INTRODUCTION

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:

Keen Pump Company, Inc.
471 US Highway 250 East
Ashland, OH 44805

Attn: Literature Department
Phone: 419-207-9400
Fax: 419-903-8031
Email: literature@keenpump.com

Name _____

Title _____

Mailing Address _____

City, State, Zip _____

Phone _____

Fax _____

Email _____

Thank you for your Interest in Keen Pump!

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, will help your business grow and prosper.

Sincerely,



Gregg Keener, President

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Keen Pump
Keen Pump Company


KEEN PUMP CO.
Your Premier Pump Choice
BEST IN CLASS
EXIT

2



SECTION 2

Residential Sump, Sewage, and Effluent

KEEN PUMP



K2PLEN

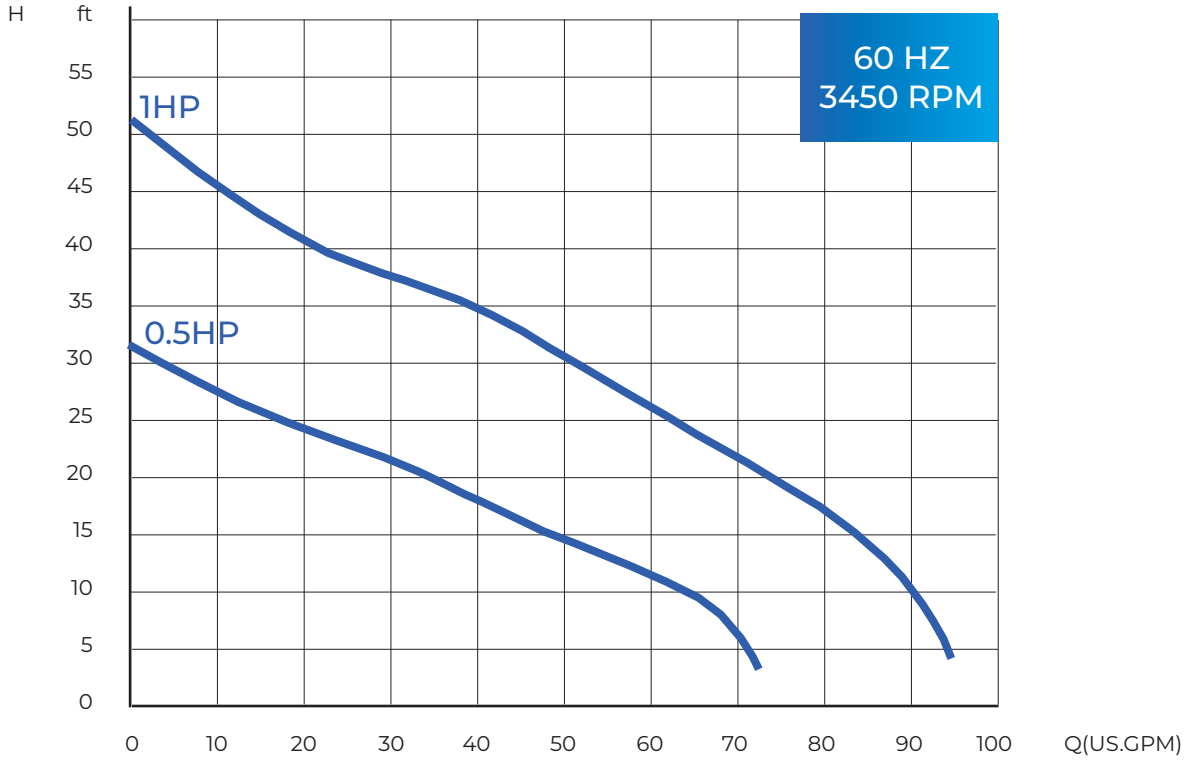
1/2HP & 1HP Sewage Pump

- 1.37” Solids Handling
- 2” NPT Vertical Discharge
- Double Mechanical Seals
- Durable Cast Iron Construction
- Automatic and Manual Models

REV 01/2024

PUMP SERIES	K2PLEN		1/2HP &1HP RECESSED IMPELLER	
Speed	3450 RPM	Discharge	2”	FULL IMPELLER

GPM:_____ TDH: _____



MODEL	HP	VOLTS	PH	AMPS	RATED	RATED		MAX.	
						FT	GPM	FT	GPM
K2PLEN-51A	0.5	115	1	6.6	3450	19.7	35	31	73
K2PLEN-101A	1	115	1	12	3450	33	45	50.8	95
K2PLEN-102A	1	230	1	6	3450	33	45	50.8	95
K2PLEN-103	1	230	3	4	3450	33	45	50.8	95

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.



K2PL

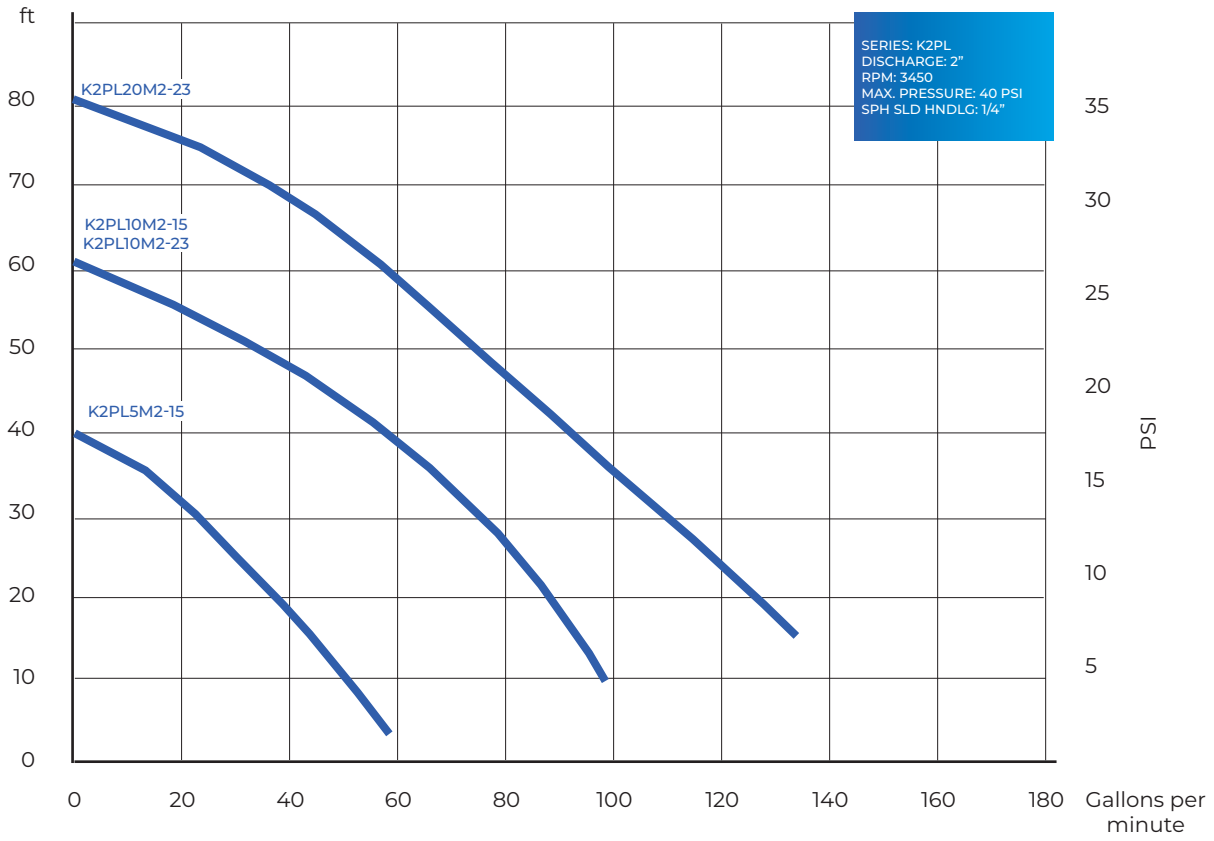
1/2HP & 2HP Dewatering Pump

- 1/4” Solids Handling
- 2” NPT Vertical Discharge
- Double Mechanical Seals
- Durable Cast Iron Construction
- Automatic and Manual Models

REV 01/2024

PUMP SERIES	K2PL		1/2HP - 2HP RECESSED IMPELLER	
Speed	3450 RPM	Discharge	2”	FULL IMPELLER

GPM:_____ TDH: _____



MODEL	HP	VOLTS	PHASE	RPM	MAX AMPS	CORD	A	B	C	D	E	WEIGHT (POUNDS)
K2PL5M2-15	0.5	115	1	3450	3.6	16AWG/3C	13.86”	9.57”	7”	4.25”	4.61”	26
K2PL5M2-15A	0.5	115	1	3450	6.6	16AWG/3C	13.86”	9.57”	7”	4.25”	4.61”	27
K2PL10M2-15	1	115	1	3450	12	16AWG/3C	14.84”	10.98”	7”	4.75”	5.24”	33
K2PL10M2-15A	1	115	1	3450	12	16AWG/3C	14.84”	10.98”	7”	4.75”	5.24”	34
K2PL10M2-23	1	230	3	3450	4	16AWG/3C	14.84”	10.98”	7”	4.75”	5.24”	33
K2PL20M2-23	2	230	3	3450	7	14AWG/4C	18.27”	12.32”	7.5”	5.13”	6.1”	42

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.



K2PLEH

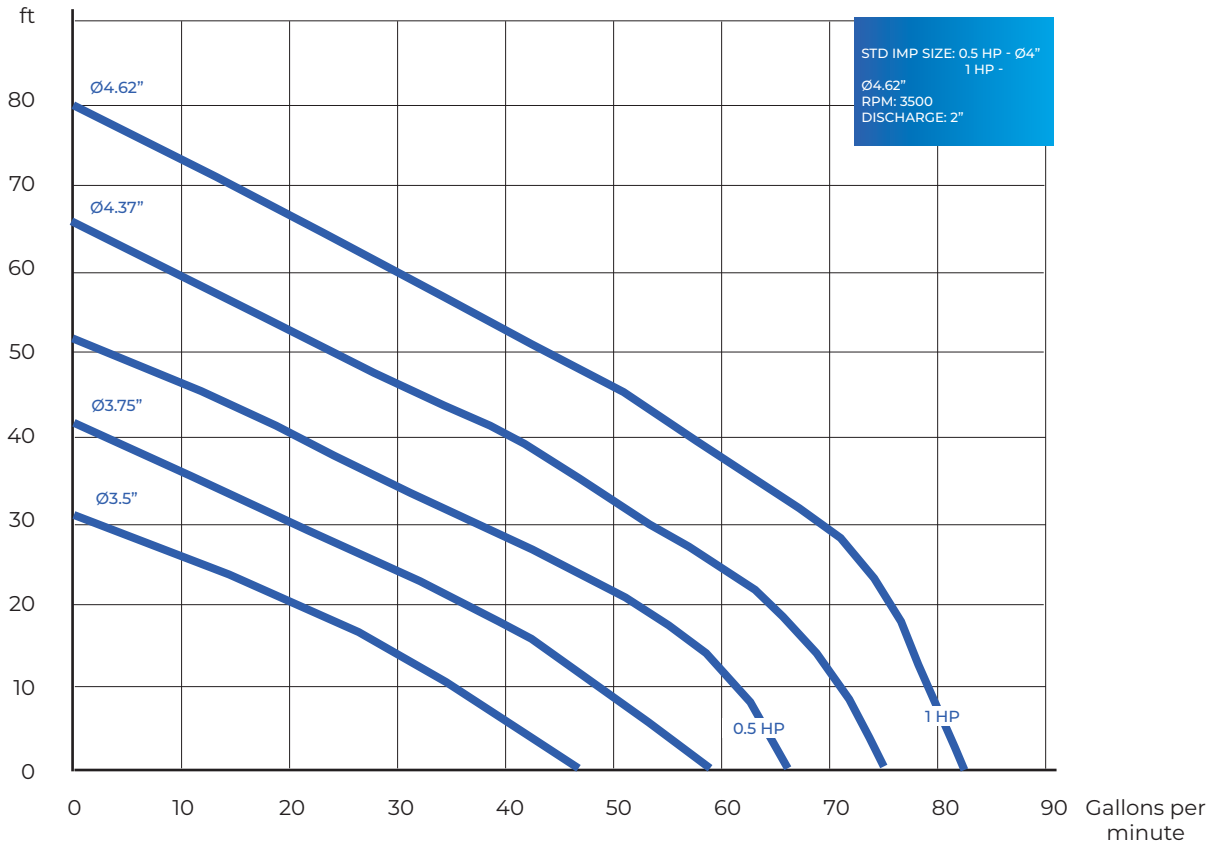
1/2HP & 1HP Effluent Pump

- 3/4” Solids Handling
- 2” NPT Vertical Discharge
- Inboard Single Mechanical Seal
- Durable Cast Iron Construction

REV 01/2024

PUMP SERIES	K2PLEH		1/2HP & 1HP RECESSED IMPELLER	
Speed	3500 RPM	Discharge	2”	FULL IMPELLER

GPM:_____ TDH: _____



MODEL	HP	VOLTS	PHASE	RPM	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O. D.	WEIGHT (POUNDS)
K2PLEH12SS	0.5	115	1	3500	11	23	F	14/3	SJTOW	0.39”	82
K2PLEH102SS	1	230	1	3500	8.2	13.8	B	14/3	SJTOW	0.9”	84
K2PLEH103SS	1	200/230	3	3500	5.4	21.2	K	12/4	SOW	0.6”	84
K2PLEH104SS	1	460	3	3500	2.8	20.7	K	12/4	SOW	0.6”	84

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.

K2PLEH - Specifications & Dimensions

Discharge: 2” NPT, vertical.

Spherical SLD HNDLG: 3/4”

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 the back side, dynamically balanced ISO G6.3. Bronze 85-5-5-5.

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, with stainless steel hardware.

Cord entry: 15 ft of neoprene cord SJO 14/3, sealed against moisture.

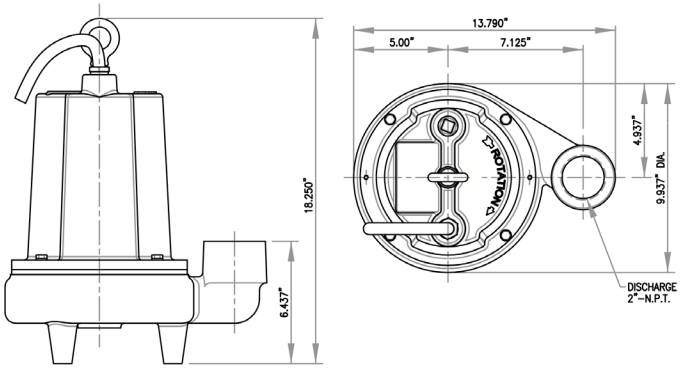
Upper bearing: Ball, single row, oil lubricated, for radial loads.

Lower bearing: Ball, single row, oil lubricated, for radial and axial loads.

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 the control panel. Additional cord, tungsten carbide seal, slide rail coupling (SRC-2).

MODEL	HP	VOLTS	PHASE	RPM	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O. D.	WEIGHT (POUNDS)
K2PLEH512SS	0.5	115	1	3500	11	23	F	14/3	SJTOW	0.39”	82
K2PLEH102SS	1	230	1	3500	8.2	13.8	B	14/3	SJTOW	0.9”	84
K2PLEH103SS	1	200/230	3	3500	5.4	21.2	K	12/4	SOW	0.6”	84
K2PLEH104SS	1	460	3	3500	2.8	20.7	K	12/4	SOW	0.6”	84





K2PLEV512

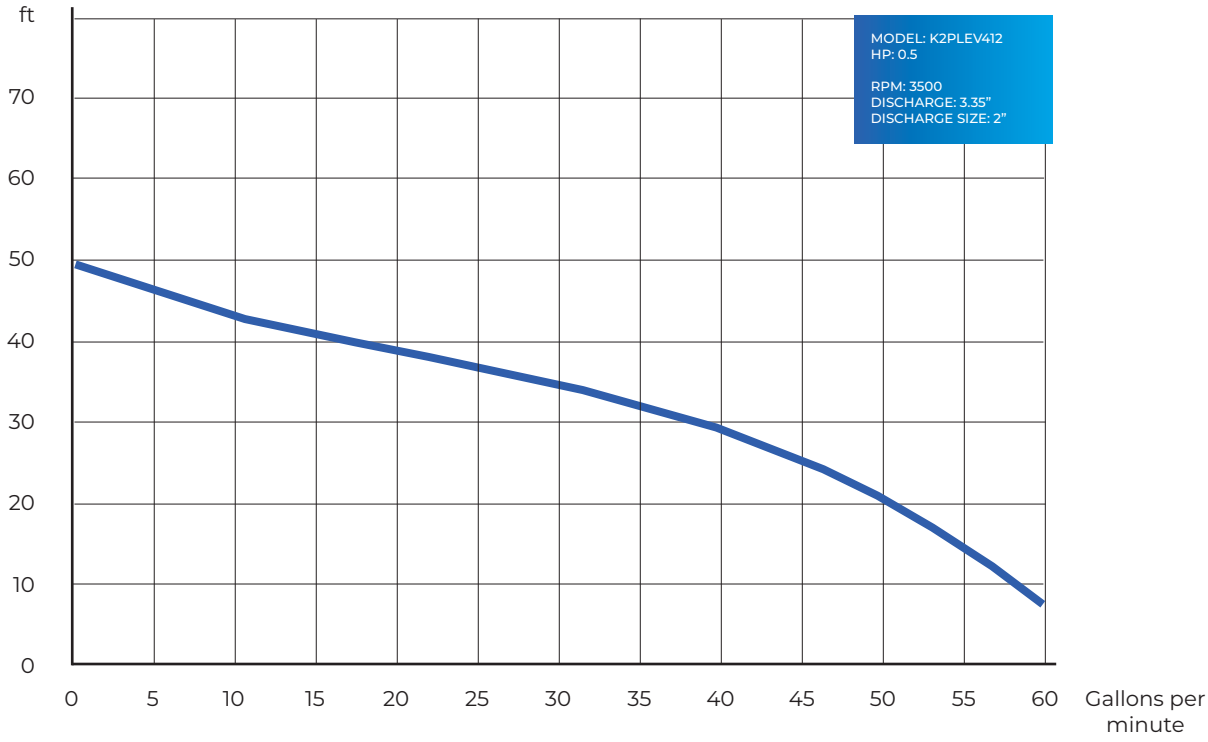
1/2HP Effluent Pump

- 3/4” Solids Handling
- 2” NPT Vertical Discharge
- Single Mechanical Seal
- Durable Cast Iron Construction
- Automatic and Manual Models

REV 01/2024

PUMP SERIES	K2PLEV512		1/2HP RECESSED IMPELLER	
Speed	3500 RPM	Discharge	2”	FULL IMPELLER

GPM:_____ TDH: _____



MODEL	HP	VOLTS	PHASE	RPM	MAX AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	WEIGHT (POUNDS)
K2PLEV512	0.5	115	1	3500	8	16	14/3	SJTOW	82
K2PLEV512A	0.5	115	1	3500	8	16	14/3	SJTOW	84

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.



