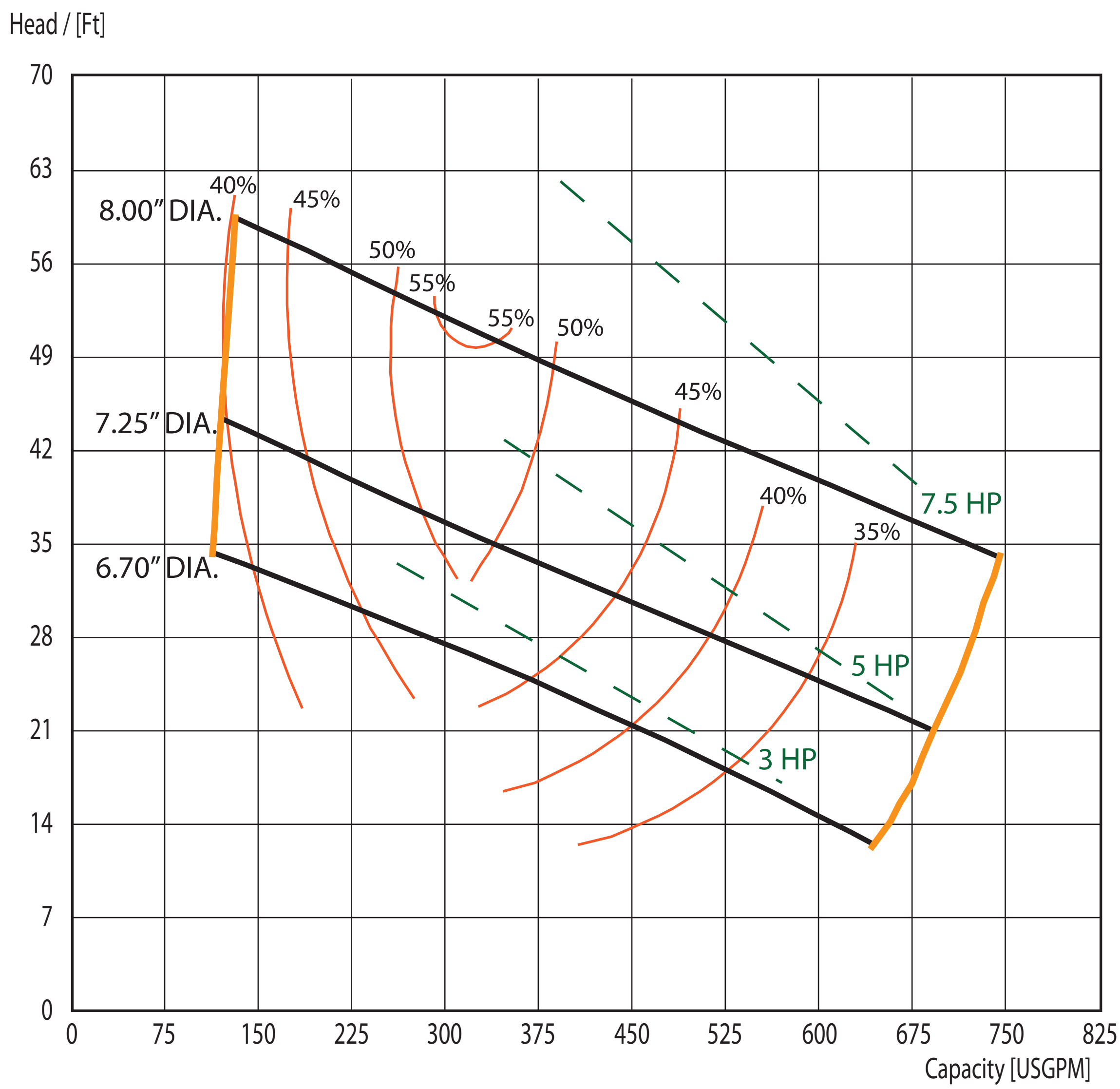
KEEN PUMP®
471 US HWY 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

KEEN PUMP CO.™

Section **ENCLOSED**
Date **JANUARY 2013**

Pump Series	**K4V**		4″ SUBMERSIBLE SEWAGE PUMPS		
Speed	**1750 RPM**	Discharge	**4″**	Solids	**3″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

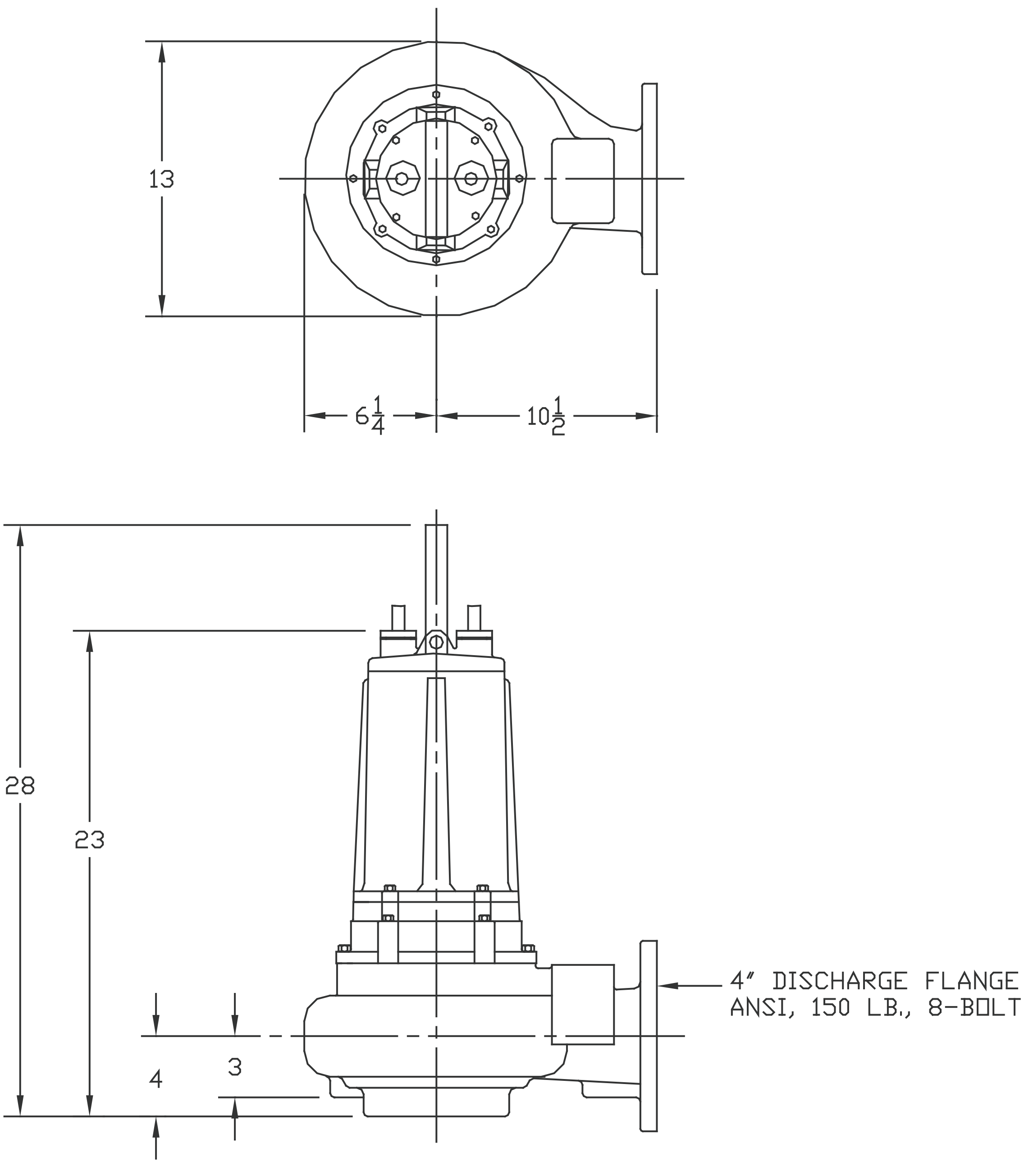
File: K4V_1750_CAT

KEEN PUMP CO.™

Section *ENCLOSED*
Date *JANUARY 2013*

Pump Series	K4V	4″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

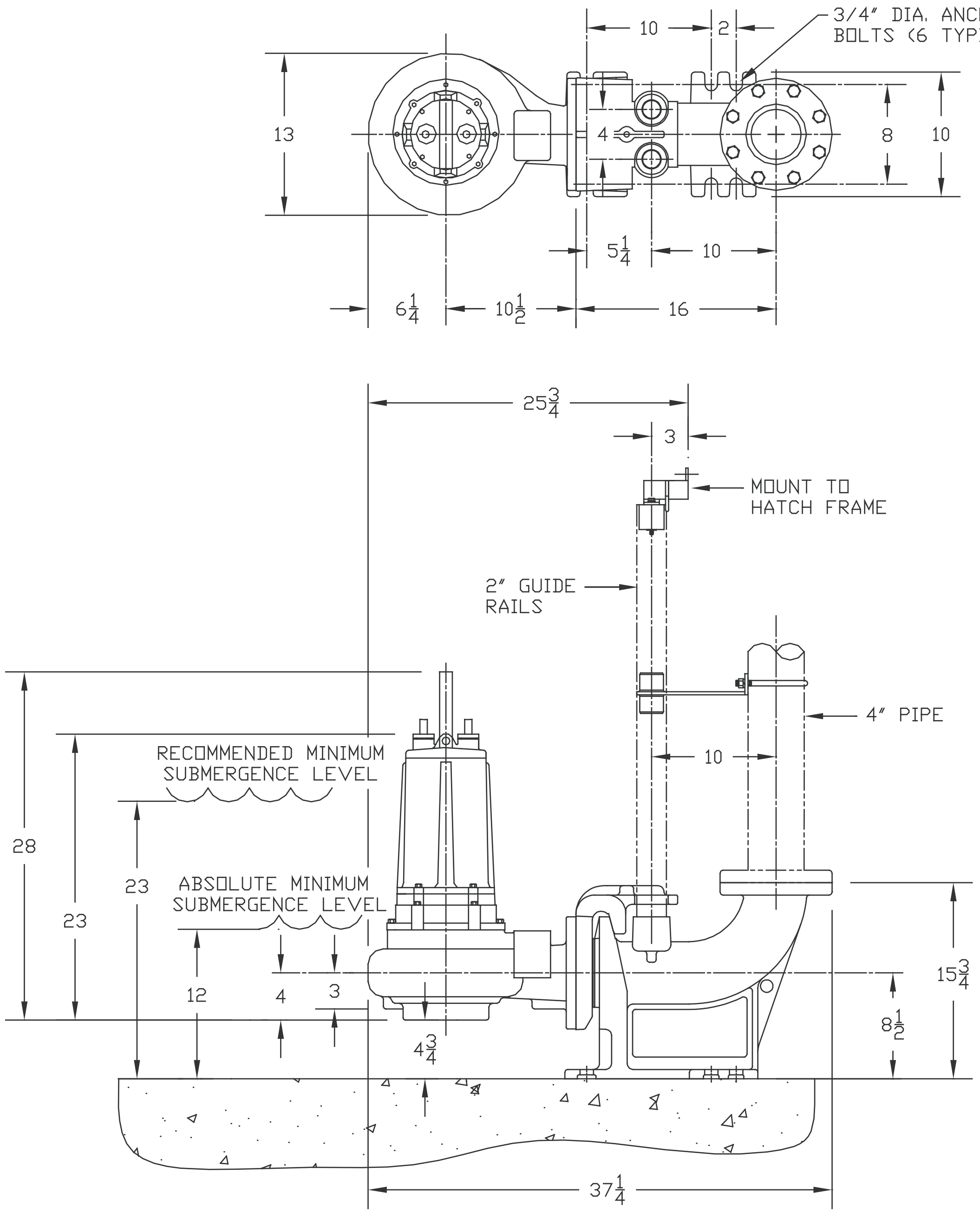


Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4V Dimensions

Pump Series	**K4V**	4″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Discharge flange 150 Lb. ANSI unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

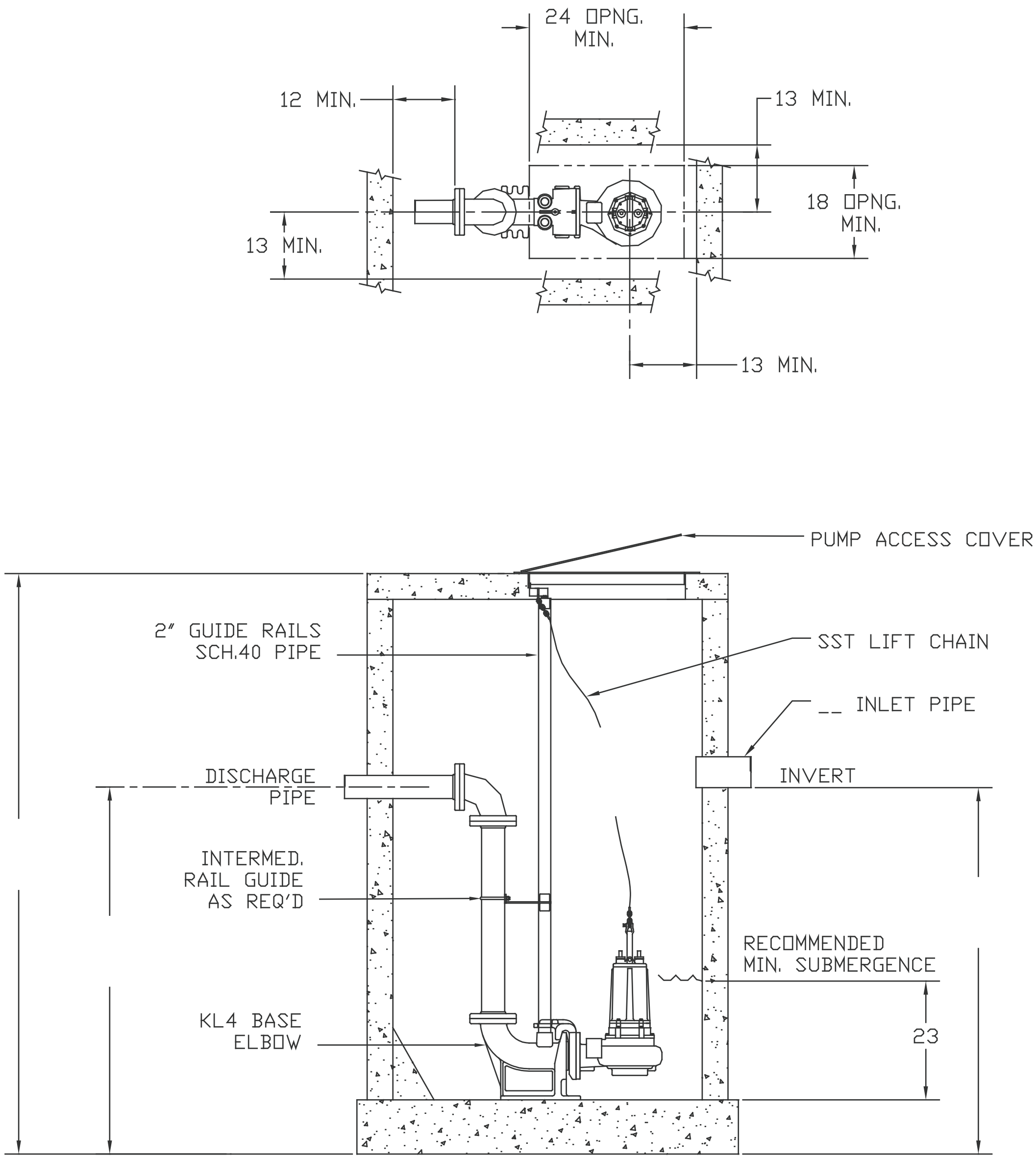
File: K4V Liftout Dimensions

KEEN PUMP CO.™

Section **ENCLOSED**
Date **JANUARY 2013**

Pump Series	K4V	4″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

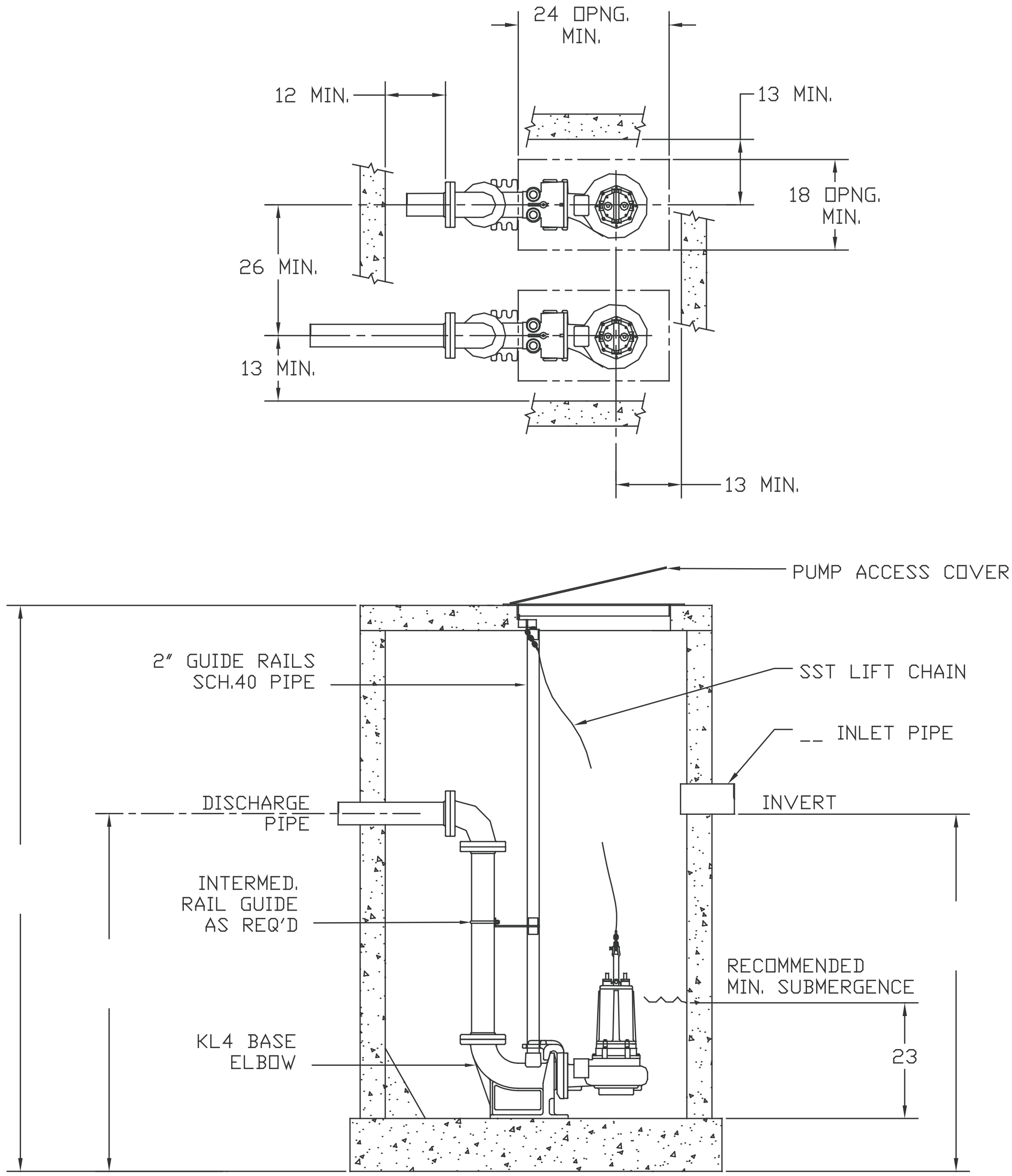
File: K4V Install Dimensions

KEEN PUMP CO.™

Section ENCLOSED
Date JANUARY 2013

Pump Series	K4V	4″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4V Install Dimensions

Pump Model: K4V

Thermal Data:

Maximum Liquid		140º F (60º C)
Maximum Stator		311º F (155º C)
Heat Sensor	**Open:**	257º F (125º C) Max. / 239º F (115º C) Min.
	Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point		390º F (199º C)

Electrical Data:

RPM	1750			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
3	208	1	G	1.2	19.1	22.9	89.8	3.3	18.6	4.0
	230				17.2	20.6	80.8			
3	208	3	L	1.2	16.3	19.6	82.1	4.5	29.5	5.6
	230				14.1	16.9	73.9			
	460				7	8.4	37.1			
5	208	1	G	1.2	37.1	44.5	148.3	6.5	30.7	7.8
	230				34.3	41.2	133.4			
5	208	3	L	1.2	21.1	25.3	109.8	5.8	39.1	7.6
	230				19	22.8	97.4			
	460				9.6	11.5	49.2			
7.5	208	3	K	1.2	32.1	38.5	179.6	8.3	64.2	12.0
	230				30.2	36.2	163.8			
	460				15.1	18.1	78.3			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
3	1	66	66	64	56	87	83	79	70
3	3	71	70	69	63	81	80	79	71
5	1	65	65	64	59	86	83	76	62
5	3	78	78	75	70	79	76	71	60
7.5	3	77	76	74	69	75	70	64	54

K4V – Series (3 – 7.5 HP) Non-Clog Submersible Pump Specification

Furnish and install _______ submersible non-clog wastewater pump(s). The KEEN pump(s) shall be equipped with a _______ HP close coupled submersible electric motor, connected for operation on _______ volts, 1 or 3 phase, 60 hertz service, with _______ feet of heavy duty submersible electric power cable. Each pump shall be capable of producing _______ GPM at _______ feet TDH. The shut-off head shall be no less than _______ feet.

Design - The KEEN pump(s) shall be capable of handling raw, unscreened sewage and shall be automatically and securely connected to the permanent discharge connection, guided by no less than two guide rails extending from the top of the station to the discharge connection. Sealing of the pumping unit to the discharge base elbow shall be accomplished by machined metal to metal watertight contact. The pump(s) shall be easily removed for inspection and service without the need for personnel to enter the wet-well. The entire pumping unit, including electric cable, shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 60 feet. No portion of the pump shall bear directly on the sump floor.

Construction – Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry enamel paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with o-rings. Fittings will be the result of controlled compression of rubber o-rings in two planes and o-ring contact of four sides without the requirement of a specific torque limit. No secondary sealing compounds, elliptical o-rings, grease or other devices shall be used.

Cooling System – Motors are sufficiently cooled by the surrounding environment or by submergence in the media. A cooling jacket is not required.

Cable / Entry Seal – The power cable shall be sized in accordance with NEC standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket has a compression grommet compressing the exterior of the cable entry system. The cable wires are individually stranded in epoxy in the cord cap assembly for a second permanent seal.

Motor – The pump motor shall be an induction type, NEMA B design with a squirrel cage rotor, shell type design, housed in an air-filled, watertight chamber. The stator windings and stator leads shall be insulated with moisture resistant Class F insulation rated. The stator shall be dipped and baked in Class F varnish and shall be heat-shrink fitted into the motor housing. The use of bolts, pins, or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be designed for continuous duty handling pumped media of 104°F (40°C) and capable up to 20 evenly spaced starts per hour. The motor horsepower shall be adequate so that the pump is not overloading throughout the entire pump performance curve from shut-off through run-out. Thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel. The motor and pump shall be designed and assembled by the same manufacturer.

Bearings – The pump shaft shall rotate on two bearings. The upper motor bearing shall be a single ball type bearing to handle radial loads. The lower bearing shall be a two row angular contact ball bearing to compensate for axial thrust and radial forces. Single row lower bearings shall not be considered acceptable. The minimum L-10 bearing life shall be 50,000 hours at any useable portion of the pump curve.

Mechanical Seal – Each pump shall be provided with a mechanical shaft seal system consisting of two assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate. The lower primary seal, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating, silicon-carbide ring. The upper, secondary seal, located between the lubricant chamber and the motor housing, shall contain one stationary and one positively driven rotating, silicon-carbide seal ring. The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counter clockwise direction of rotation without damage or loss of seal. For special applications, other seal face materials shall be available.

Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal, shall be easily accessible from the outside. The seal system shall not rely upon the pumped media to operate dry without damage while pumping under load.

Pump Shaft - The pump shaft and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft; couplings shall not be acceptable. The pump shaft shall be 410 stainless steel.

Impeller – The enclosed, 2-vane impeller shall be of ductile iron, Class 35B, dynamically balanced, double shrouded non-clogging design having long through-let without acute turns. The impeller shall be capable of handling solids, fibrous materials, heavy sludge and other material found in wastewater. The impeller shall be keyed to the shaft, retained with an impeller bolt, capable of passing a 3-inch diameter solid. Mass moment of inertia calculations shall be provided by the pump manufacture upon request. Ceramic coating on impeller for anti-abrasion wear.

Volute – The pump volute shall be gray cast iron, ASTM A-48, Class 30, single piece design with smooth passages large enough to pass any solids that may enter the impeller. A replaceable bronze wear ring system shall be utilized to provide efficient sealing between the volute and impeller suction inlet. Ceramic coating inside volute for anti-abrasion wear.

Protection – All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. At 260°F (125°C) the thermal switches shall open to signal the control to stop the motor and activate the alarm. A leakage sensor shall be installed in the lubricant chamber to detect seal leakage prior to entry and contamination of the lower bearing and motor stator housing.

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING PUMP

Series: K4PL-DS
4.5-15 HP / 1750 RPM
Discharge: 4"
Spherical solids handling: 3"

LIQUID TEMPERATURE
104 °F (40 °C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 2 vane, open, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

DIAPHRAGM
Buna-N.

CORD ENTRY
40 ft of cord, epoxy sealed housing with secondary pressure grommet for sealing and strain relief.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

MOTOR
Single phase: NEMA L, 230 volts, 60 Hz, 1750 RPM, oil filled. Capacitor start / Capacitor run, required in starter/panel.
Three phase: NEMA B, 200/230 & 460 volts, 60 Hz, 1750 RPM, oil filled.

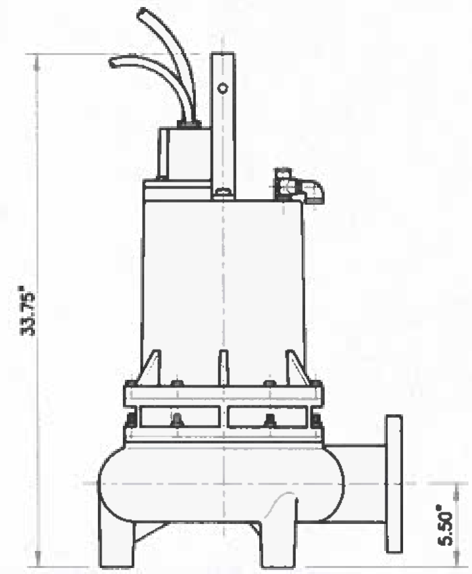
Requires overload protection to be included in control panel. Class F insulation.

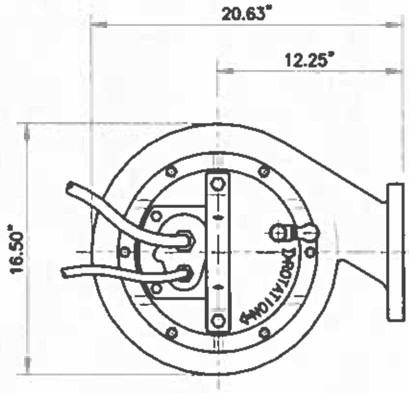
MOISTURE SENSOR
Normally open (N/O) included, requires relay in control panel.

TEMPERATURE SENSOR
Normally closed (N/C) included, requires relay in control panel.

OPTIONAL EQUIPMENT
Additional cord, tungsten carbide seal, slide rail coupling (SRC-4).

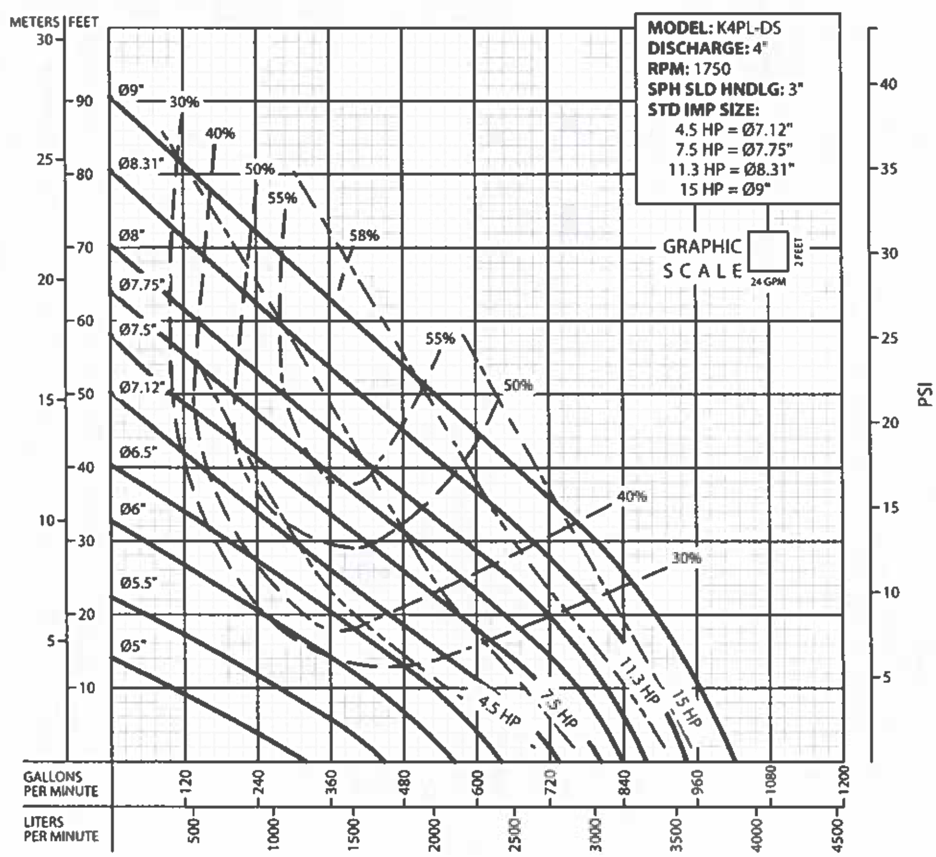
SPECIFICATIONS





MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O. D.	WEIGHT (pounds)
K4PL45M4-21DS	62170121	4.5	230	1	1750	26	59	A	10/4	SO	0.78"	287
K4PL45M4-23DS	62170122	4.5	200/230	3	1750	17.6	56	E	10/4	SO	0.78"	280
K4PL45M4-43DS	62170123	4.5	460	3	1750	8.8	28	E	10/4	SO	0.78"	280
K4PL75M4-21DS	62170124	7.5	230	1	1750	39	96	A	10/4	SO	0.78"	315
K4PL75M4-23DS	62170125	7.5	200/230	3	1750	23.6	80	D	10/4	SO	0.78"	309
K4PL75M4-43DS	62170126	7.5	460	3	1750	11.8	40	D	10/4	SO	0.78"	309
K4PL100M4-23DS	62170127	11.3	200/230	3	1750	28.4	126	D	10/4	SO	0.78"	340
K4PL100M4-43DS	62170128	11.3	460	3	1750	14.2	63	D	10/4	SO	0.78"	340
K4PL150M4-23DS	62170129	15	200/230	3	1750	40	160	D	10/4	SO	0.78"	399
K4PL150M4-43DS	62170130	15	460	3	1750	20	80	D	10/4	SO	0.78"	399

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485", for all models.



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

Installation, Operation & Maintenance Manual

Submersible Solids Handling Pumps

K4PL-DS Series

4.5, 7.5, 11.3, 15 HP
@ 1750 RPM

IMPORTANT! - Read all instructions in this manual before operating or servicing a pump.

Before installation, read the following instructions carefully. Failure to follow instruction and safety information could cause serious bodily injury, death and/or property damage. Each Keen product is carefully inspected to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

⚠ DANGER **"Danger" indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠ WARNING **"Warning" indicates an imminenty hazardous situation which, if not avoided, MAY result in death or serious injury.**

⚠ CAUTION **"Caution" indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.**

IMPORTANT! - Keen Pumps is not responsible for losses, injury or death resulting from failure to observe these safety precautions, misuse, abuse or misapplication of pumps or equipment.

ALL RETURNED PRODUCTS MUST BE CLEANED, SANITIZED, OR DECONTAMINATED PRIOR TO SHIPMENT, TO INSURE EMPLOYEES WILL NOT BE EXPOSED TO HEALTH HAZARDS IN HANDLING SAID MATERIAL. ALL APPLICABLE LAWS AND REGULATIONS SHALL APPLY.

⚠ WARNING Installation, wiring, and junction connections must be in accordance with the National Electric Code and all applicable state and local codes. Requirements may vary depending on usage and location.

⚠ WARNING Installation and servicing is to be conducted by qualified personnel only.

Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected; the rotating cutter and/or impeller can cause serious injury.

Always wear eye protection when working on pumps. Do not wear loose clothing that may become entangled in moving parts.

⚠ DANGER Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing the pump or any accessory items associated with or near the pump.

⚠ DANGER This pump is not intended for use in swimming pools or water installations where there is human contact with pumped fluid.

⚠ DANGER Risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling any aspect of the pumping system. ***Lock out power and tag.***

⚠ WARNING **Do not** use these pumps in water over 104° F. **Do not** exceed manufacturers recommended maximum performance, as this could cause the motor to overheat.

⚠ DANGER **Do not** lift, carry or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death. **Never** handle connected power cords with wet hands. Use appropriate lifting device.

⚠ WARNING Ground Fault Circuit Interrupter (GFCI) to be used with plug-in type power cord.

⚠ WARNING Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping. Never enter a basin after it has been used.

⚠ DANGER Failure to permanently ground the pump, motor and controls before connecting to power can cause shock, burns or death.

⚠ DANGER These pumps are not to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.

⚠ WARNING The Uniform Plumbing Code (UPC) states that sewage systems shall have an audio and visual alarm that signals a malfunction of the systems, that are required to reduce the potencial for property damage.

IMPORTANT! - Prior to installation, record Model Number, Serial, Amps, Voltage, Phase and HP from pump name plate for the future reference. Also record the Voltage and Current Readings at Startup:

1 Phase Models	
Amps:	Volts:
3 Phase Models	
Amps L1-2:	Volts L1-2:
Amps L2-3:	Volts L2-3:
Amps L3-1:	Volts L3-1:

Model Number: ____________________

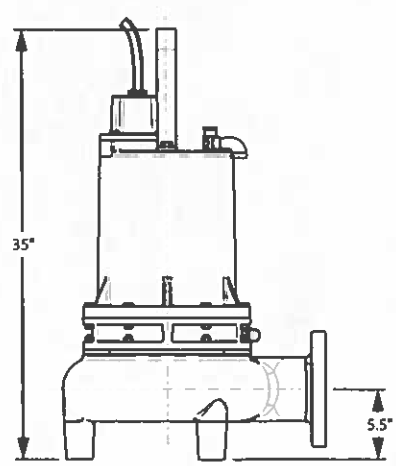
Serial: ____________

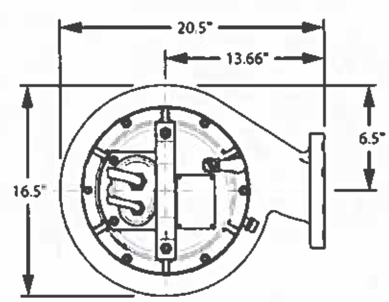
PHASE: ______ HP: ________________

DISCHARGE: 4", 125lb, flange horizontal.
SPHERICAL SLD HNDLG: 3"
LIQUID TEMPERATURE: 104° F (40° C) max.
VOLUTE: Cast iron ASTM A-48 class 30.
MOTOR HOUSING: Cast iron ASTM A-48 class 30.
SEAL PLATE: Cast iron ASTM A-48 class 30.
IMPELLER: 2 vane, open, with vanes on back side. Cast iron ASTM A-48 class 30.
SHAFT: 416 series stainless steel.
SQUARE RINGS: Buna-N.
PAINT: Air dry enamel, water based.
SEAL: Double mechanical, oil filled chamber. Silicon carbide outboard, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.
DIAPHRAGM: Buna-N.
HARDWARE: 300 series stainless steel.
CORD ENTRY: 40 ft of neoprene cord SJO 14/3, sealed against moisture.
UPPER BEARING: Ball, single row, oil lubricated, for radial load.
LOWER BEARING: Ball, single row, oil lubricated, for radial and thrust load.
MOTOR: ***Single phase:*** NEMA L, permanent split capacitor, oil filled, with overload protection in motor.
Three phase: NEMA B, oil filled. Requires overload protection to be included in control panel. Class F insulation.
MOISTURE SENSOR: Normally open (N/O) included, requires relay in control panel.
TEMPERATURE SENSOR: Normally closed (N/C) included, requires relay in control panel.
OPTIONAL EQUIPMENT: Additional cord, tungsten carbide seal, slide rail coupling (SRC-4).

MODEL	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	O. D.	WEIGHT (pounds)
K4PL45M4-21DS	4.5	230	1	1750	26	59	A	10/4	SO	0.78"	287
K4PL45M4-23DS	4.5	230	3	1750	17.6	56	E	10/4	SO	0.78"	280
K4PL45M4-43DS	4.5	460	3	1750	8.8	28	E	10/4	SO	0.78"	280
K4PL75M4-21DS	7.5	230	1	1750	39	96	A	10/4	SO	0.78"	315
K4PL75M4-23DS	7.5	230	3	1750	23.6	80	D	10/4	SO	0.78"	309
K4PL75M4-43DS	7.5	460	3	1750	11.8	40	D	10/4	SO	0.78"	309
K4PL100M4-23DS	11.3	230	3	1750	28.4	126	D	10/4	SO	0.78"	340
K4PL100M4-43DS	11.3	460	3	1750	14.2	63	D	10/4	SO	0.78"	340
K4PL150M4-23DS	15	230	3	1750	40	160	D	10/4	SO	0.78"	399
K4PL150M4-43DS	15	460	3	1750	20	80	D	10/4	SO	0.78"	399

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485", for all models.





▸ Receiving inspection
Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. If the manual is removed from the packaging, do not lose or misplace.

▸ Storage
Any product that is stored for a period longer than six (6) months from the date of purchase should be bench tested prior to installation. A bench test consists of, checking the impeller to assure it is free turning and a run test to assure the motor (and switch if provided) operate properly.

▸ Controls
Manual models require a separate approved pump control device or panel for automatic operation. Be sure the electrical specification of the control selected properly match the electrical specifications of the pump.

▸ Submergence
The pump should always be operated in the submerged condition. The minimum sump liquid level should never be less than above the pump's volute (See Figure 1).

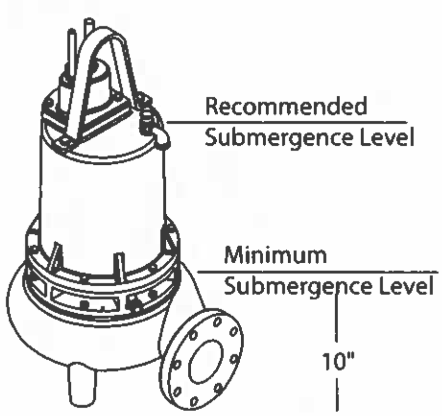


Figure 1

▸ Installation
These pumps are recommended for use in a sump, basin or lift station. The sump, basin or lift station shall be sealed and vented in accordance with local plumbing codes. **This pump is designed to pump sewage, effluent or wastewater, non-explosive and non-corrosive liquids and shall NOT be installed in locations classified as hazardous in accordance with the National Electrical Code (NEC) ANSI/NFPA 70 or Canadian Electric Code (CEC).** The pump should never be installed in a trench, ditch, or hole with a dirt bottom. The legs will sink into the dirt and the suction will become plugged.

The installation should be at a sufficient depth to ensure that all plumbing is below the frost line. If this is not feasible, remove the check valve and size the basin to accommodate backflow volume.

Pumps are most commonly installed in simplex or duplex stations or basins with a slide rail system (Keen SRC), which allows the pump(s) to be installed or removed without requiring personnel to enter the station, or resting on the basin floor.

▸ Discharge Piping
Discharge piping should be as short as possible and sized no smaller than the pump discharge. **Do not reduce the discharge pipe size below that which is provided on the pump.** Both a check valve and a shut-off valve are recommended for each pump. The check valve is used to prevent backflow into the sump. The shut-off valve is used to manually stop system low during pump servicing.

▸ Liquid Level Controls
The level control(s) should be mounted on the discharge piping, a cable rack or float pole. The level control should have adequate clearance so it cannot hang up in it's swing and that the pump is completely submerged when the level control is in the "Off" mode. By adjusting the cord tether the control level can be changed. One cycle of operation should be observed, so that any potential problems can be corrected.

It is recommended that the level control float should be set to insure that the liquid in the sump never drops below the top of the motor housing or a minimum level of 10 inches above the basin floor.

▸ Electrical Connections
Power cable:
The power cable mounted to the pump must not be modified in any way except for shortening to a specific application. Any splice between the pump and the control panel must be made in accordance with the electric codes. It is recommended that a junction box, if used, be mounted outside the sump or be of at a minimum Nema 4 construction if located within the wet well. **DO NOT USE THE POWER CABLE TO LIFT PUMP.**

Always rely upon a Certified Electrician for installation.

Overload Protection:
Single Phase - The stator in-winding overload protector used is referred to as an inherent overheating protector and operates on the combined effect of temperature and current. This means that the overload protector will trip out and shut the pump off if the windings become too hot, or the load current passing through them becomes too high.

IMPORTANT! - The overload will then automatically reset and start the pump up after the motor cools to a safe temperature. In the event of an overload, the source of this condition should be determined and corrected immediately.

⚠ WARNING DO NOT ALLOW THE PUMP TO CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS.

Three Phase - The Normally Closed (N/C) thermal sensor is embedded in the motor windings and will detect excessive heat in the event an overload condition occurs. The thermal sensor will trip when the windings become too hot and will automatically reset when the pump motor cools to a safe temperature. It is recommended that the thermal sensor be connected in series to an alarm device to alert the operator of an overload condition, and/or the motor starter coil to stop the pump. In the event of an overload, the source of this condition should be determined and repaired.

⚠ WARNING DO NOT ALLOW THE PUMP TO CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS.

Moisture Sensors - A normally open (N/O) sensor rated of 1 watt @330K ohms, 500 volt, is installed in the pump seal chamber which will detect any moisture present. It is recommended that this detector be wired in series to an alarm device or motor starter coil to alert the operator that a moisture detect has occurred. In the event of a moisture detect, check the individual moisture sensor probe leads for continuity, (∞ resistance = no moisture) and the junction box/control box for moisture content.

These situations may induce a false signal in the moisture detecting circuit. If none of the above test prove conclusive, the pump(s) should be pulled and the source of the failure repaired. **IF A MOISTURE DETECT HAS OCCURRED MAINTENANCE SHOULD BE PERFORMED AS SOON AS POSSIBLE!**

If current through the temperature sensor exceeds the values listed, an intermediate control circuit relay must be used to reduce the current or the sensor will not work properly.

TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
110-120	3.00	30.0
220-240	1.50	15.0
440-480	0.75	7.5
600	0.60	6.0

Wire Size:
If longer power cable is required consult a qualified electrician for proper wire size.

▸ Pre-Operation

1. **Check Voltage and Phase** - Compare the voltage and phase information stamped on the pump name plate.

2. **Check Pump Rotation** - Improper motor rotation can result in poor pump performance and can damage the motor and/or pump. Check rotation on three phase units by momentarily applying power and observe the "kickback".

Bottom of Pump

Kickback should always be in a counter-clockwise direction as viewed from motor end or opposite to impeller rotation. Impeller rotation is counter-clockwise as viewed from bottom of pump.

3. **Name Plate** - Record the information from the pump name plate to drawing in front of manual for future reference.

Insulation Test - An insulation (megger) test should be performed on the motor. Before the pump is put into service. The resistance values (ohms) as well as the voltage (volts) and current (amps) should be recorded.

5. **Pump-Down Test** - Be sure pump has been properly wired, lowered into the basin, sump or lift station, check the system by filling with liquid and allowing the pump to operate through its pumping cycle. The time needed to empty the system, or pump-down time along with the volume of water, should be recorded.

▸ Maintenance

No lubrication or maintenance is required. Perform the following checks when pump is removed from operation or when pump performance deteriorates:

a) Inspect motor chamber for oil level and contamination.
b) Inspect impeller and body for excessive build-up or clogging.
c) Inspect motor, bearings and shaft seal for wear or leakage.

▸ Servicing

NOTE: Item numbers in ( ) refer to Figure 6.

Cooling Oil - Anytime the pump is removed from operation, the cooling oil in the motor housing should be checked visually for oil level and contamination. To check oil, set unit upright. Remove cap screws (6), lift conduit box assembly (4) from motor housing (3), ***Do Not*** disconnect wiring from motor leads. With a flashlight, visually inspect the oil in the motor housing (3) to make sure it is clean and clear, light amber in color and free from suspended particles. Milky white oil indicates the presence of water. Oil level should be just above the motor when pump is in vertical position.

Seal Chamber - Drain oil from seal chamber by placing pump on its side with pipe plug (18) downward and remove pipe plug (18). If the oil is found to contain considerable water or other contamination, the shaft seal (19) should be inspected and replaced if required.

Oil Testing

- Drain oil into a clean, dry container placing pump on it's side, remove cap screws (6), lift conduit box assembly (4) from motor housing (3). In separate container drain seal chamber by removing pipe plug (18).
- Check oil for contamination using an oil tester with a range to 30 kV breakdown.
- If oil is found to be clean and uncontaminated (measuring above 15 kV breakdown), refill the housing.
- If oil is found to be dirty or contaminated (or measures below 15 kV breakdown), the pump must be carefully inspected for leaks at the shaft seal, conduit box, o-rings, pipe plug and pressure valve, before refilling with oil. To locate the leak, perform a pressure test.

After leak is repaired, dispose of old oil properly, and refill with new oil.

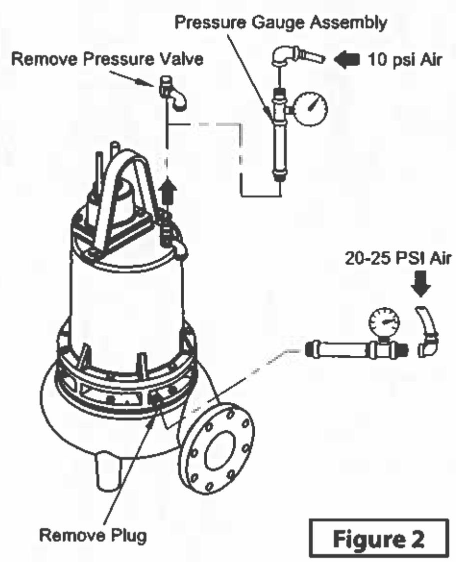


Figure 2

Pressure builds up extremely fast, increase pressure by "TAPPING" air nozzle. Too much pressure will damage seal. ***DO NOT exceed 10 PSI in housing and 20-25 PSI in seal chamber.***

Pressure Test

Motor Housing - Oil should be at normal level. Remove pressure valve (10) from motor housing (3). Apply pipe sealant to pressure gauge assembly and tighten into hole (See Figure 2). Pressurize motor housing to 10 PSI.

Use soap solution around the sealed areas above the oil level and inspect joints for "air bubbles". If, after five minutes, the pressure is still holding constant, and no "bubbles" /oil seepage is observed, slowly bleed the pressure and remove the gauge assembly. Replace oil. Leek must be located and repaired if pressure does not hold.

Seal Chamber - Check that seal chamber is full of oil by removing pipe plug (18). Apply pipe sealant to pressure gauge assembly and tighten into hole in bearing housing (16). Pressurize seal chamber to 20-25 PSI and check for leaks.

Oil Replacement - Set unit upright and refill with new cooling oil as per table. Fill to just above motor as an air space must remain in the top of the housing to compensate for oil expansion. Reassemble the o-ring (5) and conduit box (4) to motor housing (3). Apply thread locking compound to cap screws (6) and place into holes and torque to 15 ft/lbs.

DO NOT *overfill oil. Overfilling of housing with oil can create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard.*
Overfilling oil voids warranty.

Oil Replacement:
Seal Chamber - Refill chamber completely full with new cooling oil or reuse the uncontaminated oil.

Cooling Oil Recommended Supplier/Grade	
BP	Enerpar SE100
Conoco	Pale Parafin 22
Mobile	D.T.E. Oil Light
Shell Canada	Transformer-10
Texaco	Diala-Oil-AX

Disassembly

Impeller and Volute - Disconnect power. Remove hex nuts (24) and vertically lift motor housing and seal plate assembly from volute (31). Clean out volute (31) if necessary. Inspect gasket (30) and replace if cut or damaged. Clean and examine impeller (27), for pitting or wear and replace if required. To remove impeller (27), remove cap screw (29) and washer (28). With a wheel puller, pull impeller straight of shaft and remove square key (13).

Moisture Probes - Drain oil from seal chamber, if not already done. Remove cap screws (9) and lifting handle (8). Set unit upside down on blocks to avoid damaging cables. Remove socket head cap screws (22) and lift seal plate (20), with seal's (19) stationary, vertically from bearing housing (16), ***do not*** damage seal. Check moisture sensor probes (35) for damage, replace by removing screws (38) and disconnecting wires (34). Then remove probes (35) from bearing housing (16).

Diaphragm - with seal plate (20) removed, examine diaphragm (21) for ruptures or crackes. Replace diaphragm by removing capscrews (41) and plate (40). Clean vent holes in seal plate (20).

Shaft Seal - Remove outboard rotating member of seal (19), spring and inboard rotating member from shaft. Examine all seal parts.

Inspect seal for signs of uneven wear pattern on stationary members, chips and scratches on either seal face. **DO NOT interchange seal components, replace the entire shaft seal (19).** If replacing seal, remove stationary by prying out with flat screwdriver.

Motor and Bearings - Remove volute, impeller, seal plate and seal as previously stated and drain oil from motor housing (3). Position unit upright, using blocks to avoid resting unit on shaft. Remove cap screws (6) o-ring (5) and conduit box assembly (4) from motor housing (3). Note connections and then remove cable lead wires from motor lead wires and moisture and temperature sensor wires from control cable by removing connectors. Remove cap screws (12) and vertically lift the motor housing (3) from bearing housing (16). Replace square ring (15) if damaged or cut. Remove the upper motor bolts and lift upper end bell from motor (1). Remove wave washer. Remove upper bearing (2) with a wheel puller if damaged or worn.

Vertically lift stator (1) from rotor/shaft. Inspect windings for shorts and resistance. Test the temperature sensors by checking for continuity between the black and white wires. If defective contact factory or motor service station. Pull motor rotor/shaft with bearing (14) from bearing housing (16). Remove bearing (14) with a wheel puller if worn or damaged. If rotor or stator windings are defective, replace the complete motor.

IMPORTANT! - All parts must be clean before reassembly.

Reassembly

Bearings - Replace bearings, being careful not to damage the rotor or shaft. If equipped, fill notch should face the rotor core for both upper and lower bearings.

Apply adhesive compound to the shaft and press bearing (14) onto shaft, position squarely onto the shaft applying force to the inner race of bearing only, until bearing seats on shoulder of the shaft. In the same manner, assemble upper bearing (2) to shaft.

Motor - Slide rotor with bearing (14) into bearing housing (16) until bearing seats on the bottom. Position motor housing and stator into pilot, install wave washers in upper end bell.

IMPORTANT! Special wave washers in upper motor housing are required to compensate for shaft expansion. These washers must be properly reinstalled to give the required constant down force on the motor shaft.

Position upper motor end bell aligning holes and thread cap screws into bearing housing (16) and torque to 16 ft/lbs. Place all motor leads above the motor. Position square ring (15) on bearing housing (16) and lower housing (3) over motor and into pilot, aligning handle so that it is parallel to motor end bell reliefs. Apply thread locking compound to threads on cap screws (12) and place into holes and torque to 24 ft/lbs.

Handle seal parts with extreme care. DO NOT damage lapped surfaces.

Seal/Diaphragm - (See Figure 3) Clean and oil seal cavities in bearing housing (16) and seal Plate (20). Lightly oil **(Do not use grease)** outer surface of inboard and outboard stationary members of seal (19). Press inboard stationary member fi rmly into bearing housing (16) and outboard stationary into seal plate (20), using a seal pusher tool. Nothing but the seal pusher tool is to come in contact with seal face.

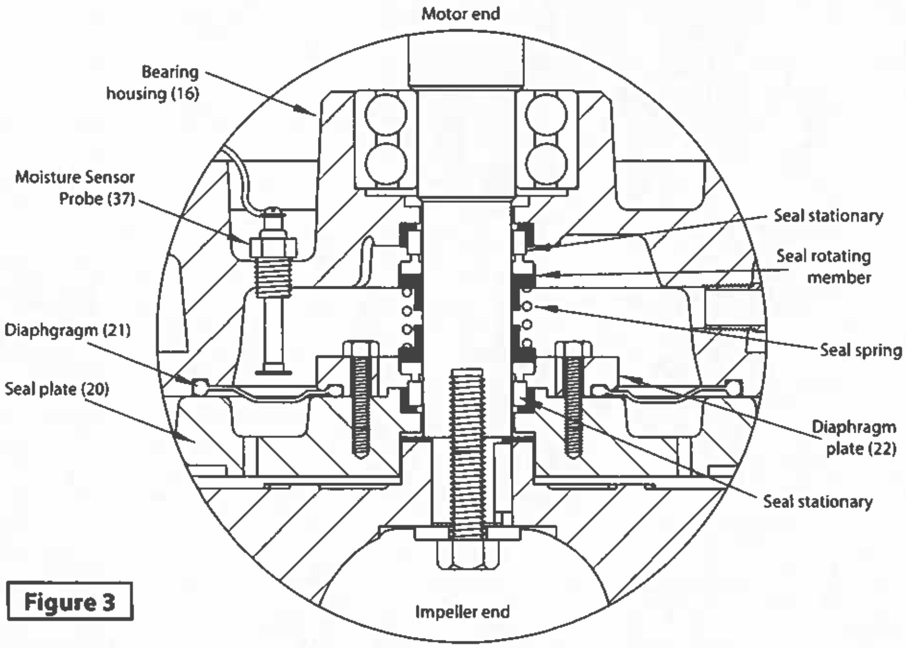


Figure 3

IMPORTANT! - Hammering on the seal pusher tool will damage the seal face.

Be sure the stationary members are in straight and that the rubber ring is not out of it's groove. Lightly oil **(Do not use grease)** shaft and inner surface of bellows on rotating member. With lapped surface facing bearing housing (16), slide rotating member onto shaft using seal pusher tool, until lapped faces are together. It is extremely important to keep seal faces clean during assembly. Dirt particales lodged between faces will cause the seal to leak.

Be sure driving lugs in retainer are matched in rotating member of seal (19). Place spring over shaft and in place on rotating member, making sure it is seated in retainer and not cocked or resting on bellows tail. Lightly oil shaft and inner surface of outboard rotating member.

With tail section toward bearing housing (16), slide rotating member onto shaft with seal pusher tool until retainer engages spring and spring is compressed slightly.

Spring should be properly engaged in both retainers.

Reassemble the diaphragm (21) with "bulg" facing seal plate (20). Place plate (22) on diaphragm (21) and insert capscrews (23) into plate and tighten.

Place seal plate (20) over shaft onto bearing housing (16), being careful not to damage outboard stationary member and align holes for cap screws (25).

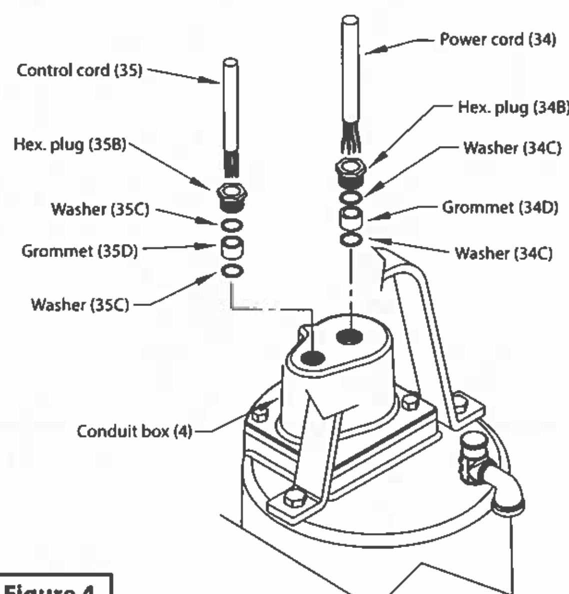


Figure 4

Thread cap screws (25) into bearing housing (16) and tighten. Refill chamber with oil.

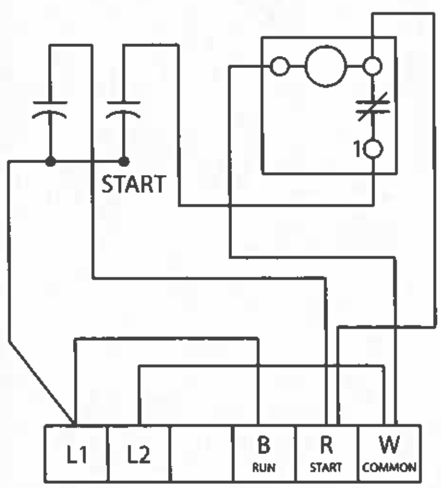
Conduit Box Assembly - Check power (34) and control cables (35) for crackes or damage and replace complete conduit box (4) if required. (See Figure 4) Bring motor wires through opening in top of motor housing (3), check sleeving and replace if damaged. Position square ring (5) in conduit box (4) and reconnect leads using connectors and insulators. See Figures 5, for wiring schematics.

Refill with cooling oil. Position conduit box (4) with square ring (5) on motor housing. Apply thread locking compound to cap screws (6) threads and torque to 16 ft/lbs.

Remove gland nuts (34B) and (35B), washers (34C) and (35C), and grommets (34D) and (35D) from conduit box (4), inspect and replace if damaged (See Figure 4). Reassemble by inserting one washer, grommet, one more washer and gland nut into conduit box. Torque gland nuts to 15 ft/lbs to prevent leakage.

Impeller and Volute - Install impeller (29) by appling a thin film of oil to motor shaft and slide impeller straight onto shaft, keeping keyways lined up. Drive key (13) into keyway. Locate washer, apply thread lock primer (such as Loctite® Primer T), let set per manufacturer's directions. Apply thread locking compound to threads on cap screw, and thread into shaft and torque to 35 ft/lbs.

Place gasket (32) on volute and install impeller and motor assembly over studs and onto volute (33). Apply thread locking compound to threads of studs (25) and thread nuts (26) onto studs and torque to 24 ft/lbs. Check for binding by rotating impeller. Clearance between the impeller and volute should be approximately 0.012 inch.



SINGLE PHASE 230 VOLT AC
Capacitor/Relay Pack For Control Panels

SINGLE-PHASE 230V AC

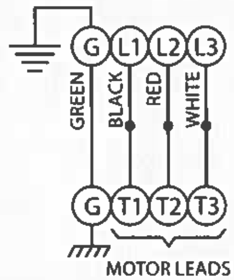


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1
Red	2
White	3

THREE-PHASE 460V AC

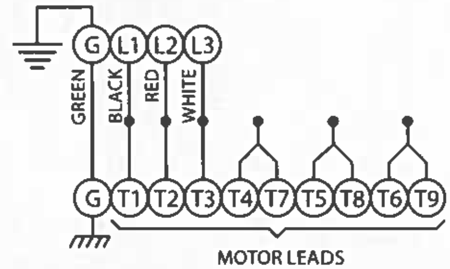


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1
Red	2
White	3
	4 and 7 together
	5 and 8 together
	6 and 9 together

THREE-PHASE 230V AC

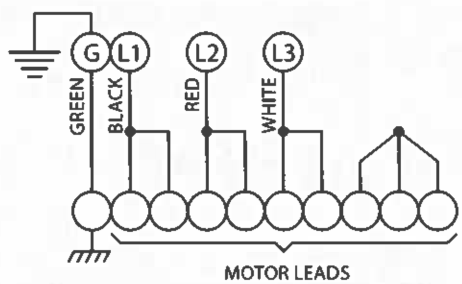


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1 and 7
Red	2 and 8
White	3 and 9
	4, 5 and 6 together

CONTROL CABLE

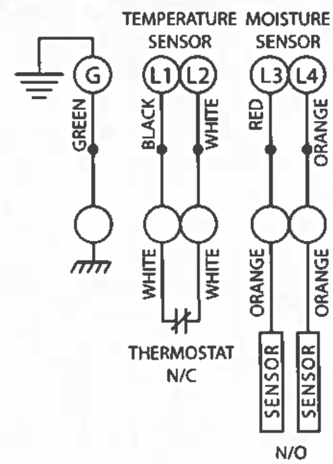
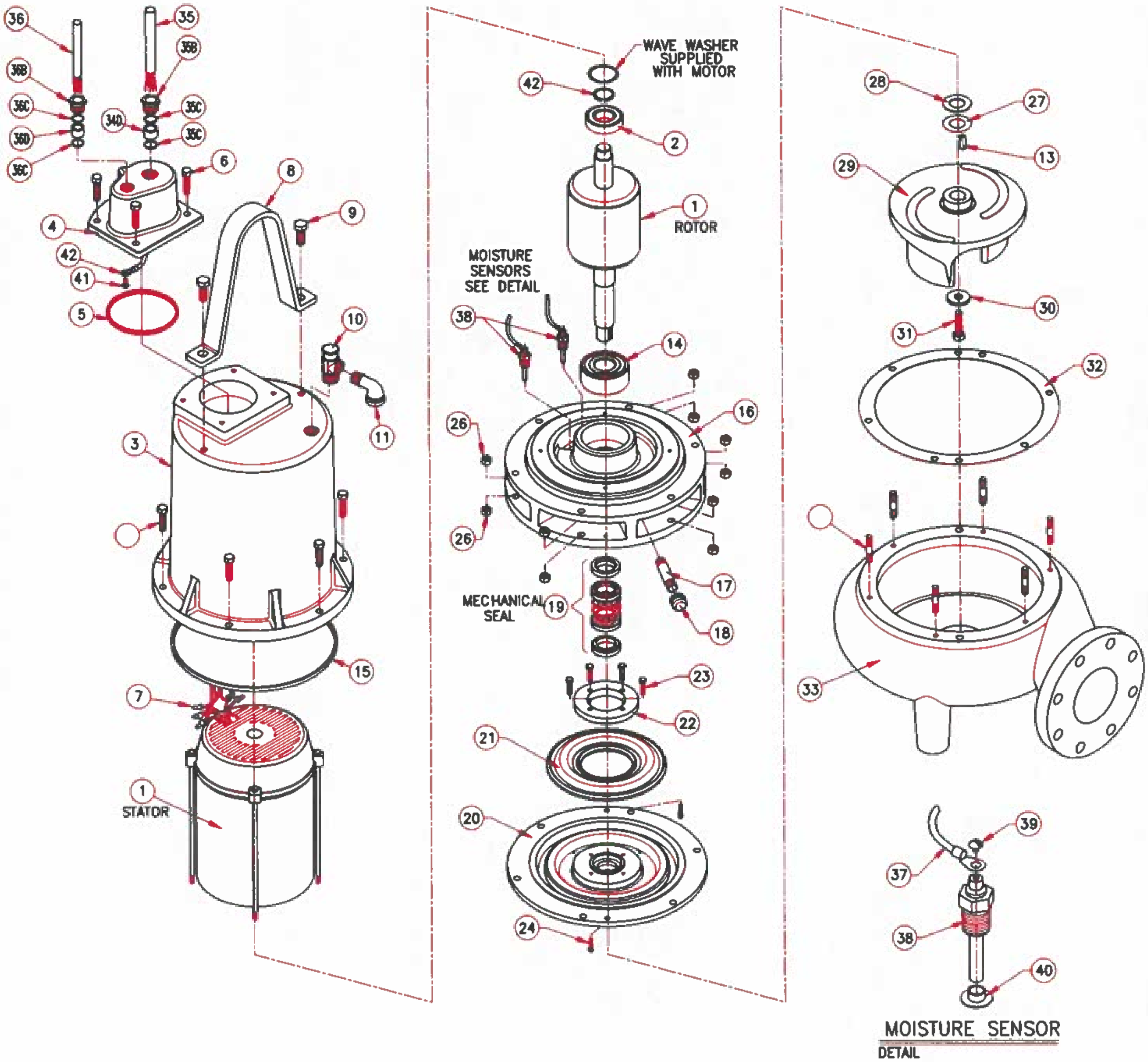


Figure 5	
Control Cable	Lead Number
Black	L1 (Temperature)
White	L2 (Temperature)
Red	L3 (Moisture)
Orange	L4 (Moisture)
Green	Ground

Figure 6



For Repair Part Please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

PART LIST			
ITEM	QTY.	DESCRIPTION	PART. No.
1	1	MOTOR:	
		4.5 HP, SINGLE PHASE, 230	40040025
		4.5 HP, THREE PHASE, 230/460	40040021
		7.5 HP, SINGLE PHASE, 230	40040026
		7.5 HP, THREE PHASE, 230/460	40040022
		11.3 HP, THREE PHASE, 230/460	40040023
		15 HP, THREE PHASE, 230/460	40040024
2	1	BEARING (UPPER)	31020009
3	1	MOTOR HOUSING	03100003
4	1	CONDUIT BOX & CABLE ASSEMBLY	03100004
5	1	SQUARE-RING	92010085
6	4	CAP SCREW 3/8"-16UNC x 1.00" SS	91010345
7		WIRE CONNECTOR	94010012
	7	SINGLE PHASE 230V	
	8	THREE PHASE 230V	
	10	THREE PHASE 460V	
8	1	LIFTING BAIL	30400844
9	2	SCREW ½"-13UNC x 1¼" SS	91010350
10	1	PRESS RELIEF VALVE	31200021
11	1	ELBOW	93010011
12	6	SCREW 3/8"-16UNC x 2.00" SS	91010347
13	1	KEYWAY	30400633
14	1	BEARING (LOWER)	31020011
15	1	SQUARE RING GASKET	92010052
16	1	BEARING HOUSING	03040008
17	1	PIPE 3/8" x 3.00"	93010066
18	1	PIPE PLUG 3/8"	93010121
19	1	MECHANICAL SEAL (# 2120BBM4MS)	31030148
20	1	SEAL PLATE	03180013
21	1	DIAPHRAGM	31040001
22	1	DIAPHRAGM PLATE	03160002
23	4	SCREW ¼"-20UNC x 1.00" SS	91010342
24	2	SCREW HEAD SOCKET ¼"-20UNC x 1.00" S	91010392
25	6	SCREW 3/8"-16UNC x 2.00" SS	91010347
26	12	HEX NUT 3/8"-16UNC SS	31010020
27	2	SHIMS WASHER (0.010")	91010121
28	2	SHIMS WASHER (0.030")	91010130
29	1	IMPELLER	
		4.5 HP (7.125" STD. DIAMETER)	03140030
		7.5 HP (7.750" STD. DIAMETER)	031400308
		11.3 HP (8.312" STD. DIAMETER)	03140038
		15 HP (9.0" STD. DIAMETER)	03140038B
30	1	IMPELLER LOCKWASHER	30400413
31	1	SCREW HEX. HD. ½"-13UNC x 1¼" SS	91010350
32	1	VOLUTE GASKET	92010084
33	1	VOLUTE	03090035
34	30 Ft	POWER CABLE 4/10	31030003
34B	1	HEX HEAD PLUG	30400903
34C	2	WASHER # 54746	91010055
34D	1	GROMMET	92010001
35	30 Ft	CORD SET, MOIST & TEMP, CABLE 5/18	31030005
35B	1	HEX HEAD PLUG	30400901
35C	2	WASHER # 21531	91010057
35D	1	GROMMET	92010005
36	2	WIRE ASSY, MOISTURE SENSOR	94010003C
37	2	MOISTURE SENSOR #39383	31160001
38	2	MACHINE SCREW MOIST, 6-32 x ¼" SS	91010403
39	2	CAP PLUG	93010101
40	1	GROUND SCREW ¼" x ½"	91010404
41	1	ROUND TERMINAL 5/16"	94010044
42	1	RETAINING RING	31010003
43	2.64 Gal	MOTOR OIL (HOUSING & SEAL CAVITY)	31010031

For Repair Part Please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Risk of electric shock. Always disconnect the pump from the power source before handling inspections or repairs.

Symptom	Possible Cause(s)	Corrective Action
Pump will not run	1. Poor electrical connection, blown fuse, tripped breaker or other interruption of power; improper power supply 2. Motor or switch inoperative (go to manual operation) 2a. Float movement restricted 2b. Switch will not activate pump or is defective 2c. Defective motor 3. Insufficient liquid level	1. Check all electrical connections for security. Have electrician measure current in motor leads, if current is within ± 20% of locked rotor Amps, impeller is probably locked. If current is 0, overload may be tripped. Remove power, allow pump to cool, then re-check current. 2a. Reposition pump or clean basin as required to provide adaquate clearance for float 2b. Disconnect level control. Set ohmmeter for a low rang, such as 100 ohms full scale and connect to level control leads. Actuate level control manually and check to see that ohmmeter shows zero ohms for closed switch and full scale for open switch. (Float Switch) 2c. Check winding insulation (Megger Test) and winding resistance. If check is outside of range, dry and re-check. If still defective, replace per service instructions. 3. Make sure liquid level is above the pump 4. Re-check all sizing calculations to determine proper pump size. 5. Check discharge line for restrictions, including ice if line passes through or into cold areas. 6. Remove and examine check valve for proper installation and freedom of operation 7. Open valve 8. Check impeller for freedom of operation, security and condition. Clean impeller cavity and inlet of any obstruction Loosen union slightly to allow trapped air to escape. Verify that turn-off level of switch is set so that the suction is always flooded. Clean vent hole 10. Check rotation. If power supply is three phase, reverse any two of three power supply leads to ensure proper impeller rotation 11. Repair fixtures as required to eliminate leakage 12. Check pump temperature limits and fluid temperature 13. Replace portion of discharge pipe with flexible connector or tighten existing piping. 14. Turn to automatic position 15. Check for leaks around basin inlet and outlets
Pump will not turn off	2a. Float movement restricted 2b. Switch will not activate pump or is defective 4. Excessive inflow or pump not properly sized for application 9. Pump may be air locked causing pump not to flow 14. H-O-A switch on panel is in "HAND" position	
Pump hums but doesn't run	1. Incorrect low voltage 8. Impeller jammed or loose on shaft, or inlet plugged	
Pump delivers insufficient capacity	1. Incorrect low voltage 4. Excessive inflow or pump not properly sized for application 5. Discharge restricted 6. Check valve partially closed or installed backwards 7. Shut-off valve closed 8. Impeller jammed or loose on shaft, or inlet plugged 9. Pump may be air locked causing pump not to flow 10. Piping fixtures leaking or discharge before the	
when fixtures are not in use	6. Check valve partially closed or installed backwards 15. Ground water entering basin	
Pump shuts off and turns on independent of switch, (trips thermal overload protector). **CAUTION!** Pump may start unexpectedly. Disconnect power supply.	1. Incorrect low voltage 4. Excessive inflow or pump not properly sized for application 8. Impeller jammed or loose on shaft, or inlet plugged 12. Excessive water temperature (internal protection only)	
Pump operates noisily or vibrates excessively	2c. Worn bearings, motor shaft bent 5. Debris in impeller cavity or broken impeller 10. Pump running backwards 13. Piping attachments to building structure too loose or rigid	

NOTE: Keen Pumps assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Keen Pumps or its authorized service centers, automatically voids warranty.

KEEN PUMPS
FACTORY WARRANTY

Keen Pumps warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for 18 months from date of manufacture or 12 months from installation date whichever occurs first. This warranty gives you specific legal rights, which vary from state to state.

This warranty is a limited warranty, and no warranty related claims of any nature whatsoever shall be made against Keen Pumps, until the ultimate consumer or his/her successor notifies us in writing of the defect and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station as instructed by Keen Pumps. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE. PRODUCT SHALL BE EITHER REPLACED OR REPAIRED AT THE ELECTION OF KEEN PUMPS. Guarantees relating to performance specifications provided in addition to the foregoing material and workmanship warranties on a product manufactured by Keen Pumps, if any, are subject to possible factory testing. Any additional guarantees, in the nature of certified performance specifications or time frame must be in writing and such writing must be signed by our authorized factory manager at time of order placement and/or at time of quotation. Due to inaccuracies in field testing and should a conflict arises between the results of field testing conducted by or for the user, Keen Pumps reserves the right to have the product returned to our factory for additional testing.

This warranty shall not apply when damage is caused by (1) improper installation, (2) improper voltage, (3) lightning, (4) excessive sand or other abrasive material, (5) corrosion build-up due to excessive chemical content or (6) uncontrollable acts of god. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective pumps, parts or systems. Keen Pumps will not accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY. No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.

IMPORTANT!
If you have a claim under the provision of the warranty, contact Keen Pumps or your authorized Keen Pumps Distributor
www.keenpump.com

KEEN PUMP®

KEEN PUMP®

SPECIFICATIONS
Submersible Solids Handling Pump
Series: **K4PL-DS**

General:
Furnish and install a quantity of _____ Keen® Pumps submersible sewage pump(s), Model K4PL____DS, ____HP, ____ RPM, ____ phase, 60 Hz, ____ volts, with a 4 inch horizontal discharge 125 ANSI discharge flange connection. Each pump shall be capable of delivering the following performance, ____ US GPM at ____ ft total dynamic head, with a shut off head of ____ ft TDH minimum, and ____ % efficiency at ____ US GPM at ____ft TDH operating point.

Pump Design:
The centrifugal sewage pump(s) shall be capable of handling 3 inch diameter spherical solids of raw, unscreened domestic sewage consisting of water, fibrous materials. The pump(s) shall be capable of handling liquids with temperatures to 104 °F continuous, and shall be capable of running dry for extended periods.

Pump Construction:
Castings: The volute, seal plates, impeller and motor housing shall be constructed of ASTM A-48 class 30 cast iron.

Coating/Hardware: Exterior surfaces shall be painted with a water based air dry enamel. All exposed hardware shall be 300 series stainless steel.

Gaskets: All gaskets shall be of the compression square ring type eliminating critical slip fits and the possibility of damage during service associated with sliding o-ring sealing arrangements.

Impeller: The impeller shall be of ___ vane, solid handling design with pump out vanes on the back side. Single and multi-vane impellers shall be capable of being trimmed to meet specific performance characteristics. The impeller shall be dynamically balanced to ISO G6.3 specifications.

Double mechanical seal: Shall be of the single spring design operating in an oil-filled seal cavity. The inner seal shall be constructed of carbon for the rotating face and ceramic for the stationary face, 300 series stainless steel hardware, and all elastomer parts to be of Buna-N. The outer seal shall be of silicon carbide faces, 300 series stainless steel hardware, and all elastomer parts to be of Buna-N. The seal shall be commercially available and not a manufacturers proprietary design.

Seal leak sensor: A seal leak detection system consisting of two normally open (N/O) probes shall be installed in the pump seal chamber. These probes will detect any moisture present and shall be connected in series to an alarm device or motor starter coil which will alert the operator that moisture has been detected in the seal cavity.

Motor: Design shall be of the capacitor start and capacitor run and overload protection for single phase units. Capacitors shall be located in an external control box. The pump shall be designed to be non-overloading throughout the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability.

The motor windings shall be of Class F insulation and operate in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of time without damage due to the heat being generated. The used dielectric oil must be disposed of as non-hazardous waste. The motor shall meet the standard NEMA L for single phase and NEMA B for three phase.

Thermal Protection: Thermal sensors shall be used to monitor stator temperatures. The stator shall be equipped with a thermal switch embedded in the end coil of the stator winding. This shall be used in conjunction with and supplemental to external motor overload protection and wired to the control panel.

Shaft: The pump shaft shall be of a one-piece design and shall be of 416 stainless steel.

Bearings: The lower bearing shall be of the double row ball type to accept radial and thrust loads, and the upper bearing of the single ball type for radial loads. Bearings shall operate in an oil bath atmosphere for superior life.

Power/Control Cords: Shall be equipped with ____ ft of type SOW power and control cords. The cords shall enter a cast iron terminal box assembly that is bolted to the motor housing and sealed with a Buna-N o-ring. The incoming lead wires shall be spliced in the terminal box. After splicing, the terminal box shall be filled with epoxy to seal the outer cable jacket and the individual strands to prevent water from entering the motor housing. Additional sealing and strain relief shall utilize a secondary pressure grommet at point of cable entry.

Tests and inspections: Shall be performed by the pump manufacture.

1. A ground continuity check and motor chamber shall be Hi-potted to test for electrical integrity.
2. Check that motor voltage and frequency matches name plate.
3. The pump shall be pressurized and a air leak test is performed to ensure the integrity of the motor housing.
4. The pump is submerged and operated to determine the unit meets hydraulic performance requirements.

SUBMERSIBLE SOLIDS HANDLING PUMP

Series: K4HPL-DS
7.5-15 HP / 1750 RPM
Discharge: 4"
Spherical solids handling: 3"

DISCHARGE
4", 125lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 2 vane, closed, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

CORD ENTRY
40 ft of cord, epoxy sealed housing with secondary pressure grommet for sealing and strain relief.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

MOTOR
NEMA B, three phase, 230 & 460 volts, 60 Hz, 1750 RPM, oil filled. Requires overload protection to be included in control panel.

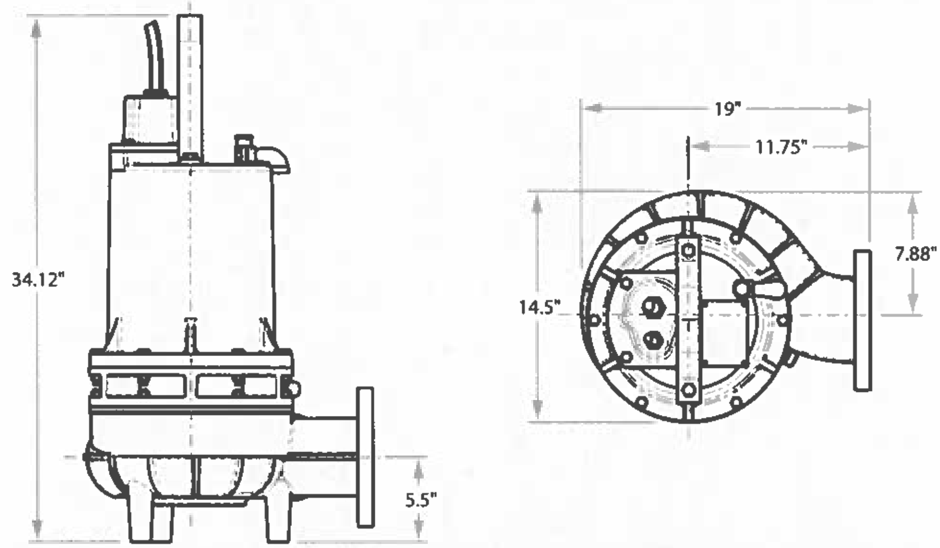
MOISTURE SENSOR
Normally open (N/O) included, requires relay in control panel.

TEMPERATURE SENSOR
Normally closed (N/C) included, requires relay in control panel.

OPTIONAL EQUIPMENT
Additional cord, tungsten carbide seal, slide rail coupling (SRC-4).

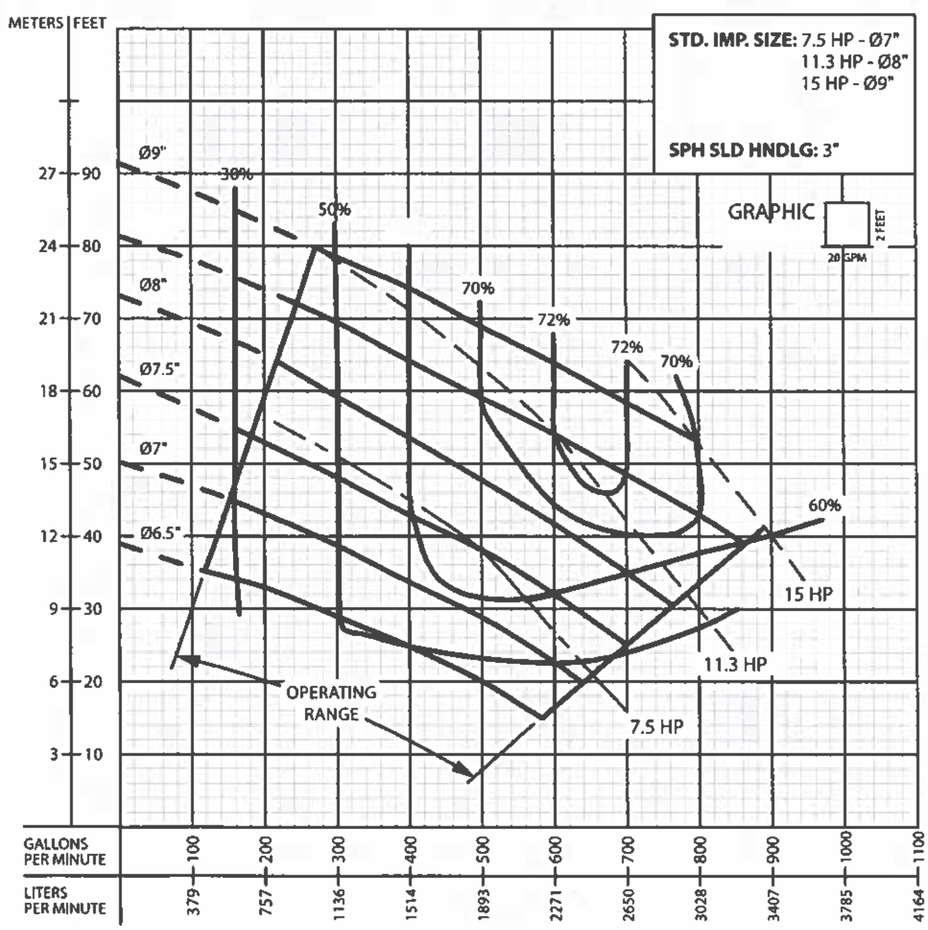
SPECIFICATIONS

SPECIFICATIONS



MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O. D.	WEIGHT (pounds)
K4HPL75M4-23DS	62170141	7.5	230	3	1750	26.8	80	D	10/4	SO	0.75"	309
K4HPL75M4-43DS	62170142	7.5	460	3	1750	13.4	40	D	10/4	SO	0.75"	309
K4HPL100M4-23DS	62170143	11.3	230	3	1750	28	126	D	10/4	SO	0.75"	340
K4HPL100M4-43DS	62170144	11.3	460	3	1750	14	63	D	10/4	SO	0.75"	340
K4HPL150M4-23DS	62170145	15	230	3	1750	38	160	D	10/4	SO	0.75"	400
K4HPL150M4-43DS	62170146	15	460	3	1750	19	80	D	10/4	SO	0.75"	400

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485", for all models.



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

Installation, Operation & Maintenance Manual

Submersible Solids Handling Pumps

K4HPL-DS SERIES

7.5, 11.3, 15 HP
@ 1750 RPM

IMPORTANT! - Read all instructions in this manual before operating or servicing a pump.

Before installation, read the following instructions carefully. Failure to follow instruction and safety information could cause serious bodily injury, death and/or property damage. Each Keen product is carefully inspected to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

⚠ DANGER **"Danger" indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠ WARNING **"Warning" indicates an imminenty hazardous situation which, if not avoided, MAY result in death or serious injury.**

⚠ CAUTION **"Caution" indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.**

IMPORTANT! - Keen Pumps is not responsible for losses, injury or death resulting from failure to observe these safety precautions, misuse, abuse or misapplication of pumps or equipment.

ALL RETURNED PRODUCTS MUST BE CLEANED, SANITIZED, OR DECONTAMINATED PRIOR TO SHIPMENT, TO INSURE EMPLOYEES WILL NOT BE EXPOSED TO HEALTH HAZARDS IN HANDLING SAID MATERIAL. ALL APPLICABLE LAWS AND

⚠ WARNING Installation, wiring, and junction connections must be in accordance with the National Electric Code and all applicable state and local codes. Requirements may vary depending on usage and location.

⚠ WARNING Installation and servicing is to be conducted by qualified personnel only.

Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected; the rotating cutter and/or impeller can cause serious injury.

Always wear eye protection when working on pumps. Do not wear loose clothing that may become entangled in moving parts.

⚠ DANGER Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing the pump or any accessory items associated with or near the pump.

⚠ DANGER This pump is not intended for use in swimming pools or water installations where there is human contact with pumped fluid.

⚠ DANGER Risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling any aspect of the pumping system. ***Lock out power and tag.***

⚠ WARNING **Do not** use these pumps in water over 104° F. **Do not** exceed manufacturers recommended maximum performance, as this could cause the motor to overheat.

⚠ DANGER **Do not** lift, carry or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death. **Never** handle connected power cords with wet hands. Use appropriate lifting device.

⚠ WARNING Ground Fault Circuit Interrupter (GFCI) to be used with plug-in type power cord.

⚠ WARNING Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping. Never enter a basin after it has been used.

⚠ DANGER Failure to permanently ground the pump, motor and controls before connecting to power can cause shock, burns or death.

⚠ DANGER These pumps are not to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.

⚠ WARNING The Uniform Plumbing Code (UPC) states that sewage systems shall have an audio and visual alarm that signals a malfunction of the systems, that are required to reduce the potencial for property damage.

IMPORTANT! - Prior to installation, record Model Number, Serial, Amps, Voltage, Phase and HP from pump name plate for the future reference. Also record the Voltage and Current Readings at Startup:

1 Phase Models	
Amps:	Volts:
3 Phase Models	
Amps L1-2:	Volts L1-2:
Amps L2-3:	Volts L2-3:
Amps L3-1:	Volts L3-1:

Model Number: ____________________

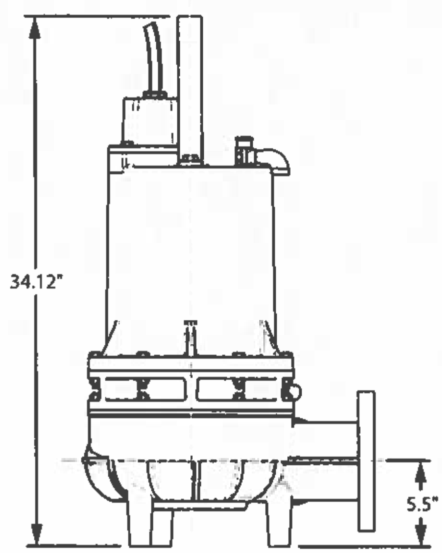
Serial: __________

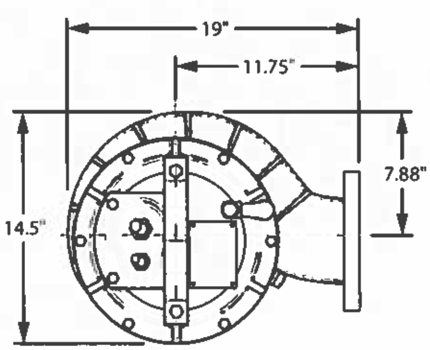
PHASE: ______ HP: ______________

DISCHARGE:	4", 125lb, flange horizontal.
SPHERICAL SLD HNDLG:	3"
LIQUID TEMPERATURE:	104° F (40° C) max.
VOLUTE:	Cast iron ASTM A-48 class 30.
MOTOR HOUSING:	Cast iron ASTM A-48 class 30.
SEAL PLATE:	Cast iron ASTM A-48 class 30.
IMPELLER:	2 vane, closed, with vanes on back side. Cast iron ASTM A-48 class 30.
SHAFT:	416 series stainless steel.
SQUARE RINGS:	Buna-N.
PAINT:	Air dry enamel, water based.
SEAL:	Double mechanical, oil filled chamber. Silicon carbide outboard, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.
DIAPHRAGM:	Buna-N.
HARDWARE:	300 series stainless steel.
CORD ENTRY:	40 ft of cord, epoxy sealed housing with secondary pressure grommet for sealing and strain relief.
UPPER BEARING:	Ball, single row, oil lubricated, for radial load.
LOWER BEARING:	Ball, single row, oil lubricated, for radial and thrust load.
MOTOR:	Three phase, NEMA B, oil filled. Requires overload protection to be included in control panel. Class F insulation.
MOISTURE SENSOR:	Normally open (N/O) included, requires relay in control panel.
TEMPERATURE SENSOR:	Normally closed (N/C) included, requires relay in control panel.
OPTIONAL EQUIPMENT:	Additional cord, tungsten carbide seal, slide rail coupling (SRC-4).

MODEL	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O. D.	WEIGHT (pounds)
K4HPL75M4-23DS	7.5	230	3	1750	26.8	80	D	10/4	SO	0.75"	309
K4HPL75M4-43DS	7.5	460	3	1750	13.4	40	D	10/4	SO	0.75"	309
K4HPL100M4-23DS	11.3	230	3	1750	28	126	D	10/4	SO	0.75"	340
K4HPL100M4-43DS	11.3	460	3	1750	14	63	D	10/4	SO	0.75"	340
K4HPL150M4-23DS	15	230	3	1750	38	160	D	10/4	SO	0.75"	400
K4HPL150M4-43DS	15	460	3	1750	19	80	D	10/4	SO	0.75"	400

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485", for all models.





▸ Receiving inspection

Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. If the manual is removed from the packaging, do not lose or misplace.

▸ Storage

Any product that is stored for a period longer than six (6) months from the date of purchase should be bench tested prior to installation. A bench test consists of, checking the impeller to assure it is free turning and a run test to assure the motor (and switch if provided) operate properly.

▸ Controls

Manual models require a separate approved pump control device or panel for automatic operation. Be sure the electrical specification of the control selected properly match the electrical specifications of the pump.

▸ Submergence

The pump should always be operated in the submerged condition. The minimum sump liquid level should never be less than above the pump's volute (See Figure 1).

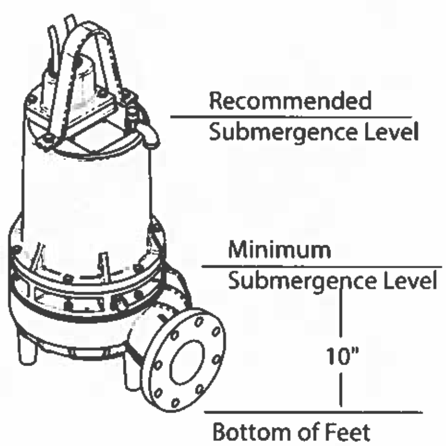


Figure 1

▸ Installation

These pumps are recommended for use in a sump, basin or lift station. The sump, basin or lift station shall be sealed and vented in accordance with local plumbing codes. **This pump is designed to pump sewage, effluent or wastewater, non-explosive and non-corrosive liquids and shall NOT be installed in locations classified as hazardous in accordance with the National Electrical Code (NEC) ANSI/NFPA 70 or Canadian Electric Code (CEC).** The pump should never be installed in a trench, ditch, or hole with a dirt bottom. The legs will sink into the dirt and the suction will become plugged.

The installation should be at a sufficient depth to ensure that all plumbing is below the frost line. If this is not feasible, remove the check valve and size the basin to accommodate the additional backflow volume.

Pumps are most commonly installed in simplex or duplex stations or basins with a slide rail system (Keen SRC), which allows the pump(s) to be installed or removed without requiring personnel to enter the station, or resting on the basin floor.

▸ Discharge Piping

Discharge piping should be as short as possible and sized no smaller than the pump discharge. **Do not reduce the discharge pipe size below that which is provided on the pump.** Both a check valve and a shut-off valve are recommended for each pump. The check valve is used to prevent backflow into the sump. The shut-off valve is used to manually stop system low during pump servicing.

▸ Liquid Level Controls

The level control(s) should be mounted on the discharge piping, a cable rack or float pole. The level control should have adequate clearance so it cannot hang up in it's swing and that the pump is completely submerged when the level control is in the "Off" mode. By adjusting the cord tether the control level can be changed. One cycle of operation should be observed, so that any potential problems can be corrected.

It is recommended that the level control float should be set to insure that the liquid in the sump never drops below the top of the motor housing or a minimum level of 10 inches above the basin floor.

▸ Electrical Connections

Power cable:

The power cable mounted to the pump must not be modified in any way except for shortening to a specific application. Any splice between the pump and the control panel must be made in accordance with the electric codes. It is recommended that a junction box, if used, be mounted outside the sump or be of at a minimum Nema 4 construction if located within the wet well. **DO NOT USE THE POWER CABLE TO LIFT PUMP.**

Always rely upon a Certified Electrician for installation.

Overload Protection:
Three Phase - The Normally Closed (N/C) thermal sensor is embedded in the motor windings and will detect excessive heat in the event an overload condition occurs. The thermal sensor will trip when the windings become too hot and will automatically reset when the pump motor cools to a safe temperature. It is recommended that the thermal sensor be connected in series to an alarm device to alert the operator of an overload condition, and/or the motor starter coil to stop the pump. In the event of an overload, the source of this condition should be determined and repaired.

⚠ WARNING DO NOT ALLOW THE PUMP TO CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS.

Moisture Sensors - A normally open (N/O) sensor rated of 1 watt @330K ohms, 500 volt, is installed in the pump seal chamber which will detect any moisture present. It is recommended that this detector be wired in series to an alarm device or motor starter coil to alert the operator that a moisture detect has occurred. In the event of a moisture detect, check the individual moisture sensor probe leads for continuity, (∞ resistance = no moisture) and the junction box/control box for moisture content.

These situations may induce a false signal in the moisture detecting circuit. If none of the above test prove conclusive, the pump(s) should be pulled and the source of the failure repaired. **IF A MOISTURE DETECT HAS OCCURRED MAINTENANCE SHOULD BE PERFORMED AS SOON AS POSSIBLE!**

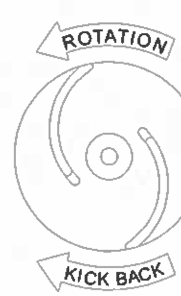
If current through the temperature sensor exceeds the values listed, an intermediate control circuit relay must be used to reduce the current or the sensor will not work properly.

TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
110-120	3.00	30.0
220-240	1.50	15.0
440-480	0.75	7.5
600	0.60	6.0

Wire Size:
If longer power cable is required consult a qualified electrician for proper wire size.

1. **Check Voltage and Phase** - Compare the voltage and phase information stamped on the pump name plate.

2. **Check Pump Rotation** - Improper motor rotation can result in poor pump performance and can damage the motor and/or pump. Check rotation on three phase units by momentarily applying power and observe the "kickback".



Bottom of Pump

Kickback should always be in a counter-clockwise direction as viewed from motor end or opposite to impeller rotation. Impeller rotation is counter-clockwise as viewed from bottom of pump.

3. **Name Plate** - Record the information from the pump name plate to drawing in front of manual for future reference.

4. **Insulation Test** - An insulation (megger) test should be performed on the motor. Before the pump is put into service. The resistance values (ohms) as well as the voltage (volts) and current (amps) should be recorded.

Pump-Down Test - Be sure pump has been properly wired, lowered into the basin, sump or lift station, check the system by filling with liquid and allowing the pump to operate through its pumping cycle. The time needed to empty the system, or pump-down time along with the volume of water, should be recorded.

▸ Maintenance
No lubrication or maintenance is required. Perform the following checks when pump is removed from operation or when pump performance deteriorates:

a) Inspect motor chamber for oil level and contamination.
b) Inspect impeller and body for excessive build-up or clogging.
c) Inspect motor, bearings and shaft seal for wear or leakage.

▸ Servicing

NOTE: Item numbers in ( ) refer to Figures 6.

Cooling Oil - Anytime the pump is removed from operation, the cooling oil in the motor housing should be checked visually for oil level and contamination. To check oil, set unit upright. Remove cap screws (6), lift conduit box assembly (4) from motor housing (3), ***Do Not*** disconnect wiring from motor leads. With a flashlight, visually inspect the oil in the motor housing (3) to make sure it is clean and clear, light amber in color and free from suspended particles. Milky white oil indicates the presence of water. Oil level should be just above the motor when pump is in vertical position.

Seal Chamber - Drain oil from seal chamber by placing pump on its side with pipe plug (18) downward and remove pipe plug (18). If the oil is found to contain considerable water or other contamination, the shaft seal (19) should be inspected and replaced if required.

Oil Testing

- Drain oil into a clean, dry container placing pump on it's side, remove cap screws (6), lift conduit box assembly (4) from motor housing (3). In separate container drain seal chamber by removing pipe plug (18).
- Check oil for contamination using an oil tester with a range to 30 kV breakdown.
- If oil is found to be clean and uncontaminated (measuring above 15 kV breakdown), refill the housing.
- If oil is found to be dirty or contaminated (or measures below 15 kV breakdown), the pump must be carefully inspected for leaks at the shaft seal, conduit box, o-rings, pipe plug and pressure valve, before refilling with oil. To locate the leak, perform a pressure test.

After leak is repaired, dispose of old oil properly, and refill with new oil.

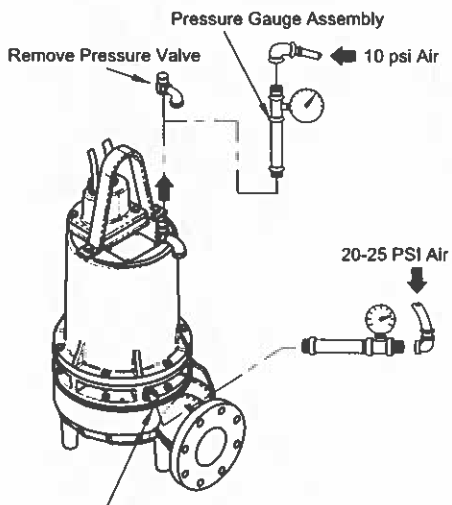


Figure 2

Pressure builds up extremely fast, increase pressure by "TAPPING" air nozzle. Too much pressure will damage seal. ***DO NOT exceed 10 PSI in housing and 20-25 PSI in seal chamber.***

Pressure Test

Motor Housing - Oil should be at normal level. Remove pressure valve (10) from motor housing (3). Apply pipe sealant to pressure gauge assembly and tighten into hole (See Figure 2). Pressurize motor housing to 10 PSI.

Use soap solution around the sealed areas above the oil level and inspect joints for "air bubbles". If, after five minutes, the pressure is still holding constant, and no "bubbles" /oil seepage is observed, slowly bleed the pressure and remove the gauge assembly. Replace oil. Leek must be located and repaired if pressure does not hold.

Seal Chamber - Check that seal chamber is full of oil by removing pipe plug (18). Apply pipe sealant to pressure gauge assembly and tighten into hole in bearing housing (16). Pressurize seal chamber to 20-25 PSI and check for leaks.

Oil Replacement - Set unit upright and refill with new cooling oil as per table. Fill to just above motor as an air space must remain in the top of the housing to compensate for oil expansion. Reassemble the o-ring (5) and conduit box (4) to motor housing (3). Apply thread locking compound to cap screws (6) and place into holes and torque to 15 ft/lbs.

DO NOT *overfill oil. Overfilling of housing with oil can create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard. Overfilling oil voids warranty.*

Oil Replacement:

Seal Chamber - Refill chamber completely full with new cooling oil or reuse the uncontaminated oil.

Cooling Oil Recommended Supplier/Grade	
BP	Enerpar SE100
Conoco	Pale Parafin 22
Mobile	D.T.E. Oil Light
Shell Canada	Transformer-10
Texaco	Diala-Oil-AX

▸ Disassembly

Impeller and Volute - Disconnect power. Remove hex nuts (26) and vertically lift motor housing and seal plate assembly from volute (34). Clean out volute (34) if necessary. Inspect gasket (32) and replace if cut or damaged. Clean and examine impeller (29), for pitting or wear and replace if required. To remove impeller (29), remove cap screw (31) and washer (30). With a wheel puller, pull impeller straight of shaft and remove square key (13).

Moisture Probes - Drain oil from seal chamber, if not already done. Remove cap screws (9) and lifting handle (8). Set unit upside down on blocks to avoid damaging cables. Remove socket head cap screws (12) and lift seal plate (20), with seal's (19) stationary, vertically from bearing housing (16), ***do not*** damage seal. Check moisture sensor probes (38) for damage, replace by removing screws (39) and disconnecting wires (37). Then remove probes (38) from bearing housing (16).

Diaphragm - with seal plate (20) removed, examine diaphragm (21) for ruptures or crackes. Replace diaphragm by removing capscrews (23) and plate (22). Clean vent holes in seal plate (20).

Shaft Seal - Remove outboard rotating member of seal (19), spring and inboard rotating member from shaft. Examine all seal parts.

Inspect seal for signs of uneven wear pattern on stationary members, chips and scratches on either seal face. **DO NOT interchange seal components, replace the entire shaft seal**. If replacing seal, remove stationary by prying out with lat screwdrive.

Motor and Bearings - Remove volute, impeller, seal plate and seal as previously stated and drain oil from motor housing (3). Position unit upright, using blocks to avoid resting unit on shaft. Remove cap screws (6) o-ring (5) and conduit box assembly (4) from motor housing (3). Note connections and then remove cable lead wires from motor lead wires and moisture and temperature sensor wires from control cable by removing connectors. Remove cap screws (12) and vertically lift the motor housing (3) from bearing housing (16). Replace square ring (15) if damaged or cut. Remove the upper motor bolts and lift upper end bell from motor (1). Remove wave washer. Remove upper bearing (2) with a wheel puller if damaged or worn.

Vertically lift stator (1) from rotor/shaft. Inspect windings for shorts and resistance. Test the temperature sensors by checking for continuity between the black and white wires. If defective contact factory or motor service station. Pull motor rotor/shaft with bearing (14) from bearing housing (16). Remove bearing (14) with a wheel puller if worn or damaged. If rotor or stator windings are defective, replace the complete motor.

⚠ ***IMPORTANT! - All parts must be clean before reassembly.***

▸ Reassembly

Bearings - Replace bearings, being careful not to damage the rotor or shaft. If equipped, fill notch should face the rotor core for both upper and lower bearings.

Apply adhesive compound to the shaft and press bearing (14) onto shaft, position squarely onto the shaft applying force to the inner race of bearing only, until bearing seats on shoulder of the shaft. In the same manner, assemble upper bearing (2) to shaft.

Motor - Slide rotor with bearing (14) into bearing housing (16) until bearing seats on the bottom. Position motor housing and stator into pilot, install wave washers in upper end bell.

IMPORTANT! Special wave washers in upper motor housing are required to compensate for shaft expansion. These washers must be properly reinstalled to give the required constant down force on the motor shaft.

Position upper motor end bell aligning holes and thread cap screws into bearing housing (16) and torque to 16 ft/lbs. Place all motor leads above the motor. Position square ring (15) on bearing housing (16) and lower housing (3) over motor and into pilot, aligning handle so that it is parallel to motor end bell reliefs. Apply thread locking compound to threads on cap screws (12) and place into holes and torque to 24 ft/lbs.

⚠ ***Handle seal parts with extreme care. DO NOT damage lapped surfaces.***

Seal/Diaphragm - (See Figure 3) Clean and oil seal cavities in bearing housing (16) and seal plate (20). Lightly oil **(Do not use grease)** outer surface of inboard and outboard stationary members of seal (19). Press inboard stationary member firmly into bearing housing (16) and outboard stationary into diaphragm plate (20), using a seal pusher tool. Nothing but the seal pusher tool is to come in contact with seal face.

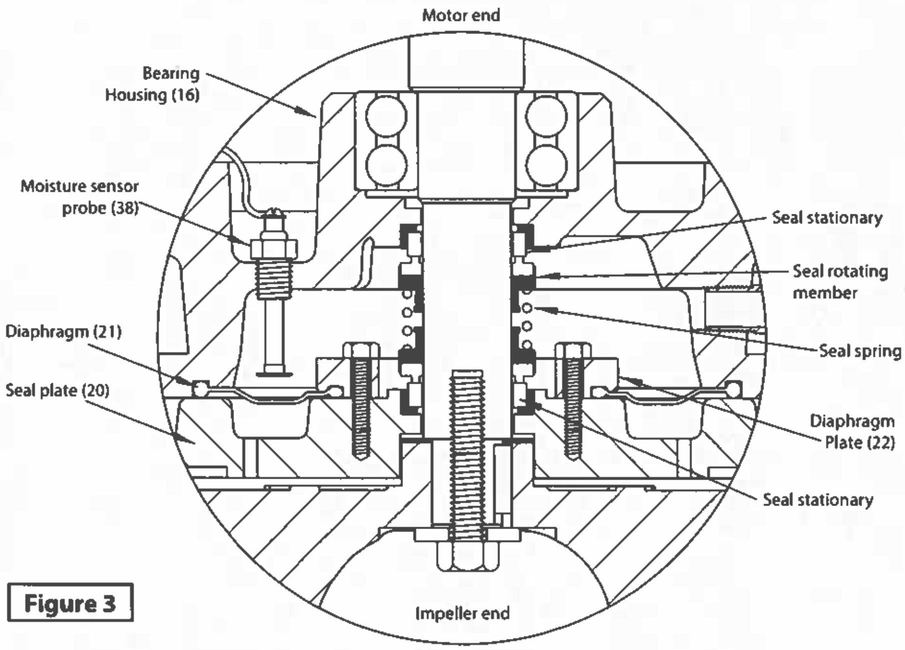


Figure 3

IMPORTANT! - Hammering on the seal pusher tool will damage the seal face.

Be sure the stationary members are in straight and that the rubber ring is not out of it's groove. Lightly oil **(Do not use grease)** shaft and inner surface of bellows on rotating member. With lapped surface facing bearing housing (16), slide rotating member onto shaft using seal pusher tool, until lapped faces are together. It is extremely important to keep seal faces clean during assembly. Dirt particales lodged between faces will cause the seal to leak.

Be sure driving lugs in retainer are matched in rotating member of seal (19). Place spring over shaft and in place on rotating member, making sure it is seated in retainer and not cocked or resting on bellows tail. Lightly oil shaft and inner surface of outboard rotating member.

With tail section toward bearing housing (16), slide rotating member onto shaft with seal pusher tool until retainer engages spring and spring is compressed slightly.

Spring should be properly engaged in both retainers.

Reassemble the diaphragm (21) with "bulg" facing diaphragm plate (22). Place plate (22) on diaphragm (21) and insert capscrews (23) into plate and tighten.

Place diaphragm plate (22) over shaft onto bearing housing (16), being careful not to damage outboard stationary member and align holes for cap screws (25).

Thread cap screws (25) into bearing housing (16) and tighten. Refill chamber with oil.

Conduit Box Assembly - Check power (35) and control cables (36) for crackes or damage and replace complete conduit box (4) if required. (See Figure 4) Bring motor wires through opening in top of motor housing (3), check sleeving and replace if damaged. Position square ring (5) in conduit box (4) and reconnect leads using connectors and insulators. See Figures 5, for wiring schematics.

Refill with cooling oil. Position conduit box (4) with square ring (5) on motor housing. Apply thread locking compound to cap screws (6) threads and torque to 16 ft/lbs.

Remove gland nuts (35B) and (36B), friction rings (35C) and (36C), and grommets (35D) and (36D) from conduit box (4), inspect and replace if damaged (See Figure 4). Reassemble by inserting one friction ring, grommet, one more friction ring and gland nut into conduit box. Torque gland nuts to 15 ft/lbs to prevent leakage.

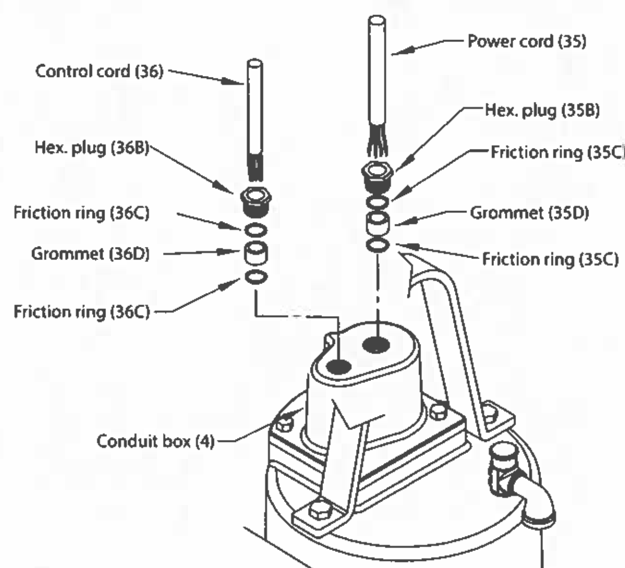


Figure 4

Impeller and Volute - Install impeller (29) by appling a thin film of oil to motor shaft and slide impeller straight onto shaft, keeping keyways lined up. Drive key (13) into keyway. Locate washer, apply thread lock primer (such as Loctite® Primer T), let set per manufacturer's directions. Apply thread locking compound to threads on cap screw, and thread into shaft and torque to 35 ft/lbs.

Place gasket (32) on volute and install impeller and motor assembly over studs and onto volute (34). Apply thread locking compound to threads of studs (25) and thread nuts (26) onto studs and torque to 24 ft/lbs. Check for binding by rotating impeller. Clearance between the impeller and volute should be approximately 0.012 inch.

THREE-PHASE 460V AC

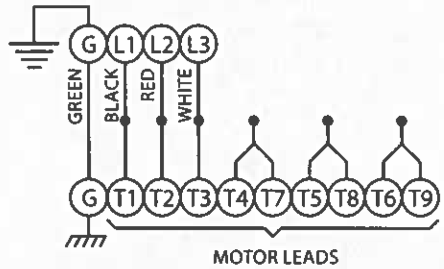


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1
Red	2
White	3
	4 and 7 together
	5 and 8 together
	6 and 9 together

CONTROL CABLE

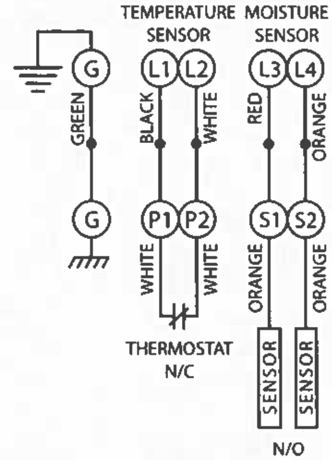


Figure 5	
Control Cable	Lead Number
Black	L1 (Temperature)
White	L2 (Temperature)
Red	L3 (Moisture)
Orange	L4 (Moisture)
Green	Ground

THREE-PHASE 230V AC

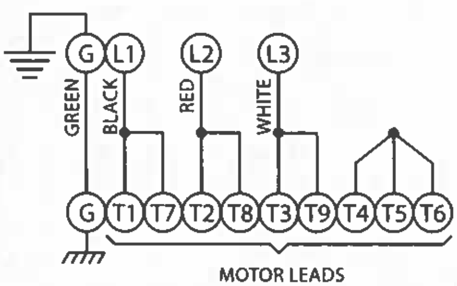
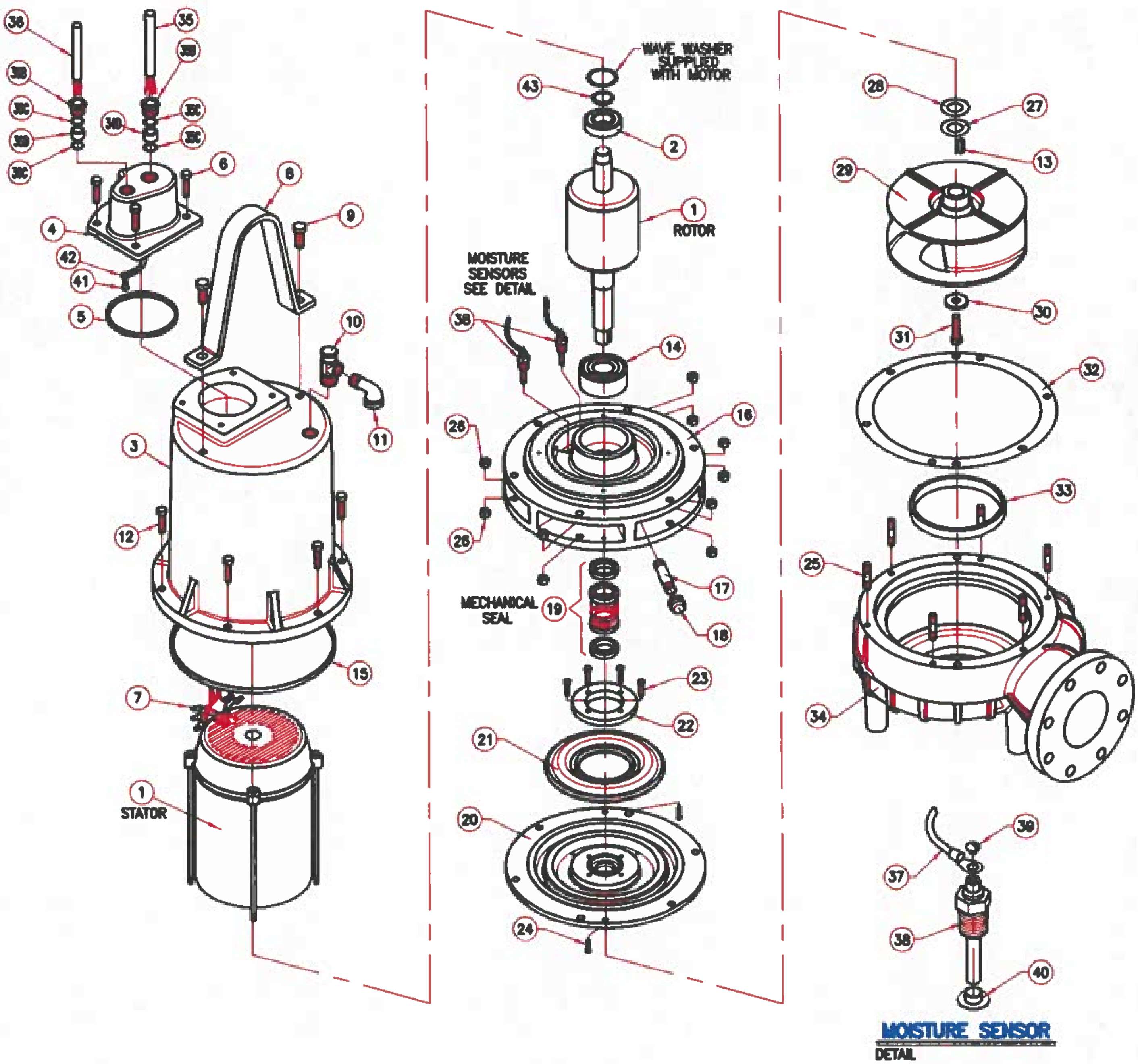


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1 and 7
Red	2 and 8
White	3 and 9
	4, 5 and 6 together

Figure 6



For Repair Part Please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

PART LIST			
ITEM	QTY.	DESCRIPTION	PART. No.
1	1	MOTOR:	
		7.5 HP, THREE PHASE, 230/460	40040022
		11.3 HP, THREE PHASE, 230/460	40040023
		15 HP, THREE PHASE, 230/460	40040024
2	1	BEARING (UPPER)	31020009
3	1	MOTOR HOUSING	03100003
4	1	CONDUIT BOX & CABLE ASSEMBLY	03100004
5	1	SQUARE-RING	92010085
6	4	CAP SCREW 3/8-16UNC x 1.00" SS	91010345
7	1	WIRE CONNECTOR	94010012
	8	THREE PHASE 230V	
	11	THREE PHASE 460V	
8	1	LIFTING BAIL	30400844
9	2	SCREW ½"-13UNC x 1¼" SS	91010350
10	1	PRESS RELIEF VALVE	31200021
11	1	ELBOW	93010011
12	6	SCREW 3/8"-16UNC x 2.00" SS	91010347
13	1	KEYWAY	30400633
14	1	BEARING (LOWER)	31020011
15	1	SQUARE RING GASKET	92010052
16	1	BEARING HOUSING	03040008
17	1	PIPE 3/8" x 3"	93010066
18	1	PIPE PLUG 3/8"	93010121
19	1	MECHANICAL SEAL (# 2120BBM4MS)	31030148
20	1	SEAL PLATE	03180013
21	1	DIAPHRAGM	31040001
22	1	DIAPHRAGM PLATE	03160002
23	4	SCREW ¼"-20UNC x 1.00" SS	91010342
24	2	SCREW HEAD SOCKET ¼"-20UNC x 1.00" SS	91010392
25	6	SCREW 3/8"-16UNC x 2.00" SS	91010347
26	12	HEX NUT 3/8"-16UNC SS	31010020
27	2	SHIMS WASHER (0.010")	91010121
28	2	SHIMS WASHER (0.030")	91010130
29	1	IMPELLER	
		15 HP (9.0" STD. DIAMETER)	03140078
		11.3 HP (8.0" STD. DIAMETER)	031400788
		7.5 HP (7.0" STD. DIAMETER)	0314078C
30	1	IMPELLER LOCKWASHER	30400413
31	1	SCREW HEX. HD. ½"-13UNC x 1¼" SS	91010350
32	1	VOLUTE GASKET	92010084
33	1	WEAR RING	30400325
34	1	VOLUTE	03090081
35	25 FL	POWER CABLE 4/10	31030003
35B	1	HEX HEAD PLUG	30400903
35C	2	WASHER # 54746	91010055
35D	1	GROMMET	92010001
36	25 FL	CORD SET, MOIST & TEMP, CABLE 5/18	31030005
36B	1	HEX HEAD PLUG	30400901
36C	2	WASHER # 21531	91010057
36D	1	GROMMET	92010005
37	2	WIRE ASSY, MOISTURE SENSOR	31030011
38	2	MOISTURE SENSOR #39383	31160001
39	2	MACHINE SCREW MOIST, 6-32 x ¼" SS	91010403
40	2	CAP PLUG	93010101
41	1	GROUND SCREW ¼" x ½"	91010404
42	1	ROUND TERMINAL 5/16"	94010044
43	1	RETAINING RING	31010003
44	2/4 GAL	MOTOR OIL (HOUSING & SEAL CAVITY)	31010031

For Repair Part Please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Risk of electric shock. Always disconnect the pump from the power source before handling inspections or repairs.

<table>
<tr><th>Symptom</th><th>Possible Cause(s)</th><th>Corrective Action</th></tr>
<tr><td>Pump will not run</td><td>1. Poor electrical connection, blown fuse, tripped breaker or other interruption of power; improper power supply
2. Motor or switch inoperative (go to manual operation)
2a. Float movement restricted
2b. Switch will not activate pump or is defective
2c. Defective motor
3. Insufficient liquid level</td><td rowspan="7">1. Check all electrical connections for security. Have electrician measure current in motor leads, if current is within ± 20% of locked rotor Amps, impeller is probably locked. If current is 0, overload may be tripped. Remove power, allow pump to cool, then re-check current.
2a. Reposition pump or clean basin as required to provide adaquate clearance for float
2b. Disconnect level control. Set ohmmeter for a low rang, such as 100 ohms full scale and connect to level control leads. Actuate level control manually and check to see that ohmmeter shows zero ohms for closed switch and full scale for open switch. (Float Switch)
2c. Check winding insulation (Megger Test) and winding resistance. If check is outside of range, dry and re-check. If still defective, replace per service instructions.
3. Make sure liquid level is above the pump
4. Re-check all sizing calculations to determine proper pump size.
5. Check discharge line for restrictions, including ice if line passes through or into cold areas.
6. Remove and examine check valve for proper installation and freedom of operation
7. Open valve
8. Check impeller for freedom of operation, security and condition. Clean impeller cavity and inlet of any obstruction
Loosen union slightly to allow trapped air to escape. Verify that turn-off level of switch is set so that the suction is always flooded. Clean vent hole
10. Check rotation. If power supply is three phase, reverse any two of three power supply leads to ensure proper impeller rotation
11. Repair fixtures as required to eliminate leakage
12. Check pump temperature limits and fluid temperature
13. Replace portion of discharge pipe with flexible connector or tighten existing piping.
14. Turn to automatic position
15. Check for leaks around basin inlet and outlets</td></tr>
<tr><td>Pump will not turn off</td><td>2a. Float movement restricted
2b. Switch will not activate pump or is defective
4. Excessive inflow or pump not properly sized for application
9. Pump may be air locked causing pump not to flow
14. H-O-A switch on panel is in "HAND" position</td></tr>
<tr><td>Pump hums but doesn't run</td><td>1. Incorrect low voltage
8. Impeller jammed or loose on shaft, or inlet plugged</td></tr>
<tr><td>Pump delivers insufficient capacity</td><td>1. Incorrect low voltage
4. Excessive inflow or pump not properly sized for application
5. Discharge restricted
6. Check valve partially closed or installed backwards
7. Shut-off valve closed
8. Impeller jammed or loose on shaft, or inlet plugged
9. Pump may be air locked causing pump not to flow
10. Piping fixtures leaking or discharge before the</td></tr>
<tr><td>when fixtures are not in use</td><td>6. Check valve partially closed or installed backwards
15. Ground water entering basin</td></tr>
<tr><td>Pump shuts off and turns on independent of switch, (trips thermal overload protector). CAUTION! Pump may start unexpectedly. Disconnect power supply.</td><td>1. Incorrect low voltage
4. Excessive inflow or pump not properly sized for application
8. Impeller jammed or loose on shaft, or inlet plugged
12. Excessive water temperature (internal protection only)</td></tr>
<tr><td>Pump operates noisily or vibrates excessively</td><td>2c. Worn bearings, motor shaft bent
5. Debris in impeller cavity or broken impeller
10. Pump running backwards
13. Piping attachments to building structure too loose or rigid</td></tr>
</table>

NOTE: Keen Pumps assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Keen Pumps or its authorized service centers, automatically voids warranty.

KEEN PUMPS
FACTORY WARRANTY

Keen Pumps warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for 18 months from date of manufacture or 12 months from installation date whichever occurs first. This warranty gives you specific legal rights, which vary from state to state.

This warranty is a limited warranty, and no warranty related claims of any nature whatsoever shall be made against Keen Pumps, until the ultimate consumer or his/her successor notifies us in writing of the defect and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station as instructed by Keen Pumps. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE. PRODUCT SHALL BE EITHER REPLACED OR REPAIRED AT THE ELECTION OF KEEN PUMPS. Guarantees relating to performance specifications provided in addition to the foregoing material and workmanship warranties on a product manufactured by Keen Pumps, if any, are subject to possible factory testing. Any additional guarantees, in the nature of certified performance specifications or time frame must be in writing and such writing must be signed by our authorized factory manager at time of order placement and/or at time of quotation. Due to inaccuracies in field testing and should a conflict arises between the results of field testing conducted by or for the user, Keen Pumps reserves the right to have the product returned to our factory for additional testing.

This warranty shall not apply when damage is caused by (1) improper installation, (2) improper voltage, (3) lightning, (4) excessive sand or other abrasive material, (5) corrosion build-up due to excessive chemical content or (6) uncontrollable acts of god. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective pumps, parts or systems. Keen Pumps will not accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY. No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.

IMPORTANT!
If you have a claim under the provision of the warranty, contact Keen Pumps or your authorized Keen Pumps Distributor:
www.keenpump.com

KEEN PUMP®

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K4XPL-DS
10 HP / 1750 RPM
Discharge: 4"
Spherical solids handling: 3"

DISCHARGE
4", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104° F (40° C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 2 vane, open, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

CORD ENTRY
25 ft of cord, epoxy sealed housing with secondary pressure gromet for sealing and strain relief.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

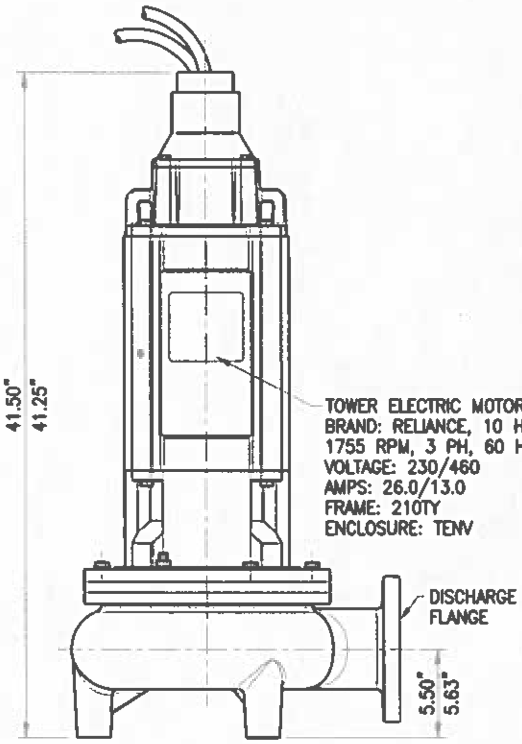
MOTOR
NEMA B, three phase, 460 volts, 60 Hz, 1750 RPM, air cooled. Explosion Proof, Class 1, Division 1, Group C & D, insulation Class F. Requires overload protection to be included in control panel.

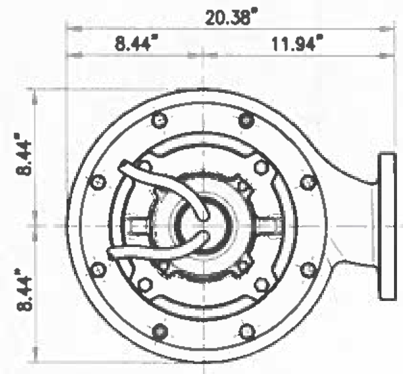
MOISTURE SENSOR
Normally open (N/O) included, requires relay in control panel.

TEMPERATURE SENSOR
Normally closed (N/C) included, requires relay in control panel.

OPTIONAL EQUIPMENT
Additional cord, tungsten carbide seal, slide rail coupling (SRC-4).

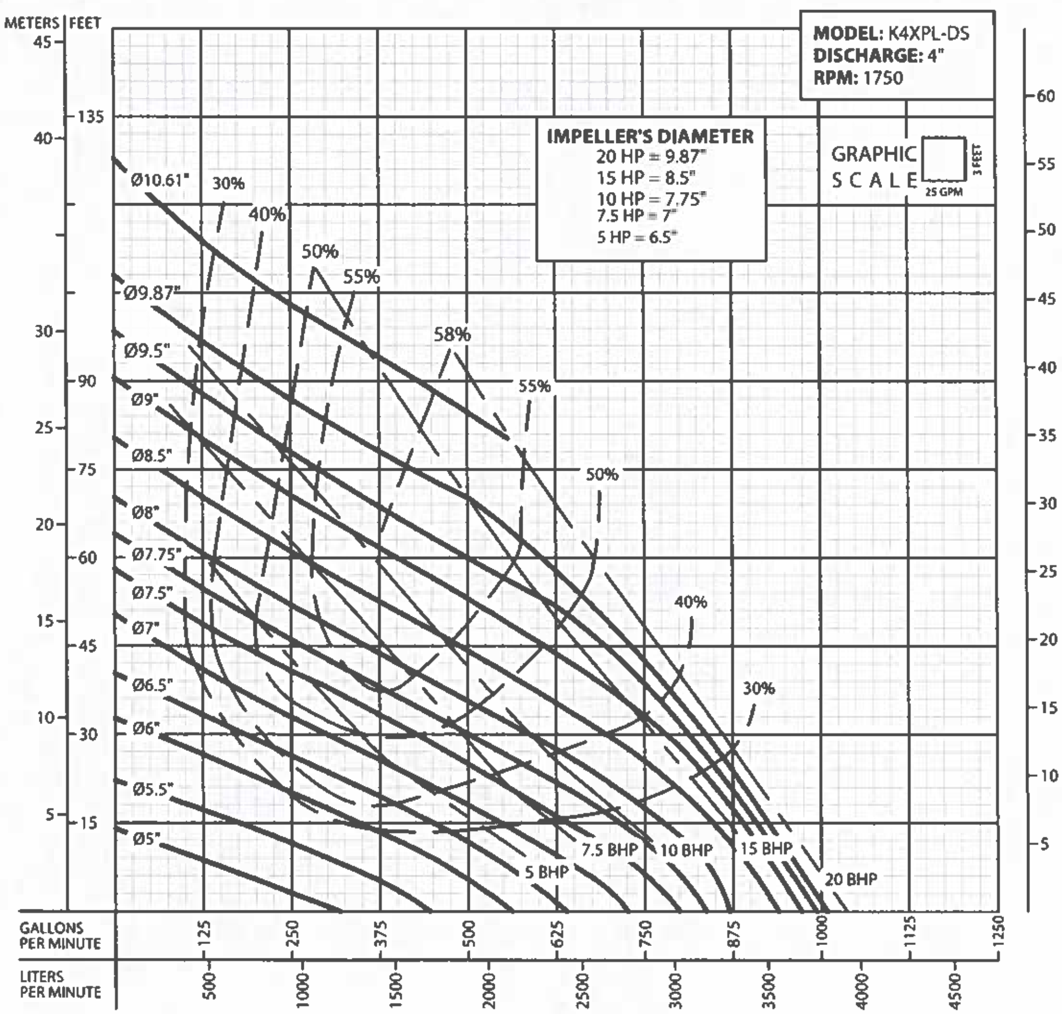
SPECIFICATIONS





DISCHARGE FLANGE

BRANCH:	4"
RATING:	150 PSI
O.D.:	9.00"
BOLTS:	8
BOLTS SIZE:	.625"
BCD:	7.50"
THICK:	.94"



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K4XPL-DS
15 HP / 1750 RPM
Discharge: 4"
Spherical solids handling: 3"

DISCHARGE
4", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104° F (40° C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 2 vane, open, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

CORD ENTRY
25 ft of cord, epoxy sealed housing with secondary pressure gromet for sealing and strain relief.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

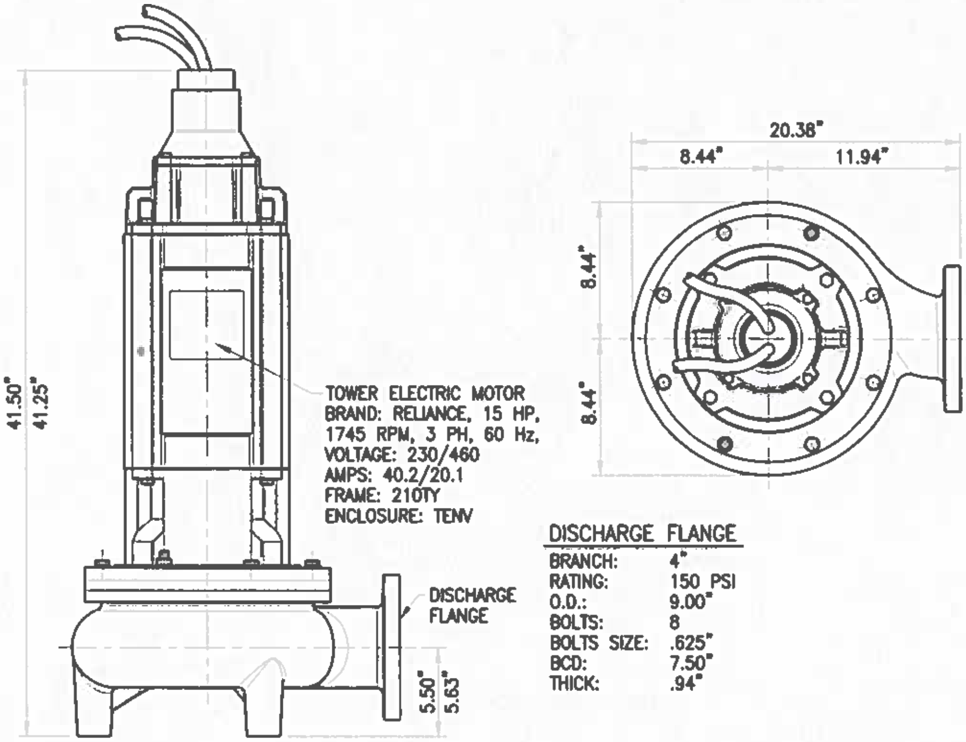
MOTOR
NEMA B, three phase, 460 volts, 60 Hz, 1750 RPM, air cooled. Explosion Proof, Class 1, Division 1, Group C & D, insulation Class F. Requires overload protection to be included in control panel.

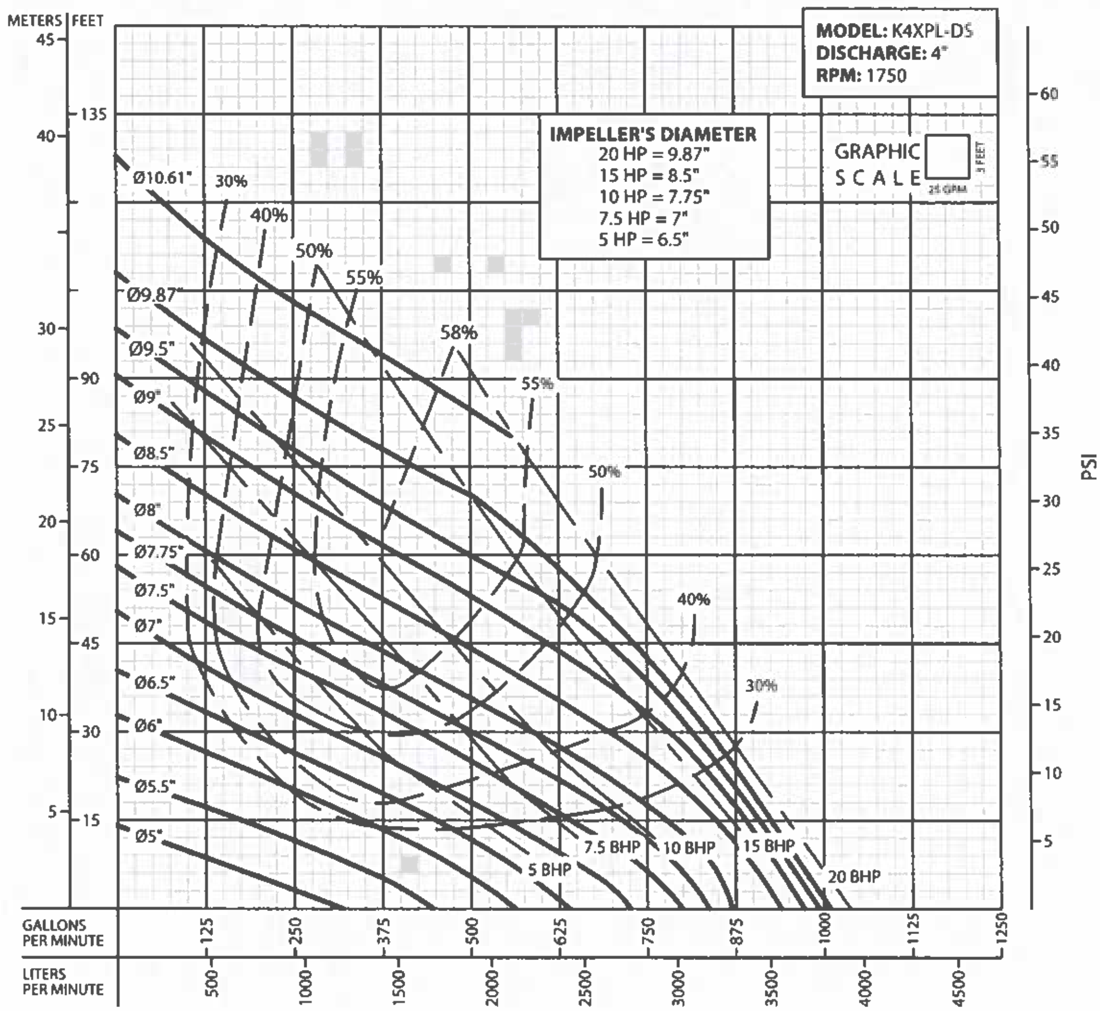
MOISTURE SENSOR
Normally open (N/O) included, requires relay in control panel.

TEMPERATURE SENSOR
Normally closed (N/C) included, requires relay in control panel.

OPTIONAL EQUIPMENT
Additional cord, tungsten carbide seal, slide rail coupling (SRC-4).

SPECIFICATIONS





IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K4XHPL-DS
7.5 HP / 1750 RPM
Discharge: 4"
Spherical solids handling: 3"

DISCHARGE
4", 125lb, flange horizontal.

LIQUID TEMPERATURE
104° F (40° C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 2 vane, open, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

CORD ENTRY
25 ft of cord, epoxy sealed housing with secondary pressure gromet for sealing and strain relief.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

MOTOR
NEMA B, three phase, 230 & 460 volts, 60 Hz, 1750 RPM, air cooled. Explosion Proof, Class 1, Division 1, Group C & D, insulation Class F. Requires overload protection to be included in control panel.

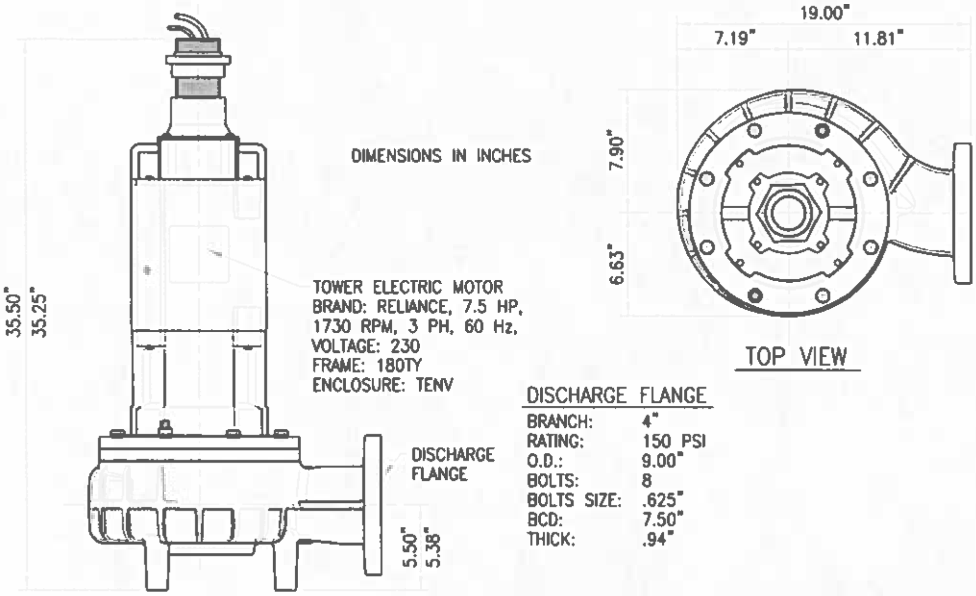
MOISTURE SENSOR
Normally open (N/O) included, requires relay in control panel.

TEMPERATURE SENSOR
Normally closed (N/C) included, requires relay in control panel.

OPTIONAL EQUIPMENT
Additional cord, tungsten carbide seal, slide rail coupling (SRC-4).

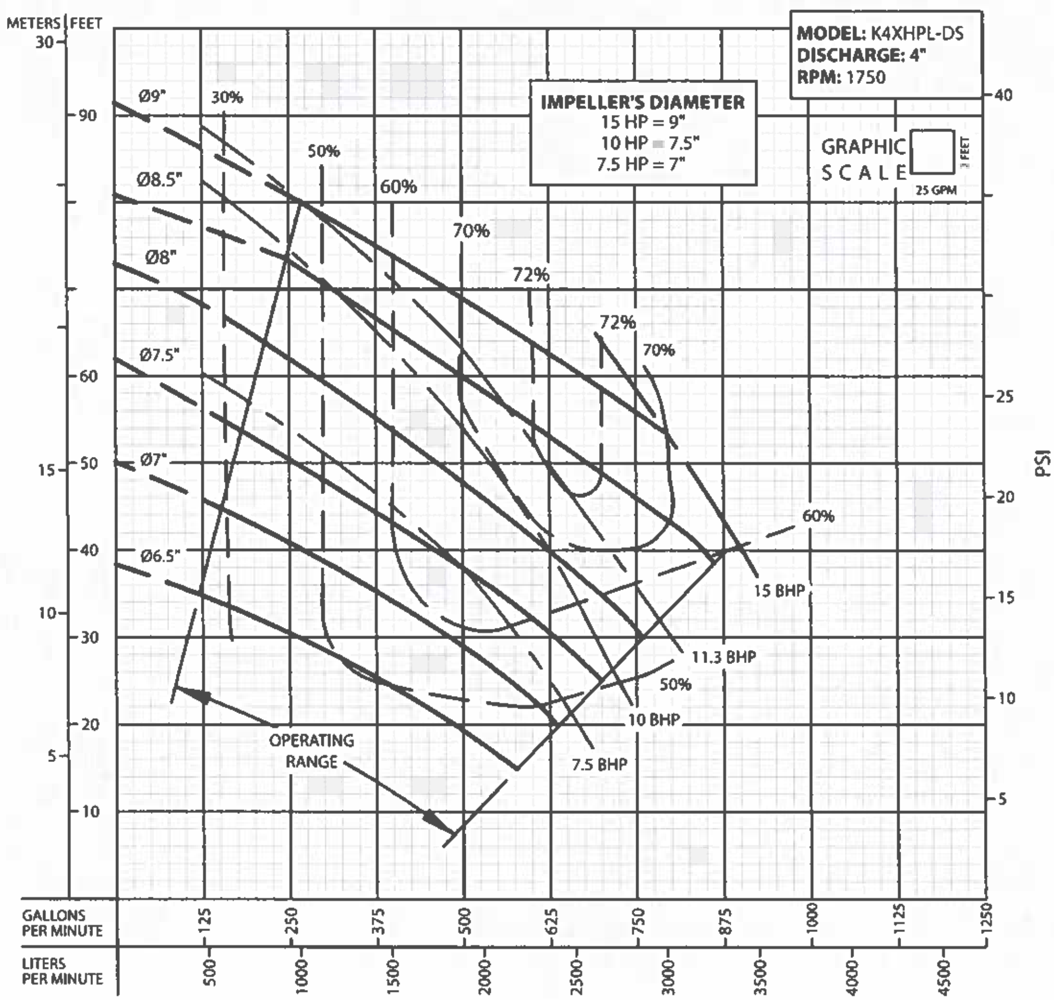
SPECIFICATIONS

SPECIFICATIONS



MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	"A"	WEIGHT (pounds)
K4XHPL75M4-23DS	-	7.5	230	3	1750	21	130	H	10/4	SOW	33.18	-
K4XHPL75M4-43DS	-	7.5	460	3	1750	10.5	65	H	10/4	SOW	33.18	-

The moisture cord and/or temperature cord for all models is size 18/5, type SOW, Ø0.485".