K2PLSEV512

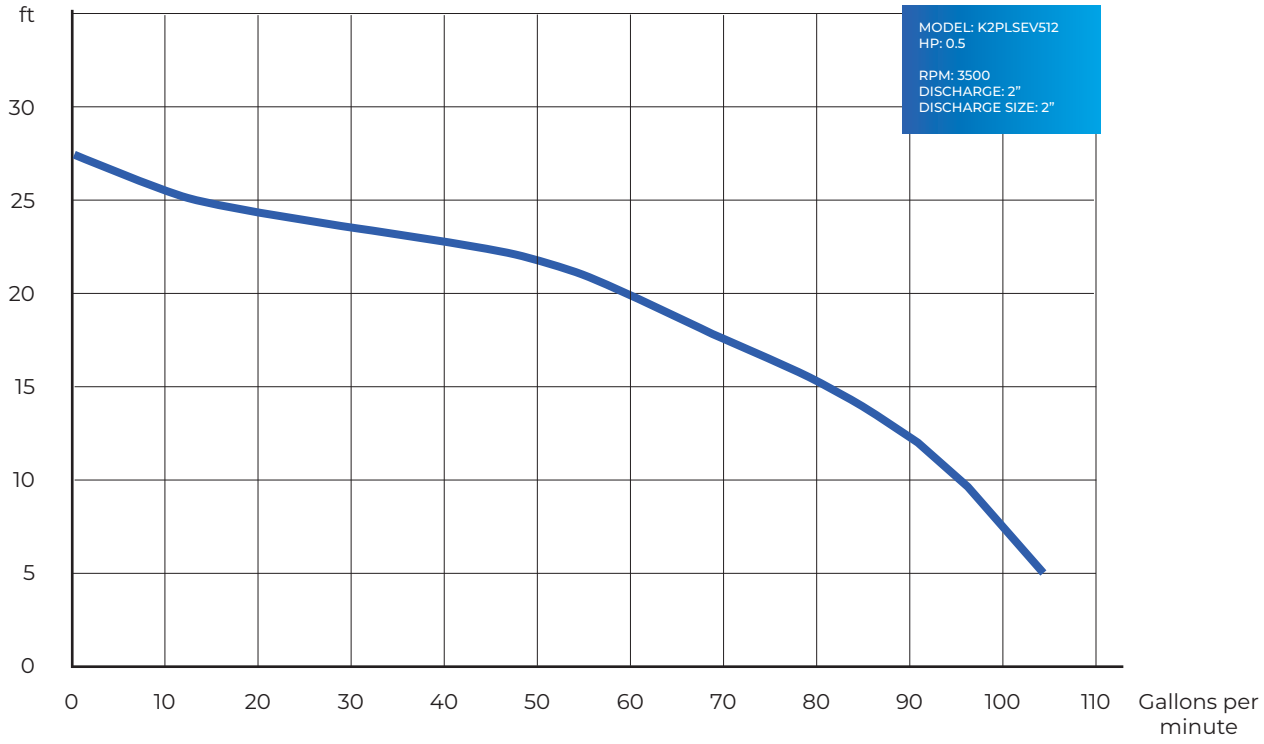
1/2HP Sewage Pump

- 2” Solids Handling
- 2” NPT Vertical Discharge
- Single Mechanical Seal
- Durable Cast Iron Construction
- Automatic and Manual Models

REV 01/2024

PUMP SERIES	K2PLSEV512		1/2HP RECESSED IMPELLER	
Speed	3500 RPM	Discharge	2”	FULL IMPELLER

GPM:_____ TDH: _____



MODEL	HP	VOLTS	PHASE	RPM	MAX AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	WEIGHT (POUNDS)
K2PLSEV512	0.5	115	1	3500	10.2	16	16/3	SJTOW	51
K2PLSEV512A	0.5	115	1	3500	10.2	16	16/3	SJTOW	53

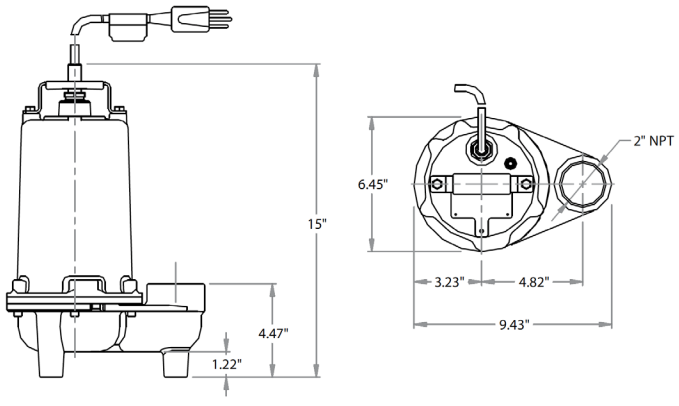
IMPORTANT!

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.

Discharge:	2” NPT, female, vertical.
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.
Impeller:	Vortex. Cast iron ASTM A-48 class 30, dynamically balanced, ISO G6.3.
Shaft:	416 series stainless steel.
O-rings:	Square shaped Buna-N.
Paint:	Air dry enamel, water based.
Seal:	Single mechanical, oil filled chamber. Carbon / Ceramic / Buna-N, with stainless steel hardware.
Hardware:	300 series stainless steel.
Cord entry:	30 ft of neoprene cord SJTOW 16/3, sealed against moisture.
Upper bearing:	Ball, single row, oil lubricated, for radial loads.
Lower bearing:	Ball, single row, oil lubricated, for radial and axial loads.
Motor:	NEMA L, single phase, permanent split capacitor, 115 volts, 60 Hz, 3500 RPM, oil filled, with overload protection in motor.
Optional Equipment:	Additional cord, slide rail coupling (SRC-2).

MODEL	HP	VOLTS	PHASE	RPM	MAX AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	WEIGHT (POUNDS)
K2PLSEV512	0.5	115	1	3500	10.2	16	16/3	SJTOW	51
K2PLSEV512A	0.5	115	1	3500	10.2	16	16/3	SJTOW	53

A = Automatic Float Switch, VF = Automatic Vertical Float Switch





K2PLSE

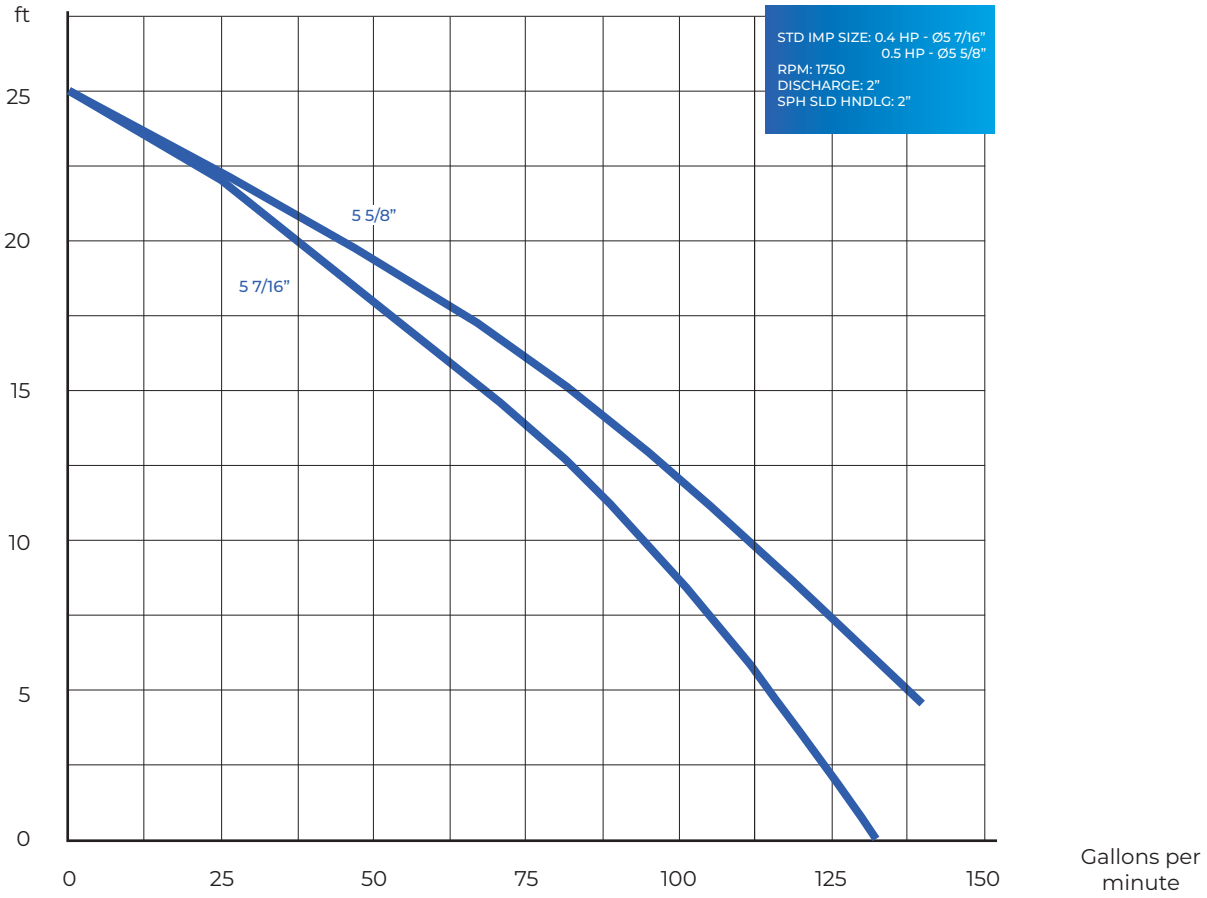
4/10HP & 1/2HP Sewage Pump

- 2” Solids Handling
- 2” NPT Vertical Discharge
- Single Mechanical Seal
- Durable Cast Iron Construction
- Automatic and Manual Models

REV 01/2024

PUMP SERIES	K2PLSE		4/10 & 1/2HP RECESSED IMPELLER	
Speed	1750 RPM	Discharge	2”	FULL IMPELLER

GPM:_____ TDH: _____



MODEL	HP	VOLTS	PHASE	RPM	MAX AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	WEIGHT (POUNDS)
K2PLSE411	0.4	115	1	1750	12	22.5	14/3	SJTOW	53
K2PLSE411A	0.4	115	1	1750	12	22.5	14/3	SJTOW	53
K2PLSE421	0.4	230	1	1750	6.1	9.3	14/3	SJTOW	53
K2PLSE511A	0.4	115	1	1750	12	22.5	14/3	SJTOW	53

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.

GENERAL - Furnish and install a quantity of _____ Keen® Pumps submersible sewage pump(s), Model K2PLSE____, ____HP, 1750 RPM, single phase, 60 Hz, ____ volts, with a 2 inch vertical bolt-on discharge ¸ange 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 inch diameter spherical solids, of raw, unscreened domestic sewage consisting of water, fibrous materials. The 115 volt pump(s) shall be capable of handling liquids with temperatures to 77 °F continuous, and the 230 volt 104 °F, 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.

STAINER -Shall be steel construction with an industrial grade powder coating.

COATING/HARDWARE -Exterior surfaces shall have an industrial grade powder coating. 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. 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 construction shall be carbon for the rotating face and ceramic for stationary face, 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.

THERMAL PROTECTION - All single phase motors shall have thermal protection with automatic reset.

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 - Shall be 20 ft. of type SJTW and connected to the motor via quick disconnect spade terminals. Crimp connected cords are not acceptable. Heat shrink tubes shall be used to connect power cord leads with motor leads. A master heat shrink tube shall be provided and 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. A three prong, grounded, 115 volt plug shall be
molded to power cord for automatic operation.

LEVEL CONTROLS - An automatic on-off float switch shall be mounted to the pump for pump down operation. An “A” series shall be a wide angle, normally open, mechanical tilt or a “VF” for vertical ¸oat switch with adjustable o°point. The switch shall be equipped with 20 ft of type SJOW cord with molded on piggy-back style plug that allows the pump to be operated manually without the removal of the pump in the event that the switch be comes inoperable.

TESTS AND INSPECTIONS - Shall be performed by the pump manufacturer.

1. A ground continuity check and motor chamber shall be Hi-potted to test for electrical integrity.
2. Check that the motor voltage and frequency matches the name plate.
3. The pump shall be pressurized and an air leak test is performed to ensure the integrity of the motor housing.



K2PLEP Series

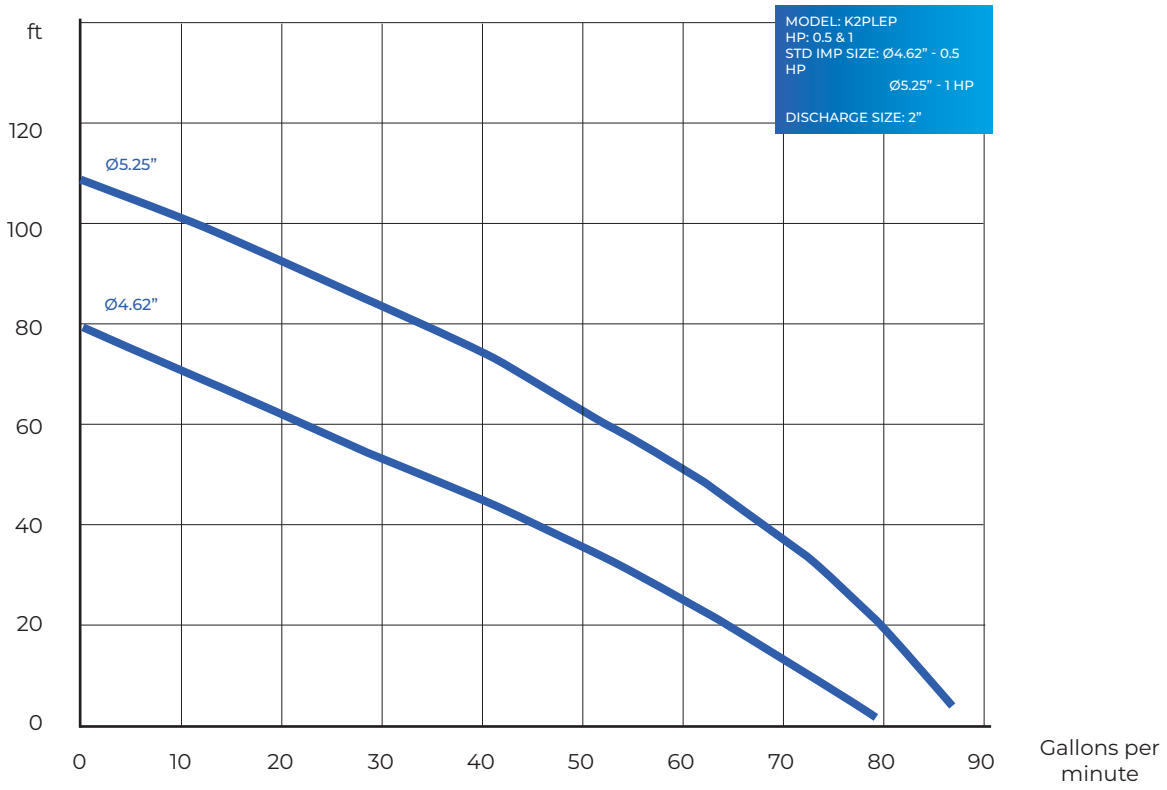
1/2HP & 1HP Effluent Pump

- 3/4” Solids Handling
- 2” NPT Vertical Discharge
- Outboard Single Mechanical Seal
- Durable Cast Iron Construction
- Automatic and Manual Models

REV 01/2024

PUMP SERIES	K2PLEP		1/2HP - 1HP ENCLOSED IMPELLER	
Speed	3500 RPM	Discharge	2”	FULL IMPELLER

GPM:_____ TDH: _____



MODEL	HP	VOLTS	PHASE	RPM	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	WEIGHT (POUNDS)
K2PLEP521	0.5	115	1	3500	13.1	26.2	G	14/3	SOW	80
K2PLEP521A	0.5	115	1	3500	13.1	26.2	G	14/3	SOW	80
K2PLEP522	0.5	230	1	3500	5.6	13.2	E	14/3	SOW	80
K2PLEP1022	1	230	1	3500	9.1	23.5	F	14/3	SOW	80

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.



K2PLSE-SS

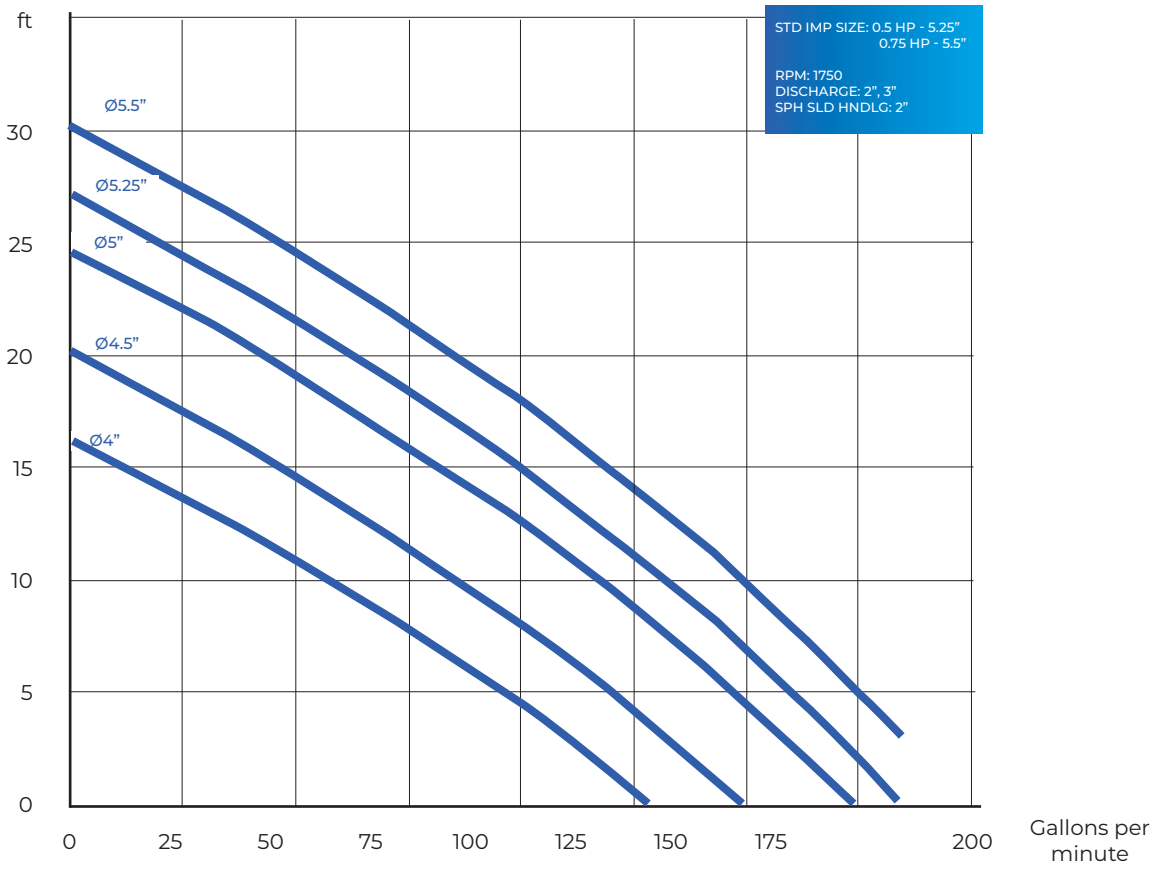
1/2HP & 3/4HP Sewage Pump

- 2” Solids Handling
- 2“ - 3” NPT Vertical Discharge
- Please Specify
- Inboard Single Mechanical Seal
- Durable Cast Iron Construction
- Automatic and Manual Models

REV 01/2024

PUMP SERIES	K2PLSE-SS		1/2HP - 3/4HP 2 VANE SEMI-OPEN IMPELLER	
Speed	3500 RPM	Discharge	2”/3”	FULL IMPELLER

GPM:_____ TDH: _____



MODEL	HP	VOLTS	PHASE	RPM	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (POUNDS)
K2PLSE51SS	0.5	115	1	1750	11.6	18.4	D	14/3	SJO	0.5”	91
K2PLSE51A	0.5	115	1	1750	11.6	18.4	D	14/3	SJO	0.5”	93
K2PLSE52SS	0.5	200/230	1	1750	5.9	14.9	B	14/3	SJO	0.5”	93
K2PLSE53SS	0.5	200/230	3	1750	4.6/4.2	9.7/11.1	K	14/3	SJO	0.5”	95
K2PLSE54SS	0.5	460	3	1750	2.2	5.3	K	14/3	SJO	0.5”	95
K2PLSE72SS	0.75	230	1	1750	10.5	17.5	D	14/3	SJO	0.5”	95
K2PLSE73SS	0.75	200/230	3	1750	5.5	16	D	12/4	SJO	0.625”	96
K2PLSE74SS	0.75	460	3	1750	3.2	8	D	12/4	SJO	0.625”	96

Available in 2” and 3” discharge - please specify

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.

GENERAL - Furnish and install a quantity of _____ Keen® Pumps submersible sewage pump(s), Model K2PLSE____ SS, ____ HP, ____ RPM, ____ phase, 60 Hz, ____ volts, with a 2 inch (optional 3") 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 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 special 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 manufacturer's 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 - Shall be ____ ft of type SJTOW on 115 volt and SOW on all other voltages and connected to the motor via Fast-Disconnect plug. Pin receptacles shall be crimped and molded to the power cord in a PVC plug. The plug shall be secured with a stainless steel compression plate to prevent water from entering the housing and to provide strain relief at the point of cord entry. A clamp shall compress the PVC molding against the cord jacket to
prevent water from entering the jacket. A terminal block with brass pin inserts shall connect the power cord leads with the motor leads. The ground pin shall be longer than the other pins such that the ground connection is the first
connection made and the last connection broken when the plug is inserted and removed, respectively. A Buna-N o-ring shall provide isolation sealing between the terminal block and the motor housing when the cord plug is removed. A three prong, grounded, 115 volt plug shall be molded to the power cord for automatic operation.

TESTS AND INSPECTIONS - Shall be performed by the pump manufacturer.

1. A ground continuity check and motor chamber shall be Hi-potted to test for electrical integrity.
2. Check that the motor voltage and frequency matches the name plate.

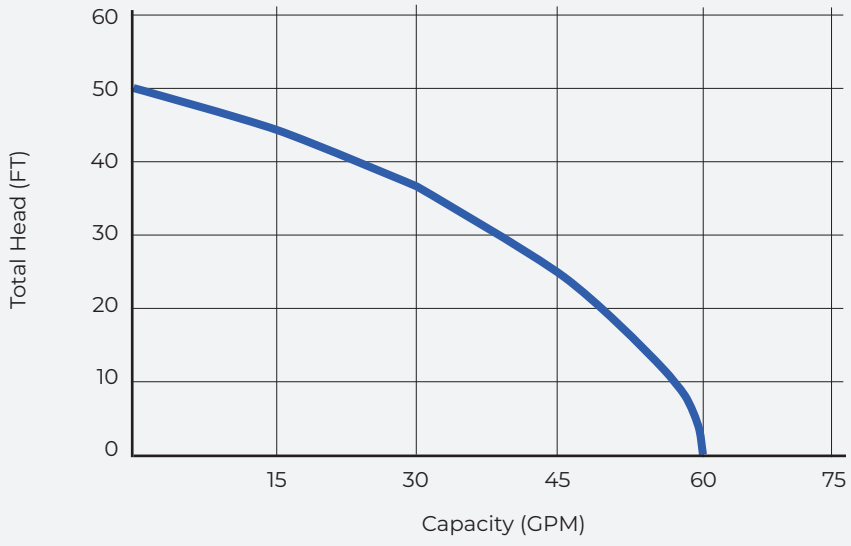


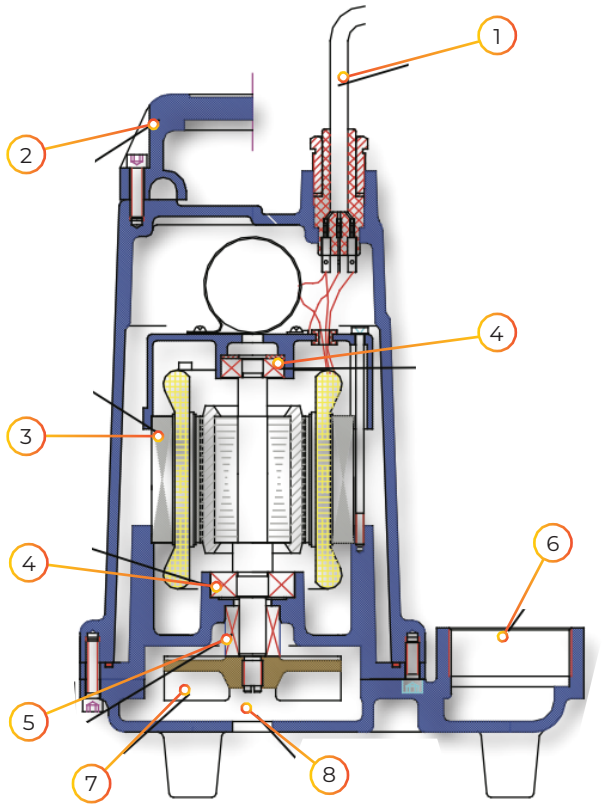
KE5

1/2HP 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)

PERFORMANCE CURVE





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.

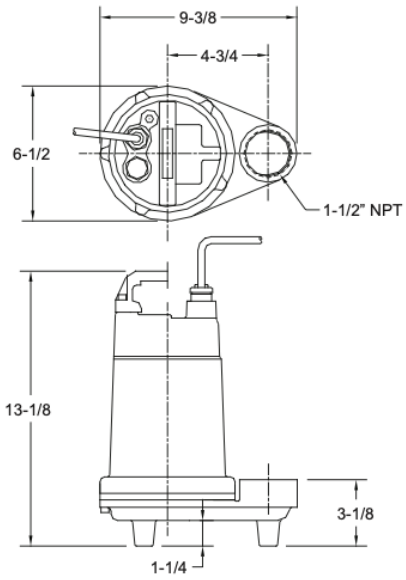
5. SHAFT SEAL - Silicon Carbide.

6. DISCHARGE - 1-1/2" NPT Vertical.

7. IMPELLER - Cast Iron.

8. SOLIDS-HANDLING - Up to 3/4" Dia.

9. *Optional Piggy-Back Float.





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.

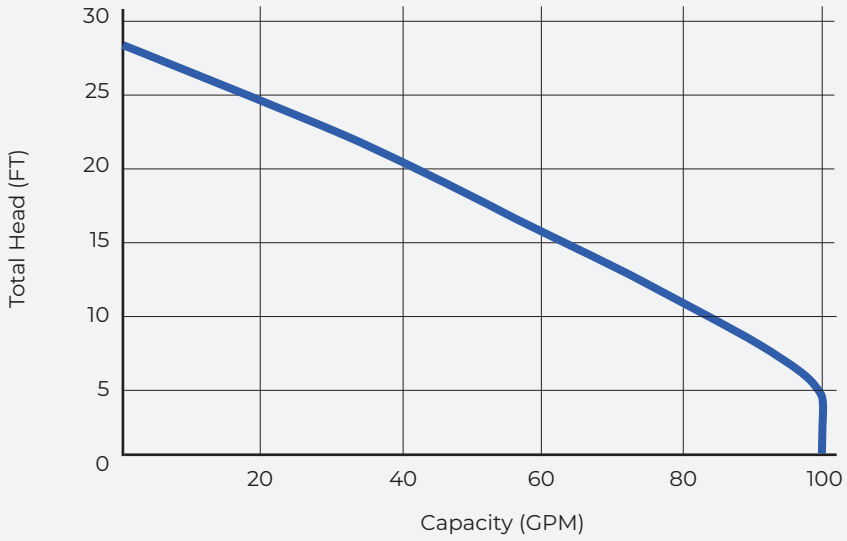


KW5

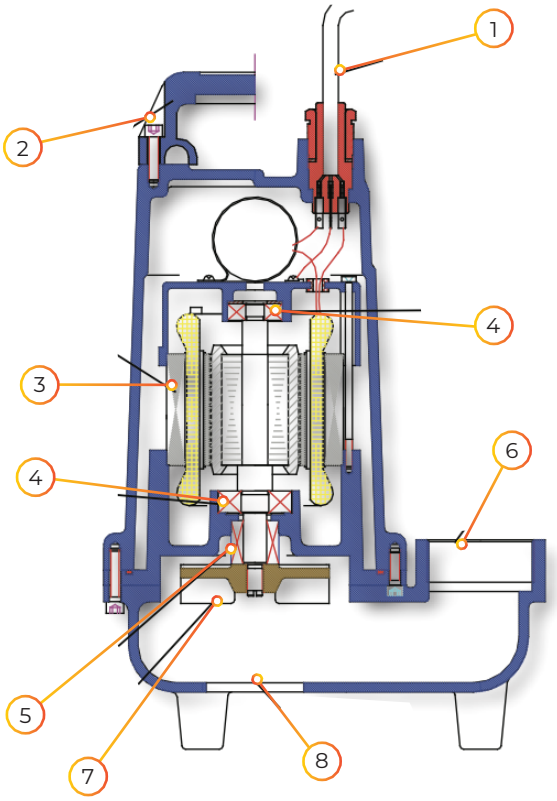
1/2HP Sewage Pump

- 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)

PERFORMANCE CURVE



REV 01/2024



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.

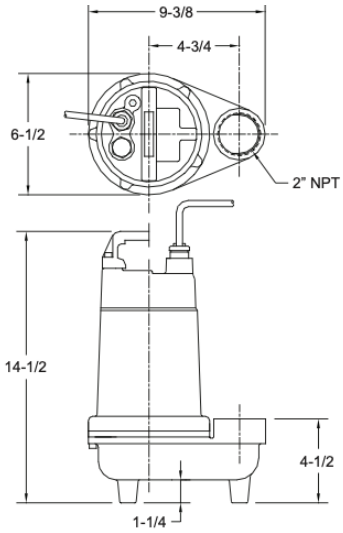
5. SHAFT SEAL - Silicon Carbide.

6. DISCHARGE - 2” NPT Vertical.

7. IMPELLER - Cast Iron.

8. SOLIDS-HANDLING - Up to 2” Dia.

9. *Optional Piggy-Back Float.





PUMP MODEL – Pump shall be of the submersible centrifugal type, 1/2 HP KEEN KW5 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.



KE(C)

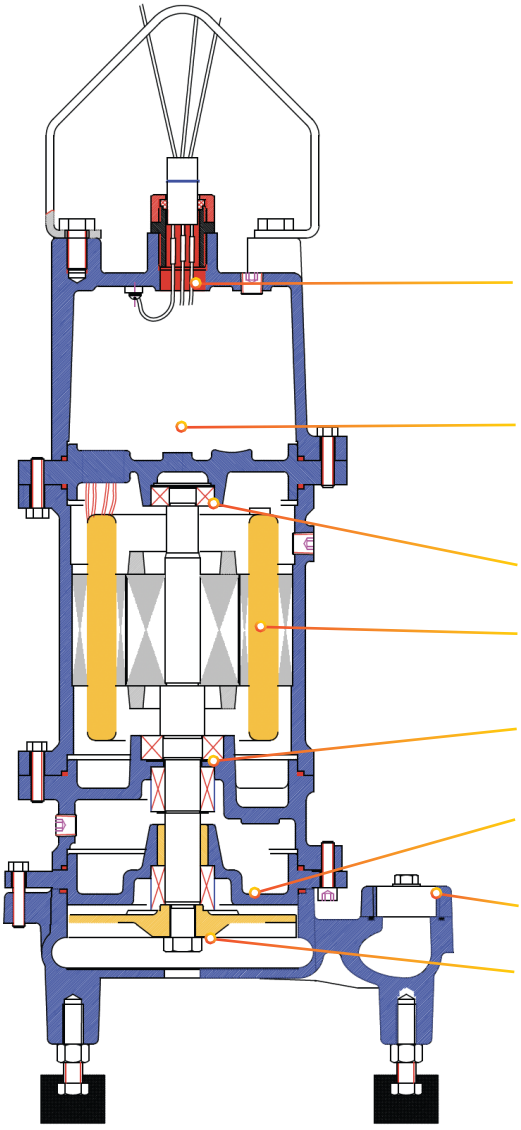
1HP Effluent Pump

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
  Viton® Elastomers
- No Control Panel Required
  Internal Start Kit Option
- Pressed Oil-Cooled Motor
  Superior Heat Transfer
  Long Bearing & Seal Life

REV 01/2024

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

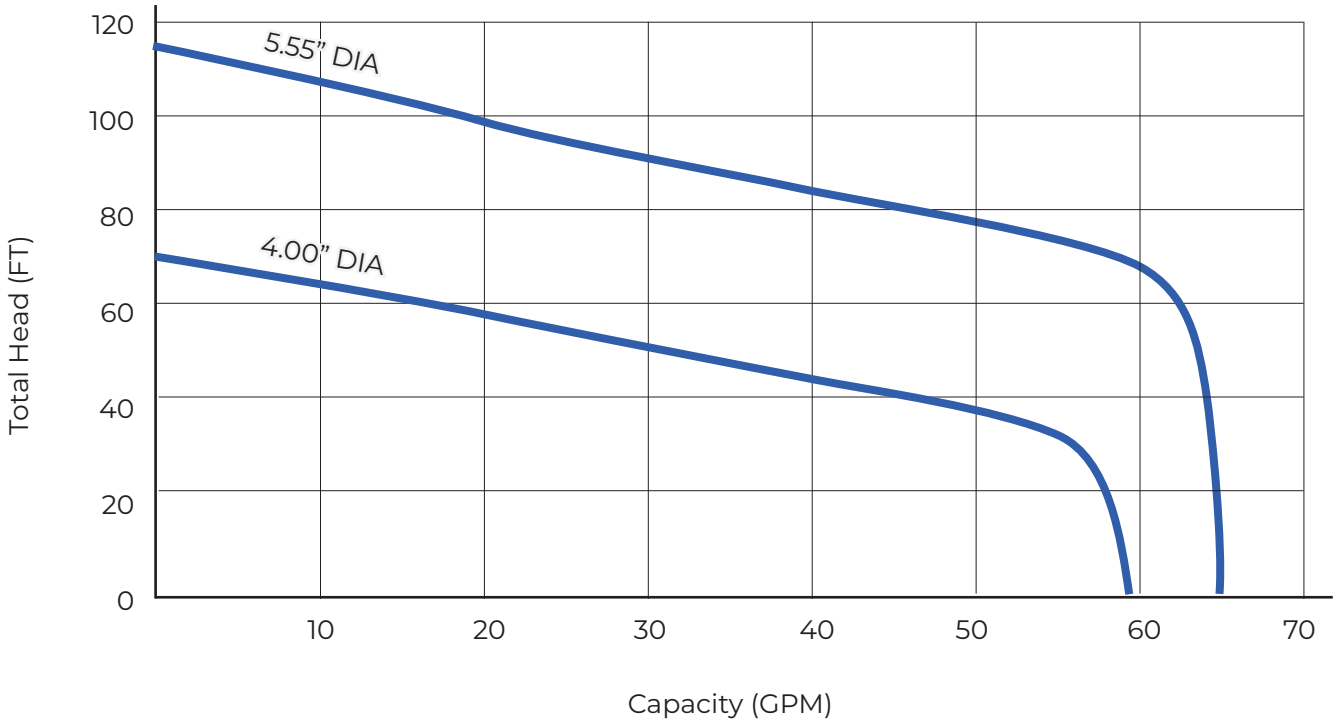
REMOVABLE 1-1/2" NPT DISCHARGE FLANGE

PASSES 3/4" SOLIDS

PUMP SERIES	KE102 & 103		1HP RECESSED IMPELLER	
Speed	3450 RPM	Discharge	1-1/2”	STANDARD FLOW

GPM:_____ TDH: _____

PERFORMANCE



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 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. 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.

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

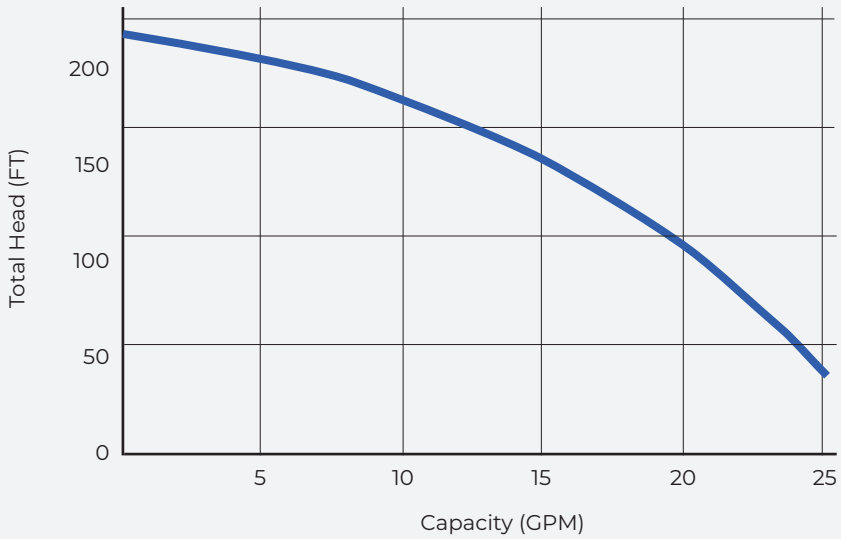


KWSE5

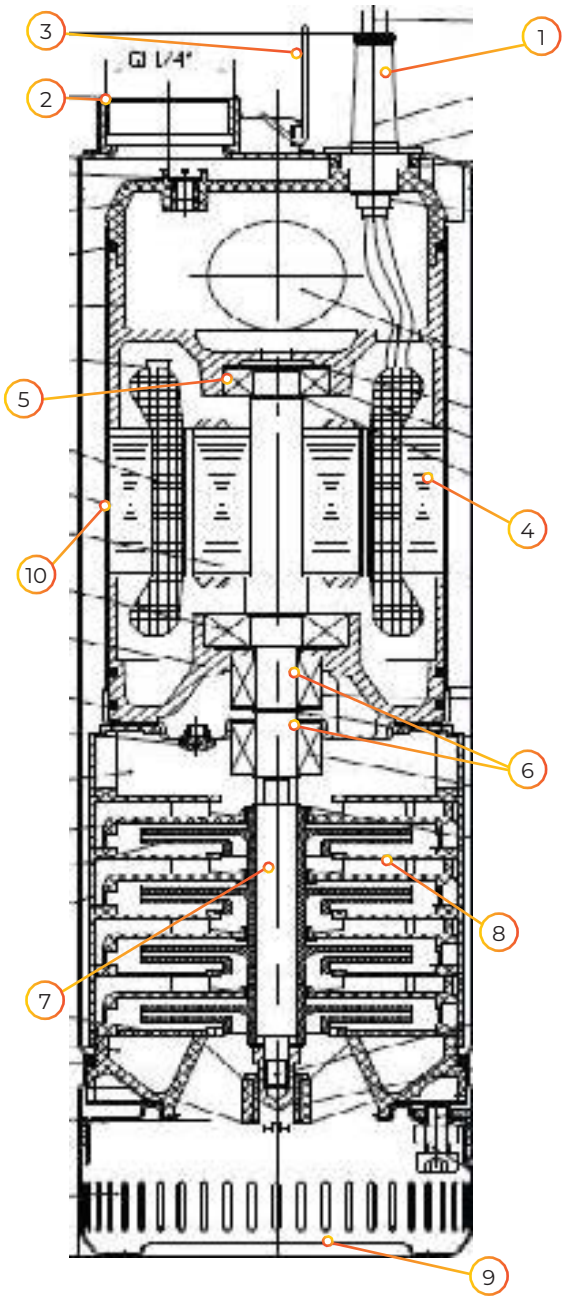
1/2 HP High Head Effluent Pump

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

PERFORMANCE CURVE



REV 01/2024



PUMP SPECIFICATIONS

- KWSE5-11, 115 Volt, 10.5 Amps
- KWSE-21, 230 Volt, 6.5 Amps
- Weight: 34 LBS
- Height: 21-1/2 Inches
- Diameter: 5 Inches
- Discharge: 1-1/4 NPT