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K4XHPL-DS
10-15 HP / 1750
Discharge: 4"
Spherical solids handling: 3"

SPECIFICATIONS

DISCHARGE
4", 125lb, flange horizontal.

LIQUID TEMPERATURE
104° F (40° C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 2 vane, open, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

CORD ENTRY
25 ft of cord, epoxy sealed housing with secondary pressure gromet for sealing and strain relief.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

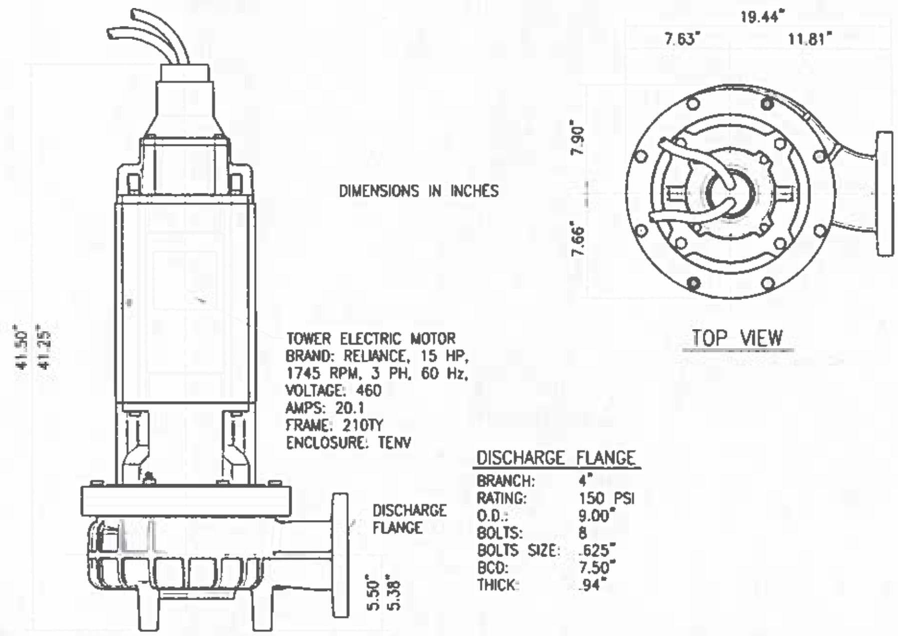
MOTOR
NEMA B, three phase, 230 & 460 volts, 60 Hz, 1750 RPM, air cooled. Explosion Proof, Class 1, Division 1, Group C & D, insulation Class F. Requires overload protection to be included in control panel.

MOISTURE SENSOR
Normally open (N/O) included, requires relay in control panel.

TEMPERATURE SENSOR
Normally closed (N/C) included, requires relay in control panel.

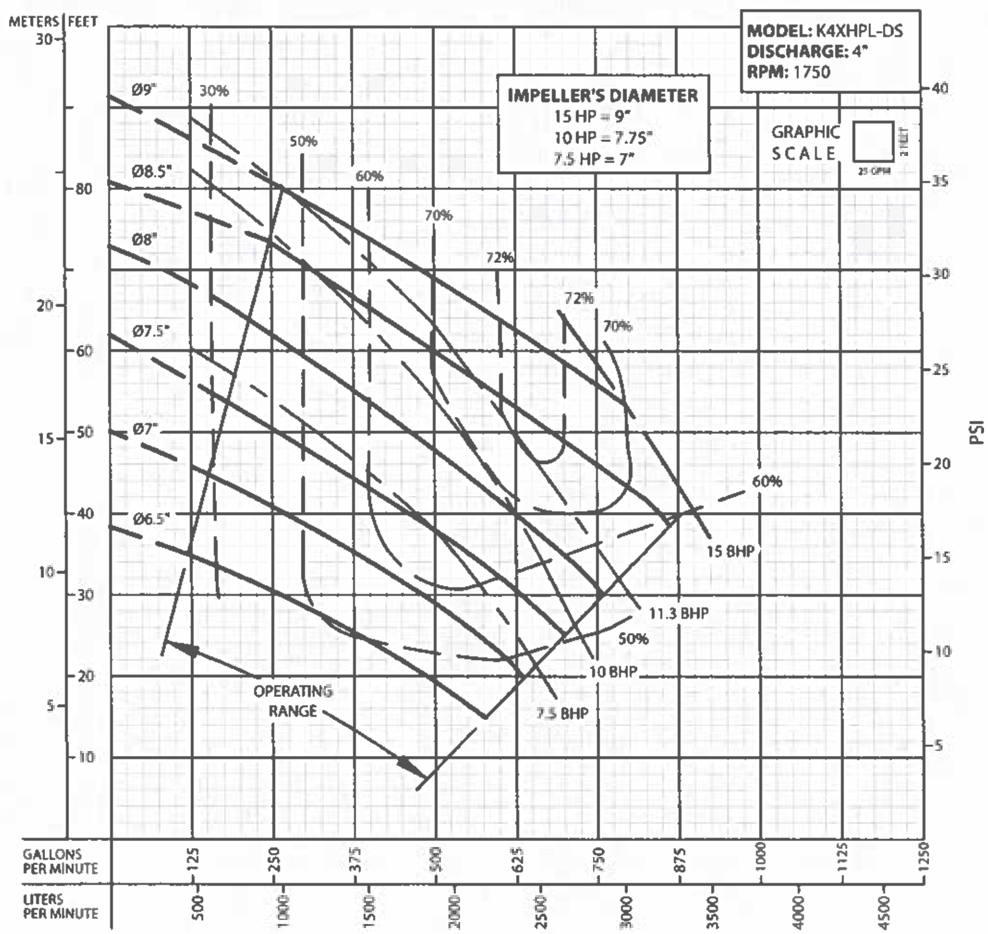
OPTIONAL EQUIPMENT
Additional cord, tungsten carbide seal, slide rail coupling (SRC-4).

SPECIFICATIONS



MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	"A"	WEIGHT (pounds)
K4XHPL100M4-23DS	-	10	230	3	1750	27	160	H	8/4	SOW	38.92	-
K4XHPL100M4-43DS	-	10	460	3	1750	13.5	80	H	8/4	SOW	38.92	-
K4XHPL150M4-23DS	-	15	230	3	1750	42	222	G	8/4	SOW	38.92	-
K4XHPL150M4-43DS	-	15	460	3	1750	21	111	G	8/4	SOW	38.92	-

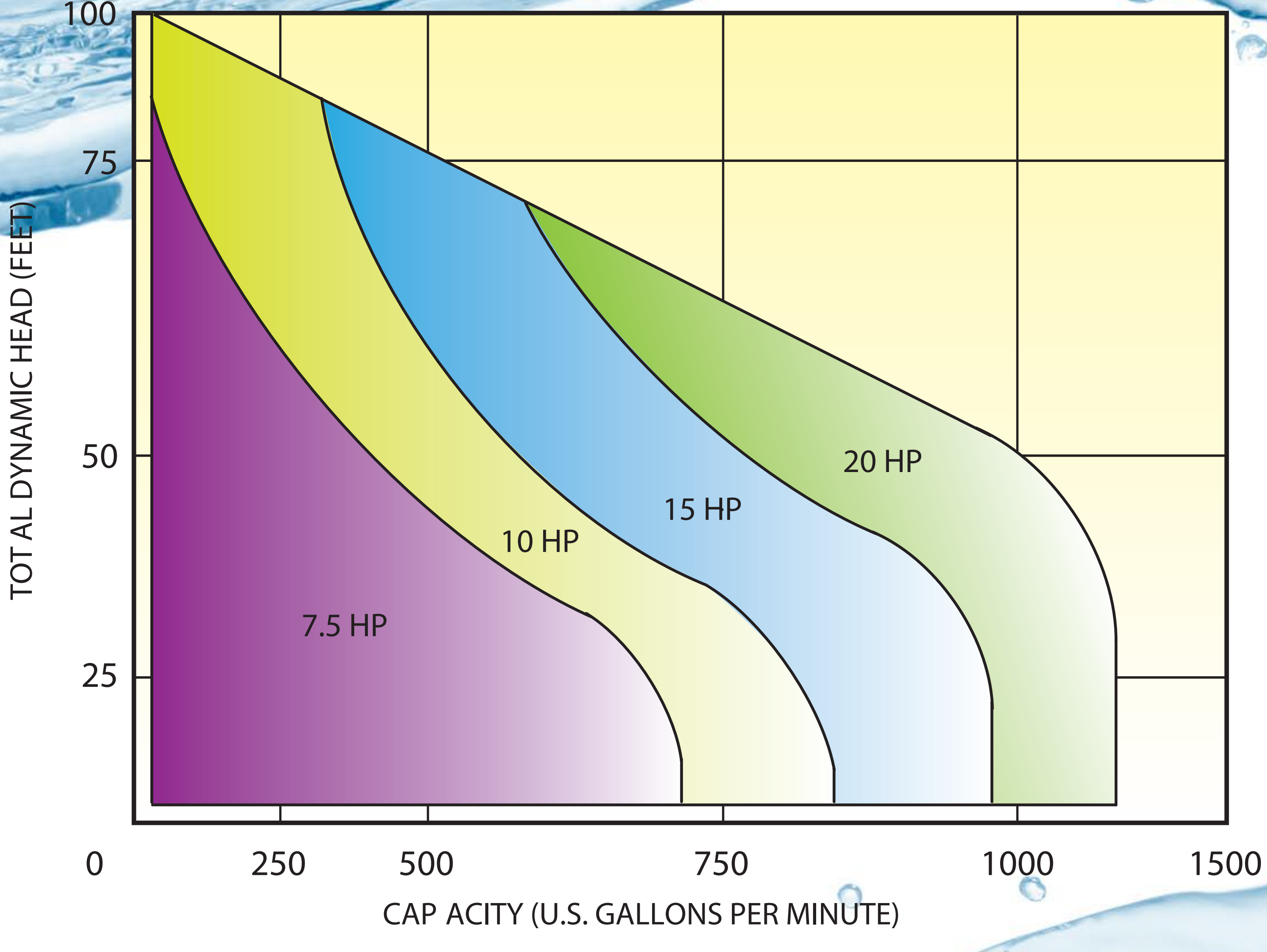
The moisture cord and/or temperature cord for all models is size 18/5, type SOW, Ø0.485".



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

K4VL Non-Clog Pump Series



471 E State Route 250 East
Ashland, Ohio

KEEN PUMP CO.®
Your Premier Pump Choice

K4VL

4" Non-Clog Wastewater Pumps

HEAVY DUTY 4" NON-CLOG SERIES

- Handles aggressive pumping applications
- Strong pumping capacities
- Centerline volute discharge
- Smooth, quiet operation

STRONG PERFORMANCE

- Ideal for higher flows
- Positive pumping action through impeller
- Pump-out vanes, prevent material build-up
- Non-overloading performance curve

LONG SERVICE LIFE

- Dual silicon carbide shaft seals
- Low motor operation temperatures
- Continuously lubricated bearings
- Premium ball bearing construction
- Epoxy potted cord entry

LOW MAINTENANCE

- Easily replaceable impeller wear ring restores original pump performance
- Unobstructed impeller passageway
- Grit-resistant silicon carbide shaft seals
- Large, 3" diameter solids handling
- High service factor motor handles tough electrical operating conditions

Capabilities:

- Flows . . . . .to 1200 GPM
- Heads . . . . to 105 Feet
- HP Range . . . . 7.5 - 20 HP
- Voltage Options . . . . 208 / 230 / 460 volt, 3 phase
- Discharge Connections .. 4" ANSI 150 lb Horizontal Flange
- Motor Speed . . . . .1150 / 1750 rpm
- Solids Handling . . . . 3"
- Minimum 1.15 Motor Service Factor

KEEN PUMP CO.
471E St Route 250 East
Ashland, Ohio 44805

Features and Benefits

4” Non-Clog Submersible Pump K4VL Series

1. Triple Sealed Cable Entrance
Epoxy filled inner cord cap with individually soldered wires provide anti-wicking moisture protection to the motor even if power cable is cut or damaged. 25’ U/L power & control cords.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy duty ASTM A48, Class 30 cast iron components.

3. Strong Motor
208 / 230 / 460 volt, 3-phase
Pressed stator securely holds motor and efficiently transfers heat. Class F construction with overload protection in air filled chamber. Inverter duty wire for VFD / soft start operation, continuous duty.

4. Solid Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearings rated for long 50,000 hour B-10 life.

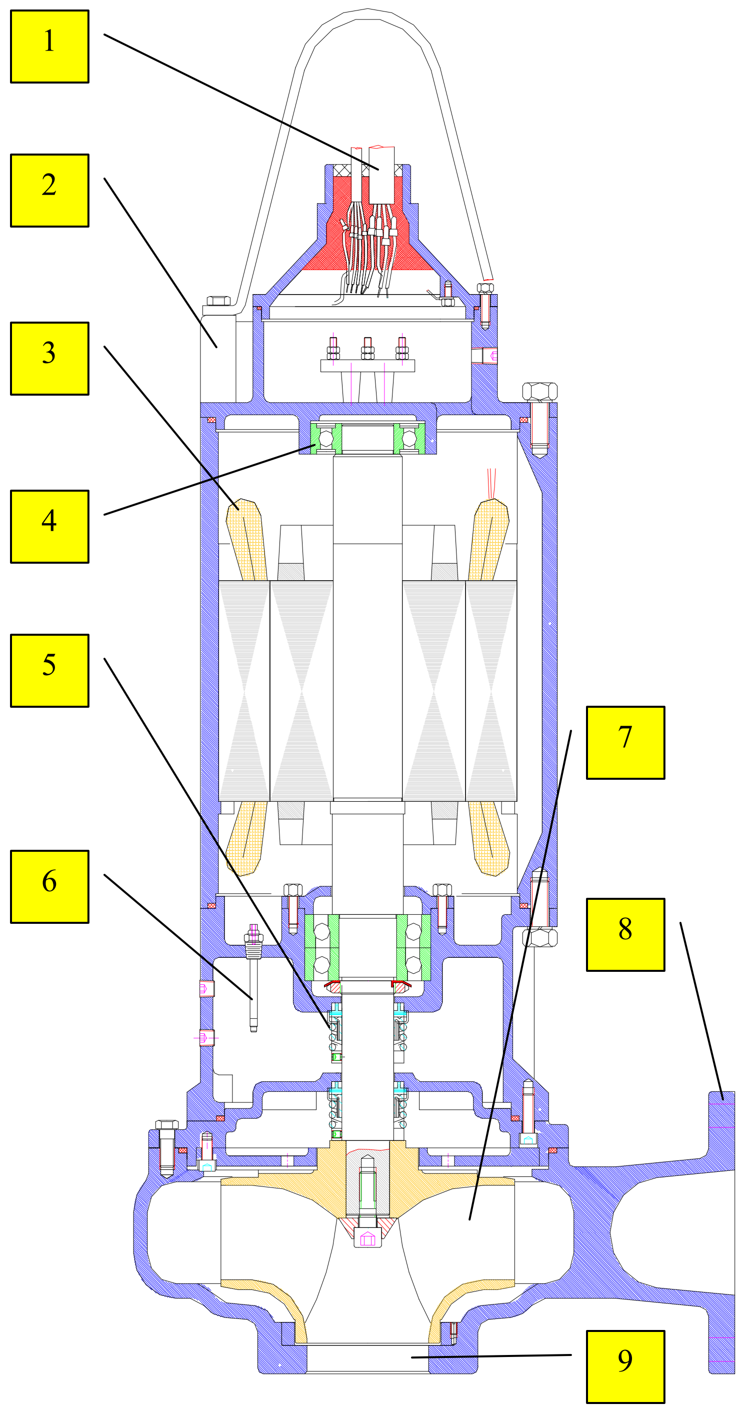
5. Severe Duty Dual Mechanical Seals
Dual carbon ceramic mechanical shaft seals provide twice the moisture and grit protection for the motor. Dual seals are housed in a secondary oil filled seal chamber.

6. Moisture Detection
Seal leak probe signals alarm in control panel for scheduled maintenance.

7. High Efficiency Hydraulic Design
Highly efficient enclosed 2 vane impeller easily passes 3” diameter solids without blockage. The strong ductile iron impeller features backside pump out vanes, keeping the lower mechanical seal clean and pressure compensated for longer life. Dynamically balanced for smooth quiet operation and long bearing life.

8. 4” Discharge Flange
4” horizontal, 125# ANSI discharge flange. Industry standard, 8-bolt pattern.

9. High Performance Wear Ring
Assists impeller in providing higher performance efficiencies and prevention of recirculation losses. Bronze ring will not corrode or deteriorate from liquid being pumped. Bronze ring reduces wear to stronger ductile iron impeller in sandy or gritty applications. Easily serviceable and replaceable.



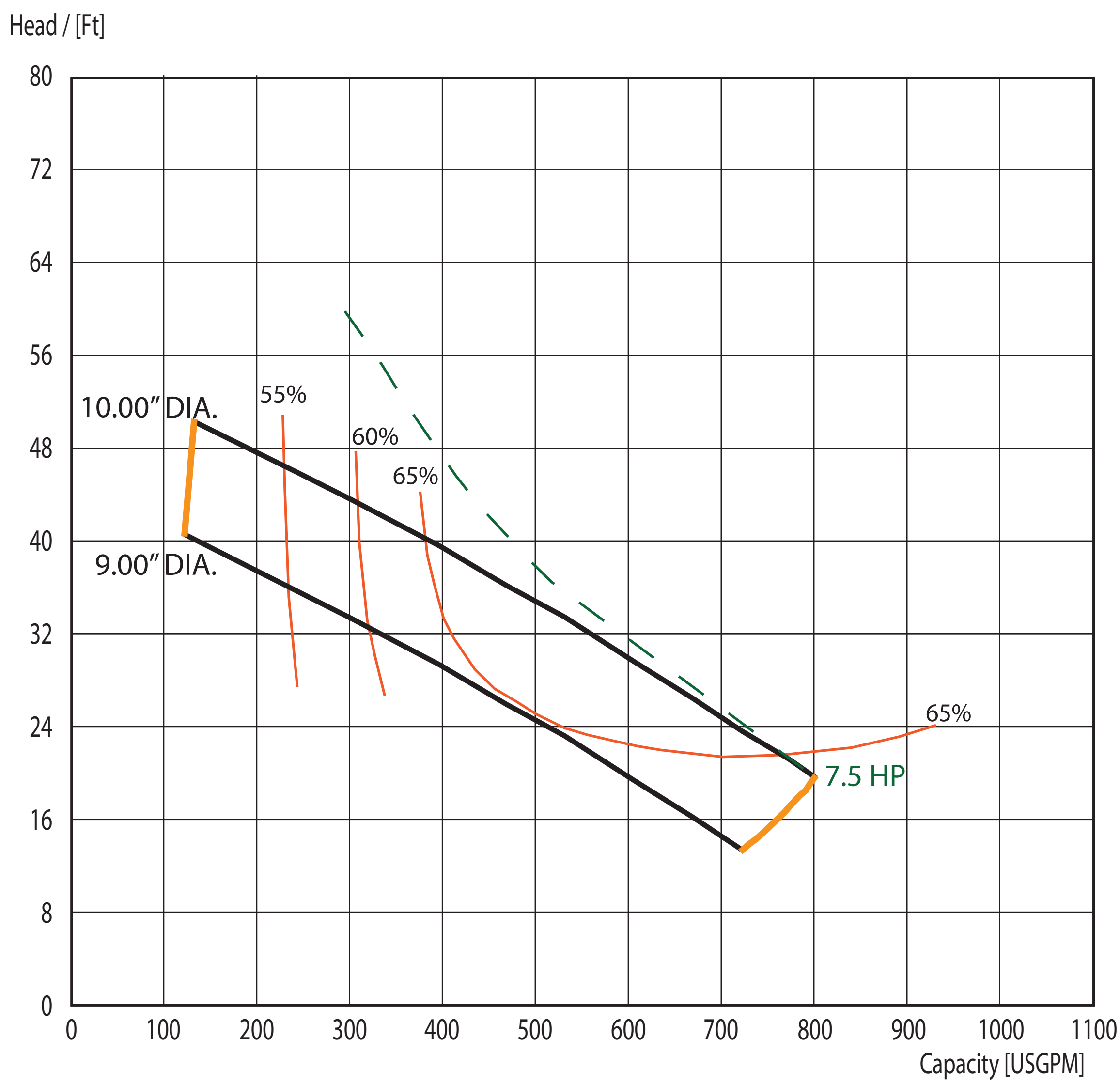
KEEN PUMP

KEEN PUMP CO.™

Section	**ENCLOSED**		
Date	**JANUARY 2013**		

Pump Series	**K4VL**		4″ SUBMERSIBLE SEWAGE PUMPS		
Speed	**1150 RPM**	Discharge	**4″**	Solids	**3″**

GPM: __________ TDH: __________

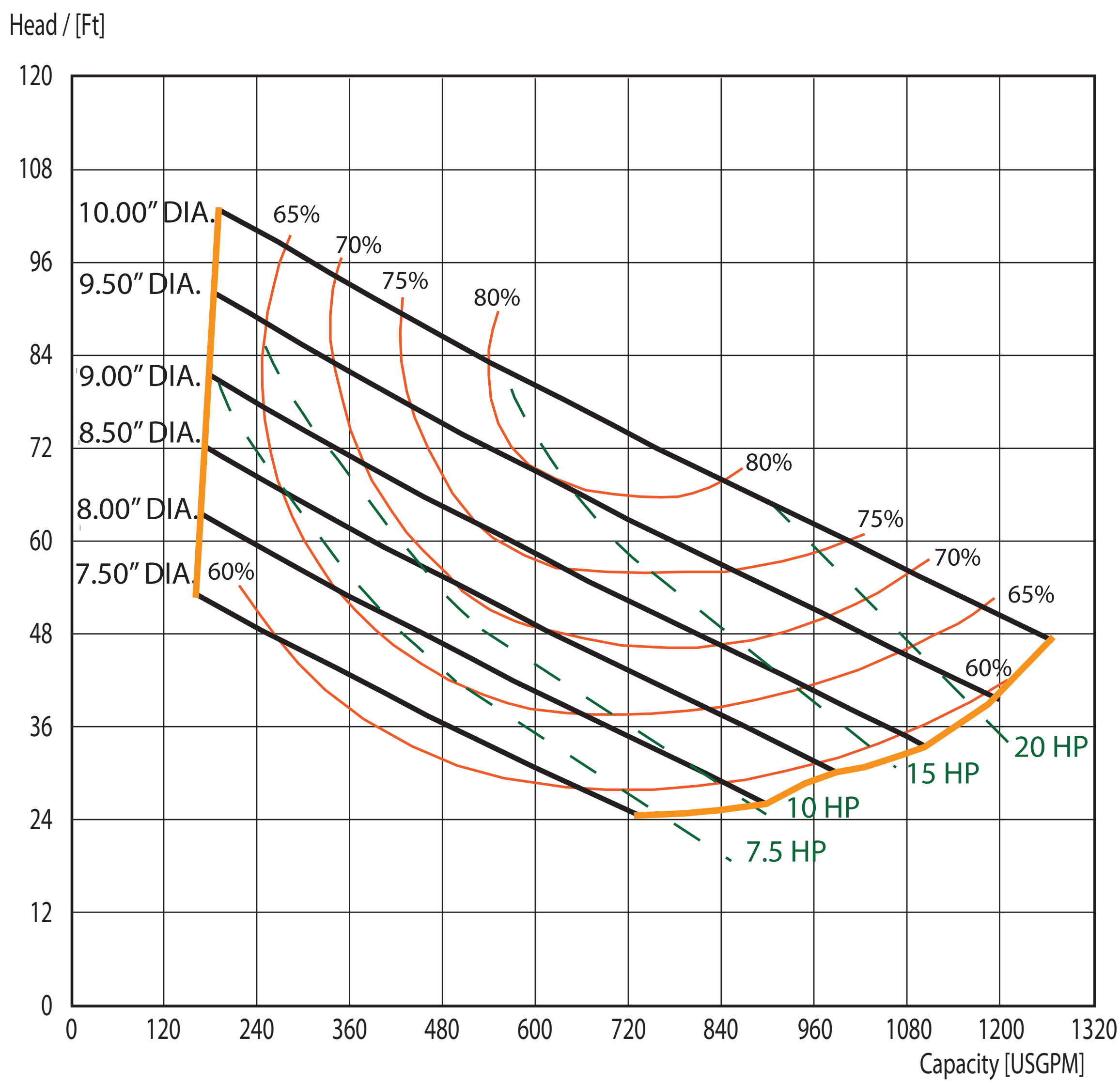


The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K4VL_1150_CAT

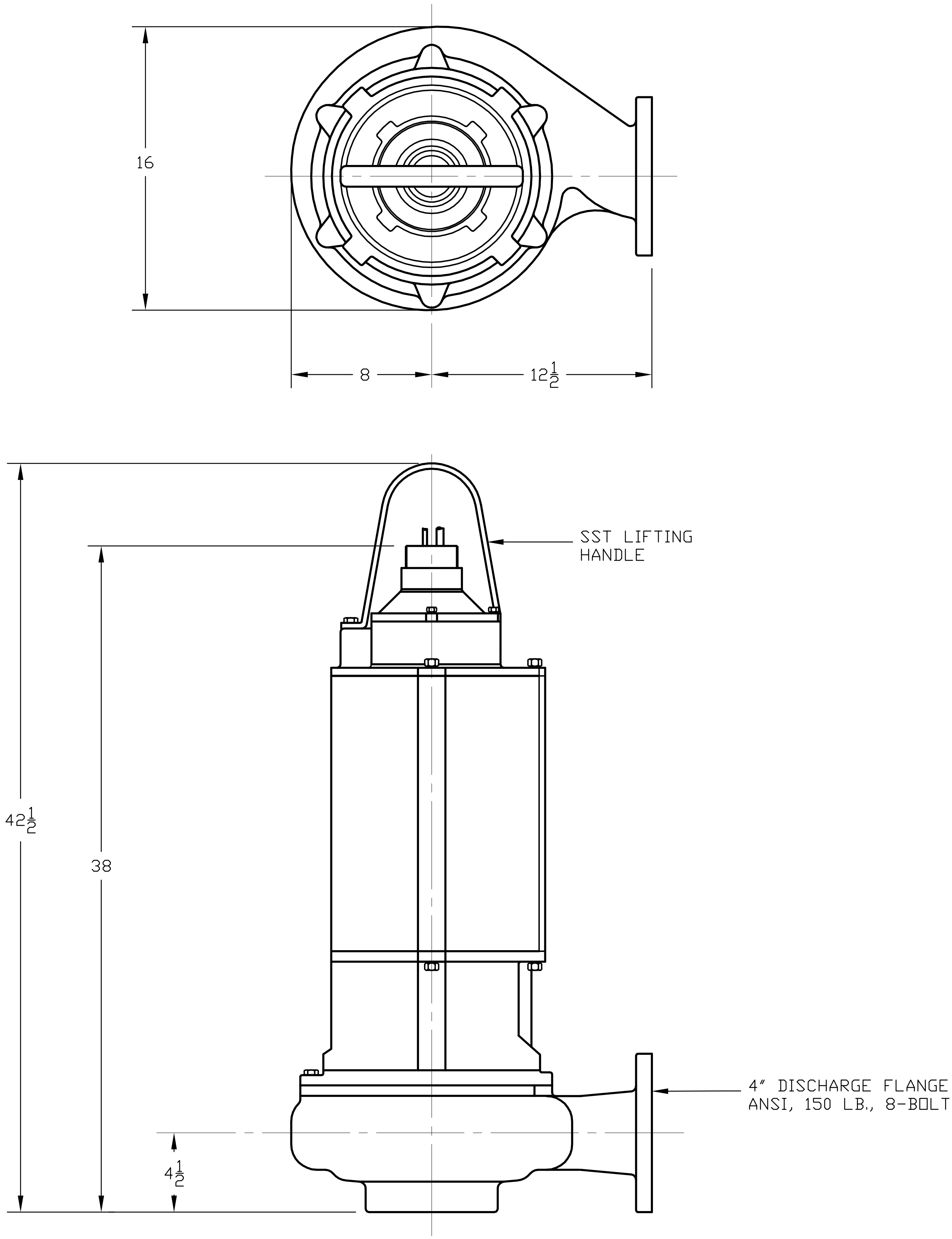
Pump Series	**K4VL**	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1750 RPM**	Discharge	**4″**	Solids	**3″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

File: K4VL_1750_CAT



KEEN PUMP COMPANY
KEEN PUMP CO.
1661 CLEVELAND AVE.
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

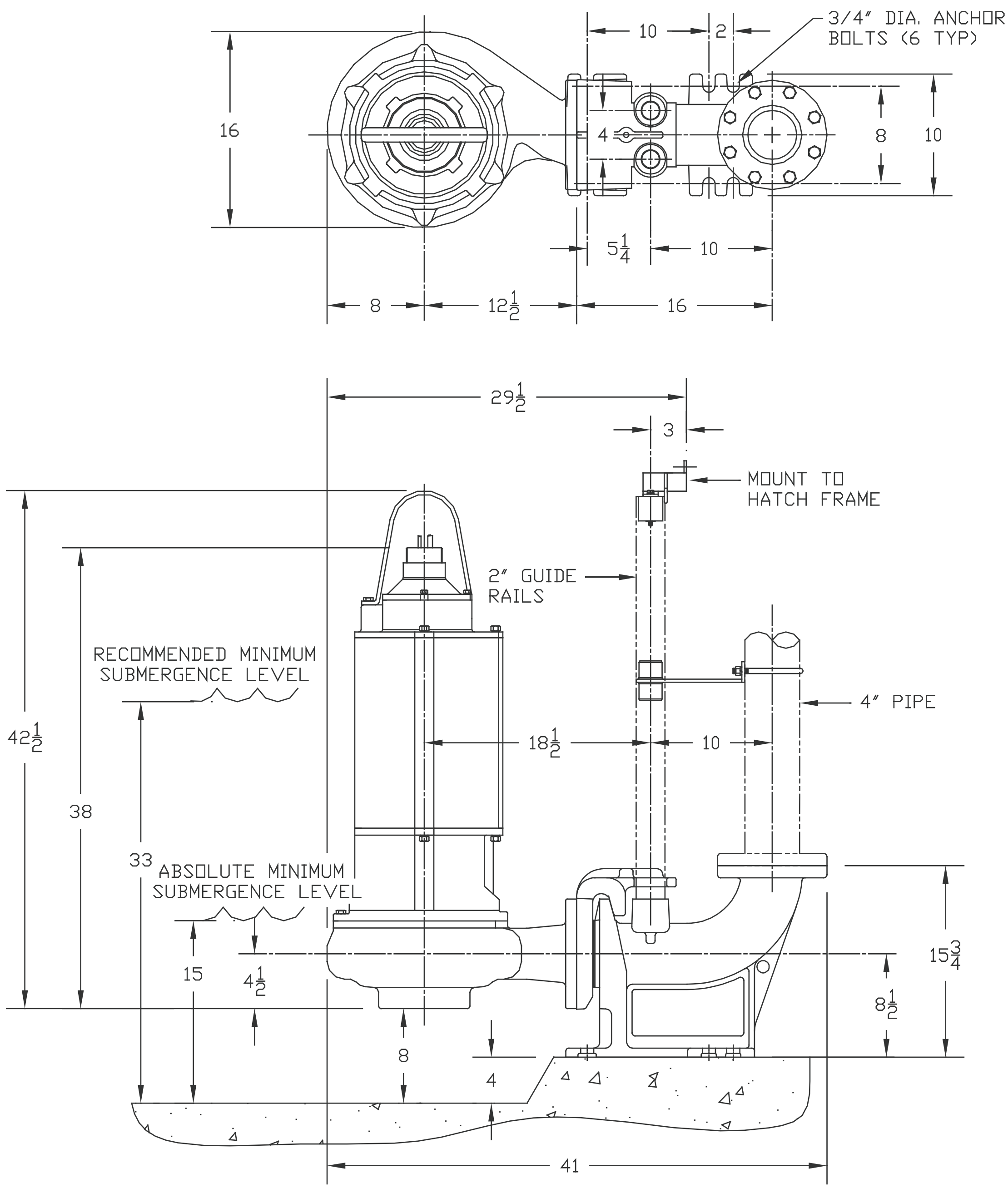
TITLE K4VL NON-CLOG SEWAGE PUMP OUTLINE			
SCALE NTS		DWG. # KN-10	REV. –
DWG. BY F. YUHASZ	DATE 9/14/08		

KEEN PUMP CO.™

Section **ENCLOSED**
Date **JANUARY 2013**

Pump Series	K4VL	4″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Discharge flange 150 Lb. ANSI unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

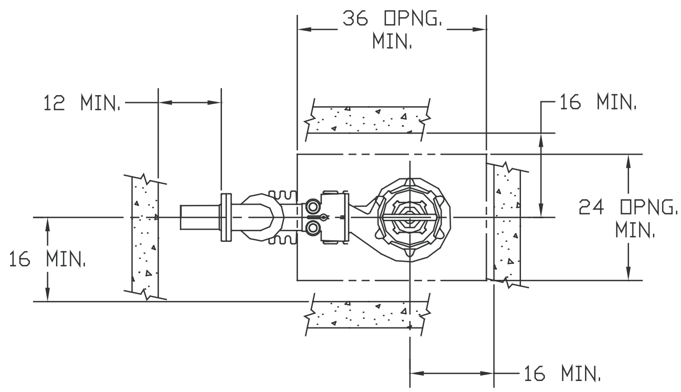
File: K4VL Liftout Dimensions

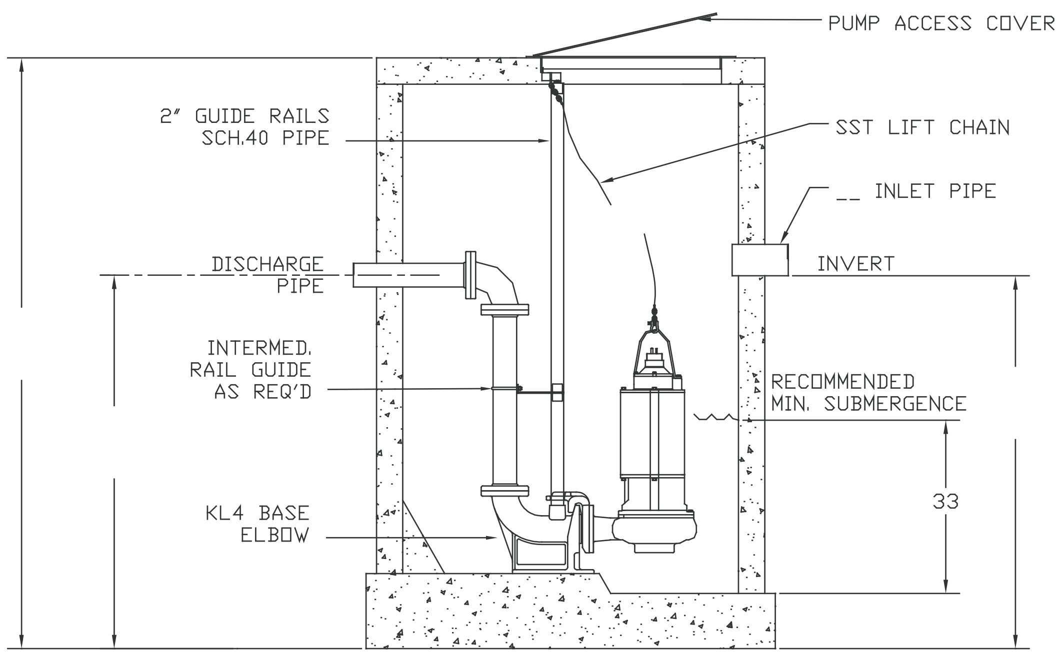
KEEN PUMP CO.™

Section **ENCLOSED**
Date **JANUARY 2013**

Pump Series	K4VL	4″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



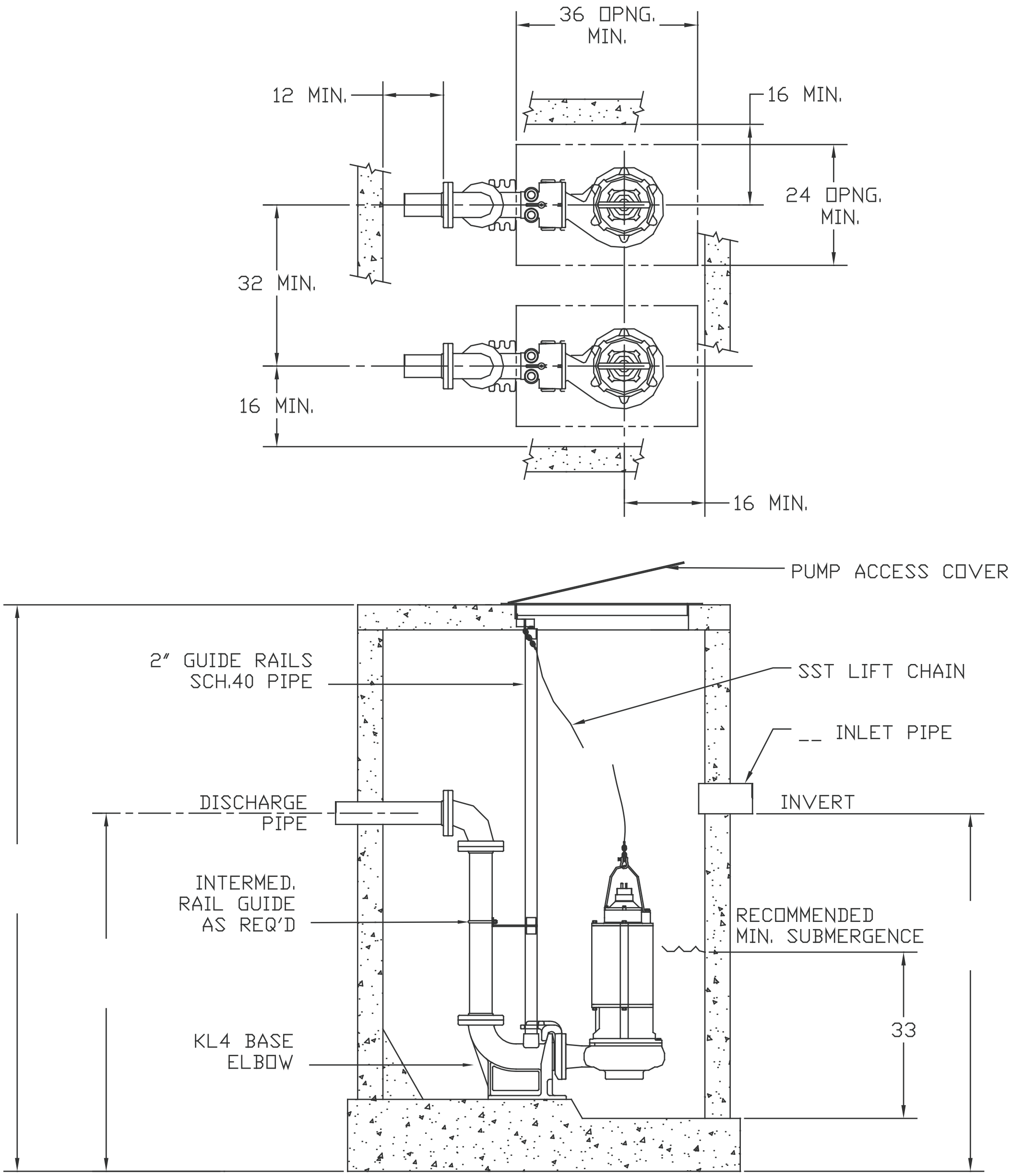


Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4VL Install Dimensions

Pump Series	**K4VL**	4″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

Pump Model: K4VL

Physical Data:

Discharge Size	ANSI 4" Horizontal
Solids Size	3"
Impeller Type	Balanced, Enclosed, 2 Vane
Power/Control Cable Length	30' Standard
Paint	Blue, Water Reducible Enamel, One Coat, Air Dried – Standard

Motor Construction:

Motor Type	Enclosed Submersible Air Filled
NEMA Insulation Code	Class H
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	356ºF (180ºC)
Power Cord Type	SOOW - 600V, 90º C
Control Cord Type	18-5 SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 30
Motor Housing	Cast Iron, ASTM A48, Class 30
Bearing Housing	Cast Iron, ASTM A48, Class 30
Volute	Cast Iron, ASTM A48, Class 30 / Ceramic Coated Inside
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Volute Wear Ring	Bronze, CDA 836
Shaft	ANSI 416 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing

K4VL – Series (7.5 - 25 HP) Non-Clog Submersible Pump Specification

Furnish and install _______ submersible non-clog wastewater pump(s). The KEEN pump(s) shall be equipped with a _______ HP close coupled submersible electric motor, connected for operation on _______ volts, 3 phase, 60 hertz service, with _______ feet of heavy duty submersible electric power cable. Each pump shall be capable of producing _______ GPM at _______ feet TDH. The shut-off head shall be no less than _______ feet.

Design - The KEEN pump(s) shall be capable of handling raw, unscreened sewage and shall be automatically and securely connected to the permanent discharge connection, guided by no less than two guide rails extending from the top of the station to the discharge connection. Sealing of the pumping unit to the discharge base elbow shall be accomplished by machined metal to metal watertight contact. The pump(s) shall be easily removed for inspection and service without the need for personnel to enter the wet-well. The entire pumping unit, including electric cable, shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 60 feet. No portion of the pump shall bear directly on the sump floor.

Construction – Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry enamel paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with o-rings. Fittings will be the result of controlled compression of rubber o-rings in two planes and o-ring contact of four sides without the requirement of a specific torque limit. No secondary sealing compounds, elliptical o-rings, grease or other devices shall be used.

Cooling System – Motors are sufficiently cooled by the air filled motor design. A cooling jacket is not required.

Cable / Entry Seal – The power cable shall be sized in accordance with NEC standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket has a compression grommet compressing the exterior of the cable entry system. The cable wires are individually stranded in epoxy in the cord cap assembly for a second permanent seal.

Motor – The pump motor shall be an induction type, NEMA B design with a squirrel cage rotor, shell type design, housed in an air-filled, watertight chamber. The stator windings and stator leads shall be insulated with moisture resistant Class H insulation rated. The stator shall be dipped and baked in Class H varnish and shall be heat-shrink fitted into the motor housing. The use of bolts, pins, or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be designed for continuous duty handling pumped media of 104°F (40°C) and capable up to 20 evenly spaced starts per hour. The motor horsepower shall be adequate so that the pump is not overloading throughout the entire published pump performance curve from shut-off through run-out. Thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel. The motor and pump shall be designed and assembled by the same manufacturer.

Bearings – The pump shaft shall rotate on two bearings. The upper motor bearing shall be a sealed and lubricated single ball type bearing to handle radial loads. The lower bearing shall be a two row angular contact ball bearing (greased) to compensate for axial thrust and radial forces. Single row lower bearings shall not be considered acceptable. The minimum L-10 bearing life shall be 50,000 hours at any useable portion of the pump curve.

Mechanical Seal – Each pump shall be provided with a mechanical shaft seal system consisting of two assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate. The lower primary seal, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating, silicon-carbide ring. The upper, secondary seal, located between the lubricant chamber and the motor housing, shall contain one stationary and one positively driven rotating, silicon-carbide seal ring. The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counter clockwise direction of rotation without damage or loss of seal. For special applications, other seal face materials shall be available.

Pump Shaft - The pump shaft and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft; couplings shall not be acceptable. The pump shaft shall be 416 stainless steel.

Impeller – The enclosed, 2-vane impeller shall be of ductile iron, Class 35B, dynamically balanced, double shrouded non-clogging design having long through-let without acute turns. The impeller shall be capable of handling solids, fibrous materials, heavy sludge and other material found in wastewater. The impeller shall be keyed to the shaft, retained with an impeller bolt, capable of passing a 3-inch diameter solid. Mass moment of inertia calculations shall be provided by the pump manufacture upon request. Ceramic coating on impeller for anti-abrasion wear.

Volute – The pump volute shall be gray cast iron, ASTM A-48, Class 30, single piece design with smooth passages large enough to pass any solids that may enter the impeller. A replaceable bronze wear ring system shall be utilized to provide efficient sealing between the volute and impeller suction inlet. Ceramic coating inside volute for anti-abrasion wear.

Protection – All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. At 260°F (125°C) the thermal switches shall open to signal the control to stop the motor and activate the alarm. A leakage sensor shall be installed in the lubricant chamber to detect seal leakage prior to entry and contamination of the lower bearing and motor stator housing.

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING PUMP

Series: K6PL-DS
9-30 HP / 1150 RPM
Discharge: 6"
Spherical solids handling: 3"

DISCHARGE
6", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

WEAR RING
Bronze.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 1 vane, closed, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 class stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord 2/4 G, sealed against moisture.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

MOTOR
NEMA B, three phase, 230 & 460 volts, 60 Hz, 1150 RPM, oil filled. Requires overload protection to be included in control panel.

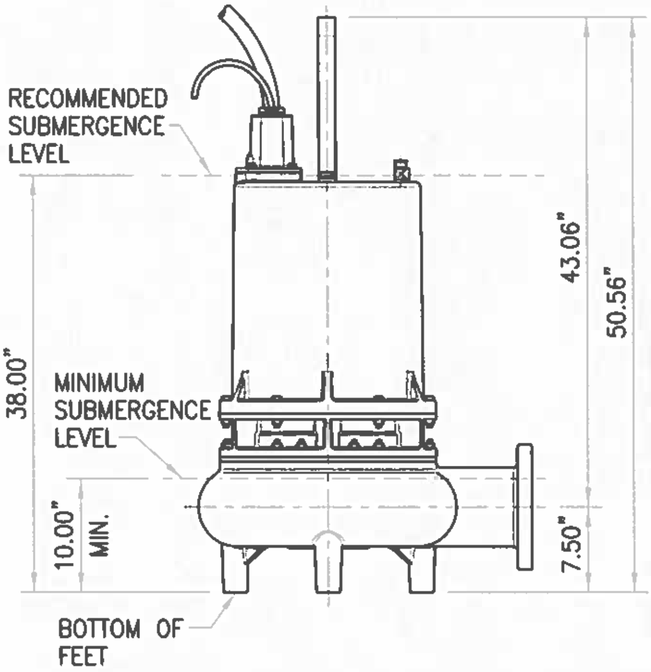
MOISTURE SENSOR
Normally open (N/O) included.

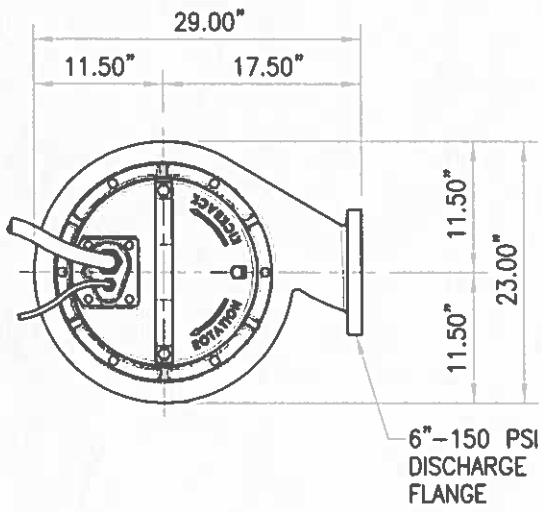
TEMPERATURE SENSOR
Normally closed (N/C) included.

OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-6).

SPECIFICATIONS

SPECIFICATIONS





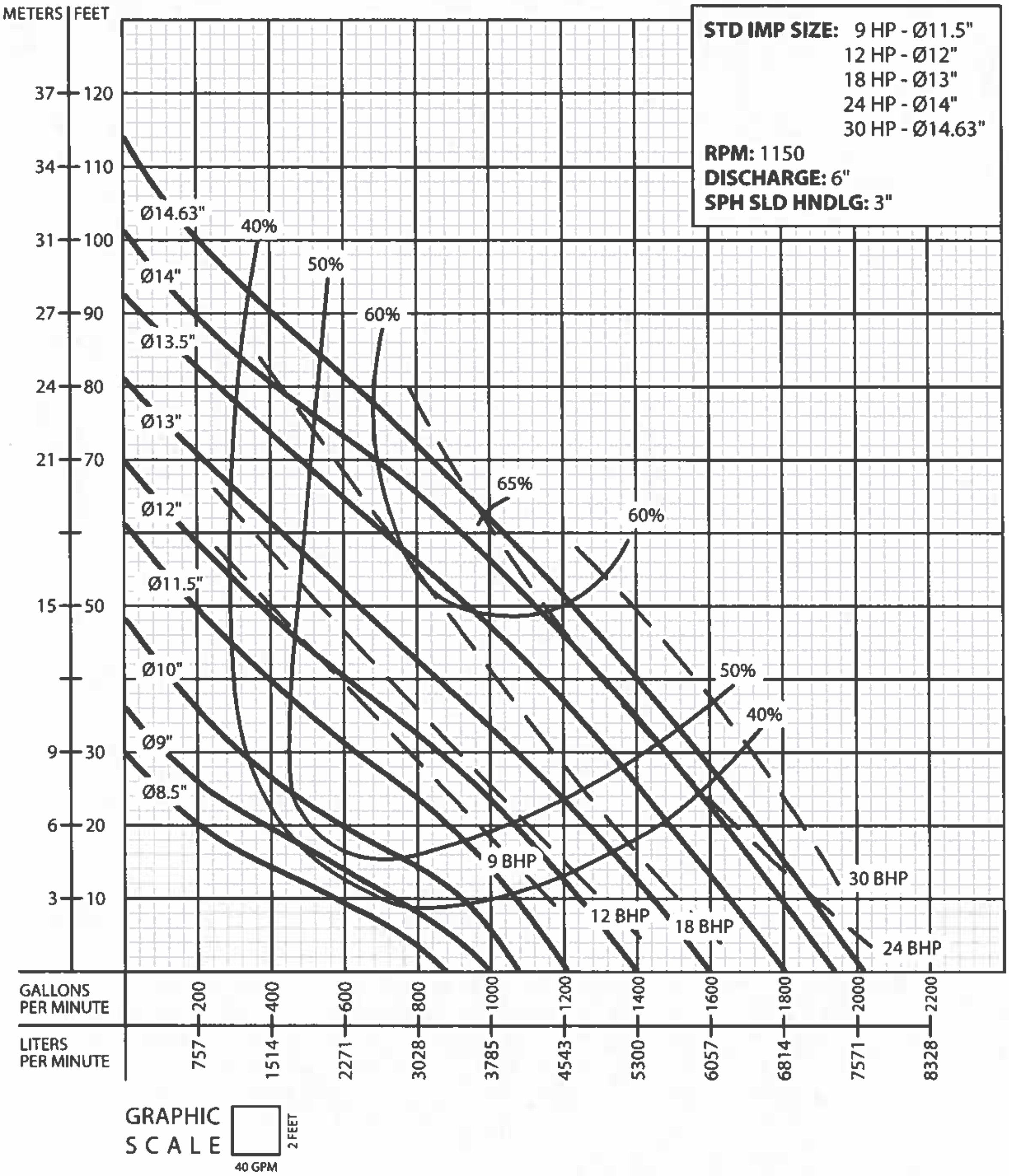
MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K6PL90M6-23DS	62170271	9	230	3	1150	26	162	F	2/3	G	1.34"	897
K6PL90M6-43DS	62170272	9	460	3	1150	13	81	J	2/3	G	1.34"	897
K6PL120M6-23DS	62170273	12	230	3	1150	36	162	D	2/3	G	1.34"	902
K6PL120M6-43DS	62170274	12	460	3	1150	18	81	F	2/3	G	1.34"	902
K6PL180M6-23DS	62170275	18	230	3	1150	50	232	C	2/3	G	1.34"	917
K6PL180M6-43DS	62170276	18	460	3	1150	25	116	F	2/3	G	1.34"	917
K6PL240M6-23DS	62170277	24	230	3	1150	64	290	C	2/3	G	1.34"	961
K6PL240M6-43DS	62170278	24	460	3	1150	32	145	E	2/3	G	1.34'	961
K6PL300M6-23DS	62170279	30	230	3	1150	82	364	C	2/3	G	1.34"	1008
K6PL300M6-43DS	62170280	30	460	3	1150	41	182	E	2/3	G	1.34"	1008

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485", for all models.

IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.

PERFORMANCE CURVE
Submersible Solids Handling Pump Models:
K6PL-DS



Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

Installation, Operation & Maintenance Manual
Submersible Solids Handling Pumps

K6PL-DS / K6HPL-DS series

9, 12, 18, 24 & 30 HP @ 1150 RPM
18, 24, 30, 36, 48 & 60 HP @ 1750 RPM

K6PL-DS
9-30 HP
18-60 HP

K6HPL-DS
30-60 HP

IMPORTANT! - Read all instructions in this manual before operating or servicing a pump.

Before installation, read the following instructions carefully. Failure to follow instruction and safety information could cause serious bodily injury, death and/or property damage. Each Keen product is carefully inspected to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

⚠ DANGER **"Danger" indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠ WARNING **"Warning" indicates an imminenty hazardous situation which, if not avoided, MAY result in death or serious injury.**

⚠ CAUTION **"Caution" indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.**

IMPORTANT! - Keen Pumps is not responsible for losses, injury or death resulting from failure to observe these safety precautions, misuse, abuse or misapplication of pumps or equipment.

ALL RETURNED PRODUCTS MUST BE CLEANED, SANITIZED, OR DECONTAMINATED PRIOR TO SHIPMENT, TO INSURE EMPLOYEES WILL NOT BE EXPOSED TO HEALTH HAZARDS IN HANDLING SAID MATERIAL. ALL APPLICABLE LAWS AND REGULATIONS SHALL APPLY.

⚠ WARNING Installation, wiring, and junction connections must be in accordance with the National Electric Code and all applicable state and local codes. Requirements may vary depending on usage and location.

⚠ WARNING Installation and servicing is to be conducted by qualified personnel only.

Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected; the rotating cutter and/or impeller can cause serious injury.

Always wear eye protection when working on pumps. Do not wear loose clothing that may become entangled in moving parts.

⚠ DANGER Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing the pump or any accessory items associated with or near the pump.

⚠ DANGER This pump is not intended for use in swimming pools or water installations where there is human contact with pumped fluid.

⚠ DANGER Risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling any aspect of the pumping system. ***Lock out power and tag.***

⚠ WARNING **Do not** use these pumps in water over 104° F. **Do not** exceed manufacturers recommended maximum performance, as this could cause the motor to overheat.

⚠ DANGER **Do not** lift, carry or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death. **Never** handle connected power cords with wet hands. Use appropriate lifting device.

⚠ WARNING Ground Fault Circuit Interrupter (GFCI) to be used with plug-in type power cord.

⚠ WARNING Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping. Never enter a basin after it has been used.

⚠ DANGER Failure to permanently ground the pump, motor and controls before connecting to power can cause shock, burns or death.

⚠ DANGER These pumps are not to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.

⚠ WARNING The Uniform Plumbing Code (UPC) states that sewage systems shall have an audio and visual alarm that signals a malfunction of the systems, that are required to reduce the potencial for property damage.

IMPORTANT! - Prior to installation, record Model Number, Serial, Amps, Voltage, Phase and HP from pump name plate for the future reference. Also record the Voltage and Current Readings at Startup:

1 Phase Models	
Amps:	Volts:
3 Phase Models	
Amps L1-2:	Volts L1-2:
Amps L2-3:	Volts L2-3:
Amps L3-1:	Volts L3-1:

Model Number: ____________________

Serial: ____________

PHASE: ______ HP: ______________

DISCHARGE:	6", 125lb, flange horizontal.
SPHERICAL SLD HNDLG:	3"
LIQUID TEMPERATURE:	104° F (40° C) max.
VOLUTE:	Cast iron ASTM A-48 class 30.
WEAR RING:	Bronze. (Only for K6PL-DS series)
MOTOR HOUSING:	Cast iron ASTM A-48 class 30.
SEAL PLATE:	Cast iron ASTM A-48 class 30.
IMPELLER:	1 vane (2 for 48 and 60 HP and 3 for K6HPL-DS series), closed, with vanes on back side. Cast iron ASTM A-48 class 30.
SHAFT:	416 series stainless steel.
SQUARE RINGS:	Buna-N.
PAINT:	Air dry enamel, water based.
SEAL:	Double mechanical, oil filled chamber. Silicon carbide outboard, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.
DIAPHRAGM:	Buna-N.
HARDWARE:	300 series stainless steel.
CORD ENTRY:	25 ft of neoprene cord 2/4 G, sealed against moisture.
UPPER BEARING:	Ball, single row, oil lubricated, for radial load.
LOWER BEARING:	Ball, single row, oil lubricated, for radial and thrust load.
MOTOR:	Three phase, NEMA B, oil filled. Requires overload protection to be included in control panel. Class F insulation.
MOISTURE SENSOR:	Normally open (N/O) included.
TEMPERATURE SENSOR:	Normally closed (N/C) included.
OPTIONAL EQUIPMENT:	Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-6).

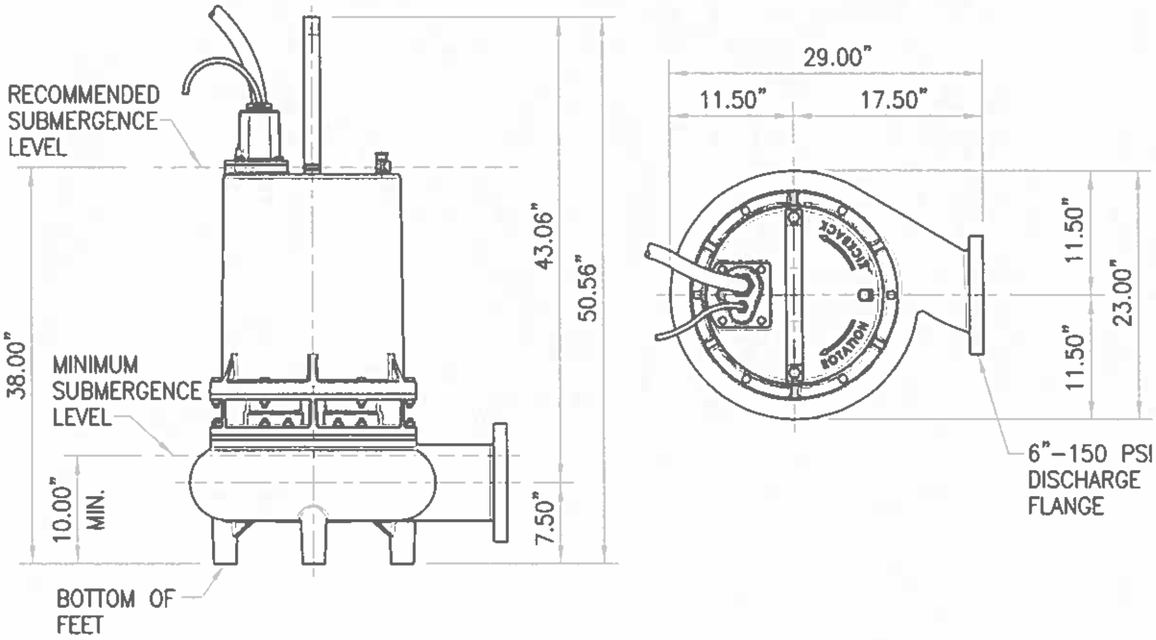
MODEL	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O. D.	WEIGHT (pounds)
K6PL90M6-23DS	9	230	3	1150	26	162	F	2/3	G	1.34"	897
K6PL90M6-43DS	9	460	3	1150	13	81	J	2/3	G	1.34"	897
K6PL120M6-23DS	12	230	3	1150	36	162	D	2/3	G	1.34"	902
K6PL120M6-43DS	12	460	3	1150	18	81	F	2/3	G	1.34"	902
K6PL180M6-23DS	18	230	3	1150	50	232	C	2/3	G	1.34"	917
K6PL180M6-43DS	18	460	3	1150	25	116	F	2/3	G	1.34"	917
K6PL240M6-23DS	24	230	3	1150	64	290	C	2/3	G	1.34"	961
K6PL240M6-43DS	24	460	3	1150	32	145	E	2/3	G	1.34"	961
K6PL300M6-23DS	30	230	3	1150	82	364	C	2/3	G	1.34"	1008
K6PL300M6-43DS	30	460	3	1150	41	182	E	2/3	G	1.34"	1008
K6PL180M4-23DS	18	230	3	1750	50.6	232	F	2/3	G	1.34"	891
K6PL180M4-43DS	18	460	3	1750	25.3	116	F	2/3	G	1.34"	891
K6PL240M4-23DS	24	230	3	1750	62.8	290	E	2/3	G	1.34"	928
K6PL240M4-43DS	24	460	3	1750	31.4	145	E	2/3	G	1.34"	928
K6PL300M4-23DS	30	230	3	1750	75.8	364	E	2/3	G	1.34"	985
K6PL300M4-43DS	30	460	3	1750	37.9	182	E	2/3	G	1.34"	985
K6PL360M4-23DS	36	230	3	1750	90	434	E	2/3	G	1.34"	992
K6PL360M4-43DS	36	460	3	1750	45	217	E	2/3	G	1.34"	992
K6PL480M4-43DS	48	460	3	1750	65	290	E	2/3	G	1.34"	1014
K6PL600M4-43DS	60	460	3	1750	78	363	E	2/3	G	1.34"	1052

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485", for all models.

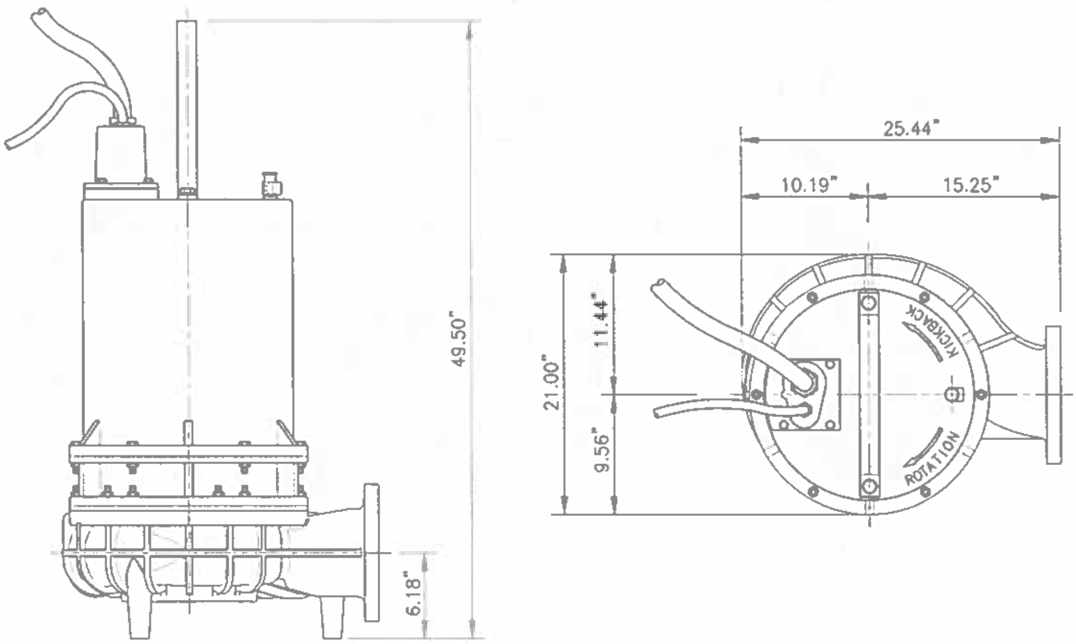
MODEL	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O. D.	WEIGHT (pounds)
K6HPL300M4-23DS	30	230	3	1750	76	364	F	2/3	G	1.34"	957
K6HPL300M4-43DS	30	460	3	1750	38	182	F	2/3	G	1.34"	957
K6HPL360M4-23DS	36	230	3	1750	90	434	E	2/3	G	1.34"	963
K6HPL360M4-43DS	36	460	3	1750	45	217	F	2/3	G	1.34"	963
K6HPL480M4-43DS	48	460	3	1750	65	290	E	2/3	G	1.34"	974
K6HPL600M4-43DS	60	460	3	1750	78	363	E	2/3	G	1.34"	1005

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485", for all models.

▸ K6PL-DS



▸ K6HPL-DS



‣ Receiving inspection
Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. If the manual is removed from the packaging, do not lose or misplace.

‣ Storage
Any product that is stored for a period longer than six (6) months from the date of purchase should be bench tested prior to installation. A bench test consists of, checking the impeller to assure it is free turning and a run test to assure the motor (and switch if provided) operate properly.

‣ Controls
Manual models require a separate approved pump control device or panel for automatic operation. Be sure the electrical specification of the control selected properly match the electrical specifications of the pump.

‣ Submergence
The pump should always be operated in the submerged condition. The minimum sump liquid level should never be less than above the pump's volute (See Figure 1).

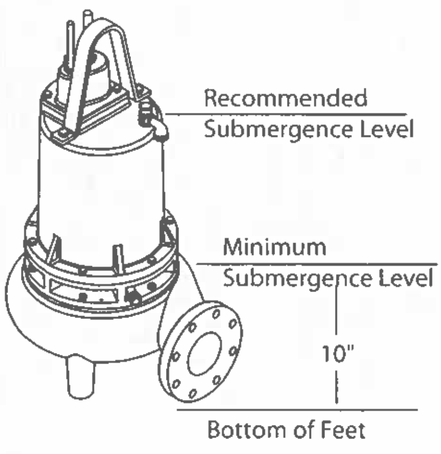


Figure 1

‣ Installation
These pumps are recommended for use in a sump, basin or lift station. The sump, basin or lift station shall be sealed and vented in accordance with local plumbing codes. **This pump is designed to pump sewage, effluent or wastewater, non-explosive and non-corrosive liquids and shall NOT be installed in locations classified as hazardous in accordance with the National Electrical Code (NEC) ANSI/NFPA 70 or Canadian Electric Code (CEC).** The pump should never be installed in a trench, ditch, or hole with a dirt bottom. The legs will sink into the dirt and the suction will become plugged.

The installation should be at a sufficient depth to ensure that all plumbing is below the frost line. If this is not feasible, remove the check valve and size the basin to accommodate the additional backflow volume.

Pumps are most commonly installed in simplex or duplex stations or basins with a slide rail system (Keen SRC), which allows the pump(s) to be installed or removed without requiring personnel to enter the station, or resting on the basin floor.

‣ Discharge Piping
Discharge piping should be as short as possible and sized no smaller than the pump discharge. **Do not reduce the discharge pipe size below that which is provided on the pump.** Both a check valve and a shut-off valve are recommended for each pump. The check valve is used to prevent backflow into the sump. The shut-of valve is used to manually stop system low during pump servicing.

‣ Liquid Level Controls
The level control(s) should be mounted on the discharge piping, a cable rack or float pole. The level control should have adequate clearance so it cannot hang up in it's swing and that the pump is completely submerged when the level control is in the "Off" mode. By adjusting the cord tether the control level can be changed. One cycle of operation should be observed, so that any potential problems can be corrected.

It is recommended that the level control float should be set to insure that the liquid in the sump never drops below the top of the motor housing or a minimum level of 10 inches above the basin floor.

‣ Electrical Connections
Power cable:
The power cable mounted to the pump must not be modified in any way except for shortening to a specific application. Any splice between the pump and the control panel must be made in accordance with the electric codes. It is recommended that a junction box, if used, be mounted outside the sump or be of at a minimum Nema 4 construction if located within the wet well. **DO NOT USE THE POWER CABLE TO LIFT PUMP.**

Always rely upon a Certified Electrician for installation.

Overload Protection:
Single Phase - The stator in-winding overload protector used is referred to as an inherent overheating protector and operates on the combined effect of temperature and current. This means that the overload protector will trip out and shut the pump off if the windings become too hot, or the load current passing through them becomes too high.

IMPORTANT! - The overload will then automatically reset and start the pump up after the motor cools to a safe temperature. In the event of an overload, the source of this condition should be determined and corrected immediately.

⚠ WARNING DO NOT ALLOW THE PUMP TO CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS.

Three Phase - The Normally Closed (N/C) thermal sensor is embedded in the motor windings and will detect excessive heat in the event an overload condition occurs. The thermal sensor will trip when the windings become too hot and will automatically reset when the pump motor cools to a safe temperature. It is recommended that the thermal sensor be connected in series to an alarm device to alert the operator of an overload condition, and/or the motor starter coil to stop the pump. In the event of an overload, the source of this condition should be determined and repaired.

⚠ WARNING DO NOT ALLOW THE PUMP TO CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS.

Moisture Sensors - A normally open (N/O) sensor rated of 1 watt @330K ohms, 500 volt, is installed in the pump seal chamber which will detect any moisture present. It is recommended that this detector be wired in series to an alarm device or motor starter coil to alert the operator that a moisture detect has occurred. In the event of a moisture detect, check the individual moisture sensor probe leads for continuity, (∞ resistance = no moisture) and the junction box/control box for moisture content.

These situations may induce a false signal in the moisture detecting circuit. If none of the above test prove conclusive, the pump(s) should be pulled and the source of the failure repaired. **IF A MOISTURE DETECT HAS OCCURRED MAINTENANCE SHOULD BE PERFORMED AS SOON AS POSSIBLE!**

If current through the temperature sensor exceeds the values listed, an intermediate control circuit relay must be used to reduce the current or the sensor will not work properly.

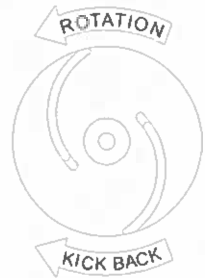
TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
110-120	3.00	30.0
220-240	1.50	15.0
440-480	0.75	7.5
600	0.60	6.0

Wire Size:
If longer power cable is required consult a qualified electrician for proper wire size.

▸ Pre-Operation

1. **Check Voltage and Phase** - Compare the voltage and phase information stamped on the pump name plate.

2. **Check Pump Rotation** - Improper motor rotation can result in poor pump performance and can damage the motor and/or pump. Check rotation on three phase units by momentarily applying power and observe the "kickback".



Bottom of Pump

Kickback should always be in a counter-clockwise direction as viewed from motor end or opposite to impeller rotation. Impeller rotation is counter-clockwise as viewed from bottom of pump.

3. **Name Plate** - Record the information from the pump name plate to drawing in front of manual for future reference.

Insulation Test - An insulation (megger) test should be performed on the motor. Before the pump is put into service. The resistance values (ohms) as well as the voltage (volts) and current (amps) should be recorded.

5. **Pump-Down Test** - Be sure pump has been properly wired, lowered into the basin, sump or lift station, check the system by filling with liquid and allowing the pump to operate through its pumping cycle. The time needed to empty the system, or pump-down time along with the volume of water, should be recorded.

▸ Maintenance

No lubrication or maintenance is required. Perform the following checks when pump is removed from operation or when pump performance deteriorates:

a) Inspect motor chamber for oil level and contamination.
b) Inspect impeller and body for excessive build-up or clogging.
c) Inspect motor, bearings and shaft seal for wear or leakage.

▸ Servicing

NOTE: Item numbers in ( ) refer to Figures 6 & 7.

Cooling Oil - Anytime the pump is removed from operation, the cooling oil in the motor housing should be checked visually for oil level and contamination. To check oil, set unit upright. Remove cap screws (6), lift conduit box assembly (4) from motor housing (3), ***Do Not*** disconnect wiring from motor leads. With a flashlight, visually inspect the oil in the motor housing (3) to make sure it is clean and clear, light amber in color and free from suspended particles. Milky white oil indicates the presence of water. Oil level should be just above the motor when pump is in vertical position.

Seal Chamber - Drain oil from seal chamber by placing pump on its side with pipe plug (18) downward and remove pipe plug (18). If the oil is found to contain considerable water or other contamination, the shaft seal (19) should be inspected and replaced if required.

Oil Testing

- Drain oil into a clean, dry container placing pump on it's side, remove cap screws (6), lift conduit box assembly (4) from motor housing (3). In separate container drain seal chamber by removing pipe plug (18).
- Check oil for contamination using an oil tester with a range to 30 kV breakdown.
- If oil is found to be clean and uncontaminated (measuring above 15 kV breakdown), refill the housing.
- If oil is found to be dirty or contaminated (or measures below 15 kV breakdown), the pump must be carefully inspected for leaks at the shaft seal, conduit box, o-rings, pipe plug and pressure valve, before refilling with oil. To locate the leak, perform a pressure test.

After leak is repaired, dispose of old oil properly, and refill with new oil.

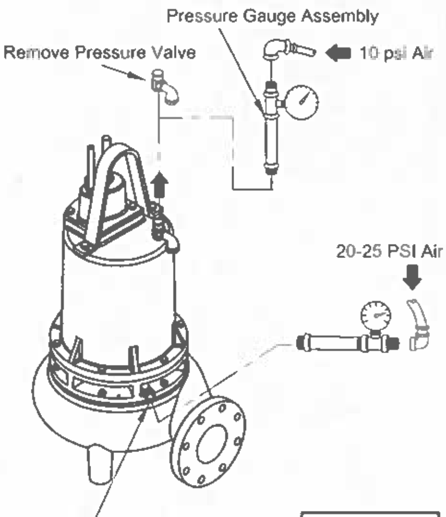


Figure 2

Pressure builds up extremely fast, increase pressure by "TAPPING" air nozzle. Too much pressure will damage seal. ***DO NOT exceed 10 PSI in housing and 20-25 PSI in seal chamber.***

Pressure Test

Motor Housing - Oil should be at normal level. Remove pressure valve (11) from motor housing (3). Apply pipe sealant to pressure gauge assembly and tighten into hole (See Figure 2). Pressurize motor housing to 10 PSI.

Use soap solution around the sealed areas above the oil level and inspect joints for "air bubbles". If, after five minutes, the pressure is still holding constant, and no "bubbles" /oil seepage is observed, slowly bleed the pressure and remove the gauge assembly. Replace oil. Leek must be located and repaired if pressure does not hold.

Seal Chamber - Check that seal chamber is full of oil by removing pipe plug (18). Apply pipe sealant to pressure gauge assembly and tighten into hole in bearing housing (15). Pressurize seal chamber to 20-25 PSI and check for leaks.

Oil Replacement - Set unit upright and refill with new cooling oil as per table. Fill to just above motor as an air space must remain in the top of the housing to compensate for oil expansion. Reassemble the o-ring (5) and conduit box (4) to motor housing (3). Apply thread locking compound to cap screws (6) and place into holes and torque to 15 ft/lbs.

DO NOT *overfill oil. Overfilling of housing with oil can create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard.*
Overfilling oil voids warranty.

Oil Replacement:
Seal Chamber - Refill chamber completely full with new cooling oil or reuse the uncontaminated oil.

Cooling Oil Recommended Supplier/Grade	
BP	Enerpar SE100
Conoco	Pale Parafin 22
Mobile	D.T.E. Oil Light
Shell Canada	Transformer-10
Texaco	Diala-Oil-AX

Disassembly

Impeller and Volute - Disconnect power. Remove hex nuts (16) and vertically lift motor housing and seal plate assembly from volute (37). Clean out volute (37) if necessary. Inspect gasket (36) and replace if cut or damaged. Clean and examine impeller (32), for pitting or wear and replace if required. To remove impeller (32), remove cap screw (35) and washer (34). With a wheel puller, pull impeller straight of shaft and remove square key. To remove wear ring (33), split it and remove, being carefull not to damage volute.

Moisture Probes - Drain oil from seal chamber, if not already done. Remove cap screws (9) and lifting handle (8). Set unit upside down on blocks to avoid damaging cables. Remove socket head cap screws (27) and lift seal plate (26), with seal's (19) stationary, vertically from bearing housing (15), ***do not*** damage seal. Check moisture sensor probes (41) for damage, replace by removing screws (42) and disconnecting wires (40). Then remove probes (41) from bearing housing (15).

Diaphragm - with seal plate (26) removed, examine diaphragm (23) for ruptures or crackes. Replace diaphragm by removing capscrews (25) and plate (24). Clean vent holes in seal plate (26).

Shaft Seal - Remove outboard rotating member of seal (19), spring and inboard rotating member from shaft. Examine all seal parts.

Inspect seal for signs of uneven wear pattern on stationary members, chips and scratches on either seal face. **DO NOT interchange seal components, replace the entire shaft seal (19).** If replacing seal, remove stationary by prying out with flat screwdriver.

Motor and Bearings - Remove volute, impeller, seal plate and seal as previously stated and drain oil from motor housing (3). Position unit upright, using blocks to avoid resting unit on shaft. Remove cap screws (6) o-ring (5) and conduit box assembly (4) from motor housing (3). Note connections and then remove cable lead wires from motor lead wires and moisture and temperature sensor wires from control cable by removing connectors. Remove cap screws (12) and vertically lift the motor housing (3) from bearing housing (15). Replace square ring (14) if damaged or cut. Remove the upper motor bolts and lift upper end bell from motor (1). Remove wave washer. Remove upper bearing (2) with a wheel puller if damaged or worn.

Vertically lift stator (1) from rotor/shaft. Inspect windings for shorts and resistance. Test the temperature sensors by checking for continuity between the black and white wires. If defective contact factory or motor service station. Pull motor rotor/shaft with bearing (13) from bearing housing (15). Remove bearing (13) with a wheel puller if worn or damaged. If rotor or stator windings are defective, replace the complete motor.

IMPORTANT! - All parts must be clean before reassembly.

Reassembly

Bearings - Replace bearings, being careful not to damage the rotor or shaft. If equipped, fill notch should face the rotor core for both upper and lower bearings.

Apply adhesive compound to the shaft and press bearing (13) onto shaft, position squarely onto the shaft applying force to the inner race of bearing only, until bearing seats on shoulder of the shaft. In the same manner, assemble upper bearing (2) to shaft.

Motor - Slide rotor with bearing (13) into bearing housing (15) until bearing seats on the bottom. Position motor housing and stator into pilot, install wave washers in upper end bell.

IMPORTANT! Special wave washers in upper motor housing are required to compensate for shaft expansion. These washers must be properly reinstalled to give the required constant down force on the motor shaft.

Position upper motor end bell aligning holes and thread cap screws into bearing housing (15) and torque to 16 ft/lbs. Place all motor leads above the motor. Position square ring (14) on bearing housing (15) and lower housing (3) over motor and into pilot, aligning handle so that it is parallel to motor end bell reliefs. Apply thread locking compound to threads on cap screws (12) and install with nuts (16) and torque to 24 ft/lbs.

Handle seal parts with extreme care. DO NOT damage lapped surfaces.

Seal/Diaphragm - (See Figure 3) Clean and oil seal cavities in bearing housing (15) and seal plate (26). Lightly oil **(Do not use grease)** outer surface of inboard and outboard stationary members of seal (19). Press inboard stationary member firmly into bearing housing (15) and outboard stationary into seal plate (24), using a seal pusher tool. Nothing but the seal pusher tool is to come in contact with seal face.

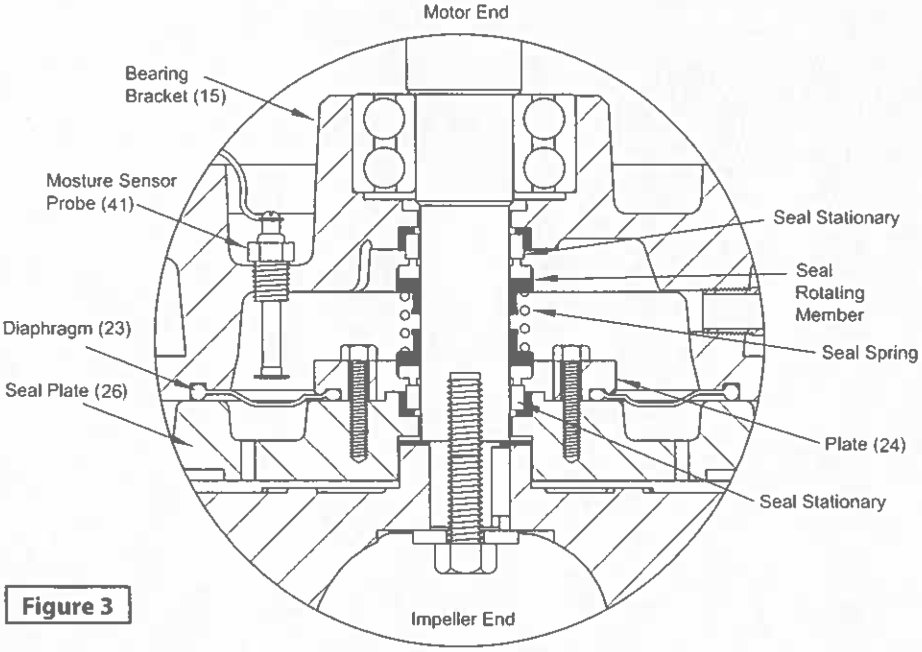


Figure 3

⚠ *IMPORTANT! - Hammering on the seal pusher tool will damage the seal face.*

Be sure the stationary members are in straight and that the rubber ring is not out of it's groove. Lightly oil **(Do not use grease)** shaft and inner surface of bellows on rotating member. With lapped surface facing bearing housing (15), slide rotating member onto shaft using seal pusher tool, until lapped faces are together. It is extremely important to keep seal faces clean during assembly. Dirt particales lodged between faces will cause the seal to leak.

Be sure driving lugs in retainer are matched in rotating member of seal (19). Place spring over shaft and in place on rotating member, making sure it is seated in retainer and not cocked or resting on bellows tail. Lightly oil shaft and inner surface of outboard rotating member.

With tail section toward bearing housing (15), slide rotating member onto shaft with seal pusher tool until retainer engages spring and spring is compressed slightly.

Spring should be properly engaged in both retainers.

Reassemble the diaphragm (23) with "bulg" facing seal plate (24). Place plate (24) on diaphragm (23) and insert capscrews (25) into plate and tighten.

Place seal plate (24) over shaft onto bearing housing (15), being careful not to damage outboard stationary member and align holes for cap screws (25).

Thread cap screws (25) into bearing housing (15) and tighten. Refill chamber with oil.

Conduit Box Assembly - Check power (38) and control cables (39) for crackes or damage and replace complete conduit box (4) if required. (See Figure 4) Bring motor wires through opening in top of motor housing (3), check sleeving and replace if damaged. Position square ring (5) in conduit box (4) and reconnect leads using connectors and insulators. See Figures 5, for wiring schematics.

Refill with cooling oil. Position conduit box (4) with square ring (5) on motor housing. Apply thread locking compound to cap screws (6) threads and torque to 16 ft/lbs.

Remove gland nuts (38B) and (39B), friction rings (38C) and (39C), and grommets (38D) and (39D) from conduit box (4), inspect and replace if damaged (See Figure 4). Reassemble by inserting one friction ring, grommet, one more friction ring and gland nut into conduit box. Torque gland nuts to 15 ft/lbs to prevent leakage.

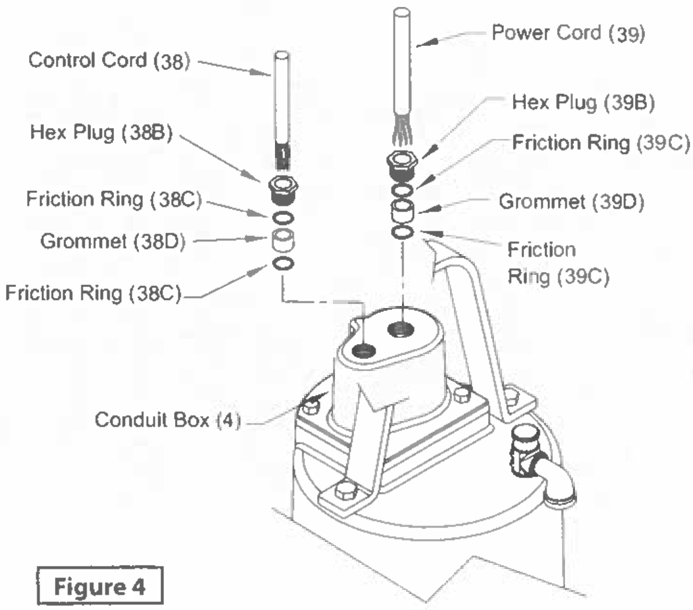


Figure 4

Wear Ring - Apply retaining compound to the bore of volute (37) and press wear ring (33) into bore until seated.

Impeller and Volute - Install impeller (32) by appling a thin film of oil to motor shaft and slide impeller straight onto shaft, keeping keyways lined up. Drive key into keyway. Locate washer (34) and lockwasher (10), apply thread lock primer (such as Loctite® Primer T), let set per manufacturer's directions. Apply thread locking compound to threads on cap screw (35), and thread into shaft and torque to 35 ft/lbs.

Place gasket (36) on volute and install impeller and motor assembly over studs and onto volute (37). Apply thread locking compound to threads of studs (31) and thread nuts (16) onto studs and torque to 24 ft/lbs. Check for binding by rotating impeller. Clearance between the impeller and volute should be approximately 0.012 inch.

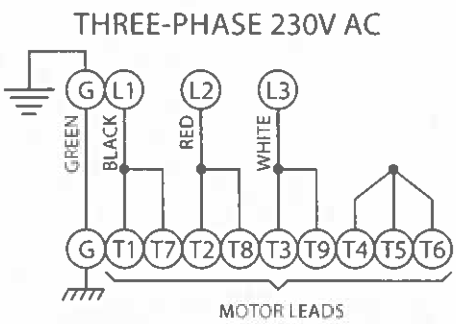


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1 and 7
Red	2 and 8
White	3 and 9
	4, 5 and 6 together

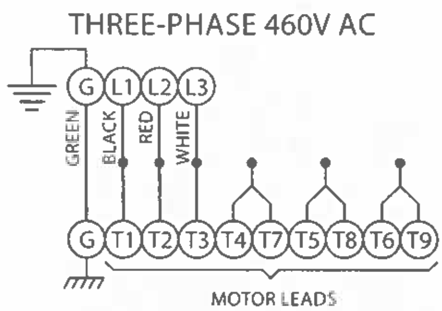


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1
Red	2
White	3
	4 and 7 together
	5 and 8 together
	6 and 9 together

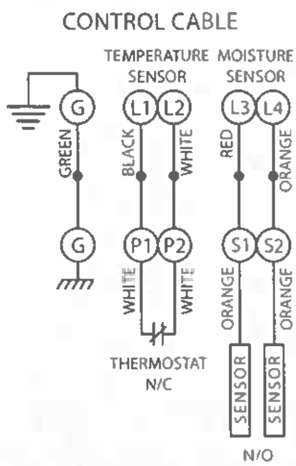
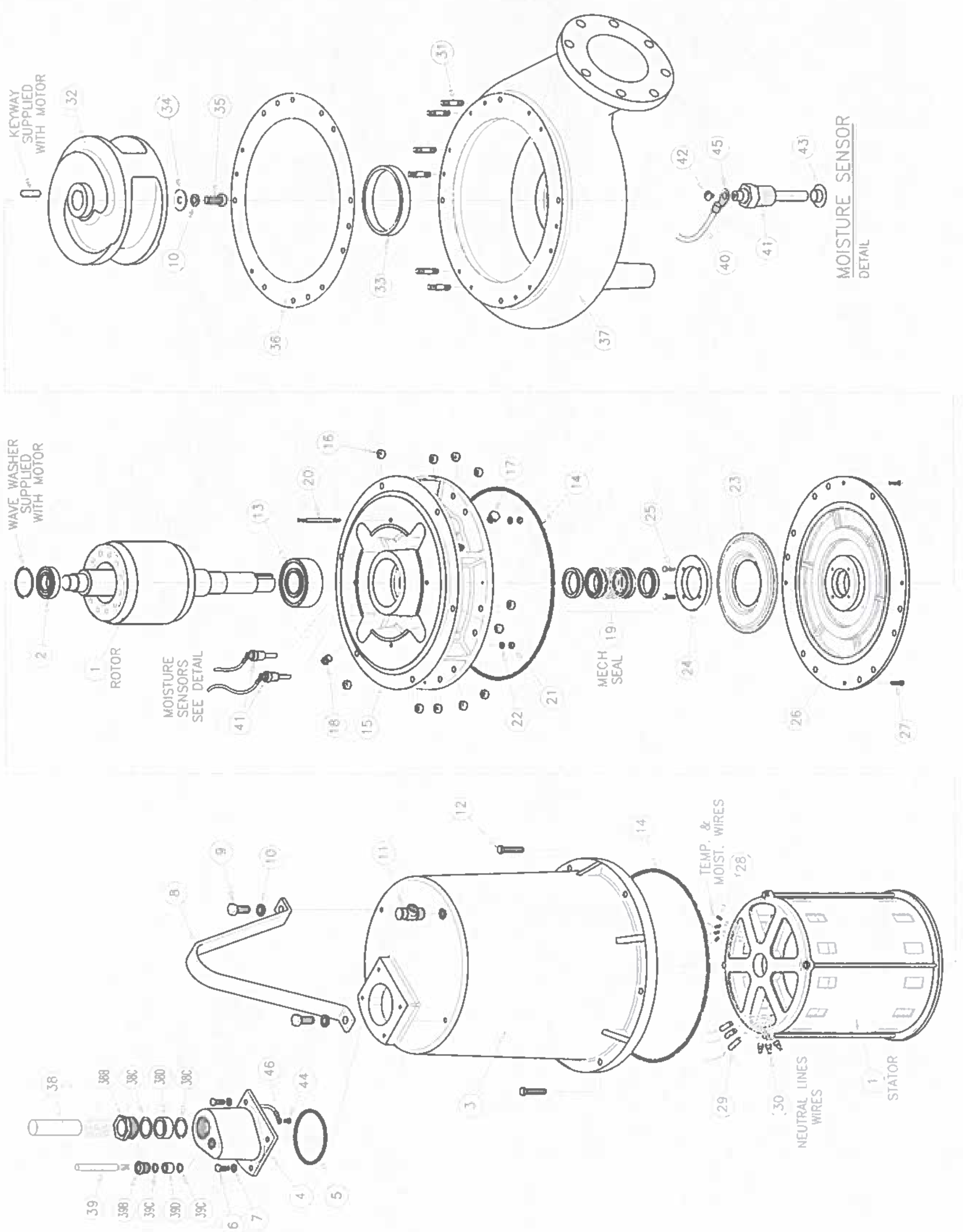


Figure 5	
Control Cable	Lead Number
Black	L1 (Temperature)
White	L2 (Temperature)
Red	L3 (Moisture)
Orange	L4 (Moisture)
Green	Ground

▸ K6PL-DS

Figure 6



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

▸ K6PL-DS

Item	Part Number	Description	Qty.	Material
		Motor		
	40040031	18 HP, 1750 RPM, three phase, 230/460 V		
	40040032	24 HP, 1750 RPM, three phase, 230/460 V		
	40040033	30 HP, 1750 RPM, three phase, 230/460 V		
	40040034	36 HP, 1750 RPM, three phase, 230/460 V		Brand
1	40040035	48 HP, 1750 RPM, three phase, 460 V	1	US
	40040036	60 HP, 1750 RPM, three phase, 460 V		
	40040041	12 HP, 1150 RPM, three phase, 230/460 V		
	40040042	18 HP, 1150 RPM, three phase, 230/460 V		
	40040043	24 HP, 1150 RPM, three phase, 230/460 V		
	40040044	30 HP, 1150 RPM, three phase, 230/460 V		
2	31020018	Bearing (Upper)	1	Steel
3	03100006	Motor Housing	1	Cast Iron
4	03100007	Conduit Box & Cable Assembly	1	Cast Iron
5	92010085	Square Ring # 1937	1	Buna
6	91010345	Cap Screw 3/8"-16UNC x 1.00" SS	4	SS 304
7	91010061	Lockwasher 3/8" SS	4	SS 304
8	30400845	Lifting Bail	1	Steel
9	91010354	Screw 5/8"-11 UNC x 1½" SS	2	SS 304
10	91010063	Lockwasher 5/8" SS	3	SS 304
11	31200021	Press Relief Valve	1	Brass
12	91010348	Screw 7/16-14 UNC x 21/4" SS	6	SS 304
13	31020019	Bearing (Lower)	1	Steel
14	92010051	O-Ring # 52082	2	Buna
		Bearing Housing		
	03040013	for 18 to 36 HP at 1750 RPM		
15		for 9 to 18 HP at 1150 RPM	1	Cast Iron
	03040013B	for 48 & 60 HP at 1750 RPM		
		for 24 to 30 HP at 1150 RPM		
16	91010434	Hex Nut 7/16"-14 UNC SS	18	SS 304
17	93010131	Hex Head Plug 3/8" SS # 22932	1	SS 304
18	93010149	Plug 3/8"	1	Cast Iron
19	31030146	Mechanical Seal, 2130SBH4GS (Motor end) carbon / ceramic / buna (Pump end) silicon / silicon / buna	1	Inpacom
20	91010376	Stud 3/8"-16 UNC x 4½ # 84	4	
21	91010433	Hex Nut 3/8" 16 UNC SS	4	SS 304
22	91010061	Lockwasher 3/8" SS	4	SS 304
23	31040002	Diaphragm # 52093	1	Buna
24	03160006	Diaphragm plate	1	Cast Iron
25	91010342	Screw ¼"-20UNC x 1.00" SS	4	SS 304
26	03180016	Seal Plate	1	Cast Iron
27	91010392	Screw Head Socket ¼"-20 UNC x 1.0" SS	4	SS 304
28	94010021	Connector # 52990 10/12	4	
29	94010022	Connector # 56730	3	
30	94010023	Wire Connector	3	Plastic
31	91010377	Stud 7/16" 14 UNC x 2¼"	12	

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

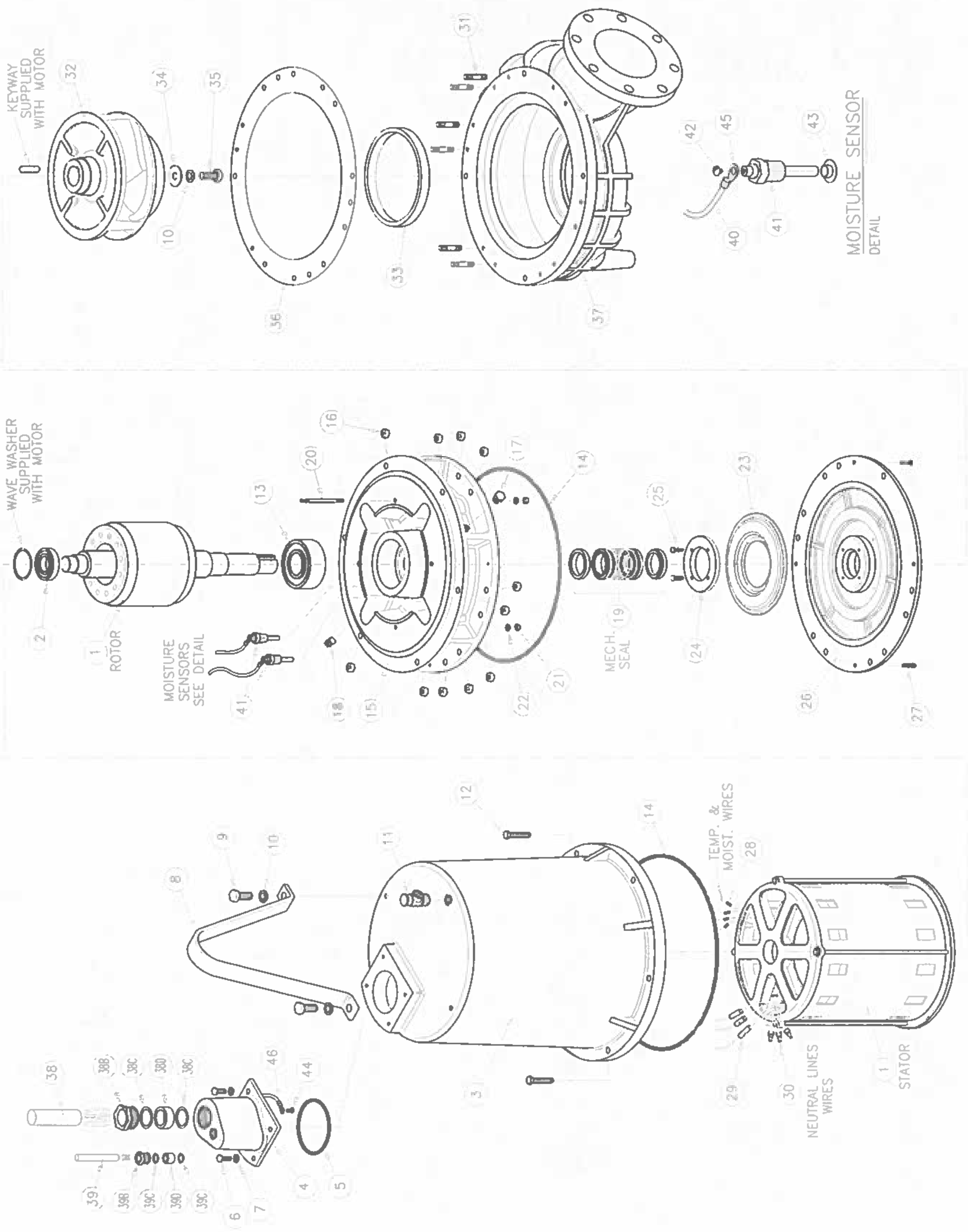
▸ K6PL-DS

Item	Part Number	Description	Qty.	Material
32		Impeller	1	Cast Iron
	03140053	18 HP, 1750 RPM, 9.50"Ø		
	03140053B	24 HP, 1750 RPM, 10.50"Ø		
	03140053C	30 HP, 1750 RPM, 11.00"Ø		
	03140053D	36 HP, 1750 RPM, 11.50"Ø		
	03140054	48 HP, 1750 RPM, 10.00"Ø		
	03140054B	60 HP, 1750 RPM, 11.00"Ø		
	03140053D	9 HP, 1150 RPM, 11.50"Ø		
	03140081	12 HP, 1150 RPM, 12.00"Ø		
	03140081B	18 HP, 1150 RPM, 13.00"Ø		
	03140081C	24 HP, 1150 RPM, 14.00"Ø		
	03140081D	30 HP, 1150 RPM, 14.62"Ø		
33	30400314	Wear Ring	1	Bronze
34	30400423	Impeller Washer	1	SS 304
35	91010354	Screw Hex Head 5/8" 11UNC x 1½" SS	1	SS 304
36	92010192	Volute Gasket # 51936	1	Rubber
37	03090053	Volute	1	Cast Iron
38	31030006	Power Cable 3x2 # 37917	25 ft	
38B	30400904	Hex Head Plug	1	SS 303
38C	30400401	Washer	2	SS 304
38D	92010002	Grommet	1	Rubber
39	31030005	Cord Set, Moist & temp, 5x18 #34840	25 ft	
39B	30400901	Hex Head Plug	1	SS 303
39C	91010057	Washer	2	Steel 1018
39D	92010005	Grommet	1	Rubber
40	94010003C	Wire assy., moisture sensor	2	
41	31160001	Moisture Sensor # 39383	2	
42	91010403	Machine screw Moist, 6-32 x ¼" SS	2	SS 304
43	93010101	Cap Plug	2	Plastic
44	91010410	Ground Screw ¼" x ½"	1	Steel
45	94010043	Round terminal 3/16"	2	
46	94010044	Round terminal 5/16"	1	
47	31010031	Motor Oil (Housing & seal Cavity)	11.1 gal.	

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

▸ K6HPL-DS

Figure 7



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

K6HPL-DS

<table>
<tr><th>Item</th><th>Part Number</th><th>Description</th><th>Qty.</th><th>Material</th></tr>
<tr><td rowspan="5">1</td><td></td><td>Motor</td><td rowspan="5">1</td><td rowspan="5">Brand US</td></tr>
<tr><td>40040033</td><td>30 HP, 1750 RPM, three phase, 230/460 V</td></tr>
<tr><td>40040034</td><td>36 HP, 1750 RPM, three phase, 230/460 V</td></tr>
<tr><td>40040035</td><td>48 HP, 1750 RPM, three phase, 460 V</td></tr>
<tr><td>40040036</td><td>60 HP, 1750 RPM, three phase, 460 V</td></tr>
<tr><td>2</td><td>31020018</td><td>Bearing (Upper)</td><td>1</td><td>Steel</td></tr>
<tr><td>3</td><td>03100006</td><td>Motor Housing</td><td>1</td><td>Cast Iron</td></tr>
<tr><td>4</td><td>03100007</td><td>Conduit Box & Cable Assembly</td><td>1</td><td>Cast Iron</td></tr>
<tr><td>5</td><td>92010085</td><td>Square Ring # 1937</td><td>1</td><td>Buna</td></tr>
<tr><td>6</td><td>91010345</td><td>Cap Screw 3/8"-16UNC x 1.00" SS</td><td>4</td><td>SS 304</td></tr>
<tr><td>7</td><td>91010061</td><td>Lockwasher 3/8" SS</td><td>4</td><td>SS 304</td></tr>
<tr><td>8</td><td>30400845</td><td>Lifting Bail</td><td>1</td><td>Steel</td></tr>
<tr><td>9</td><td>91010354</td><td>Screw 5/8"-11 UNC x 1½" SS</td><td>2</td><td>SS 304</td></tr>
<tr><td>10</td><td>91010063</td><td>Lockwasher 5/8" SS</td><td>3</td><td>SS 304</td></tr>
<tr><td>11</td><td>31200021</td><td>Press Relief Valve</td><td>1</td><td>Brass</td></tr>
<tr><td>12</td><td>91010348</td><td>Screw 7/16-14 UNC x 2¼" SS</td><td>6</td><td>SS 304</td></tr>
<tr><td>13</td><td>31020019</td><td>Bearing (Lower)</td><td>1</td><td>Steel</td></tr>
<tr><td>14</td><td>92010051</td><td>O-Ring # 52082</td><td>2</td><td>Buna</td></tr>
<tr><td rowspan="3">15</td><td></td><td>Bearing Housing</td><td rowspan="3">1</td><td rowspan="3">Cast Iron</td></tr>
<tr><td>03040013</td><td>for 30 & 36 HP</td></tr>
<tr><td>03040013B</td><td>for 48 & 60 HP</td></tr>
<tr><td>16</td><td>91010434</td><td>Hex Nut 7/16"-14 /UNC SS</td><td>18</td><td>SS 304</td></tr>
<tr><td>17</td><td>93010131</td><td>Hex Head Plug 3/8" SS # 22932</td><td>1</td><td>SS 304</td></tr>
<tr><td>18</td><td>93010149</td><td>Plug 3/8"</td><td>1</td><td>Cast Iron</td></tr>
<tr><td>19</td><td>31030146</td><td>Mechanical Seal, 2130SBH4GS
(Motor end) carbon / ceramic / buna
(Pump end) silicon / silicon / buna</td><td>1</td><td>Inpacom</td></tr>
<tr><td>20</td><td>91010376</td><td>Stud 3/8"-16 UNC x 4½ # 84</td><td>4</td><td></td></tr>
<tr><td>21</td><td>91010433</td><td>Hex Nut 3/8" 16 UNC SS</td><td>4</td><td>SS 304</td></tr>
<tr><td>22</td><td>91010061</td><td>Lockwasher 3/8" SS</td><td>4</td><td>SS 304</td></tr>
<tr><td>23</td><td>31040002</td><td>Diaphragm # 52093</td><td>1</td><td>Buna</td></tr>
<tr><td>24</td><td>03160006</td><td>Diaphragm plate</td><td>1</td><td>Cast Iron</td></tr>
<tr><td>25</td><td>91010342</td><td>Screw ¼"-20UNC x 1.00" SS</td><td>4</td><td>SS 304</td></tr>
<tr><td>26</td><td>03180016</td><td>Seal Plate</td><td>1</td><td>Cast Iron</td></tr>
<tr><td>27</td><td>91010392</td><td>Screw Head Socket ¼"-20 UNC x 1.0" SS</td><td>4</td><td>SS 304</td></tr>
<tr><td>28</td><td>94010021</td><td>Connector # 52990 10/12</td><td>4</td><td></td></tr>
<tr><td>29</td><td>94010022</td><td>Connector # 56730</td><td>3</td><td></td></tr>
<tr><td>30</td><td>94010023</td><td>Wire Connector</td><td>3</td><td>Plastic</td></tr>
<tr><td>31</td><td>91010377</td><td>Stud 7/16" 14 UNC x 2¼"</td><td>12</td><td></td></tr>
<tr><td rowspan="5">32</td><td></td><td>Impeller</td><td rowspan="5">1</td><td rowspan="5">Cast Iron</td></tr>
<tr><td>03140111</td><td>30 HP, 1750 RPM, 9.25"Ø</td></tr>
<tr><td>03140111B</td><td>36 HP, 1750 RPM, 9.50"Ø</td></tr>
<tr><td>03140111C</td><td>48 HP, 1750 RPM, 10.50"Ø</td></tr>
<tr><td>03140111D</td><td>60 HP, 1750 RPM, 11.25"Ø</td></tr>
</table>

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

▸ K6HPL-DS

Item	Part Number	Description	Qty.	Material
33	30400315	Wear Ring	1	Bronze
34	30400411	Impeller Washer	1	SS 304
35	91010354	Screw Hex Head 5/8" 11UNC x 1½" SS	1	SS 304
36	92010192	Volute Gasket # 51936	1	Rubber
37	03090063	Volute	1	Cast Iron
38	31030006	Power Cable 3x2 # 37917	25 ft	
38B	30400904	Hex Head Plug	1	SS 303
38C	30400401	Washer	2	SS 304
38D	92010002	Grommet	1	Rubber
39	31030005	Cord Set, Moist & temp, 5x18 # 34840	25 ft	
39B	30400901	Hex Head Plug	1	SS 303
39C	91010057	Washer	2	Steel 1018
39D	92010005	Grommet	1	Rubber
40	94010003C	Wire assy., moisture sensor	2	
41	31160001	Moisture Sensor # 39383	2	
42	91010403	Machine screw Moist, 6-32 x ¼" SS	2	SS 304
43	93010101	Cap Plug	2	Plastic
44	91010410	Ground Screw ¼" x ½"	1	Steel
45	94010043	Round terminal 3/16"	2	
46	94010044	Round terminal 5/16"	1	
47	31010031	Motor Oil (Housing & seal Cavity)	11.1 gal.	

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

⚠ Risk of electric shock. Always disconnect the pump from the power source before handling inspections or repairs.

<table>
<tr><th>Symptom</th><th>Possible Cause(s)</th><th>Corrective Action</th></tr>
<tr><td>Pump will not run</td><td>1. Poor electrical connection, blown fuse, tripped breaker or other interruption of power; improper power supply
2. Motor or switch inoperative (go to manual operation)
2a. Float movement restricted
2b. Switch will not activate pump or is defective
2c. Defective motor
3. Insufficient liquid level</td><td rowspan="7">1. Check all electrical connections for security. Have electrician measure current in motor leads, if current is within ± 20% of locked rotor Amps, impeller is probably locked. If current is 0, overload may be tripped. Remove power, allow pump to cool, then re-check current.
2a. Reposition pump or clean basin as required to provide adaquate clearance for float
2b. Disconnect level control. Set ohmmeter for a low rang, such as 100 ohms full scale and connect to level control leads. Actuate level control manually and check to see that ohmmeter shows zero ohms for closed switch and full scale for open switch. (Float Switch)
2c. Check winding insulation (Megger Test) and winding resistance. If check is outside of range, dry and re-check. If still defective, replace per service instructions.
3. Make sure liquid level is above the pump
4. Re-check all sizing calculations to determine proper pump size.
5. Check discharge line for restrictions, including ice if line passes through or into cold areas.
6. Remove and examine check valve for proper installation and freedom of operation
7. Open valve
8. Check impeller for freedom of operation, security and condition. Clean impeller cavity and inlet of any obstruction
Loosen union slightly to allow trapped air to escape. Verify that turn-off level of switch is set so that the suction is always flooded. Clean vent hole
10. Check rotation. If power supply is three phase, reverse any two of three power supply leads to ensure proper impeller rotation
11. Repair fixtures as required to eliminate leakage
12. Check pump temperature limits and fluid temperature
13. Replace portion of discharge pipe with flexible connector or tighten existing piping.
14. Turn to automatic position
15. Check for leaks around basin inlet and outlets</td></tr>
<tr><td>Pump will not turn off</td><td>2a. Float movement restricted
2b. Switch will not activate pump or is defective
4. Excessive inflow or pump not properly sized for application
9. Pump may be air locked causing pump not to flow
14. H-O-A switch on panel is in "HAND" position</td></tr>
<tr><td>Pump hums but doesn't run</td><td>1. Incorrect low voltage
8. Impeller jammed or loose on shaft, or inlet plugged</td></tr>
<tr><td>Pump delivers insufficient capacity</td><td>1. Incorrect low voltage
4. Excessive inflow or pump not properly sized for application
5. Discharge restricted
6. Check valve partially closed or installed backwards
7. Shut-off valve closed
8. Impeller jammed or loose on shaft, or inlet plugged
9. Pump may be air locked causing pump not to flow
10. Piping fixtures leaking or discharge before the nozzle</td></tr>
<tr><td>when fixtures are not in use</td><td>6. Check valve partially closed or installed backwards
11. Fixtures are leaking
15. Ground water entering basin</td></tr>
<tr><td>Pump shuts off and turns on independent of switch, (trips thermal overload protector). CAUTION! Pump may start unexpectedly. Disconnect power supply.</td><td>1. Incorrect low voltage
4. Excessive inflow or pump not properly sized for application
8. Impeller jammed or loose on shaft, or inlet plugged
12. Excessive water temperature (internal protection only)</td></tr>
<tr><td>Pump operates noisily or vibrates excessively</td><td>2c. Worn bearings, motor shaft bent
5. Debris in impeller cavity or broken impeller
10. Pump running backwards
13. Piping attachments to building structure too loose or rigid</td></tr>
</table>

NOTE: Keen Pumps assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Keen Pumps or its authorized service centers, automatically voids warranty.

KEEN PUMPS
FACTORY WARRANTY

Keen Pumps warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for 18 months from date of manufacture or 12 months from installation date whichever occurs first. This warranty gives you specific legal rights, which vary from state to state.

This warranty is a limited warranty, and no warranty related claims of any nature whatsoever shall be made against Keen Pumps, until the ultimate consumer or his/her successor notifies us in writing of the defect and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station as instructed by Keen Pumps. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE. PRODUCT SHALL BE EITHER REPLACED OR REPAIRED AT THE ELECTION OF KEEN PUMPS. Guarantees relating to performance specifications provided in addition to the foregoing material and workmanship warranties on a product manufactured by Keen Pumps, if any, are subject to possible factory testing. Any additional guarantees, in the nature of certified performance specifications or time frame must be in writing and such writing must be signed by our authorized factory manager at time of order placement and/or at time of quotation. Due to inaccuracies in field testing and should a conflict arises between the results of field testing conducted by or for the user, Keen Pumps reserves the right to have the product returned to our factory for additional testing.

This warranty shall not apply when damage is caused by (1) improper installation, (2) improper voltage, (3) lightning, (4) excessive sand or other abrasive material, (5) corrosion build-up due to excessive chemical content or (6) uncontrollable acts of god. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective pumps, parts or systems. Keen Pumps will not accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY. No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.

IMPORTANT!
If you have a claim under the provision of the warranty, contact Keen Pumps or your authorized Keen Pumps Distributor
www.keenpump.com

KEEN PUMP®

KEEN PUMP®

SPECIFICATIONS
Submersible Solids Handling Pump
Series: 6KPL-D S

General:
Furnish and install a quantity of _____ Keen® Pumps submersible sewage pump(s), Model K6PL____DS, ____HP, ____ RPM, ____ phase, 60 Hz, ____ volts, with a 6 inch horizontal discharge 125 ANSI discharge flange connection. Each pump shall be capable of delivering the following performance, ____ US GPM at ____ ft total dynamic head, with a shut off head of ____ ft TDH minimum, and ____ % efficiency at ____ US GPM at ____ ft TDH operating point.

Pump Design:
The centrifugal sewage pump(s) shall be capable of handling 3 inch diameter spherical solids of raw, unscreened domestic sewage consisting of water, fibrous materials. The pump(s) shall be capable of handling liquids with temperatures to 104 °F continuous, and shall be capable of running dry for extended periods.

Pump Construction:
Castings: The volute, seal plates, impeller and motor housing shall be constructed of ASTM A-48 class 30 cast iron.

Coating/Hardware: Exterior surfaces shall be painted with a water based air dry enamel. All exposed hardware shall be 300 series stainless steel.

Gaskets: All gaskets shall be of the compression square ring type eliminating critical slip fits and the possibility of damage during service associated with sliding o-ring sealing arrangements.

Impeller: The impeller shall be of ___ vane, solid handling design with pump out vanes on the back side. Single and multi-vane impellers shall be capable of being trimmed to meet specific performance characteristics. The impeller shall be dynamically balanced to ISO G6.3 specifications.

Double mechanical seal: Shall be of the single spring design operating in an oil-filled seal cavity. The inner seal shall be constructed of carbon for the rotating face and ceramic for the stationary face, 300 series stainless steel hardware, and all elastomer parts to be of Buna-N. The outer seal shall be of silicon carbide faces, 300 series stainless steel hardware, and all elastomer parts to be of Buna-N. The seal shall be commercially available and not a manufacturers proprietary design.

Seal leak sensor: A seal leak detection system consisting of two normally open (N/O) probes shall be installed in the pump seal chamber. These probes will detect any moisture present and shall be connected in series to an alarm device or motor starter coil which will alert the operator that moisture has been detected in the seal cavity.

Motor: Design shall be of the capacitor start and capacitor run and overload protection for single phase units. Capacitors shall be located in an external control box. The pump shall be designed to be non-overloading throughout the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability.

The motor windings shall be of Class F insulation and operate in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of time without damage due to the heat being generated. The used dielectric oil must be disposed of as non-hazardous waste. The motor shall meet the standard NEMA L for single phase and NEMA B for three phase.

Thermal Protection: Thermal sensors shall be used to monitor stator temperatures. The stator shall be equipped with a thermal switch embedded in the end coil of the stator winding. This shall be used in conjunction with and supplemental to external motor overload protection and wired to the control panel.

Shaft: The pump shaft shall be of a one-piece design and shall be of 416 stainless steel.

Bearings: The lower bearing shall be of the double row ball type to accept radial and thrust loads, and the upper bearing of the single ball type for radial loads. Bearings shall operate in an oil bath atmosphere for superior life.

Power/Control Cords: Shall be equipped with ____ ft of type SOW power and control cords. The cords shall enter a cast iron terminal box assembly that is bolted to the motor housing and sealed with a Buna-N o-ring. The incoming lead wires shall be spliced in the terminal box. After splicing, the terminal box shall be filled with epoxy to seal the outer cable jacket and the individual strands to prevent water from entering the motor housing. Additional sealing and strain relief shall utilize a secondary pressure grommet at point of cable entry.

Tests and inspections: Shall be performed by the pump manufacture.
1. A ground continuity check and motor chamber shall be Hi-potted to test for electrical integrity.
2. Check that motor voltage and frequency matches name plate.
3. The pump shall be pressurized and a air leak test is performed to ensure the integrity of the motor housing.
4. The pump is submerged and operated to determine the unit meets hydraulic performance requirements.

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING PUMP

Series: K6PL-DS
18-60 HP / 1750 RPM
Discharge: 6"
Spherical solids handling: 3"

SPECIFICATIONS

LIQUID TEMPERATURE
104 °F (40 °C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

WEAR RING
Bronze.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 1 vane (2 for 48 and 60 HP), closed, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

DIAPHRAGM
Buna-N.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord 2/3 G, sealed against moisture.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

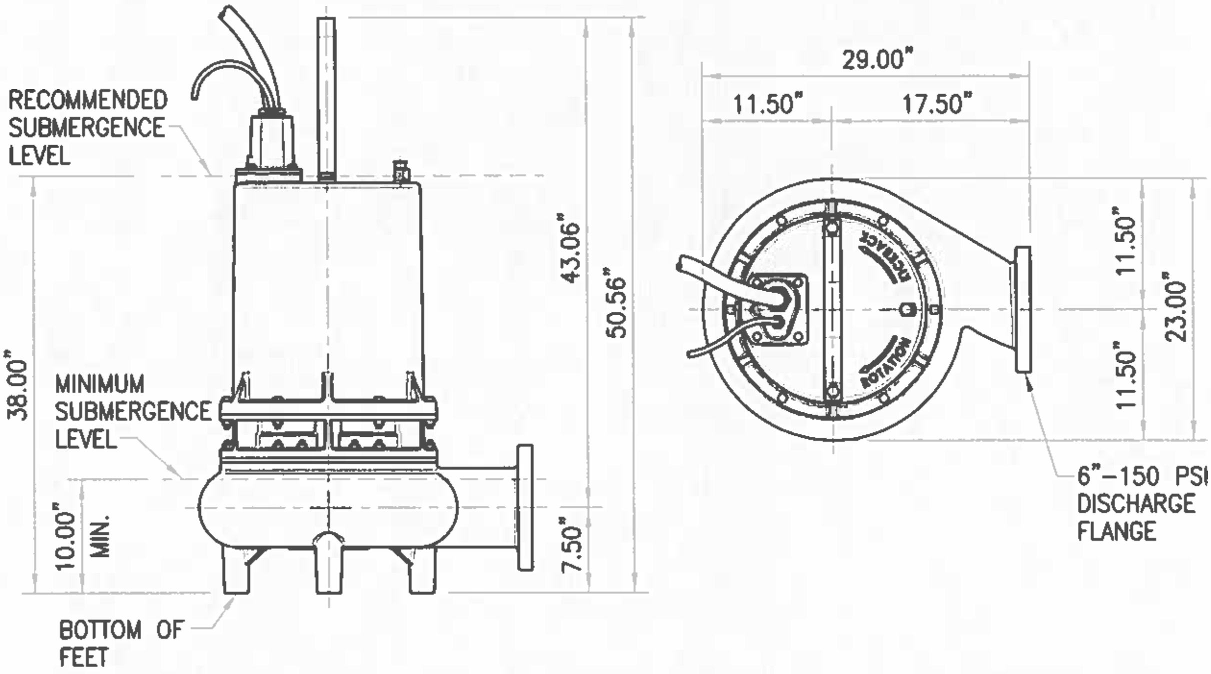
MOTOR
NEMA B, three phase, 230 & 460 volts, 60 Hz, 1750 RPM, oil filled. Requires overload protection to be included in control panel.

MOISTURE SENSOR
Normally open (N/O) included.

TEMPERATURE SENSOR
Normally closed (N/C) included.

OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-6).

SPECIFICATIONS



MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O. D.	WEIGHT (pounds)
K6PL180M4-23DS	62170206	18	230	3	1750	50.6	232	F	2/3	G	1.34"	891
K6PL180M4-43DS	62170207	18	460	3	1750	25.3	116	F	2/3	G	1.34"	891
K6PL240M4-23DS	62170210	24	230	3	1750	62.8	290	E	2/3	G	1.34"	928
K6PL240M4-43DS	62170211	24	460	3	1750	31.4	145	E	2/3	G	1.34"	928
K6PL300M4-23DS	62170214	30	230	3	1750	75.8	364	E	2/3	G	1.34"	985
K6PL300M4-43DS	62170215	30	460	3	1750	37.9	182	E	2/3	G	1.34"	985
K6PL360M4-23DS	62170206	36	230	3	1750	90	434	E	2/3	G	1.34"	992
K6PL360M4-43DS	62170232	36	460	3	1750	45	217	E	2/3	G	1.34"	992
K6PL480M4-43DS	62170220	48	460	3	1750	65	290	E	2/3	G	1.34"	1014
K6PL600M4-43DS	62170251	60	460	3	1750	78	363	E	2/3	G	1.34"	1052

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485", for all models.

IMPORTANT!

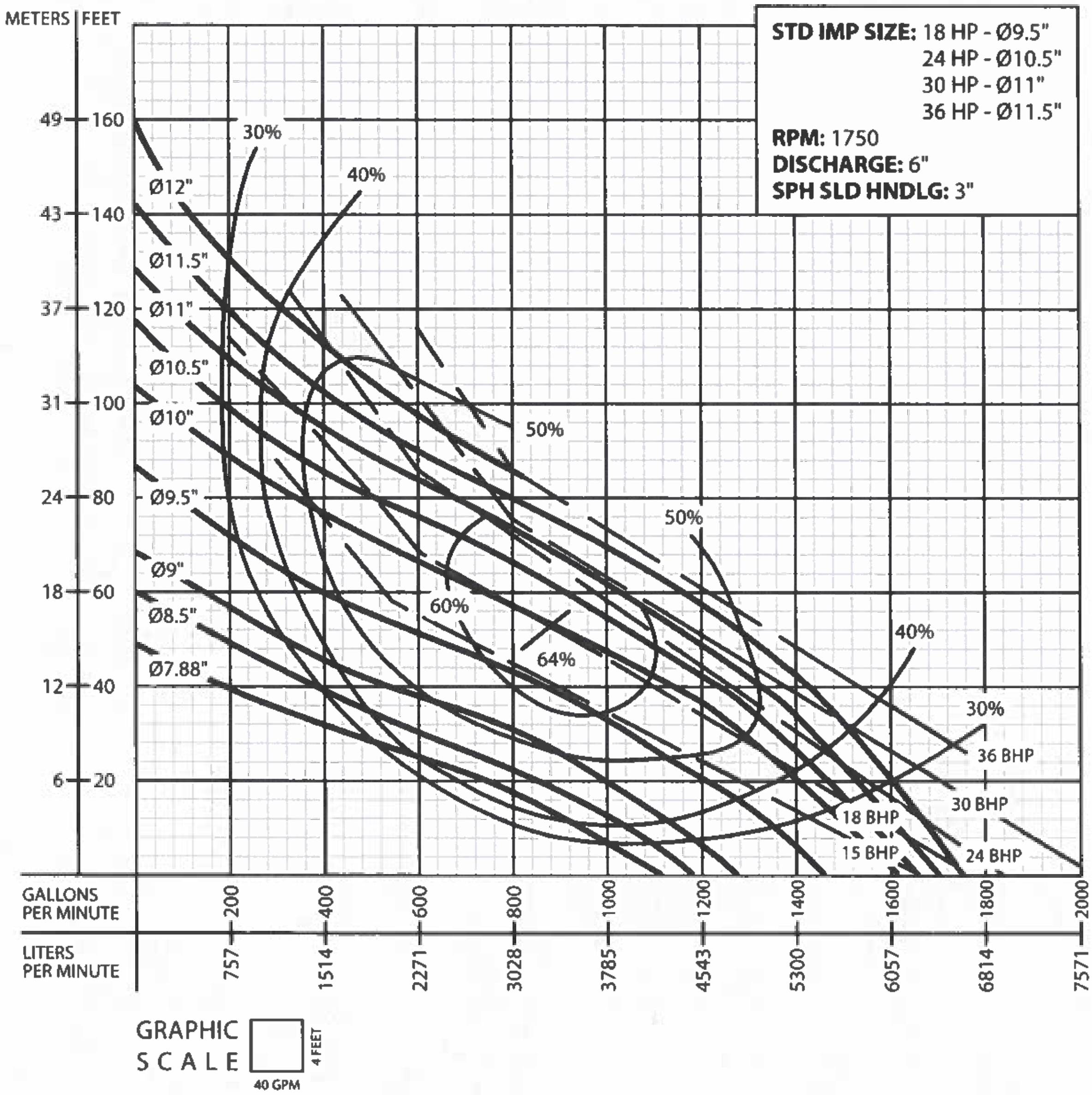
1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.

KEEN PUMP®

PERFORMANCE CURVE

Submersible Solids Handling Pump

Series: **K6PL-DS**

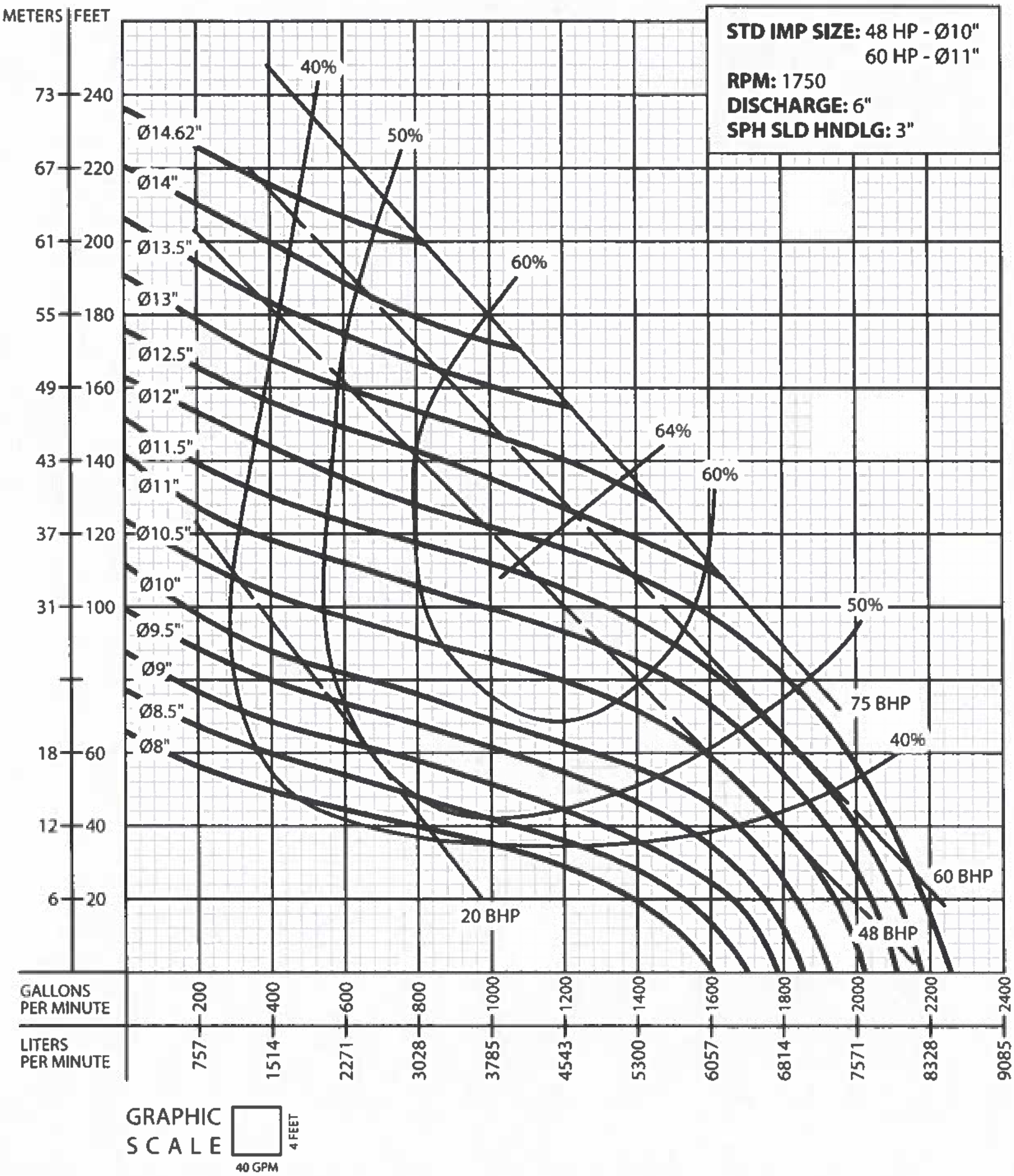


Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

PERFORMANCE CURVE

Submersible Solids Handling Pump

Series: **K6PL-DS**



Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

Installation, Operation &
Maintenance Manual
Submersible Solids
Handling Pumps

K6PL-DS / K6HPL-DS series

9, 12, 18, 24 & 30 HP @ 1150 RPM
18, 24, 30, 36, 48 & 60 HP @ 1750 RPM

K6PL-DS
9-30 HP
18-60 HP

K6HPL-DS
30-60 HP

IMPORTANT! - Read all instructions in this manual before operating or servicing a pump.

Before installation, read the following instructions carefully. Failure to follow instruction and safety information could cause serious bodily injury, death and/or property damage. Each Keen product is carefully inspected to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

⚠ DANGER "Danger" indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.

⚠ WARNING "Warning" indicates an imminenty hazardous situation which, if not avoided, MAY result in death or serious injury.

⚠ CAUTION "Caution" indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.

IMPORTANT! - Keen Pumps is not responsible for losses, injury or death resulting from failure to observe these safety precautions, misuse, abuse or misapplication of pumps or equipment.

ALL RETURNED PRODUCTS MUST BE CLEANED, SANITIZED, OR DECONTAMINATED PRIOR TO SHIPMENT, TO INSURE EMPLOYEES WILL NOT BE EXPOSED TO HEALTH HAZARDS IN HANDLING SAID MATERIAL. ALL APPLICABLE LAWS AND REGULATIONS SHALL APPLY.

⚠ WARNING Installation, wiring, and junction connections must be in accordance with the National Electric Code and all applicable state and local codes. Requirements may vary depending on usage and location.

⚠ WARNING Installation and servicing is to be conducted by qualified personnel only.

Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected; the rotating cutter and/or impeller can cause serious injury.

Always wear eye protection when working on pumps. Do not wear loose clothing that may become entangled in moving parts.

⚠ DANGER Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing the pump or any accessory items associated with or near the pump.

⚠ DANGER This pump is not intended for use in swimming pools or water installations where there is human contact with pumped fluid.

⚠ DANGER Risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling any aspect of the pumping system. ***Lock out power and tag.***

⚠ WARNING **Do not** use these pumps in water over 104° F. **Do not** exceed manufacturers recommended maximum performance, as this could cause the motor to overheat.

⚠ DANGER **Do not** lift, carry or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death. **Never** handle connected power cords with wet hands. Use appropriate lifting device.

⚠ WARNING Ground Fault Circuit Interrupter (GFCI) to be used with plug-in type power cord.

⚠ WARNING Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping. Never enter a basin after it has been used.

⚠ DANGER Failure to permanently ground the pump, motor and controls before connecting to power can cause shock, burns or death.

⚠ DANGER These pumps are not to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.

⚠ WARNING The Uniform Plumbing Code (UPC) states that sewage systems shall have an audio and visual alarm that signals a malfunction of the systems, that are required to reduce the potencial for property damage.

IMPORTANT! - Prior to installation, record Model Number, Serial, Amps, Voltage, Phase and HP from pump name plate for the future reference. Also record the Voltage and Current Readings at Startup:

1 Phase Models	
Amps:	Volts:
3 Phase Models	
Amps L1-2:	Volts L1-2:
Amps L2-3:	Volts L2-3:
Amps L3-1:	Volts L3-1:

Model Number: ____________________

Serial: ____________

PHASE: ______ HP: ________________

DISCHARGE: 6", 125lb, flange horizontal.
SPHERICAL SLD HNDLG: 3"
LIQUID TEMPERATURE: 104° F (40° C) max.
VOLUTE: Cast iron ASTM A-48 class 30.
WEAR RING: Bronze. (Only for K6HPL-DS series)
MOTOR HOUSING: Cast iron ASTM A-48 class 30.
SEAL PLATE: Cast iron ASTM A-48 class 30.
IMPELLER: 1 vane (2 for 48 and 60 HP and 3 for K6HPL-DS series), closed, with vanes on back side. Cast iron ASTM A-48 class 30.
SHAFT: 416 series stainless steel.
SQUARE RINGS: Buna-N.
PAINT: Air dry enamel, water based.
SEAL: Double mechanical, oil filled chamber. Silicon carbide outboard, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.
DIAPHRAGM: Buna-N.
HARDWARE: 300 series stainless steel.
CORD ENTRY: 25 ft of neoprene cord 2/4 G, sealed against moisture.
UPPER BEARING: Ball, single row, oil lubricated, for radial load.
LOWER BEARING: Ball, single row, oil lubricated, for radial and thrust load.
MOTOR: Three phase, NEMA B, oil filled. Requires overload protection to be included in control panel. Class F insulation.
MOISTURE SENSOR: Normally open (N/O) included.
TEMPERATURE SENSOR: Normally closed (N/C) included.
OPTIONAL EQUIPMENT: Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-6).

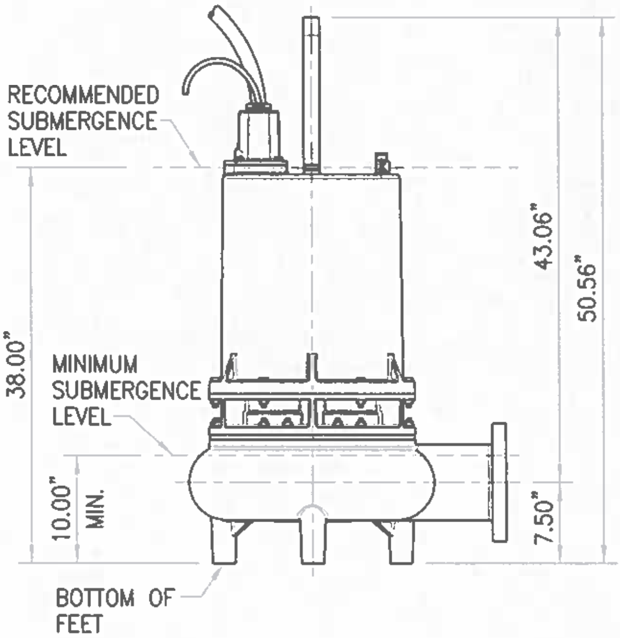
MODEL	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O. D.	WEIGHT (pounds)
K6PL90M6-23DS	9	230	3	1150	26	162	F	2/3	G	1.34"	897
K6PL90M6-43DS	9	460	3	1150	13	81	J	2/3	G	1.34"	897
K6PL120M6-23DS	12	230	3	1150	36	162	D	2/3	G	1.34"	902
K6PL120M6-43DS	12	460	3	1150	18	81	F	2/3	G	1.34"	902
K6PL180M6-23DS	18	230	3	1150	50	232	C	2/3	G	1.34"	917
K6PL180M6-43DS	18	460	3	1150	25	116	F	2/3	G	1.34"	917
K6PL240M6-23DS	24	230	3	1150	64	290	C	2/3	G	1.34"	961
K6PL240M6-43DS	24	460	3	1150	32	145	E	2/3	G	1.34"	961
K6PL300M6-23DS	30	230	3	1150	82	364	C	2/3	G	1.34"	1008
K6PL300M6-43DS	30	460	3	1150	41	182	E	2/3	G	1.34"	1008
K6PL180M4-23DS	18	230	3	1750	50.6	232	F	2/3	G	1.34"	891
K6PL180M4-43DS	18	460	3	1750	25.3	116	F	2/3	G	1.34"	891
K6PL240M4-23DS	24	230	3	1750	62.8	290	E	2/3	G	1.34"	928
K6PL240M4-43DS	24	460	3	1750	31.4	145	E	2/3	G	1.34"	928
K6PL300M4-23DS	30	230	3	1750	75.8	364	E	2/3	G	1.34"	985
K6PL300M4-43DS	30	460	3	1750	37.9	182	E	2/3	G	1.34"	985
K6PL360M4-23DS	36	230	3	1750	90	434	E	2/3	G	1.34"	992
K6PL360M4-43DS	36	460	3	1750	45	217	E	2/3	G	1.34"	992
K6PL480M4-43DS	48	460	3	1750	65	290	E	2/3	G	1.34"	1014
K6PL600M4-43DS	60	460	3	1750	78	363	E	2/3	G	1.34"	1052

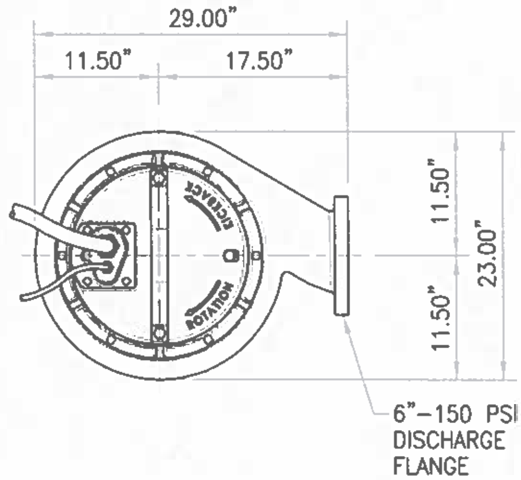
The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485", for all models.

MODEL	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K6HPL300M4-23DS	30	230	3	1750	76	364	F	2/3	G	1.34"	957
K6HPL300M4-43DS	30	460	3	1750	38	182	F	2/3	G	1.34"	957
K6HPL360M4-23DS	36	230	3	1750	90	434	E	2/3	G	1.34"	963
K6HPL360M4-43DS	36	460	3	1750	45	217	F	2/3	G	1.34"	963
K6HPL480M4-43DS	48	460	3	1750	65	290	E	2/3	G	1.34"	974
K6HPL600M4-43DS	60	460	3	1750	78	363	E	2/3	G	1.34"	1005

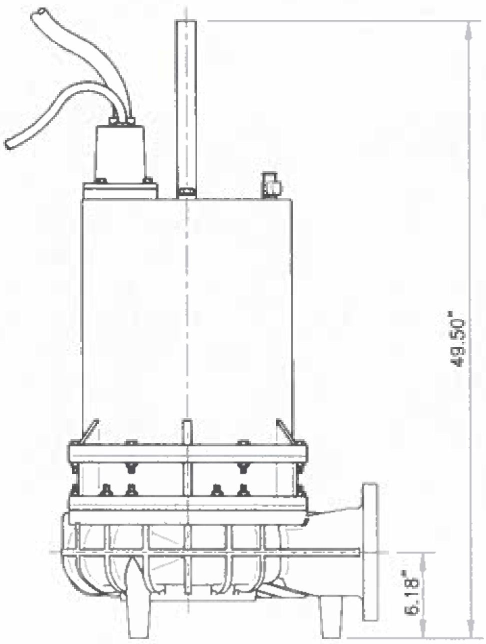
The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485", for all models.

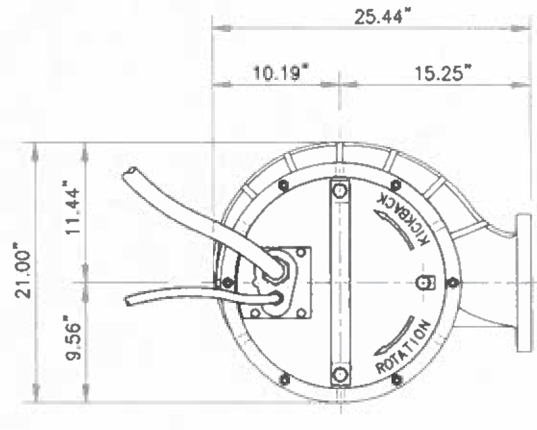
▸ K6PL-DS





▸ K6HPL-DS





Receiving inspection
Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. If the manual is removed from the packaging, do not lose or misplace.

Storage
Any product that is stored for a period longer than six (6) months from the date of purchase should be bench tested prior to installation. A bench test consists of, checking the impeller to assure it is free turning and a run test to assure the motor (and switch if provided) operate properly.

Controls
Manual models require a separate approved pump control device or panel for automatic operation. Be sure the electrical specification of the control selected properly match the electrical specifications of the pump.

Submergence
The pump should always be operated in the submerged condition. The minimum sump liquid level should never be less than above the pump's volute (See Figure 1).