1. POWER CORD - 10 ft. standard
2. DISCHARGE 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
7. SHAFT- One Piece Stainless Steel
8. PUMP STAGING- Multi-Stage for High Pressure. High Impact/Temperature/ Chemical Resistant, Glass Reinforced Resin
9. INLET- All Stainless Steel Construction, Removable for Easy Cleaning
10. INTERNAL WATER - Flows Past Motor, Keeps Passageway Motor Cool



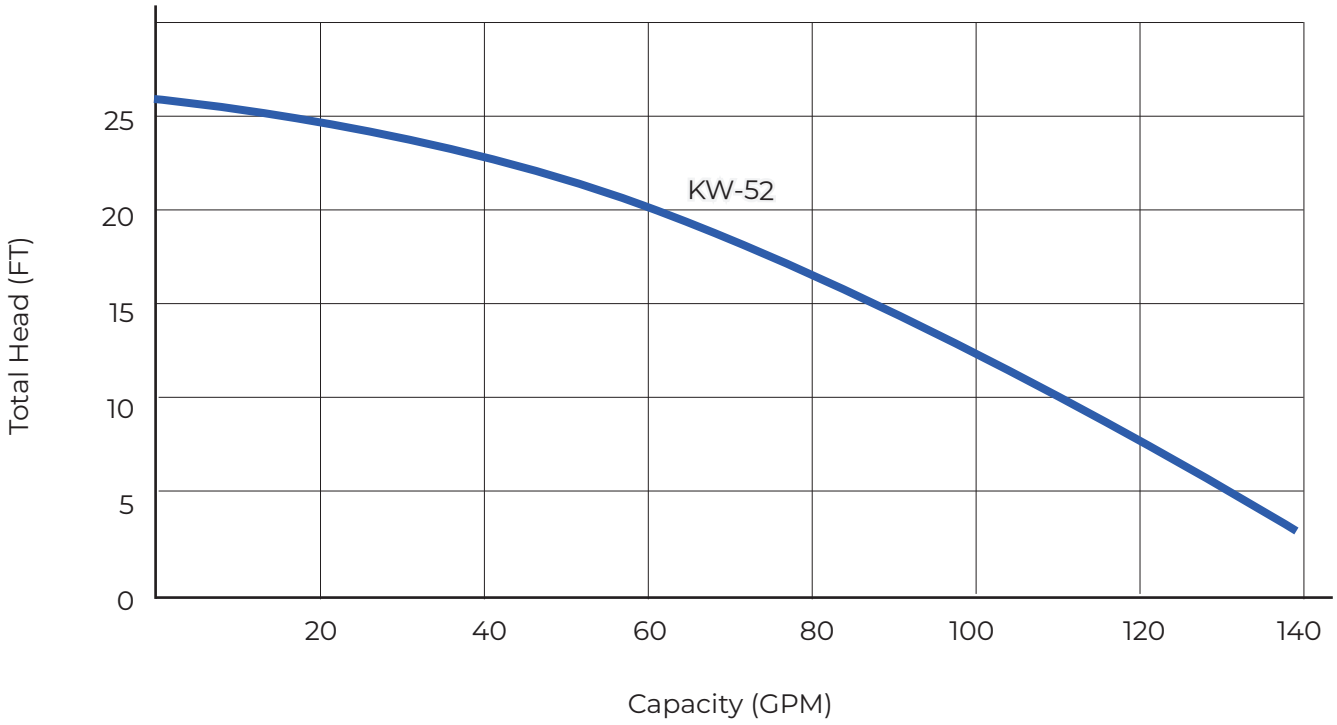
KW-52

1/2HP Sewage Pump

- 2” Solids Handling
- Heavy-Duty Mechanical Seal
- 2 Vane Open Impeller
- Durable Cast Iron Construction
- Automatic and Manual Models

PUMP SERIES	KW-52		2 VANE IMPELLER	
Speed	1750 RPM	Discharge	2”	STANDARD FLOW

PERFORMANCE

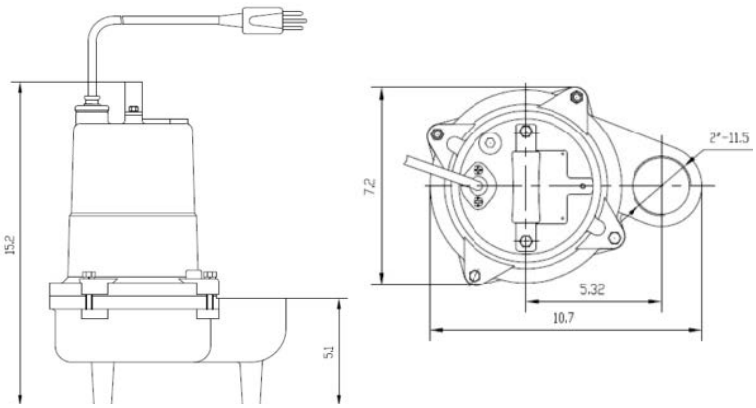


MODEL	HP	VOLTS	PH/HZ	RPM	AMPS	SWITCH TYPE	DISCHARGE SIZE	CORD TYPE	CORD LENGHT	WEIGHT (POUNDS)
KW-52	1.5	230	1/60	1750	6	Manual	2”	SJTOW	20’	49
KW-52A	1.5	230	1/60	1750	6	Teathered Automatic	2”	SJTOW	20’	50

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.

Discharge:	2” NPT, female, vertical.
Liquid temperature:	104°F (40°C) Continuous
Volute:	Cast iron ASTM A-48 class 30.
Motor housing:	Cast iron ASTM A-48 class 30.
Impeller:	Cast Iron ASTM A-48,Class 30, 2 Vane open with pump out vanes on back side.
Shaft:	420 Stainless Steel.
O-rings:	Buna-N.
Seal:	Single Seal, Carbon/Ceramic Elastomer - Buna -N
Hardware:	300 series stainless steel.
Cord entry:	20 Ft Cord w/Plug, UL &CUL 14AWG, Type SJTOW
Upper bearing:	Ball, single row, oil lubricated, for radial loads.
Lower bearing:	Ball, single row, oil lubricated, for radial and axial loads.
Motor:	Single Phase, 1750 RPM, 60 Hz, 115V, 12A; 230V, 6A, Includes Overload Protec on in, the motor, Oil Filled,Class B, Capacitor Start / Capacitor Run
Switch Type:	Piggy-back Float Switch

MODEL	HP	VOLTS	PH/HZ	RPM	AMPS	SWITCH TYPE	DISCHARGE SIZE	CORD TYPE	CORD LENGHT	WEIGHT (POUNDS)
KW-52	1.5	230	1/60	1750	6	Manual	2”	SJTOW	20’	49
KW-52A	1.5	230	1/60	1750	6	Teathered Automatic	2”	SJTOW	20’	50





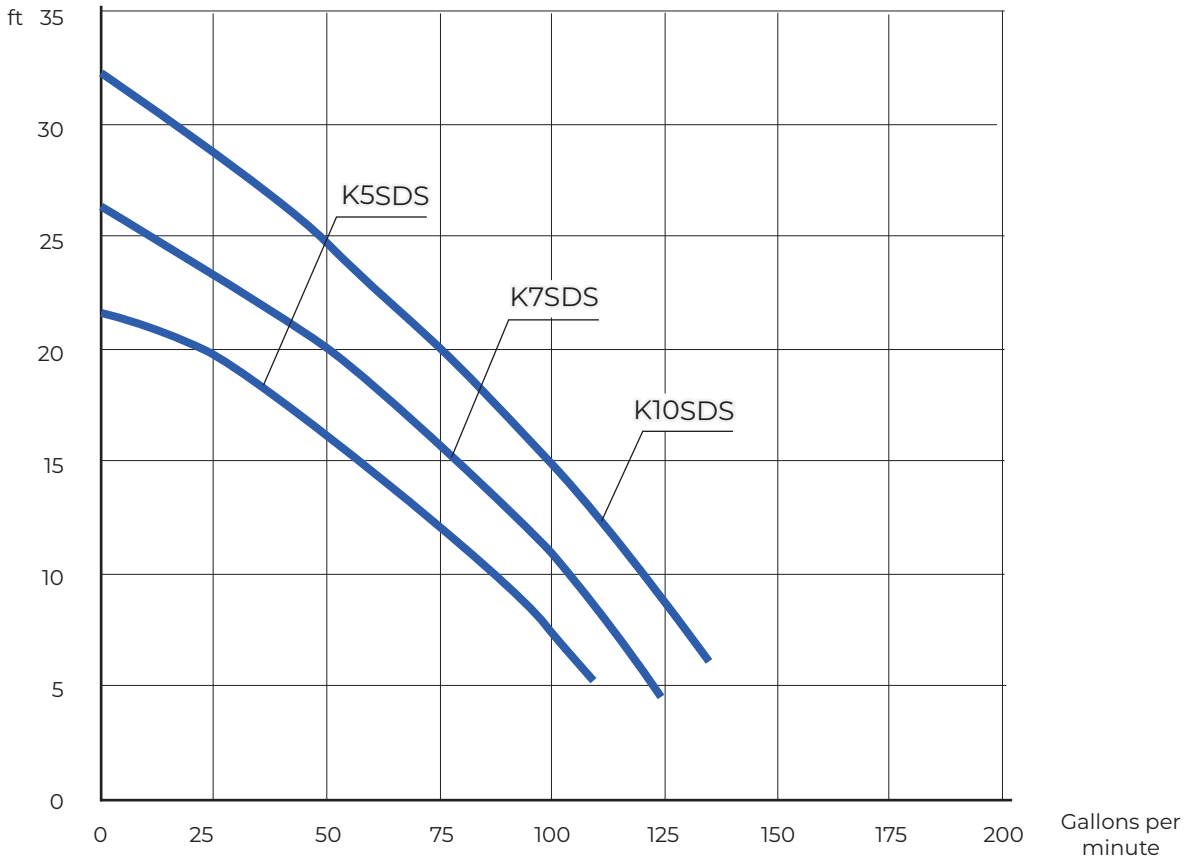
K5/7/10SDS

1/2-1HP Sewage Pump

- 1.5” Solids-Handling
- Stainless Steel “Keyed” Shaft
- Flows to 160 GPM
- Heads to 33 Feet
- 1/2 HP - 1 HP, 3450 RPM
- 2” NPT Discharge
- Optional Piggyback Float Switch

PUMP SERIES	KSDS		10 VANE IMPELLER	
Speed	3450 RPM	Discharge	2”	STANDARD FLOW

PERFORMANCE



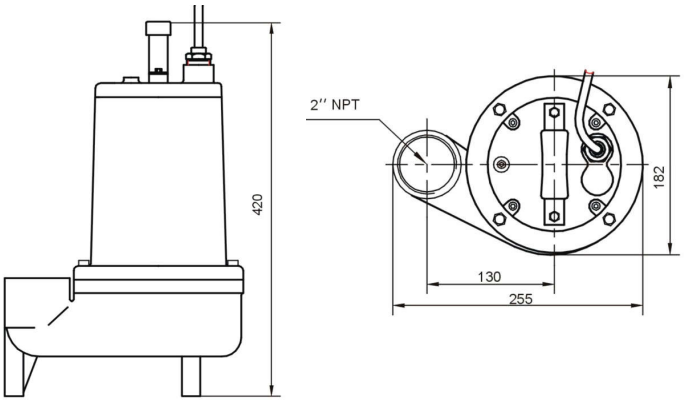
MODEL	HP	VOLTS	PHASE	RPM	FULL LOAD AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	WEIGHT (POUNDS)
K5SDS	0.5	115/127	1/60	3450	10	37	14/3	SJTOW	57
K7SDS	0.75	115/127	1/60	3450	12	45	14/3	SJTOW	58
K10SDS	1	115/127	1/60	3450	15	45	14/3	SJTOW	59

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.

2 K5/7/10SDS - Specifications & Dimensions

Discharge:	2” NPT, female, vertical.
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:	Cast Iron ASTM A-48,Class 30, 2 Vane open with pump out vanes on back side.
Shaft:	420 Stainless Steel.
O-rings:	Buna-N.
Seal:	Dual Mechanical Seals (Motor Side) Rotating Face - Carbon, Stationary Face - Ceramic (Pump Side) Rotating Face - Silicon Carbide, Stationary Face - Silicon Carbide
Hardware:	300 series stainless steel.
Cord entry:	20 Ft Cord With Pressure Grommet for Sealing, UL listed SJTOW
Upper bearing:	Ball, single row, oil lubricated, for radial loads.
Lower bearing:	Ball, single row, oil lubricated, for radial and axial loads.
Motor:	Single Phase, 3450 RPM, 115V, 60 Hz. Includes Overload Protectioon in the motor, Oil Filled,Class B, Capacitor Start / Capacitor Run
Switch Type:	Piggy-back Float Switch

MODEL	HP	VOLTS	PHASE	RPM	FULL LOAD AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	WEIGHT (POUNDS)
K5SDS	0.5	115/127	1/60	3450	10	37	14/3	SJTOW	57
K7SDS	0.75	115/127	1/60	3450	12	45	14/3	SJTOW	58
K10SDS	1	115/127	1/60	3450	15	45	14/3	SJTOW	59

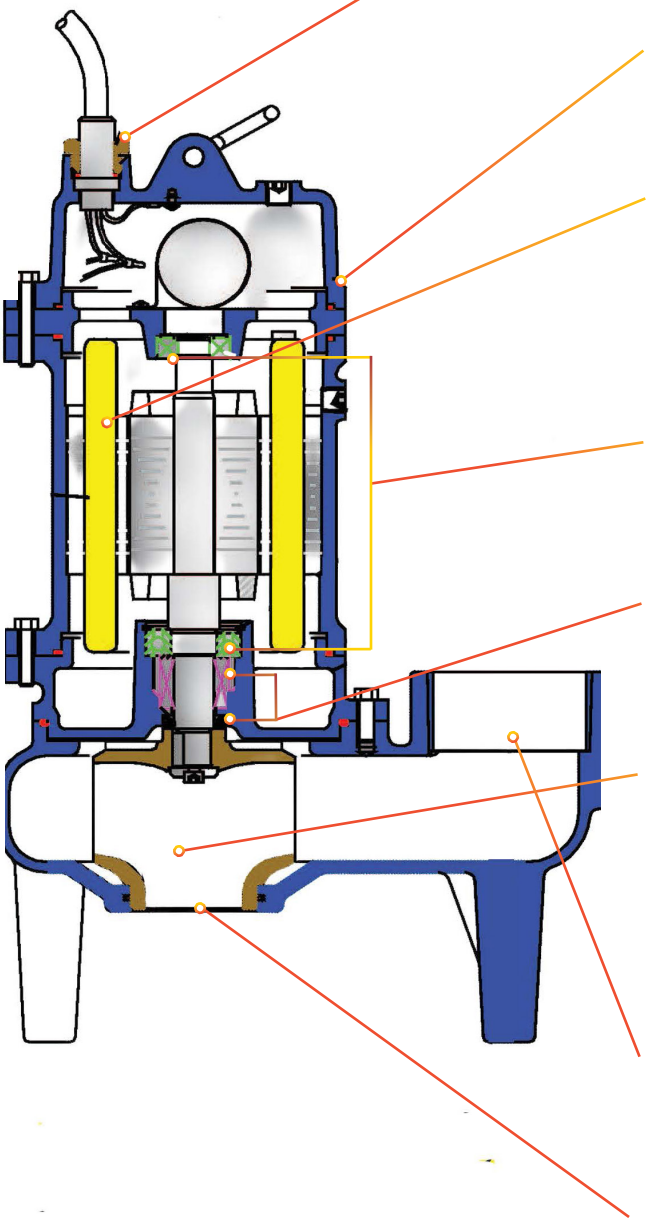




KW

1-3HP Sewage Pump

- Up to 2” Solids-Handling
- Heavy-Duty, Silicon Carbide Seals
- Stainless Steel “Keyed” Shaft
- Flows to 325 GPM / Heads to 95ft
- Up to 2” Solids-Handling
- Heads to 95 Feet
- 1 HP - 3 HP, 3450 RPM
- Single or Three Phase
- 2” or 3” NPT Discharge
- Optional Piggyback Float



WATER TIGHT CABLE ENTRANCE

- Watertight strain relief with compression grommet protects outer cord jacket. Cable wires individually stranded in epoxy in cord cap assembly provides anti-wicking moisture protection to the motor even if power cable is cut or damaged.

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.

STRONG MOTOR

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

BEARING SUPPORT

- Motor / Pump shaft securely held with upper and lower ball bearing 50,000 hour B-10 life.

SEVERE DUTY DUAL MECHANICAL SEALS

- Dual shaft seals provide twice the moisture and grit protection for the motor. Inboard seal silicon-carbide with outboard lip seal. Tougher silicon carbide seals better handle sand, grit and abrasive materials.

HIGH EFFICIENCY HYDRAULIC DESIGN

- Highly efficient, single-vane impeller easily passes 2” dia. solids without blockage. Strong ductile iron design features backside pump-out vanes, keeping lower seal clean and pressurecompensated for longer life. Dynamically-balanced for smooth, quiet operation and long bearing life.

VERTICAL DISCHARGE CONNECTION

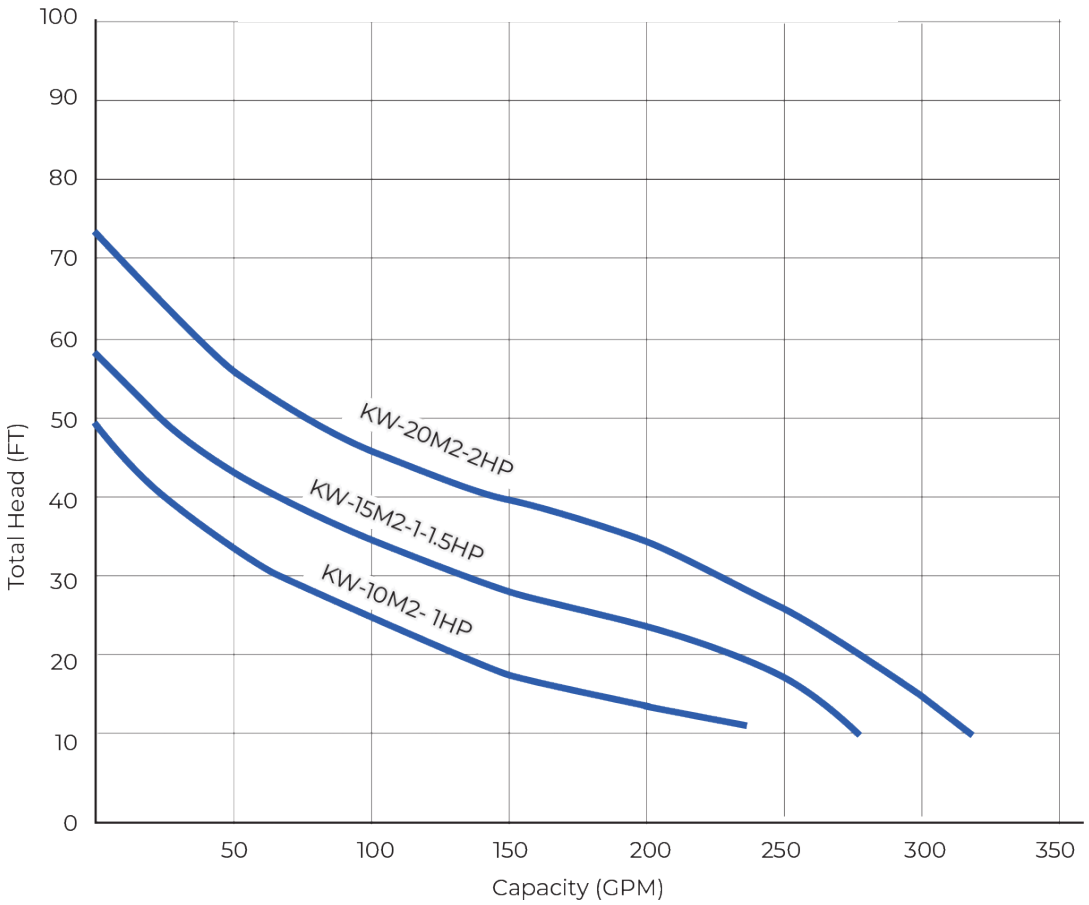
- 2“ NPT vertical discharge. Volute included with support legs. OPTIONAL 3” NPT Reducer.