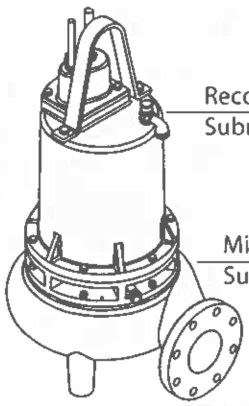


Figure 1

Installation
These pumps are recommended for use in a sump, basin or lift station. The sump, basin or lift station shall be sealed and vented in accordance with local plumbing codes. **This pump is designed to pump sewage, effluent or wastewater, non-explosive and non-corrosive liquids and shall NOT be installed in locations classified as hazardous in accordance with the National Electrical Code (NEC) ANSI/NFPA 70 or Canadian Electric Code (CEC).** The pump should never be installed in a trench, ditch, or hole with a dirt bottom. The legs will sink into the dirt and the suction will become plugged.

The installation should be at a sufficient depth to ensure that all plumbing is below the frost line. If this is not feasible, remove the check valve and size the basin to accommodate the additional backflow volume.

Pumps are most commonly installed in simplex or duplex stations or basins with a slide rail system (Keen SRC), which allows the pump(s) to be installed or removed without requiring personnel to enter the station, or resting on the basin floor.

Discharge Piping
Discharge piping should be as short as possible and sized no smaller than the pump discharge. **Do not reduce the discharge pipe size below that which is provided on the pump.** Both a check valve and a shut-off valve are recommended for each pump. The check valve is used to prevent backflow into the sump. The shut-of valve is used to manually stop system low during pump servicing.

Liquid Level Controls
The level control(s) should be mounted on the discharge piping, a cable rack or float pole. The level control should have adequate clearance so it cannot hang up in it's swing and that the pump is completely submerged when the level control is in the "Off" mode. By adjusting the cord tether the control level can be changed. One cycle of operation should be observed, so that any potential problems can be corrected.

It is recommended that the level control float should be set to insure that the liquid in the sump never drops below the top of the motor housing or a minimum level of 10 inches above the basin floor.

Electrical Connections
Power cable:
The power cable mounted to the pump must not be modified in any way except for shortening to a specific application. Any splice between the pump and the control panel must be made in accordance with the electric codes. It is recommended that a junction box, if used, be mounted outside the sump or be of at a minimum Nema 4 construction if located within the wet well. **DO NOT USE THE POWER CABLE TO LIFT PUMP.**

Always rely upon a Certified Electrician for installation.

Overload Protection:
Single Phase - The stator in-winding overload protector used is referred to as an inherent overheating protector and operates on the combined effect of temperature and current. This means that the overload protector will trip out and shut the pump off if the windings become too hot, or the load current passing through them becomes too high.

IMPORTANT! **-** The overload will then automatically reset and start the pump up after the motor cools to a safe temperature. In the event of an overload, the source of this condition should be determined and corrected immediately.

⚠ WARNING DO NOT ALLOW THE PUMP TO CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS.

Three Phase - The Normally Closed (N/C) thermal sensor is embedded in the motor windings and will detect excessive heat in the event an overload condition occurs. The thermal sensor will trip when the windings become too hot and will automatically reset when the pump motor cools to a safe temperature. It is recommended that the thermal sensor be connected in series to an alarm device to alert the operator of an overload condition, and/or the motor starter coil to stop the pump. In the event of an overload, the source of this condition should be determined and repaired.

⚠ WARNING DO NOT ALLOW THE PUMP TO CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS.

Moisture Sensors - A normally open (N/O) sensor rated of 1 watt @330K ohms, 500 volt, is installed in the pump seal chamber which will detect any moisture present. It is recommended that this detector be wired in series to an alarm device or motor starter coil to alert the operator that a moisture detect has occurred. In the event of a moisture detect, check the individual moisture sensor probe leads for continuity, (∞ resistance = no moisture) and the junction box/control box for moisture content.

These situations may induce a false signal in the moisture detecting circuit. If none of the above test prove conclusive, the pump(s) should be pulled and the source of the failure repaired. **IF A MOISTURE DETECT HAS OCCURRED MAINTENANCE SHOULD BE PERFORMED AS SOON AS POSSIBLE!**

If current through the temperature sensor exceeds the values listed, an intermediate control circuit relay must be used to reduce the current or the sensor will not work properly.

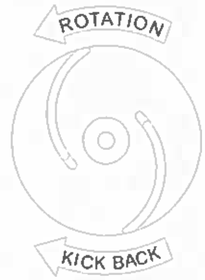
TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
110-120	3.00	30.0
220-240	1.50	15.0
440-480	0.75	7.5
600	0.60	6.0

Wire Size:
If longer power cable is required consult a qualified electrician for proper wire size.

▸ Pre-Operation

1. **Check Voltage and Phase -** Compare the voltage and phase information stamped on the pump name plate.

2. **Check Pump Rotation -** Improper motor rotation can result in poor pump performance and can damage the motor and/or pump. Check rotation on three phase units by momentarily applying power and observe the "kickback".



Bottom of Pump

Kickback should always be in a counter-clockwise direction as viewed from motor end or opposite to impeller rotation. Impeller rotation is counter-clockwise as viewed from bottom of pump.

3. **Name Plate -** Record the information from the pump name plate to drawing in front of manual for future reference.

Insulation Test - An insulation (megger) test should be performed on the motor. Before the pump is put into service. The resistance values (ohms) as well as the voltage (volts) and current (amps) should be recorded.

5. **Pump-Down Test -** Be sure pump has been properly wired, lowered into the basin, sump or lift station, check the system by filling with liquid and allowing the pump to operate through its pumping cycle. The time needed to empty the system, or pump-down time along with the volume of water, should be recorded.

▸ Maintenance

No lubrication or maintenance is required. Perform the following checks when pump is removed from operation or when pump performance deteriorates:

a) Inspect motor chamber for oil level and contamination.
b) Inspect impeller and body for excessive build-up or clogging.
c) Inspect motor, bearings and shaft seal for wear or leakage.

▸ Servicing

NOTE: Item numbers in ( ) refer to Figures 6 & 7.

Cooling Oil - Anytime the pump is removed from operation, the cooling oil in the motor housing should be checked visually for oil level and contamination. To check oil, set unit upright. Remove cap screws (6), lift conduit box assembly (4) from motor housing (3), ***Do Not*** disconnect wiring from motor leads. With a flashlight, visually inspect the oil in the motor housing (3) to make sure it is clean and clear, light amber in color and free from suspended particles. Milky white oil indicates the presence of water. Oil level should be just above the motor when pump is in vertical position.

Seal Chamber - Drain oil from seal chamber by placing pump on its side with pipe plug (18) downward and remove pipe plug (18). If the oil is found to contain considerable water or other contamination, the shaft seal (19) should be inspected and replaced if required.

Oil Testing

- Drain oil into a clean, dry container placing pump on it's side, remove cap screws (6), lift conduit box assembly (4) from motor housing (3). In separate container drain seal chamber by removing pipe plug (18).
- Check oil for contamination using an oil tester with a range to 30 kV breakdown.
- If oil is found to be clean and uncontaminated (measuring above 15 kV breakdown), refill the housing.
- If oil is found to be dirty or contaminated (or measures below 15 kV breakdown), the pump must be carefully inspected for leaks at the shaft seal, conduit box, o-rings, pipe plug and pressure valve, before refilling with oil. To locate the leak, perform a pressure test.

After leak is repaired, dispose of old oil properly, and refill with new oil.

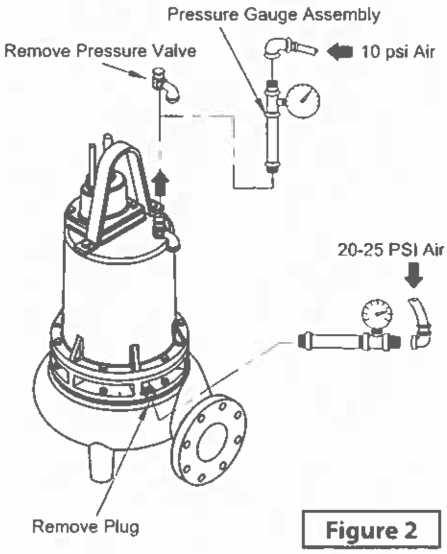
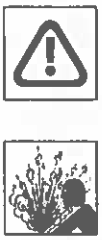


Figure 2



Pressure builds up extremely fast, increase pressure by "TAPPING" air nozzle. Too much pressure will damage seal. ***DO NOT exceed 10 PSI in housing and 20-25 PSI in seal chamber.***

Pressure Test

Motor Housing - Oil should be at normal level. Remove pressure valve (11) from motor housing (3). Apply pipe sealant to pressure gauge assembly and tighten into hole (See Figure 2). Pressurize motor housing to 10 PSI. Use soap solution around the sealed areas above the oil level and inspect joints for "air bubbles". If, after five minutes, the pressure is still holding constant, and no "bubbles" /oil seepage is observed, slowly bleed the pressure and remove the gauge assembly. Replace oil. Leek must be located and repaired if pressure does not hold.

Seal Chamber - Check that seal chamber is full of oil by removing pipe plug (18). Apply pipe sealant to pressure gauge assembly and tighten into hole in bearing housing (15). Pressurize seal chamber to 20-25 PSI and check for leaks.

Oil Replacement - Set unit upright and refill with new cooling oil as per table. Fill to just above motor as an air space must remain in the top of the housing to compensate for oil expansion. Reassemble the o-ring (5) and conduit box (4) to motor housing (3). Apply thread locking compound to cap screws (6) and place into holes and torque to 15 ft/lbs.

***DO NOT** overfill oil. Overfilling of housing with oil can create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard.*
Overfilling oil voids warranty.

Oil Replacement:
Seal Chamber - Refill chamber completely full with new cooling oil or reuse the uncontaminated oil.

Cooling Oil Recommended Supplier/Grade	
BP	Enerpar SE100
Conoco	Pale Parafin 22
Mobile	D.T.E. Oil Light
Shell Canada	Transformer-10
Texaco	Diala-Oil-AX

Disassembly

Impeller and Volute - Disconnect power. Remove hex nuts (16) and vertically lift motor housing and seal plate assembly from volute (37). Clean out volute (37) if necessary. Inspect gasket (36) and replace if cut or damaged. Clean and examine impeller (32), for pitting or wear and replace if required. To remove impeller (32), remove cap screw (35) and washer (34). With a wheel puller, pull impeller straight of shaft and remove square key. To remove wear ring (33), split it and remove, being carefull not to damage volute.

Moisture Probes - Drain oil from seal chamber, if not already done. Remove cap screws (9) and lifting handle (8). Set unit upside down on blocks to avoid damaging cables. Remove socket head cap screws (27) and lift seal plate (26), with seal's (19) stationary, vertically from bearing housing (15), ***do not*** damage seal. Check moisture sensor probes (41) for damage, replace by removing screws (42) and disconnecting wires (40). Then remove probes (41) from bearing housing (15).

Diaphragm - with seal plate (26) removed, examine diaphragm (23) for ruptures or crackes. Replace diaphragm by removing capscrews (25) and plate (24). Clean vent holes in seal plate (26).

Shaft Seal - Remove outboard rotating member of seal (19), spring and inboard rotating member from shaft. Examine all seal parts.

Inspect seal for signs of uneven wear pattern on stationary members, chips and scratches on either seal face. **DO NOT interchange seal components, replace the entire shaft seal (19).** If replacing seal, remove stationary by prying out with flat screwdriver.

Motor and Bearings - Remove volute, impeller, seal plate and seal as previously stated and drain oil from motor housing (3). Position unit upright, using blocks to avoid resting unit on shaft. Remove cap screws (6) o-ring (5) and conduit box assembly (4) from motor housing (3). Note connections and then remove cable lead wires from motor lead wires and moisture and temperature sensor wires from control cable by removing connectors. Remove cap screws (12) and vertically lift the motor housing (3) from bearing housing (15). Replace square ring (14) if damaged or cut. Remove the upper motor bolts and lift upper end bell from motor (1). Remove wave washer. Remove upper bearing (2) with a wheel puller if damaged or worn.

Vertically lift stator (1) from rotor/shaft. Inspect windings for shorts and resistance. Test the temperature sensors by checking for continuity between the black and white wires. If defective contact factory or motor service station. Pull motor rotor/shaft with bearing (13) from bearing housing (15). Remove bearing (13) with a wheel puller if worn or damaged. If rotor or stator windings are defective, replace the complete motor.

⚠ ***IMPORTANT! - All parts must be clean before reassembly.***

Reassembly

Bearings - Replace bearings, being careful not to damage the rotor or shaft. If equipped, fill notch should face the rotor core for both upper and lower bearings.

Apply adhesive compound to the shaft and press bearing (13) onto shaft, position squarely onto the shaft applying force to the inner race of bearing only, until bearing seats on shoulder of the shaft. In the same manner, assemble upper bearing (2) to shaft.

Motor - Slide rotor with bearing (13) into bearing housing (15) until bearing seats on the bottom. Position motor housing and stator into pilot, install wave washers in upper end bell.

IMPORTANT! Special wave washers in upper motor housing are required to compensate for shaft expansion. These washers must be properly reinstalled to give the required constant down force on the motor shaft.

Position upper motor end bell aligning holes and thread cap screws into bearing housing (15) and torque to 16 ft/lbs. Place all motor leads above the motor. Position square ring (14) on bearing housing (15) and lower housing (3) over motor and into pilot, aligning handle so that it is parallel to motor end bell reliefs. Apply thread locking compound to threads on cap screws (12) and install with nuts (16) and torque to 24 ft/lbs.

⚠ ***Handle seal parts with extreme care. DO NOT damage lapped surfaces.***

Seal/Diaphragm - (See Figure 3) Clean and oil seal cavities in bearing housing (15) and seal plate (26). Lightly oil **(Do not use grease)** outer surface of inboard and outboard stationary members of seal (19). Press inboard stationary member fi rmly into bearing housing (15) and outboard stationary into seal plate (24), using a seal pusher tool. Nothing but the seal pusher tool is to come in contact with seal face.

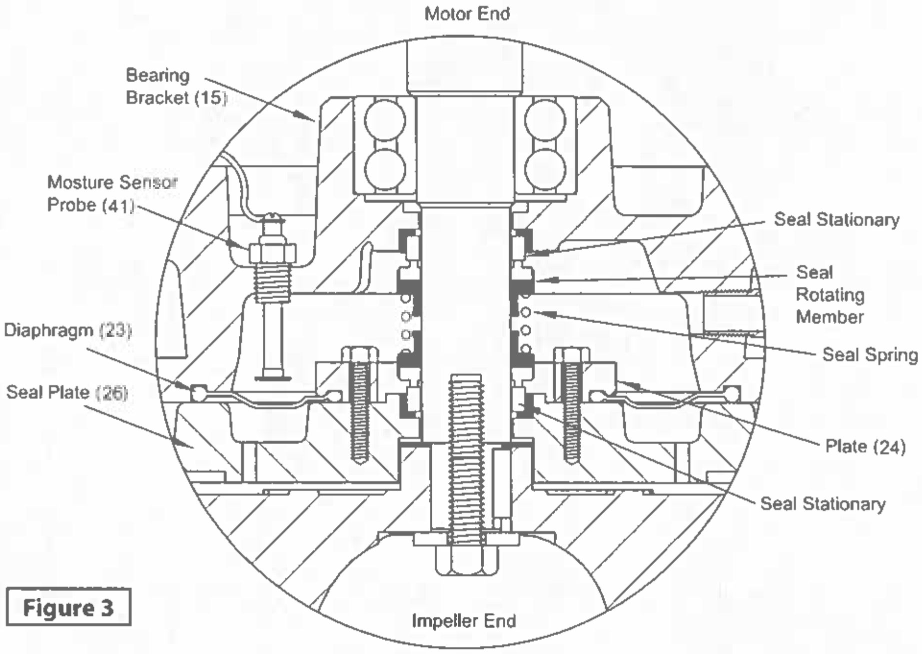


Figure 3

IMPORTANT! - Hammering on the seal pusher tool will damage the seal face.

Be sure the stationary members are in straight and that the rubber ring is not out of it's groove. Lightly oil **(Do not use grease)** shaft and inner surface of bellows on rotating member. With lapped surface facing bearing housing (15), slide rotating member onto shaft using seal pusher tool, until lapped faces are together. It is extremely important to keep seal faces clean during assembly. Dirt particales lodged between faces will cause the seal to leak.

Be sure driving lugs in retainer are matched in rotating member of seal (19). Place spring over shaft and in place on rotating member, making sure it is seated in retainer and not cocked or resting on bellows tail. Lightly oil shaft and inner surface of outboard rotating member.

With tail section toward bearing housing (15), slide rotating member onto shaft with seal pusher tool until retainer engages spring and spring is compressed slightly.

Spring should be properly engaged in both retainers.

Reassemble the diaphragm (23) with "bulg" facing seal plate (24). Place plate (24) on diaphragm (23) and insert capscrews (25) into plate and tighten.

Place seal plate (24) over shaft onto bearing housing (15), being careful not to damage outboard stationary member and align holes for cap screws (25).

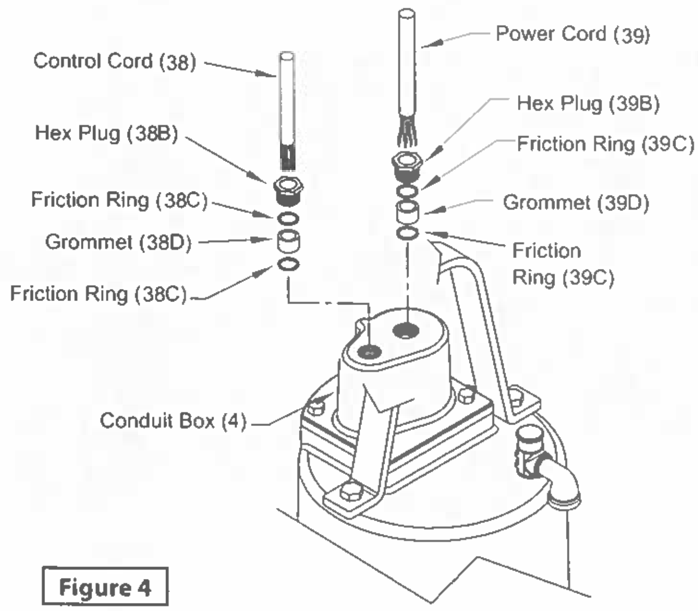


Figure 4

Thread cap screws (25) into bearing housing (15) and tighten. Refill chamber with oil.

Conduit Box Assembly - Check power (38) and control cables (39) for crackes or damage and replace complete conduit box (4) if required. (See Figure 4) Bring motor wires through opening in top of motor housing (3), check sleeving and replace if damaged. Position square ring (5) in conduit box (4) and reconnect leads using connectors and insulators. See Figures 5, for wiring schematics.

Refill with cooling oil. Position conduit box (4) with square ring (5) on motor housing. Apply thread locking compound to cap screws (6) threads and torque to 16 ft/lbs.

Remove gland nuts (38B) and (39B), friction rings (38C) and (39C), and grommets (38D) and (39D) from conduit box (4), inspect and replace if damaged (See Figure 4). Reassemble by inserting one friction ring, grommet, one more friction ring and gland nut into conduit box. Torque gland nuts to 15 ft/lbs to prevent leakage.

Wear Ring - Apply retaining compound to the bore of volute (37) and press wear ring (33) into bore until seated.

Impeller and Volute - Install impeller (32) by appling a thin film of oil to motor shaft and slide impeller straight onto shaft, keeping keyways lined up. Drive key into keyway. Locate washer (34) and lockwasher (10), apply thread lock primer (such as Loctite® Primer T), let set per manufacturer's directions. Apply thread locking compound to threads on cap screw (35), and thread into shaft and torque to 35 ft/lbs.

Place gasket (36) on volute and install impeller and motor assembly over studs and onto volute (37). Apply thread locking compound to threads of studs (31) and thread nuts (16) onto studs and torque to 24 ft/lbs. Check for binding by rotating impeller. Clearance between the impeller and volute should be approximately 0.012 inch.

THREE-PHASE 230V AC

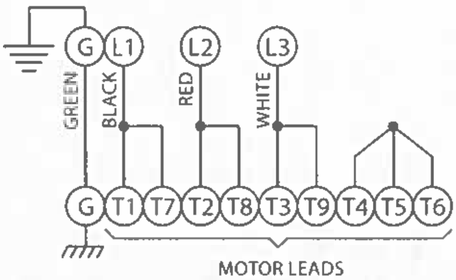


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1 and 7
Red	2 and 8
White	3 and 9
	4, 5 and 6 together

THREE-PHASE 460V AC

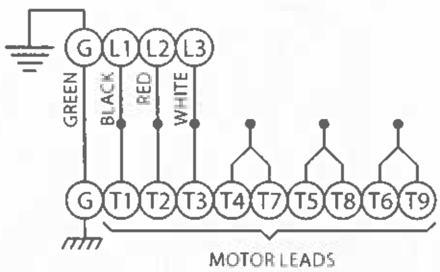


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1
Red	2
White	3
	4 and 7 together
	5 and 8 together
	6 and 9 together

CONTROL CABLE

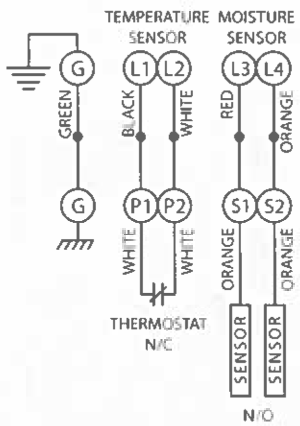
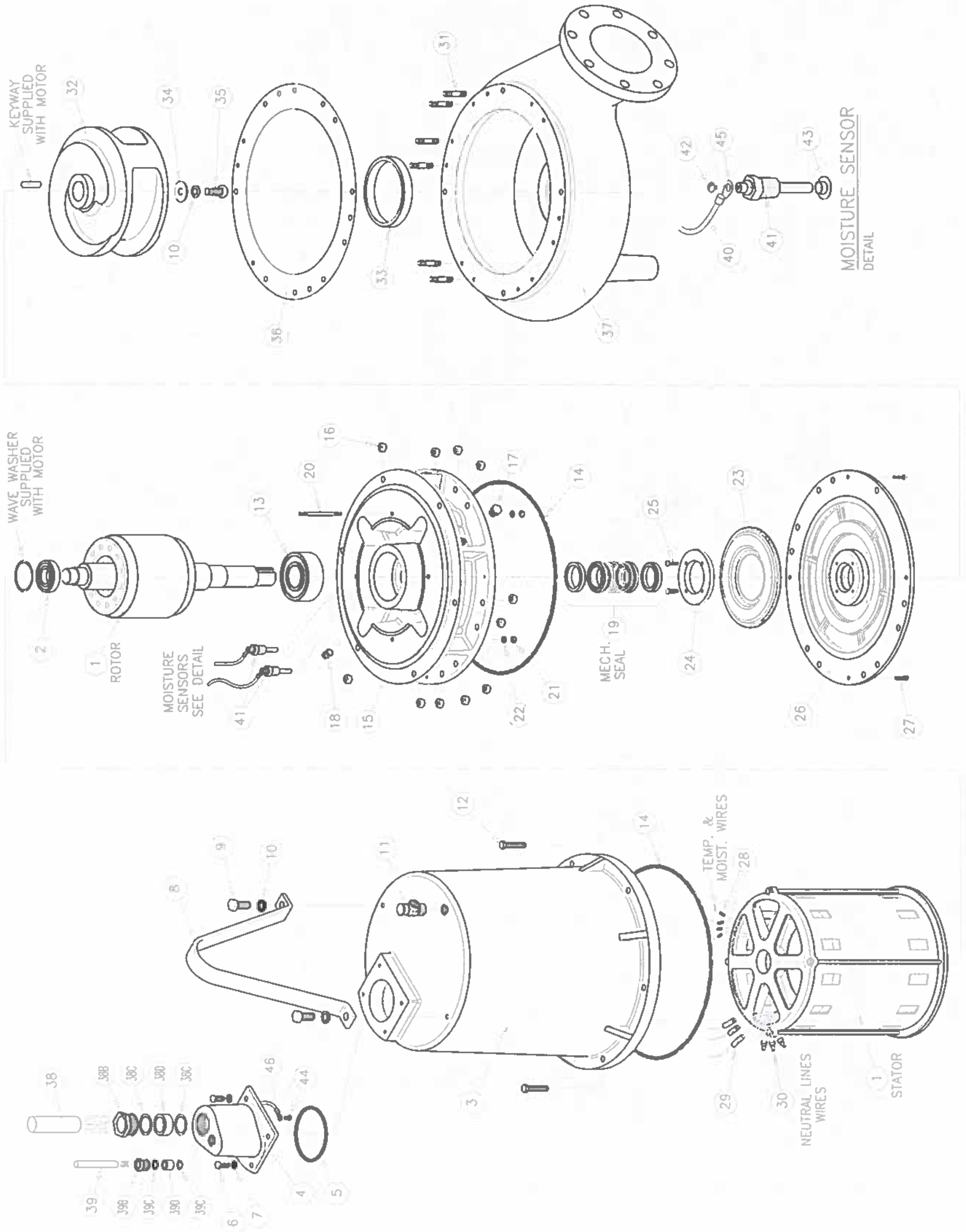


Figure 5	
Control Cable	Lead Number
Black	L1 (Temperature)
White	L2 (Temperature)
Red	L3 (Moisture)
Orange	L4 (Moisture)
Green	Ground

▸ K6PL-DS

Figure 6



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

▸ K6PL-DS

Item	Part Number	Description	Qty.	Material
1		Motor	1	Brand US
	40040031	18 HP, 1750 RPM, three phase, 230/460 V		
	40040032	24 HP, 1750 RPM, three phase, 230/460 V		
	40040033	30 HP, 1750 RPM, three phase, 230/460 V		
	40040034	36 HP, 1750 RPM, three phase, 230/460 V		
	40040035	48 HP, 1750 RPM, three phase, 460 V		
	40040036	60 HP, 1750 RPM, three phase, 460 V		
	40040041	12 HP, 1150 RPM, three phase, 230/460 V		
	40040042	18 HP, 1150 RPM, three phase, 230/460 V		
	40040043	24 HP, 1150 RPM, three phase, 230/460 V		
	40040044	30 HP, 1150 RPM, three phase, 230/460 V		
2	31020018	Bearing (Upper)	1	Steel
3	03100006	Motor Housing	1	Cast Iron
4	03100007	Conduit Box & Cable Assembly	1	Cast Iron
5	92010085	Square Ring # 1937	1	Buna
6	91010345	Cap Screw 3/8"-16UNC x 1.00" SS	4	SS 304
7	91010061	Lockwasher 3/8" SS	4	SS 304
8	30400845	Lifting Bail	1	Steel
9	91010354	Screw 5/8"-11 UNC x 1½" SS	2	SS 304
10	91010063	Lockwasher 5/8" SS	3	SS 304
11	31200021	Press Relief Valve	1	Brass
12	91010348	Screw 7/16-14 UNC x 2 1/4" SS	6	SS 304
13	31020019	Bearing (Lower)	1	Steel
14	92010051	O-Ring # 52082	2	Buna
15		Bearing Housing	1	Cast Iron
	03040013	for 18 to 36 HP at 1750 RPM		
		for 9 to 18 HP at 1150 RPM		
	03040013B	for 48 & 60 HP at 1750 RPM		
		for 24 to 30 HP at 1150 RPM		
16	91010434	Hex Nut 7/16"-14 UNC SS	18	SS 304
17	93010131	Hex Head Plug 3/8" SS # 22932	1	SS 304
18	93010149	Plug 3/8"	1	Cast Iron
19	31030146	Mechanical Seal, 2130SBH4GS (Motor end) carbon / ceramic / buna (Pump end) silicon / silicon / buna	1	Inpacom
20	91010376	Stud 3/8"-16 UNC x 4½ # 84	4	
21	91010433	Hex Nut 3/8" 16 UNC SS	4	SS 304
22	91010061	Lockwasher 3/8" SS	4	SS 304
23	31040002	Diaphragm # 52093	1	Buna
24	03160006	Diaphragm plate	1	Cast Iron
25	91010342	Screw ¼"-20UNC x 1.00" SS	4	SS 304
26	03180016	Seal Plate	1	Cast Iron
27	91010392	Screw Head Socket ¼"-20 UNC x 1.0" SS	4	SS 304
28	94010021	Connector # 52990 10/12	4	
29	94010022	Connector # 56730	3	
30	94010023	Wire Connector	3	Plastic
31	91010377	Stud 7/16" 14 UNC x 2¼"	12	

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

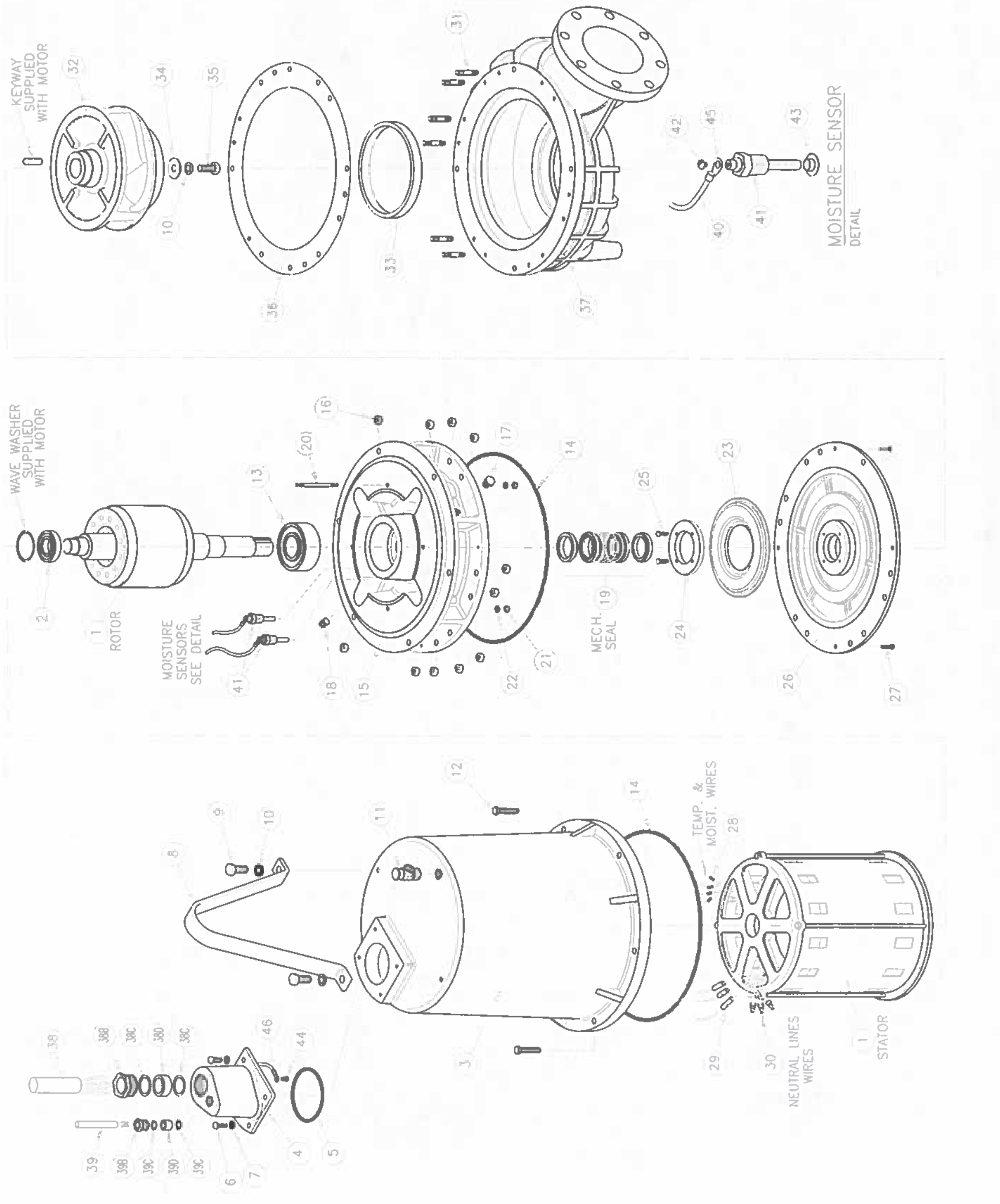
▸ **K6PL-DS**

Item	Part Number	Description	Qty.	Material
32		Impeller	1	Cast Iron
	03140053	18 HP, 1750 RPM, 9.50"Ø		
	03140053B	24 HP, 1750 RPM, 10.50"Ø		
	03140053C	30 HP, 1750 RPM, 11.00"Ø		
	03140053D	36 HP, 1750 RPM, 11.50"Ø		
	03140054	48 HP, 1750 RPM, 10.00"Ø		
	03140054B	60 HP, 1750 RPM, 11.00"Ø		
	03140053D	9 HP, 1150 RPM, 11.50"Ø		
	03140081	12 HP, 1150 RPM, 12.00"Ø		
	03140081B	18 HP, 1150 RPM, 13.00"Ø		
	03140081C	24 HP, 1150 RPM, 14.00"Ø		
	03140081D	30 HP, 1150 RPM, 14.62"Ø		
33	30400314	Wear Ring	1	Bronze
34	30400423	Impeller Washer	1	SS 304
35	91010354	Screw Hex Head 5/8" 11UNC x 1½" SS	1	SS 304
36	92010192	Volute Gasket # 51936	1	Rubber
37	03090053	Volute	1	Cast Iron
38	31030006	Power Cable 3x2 # 37917	25 ft	
38B	30400904	Hex Head Plug	1	SS 303
38C	30400401	Washer	2	SS 304
38D	92010002	Grommet	1	Rubber
39	31030005	Cord Set, Moist & temp, 5x18 # 34840	25 ft	
39B	30400901	Hex Head Plug	1	SS 303
39C	91010057	Washer	2	Steel 1018
39D	92010005	Grommet	1	Rubber
40	94010003C	Wire assy., moisture sensor	2	
41	31160001	Moisture Sensor # 39383	2	
42	91010403	Machine screw Moist, 6-32 x ¼" SS	2	SS 304
43	93010101	Cap Plug	2	Plastic
44	91010410	Ground Screw ¼" x ½"	1	Steel
45	94010043	Round terminal 3/16"	2	
46	94010044	Round terminal 5/16"	1	
47	31010031	Motor Oil (Housing & seal Cavity)	11.1 gal.	

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

K6HPL-DS

Figure 7



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

▸ K6HPL-DS

Item	Part Number	Description	Qty.	Material
1		Motor	1	Brand US
	40040033	30 HP, 1750 RPM, three phase, 230/460 V		
	40040034	36 HP, 1750 RPM, three phase, 230/460 V		
	40040035	48 HP, 1750 RPM, three phase, 460 V		
	40040036	60 HP, 1750 RPM, three phase, 460 V		
2	31020018	Bearing (Upper)	1	Steel
3	03100006	Motor Housing	1	Cast Iron
4	03100007	Conduit Box & Cable Assembly	1	Cast Iron
5	92010085	Square Ring # 1937	1	Buna
6	91010345	Cap Screw 3/8"-16UNC x 1.00" SS	4	SS 304
7	91010061	Lockwasher 3/8" SS	4	SS 304
8	30400845	Lifting Bail	1	Steel
9	91010354	Screw 5/8"-11 UNC x 1½" SS	2	SS 304
10	91010063	Lockwasher 5/8" SS	3	SS 304
11	31200021	Press Relief Valve	1	Brass
12	91010348	Screw 7/16-14 UNC x 2¼" SS	6	SS 304
13	31020019	Bearing (Lower)	1	Steel
14	92010051	O-Ring # 52082	2	Buna
15		Bearing Housing	1	Cast Iron
	03040013	for 30 & 36 HP		
	03040013B	for 48 & 60 HP		
16	91010434	Hex Nut 7/16"-14 UNC SS	18	SS 304
17	93010131	Hex Head Plug 3/8" SS # 22932	1	SS 304
18	93010149	Plug 3/8"	1	Cast Iron
19	31030146	Mechanical Seal, 2130SBH4GS (Motor end) carbon / ceramic / buna (Pump end) silicon / silicon / buna	1	Inpacom
20	91010376	Stud 3/8"-16 UNC x 4½ # 84	4	
21	91010433	Hex Nut 3/8" 16 UNC SS	4	SS 304
22	91010061	Lockwasher 3/8" SS	4	SS 304
23	31040002	Diaphragm # 52093	1	Buna
24	03160006	Diaphragm plate	1	Cast Iron
25	91010342	Screw ¼"-20UNC x 1.00" SS	4	SS 304
26	03180016	Seal Plate	1	Cast Iron
27	91010392	Screw Head Socket ¼"-20 UNC x 1.0" SS	4	SS 304
28	94010021	Connector # 52990 10/12	4	
29	94010022	Connector # 56730	3	
30	94010023	Wire Connector	3	Plastic
31	91010377	Stud 7/16" 14 UNC x 2¼"	12	
32		Impeller	1	Cast Iron
	03140111	30 HP, 1750 RPM, 9.25"Ø		
	03140111B	36 HP, 1750 RPM, 9.50"Ø		
	03140111C	48 HP, 1750 RPM, 10.50"Ø		
	03140111D	60 HP, 1750 RPM, 11.25"Ø		

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

K6HPL-DS

Item	Part Number	Description	Qty.	Material
33	30400315	Wear Ring	1	Bronze
34	30400411	Impeller Washer	1	SS 304
35	91010354	Screw Hex Head 5/8" 11UNC x 1½" SS	1	SS 304
36	92010192	Volute Gasket # 51936	1	Rubber
37	03090063	Volute	1	Cast Iron
38	31030006	Power Cable 3x2 # 37917	25 ft	
38B	30400904	Hex Head Plug	1	SS 303
38C	30400401	Washer	2	SS 304
38D	92010002	Grommet	1	Rubber
39	31030005	Cord Set, Moist & temp, 5x18 # 34840	25 ft	
39B	30400901	Hex Head Plug	1	SS 303
39C	91010057	Washer	2	Steel 1018
39D	92010005	Grommet	1	Rubber
40	94010003C	Wire assy., moisture sensor	2	
41	31160001	Moisture Sensor # 39383	2	
42	91010403	Machine screw Moist, 6-32 x ¼" SS	2	SS 304
43	93010101	Cap Plug	2	Plastic
44	91010410	Ground Screw ¼" x ½"	1	Steel
45	94010043	Round terminal 3/16"	2	
46	94010044	Round terminal 5/16"	1	
47	31010031	Motor Oil (Housing & seal Cavity)	11.1 gal.	

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

Risk of electric shock. Always disconnect the pump from the power source before handling inspections or repairs.

Symptom	Possible Cause(s)	Corrective Action
Pump will not run	1. Poor electrical connection, blown fuse, tripped breaker or other interruption of power; improper power supply 2. Motor or switch inoperative (go to manual operation) 2a. Float movement restricted 2b. Switch will not activate pump or is defective 2c. Defective motor 3. Insufficient liquid level	1. Check all electrical connections for security. Have electrician measure current in motor leads, if current is within ± 20% of locked rotor Amps, impeller is probably locked. If current is 0, overload may be tripped. Remove power, allow pump to cool, then re-check current. 2a. Reposition pump or clean basin as required to provide adaquate clearance for float 2b. Disconnect level control. Set ohmmeter for a low rang, such as 100 ohms full scale and connect to level control leads. Actuate level control manually and check to see that ohmmeter shows zero ohms for closed switch and full scale for open switch. (Float Switch) 2c. Check winding insulation (Megger Test) and winding resistance. If check is outside of range, dry and re-check. If still defective, replace per service instructions. 3. Make sure liquid level is above the pump 4. Re-check all sizing calculations to determine proper pump size. 5. Check discharge line for restrictions, including ice if line passes through or into cold areas. 6. Remove and examine check valve for proper installation and freedom of operation 7. Open valve 8. Check impeller for freedom of operation, security and condition. Clean impeller cavity and inlet of any obstruction Loosen union slightly to allow trapped air to escape. Verify that turn-off level of switch is set so that the suction is always flooded. Clean vent hole 10. Check rotation. If power supply is three phase, reverse any two of three power supply leads to ensure proper impeller rotation 11. Repair fixtures as required to eliminate leakage 12. Check pump temperature limits and fluid temperature 13. Replace portion of discharge pipe with flexible connector or tighten existing piping. 14. Turn to automatic position 15. Check for leaks around basin inlet and outlets
Pump will not turn off	2a. Float movement restricted 2b. Switch will not activate pump or is defective 4. Excessive inflow or pump not properly sized for application 9. Pump may be air locked causing pump not to flow 14. H-O-A switch on panel is in "HAND" position	
Pump hums but doesn't run	1. Incorrect low voltage 8. Impeller jammed or loose on shaft, or inlet plugged	
Pump delivers insufficient capacity	1. Incorrect low voltage 4. Excessive inflow or pump not properly sized for application 5. Discharge restricted 6. Check valve partially closed or installed backwards 7. Shut-off valve closed 8. Impeller jammed or loose on shaft, or inlet plugged 9. Pump may be air locked causing pump not to flow 10. Piping fixtures leaking or discharge before the nozzle	
when fixtures are not in use	6. Check valve partially closed or installed backwards 11. Fixtures are leaking 15. Ground water entering basin	
Pump shuts off and turns on independent of switch, (trips thermal overload protector). **CAUTION!** Pump may start unexpectedly. Disconnect power supply.	1. Incorrect low voltage 4. Excessive inflow or pump not properly sized for application 8. Impeller jammed or loose on shaft, or inlet plugged 12. Excessive water temperature (internal protection only)	
Pump operates noisily or vibrates excessively	2c. Worn bearings, motor shaft bent 5. Debris in impeller cavity or broken impeller 10. Pump running backwards 13. Piping attachments to building structure too loose or rigid	

NOTE: Keen Pumps assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Keen Pumps or its authorized service centers, automatically voids warranty.

KEEN PUMPS
FACTORY WARRANTY

Keen Pumps warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for 18 months from date of manufacture or 12 months from installation date whichever occurs first. This warranty gives you specific legal rights, which vary from state to state.

This warranty is a limited warranty, and no warranty related claims of any nature whatsoever shall be made against Keen Pumps, until the ultimate consumer or his/her successor notifies us in writing of the defect and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station as instructed by Keen Pumps. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE. PRODUCT SHALL BE EITHER REPLACED OR REPAIRED AT THE ELECTION OF KEEN PUMPS. Guarantees relating to performance specifications provided in addition to the foregoing material and workmanship warranties on a product manufactured by Keen Pumps, if any, are subject to possible factory testing. Any additional guarantees, in the nature of certified performance specifications or time frame must be in writing and such writing must be signed by our authorized factory manager at time of order placement and/or at time of quotation. Due to inaccuracies in field testing and should a conflict arises between the results of field testing conducted by or for the user, Keen Pumps reserves the right to have the product returned to our factory for additional testing.

This warranty shall not apply when damage is caused by (1) improper installation, (2) improper voltage, (3) lightning, (4) excessive sand or other abrasive material, (5) corrosion build-up due to excessive chemical content or (6) uncontrollable acts of god. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective pumps, parts or systems. Keen Pumps will not accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY. No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.

IMPORTANT!
If you have a claim under the provision of the warranty, contact Keen Pumps or your authorized Keen Pumps Distributor
www.keenpump.com

KEEN PUMP®

KEEN PUMP®

SPECIFICATIONS
Submersible Solids Handling Pump
Series: K6PL-DS

General:
Furnish and install a quantity of _____ Keen® Pumps submersible sewage pump(s), Model K6PL____DS, ____HP, ____ RPM, ____ phase, 60 Hz, ____ volts, with a 6 inch horizontal discharge 125 ANSI discharge flange connection. Each pump shall be capable of delivering the following performance, ____ US GPM at ____ ft total dynamic head, with a shut off head of ____ ft TDH minimum, and ____% efficiency at ____ US GPM at ____ft TDH operating point.

Pump Design:
The centrifugal sewage pump(s) shall be capable of handling 3 inch diameter spherical solids of raw, unscreened domestic sewage consisting of water, fibrous materials. The pump(s) shall be capable of handling liquids with temperatures to 104 °F continuous, and shall be capable of running dry for extended periods.

Pump Construction:
Castings: The volute, seal plates, impeller and motor housing shall be constructed of ASTM A-48 class 30 cast iron.

Coating/Hardware: Exterior surfaces shall be painted with a water based air dry enamel. All exposed hardware shall be 300 series stainless steel.

Gaskets: All gaskets shall be of the compression square ring type eliminating critical slip fits and the possibility of damage during service associated with sliding o-ring sealing arrangements.

Impeller: The impeller shall be of ___ vane, solid handling design with pump out vanes on the back side. Single and multi-vane impellers shall be capable of being trimmed to meet specific performance characteristics. The impeller shall be dynamically balanced to ISO G6.3 specifications.

Double mechanical seal: Shall be of the single spring design operating in an oil-filled seal cavity. The inner seal shall be constructed of carbon for the rotating face and ceramic for the stationary face, 300 series stainless steel hardware, and all elastomer parts to be of Buna-N. The outer seal shall be of silicon carbide faces, 300 series stainless steel hardware, and all elastomer parts to be of Buna-N. The seal shall be commercially available and not a manufacturers proprietary design.

Seal leak sensor: A seal leak detection system consisting of two normally open (N/O) probes shall be installed in the pump seal chamber. These probes will detect any moisture present and shall be connected in series to an alarm device or motor starter coil which will alert the operator that moisture has been detected in the seal cavity.

Motor: Design shall be of the capacitor start and capacitor run and overload protection for single phase units. Capacitors shall be located in an external control box. The pump shall be designed to be non-overloading throughout the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability.

The motor windings shall be of Class F insulation and operate in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of time without damage due to the heat being generated. The used dielectric oil must be disposed of as non-hazardous waste. The motor shall meet the standard NEMA L for single phase and NEMA B for three phase.

Thermal Protection: Thermal sensors shall be used to monitor stator temperatures. The stator shall be equipped with a thermal switch embedded in the end coil of the stator winding. This shall be used in conjunction with and supplemental to external motor overload protection and wired to the control panel.

Shaft: The pump shaft shall be of a one-piece design and shall be of 416 stainless steel.

Bearings: The lower bearing shall be of the double row ball type to accept radial and thrust loads, and the upper bearing of the single ball type for radial loads. Bearings shall operate in an oil bath atmosphere for superior life.

Power/Control Cords: Shall be equipped with ____ ft of type SOW power and control cords. The cords shall enter a cast iron terminal box assembly that is bolted to the motor housing and sealed with a Buna-N o-ring. The incoming lead wires shall be spliced in the terminal box. After splicing, the terminal box shall be filled with epoxy to seal the outer cable jacket and the individual strands to prevent water from entering the motor housing. Additional sealing and strain relief shall utilize a secondary pressure grommet at point of cable entry.

Tests and inspections: Shall be performed by the pump manufacture.

1. A ground continuity check and motor chamber shall be Hi-potted to test for electrical integrity.
2. Check that motor voltage and frequency matches name plate.
3. The pump shall be pressurized and a air leak test is performed to ensure the integrity of the motor housing.
4. The pump is submerged and operated to determine the unit meets hydraulic performance requirements.

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K6XPL-DS
15 HP / 1750 RPM
Discharge: 6"
Spherical solids handling: 3"

DISCHARGE
6", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104° F (40° C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

WEAR RING
Bronze.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 1 vane, closed, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord 2/3 G, sealed against moisture.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

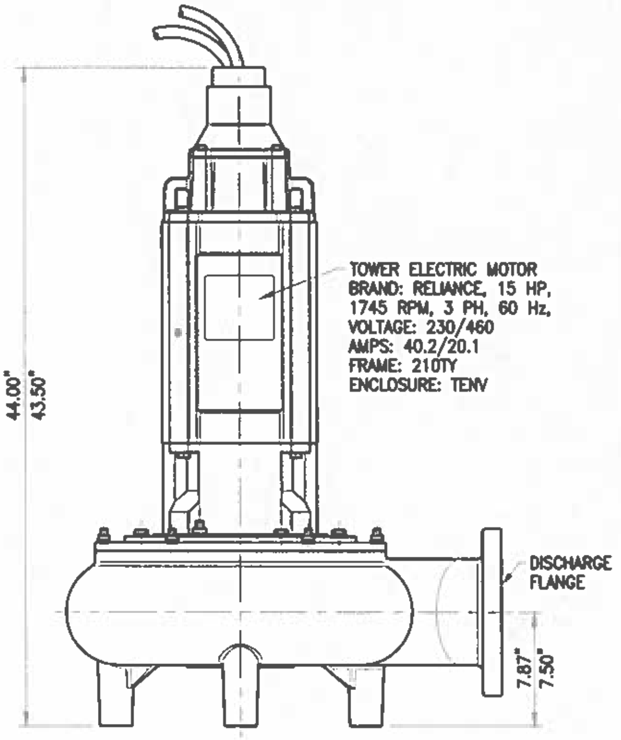
MOTOR
NEMA B, three phase, 460 volts, 60 Hz, 1750 RPM, air cooled. Explosion Proof, Class 1, Division 1, Group C & D, insulation Class F. Requires overload protection to be included in control panel.

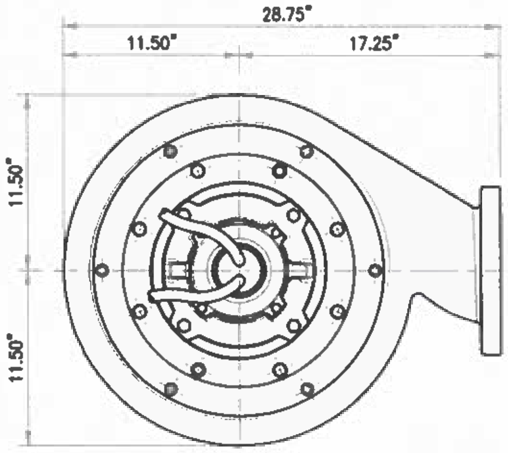
MOISTURE SENSOR
Normally open (N/O) included.

TEMPERATURE SENSOR
Normally closed (N/C) included.

OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-6).

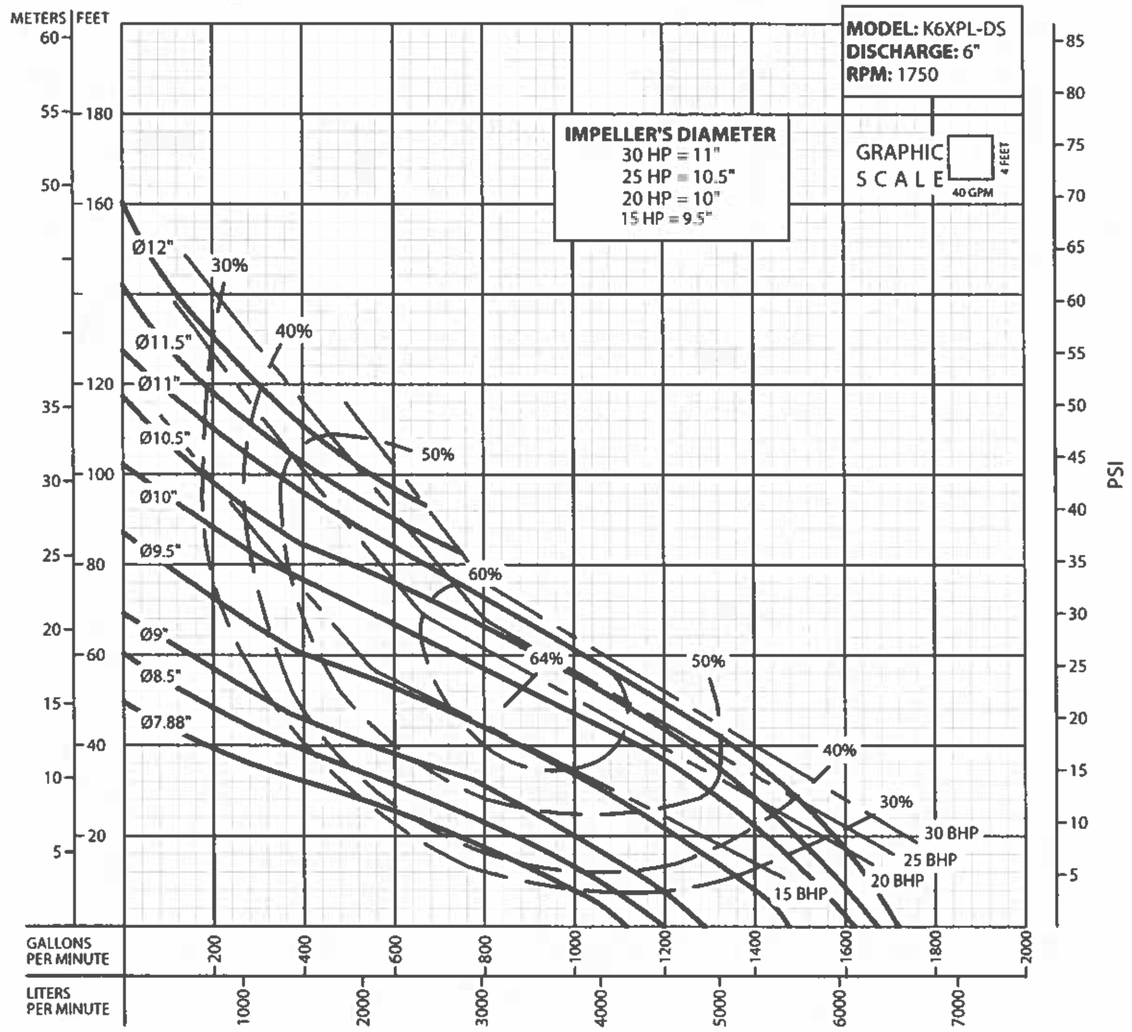
SPECIFICATIONS





DISCHARGE FLANGE

BRANCH:	6"
RATING:	150 PSI
O.D.:	11.00"
BOLTS:	8
BOLTS SIZE:	.750"
BCD:	9.50"
THICK:	1.00"



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K6XPL-DS
20 HP / 1750 RPM
Discharge: 4"
Spherical solids handling: 4"

DISCHARGE
6", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104° F (40° C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

WEAR RING
Bronze.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 1 vane, closed, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord 2/4 G, sealed against moisture.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

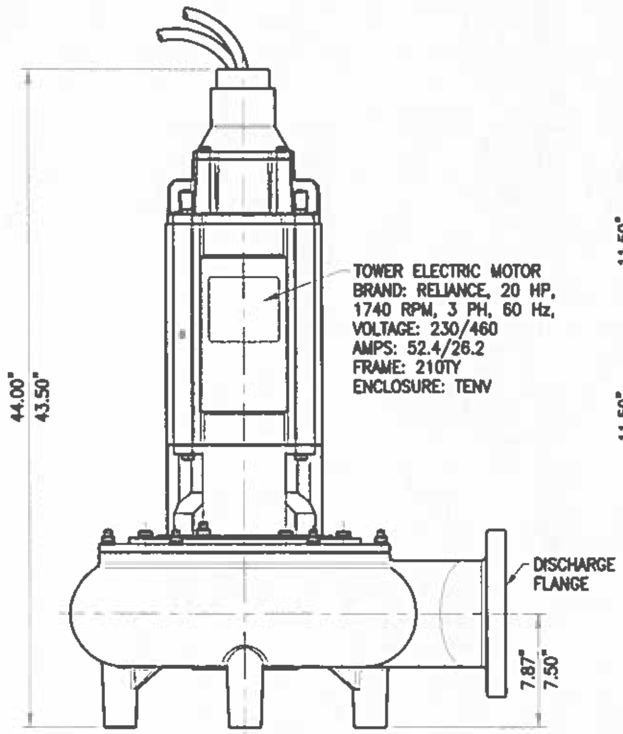
MOTOR
NEMA B, three phase, 460 volts, 60 Hz, 1750 RPM, air cooled. Explosion Proof, Class 1, Division 1, Group C & D, insulation Class F. Requires overload protection to be included in control panel.

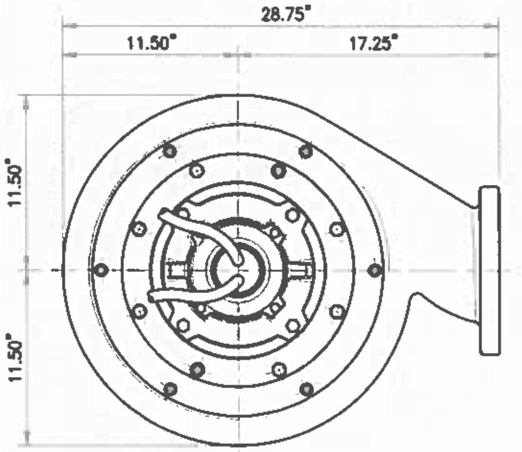
MOISTURE SENSOR
Normally open (N/O) included.

TEMPERATURE SENSOR
Normally closed (N/C) included.

OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-6).

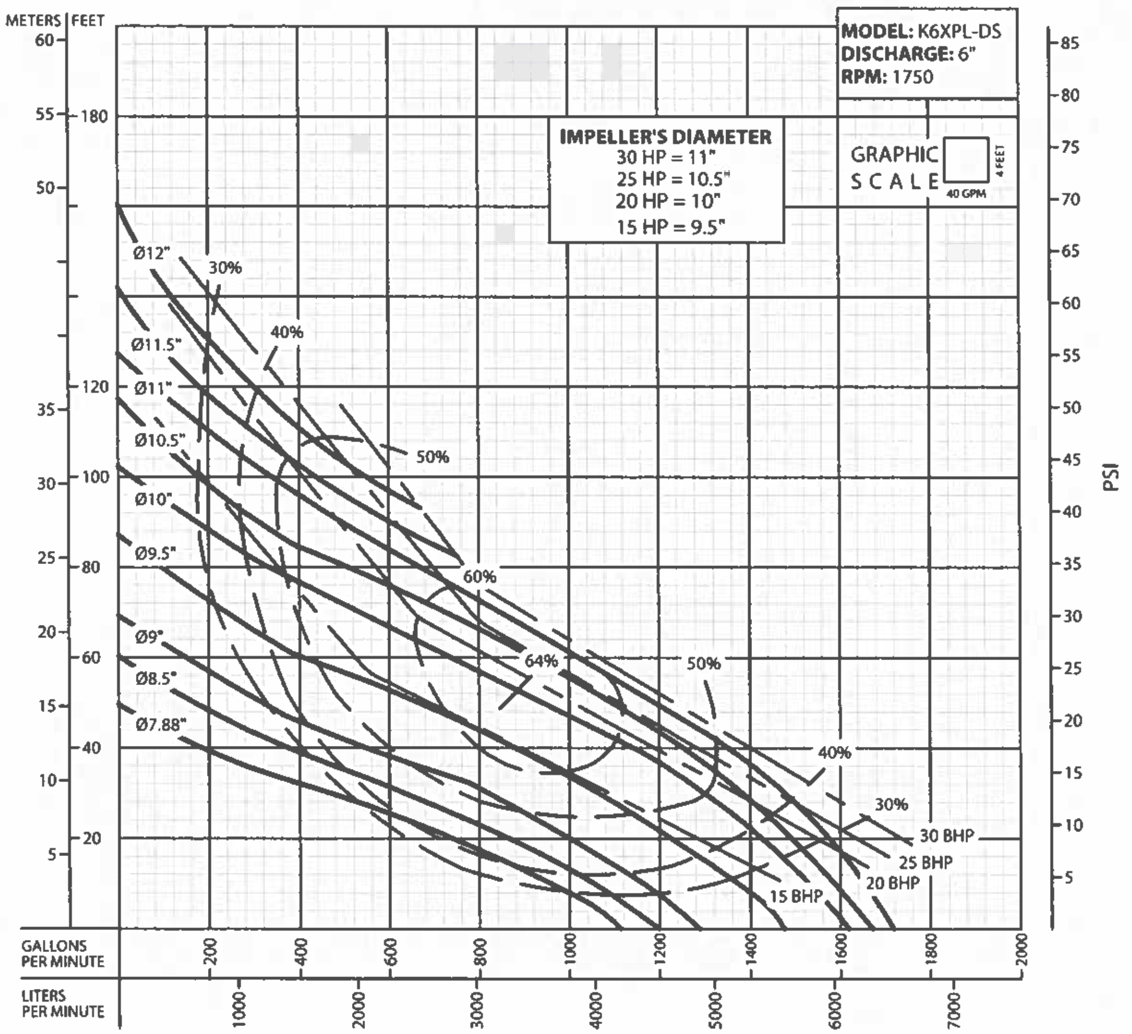
SPECIFICATIONS





DISCHARGE FLANGE

BRANCH:	6"
RATING:	150 PSI
O.D.:	11.00"
BOLTS:	8
BOLTS SIZE:	.750"
BCD:	9.50"
THICK:	1.00"



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K6XHPL-DS
40 HP / 1750 RPM
Discharge: 6"
Spherical solids handling: 4"

DISCHARGE
6", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104° F (40° C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

WEAR RING
Bronze.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 1 vane, closed, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Buna-N.

PAINT
Air dry enamel, water based.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord 2/4 G, sealed against moisture.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

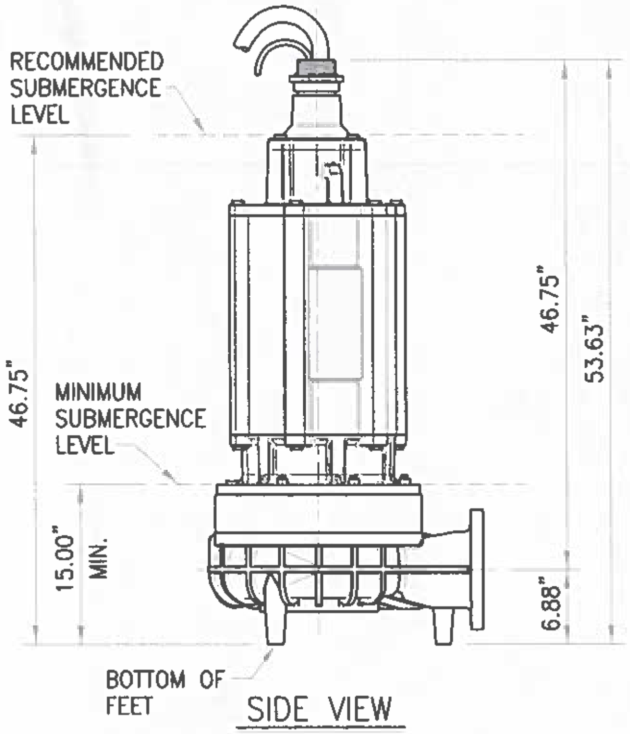
MOTOR
NEMA B, three phase, 460 volts, 60 Hz, 1750 RPM, air cooled. Explosion Proof, Class 1, Division 1, Group C & D, insulation Class F. Requires overload protection to be included in control panel.

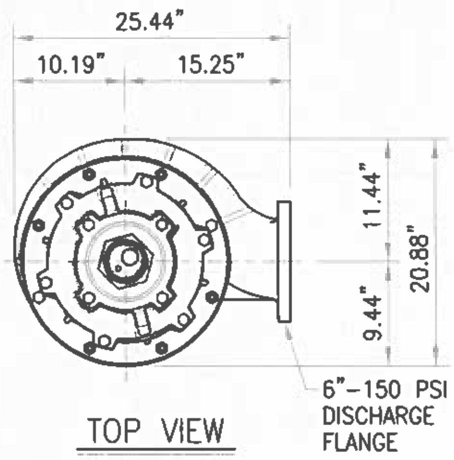
MOISTURE SENSOR
Normally open (N/O) included.

TEMPERATURE SENSOR
Normally closed (N/C) included.

OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-6).

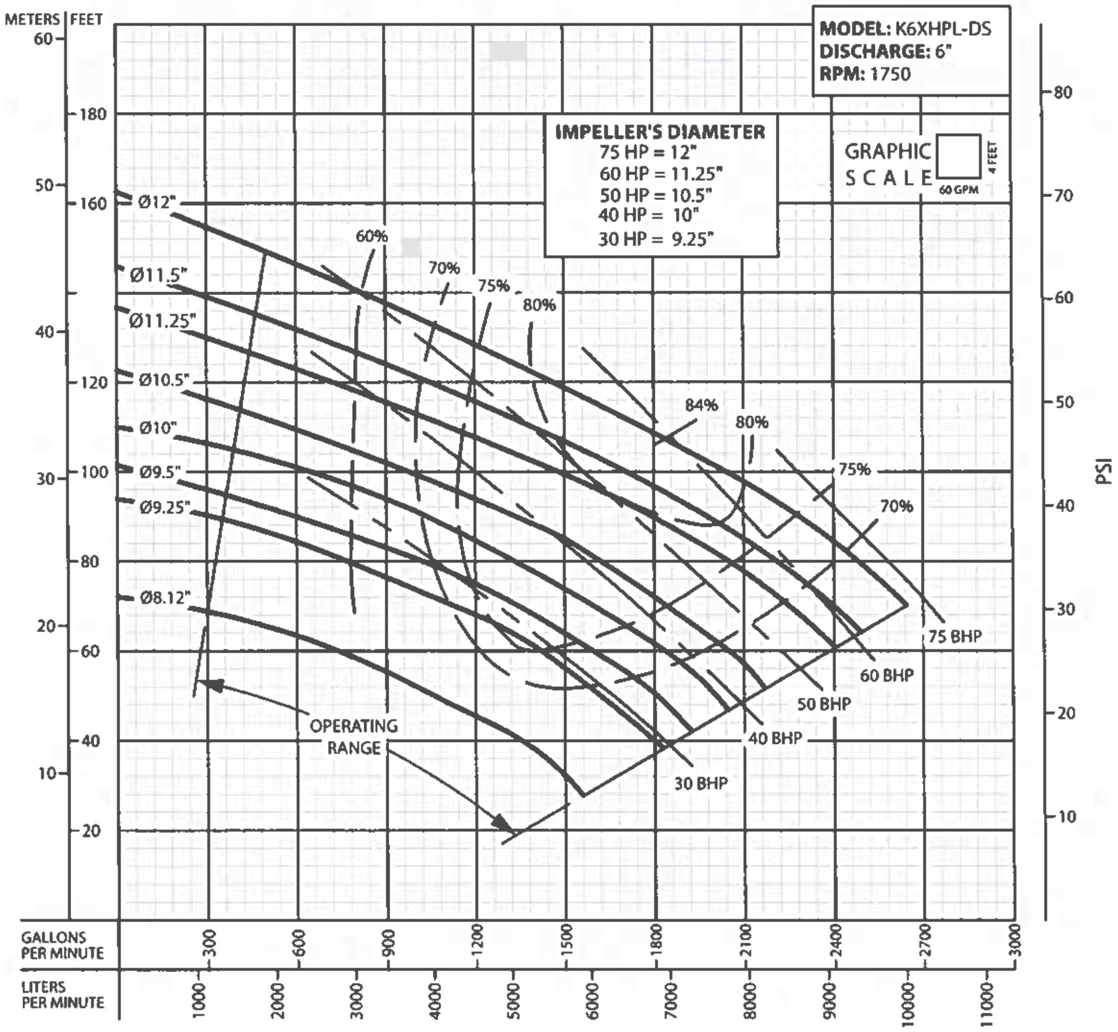
SPECIFICATIONS





ALL DIMENSIONS IN INCHES.

ELECTRIC MOTOR SPECS:
BRAND: BALDOR-RELIANCE
HP: 40
RPM: 1770
VOLTS: 460
HZ: 60
PH: 3
FRAME: 320TY
ENCL: TENV



IMPORTANT!
1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K6XHPL-DS
30-75 HP / 1750 RPM
Discharge: 6"
Spherical solids handling: 3"

DISCHARGE
6", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104° F (40° C) continuous.

VOLUTE
Cast iron ASTM A-48 class 30.

WEAR RING
Bronze.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 3 vane, closed, with vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

PAINT
Air dry enamel, water based.

HARDWARE
300 series stainless steel.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord 2/4 G, sealed against moisture.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, double row, grease lubricated, for radial and thrust load.

MOTOR
NEMA B, three phase, 460 volts, 60 Hz, 1750 RPM, air cooled. Explosion Proof, Class 1, Division 1, Group C & D, insulation Class F. Requires overload protection to be included in control panel.

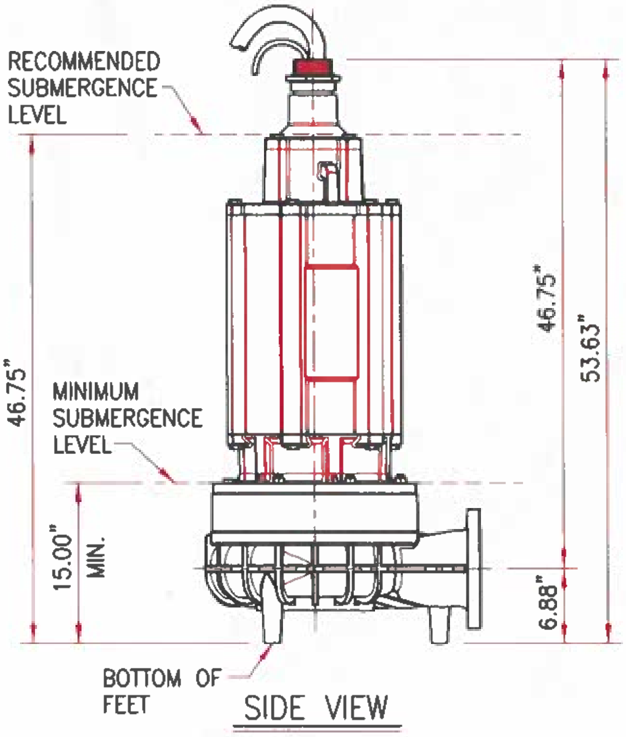
MOISTURE SENSOR
Normally open (N/O) included.

TEMPERATURE SENSOR
Normally closed (N/C) included.

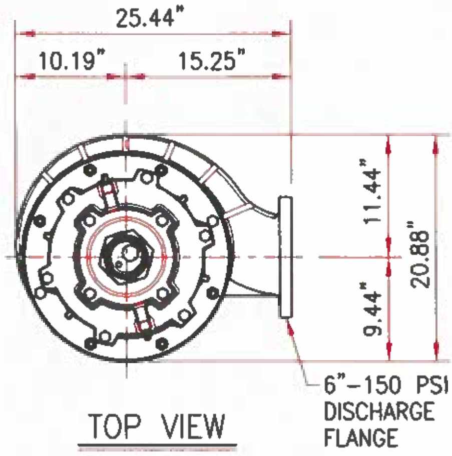
OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-6).

SPECIFICATIONS

SPECIFICATIONS



SIDE VIEW

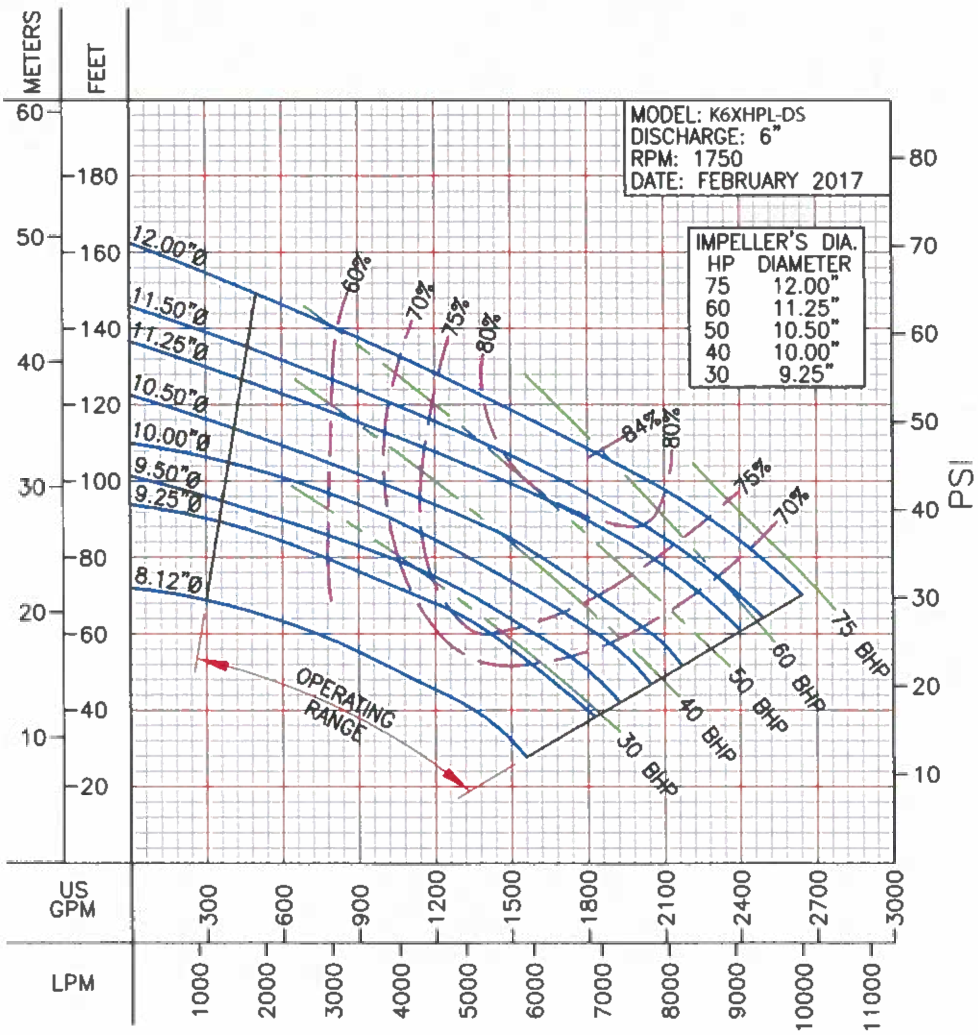


TOP VIEW

ALL DIMENSIONS IN INCHES.

ELECTRIC MOTOR SPECS:

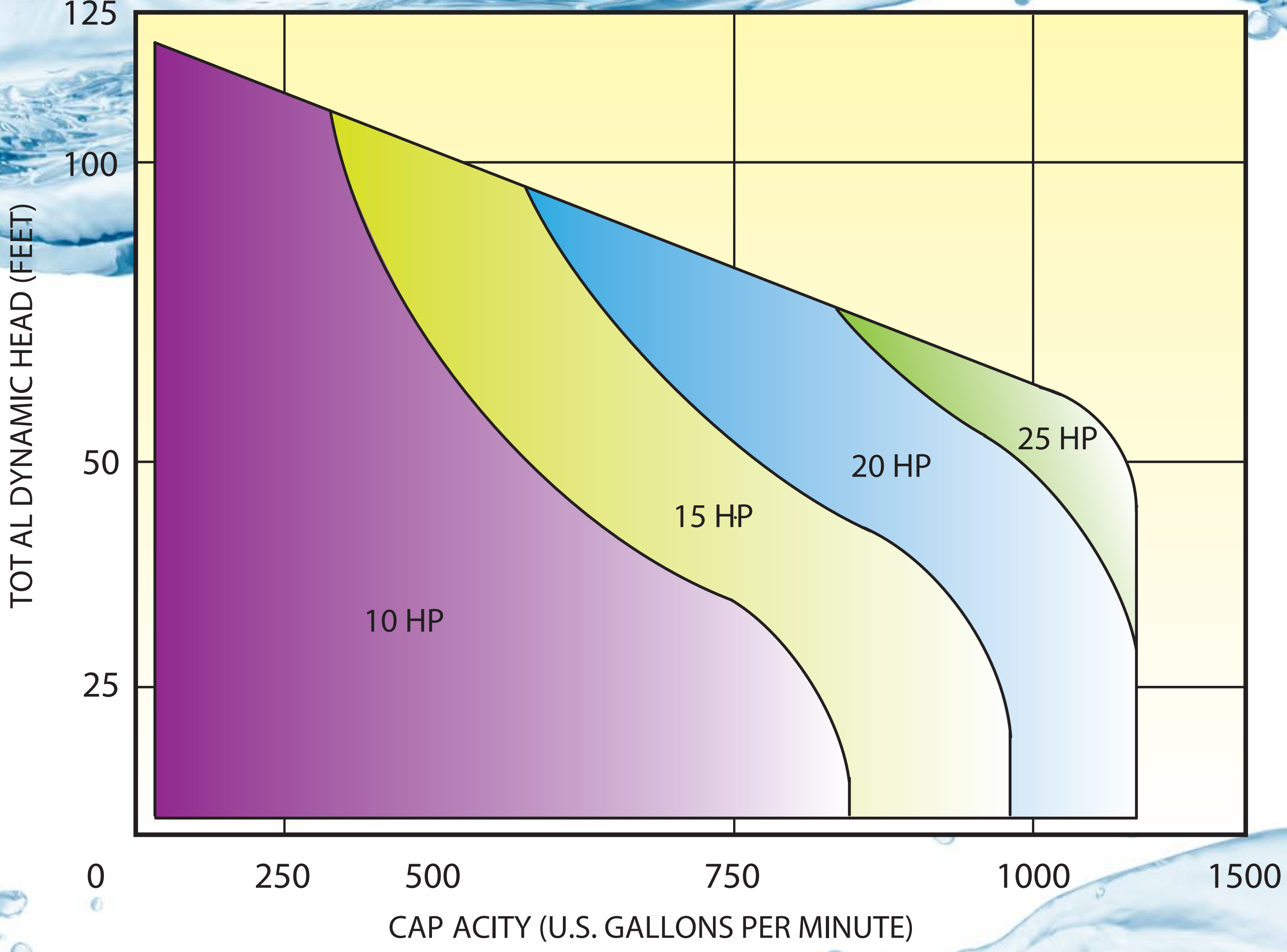
BRAND: BALDOR-RELIANCE
HP: 75
RPM: 1770
VOLTS: 460
HZ: 60
PH: 3
FRAME: 320TY
ENCL: TENV



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

K6H Non-Clog Pump Series



KEEN PUMP CO.®
Your Premier Pump Choice

471 E State Route 250 East
Ashland, Ohio

KH Series

The KH Series pumps are designed for demanding services such as wastewater, municipal sewage treatment plants, storm water, industrial, commercial and a wide range of water handling applications.

The KH Series pumps feature a self-contained cooling jacket system, circulating impeller, heat exchanger plate and liquid refrigerant with a high boiling point (195°C). Standard construction allows for submersible and dry pit installations.

The pumps are equipped with high efficiency, inverter duty rated, Class H insulation motors. Electrical features include a fully automatic alarm protection system and liquid level control system, protecting the motor from water, oil, phase loss, overheating and grounding.

Features:

- **Flows ---------------------------------- Up to 20,000 GPM**
- **Heads ---------------------------------- Up to 150 Feet**
- **HP Range -------------------------------- Up to 350 HP**
- **Voltage Options -------------------------- 460 volt, 3 phase**
- **Discharge Connections ------------------- 6" to 24"**
- **Motor Speeds --------------------------- 1150 / 1750 / 3450 rpm**
- **Solids Handling ------------------------- 3.5" to 6"**
- **Impeller ----------------------------**
- **Motor Serice Factor ----------------------- 1.15**

KEEN PUMP

K8H 350hp

8" Solids-Handling Pump

KEEN PUMP "KH" Series pumps are designed for demanding wastewater, municipal sewage treatment plants, storm water, industrial, commercial and a wide range of water-handling applications.

"KH" Series pumps feature a self-contained cooling jacket system, circulating impeller, heat exchanger plate and liquid refrigerant with a high boiling point (195º C). Standard construction allows for submersible and dry pit installations.

"KH" pumps are equipped with high-efficiency, inverter-duty rated, Class H insulation motors. Electrical features include fully automatic alarm protection system and liquid level control system, protecting the motor from water, oil, phase loss, overheating and grounding.

CAPABILITIES:

- **Flows-------------------------------------- to 6300 GPM**
- **Heads------------------------------------ to 330 Feet**
- **Horsepower---------------------------- 350 HP**
- **Voltage / Phase Options------------- 460, 3 Phase**
- **Discharge Connections-------------- 8" ANSI 150 Lb. Horizontal Flange**
- **Motor Speeds-------------------------- 1750 RPM**
- **Solids-Handling------------------------ 3.5"**
- **Impeller---------------------------------- Balanced, Vaned - Enclosed**
- **Motor Service Factor----------------- 1.20**

Features and Benefits

K8H

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grips with compression grommets protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged. 40' UL power & control cords. Additional sealing accomplished by individually soldered wires.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 30 cast iron components.

3. Strong Motor / Cooling Jacket System
Powerful high-torque, Class F motor for reliable pump operation. Overload protection in air-filled chamber. Inverter-duty wire for VFD / soft start operation, continuous duty. Self-contained cooling jacket system with recirculating impeller. Includes heat exchanger plate. Liquid refrigerant coolant supplied.

4. Solid Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearings rated for 100,000 hour B-10 life.

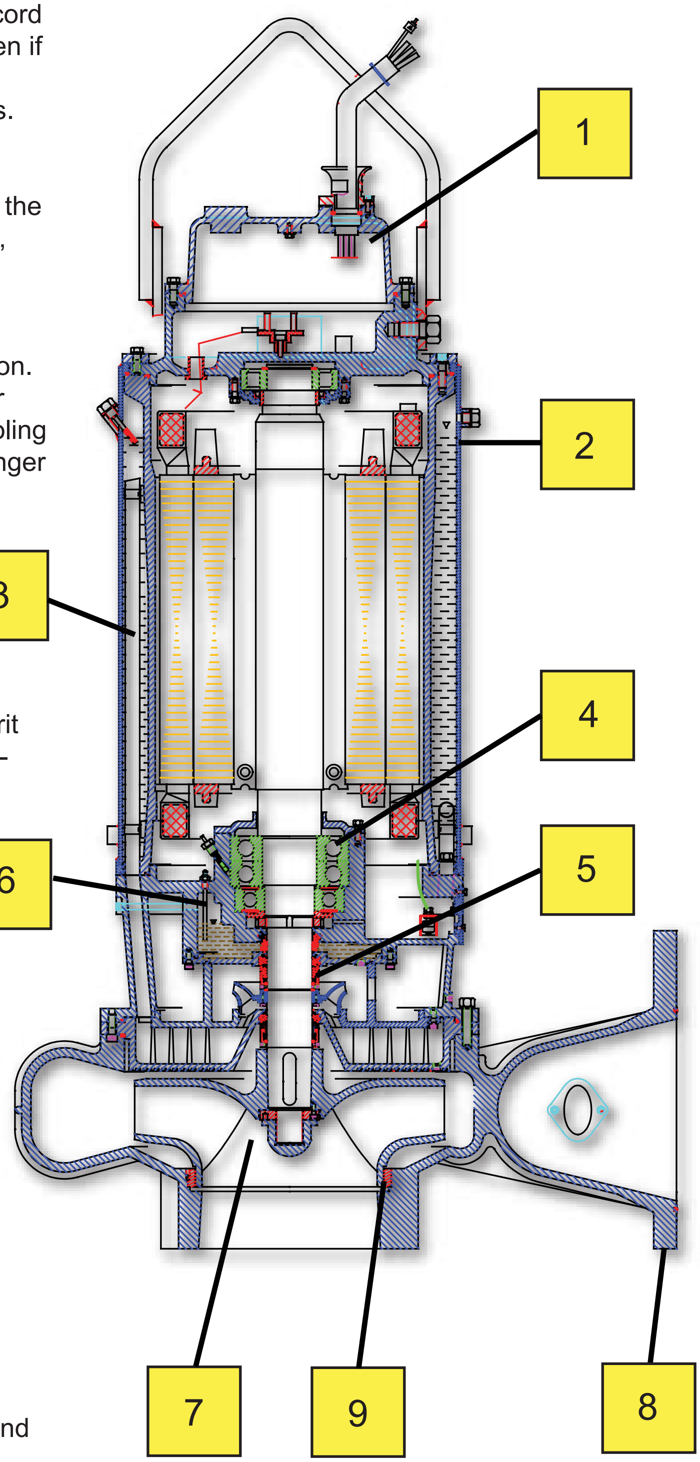
5. Severe Duty Dual Mechanical Seals
Dual mechanical shaft seals provide twice the moisture and grit protection for the motor. Silicon-Carbide Upper and Tungsten-Carbide Lower seals are housed in a secondary oil-filled seal chamber. Tougher material seals better handle sand, grit and abrasive materials.

6. 3-Chamber Moisture Detection
Moisture detection in lower seal chamber, motor housing and upper cord cap housing.

7. High Efficiency Hydraulic Design
Highly efficient enclosed, vaned impeller easily passes 3.5" diameter solids without blockage. Strong, ductile iron impeller features backside pump-out vanes, keeping lower seal clean and pressure-compensated for longer life. Dynamically balanced for smooth, quiet operation and long bearing life.

8. Standard Flange Connection
8" Horizontal, 150 Lb., ANSI discharge flange. Industry standard, 8-bolt pattern.

9. High Performance Wear Ring
Assists impeller in providing higher performance efficiencies and prevention of recirculation losses. Ring will not corrode or deteriorate from liquid being pumped. Ring reduces wear to stronger ductile iron impeller in sandy or gritty applications. Easily serviceable and replaceable.



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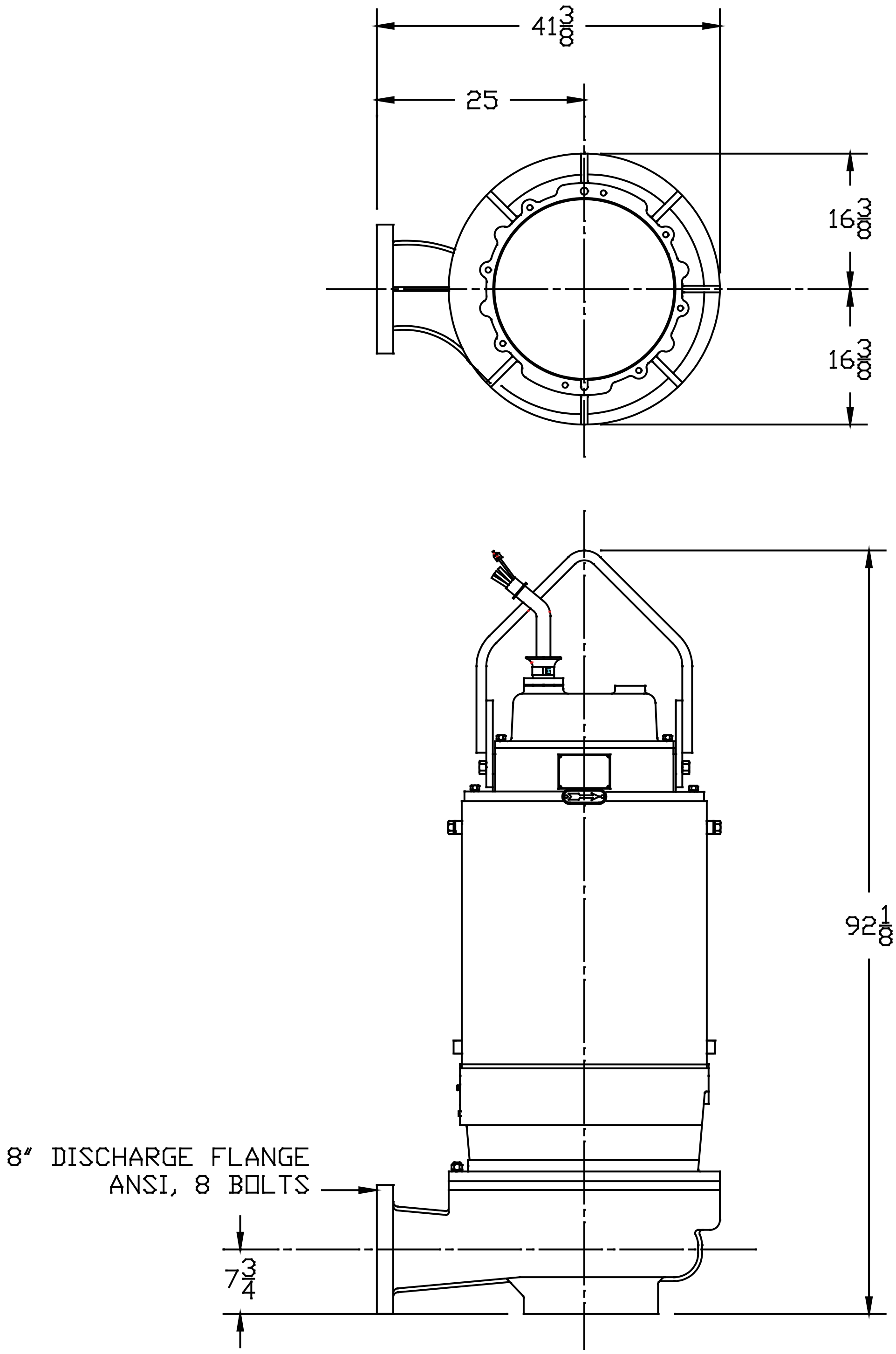
KEEN PUMP

Section **ENCLOSED**
Date **NOV 2015**

Pump Series	**K8H**	8″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K8H Dimensions

Keen Pump

K12H Series

12” *SUBMERSIBLE WASTEWATER PUMPS*

The K12H Series pumps are designed for demanding services such as wastewater, municipal sewage treatment plants, storm water, industrial, commercial and a wide range of water handling applications.

The K12H Series pumps feature:

- **Capacities to 7,000 gpm**
- **Heads to 150’**
- **12” ANSI discharge flanges**
- **Power requirements to 300 HP**
- **Minimum 1.15 Motor Service Factor**

The K12H Series pumps feature a self-contained cooling jacket system, circulating impeller, heat exchanger plate and liquid refrigerant with a high boiling point (195 degree C). Standard construction allows for submersible and dry pit installations. Many material options for impeller / volute wear rings and chemical resistant coatings.

The pumps are equipped with high efficiency, inverter duty rated, Class H insulation motors. Electrical features include a fully automatic alarm protection system and liquid level control system, protecting the motor from water, oil, phase loss, overheating and grounding.

ACCESSORIES

- ***Lift-out base elbow assemblies***
- ***Guide rail system / components***
- ***Engineered control panels***

Solids-Handling Pumps

KEEN PUMP

K14H

14” Submersible, Enclosed Impeller

KEEN PUMP “KH” Series pumps are designed for demanding wastewater, municipal sewage treatment plants, storm water, industrial, commercial and a wide range of water-handling applications.

“KH” Series pumps feature a self-contained cooling jacket system, circulating impeller, heat exhanger plate and liquid refrigerant with a high boiling point (195º C). Standard construction allows for submersible and dry pit installations.

“KH” pumps are equipped with high-efficiency, inverter-duty rated, Class H insulation motors. Electrical features include fully automatic alarm protection system and liquid level control system, protecting the motor from water, oil, phase loss, overheating and grounding.

CAPABILITIES:

- Flows-------------------------------------- to 10,000 GPM
- Heads------------------------------------ to 70 Feet
- Horsepower---------------------------- 100 HP
- Voltage / Phase Options------------- 460, 3 Phase
- Discharge Connections-------------- 14” ANSI 150 Lb. Horizontal Flange
- Motor Speeds-------------------------- 875 RPM
- Solids-Handling------------------------ 6”
- Impeller--------------------------------- Balanced, Vaned - Enclosed
- Motor Service Factor----------------- 1.20

Features and Benefits

K14H

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grips with compression grommets protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged. 40' UL power & control cords. Additional sealing accomplished by individually soldered wires.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 30 cast iron components.

3. Strong Motor / Cooling Jacket System
Powerful high-torque, Class H motor for reliable pump operation. Overload protection in air-filled chamber. Inverter-duty wire for VFD / soft start operation, continuous duty. Self-contained cooling jacket system with recirculating impeller. Includes heat exchanger plate. Liquid refrigerant coolant supplied.

4. Solid Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearings rated for 100,000 hour B-10 life.

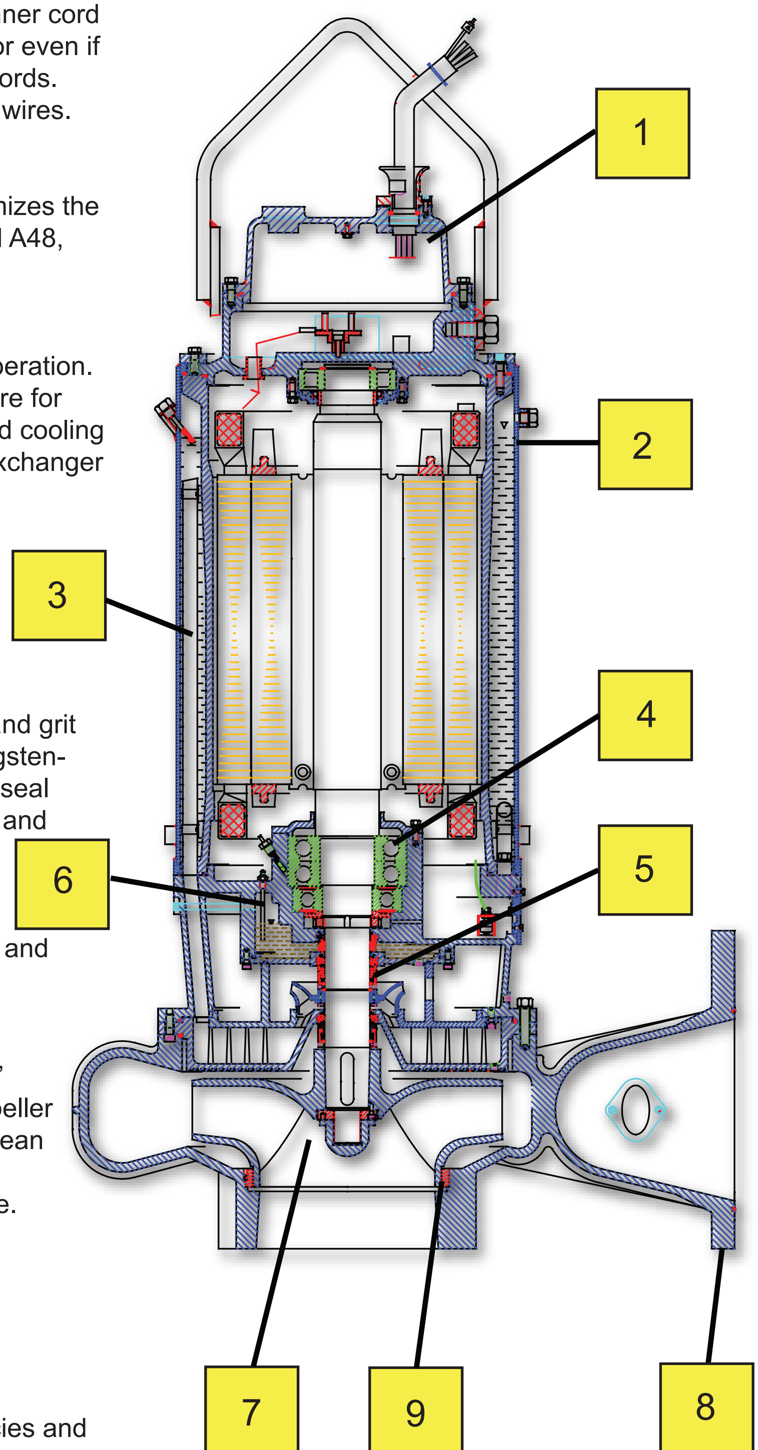
5. Severe Duty Dual Mechanical Seals
Dual mechanical shaft seals provide twice the moisture and grit protection for the motor. Silicon-Carbide Upper and Tungsten-Carbide Lower seals are housed in a secondary oil-filled seal chamber. Tougher material seals better handle sand, grit and abrasive materials.

6. 3-Chamber Moisture Detection
Moisture detection in lower seal chamber, motor housing and upper cord cap housing.

7. High Efficiency Hydraulic Design
Highly efficient enclosed, vaned impeller easily passes 6" diameter solids without blockage. Strong, ductile iron impeller features backside pump-out vanes, keeping lower seal clean and pressure-compensated for longer life. Dynamically balanced for smooth, quiet operation and long bearing life.

8. Standard Flange Connection
14" Horizontal, 150 Lb., ANSI discharge flange. Industry standard, 12-bolt pattern.

9. High Performance Wear Ring
Assists impeller in providing higher performance efficiencies and prevention of recirculation losses. Ring will not corrode or deteriorate from liquid being pumped. Ring reduces wear to stronger ductile iron impeller in sandy or gritty applications. Easily serviceable and replaceable.



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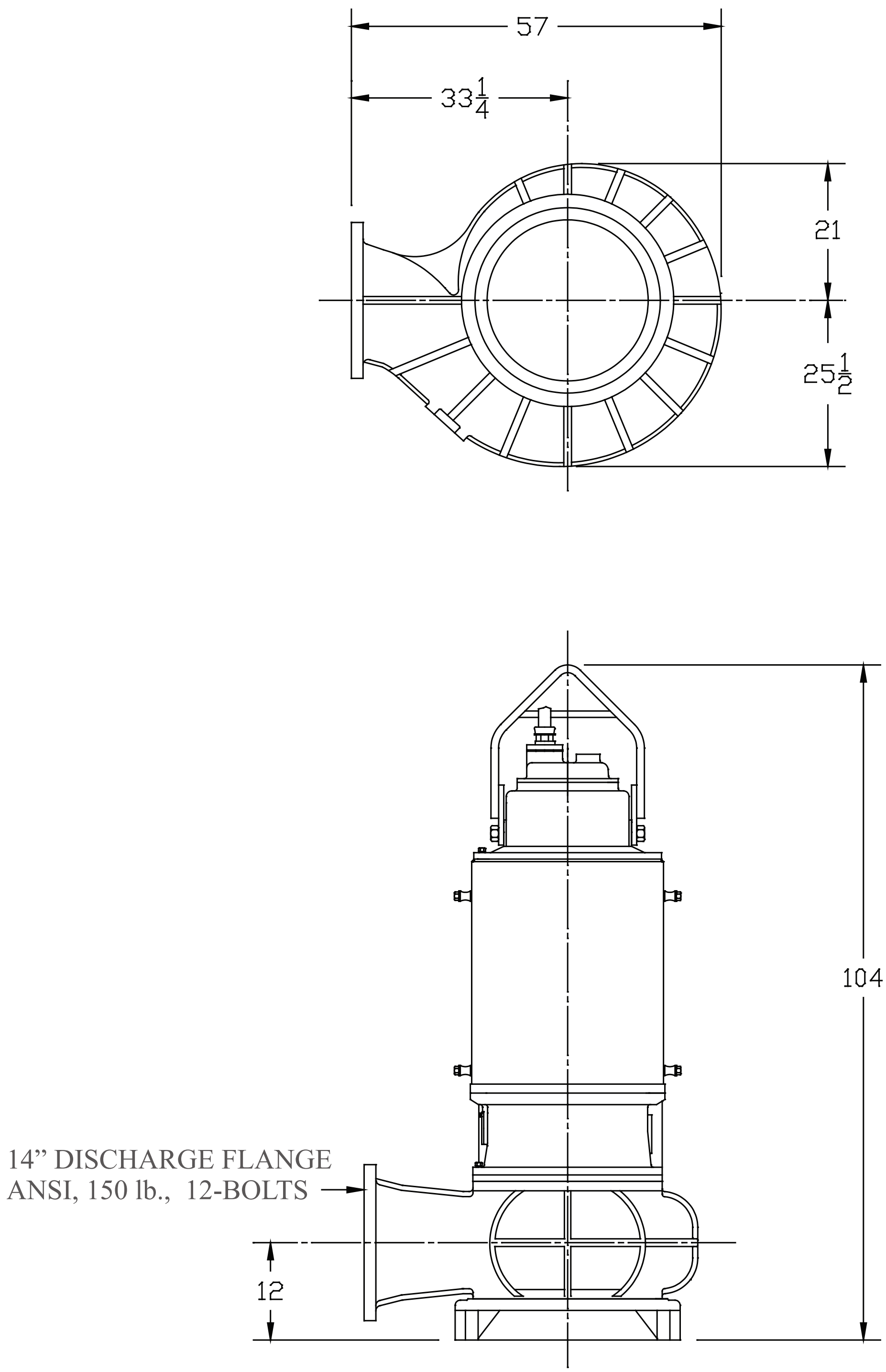
Pump Series	**K14H**	14″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



Note: All dimensions in inches and (millimeters).
Dimensions may vary due to normal manufacturing tolerances.

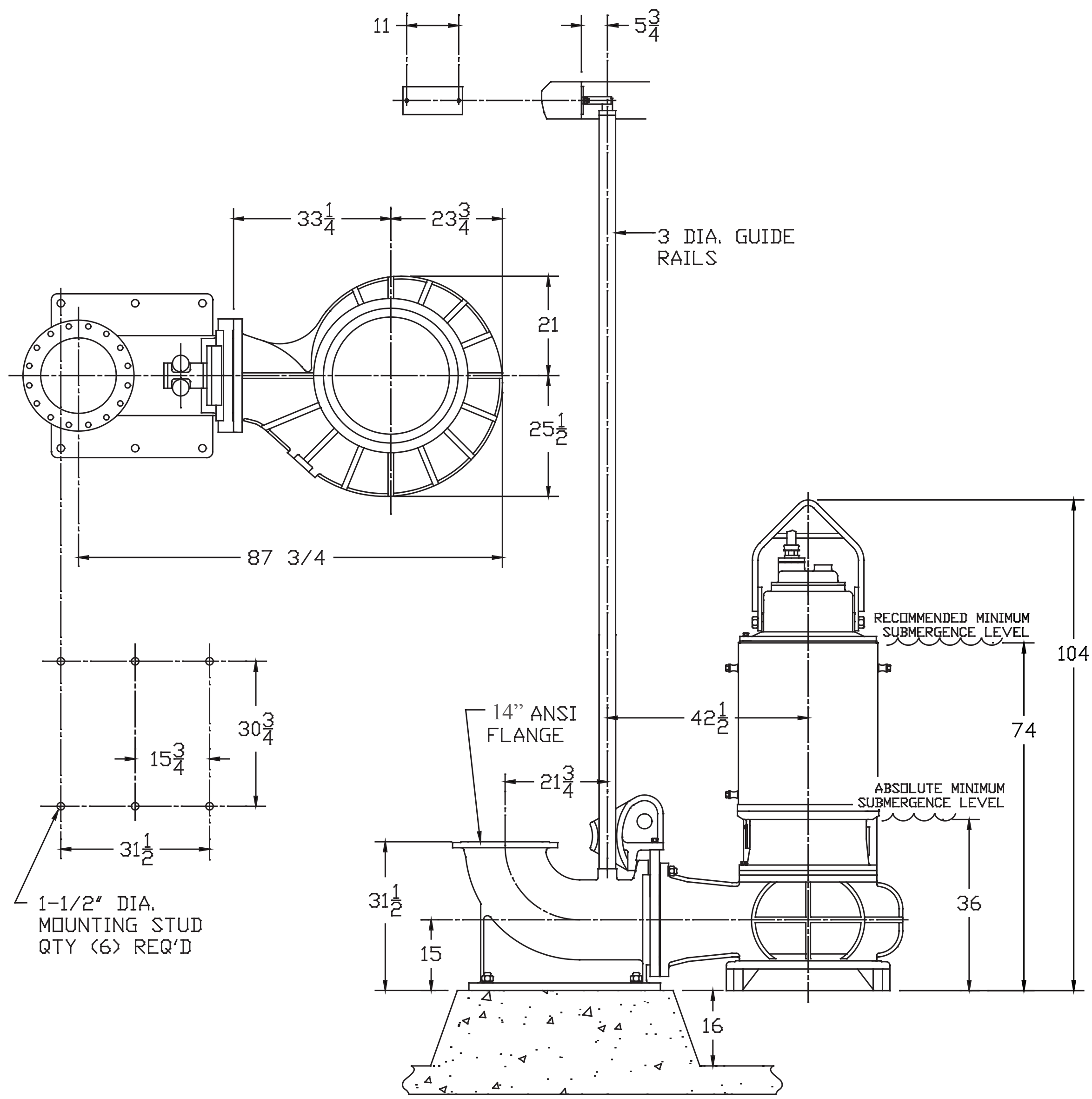
File: K14H Dimensions

KEEN PUMP

Section ENCLOSED
Date April 2015

Pump Series	K14H	14″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



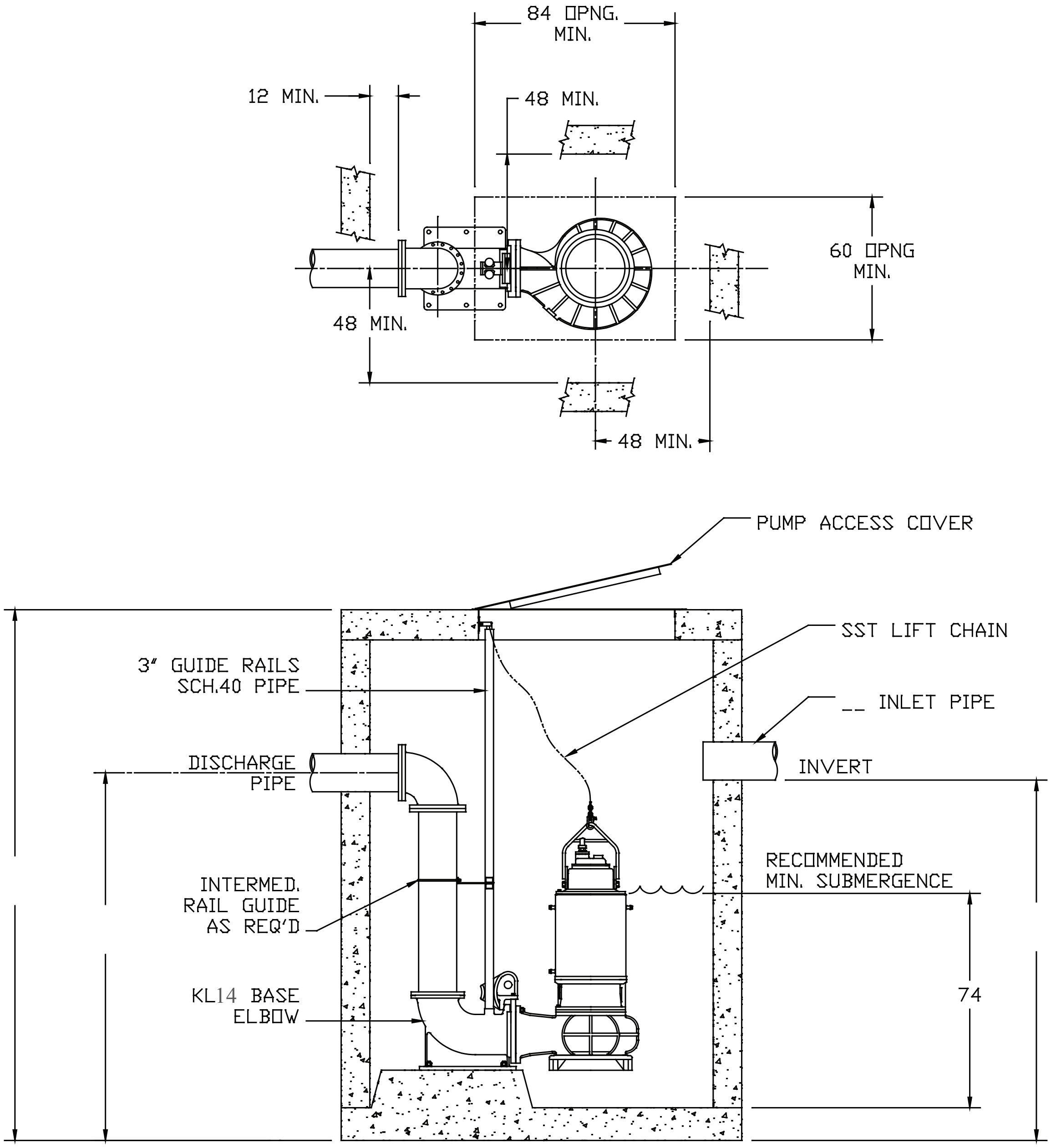
Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI 150 lb. unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K14H Liftout Dimensions

Section ENCLOSED
Date April 2015

Pump Series	K14H	14″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



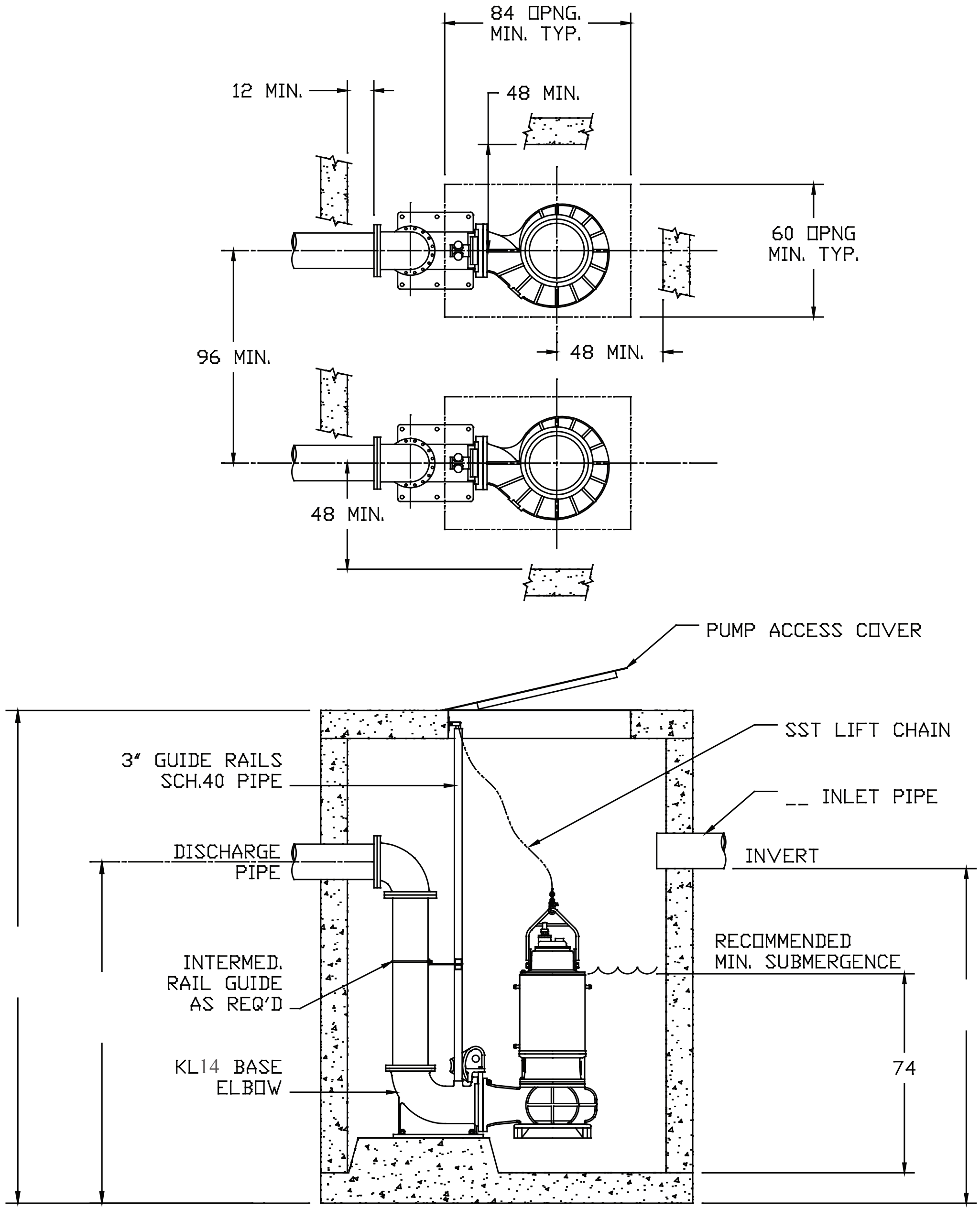
Notes:
1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. Dimensions may vary due to normal manufacturing tolerances.
7. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K14H Install Dimensions

Section ENCLOSED
Date April 2015

Pump Series	K14H	14″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:

1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. Dimensions may vary due to normal manufacturing tolerances.
7. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K14H Install Dimensions

KEEN PUMP

K16H

16” Submersible, Enclosed Impeller

KEEN PUMP “KH” Series pumps are designed for demanding wastewater, municipal sewage treatment plants, storm water, industrial, commercial and a wide range of water-handling applications.

“KH” Series pumps feature a self-contained cooling jacket system, circulating impeller, heat exchanger plate and liquid refrigerant with a high boiling point (195º C). Standard construction allows for submersible and dry pit installations.

“KH” pumps are equipped with high-efficiency, inverter-duty rated, Class H insulation motors. Electrical features include fully automatic alarm protection system and liquid level control system, protecting the motor from water, oil, phase loss, overheating and grounding.

CAPABILITIES:

- **Flows-------------------------------------- to 12,500 GPM**
- **Heads------------------------------------ to 131 Feet**
- **Horsepower---------------------------- 275 HP**
- **Voltage / Phase Options------------- 460, 3 Phase**
- **Discharge Connections-------------- 16” ANSI 150 Lb. Horizontal Flange**
- **Motor Speeds-------------------------- 710 RPM**
- **Solids-Handling----------------------- 6”**
- **Impeller---------------------------------- Balanced, Vaned - Enclosed**
- **Motor Service Factor----------------- 1.20**

K16H

Features and Benefits

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grips with compression grommets protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged. 40' UL power & control cords. Additional sealing accomplished by individually soldered wires.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 30 cast iron components.

3. Strong Motor / Cooling Jacket System
Powerful high-torque, Class H motor for reliable pump operation. Overload protection in air-filled chamber. Inverter-duty wire for VFD / soft start operation, continuous duty. Self-contained cooling jacket system with recirculating impeller. Includes heat exchanger plate. Liquid refrigerant coolant supplied.

4. Solid Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearings rated for 100,000 hour B-10 life.

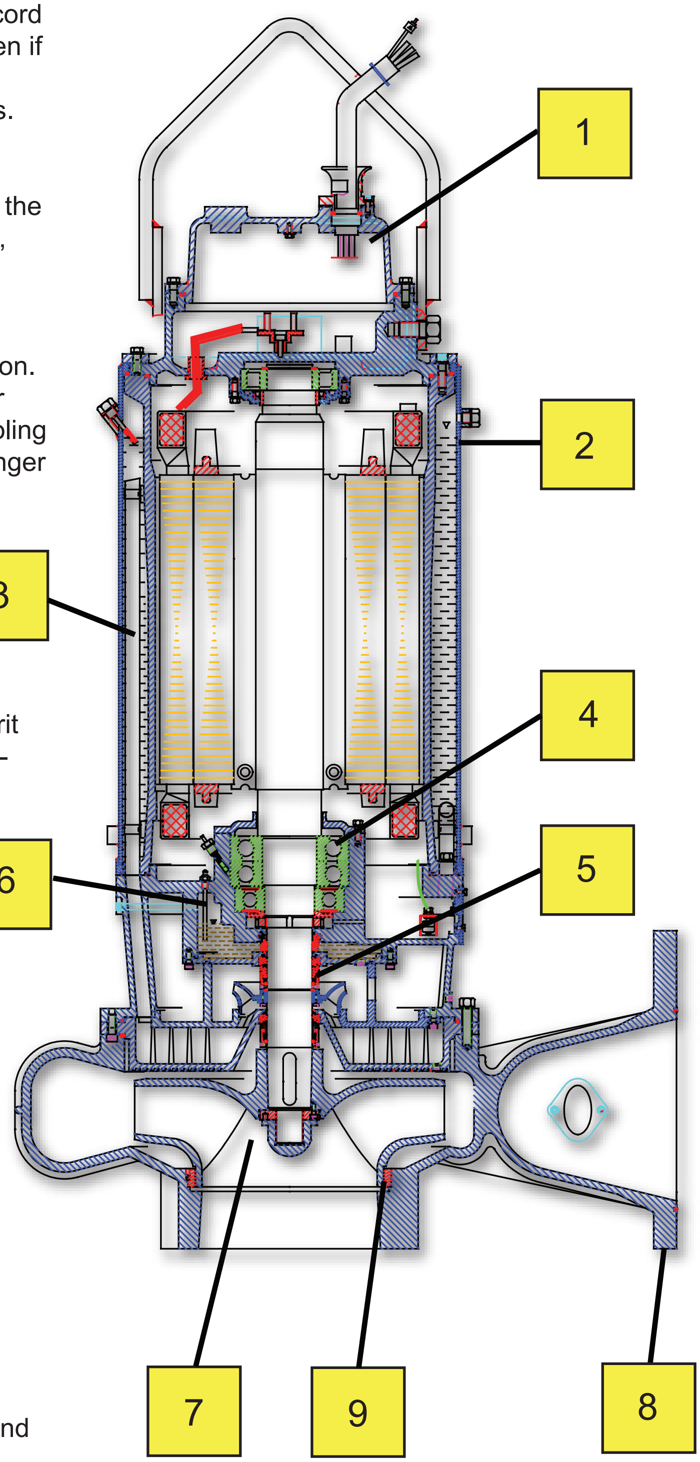
5. Severe Duty Dual Mechanical Seals
Dual mechanical shaft seals provide twice the moisture and grit protection for the motor. Silicon-Carbide Upper and Tungsten-Carbide Lower seals are housed in a secondary oil-filled seal chamber. Tougher material seals better handle sand, grit and abrasive materials.

6. 3-Chamber Moisture Detection
Moisture detection in lower seal chamber, motor housing and upper cord cap housing.

7. High Efficiency Hydraulic Design
Highly efficient enclosed, vaned impeller easily passes 6" diameter solids without blockage. Strong, ductile iron impeller features backside pump-out vanes, keeping lower seal clean and pressure-compensated for longer life. Dynamically balanced for smooth, quiet operation and long bearing life.

8. Standard Flange Connection
16" Horizontal, 150 Lb., ANSI discharge flange. Industry standard, 16-bolt pattern.

9. High Performance Wear Ring
Assists impeller in providing higher performance efficiencies and prevention of recirculation losses. Ring will not corrode or deteriorate from liquid being pumped. Ring reduces wear to stronger ductile iron impeller in sandy or gritty applications. Easily serviceable and replaceable.



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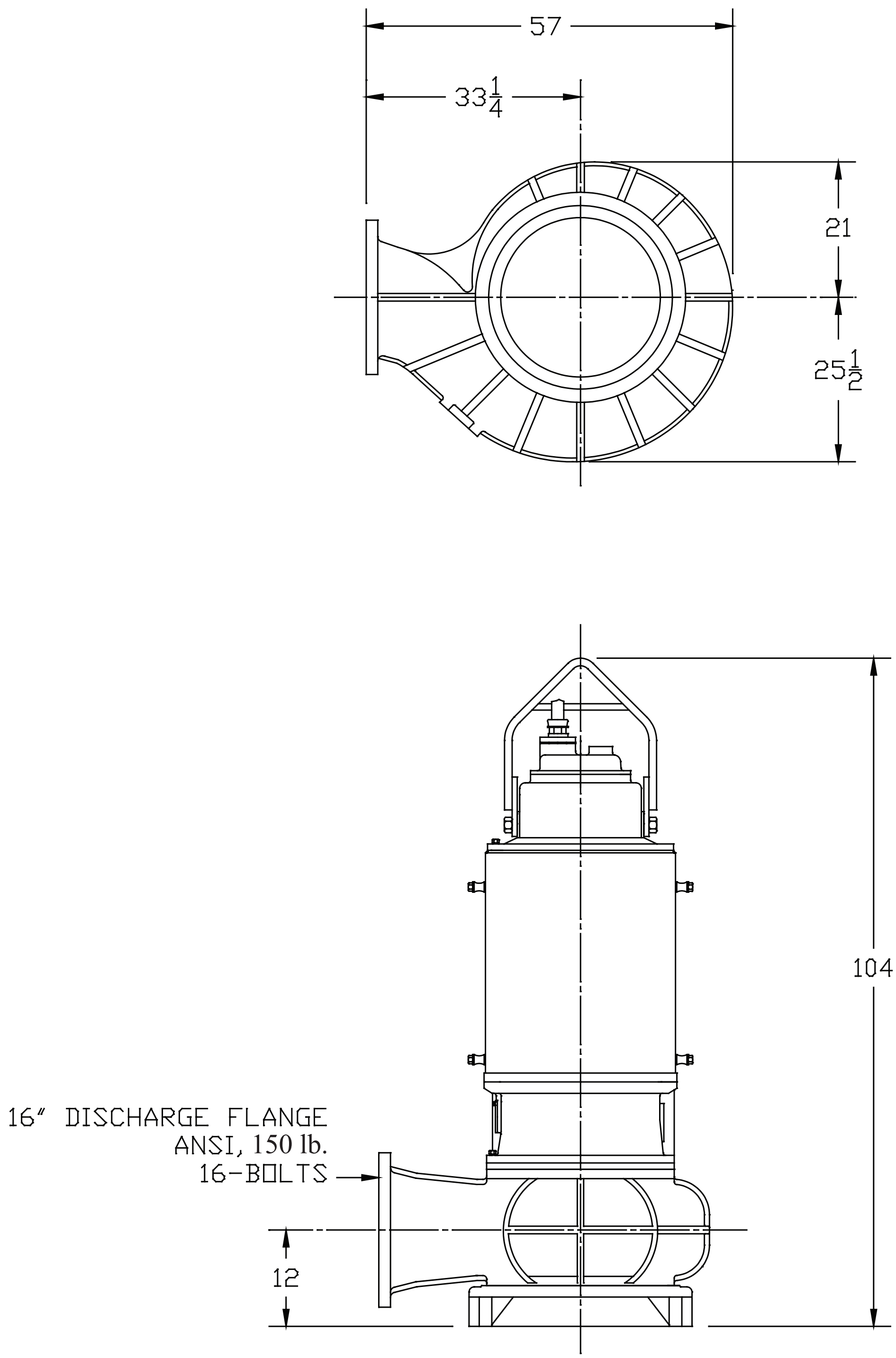
Section **ENCLOSED**
Date **April 2015**

Pump Series	K16H	16″ SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



Note: All dimensions in inches and (millimeters).
Dimensions may vary due to normal manufacturing tolerances.

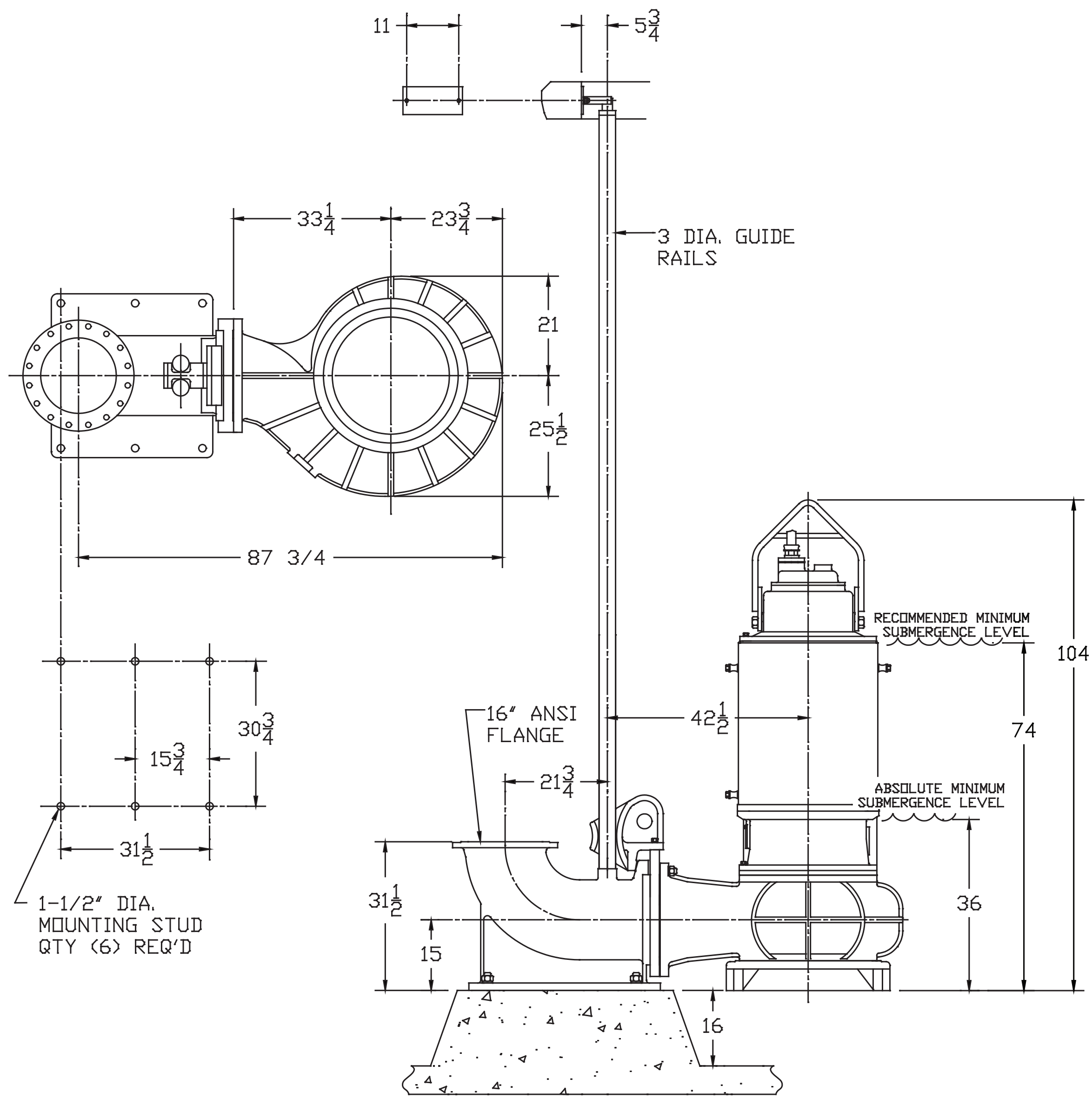
File: K16H Dimensions

KEEN PUMP

Section	**ENCLOSED**
Date	**April 2015**

Pump Series	K16H	16″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



Notes:

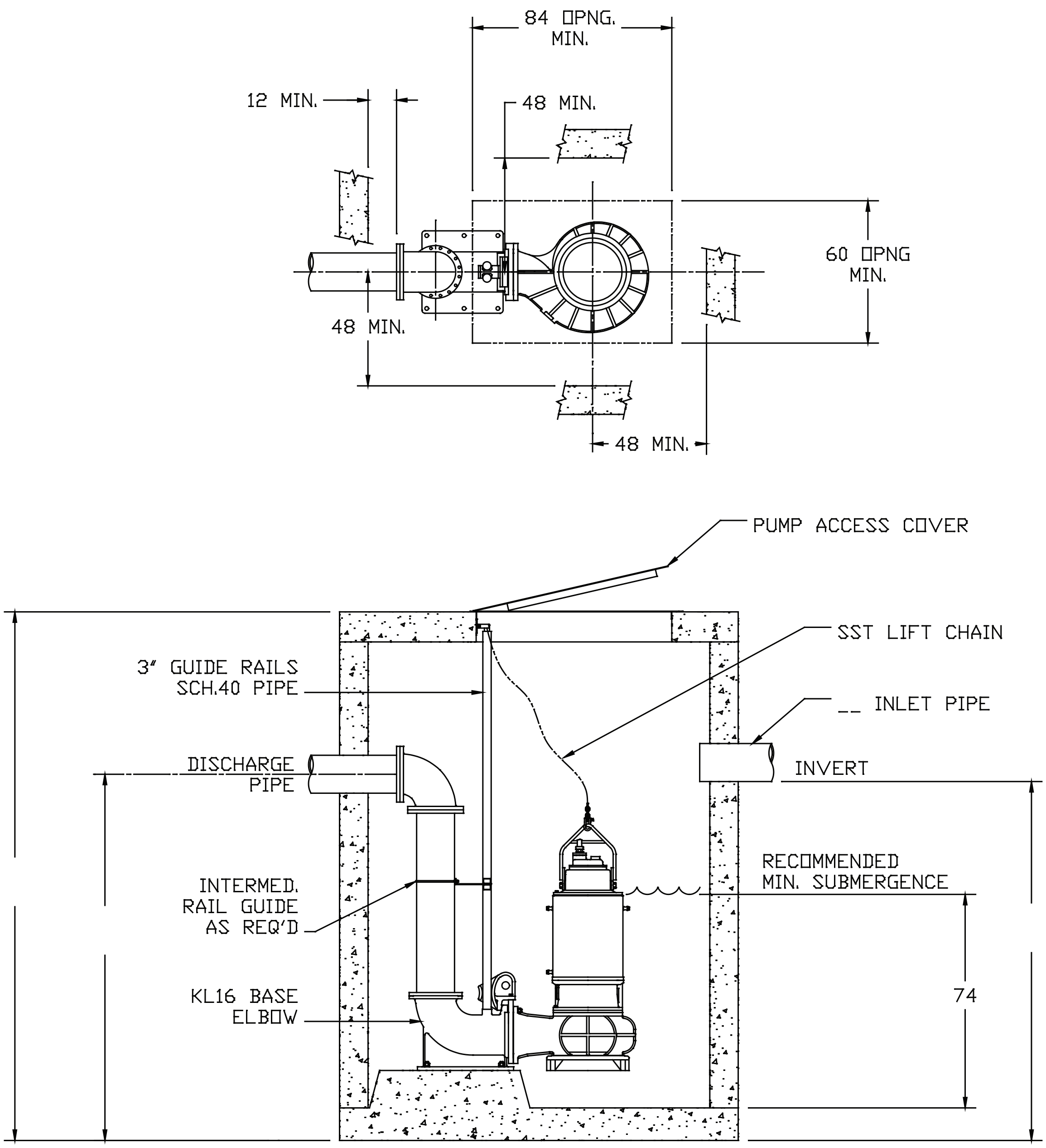
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI 150 lb. unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K16H Liftout Dimensions

Section ENCLOSED
Date April 2015

Pump Series	K16H	16" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA

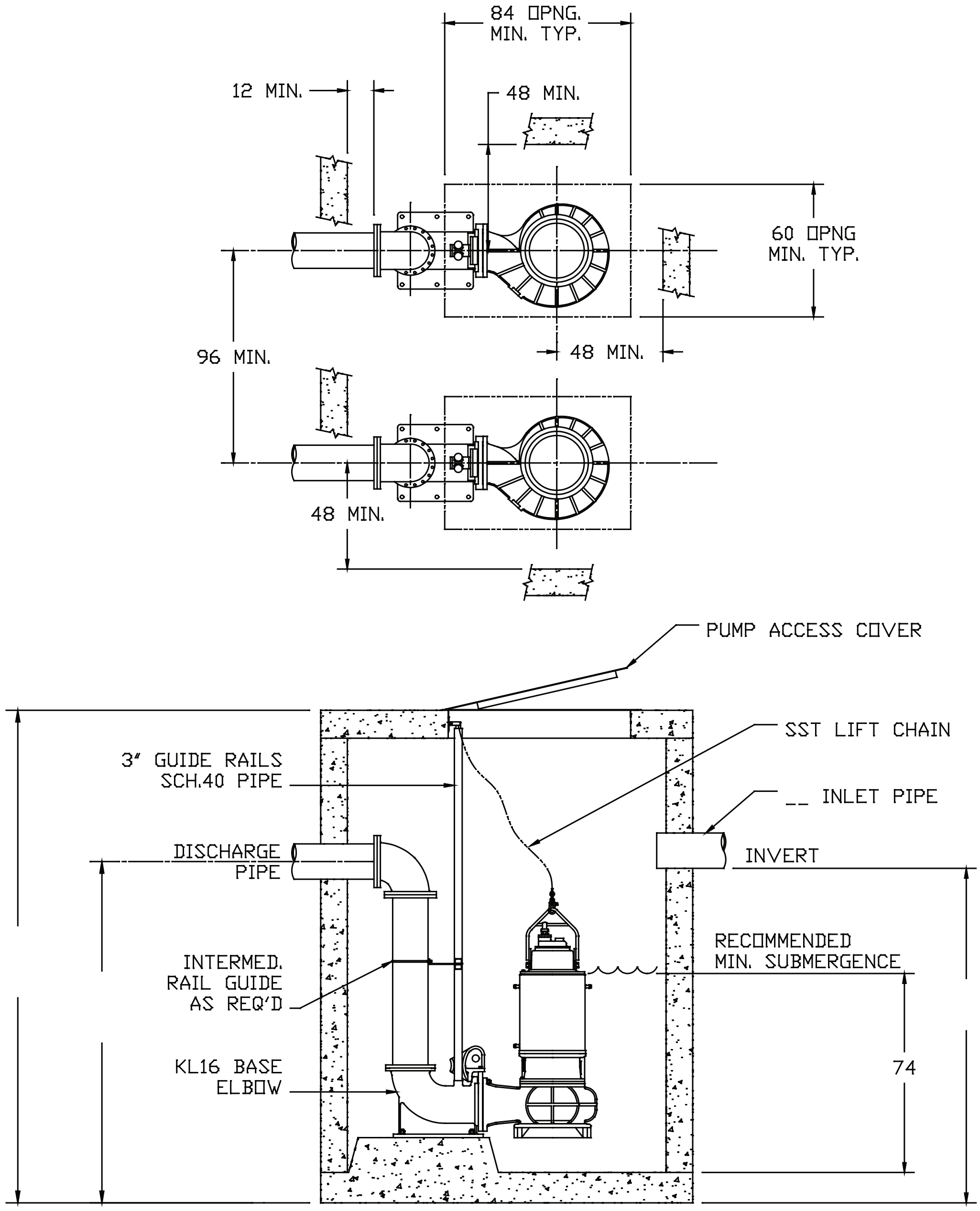


Notes:
1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. Dimensions may vary due to normal manufacturing tolerances.
7. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K16H Install Dimensions

Pump Series	K16H	16″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA

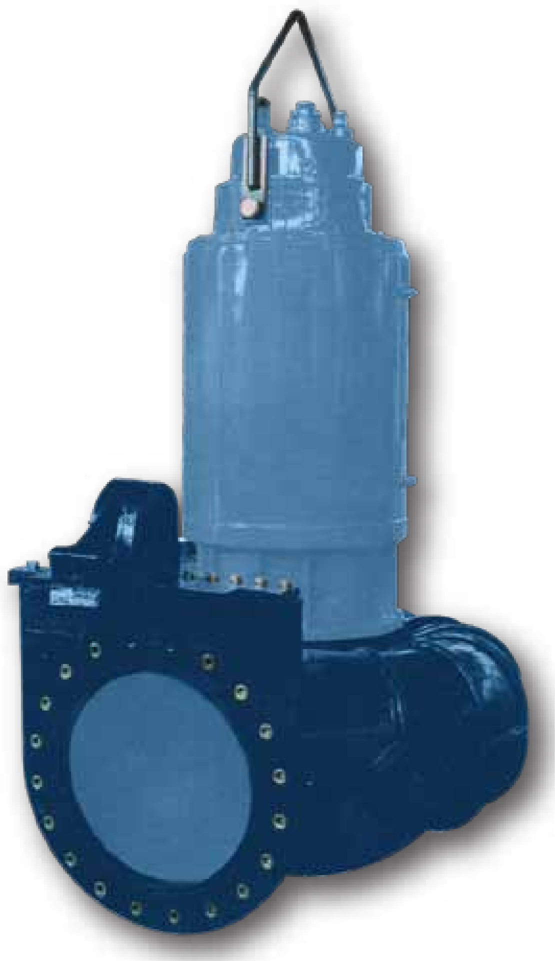


Notes:
1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. Dimensions may vary due to normal manufacturing tolerances.
7. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

KEEN PUMP

K24VK

24” Submersible, Enclosed Impeller



KEEN PUMP “K24VK” Series pumps are designed for demanding wastewater, municipal sewage treatment plants, storm water, industrial, commercial and a wide range of water-handling applications.

“K24VK” Series pumps feature a self-contained cooling jacket system, circulating impeller, heat exhanger plate and liquid refrigerant with a high boiling point (195º C). Standard construction allows for submersible and dry pit installations.

“K24VK” pumps are equipped with high-efficiency, inverter-duty rated, Class H insulation motors. Electrical features include fully automatic alarm protection system and liquid level control system, protecting the motor from water, oil, phase loss, overheating and grounding.

CAPABILITIES:

- **Flows-------------------------------------- to 16,000 GPM**
- **Heads------------------------------------ to 26 Feet**
- **Horsepower---------------------------- 100 HP**
- **Voltage / Phase Options------------- 460, 3 Phase**
- **Discharge Connections-------------- 24” ANSI 150 Lb. Horizontal Flange**
- **Motor Speeds-------------------------- 600 RPM**
- **Solids-Handling------------------------ 6”**
- **Impeller---------------------------------- Balanced, Mixed Flow Enclosed**
- **Motor Service Factor----------------- 1.25**

Features and Benefits

K24VK

1. Watertight Cable Entrance
Agency-approved, watertight strain relief cord grips with compression grommets protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged. 40' UL power & control cords. Additional sealing accomplished by individually soldered wires.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 30 cast iron components.

3. Strong Motor / Cooling Jacket System
Powerful high-torque, Class H motor for reliable pump operation. Overload protection in air-filled chamber. Inverter-duty wire for VFD / soft start operation, continuous duty. Self-contained cooling jacket system with recirculating impeller. Includes heat exchanger plate. Liquid refrigerant coolant supplied.

4. Solid Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearings rated for 100,000 hour B-10 life.

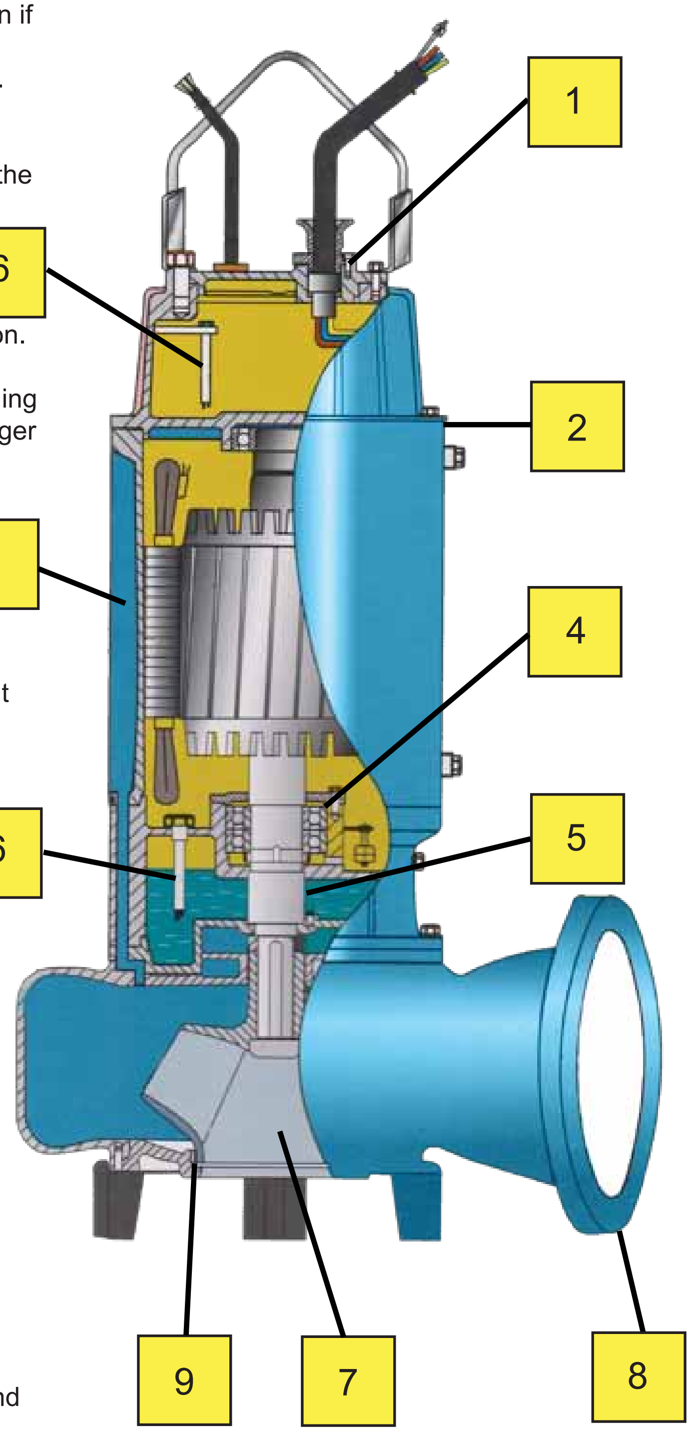
5. Severe Duty Dual Mechanical Seals
Dual mechanical shaft seals provide twice the moisture and grit protection for the motor. Silicon-Carbide Upper and Tungsten-Carbide Lower seals are housed in a secondary oil-filled seal chamber. Tougher material seals better handle sand, grit and abrasive materials.

6. 3-Chamber Moisture Detection
Moisture detection in lower seal chamber, motor housing and upper cord cap housing.

7. High Efficiency Hydraulic Design
Highly efficient enclosed, mixed-flow impeller easily passes 6" diameter solids without blockage. Strong, ductile iron impeller features backside pump-out vanes, keeping lower seal clean and pressure-compensated for longer life. Dynamically balanced for smooth, quiet operation and long bearing life.

8. Standard Flange Connection
24" Horizontal, 150 Lb., ANSI discharge flange. Industry standard, 20-bolt pattern.

9. High Performance Wear Ring
Assists impeller in providing higher performance efficiencies and prevention of recirculation losses. Ring will not corrode or deteriorate from liquid being pumped. Ring reduces wear to stronger ductile iron impeller in sandy or gritty applications. Easily serviceable and replaceable.