2” SOLIDS-HANDLING

- Clear, unobstructed passageway provides reliable movement of solids.

PUMP SERIES	KW - SINGLE PHASE		SINGLE VANE IMPELLER	
Speed	3450 RPM	Discharge	3”	STANDARD FLOW

PERFORMANCE

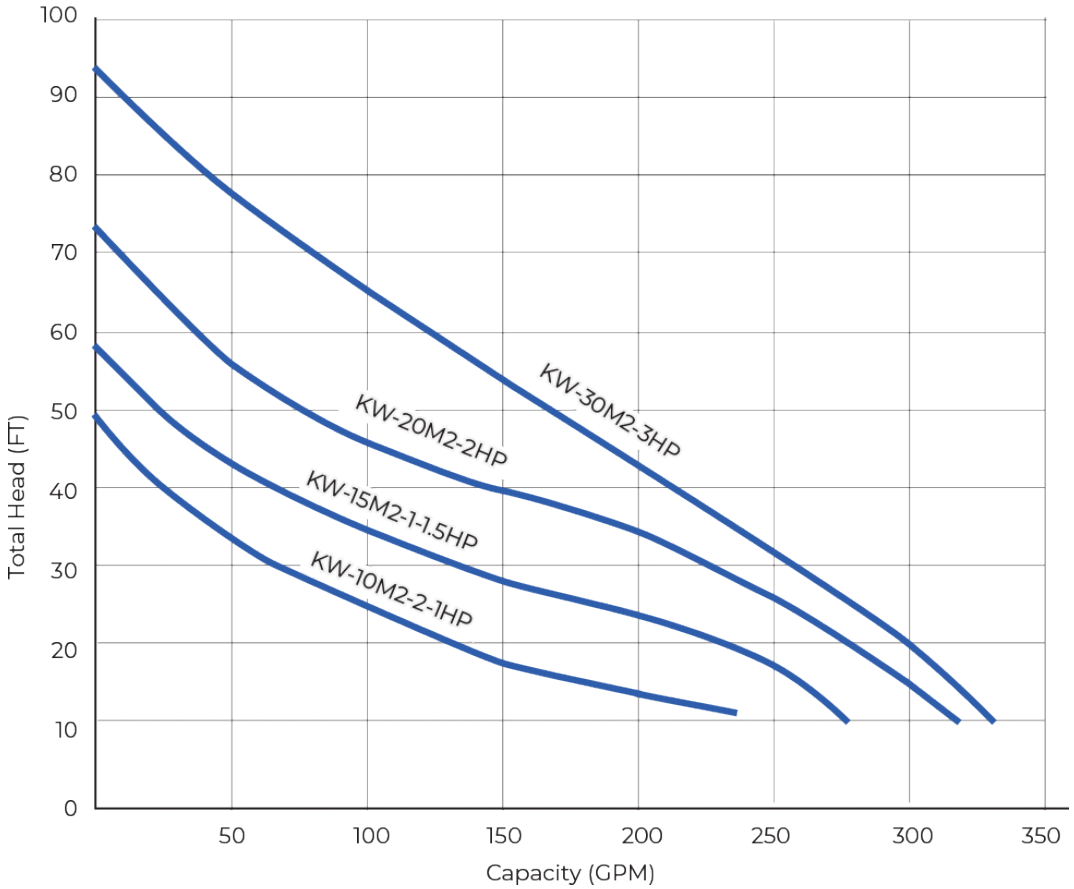


SINGLE PHASE

MODEL	HP	VOLTS	PHASE	RPM	FLA AMPS
KW-10M2-01-3	1	208/230	1	3459	13.0/11.9
KW-15M2-01-3	1-1.5	208/230	1	3450	14.0/12.8
KW-20M2-01-3	2	208/230	1	3450	14.4/13.1

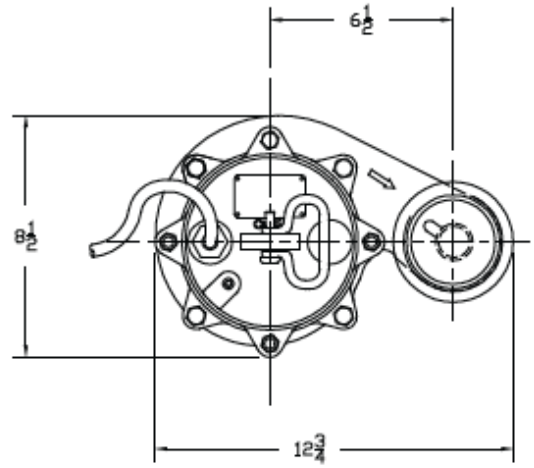
PUMP SERIES	KW - THREE PHASE		SINGLE VANE IMPELLER	
Speed	3450 RPM	Discharge	3”	STANDARD FLOW

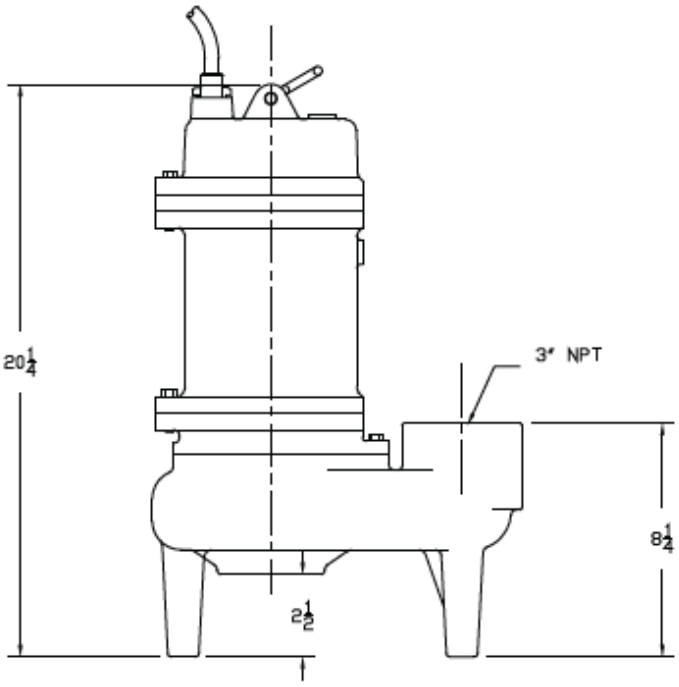
PERFORMANCE



THREE PHASE

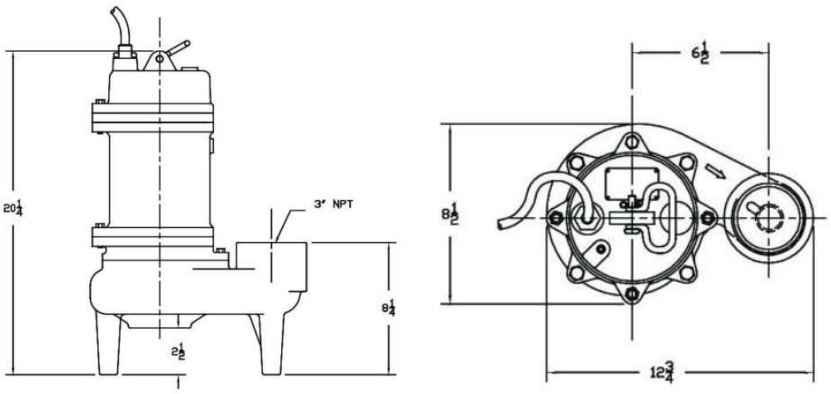
MODEL	HP	VOLTS	PHASE	RPM	FLA AMPS
KW-10M2-03-3	1	208/230	3	3459	7.0/6.4
KW-10M2-43-3	1	460	3	3450	3.2
KW-15M2-03-3	1-1.5	208/230	3	3450	7.7/7.0
KW-15M2-43-3	1-1.5	460	3	3450	3.5
KW-20M2-03-3	2	208/230	3	3450	8.5/7.7
KW-20M2-43-3	2	460	3	3450	3.9
KW-30M2-03-3	3	208/230	3	3450	14.4/9.0
KW-30M2-43-3	3	460	3	3450	4.5





KEEN PUMP COMPANY — KEEN PUMP CO., 471E ST ROUTE 250 EAST, ASHLAND, OHIO 44805 — PHONE: 419-207-9400, FAX: 419-207-8031			
TITLE: KW 2-POLE SINGLE-VANE SEWAGE PUMP			
SCALE: NTS		DWG. #: KN-888	REV.: –
DWG. BY: SE	DATE: 03/28/2014		

Discharge:	3” NPT,Vertical
Liquid temperature:	104°F (40°C) Continuous
Volute:	Cast iron ASTM A-48 class 30.
Motor housing:	Cast iron ASTM A-48 class 30.
Impeller:	Cast Iron ASTM A-48,Class 30, Close, Single Channel, Dynamically Balanced,ISO G6.3
Shaft:	420 Stainless Steel.
O-rings:	Buna-N.
Seal:	Single Mechanical, Rotating Face - Silicon Carbide, Rotating Face - Silicon Carbide, Elastomer - Buna -N
Hardware:	300 series stainless steel.
Cord entry:	30 Ft (9.1m) Cord With Pressure, Grommet for Sealing
Upper bearing:	Ball, single row, oil lubricated, for radial loads.
Lower bearing:	Ball, single row, oil lubricated, for radial and axial loads.
Motor:	Includes Overload Protection in the Motor Oil Filled, Class F (Single Phase) 3450 RPM, 60Hz, 200/230 V, Capacitor Start/ Capacitor Run, (Three Phase) 3450RPM, 60Hz, 230 / 460V



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SECTION 3

1-2HP Grinder Pumps

KEEN PUMP



Keen Pump GRINDERS Available in STAINLESS STEEL

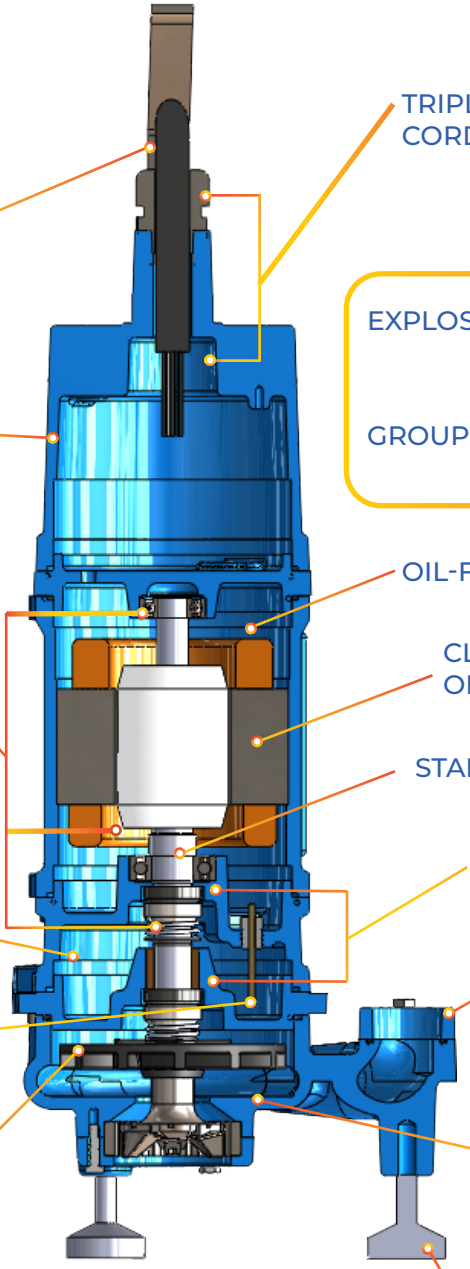
304 Stainless Steel Construction

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.

REV 01/2024

Pump Model	HP	Voltage	Phase	Max. Flow (GPM)	Max. Head (TDH)
KPLCG	1	208/230	1	20	185*
KPCG-21(C) FM APPROVED	1	208/230	1	20	185*
LCG2	2	208/240	1	47	106
KG2-115 FM APPROVED	2	115	1	20	90
KG2-C	2	208/240	1	47	106
KG2 FM APPROVED	2	208/240/460	1 or 3	47	106
KHG2 FM APPROVED	2	208/240/460	1 or 3	25	95
KFG2 FM APPROVED	2	208/240/460	1 or 3	70	90
KGS2 FM APPROVED	2	208/240/460	1 or 3	50	145
KHGS2 FM APPROVED	3-5	208/230/460	1 or 3	30	195
KG3, 5 FM APPROVED	3-7.5	208/230/460	1 or 3	180	85
KHG3, 5, 7 FM APPROVED	10	208/230/460	3	105	175
KG10 FM APPROVED	7.5	230/460	3	180	148
KGP75 FM PENDING	10	230/460	3	160	150
KGP100 FM PENDING	15	230/460	3	160	200
KGP150 FM APPROVED	15	208/460	3	160	250

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



TRIPLE-PROTECTION EPOXY-FILLED CORD ENTRY

STAINLESS STEEL LIFT BALE INCLUDED

EXPLOSION-PROOF CLASS 1, DIV.1

FM APPROVED

GROUPS C&D FM3615

HEAVY-DUTY CLASS 35 IRON CASTINGS

OIL-FILLED MOTOR HOUSING

3-BEARING DESIGN MIN. 100,000 HOURS B-10 LIFE

CLASS N INSULATED, OIL-COOLED MOTOR

STAINLESS STEEL SHAFT

DUAL SILICON-CARBIDE SEALS

OIL-FILLED BEARING HOUSING

1-2HP (BOLT-ON FLANGE W/ 1-1/4" NPT)

SEAL LEAK PROTECTION (EXCEPT INTERNAL START KIT MODELS)

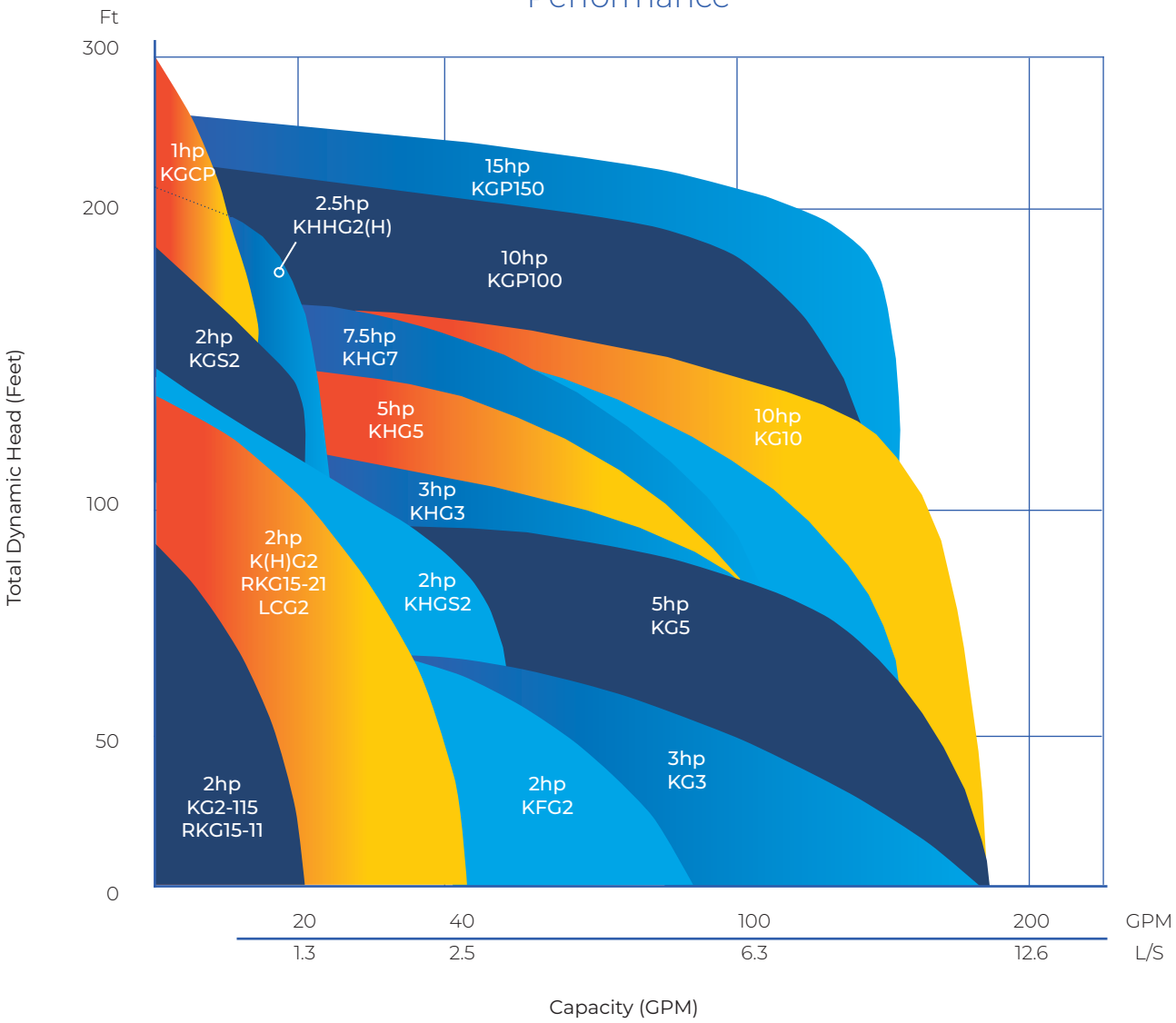
SLICER CUTTING TECHNOLOGY (AXIAL) AVAILABLE MOST MODELS
GRINDING CUTTER (RADIAL) ALL MODELS AVAILABLE

BALANCED IMPELLER, VORTEX DUCTILE IRON (CENTRIFUGAL) SST INVESTMENT CAST IMPELLER (SEMI-OPEN)