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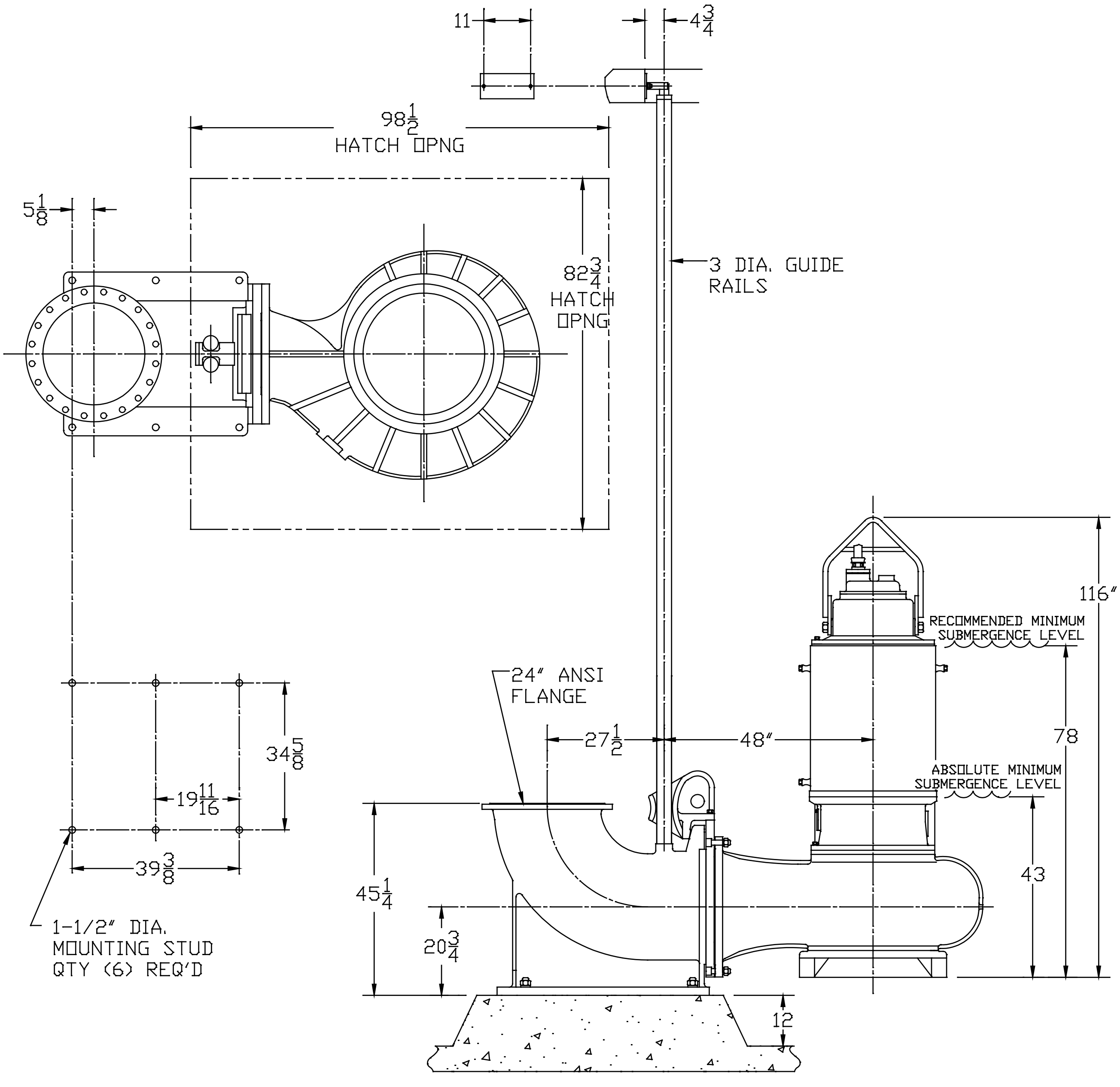
Section **ENCLOSED**
Date **Nov 2016**

Pump Series	**K24VK**	24″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI 150 lb. unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K24VK Liftout Dimensions

KH Series
Non-Clog Submersible Pump Specification

Furnish and install _______ submersible non-clog wastewater pump(s). The KEEN pump(s) shall be equipped with a _______ HP close coupled submersible electric motor, connected for operation on _______ volts, 3 phase, 60 hertz service, with _______ feet of heavy duty submersible electric power cable. Each pump shall be capable of producing _______ GPM at _______ feet TDH. The shut-off head shall be no less than _______ feet.

Design - The KEEN pump(s) shall be capable of handling raw, unscreened sewage and shall be automatically and securely connected to the permanent discharge connection, guided by no less than two guide rails extending from the top of the station to the discharge connection. Sealing of the pumping unit to the discharge base elbow shall be accomplished by machined metal to metal watertight contact. The pump(s) shall be easily removed for inspection and service without the need for personnel to enter the wet-well. The entire pumping unit, including electric cable, shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 60 feet. No portion of the pump shall bear directly on the sump floor.

Construction – Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry enamel paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with o-rings. Fittings will be the result of controlled compression of rubber o-rings in two planes and o-ring contact of four sides without the requirement of a specific torque limit. No secondary sealing compounds, elliptical o-rings, grease or other devices shall be used.

Cooling System – Each unit shall be provided with an integral, self-supplying internal cooling system. The cooling system shall encircle the stator housing, providing for dissipation of the motor heat regardless of type of installation. The closed cooling system shall consist of a cooling jacket, circulator impeller, liquid refrigerant snd drain / fill plugs. The circulating impeller shall be attached to the motor shaft, turning at the same speed of the motor. The liquid refrigerant has a high boiling point (195 degree C, 383 degree F) and low freezing point (-40 degree C). The circulating impeller shall provide the necessary circulation of the cooling liquid through the cooling system. The closed cooling system shall provide for continuous submerged or completely non-submerged pump operation in liquid or ambient temperatures up to 40 degree C or 104 degree F, in accordance with NEMA standards.

Cable / Entry Seal – The power cable shall be sized in accordance with NEC standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket has a compression grommet compressing the exterior of the cable entry system. The cable wires are individually stranded in epoxy in the cord cap assembly for a second permanent seal.

Motor – The pump motor shall be an induction type, NEMA B design with a squirrel cage rotor, shell type design, housed in an air-filled, watertight chamber. The motor shall be inverter duty rated. The stator windings and stator leads shall be insulated with moisture resistant Class H insulation rated. The stator shall be dipped and baked in Class H varnish and shall be heat-shrink fitted into the motor housing. The use of bolts, pins, or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be designed for continuous duty handling pumped media of 104°F (40°C) and capable up to 15 evenly spaced starts per hour. The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15. The motor shall have voltage tolerance of plus or minus 10% and frequency tolerance of plus or minus 5%. The motor horsepower shall be adequate so that the pump is not overloading throughout the entire pump performance curve from shut-off through run-out. Thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel. The motor and pump shall be designed and assembled by the same manufacturer.

Bearings – The pump shaft shall rotate on two bearings. The motor bearings shall be double shielded and permanently lubricated with high temperature grease. The upper motor bearing shall be a single ball type bearing to handle radial loads. The lower bearing shall be a two row angular contact ball bearing to compensate for axial thrust and radial forces. Single row lower bearings shall not be considered acceptable. The minimum L-10 bearing life shall be 100,000 hours at any useable portion of the pump curve.

Mechanical Seal – Each pump shall be provided with a mechanical shaft seal system consisting of two assemblies. The seals shall operate in a lubricant reservoir that hydrodynamically lubricates the seal faces at a constant rate. The lower primary seal, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating, silicon-carbide ring. The upper, secondary seal, located between the lubricant chamber and the motor housing, shall contain one stationary and one positively driven rotating, silicon-carbide seal ring. The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counter clockwise direction of rotation without damage or loss of seal. For special applications, other seal face materials shall be available.

Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal, shall be easily accessible from the outside. The seal system shall not rely upon the pumped media to operate dry without damage while pumping under load.

Pump Shaft - The pump shaft and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft; couplings shall not be acceptable. The pump shaft shall be 410 stainless steel.

Impeller – The enclosed, 2-vane impeller shall be of ductile iron, Class 35B, dynamically balanced, double shrouded non-clogging design having long through-let without acute turns. The impeller shall be capable of handling solids, fibrous materials, heavy sludge and other material found in wastewater. The impeller shall be keyed to the shaft, retained with an impeller bolt, capable of passing a 3-inch diameter solid. Mass moment of inertia calculations shall be provided by the pump manufacture upon request. Ceramic coating on impeller for anti-abrasion wear.

Volute – The pump volute shall be gray cast iron, ASTM A-48, Class 30, single piece design with smooth passages large enough to pass any solids that may enter the impeller. A replaceable bronze wear ring system shall be utilized to provide efficient sealing between the volute and impeller suction inlet. Ceramic coating inside volute for anti-abrasion wear.

Protection – All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. At 260°F (125°C) the thermal switches shall open to signal the control to stop the motor and activate the alarm. A leakage sensor shall be installed in the lubricant chamber to detect seal leakage prior to entry and contamination of the lower bearing and motor stator housing.

K4RC

4" NON-CLOG HIGH HEAD SEWAGE PUMP

HIGH OPERATING PRESSURES

- Up to 260' total dynamic heads
- Strong pumping capacities to 750 GPM
- Ideal for long pumping distances
- Handles challenging terrain conditions

PUMPS STRINGY FIBEROUS WASTE

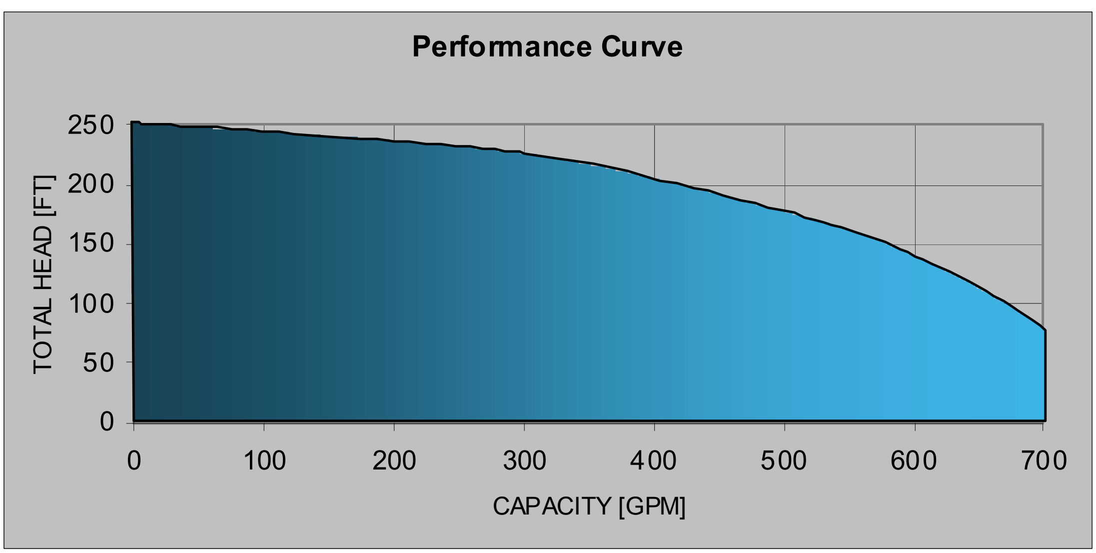
- Recessed impeller out of passageway
- Solids can not get caught
- Pump-out vanes, prevent material build-up
- Completely open volute flow

HANDLES ALL OPERATING CONDITIONS

- Entire performance curve
- No cavitation or vibration
- Adjusts to changing pumping conditions
- Operates near shut-off and / or wide open flow

LOW MAINTENANCE

- Unobstructed impeller passageway
- Grit-resistant silicon carbide shaft seals
- Large, 3" diameter solids handling
- High service factor motor handles tough electrical operat conditions
- Recessed impeller minimizes radial bearing load, significantly increasing bearing life



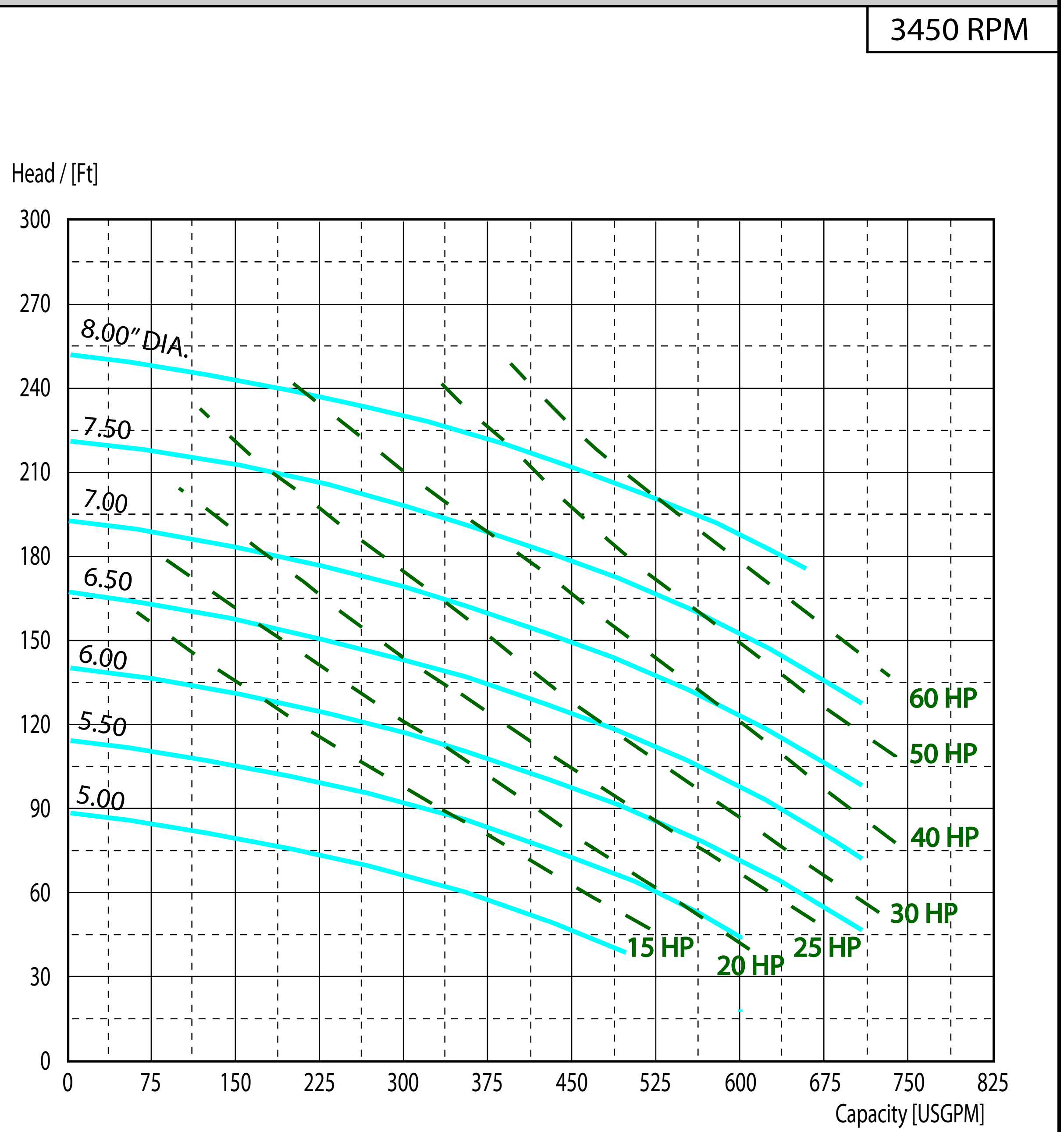
KEEN PUMP CO.

471 St. Rt. 250 East
Ashland, Ohio 44805

KEEN PUMP CO.™ 4" SUBMERSIBLE SEWAGE PUMPS

GENERAL	K4RC	MOTOR DATA			
Pump Series		Volt	230	460	575
PUMP DATA		Phase	3	3	3
Date	5/30/2012	Hz	60 Hz		
Discharge Flange	4" ANSI, 150lb	HP	15, 20, 25, 30, 40, 50, & 60 HP		
Solids Size	3 inch	Poles / Rated Speed	2 P / 3450 rpm		
Impeller Type	Recessed	Insulation Class	H Class		

PERFORMANCE CURVE



* Performance with clear water and ambient temp 20ºC (68ºF)

Rev. 0

KEEN PUMP CO.™

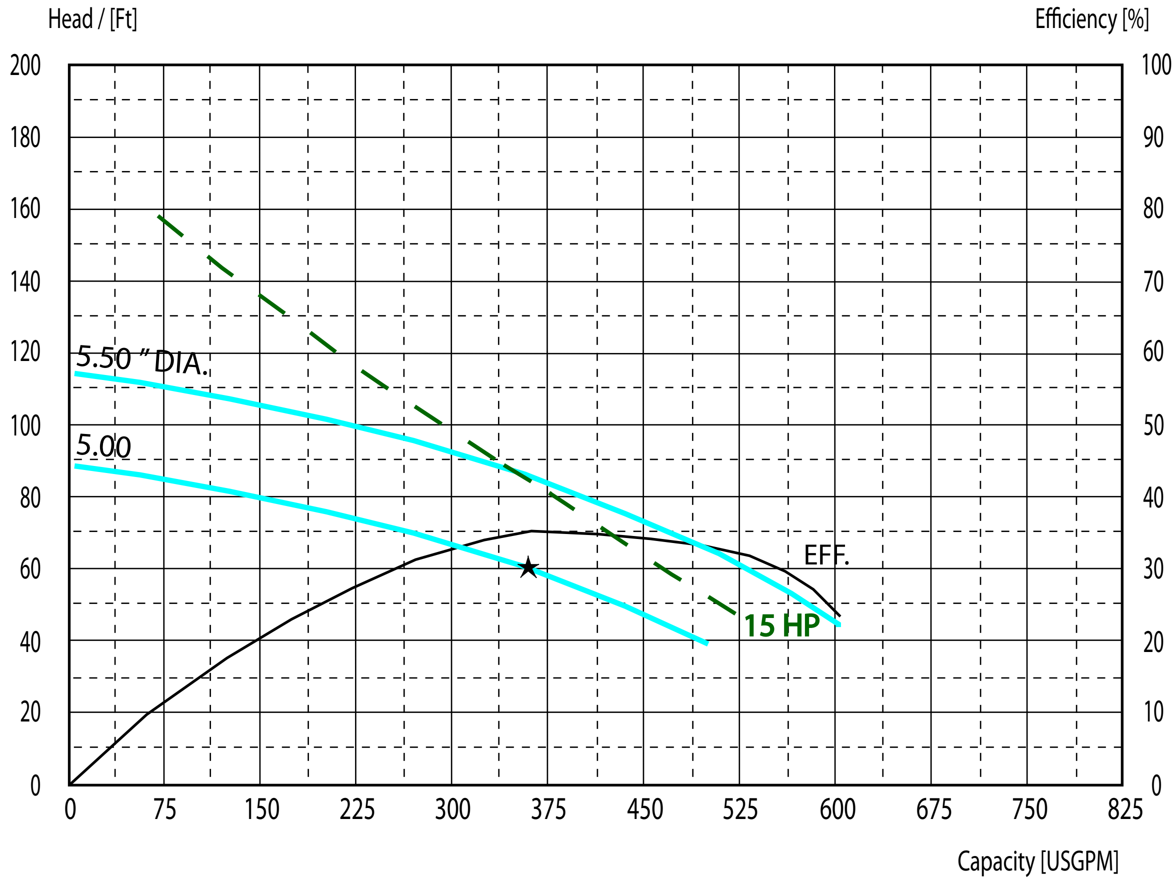
4" SUBMERSIBLE SEWAGE PUMPS

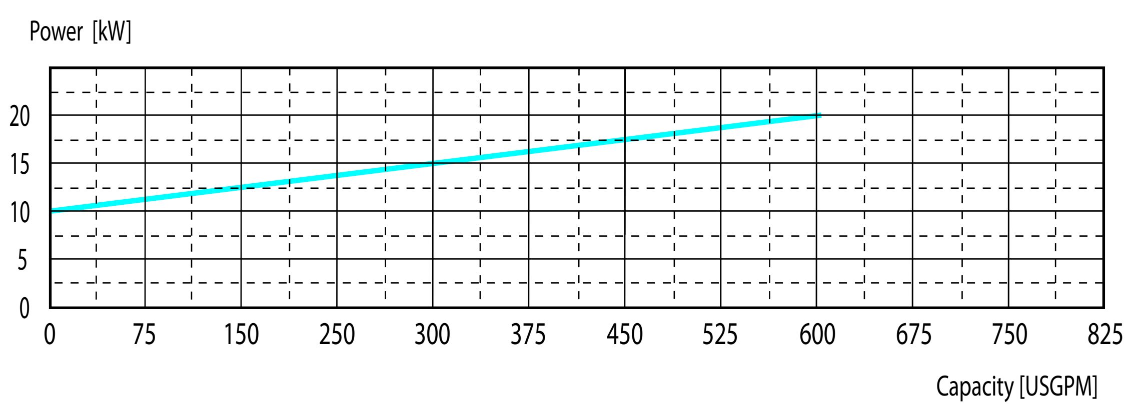
GENERAL		MOTOR DATA			
Pump Model	K4RC150M2-23/43	Load	1/1	3/4	1/2
PUMP DATA		Efficiency (%)	85	87	86
Date	5/30/2012	Power Supply	3 Φ, 230/460 V, 60 Hz		
Discharge Flange	4" ANSI, 150lb	HP / Amps	15 HP/ 52/26 A		
Solids Size	3 inch	Poles / Rated Speed	2 P / 3450 rpm		
Impeller Type / Dia.	Recessed/ 5.00" Dia.	Insulation Class	H Class		

PERFORMANCE CURVE

3450 RPM

	Head [Ft]	Cap. [USgpm]	POWER [kW]	EFF. [%]	NPSHre [Ft]
★ Best EFF Point	60	356	16	35	5.7





* Performance with clear water and ambient temp 20°C (68°F)

Rev. 0

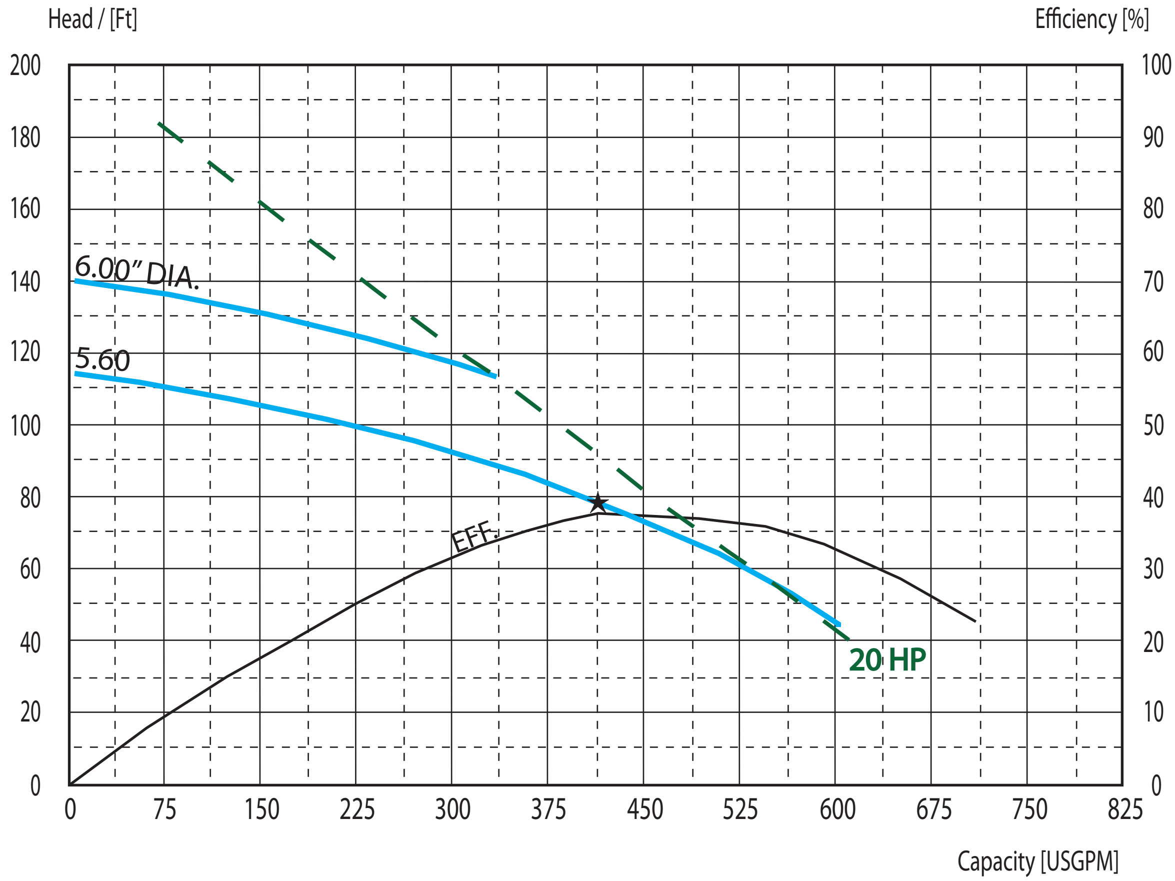
KEEN PUMP CO.™ **4" SUBMERSIBLE SEWAGE PUMPS**

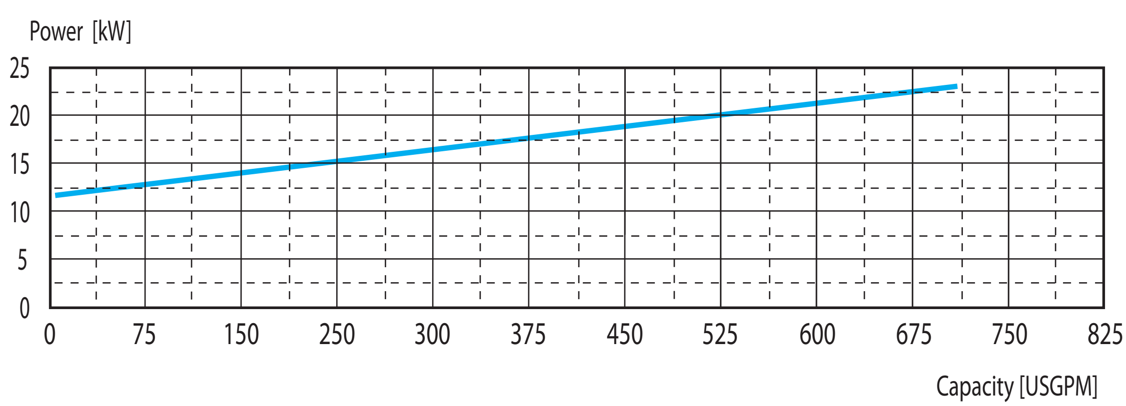
GENERAL		MOTOR DATA			
Pump Model	K4RC200M2-23/43	Load	1/1	3/4	1/2
PUMP DATA		Efficiency (%)	85	87	86
Date	5/30/2012	Power Supply	3 Φ, 230/460 V, 60 Hz		
Discharge Flange	4" ANSI, 150lb	HP / Amps	20 HP/ 60/30 A		
Solids Size	3 inch	Poles / Rated Speed	2 P / 3450 rpm		
Impeller Type / Dia.	Recessed/ 5.60" Dia.	Insulation Class	H Class		

PERFORMANCE CURVE

3450 RPM

	Head [Ft]	Cap. [USgpm]	POWER [kW]	EFF. [%]	NPSHre [Ft]
★ Best EFF Point	78	412	18	38	5.7





* Performance with clear water and ambient temp 20°C (68°F)

Rev. 0

KEEN PUMP CO.™

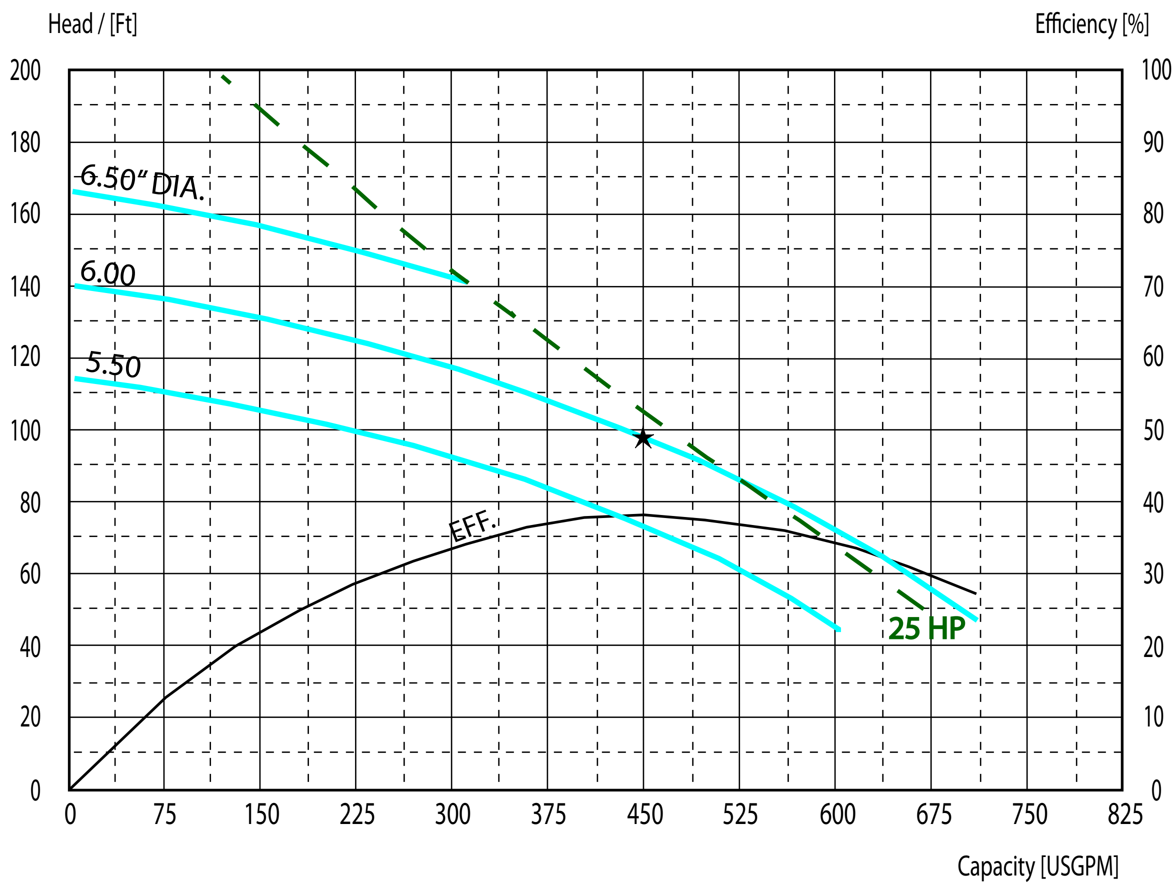
4" SUBMERSIBLE SEWAGE PUMPS

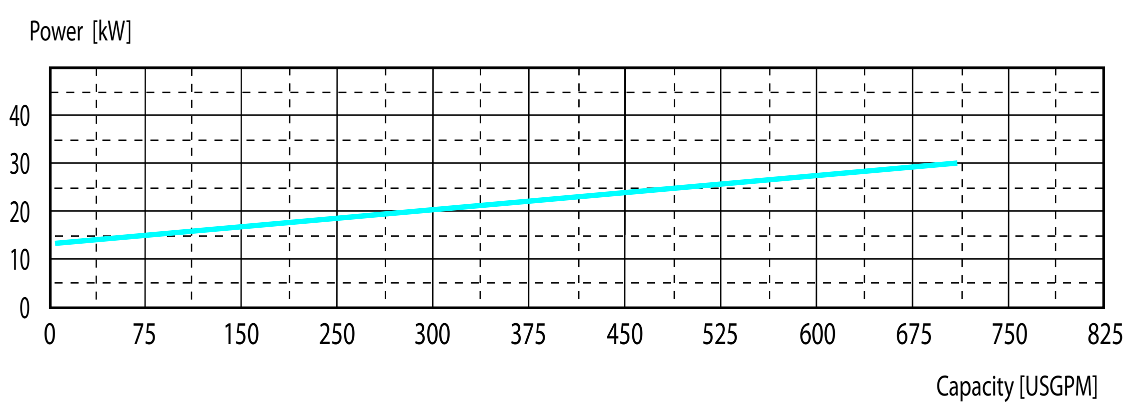
GENERAL		MOTOR DATA			
Pump Model	K4RC250M2-23/43	Load	1/1	3/4	1/2
PUMP DATA		Efficiency (%)	85	87	86
Date	5/30/2012	Power Supply	3 Φ, 230/460 V, 60 Hz		
Discharge Flange	4" ANSI, 150lb	HP / Amps	25 HP/ 84/42 A		
Solids Size	3 inch	Poles / Rated Speed	2 P / 3450 rpm		
Impeller Type / Dia.	Recessed/ 6.00" Dia.	Insulation Class	H Class		

PERFORMANCE CURVE

3450 RPM

	Head [Ft]	Cap. [USgpm]	POWER [kW]	EFF. [%]	NPSHre [Ft]
★ Best EFF Point	97	450	24	38	5.7





* Performance with clear water and ambient temp 20°C (68°F)

Rev. 0

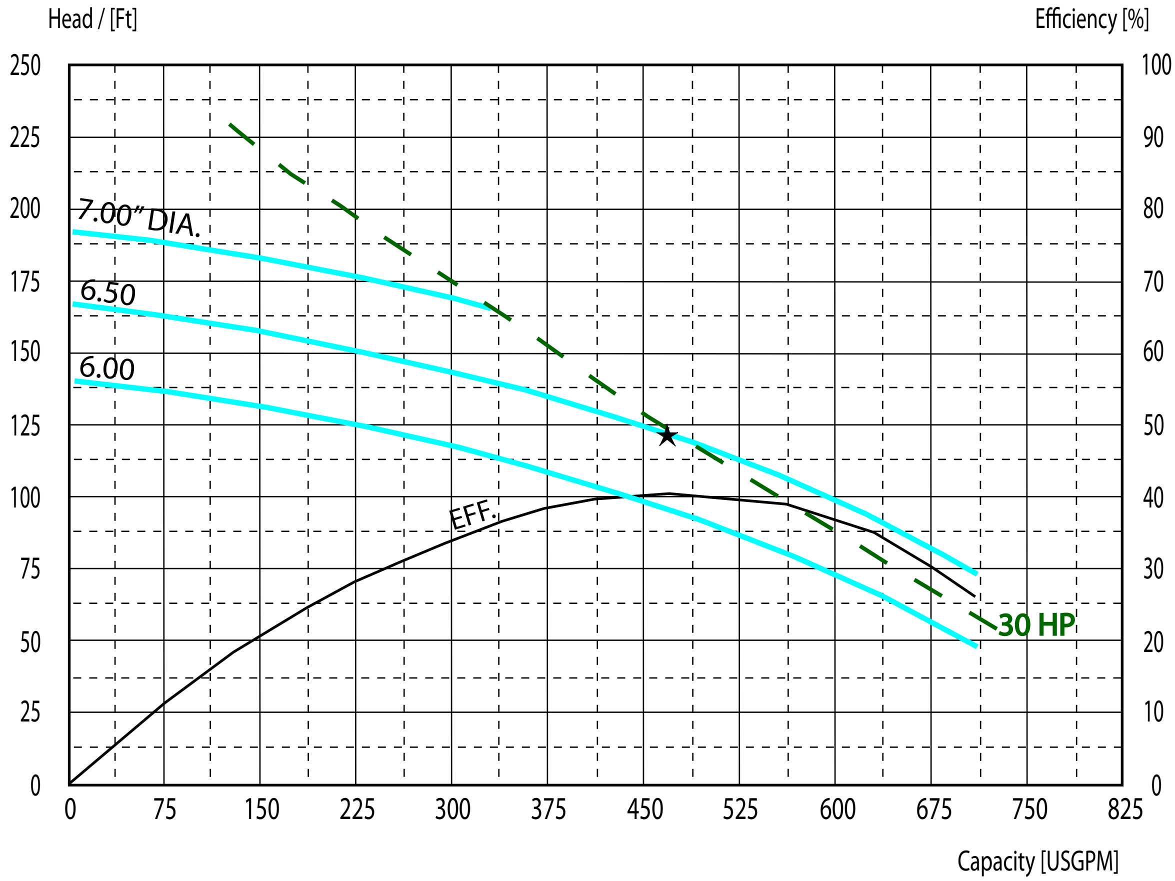
KEEN PUMP CO.™ 4" SUBMERSIBLE SEWAGE PUMPS

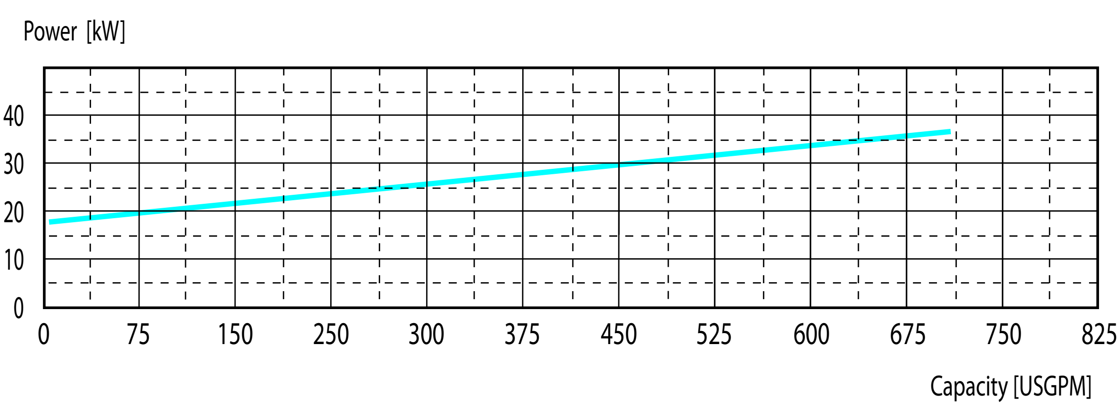
GENERAL		MOTOR DATA			
Pump Model	K4RC300M2-23/43	Load	1/1	3/4	1/2
PUMP DATA		Efficiency (%)	85	87	86
Date	5/30/2012	Power Supply	3 Φ, 230/460 V, 60 Hz		
Discharge Flange	4" ANSI, 150lb	HP / Amps	30 HP/ 100/50 A		
Solids Size	3 inch	Poles / Rated Speed	2 P / 3450 rpm		
Impeller Type / Dia.	Recessed/ 6.50" Dia.	Insulation Class	H Class		

PERFORMANCE CURVE

3450 RPM

	Head [Ft]	Cap. [USgpm]	POWER [kW]	EFF. [%]	NPSHre [Ft]
★ Best EFF Point	120	470	30	41	5.7





* Performance with clear water and ambient temp 20°C (68°F)

Rev. 0

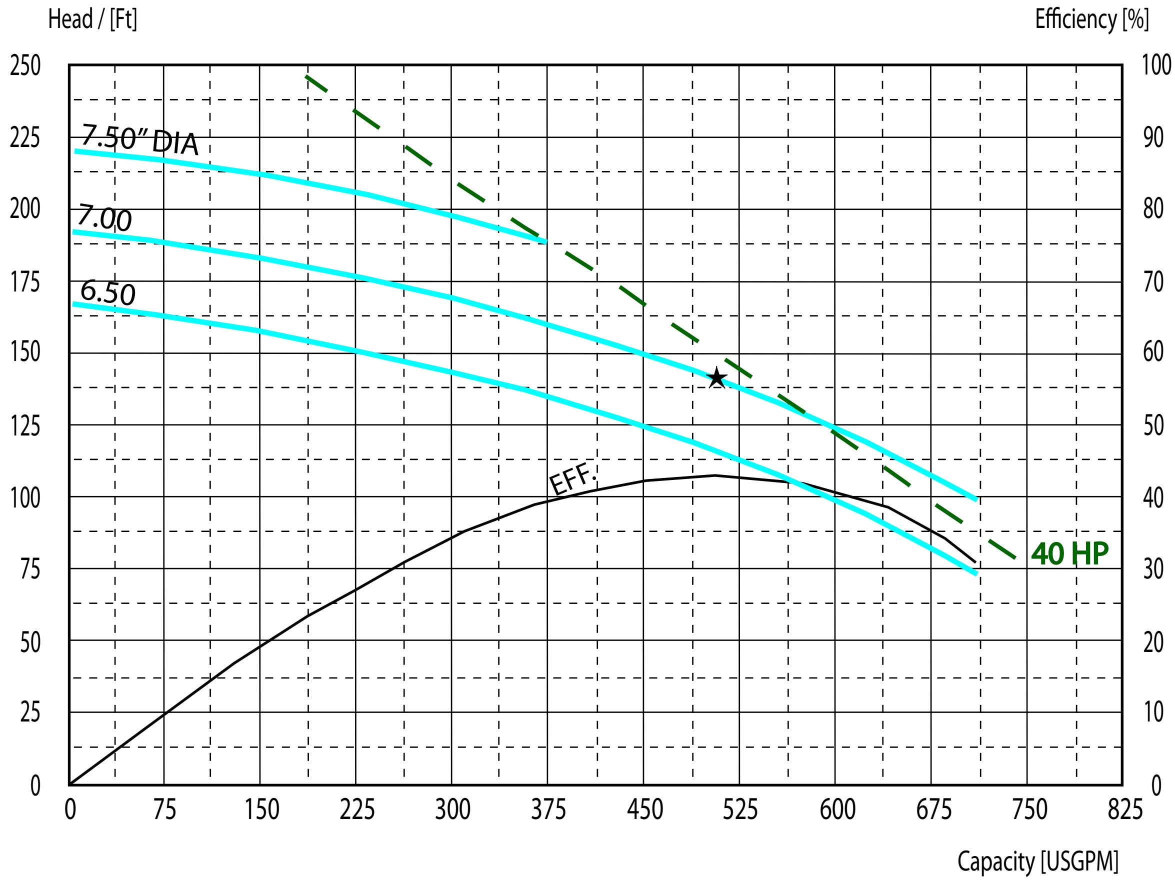
KEEN PUMP CO.™ *4" SUBMERSIBLE SEWAGE PUMPS*

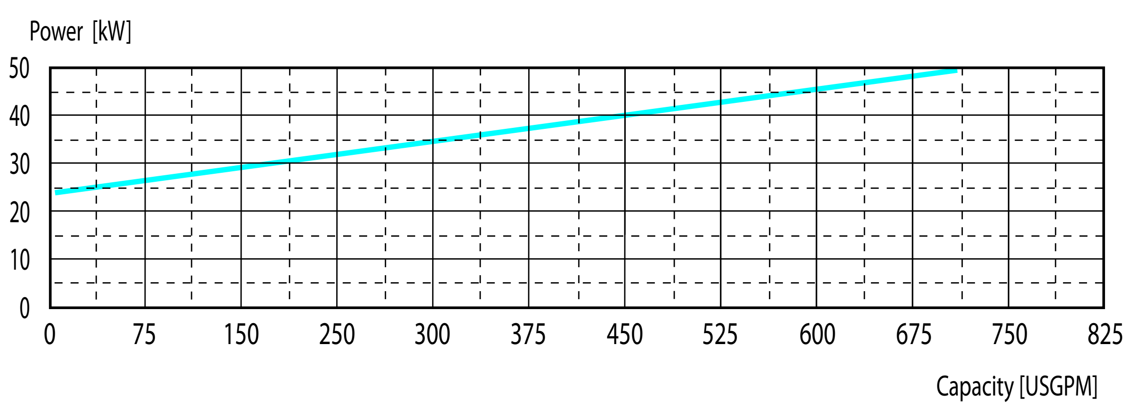
GENERAL		MOTOR DATA			
Pump Model	**K4RC400M2-23/43**	Load	1/1	3/4	1/2
PUMP DATA		Efficiency (%)	85	87	86
Date	5/30/2012	Power Supply	3 Φ, 230/460 V, 60 Hz		
Discharge Flange	4" ANSI, 150lb	HP / Amps	40 HP/ 140/70 A		
Solids Size	3 inch	Poles / Rated Speed	2 P / 3450 rpm		
Impeller Type / Dia.	Recessed/ 7.00" Dia.	Insulation Class	H Class		

PERFORMANCE CURVE

3450 RPM

	Head [Ft]	Cap. [USgpm]	POWER [kW]	EFF. [%]	NPSHre [Ft]
★ Best EFF Point	140	515	42	43	5.7





* Performance with clear water and ambient temp 20ºC (68ºF)

Rev. 0

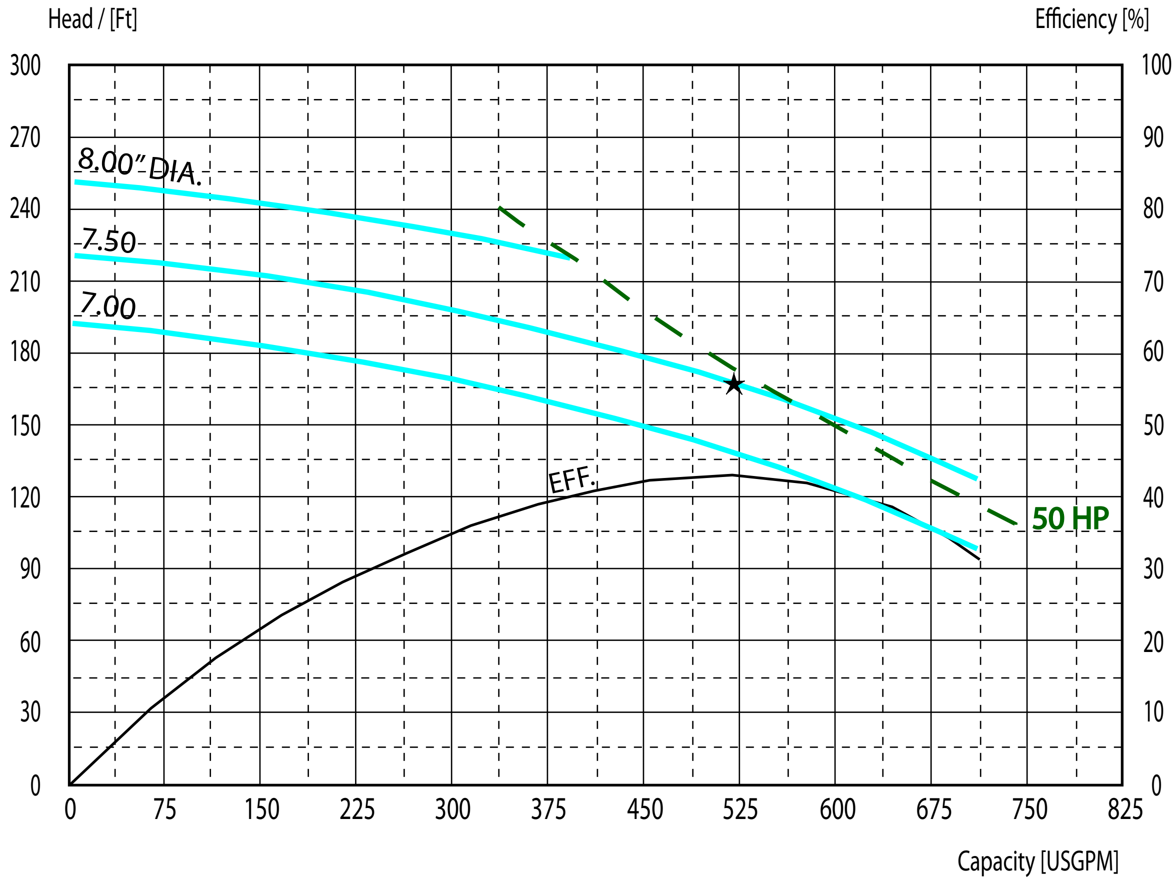
KEEN PUMP CO.™ 4″ SUBMERSIBLE SEWAGE PUMPS

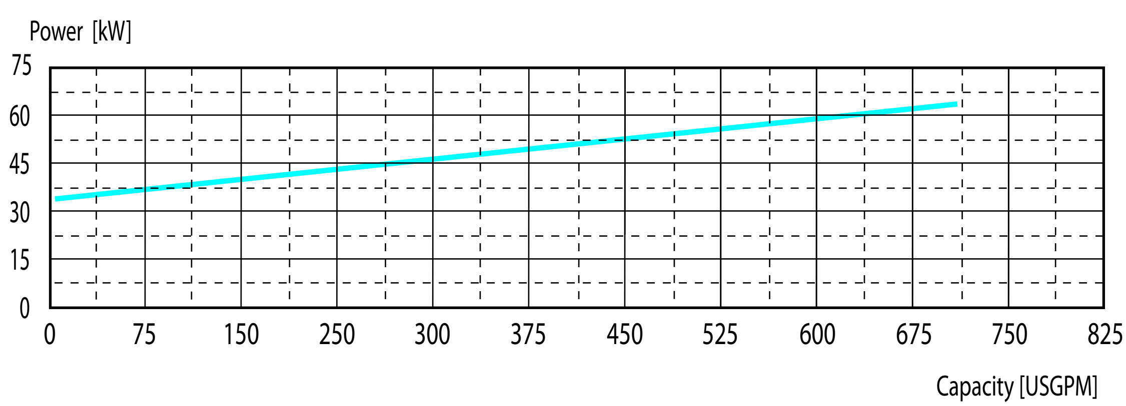
GENERAL		MOTOR DATA			
Pump Model	K4RC500M2-43	Load	1/1	3/4	1/2
PUMP DATA		Efficiency (%)	85	87	86
Date	5/30/2012	Power Supply	3 Φ, 460 V, 60 Hz		
Discharge Flange	4″ ANSI, 150lb	HP / Amps	50 HP/ 90 A		
Solids Size	3 inch	Poles / Rated Speed	2 P / 3450 rpm		
Impeller Type / Dia.	Recessed/ 7.50″ Dia.	Insulation Class	H Class		

PERFORMANCE CURVE

3450 RPM

	Head [Ft]	Cap. [USgpm]	POWER [kW]	EFF. [%]	NPSHre [Ft]
★ Best EFF Point	168	520	55	43	5.7





* Performance with clear water and ambient temp 20°C (68°F)

Rev. 0

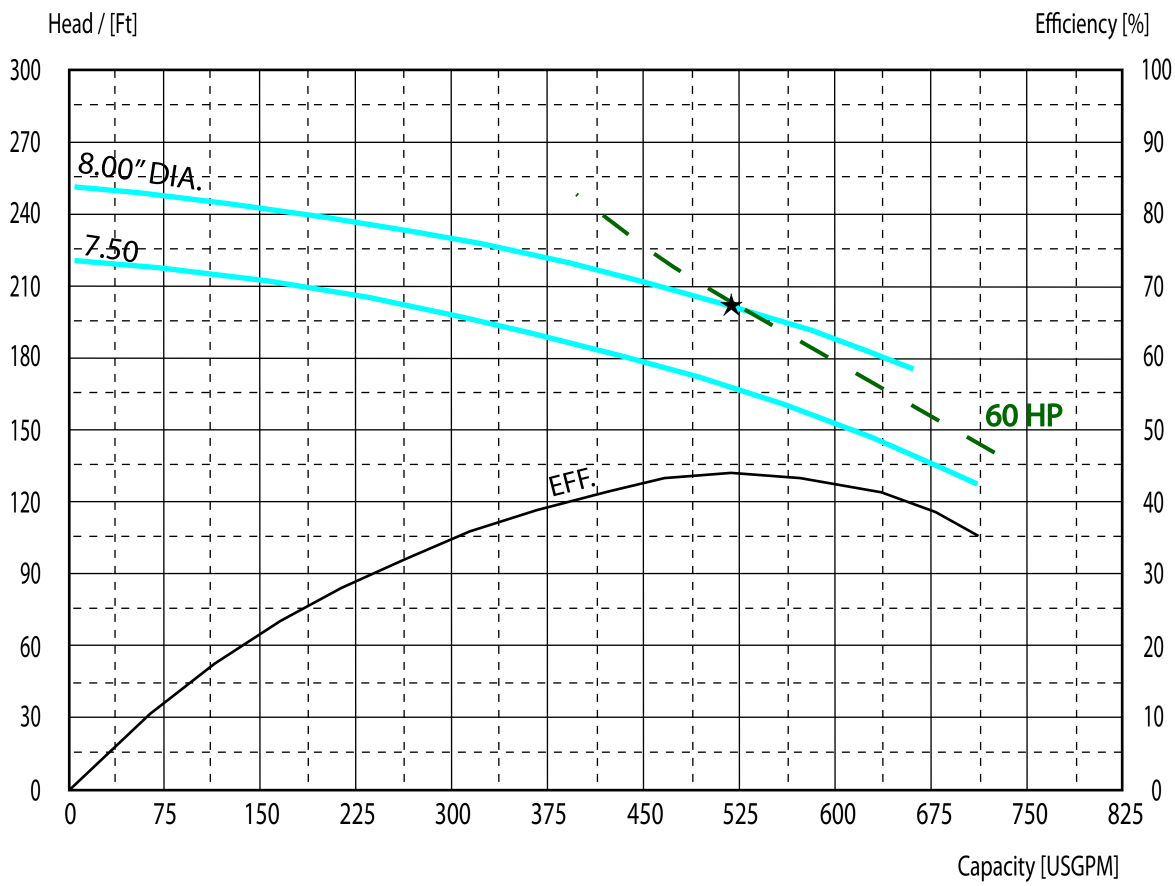
KEEN PUMP CO.™ 4″ SUBMERSIBLE SEWAGE PUMPS

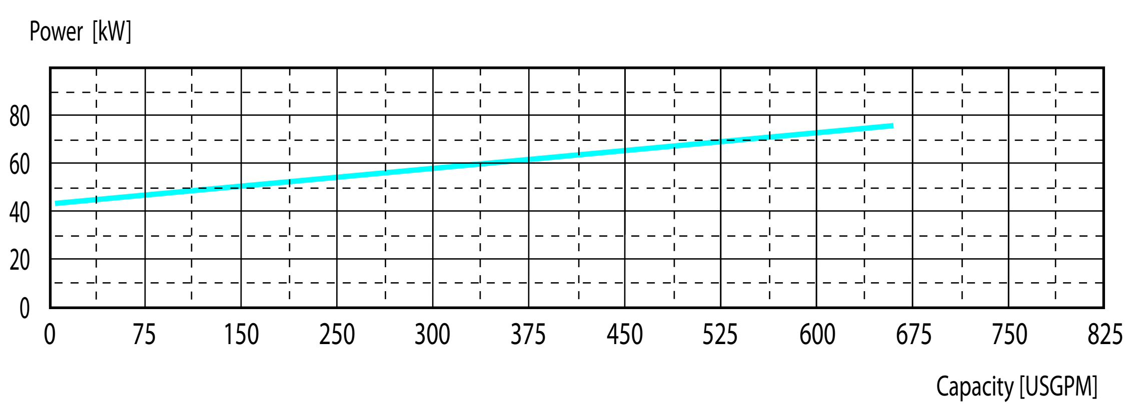
GENERAL	K4RC600M2-43	MOTOR DATA			
Pump Model		Load	1/1	3/4	1/2
PUMP DATA		Efficiency (%)	85	87	86
Date	5/30/2012	Power Supply	3 Φ, 460 V, 60 Hz		
Discharge Flange	4″ ANSI, 150lb	HP / Amps	60 HP/ 108 A		
Solids Size	3 inch	Poles / Rated Speed	2 P / 3450 rpm		
Impeller Type / Dia.	Recessed/ 8.00″ Dia.	Insulation Class	H Class		

PERFORMANCE CURVE

3450 RPM

	Head [Ft]	Cap. [USgpm]	POWER [kW]	EFF. [%]	NPSHre [Ft]
★ Best EFF Point	205	520	69	44	5.7





* Performance with clear water and ambient temp 20ºC (68ºF)

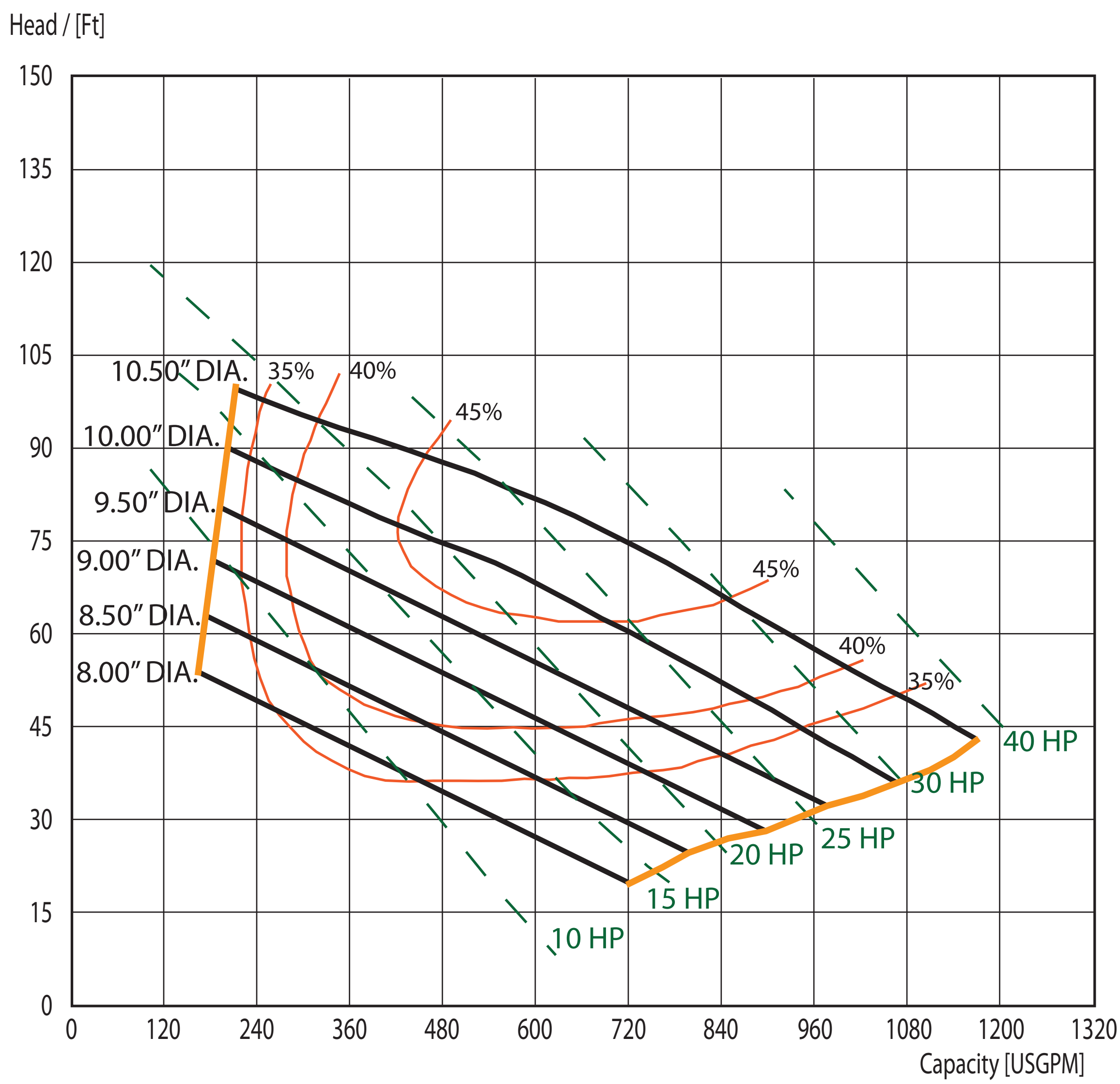
Rev. 0

KEEN PUMP CO.™

Section **VORTEX**
Date **JANUARY 2013**

Pump Series	**K4RC**	4″ SUBMERSIBLE SEWAGE PUMPS			
Speed	**1750 RPM**	Discharge	**4″**	Solids	**3″**

GPM: __________ TDH: __________



The curves reflect maximum performance characteristics without exceeding full load.
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70º F and 1280 feet site elevation.

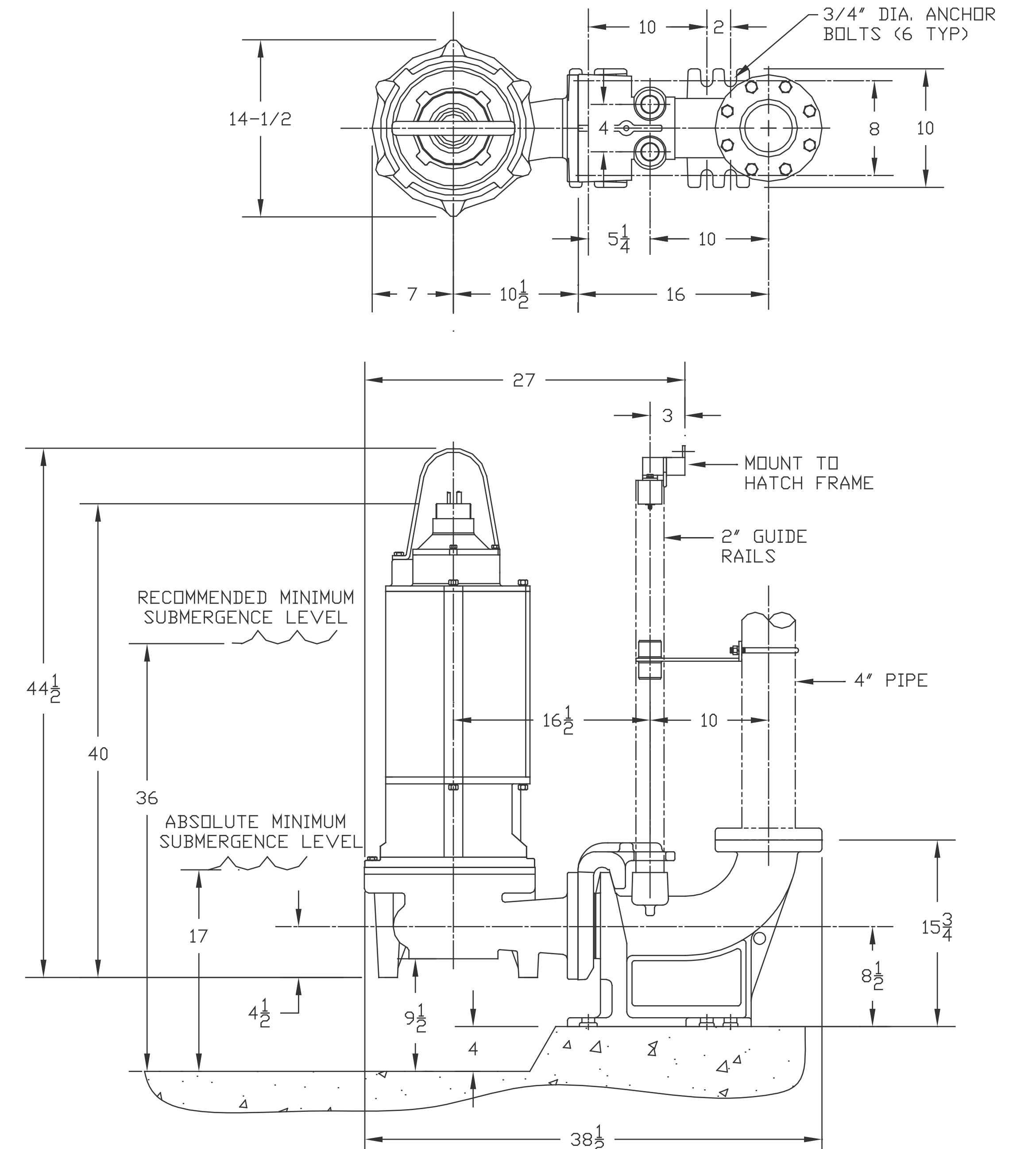
File: K4RC_1750_CAT

KEEN PUMP CO.™

Section **VORTEX**
Date **JANUARY 2013**

Pump Series	**K4RC**	4″ SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

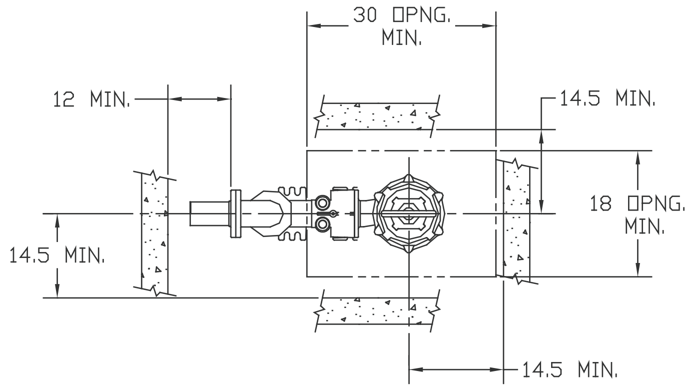


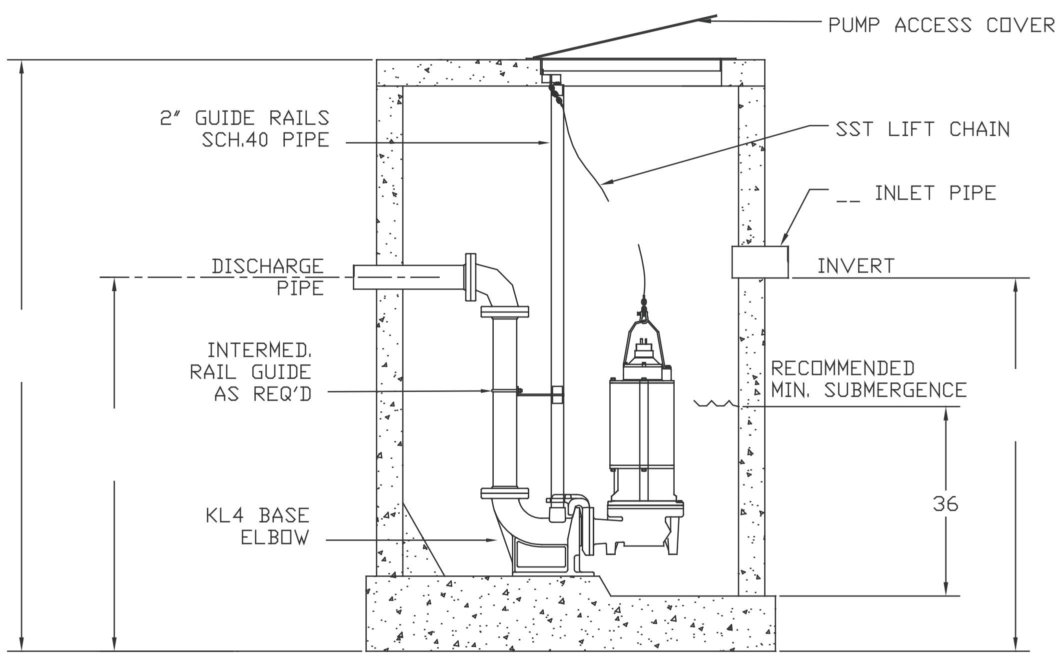
Notes:
1. All dimensions in inches unless noted.
2. Discharge flange 150 Lb. ANSI unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4RC Liftout Dimensions

Pump Series	K4RC	4″ SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA





Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

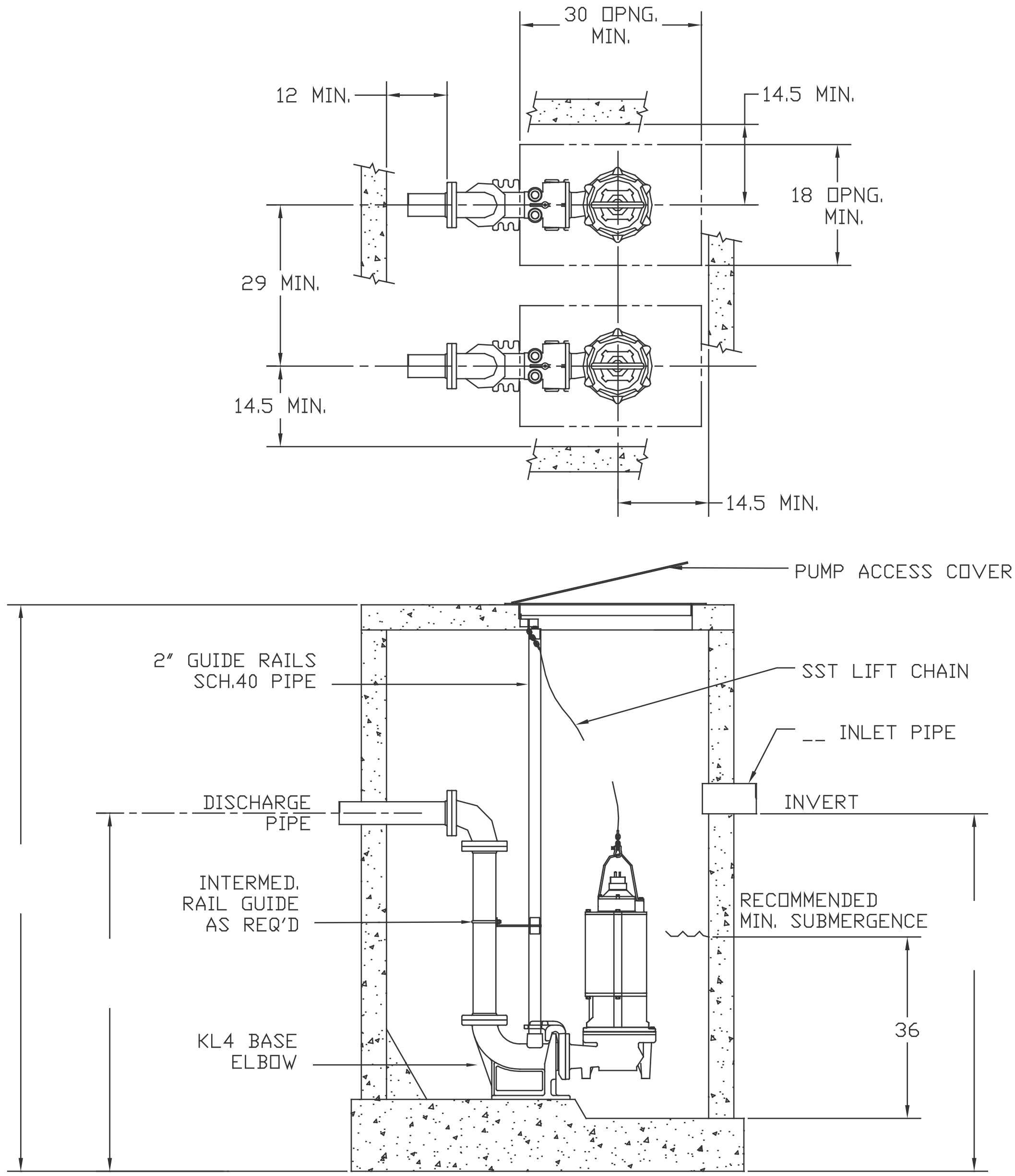
File: K4RC Install Dimensions

KEEN PUMP CO.™

Section **VORTEX**
Date **JANUARY 2013**

Pump Series	**K4RC**	4″ SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4RC Install Dimensions

Pump Model: K4RC

Thermal Data:

Maximum Liquid	140º F (60º C)
Maximum Stator	311º F (155º C)
Heat Sensor Open:	257º F (125º C) Max. / 239º F (115º C) Min.
Closed:	194º F (90º C) Max. / 119º F (48º C) Min.
Oil Flash Point	390º F (199º C)

Electrical Data:

RPM	3450			
Electrical Ratings	Heat Sensor	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	**Voltage**	**Phase**	**NEC Code**	**Service Factor**	**Full Load AMPS**	**SF Amps**	**Locked Rotor AMPS**	**Run KW**	**Start KVA**	**Run KVA**
15	208	3	F	1.2	56.1	67.3	224.0	16.1	78.2	19.6
	230				48.2	57.8	193.6			
	460				24.1	28.9	95.8			
20	208	3	F	1.2	74.1	88.9	294.3	21.7	103.6	25.8
	230				64.1	76.9	257.3			
	460				32.0	38.4	129.6			
25	208	3	F	1.2	94.9	113.9	379.6	28.3	134.9	33.7
	230				84.1	100.9	338.1			
	460				42.1	50.5	167.9			
30	208	3	F	1.2	115.0	138.0	459.8	34.8	162.3	40.5
	230				100.1	120.1	401.6			
	460				50.1	60.1	201.8			

Motor Efficiencies & Power Factor									
		Motor Efficiency %				**Power Factor %**			
HP	**Phase**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**	**Service Factor Load**	**100% Load**	**75% Load**	**50% Load**
15	3	71	72	67	59	82.5	82	81	79
20	3	72	73	69	61	84	84	82	81
25	3	74	73	70	63	85	84	82	79
30	3	75	76	71	65	85	86	84	82

Pump Model: K4RC

Physical Data:

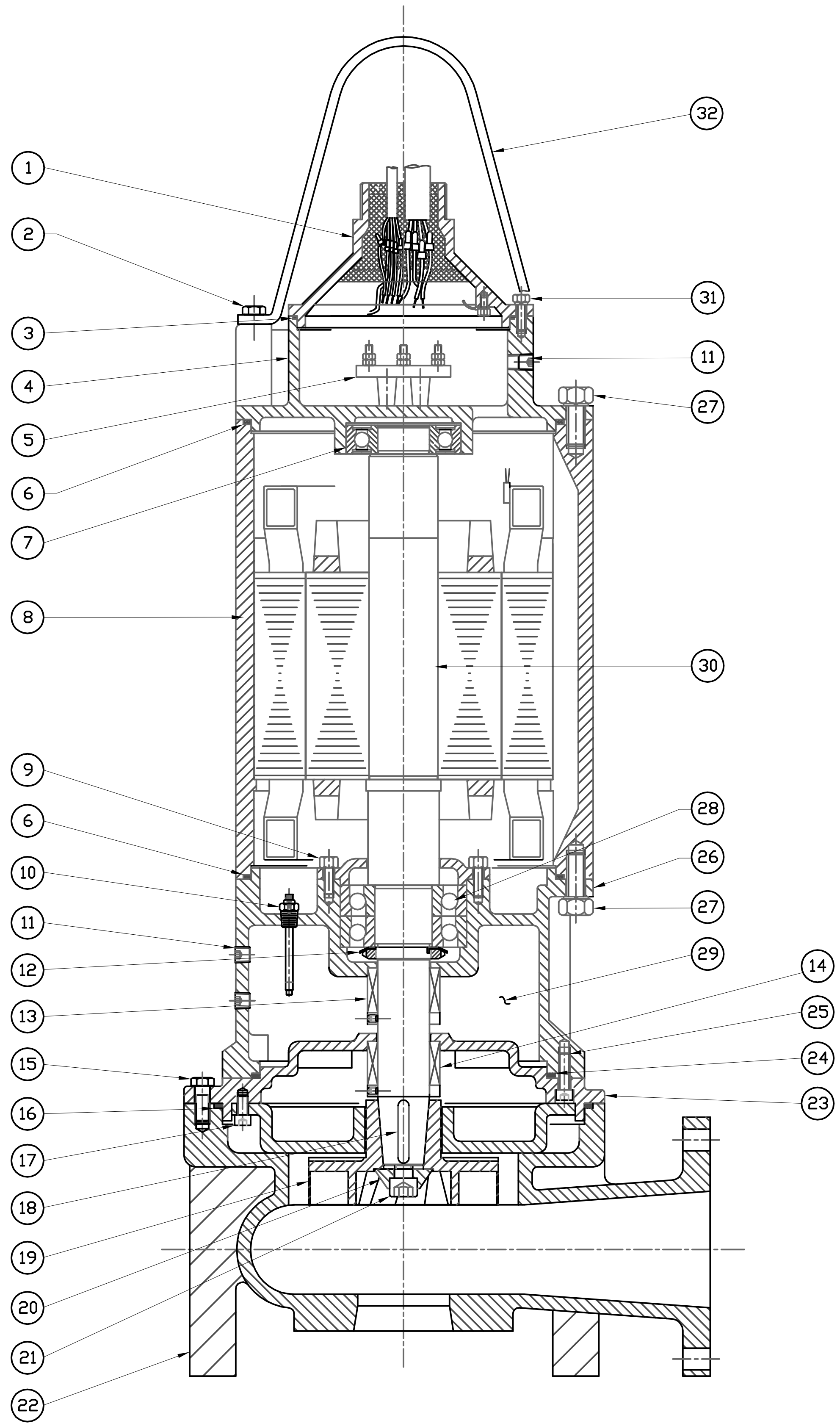
Discharge Size	ANSI 4" Horizontal
Solids Size	3"
Impeller Type	Balanced, Vortex, 10 Vane
Power/Control Cable Length	30' Standard
Paint	Blue, Water Reducible Enamel, One Coat, Air Dried – Standard

Motor Construction:

Motor Type	Enclosed Submersible Air Filled
NEMA Insulation Code	Class H
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Single Phase Configuration	External Start and Run Components
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	356ºF (180ºC)
Power Cord Type	SOOW - 600V, 90º C
Control Cord Type	18-5 SOOW - 600V, 90º C

Materials of Construction:

Cord Entry	Cast Iron, ASTM A48, Class 30
Motor Housing	Cast Iron, ASTM A48, Class 30
Bearing Housing	Cast Iron, ASTM A48, Class 30
Volute	Cast Iron, ASTM A48, Class 30 / Ceramic Coated Inside
Impeller	Ductile Iron, ASTM A536, 60-40-18 / Ceramic Coated
Shaft	ANSI 416 Stainless Steel
Inboard Mechanical Seal	Silicone Carbide / Silicone Carbide
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Single Row Deep Groove Ball Bearing



REF. NO.	DESCRIPTION	QTY.	PART NUMBER
1	Assy, Cord Cap	1	KN4103
2	Screw, Cap, 1/2-13UNC x 1-1/4" LG, SST	2	KN4104
3	O-Ring, Buna-N	1	KN4105
4	Housing, Upper Bearing, Cast Iron	1	KN4106
5	Board, Terminal	1	KN4107
6	O-Ring, Buna-N	2	KN4108
7	Bearing, Upper Ball	1	KN4109
8	Assy, Housing, Motor with Stator	1	KN4110
9	Screw, Cap, 5/16-18UNC x 3/4" LG, SST	4	KN4111
10	Sensor, Moisture	2	KN4015
11	Plug, 1/4" NPT pipe, SST	3	KN4016
12	Seal, Lip	1	KN4112
13	Seal, Upper Shaft	1	KN4113
14	Seal, Lower Shaft	1	KN4114
15	Screw, Cap, 7/16-14UNC x 1-1/4" LG, SST	8	KN4115
16	O-Ring, Buna-N	1	KN4116
17	Screw, Hex recessed, 3/8-16UNC x 1/2" LG, SST	4	KN4117
18	Key, 3/8", SST	1	KN4118
19	Impeller, Ductile Iron	1	KN4119
20	Washer, Impeller, SST	1	KN4120
21	Screw, Hex recessed, 5/8-11UNC x 1-1/2" LG, SST	1	KN4121
22	Case, Volute, Ductile Iron	1	KN4122
23	Housing, Lower Seal, Cast Iron	1	KN4123
24	O-Ring, Buna-N	1	KN4124
25	Screw, Hex recessed, 3/8-16UNC x 1" LG, SST	8	KN4125
26	Housing, Upper Seal/Bearing, Cast Iron	1	KN4126
27	Screw, Cap, 5/8-11UNC x 1-1/4" LG, SST	8	KN4127
28	Bearing, Lower Ball	2	KN4128
29	Oil		KN4129
30	Assy, Rotor with shaft	1	KN4130
31	Screw, Cap, 5/16-18UNC x 1" LG, SST	4	KN4131
32	Bale, Lifting, SST	1	KN4132

KEEN PUMP COMPANY
KEEN PUMP CO.
1661 CLEVELAND AVE.
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE K4RC 4" NON-CLOG PUMP PARTS LIST

SCALE	DWG. #	REV.
NTS	KN-234	–

DWG. BY S. ETZEL
DATE 12/9/10

K4RC – Series (15 – 60 HP) Non-Clog Submersible Pump Specification

Furnish and install _______ submersible non-clog wastewater pump(s). The KEEN pump(s) shall be equipped with a _______ HP close coupled submersible electric motor, connected for operation on _______ volts, 1 or 3 phase, 60 hertz service, with _______ feet of heavy duty submersible electric power cable. Each pump shall be capable of producing _______ GPM at _______ feet TDH. The shut-off head shall be no less than _______ feet.

Design - The KEEN pump(s) shall be capable of handling raw, unscreened sewage and shall be automatically and securely connected to the permanent discharge connection, guided by no less than two guide rails extending from the top of the station to the discharge connection. Sealing of the pumping unit to the discharge base elbow shall be accomplished by machined metal to metal watertight contact. The pump(s) shall be easily removed for inspection and service without the need for personnel to enter the wet-well. The entire pumping unit, including electric cable, shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 60 feet. No portion of the pump shall bear directly on the sump floor.

Construction – Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry enamel paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with o-rings. Fittings will be the result of controlled compression of rubber o-rings in two planes and o-ring contact of four sides without the requirement of a specific torque limit. No secondary sealing compounds, elliptical o-rings, grease or other devices shall be used.

Cooling System – Motors are sufficiently cooled by the submergence in the media. A cooling jacket is not required.

Cable / Entry Seal – The power cable shall be sized in accordance with NEC standards and shall be of sufficient length to reach the junction box without the need of any splices. The cable wires are individually stranded in epoxy in the cord cap assembly for a permanent seal.

Motor – The pump motor shall be an induction type, NEMA B design with a squirrel cage rotor, shell type design, housed in an air-filled, watertight chamber. The stator windings and stator leads shall be insulated with moisture resistant Class H insulation rated. Stator shall be heat-shrink fitted into the motor housing. The use of bolts, pins, or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be designed for continuous duty handling pumped media of 104°F (40°C) and capable up to 20 evenly spaced starts per hour. The motor horsepower shall be adequate so that the pump is not overloading throughout the entire pump performance curve from shut-off through run-out. Thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel. The motor and pump shall be designed and assembled by the same manufacturer.

Bearings – The pump shaft shall rotate on two bearings. The upper motor bearing shall be a single ball type bearing to handle radial loads. The lower bearing shall be a two row angular contact ball bearing to compensate for axial thrust and radial forces. Single row lower bearings shall not be considered acceptable. The minimum L-10 bearing life shall be 50,000 hours at any useable portion of the pump curve.

Mechanical Seal – Each pump shall be provided with a mechanical shaft seal system consisting of two assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate. The lower primary seal, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating, silicon-carbide ring. The upper, secondary seal, located between the lubricant chamber and the motor housing, shall contain one stationary and one positively driven rotating, silicon-carbide seal ring. The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counter clockwise direction of rotation without damage or loss of seal. For special applications, other seal face materials shall be available.

Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal, shall be easily accessible from the outside. The seal system shall not rely upon the pumped media to operate dry without damage while pumping under load.

Pump Shaft - The pump shaft and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft; couplings shall not be acceptable. The pump shaft shall be 416 stainless steel.

Impeller – The vortex impeller shall be of ductile iron, Class 35B, dynamically balanced. The impeller shall be capable of handling solids, fibrous materials, heavy sludge and other material found in wastewater. The impeller shall be keyed to the shaft, retained with an impeller bolt, capable of passing a 3-inch diameter solid. Mass moment of inertia calculations shall be provided by the pump manufacture upon request. Ceramic coated on impeller for anti-abrasion wear.

Volute – The pump volute shall be gray cast iron, ASTM A-48, Class 30, single piece design with smooth passages large enough to pass any solids that may enter the impeller. Ceramic coating on inside volute for anti-abrasion wear.

Protection – All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. At 260°F (125°C) the thermal switches shall open to signal the control to stop the motor and activate the alarm. A leakage sensor shall be installed in the lubricant chamber to detect seal leakage prior to entry and contamination of the lower bearing and motor stator housing.

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING PUMP

Series: K8PL-HLDS
36-48 HP / 1150 RPM
Discharge: 8"
Spherical solids handling: 3"

DISCHARGE
8", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C).

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
Cast iron ASTM A-48 class 30.

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 3 vanes, closed, with a bronze wear ring and vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Square shaped Buna-N.

PAINT
Air dry enamel, water based.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

SEAL
Design: double, mechanical, oil filled chamber.
Material: silicon carbide outboard seal, carbon ceramic inboard seal, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord, sealed against moisture.

BEARINGS
Upper: ball, single row, oil lubricated, for radial load.
Lower: ball, single row, oil lubricated, for radial and thrust load.

MOTOR
NEMA B, three phase, 230 & 460 volts, 60 Hz, 1150 RPM, oil filled. Requires overload protection to be included in control panel.

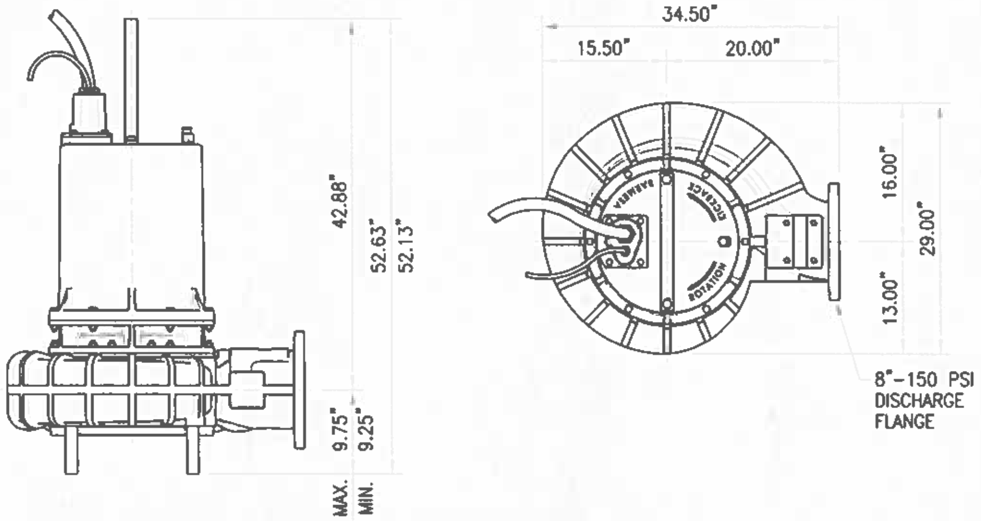
MOISTURE SENSOR
Normally open (N/O) included.

TEMPERATURE SENSOR
Normally closed (N/C) included.

OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-8).

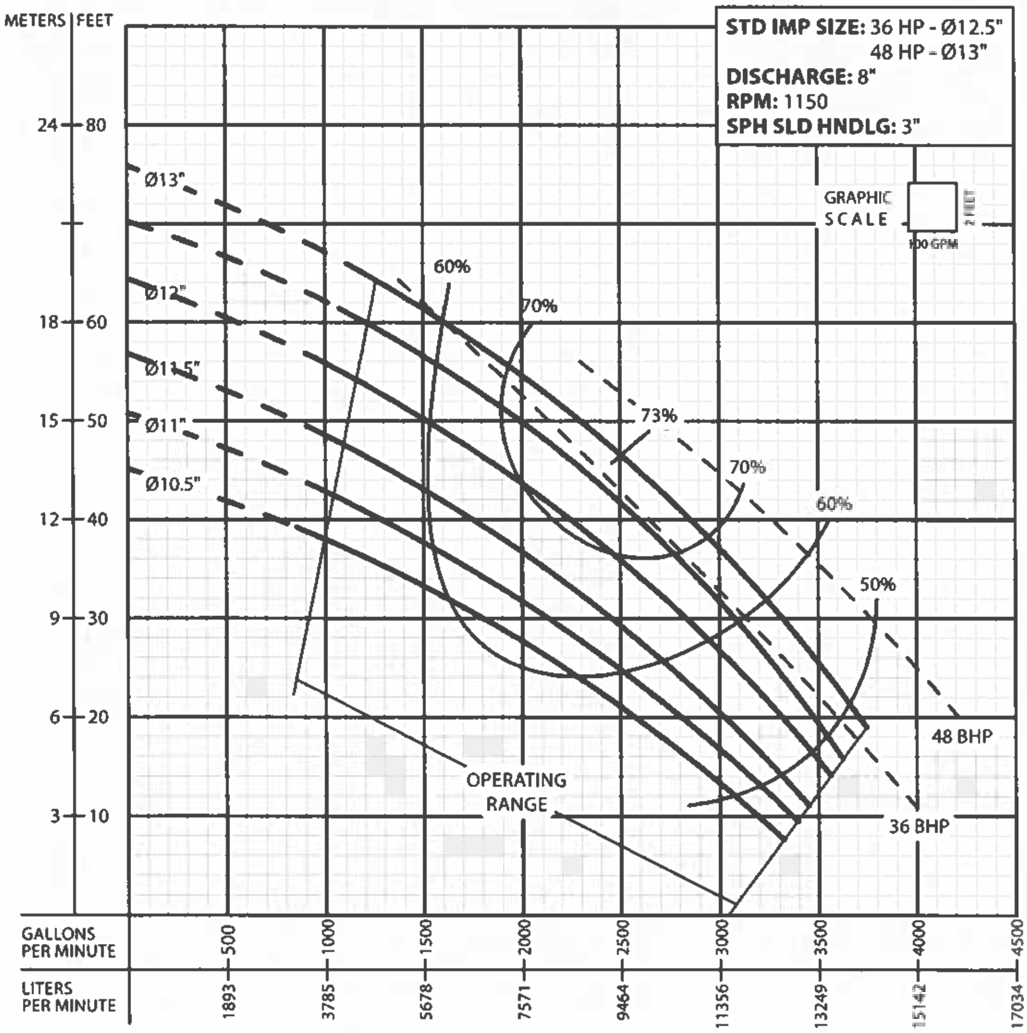
SPECIFICATIONS

SPECIFICATIONS



MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K8PL360M6-23HLDS	62170351	36	230	3	1150	90	434	E	2/3	3G	1.34"	992
K8PL360M6-43HLDS	62170352	36	460	3	1150	45	217	E	2/3	3G	1.34"	992
K8PL480M6-43HLDS	62170353	48	460	3	1150	65	290	E	2/3	3G	1.34"	1014

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485", for all models.



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

Installation, Operation &
Maintenance Manual
Submersible Solids
Handling Pumps

K8PL-HLDS SERIES

36 & 48 HP
@ 1150 RPM

IMPORTANT! - Read all instructions in this manual before operating or servicing a pump.

Before installation, read the following instructions carefully. Failure to follow instruction and safety information could cause serious bodily injury, death and/or property damage. Each Keen product is carefully inspected to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

⚠ DANGER **"Danger" indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠ WARNING **"Warning" indicates an imminenty hazardous situation which, if not avoided, MAY result in death or serious injury.**

⚠ CAUTION **"Caution" indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.**

IMPORTANT! - Keen Pumps is not responsible for losses, injury or death resulting from failure to observe these safety precautions, misuse, abuse or misapplication of pumps or equipment.

ALL RETURNED PRODUCTS MUST BE CLEANED, SANITIZED, OR DECONTAMINATED PRIOR TO SHIPMENT, TO INSURE EMPLOYEES WILL NOT BE EXPOSED TO HEALTH HAZARDS IN HANDLING SAID MATERIAL. ALL APPLICABLE LAWS AND REGULATIONS SHALL APPLY.

⚠ WARNING Installation, wiring, and junction connections must be in accordance with the National Electric Code and all applicable state and local codes. Requirements may vary depending on usage and location.

⚠ WARNING Installation and servicing is to be conducted by qualified personnel only.

Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected; the rotating cutter and/or impeller can cause serious injury.

Always wear eye protection when working on pumps. Do not wear loose clothing that may become entangled in moving parts.

⚠ DANGER Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing the pump or any accessory items associated with or near the pump.

⚠ DANGER This pump is not intended for use in swimming pools or water installations where there is human contact with pumped fluid.

⚠ DANGER Risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling any aspect of the pumping system. ***Lock out power and tag.***

⚠ WARNING **Do not** use these pumps in water over 104° F. **Do not** exceed manufacturers recommended maximum performance, as this could cause the motor to overheat.

⚠ DANGER **Do not** lift, carry or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death. **Never** handle connected power cords with wet hands. Use appropriate lifting device.

⚠ WARNING Ground Fault Circuit Interrupter (GFCI) to be used with plug-in type power cord.

⚠ WARNING Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping. Never enter a basin after it has been used.

⚠ DANGER Failure to permanently ground the pump, motor and controls before connecting to power can cause shock, burns or death.

⚠ DANGER These pumps are not to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.

⚠ WARNING The Uniform Plumbing Code (UPC) states that sewage systems shall have an audio and visual alarm that signals a malfunction of the systems, that are required to reduce the potencial for property damage.

IMPORTANT! - Prior to installation, record Model Number, Serial, Amps, Voltage, Phase and HP from pump name plate for the future reference. Also record the Voltage and Current Readings at Startup:

3 Phase Models	
Amps L1-2:	Volts L1-2:
Amps L2-3:	Volts L2-3:
Amps L3-1:	Volts L3-1:

Model Number: ____________________

Serial: ____________

PHASE: ______ HP: ______________

DISCHARGE: 8", 125lb, flange horizontal.
SPHERICAL SLD HNDLG: 3"
LIQUID TEMPERATURE: 104° F (40° C) max.
VOLUTE: Cast iron ASTM A-48 class 30.
WEAR RING: Bronze.
MOTOR HOUSING: Cast iron ASTM A-48 class 30.
SEAL PLATE: Cast iron ASTM A-48 class 30.
IMPELLER: 3 vanes, closed, with a bronze wear ring and vanes on back side. Cast iron ASTM A-48 class 30.
SHAFT: 416 series stainless steel.
SQUARE RINGS: Buna-N.
PAINT: Air dry enamel, water based.
SEAL: Double mechanical, oil filled chamber. Silicon carbide outboard, carbon ceramic inboard seal, elastomer Buna-N and stainless steel hardware.
DIAPHRAGM: Buna-N.
HARDWARE: 300 series stainless steel.
CORD ENTRY: 25 ft of neoprene cord, sealed against moisture.
UPPER BEARING: Ball, single row, oil lubricated, for radial load.
LOWER BEARING: Ball, single row, oil lubricated, for radial and thrust load.
MOTOR: Three phase, NEMA B, oil filled. Requires overload protection to be included in control panel. Class F insulation.
MOISTURE SENSOR: Normally open (N/O) included.
TEMPERATURE SENSOR: Normally closed (N/C) included.
OPTIONAL EQUIPMENT: Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-8).

MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K8PL360M6-23HLDS	62170351	36	230	3	1150	90	434	E	2/3	3G	1.34"	992
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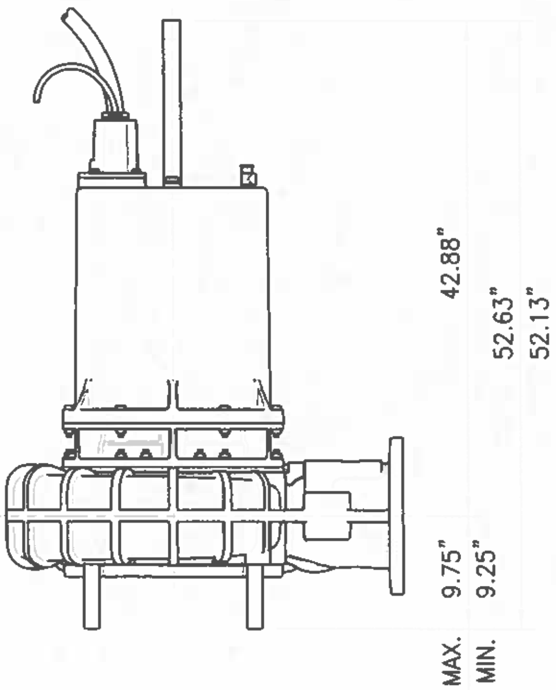
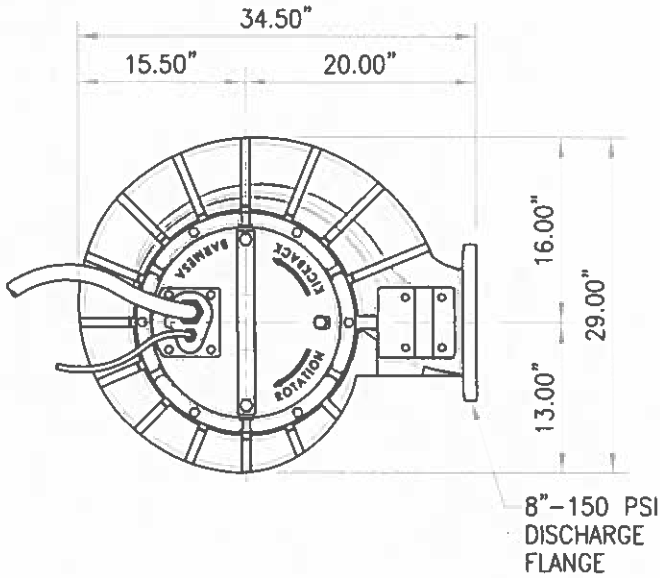




▸ Receiving inspection

Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. If the manual is removed from the packaging, do not lose or misplace.

▸ Storage

Any product that is stored for a period longer than six (6) months from the date of purchase should be bench tested prior to installation. A bench test consists of, checking the impeller to assure it is free turning and a run test to assure the motor (and switch if provided) operate properly.

▸ Controls

Manual models require a separate approved pump control device or panel for automatic operation. Be sure the electrical specification of the control selected properly match the electrical specifications of the pump.

▸ Submergence

The pump should always be operated in the submerged condition. The minimum sump liquid level should never be less than above the pump's volute (See Figure 1).

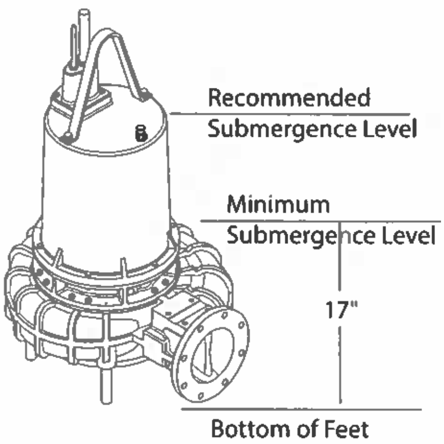


Figure 1

▸ Installation

These pumps are recommended for use in a sump, basin or lift station. The sump, basin or lift station shall be sealed and vented in accordance with local plumbing codes. **This pump is designed to pump sewage, effluent or wastewater, non-explosive and non-corrosive liquids and shall NOT be installed in locations classified as hazardous in accordance with the National Electrical Code (NEC) ANSI/NFPA 70 or Canadian Electric Code (CEC).** The pump should never be installed in a trench, ditch, or hole with a dirt bottom. The legs will sink into the dirt and the suction will become plugged.

The installation should be at a sufficient depth to ensure that all plumbing is below the frost line. If this is not feasible, remove the check valve and size the basin to accommodate the additional backflow volume.

Pumps are most commonly installed in simplex or duplex stations or basins with a slide rail system (Keen SRC), which allows the pump(s) to be installed or removed without requiring personnel to enter the station, or resting on the basin floor.

▸ Discharge Piping

Discharge piping should be as short as possible and sized no smaller than the pump discharge. **Do not reduce the discharge pipe size below that which is provided on the pump.** Both a check valve and a shut-off valve are recommended for each pump. The check valve is used to prevent backflow into the sump. The shut-of valve is used to manually stop system low during pump servicing.

▸ Liquid Level Controls

The level control(s) should be mounted on the discharge piping, a cable rack or float pole. The level control should have adequate clearance so it cannot hang up in it's swing and that the pump is completely submerged when the level control is in the "Off" mode. By adjusting the cord tether the control level can be changed. One cycle of operation should be observed, so that any potential problems can be corrected.

It is recommended that the level control float should be set to insure that the liquid in the sump never drops below the top of the motor housing or a minimum level of 10 inches above the basin floor.

▸ Electrical Connections

Power cable:

The power cable mounted to the pump must not be modified in any way except for shortening to a specific application. Any splice between the pump and the control panel must be made in accordance with the electric codes. It is recommended that a junction box, if used, be mounted outside the sump or be of at a minimum Nema 4 construction if located within the wet well. **DO NOT USE THE POWER CABLE TO LIFT PUMP.**

Always rely upon a Certified Electrician for installation.

Overload Protection:

Three Phase - The Normally Closed (N/C) thermal sensor is embedded in the motor windings and will detect excessive heat in the event an overload condition occurs. The thermal sensor will trip when the windings become too hot and will automatically reset when the pump motor cools to a safe temperature. It is recommended that the thermal sensor be connected in series to an alarm device to alert the operator of an overload condition, and/or the motor starter coil to stop the pump. In the event of an overload, the source of this condition should be determined and repaired.

⚠ WARNING DO NOT ALLOW THE PUMP TO CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS.

Moisture Sensors - A normally open (N/O) sensor rated of 1 watt @330K ohms, 500 volt, is installed in the pump seal chamber which will detect any moisture present. It is recommended that this detector be wired in series to an alarm device or motor starter coil to alert the operator that a moisture detect has occurred. In the event of a moisture detect, check the individual moisture sensor probe leads for continuity, (∞ resistance = no moisture) and the junction box/control box for moisture content.

These situations may induce a false signal in the moisture detecting circuit. If none of the above test prove conclusive, the pump(s) should be pulled and the source of the failure repaired. **IF A MOISTURE DETECT HAS OCCURRED MAINTENANCE SHOULD BE PERFORMED AS SOON AS POSSIBLE!**

If current through the temperature sensor exceeds the values listed, an intermediate control circuit relay must be used to reduce the current or the sensor will not work properly.

TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
220-240	1.50	15.0
440-480	0.75	7.5

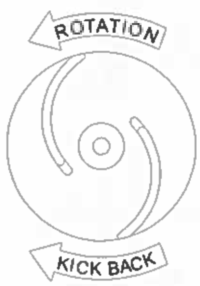
Wire Size:

If longer power cable is required consult a qualified electrician for proper wire size.

▸ Pre-Operation

1. **Check Voltage and Phase -** Compare the voltage and phase information stamped on the pump name plate.

2. **Check Pump Rotation -** Improper motor rotation can result in poor pump performance and can damage the motor and/or pump. Check rotation on three phase units by momentarily applying power and observe the "kickback".



Bottom of Pump

Kickback should always be in a counter-clockwise direction as viewed from motor end or opposite to impeller rotation. Impeller rotation is counter-clockwise as viewed from bottom of pump.

3. **Name Plate -** Record the information from the pump name plate to drawing in front of manual for future reference.

4. **Insulation Test -** An insulation (megger) test should be performed on the motor. Before the pump is put into service. The resistance values (ohms) as well as the voltage (volts) and current (amps) should be recorded.

5. **Pump-Down Test -** Be sure pump has been properly wired, lowered into the basin, sump or lift station, check the system by filling with liquid and allowing the pump to operate through its pumping cycle. The time needed to empty the system, or pump-down time along with the volume of water, should be recorded.

▸ Maintenance

No lubrication or maintenance is required. Perform the following checks when pump is removed from operation or when pump performance deteriorates:

a) Inspect motor and seal chambers for oil level and contamination.
b) Inspect impeller and body for excessive build-up or clogging.
c) Inspect motor, bearings and seal for wear or leakage, replace if required.

▸ Servicing

NOTE: Item numbers in ( ) refer to Figures 6 and 7.

Cooling Oil - Anytime the pump is removed from operation, the cooling oil in the motor housing should be checked visually for oil level and contamination. To check oil, set unit upright. Remove cap screws (6), lift conduit box assembly (4) from motor housing (3), ***Do Not*** disconnect wiring from motor leads. With a flashlight, visually inspect the oil in the motor housing (3) to make sure it is clean and clear, light amber in color and free from suspended particles. Milky white oil indicates the presence of water. Oil level should be just above the motor when pump is in vertical position.

Seal Chamber - Drain oil from seal chamber by placing pump on its side with pipe plug (18) downward and remove pipe plug (18). If the oil is found to contain considerable water or other contamination, the shaft seal (19) should be inspected and replaced if required.

Oil Testing

- Drain oil into a clean, dry container placing pump on it's side, remove cap screws (6), lift conduit box assembly (4) from motor housing (3). In separate container drain seal chamber by removing pipe plug (18).
- Check oil for contamination using an oil tester with a range to 30 kV breakdown.
- If oil is found to be clean and uncontaminated (measuring above 15 kV breakdown), refill the housing.
- If oil is found to be dirty or contaminated (or measures below 15 kV breakdown), the pump must be carefully inspected for leaks at the shaft seal, conduit box, o-rings, pipe plug and pressure valve, before refilling with oil. To locate the leak, perform a pressure test.

After leak is repaired, dispose of old oil properly, and refill with new oil.

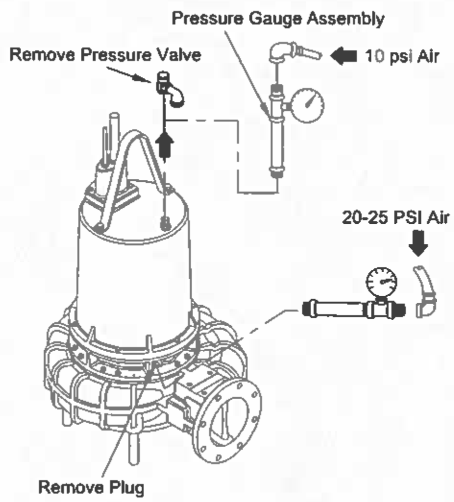


Figure 2

Pressure builds up extremely fast, increase pressure by "TAPPING" air nozzle. Too much pressure will damage seal. ***DO NOT exceed 10 PSI in housing and 20-25 PSI in seal chamber.***

Pressure Test

Motor Housing - Oil should be at normal level. Remove pressure valve (11) from motor housing (3). Apply pipe sealant to pressure gauge assembly and tighten into hole (See Figure 2). Pressurize motor housing to 10 PSI. Use soap solution around the sealed areas above the oil level and inspect joints for "air bubbles".

If, after five minutes, the pressure is still holding constant, and no "bubbles" /oil seepage is observed, slowly bleed the pressure and remove the gauge assembly. Replace oil. Leek must be located and repaired if pressure does not hold.

Seal Chamber - Check that seal chamber is full of oil by removing pipe plug (18). Apply pipe sealant to pressure gauge assembly and tighten into hole in bearing bracket (15). Pressurize seal chamber to 20-25 PSI and check for leaks.

Oil Replacement - Set unit upright and refill with new cooling oil as per table. Fill to just above motor as an air space must remain in the top of the housing to compensate for oil expansion. Reassemble the o-ring (5) and conduit box (4) to motor housing (3). Apply thread locking compound to cap screws (6) and place into holes and torque to 15 ft/lbs.

DO NOT *overfill oil. Overfilling of housing with oil can create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard. Overfilling oil voids warranty.*

Oil Replacement:
Seal Chamber - Refill chamber completely full with new cooling oil or reuse the uncontaminated oil.

Cooling Oil Recommended Supplier/Grade	
BP	Enerpar SE100
Conoco	Pale Parafin 22
Mobile	D.T.E. Oil Light
Shell Canada	Transformer-10
Texaco	Diala-Oil-AX

▸ Disassembly

Impeller and Volute - Disconnect power. Remove hex nuts (16) and vertically lift motor housing and seal plate assembly from volute (37). Clean out volute (37) if necessary. Inspect gasket (36) and replace if cut or damaged. Clean and examine impeller (32), for pitting or wear and replace if required.

To remove impeller (32), remove cap screw (35), lockwasher (10) and washer (34). With a wheel puller, pull impeller straight of shaft and remove square key. To remove wear ring (33), split it and remove, being carefull not to damage volute.

Moisture Probes - Drain oil from seal chamber, if not already done. Remove cap screws (9) and lifting handle (8). Set unit upside down on blocks to avoid damaging cables. Remove socket head cap screws (27) and lift seal plate (26), with seal's (19) stationary, vertically from bearing bracket (15), ***do not*** damage seal. Check moisture sensor probes (41) for damage, replace by removing screws (42) and disconnecting wires (40). Then remove probes (41) from bearing bracket (15).

Diaphragm - with seal plate (26) removed, examine diaphragm (23) for ruptures or crackes. Replace diaphragm by removing capscrews (25) and plate (24). Clean vent holes in seal plate (26).

Shaft Seal - Remove outboard rotating member of seal (19), spring and inboard rotating member from shaft. Examine all seal parts. Inspect seal for signs of uneven wear pattern on stationary members, chips and scratches on either seal face. **DO NOT interchange seal components, replace the entire shaft seal (19)**. If replacing seal, remove stationary by prying out with flat screwdriver.

Motor and Bearings - Remove volute, impeller, seal plate and seal as previously stated and drain oil from motor housing (3). Position unit upright, using blocks to avoid resting unit on shaft.

Remove cap screws (6), o-ring (5) and conduit box assembly (4) from motor housing (3). Note connections and then remove cable lead wires from motor lead wires and moisture and temperature sensor wires from control cable by removing connectors. Remove cap screws (12) and vertically lift the motor housing (3) from bearing bracket (15). Replace square ring (14) if damaged or cut. Remove the upper motor bolts and lift upper end bell from motor (1). Remove wave washer. Remove upper bearing (2) with a wheel puller if damaged or worn.

Vertically lift stator (1) from rotor/shaft. Inspect windings for shorts and resistance. Test the temperature sensors by checking for continuity between the black and white wires. If defective contact factory or motor service station. Pull motor rotor/shaft with bearing (13) from bearing bracket (15). Remove bearing (13) with a wheel puller if worn or damaged. If rotor or stator windings are defective, replace the complete motor.

⚠ ***IMPORTANT! - All parts must be clean before reassembly.***

▸ Reassembly

Bearings - Replace bearings, being careful not to damage the rotor or shaft. If equipped, fill notch should face the rotor core for both upper and lower bearings. Apply adhesive compound to the shaft and press bearing (13) onto shaft, position squarely onto the shaft applying force to the inner race of bearing only, until bearing seats on shoulder of the shaft. In the same manner, assemble upper bearing (2) to shaft.

Motor - Slide rotor with bearing (13) into bearing bracket (15) until bearing seats on the bottom. Position motor housing and stator into pilot, install wave washers in upper end bell.

IMPORTANT! Special wave washers in upper motor housing are required to compensate for shaft expansion. These washers must be properly reinstalled to give the required constant down force on the motor shaft.

Position upper motor end bell aligning holes and thread cap screws into bearing bracket (15) and torque to 16 ft/lbs. Place all motor leads above the motor. Position square ring (14) on bearing bracket (15) and lower housing (3) over motor and into pilot, aligning handle so that it is parallel to motor end bell reliefs. Apply thread locking compound to threads on cap screws (12) and install with nuts (16) and torque to 24 ft/lbs.

⚠ ***Handle seal parts with extreme care. DO NOT damage lapped surfaces.***

Seal/Diaphragm - (See Figure 3) Clean and oil seal cavities in bearing bracket (15) and seal plate (26). Lightly oil **(do not use grease)** outer surface of inboard and outboard stationary members of seal (19). Press inboard stationary member firmly into bearing bracket (15) and outboard stationary into seal plate (26), using a seal pusher tool. Nothing but the seal pusher tool is to come in contact with seal face.

⚠ ***IMPORTANT! - Hammering on the seal pusher tool will damage the seal face.***

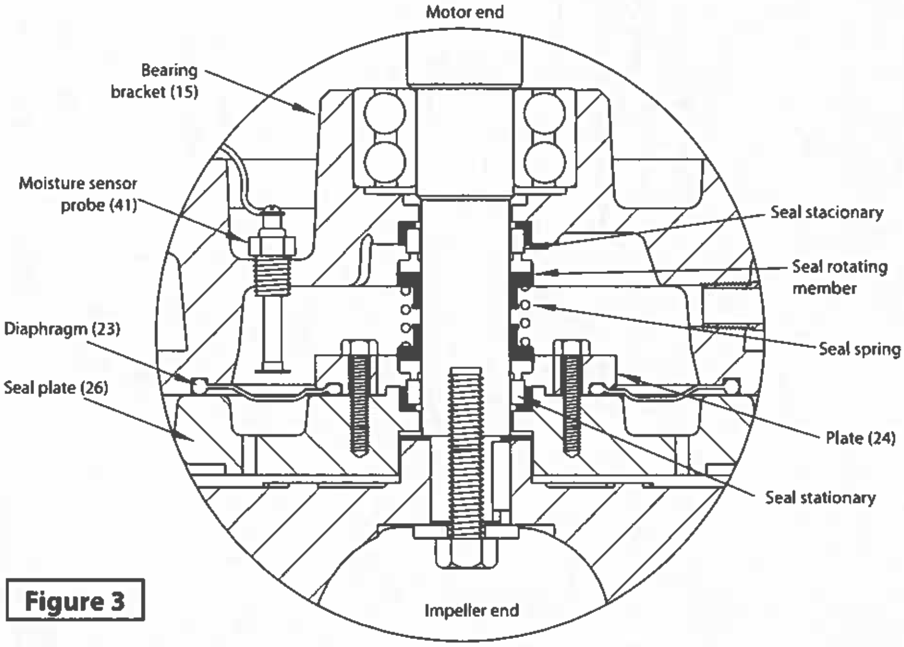


Figure 3

Conduit Box Assembly - Check power (38) and control cables (39) for crackes or damage and replace complete conduit box (4) if required. (See Figure 4) Bring motor wires through opening in top of motor housing (3), check sleeving and replace if damaged. Position square ring (5) in conduit box (4) and reconnect leads using connectors and insulators. See Figures 5, for wiring schematics.

Refill with cooling oil. Position conduit box (4) with square ring (5) on motor housing. Apply thread locking compound to cap screws (6) threads and torque to 16 ft/lbs.

Be sure the stationary members are in straight and that the rubber ring is not out of it's groove. Lightly oil **(Do not use grease)** shaft and inner surface of bellows on rotating member. With lapped surface facing bearing bracket (15), slide rotating member onto shaft using seal pusher tool, until lapped faces are together. It is extremely important to keep seal faces clean during assembly. Dirt particales lodged between faces will cause the seal to leak.

Be sure driving lugs in retainer are matched in rotating member of seal (19). Place spring over shaft and in place on rotating member, making sure it is seated in retainer and not cocked or resting on bellows tail. Lightly oil shaft and inner surface of outboard rotating member.

With tail section toward bearing bracket (15), slide rotating member onto shaft with seal pusher tool until retainer engages spring and spring is compressed slightly. Spring should be properly engaged in both retainers.

Reassemble the diaphragm (23) with "bulg" facing seal plate (26). Place plate (24) on diaphragm (23) and insert capscrews (25) into plate and tighten.

Place seal plate (26) over shaft onto bearing bracket (15), being careful not to damage outboard stationary member and align holes for cap screws (27). Thread cap screws (27) into bearing bracket (15) and tighten. Refill chamber with oil.

Remove gland nuts (38B) and (39B), friction rings (38C) and (39C), and grommets (38D) and (39D) from conduit box (4), inspect and replace if damaged (See Figure 4).

Reassemble by inserting one friction ring, grommet, one more friction ring and gland nut into conduit box. Torque gland nuts to 15 ft/lbs to prevent leakage.

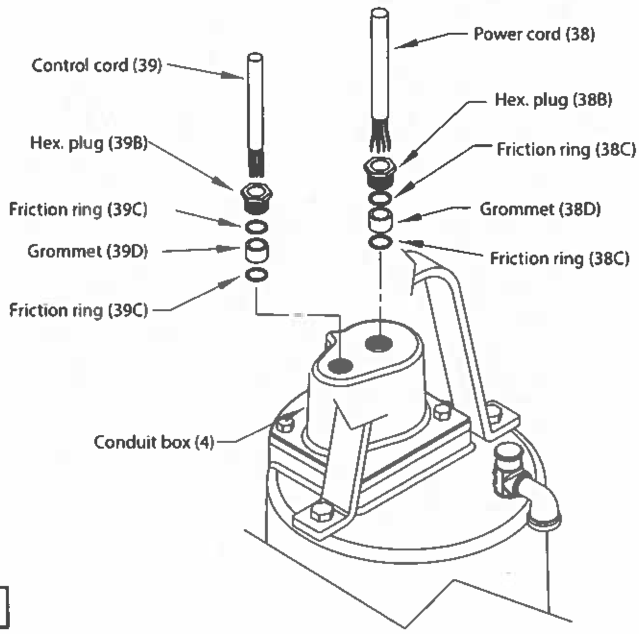


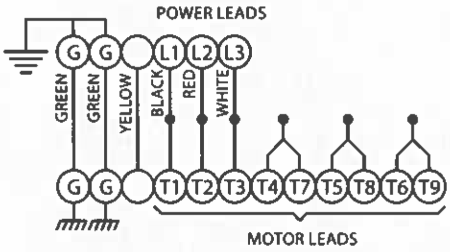
Figure 4

Wear Ring - Apply retaining compound to the bore of volute (37) and press wear ring (33) into bore until seated.

Impeller and Volute - Install impeller (32) by appling a thin film of oil to motor shaft and slide impeller straight onto shaft, keeping keyways lined up. Drive key into keyway. Locate washer (34) and lockwasher (10), apply thread lock primer (such as Loctite® Primer T), let set per manufacturer's directions. Apply thread locking compound to threads on cap screw (35), and thread into shaft and torque to 35 ft/lbs.

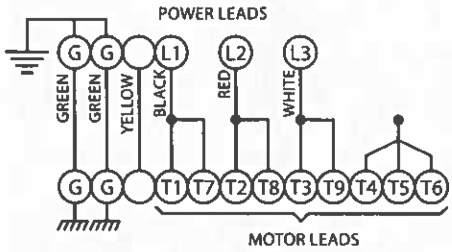
Place gasket (36) on volute and install impeller and motor assembly over studs and onto volute (37). Apply thread locking compound to threads of studs (31) and thread nuts (16) onto studs and torque to 24 ft/lbs. Check for binding by rotating impeller. Clearance between the impeller and volute should be approximately 0.012 inch.

THREE PHASE 460V AC



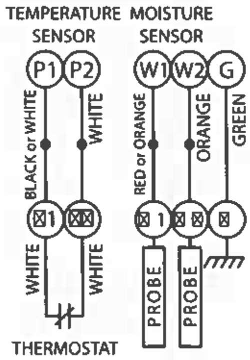
Power Cable	Motor Lead Number
Green (Ground)	Green – 2
Yellow	Not used
Black	1
Red	2
White	3
	T4 & T7 together
	T5 & T8 together
	T6 & T9 together

THREE PHASE 208-230V AC



Power Cable	Motor Lead Number
Green (Ground)	Green – 2
Yellow	Not used
Black	1 & 7
Red	2 & 8
White	3 & 9
	T4, T5 & T6 together

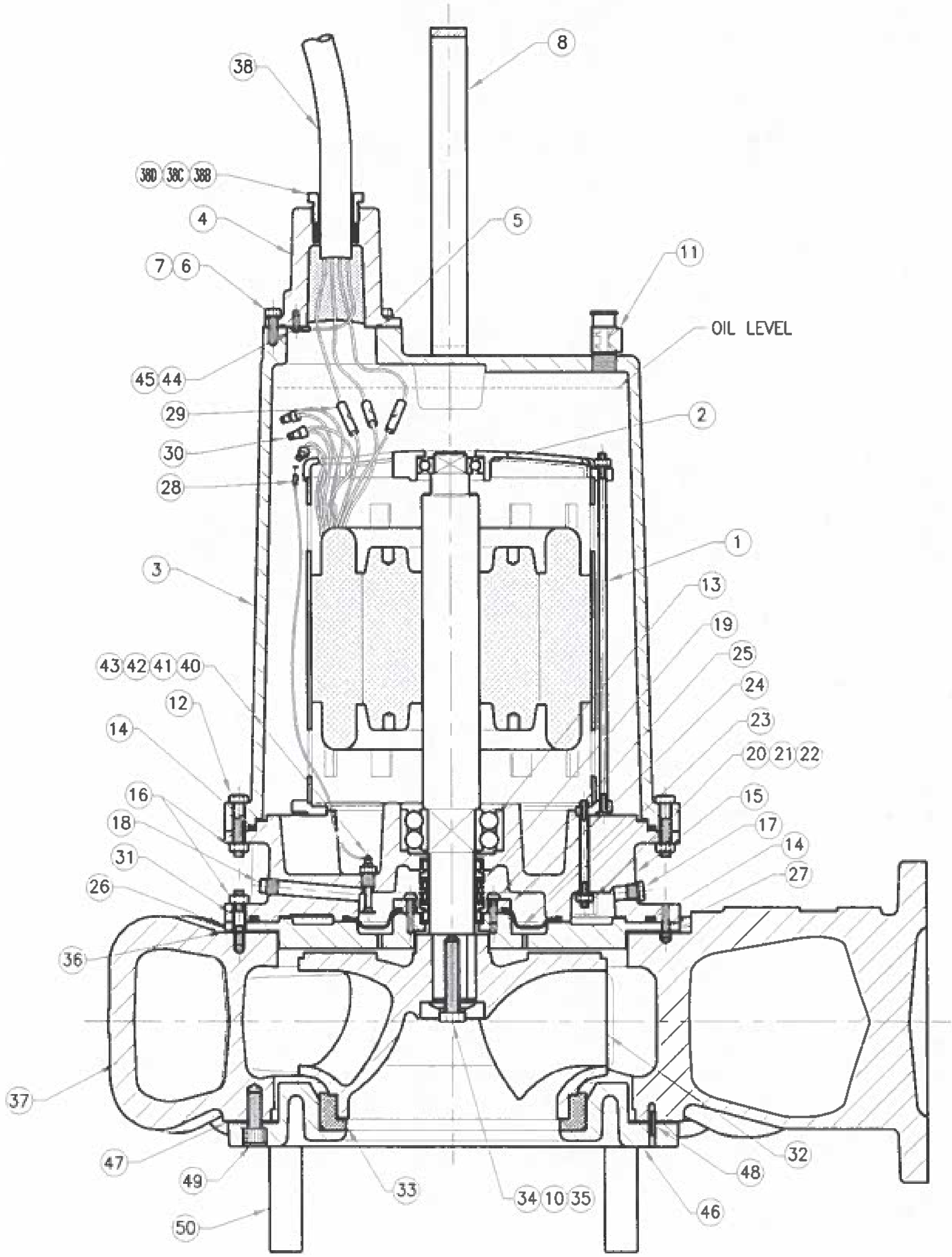
CONTROL CABLE



Control Cable	Lead Number
Green	Ground
Black	P1 (Temp. sensor)
White	P2 (Temp. sensor)
Red	W1 (Moisture sensor)
Orange	W2 (Moisture sensor)

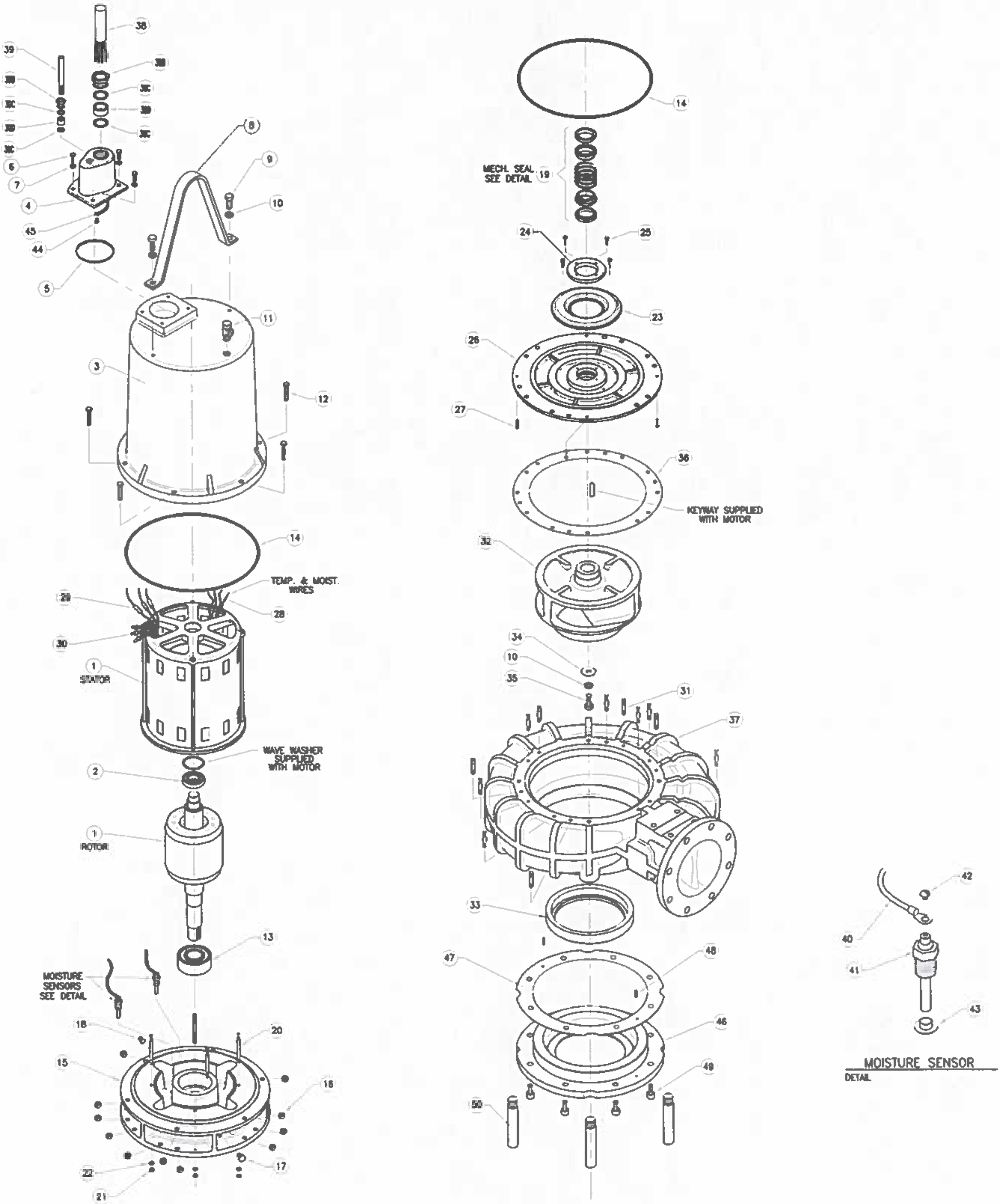
Figure 5

Figure 7



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

Figure 7



For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

PART LIST			
ITEM	QTY.	DESCRIPTION	PART. No.
1	1	MOTOR:	
		48 H.P., 3 PHASE, 1150 RPM, 230/460	40040046
2	1	BEARING (UPPER)	31020018
3	1	MOTOR HOUSING	03100006
4	1	CONDUIT BOX & CABLE ASSEMBLY	03100007
5	1	O-RING #51937	92010085
6	4	CAP SCREW 3/8-16UNC x 1" SS	91010345
7	4	LOCKWASHER 3/8" SS	91010061
8	1	LIFTING BAIL	30400845
9	2	SCREW 5/8-11 x 1-1/2"	91010354
10	3	LOCKWASHER 5/8"	91010063
11	1	PRESS RELIEF VALVE	31200021
12	6	SCREW 7/16-14 x 2.25" SS	91010348
13	1	BEARING (LOWER)	31020019
14	2	"O" RING GASKET # 52082	92010051
15	1	BEARING HOUSING	030400138
16	18	HEX NUT 7/16-14 UNC SS	91010434
17	1	HEX HEAD PLUG 3/8" SS # 22932	93010131
18	1	PLUG 3/8"	93010149
19	1	MECHANICAL SEAL # 60818	31030146
20	4	STUD 3/8-16 UNC x 4.5" LG.	91010376
21	4	HEX NUT 3/8-16 UNC SS	91010433
22	4	LOCKWASHER 3/8" SS	91010061
23	1	DIAPHRAGM # 52093	31040002
24	1	DIAPHRAGM PLATE	03160006
25	4	SCREW 1/4-20 x 1" SS	91010342
26	1	SEAL PLATE	03180016
27	4	SCREW HEAD SOCKET 1/4-20UNC x 1" SS	91010392
28	4	CONECTOR # 52990	94010021
29	3	CONECTOR # 56730	94010022
30		WIRE CONECTOR # 55844	94010024
	3	230 VOLTS.	
	1	460 VOLTS.	
31	12	STUD 7/16-14 UNC x 2.25" LG.	91010377
32	1	IMPELLER	
		36 H.P., 1150 RPM (12.50" STD. DIAMETER)	03140107
		48 H.P., 1150 RPM (13.00" STD. DIAMETER)	031401078
33	1	WEAR RING	30400301
34	1	IMPELLER WASHER	30400423
35	1	SCREW HEX. HD. 5/8-11 x 3" SS	91010360
36	1	VOLUTE GASKET # 51936	92010192
37	1	VOLUTE	03090062
38	27 Ft.	POWER CABLE 3/2 # 52283	31030006
38B	1	HEX HEAD PLUG	30400904
38C	2	WASHER SS	30400401
38D	1	GROMMET	92010002
39	27 Ft.	CORD SET, MOIST & TEMP. CABLE 5/18	31030005
39B	1	HEX HEAD PLUG	30400901
39C	2	WASHER # 21531	91010057
39D	1	GROMMET	92010005
40	2	WIRE ASSY, MOISTURE SENSOR	31030011
41	2	MOISTURE SENSOR #39383	31160001
42	2	MACHINE SCREW MOIST, 6-32 x 1/4" SS	91010403
43	2	CAP PLUG	93010101
44	1	GROUND SCREW 1/4" x 1/2"	91010404
45	1	ROUND TERMINAL 5/16"	94010044
46	1	SUCTION FLANGE	03050013
47	1	SUCTION FLANGE GASKET	92010169
48	2	ROLL PIN 1/4"Ø x 1"	91010181
49	8	SCREW HEAD SOCKET 5/8-11 x 1-1/2" SS	91010396
50	4	FOOT SUPPORT	30400875
51	13.7 Gal.	MOTOR OIL (HOUSING & SEAL CAVITY)	31010031

For repair part please supply: Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on parts list.

Risk of electric shock. Always disconnect the pump from the power source before handling inspections or repairs.

<table>
<tr><th>Symptom</th><th>Possible Cause(s)</th><th>Corrective Action</th></tr>
<tr><td>Pump will not run</td><td>1. Poor electrical connection, blown fuse, tripped breaker or other interruption of power; improper power supply
2. Motor or switch inoperative (go to manual operation)
2a. Float movement restricted
2b. Switch will not activate pump or is defective
2c. Defective motor
3. Insufficient liquid level</td><td rowspan="7">1. Check all electrical connections for security. Have electrician measure current in motor leads, if current is within ± 20% of locked rotor Amps, impeller is probably locked. If current is 0, overload may be tripped. Remove power, allow pump to cool, then re-check current.
2a. Reposition pump or clean basin as required to provide adaquate clearance for float
2b. Disconnect level control. Set ohmmeter for a low rang, such as 100 ohms full scale and connect to level control leads. Actuate level control manually and check to see that ohmmeter shows zero ohms for closed switch and full scale for open switch. (Float Switch)
2c. Check winding insulation (Megger Test) and winding resistance. If check is outside of range, dry and re-check. If still defective, replace per service instructions.
3. Make sure liquid level is above the pump
4. Re-check all sizing calculations to determine proper pump size.
5. Check discharge line for restrictions, including ice if line passes through or into cold areas.
6. Remove and examine check valve for proper installation and freedom of operation
7. Open valve
8. Check impeller for freedom of operation, security and condition. Clean impeller cavity and inlet of any obstruction
Loosen union slightly to allow trapped air to escape. Verify that turn-off level of switch is set so that the suction is always flooded. Clean vent hole
10. Check rotation. If power supply is three phase, reverse any two of three power supply leads to ensure proper impeller rotation
11. Repair fixtures as required to eliminate leakage
12. Check pump temperature limits and fluid temperature
13. Replace portion of discharge pipe with flexible connector or tighten existing piping.
14. Turn to automatic position
15. Check for leaks around basin inlet and outlets</td></tr>
<tr><td>Pump will not turn off</td><td>2a. Float movement restricted
2b. Switch will not activate pump or is defective
4. Excessive inflow or pump not properly sized for application
9. Pump may be air locked causing pump not to flow
14. H-O-A switch on panel is in "HAND" position</td></tr>
<tr><td>Pump hums but doesn't run</td><td>1. Incorrect low voltage
8. Impeller jammed or loose on shaft, or inlet plugged</td></tr>
<tr><td>Pump delivers insufficient capacity</td><td>1. Incorrect low voltage
4. Excessive inflow or pump not properly sized for application
5. Discharge restricted
6. Check valve partially closed or installed backwards
7. Shut-off valve closed
8. Impeller jammed or loose on shaft, or inlet plugged
9. Pump may be air locked causing pump not to flow
10. Piping fixtures leaking or discharge before the</td></tr>
<tr><td>when fixtures are not in use</td><td>6. Check valve partially closed or installed backwards
11. Fixtures are leaking
15. Ground water entering basin</td></tr>
<tr><td>Pump shuts off and turns on independent of switch, (trips thermal overload protector).
CAUTION! Pump may start unexpectedly. Disconnect power supply.</td><td>1. Incorrect low voltage
4. Excessive inflow or pump not properly sized for application
8. Impeller jammed or loose on shaft, or inlet plugged
12. Excessive water temperature (internal protection only)</td></tr>
<tr><td>Pump operates noisily or vibrates excessively</td><td>2c. Worn bearings, motor shaft bent
5. Debris in impeller cavity or broken impeller
10. Pump running backwards
13. Piping attachments to building structure too loose or rigid</td></tr>
</table>

NOTE: Keen Pumps assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Keen Pumps or its authorized service centers, automatically voids warranty.

KEEN PUMPS
FACTORY WARRANTY

Keen Pumps warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for 18 months from date of manufacture or 12 months from installation date whichever occurs first. This warranty gives you specific legal rights, which vary from state to state.

This warranty is a limited warranty, and no warranty related claims of any nature whatsoever shall be made against Keen Pumps, until the ultimate consumer or his/her successor notifies us in writing of the defect and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station as instructed by Keen Pumps. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE. PRODUCT SHALL BE EITHER REPLACED OR REPAIRED AT THE ELECTION OF KEEN PUMPS. Guarantees relating to performance specifications provided in addition to the foregoing material and workmanship warranties on a product manufactured by Keen Pumps, if any, are subject to possible factory testing. Any additional guarantees, in the nature of certified performance specifications or time frame must be in writing and such writing must be signed by our authorized factory manager at time of order placement and/or at time of quotation. Due to inaccuracies in field testing and should a conflict arises between the results of field testing conducted by or for the user, Keen Pumps reserves the right to have the product returned to our factory for additional testing.

This warranty shall not apply when damage is caused by (1) improper installation, (2) improper voltage, (3) lightning, (4) excessive sand or other abrasive material, (5) corrosion build-up due to excessive chemical content or (6) uncontrollable acts of god. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective pumps, parts or systems. Keen Pumps will not accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY. No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.

IMPORTANT!
If you have a claim under the provision of the warranty, contact Keen Pumps or your authorized Keen Pumps Distributor:
www.keenpump.com

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K8XHPL-DS
30 HP / 1150 RPM
Discharge: 8"
Spherical solids handling: 3"

DISCHARGE
8", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C).

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
N/A

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 3 vanes, closed, with a bronze wear ring and vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Square shaped Buna-N.

PAINT
Air dry enamel, water based.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

SEAL
Design: double, mechanical, oil filled chamber.
Material: ceramic stationary seat, carbon ring and exclusion seal in the rotatory set, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord, sealed against moisture.

BEARINGS
Upper: single row, ball, permanently oil lubricated, designed for radial load.
Lower: double row, ball, permanently oil lubricated, designed for radial and axial loads.

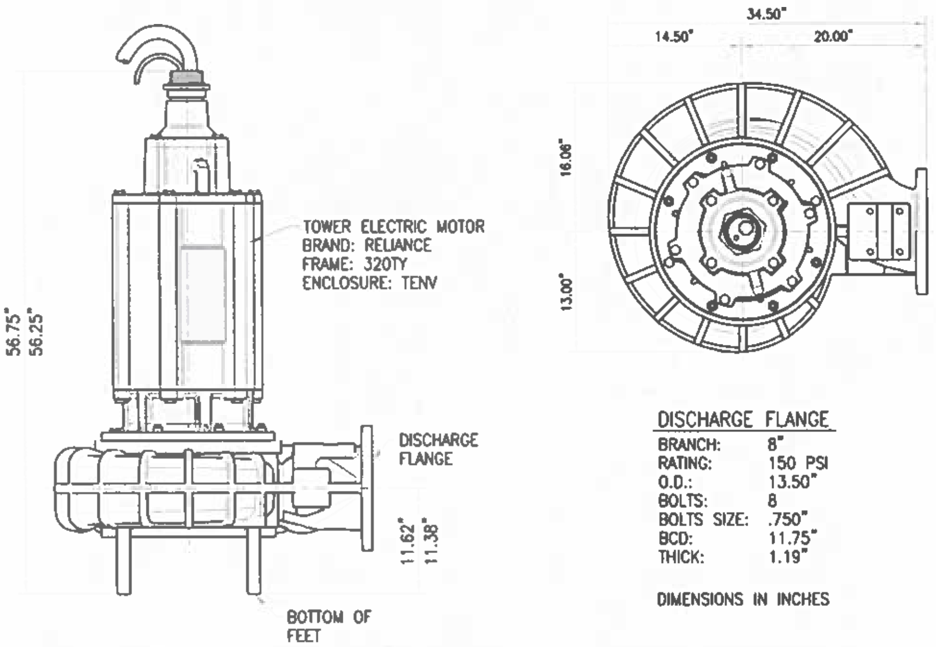
MOTOR
Explosion proof, NEMA B, three phase, 460 volts, 60 Hz, 1150 RPM, air cooled. Requires overload protection to be included in control panel.

MOISTURE SENSOR
Normally open (N/O) included.

TEMPERATURE SENSOR
Normally closed (N/C) included.

OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-8).

SPECIFICATIONS



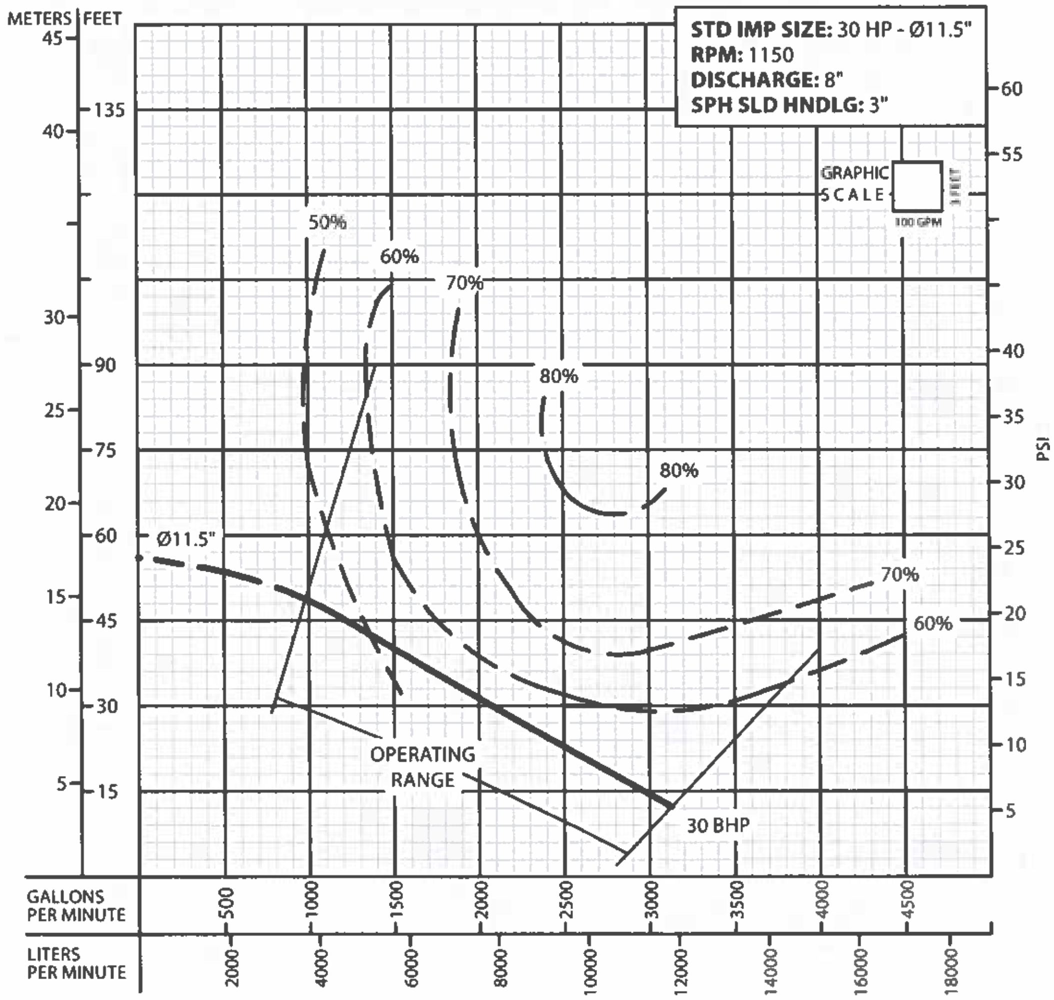
DISCHARGE FLANGE

BRANCH:	8"
RATING:	150 PSI
O.D.:	13.50"
BOLTS:	8
BOLTS SIZE:	.750"
BCD:	11.75"
THICK:	1.19"

DIMENSIONS IN INCHES

MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K8XHPL300M6-43DS	62170361	30	460	3	1150	40	210	G	8/4	SOW	0.985"	1700

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485".



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K8XHPL-DS
40 HP / 1150 RPM
Discharge: 8"
Spherical solids handling: 3"

DISCHARGE
8", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C).

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
N/A

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 3 vanes, closed, with a bronze wear ring and vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Square shaped Buna-N.

PAINT
Air dry enamel, water based.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

SEAL
Design: double, mechanical, oil filled chamber.
Material: ceramic stationary seat, carbon ring and exclusion seal in the rotatory set, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord, sealed against moisture.

BEARINGS
Upper: single row, ball, permanently oil lubricated, designed for radial load.
Lower: double row, ball, permanently oil lubricated, designed for radial and axial loads.

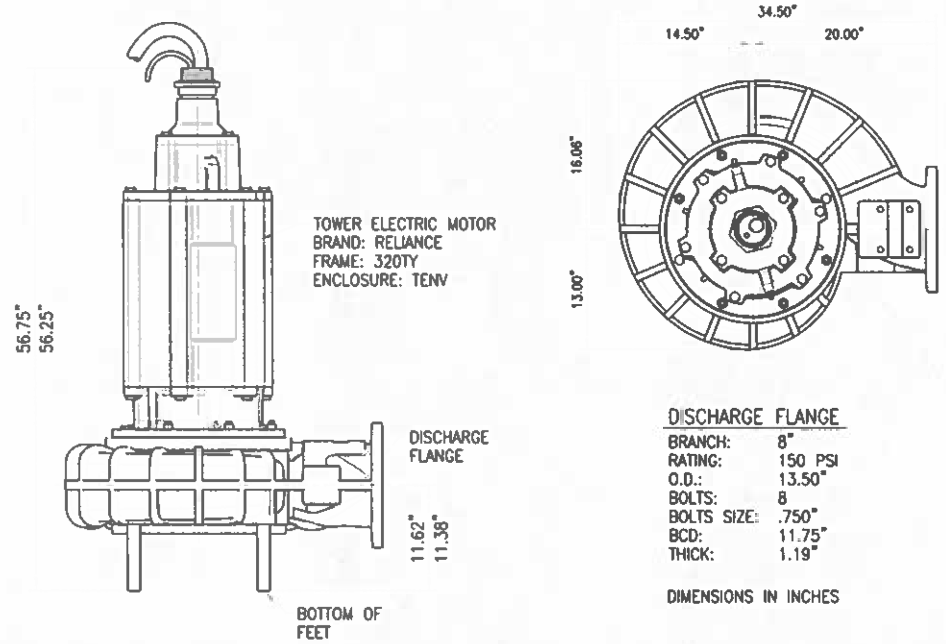
MOTOR
Explosion proof, NEMA B, three phase, 460 volts, 60 Hz, 1150 RPM, air cooled. Requires overload protection to be included in control panel.

MOISTURE SENSOR
Normally open (N/O) included.

TEMPERATURE SENSOR
Normally closed (N/C) included.

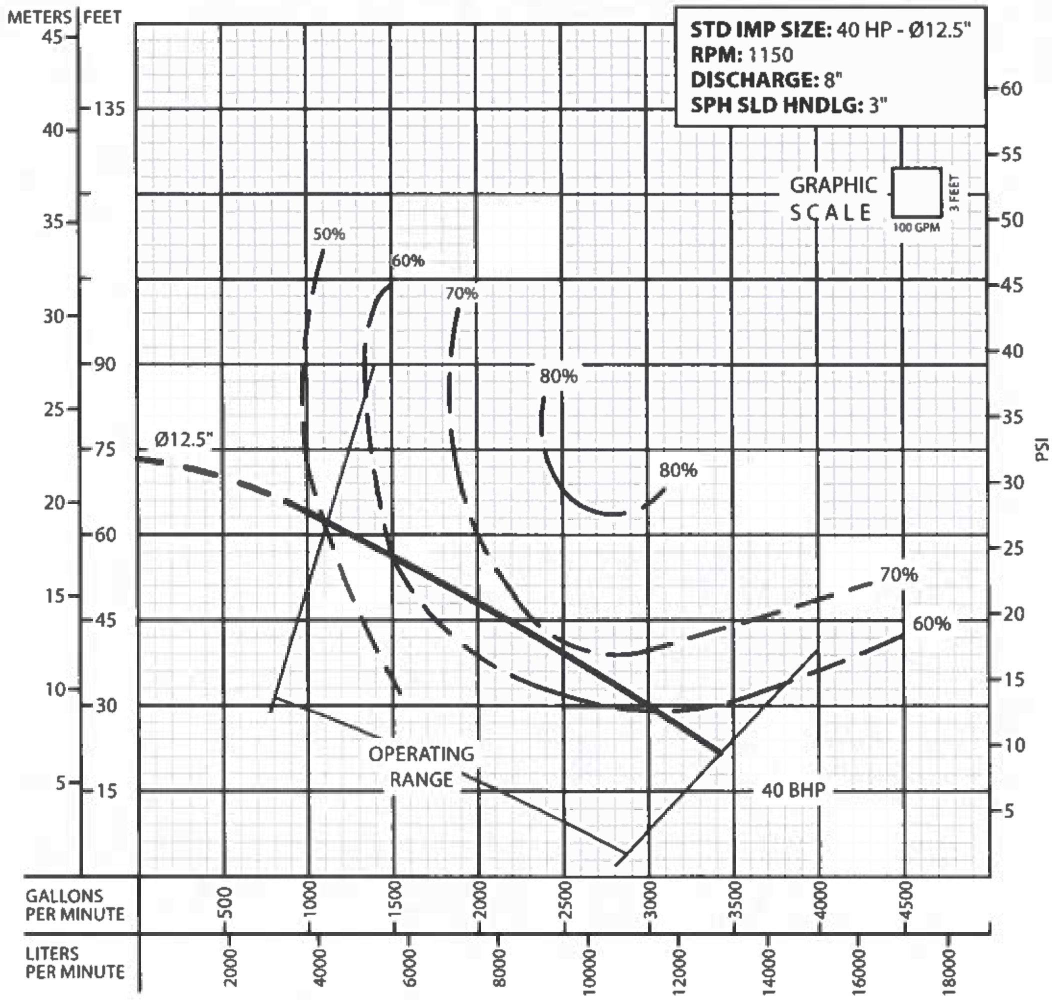
OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-8).

SPECIFICATIONS



MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K8XHPL400M6-43DS	62170362	40	460	3	1150	52	282	G	6/4	SOW	1.125"	1700

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485".



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
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4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

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SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

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50 HP / 1150 RPM
Discharge: 8"
Spherical solids handling: 3"

DISCHARGE
8", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C).

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
N/A

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 3 vanes, closed, with a bronze wear ring and vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
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DIAPHRAGM
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25 ft of neoprene cord, sealed against moisture.

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Lower: double row, ball, permanently oil lubricated, designed for radial and axial loads.

MOTOR
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Normally closed (N/C) included.

OPTIONAL EQUIPMENT
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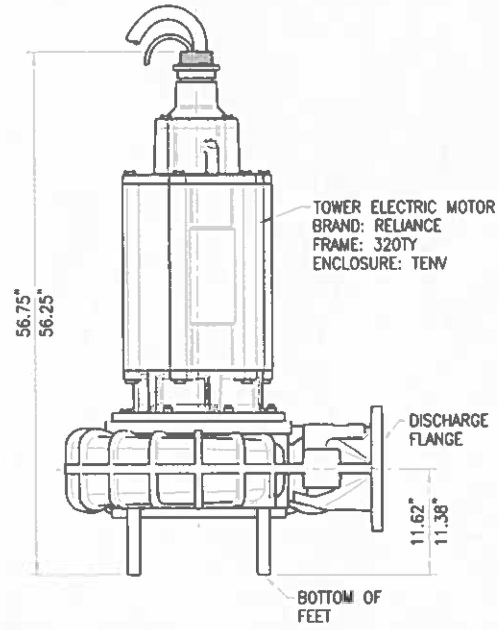
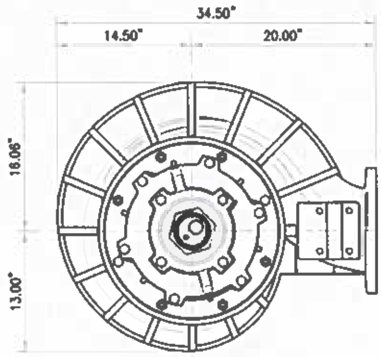
SPECIFICATIONS



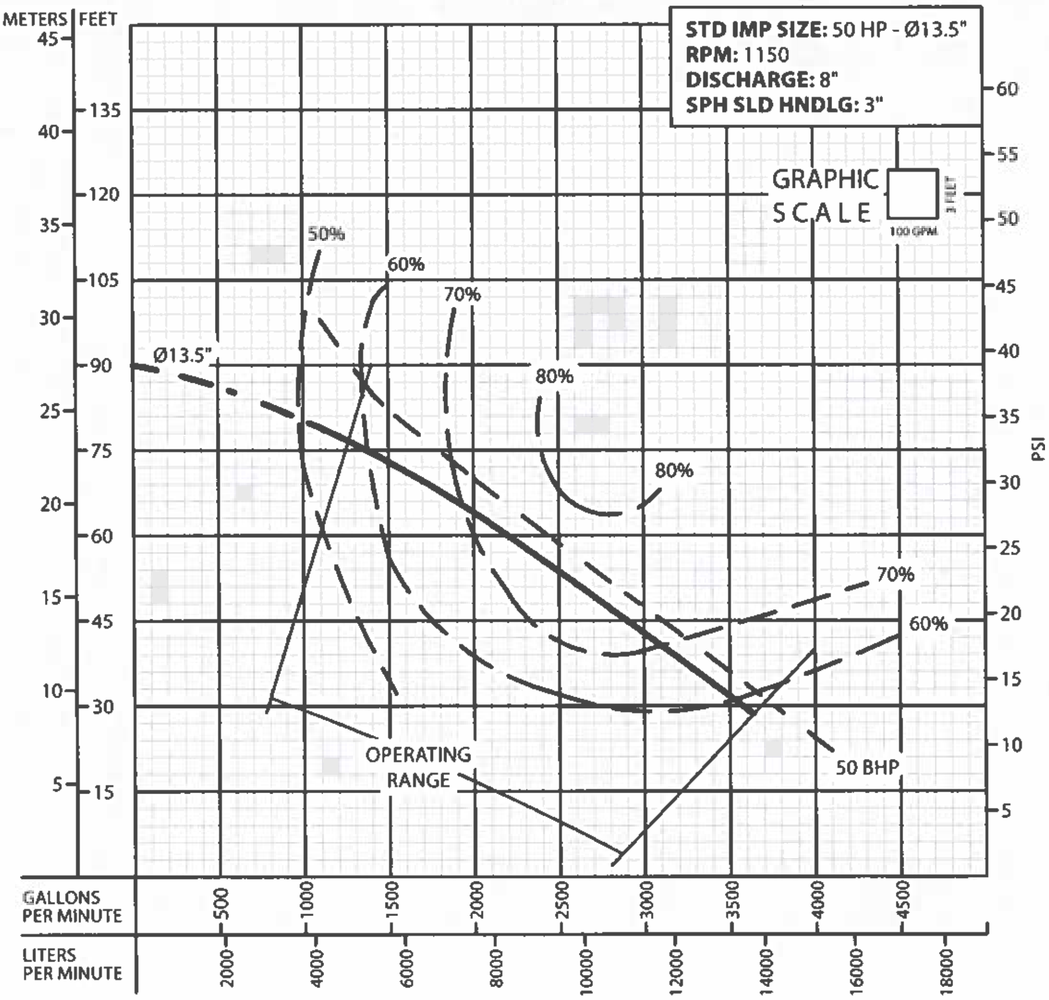


DISCHARGE FLANGE
BRANCH: 8"
RATING: 150 PSI
O.D.: 13.50"
BOLTS: 8
BOLTS SIZE: .750"
BCD: 11.75"
THICK: 1.19"

DIMENSIONS IN INCHES

MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K8XHPL500M6-43DS	62170363	50	460	3	1150	67	322	F	4/4	SOW	1.350"	1706

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485".



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K8XHPL-DS
60 HP / 1150 RPM
Discharge: 8"
Spherical solids handling: 3"

DISCHARGE
8", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C).

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
N/A

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 3 vanes, closed, with a bronze wear ring and vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Square shaped Buna-N.

PAINT
Air dry enamel, water based.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

SEAL
Design: double, mechanical, oil filled chamber.
Material: ceramic stationary seat, carbon ring and exclusion seal in the rotatory set, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord, sealed against moisture.

BEARINGS
Upper: single row, ball, permanently oil lubricated, designed for radial load.
Lower: double row, ball, permanently oil lubricated, designed for radial and axial loads.

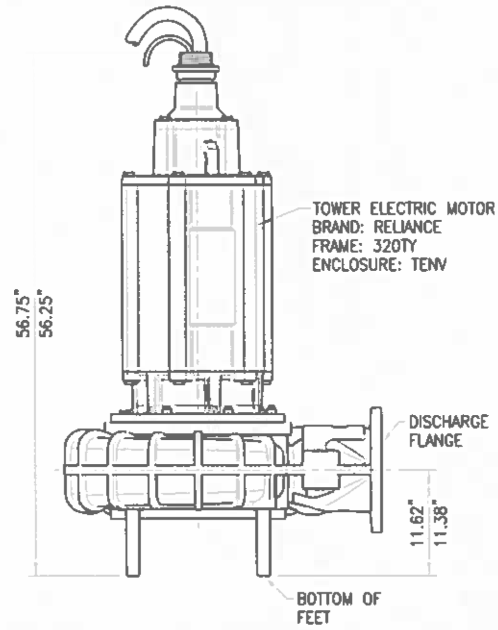
MOTOR
Explosion proof, NEMA B, three phase, 460 volts, 60 Hz, 1150 RPM, air cooled. Requires overload protection to be included in control panel.

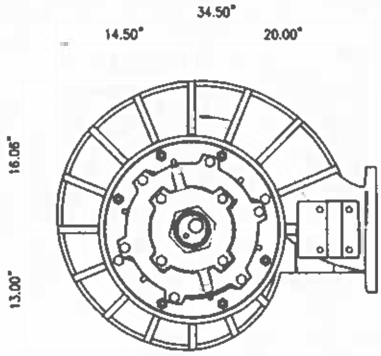
MOISTURE SENSOR
Normally open (N/O) included.

TEMPERATURE SENSOR
Normally closed (N/C) included.

OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-8).

SPECIFICATIONS





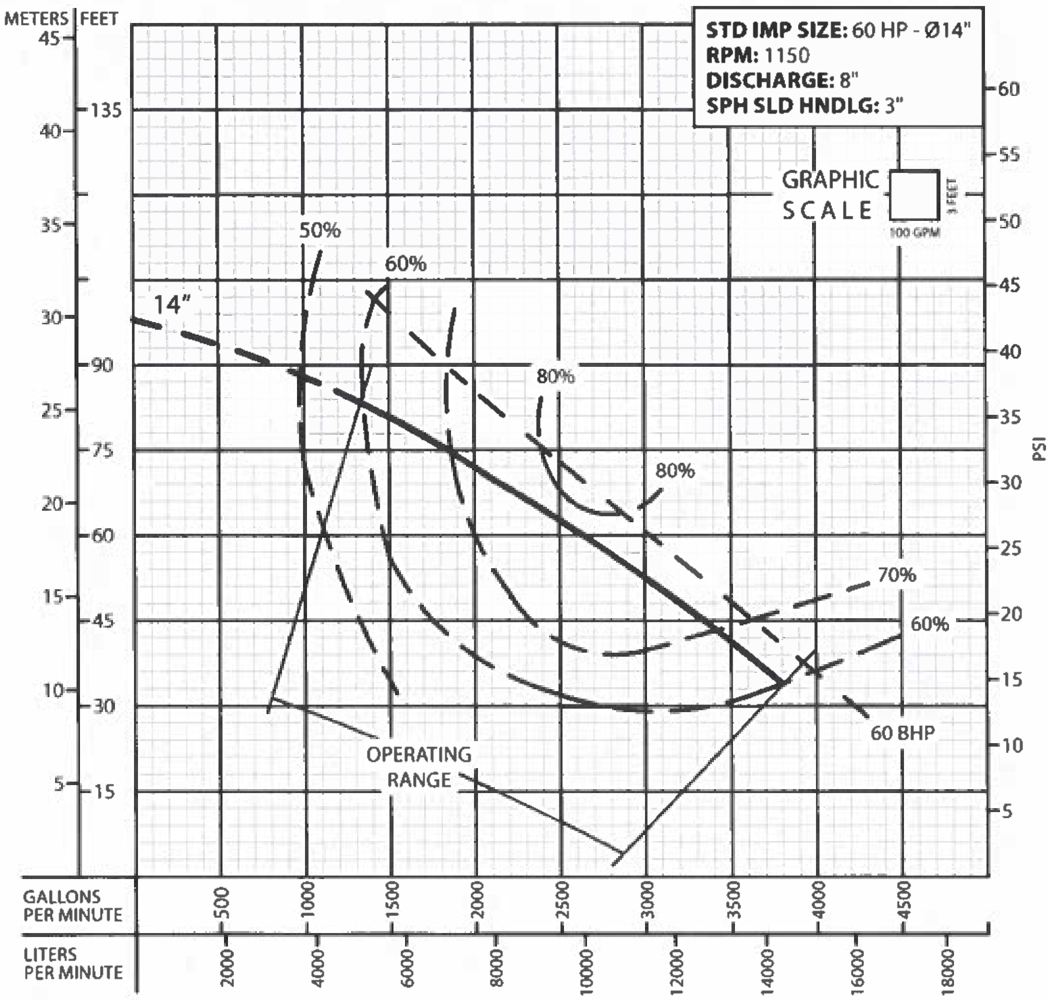
DISCHARGE FLANGE

BRANCH:	8"
RATING:	150 PSI
O.D.:	13.50"
BOLTS:	8
BOLTS SIZE:	.750"
BCD:	11.75"
THICK:	1.19"

DIMENSIONS IN INCHES

MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K8XHPL600M6-43DS	62170364	60	460	3	1150	76.9	409	F	2/4	SOW	1.550"	1711

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485".



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K8XHPL-DS
75 HP / 1150 RPM
Discharge: 8"
Spherical solids handling: 3"

DISCHARGE
8", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C).

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
N/A

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 3 vanes, closed, with a bronze wear ring and vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Square shaped Buna-N.

PAINT
Air dry enamel, water based.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

SEAL
Design: double, mechanical, oil filled chamber.
Material: ceramic stationary seat, carbon ring and exclusion seal in the rotatory set, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord, sealed against moisture.

BEARINGS
Upper: single row, ball, permanently oil lubricated, designed for radial load.
Lower: double row, ball, permanently oil lubricated, designed for radial and axial loads.

MOTOR
Explosion proof, NEMA B, three phase, 460 volts, 60 Hz, 1150 RPM, air cooled. Requires overload protection to be included in control panel.

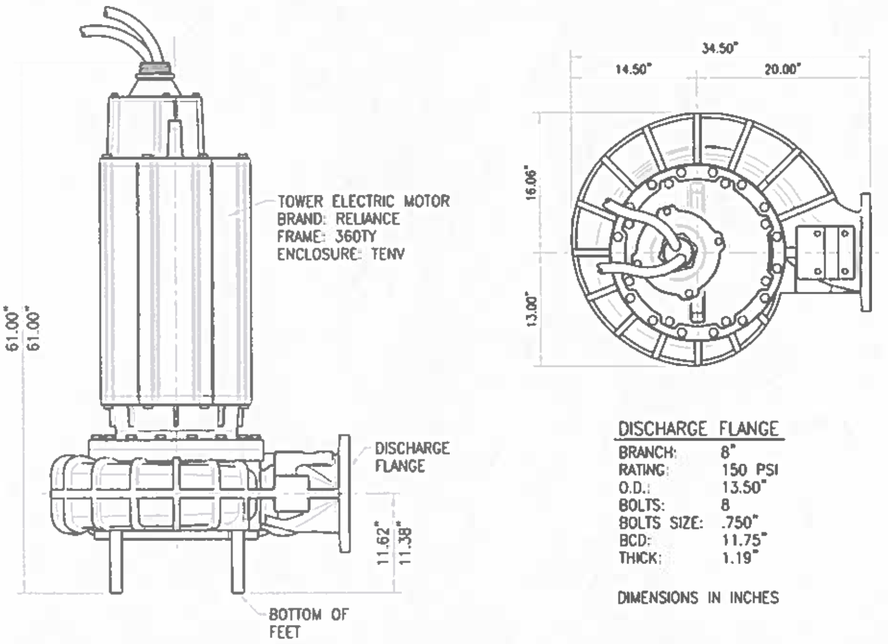
MOISTURE SENSOR
Normally open (N/O) included.

TEMPERATURE SENSOR
Normally closed (N/C) included.

OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-8).

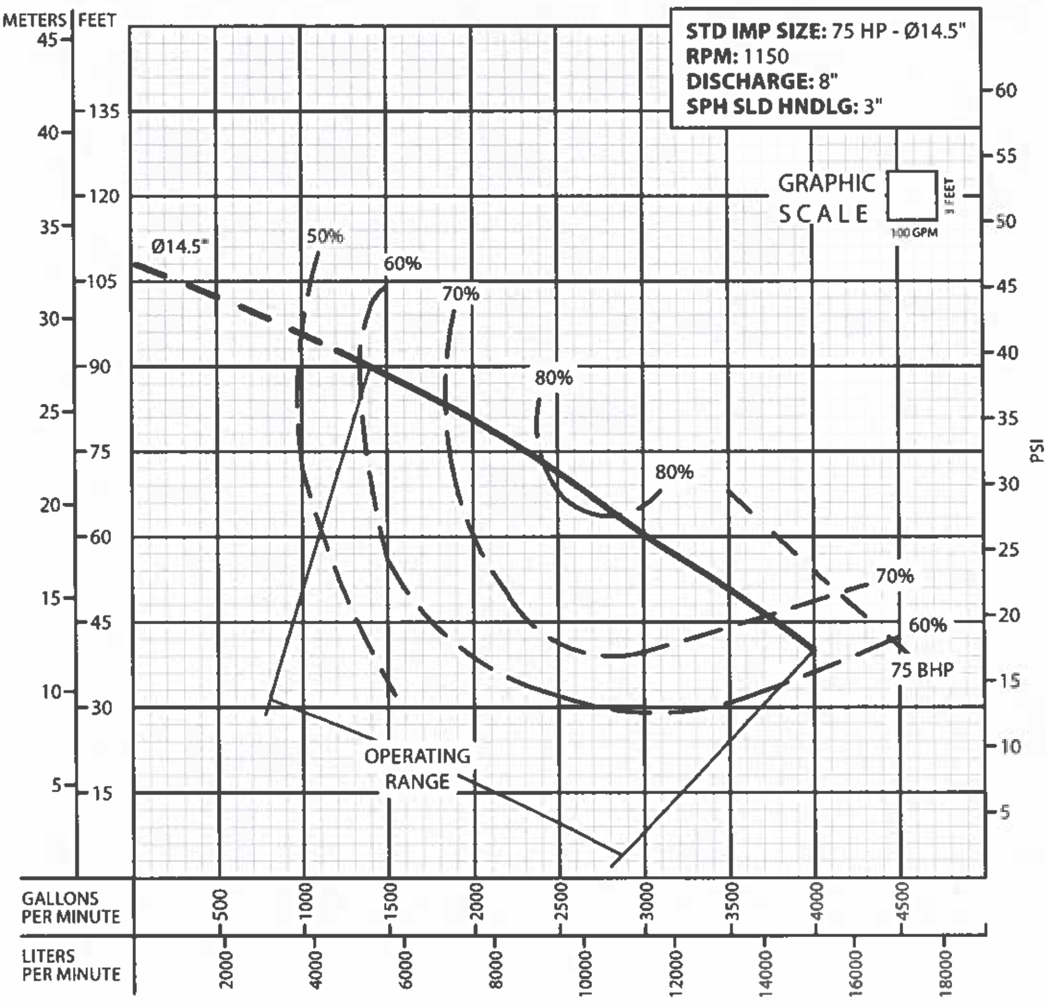
SPECIFICATIONS

SPECIFICATIONS



MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K8XHPL750M6-43DS	62170365	75	460	3	1150	92	534	G	2/4	SOW	1.550"	2028

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485".



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K8XHPL-DS
100 HP / 1750 RPM
Discharge: 8"
Spherical solids handling: 3"

DISCHARGE
8", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C).

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
N/A

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 3 vanes, closed, with a bronze wear ring and vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Square shaped Buna-N.

PAINT
Air dry enamel, water based.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

SEAL
Design: double, mechanical, oil filled chamber.
Material: ceramic stationary seat, carbon ring and exclusion seal in the rotatory set, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord, sealed against moisture.

BEARINGS
Upper: single row, ball, permanently oil lubricated, designed for radial load.
Lower: double row, ball, permanently oil lubricated, designed for radial and axial loads.

MOTOR
Explosion proof, NEMA B, three phase, 460 volts, 60 Hz, 1750 RPM, air cooled. Requires overload protection to be included in control panel.

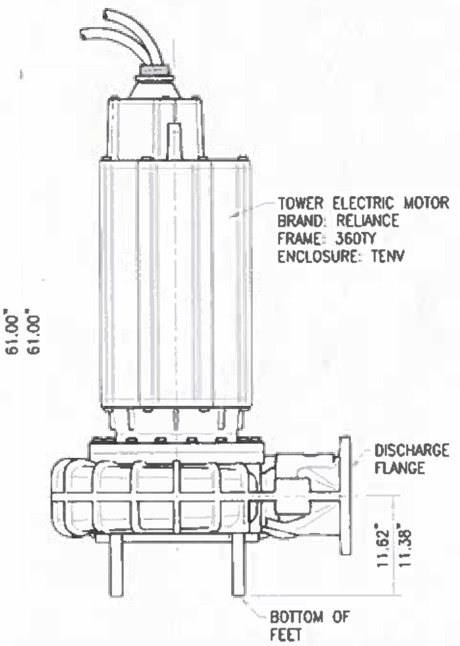
MOISTURE SENSOR
Normally open (N/O) included.

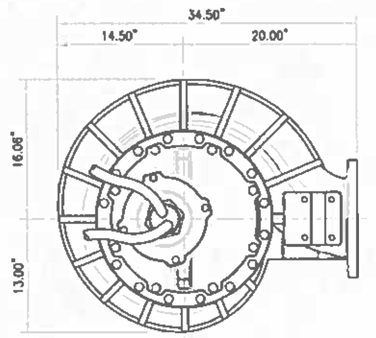
TEMPERATURE SENSOR
Normally closed (N/C) included.

OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-8).

SPECIFICATIONS

SPECIFICATIONS





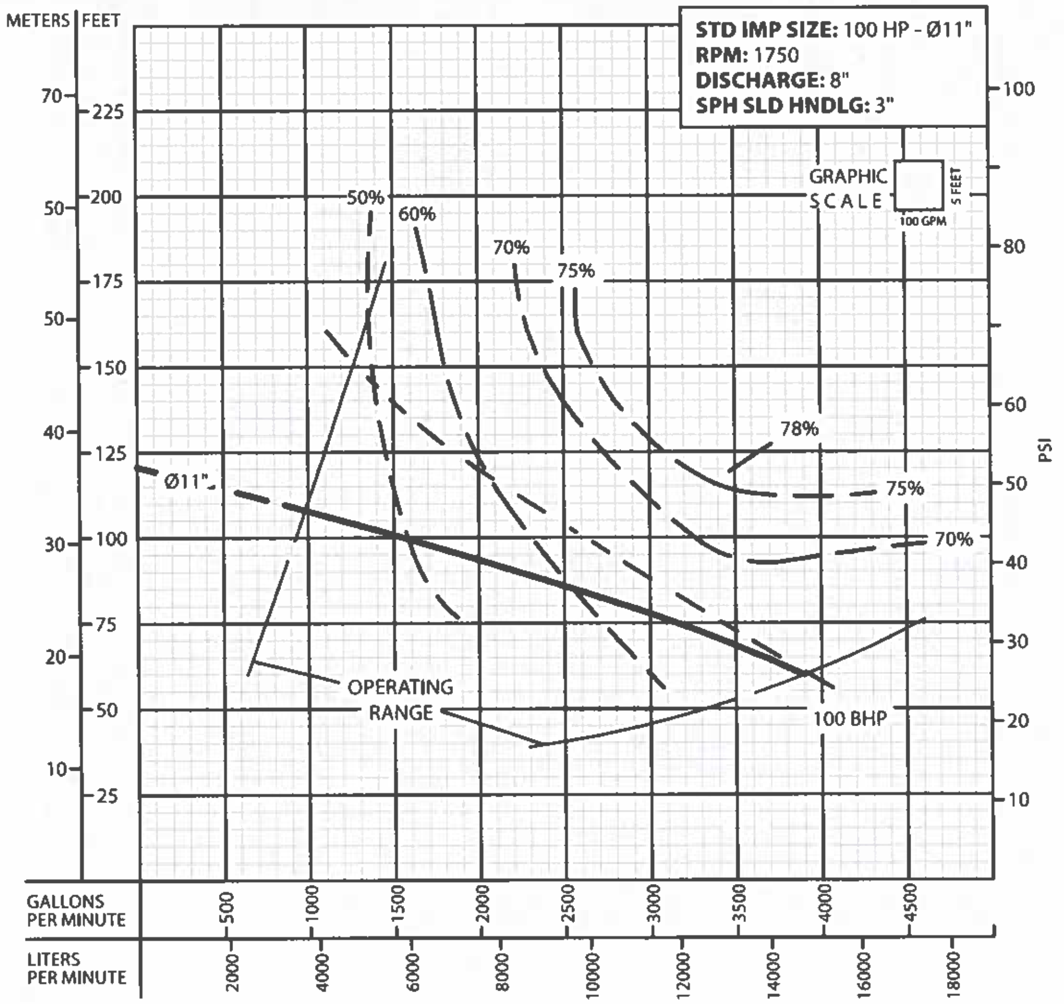
DISCHARGE FLANGE

BRANCH:	8"
RATING:	150 PSI
O.D.:	13.50"
BOLTS:	8
BOLTS SIZE:	.750"
BCD:	11.75"
THICK:	1.19"

DIMENSIONS IN INCHES

MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K8XHPL1000M4-43DS	62170366	100	460	3	1750	123	703	G	1/4	SOW	1.680"	2050

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485".



IMPORTANT!

1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.
4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K8XHPL-DS
125 HP / 1750 RPM
Discharge: 8"
Spherical solids handling: 3"

DISCHARGE
8", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C).

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
N/A

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 3 vanes, closed, with a bronze wear ring and vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Square shaped Buna-N.

PAINT
Air dry enamel, water based.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

SEAL
Design: double, mechanical, oil filled chamber.
Material: ceramic stationary seat, carbon ring and exclusion seal in the rotatory set, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord, sealed against moisture.

BEARINGS
Upper: single row, ball, permanently oil lubricated, designed for radial load.
Lower: double row, ball, permanently oil lubricated, designed for radial and axial loads.

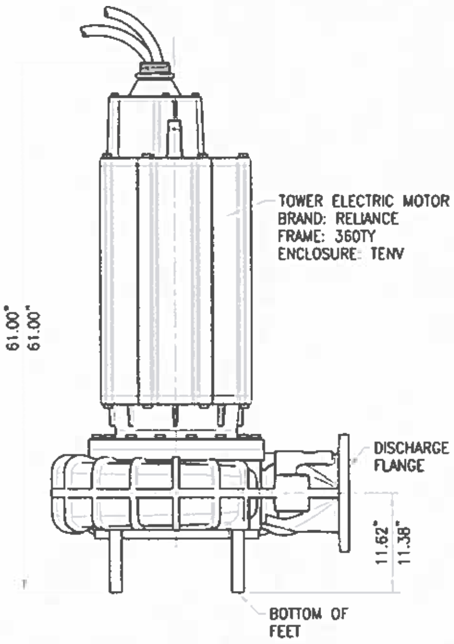
MOTOR
Explosion proof, NEMA B, three phase, 460 volts, 60 Hz, 1750 RPM, air cooled. Requires overload protection to be included in control panel.

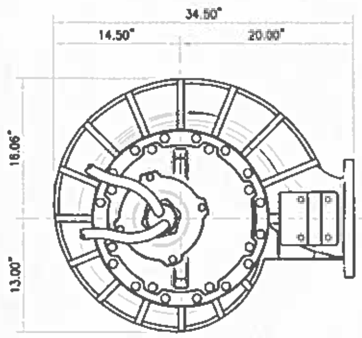
MOISTURE SENSOR
Normally open (N/O) included.

TEMPERATURE SENSOR
Normally closed (N/C) included.

OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-8).

SPECIFICATIONS





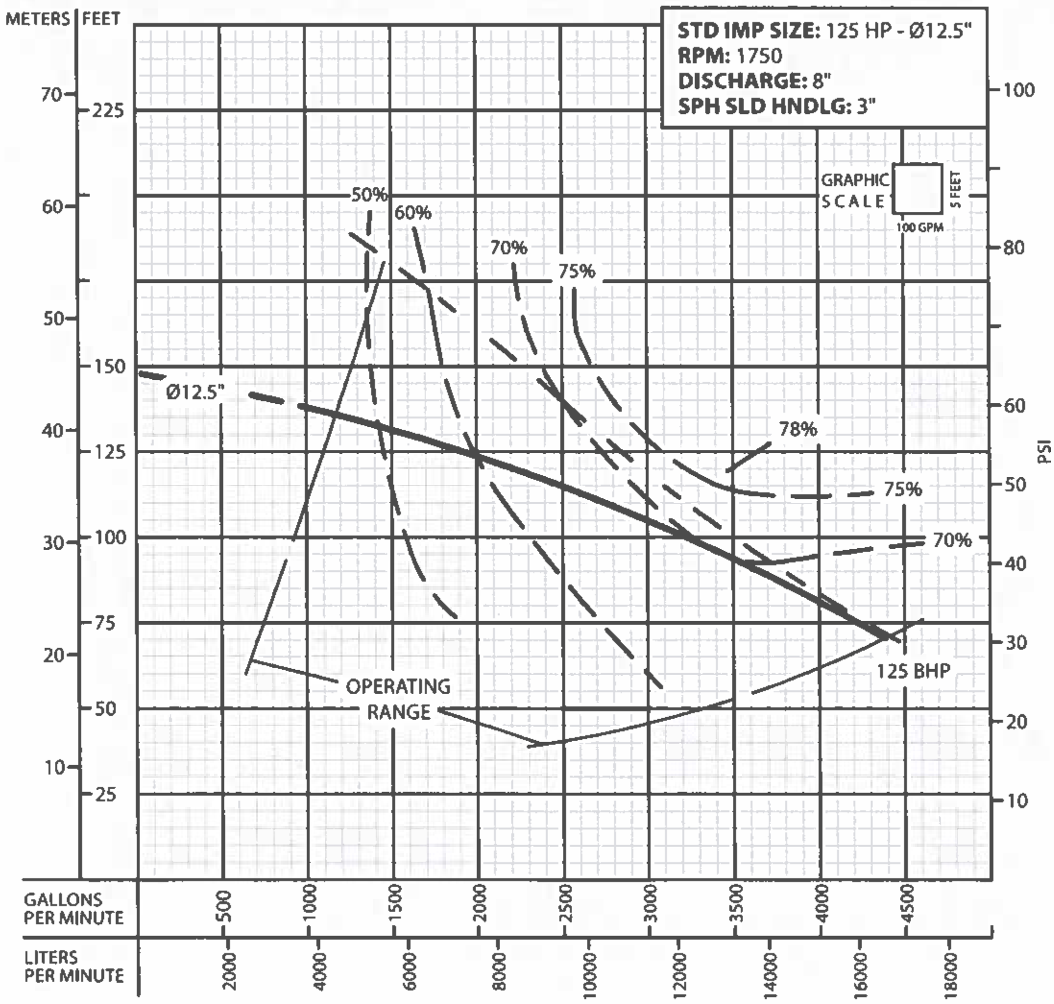
DISCHARGE FLANGE

BRANCH:	8"
RATING:	150 PSI
O.D.:	13.50"
BOLTS:	8
BOLTS SIZE:	.750"
BCD:	11.75"
THICK:	1.19"

DIMENSIONS IN INCHES

MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K8XHPL1250M4-43DS	62170367	125	460	3	1750	153	864	F	2/0/4	SOW	1.930"	2061

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485".



IMPORTANT!

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3. Pump may be operated "dry" for extended periods without damage to motor and/or seals.

KEEN PUMP®

SUBMERSIBLE SOLIDS HANDLING X-PROOF PUMP

Series: K8XHPL-DS
150 HP / 1750 RPM
Discharge: 8"
Spherical solids handling: 3"

SPECIFICATIONS

DISCHARGE
8", 125 lb, flange horizontal.

LIQUID TEMPERATURE
104 °F (40 °C).

VOLUTE
Cast iron ASTM A-48 class 30.

MOTOR HOUSING
N/A

SEAL PLATE
Cast iron ASTM A-48 class 30.

IMPELLER
Design: 3 vanes, closed, with a bronze wear ring and vanes on back side.
Material: cast iron ASTM A-48 class 30.

SHAFT
416 series stainless steel.

SQUARE RINGS
Square shaped Buna-N.

PAINT
Air dry enamel, water based.

DIAPHRAGM
Buna-N.

HARDWARE
300 series stainless steel.

SEAL
Design: double, mechanical, oil filled chamber.
Material: ceramic stationary seat, carbon ring and exclusion seal in the rotatory set, Buna-N elastomer and stainless steel hardware.

CORD ENTRY
25 ft of neoprene cord, sealed against moisture.

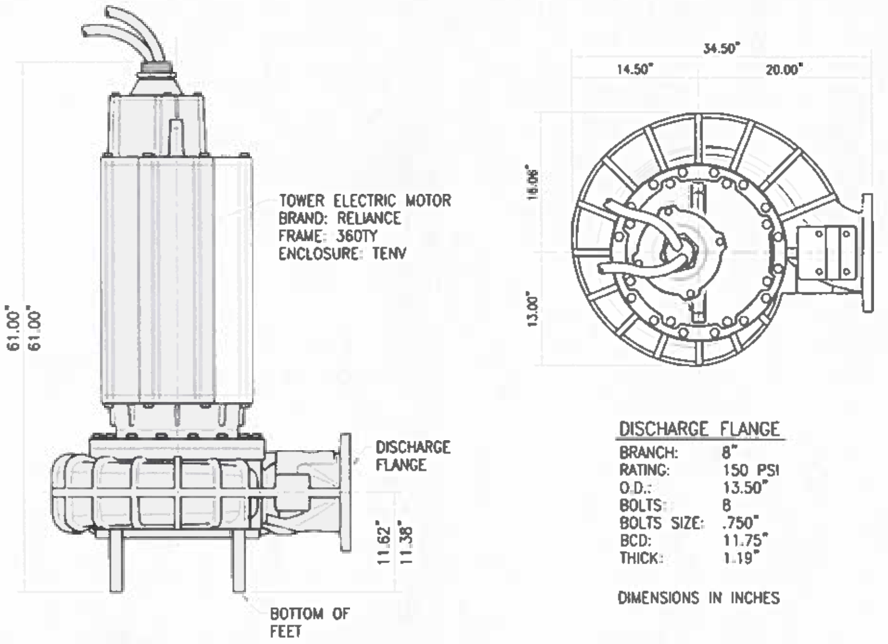
BEARINGS
Upper: single row, ball, permanently oil lubricated, designed for radial load.
Lower: double row, ball, permanently oil lubricated, designed for radial and axial loads.

MOTOR
Explosion proof, NEMA B, three phase, 460 volts, 60 Hz, 1750 RPM, air cooled. Requires overload protection to be included in control panel.

MOISTURE SENSOR
Normally open (N/O) included.

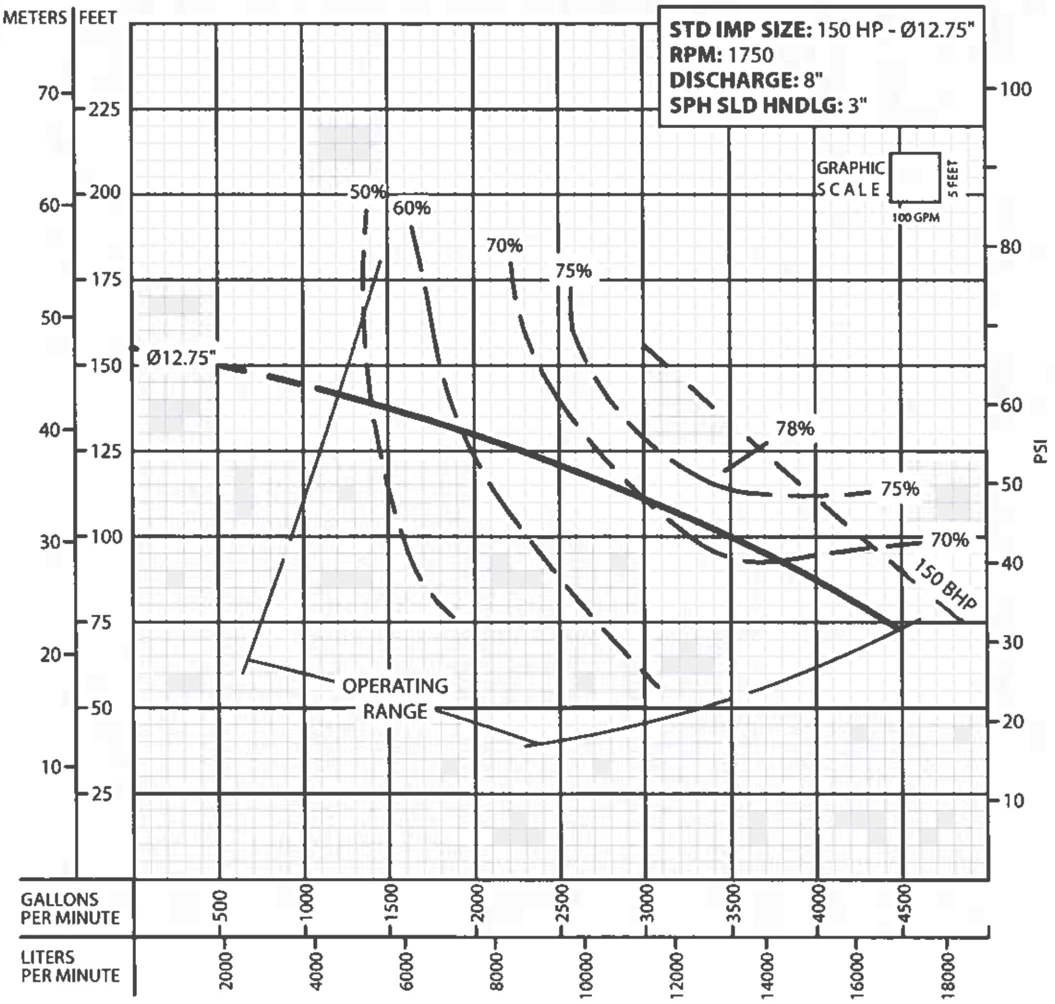
TEMPERATURE SENSOR
Normally closed (N/C) included.

OPTIONAL EQUIPMENT
Impeller trimming, additional cord, tungsten carbide seal, slide rail coupling (SRC-8).



MODEL	PART No.	HP	VOLTS	PHASE	RPM (Nominal)	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (pounds)
K8XHPL1500M4-43DS	62170368	150	460	3	1750	182	1080	E	3/0/4	SOW	2.070"	2258

The moisture cord and/or temperature cord is size 18/5, type SO, Ø0.485".



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4. Testing is performed with water specific gravity of 1.0 @ 68 °F (20 °C); other fluids may vary performance.

KEEN PUMP COMPANY, INC.

471 E State Route 250 East, Ashland, OH 44805

Phone: 419-207-9400 Fax: 419-207-8031

Limited 5 – Year Warranty Solids Handling Pumps

During the time periods and subject to the conditions hereinafter set forth, Keen Pump will repair or replace to the original user or consumer, any portion of your new Keen product which proves defective due to defective materials or workmanship of Keen Pump. Contact your closest authorized Keen Pump representative or distributor for warranty service. At all times, Keen Pump shall have and possess the sole right and option to determine whether to repair or replace defective equipment, parts or components. Damage caused by acts of GOD or conditions beyond the control of Keen Pump is not covered by this warranty.

WARRANTY PERIOD:
60 months from date of manufacture.
Start-up reports are required to support warranty claims. Warranty effective only if Keen Pump supplied or authorized control panels are used. Single phase pumps must utilize Keen Pump supplied start components.

THIS WARRANTY WILL NOT APPLY:

1. **To defects or malfunctions resulting from failure to properly install, operate or maintained the product in accordance with printed instructions provided.**
2. **To failures resulting from abuse, accident or negligence.**
3. **To normal maintenance services and the parts used in conjunction with such service.**
4. **To products which are not installed in accordance with applicable local codes, ordinances and good trade practices.**
5. **The product is used for purposes other than for what is was designed and manufactured.**
6. **If 3 phase motors are installed on a single phase power supply using a phase converter or if 3 phase power is supplied by only two transformers, making an open Delta system.**

WARRANTY EXCLUSIONS:
Keen Pump specifically disclaims the implied warranties of merchantability and fitness for a particular purpose after the termination of the warranty period set forth herein. No warranties or representations at any time made by any representatives of Keen Pump shall vary or expand the provision hereof.

LIABILITY LIMITATION:
In no event shall Keen Pump be liable or responsible for consequential, incidental or special damages resulting from or related in any manner to any Keen Pump product or parts thereof. Personal injury and/or property damage may result from improper installation. Keen Pump disclaims all liability, including liability under this warranty, for improper installation. Keen Pump recommends following the instructions in the installation manual. When in doubt, consult a professional. Some states do no allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

LABOR, ETC., COSTS:
Keen Pump shall in no event be responsible or liable for the cost of field labor or other charges incurred by any customer in removing and/or reaffixing any Keen Pump product, part or component thereof or any temporary pumping of other equipment.

RETURNED OR REPLACED COMPONENTS:
Any item to be replaced under this Warranty must be returned to Keen Pump, or such other place as Keen Pump may designate, freight prepaid.

This warranty gives you specific legal rights and other rights which may vary from state to state.

In the absence of suitable proof of this purchase date, the effective date of this warranty will be based upon the date of manufacture. Example: 1501 = Year-Month= January, 2015.

KEEN PUMP

Simplex Control Panels

2 or 3 Float Operation

KEEN Pump simplex control panels are custom designed for use with KEEN Pump grinder pumps and packaged systems.

All control panels are built to Underwriters Laboratories UL508 standard to ensure the highest level of quality and safety.

All panels can carry the UL label.

There are many optional features available, consult the "Control Panel Options Page".

Standard Features – Simplex Panels

Single Phase

NEMA 4X Fiberglass Enclosure
Stainless Steel Piano Hinge
Pump Circuit Breaker (2 Pole)
Control Circuit Breaker
Motor Contactor
Start Capacitor Kit

External Alarm Light

- **Flashing – High Water Level**

Audible Alarm – Sonalert Buzzer
Alarm Test / Silence Switch
Control Circuit Relay
DIN Rail Mounted Components
Aluminum Back plate
Internal HOA Switch
External Lockable Hasps
Easy Wiring Terminal Blocks
Grounding Lugs
Wiring in Enclosed Wire way

Three Phase

NEMA 4X Fiberglass Enclosure
Stainless Steel Piano Hinge
Pump Circuit Breakers (3 Pole)
Internal Pump Run Light
Control Circuit Breaker
Motor Starter

External Alarm Light

- **Flashing – High Water Level**

Audible Alarm – Sonalert Buzzer
Alarm Test / Silence Switch
Motor Temperature Sensing Control
Control Circuit Relay
DIN Rail Mounted Components
Aluminum Back plate
Internal HOA Switch
External Lockable Hasps
Easy Wiring Terminal Blocks
Grounding Lugs
Wiring in Enclosed Wire way
Transformer (460 volts panels only)

KEEN PUMP

Simplex Control Panel Single Phase

3 Floats – Capacitors in Panel

Technical Specifications

A NEMA 4X fiberglass control panel shall be furnished with each pumping unit / basin package.

The control panel enclosure shall be molded of glass reinforced polyester resins, which are chemically resistant to corrosive atmospheres. The resin system shall be pigmented to impart a gray color to the enclosure and be resistant to ultraviolet light.

The resin system also shall include a flame retardant to obtain a flammability rating which meets U.L. 94V-0. Heat distortion temperature shall be 350 degrees Fahrenheit.

The enclosure shall be of one piece, NEMA 4X fiberglass, weatherproof construction with smooth, rounded corners and shall be constructed to have a smooth exterior and interior. The enclosure shall be fitted with a closed cell neoprene gasket cover. The enclosure shall have back panel mounting provisions.

The cover shall be hinged with a heavy-duty corrosion resistant stainless steel piano hinge. The cover shall be lockable by means of two (2) high quality combination stainless steel latches and padlock hasps.

The enclosure shall be provided with external mounting feet on the top and bottom of the enclosure. These mounting feet shall be of fiberglass and molded as an integral part of the enclosure.

The back panel shall be a minimum of .080" aluminum and held in place by (4) #10 screws, which will mate to four (4) threaded standoffs, which are molded into the enclosure.

The panel shall include a double pole, main disconnect circuit breaker, control circuit breaker, I.E.C. rated motor contactor, start and run capacitors, plug-in control relay, pump hand-off-auto switch, red alarm light, audible alarm, alarm silence switch, enclosed wire way, terminal blocks, ground lug and all necessary wiring. Terminal strips must have a minimum 3" clearance to the inside wall of the enclosure for ease of wiring.

The control panel shall be fitted with a red lexan alarm light. The light shall remain solidly illuminated for moisture detection in the lower seal chamber of the pump. The alarm light shall flash, indicating a high water alarm condition in the basin. The light shall be approximately 3" high by 2" diameter, mounted on the top surface of the enclosure, visible from all 360-degree direction. The bulb shall be 40-watt minimum high intensity-medium base type. The bulb or lens shall be easily replaced by removing a threaded setscrew and locking washer on the interior of the panel. The lens shall be mounted on top of the enclosure with a neoprene gasket.

The alarm condition will produce a bright glowing alarm light and audible buzzer. The audible buzzer can be silenced by means of the silence switch inside the front panel. The red indicator light will remain illuminated as long as the alarm condition persists. Both flashing alarm light and audible buzzer will stop when the water level drops to normal operating conditions.

All internal wiring shall be neatly assembled within an enclosed wire way. Each wire shall be a different color or stripe (except for ground), and all incoming wires shall terminate in the terminal block. All wires shall be 14GA. Type TEW rated for 105 degrees Celsius.

A schematic diagram shall be permanently fastened to the inside of the enclosure.

The control panel shall be U.L. listable as an assembly.

KEEN PUMP

Simplex Control Panel Specification – Model KCG2-21S-LC

(Single Phase - 3 Floats – Capacitors in Panel)

A NEMA 4X polycarbonate (optional fiberglass) control panel shall be furnished with each pumping unit / basin package.

The control panel enclosure shall be molded of polyester resins, which are weather and chemically resistant to corrosive atmospheres. The resin system shall be pigmented to impart a gray color to the enclosure and be resistant to ultraviolet light.

The resin system also shall include a flame retardant to obtain a flammability rating which meets U.L. 94V-0. Heat distortion temperature shall be 350 degrees Fahrenheit.

The enclosure shall be of one piece, NEMA 4X polycarbonate, weatherproof construction with smooth, rounded corners and shall be constructed to have a smooth exterior and interior. The enclosure shall be fitted with a closed cell neoprene gasket cover. The enclosure shall have back panel mounting provisions.

The cover shall be hinged with a heavy-duty corrosion resistant hinges. The cover shall be lockable by means of two (2) high quality combination stainless steel latches and padlock hasps.

The enclosure shall be provided with external mounting feet on the top and bottom of the enclosure.

The back panel shall be a minimum of .080” aluminum and held in place by (4) #10 screws, which will mate to four (4) threaded standoffs, which are molded into the enclosure.

The panel shall include a double pole, main disconnect circuit breaker, control circuit breaker, I.E.C. rated motor contactor, start and run capacitors, plug-in control relay, pump hand-off-auto switch, red alarm light, audible alarm, alarm silence switch, enclosed wire way, terminal blocks, ground lug and all necessary wiring. Terminal strips must have a minimum 3” clearance to the inside wall of the enclosure for ease of wiring.

The control panel shall be fitted with a red lexan alarm light. The light shall remain solidly illuminated for moisture detection in the lower seal chamber of the pump. The alarm light shall flash, indicating a high water alarm condition in the basin. The light shall be mounted on the top surface of the enclosure, visible from all 360-degree direction. The bulb or lens shall be easily replaced by removing a threaded setscrew and locking washer on the interior of the panel. The lens shall be mounted on top of the enclosure with a neoprene gasket.

The alarm condition will produce a bright glowing alarm light and audible buzzer. The audible buzzer can be silenced by means of the silence switch inside the front panel. The red indicator light will remain illuminated as long as the alarm condition persists. Both flashing alarm light and audible buzzer will stop when the water level drops to normal operating conditions.

All internal wiring shall be neatly assembled. Each wire shall be a different color or stripe (except for ground), and all incoming wires shall terminate in the terminal block. All wires shall be 14GA. Type TEW rated for 105 degrees Celsius.

A schematic diagram shall be permanently fastened to the inside of the enclosure.

The control panel shall be U.L. listable as an assembly.

KEEN PUMP

Duplex Control Panels

4 Float Operation

KEEN Pump duplex control panels are custom designed for use with KEEN grinder and sewage pumps and packaged systems.

All control panels are built to Underwriters Laboratories UL508 standard to ensure the highest level of quality and safety.

All panels can carry the UL label.

There are many optional features available, consult the “Control Panel Options Page”.

Standard Features – Duplex Panels

Single Phase

NEMA 4X Polycarbonate Enclosure
Polycarbonate Hinge
(2) Pump Circuit Breakers (2 Pole)
(2) Capacitor Start Kits
Control Circuit Breaker
(2) Motor Contactors
Alternator (switch able w/ lights)

External Alarm Light

- **Flashing – High Water Level**

Audible Alarm – Sonalert Buzzer
Alarm Test Switch
(3) Control Circuit Relays
DIN Rail Mounted Components
Aluminum Back plate
(2) Internal HOA Switches
External Lockable Hasps
Easy Wiring Terminal Blocks
Grounding Lugs

Three Phase

NEMA 4X Polycarbonate
Enclosure Polycarbonate Hinge
(2) Pump Circuit Breakers (3 Pole)
Control Circuit Breaker
(2) Motor Starters
Alternator (switch able w/ lights)

External Alarm Light

- **Flashing – High Water Level**

Audible Alarm – Sonalert Buzzer
Alarm Test Switch
(3)Control Circuit Relays
DIN Rail Mounted Components
Aluminum Back plate
(2) Internal HOA Switches
External Lockable Hasps
Easy Wiring Terminal Blocks
Grounding Lugs
Wiring in Enclosed Wire way
Transformer (460 volt panels only)

KEEN PUMP

DUPLEX CONTROL PANEL SINGLE PHASE
4 FLOATS - CAPACITORS in PANEL

Technical Specifications

A NEMA 4X fiberglass control panel shall be furnished with each pumping unit / basin package.

The control panel enclosure shall be molded of Polycarbonate resins, which are chemically resistant to corrosive atmospheres. The resin system shall be pigmented to impart a gray color to the enclosure and be resistant to ultraviolet light.

The resin system also shall include a flame retardant to obtain a flammability rating which meets U.L. 94V-0. Heat distortion temperature shall be 350 degrees Fahrenheit.

The enclosure shall be of one piece, NEMA 4X fiberglass, weatherproof construction with smooth, rounded corners and shall be constructed to have a smooth exterior and interior. The enclosure shall be fitted with a closed cell neoprene gasket cover. The enclosure shall have back panel mounting provisions.

The cover shall be hinged with a heavy-duty corrosion resistant Polycarbonate clasps. The cover shall be lockable by means of two (2) high quality combination stainless steel latches and padlock hasps.

The enclosure shall be provided with external mounting feet on the top and bottom of the enclosure. These mounting feet shall be of Polycarbonate, separately mounted to the enclosure.

The back panel shall be a minimum of .080" aluminum and held in place by (4) #10 screws, which will mate to four (4) threaded standoffs, which are molded into the enclosure.

The panel shall include (2) double pole main disconnect circuit breakers, alarm circuit breaker, (2) I.E.C. rated motor contactors, (2) sets of start and run capacitors, (2) plug-in control relays, alternator relay, (2) pump hand-off-auto switches, red alarm light, audible alarm, alarm silence switch, enclosed wire way, terminal blocks, ground lug and all necessary wiring. Terminal strips must have a minimum 3" clearance to the inside wall of the enclosure for ease of wiring.

The control panel shall be fitted with a red lexan alarm light. The light shall remain solidly illuminated for moisture detection in the lower seal chamber of the pump. The alarm light shall flash, indicating a high water alarm condition in the basin. The light shall be approximately 3" high by 2" diameter, mounted on the top surface of the enclosure, visible from all 360-degree direction. The bulb shall be 40-watt minimum high intensity-medium base type. The bulb or lens shall be easily replaced by removing a threaded setscrew and locking washer on the interior of the panel. The lens shall be mounted on top of the enclosure with a neoprene gasket.

The alarm condition will produce a bright glowing alarm light and audible buzzer. The audible buzzer can be silenced by means of the silence switch inside the front panel. The red indicator light will remain illuminated as long as the alarm condition persists. Both flashing alarm light and audible buzzer will stop when the water level drops to normal operating conditions.

All internal wiring shall be neatly assembled within an enclosed wire way. Each wire shall be a different color or stripe (except for ground), and all incoming wires shall terminate in the terminal block. All wires shall be 14GA. Type TEW rated for 105 degrees Celsius.

A schematic diagram shall be permanently fastened to the inside of the enclosure.

The control panel shall be U.L. listable as an assembly.

KEEN PUMP

DUPLEX CONTROL PANEL SINGLE PHASE
4 FLOATS - CAPACITORS in PUMP

Technical Specification

A NEMA 4X fiberglass control panel shall be furnished with each pumping unit / basin package.

The control panel enclosure shall be molded of glass reinforced polyester resins, which are chemically resistant to corrosive atmospheres. The resin system shall be pigmented to impart a gray color to the enclosure and be resistant to ultraviolet light.

The resin system also shall include a flame retardant to obtain a flammability rating which meets U.L. 94V-0. Heat distortion temperature shall be 350 degrees Fahrenheit.

The enclosure shall be of one piece, NEMA 4X fiberglass, weatherproof construction with smooth, rounded corners and shall be constructed to have a smooth exterior and interior. The enclosure shall be fitted with a closed cell neoprene gasket cover. The enclosure shall have back panel mounting provisions.

The cover shall be hinged with a heavy-duty corrosion resistant stainless steel piano hinge. The cover shall be lockable by means of two (2) high quality combination stainless steel latches and padlock hasps.

The enclosure shall be provided with external mounting feet on the top and bottom of the enclosure. These mounting feet shall be of fiberglass and molded as an integral part of the enclosure.

The back panel shall be a minimum of .080" aluminum and held in place by (4) #10 screws, which will mate to four (4) threaded standoffs, which are molded into the enclosure.

The panel shall include (2) double pole main disconnect circuit breakers, alarm circuit breaker, (2) I.E.C. rated motor contactors, (2) plug-in control relays, alternator relay, (2) pump hand-off-auto switches, red alarm light, audible alarm, alarm silence switch, enclosed wire way, terminal blocks, ground lug and all necessary wiring. Terminal strips must have a minimum 3" clearance to the inside wall of the enclosure for ease of wiring.

The control panel shall be fitted with a red lexan alarm light. The alarm light shall flash, indicating a high water alarm condition in the basin. The light shall be approximately 3" high by 2" diameter, mounted on the top surface of the enclosure, visible from all 360-degree direction. The bulb shall be 40-watt minimum high intensity-medium base type. The bulb or lens shall be easily replaced by removing a threaded setscrew and locking washer on the interior of the panel. The lens shall be mounted on top of the enclosure with a neoprene gasket.

The alarm condition will produce a bright glowing alarm light and audible buzzer. The audible buzzer can be silenced by means of the silence switch inside the front panel. The red indicator light will remain illuminated as long as the alarm condition persists. Both flashing alarm light and audible buzzer will stop when the water level drops to normal operating conditions.

All internal wiring shall be neatly assembled within an enclosed wire way. Each wire shall be a different color or stripe (except for ground), and all incoming wires shall terminate in the terminal block. All wires shall be 14GA. Type TEW rated for 105 degrees Celsius.

A schematic diagram shall be permanently fastened to the inside of the enclosure.

The control panel shall be U.L. listable as an assembly.

KEEN PUMP

DUPLEX CONTROL PANEL THREE PHASE
4 FLOAT OPERATION

Technical Specifications

A NEMA 4X fiberglass control panel shall be furnished with each pumping unit / basin package.

The control panel enclosure shall be molded of glass reinforced polyester resins, which are chemically resistant to corrosive atmospheres. The resin system shall be pigmented to impart a gray color to the enclosure and be resistant to ultraviolet light.

The resin system also shall include a flame retardant to obtain a flammability rating which meets U.L. 94V-0. Heat distortion temperature shall be 350 degrees Fahrenheit.

The enclosure shall be of one piece, NEMA 4X, weatherproof construction with smooth, rounded corners and shall be constructed to have a smooth exterior and interior. The enclosure shall be fitted with a closed cell neoprene gasket cover. The enclosure shall have back panel mounting provisions.

The cover shall be hinged with a heavy-duty corrosion resistant stainless steel piano hinge. The cover shall be lockable by means of two (2) high quality combination stainless steel latches and padlock hasps.

The enclosure shall be provided with external mounting feet on the top and bottom of the enclosure. These mounting feet shall be of fiberglass and molded as an integral part of the enclosure.

The back panel shall be a minimum of .080” aluminum and held in place by (4) #10 screws, which will mate to four (4) threaded standoffs, which are molded into the enclosure.

The panel shall include (2) three pole main disconnect circuit breakers, alarm circuit breaker, (2) I.E.C. rated motor starters with ambient compensated bimetal overload relay, control transformer with primary fusing, (2) plug-in control relays, alternator relay, (2) pump hand-off-auto switches, red alarm light, audible alarm, alarm silence switch, enclosed wire way, terminal blocks, ground lug and all necessary wiring. Terminal strips must have a minimum 3” clearance to the inside wall of the enclosure for ease of wiring.

The control circuitry shall include thermal overload protection, automatically stopping pump operation if overheating is sensed inside the motor housing of the pump. Pump operation will automatically resume once overheating conditions have passed.

The control panel shall be fitted with a red lexan alarm light. The light shall remain solidly illuminated for moisture detection in the lower seal chamber of the pump. The alarm light shall flash, indicating a high water condition in the basin. The light shall be approximately 3” high by 2” diameter, mounted on the top surface of the enclosure, visible from all 360-degree direction. The bulb shall be 40-watt minimum high intensity-medium base type. The bulb or lens shall be easily replaced by removing a threaded setscrew and locking washer on the interior of the panel. The lens shall be mounted on top of the enclosure with a neoprene gasket.

The alarm condition will produce a bright glowing alarm light and audible buzzer. The audible buzzer can be silenced by means of the silence switch inside the front panel. The red indicator light will remain illuminated as long as the alarm condition persists. Both flashing alarm light and audible buzzer will stop when the water level drops to normal operating conditions.

All internal wiring shall be neatly assembled within an enclosed wire way. Each wire shall be a different color or stripe (except for ground), and all incoming wires shall terminate in the terminal block. All wires shall be 14GA. Type TEW rated for 105 degrees Celsius.

A schematic diagram shall be permanently fastened to the inside of the enclosure.

The control panel shall be U.L. listable as an assembly.

KEEN PUMP

SINGLE PHASE CONTROL PANELS

SIMPLEX

Model No.	HP	VOLTS	PUMP SERIES
KCG2-115S	2	208 / 230	KG2-115
KCG2-21CS	2	208 / 230	KG2-21C
KCG2-21S	2	208 / 230	KG2-21, KHG2-21
KCGHH2-21S	2	208 / 230	KHHG2-21, KHHG2H-21
KCNC3-21S	3	208 / 230	KG-31, KHG-31 K4R30M2-21 K4V30M4-21
KCNC5-21S	5	208 / 230	KG-51, KHG-51 K4R50M2-21 K4V50M4-21
KCNC7-21S	7.5	230	KHG-71

DUPLEX

Model No.	HP	VOLTS	PUMP SERIES
KCG2-115D	2	208 / 230	KG2-115
KCG2-21CD	2	208 / 230	KG2-21C
KCG2-21D	2	208 / 230	KG2-21, KHG2-21
KCGHH2-21D	2	208 / 230	KHHG2-21, KHHG2H-21
KCNC3-21D	3	208 / 230	KG-31, KHG-31 K4R30M2-21 K4V30M4-21
KCNC5-21D	5	208 / 230	KG-51, KHG-51 K4R50M2-21 K4V50M4-21
KCNC7-21D	7.5	230	KHG-71

KEEN PUMP

THREE PHASE CONTROL PANELS

DUPLEX

Model No.	HP	VOLTS	PUMP SERIES
KCG2-23D	2	208 / 230	KG2-23, KHG2-23
KCG2-43D	2	460	KG2-43, KHG2-43
KCNC3-23D	3	208 / 230	KG-33, KHG-33 K4R30M2-23 K4V30M4-23
KCNC3-43D	3	460	KG-33, KHG-33 K4R30M2-43 K4V30M4-43
KCNC5-23D	5	208 / 230	KG-53, KHG-53 K4R50M2-23 K4V50M4-23
KCNC5-43D	5	460	KG-53, KHG-53 K4R50M2-43 K4V50M4-43
KCNC7-23D	7.5	208 / 230	KHG-73 K4R75M2-23 K4V75M4-23 K4VL75M4-23 K4VL75M6-23 K6VL75M6-23
KCNC7-43D	7.5	460	KHG-73 K4R75M2-43 K4V75M4-43 K4VL75M4-43 K4VL75M6-43 K6VL75M6-43
KCNC10-23D	10	230	K4VL100M4-23 K4VL100M6-23 K6VL100M4-23 K6VL100M6-23
KCNC10-43D	10	460	K4VL100M4-43 K4VL100M6-43 K6VL100M4-43 K6VL100M6-43

THREE PHASE CONTROL PANELS

DUPLEX

Model No.	HP	VOLTS	PUMP SERIES
KCNC15-23D	15	230	K4VL150M4-23 K4H150M6-23 K6VL150M4-23 K6H150M6-23 K8H150M4-23
KCNC15-43D	15	460	K4VL150M4-43 K4H150M6-43 K6VL150M4-43 K6H150M6-43 K8H150M4-43
KCNC20-23D	20	230	K4VL200M4-23 K4H200M6-23 K6VL200M4-23 K6H200M6-23 K8H200M4-23
KCNC20-43D	20	460	K4VL200M4-43 K4H200M6-43 K6VL200M4-43 K6H200M6-43 K8H200M4-43
KCNC25-23D	25	230	K4H250M4-23 K4H250M6-23 K6H250M4-23 K6H250M6-23 K8H250M4-23
KCNC25-43D	25	460	K4H250M4-43 K4H250M6-43 K6H250M4-43 K6H250M6-43 K8H250M4-43
KCNC30-23D	30	230	K8H300M4-23
KCNC30-43D	30	460	K8H300M4-43
KCNC40-23D	40	230	K8H400M8-23 K10H400M8-23
KCNC40-43D	40	460	K8H400M8-43 K10H400M8-43
KCNC50-23D	50	230	K8H500M8-23 K10H500M8-23
KCNC50-43D	50	460	K8H500M8-43 K10H500M8-43

KEEN PUMP

Control Panel Options

A1 - - - AUDIBLE ALARM HORN
A2 - - - AUDIBLE ALARM BELL (TYPE 3R ONLY)
A3 - - - AUDIBLE ALARM SONALERT

AX - - - AUXILIARY CONTACTS (DRY FORM A)

C1 - - - ELAPSED TIME METER (PER METER)

C2 - - - CYCLE COUNTER (PER COUNTER)

D - - - - DEAD FRONT DOOR

G - - - - GENERATOR RECEPTACLE

LA - - - LIGHTNING ARRESTOR

LL - - - REDUNDANT LOW LEVEL OFF

M - - - MAIN DISCONNECT

PM - - PHASE / VOLTAGE MONITOR

R - - - REMOTE DIALER

UL - - UL 508A SERIALIZED LABELING

KP-CF(M)

KEEN Control Duty Floats

"KP-CF10" (10 Ft. Lg)
Mercury Float……….CONTROL PILOT DUTY
Narrow Angle Operation
Normally Open w/Cord (10',15',20',30',50' Options)
18/2 SJOW-A Cord w/External Weight
2 Amp @ 120VAC

"KP-CF10M" (10 Ft. Lg)
Mechanical Float……….CONTROL PILOT DUTY
Narrow Angle Operation
Normally Open w/Cord (10',15',20',30',50' Options)
18/2 SJOW-A Cord w/External Weight
2 Amp @ 120VAC

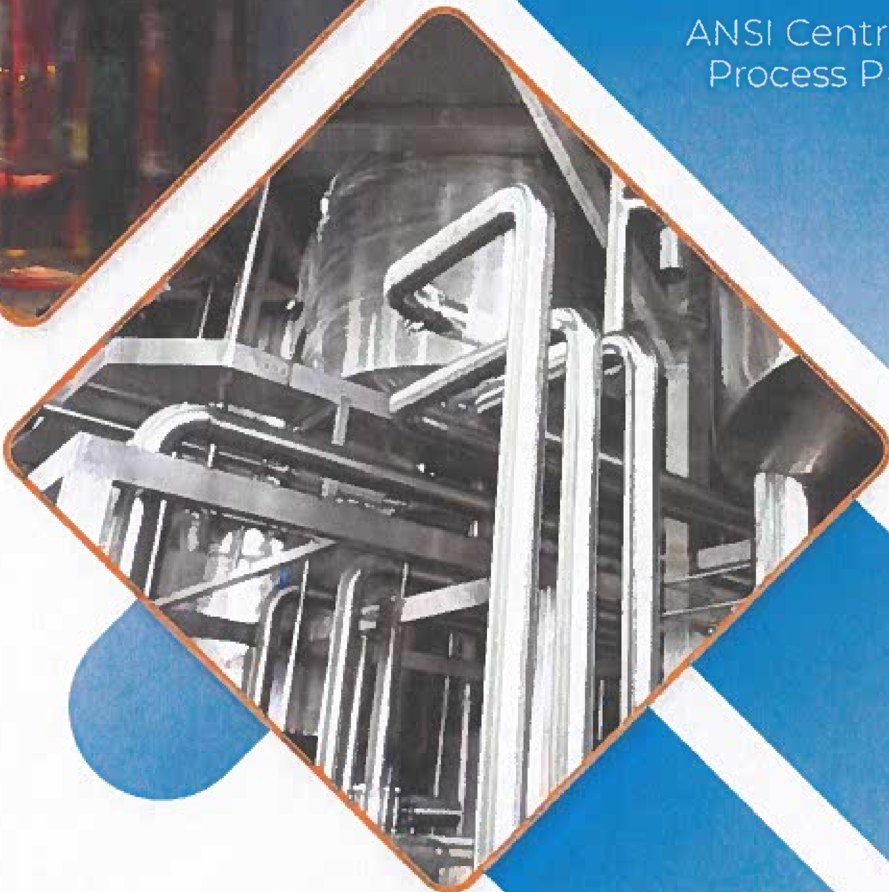
Construction: (All Floats)

Outer Shell	ABS (Acrylonitril Butadiene Styrene), rated 105 deg. C, ultrasonically welded
Mercury Switch	Hermetically welded and sealed canister, pr essurized pure argon gas for mercury Provides clean, spark extinguishing atmosphere for long life
Mechanical Switch	Snap-action switch, steel ball in switching tube
Cord	Flexible SJOW in lengths to 50' Epoxy potted and bonded to float for watertight seal
Weights	Provided (attached) with all float controls

KEEN PUMP
471E State Route 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

KP 911 series

ANSI Centrifugal Process Pumps



KEEN PUMP®

Quality Pumps Since 2004

What is an ANSI pumps?

In 1977, the American National Standard Institue (ANSI) established criteria for centrifugal pumps in terms of dimension, chemical composition of the materials and safety specifications, to cover the needs from chemical process industry.

Design features were established, such as being self-venting, foot mounted, center line discharge and back pull-out disassembly

The ANSI pump revolves around a basic hydraulic and mechanical design concept to ensure greater efficiency in the range of operation, flexible application and superior interchangeability.

- Available materials:
  - Ductile iron
  - 316 SS
  - CD4MCu

- Serving industries:
  - Automotive
  - Food & beverage
  - Textile
  - Petrochemical
    Pharmaceutical
    Chemical
    Pulps & paper
    General industry

- More than 30 different models.
- Speed and ease of repair.
- Low initial and operating costs.
- Interchangeable with other brands.
- Capacities up to 4000 GPM.
  Pressure Head up to 670 ft.
  Temperatures up to 350 °F (177 °C).
  Pressures up to 285 PSIG.

Features

Automotive

Food & beverage

Reliability

With experience over 18 years manufacturing pumps, our engineering enable us to understand the requirements of the industry and suggest the appropriate solution.

High reliability is due to the design of the pump itself. The KP911 Series meets and exceeds ANSI B 73.1

Durability

The Keen Pumps KP911 Series are designed to the highest expectations of durability and easy maintenance, increasing equipment life.

The open type impeller and seal chamber were designed to facilitate the handling of corrosive and abrasive liquids.

The bearing design minimizes deflection on the shaft.

Versatility

A variety of interchangeable liquid ends ensures maximum flexibility.

The modular design ensures easy conversion to new requirements and changes in the plant installation.

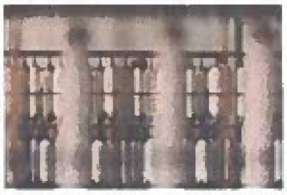
Low initial and operations costs

In the Keen process pumps KP911 Series, you get low initial and operating costs, unlike other brands that also offer a low cost when you purchase your equipment, but an excessive cost on their spare parts.

Fast and ease of repair

All parts of the Keen process pumps KP911 Series are fully interchangeable with thousands of pumps on the market, because of this and our extensive stock, a repair can be perform very quickly.

Keen pumps are your best choice.



Textile

Petrochemical industry

Fully open impeller

- High efficiency, eliminates recirculation.
- Superior handling of solids, abrasive and corrosive liquids.
- Vanes in the back side reduce hydraulic and back pressure in the seal chamber.
- Teflon impeller gasket.
- Available materials: ductile Iron, 316 SS and CD4MCu.

Inpro VBX labyrinth seal

Isolates bearings from the environment, ensuring that it will remain properly lubricated and unpolluted throughout its life.

Minimum number of components: motor, stator and rings.

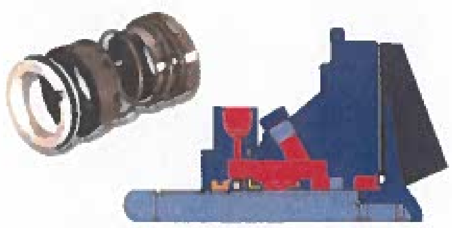
Isolate the bearings from contamination.

Multiport for proper drainage.

Seal solutions

The seal plate is designed to accept a variety of cooling plans to meet specific user requirements.

Single interior seal



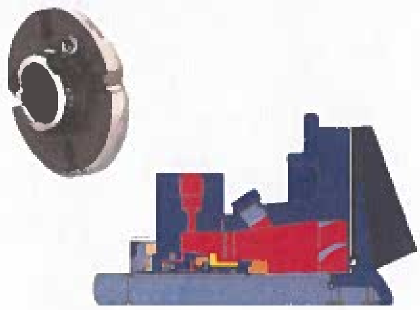
- Non-corrosive liquids to moderately corrosive.
- Mild abrasives.
- Pumping liquids with good lubricating qualities.

Conventional double seal

- Liquids not compatible with single seals.
- Toxic, hazardous, abrasive and corrosive liquids.
- When the pump is operating under low flow conditions.

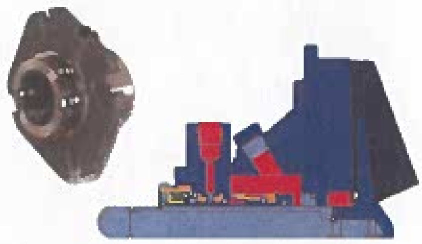
Single cartridge seal

- Non-corrosive liquids to moderately corrosive.
- Mild abrasives.
- Pumping liquids with good lubricating qualities.



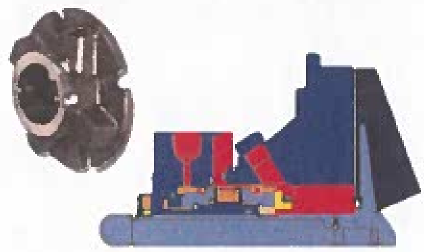
Double cartridge seal

- Same applications as conventional double seal.
- Reduced maintenance costs.
- No error when installing the seal.



Double gas barrier seal

- Toxic or hazardous liquids.
- When an external drain is not accepted.
- When the draining liquid is not compatible or absent.



Pharmaceutical

Steel

Chemical

Pulps & paper

Increase the seal lifespan reducing maintenance costs.

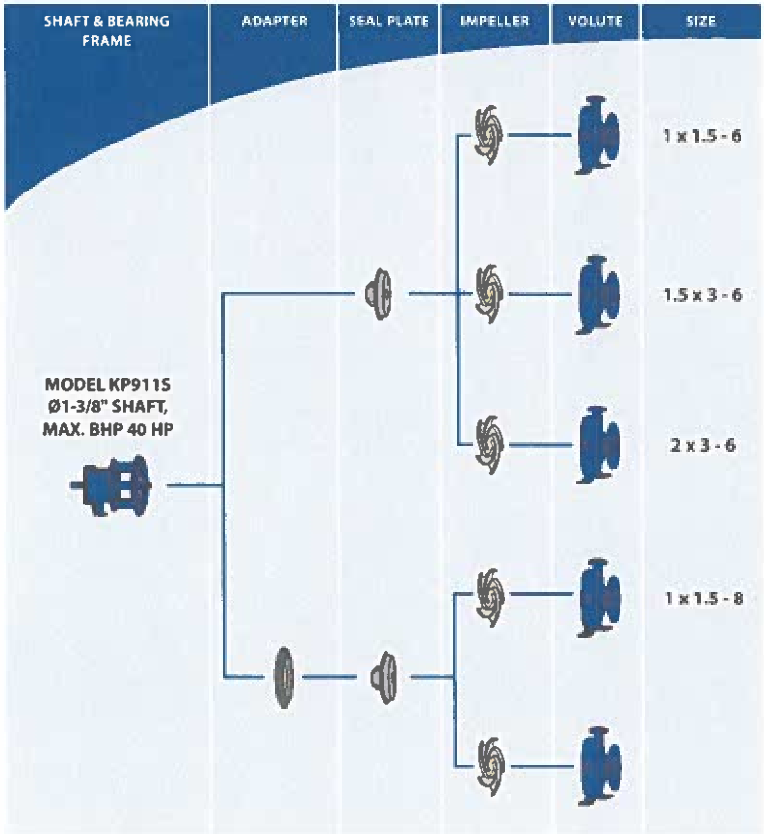
The most common cause of failure in a process pump is the mechanical seal.

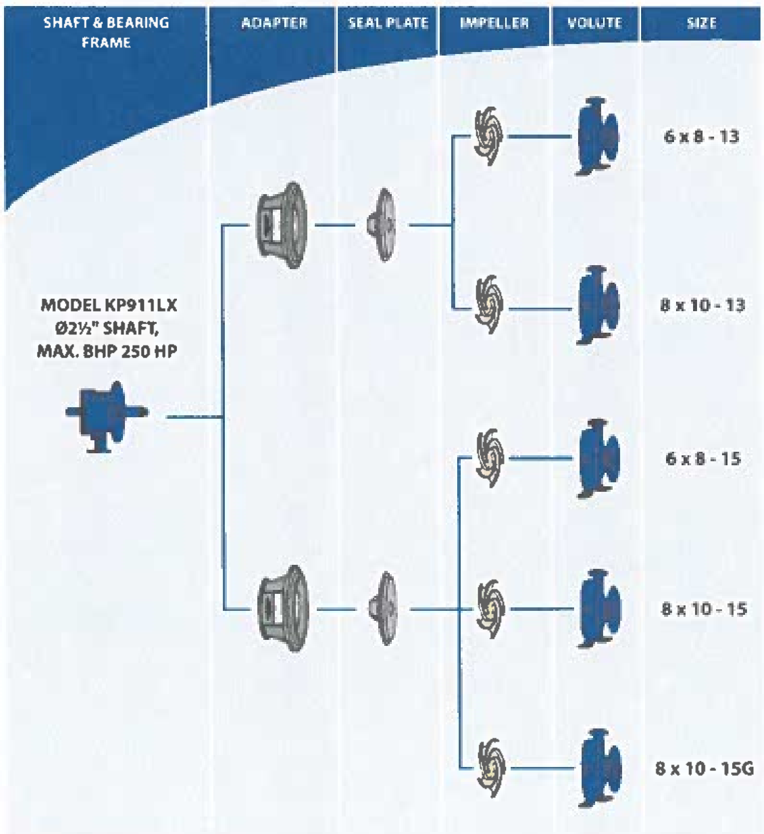
This failure is usually attributed to poor heat dissipation, poor lubrication on the seal faces or pumping liquids containing solids, air or vapors.

We have several seal plates designed to accommodate the best sealing system and adequate lubrication.

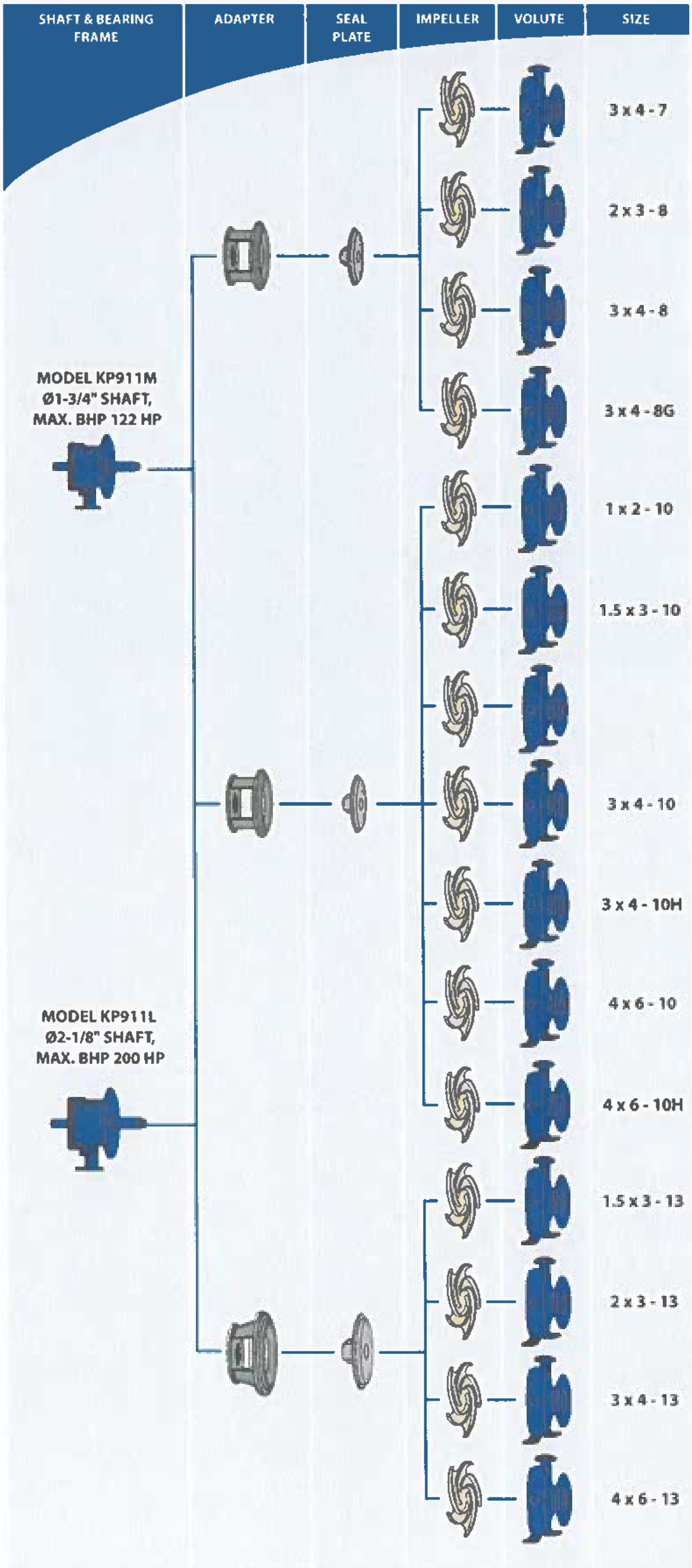
Ask our Keen Pumps distributor, he will recommend the best option with better fluid circulation in the seal, heat dissipation, etc., to increase seal and pump life.

Component interchangeability





Component interchangeability



ANSI KP911 model design

ENGINEERING THAT OFFERS FLEXIBILITY AND DURABILITY

The KP911 Series is offered in a variety of sizes, capacities and materials covering every applications in the process industry.

With over 30 different sizes with multiple cooling plans and seals, the Keen KP911 Series pumps are your best choice.

Our strict quality program ensures that all components are manufactured to the highest standard for engineered tolerances.

With controlled process in our manufacturing line we have structured a state-of-the-art pump to deliver high-level solutions meeting your most critical requirement.

CNC (computer numerically controlled machining equipment guarantees consistency for all parts.

BEARING BOX WITH EXTRA-LARGE OIL SUMP

Large oil capacity which improves heat transfer, assuring bearing longevity, quality and performance. For higher temperature applications, a variety of cooling systems can be accommodated in the KP911 Series.

EXTERNAL CLEARANCE ADJUSTMENT

To maintain flow, pressure and efficiency, the tolerance between the volute and impeller is externally calibrated, minimizing energy consumptions and repairs and maximizing its performance.

HEAVY DUTY SHAFT AND BEARINGS

Engineered in accordance to ANSI standards for chemical processing to minimize vibration and shaft deflection, less than 0.002, long-term reliable function. Solid or sleeved shaft is available in different materials. Bearings life expectancy of 10-year under tough operating conditions.

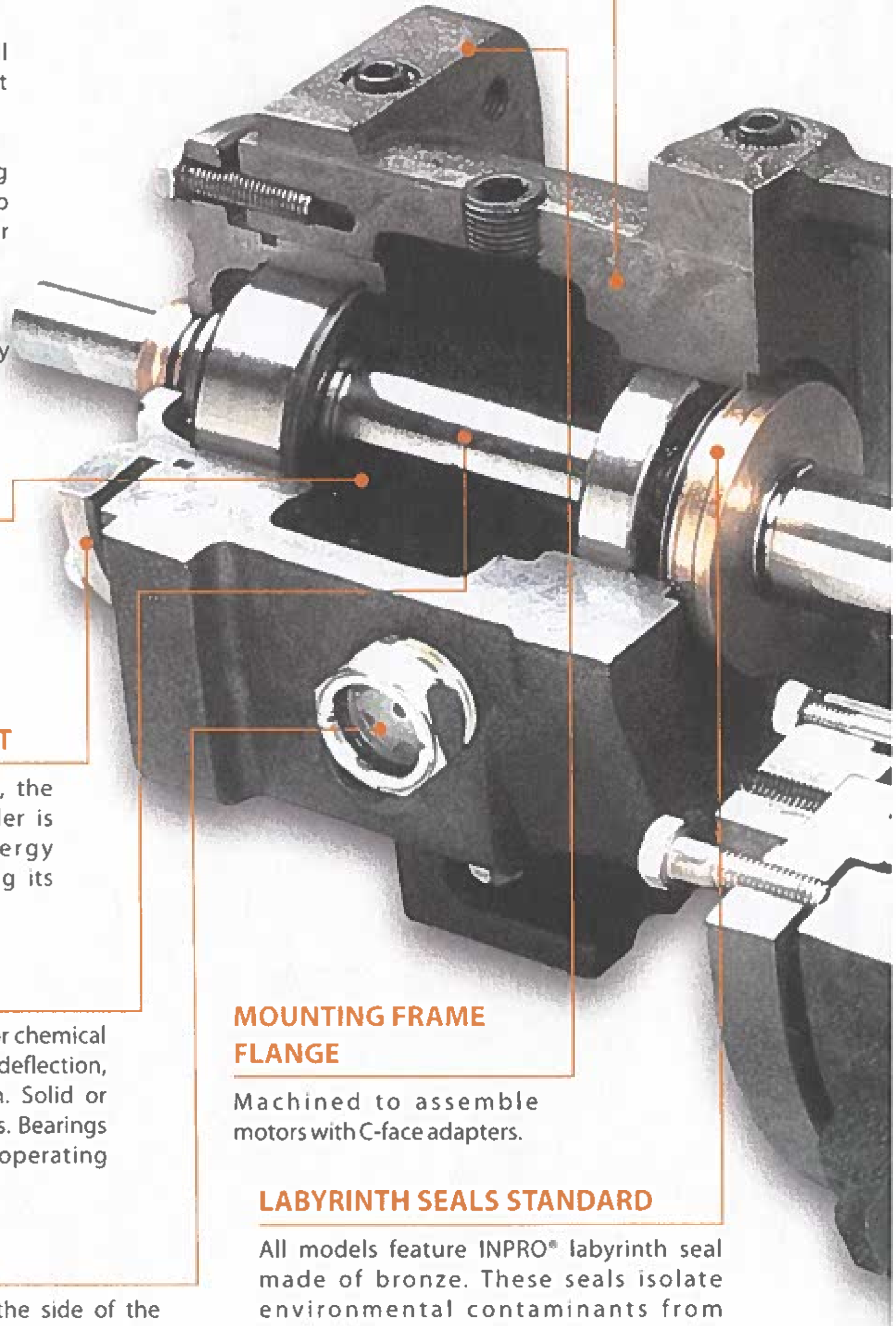
OVERSIZED SIGHT GLASS

One-inch bulls-eye sight glass, located on the side of the bearing unit, facilitates monitoring oil level and condition, assuring bearing longevity and efficiency.

OVERSIZED ADAPTER

Its construction ensures rigidity and safety, precision machining allows perfect alignment between the liquid end and the power end.

Large openings which facilitate installation and maintenance.



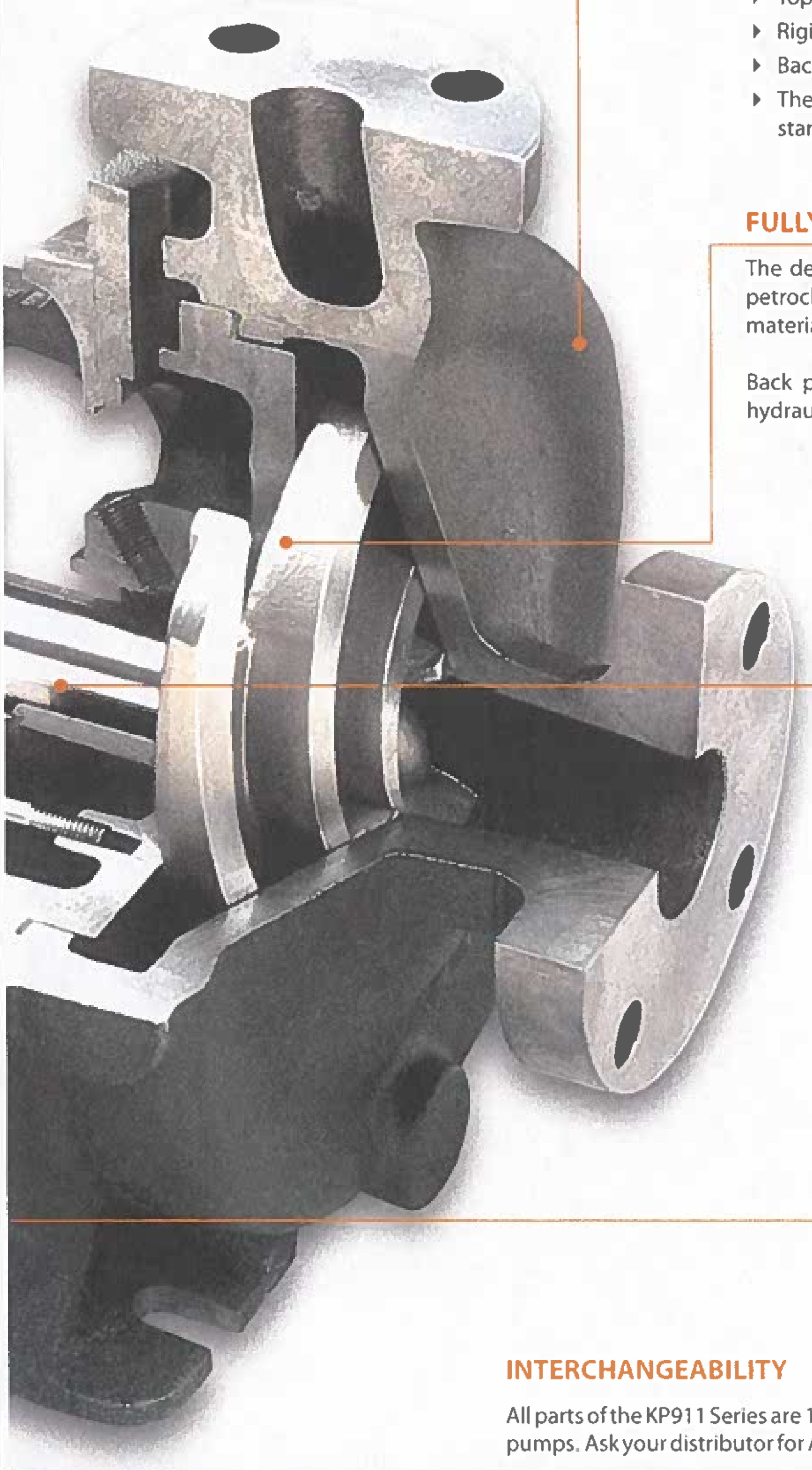
MOUNTING FRAME FLANGE

Machined to assemble motors with C-face adapters.

LABYRINTH SEALS STANDARD

All models feature INPRO® labyrinth seal made of bronze. These seals isolate environmental contaminants from lubrication media, significantly extending bearing life.

ANSI KP911 model design



EXTRA-HEAVY CASTINGS

All KP911 Series pumps are designed with a greater thickness than conventional wall.

- Top center line, self-venting.
- Rigid casing feet prevents pipe line misalignment.
- Back pull-out design to simplify maintenance.
- The flanges meet ANSI B 16.5 requirements, class 150 FF standard flanges and class 150 RF optional.

FULLY OPEN IMPELLER

The design of the impeller is recognized as the best in the petrochemical industry, either for handling solids, fibrous material and corrosive / abrasive fluids.

Back pump-out vanes reduce seal chamber pressure and hydraulic loads.

SEALING FLEXIBILITY

Wide range of sealing options, coupled with stuffing boxes and seal chambers to improve heat dissipation and lubrication of seal faces, maximizing pump operation.

SELF-CONTAINED VOLUTE GASKET

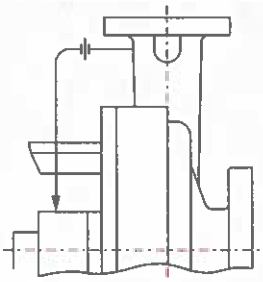
Provides a positive seal between the volute and the seal plate, prevents "blow out" and facilitates disassembly.

INTERCHANGEABILITY

All parts of the KP911 Series are 100% interchangeable with other existing ANSI pumps. Ask your distributor for ANSI KP911 parts list.

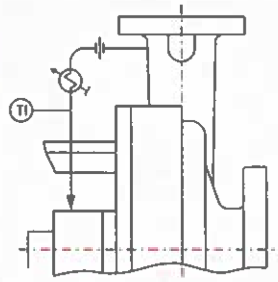
Cooling options (common arrangements)

1 PLAN 7311



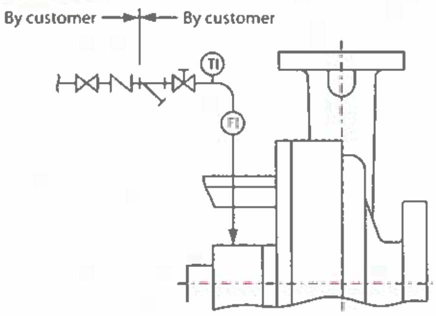
Recirculation from the volute to the mechanical seal flange.

2 PLAN 7321



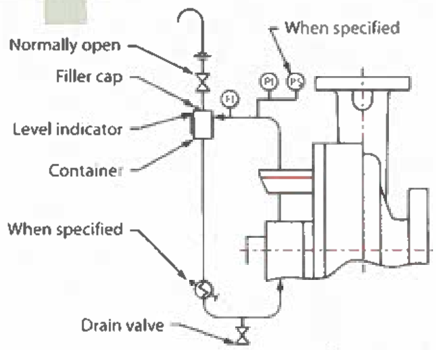
Recirculation of the volute to the heat exchanger and then to the mechanical seal flange.

3 PLAN 7332



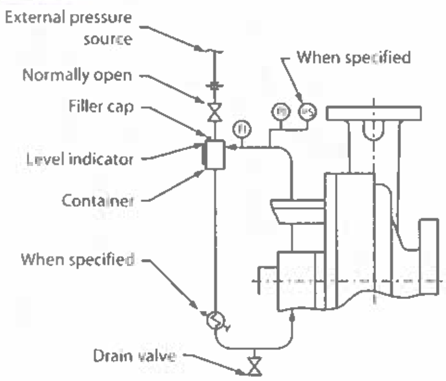
Injection in the mechanical seal from a source of clean fluid.

4 PLAN 7352



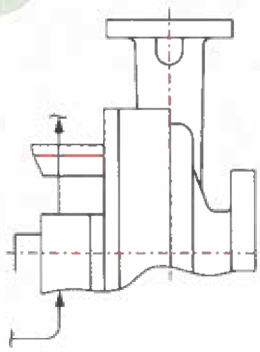
External fluid container without pressurizing; forced circulation.

5 PLAN 7353

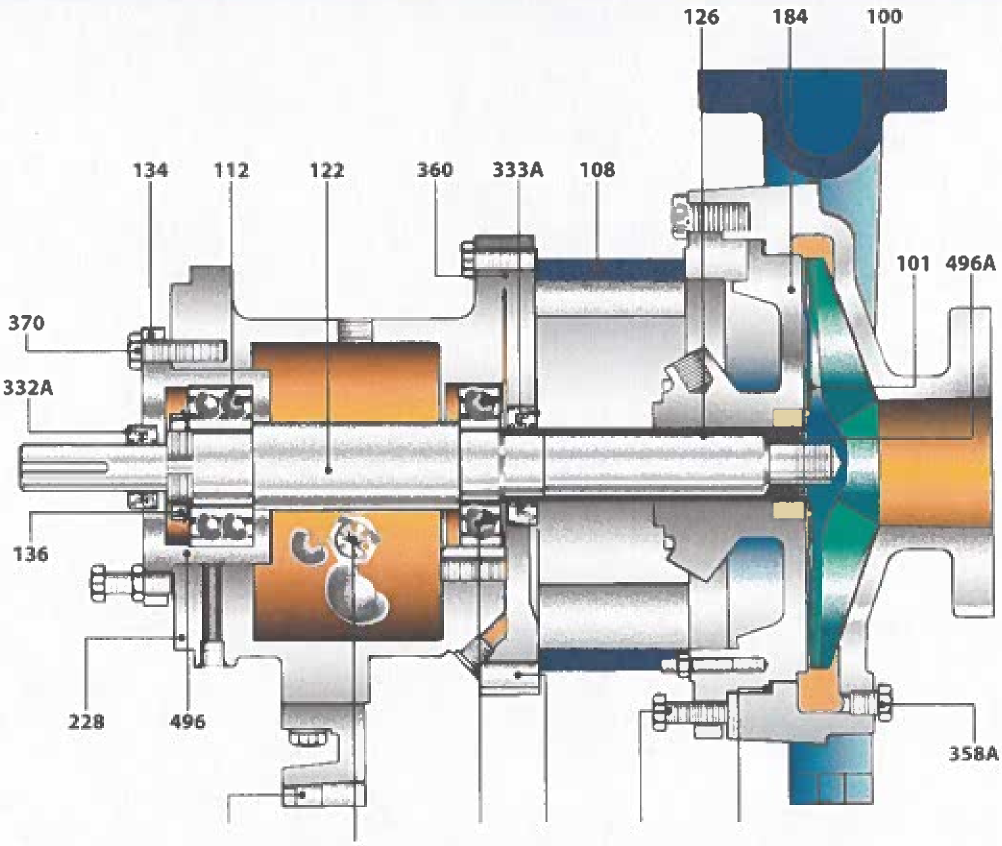


External pressurized fluid container; forced circulation.

6 PLAN 7354



Circulation of clean fluid from an external system.

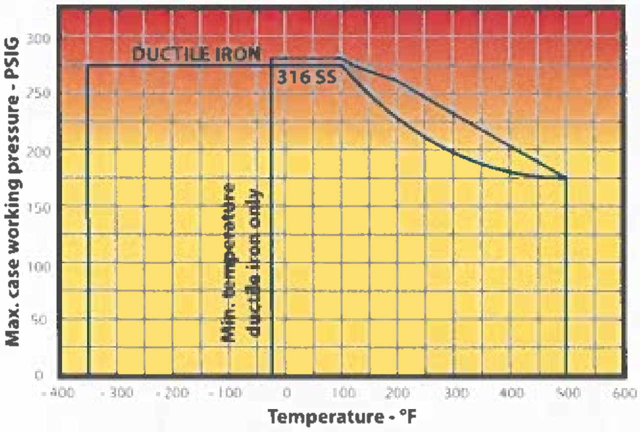


Item	Required per pump	Description	Material		
			Ductile iron	316 SS	CD4MCu
100	1	Casing	Ductile iron	316 SS	CD4MCu
101	1	Impeller	Ductile iron	316 SS	CD4MCu
108	1	Frame adapter	Ductile iron		
112	1	Outboard bearing	Steel		
122	1	Shaft - less sleeve (optional)	316 SS		
122	1	Shaft for sleeve design	AISI 4140		
126	1	Sleeve	316 SS		
134	1	Bearing housing	Ductile iron		
136	1	Thrust bearing locknut	Steel		
168	1	Inboard bearing	Steel		
184	1	Stuffing box cover	Ductile iron	316 SS	CD4MCu
228	1	Frame	Ductile iron		
241	1	Frame foot support	Ductile iron		
250	1	Flush gland mechanical seal	316 SS		CD4MCu
319	1	Sight glass	Glass / Steel		
332A	1	Outboard labyrinth seal INPRO	Bronze / Viton O-Rings		
333A	1	Inboard labyrinth seal INPRO	Bronze / Viton O-Rings		
351	1	Casing gasket	EPDM		
353	2	Gland stud	316 SS		
355	2	Gland stud nut	304 SS		
357K	2	Hex nut for 370H	304 SS		
358A	1	Drain plug (optional)	Steel	316 SS	CD4MCu
360	1	Gasket Frame-Adapter	Vellumoid		
370	3	Bolt Adapter - Casing	Steel		
418	3	Jack bolt Adapter - Casing	316 SS		
469B	2	Dowel pin Frame - Adapter	Steel		
496	2	Bearing Housing O-Ring	Buna-N		
496A	2	Impeller O-Ring	Teflon		

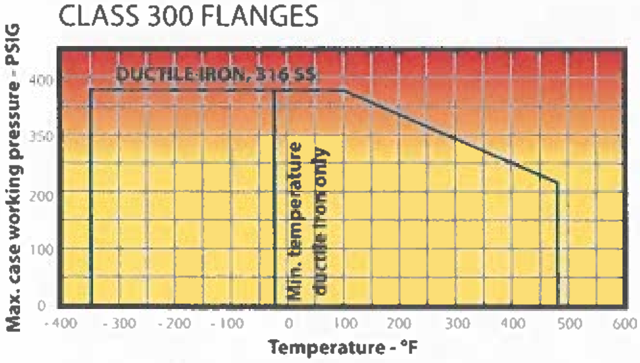
MAX. WORKING PRESSURE LIMITS

MODELS KP911S, M, L, LX

CLASS 150 FLANGES

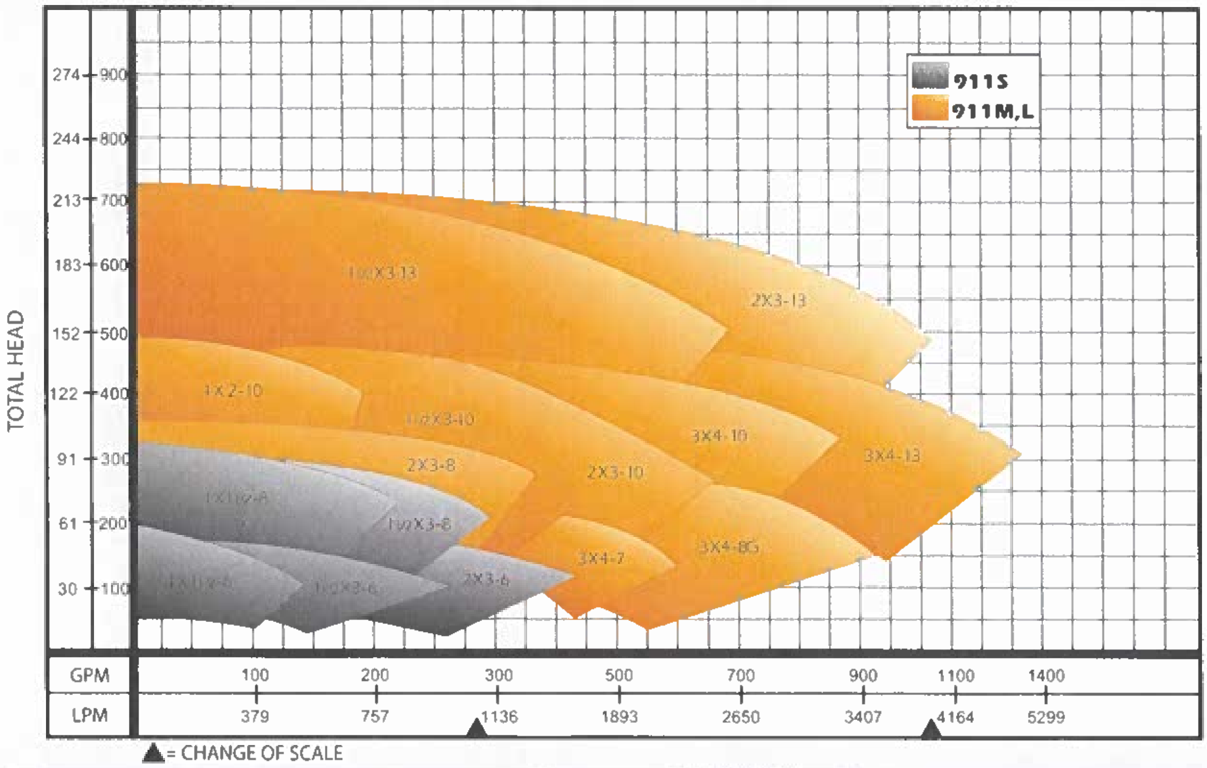


CLASS 300 FLANGES



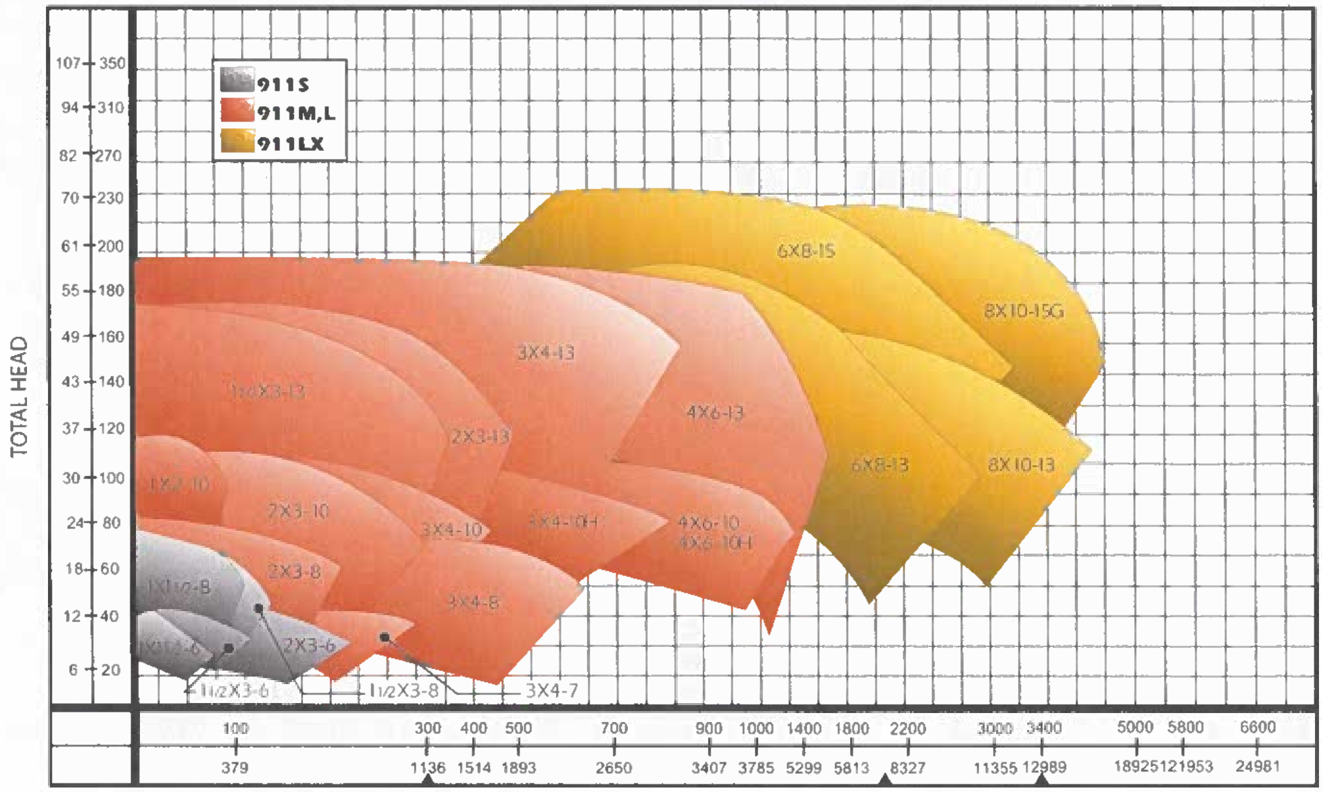
Performance curve

3500 RPM



Performance curve & construction

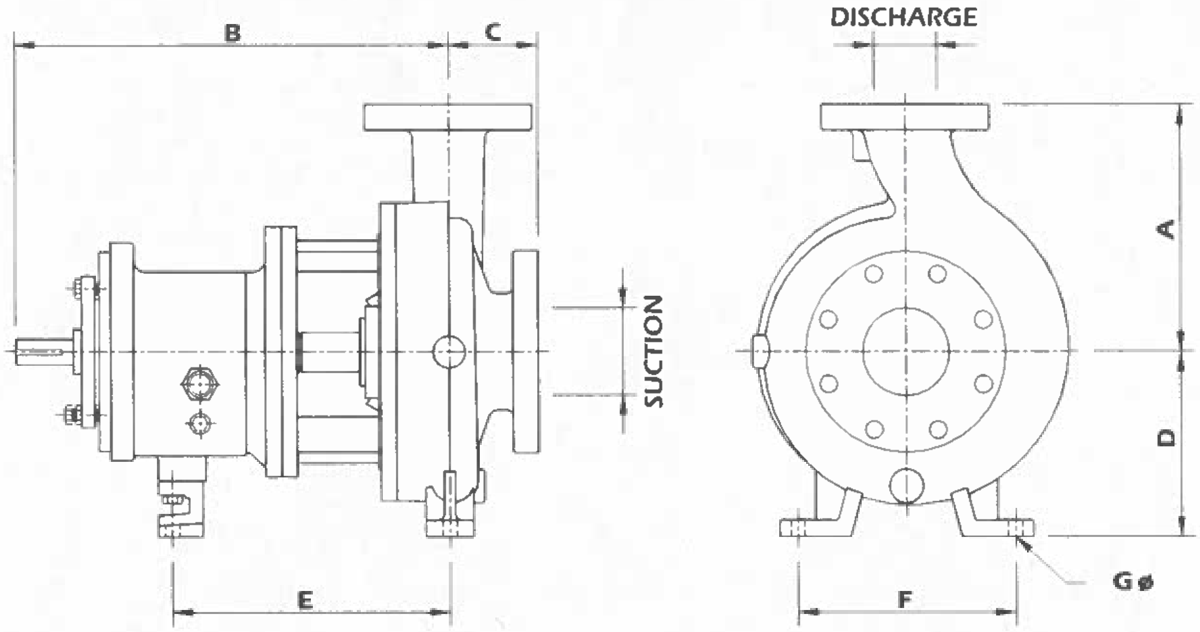
1750 RPM



▲ = CHANGE OF SCALE

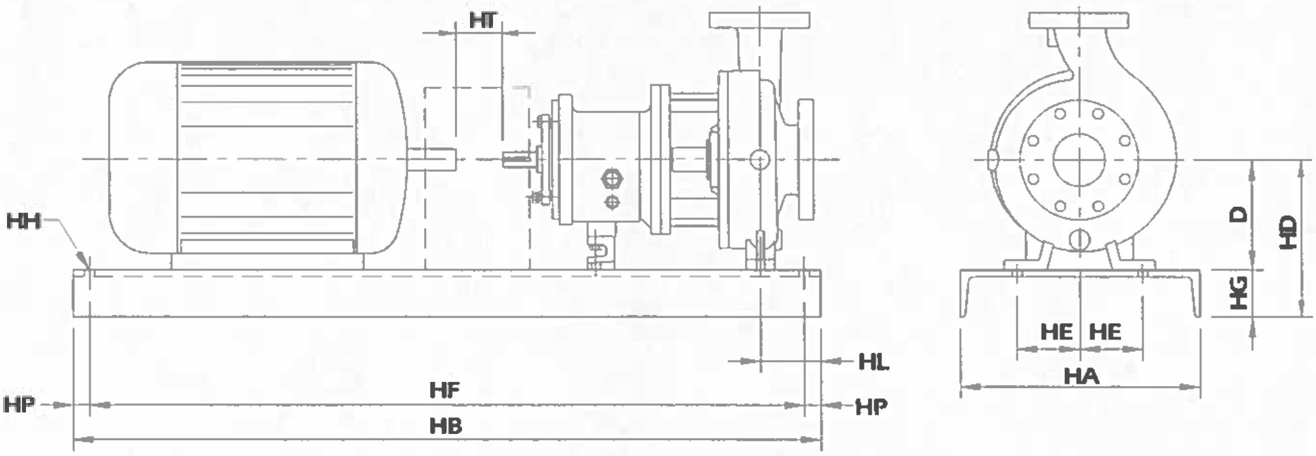
CONSTRUCTION DETAILS

	SIZE & ANSI DESIGNATION	1 x 1.5 - 6 AA, 1.5 x 3 - 6 AB, 2 x 3 - 6, 1 x 1.5 - 8 AA, 1.5 x 3 - 8 AB	3 x 4 - 7 A70, 2 x 3 - 8 A60, 3 x 4 - 8 A70, 3 x 4 - 8G A70, 1 x 2 - 10 A05, 1.5 x 3 - 10 A50, 2 x 3 - 10 A60, 3 x 4 - 10 A70, 3 x 4 - 10H A40, 4 x 6 - 10 A80, 4 x 6 - 10H A80	1.5 x 3 - 13 A20, 2 x 3 - 13 A30, 3 x 4 - 13 A40, 4 x 6 - 13 A80	1 x 2 - 10 A05, 1.5 x 3 - 10 A50, 2 x 3 - 10 A60, 3 x 4 - 10 A70, 3 x 4 - 10H A40, 4 x 6 - 10 A80	4 x 6 - 10H A80, 1.5 x 3 - 13 A20, 2 x 3 - 13 A30, 3 x 4 - 13 A40, 4 x 6 - 13 A80	6 x 8 - 13 A90, 8 x 10 - 13 A100, 6 x 8 - 15 A110, 8 x 10 - 15 A120, 8 x 10 - 15G A120
	MODEL	911 S	911 M (max. BHP 122 HP)		911 L (max. BHP 200 HP)		911 LX
CASING	NOMINAL CASE THICKNESS	3/8"	1/2"	9/16"	1/2"	9/16"	1/2"
CASING	CORROSIVE ALLOWANCE @ MAX.	1/8"					
CASING	WORKING PRESSURE	LIMITS SET BY ANSI B16.5					
CASING	MAX. WORKING PSIG	SEE PRESSURE / TEMPERATURE CHARTS					
CASING	HYDRO TEST PSIG @ 100 °F	150% OF WORKING PRESSURE					
CASING	MAX. LIQUID TEMPERATURE	350 °F WITHOUT COOLING					
SHAFT	DIAMETER AT COUPLING	7/8"	1⅛"		1⅞"		2⅜"
SHAFT	SLEEVE DIAMETER UNDER SEAL	1⅜"	1¾"		2⅛"		2½"
SHAFT	IMPELLER THREAD	3/4"	1"		1¼"		1½"
SHAFT	DIAMETER WITHOUT SLEEVE	1⅜"	1½"		1⅞"		2"
SHAFT	OVERHANG	6"	7⅞"		8"		9"
BEARINGS	THRUST BEARING	SKF 5306A/C3	SKF 5309A/C3		SKF 7310 BECBM (DOUBLE)		SKF 5313A/C3
BEARINGS	RADIAL BEARING	SKF 6207	SKF 6309		SKF 6311		SKF 6313
BEARINGS	BEARING SPAN	6"	5$\frac{5}{16}$"		4¼"		5"
	MECHANICAL SEAL SIZE	1⅜"	1¾"		2⅛"		2½"
STUFFING BOX SIZE	INSIDE DIAMETER	2"	2½"		2⅞"		3⅜"
STUFFING BOX SIZE	DEPTH	2⅛"	2⅝"				3"
STUFFING BOX SIZE	DISTANCE END OF BOX TO NEAREST OBSTRUCTION	2⅜"	2$\frac{13}{16}$"				2⅞"
	LANTERN RING WIDTH	7/16"	5/8"				5/8"



MODEL	PUMP SIZE	ANSI DESIGNATION	DISCHARGE DIAM.	SUCTION DIAM.	A	B	C	D	E	F	ØG HOLES	APROX. WEIGHT (kg)
KP911S	1 x 1.5 - 6	AA	1	1.5	6.5"	13.5"	4"	5.25"	7.25"	6"	0.625"	38
	1.5 x 3 - 6	AB	1.5	3								42
	2 x 3 - 6	-	2	3								43
	1 x 1.5 - 8	AA	1	1.5							0.563"	45
	1.5 x 3 - 8	AB	1.2	3								49
KP911M & KP911L	3 x 4 - 7	A70	3	4	11"	19.5"	4"	8.25"	12.5"	9.75"	0.625"	100
	2 x 3 - 8	A60	2	3	9.5"							91
	3 x 4 - 8	A70	3	4	11"							100
	3 x 4 - 8G	A70	3	4								
	1 x 2 - 10	A05	1	2	8.5"							91
	1.5 x 3 - 10	A50	1.5	3								100
	2 x 3 - 10	A60	2	3	9.5"							104
	3 x 4 - 10	A70	3	4	11"							120
	3 x 4 - 10H	A40	3	4	12.5"			10"				138
	4 x 6 - 10	A80	4	6	13.5"							138
	4 x 6 - 10H	A80	4	6								
	1.5 x 3 - 13	A20	1.5	3	10.5"							111
	2 x 3 - 13	A30	2	3	11.5"							125
	3 x 4 - 13	A40	3	4	12.5"							150
	4 x 6 - 13	A80	4	6	13.5"						0.563"	184
911LX	6 x 8 - 13	A90	6	8	16"	27.9"	6"	14.5"	18.75"	16"	0.875"	254
	8 x 10 - 13	A100	8	10	18"							304
	6 x 8 - 15	A110	6	8								277
	8 x 10 - 15	A120	8	10	19"							336
	8 x 10 - 15G	A120	8	10								710

General dimensions (with baseplate)



NEMA FRAME	BASEPLATE NUMBER	HA MAX.	HB MAX.	HT MIN.	HD MAX.				HE	HF	HG MAX.	HH	HL	HP
					D=5.25"	D=8.25"	D=10"	D=14.5"						
184T	139	15"	39"	3.5"	9"	-	-	-	4.5"	36.5"	3.75"	0.75"	4.5"	1.25"
256T	148	18"	48"	3.5"	10.5"	-	-	-	6"	45.5"	4.13"	0.75"	4.5"	1.25"
326TS	153	21"	53"	3.5"	12.88"	-	-	-	7.5"	50.5"	4.75"	0.75"	4.5"	1.25"
286T	258	21"	58"	3.5"	-	13"	14.75"	-	7.5"	55.5"	4.75"	1"	4.5"	1.25"
365T	264	21"	64"	3.5"	-	13.88"	14.75"	-	7.5"	61.5"	4.75"	1"	4.5"	1.25"
405TS	268	26"	68"	3.5"	-	14.88"	14.88"	-	9.5"	65.5"	4.75"	1"	4.5"	1.25"
449TS	280	26"	80"	3.5"	-	15.88"	15.88"	-	9.5"	77.5"	4.75"	1"	4.5"	1.25"
286T	368	26"	68"	5"	-	-	-	19.25"	9.5"	65.5"	4.75"	1"	6.5"	1.25"
405TS	380	26"	80"	5"	-	-	-	19.25"	9.5"	77.5"	4.75"	1"	6.5"	1.25"
449TS	398	26"	98"	5"	-	-	-	19.25"	9.5"	95.5"	4.75"	1"	6.5"	1.25"

www.keenpump.com

KEEN PUMP®

Installation, Operation & Maintenance Manual

ANSI Process Pumps

KP911 series

IMPORTANT! - Read all instructions in this manual before operating or servicing a pump.

KEEN process pump series KP911 is a centrifugal pump with horizontal suction and vertical discharge, open impeller, which meets ANSI B73.1 requirements. It is made of the best materials and components, with continuous inspection, ensuring high quality. Through proper installation periodic inspection, monitoring its condition and careful maintenance, this pump will give you satisfying and lasting service.
Maintenance operators must realize this and follow the appropriate safety precautions. This manual provides information for installation, preventive maintenance, troubleshooting and corrections, and the part list.

It is important to consider the following:
1. Always be sure to disconnect engine electric current power before performing maintenance to the pump.
2. Never operate the pump in conditions beyond those with which the pump was sold.
3. Never operate the pump without the flexible coupling guard
4. Never apply heat to disassemble the pump or remove the drive, It can explode due to trapped fluid.
5. Never operate the pump without safety devices.
6. Never operate the pump with the discharge and/or suction valve closed.
7. Never start the pump without priming.

▸ Specifications

Volute: in horizontal suction and vertical discharge, foot design makes it resistant to slippage and the distortion due to piping loads. Packing is fully confined, the standard layout is serrated flanges with flat face, ASME/ANSI B16.5, for 150#, there are other alternatives such as: 150#RF, 300#FF and 300#RF.

Impeller: fully open and threaded to the drive shaft, thread is isolated from the fluid pumped by teflon ring.

Seal plate: manufactured in iron or stainless steel 316, machined to totally seal with the volute gaskets.

Adaptor: made of iron, with a machined socket to hold the volute and the seal plate, having holes to fit the bearings box.

Shaft: it is made of 4140 steel, comes with adjustable bearing set. This shaft can also be supplied in 316 stainless and in this case it requires no sleeve.

Bearing box: rigid construction and requires no additional machining, to make lubrication oil to grease or oil mist, has a sight glass to check the oil level, the box is sealed using INPRO labyrinth seal "VBX". This bearing box is made of iron for models KP911M has two bearings box support sizes; according to the suction lift the support size is selected.

Bearing support: made of iron material, slot holes for lubrication with oil, grease or oil mist.

Outer bearing: located in the bearing support, it is a two angular contact ball and its design is suitable to support combined load, meaning axial and radial loads acting simultaneously.

Bearing interior: a rigid single row bearings, simple design, suitable for high operating speeds besides requiring little service attention.

Data plate: each pump has a plate identification, which provides information about: model, pump size impeller diameter, building materials, serial No., etc. (see Figure1); the plate is located on the frame. When requiring spare parts please identify the pump model, size, serial, number, plus the number of required parts.

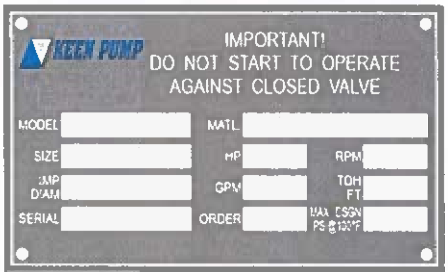


Figure 1

▸ Pump reception

Upon receving of the pump, it is important to verify that there is no missing parts/components and has not suffered any damage.

Any claim for shortage or management should be directed to the transportation company. This pump is rigid and heavy lifting equipment must be able to adequately support the entire asembly. Lift pump using a suitable sling (see figures 2 and 3) are examples or proper lifting of these pumps.

Figure 2

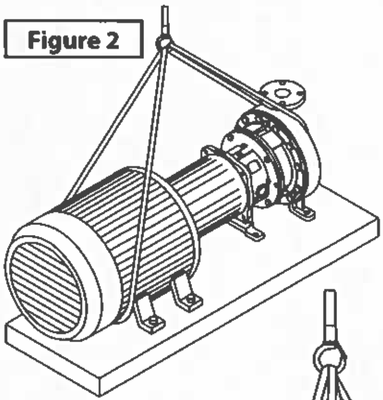
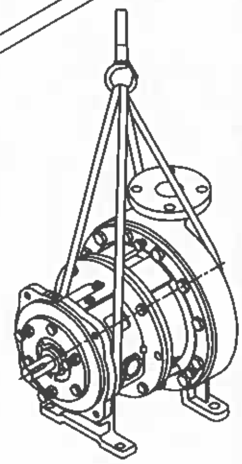


Figure 3



▸ Pump instalation

All pumping equipment should be installed as close as possible to the source of liquid being pumped, in addition to a base that is able to absorb vibrations generated during the operation of the pump, this facility should de located in a space so that the work of operation, maintenance and repair can be performed properly and without risk of equipment damage or personal injury.

▸ Base plate foundation and leveling

Foundation: a good foundation is made by pouring concrete in the location area of the base plate, the type of anchor is usually sleeve type, since this allows a movement of the basis for the final adjustment. In Fig. 4 and 5 two types of anchoring are shown:

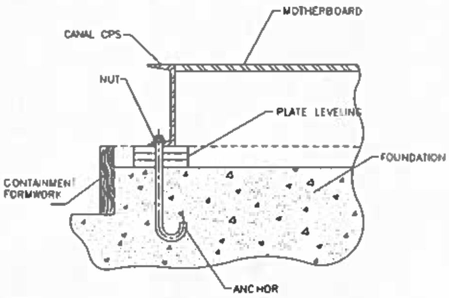


Figure 4

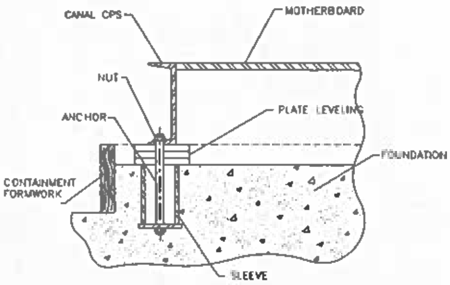


Figure 5

Leveling: (see figure 6 and 7)

a) Shall have two sets of shims on the sides of each anchor to reach a height of 1½" above the work floor level, and allow the appropriate application of pouring concrete, plus a uniform settle in the base plate, once the concrete is emptied.

b) If you use anchor sleeve, remove the waste solids or liquids of the interior of each anchor sleeve and insert paper or rag to prevent them from filling with concrete when pouring.

c) Carefully install the base plate, ensuring that all anchors fit together into their respective holes, and sit on the shims evenly.

d) Level the base with a tolerance of 1/8" (3.17 mm) length and 1/16" (1.58 mm) width, adjusting shims.

e) Install nuts, tightening them by hand. Once aligned the motherboard, the next step is the pump.

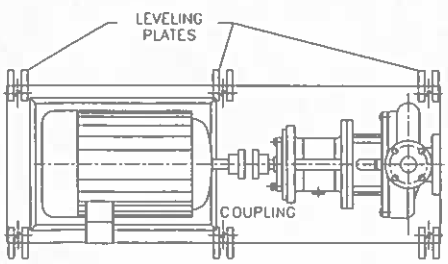


Figure 6

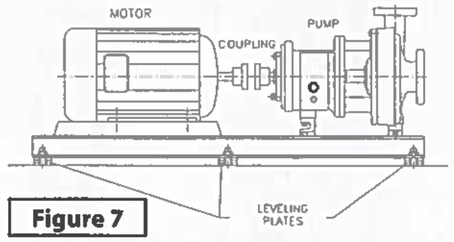


Figure 7

▸ Alignment procedure

Initial alignment: this is done before putting into operation the pump and is divided into three stages:

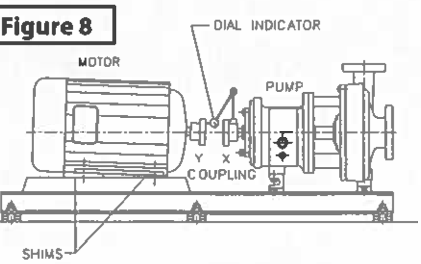
- Before pouring the concrete: To ensure base plate alignment, seen in the leveling section, subsections C and D.
- After pouring the concrete: in order to ensure that there are no sudden movements or abnormal contractions of concrete during casting.
- After connecting the pipes: checking that the stress on the pipeline have not altered the alignment, if any misalignment, modify the suction and discharge support system to reduce the stress in the flange of the pump.

Final alignment: after the first pump operation the alignment should be checked to ensure that everything is in order, starting from this, you should check the alignment periodically, to maximize the pump performance. A unit is in proper alignment when the angular and parallel alignment readings do not exceed 0.002" (0.05 mm). Here we present some criteria and suggestions for achieving a proper alignment.

Angular alignment.

Vertical: Consists of installing a dial indicator (see Figure 8) in the top half of the coupling "X" leaving it fixed, then coupling "Y" is halfway rotated. If reading exceed 0.002" (0.05 mm), this means that the motor is offset from the top down, install shims at the motor feet to correct the readings.

Figure 8



Horizontal: Consist of installing a dial indicator (see Figure 9) in the top half of the coupling "X" leaving it fixed, then coupling "Y" is halfway rotated. If the readings exceed 0.002" (0.05 mm), this means that the motor is offset from the top down, install shims at the motor feet to correct the readings.

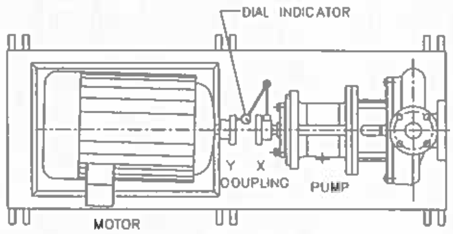
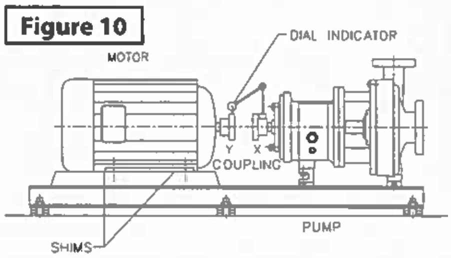


Figure 9

Parallel alignment.

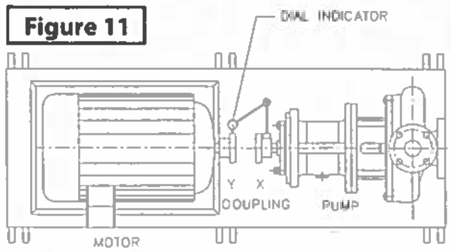
Vertical: Consist of installing a dial indicator (see Figure 10) in the top half of the coupling "X" leaving it fixed, and four cardinal points in the half of the "Y" coupling are inspected. If readings exceed 0.002" (0.05mm), means that the motor is offset from the top down, install or remove equal amounts of shims at the motor feet, to correct the readings.

Figure 10



Horizontal: Consist of installing a dial indicator (see Figure 11) in the top half of the coupling "X", leaving it fixed, and then proceeds to inspect the four cardinal points of the "Y" coupling. If readings exceed 0.002" (0.05 mm), means that the motor is offset from the top down, so install or remove equal amounts of shims at the motor feet, to correct the readings.

Figure 11



▸ Concrete pouring application

1. Build a dam with particular area and height for concrete pouring (see Figure 12).
2. Clean the areas that have direct contact with the concrete pouring with a damp cloth, wet thorougly.
3. It is recommended that pouring be consistent (see distributor instructions).
4. Pour the concrete in order to reach the dam level, then make sure there are no trapped air bubbles.
5. Let first pour harden for 18 hours.
6. Make the second concrete pouring filling the whole base plate (see Figure 13).
7. Let harden the second concrete pouring at least 48 hours.
8. Tighten nuts anchoring the base plate.
9. Verify pump alignment.

Figure 12

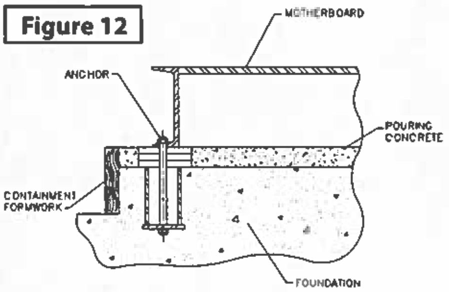
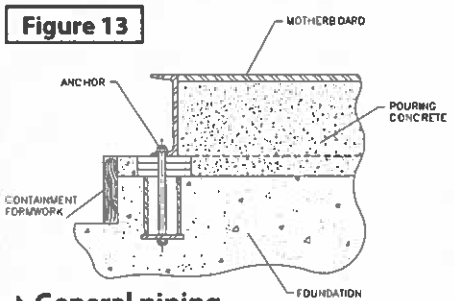


Figure 13



▸ General piping

1. Clean all pump piping, valves and accessories before assemble.
2. The pipe must be connected to the pump until concrete pouring has completely hardened.
3. The lengths of pipe should be as short as possible in order to minimize friction losses.
4. Where hazardous liquids are handled, piping should allow pump to be washed before disassembling the unit.
5. All piping must be supported independently apart from the pump, this support should be adequate to prevent misalignment of the pump.
6. All the suction pipe must remain adequately submerged below the liquid level avoiding vortex and air pockets in the suction.

Suction pipe

a) The suction pipe diameter should never be less than the suction flange of the pump, pipe diameter is recommended to be one or two times the suction flange diameter.
b) In addition, use an eccentric reducer with sloping side down.
c) Avoid installing short radius elbows.
d) At least there should be a straight equivalent of 2 or 3 long pipe diameters from the suction flange to the first side section.
e) When simultaneously having 2 pumps systems working on the same supply the suction pipe must be separated as much as possible.
f) When the suction is negative, i.e. when the pump is above the suction level (see Figure 18) all joints must be airtight, suction piping must be without air bags, this requires installing a foot valve.
g) When the suction is positive, i.e. when the pump is with suction flooded, (see Figure 17) a gate valve should be installed in the suction line at least two diameters of the suction flange, no portion of the piping should extend below the suction flange.

Discharge pipe

a) The discharge must have gate valves and check valves, install the retention valve between the pump and the gate valve, this will permit inspection of the check valve, gate valve is required for the priming, flow regulation, inspection and pump maintenance.
b) If a reduction bell is used as a booster, it should be placed between the pump and the valve.
c) Damping devices shall be used to protect pressure pulsations and water hammer.

Final verification

Turn the shaft by hand several times ensure that the parts are friction free, besides verifying alignment in accordance with section "Final alignment".

▸ Pump start up preparation

CAUTION! - Block the motor power supply before performing any maintenance, operation and repair or adjustment of the pump. (To prevent accidental starting and/or personal injury).

▸ Pump rotation verification

1. Make sure the coupling is securely fastened to the shaft.
2. Verify that nobody can interfere with this operation.
3. Turn on and off the motor quickly to verify the direction of rotation, rotation should correspond with the shaft on the bearing box. **You may cause severe damage if the pump runs in the wrong direction.**
4. Block the motor power to proceed with the start up preparation.

▸ Impeller clearance verification

Before operating or starting the pump you should verify the impeller. The efficiency of the pump maintains when having a proper impeller clearance. The best way is obtained by fixing the clear front impeller in the factory, with the default limits that may be compatible with the service conditions. The minimum values for impeller adjustment are illustrated in the "Impellers Clearance at Operating Temperatures" table, where you can find values for different temperatures, depending on the model, these values are necessary to prevent the driver to touch the surface of the body due to dilatation of metal being a result of the pump operation, not being within these ranges may cause significant damage to the unit.

IMPELLER CLEARANCE AT OPERATING TEMPERATURES			
OPERATING TEMPERATURE	MODEL KP911S	MODEL KP911M	MODEL KP911 LX
Up to 93° C (200° F)	0.005" (0.13 mm)	0.008" (0.20 mm)	0.15" (0.38 mm)
93° - 121° C (250° F)	0.007" (0.18 mm)	0.010" (0.26 mm)	0.17" (0.43 mm)
121° - 149° C (300° F)	0.009" (0.23 mm)	0.012" (0.30 mm)	0.19" (0.48 mm)
149° - 177° C (350° F)	0.011" (0.28 mm)	0.014" (0.36 mm)	0.21" (0.53 mm)

▸ Bearings lubrication

Oil lubrication: Fill the bearing oil by removing the oil filler cap located on top the box until the oil sight glass indicates half, use a high quality oil turbine type with rust and oxidation inhibitors. (See table: "Minimum Requirement for oil lubrication").

Grease: Pumps are shipped grease free. (See Table "Minimum Requirements for grease lubrication").

Bearings greased for life: These bearings are filled with grease and sealed by the manufacturer. If the pump is operated after a long idle time, flush the bearings and bearing frame with a light oil to remove contaminants. During washing, slowly turn the shaft by hand. Finally, flush the bearing box with proper lubricating oil to ensure oil quality after cleaning.

MINIMUM REQUIREMENTS FOR OIL LUBRICATION	
	TEMP. PUMPING UP 177° C (350° F)
ISO DEGREE	VG 68
Approx. SSU - 38° C (100° F)	300
DIN	C68

MINIMUM REQUIREMENTS FOR GREASE LUBRICATION	
	TEMP. PUMPING UP 177° C (350° F)
SKF	LGMT 2
EXXON	UNIREX N2
CONSISTENCY NGLI	2

▸ Shaft seal

Mechanical seal: the pumps can be sent with or without mechanical seal installed at the factory, the common mechanical seal for KEEN KP911 series pump is the cartridge type; these are prefabricated at the factory and do not require field adjustment, for other types of mechanical seal see the installation instructions and manufacturer setting.

Packing gland: these pumps are shipped without packing rings, lantern rings, gaskets, etc., these are available as accessories and must be installed before starting the pump.

▸ Packing installation

1. Perfectly clean seal plate cavity.
2. Must twist packing and lantern rings, just to keep in touch with the sleeve, (see in Figures 14 and 15 the correct way to turn these rings is shown).
3. Insert packing, this should be done alternating the joints of each packing and following the sleeve contour.
4. The arrangement of the packaging should be packing rings at the bottom of the chamber, a lantern ring intermediate and three packing rings at the end, then install the gland (see Figure 16, for example).
5. Install the gland by placing the two halves, with studs and install the nuts (hand tightened).