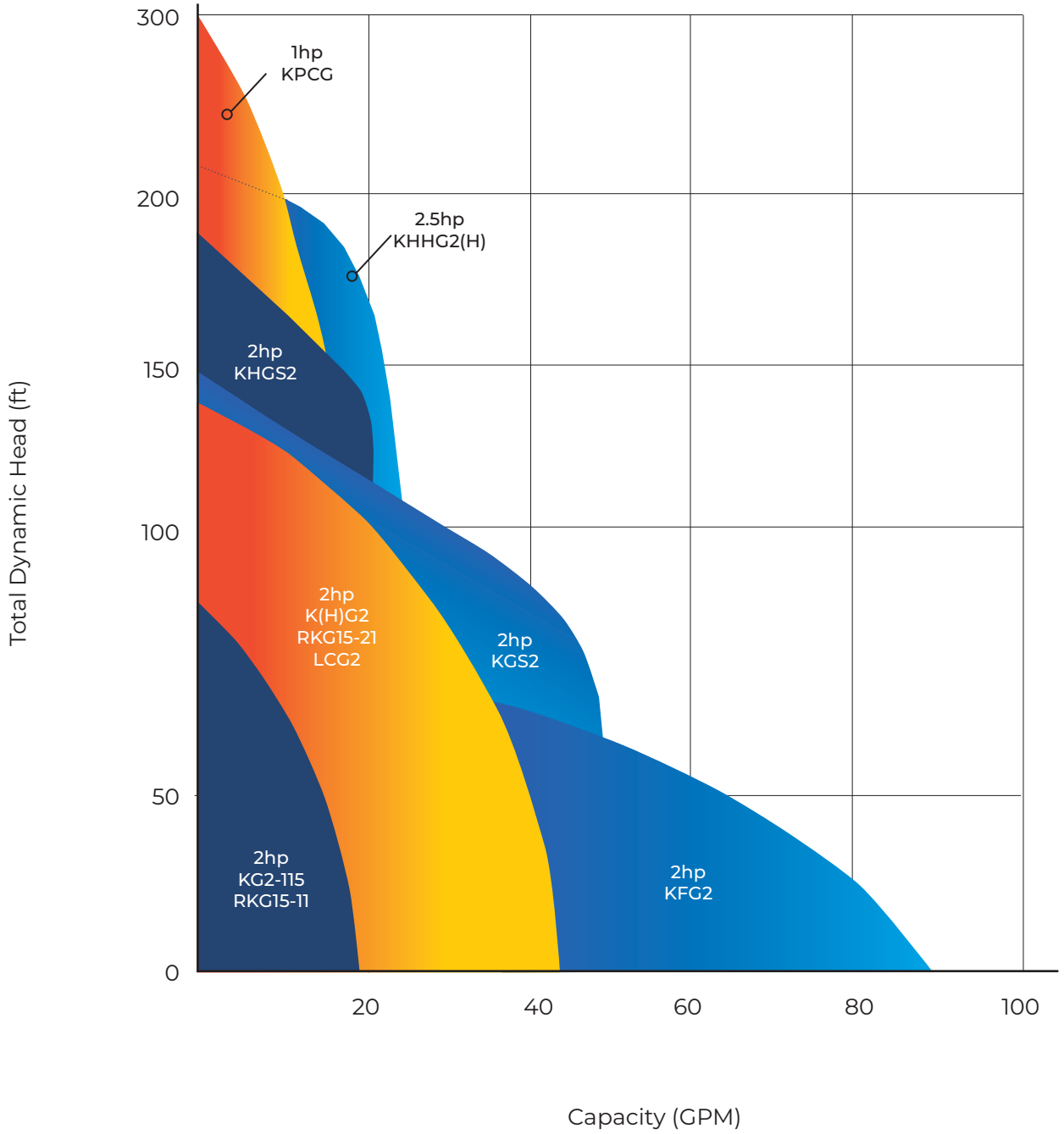
KG2 PICTURED

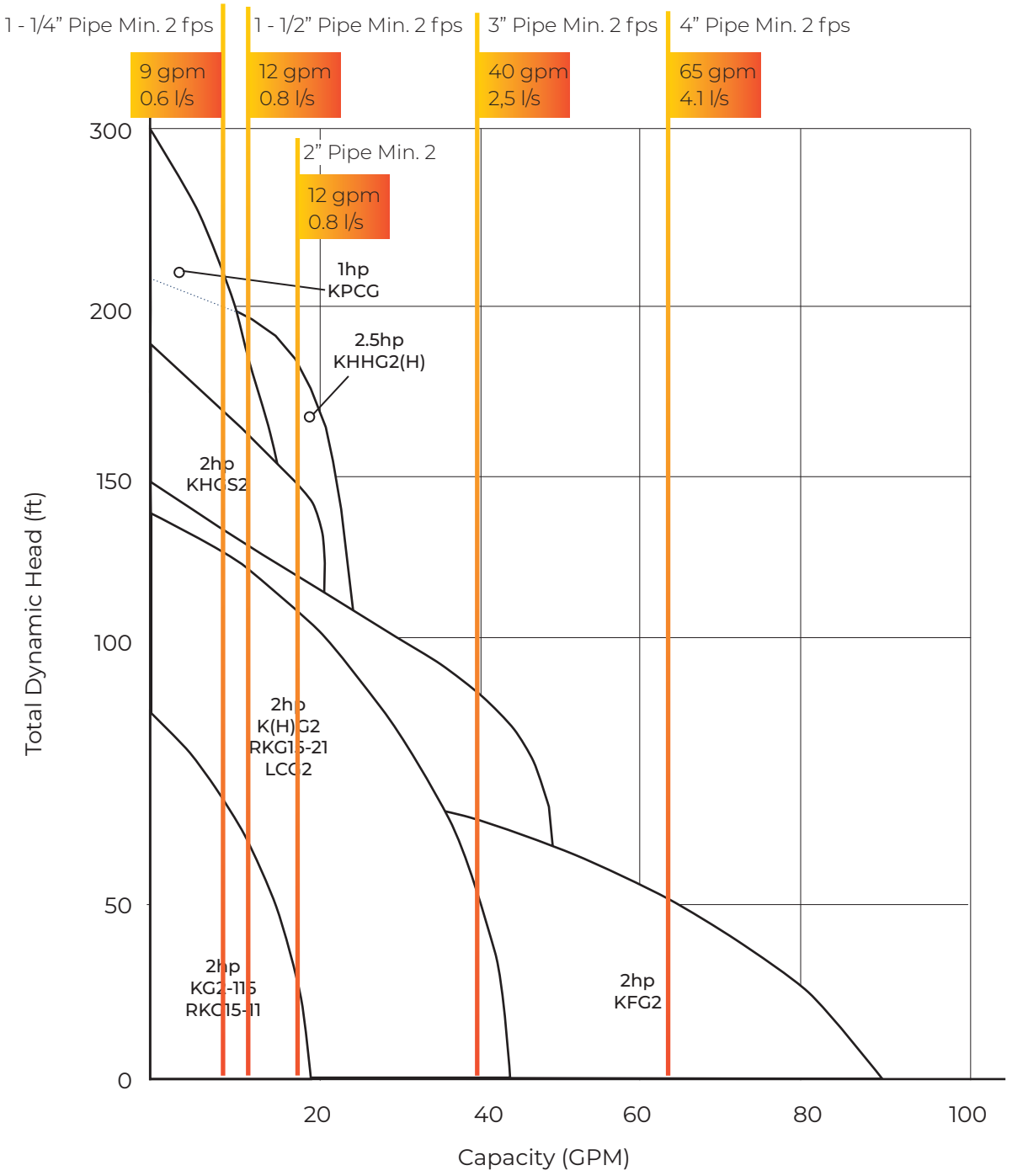
ANTI-VIBRATION FEET AVAILABLE FOR ALL CENTRIFUGAL MODELS

Performance



1HP - 2HP GRINDER PUMP FAMILY CURVE





- Min. 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)

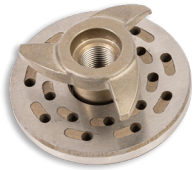


KPCGX-(C)

PROGRESSIVE GRINDER SERIES

Optional - Start Components on Board (No Control Panel)

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



"Slicer"

FM APPROVED

ADVANCED SLICING FOR "FLUSHABLES"

- Wipes, Floor Pads, etc.

NO CONTROL PANEL REQUIRED

- For Internal Start Configuration if Replacing Competitor Existing Pump

SILICON CARBIDE DUAL SEALS

- Viton® Elastomers

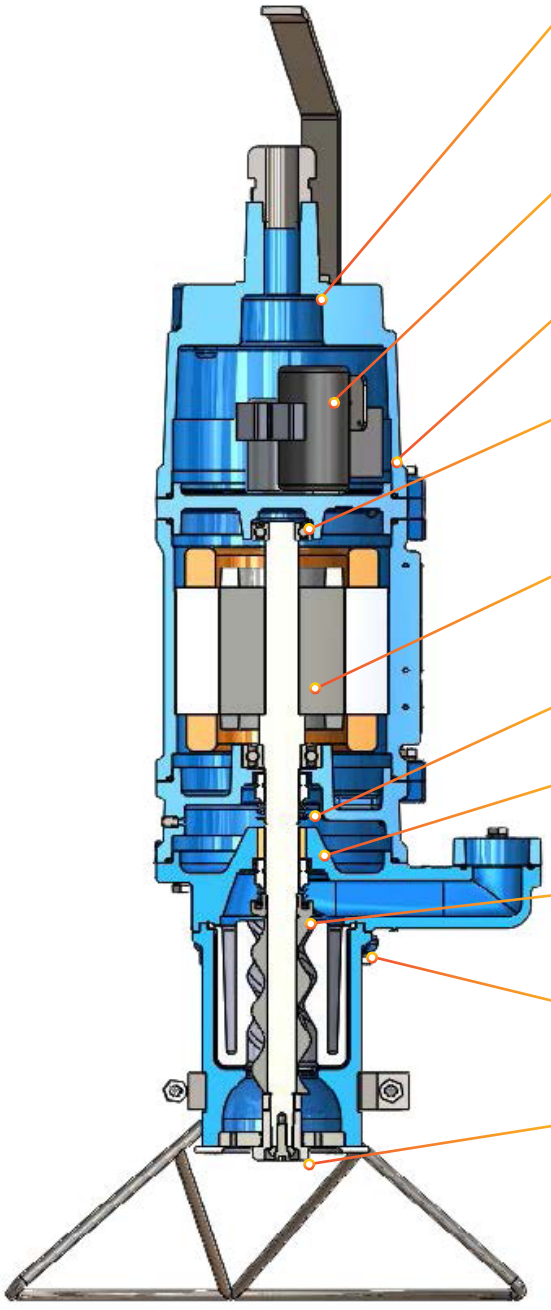
PRESSED OIL-COOLED MOTOR

- Superior Heat Transfer
- Long Bearing & Seal Life
- Class N Insulation

HAZARDOUS LOCATION DESIGN

- True "Explosion-Proof" Service
- FM 3615 Listed
- Third Party Quality Standard to Validate Pump Performance and Cosntruction

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

RUGGED PUMP CONSTRUCTION
- Strongest Class 35 Iron Castings
- No Plastic Materials

- 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 APPLICATIONS

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

MOISTURE SENSOR
- Alerts Customer if Lower Seal Fails Via Light Inside Control Panel

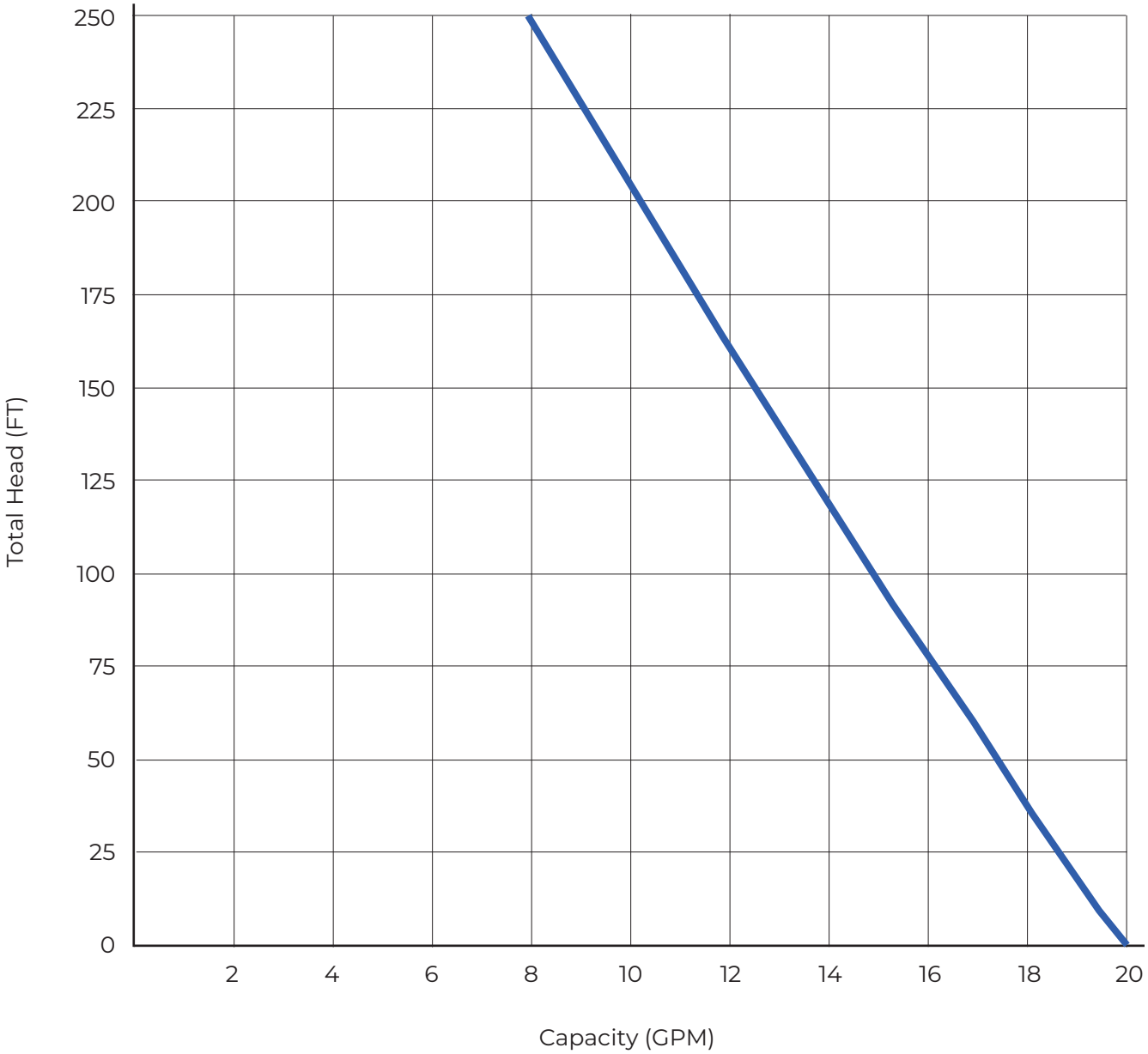
DURABLE STAINLESS STEEL ROTOR WEAR-RESISTANT STATOR
- Proprietory Construction for Long Life

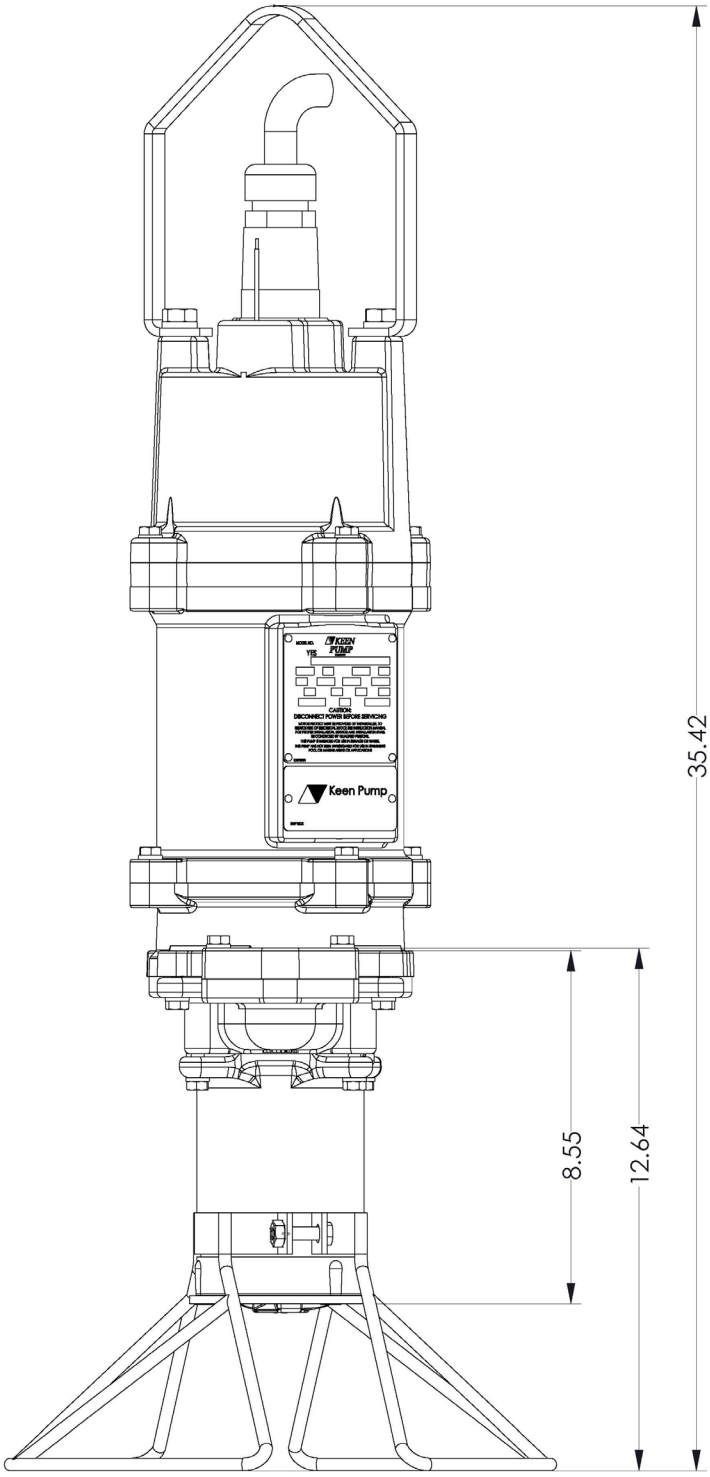
DURABLE STAINLESS STEEL ROTOR WEAR-RESISTANT STATOR

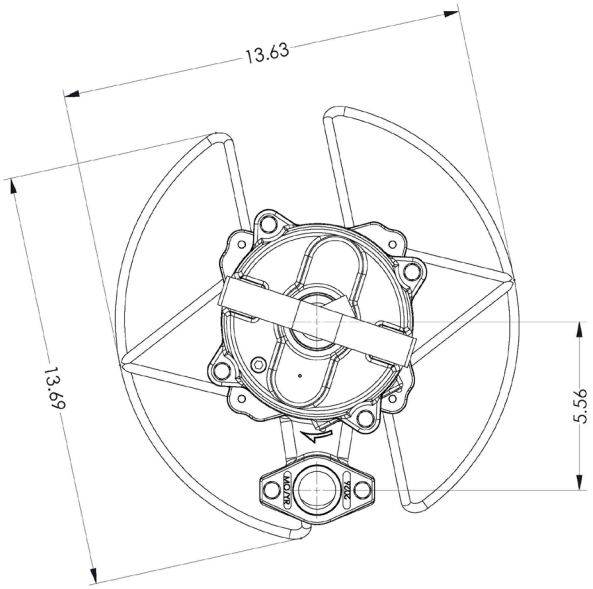
ADVANCED SLICING SYSTEM
- Highly Efficient Solids-Slicing
- Hardened Stainless Steel

PUMP SERIES	KPCG-(C)		1HP PROGRESSIVE CAVITY GRINDER
Speed	1750 RPM	Discharge	1-1/4”

BEST PUMP PERFORMANCE IN THE INDUSTRY!