Figure 14

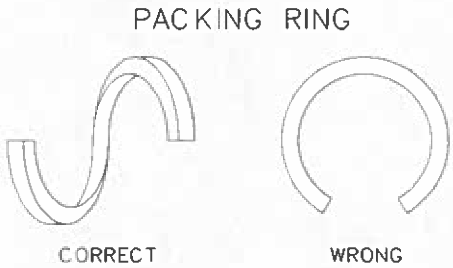
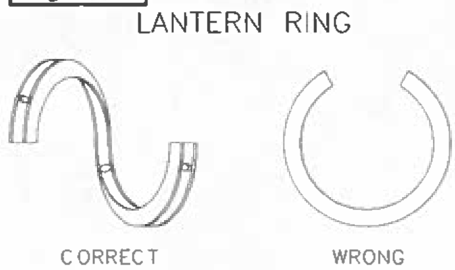


Figure 15



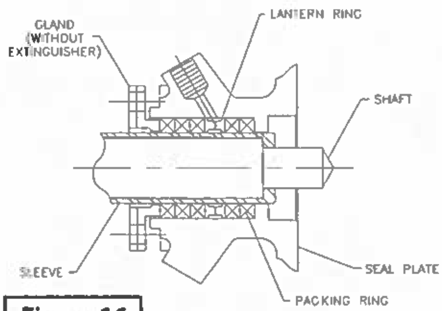


Figure 16

▸ Priming the pump

Never start the pump until it has been properly primed. You can use different priming methods depending of the type service and installation required.

Providing suctions above the pump:
1. Slowly open the gate valve located in the suction pipe (see Figure 17).
2. Open the vents in the suction and discharge pipe until water flows.
3. Close vent valves.

Providing suctions below the pump:
An aspiration valve and external liquid can be used in order to prime the pump, as shown in Figure 18 and 19. The external liquid can be obtained from a priming pump, a depressurized discharge pipe or an external supply.
1. Close the discharge valve and open the volute vents.
2. Open external supplier valve just enought to have water escape the ventilation valves.
3. Close vent valves first and the external supplier line.

Figure 17

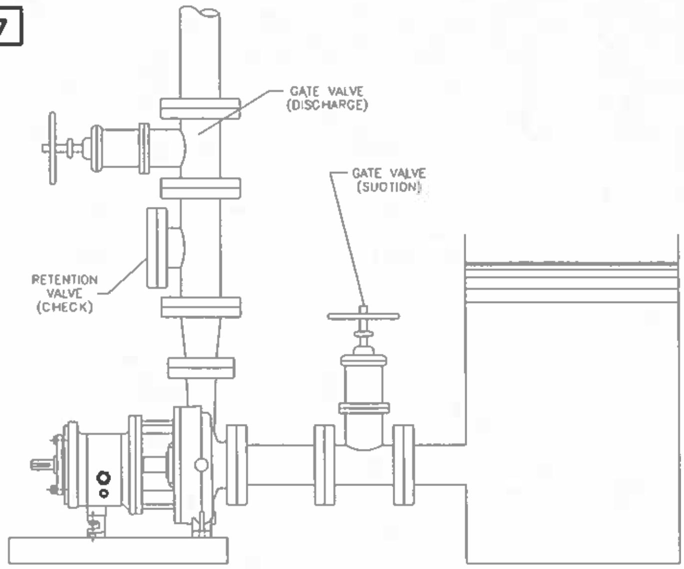


Figure 18

PRIMING SYSTEM WITH FOOT VALVE AND EXTERNAL SUPPLY

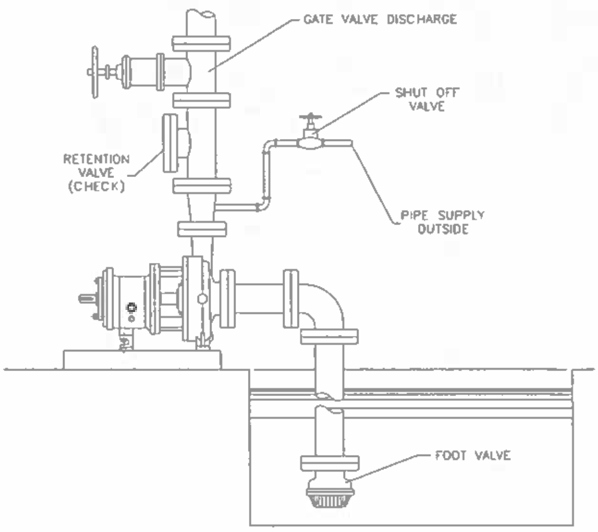
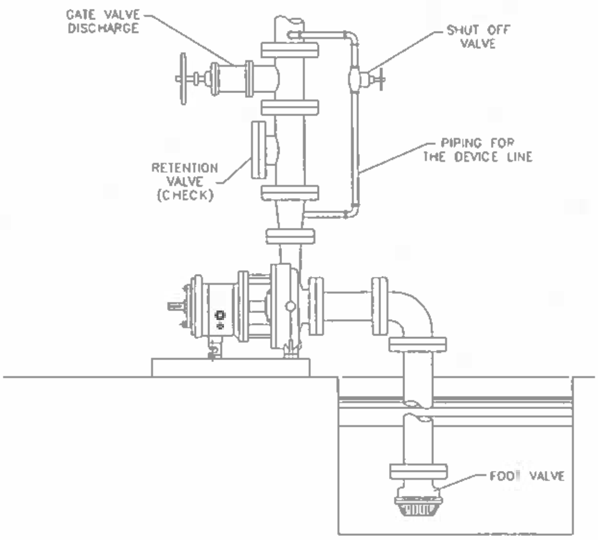


Figure 19

PRIMING SYSTEM WITH VALVE STANDING BYPASS DRIVER ON



▸ Pump operation

1. Make sure the suction valve and another recirculation or cooling valves are open.
2. Totally close or partially open the discharge valve, following the system conditions.
3. Start the motor. It is important to observe the manometer. In case the discharge pressure is not reached, stop the engine, prime the pump a second time and start again.
4. Slowly open the discharge valve until the desire flow is obtained.
5. Always operate this pump at or near the flow regime, to prevent damage resulting from cavitations or recirculating conditions.
6. Motor can be overload if the specific gravity (density) of the liquid being pumped is greater than the original stated liquid or if the maximum flow is exceeded. (See table: "Minimum Recommended Flow" for Keen 911 series pumps)

Operating pumps at reduced capacity: do not operate below the minimum flow requirement or with the discharge/suction valves closed. In this condition there is a risk of an explosion due to the pumping vaporization which may lead to pump a failure or a personal injury.

Operating pumps at freezing conditions: exposure to freezing conditons while the pump is out of service can cause the liquid to freeze and damage the pump. Liquid should be drained from the pump.

Damages occurring mainly for the following reasons:

1. High radial thrusts (shaft or bearing stresses).
2. High levels of vibration. (Affect bearings, mechanical seal, packing gland).
3. Heat generation. (Vaporization causes inner components to rotate, jam or scratch).
4. Cavitations. (These causes damage within the pump, especially with the pumps impeller).

RECOMMENDED MINIMUM FLOW (gallon per minute at the maximum diameter)							
SIZE	MODEL	2 POLES / 60 Hz 3560 RPM	2 POLES / 50 Hz 2900 RPM	4 POLES / 60 Hz 1780 RPM	4 POLES / 50 Hz 1470 RPM	6 POLES / 60 Hz 1180 RPM	6 POLES / 50 Hz 960 RPM
1 x 1½ - 6		10.04	5.02	2.9	1.05	-	-
1½ x 3 - 6		20.08	8.9	5.02	2.11	-	-
2 x 3 - 6	KP911S	39.89	25.88	8.9	2.9	-	-
1 x 1½ - 8		20.08	12.9	5.02	2.11	-	-
1½ x 3 - 8		39.89	22.98	6.07	2.11	-	-
3 x 4 - 7		124.95	76.87	12.9	3.96	-	-
2 x 3 - 8		59.96	34.87	8.9	3.96	-	-
3 x 4 - 8		N/A	180.95	100.1	30.9	16.9	-
3 x 4 - 8 G		189.93	104.08	25.88	11.09	-	-
1 x 2 - 10		39.89	21.92	5.02	2.9	2.9	-
1½ x 3 - 10		80.05	56.0	14.0	6.07	5.02	-
2 x 3 - 10	KP911M	199.98	72.91	19.02	6.07	2.9	-
3 x 4 - 10		199.98	180.95	49.92	20.07	11.88	-
3 x 4 - 10 H		N/A	N/A	150.04	76.08	30.11	11.09
4 x 6 - 10		N/A	N/A	449.88	117.02	78.98	24.03
4 x 6 - 10 H		N/A	N/A	399.95	152.95	85.06	45.96
1½ x 3 - 13		179.9	105.93	44.9	22.98	11.09	-
2 x 3 - 13		239.86	170.91	62.87	36.98	17.96	-
3 x 4 - 13		399.95	332.85	168.01	104.08	67.09	30.9
4 x 6 - 13		N/A	N/A	369.84	296.92	150.04	89.02
6 x 8 - 13		N/A	N/A	849.84	480.0	374.86	197.07
8 x 10 - 13		N/A	N/A	1199.86	974.79	569.81	383.04
6 x 8 - 15	KP911LX	N/A	N/A	999.89	725.94	462.03	276.85
8 x 10 - 15		N/A	N/A	N/A	1399.84	999.89	769.79
8 x 10 - 15 G		N/A	N/A	1399.84	1374.75	846.93	603.89

Final alignment

1. Start the unit in real operating conditions enough time in order to bring the pump and engine into their operation temperature.
2. Verify aligment while the unit is still hot.
3. Reinstall the coupling guard.

Routine inspection

- Periodically inspect the pump and pipelines, making sure there are no leakage.
- Verify unusual sounds, vibrations or temperature on the bearings.
- Bearings constantly and periodically lubricated.
- Seal inspection (no leakage).
- Verify discharge and suction.
- Vibrations analysis.
- Temperature verification.
- Verify oil levels on bearings box.
- Packaging (any excessive leak requires adjustments or a possible replacement).

Bimonthly inspection

- Foundation, anchor and hardware inspection verifying everything is well adjust.
- Oil change, every two months (1850 hours) or before, depending on conditions where oil can be contaminated or decompose.
- If the unit was idle, the packaging should be inspected and if needed replaced.
- Bearing periodically inspected and lubricated.

Yearly inspection

Verify pump capacity, (pressure and power) if the pump efficiency doesn't meet the needed requirements for the process, the pump should be disassembled, inspected and replaced any worn out pieces. In case this inspection results are OK, a system inspection should be done.

Oil lubricated bearings

To fill the bearing box with oil, first oil cap located on top of the bearing is removed, add oil until the oil sight glass mark is located at the center, then install the oil cap.

OIL VOLUMES		
BEARINGS BOX	PINTS	INCHES
KP911S	1	15.74
KP911M	2.6	49.21
KP911M	3	55.11
KP911LX	6	118.11

You should change the oil every 1850 hours or every two months, we recommend using high quality oil for most operating conditions such as:

BRAND	DESIGNATION
ROYAL PURPULE	SYNFILM ISO VG68 SYNTHETIC LUBE
MOBIL	MOBIL DTE 26 300 SSU @ 100° F (38° C)
EXXON	TERESSTIC EP 68
SUNOCO	SUNVIS 968

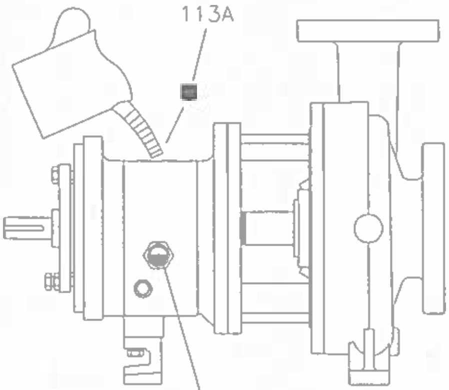


Figure 20

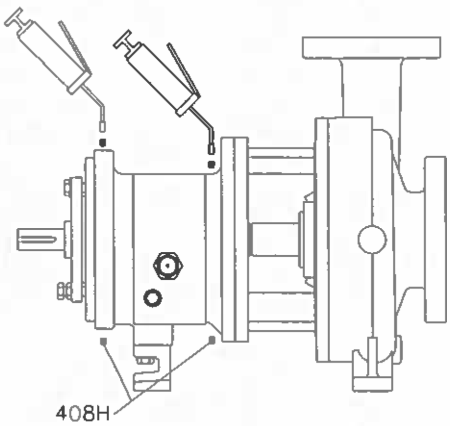


Figure 21

▸ Grease lubricated bearings

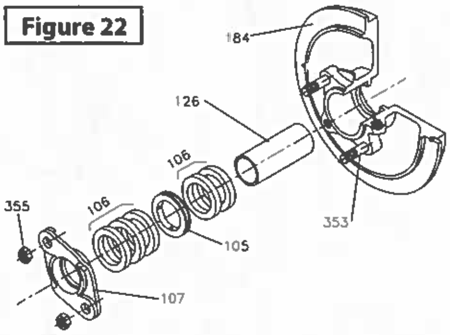
1. Clean and wipe out all elements such as: the grease container, relief plugs, etc. to prevent dirt from entering the bearing support.
2. Fill both grease cavities through the greased ducts until fresh grease comes out the relief holes.
3. Reinstall relief plugs in place.

▸ Gaskets

The area used for gaskets and packing glands is not always filled at the factory and must be filled before operating the pump, it can be provided in a box of accesories with the pump. Before installation make sure the gland is clean, check the sleeve for scratches or wear, if so replace if necessary. Begin by placing two packing rings, then the lantern ring, three packing, rings, finally adapt the gland (see figure 22). To place the packing and latern rings you must make a twist motion type, as shown in figure 14 and 15 alternating 90° and tightening each ring to ensure proper compression of the gland.

The gland should be tightened evenly to achieve a good seal, excessive tightening of the gland can cause premature wear on the packaging and/or sleeve.
Upon completion of this process, the shaft should be turned by hand once the pump is working a final gland adjustment can be made.

Figure 22

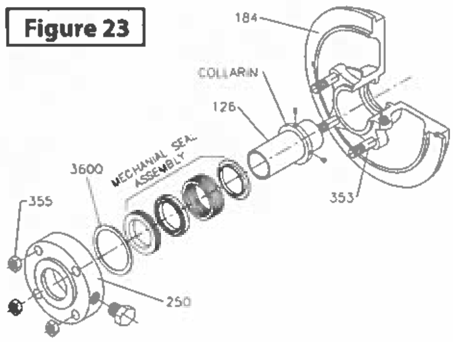


▸ Mechanical seal

If a mechanical seal is required a manufacturer catalog must be provided with is respective data. This catalog or plan shall be kept for future repairs or mantenance. It must also specify the required type of washing liquid and coupling points, every detail of installation, lubrication, pipes must be checked before starting the equipment (see Figure 23).

Because the mechanical seal service life depends on many factors such as: lubrication, maintenance, liquid being handled, operating conditions, etc is not possible to determine the lifetime of the mechanical seal.

Figure 23



IMPORTANT! - Never operate the pump when fluid is not supplied to the mechanical seal, this can cause damage to the mechanical seal, wearing on sleeve, besides being able to cause serious injury if these seals fail.

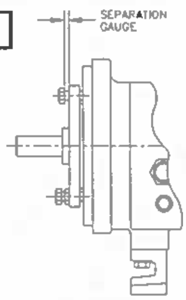
▸ Impeller clearings adjustment

As time passes by a change may be noticed in pump performance, this decrease in the work load can be renewed by adjusting the impeller. Here are two techniques explained to perform this procedure.

Feeler gauge method

1. Remove guard.
2. Loosen the leveling screw nut, back screw two or three turns.
3. Tighten evenly each of the screws, then push the bearing supports into the bearing box when the impeller makes contact with the volute, rotate the shaft to ensure uniform contact is made.
4. With a feeler gauge the distance between the three screws, they push the bearing supports should be fixed according to the table: "Impellers clearance at operating temperature".
5. Tighten the leveling screws moving away the bearing support until it makes even contact with fasteners. (See Figure24).
6. Tighten the locknuts.
7. The shaft should turn freely.
8. Install the coupling guard.

Figure 24

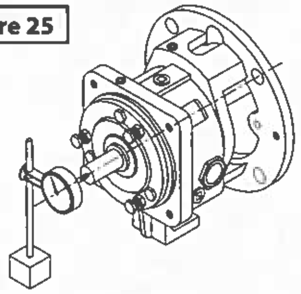


Dial indicator method

1. Remove guard and coupling.
2. The dial indicator is set at the end of the shaft, the gauge sensor must make contact with the shaft's flat face (see Figure 25).

3. Loosen the leveling screw nut, back screw two or three turns.
4. Evenly tighten each of the screws, pushing the bearing support into the bearing box, when the impeller makes contact with the volute, rotate the shaft to ensure uniform contact is made.
5. Gauge is set to zero, and the screws are loosen about one turn.
6. Turn the leveling screws until they make even contact with the bearing.
7. Tighten evenly the leveling screws removing the bearing support of the bearing box until the dial indicator marks the distance or the impeller clearances are appropriate according to the table "Impellers clearance for operating temperatures".
8. Tighten the screws keeping the indicator reading at the proper setting.
9. Tighten the locknuts.
10. The shaft should turn freely.
11. Place coupling in position.
12. Install the coupling guard.

Figure 25



Pump disassemble

Main precautions

Before starting the disassembly or performing any work on the pump:

- Power energy must be blocked or disconnected in order to avoid an accidental pump start up.
- Use personal protective equipment when performing any maneuver on this pump.
- This pump can handle dangerous and/or toxic liquids, you should never apply heat to remove the components of this pump also at all times you must use personal protective equipment to avoid injury.
- Some elements of this pump are stiff or heavy, extreme precaution is recommended when moving and lifting these parts, all lifting equipment should be resistent, lifting maneuvers and the moving of parts must be correct and careful.
- Use heavy duty glove, impeller has sharp edges that removing or installing it could cause injuries.
- Before starting any work on the pump you must close all valves and liquid connections, such as suction discharge, auxiliary piping, etc. Once the valves closed, the pump must be drained and washed if necessary.
- Make sure you have all the parts, spare parts and tools needed before disassembling the pump.

Recommended spare parts

- Impeler.
- Sleeve.
- Shaft/coupling.
- Outer bearing.
- Inner bearing.
- Inner labyrinth seal.
- Outer labyrinth seal.
- Fastening nut.
- Lock washer.
- Volute gasket.
- "O" gasket bearing support.
- Bearing box adaptor gasket.
- Gland gasket.
- "O" impeller's gasket.

Tools required

- Wrench 7/16", 1/2", 9/16", 3/4", 7/8" and 15/16".
- Clamps for interior locks.
- Pressure clamps.
- Soft hammer.
- Set of allen keys.
- Indoors and outdoors micrometer.
- Torque wrenches.
- Dial indicator.
- Wrench (SKF designations HN6, HN9, HN10).
- Adjustable wrench.
- Heavy duty gloves.
- Cleaning elements.

Disassembly

1. Close and fully drain the pump and piping, drain the volute and disconnect all auxiliary piping before starting.
2. Remove the coupling guard.
3. Disconnet the coupling.
4. If using oil as a lubricant it should be drained by removing the plug from the bearing box and reinstalling the plug immediately.
5. Volute and the bearing box support screws are removed.
6. Attach the pump with a sling, make sure it is securely fastened to proceed to move it to work pleace.
7. Move the bearing support to a work place.
8. Remove the shaft's coupling.
9. Remove the impeller, the impeller is remove from the shaft, install a wrench at the end, rotate the impeller clokwise when viewed from the end of the impeller and make sure the wrench handle makes contact with the workbench, quickly rotate the impeller counter clockwise until is loosen.
10. Remove the "O" teflon gasket.
11. Remove the volute gasket, this should be discarded and replaced with a new gasket during reassembly.
12. Remove the leveling screws from the volute adapter.
13. Remove the packing system, either mechanical seal or gland.
14. Remove the seal plate by loosening the nuts in the set crew, then seal plate is removed as well as the packing or mechanical seal.
15. Shaft's sleeve is removed.
16. Loosen screws in bearing box.
17. Bearing box adapter is removed.
18. Remove and discard the adapter's gasket, replacing it with a new one during reassembly.
19.- Remove the inner labyrinth seal, located on the bearing box for model KP911S and in the adapter for KP911M models, this piece is part of the spare part kits.
20.- Once removed the inner labyrinth seal, remove the bearing support, back the lock nuts, tightening evenly the leveling screws to detach the bearing support.
21.- Remove all leveling/fastening screws, and locking nuts from the bearing support, store them and inspect them for reassembly, if necessary replace them with new ones.
22.- Remove the shaft and rotating elements inside the bearing box.
23.- Once out of the bearing box, remove the inner bearing.
24.- Remove gasket "O" from the bearing support.
25.- For the KP911M and KP911S models, remove the lock using tongs for interior locks.

26.- Remove labyrinth seal installed on the bearing support.
27.- Remove the bearing box, shaft with bearings, lock nut and washer installed.
28.- Remove the lock nut, using the respective wrench.
29.- Remove the washer.
30.- Remove the bearings.
31.- Finally the bearing box disassembly, remove all plugs (oil filler, oil drain, oil mist connection, both input and output plugs for oil cooler), plus the oil sight glass and the two guide pins.

Completing this process of dismantling the pump, all parts will be available to proceed to inspection.

Inspections of pump parts

Must inspect all parts of the pump before being reassembled, using the following criteria noted here to achieve a suitable pump operation.

During inspection if any piece or component does not have the minimum requierements it should be replaced.

Impeller: (see Figure 26)

- You should inspect the impeller vanes checking if they are damaged, must be replaced if the slots are greater than 1/16" deep or if they have a uniform wear over 1/32" (point A).
- Inspect the rear vanes, if they have more wear than 1/32" (point B), replace the impeller.
- Inspect the leading and trailing edges of the blades, if these presents corrosion or wear (point C), substitute for a new impeller.

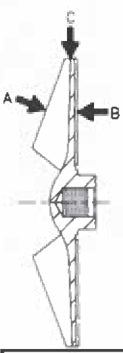


Figure 26

Volute:

- You should inspect the inside of the body and the gasket body surface, if you have slots than 1/8" it should be repaired or replaced (see Figure 27).

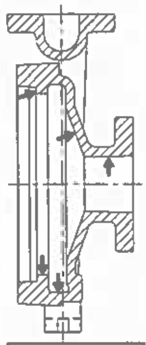


Figure 27

Adapter:

- When inspecting the adapter, you should check for any cracks or excessive corrosion damage, must be replaced (see Figure 28).

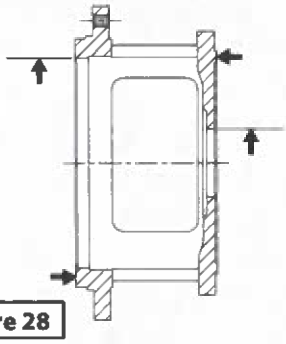
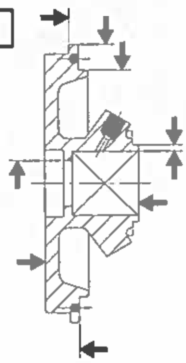


Figure 28

Seal plate:

- When inspecting the seal plate should check the packaging chamber is cleaned and does not have excessive corrosion, in addition review the area of the flat place that makes direct contact with the volute's inside should be replaced if you have any crack or more wear than1/8" deep (see Figure 29).

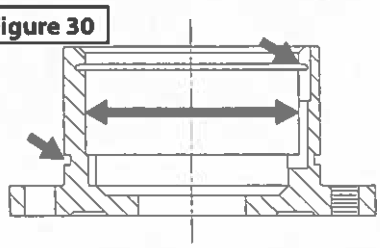
Figure 29



Bearing support:

- Check the bearing seat according to the "Table for bearing adjustment and tolerances", replace if values exceed those listed in the table (see Figure 30).
- Inspect the lock slot, it should not have any cracks, replace if necessary.

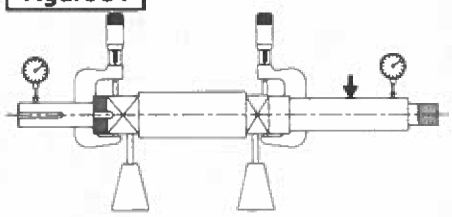
Figure 30



Shaft:

- Review the shaft, reviewing courts bearings, the setting must match the tolerances specified in the table: "Table for bearing adjustment and tolerances".
- Inspect the righteousness of the shaft, replace the shaft it exceeds more than 0.002" (0.050 mm) between centers.
- Inspect the shaft, reviewing the general aspects, replace if you have grooves or pits (see Figure 31).

Figure 31



Sleeve:

- When inspecting the sleeve, review the outer and inner tracks, replace if you have grooves or pits (see Figure 32).

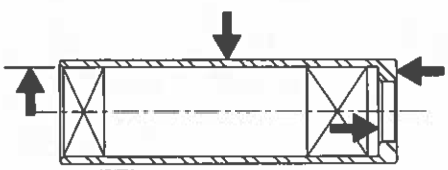


Figure 32

Bearing box and bearing box support:

- Inspect the bearing box, make sure it is not cracked.
- Inspect the inner bearing according to the "Bearing adjustment and tolerances table"
- Replaces if values exceed those listed in this table.
- Check all lubrication passages and make sure they are not clogged (see Figure 33).
- If the bearing was exposed to the fluid pump, inspect for corrosion, replace if necessary.

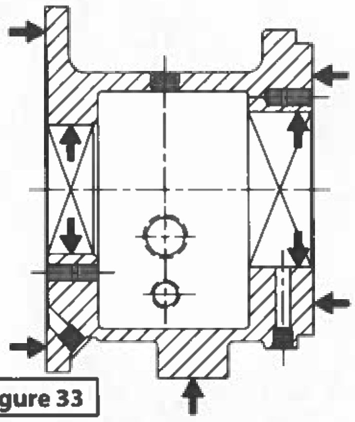


Figure 33

Bearings:

- Check the bearings, the condition of these is important in determining working conditions within the bearing box, note the condition of the lubricant, this information may be useful in determining future prevention.
- If the wear cause is not normal, it must be corrected before installing new bearings.
- Do not reuse the bearings.

Labyrinth seals:

- Check the status of the labyrinth seals, inspect so the gaskets have no cuts or cracks, replace if necessary.

BEARINGS TYPE		
Bearing box	Inner bearing	Outer bearing
KP911S	6207	5306 A/C3
KP911M	6309	5309 A/C3
KP911L	6311	7310 BE (DOUBLE)
KP911LX	6313	5313 A/C3

TABLE SETTINGS AND TOLERANCES BEARINGS	MODEL KP911S	MODEL KP911M	MODEL KP911L	MODEL KP911LX
Outside diameter of the arrow	1.3785	1.7722	2.166	2.5597
	1.2781	1.7718	2.1655	2.5592
	0.0010 tight	0.0010 tight	0.0012 tight	0.0012 tight
	0.0001 tight	0.0001 tight	0.0001 tight	0.0001 tight
Inner diameter of the bearing (int. bearing)	1.378	1.7717	2.1654	2.5591
	1.3775	1.7712	2.1648	2.5585
Housing diameter (int. bearing)	2.8346	3.937	4.7244	5.5118
	2.8353	3.9379	4.7253	5.5128
	0.0012 loose	0.0015 loose	-	0.0017 loose
	0.0000 loose	0.0000 loose	-	0.0000 loose
Outside diameter of the bearing (int. bearing)	2.8346	3.937	4.7244	5.5118
	2.8341	3.9364	4.7238	5.5111
	1.1815	1.7722	1.969	2.5597
Outside diameter of the arrow (ext. bearing)	1.1812	1.7718	1.9686	2.5592
	0.0008 tight	0.0010 tight	-	0.0012 tight
	0.0001 tight	0.0001 tight	-	0.0001 tight
Inner diameter of the bearing (ext. bearing)	1.1811	1.7717	1.9685	2.5591
	1.1807	1.7712	1.968	2.5585
Housing diameter (ext. bearing)	2.8346	3.397	4.3307	5.5118
	2.8353	3.3979	4.3316	5.5128
	0.0012 loose	0.0015 loose	-	0.0017 loose
	0.0000 loose	0.0000 loose	-	0.0000 loose
Outside diameter of the bearing	2.8346	3.937	4.3307	5.5118
	2.8341	3.9364	4.3301	5.5111

▸ Pump reassembly

Before reassembly of the pump, check the threads of all parts of the pump and make sure they are clean and in good condition, otherwise you must inspect them before starting.

▸ Bearing box assembly

1.- Install in the bearing box all screw plugs (the oil drain plug, the four connection plugs oil mist, the two inlet plugs, cooling system outlet plug), in addition to the oil inspection glass and the two guide pins. (See Figure 34)

2.- Reinstall the bracket bearing box with screws and washers, hand tight.

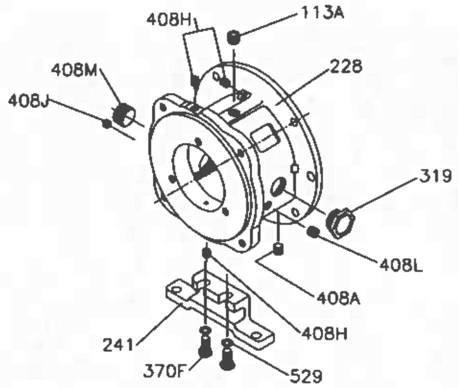


Figure 34

▸ Mounting the coupling and rotating elements

1.- For the KP911S and KP911M models: In stall the outer bearing on the shaft, before installing moisten the inner ring of the bearing with the same oil use durin g the pump operation.
For installation, this bearing has one defense oriented impeller.
For the KP911L model: Install the outer bearing on the shaft, before installing, make sure your setup in on "O" (back to back, see SKF catalog for more information on this installation), moisten the inside track bearings with the same oil intended for use during pump operation.

2.- Place the washer on the shaft, locating tab washer in accordance with the shaft's keyway.

3.- Screw the nut fixation on the shaft, once reached the top; help yourself with the respective spanner wrench for proper fit, then twist a washer in one of the nut notches in the corresponding fixation.

4.- For KP911S and KP911M models: Place the lock throught the end of the impeller towards the outside bearing, this lock is beveled at its outer diameter, you must position the flat side toward the outer bearing (see Figure 35).
For the KP911L model: Place the retaining bearing ring checking side orientation embedded in the bearing support, this ring will remain loose for a few moments while the inner bearing is intalled.
5.- Install the inner bearing on the shaft, before installing brush the bearing inner track with the same oil intended to be use during pump operation.
6.- Install a gasket type "O" on the bearing support in the outer track sealing within the bearing box.
7.- Brush the outer track of the bearing and the inner track of the bearing bracket with the same oil intended to be use during pump operation.
8.- Install the bearing bracket in the shaft with its rotating parts.
9.- For KP911S and KP911M models: Secure the lock into its slot with tweezers for interior locks, ensure that the oil return slot in the bracket bearing remains unobstructed by the padlock.
For the KP911L model: Snap the retaining ring into the bearing box, ensuring that lubrication grooves and screws match with the support, tighten the screws with their respective wrench (see Figure 36).
10.- After step 9 is concluded make sure the shaft turns freely.
11.- Before installing the exterior labyrinth seal, make sure the edges of the keyway on the shaft does not have burrs or sharp parts, in order to protect the outer packaging labyrinth seal.
12.- Install the exterior labyrinth seal in the bearing box, this is with an adjustment gasket type "O" slot oil drain must point downwards (see Figure 37).
13.- Moisten the outer track of the bearing box, the inner bearing and inner track of the bearing with the same oil to be use during pump operation, this to facilitate assembly.
14.- Install the shaft in the bearing with its rotating elements assembled, make sure the shaft turns freely.
15.- The orientation of the bearing support in the bearing box, must match the word "TOP" towards the top of the bearing box, put the screws and the leveling screws, with its respective nut and hand tighten.
16.- Shaft and rotating elements already installed in the bearing, put a dial indicator on the end of the shaft move the shaft forward, then backward, getting the axial reading, if readings are higher than 0.011" (0.28 mm) for the KP911S model, or 0.019" (0.49 mm) for KP911L and KP911M models, disassemble and determine the cause.
17.- Shaft eccentricity verification, install the sleeve and make sure it is properly installed, screw the drive in the shaft, hand tightening.
18.- Adapt a dial indicator, touching the sleeve track and turn the shaft, if the reading is greater than 0.002" (0.05 mm) disassemble and determine the cause.
19.- Unscrew the impeller and remove the sleeve.
20.- Check the squareness of the face frame against shaft.
21.- Adapt a dial indicator on the shaft, touching the flat face of the frame, hand turn the shaft for 360° if the reading is greater than 0.001" (0.025 mm), disassemble and determine the cause.
22.- Install the gasket adapter.
23.- Install the adapter, ensure the correct position of the adapter through the two bolts and screws, tighten the screws with a torque approximately 45 lbf-ft.
24.- Check the axial, perpendicular and eccentric adapter settings with a dial indicator adapted in the shaft, checking 360°, if the readings are greater than 0.005" (0.013 mm), remove the adapter and determine the cause.
25.- Install the labyrinth seal in the bearing box, this is with an adjustment on the gasket type "O", the oil drain slot should face down (see Figure 37).

Completed this procedure, we proceed with the two forms of sealing, which can be mechanical seal or packaging gland.

Figure 35

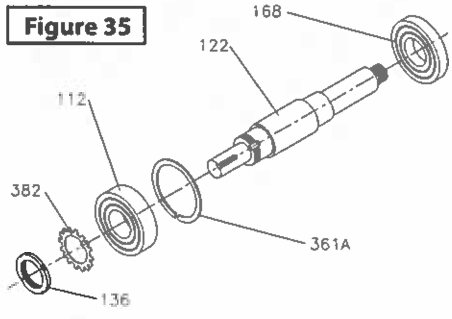


Figure 36

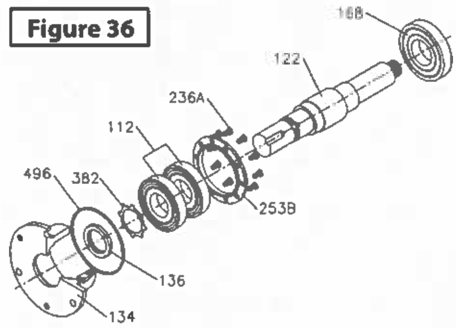
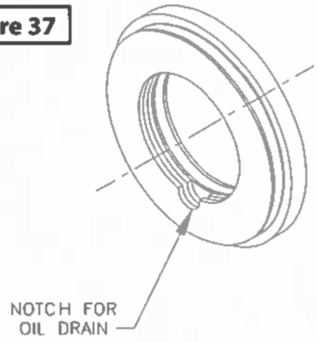


Figure 37



▸ **Pump with mechanical seal**

1.- Install the seal plate by holding the adapter, tightening the screws and nuts. 2.- Verify perpendicular and eccentric adjustments on seal plate with a dial indicator adapted on the shaft checking 360° if the readings are higher than 0.005" (0.13 mm), remove the seal plate and determine the cause.
3.- Install the sleeve, ensure sleeve snaps in slot in the bolt hole of the shaft.
4.- Install the impeller with gasket type "O", hand tighten. 5.- Install the keyway in place.
6.- Install a spanner at the end of the shaft, ensure perfectly wedge pinch, rotate the impeller clokwise when viewed from the end of the drive and make sure the handle spanner wrench makes contact with the workbench, quickly turn the impeller clockwise, then tighten the impeller. With a soft hammer lightly tap the drive to achieve proper fit.
7.- At the other end, loosen the screws and leveling of the bearing box support, measure the clearance between the seal plate and impeller with a feeler gauge, when setting clearance to 0.030" (0.76 mm), tighten the screws, leveling and lock nuts, this approximates the impeller position 0.015" (0.38 mm) scroll, final adjustment should be done after installing the volute.

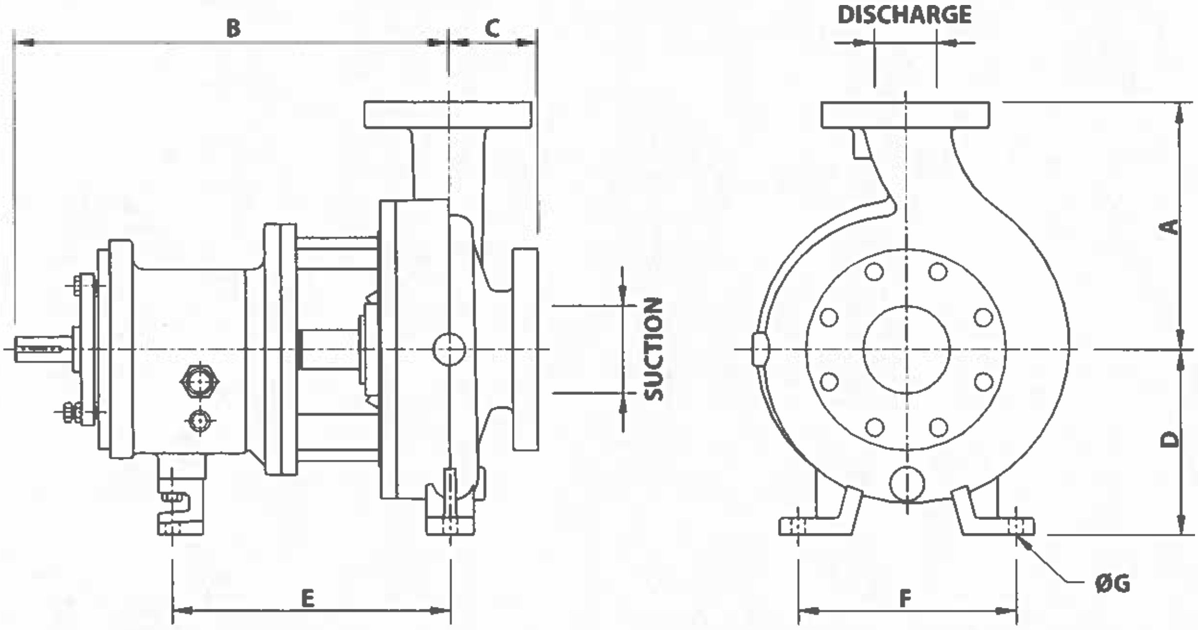
8.- Verify perpendicular and eccentric impeller adjustments, with a dial indicator, checking the 360° between the tips of each blade, if the readings are higher than 0.005" (0.13 mm), remove the impeller and determine the cause.
9.- Mark the sleeve on the outer face, this will serve as a reference when installing the mechanical seal.
10.- Disassembly the impeller and the sleeve.
11.- Remove the seal plate.
12.- Install the mechanical seal according to manufacturer's instructions.
13.- Install the impeller with its new gasket type "O", hand tighten.
14.- Install a spanner at the end of the shaft, ensure perfectly wedge pinch, rotate the impeller clockwise when viewed from the end of the drive and make sure the handle spanner wrench contacts the workbench quickly turn the impeller clockwise, then tighten the impeller, then with a soft hammer lightly tap the drive to achieve proper fit.
15.- Install seal flange with their nuts.

▸ Pump with gaskets

1.- Install the seal plate grasping it with the adapter, tightening with studs and nuts.
2.- Verify axial, perpendicular and eccentric adjustments on the seal plate with a dial indicator on the shaft, checking 360°, if the readings are higher than 0.005" (0.13 mm), remove the plate seal and determine the cause.
3.- Install the sleeve, make sure the sleeve is properly seated.
4.- Install the impeller with gasket type "O", hand tighten.
5.- Install the keyway in place.
6.- Install a spanner at the end of the shaft, ensure perfectly wedge pinch, rotate the impeller clockwise when viewed from the end of the drive and make sure the handle spanner wrench contacts the workbench, quickly turn the impeller clockwise, then tighten the impeller, then with a soft hammer lightly tap the drive to achieve proper fit.
7.- At the other end loosen the screws and leveling of the bearing box support, measure the clearance between the seal plate and impeller with a feeler gauge, when setting clear to 0.030" (0.76 mm), tighten the screws, leveling and locknuts, this approximates the impeller position 0.015" (0.38 mm) scroll, final adjustment should be done after installing the volute.
8.- Verify perpendicular and eccentric impeller adjustments, with a dial indicator, checking the 360° between the tips of each blade, if the readings are higher than 0.005" (0.13 mm), remove the impeller and determine the cause.

▸ Pump reinstallation

1.- Install the volute gasket on the seal plate.
2.- Clean adjustment tracks and gasket volute seating.
3.- Loosen the screws and leveling on the bearing box supports.
4.- Install the bearing box.
5.- Install all bolts holding the adapter to the volute, hand tighten, before the final torque, it is recommended to apply the screws an anti-galling compound, to help the disassembly.
6.- Replace shims under bearing box support, adjust a dial indicator to measure the distance between the top of the box and the base plate, it should not vary when the screws are tightened in the bracket to the rack.
7.- Tighten the bolts to 45 lbf-ft.
8.- Install the leveling screws tight fit (do not over tighten).
9.- Verify the total length of the impeller in the volute, this measure should be 0.065" (1.65 mm) with new elements, if not, the elements are inadequate. Determine the cause and correct.
10.- Set the impeller clearance according to section factors.
11.- Fill the bearing box with proper lubricant according to the requirements of the table: "Minimum requirements for lubricating oil".
12.- Finally verifed that the impeller can be easily rotated (by hand).



<table>
<tr><th>MODEL</th><th>PUMP SIZE</th><th>ANSI DESIGNATION</th><th>DISCHARGE DIAM.</th><th>SUCTION DIAM.</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>ØG HOLES</th><th>APROX. WEIGHT (kg)</th></tr>
<tr><td rowspan="5">KP911S</td><td>1 x 1.5 - 6</td><td>AA</td><td>1</td><td>1.5</td><td rowspan="5">6.5"</td><td rowspan="5">13.5"</td><td rowspan="5">4"</td><td rowspan="5">5.25"</td><td rowspan="5">7.25"</td><td rowspan="5">6"</td><td rowspan="3">0.625"</td><td>38</td></tr>
<tr><td>1.5 x 3 - 6</td><td>AB</td><td>1.5</td><td>3</td><td>42</td></tr>
<tr><td>2 x 3 - 6</td><td>-</td><td>2</td><td>3</td><td>43</td></tr>
<tr><td>1 x 1.5 - 8</td><td>AA</td><td>1</td><td>1.5</td><td rowspan="2">0.563"</td><td>45</td></tr>
<tr><td>1.5 x 3 - 8</td><td>AB</td><td>1.2</td><td>3</td><td>49</td></tr>
<tr><td rowspan="15">KP911M & KP911L</td><td>3 x 4 - 7</td><td>A70</td><td>3</td><td>4</td><td>11"</td><td rowspan="15">19.5"</td><td rowspan="15">4"</td><td rowspan="8">8.25"</td><td rowspan="15">12.5"</td><td rowspan="15">9.75"</td><td rowspan="14">0.625"</td><td>100</td></tr>
<tr><td>2 x 3 - 8</td><td>A60</td><td>2</td><td>3</td><td>9.5"</td><td>91</td></tr>
<tr><td>3 x 4 - 8</td><td>A70</td><td>3</td><td>4</td><td rowspan="2">11"</td><td rowspan="2">100</td></tr>
<tr><td>3 x 4 - 8G</td><td>A70</td><td>3</td><td>4</td></tr>
<tr><td>1 x 2 - 10</td><td>A05</td><td>1</td><td>2</td><td rowspan="2">8.5"</td><td>91</td></tr>
<tr><td>1.5 x 3 - 10</td><td>A50</td><td>1.5</td><td>3</td><td>100</td></tr>
<tr><td>2 x 3 - 10</td><td>A60</td><td>2</td><td>3</td><td>9.5"</td><td>104</td></tr>
<tr><td>3 x 4 - 10</td><td>A70</td><td>3</td><td>4</td><td>11"</td><td>120</td></tr>
<tr><td>3 x 4 - 10H</td><td>A40</td><td>3</td><td>4</td><td>12.5"</td><td rowspan="7">10"</td><td>138</td></tr>
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<tr><td>4 x 6 - 10H</td><td>A80</td><td>4</td><td>6</td></tr>
<tr><td>1.5 x 3 - 13</td><td>A20</td><td>1.5</td><td>3</td><td>10.5"</td><td>111</td></tr>
<tr><td>2 x 3 - 13</td><td>A30</td><td>2</td><td>3</td><td>11.5"</td><td>125</td></tr>
<tr><td>3 x 4 - 13</td><td>A40</td><td>3</td><td>4</td><td>12.5"</td><td>150</td></tr>
<tr><td>4 x 6 - 13</td><td>A80</td><td>4</td><td>6</td><td>13.5"</td><td>0.563"</td><td>184</td></tr>
<tr><td rowspan="5">KP911LX</td><td>6 x 8 - 13</td><td>A90</td><td>6</td><td>8</td><td>16"</td><td rowspan="5">27.9"</td><td rowspan="5">6"</td><td rowspan="5">14.5"</td><td rowspan="5">18.75"</td><td rowspan="5">16"</td><td rowspan="5">0.875"</td><td>254</td></tr>
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<tr><td>6 x 8 - 15</td><td>A110</td><td>6</td><td>8</td><td>277</td></tr>
<tr><td>8 x 10 - 15</td><td>A120</td><td>8</td><td>10</td><td rowspan="2">19"</td><td>336</td></tr>
<tr><td>8 x 10 - 15G</td><td>A120</td><td>8</td><td>10</td><td>710</td></tr>
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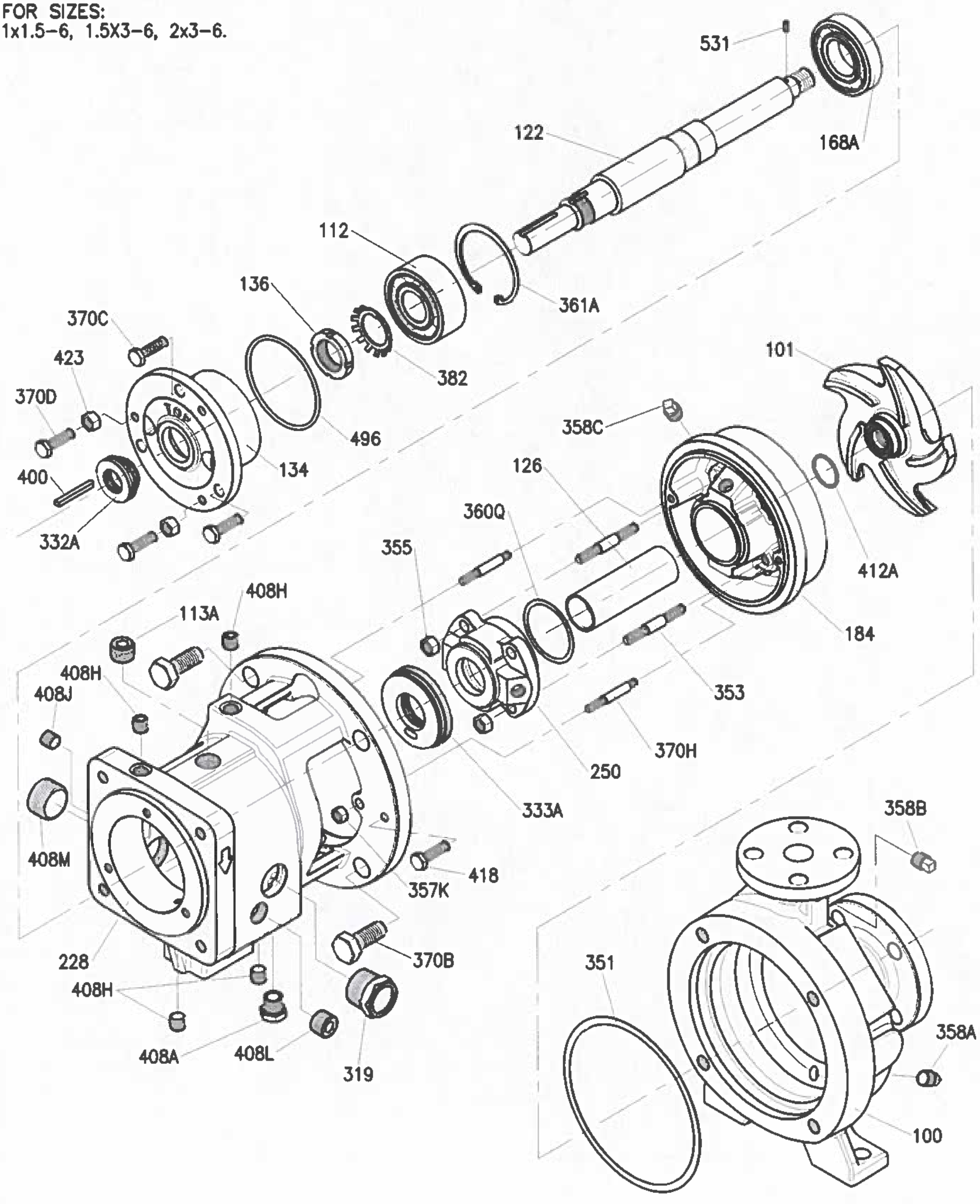
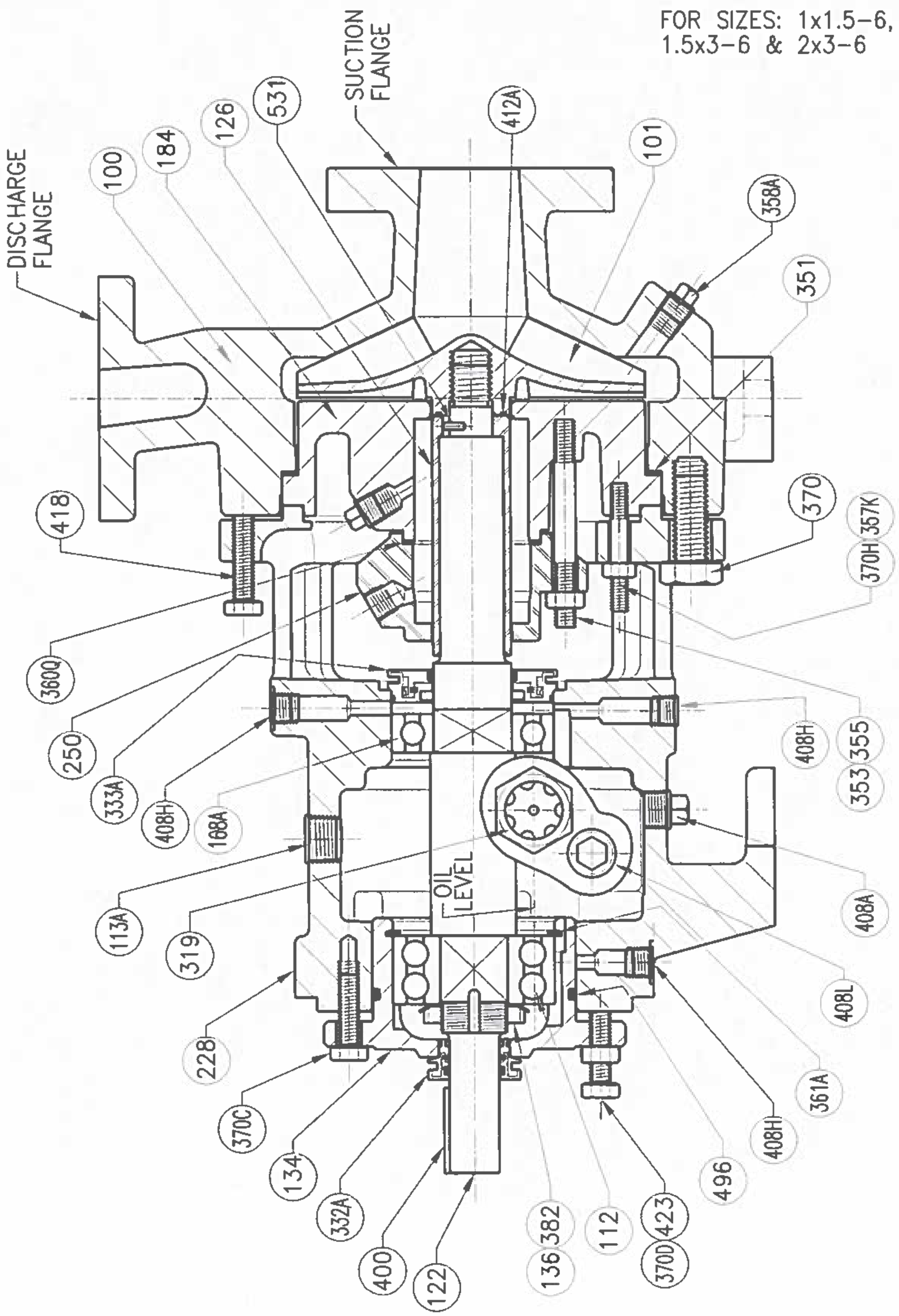
EXPLODED VIEW DRAWING
Series: **KP911S**

FOR SIZES:
1x1.5–6, 1.5X3–6, 2x3–6.



SECTIONAL VIEW DRAWING

Series: **KP911S**

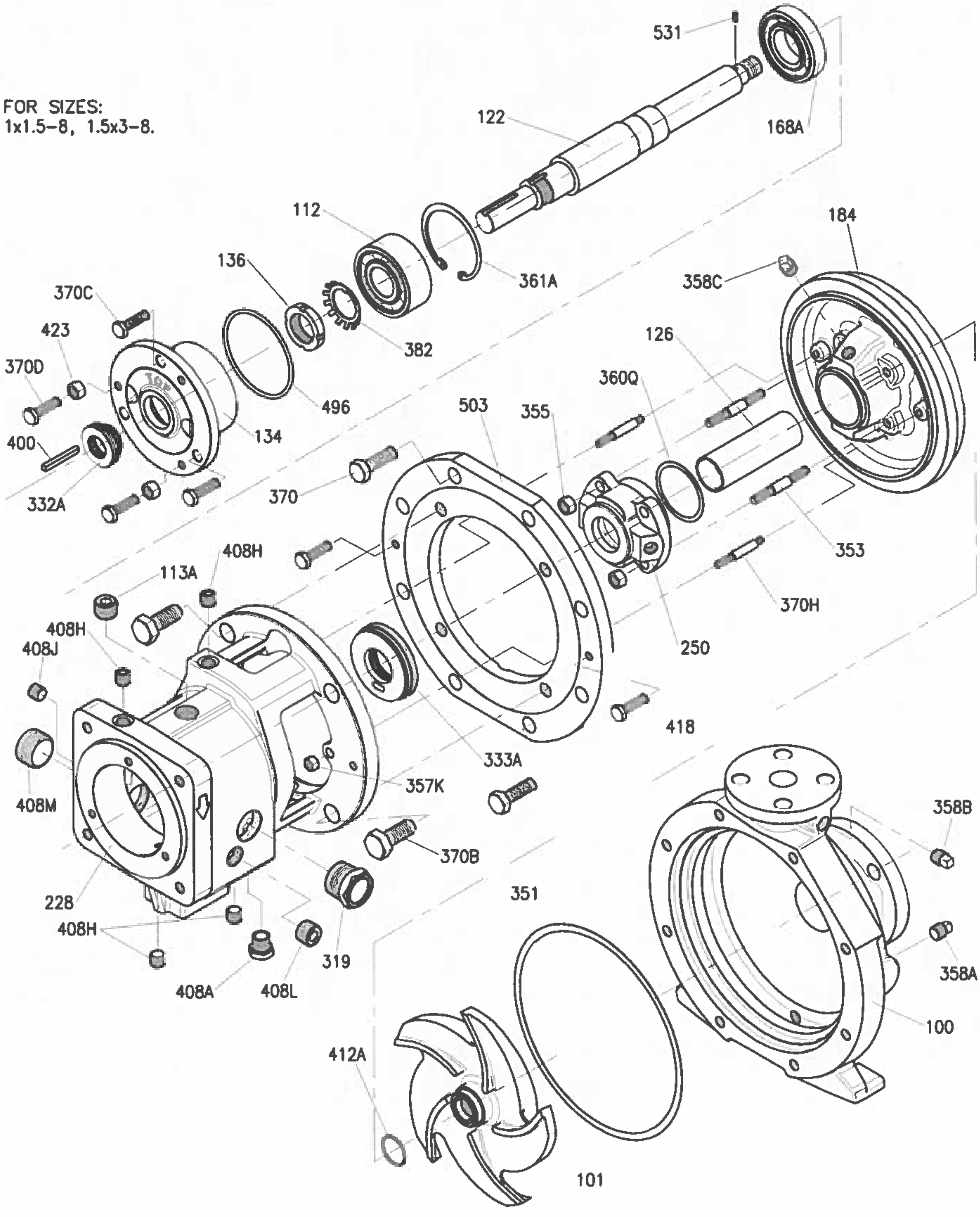


PART LIST
Series: **KP911S**

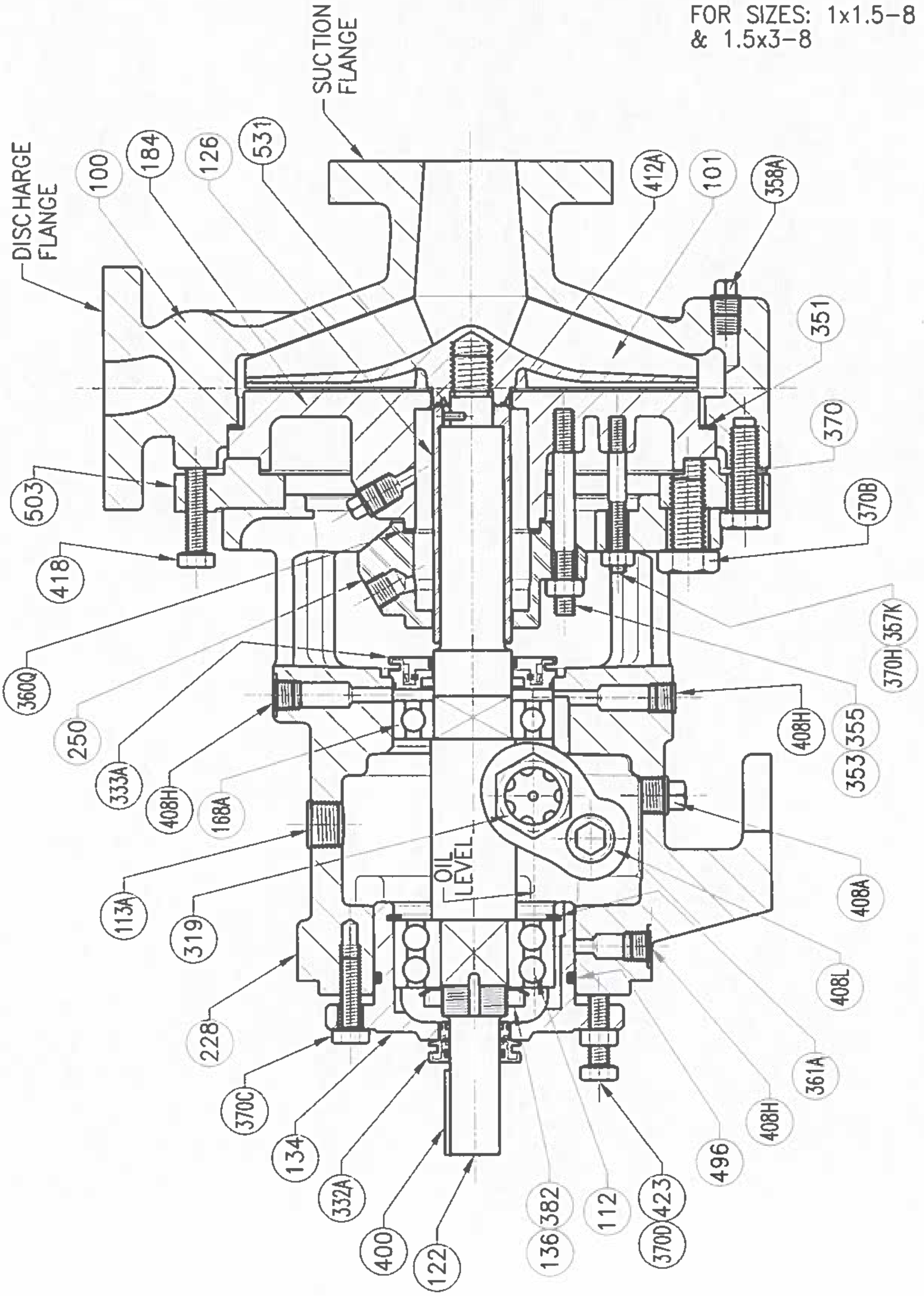
ITEM	QTY.	DESCRIPTION	MATERIAL	PART No.
100	1	Casing 1x1.5-6	Cast iron	03730010
			CF8M	03730011
		Casing 1.5x3-6	Cast iron	03730020
			CF8M	03730021
		Casing 2x3-6	Cast iron	03730030
			CF8M	03730031
101	1	Impeller 1x1.5-6	Cast iron	03750010
			CF8M	03750011
		Impeller 1.5x3-6	Cast iron	03750020
			CF8M	03750021
		Impeller 2x3-6	Cast iron	03750030
			CF8M	03750031
105	1	Lantern ring KP911 S	Teflon®	31010026
106	5	Cord ring 5/16"	Teflon®	92010135
107	1	Stuffing box KP911 S	CF8M	30300203
112	1	Outer bearing	Steel	31020023
113A	1	Dry seal cap ½"	Steel	93010112
122	1	Shaft with sleeve	Steel 4140	30300351
		Shaft without sleeve	316 SS	30300356
126	1	Sleeve	316 SS	30300681
134	1	Bearing support	Cast iron	03780001
136	1	Safety nut M6	Steel	91010451
168A	1	Inner bearing	Steel	31020022
184	1	Seal plate 6"	Cast iron	03770010
			CF8M	03770011
228	1	Frame 911 S	Cast iron	03720001
250	1	Mechanical seal flange	CF8M	30300301
319	1	Oil sight glass	Steel/Glass	31120011
332A	1	Outboard lab'y seal KP911 S	Bronze	31030202
333A	1	Inboard lab'y seal KP911 S	Bronze	31030201
351	1	Body gasket 6"	EPDM	92010194
353	4	Stud screw 3/8"x 4"	304 SS	91010375
355	4	Nut 3/8"	304 SS	91010433
357K	2	Nut 5/16"	304 SS	91010432
358C	1	Plug ¼"	Steel Galv.	93010143
			304 SS	S/N
360Q	1	Seal flange gasket	EPDM	92010176
361A	1	Snap ring	Steel	31010011
370B	4	Screw 5/8"x 1½"	Carbon Steel	91010282
			304 SS	91010354
370C	3	Screw 3/8"x 1¼"	Carbon Steel	91010243
370D	3	Screw 3/8"x 1¼"	Carbon Steel	91010243
370H	2	Stud screw 5/16" x 1-7/8"	304 SS	91010372B
382	1	Lock washer MB6	Steel	91010058
400	1	Key 3/16"	Steel 1018	30400631
408A	1	Plug 3/8"	Cast iron	93010149
408H	4	Dry seal cap ¼"	Steel	93010113
408J	1	Dry seal cap ¼"	Steel	93010113
408L	1	Dry seal cap ½"	Steel	93010112
408M	1	Dry seal cap 1"	Steel	93010111
412A	1	Impeller gasket	Teflon®	92010059
418	2	Screw 3/8" x 1½"	304 SS	91010346
423	3	Nut 3/8"	Steel	91010413
496	1	Support gasket	Buna-N	92010039
531	1	Roll pin	Steel	91010184

EXPLODED VIEW DRAWING

Series: **KP911S**



SECTIONAL VIEW DRAWING
Series: **KP911S**

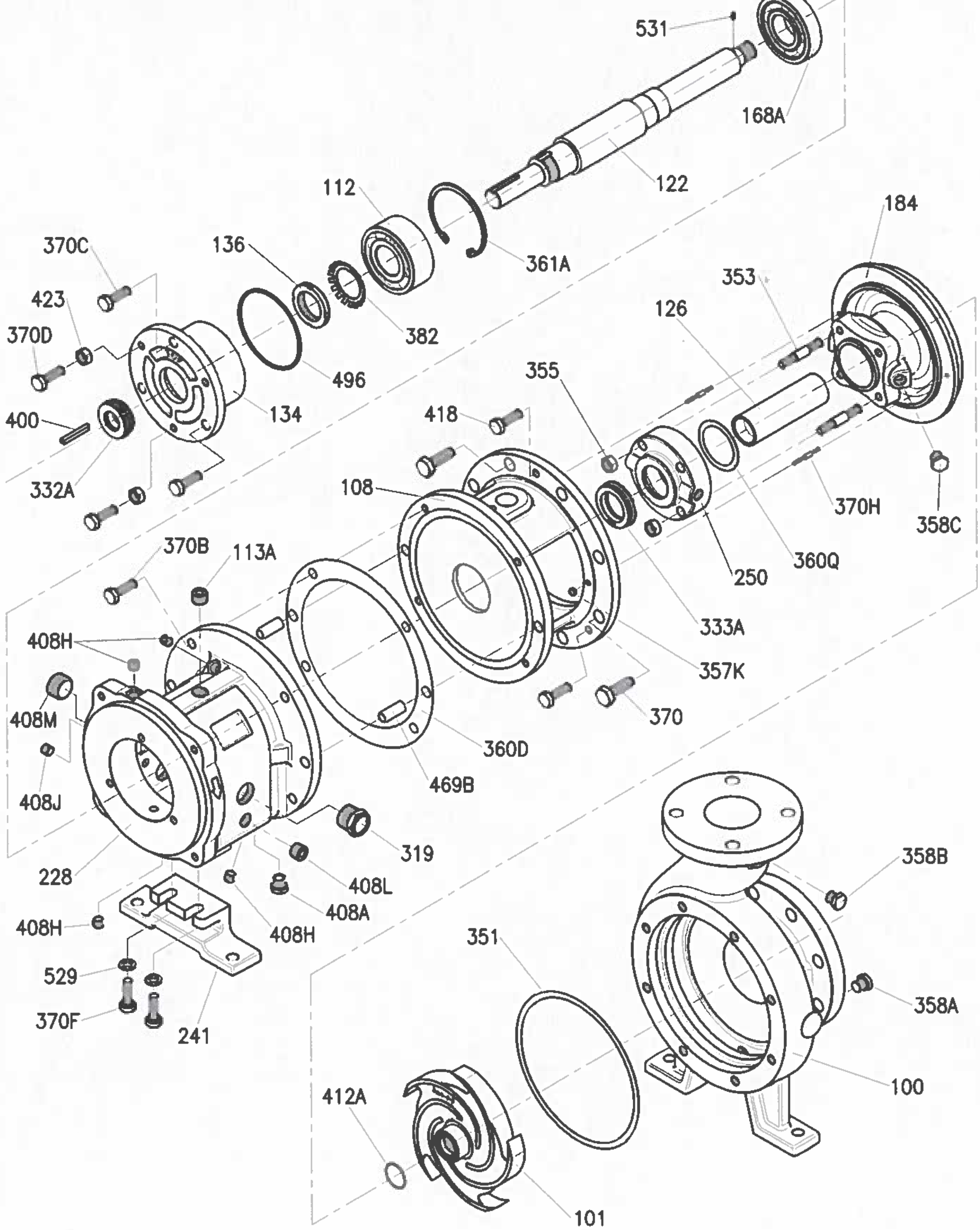


PART LIST
Series: **KP911S**

ITEM	QTY.	DESCRIPTION	MATERIAL	PART No.
100	1	Casing 1x1.5-8	Cast iron	03730040
			CF8M	03730041
		Casing 1.5x3-8	Cast iron	03730050
			CF8M	03730051
101	1	Impeller 1x1.5-8	Cast iron	03750040
			CF8M	03750041
		Impeller 1.5x3-8	Cast iron	03750050
			CF8M	03750051
105	1	Lantern ring KP911 S	Teflon®	31010026
106	5	Cord ring 5/16"	Teflon®	92010135
107	1	Stuffing box KP911 S	CF8M	30300203
112	1	Outer bearing	Steel	31020023
113A	1	Dry seal cap ½"	Steel	93010112
122	1	Shaft with sleeve	Steel 4140	30300351
		Shaft without sleeve	316 SS	30300356
126	1	Sleeve	316 SS	30300681
134	1	Bearing support	Cast iron	03780001
136	1	Safety nut M6	Steel	91010451
168A	1	Inner bearing	Steel	31020022
184	1	Seal plate 8"	Cast iron	03770020
			CF8M	03770021
228	1	Frame 911 S	Cast iron	03720001
250	1	Mechanical seal flange	CF8M	30300301
319	1	Oil sight glass	Steel/Glass	31120011
332A	1	Outboard lab'y seal KP911 S	Bronze	31030202
333A	1	Inboard lab'y seal KP911 S	Bronze	31030201
351	1	Body gasket 8"	EPDM	92010195
353	4	Stud screw 3/8"x 4"	304 SS	91010375
355	4	Nut 3/8"	304 SS	91010433
357K	2	Nut 5/16"	304 SS	91010432
358C	1	Plug ¼"	Steel Galv.	93010143
			304 SS	S/N
360Q	1	Seal flange gasket	EPDM	92010176
361A	1	Snap ring	Steel	31010011
370	8	Screw ½"x 1½"	Carbon Steel	91010263
			304 SS	91010351
370B	4	Screw 5/8"x 1¼"	Carbon Steel	91010289
370C	3	Screw 3/8"x 1¼"	Carbon Steel	91010243
370D	3	Screw 3/8"x 1¼"	Carbon Steel	91010243
370H	2	Stud screw 5/16" x 2¾"	304 SS	91010372
382	1	Lock washer MB6	Steel	91010058
400	1	Key 3/16"	Steel 1018	30400631
408A	1	Plug 3/8"	Cast iron	93010149
408H	4	Dry seal cap ¼"	Steel	93010113
408J	1	Dry seal cap ¼"	Steel	93010113
408L	1	Dry seal cap ½"	Steel	93010112
408M	1	Dry seal cap 1"	Steel	93010111
412A	1	Impeller gasket	Teflon®	92010059
418	2	Screw 3/8" x 1½"	304 SS	91010346
423	3	Nut 3/8"	Steel	91010413
496	1	Support gasket	Buna-N	92010039
503	1	Adapter 8" 911S	Cast iron	03710001
531	1	Roll pin	Steel	91010184

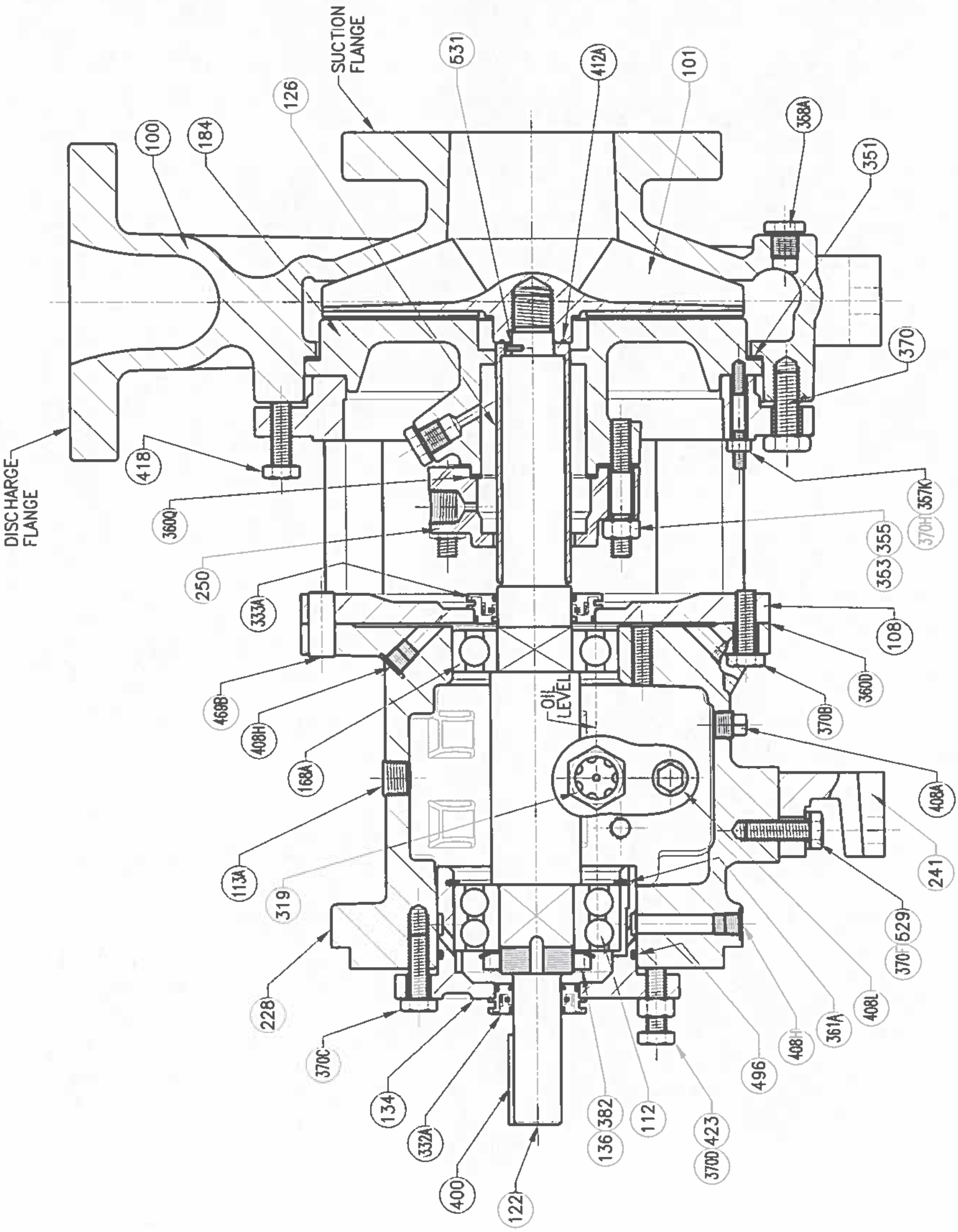
EXPLODED VIEW DRAWING

Series: **KP911M**



SECTIONAL VIEW DRAWING

Series: **KP911M**



PART LIST
Series: **KP911M**

ITEM	QTY.	DESCRIPTION	MATERIAL	PART No.
100	1	Casing 3x4-7	Cast iron	03730060
			CF8M	03730061
		Casing 2x3-8	Cast iron	03730070
			CF8M	03730071
		Casing 3x4-8	Cast iron	03730080
			CF8M	03730081
		Casing 3x4-8G	Cast iron	03730090
			CF8M	03730091
101	1	Impeller 3x4-7	Cast iron	03750060
			CF8M	03750061
		Impeller 2x3-8	Cast iron	03750070
			CF8M	03750071
		Impeller 3x4-8	Cast iron	03750080
			CF8M	03750081
		Impeller 3x4-8G	Cast iron	03750090
			CF8M	03750091
105	1	Lantern ring KP911 M	Teflon®	31010027
106	5	Cord ring 3/8"	Teflon®	92010134
107	1	Stuffing box KP911 M	CF8M	30300202
108	1	Adapter 8"	Cast iron	03710002
112	1	Outer bearing	Steel	31020024
113A	1	Dry seal cap ½"	Steel	93010112
122	1	Shaft with sleeve	Steel 4140	30300352
		Shaft without sleeve	316 SS	30300360
126	1	Sleeve	316 SS	30300682
134	1	Bearing support	Cast iron	03780002
136	1	Safety nut M9	Steel	91010453
168A	1	Inner bearing	Steel	31020025
184	1	Seal plate 8"	Cast iron	03770030
			CF8M	03770031
228	1	Frame 911 M	Cast iron	03720002
241	1	Frame support 8¼"	Cast iron	03790001
250	1	Mechanical seal flange	CF8M	30300302
319	1	Oil sight glass	Steel/Glass	31120011
332A	1	Outboard lab'y seal KP911 M	Bronze	31030203
333A	1	Inboard lab'y seal KP911 M	Bronze	31030204
351	1	Body gasket 8"	EPDM	92010196
353	4	Stud screw ½"x 3¼" lgo.	304 SS	91010378
355	4	Nut ½"	304 SS	91010435
357K	2	Nut 3/16"	304 SS	91010431
358C	1	Plug 3/8"	Cast iron	93010149
			304 SS	93010131
360D	1	Adapter gasket	Vellumoid	92010171
360Q	1	Seal flange gasket	EPDM	92010177
361A	1	Snap ring	Steel	31010012
370	8	Screw 5/8"x 1½"	Carbon Steel	91010282
			304 SS	91010354
370B	4	Screw ½"x 1½"	Carbon Steel	91010263
370C	3	Screw ½"x 1½"	Carbon Steel	91010263
370D	3	Screw ½"x 1½"	Carbon Steel	91010263
370F	2	Screw ½"x 1½"	Carbon Steel	91010263
370H	2	Stud screw 3/16" x 2½"	304 SS	91010371
382	1	Lock washer MB9	Steel	91010059
400	1	Key ¼"	Steel 1018	30400633
408A	1	Plug 3/8"	Cast iron	93010149
408H	4	Dry seal cap ¼"	Steel	93010113
408J	1	Dry seal cap ¼"	Steel	93010113
408L	1	Dry seal cap ½"	Steel	93010112
408M	1	Dry seal cap 1"	Steel	93010111
412A	1	Impeller gasket	Teflon®	92010058
418	3	Screw ½"x 1½"	304 SS	91010351
423	3	Nut ½"	Steel	91010415
469B	2	Dowel Pin Frame	Steel 1018	30400864
496	1	Support gasket	Buna-N	92010040
529	2	Spring washer	Steel	91010014
531	1	Roll pin	Steel	91010184

ITEM	QTY.	DESCRIPTION	MATERIAL	PART No.
100	1	Casing 1x2-10	Cast iron	03730100
			CF8M	03730101
		Casing 1.5x3-10	Cast iron	03730110
			CF8M	03730111
		Casing 2x3-10	Cast iron	03730120
			CF8M	03730121
		Casing 3x4-10	Cast iron	03730130
			CF8M	03730131
		Casing 3x4-10H	Cast iron	03730140
			CF8M	03730141
		Casing 4x6-10	Cast iron	03730150
			CF8M	03730151
		Casing 4x6-10H	Cast iron	03730160
			CF8M	03730161
101	1	Impeller 1x2-10	Cast iron	03750100
			CF8M	03750101
		Impeller 1.5x3-10	Cast iron	03750110
			CF8M	03750111
		Impeller 2x3-10	Cast iron	03750120
			CF8M	03750121
		Impeller 3x4-10	Cast iron	03750130
			CF8M	03750131
		Impeller 3x4-10H	Cast iron	03750140
			CF8M	03750141
		Impeller 4x6-10	Cast iron	03750150
			CF8M	03750151
		Impeller 4x6-10H	Cast iron	03750160
			CF8M	03750161
105	1	Flashlight ring KP911 M	Teflon®	31010027
106	5	Cord ring 3/8"	Teflon®	92010134
107	1	Stuffing box KP911 M	CF8M	30300202
108	1	Adapter 10"	Cast iron	03710003
112	1	Outer bearing	Steel	31020024
113A	1	Dry seal cap ½"	Steel	93010112
122	1	Shaft with sleeve	Steel 4140	30300352
		Shaft without sleeve	316 SS	30300360
126	1	Sleeve	316 SS	30300682
134	1	Bearing support	Cast iron	03780002
136	1	Safety nut M9	Steel	91010453
168A	1	Inner bearing	Steel	31020025
184	1	Seal plate 10"	Cast iron	03770040
			CF8M	03770041
228	1	Frame KP911 M	Cast iron	03720002
241	1	Frame support 8¼"	Cast iron	03790001
		Frame support 10"	Cast iron	03790002
250	1	Mechanical seal flange	CF8M	30300302
319	1	Oil sight glass	Steel/Glass	31120011
332A	1	Outboard lab'y seal KP911 M	Bronze	31030203
333A	1	Inboard lab'y seal KP911 M	Bronze	31030204
351	1	Body gasket 10"	EPDM	92010197
353	4	Stud screw ½"x 3¼" lgo.	304 SS	91010378
355	4	Nut ½"	304 SS	91010435
357K	2	Nut 5/16"	304 SS	91010432
358C	1	Plug 3/8"	Cast iron	93010149
			304 SS	93010131
360D	1	Adapter gasket	Vellumoid	92010171
360Q	1	Seal flange gasket	EPDM	92010177
361A	1	Snap ring	Steel	31010012
370	12	Screw 5/8"x 1½"	Carbon Steel	91010282
			304 SS	91010354
370B	4	Screw ½"x 1½"	Carbon Steel	91010263
370C	3	Screw ½"x 1½"	Carbon Steel	91010263
370D	3	Screw ½"x 1½"	Carbon Steel	91010263
370F	2	Screw ½"x 1½"	Carbon Steel	91010263
370H	2	Stud screw 5/16" x 2¾"	304 SS	91010372
382	1	Lock washer MB9	Steel	91010059

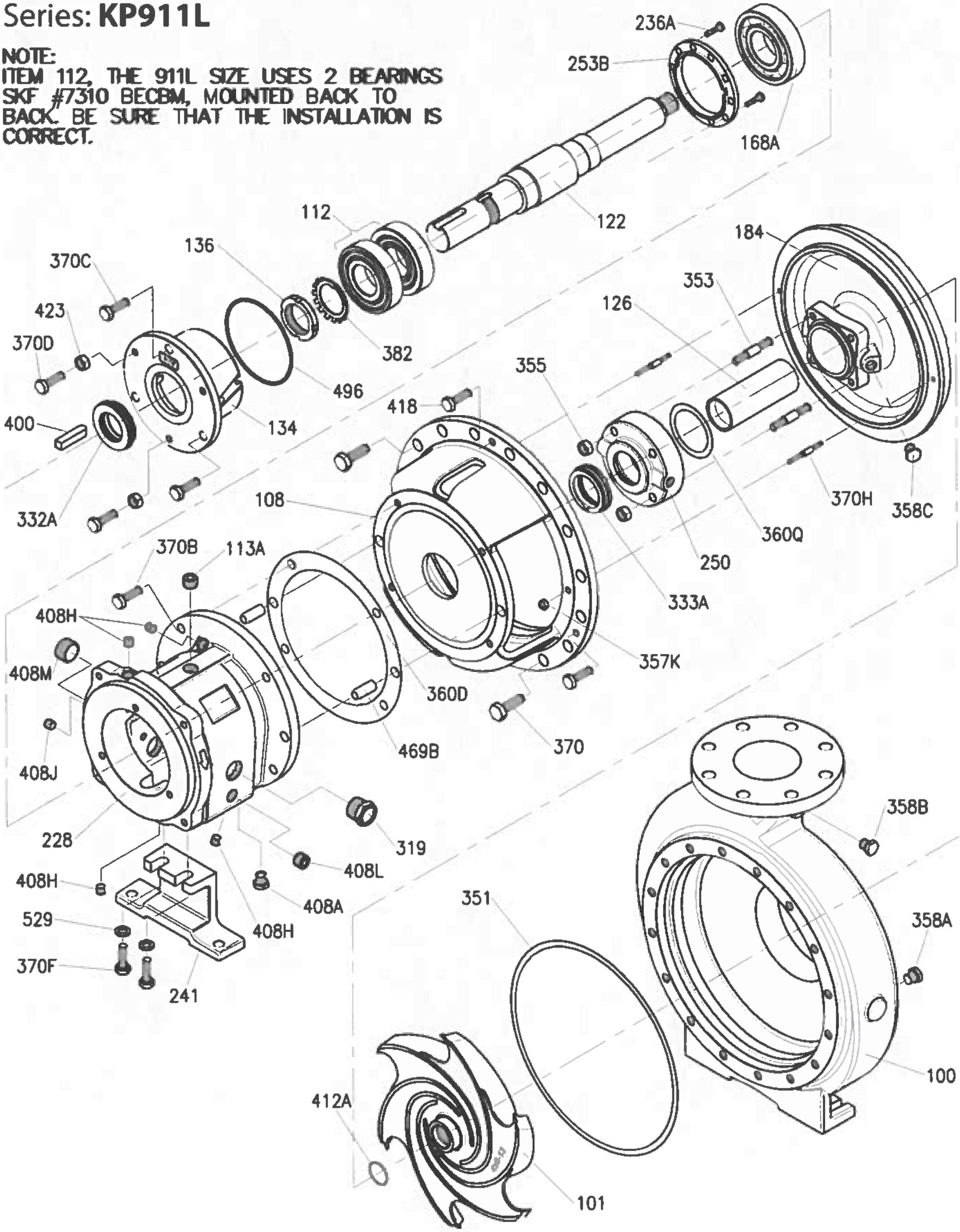
ITEM	QTY.	DESCRIPTION	MATERIAL	PART No.
400	1	Key ¼"	Steel 1018	30400633
408A	1	Plug 3/8"	Cast iron	93010149
408H	4	Dry seal cap ¼"	Steel	93010113
408J	1	Dry seal cap ¼"	Steel	93010113
408L	1	Dry seal cap ½"	Steel	93010112
408M	1	Dry seal cap 1"	Steel	93010111
412A	1	Impeller gasket	Teflon®	92010058
418	3	Screw ½"x 1½"	304 SS	91010351
423	3	Nut ½"	Steel	91010415
469B	2	Dowel Pin Frame	Steel 1018	30400864
496	1	Support gasket	Buna-N	92010040
529	2	Spring washer	Steel	91010014
531	1	Roll pin	Steel	91010184

ITEM	QTY.	DESCRIPTION	MATERIAL	PART No.
100	1	Casing 1.5x3-13	Cast iron	03730170
			CF8M	03730171
		Casing 2x3-13	Cast iron	03730180
			CF8M	03730181
		Casing 3x4-13	Cast iron	03730190
			CF8M	03730191
		Casing 4x6-13	Cast iron	03730200
			CF8M	03730201
101	1	Impeller 1.5x3-13	Cast iron	03750170
			CF8M	03750171
		Impeller 2x3-13	Cast iron	03750180
			CF8M	03750181
		Impeller 3x4-13	Cast iron	03750190
			CF8M	03750191
		Impeller 4x6-13	Cast iron	03750200
			CF8M	03750201
105	1	Lantern ring KP911 M	Teflon®	31010027
106	5	Cord ring 3/8"	Teflon®	92010134
107	1	Stuffing box KP911 M	CF8M	30300202
108	1	Adapter 13"	Cast iron	03710004
112	1	Outer bearing	Steel	31020024
113A	1	Dry seal cap ½"	Steel	93010112
122	1	Shaft with sleeve	Steel 4140	30300352
		Shaft without sleeve	316 SS	30300360
126	1	Sleeve	316 SS	30300682
134	1	Bearing support	Cast iron	03780002
136	1	Safety nut M9	Steel	91010453
168A	1	Inner bearing	Steel	31020025
184	1	Seal plate 13"	Cast iron	03770050
			CF8M	03770051
228	1	Frame 911 M	Cast iron	03720002
241	1	Frame support 10"	Cast iron	03790002
250	1	Mechanical seal flange	CF8M	30300302
319	1	Oil sight glass	Steel/Glass	31120011
332A	1	Outboard lab'y seal KP911 M	Bronze	31030203
333A	1	Inboard lab'y seal KP911 M	Bronze	31030204
351	1	Body gasket 13"	EPDM	92010198
353	4	Stud screw ½"x 3¼" lgo.	304 SS	91010378
355	4	Nut ½"	304 SS	91010435
357K	2	Nut 5/16"	304 SS	91010432
358C	1	Plug 3/8"	Cast iron	93010149
			304 SS	93010131
360D	1	Adapter gasket	Vellumoid	92010171
360Q	1	Seal flange gasket	EPDM	92010177
361A	1	Snap ring	Steel	31010012
370	16	Screw 5/8"x 1½"	Carbon Steel	91010282
			304 SS	91010354
370B	4	Screw ½"x 1½"	Carbon Steel	91010263
370C	3	Screw ½"x 1½"	Carbon Steel	91010263
370D	3	Screw ½"x 1½"	Carbon Steel	91010263
370F	2	Screw ½"x 1½"	Carbon Steel	91010263
370H	2	Stud screw 5/16" x 2¾"	304 SS	91010372
382	1	Lock washer MB9	Steel	91010059
400	1	Key de ¼"	Steel 1018	30400633
408A	1	Plug de 3/8"	Cast iron	93010149
408H	4	Dry seal cap ¼"	Steel	93010113
408J	1	Dry seal cap ¼"	Steel	93010113
408L	1	Dry seal cap ½"	Steel	93010112
408M	1	Dry seal cap 1"	Steel	93010111
412A	1	Impeller gasket	Teflon®	92010058
418	3	Screw ½"x 1½"	304 SS	91010351
423	3	Nut ½"	Steel	91010415
469B	2	Dowel Pin Frame	Steel 1018	30400864
496	1	Support gasket	Buna-N	92010040
529	2	Spring washer	Steel	91010014
531	1	Roll pin	Steel	91010184

EXPLODED VIEW DRAWING

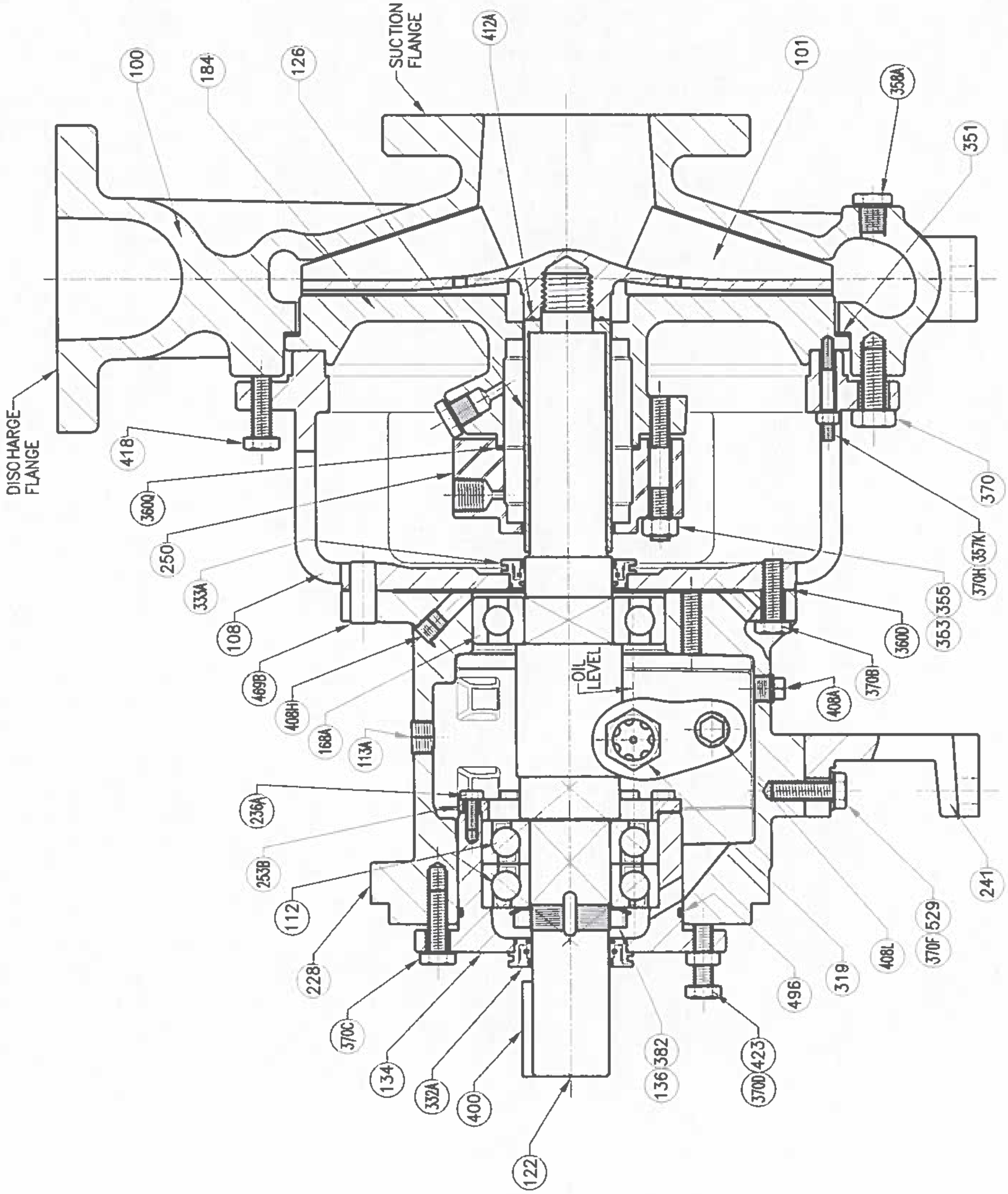
Series: **KP911L**

NOTE:
ITEM 112, THE 911L SIZE USES 2 BEARINGS SKF #7310 BECBM, MOUNTED BACK TO BACK. BE SURE THAT THE INSTALLATION IS CORRECT.



SECTIONAL VIEW DRAWING

Series: **KP911L**



PART LIST

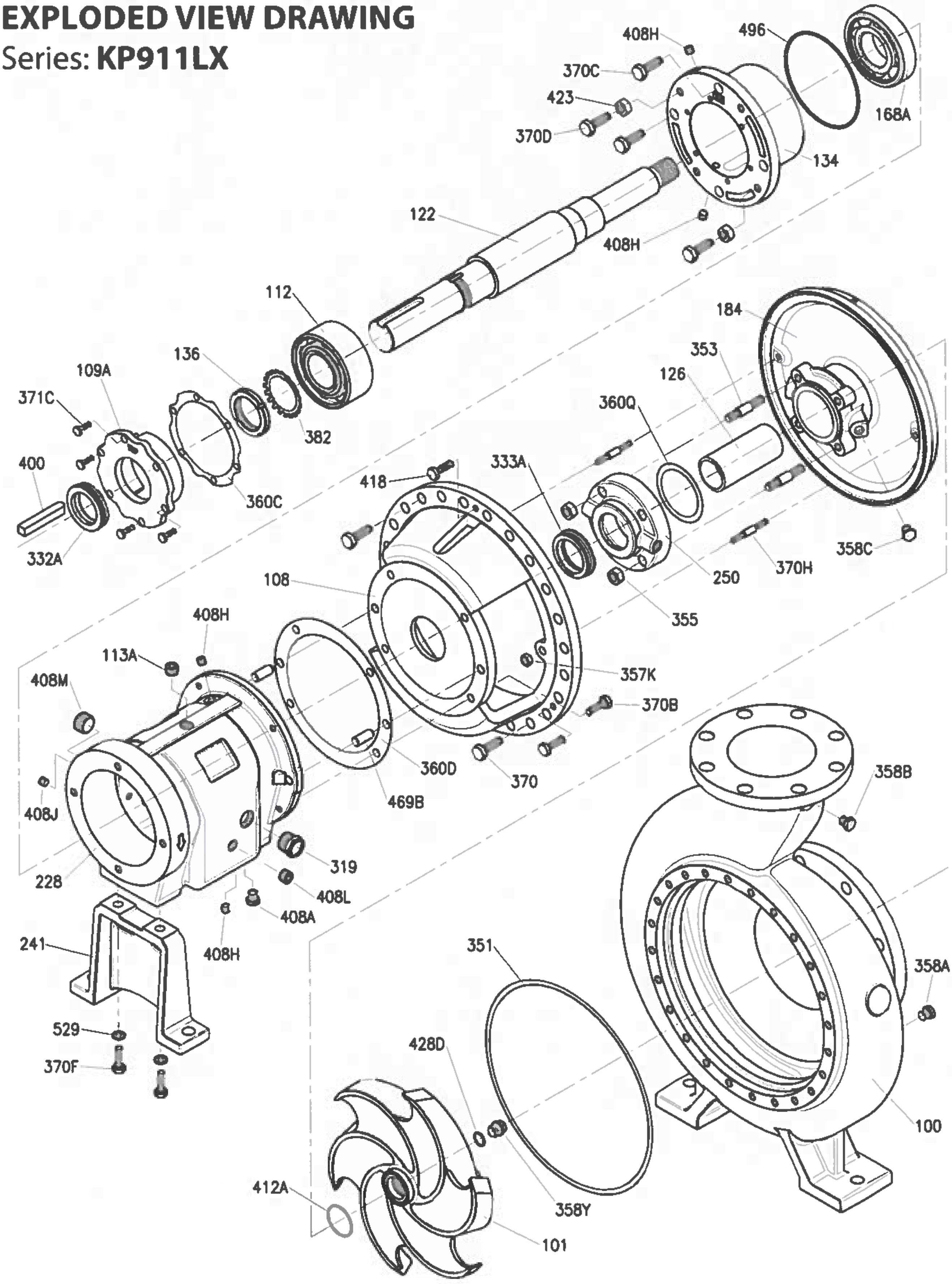
Series: **KP911L**

ITEM	QTY.	DESCRIPTION	MATERIAL	PART No.
100	1	Casing 1x2-10	Cast iron	03730100
			CF8M	03730101
		Casing 1.5x3-10	Cast iron	03730110
			CF8M	03730111
		Casing 2x3-10	Cast iron	03730120
			CF8M	03730121
		Casing 3x4-10	Cast iron	03730130
			CF8M	03730131
		Casing 3x4-10H	Cast iron	03730140
			CF8M	03730141
		Casing 4x6-10	Cast iron	03730150
			CF8M	03730151
		Casing 4x6-10H	Cast iron	03730160
			CF8M	03730161
101	1	Impeller 1x2-10	Cast iron	03750100B
			CF8M	03750101B
		Impeller 1.5x3-10	Cast iron	03750110B
			CF8M	03750111B
		Impeller 2x3-10	Cast iron	03750120B
			CF8M	03750121B
		Impeller 3x4-10	Cast iron	03750130B
			CF8M	03750131B
		Impeller 3x4-10H	Cast iron	03750140B
			CF8M	03750141B
		Impeller 4x6-10	Cast iron	03750150B
			CF8M	03750151B
		Impeller 4x6-10H	Cast iron	03750160B
			CF8M	03750161B
105	1	Lantern ring KP911 L	Teflon®	S/N
106	5	Cord ring 3/8"	Teflon®	S/N
107	1	Stuffing box KP911 L	CF8M	S/N
108	1	Adapter 10"	Cast iron	03710003
112	1	Outer bearing	Steel	31020028
113A	1	Dry seal cap ½"	Steel	93010112
122	1	Shaft with sleeve	Steel 4140	30300353
		Shaft without sleeve	316 SS	30300361
126	1	Sleeve	316 SS	30300683
134	1	Bearing support	Cast iron	03780003
136	1	Safety nut M10	Steel	91010452
168A	1	Inner bearing	Steel	31020015
184	1	Seal plate 10"	Cast iron	03770060
			CF8M	03770061
228	1	Frame KP911 L	Cast iron	03720003
236A	10	Screw 5/16" x ¾"	Steel	91010221
241	1	Frame support 8¼"	Cast iron	03790001
		Frame support 10"	Cast iron	03790002
253B	1	Clamp ring KP911 L	Steel	30400352
319	1	Oil sight glass	Steel/Glass	31120011
332A	1	Outboard lab'y seal KP911 L	Bronze	31030206
333A	1	Inboard lab'y seal KP911 L	Bronze	31030205
351	1	Body gasket 10"	EPDM	92010197
353	4	Stud screw ½"x 3¼" lgo.	304 SS	91010378
355	4	Nut ½"	304 SS	91010435
357K	2	Nut 5/16"	304 SS	91010432
358C	1	Plug 3/8"	Cast iron	93010149
			304 SS	93010131
360D	1	Adapter gasket	Vellumoid	92010171
360Q	1	Seal flange gasket	EPDM	92010185
370	12	Screw 5/8"x 1½"	Carbon Steel	91010282
			304 SS	91010354
370B	4	Screw ½"x 1½"	Carbon Steel	91010263
370C	3	Screw ½"x 1½"	Carbon Steel	91010263
370D	3	Screw ½"x 1½"	Carbon Steel	91010263
370F	2	Screw ½"x 1½"	Carbon Steel	91010263
370H	2	Stud screw 5/16" x 2¾"	304 SS	91010372
382	1	Lock washer MB10	Steel	91010067

ITEM	QTY.	DESCRIPTION	MATERIAL	PART No.
400	1	Key ½"	Steel 1018	30400637
408A	1	Plug 3/8"	Cast iron	93010149
408H	4	Dry seal cap ¼"	Steel	93010113
408J	1	Dry seal cap ¼"	Steel	93010113
408L	1	Dry seal cap ½"	Steel	93010112
408M	1	Dry seal cap 1"	Steel	93010111
412A	1	Impeller gasket	Teflon®	92010058
418	3	Screw ½"x 1½"	304 SS	91010351
423	3	Nut ½"	Steel	91010415
496	1	Support gasket	Buna-N	92010042
529	2	Spring washer	Steel	91010014

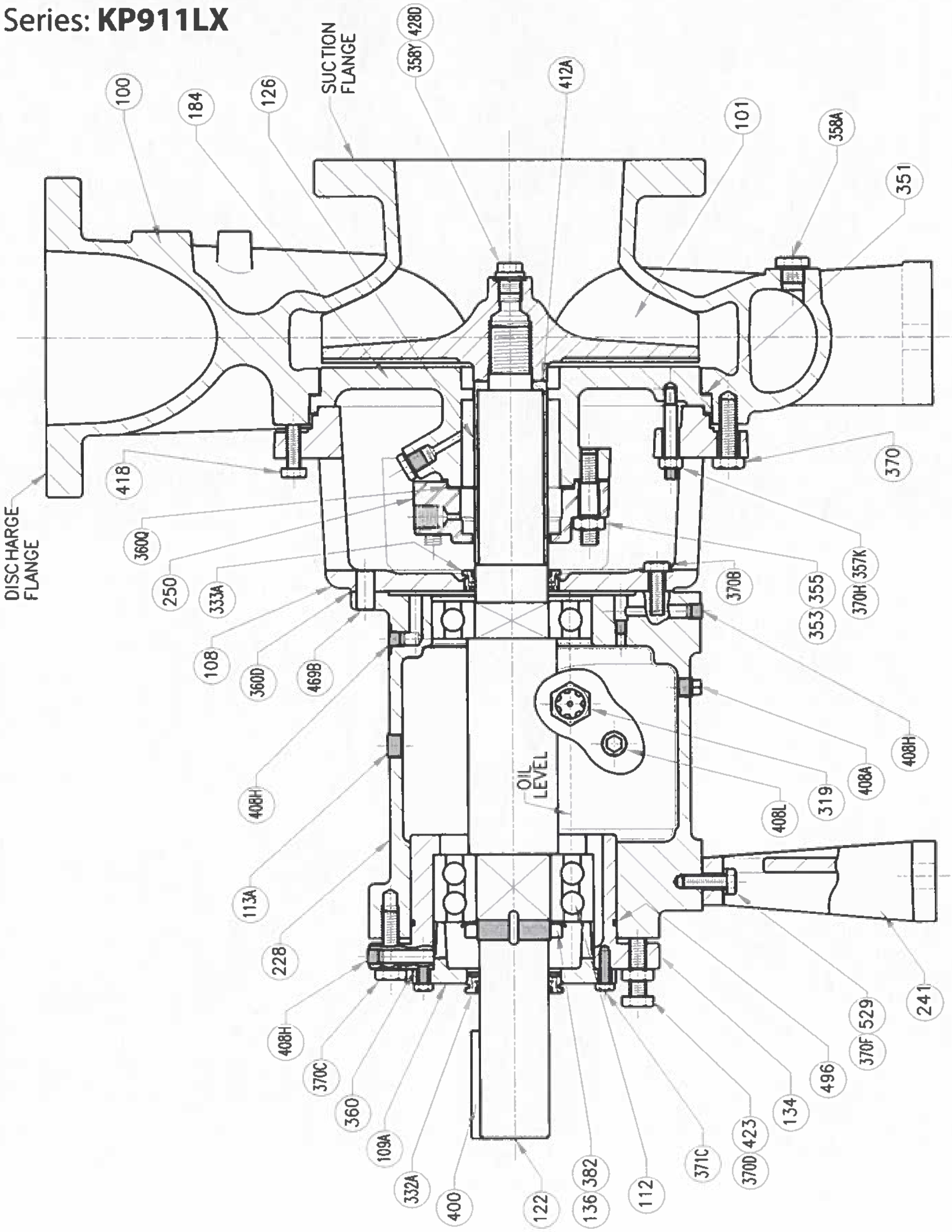
ITEM	QTY.	DESCRIPTION	MATERIAL	PART No.
100	1	Casing 1.5x3-13	Cast iron	03730170
			CF8M	03730171
		Casing 2x3-13	Cast iron	03730180
			CF8M	03730181
		Casing 3x4-13	Cast iron	03730190
			CF8M	03730191
		Casing 4x6-13	Cast iron	03730200
			CF8M	03730201
101	1	Impeller 1.5x3-13	Cast iron	03750170B
			CF8M	03750171B
		Impeller 2x3-13	Cast iron	03750180B
			CF8M	03750181B
		Impeller 3x4-13	Cast iron	03750190B
			CF8M	03750191B
		Impeller 4x6-13	Cast iron	03750200B
			CF8M	03750201B
105	1	Lantern ring KP911 L	Teflon®	S/N
106	5	Cord ring 3/8"	Teflon®	S/N
107	1	Stuffing box KP911 L	CF8M	S/N
108	1	Adapter 13"	Cast iron	03710004
112	1	Outer bearing	Steel	31020028
113A	1	Dry seal cap ½"	Steel	93010112
122	1	Shaft KP911 L	Steel 4140	30300353
		Solid shaft KP911 L	316 SS	30300361
126	1	Sleeve KP911 L	316 SS	30300683
134	1	Bearing support	Cast iron	03780003
136	1	Safety nut M10	Steel	91010452
168A	1	Inner bearing	Steel	31020015
184	1	Seal plate 13"	Cast iron	03770070
184		Seal plate 13"	CF8M	03770071
228	1	Frame KP911 L	Cast iron	03720003
236A	10	Screw 5/16" x ¾"	Steel	91010221
241	1	Frame support 10"	Cast iron	03790002
253B	1	Clamp ring KP911 L	Steel	30400352
319	1	Oil sight glass	Steel/Glass	31120011
332A	1	Outboard lab'y seal KP911 L	Bronze	31030206
333A	1	Inboard lab'y seal KP911 L	Bronze	31030205
351	1	Body gasket 13"	EPDM	92010198
353	4	Stud screw ½"x 3¼" lgo.	304 SS	91010378
355	4	Nut ½"	304 SS	91010435
357K	2	Nut 5/16"	304 SS	91010432
358C	1	Plug 3/8"	Cast iron	93010149
			304 SS	93010131
360D	1	Adapter gasket	Vellumoid	92010171
360Q	1	Seal flange gasket	EPDM	92010185
370	16	Screw 5/8"x 1½"	Carbon Steel	91010282
			304 SS	91010354
370B	4	Screw ½"x 1½"	Carbon Steel	91010263
370C	3	Screw ½"x 1½"	Carbon Steel	91010263
370D	3	Screw ½"x 1½"	Carbon Steel	91010263
370F	2	Screw ½"x 1½"	Carbon Steel	91010263
370H	2	Stud screw 5/16" x 2¾"	304 SS	91010372
382	1	Lock washer MB10	Steel	91010067
400	1	Key ½"	Steel 1018	30400637
408A	1	Plug 3/8"	Cast iron	93010149
408H	4	Dry seal cap ¼"	Steel	93010113
408J	1	Dry seal cap ¼"	Steel	93010113
408L	1	Dry seal cap ½"	Steel	93010112
408M	1	Dry seal cap 1"	Steel	93010111
412A	1	Impeller gasket	Teflon®	92010058
418	3	Screw ½"x 1½"	304 SS	91010351
423	3	Nut ½"	Steel	91010415
496	1	Support gasket	Buna-N	92010042
529	2	Spring washer	Steel	91010014

EXPLODED VIEW DRAWING
Series: **KP911LX**



SECTIONAL VIEW DRAWING

Series: **KP911LX**



PART LIST
Series: **KP911LX**

ITEM	QTY.	DESCRIPTION	MATERIAL	PART No.
100	1	Casing 6x8-13	Cast iron	03730210
			CF8M	03730211
		Casing 8x10-13	Cast iron	03730220
			CF8M	03730221
101	1	Impeller 6x8-13	Cast iron	03750210
			CF8M	03750211
		Impeller 8x10-13	Cast iron	03750220
			CF8M	03750221
105	1	Lantern ring KP911 LX	Teflon®	S/N
106	5	cord ring 7/16"	Teflon®	S/N
107	1	Stuffing box KP911 LX	CF8M	S/N
108	1	Adapter of 13", KP911 LX	Cast iron	03710005
109C	1	Cover for bearing support	Cast iron	03790101
112	1	Outer bearing	Steel	31020041
113A	1	Dry seal cap ½"	Steel	93010112
122	1	Shaft with sleeve	Steel 4140	30300354
		Shaft without sleeve	316 SS	30300362
126	1	Sleeve KP911 LX	316 SS	30300684
134	1	Bearing support	Cast iron	03780004
136	1	Safety nut M13	Steel	91010458
168A	1	Inner bearing	Steel	31020042
184	1	Seal plate of 13"	Cast iron	03770080
			CF8M	03770081
228	1	Frame KP911 LX	Cast iron	03720004
241	1	Frame holder 14½"	Cast iron	03790003
319	1	Oil sight glass	Steel/Glass	31120011
332A	1	Outboard lab'y seal KP911 LX	Bronze	31030207
333A	1	Inboard lab'y seal KP911 LX	Bronze	31030208
351	1	Body gasket 13"	EPDM	92010198
353	4	Stud screw 5/8"x 3½" lgo.	304 SS	91010385
355	4	Nut 5/8"	304 SS	91010436
357K	2	Nut ½"	304 SS	91010435
358C	1	Plug 3/8"	Cast iron	93010149
			304 SS	93010131
358Y	1	Impeller nut	316 SS	30400908
360	1	Gasket stand cap	Vellumoid	92010076
360D	1	Adapter gasket	Vellumoid	92010171
360Q	1	Seal flange gasket	EPDM	92010184
370	16	Screw 5/8"x 2"	Carbon steel	91010283
			304 SS	91010356
370B	4	Screw ½"x 1½"	Carbon steel	91010263
370C	4	Screw 5/8"x 1½"	Carbon steel	91010282
370D	4	Screw 5/8"x 2"	Carbon steel	91010283
370F	2	Screw ½"x 1½"	Carbon steel	91010263
370H	2	Stud screw ½" x 3¼"	304 SS	91010378
371C	1	Screw 3/8"x 1¼"	Carbon steel	91010243
382	1	Lock washer MB13	Steel	91010068
400	1	Key 5/8"	Steel 1018	30400630
408A	1	Plug 3/8"	Cast iron	93010149
408H	4	Dry seal cap ¼"	Steel	93010113
408J	1	Dry seal cap ¼"	Steel	93010113
408L	1	Dry seal cap ½"	Steel	93010112
408M	1	Dry seal cap 1"	Steel	93010111
412A	1	Impeller gasket	Teflon®	92010073
418	3	Screw ½"x 1½"	304 SS	91010351
423	4	Nut 5/8"	Steel	91010416
428D	1	Impeller cap gasket	Teflon®	92010074
469B	2	Guide pin	Steel 1018	30400864
496	1	Support gasket	Buna-N	92010075
529	2	Spring washer	Steel	91010014

ITEM	QTY.	DESCRIPTION	MATERIAL	PART No.
100	1	Casing 6x8-15	Cast iron	03730230
			CF8M	03730231
		Casing 8x10-15	Cast iron	03730240
			CF8M	03730241
		Casing 8x10-15G	Cast iron	03730250
			CF8M	03730251
101	1	Impeller 6x8-15	Cast iron	03750230
			CF8M	03750231
		Impeller 8x10-15	Cast iron	03750240
			CF8M	03750241
		Impeller 8x10-15G	Cast iron	03750250
			CF8M	03750251
105	1	Lantern ring KP911 LX	Teflon®	S/N
106	5	cord ring 7/16"	Teflon®	S/N
107	1	Stuffing box KP911 LX	CF8M	S/N
108	1	Adapter of 15"	Cast iron	03710006
109C	1	Cover for bearing support	Cast iron	03790101
112	1	Outer bearing	Steel	31020041
113A	1	Dry seal cap ½"	Steel	93010112
122	1	Shaft with sleeve	Steel 4140	30300354
		Shaft without sleeve	316 SS	30300362
126	1	Sleeve KP911 LX	316 SS	30300684
134	1	Bearing support	Cast iron	03780004
136	1	Safety nut M13	Steel	91010458
168A	1	Inner bearing	Steel	31020042
184	1	Seal plate of 15"	Cast iron	03770090
			CF8M	03770091
228	1	Frame KP911 LX	Cast iron	03720004
241	1	Frame holder 14½"	Cast iron	03790003
319	1	Oil sight glass	Steel/Glass	31120011
332A	1	Outboard lab'y seal KP911 LX	Bronze	31030207
333A	1	Inboard lab'y seal KP911 LX	Bronze	31030208
351	1	Body gasket 15"	EPDM	92010204
353	4	Stud screw 5/8"x 3½" lgo.	304 SS	91010385
355	4	Nut 5/8"	304 SS	91010436
357K	2	Nut ½"	304 SS	91010435
358C	1	Plug 3/8"	Cast iron	93010149
			304 SS	93010131
358Y	1	Impeller nut	316 SS	30400908
360	1	Gasket stand cap	Vellumoid	92010076
360D	1	Adapter gasket	Vellumoid	92010171
360Q	1	Seal flange gasket	EPDM	92010184
370	24	Screw 5/8"x 2"	Carbon steel	91010283
			304 SS	91010356
370B	4	Screw ½"x 1½"	Carbon steel	91010263
370C	4	Screw 5/8"x 1½"	Carbon steel	91010282
370D	4	Screw 5/8"x 2"	Carbon steel	91010283
370F	2	Screw ½"x 1½"	Carbon steel	91010263
370H	2	Stud screw ½" x 3¼"	304 SS	91010378
371C	1	Screw 3/8"x 1¼"	Carbon steel	91010243
382	1	Lock washer MB13	Steel	91010068
400	1	Key 5/8"	Steel 1018	30400630
408A	1	Plug 3/8"	Cast iron	93010149
408H	4	Dry seal cap ¼"	Steel	93010113
408J	1	Dry seal cap ¼"	Steel	93010113
408L	1	Dry seal cap ½"	Steel	93010112
408M	1	Dry seal cap 1"	Steel	93010111
412A	1	Impeller gasket	Teflon®	92010073
418	3	Screw ½"x 1½"	304 SS	91010351
423	4	Nut 5/8"	Steel	91010416
428D	1	Impeller cap gasket	Teflon®	92010074
469B	2	Guide pin	Steel 1018	30400864
496	1	Support gasket	Buna-N	92010075
529	2	Spring washer	Steel	91010014

Risk of electric shock. Always disconnect the pump from the power source before handling inspections or repairs.

PROBLEMS THAT MAY BE PRESENT AT THE PUMP		
PROBLEM	**PROBABLE CAUSE**	**SOLUTION**
The pump does not carry nominal flow or height.	Partially clogged impeller.	Flush the pump reverse drain to clean the impeller.
	Insufficient suction lift.	Make sure the suction valve is completely open and free of foreign matter.
	Broken or worn impeller.	Inspect and replace if necessary.
	Worn suction plate.	Replace the defective part.
	Air entering throught the gasket.	Replace the gasket.
	Air enter through the gland.	Replace or readjust gasket/mechanical seal.
Bearings warming.	The lubricant cooling system.	Inspect the cooling system.
	Improper alignment.	Realign the pump and motor.
	Inadequate lubrication.	Verify that the oil level is adequate.
Gland excessive leakage.	Mechanical seals overheated.	Verify lubrication and cooling lines.
	Scratches on the surface of the sleeve.	Replace the sleeve.
	The gland improperly adjusted.	Tighten bolts cap.
	Worn mechanical seal parts.	Replace worn parts.
	Gland improperly filled.	Verify gasket and refill the gland.
Pump is not delivering liquid.	The pump is not primed.	Re-prime the pump and verifay that the pump and suction line are full of liquid.
	Clogged suction line.	Remove obstructions.
	Wrong direction of rotation.	Change rotation so that it follows with the direction indicated by the shaft on the bearing box or the pump volute.
	Suction valve or suction tube not sufficiently submerged.	Consult factory for proper depth. Use a deflector to eliminate vortices.
	Suction lift too high.	Shorten the suction pipe.
The engine requires excessive power.	Rotating parts touch against each other.	Verify internal wear parts checking for the proper clearance.
	Liquid heavier than expected.	Verify specific gravity and viscosity.
	Height lower than regime. Pumping too much liquid.	Consult the factory, install throttle valve, adjust the impeller diameter.
	The bearing gland too tight.	Readjust the gasket. Replace if worn.
Pump is noisy and vibrates.	Worn bearings.	Replace barings.
	Broken or bend impeller/shaft.	Replace as needed.
	No rigid foundation	Tighten the anchors securing the pump and motor or adjust the brackets.
	The pump is cavitating	System problem.
	Improper alignment of the pump/motor.	Align the shafts.
	Partially clogged impeller causing imbalance.	Flush the pump drain reverse to clean the impeller.
	Suction or discharge piping is not anchored or properly supported.	Anchor according to recommendations and standards.
The pump starts and after a while it stops pumping.	Air entering the suction line.	Repair leak.
	Air pockets or vapor in suction line.	Arrange piping to eliminate air pockets.
	Pump primed inappropriately.	Re-prime the pump.

NOTE: Keen Pumps assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Keen Pumps or its authorized service centers, automatically voids warranty.

KEEN PUMP COMPANY, INC.
FACTORY WARRANTY

Keen Pump warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for 18 months from the date of manufacture or 12 months from installation date whichever occurs first. This warranty gives you specific legal rights, which vary from state to state.

This warranty is a limited warranty, and no warranty related claims of any nature whatsoever shall be made against Keen Pump, until the ultimate consumer or his/her successor notifies us in writing of the defect and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station as instructed by Keen Pump. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE. PRODUCT SHALL BE EITHER REPLACED OR REPAIRED AT THE ELECTION OF KEEN PUMP. Guarantees relating to performance specifications provided in addition to the foregoing material and workmanship warranties on a product manufactured by Keen Pump, if any, are subject to possible factory testing. Any additional guarantees, in the nature of certified performance specifications or time frame must be in writing and such writing must be signed by our authorized factory manager at time of order placement and/or at time of quotation. Due to inaccuracies in field testing and should a conflict arises between the results of field testing conducted by or for the user, Keen Pump reserves the right to have the product returned to our factory for additional testing.

This warranty shall not apply when damage is caused by [1] improper installation, [2] improper voltage, [3] lightning, [4] excessive sand or other abrasive material, [5] corrosion build-up due to excessive chemical content or [6] uncontrollable acts of god. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective pumps, parts or systems. Keen Pump will not accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication on all neccessary information regarding the application and use of the product. UNDER NO CIRCUMSTANCES WILL BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES. INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTIONS, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY. No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.

IMPORTANT!!!

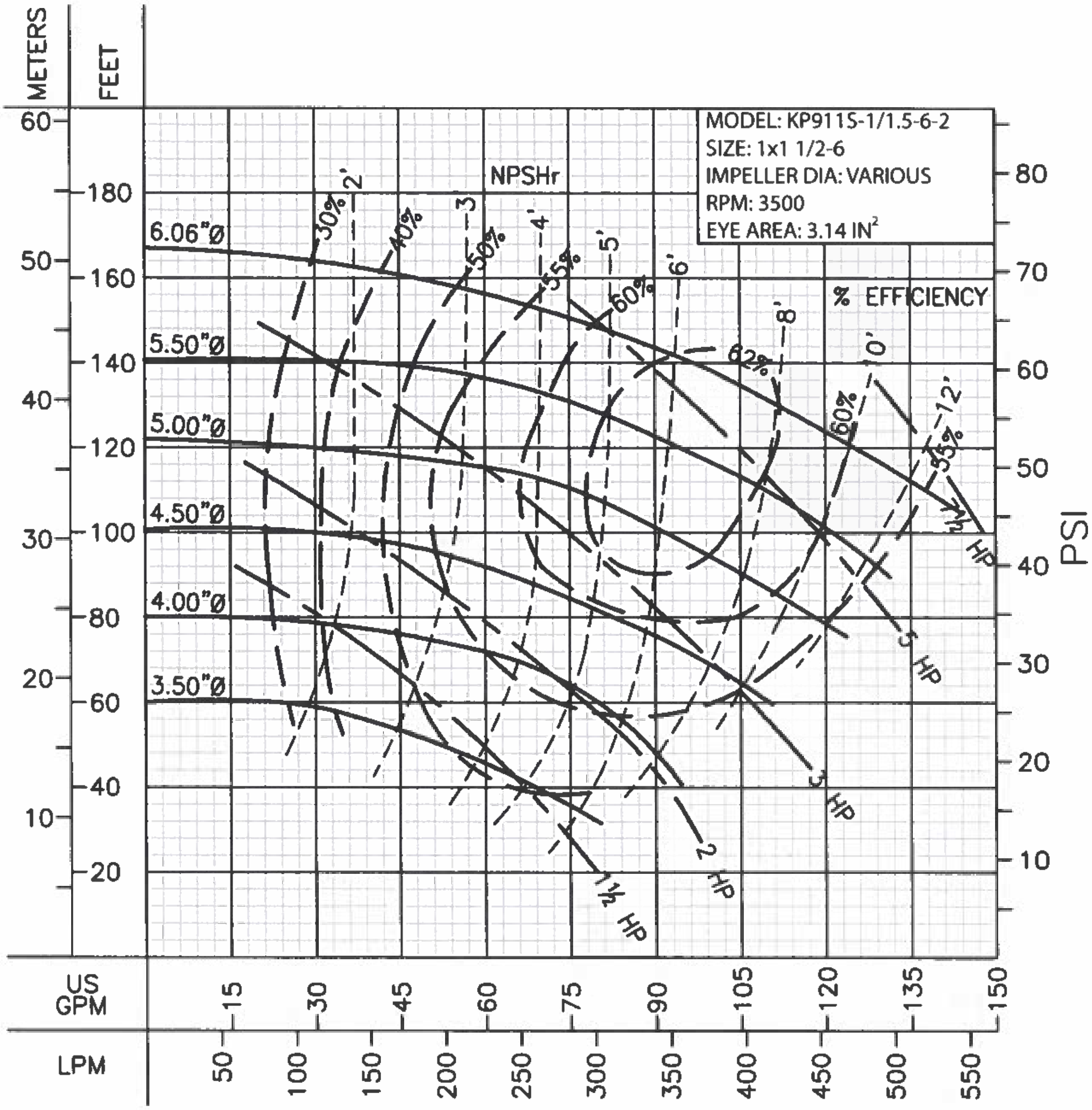
If you have a claim under the provision of the warranty, contact Keen Pump or your authorized Keen Pump Distributor.

www.keenpump.com

KEEN PUMP®

KEEN PUMP®

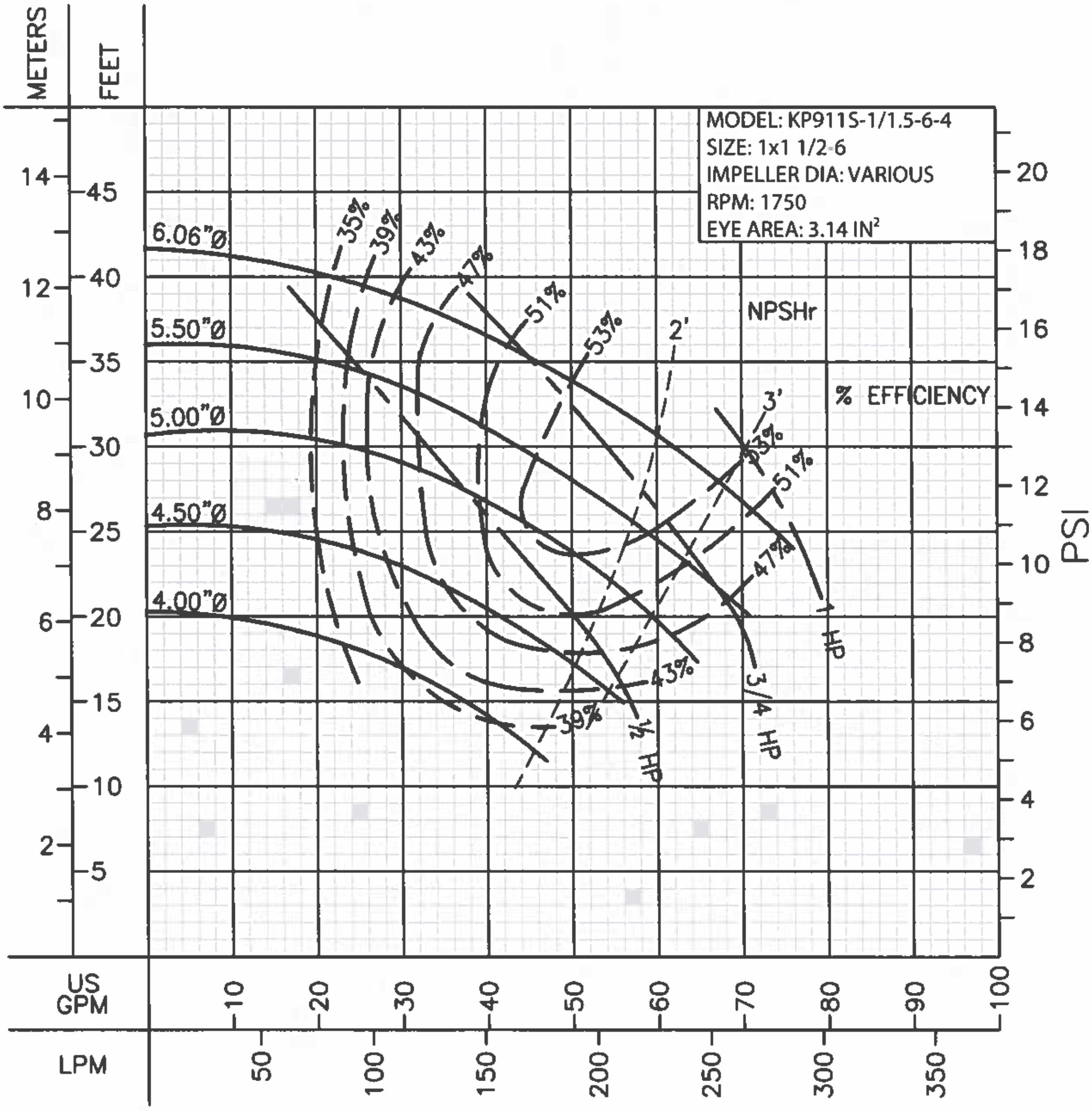
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911S**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

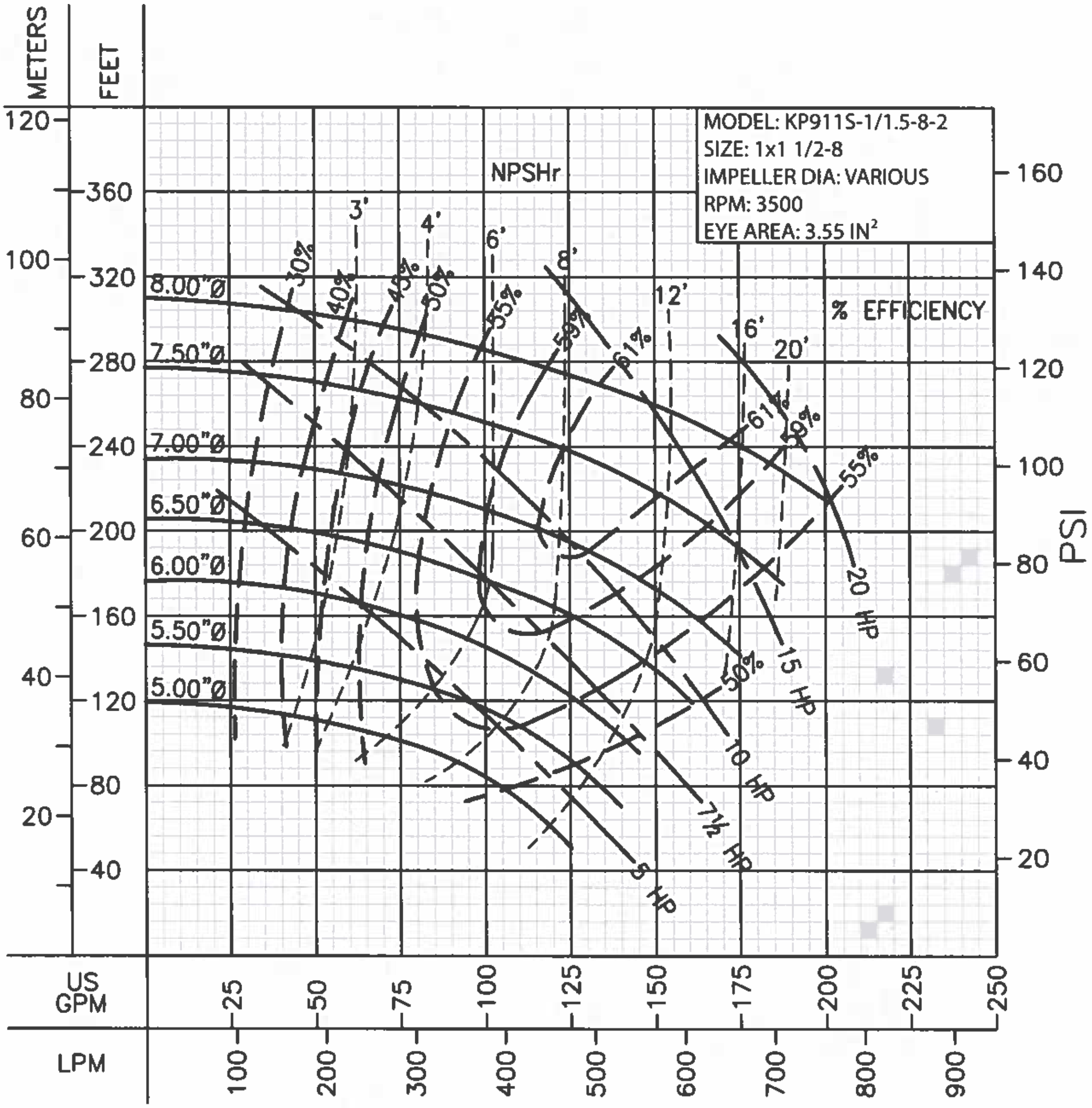
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911S**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .440 in

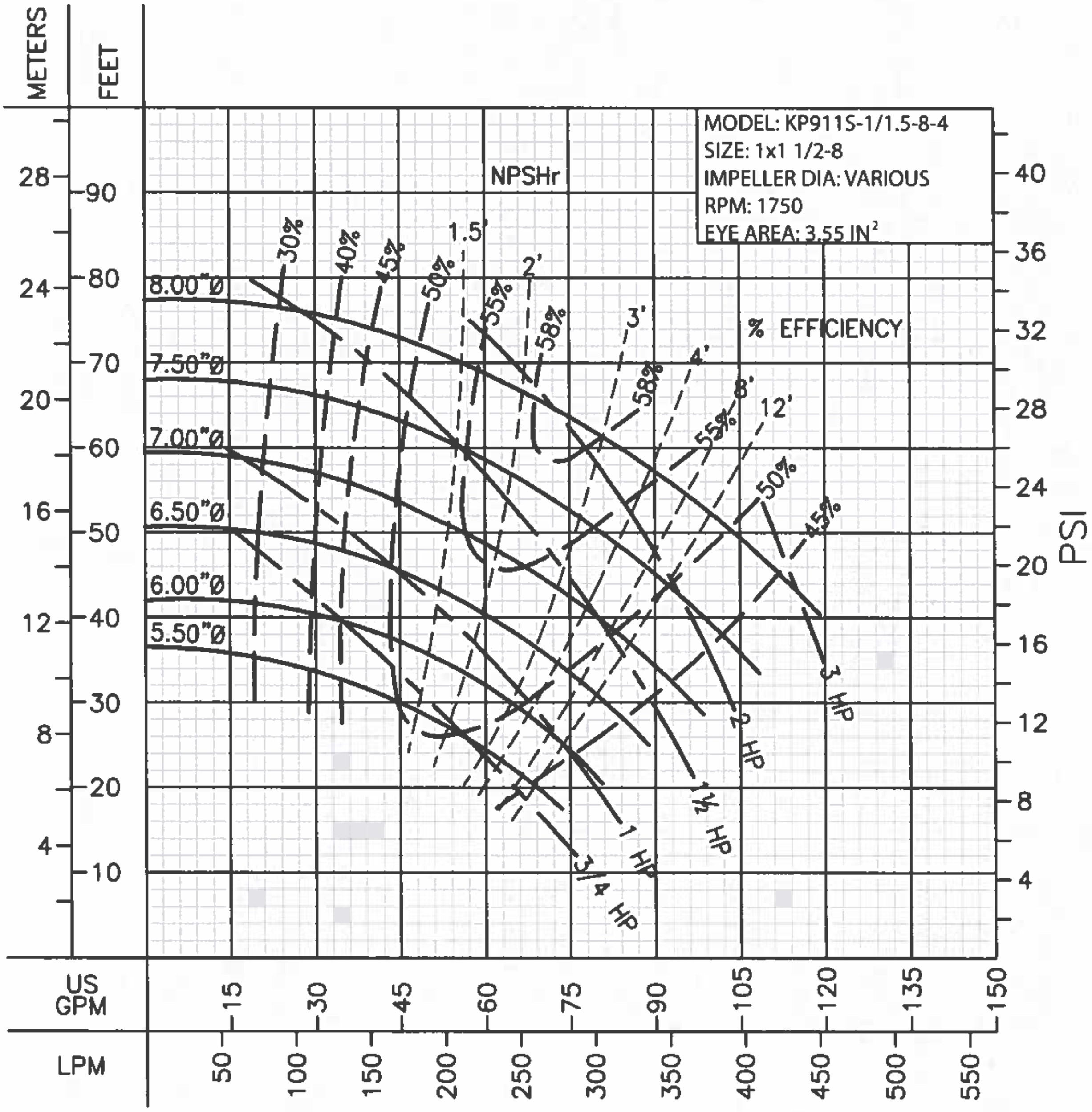
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911S**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .440 in

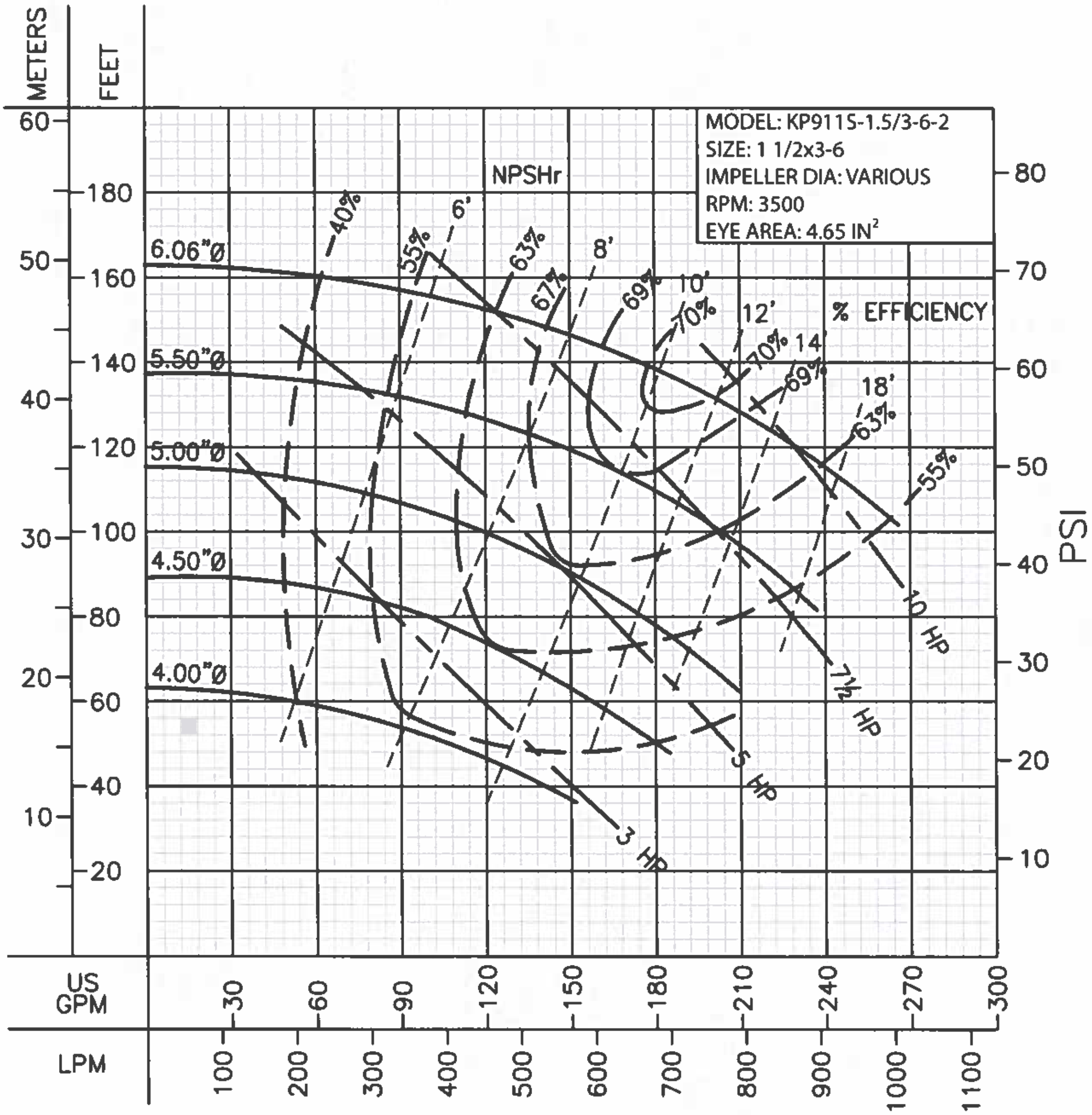
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911S**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .440 in

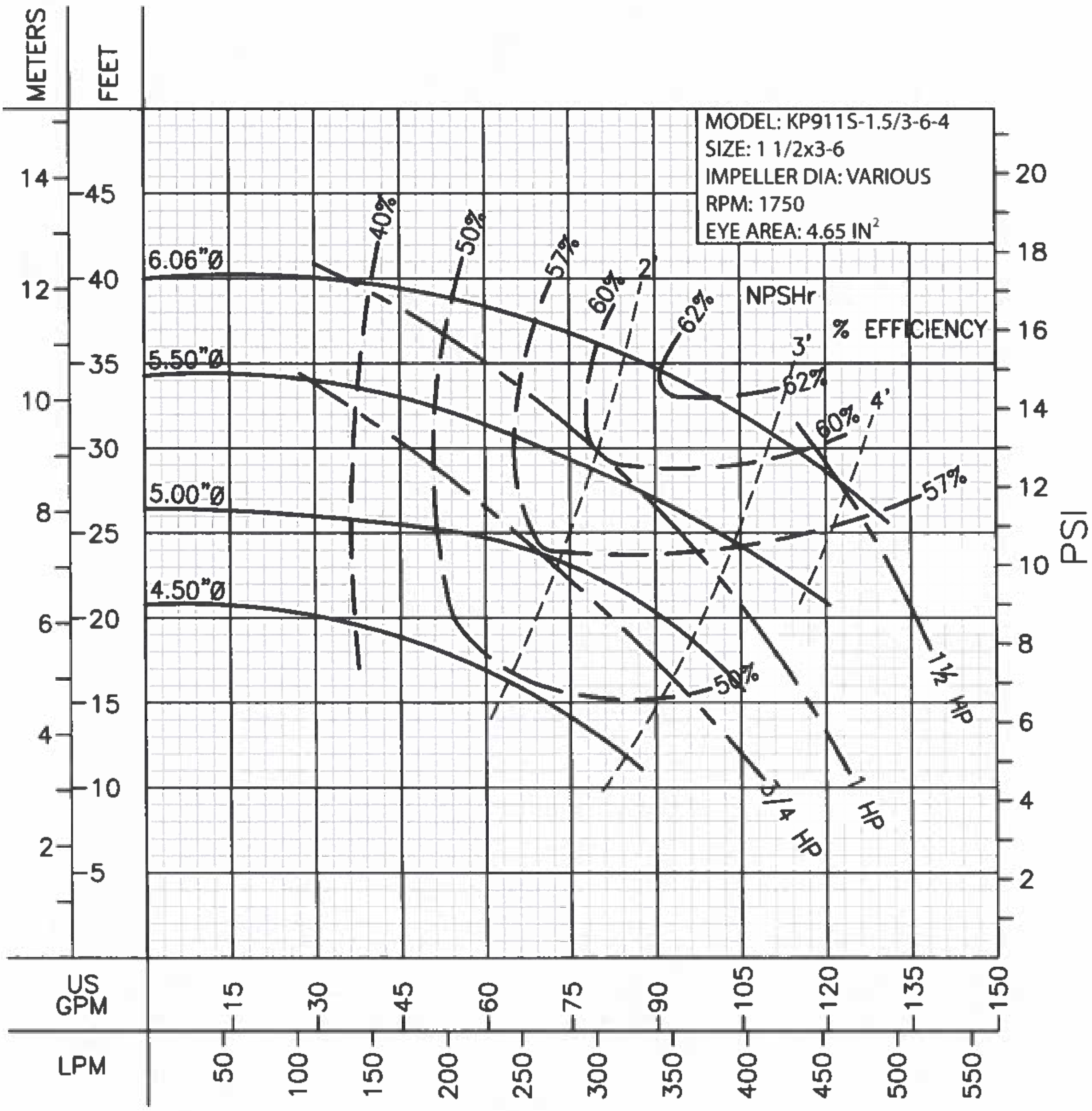
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911S**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .440 in

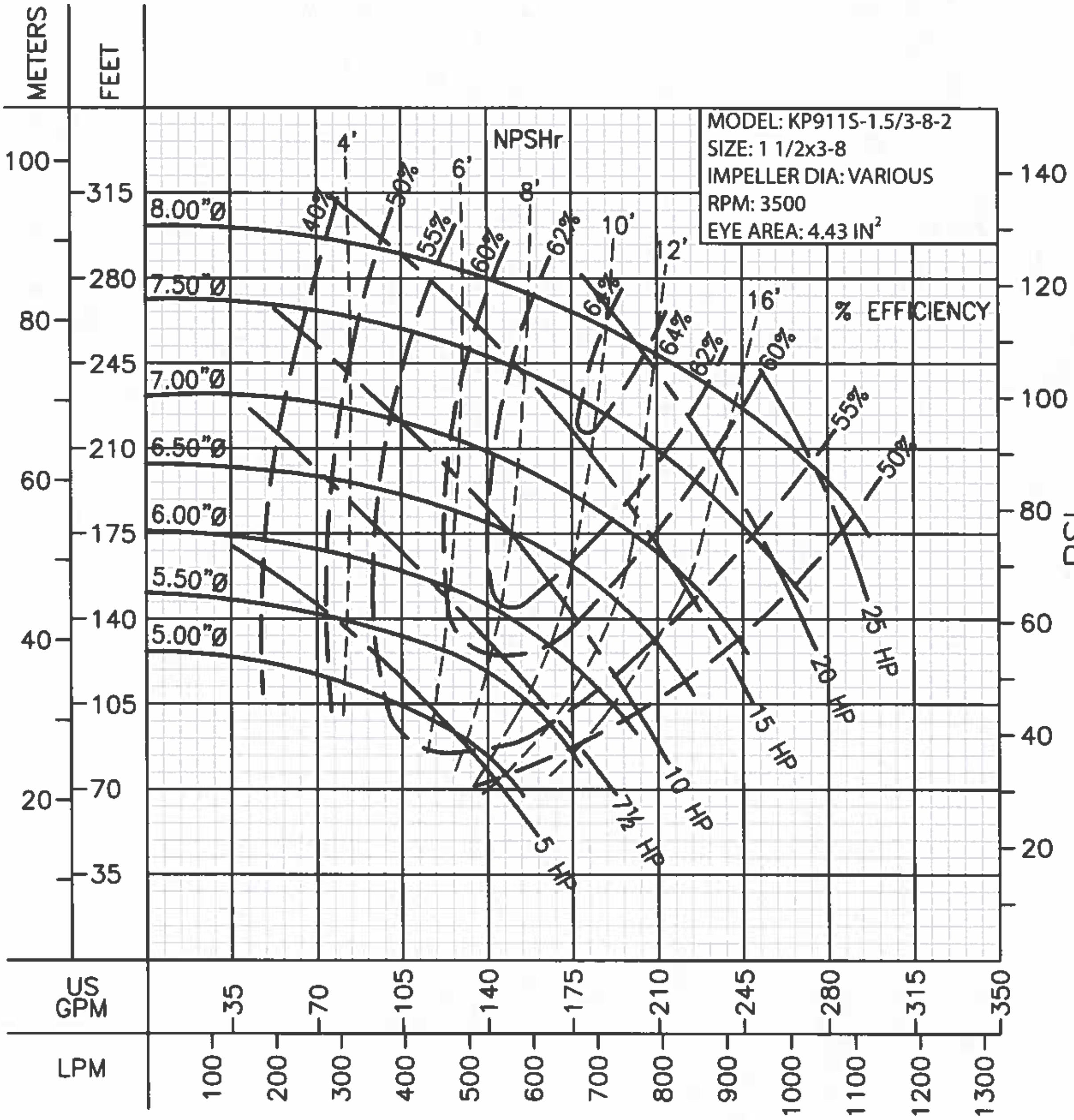
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911S**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .440 in

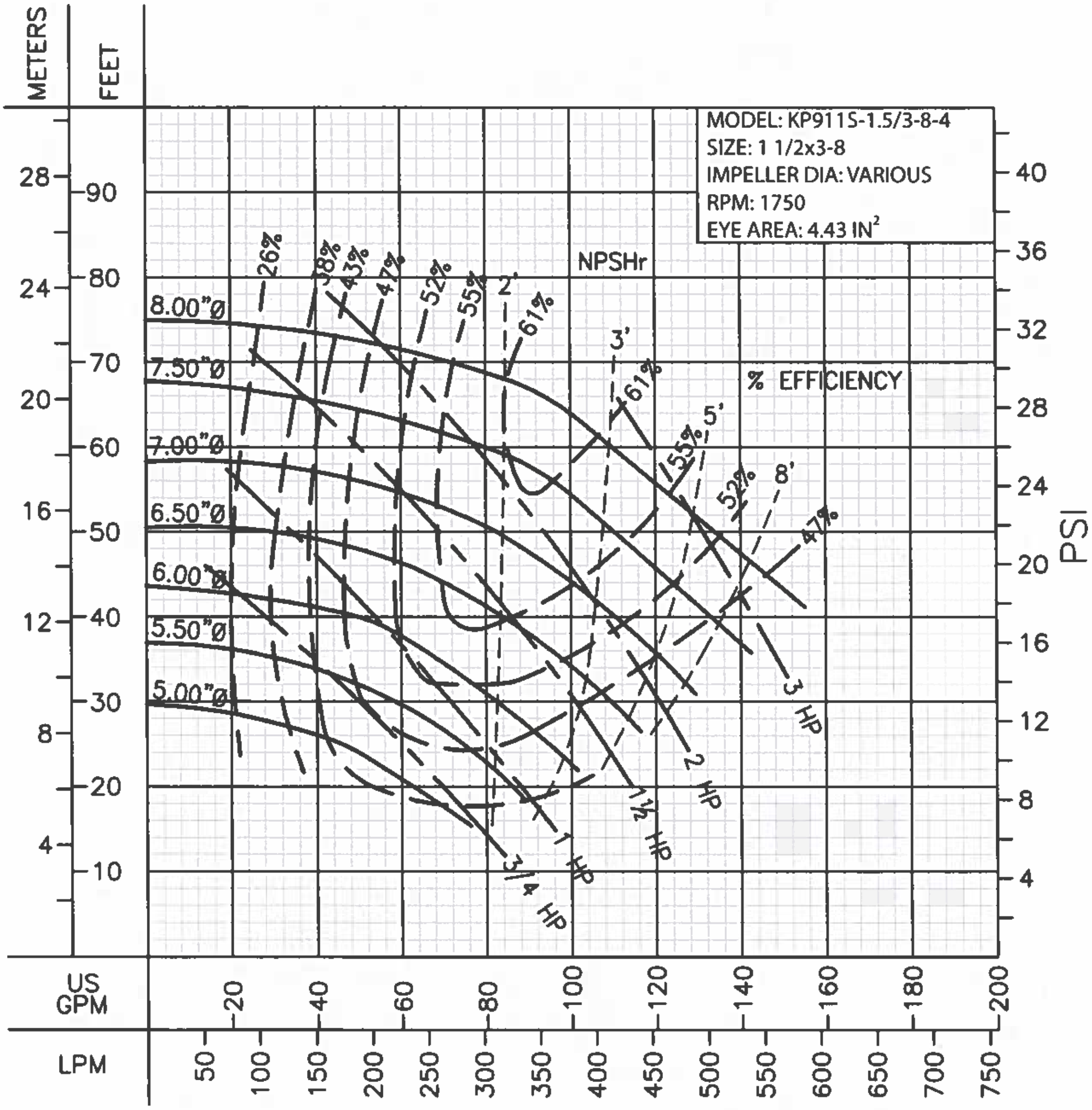
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911S**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .560 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911S**

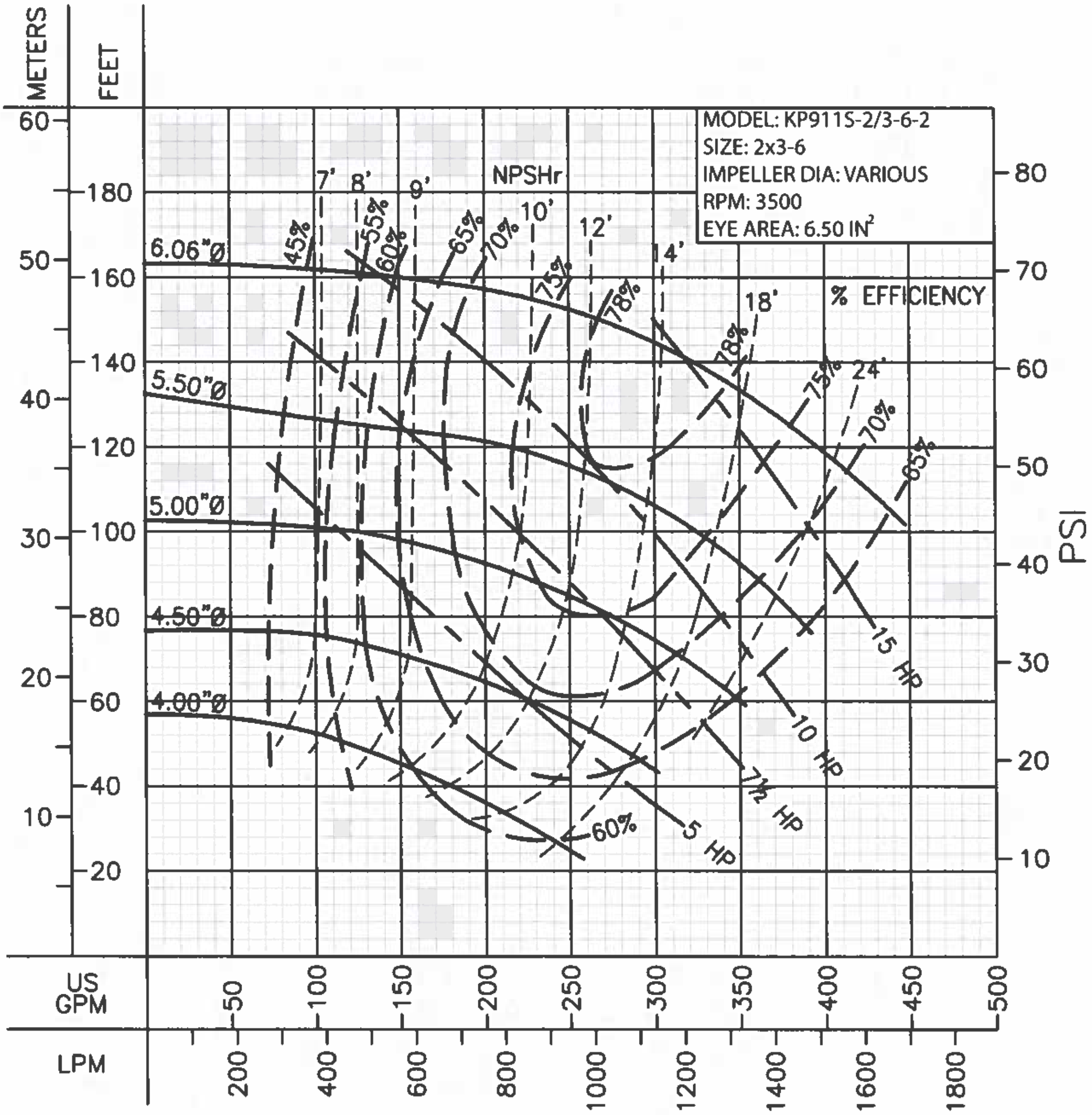


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .560 in

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911S**



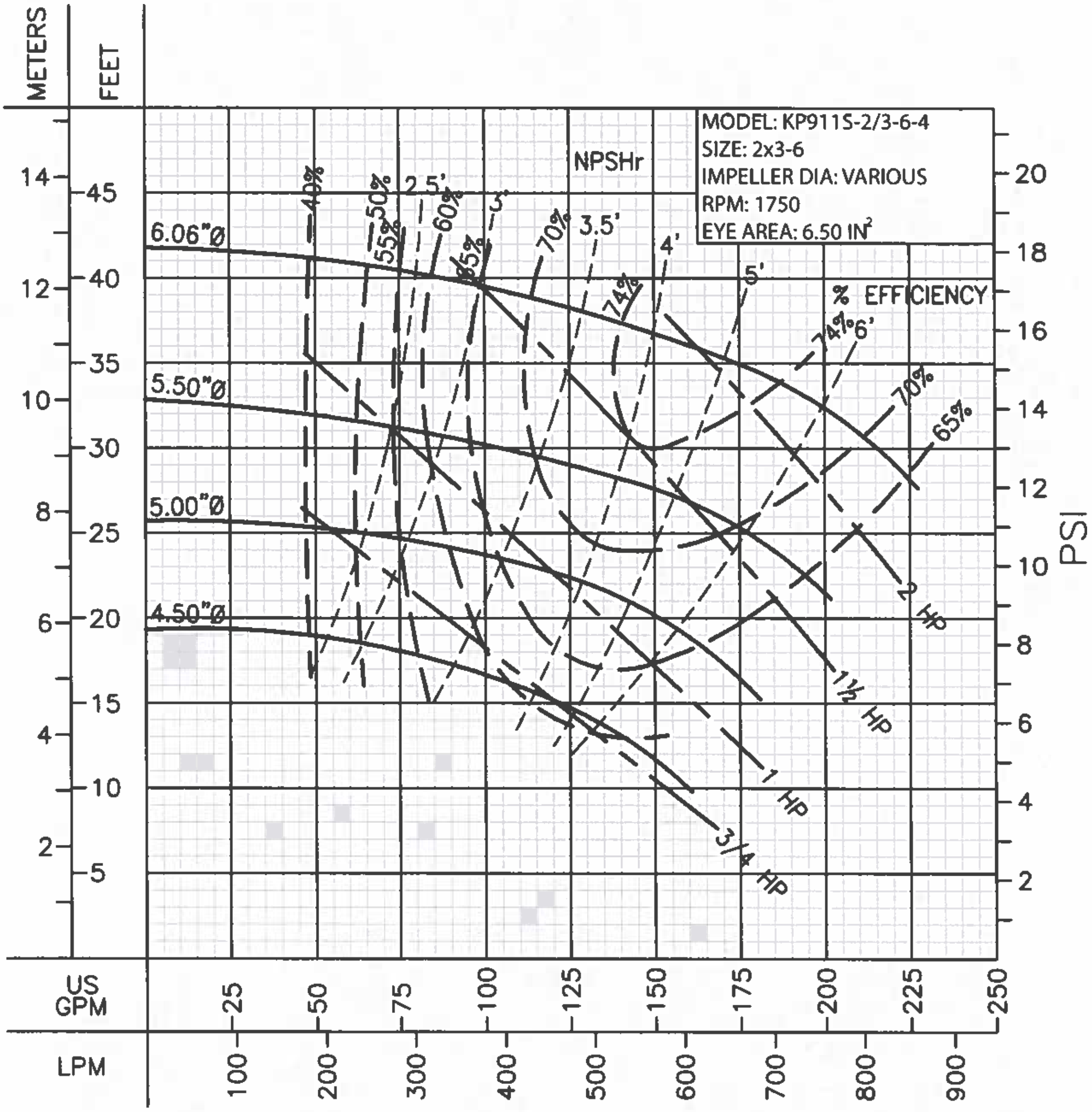
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .440 in

PERFORMANCE CURVES

ANSI Centrifugal Process Pumps

Series: **KP911S**



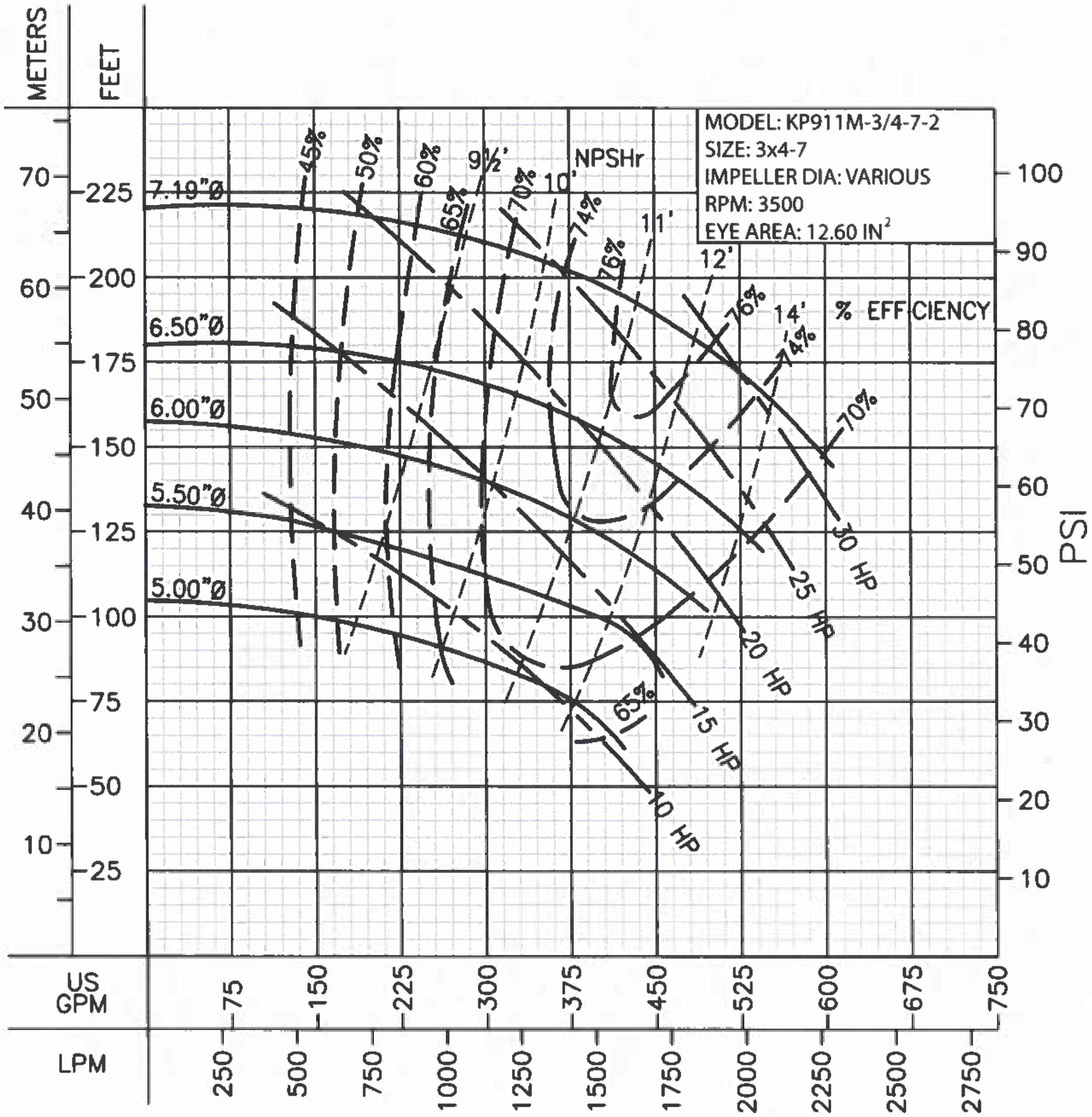
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .440 in

KEEN PUMP®

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**

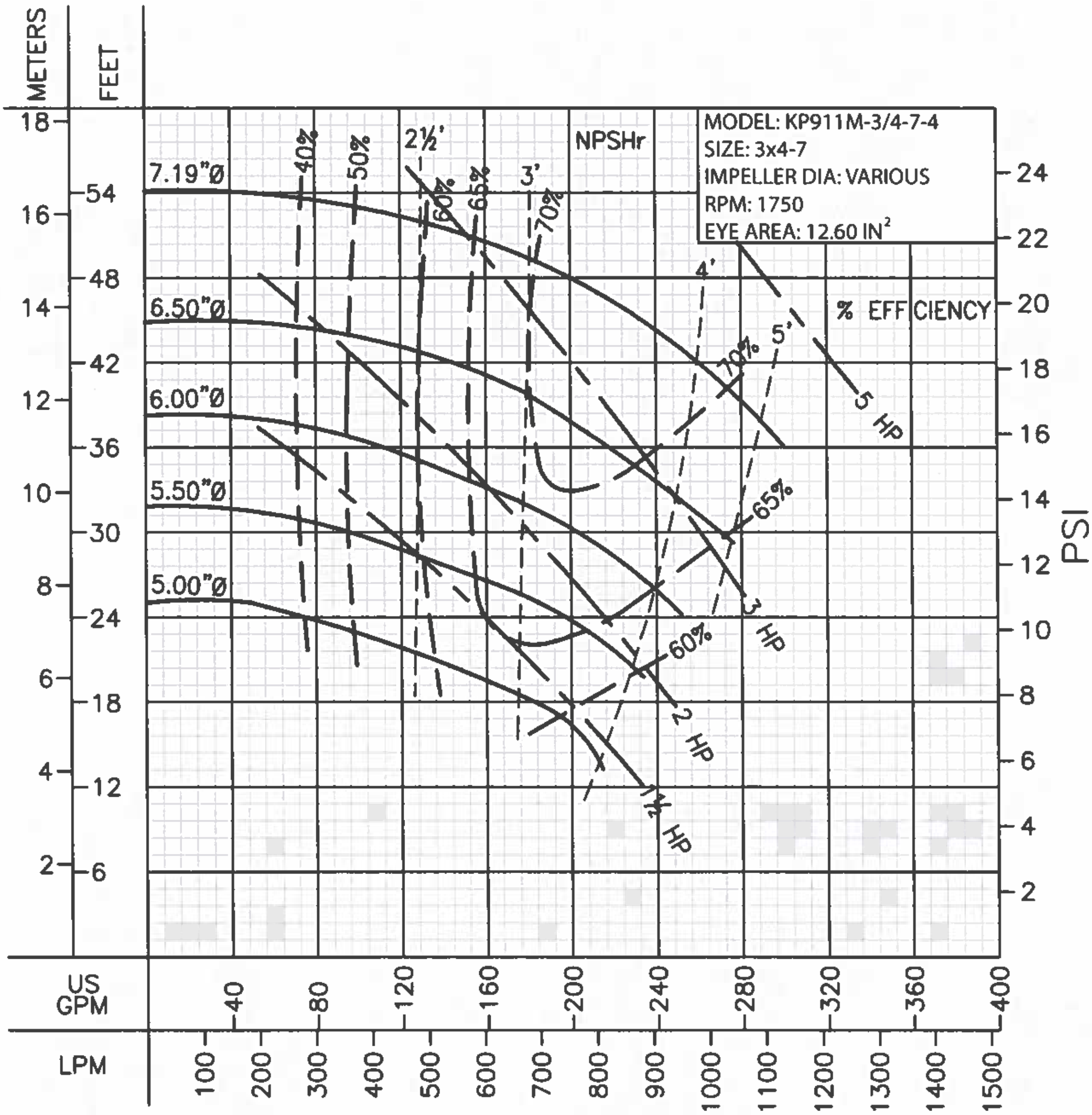


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**

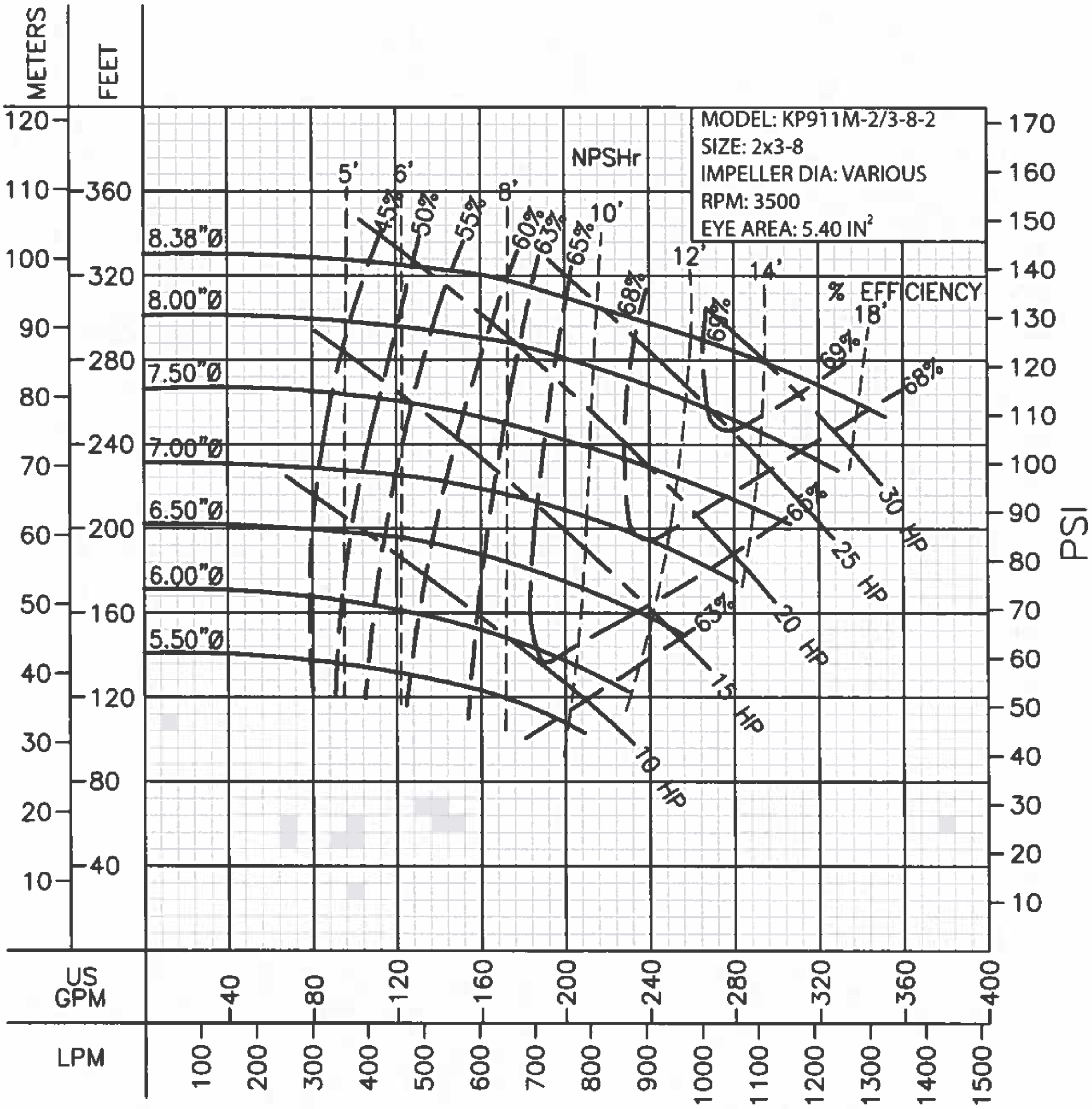


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

PERFORMANCE CURVES

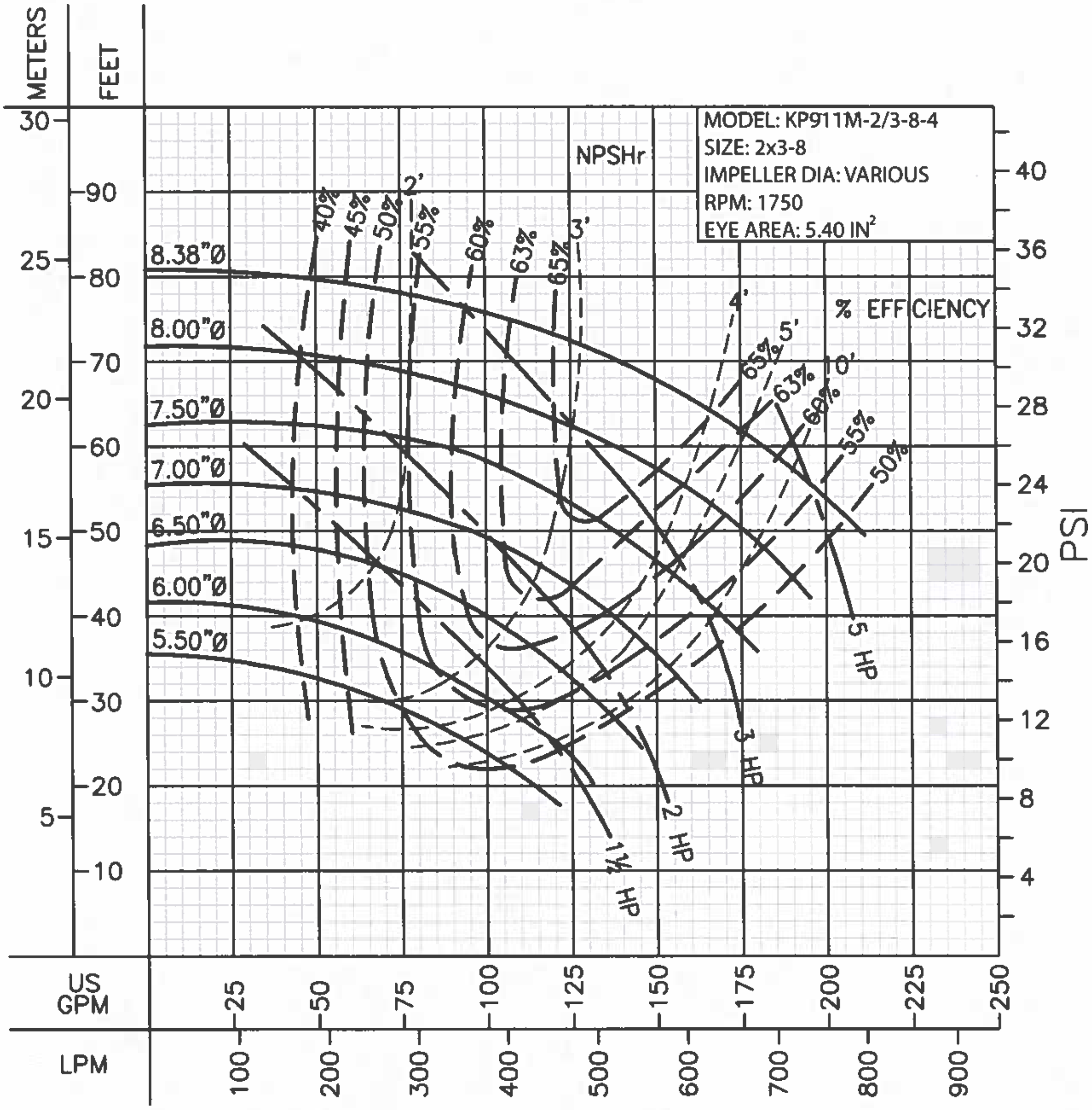
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .625 in

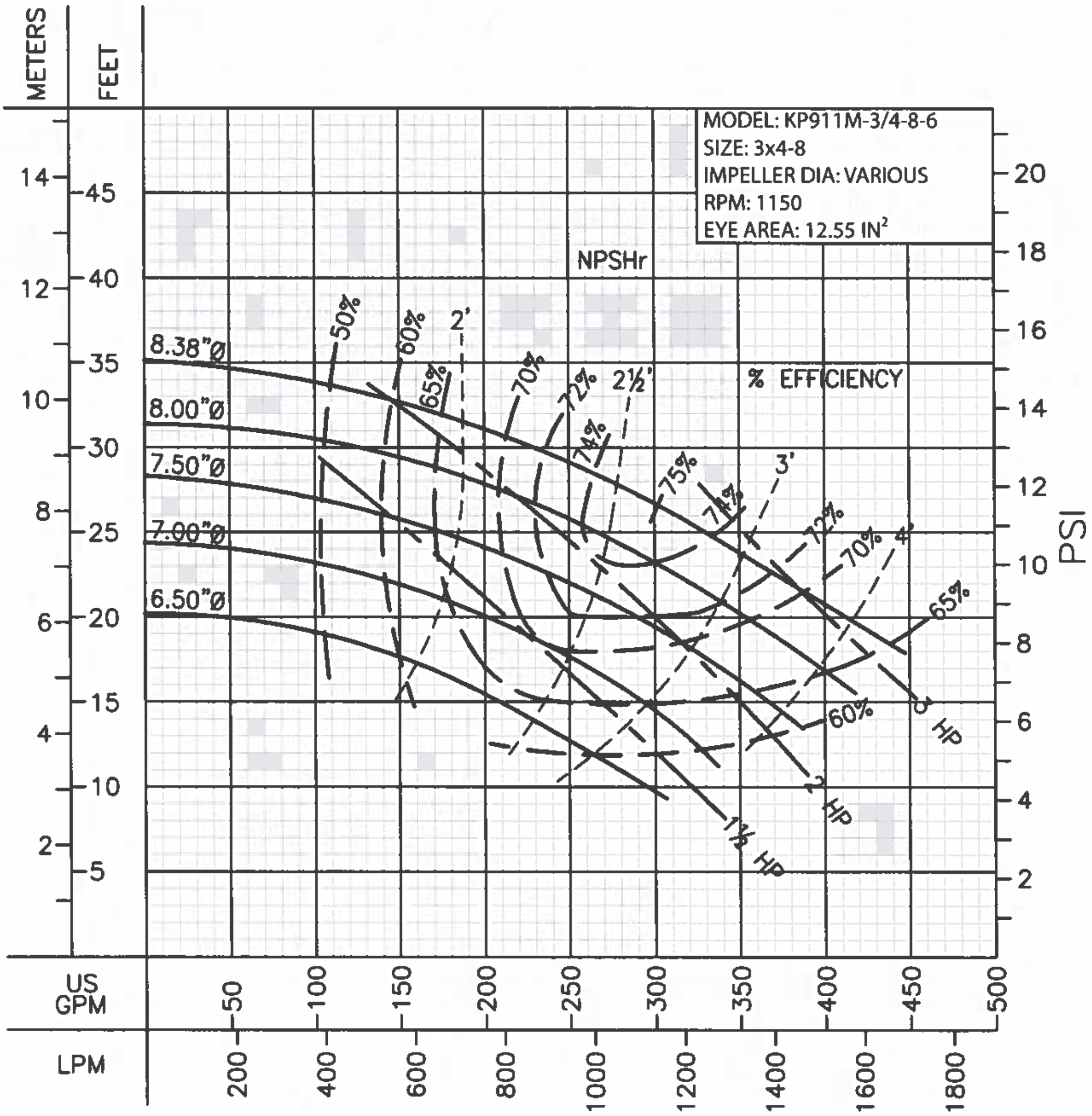
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .625 in

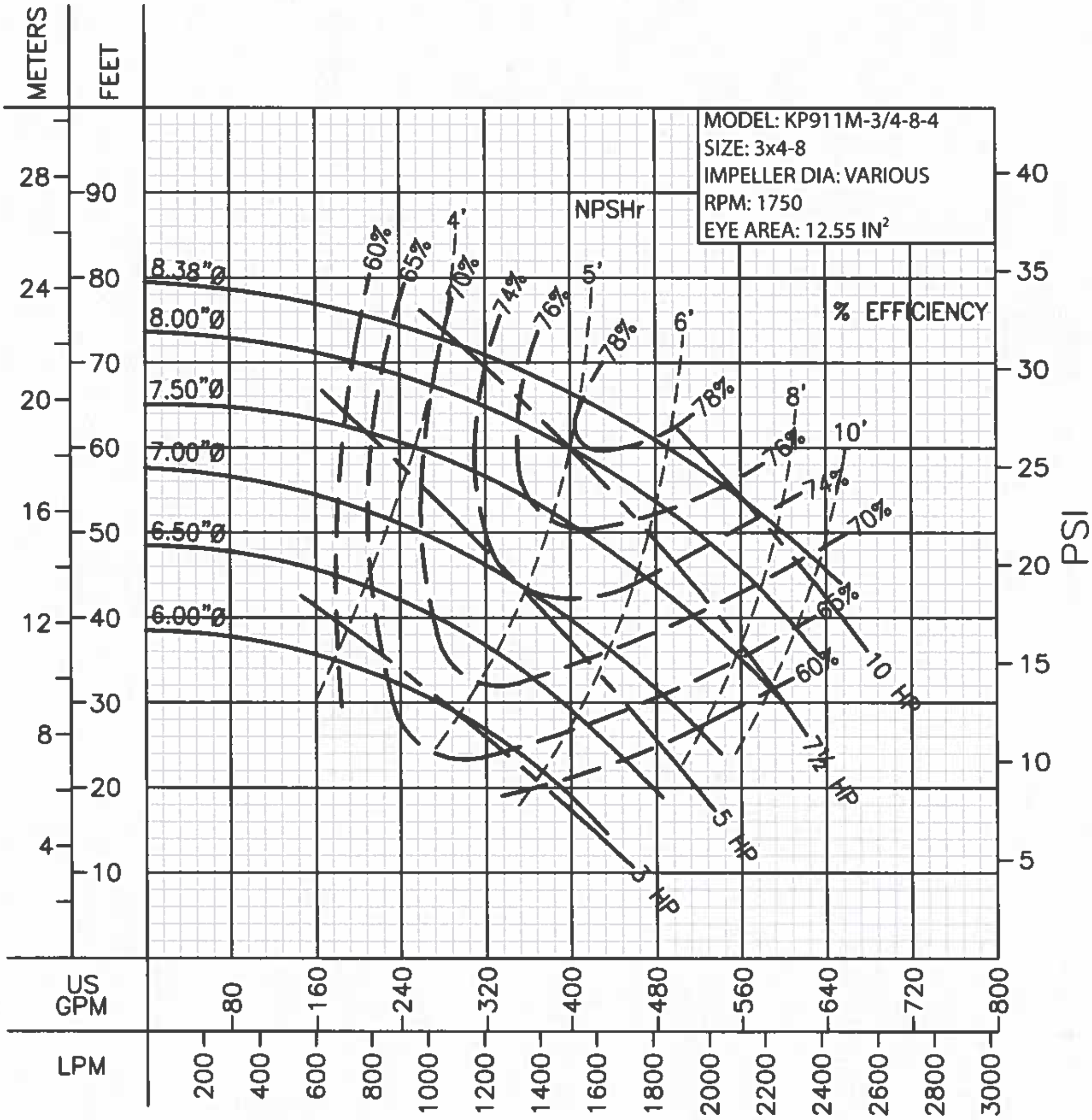
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: 1.190 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

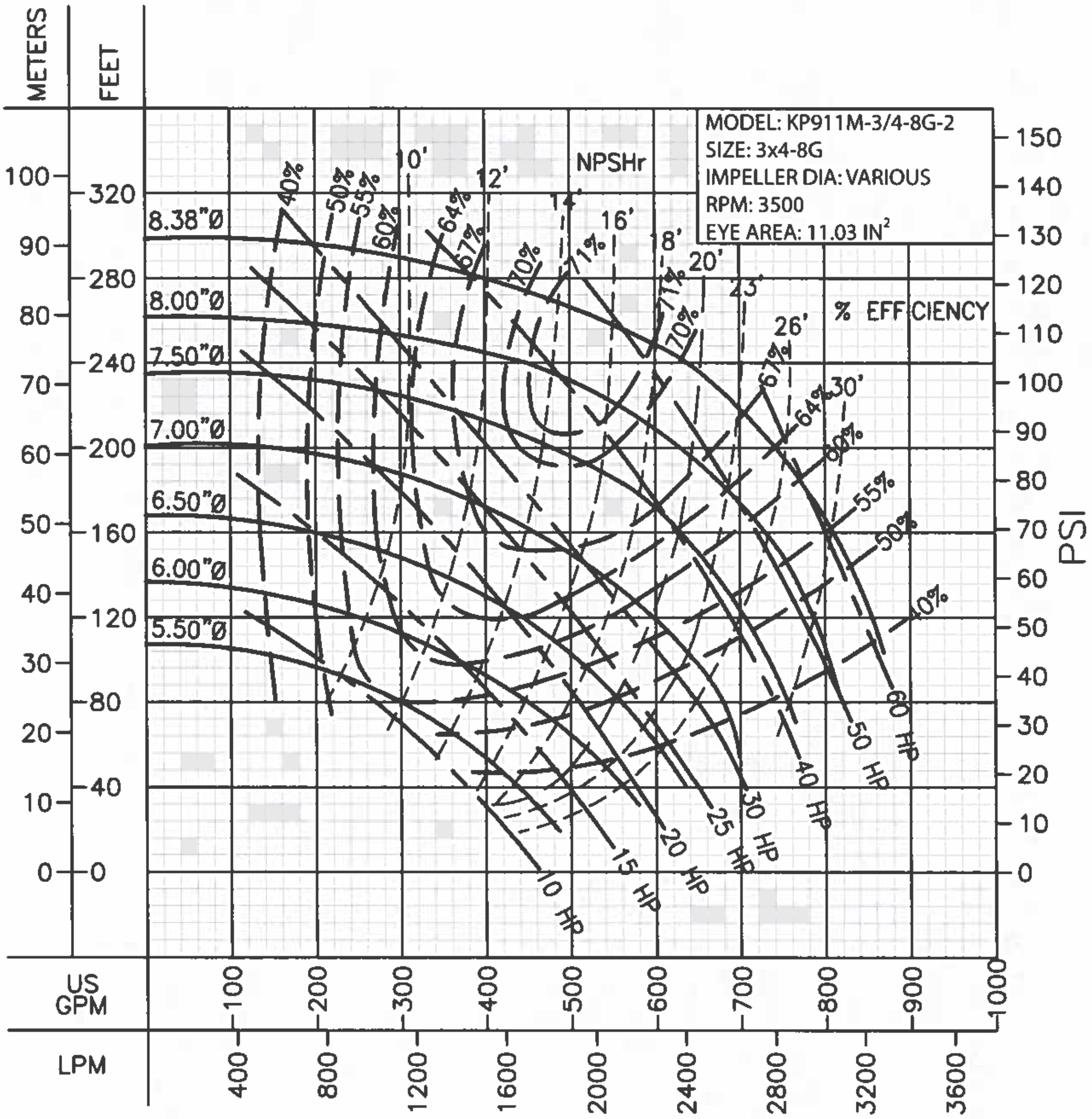


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: 1.19 in

PERFORMANCE CURVES

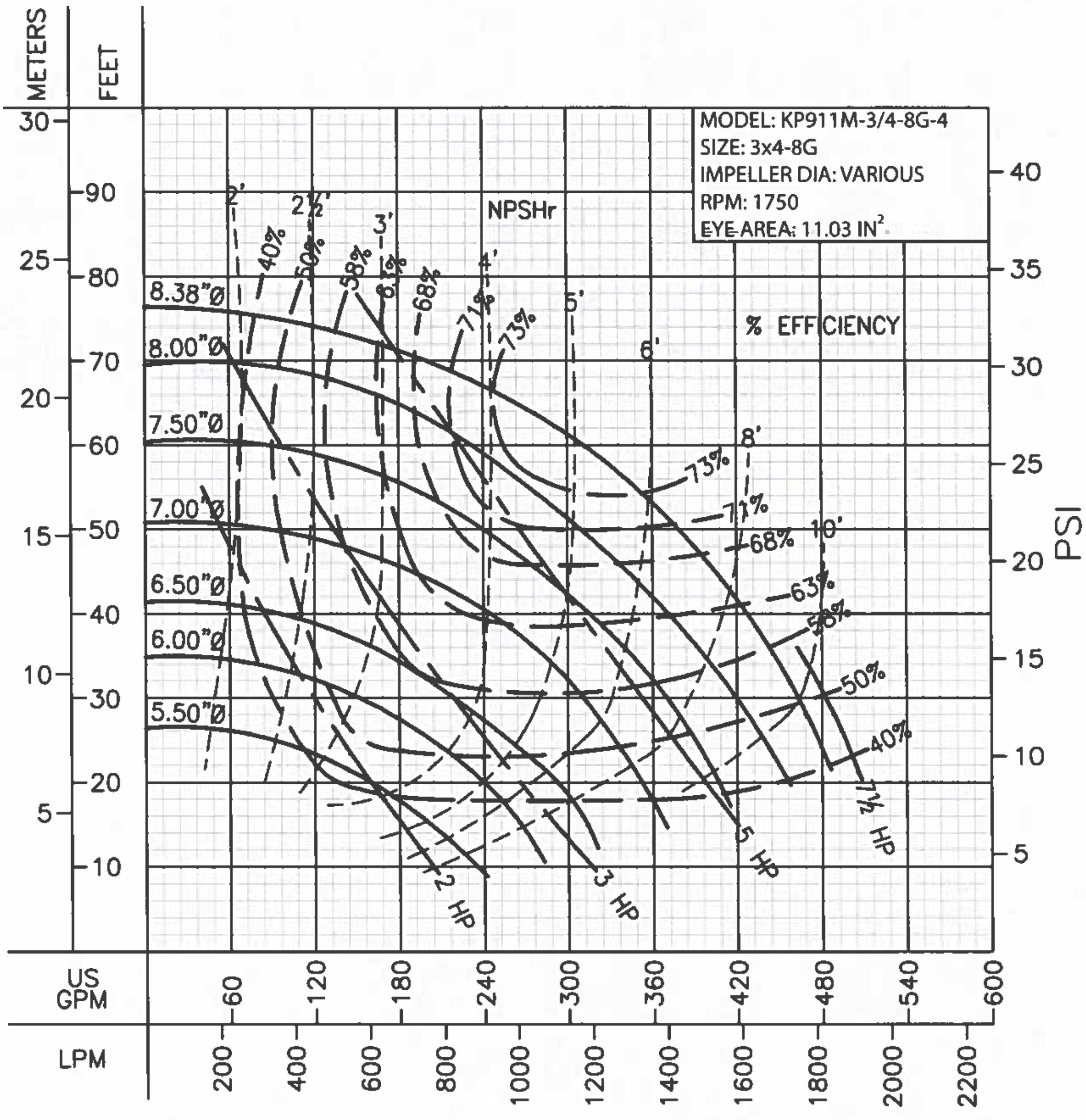
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

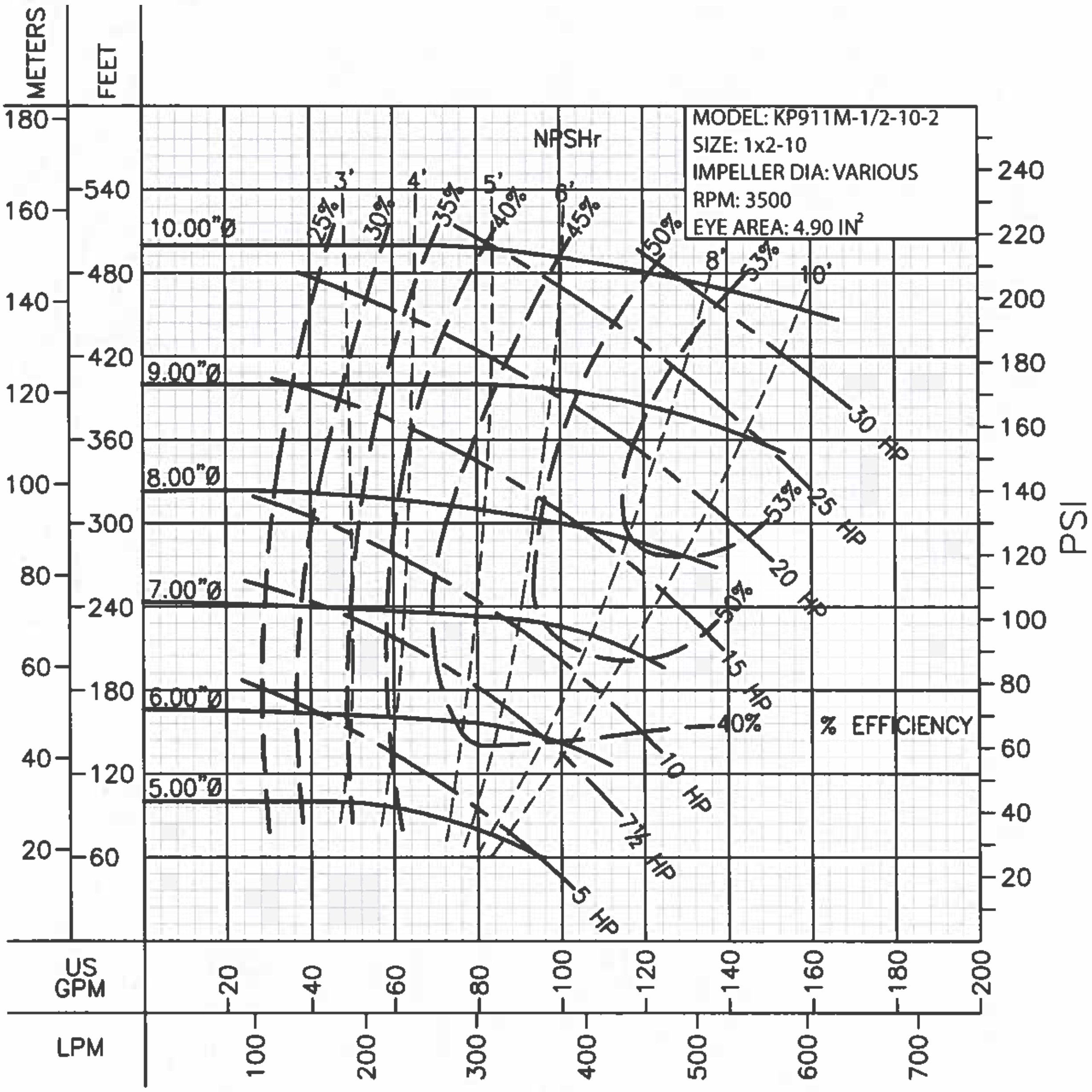
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

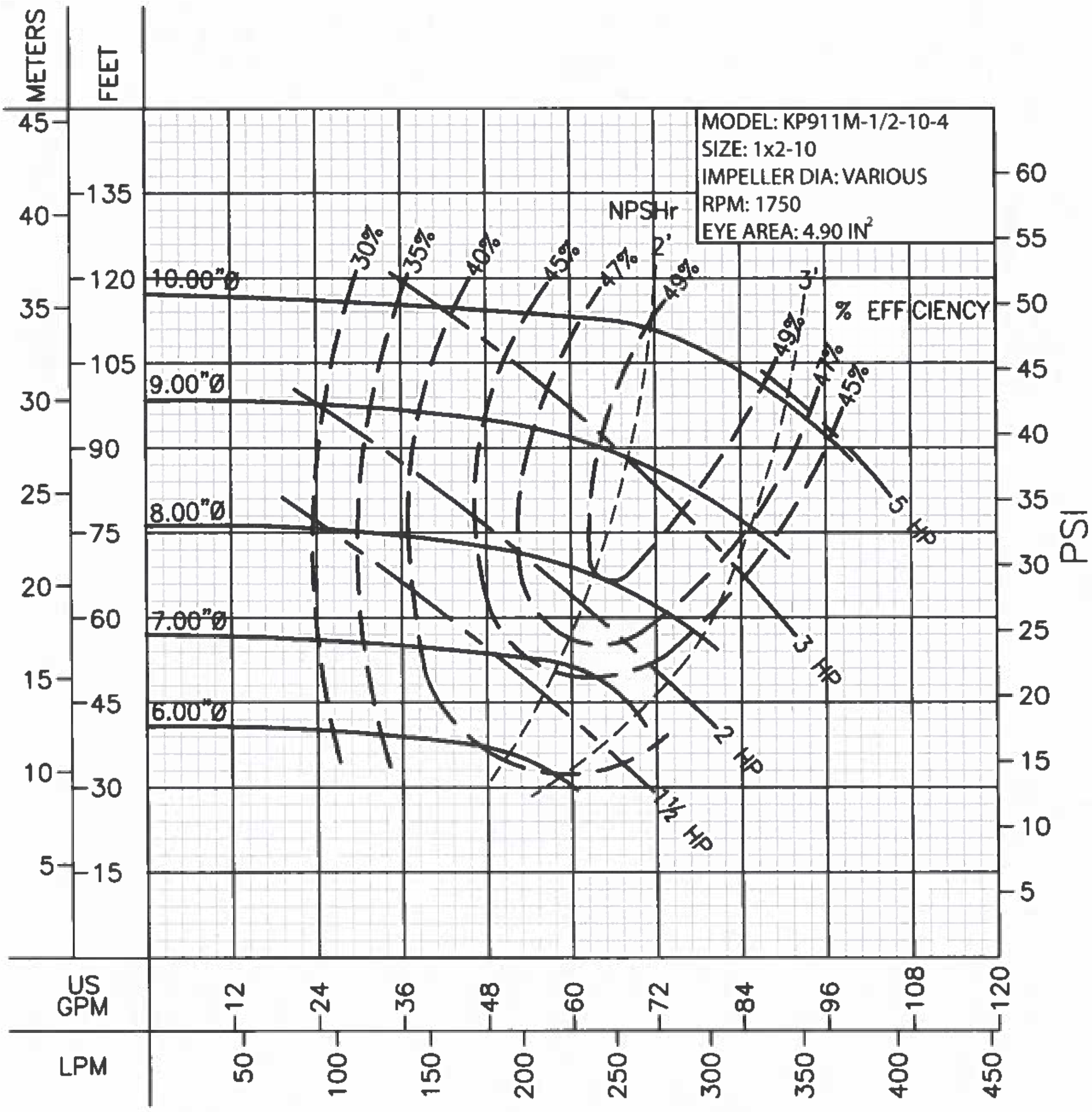
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

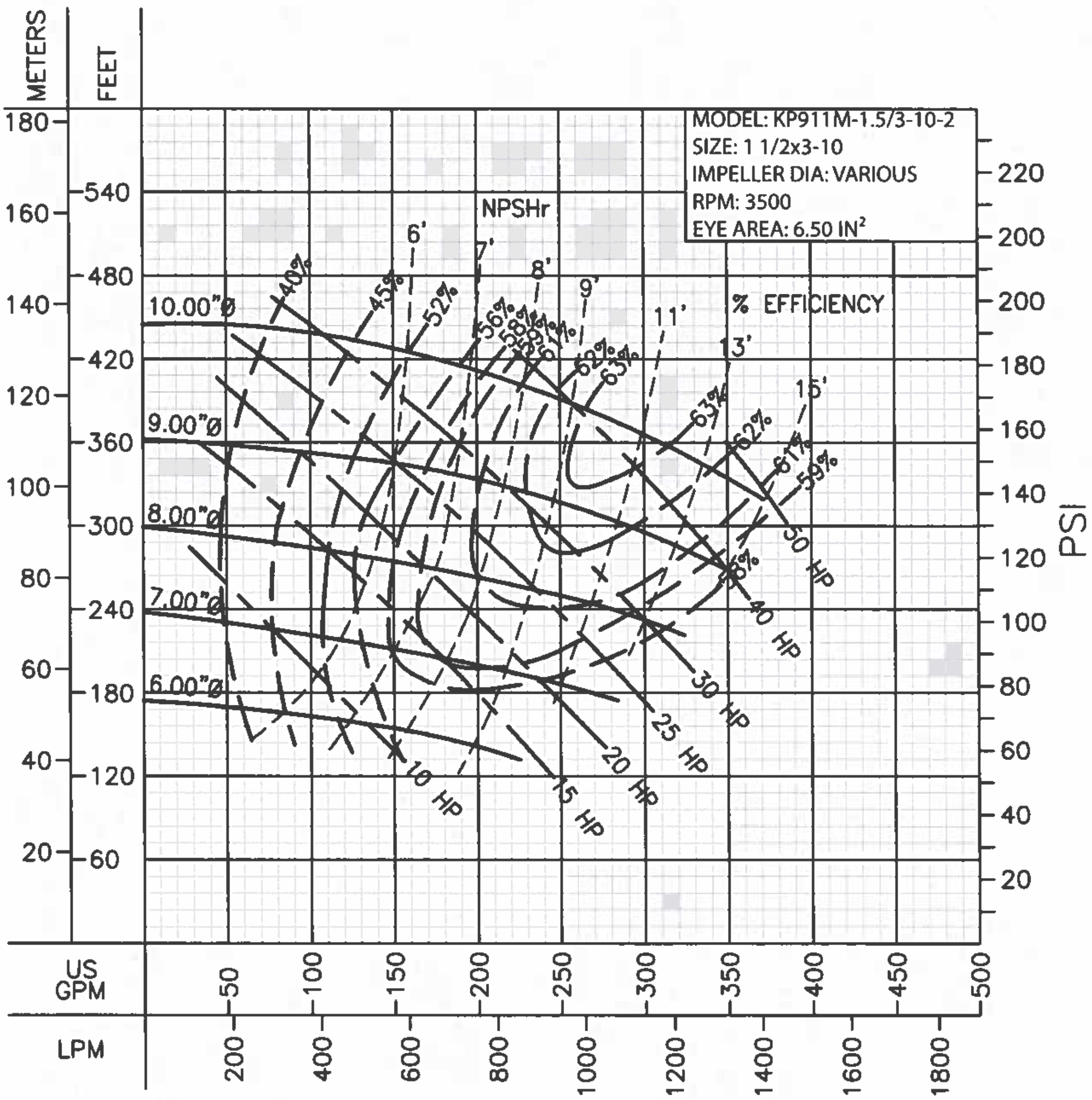
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

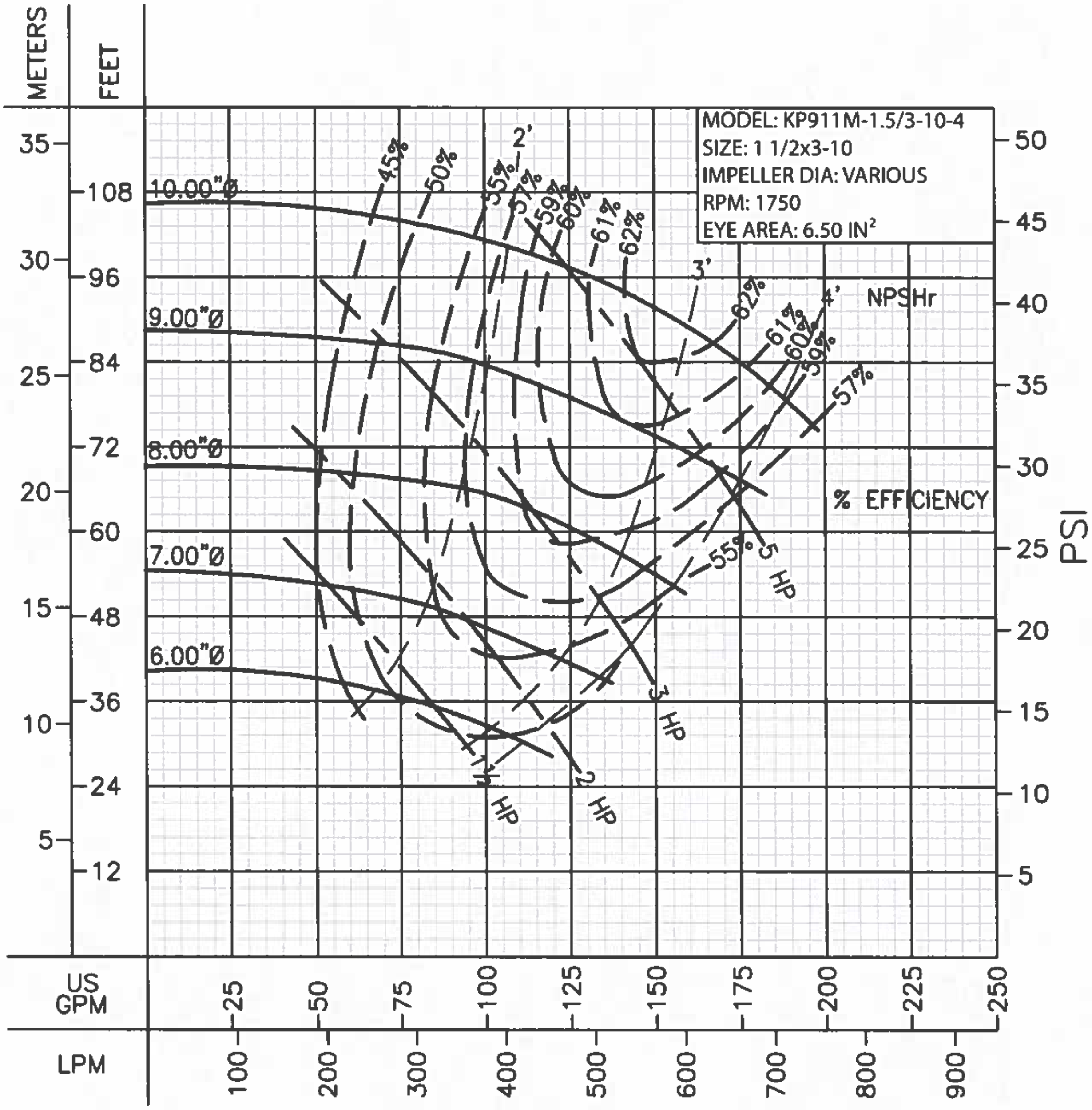


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

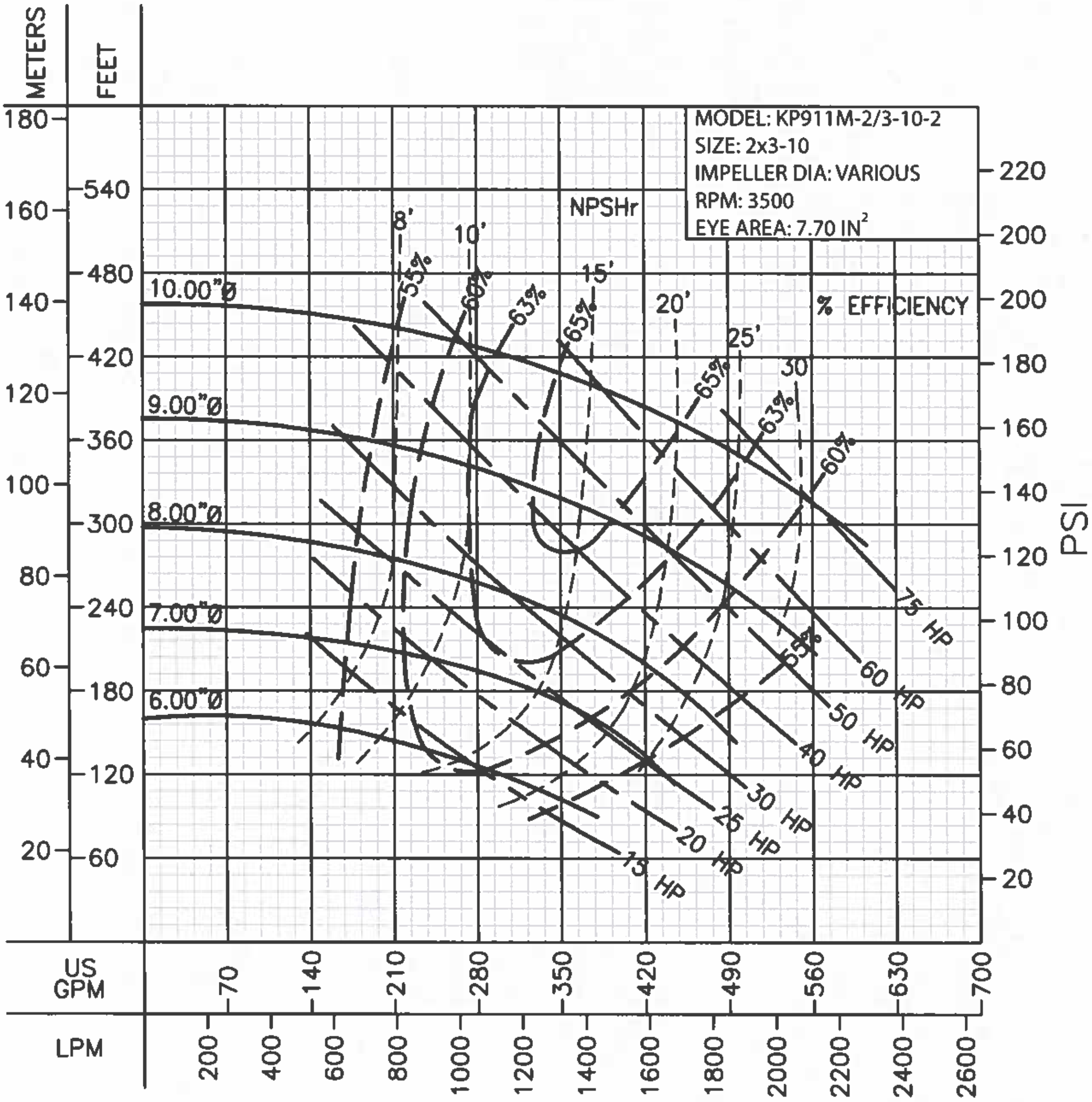
KEEN PUMP®



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



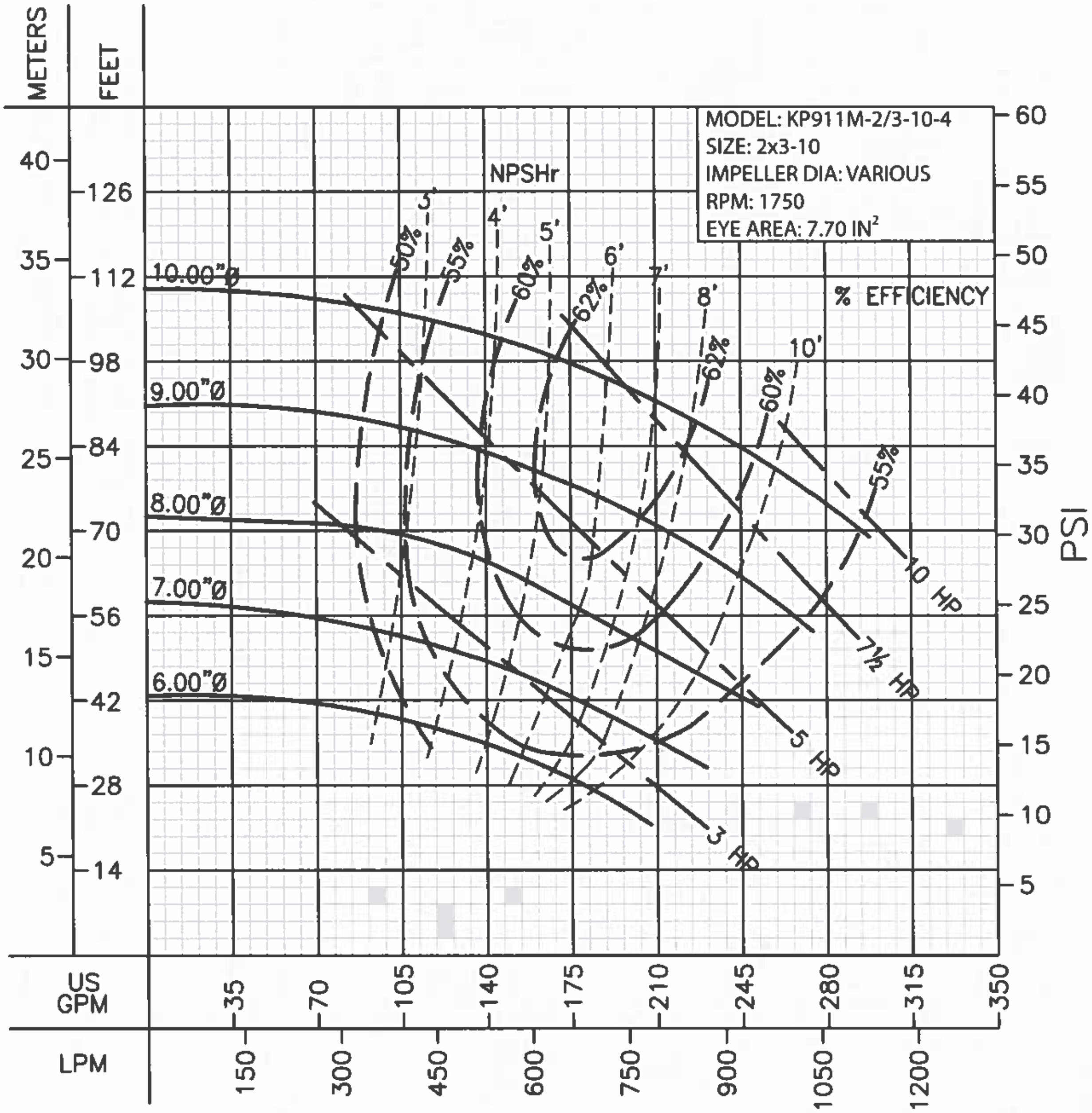
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

KEEN PUMP®

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**

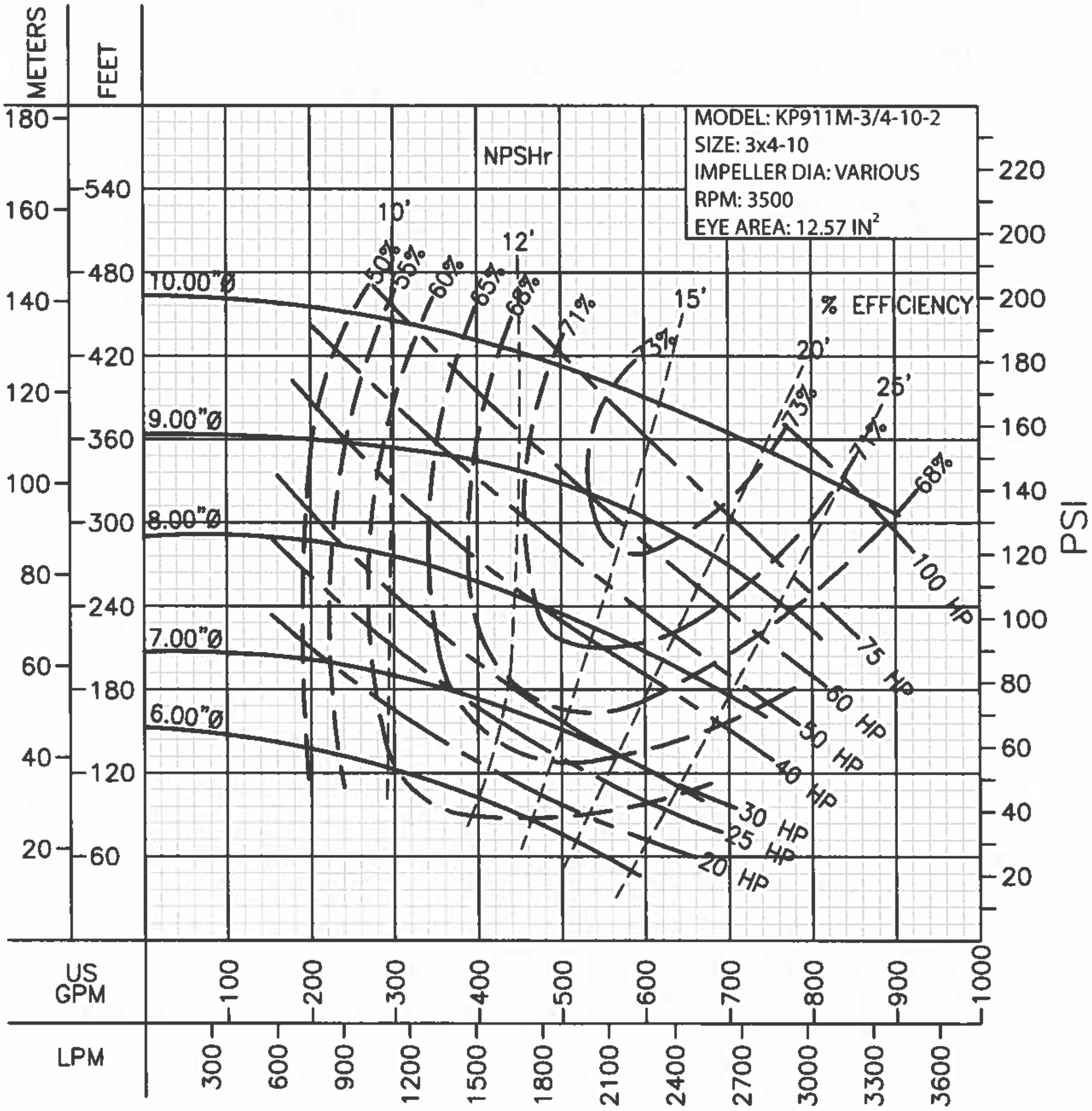


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

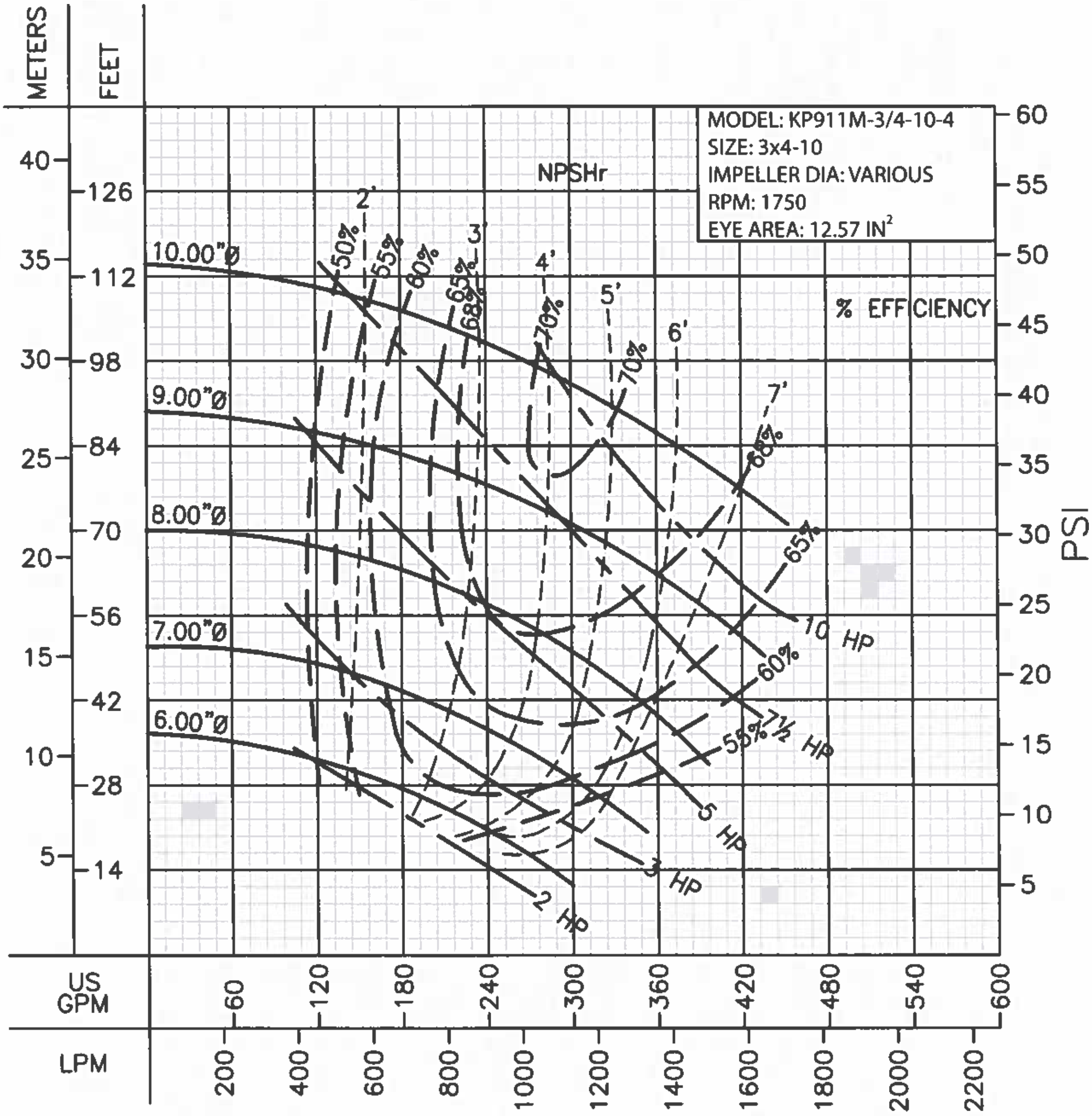
KEEN PUMP®



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

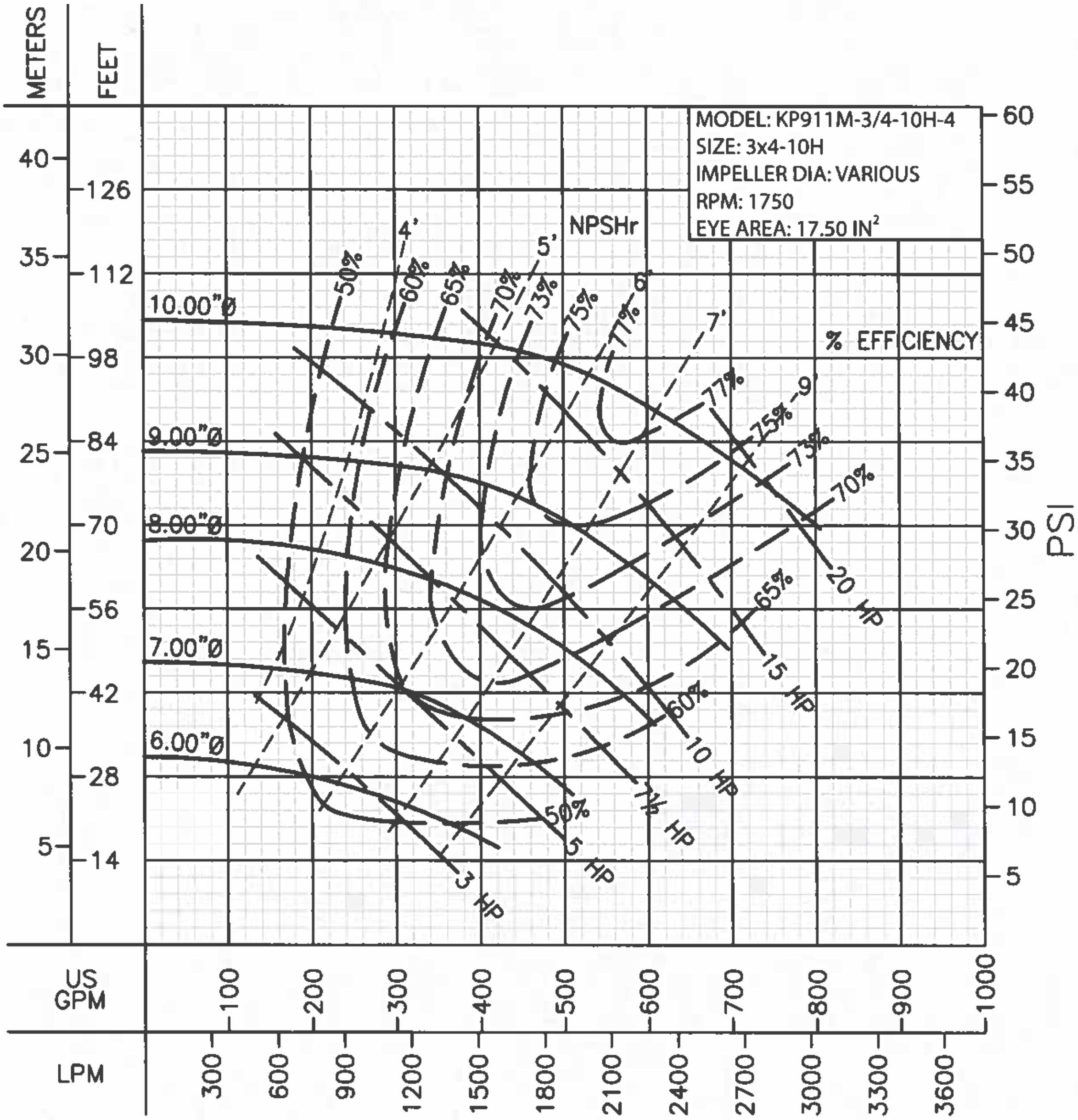
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

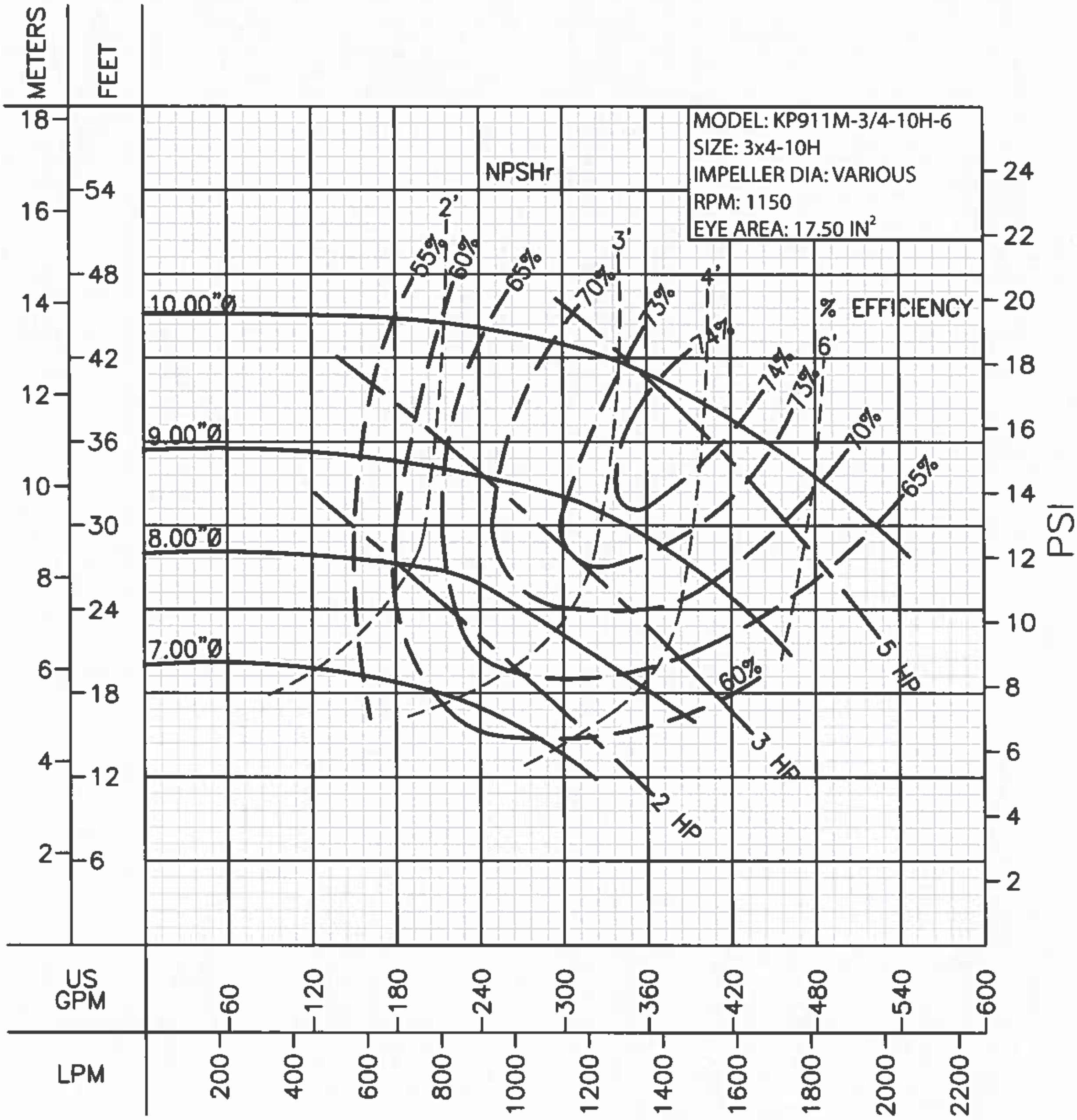
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

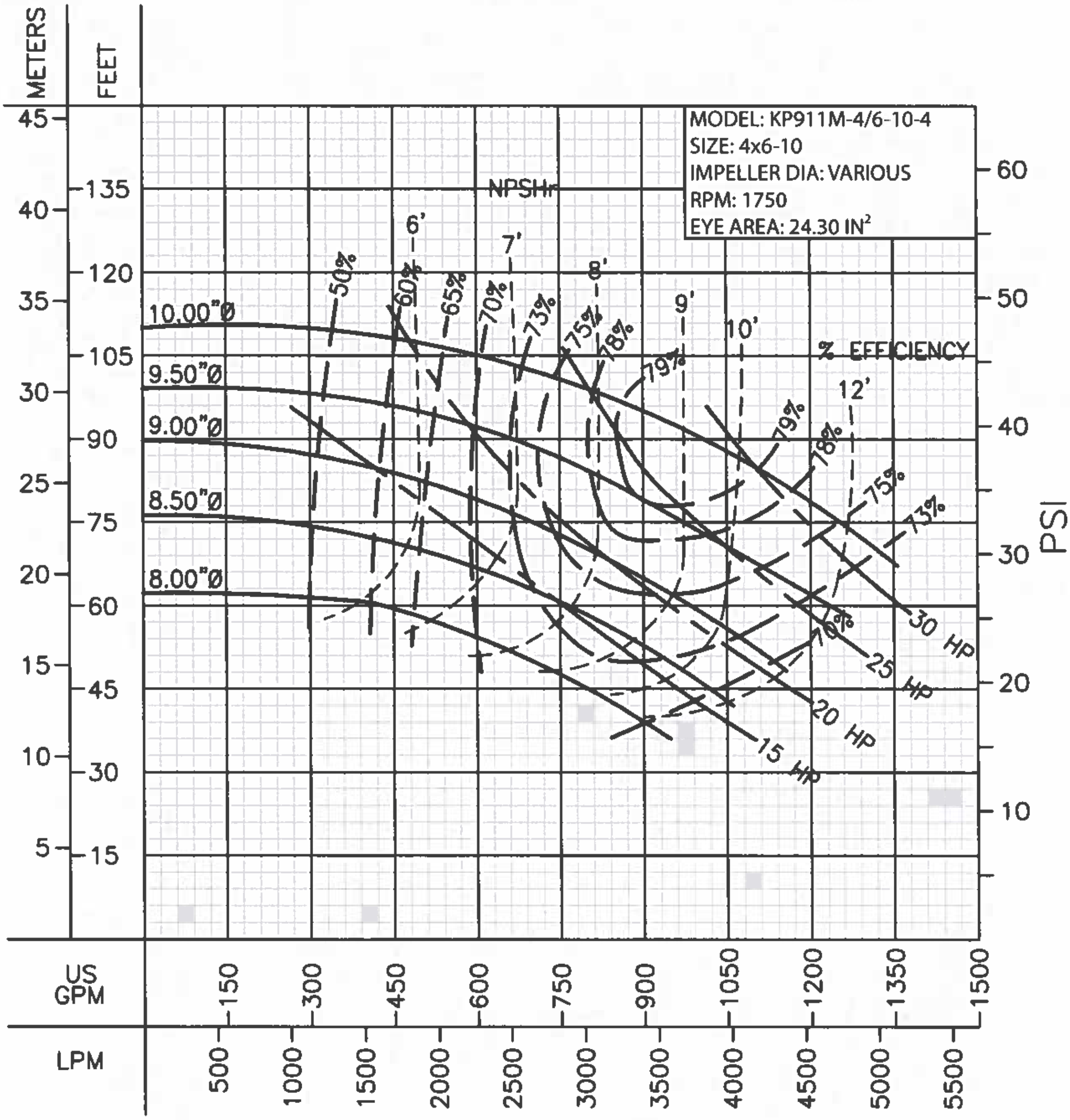


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

PERFORMANCE CURVES

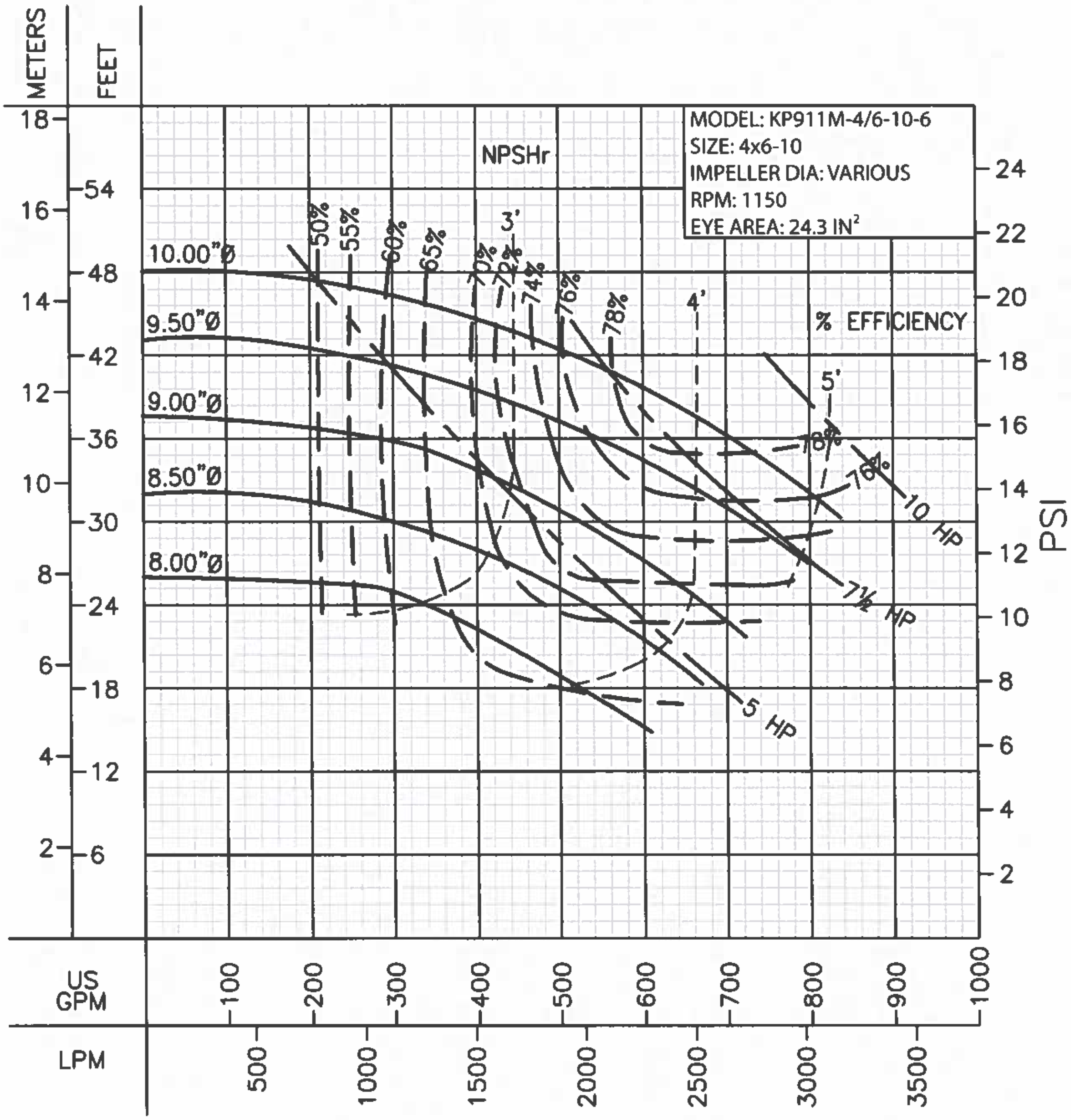
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .875 in

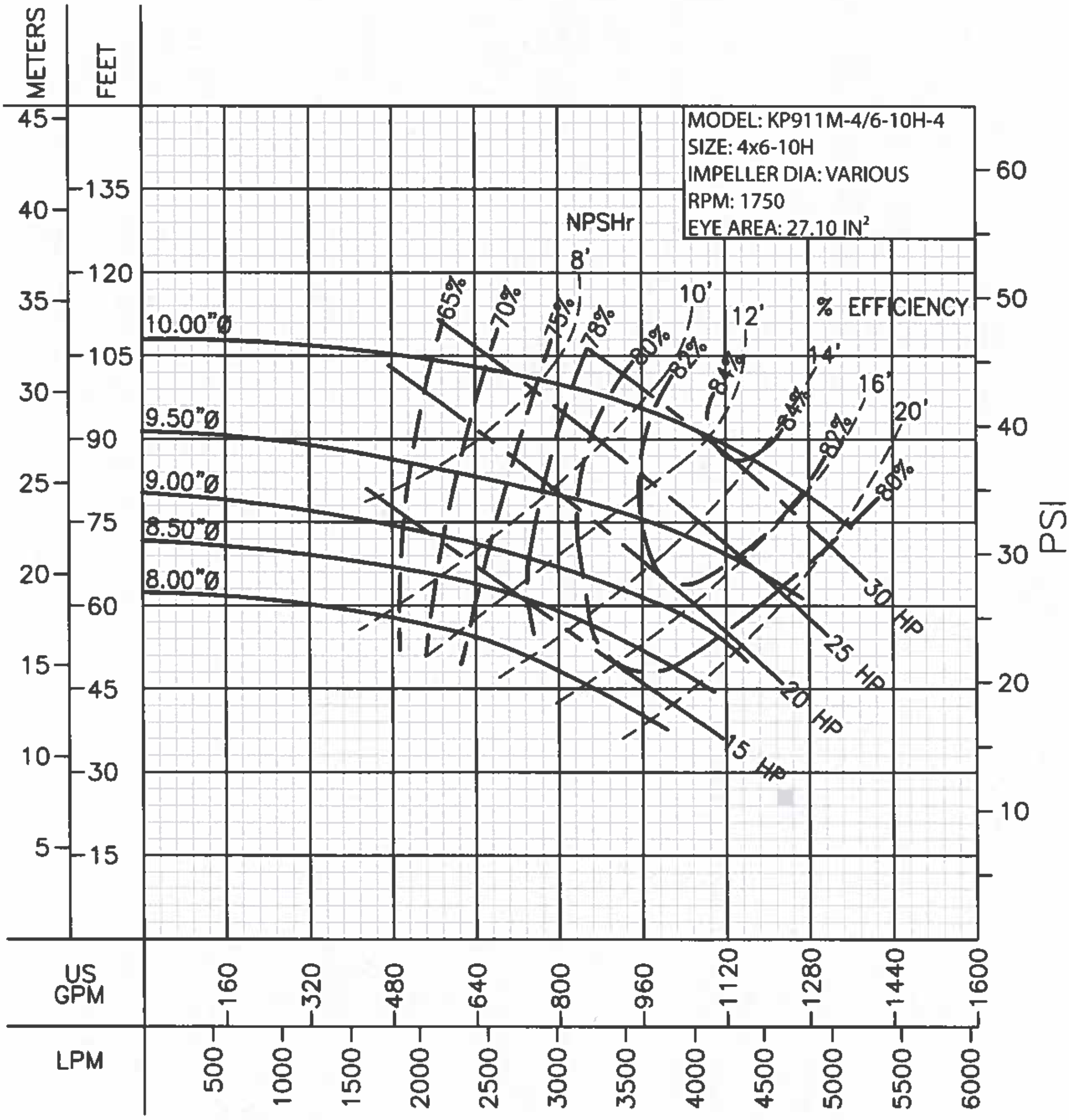
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .875 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

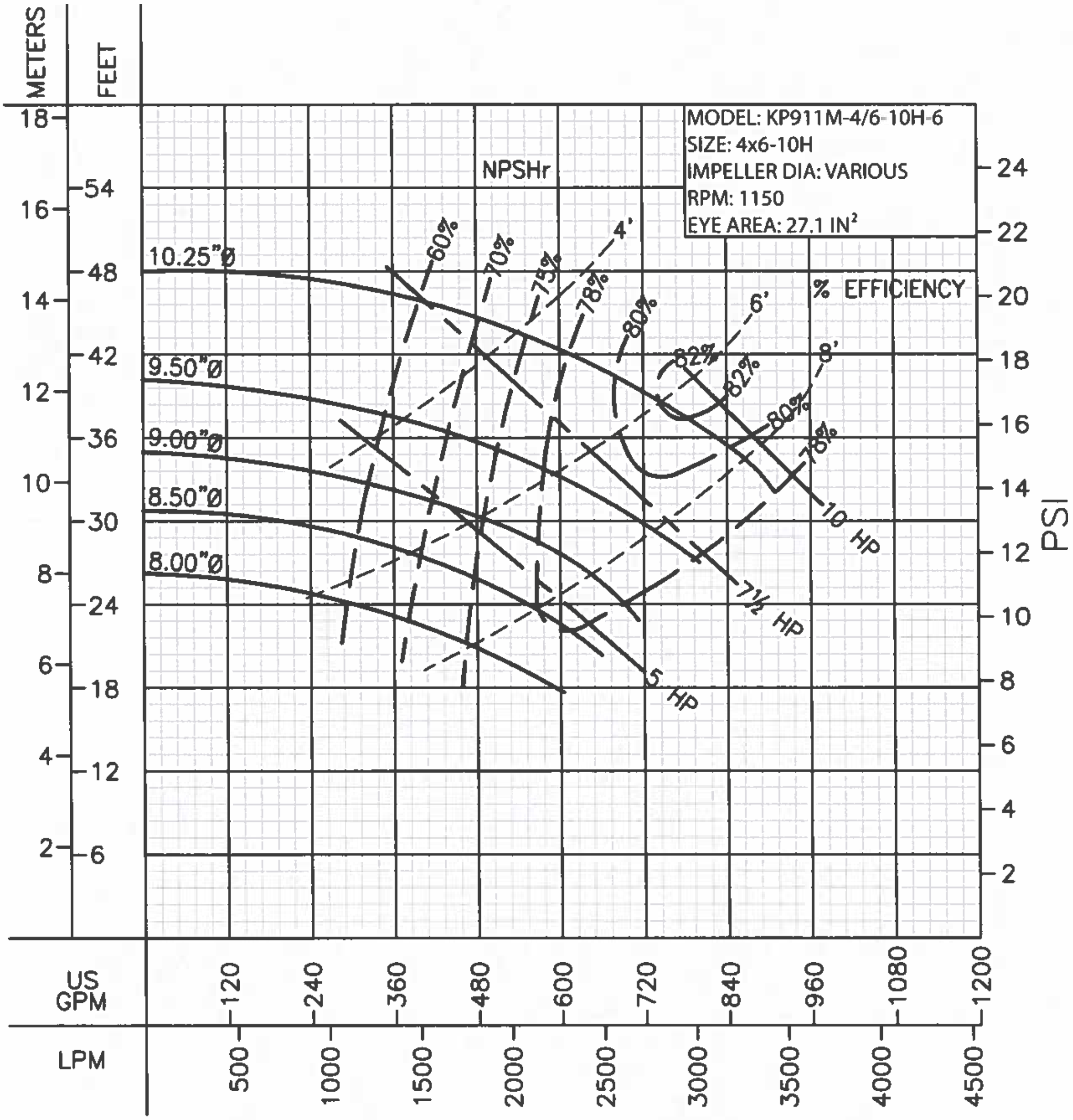


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

PERFORMANCE CURVES

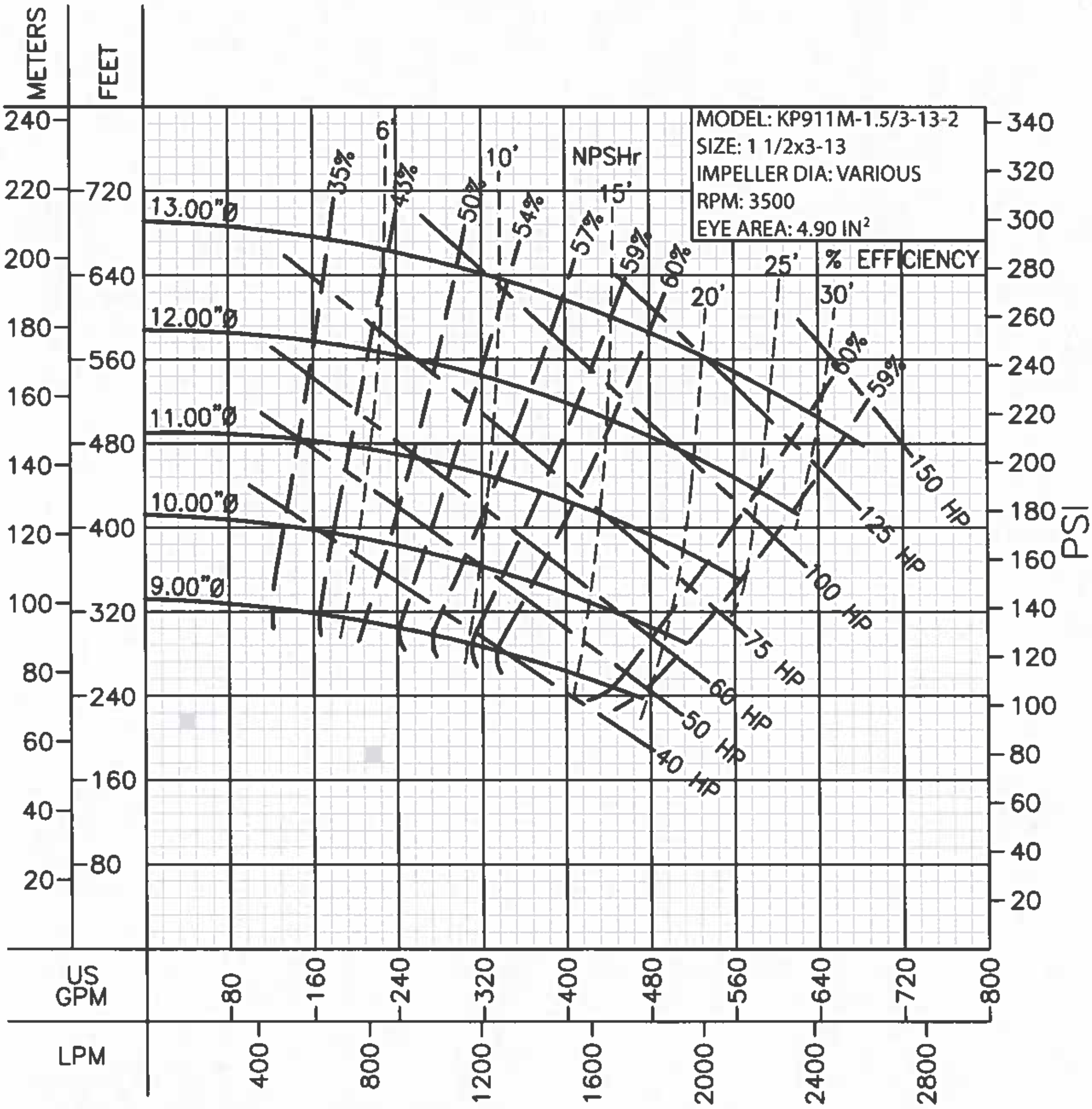
ANSI Centrifugal
Process Pumps
Series: **911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

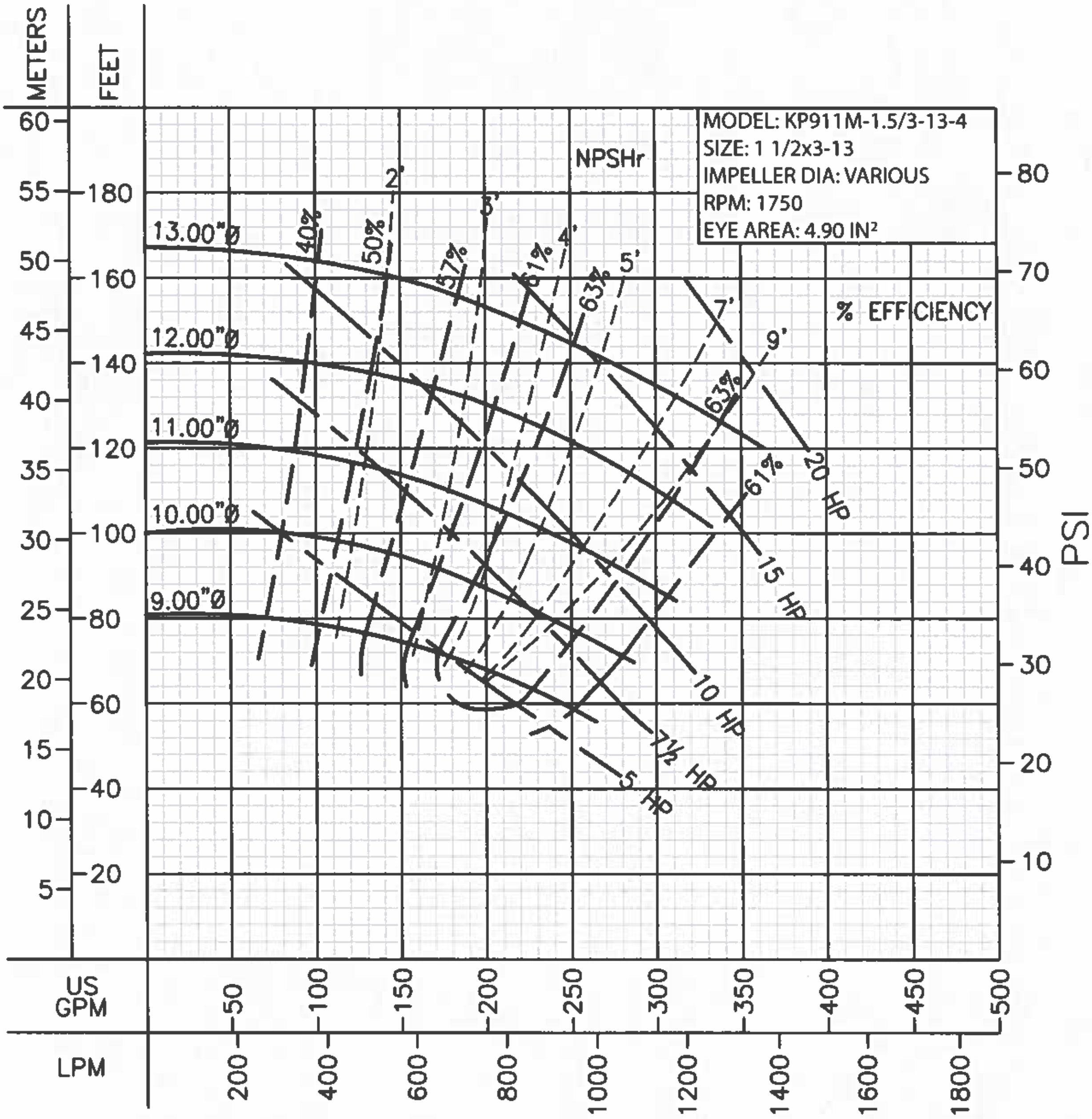
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

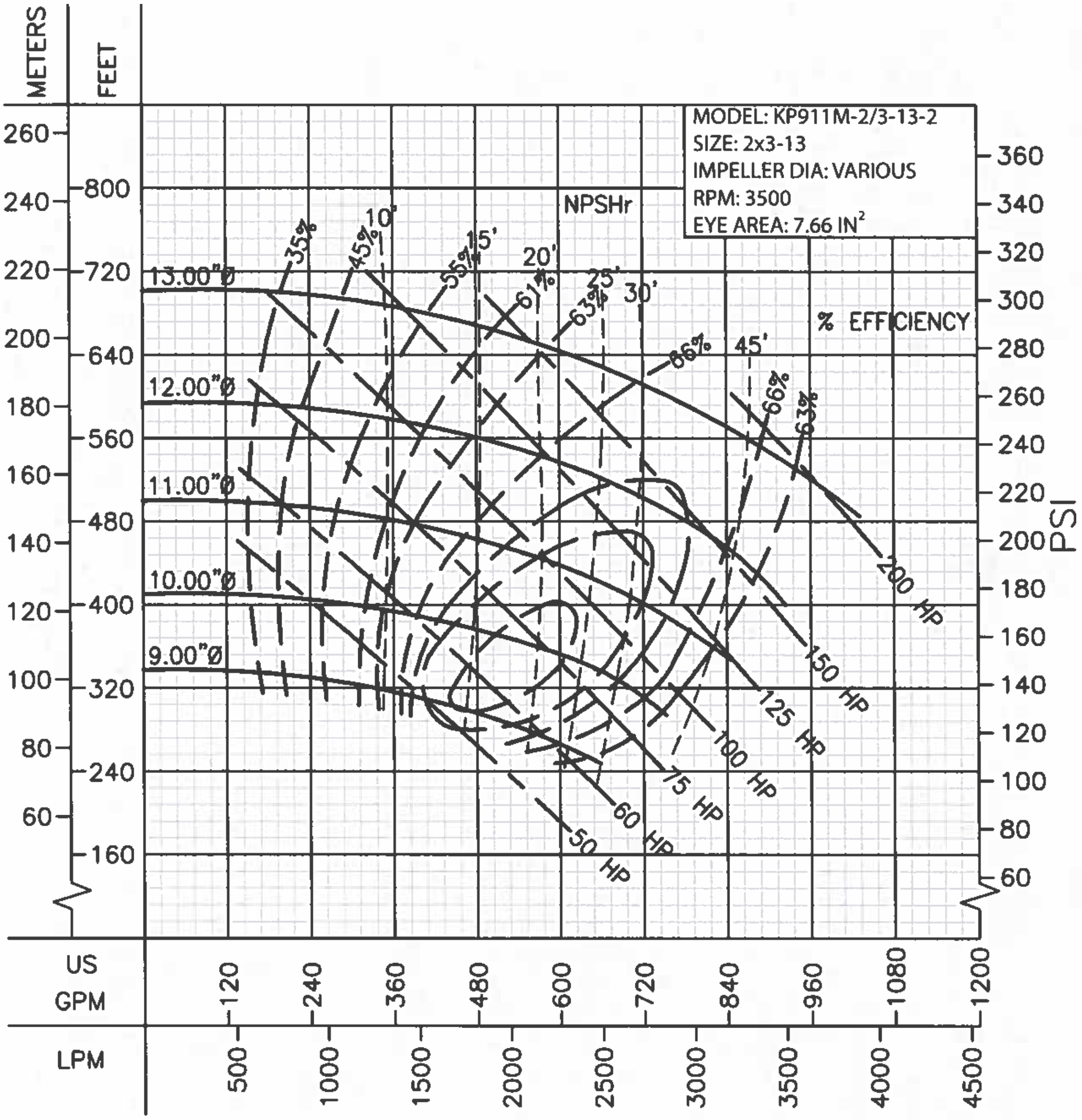
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

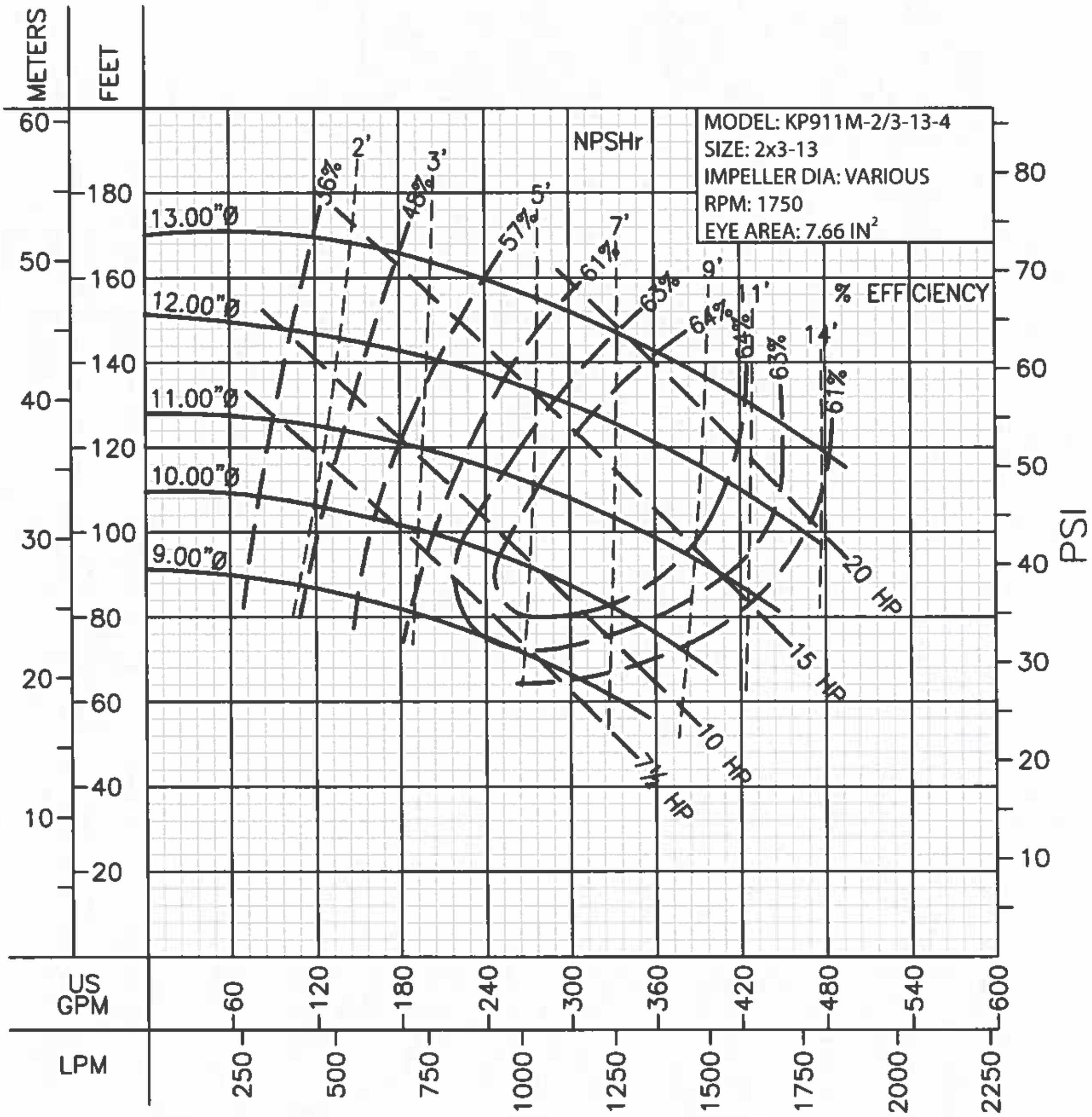
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .690 in

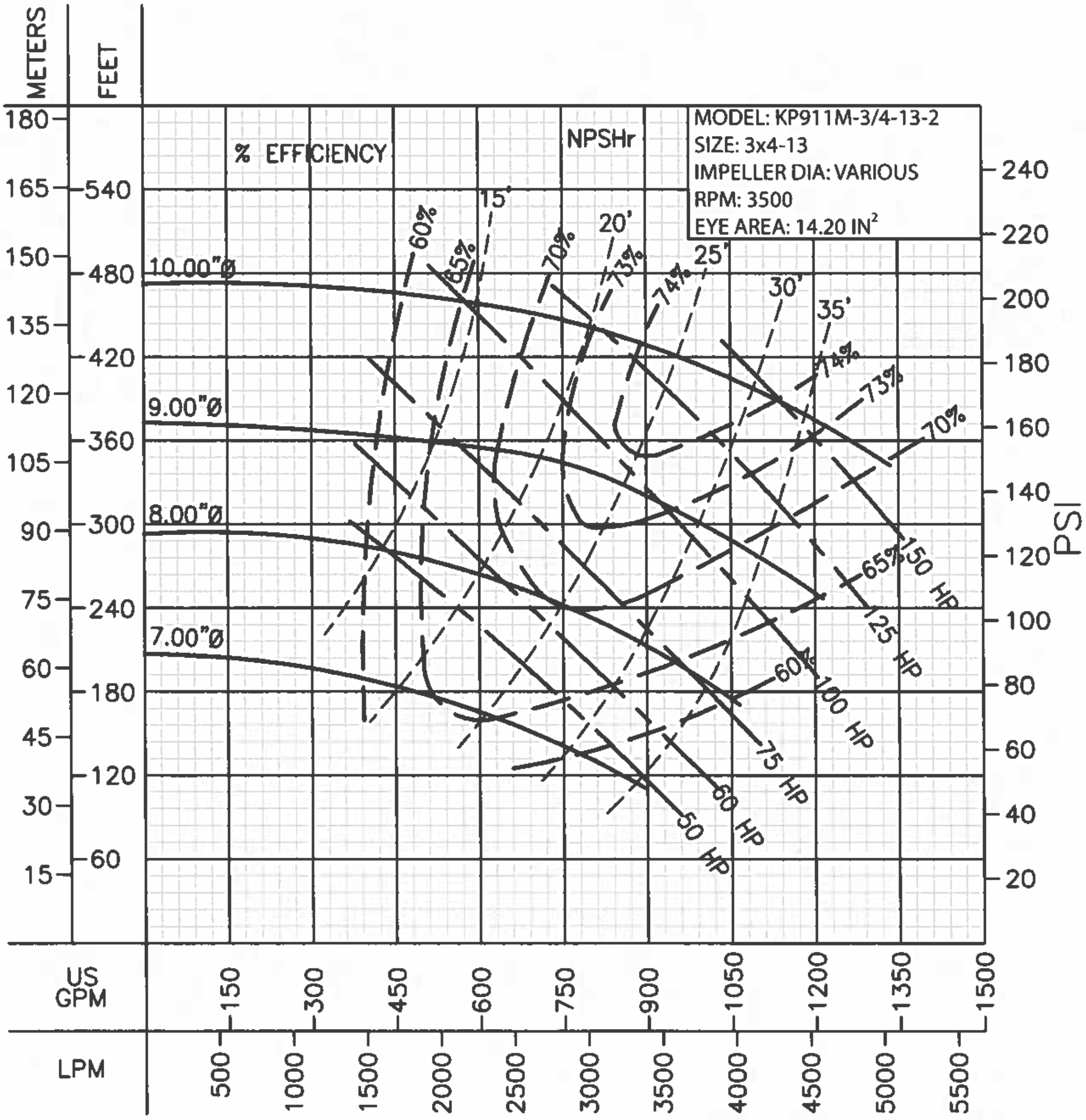
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .690 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

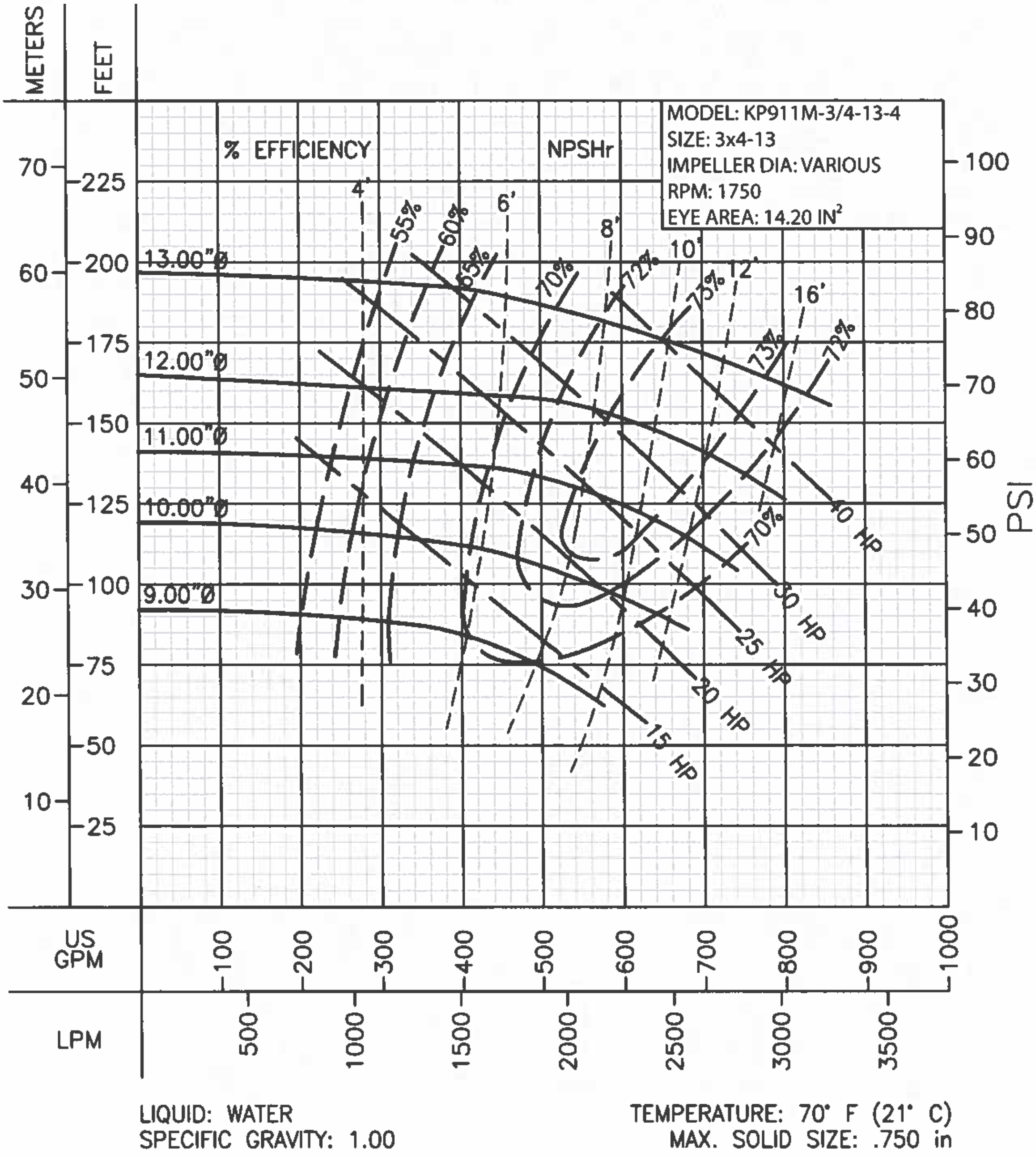


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

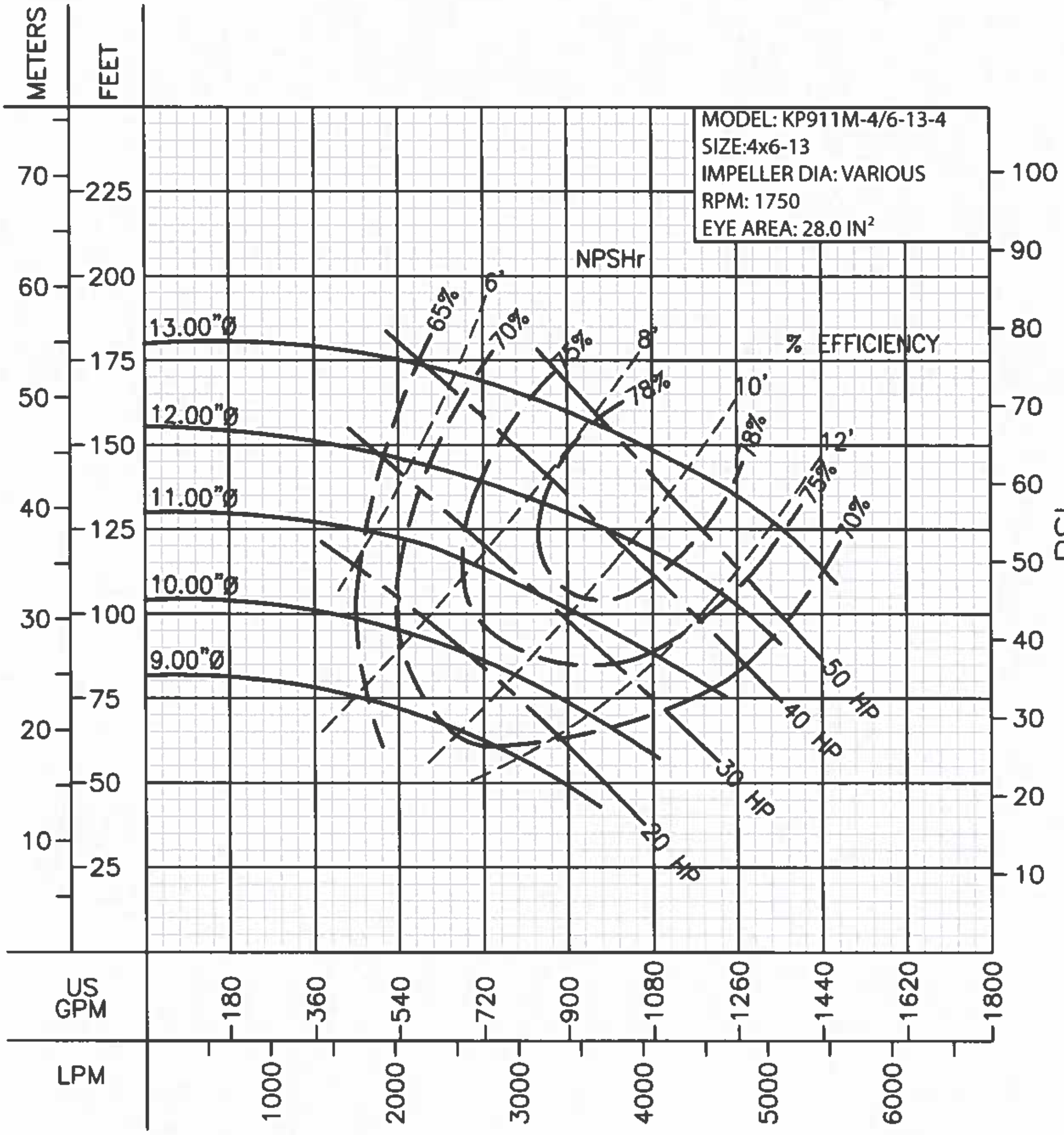
TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**



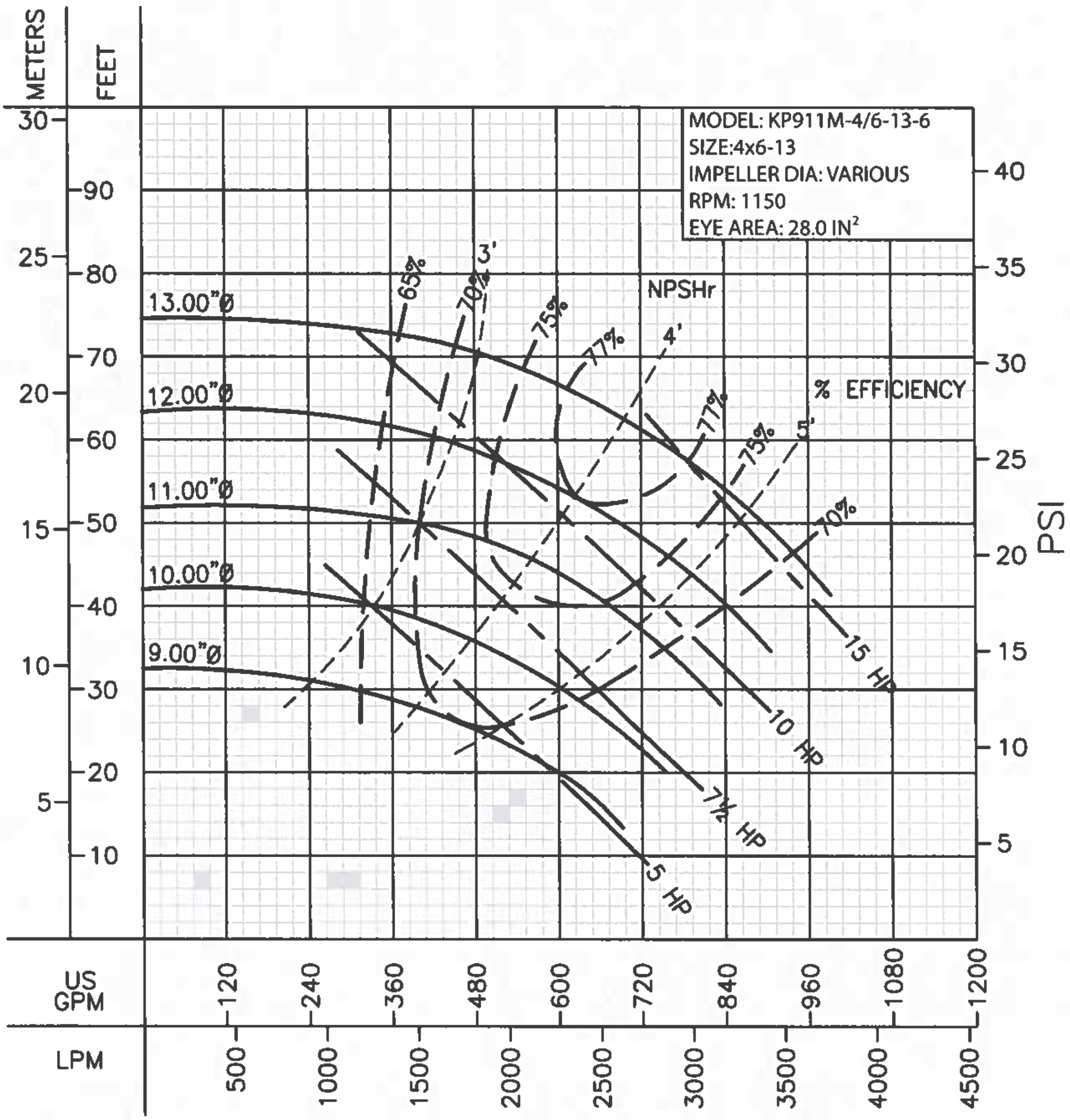
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .930 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

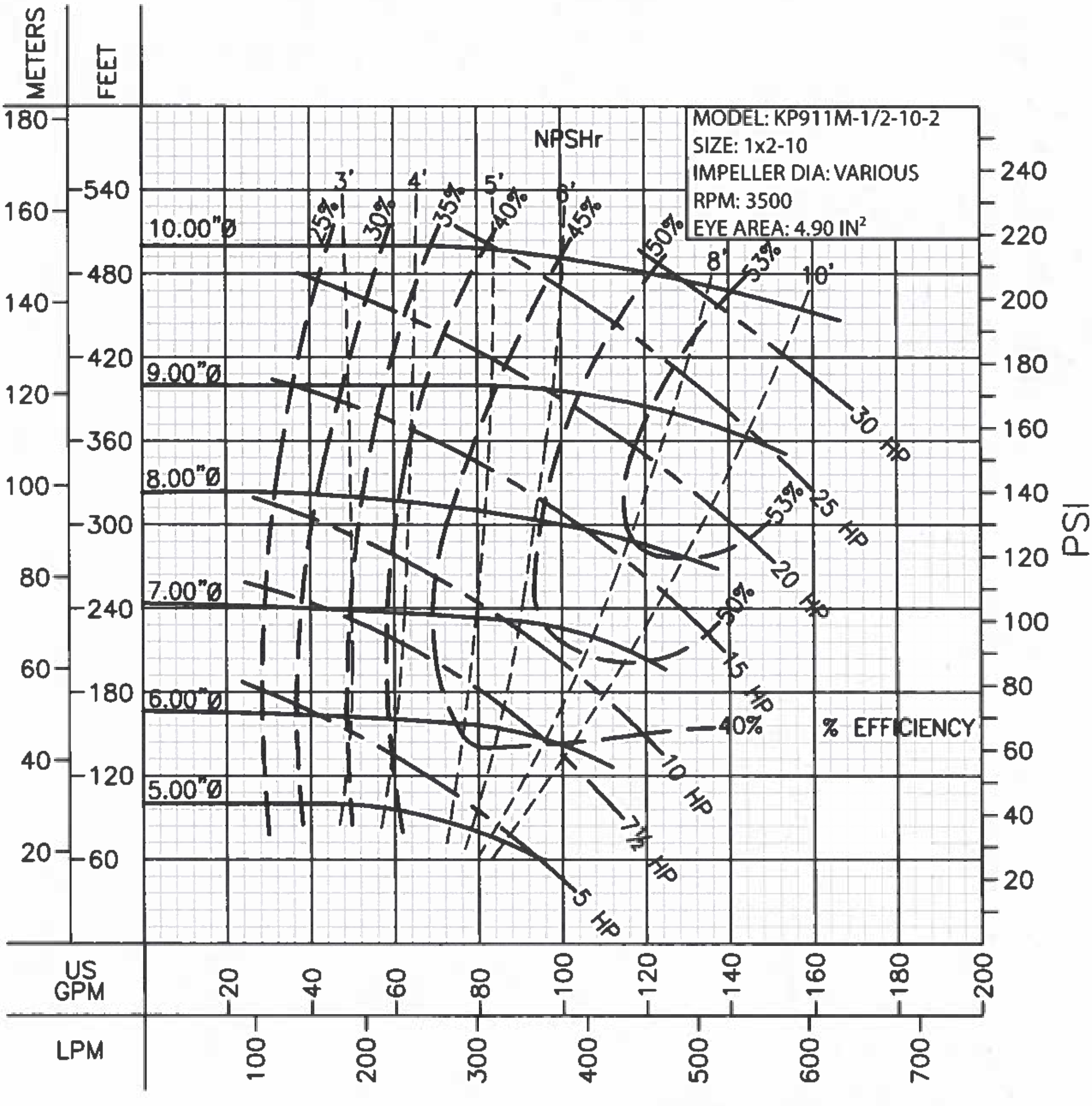


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .930 in

PERFORMANCE CURVES

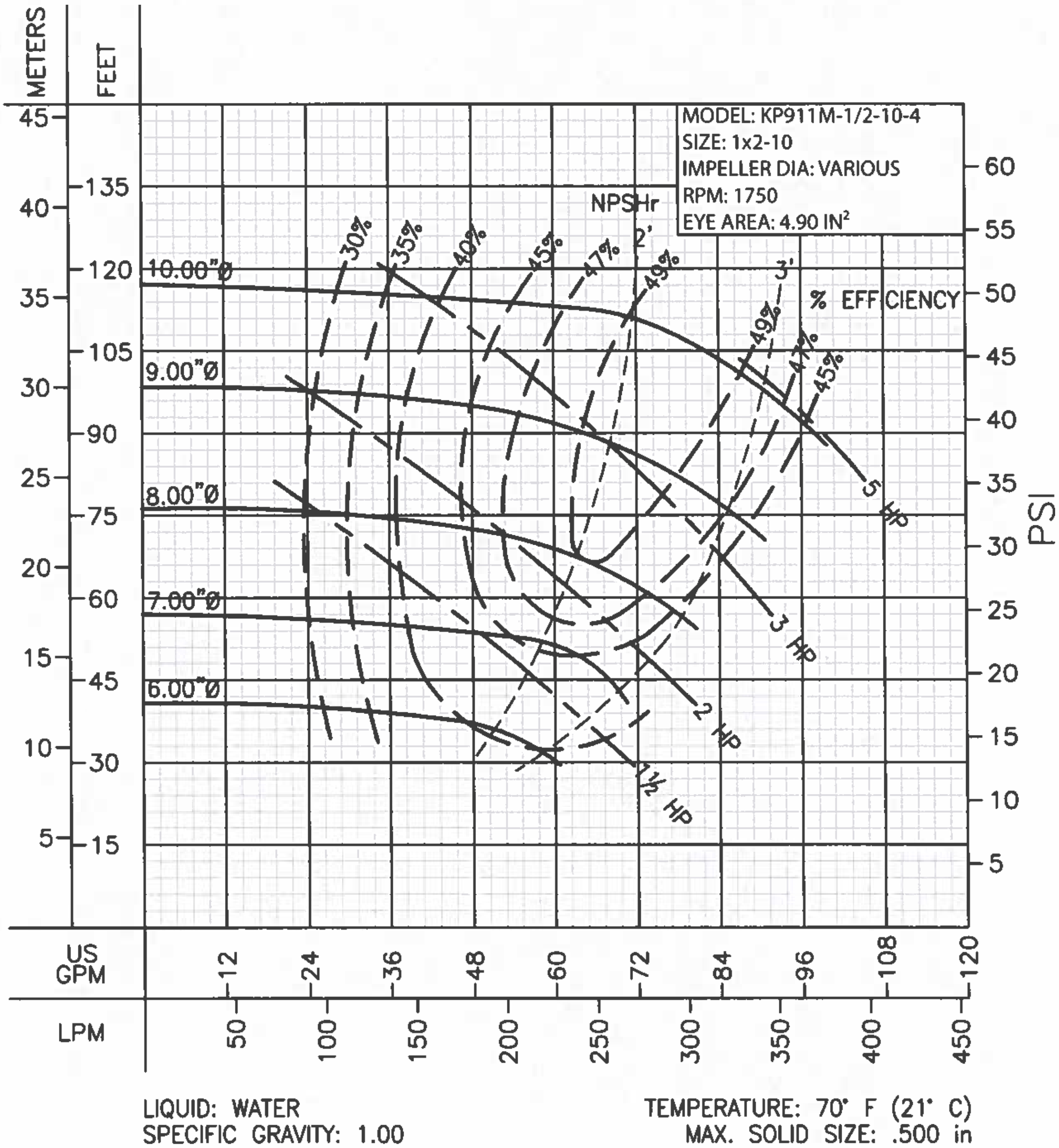
ANSI Centrifugal
Process Pumps
Series: **KP911M**



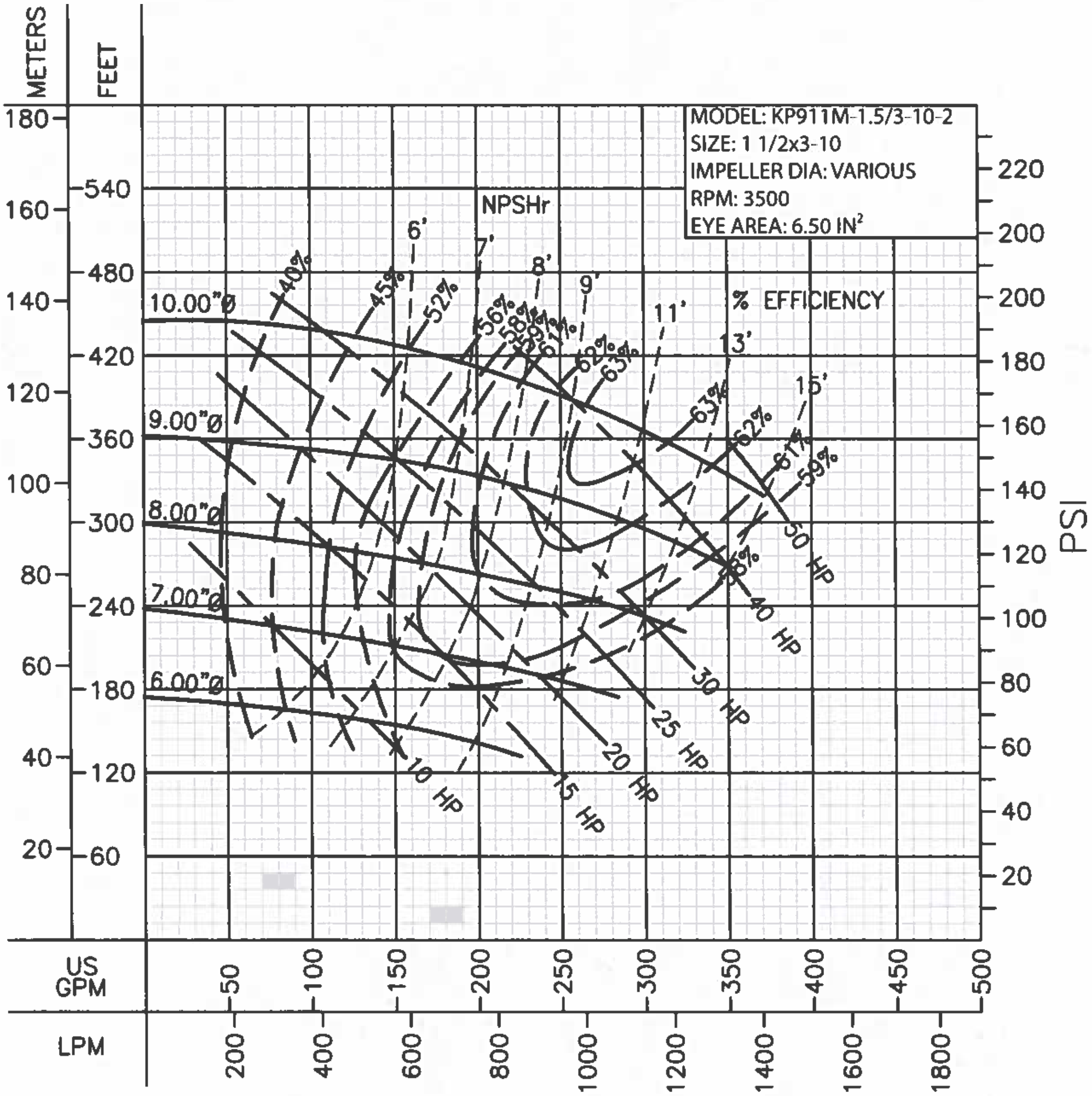
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