35.42
8.55
12.64
Keen Pump


13.63
13.69
5.56

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, Powder Coat Paint Finish

MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class N
Service Factor	1.2
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	392°F (200°C)
Power Cord "C" Pump	14-3 SOOW - 600V, 90° C
Power Cord (Remote Start Kit)	14-5 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
Rotor, Wobble	Stainless Steel
Stator, Full Lobe	EPDM
Stator Liner	Nylon
Shaft	ANSI 400 Stainless Steel
Rotating "Axial" Slicer	440 SST Hardened 58-60 Rockwell C
Stationary "Axial" Slicer	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	304 Stainless Steel
O-Rings	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min. (Engineering Advise)
	Closed:	205° F (96° C) Max. / 154° F (68° C) Min. (Engineering Advise)
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%			
Start Kit	Start Capacitor = 216 ufd, 250 VAC			
	Run Capacitor = 30 ufd, 370 VAC			

MODEL "C" INTERNAL CAPS (SLICER)	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	SF AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
KPCG-01CSL	1	208	1	G	1.2	9.0		40.5	1.87	2.34
KPCG-21CSL	1	230	1	G	1.2	8.0		37.0	1.84	2.30

MODEL EXTERNAL CAPS (SLICER)	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	SF AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
KPCG-01SL	1	208	1	G	1.2	9.0		40.5	1.87	2.34
KPCG-21SL	1	230	1	G	1.2	8.0		37.0	1.84	2.30

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).

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 – 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 baked on, powder coat 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 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.

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 – 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 N ratings.

The stator winding shall be of the open type with Class N 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 relay 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 14 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.

MOISTURE PROBE – Rotor and stator in the motor housing shall be separated and protected from the pumped liquid by an oil filled seal housing incorporating two type 21, Silicon Carbide upper and lower mechanical seals. The seal housing shall be equipped with a moisture sensing probe installed between the seals, and the sensing of moisture in the seal chamber shall be automatic, continuous, and not require the pump to be stopped or removed from the wetwell.

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).

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 – 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 baked on power coat 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.

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 – 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 N ratings.

The stator winding shall be of the open type with Class N 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 relay 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 14 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.



KPCLG

PROGRESSIVE GRINDER SERIES

Best Value Pump on the Market.



"Slicer"

HIGHEST PUMP PERFORMANCE

- Flows to 20 GPM
- 11 GPM @ 75 PSI
- Higher Flow Capacities to Keep Pipe Lines Scoured and Clean
- Strong Performance at High Pressures

FIELD PROVEN RELIABILITY & LONGEVITY

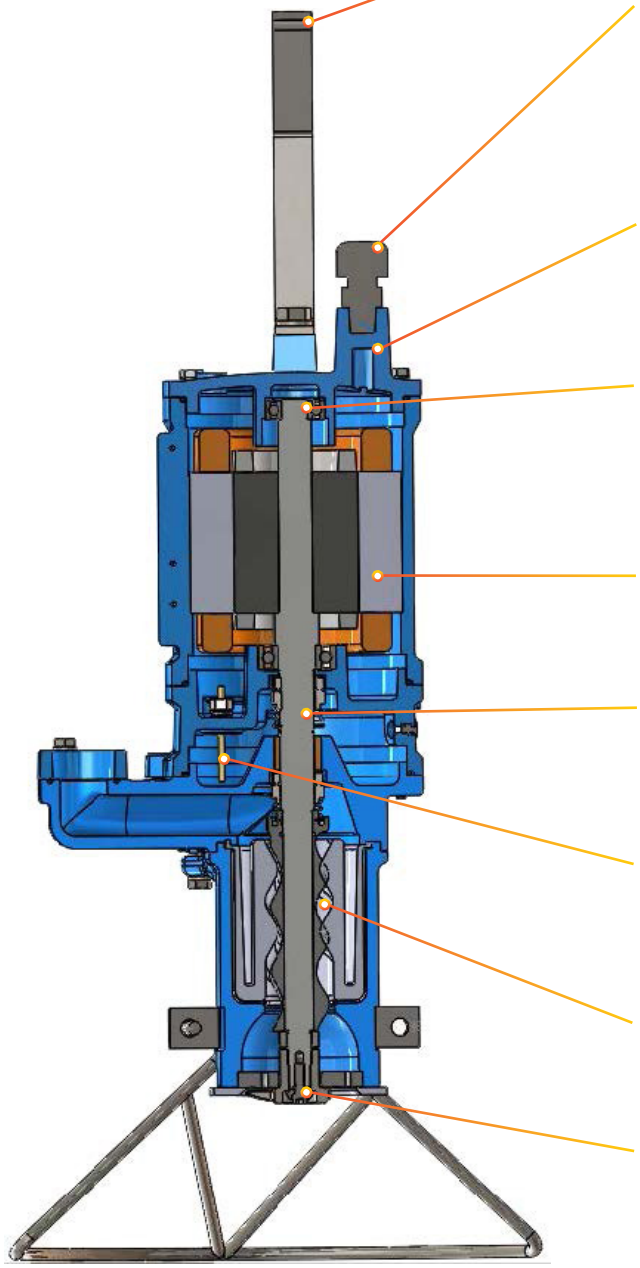
- Handles Extreme Operating Conditions
  - High Pressures
  - Long Run Times
  - Fluctuating System Requirements

ADVANCED GRINDER SLICING DESIGN

- Effectively Breaks Down Solids
- Prevents Jamming
- 100% Hardened Stainless Steel

EASY INSTALLATION

- Compact Size, Easy to Handle
- Rugged Construction
- Easily Fits into Existing Pump Stations



LIFTING HANDLE
- Stainless Steel for Non-Corrosive

BEST CABLE SEALING SYSTEM KEEPS WATER OUT
- Triple-Water Barrier Intrusion
- SST Compression Grommet
- Motor Leads, Power Cable Leads - Solder Block
- Epoxy Potting

RUGGED PUMP CONSTRUCTION
- Strongest Class 35 Iron Castings
- No Plastic Materials

- Three Bearing Design Upper /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 APPLICATIONS

SUPERIOR DOUBLE MECHANICAL SEAL - SILICON CARBIDE W/ VITON® ELASTOMERS
- Not Damaged by Abresive Materials

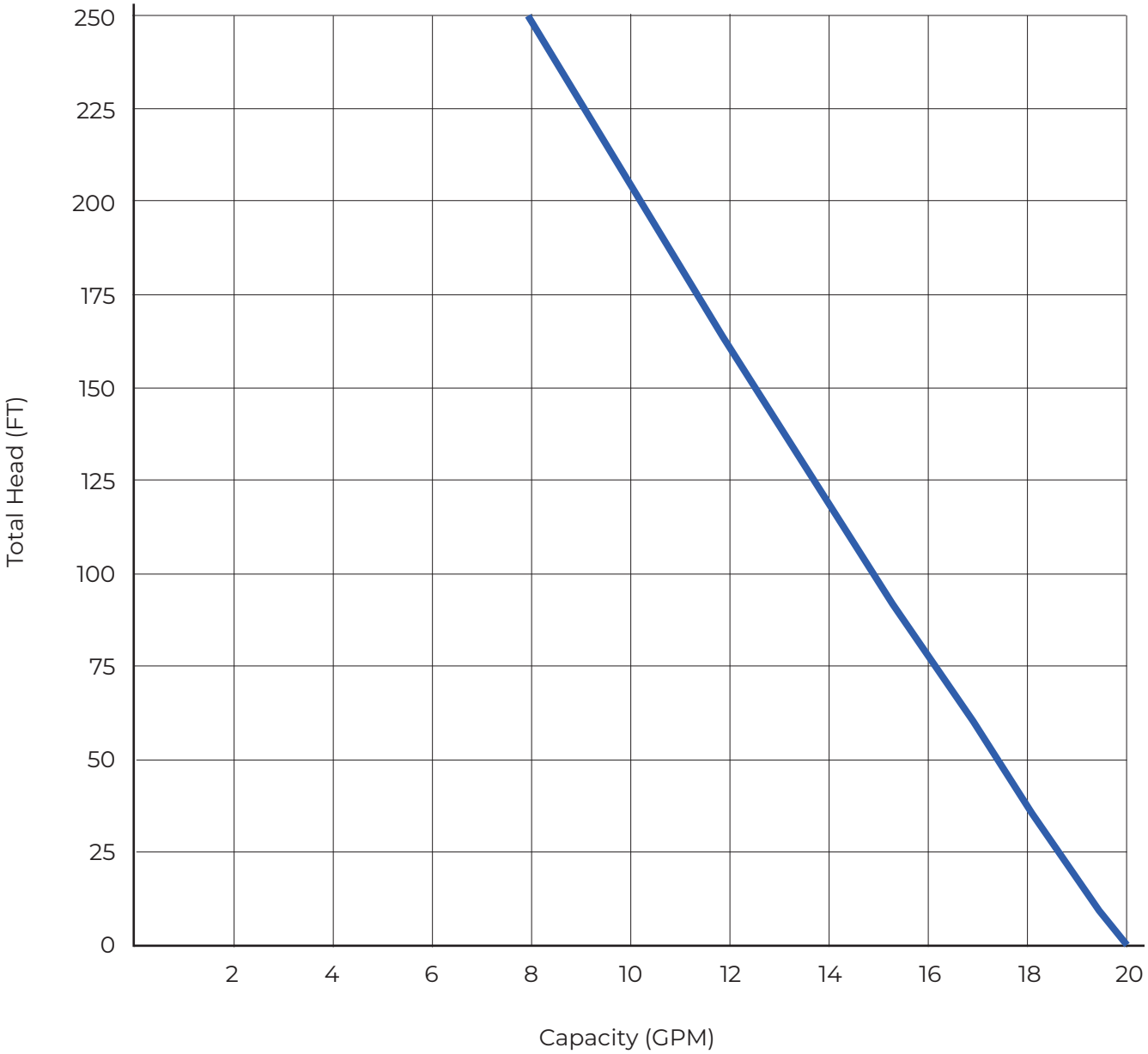
MOISTURE SENSOR
- Alerts Customer if Lower Seal Fails Via Light Inside Control Panel

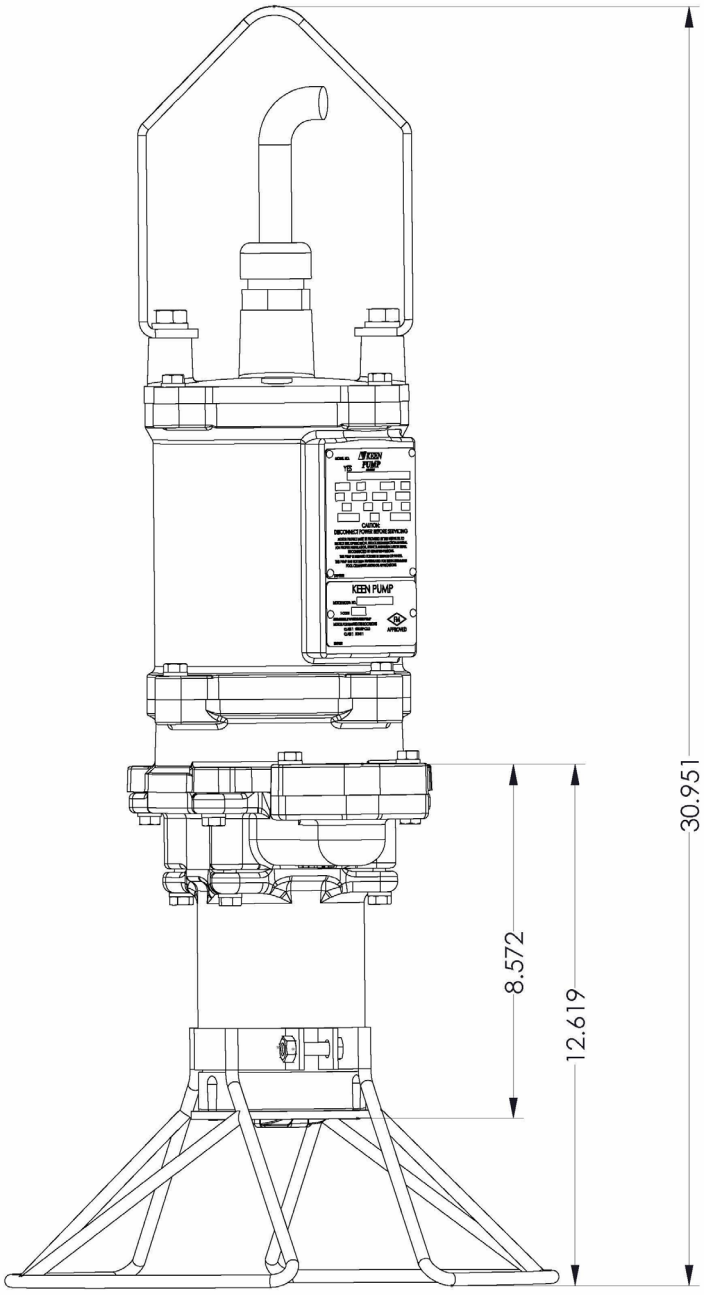
DURABLE STAINLESS STEEL ROTOR WEAR-RESISTANT STATOR
- Proprietory Construction for Long Life

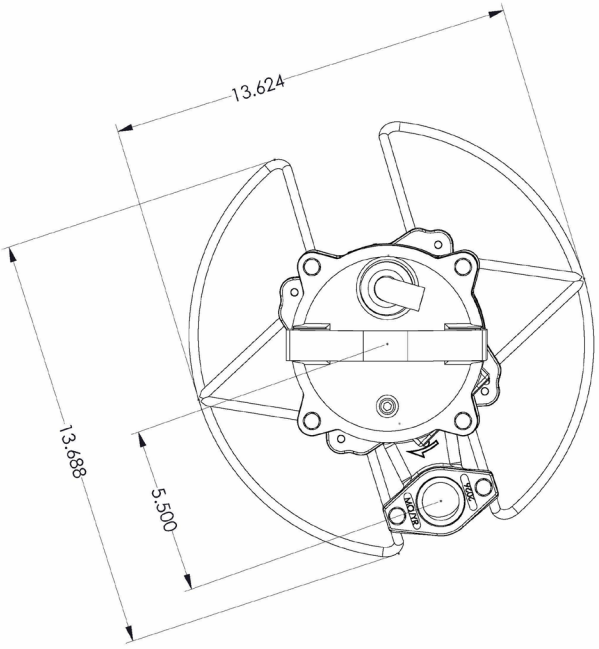
ADVANCED SLICING SYSTEM
- Highly Efficient Solids-Slicing
- Hardened Stainless Steel

PUMP SERIES	KPCLG		1HP PROGRESSIVE CAVITY GRINDER
Speed	1750 RPM	Discharge	1-1/4”

BEST PUMP PERFORMANCE IN THE INDUSTRY!




KEEN PUMP
30.951
8.572
12.619


13.624
13.688
5.500

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, Powder Coat Paint Finish

MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class N
Service Factor	1.2
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	392°F (200°C)
Power Cord	14-5 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
Rotor, Wobble	Stainless Steel
Stator, Full Lobe	EPDM Blend
Stator Liner	Nylon
Shaft	ANSI 400 Stainless Steel
Rotating "Axial" Slicer	440 SST Hardened 58-60 Rockwell C
Stationary "Axial" Slicer	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	304 Stainless Steel
O-Rings	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392°F (200°C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° 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%			
Start Kit	Start Capacitor = 216 ufd, 250 VAC			
	Run Capacitor = 30 ufd, 370 VAC			

MODEL EXTERNAL CAPS (SLICER)	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
KPCLG-2081	1	240	1	G	1.2	9.0	40.5	1.87	2.34
KPCLG-2401	1	240	1	G	1.2	8.0	37.0	1.84	2.30

1 HP GRINDER PUMPS

MODEL NO. KPCLG

PUMP MODEL – Pump shall be of the progressive cavity type, KPCLG, with an integrally built-in grinder unit and submersible type motor.

OPERATING CONDITIONS – The pump shall have a non-overloading maximum capacity of 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 – Major pump castings 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 baked on, powder coat 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 (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 polished stainless steel construction.

STATOR – Progressive cavity design stator that has a full lobe. Material shall be ethylene propylene synthetic blend. 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.

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. 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 N ratings.

The stator winding shall be of the open type with Class N 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 dr wet well or any condition that may cause the pump to run outside of the specified operating temperature range.

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 14 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 epox-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. Cord shall withstand a pull strain to meet FM requirements.

MOISTURE PROBE – Rotor and stator in the motor housing shall be separated and protected from the pumped liquid by an oil filled seal housing incorporating two type 21, Silicon Carbide upper and lower mechanical seals. The seal housing shall be equipped with a moisture sensing probe installed between the seals, and the sensing of moisture in the seal chamber shall be automatic, continuous, and not require the pump to be stopped or removed from the wetwell.



LCG2(HZ)(SL)

Centrifugal Grinder Series
HZ-Horizontal Discharge
SL-Slicer Cutter

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

ADVANCED SLICING FOR FLUSHABLES

- Wipes, Floor Pads, etc.

CAPACITIES

- Up to 48 GPM
- Up to 110 Feet Shutoff

SILICON CARBIDE DUAL SEALS

BEST MOTOR DESIGN

- Motor Pressed into Housing for Superios Heat Transfer
- Long Bearing & Seal Life

COMPACT DESIGN

- Low Profile - Lightweight

REV 01/2024

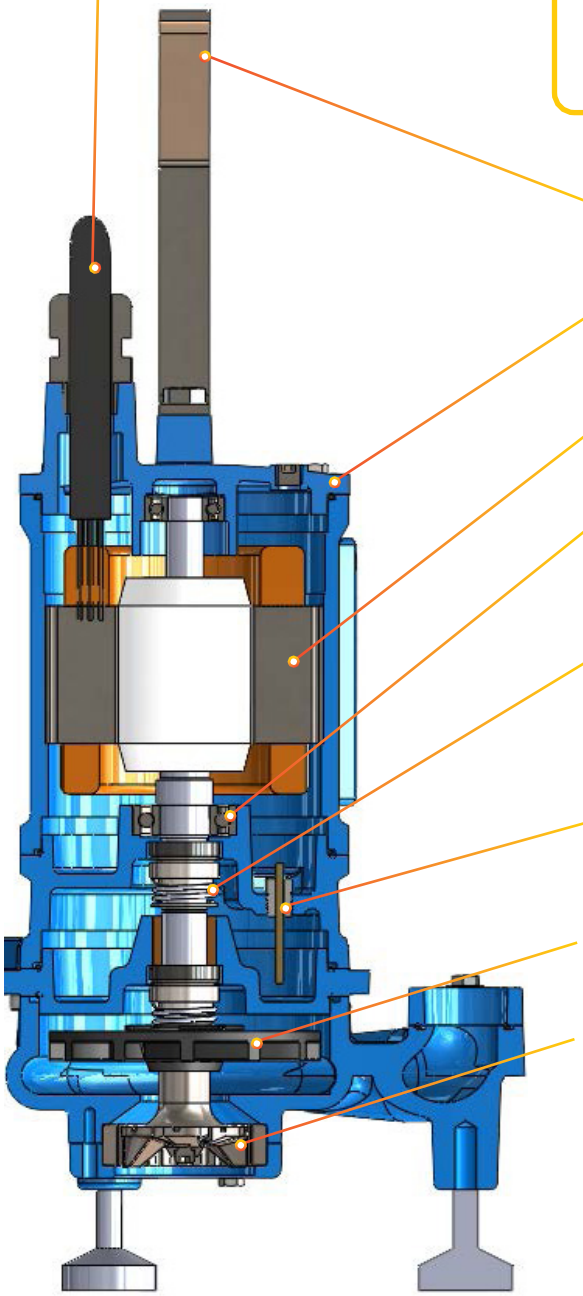
TRIPLE BARRRIER SEAL
- Exterior Stainless Steel Compression Fitting, Epoxy Potting and Solder Blocked Wires Located in Potting