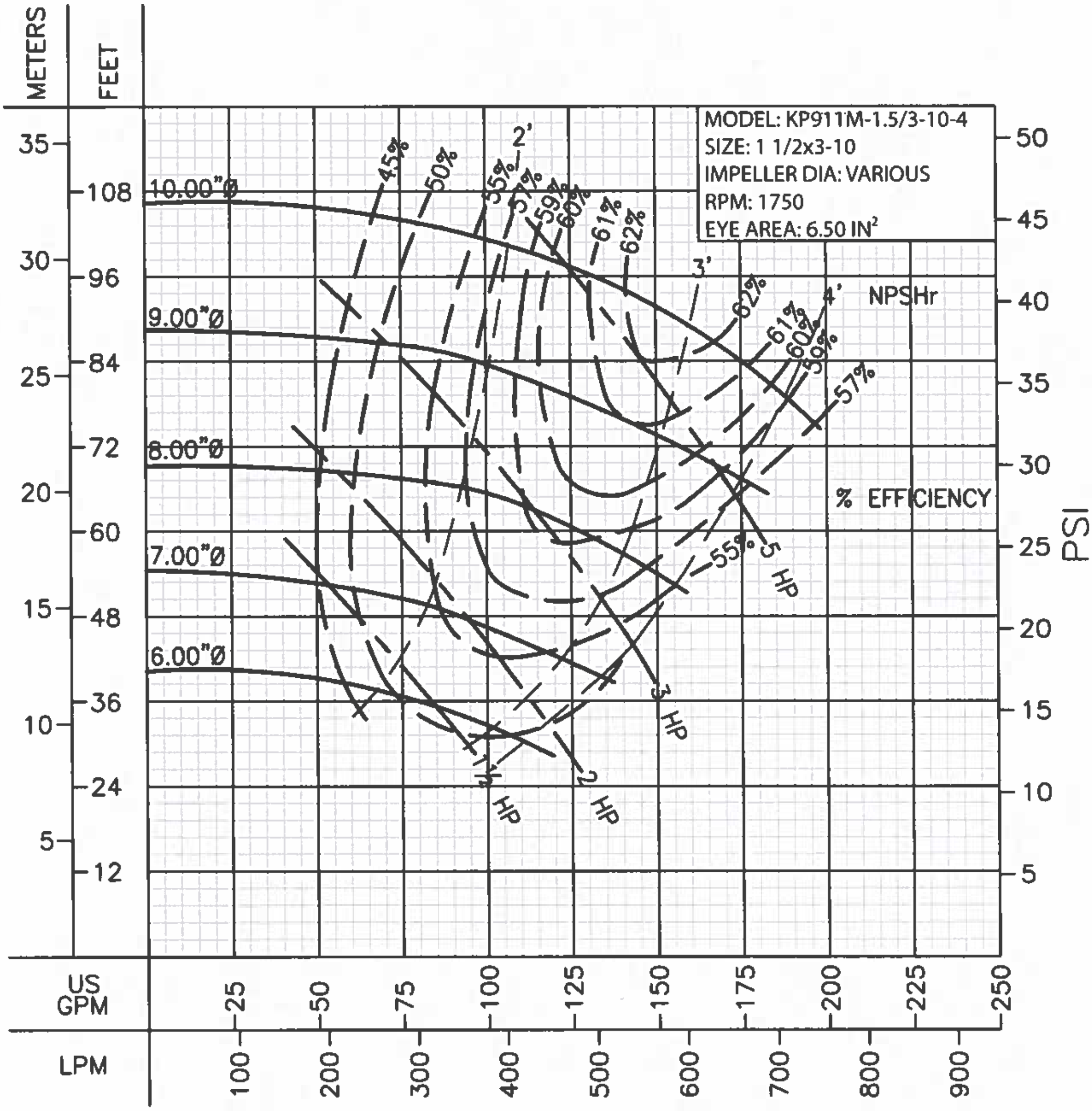


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

KEEN PUMP®

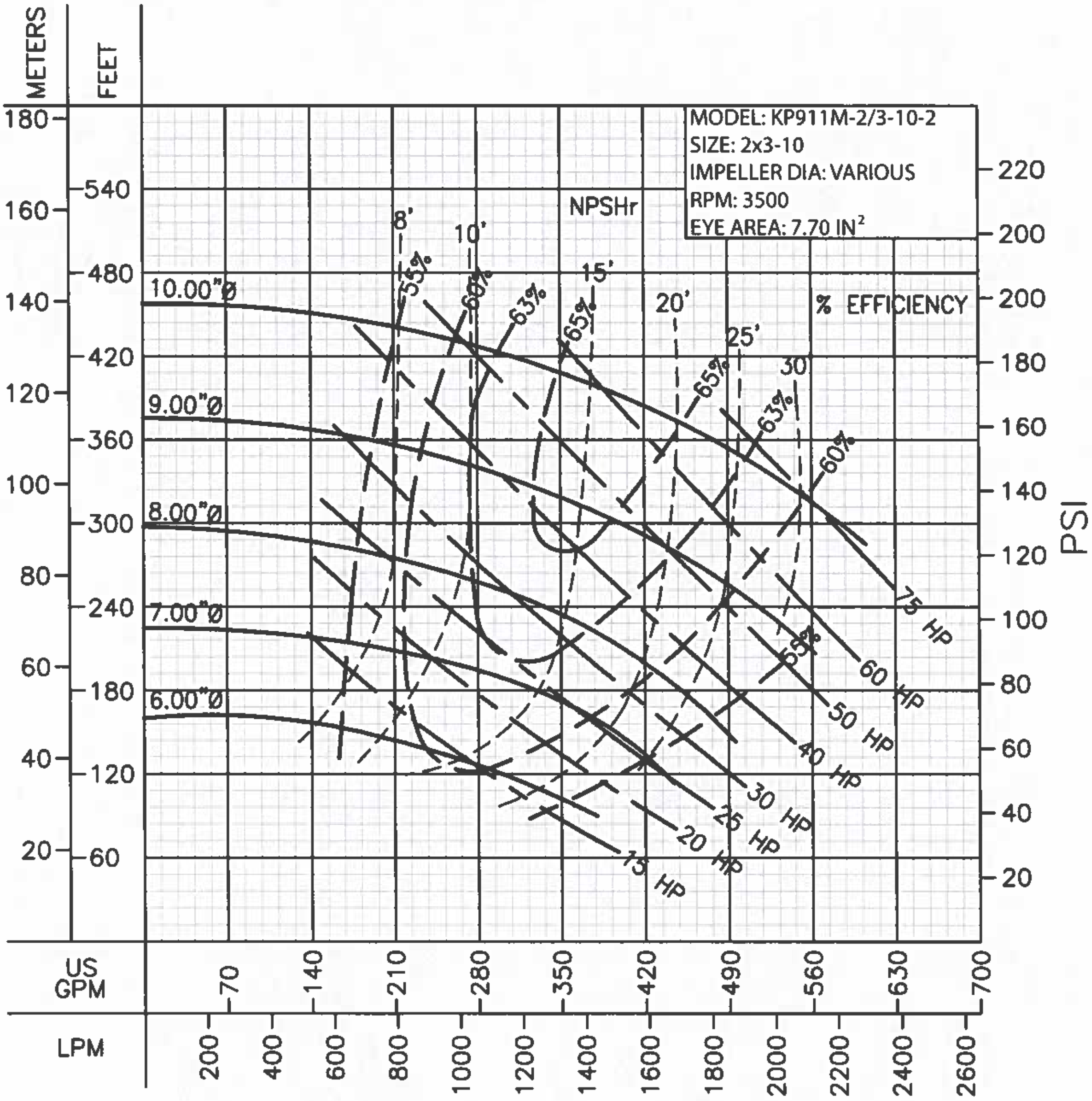
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

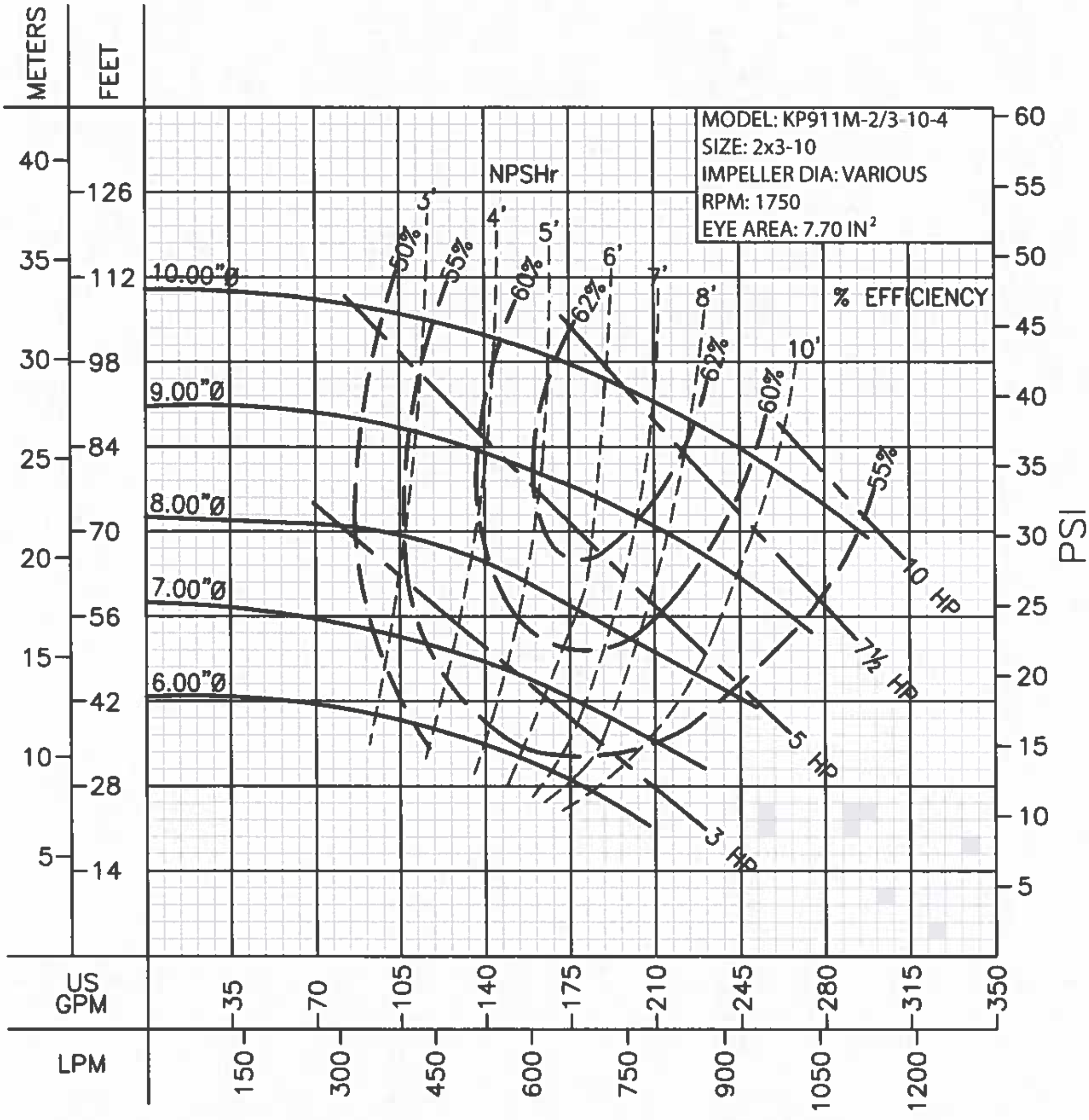


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

KEEN PUMP®

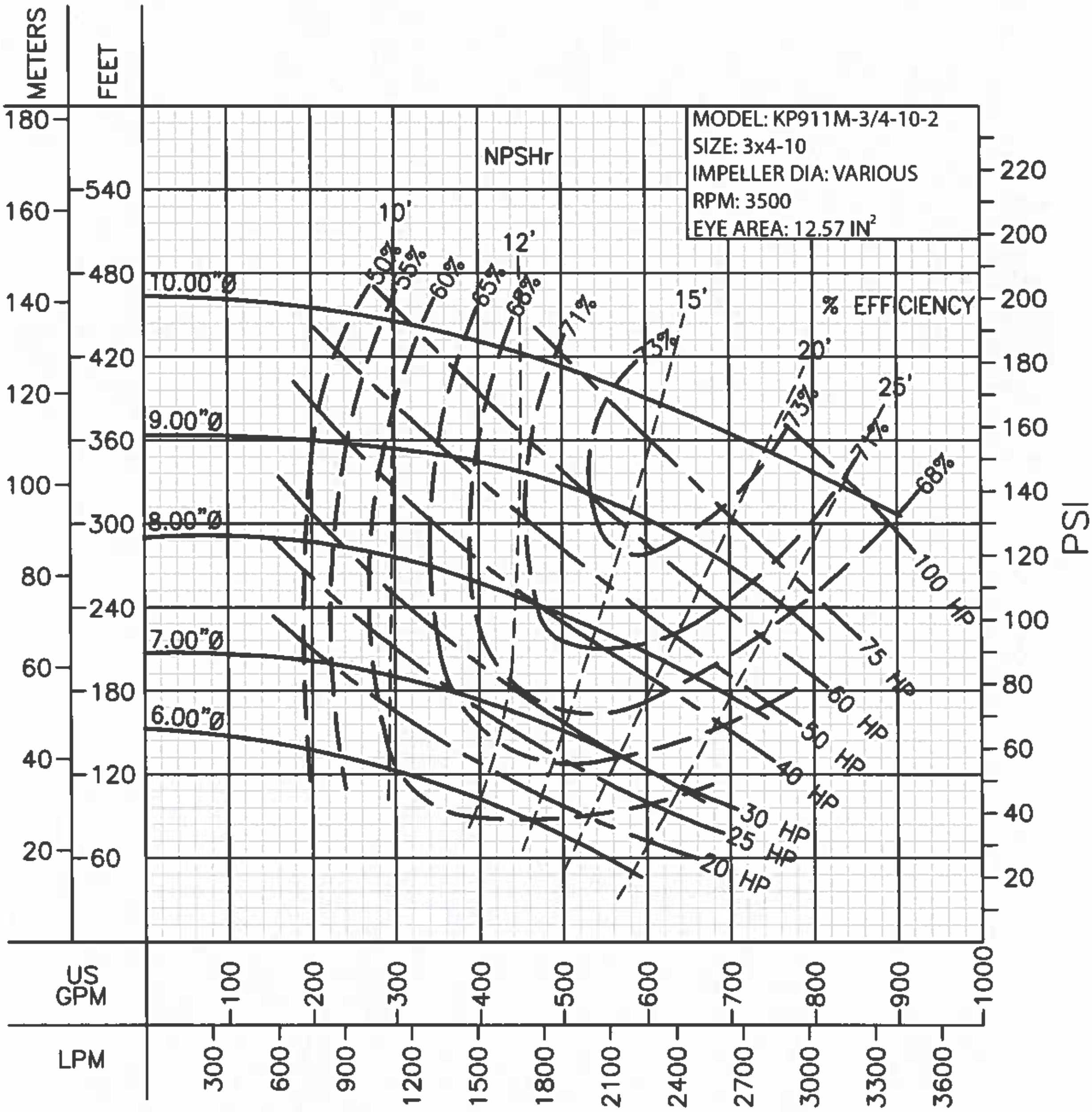
PERFORMANCE CURVES
ANSI Centrifugal Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

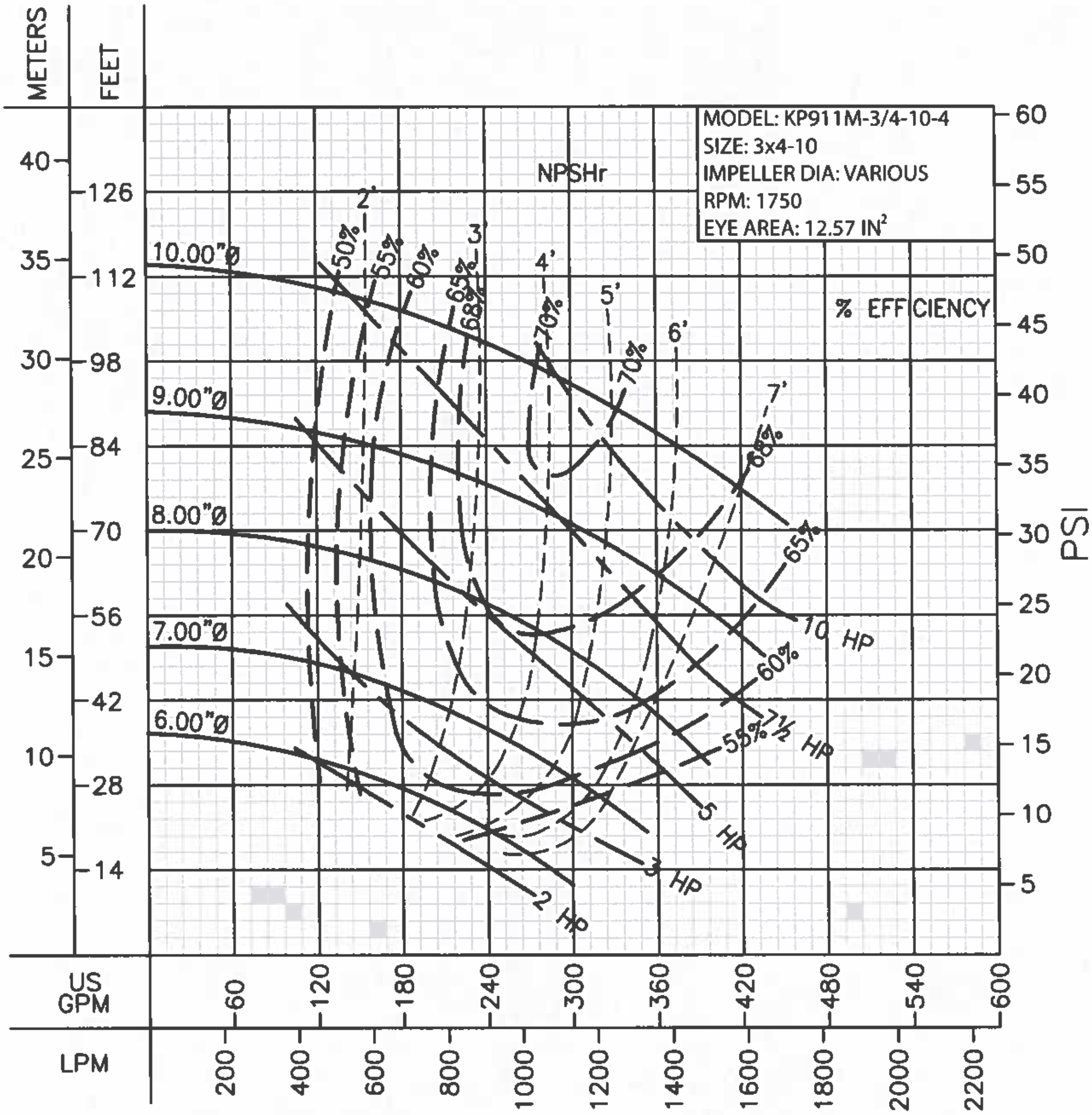
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

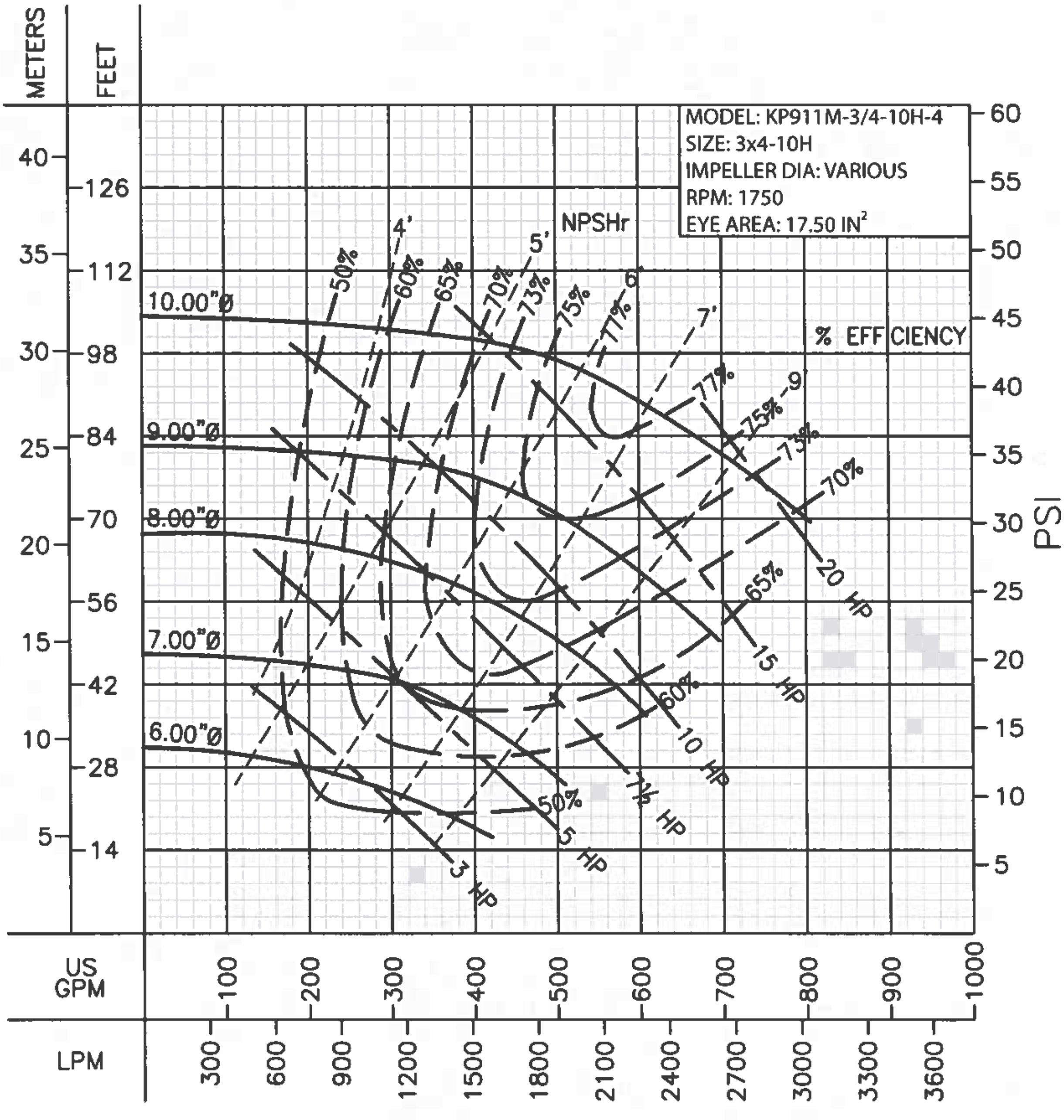
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

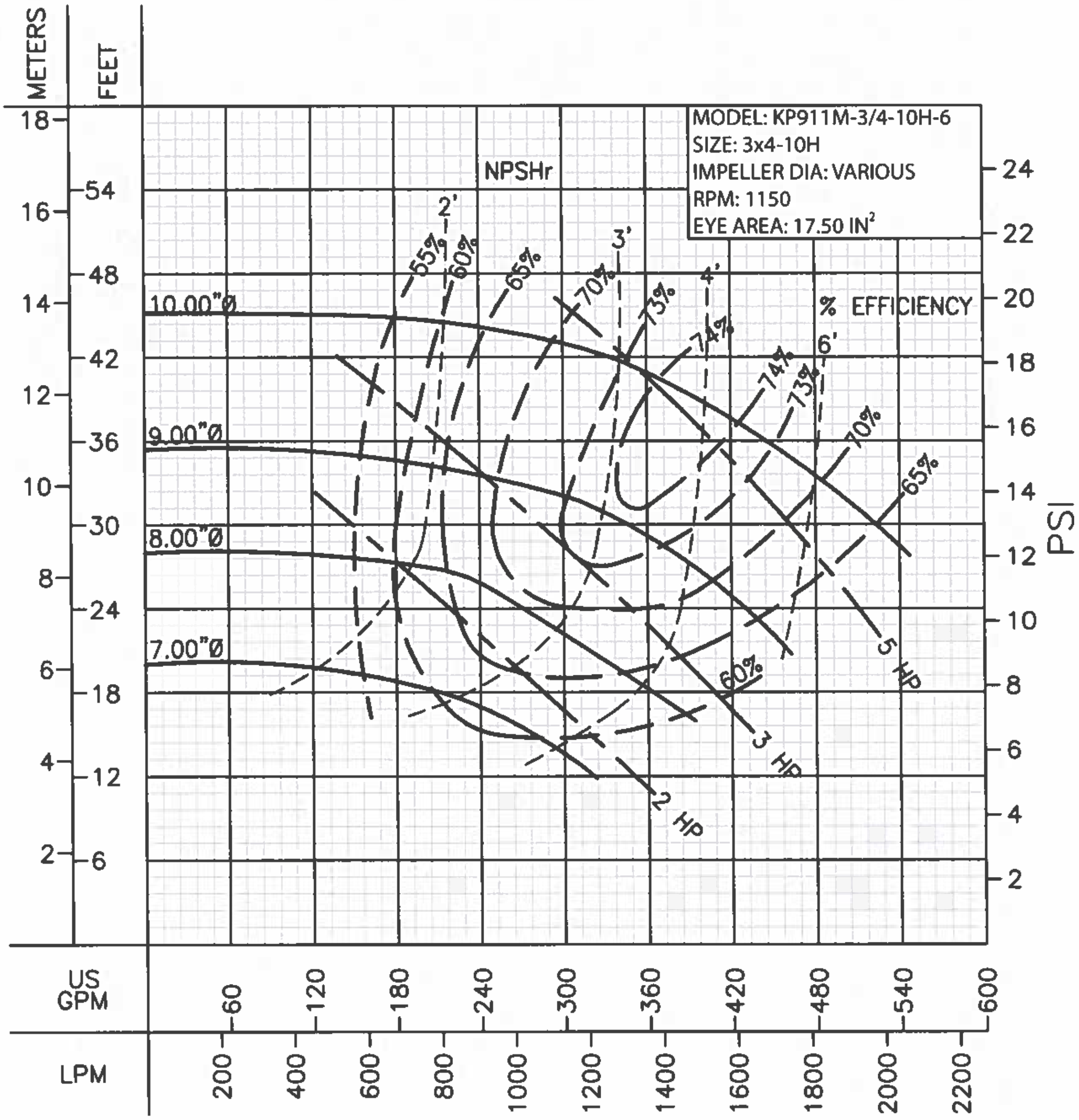
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

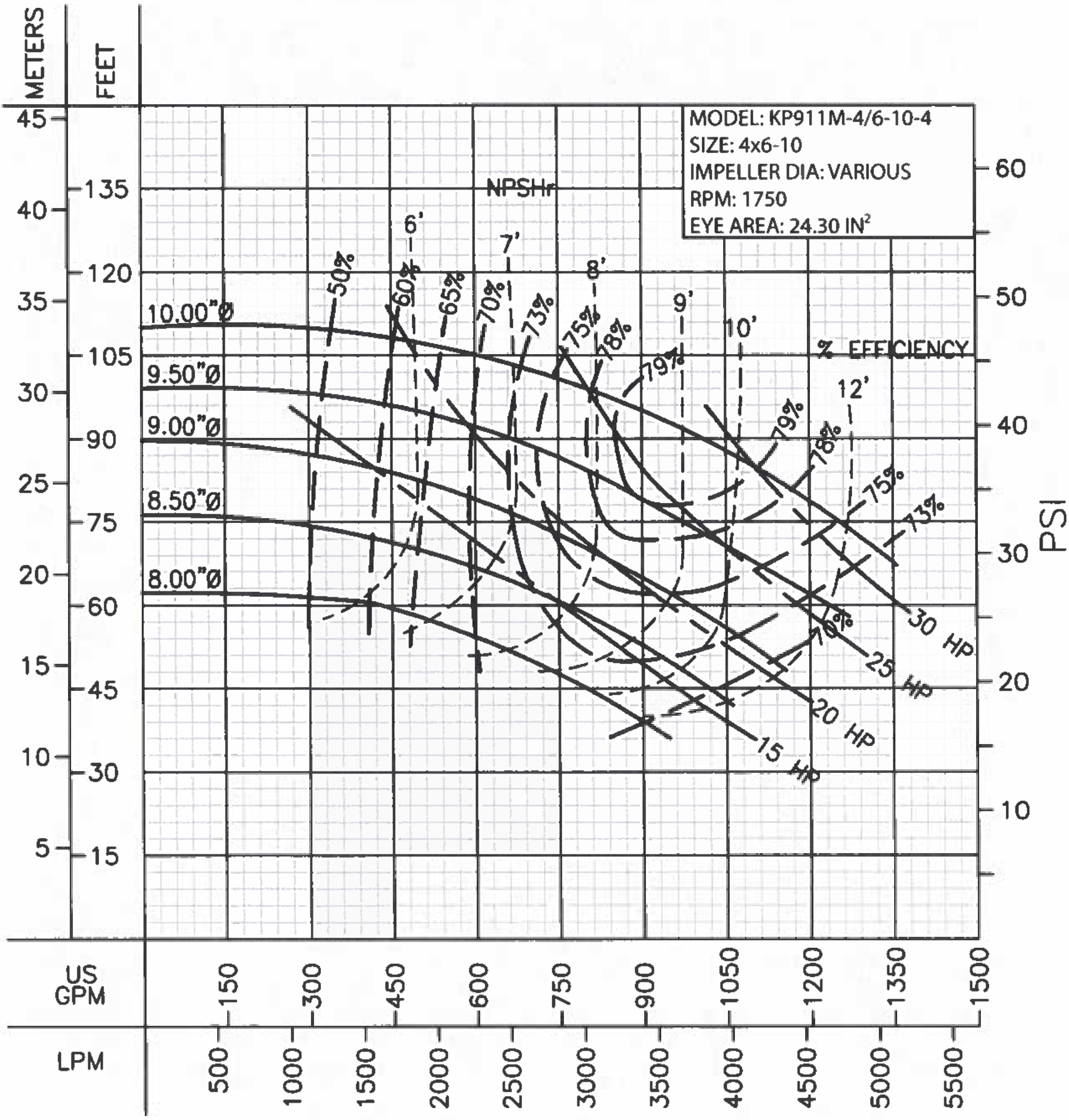


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

KEEN PUMP®

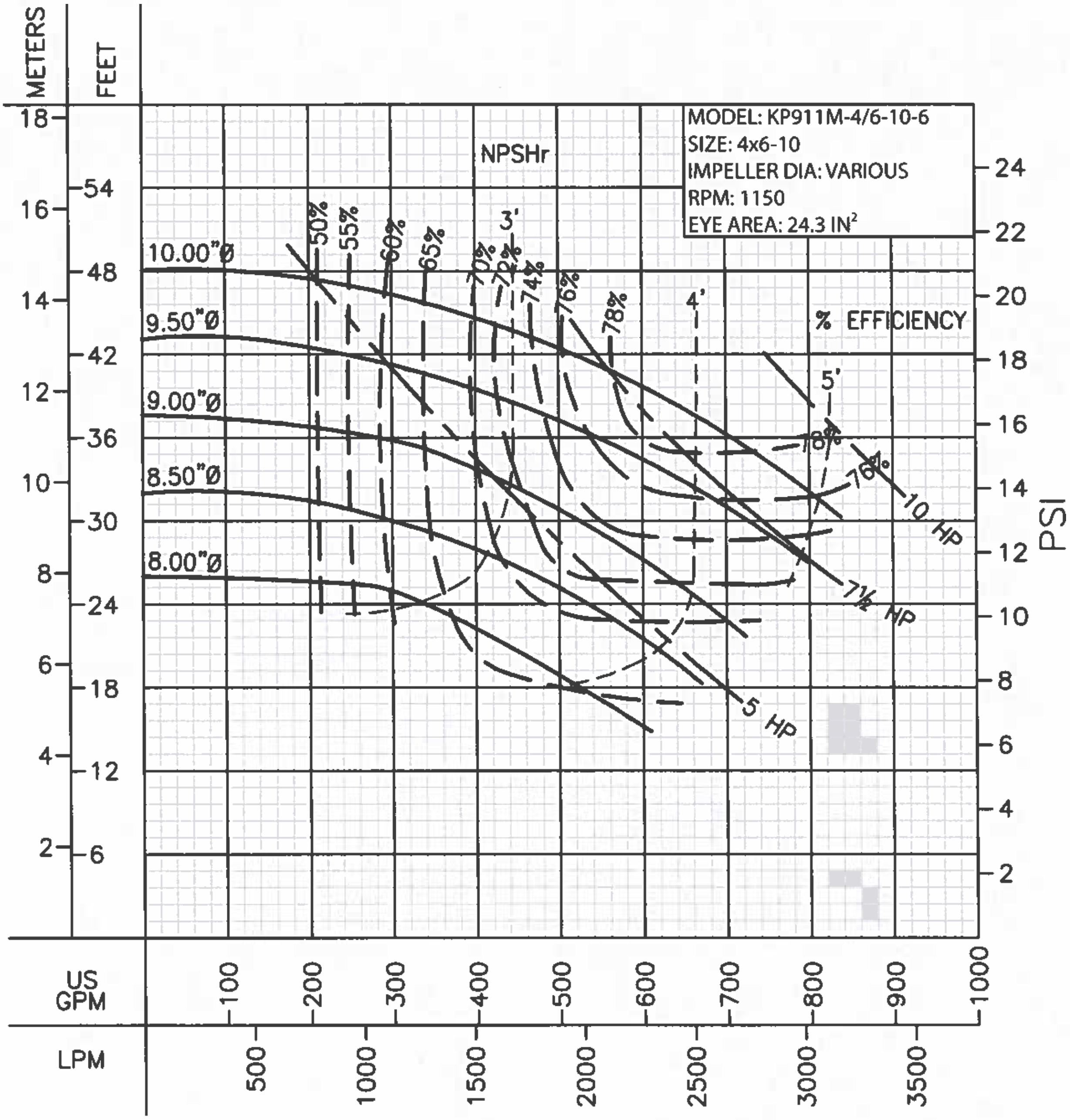


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .875 in

PERFORMANCE CURVES

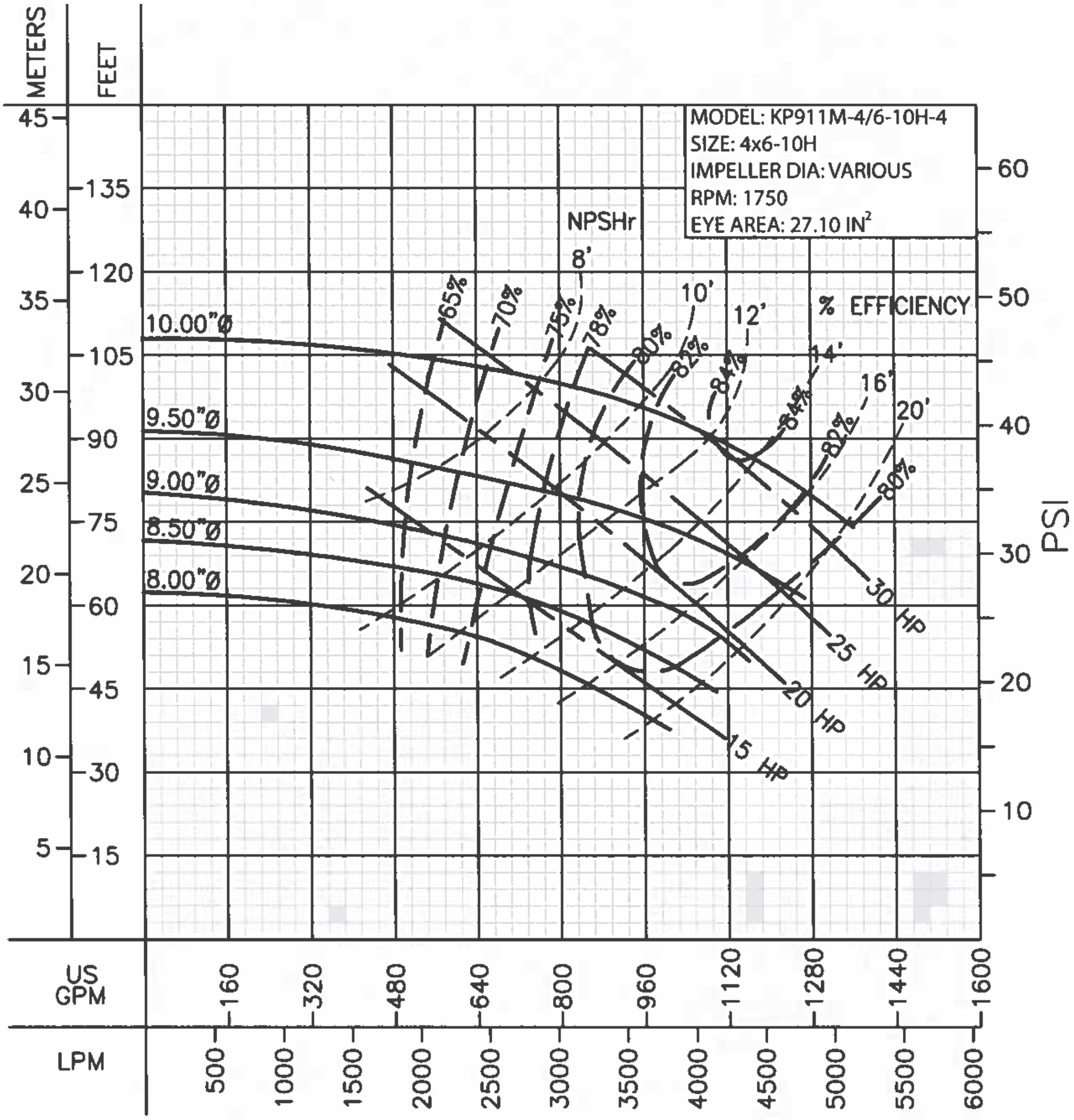
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .875 in

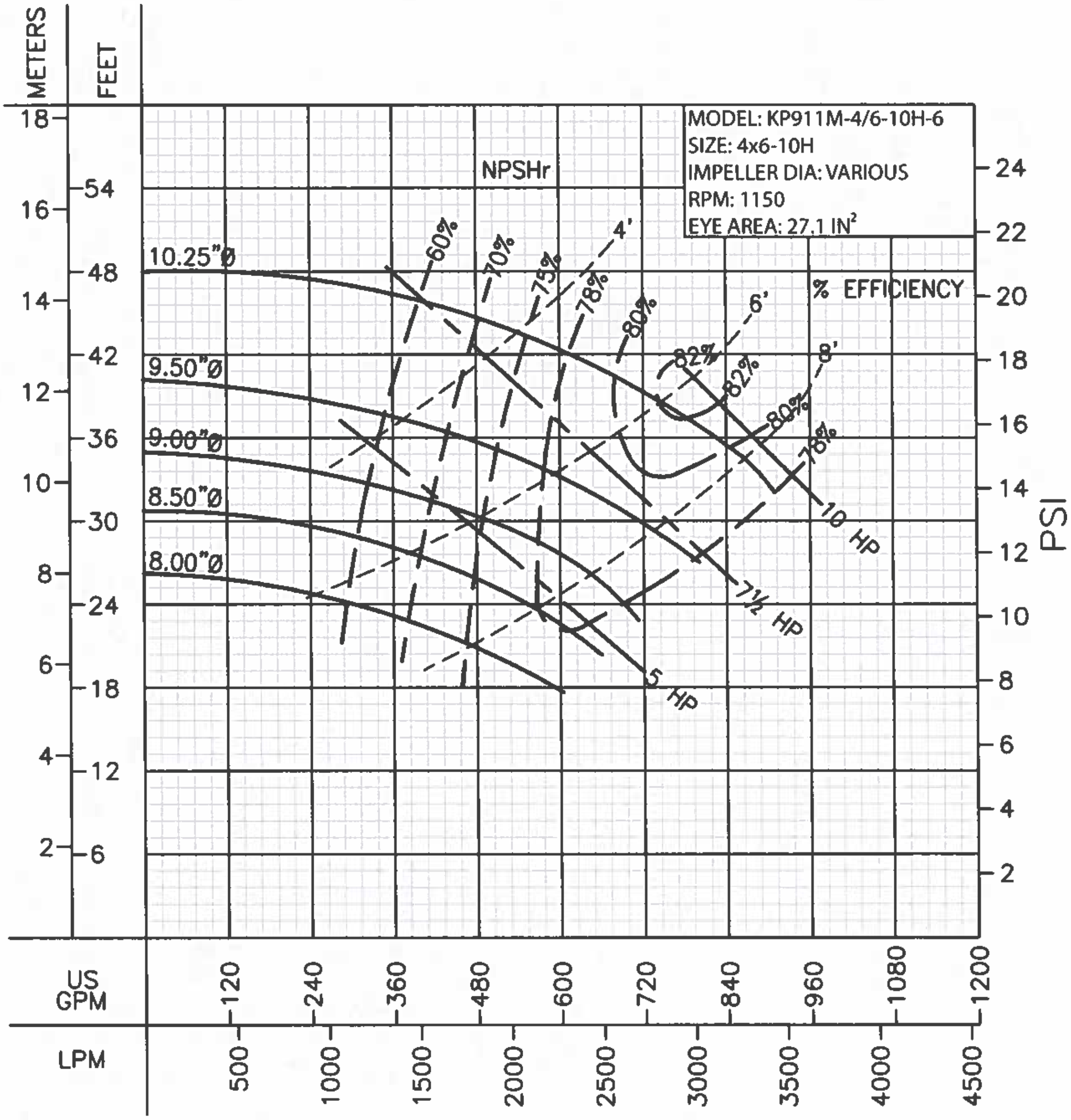
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

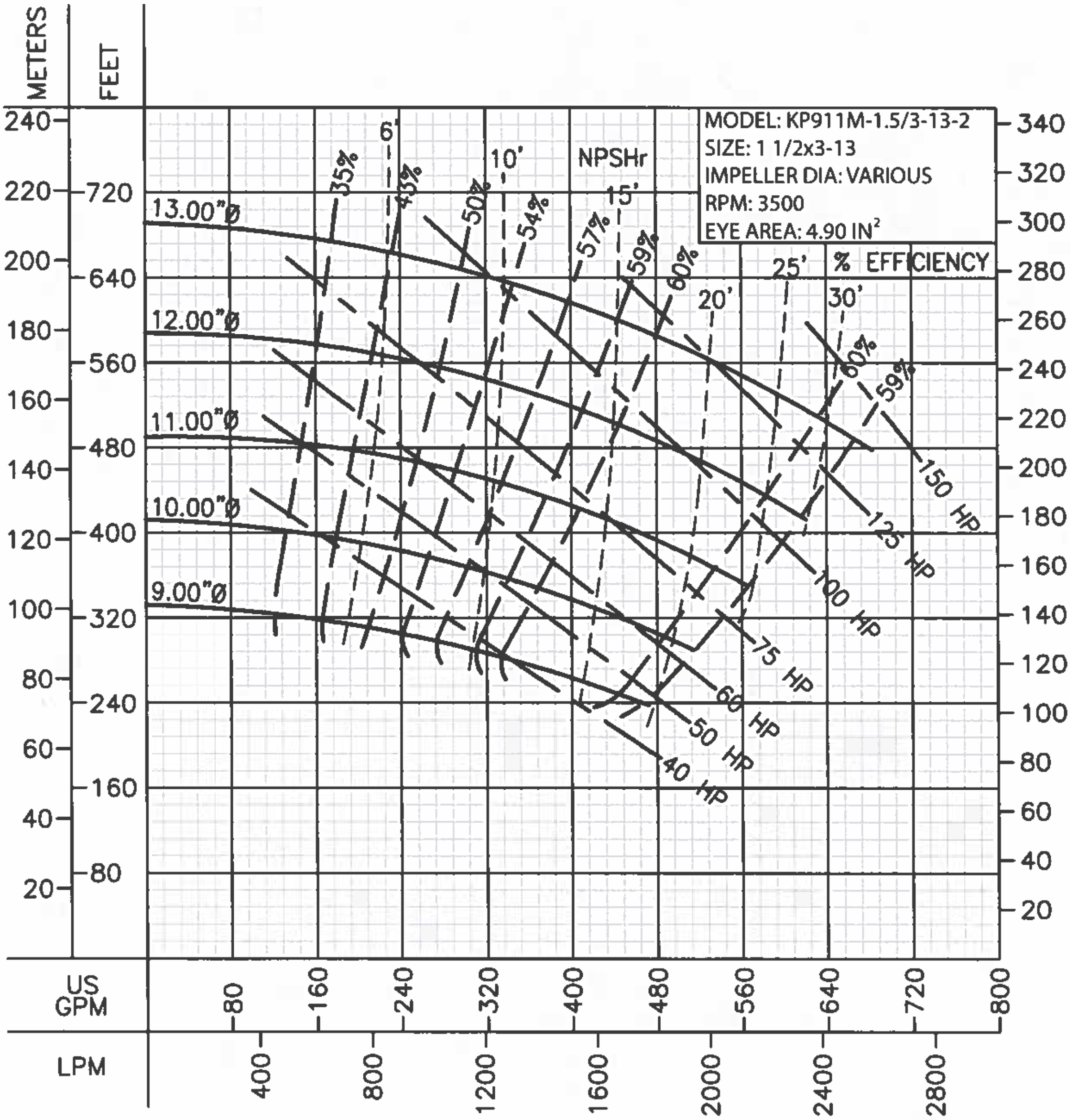
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

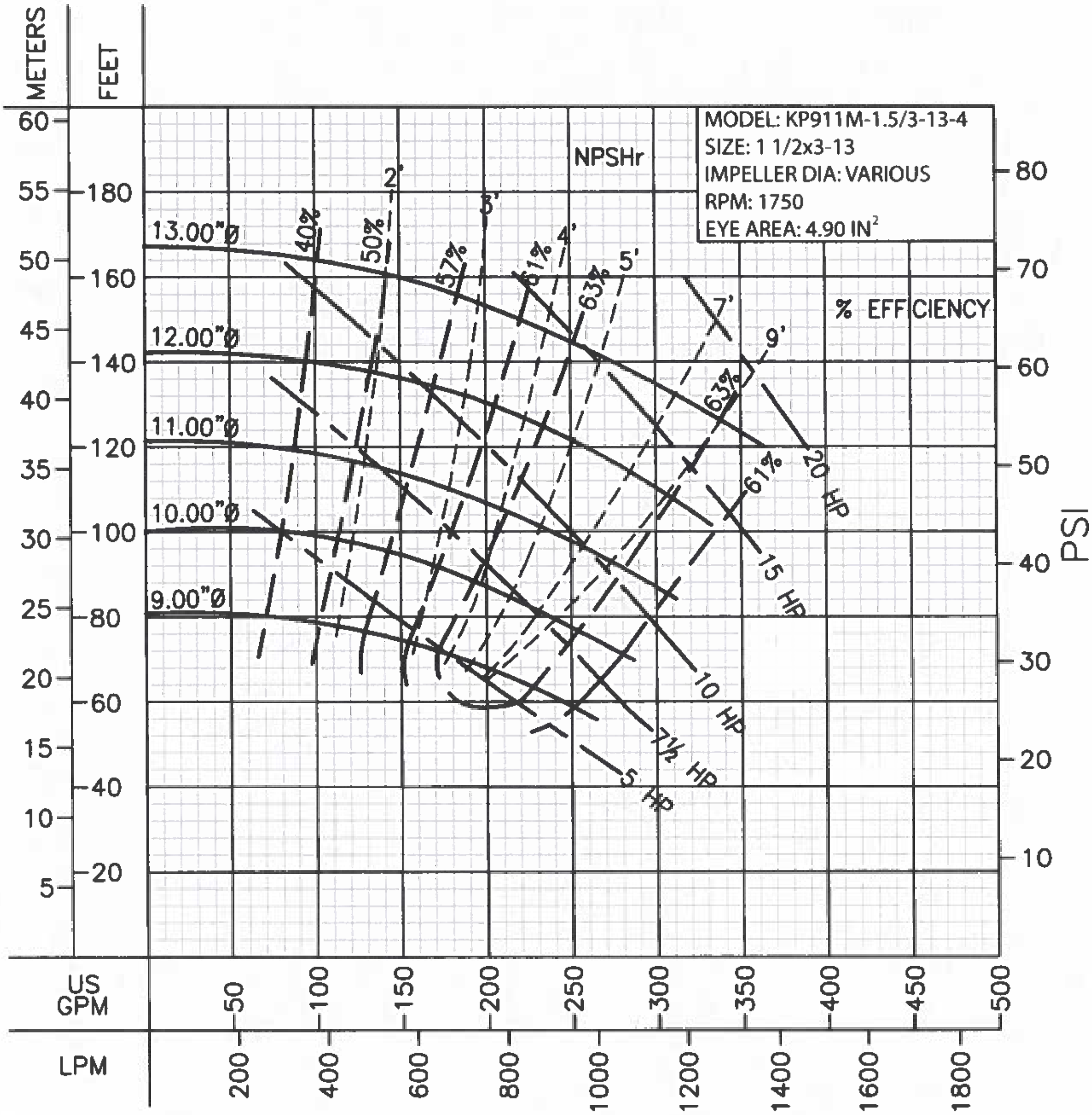
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

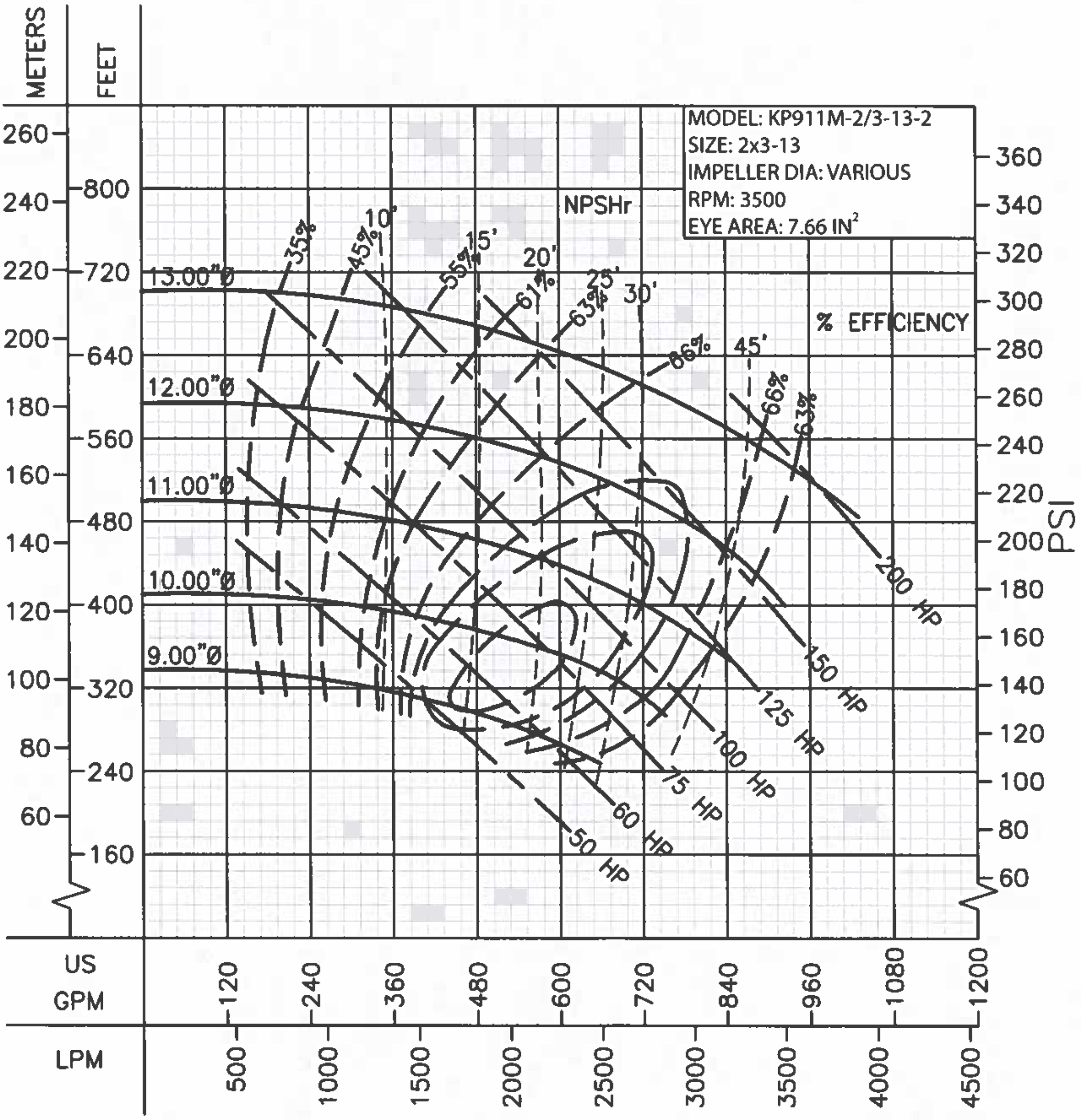
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

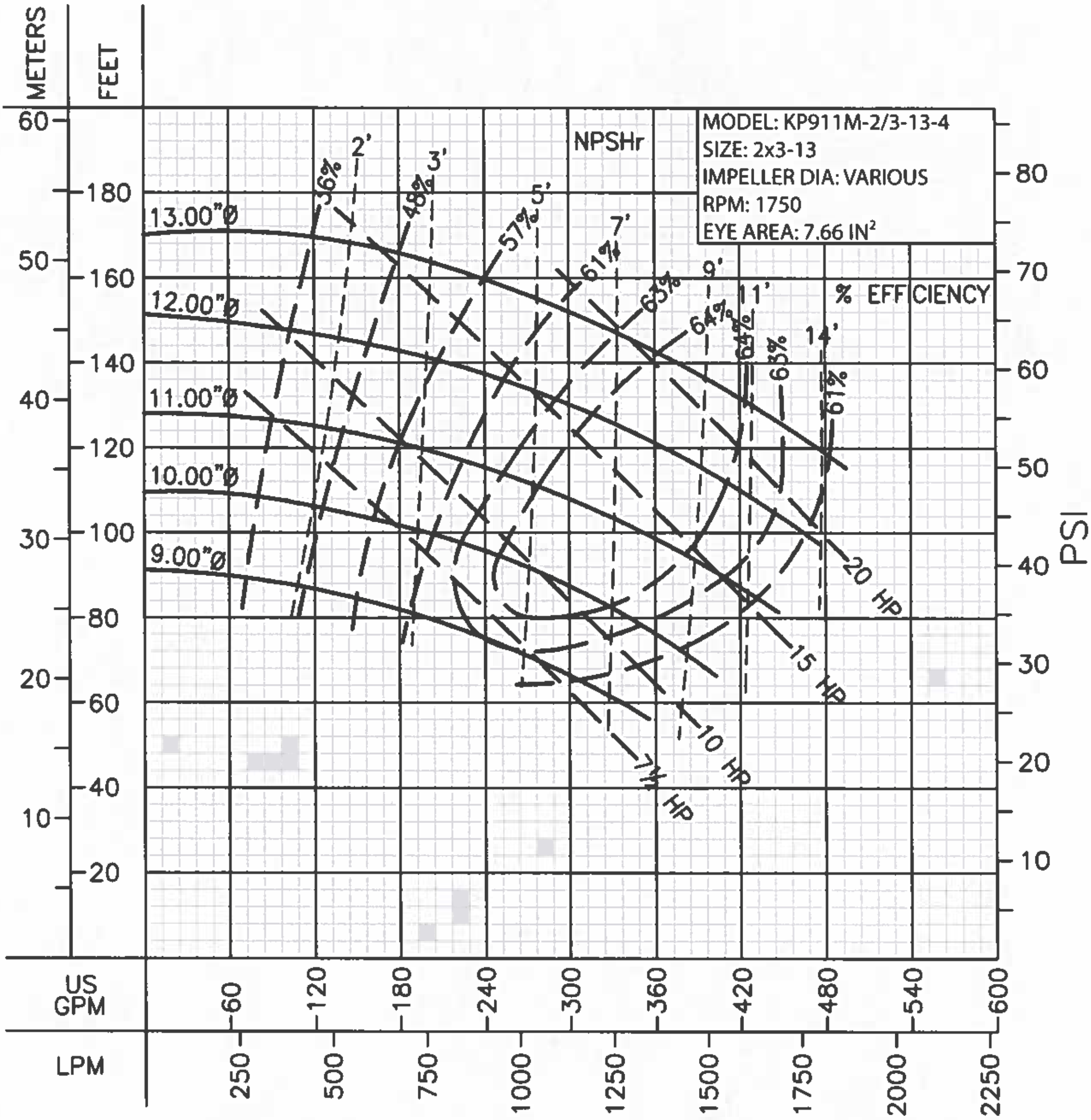
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .690 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

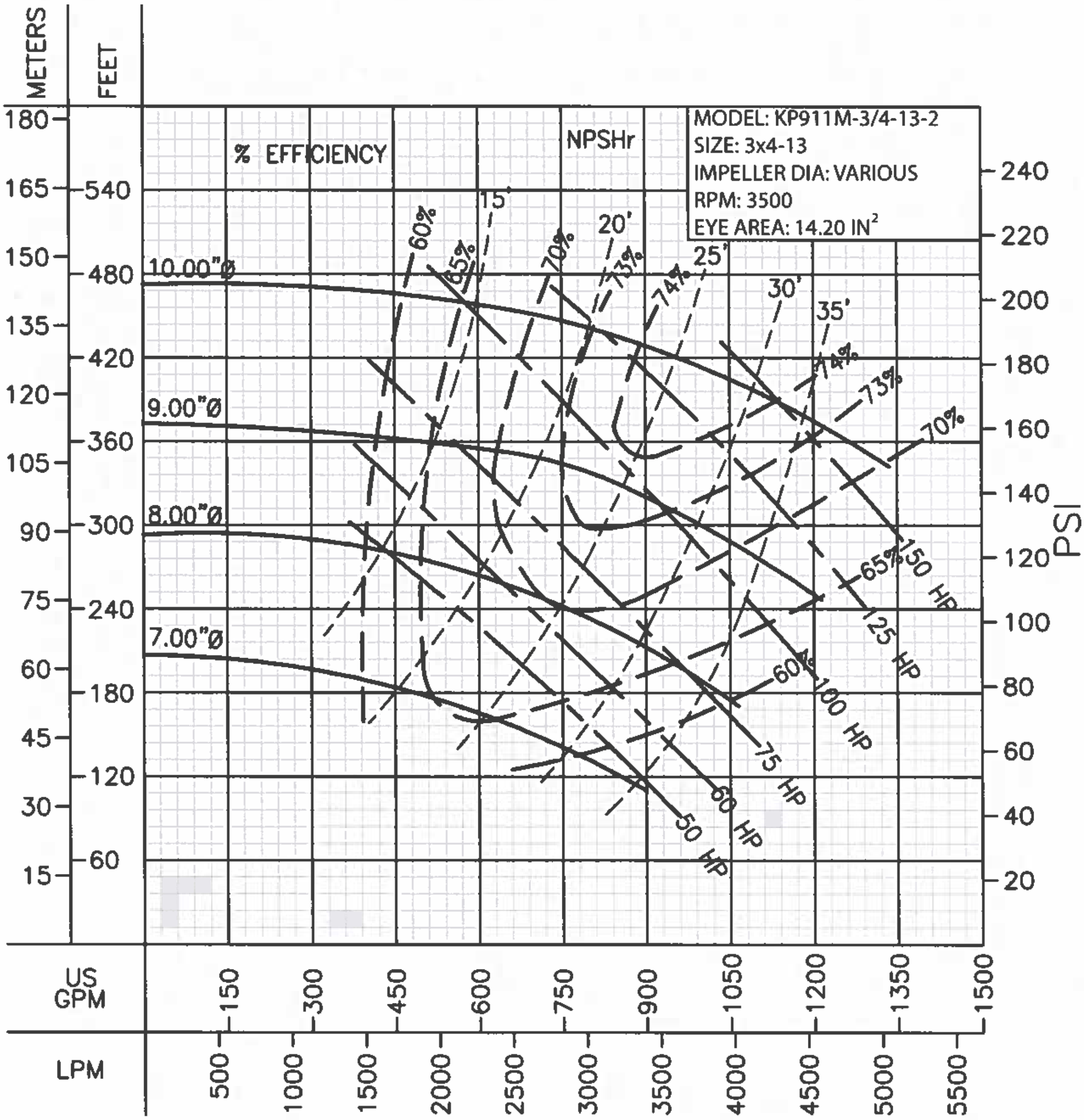


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .690 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

KEEN PUMP®



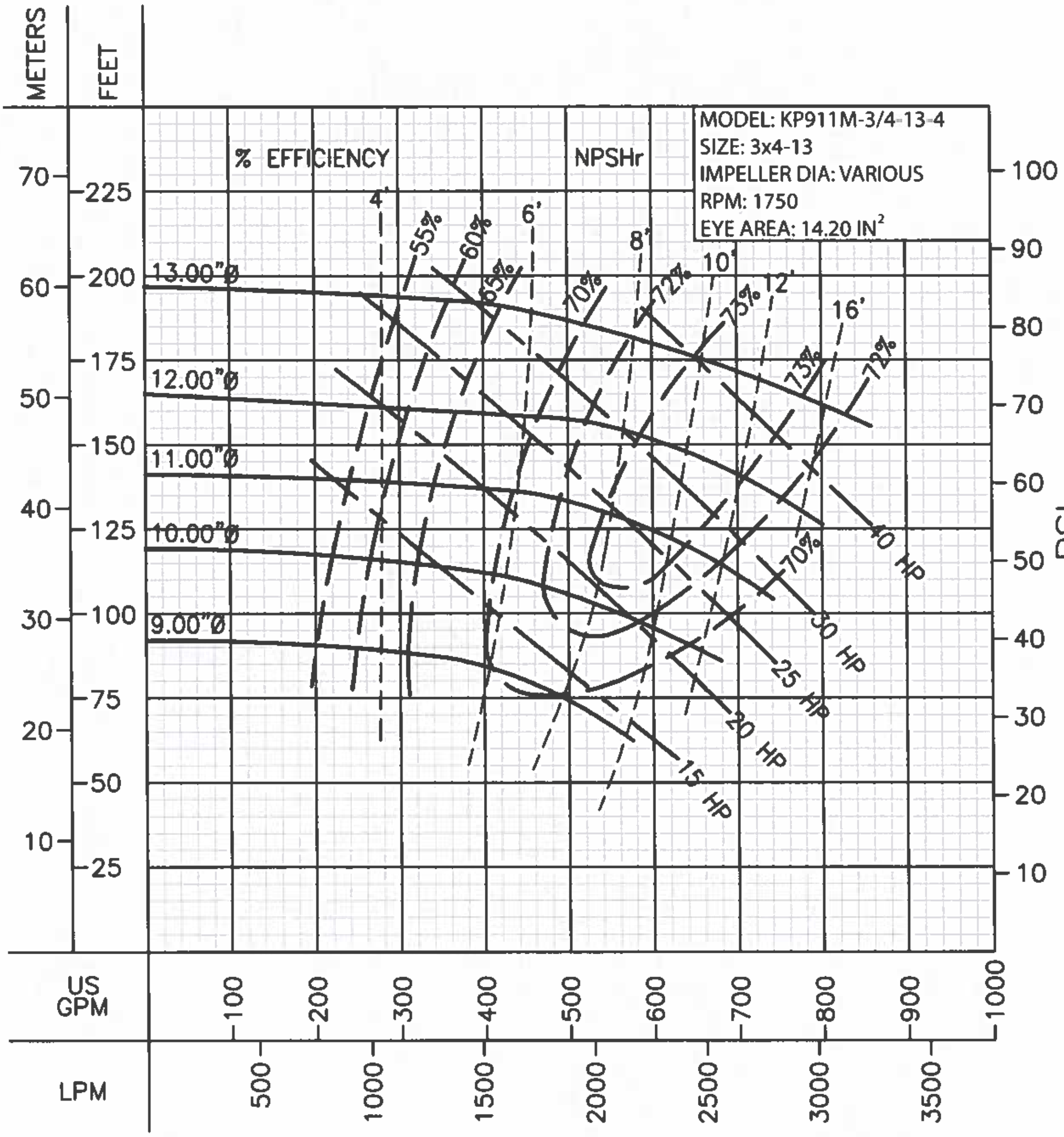
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**

KEEN PUMP®

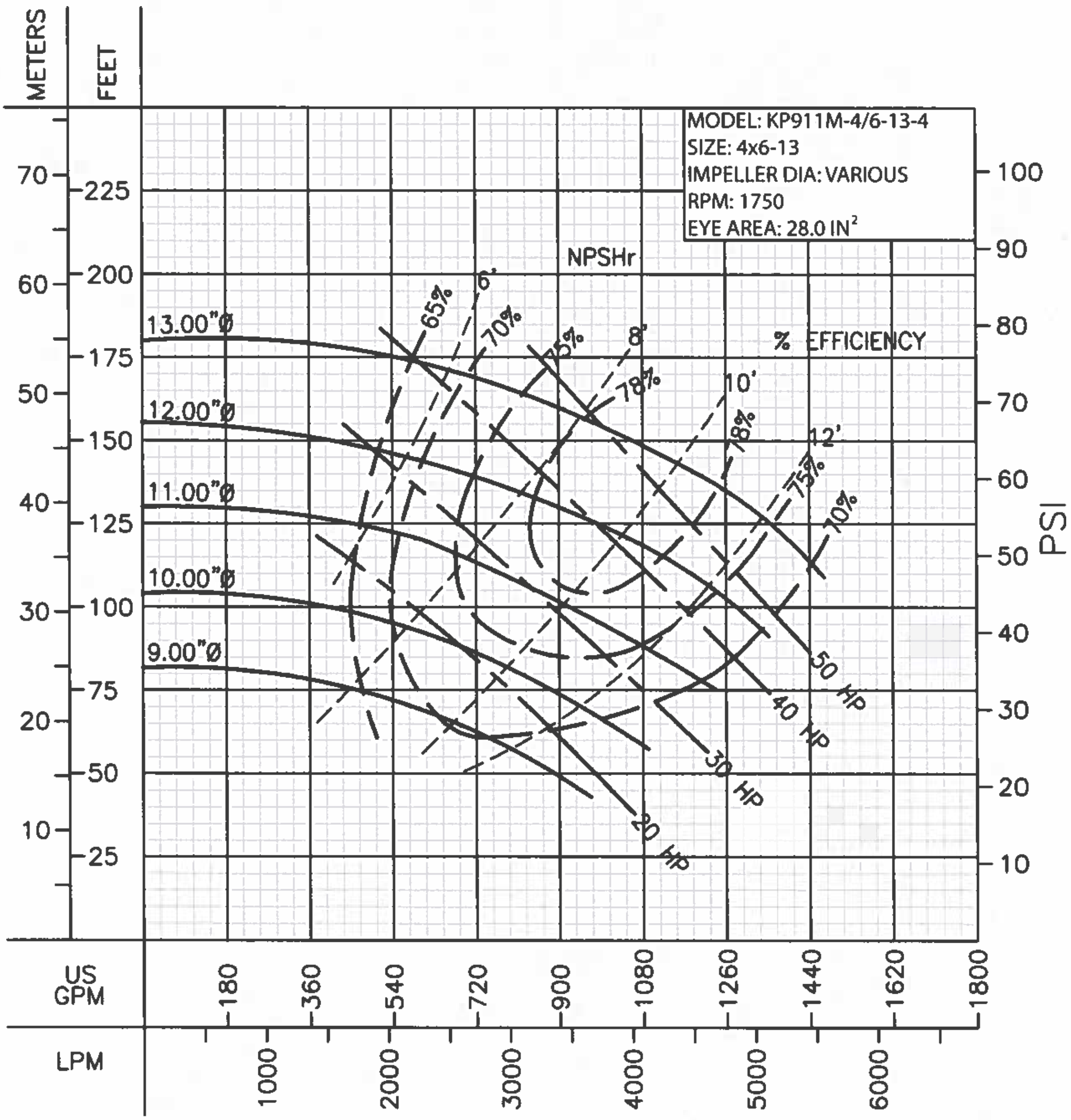


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**



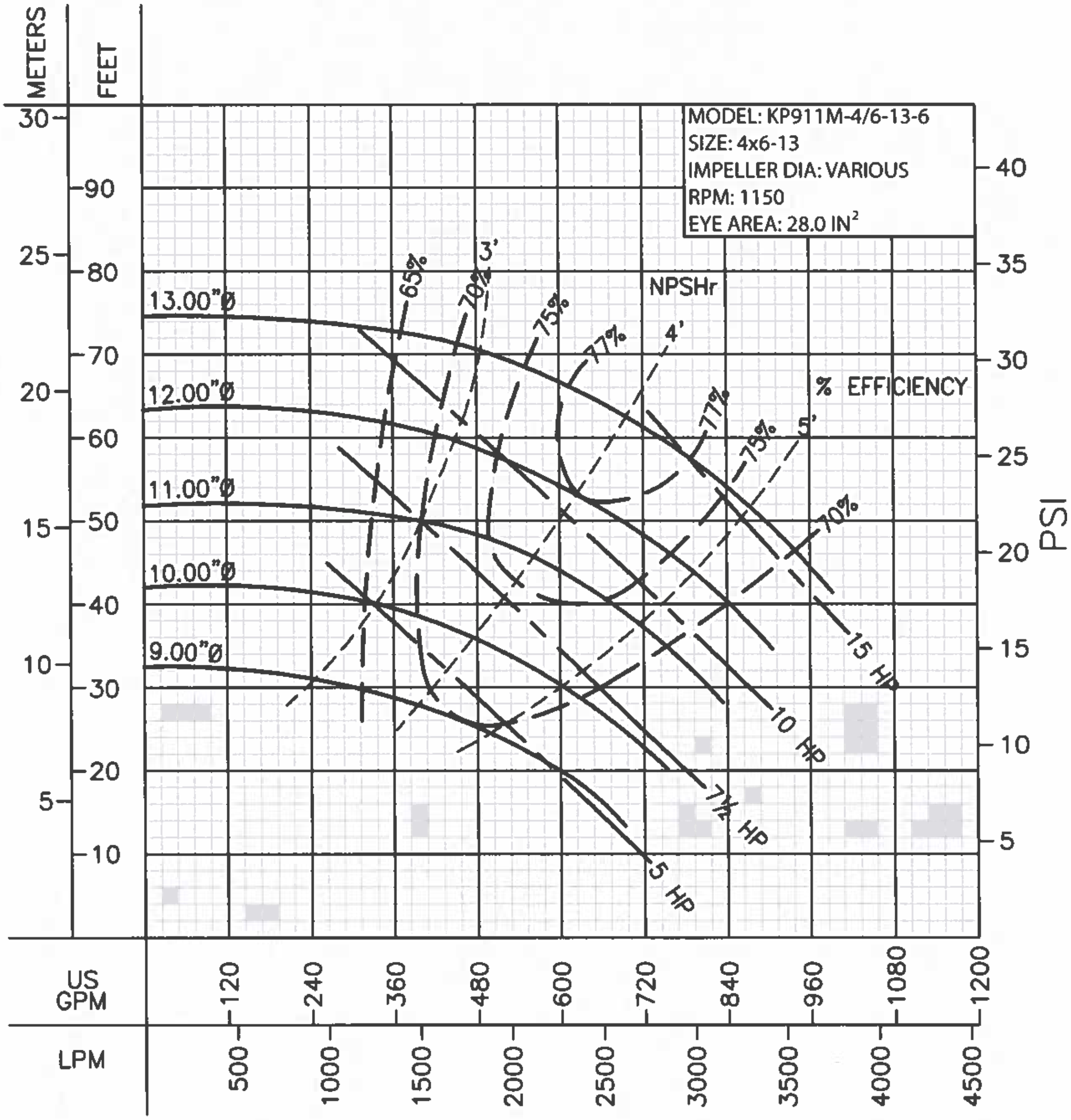
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .930 in

KEEN PUMP®

PERFORMANCE CURVES

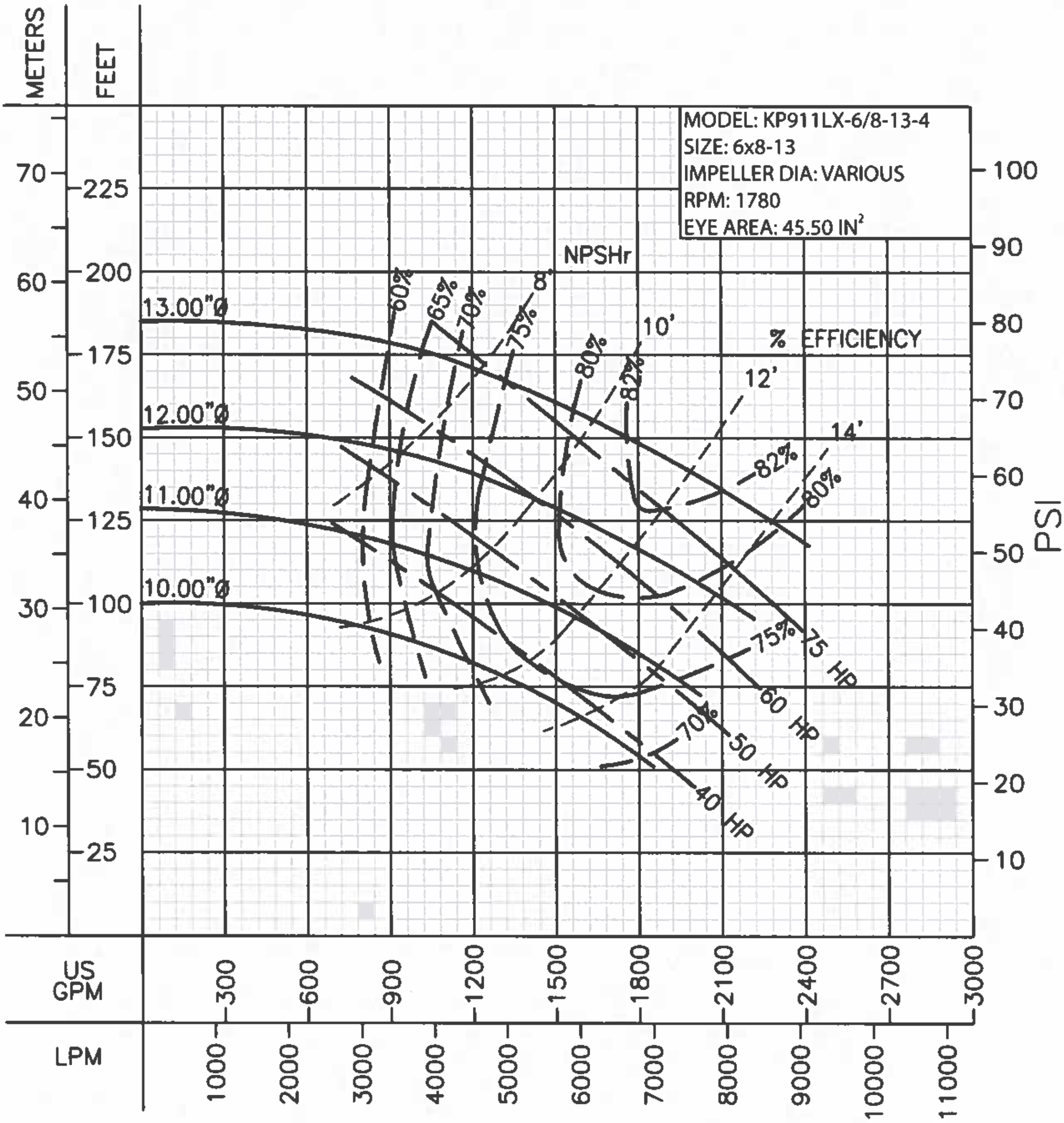
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .930 in

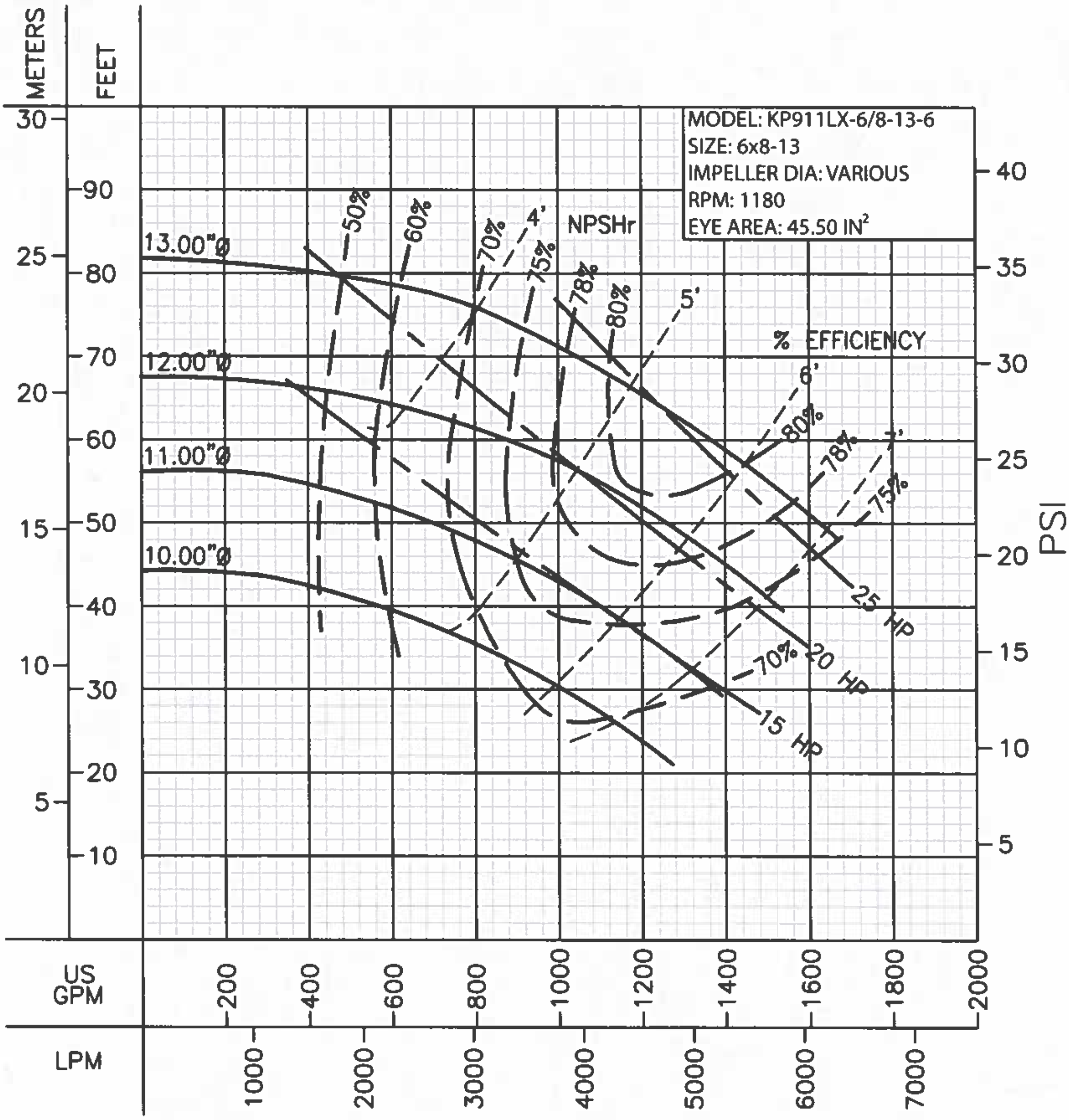
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .875 in

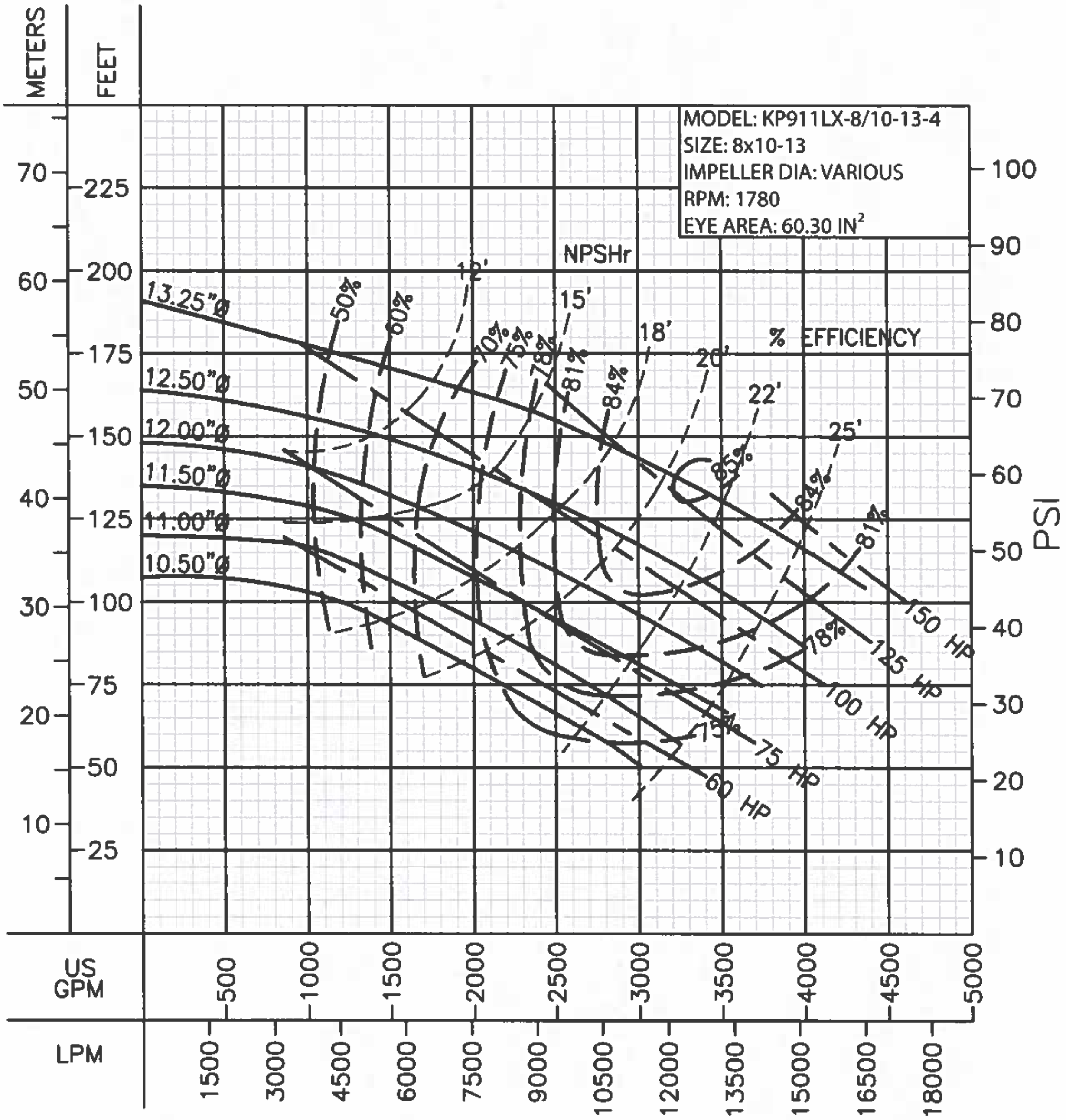
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .875 in

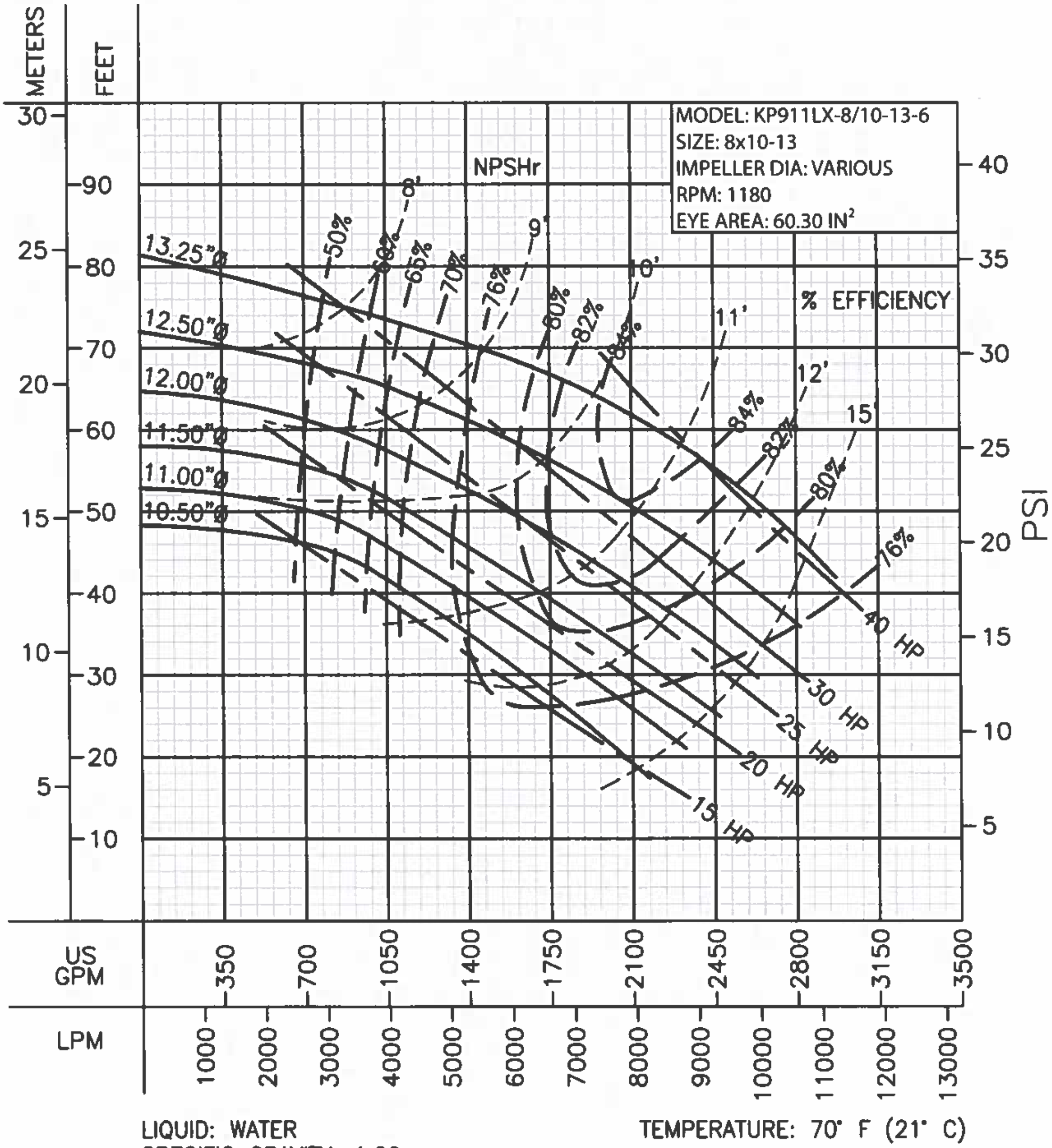
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**

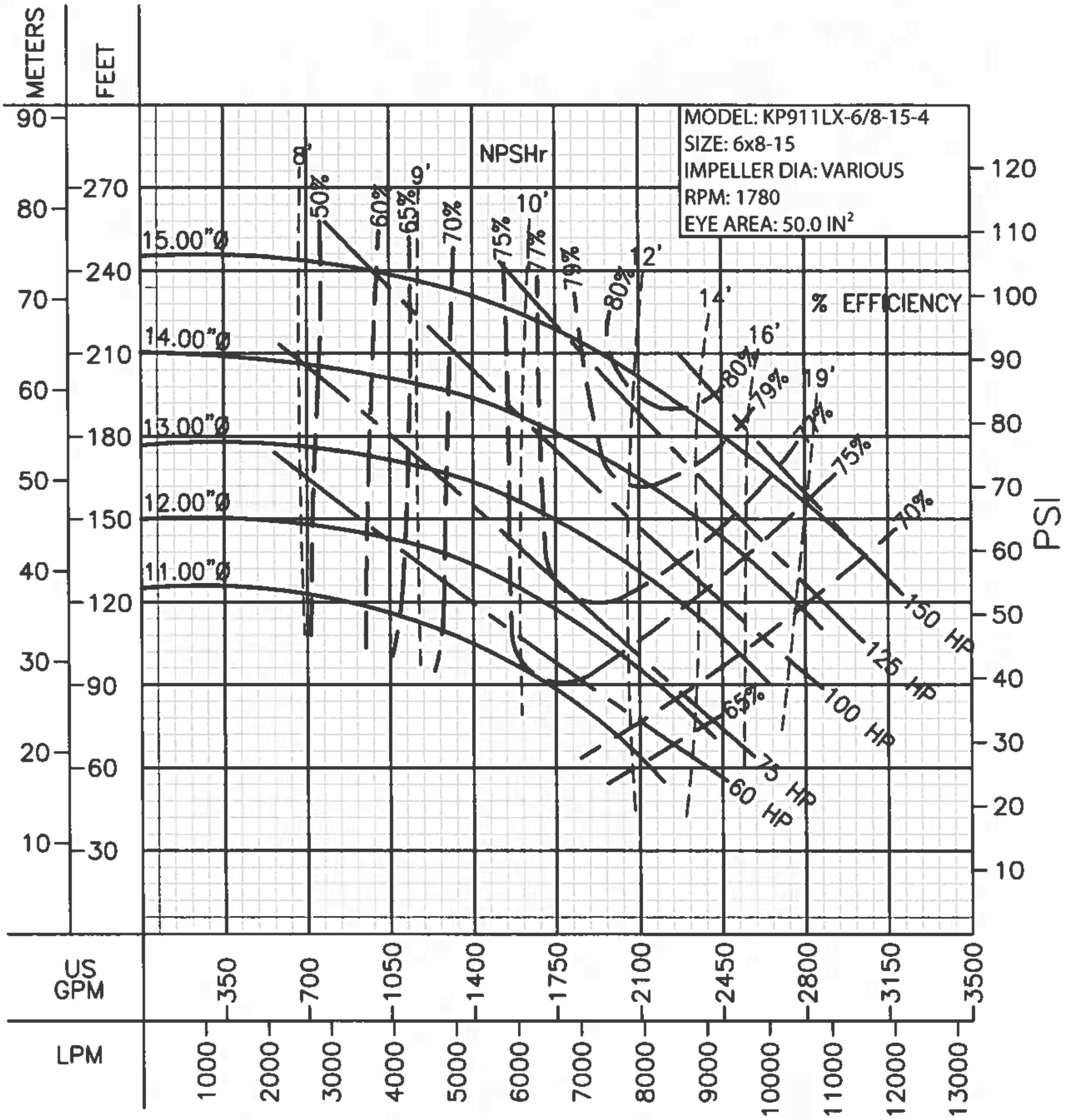


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**

KEEN PUMP®

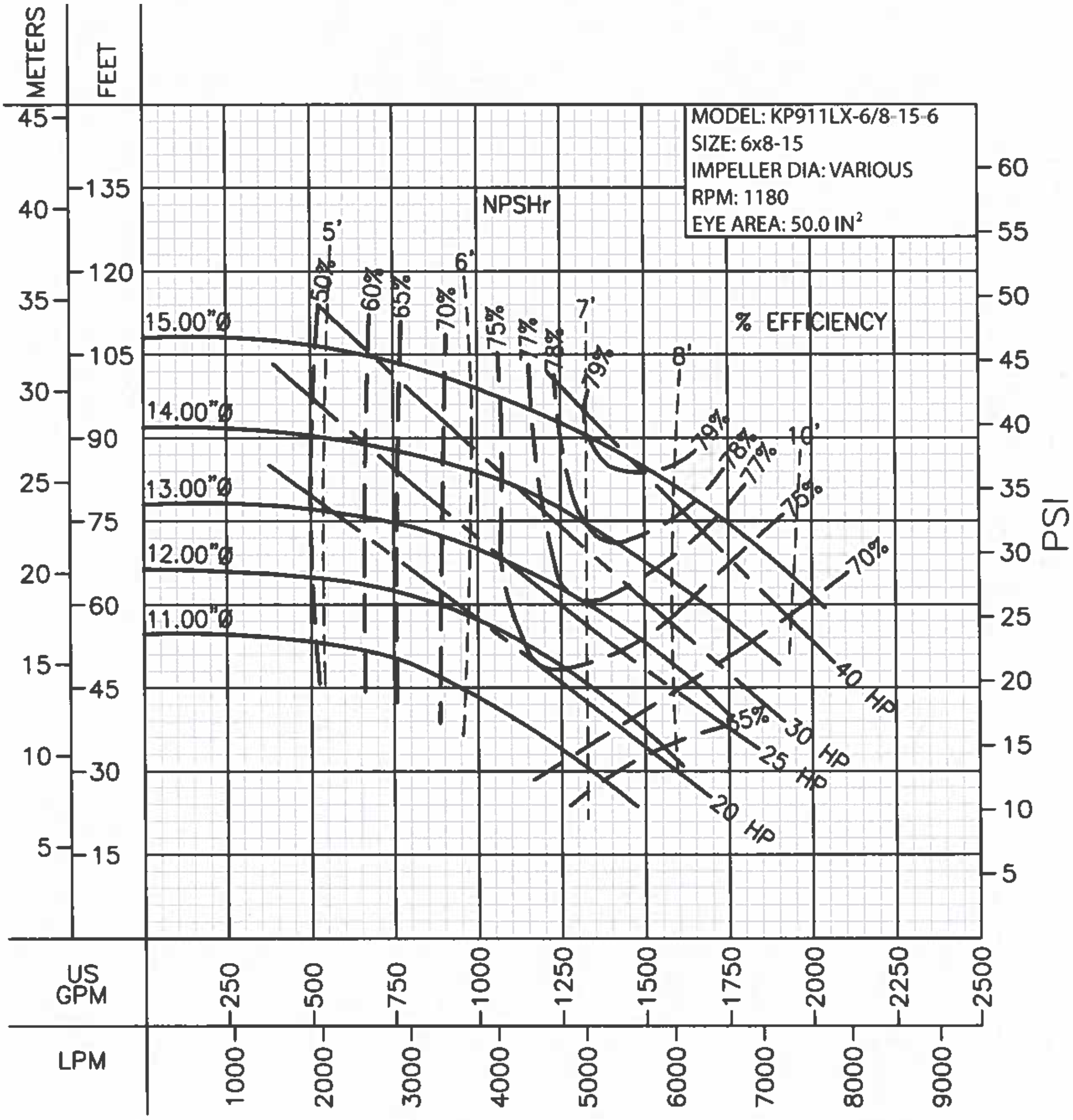


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAXIMUM DIA. SOLIDS: 1.125 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**

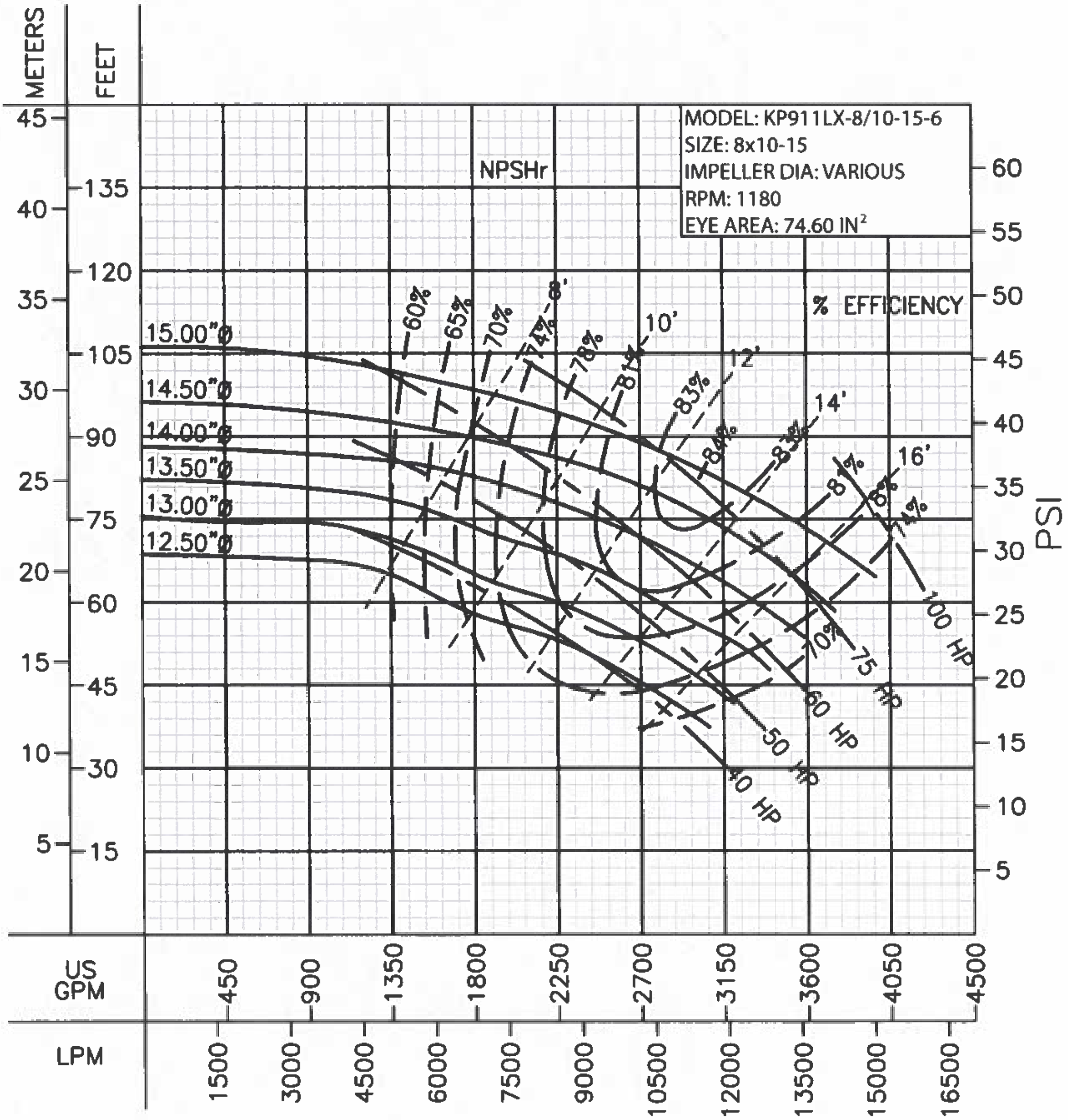
KEEN PUMP®



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: 1.125 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**

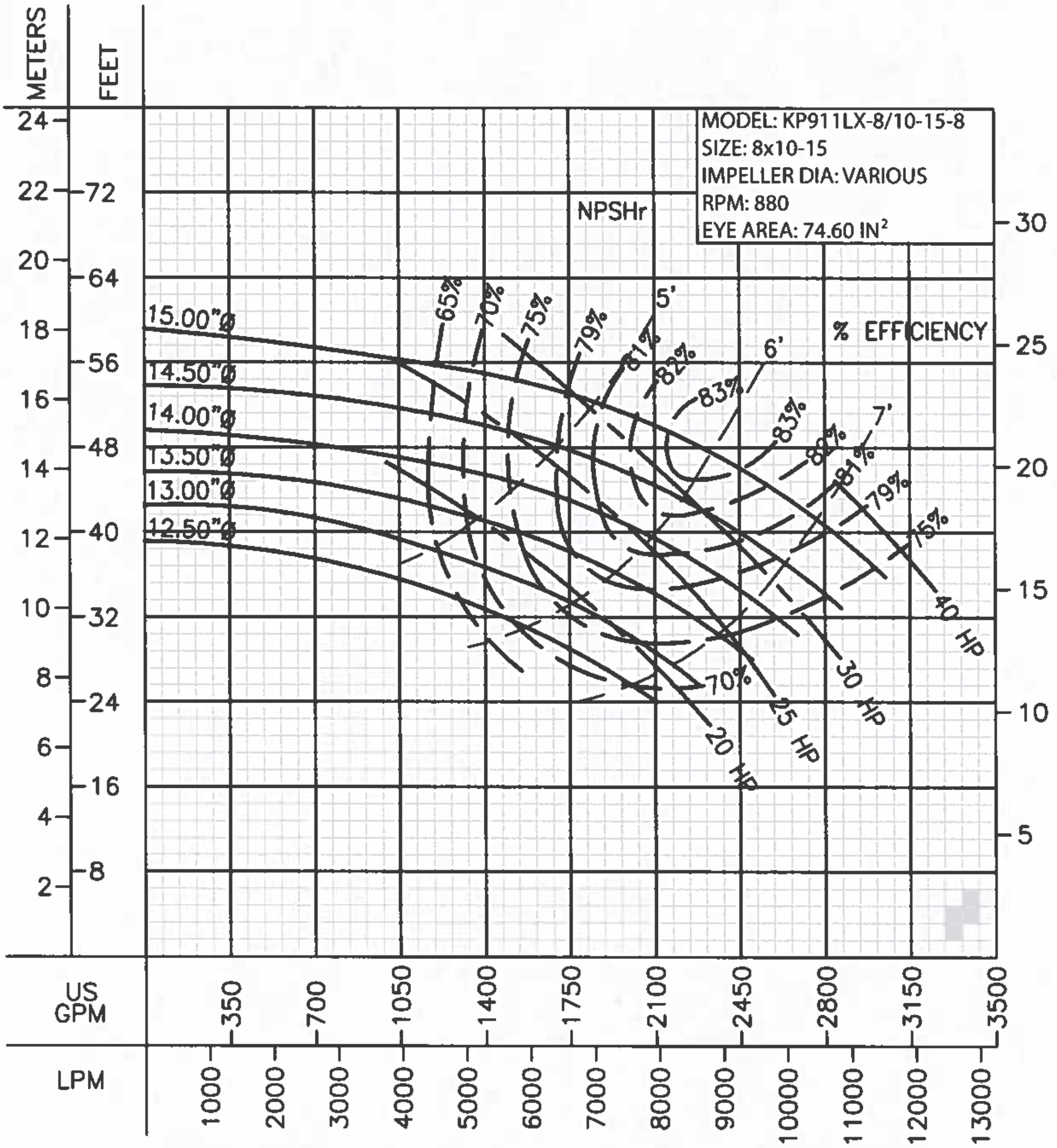


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)

PERFORMANCE CURVES

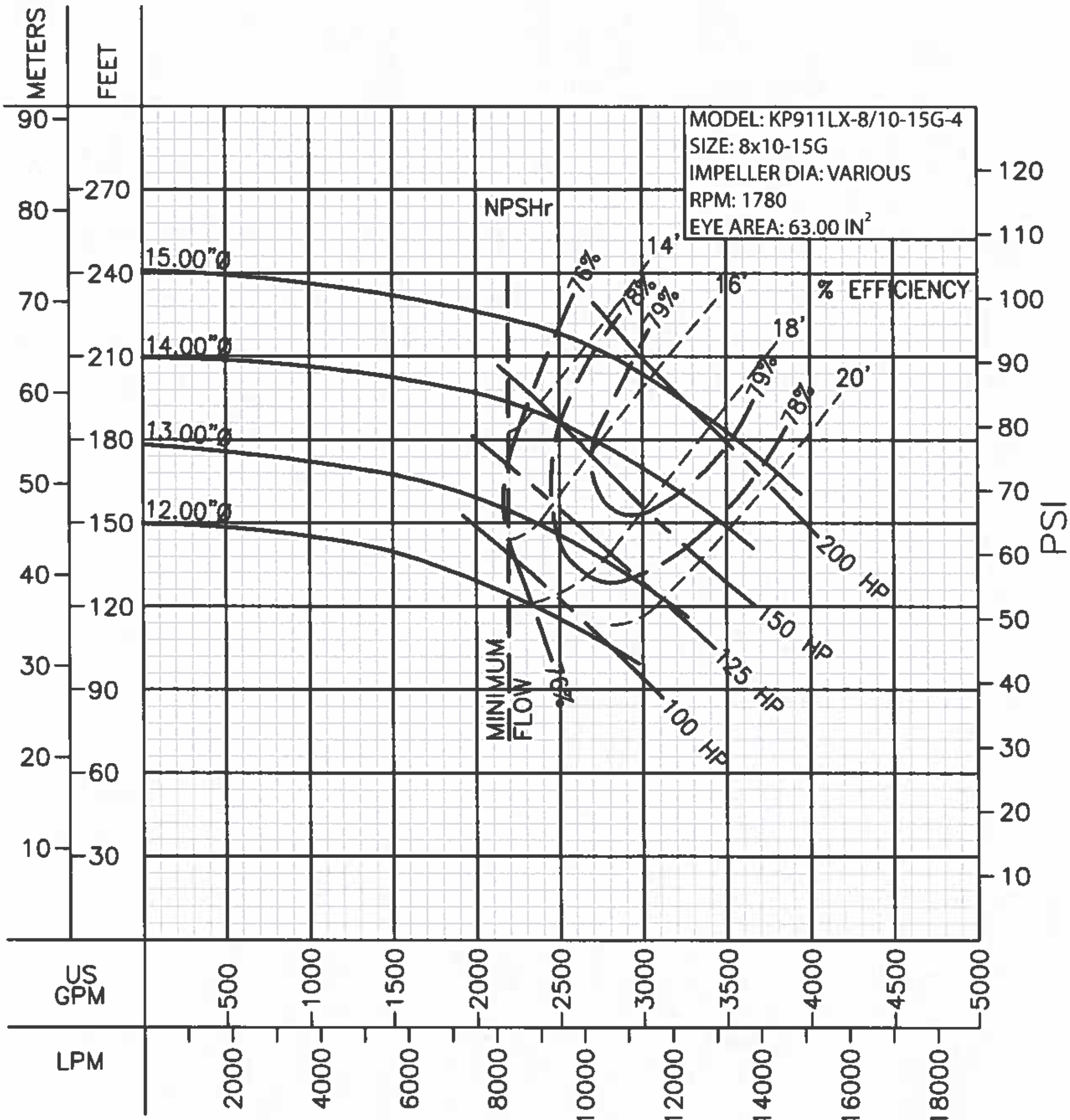
ANSI Centrifugal
Process Pumps
Series: **KP911LX**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**

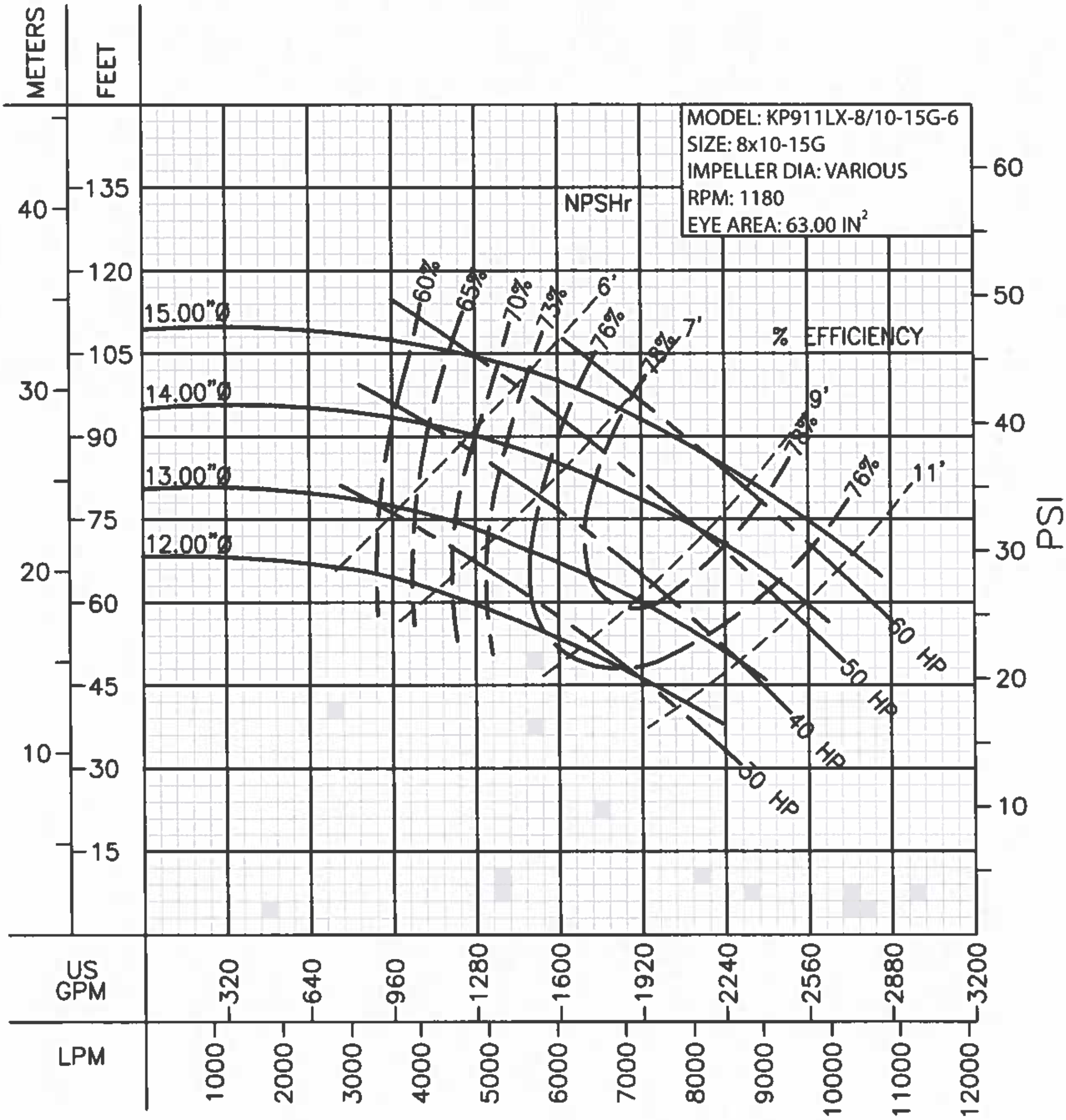


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: 1.060 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**

KEEN PUMP®

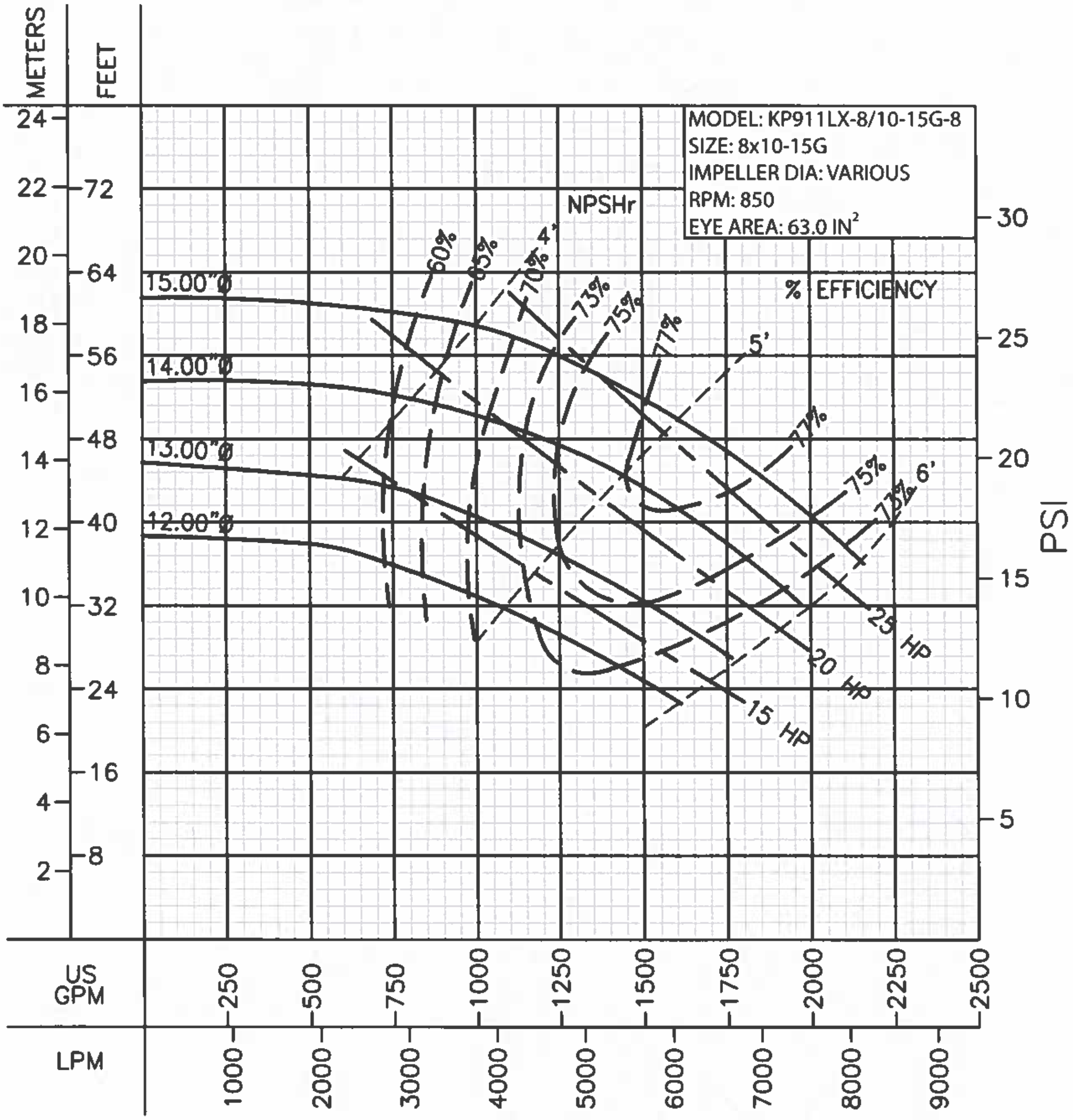


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: 1.060 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**

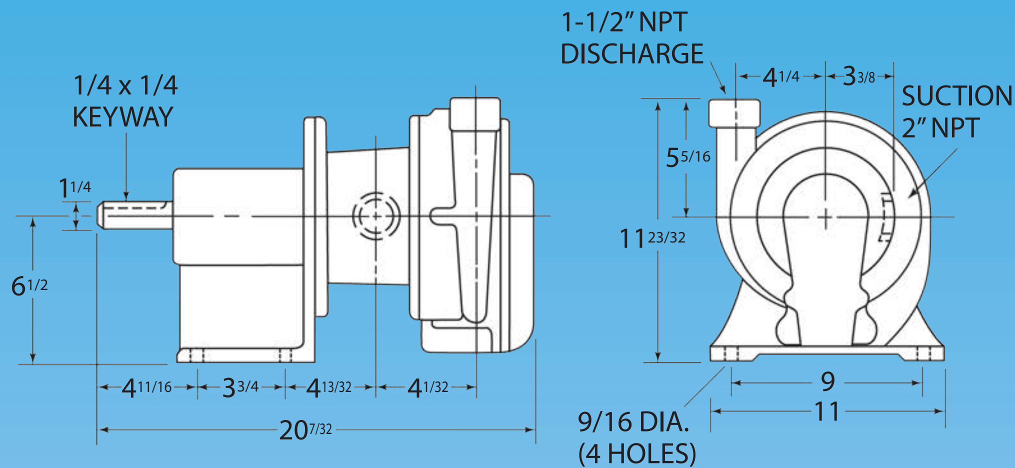
KEEN PUMP®



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

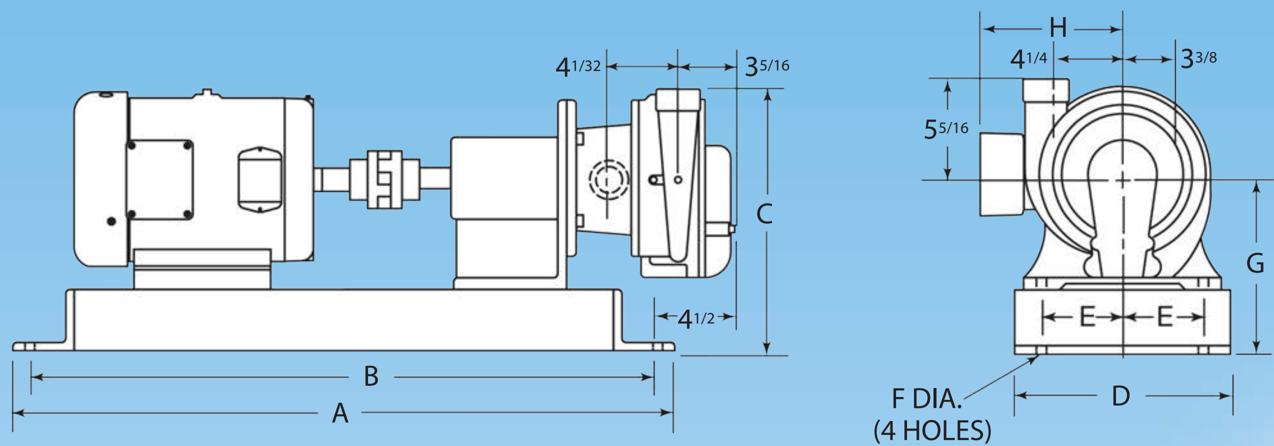
TEMPERATURE: 70° F (21° C)
MAXIMUM DIA. SOLIDS: 1.060 in

REFERENCE DIMENSIONS



Basic Pumps

Catalog No.	Standard Impeller Dia.	Approx. Ship Wt. Lbs.
KI-TSC-5	$4\frac{3}{4}$"	130
KI-TSC-7	$5\frac{1}{4}$"	130
KI-TSC-10	$5\frac{3}{4}$"	130
KI-TSC-15	$6\frac{1}{2}$"	130
KI-TSC-20	7"	130



Catalog No.	Pump Motor HP	Motor Frame	Pump Shaft Dia.	Motor Shaft Dia.	Dimension-Inches									Approx. Ship Wt. Lbs.
					A	B	C	D	E	F	G	H	I	
KI-TSC-5P	5	184T	$1\frac{1}{4}$"	$1\frac{1}{8}$"	37	35	$14\frac{13}{16}$	12	5	$\frac{5}{8}$	$9\frac{1}{2}$	$8\frac{1}{16}$	$14\frac{13}{16}$	365
KI-TSC-7P	$7\frac{1}{2}$	213T	$1\frac{1}{4}$"	$1\frac{1}{8}$"	37	35	$14\frac{13}{16}$	12	5	$\frac{5}{8}$	$9\frac{1}{2}$	$8\frac{1}{16}$	$14\frac{13}{16}$	375
KI-TSC-10P	10	215T	$1\frac{1}{4}$"	$1\frac{3}{8}$"	42	40	$15\frac{5}{16}$	15	$6\frac{1}{2}$	$\frac{11}{16}$	10	$8\frac{7}{8}$	$15\frac{5}{16}$	410
KI-TSC-15P	15	254T	$1\frac{1}{4}$"	$1\frac{3}{8}$"	42	40	$15\frac{5}{16}$	15	$6\frac{1}{2}$	$\frac{11}{16}$	10	$8\frac{7}{8}$	$15\frac{5}{16}$	450
KI-TSC-20P	20	256T	$1\frac{1}{4}$"	$1\frac{3}{8}$"	42	40	$15\frac{5}{16}$	15	$6\frac{1}{2}$	$\frac{11}{16}$	10	$9\frac{11}{16}$	$15\frac{5}{16}$	510

KEEN PUMP is dedicated to producing a quality product, delivered on time, backed by reliable service, at a reasonable price. We back up our product with the BEST warranty. **KEEN PUMP** knows HIGH PRESSURE PUMPS!

KEEN PUMP

471 Highway 250 East · Ashland, Ohio 44805
419.207.9400 fax 419.207.8031
www.keenpump.com

K0018 12/19

HIGH PRESSURE PUMPS

"2-Stage Centrifugal"

Newly Upgraded Construction To Include:

- Powder Coat Paint Finish
- Double Row Rear Bearing For Stronger Loading
- Oring Seal For Best Design - Better Than Competitor Flat Gasket
- Upgrated From ASTM Class 30 to 35 For Stronger Casting Construction

KEEN PUMP

KEEN PUMP 2-STAGE CENTRIFUGAL PUMPS FEATURE:

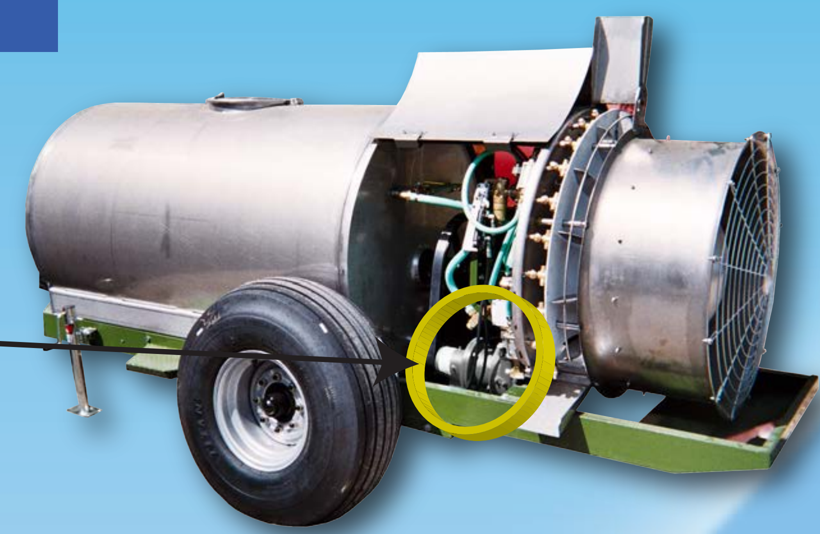
HIGH HEAD PERFORMANCE
- 510 feet (220 psi) @

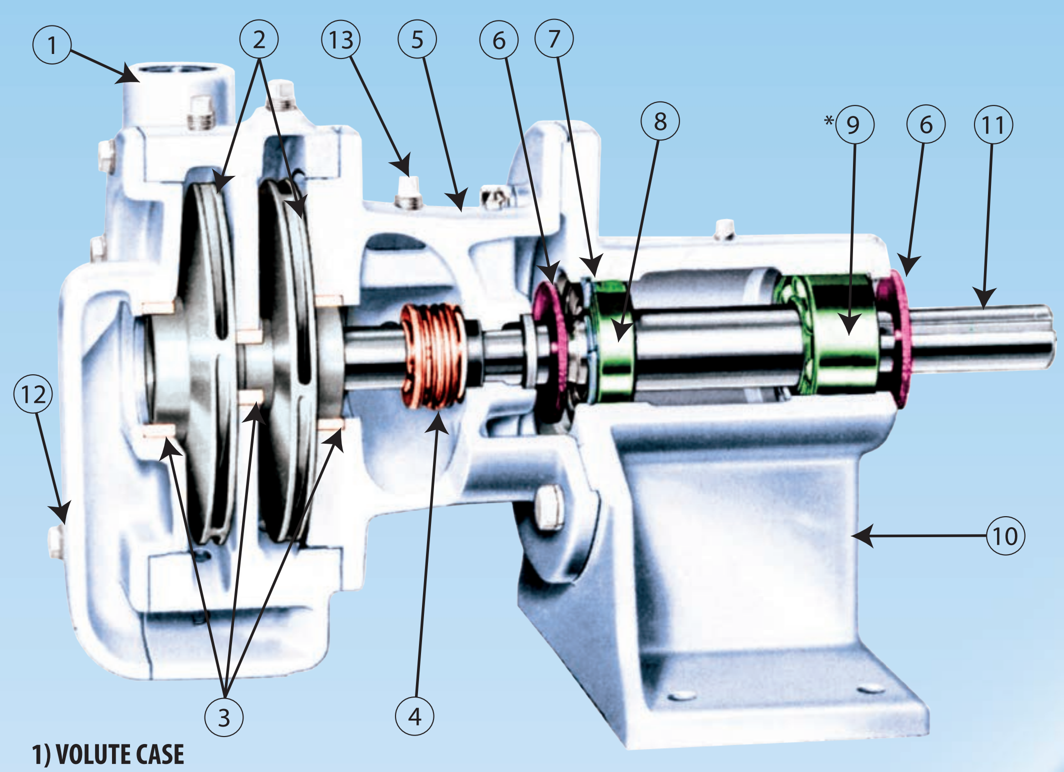
RUGGED CONSTRUCTION
- High Tensile Strength Cast Iron Castings
- Standard Cast Iron Impellers

VERSATILE CONSTRUCTION OPTIONS
- Pump End Only (1-1/4" Keyed Shaft End)

VALUE
- Immediately Available for Quick Shipment
- Priced to Save You Money

APPLICATIONS
- Agricultural Spraying
- Car Wash
- OEM Deicing Equipment
- Booster Service





1) VOLUTE CASE
Versatile (8) position discharge orientation for convenient adaptation to your piping requirements. 1-1/2" NPT discharge. Cast iron case with bronze wear rings.

2) IMPELLERS
Opposing dual enclosed impellers for high pressure performance. Opposing design offsets thrust and minimizes bearing loading. Dynamically balanced for smooth, vibration-free operation.

3) WEAR RINGS
(3) Bronze wear rings, (2) for impeller inlets, (1) common bushing for impeller heads. Maintains peak pump operating performance. Bronze rings are easily replaceable and eliminates wear to casting.

4) MECHANICAL SHAFT SEAL
Durable, chemical and grit resistant silicon carbide faces, viton elastomer and stainless steel parts. Located on inlet (low pressure) side of pump, allowing for maximum 80 psi inlet pressure.

6) SLINGERS
Rubber slingers shield bearings from moisture, dirt and other impurities.

7) SNAP RING
Holds bearing and shaft assembly in place, preventing axial movement.

8) SHAFT BEARING
Heavy-duty ball bearing, regreasable, greased during assembly. Bearing sealed on outboard side.

9) * NEW & IMPROVED SHAFT BEARING
DOUBLE-ROW, HEAVY-DUTY ball bearing, regreasable, greased during assembly. Bearing sealed on outboard side.

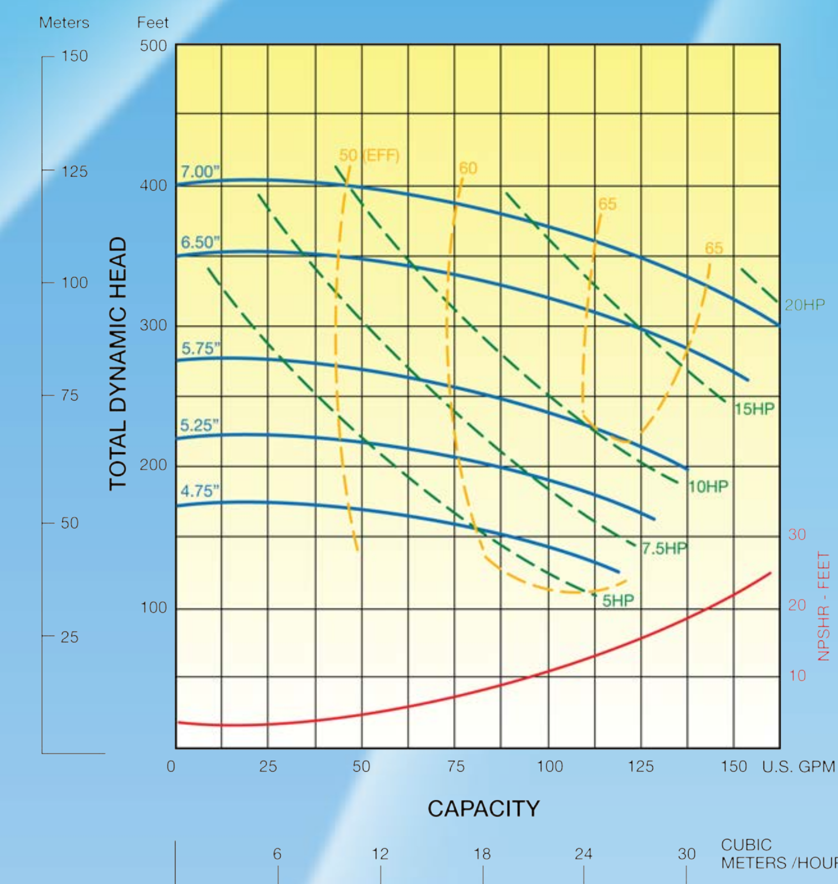
10) BEARING BRACKET
Heavy-duty cast iron bracket holds (2) shaft ball bearings in exact alignment, keeping shaft and impeller assembly running quiet and vibration-free. Bracket provides rigid support for pump end.

11) PUMP SHAFT
Corrosion-resistant stainless steel provides long life in many applications.

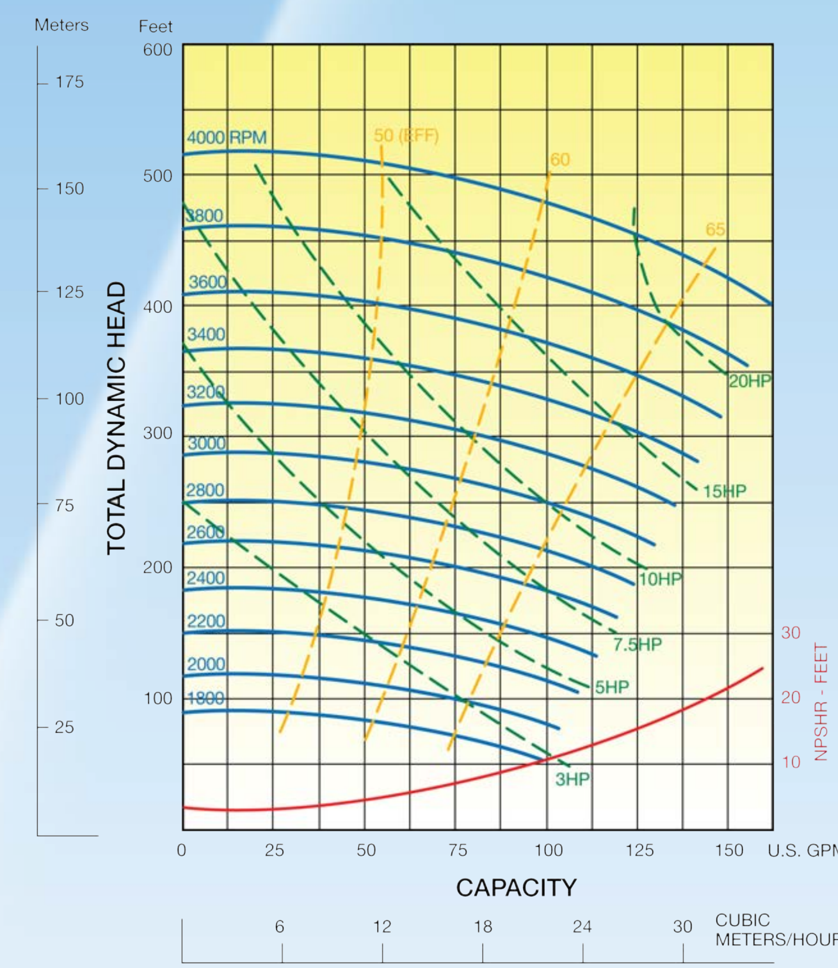
12) DRAIN PLUGS
Conveniently located, allowing (8) position discharge orientation and always providing for liquid draining capabilities.

PERFORMANCE

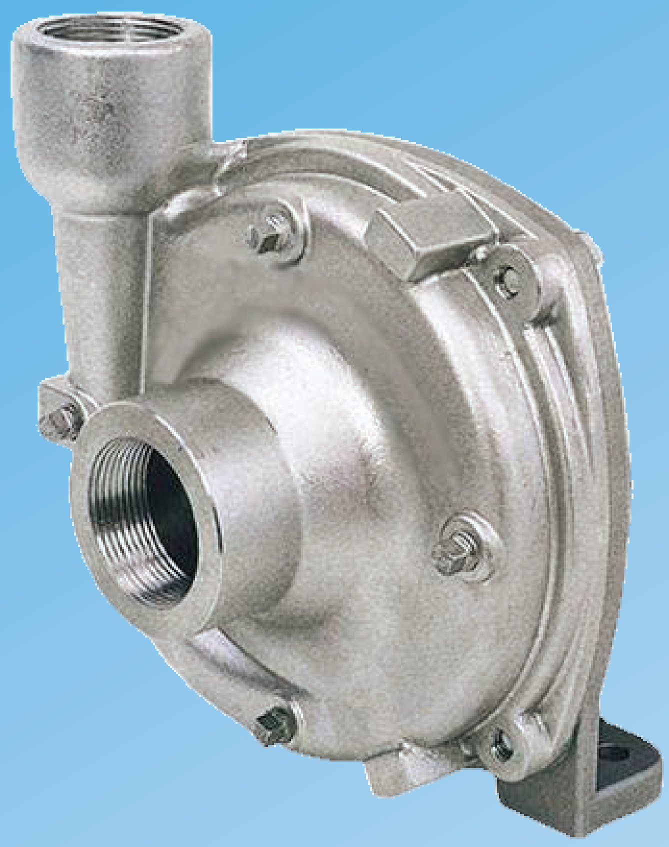
VARIABLE RPM • 7" Impeller • 2" Suction • 1-1/2" Discharge



3450 RPM • Impeller as Noted • 2" Suction • 1-1/2" Discharge



KCPMSST



- Pedestal Mounted Centrifugal Pump
- Full Stainless Steel Design
- Up To 6000 RPM
- Flows Up To 140 GPM
- Pressure Up To 323 TDH
- Shaft Size : 5/8 “ Solid

KEEN PUMP

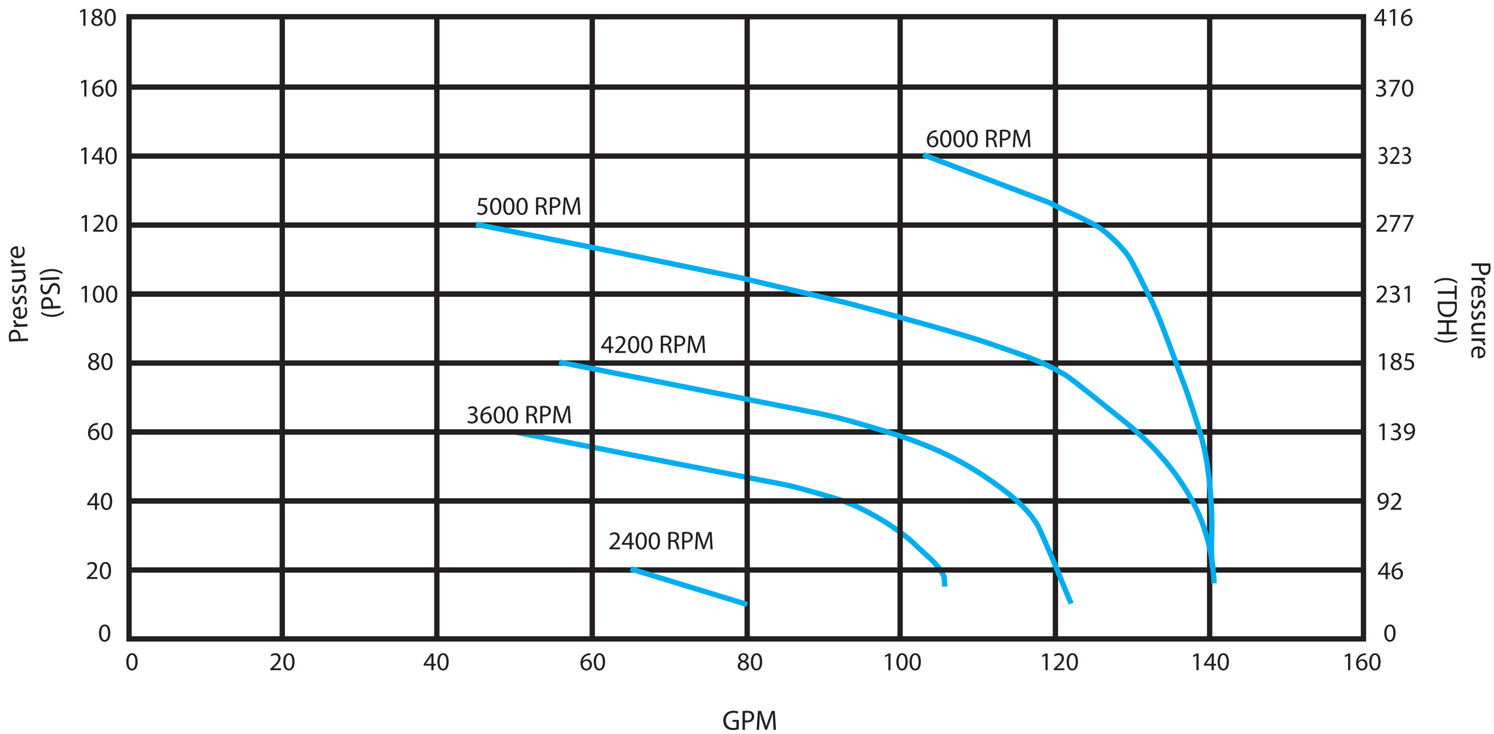
KEEN PUMP

Keen Centrifugal End Suction Pump

PUMP MODEL			KCPMSST		
Inlet	1.5″	Discharge	1.25″	Max RPM	6000

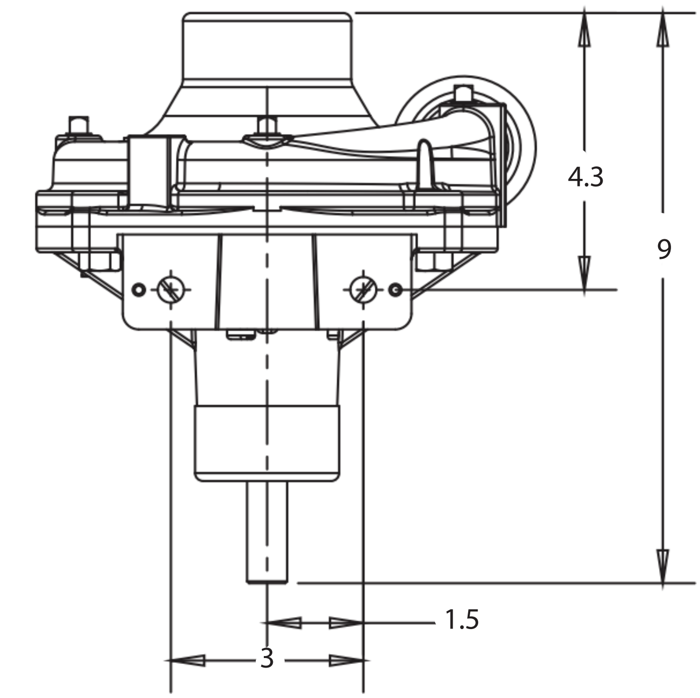
PERFORMANCE CURVE

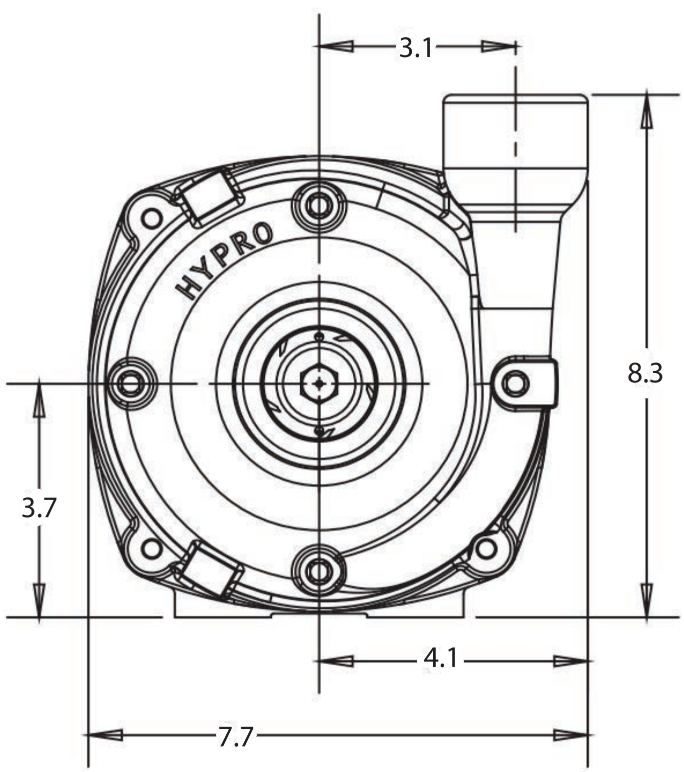
Operating Conditions : GPM: ________ TDH: ________



* Performance with clear water and ambient temp 20ºC (68ºF)

Rev. 0





Dimensions Are In Inches

KEEN PUMP COMPANY
KEEN PUMP CO.
471E ST ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE: KCPMSST			
SCALE: NTS		DWG. #: KCPMSST	REV.: –
DWG. BY: DS	DATE: 03/24/21		