"Slicer" Cutter Preventing Jamming on Solids



"Radial" Cutter 50 Year Proven Design



LIFTING HANDLE
- Stainless Steel for Non-Corrosive

RUGGED CAST IRON CONSTRUCTION
- ASTM - Class 35 For Extra Hard Protection for Pump Interior Components

OIL FILLED MOTOR
- Best Industry Design For Cooling Motor

TRIPLE BEARING DESIGN
- Upper and Mid Range Bearing, Duty Ball Bearing, Lower Brass Sleeve Bearing

SUPERIOR DUAL MECHANICAL SEALS - SILICON CARBIDE W/ VITON® ELASTOMERS
- Best Selection For Wastewater applications
- Handles Grit, Sand, and Abrasives

MOISTURE SENSOR
- Alerts Customers If Lower Seal Fails via Light inside Conrol Panel

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

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

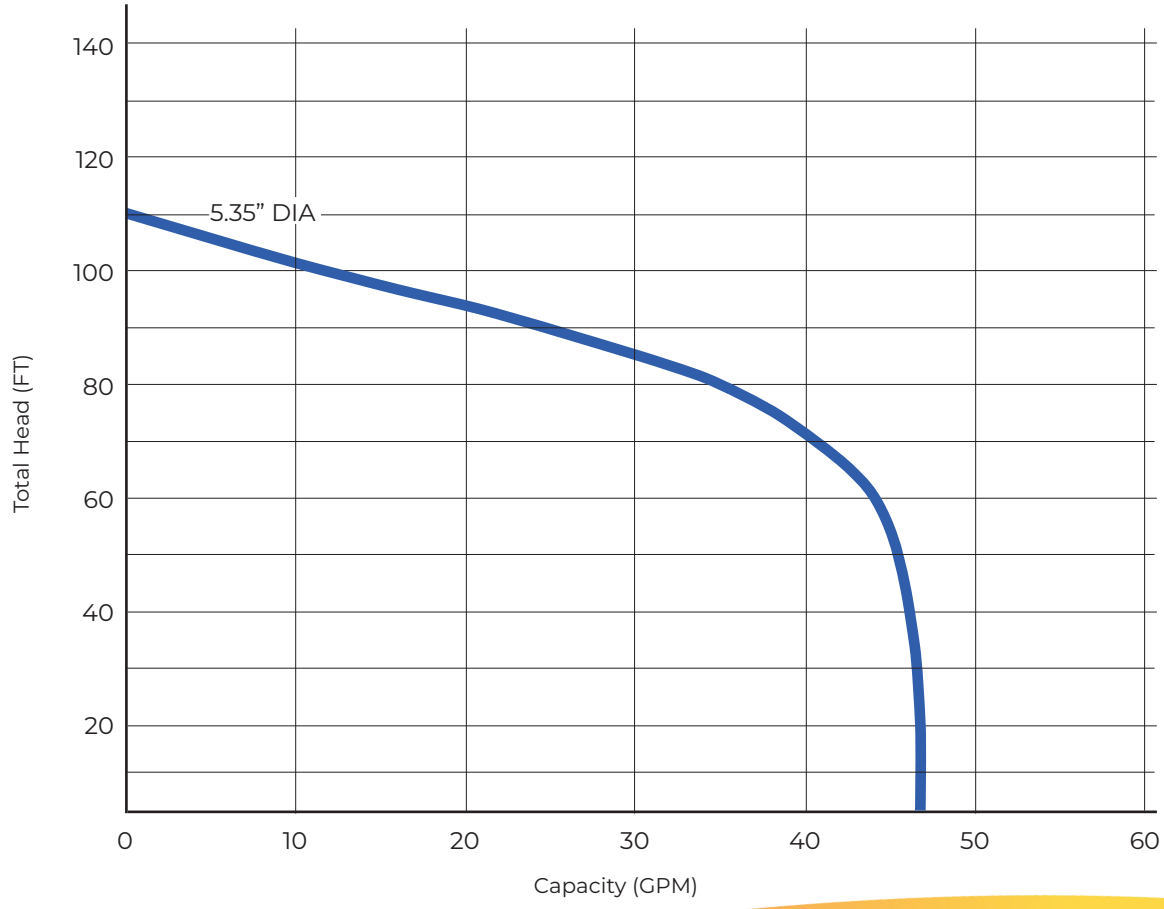
INTERCHANGEABILITY
- Axial Slicer or Optional Radial Cutter

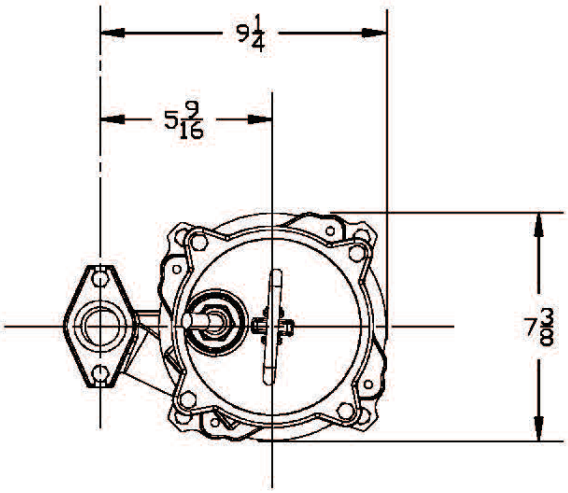
2HP SUBMERSIBLE GRINDER PUMP

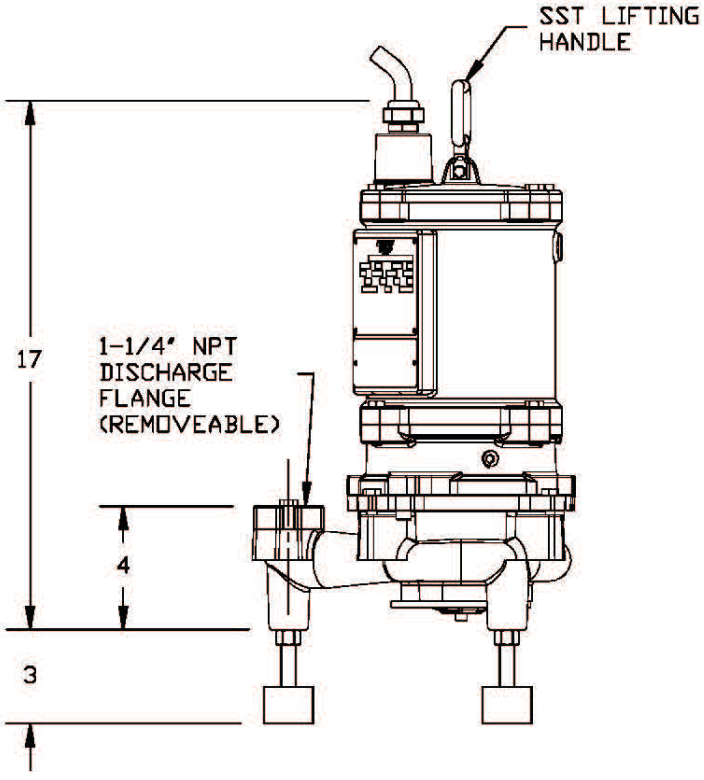
GENERAL	LCG2(HZ)
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	1-1/4" NPT, Horizontal or Vertical
Grinder Construction	Stainless Steel
Grinder Hardness	58 - 60 Rockwell
Impeller Type	Recessed
SINGLE PHASE	START KIT SK-2A includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	2HP / 1 ϕ , 60 Hz
Full Load Amps 208V	15.5 Amps
Start Amps	72 Amps
Full Load Amps 240V	14.5 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	N Class
Start Capacitor	216 ufd, 250 VAC
Run Capacitor	25 ufd, 370 VAC

PERFORMANCE CURVE




9 1/4
5 9/16
7 3/8


SST LIFTING HANDLE
17
1-1/4" NPT DISCHARGE FLANGE (REMOVEABLE)
4
3

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, Powder Coat Paint Finish

MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class N
Service Factor	1.2
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	392°F (200°C)
Power Cord	12-5 SOOW - 600V, 90° 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	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	304 Stainless Steel
O-Rings	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° 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%			
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	START AMPS	FULL LOAD KW	FULL LOAD KVA
LCG2-2081SL	LCG2-208	2	208	1	G	1.2	15.5	72.8	4.33	4.33
LCG2-2401SL	LCG2-2401		240				14.5	54.3	3.56	3.56

2 HP GRINDER PUMPS
MODEL NO. LCG2(SL)

PUMP MODEL – Pump shall be of the centrifugal type, LCG2(SL), with an integrally built-in grinder unit and submersible type motor.

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 baked on power coat 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, 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 N ratings.

The stator winding shall be of the open type with Class N 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 epox-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. Cord shall withstand a pull strain to meet FM requirements.

MOISTURE PROBE – Rotor and stator in the motor housing shall be separated and protected from the pumped liquid by an oil filled seal housing incorporating two type 21, Silicon Carbide upper and lower mechanical seals. The seal housing shall be equipped with a moisture sensing probe installed between the seals, and the sensing of moisture in the seal chamber shall be automatic, continuous, and not require the pump to be stopped or removed from the wetwell.



KG2-115

Centrifugal Grinder Series

CENTRIFUGAL GRINDER SERIES
INTERNAL START COMPONENTS
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!

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

BEST MOTOR DESIGN

- Motor Pressed into Housing for Superior Heat Transfer
- Long Bearing & Seal Life



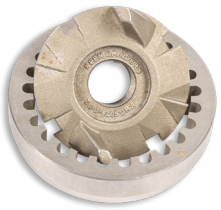
"Radial"Cutter
(STANDARD)

REV 01/2024

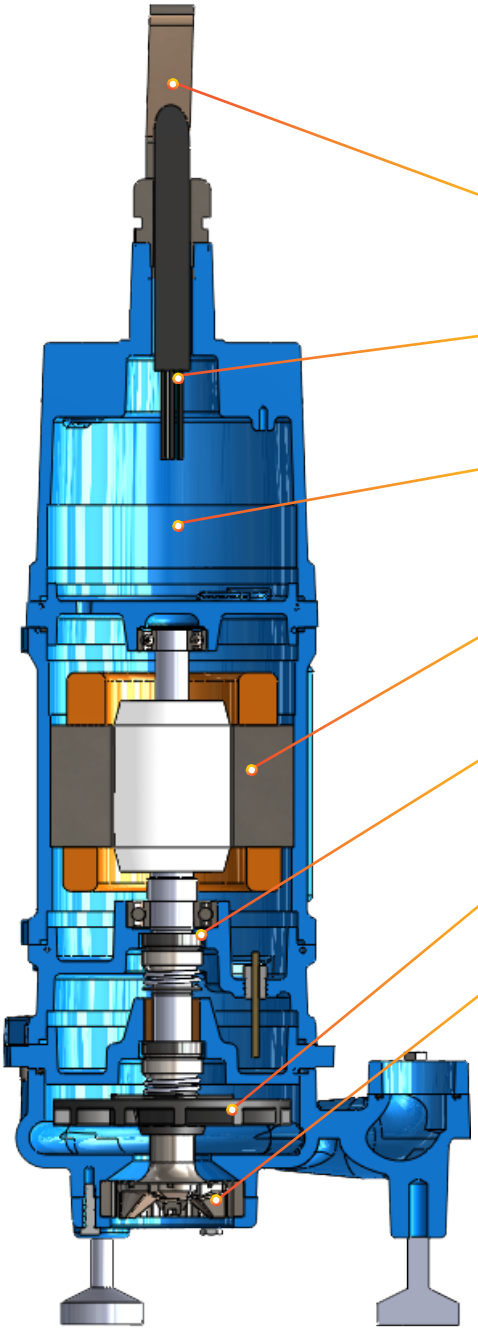
KG2-115 - Features and Benefits



"Slicer" Cutter
Preventing Jamming
on Solids



"Radial" Cutter
50 Year Proven
Design



STAINLESS STEEL LIFTING HANDLE

EPOXY-POTTED CORD ENTRY
- Triple-Barrier Moisture Protection

INTERNAL START COMPONENTS
- No Panel Required

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

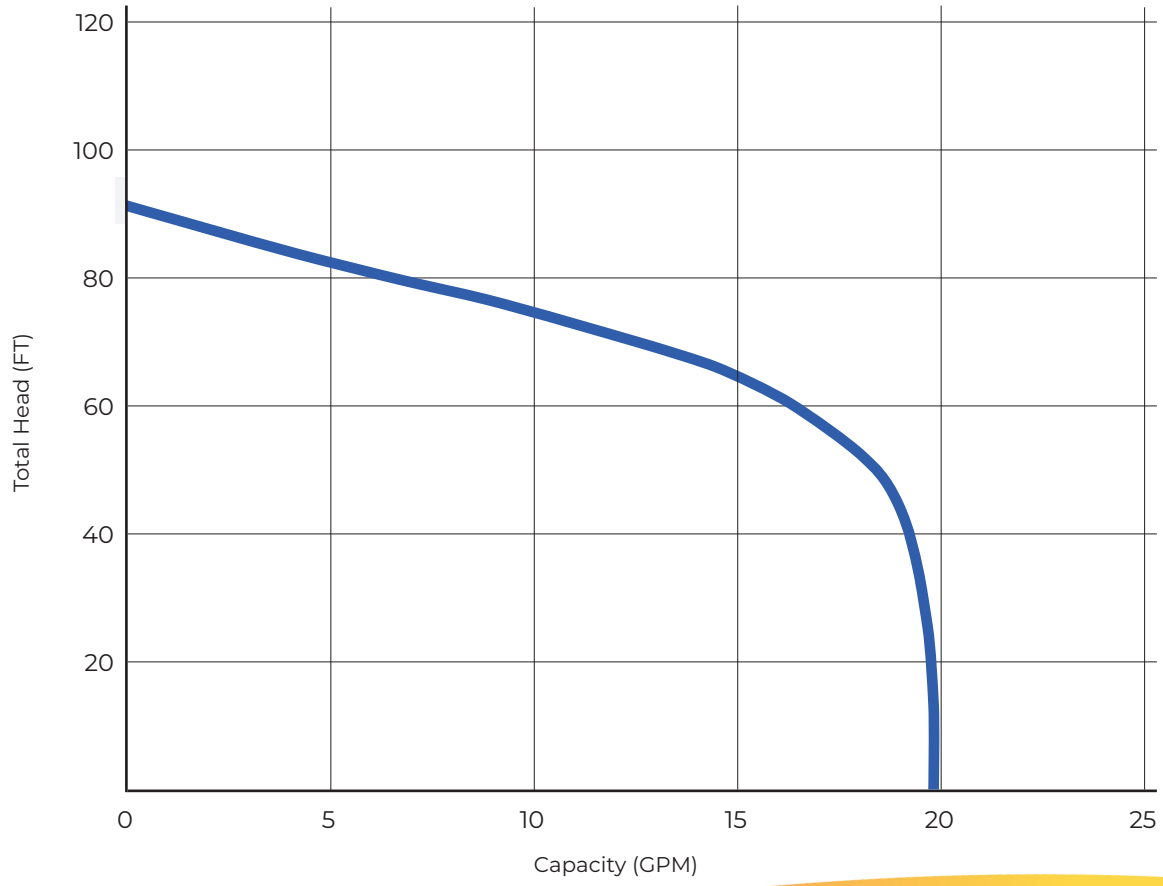
PROVEN CUTTING SYSTEM
- Highly Effecient Solids-Slicing
- SST Grinder/Ring Hardened to Rockwell 56-60
- Reversible Grinder Ring Prolongs Service Life
- User-Friendly Field Service

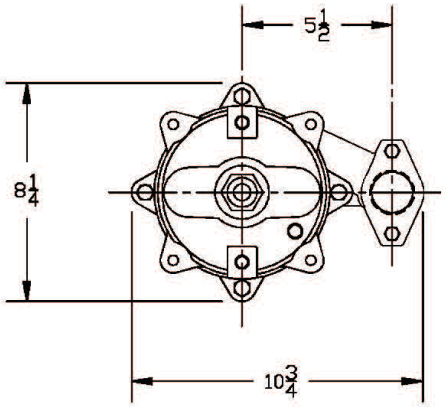
2HP SUBMERSIBLE GRINDER PUMP

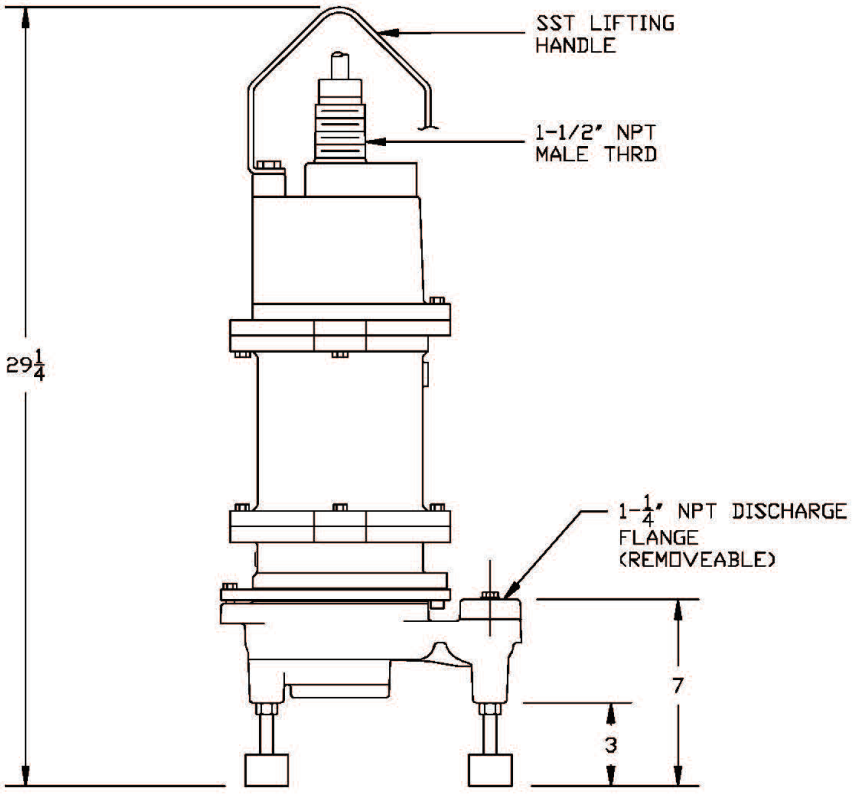
GENERAL	KG2-115
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	1-1/4" NPT, Horizontal or Vertical
Grinder Construction	Stainless Steel
Grinder Hardness	58 - 60 Rockwell
Impeller Type	Recessed
SINGLE PHASE	START KIT SK-1E includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	2HP / 1 ϕ , 60 Hz
Full Load Amps 115V	19.5 Amps
Insulation Class	F Class
Start Capacitor	200 ufd, 250 VAC
Run Capacitor	70 ufd, 370 VAC

PERFORMANCE CURVE




5 1/2
8 1/4
10 3/4


SST LIFTING HANDLE
1-1/2" NPT MALE THRD
29 1/4
1-1/4" NPT DISCHARGE FLANGE (REMOVEABLE)
7
3

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, Powder Coat Paint Finish

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	266°F (130°C)
Power Cord	12-3 SOOW - 600V, 90° 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 “Radiall” Cutter	440 SST Hardened 58-60 Rockwell C
Stationary “Radiall” 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	304 Stainless Steel
O-Rings	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		266° F (130° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° C) Min.
Oil Flash Point		390° F (199° 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 = 200 ufd, 125 VAC			
	Run Capacitor = 70 ufd, 250 VAC			

MODEL	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
KG2-115	2	115	1	G	1.0	19.5	48.0	1.84	2.30

2 HP GRINDER PUMPS
MODEL NO. 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.

KG(X)2(HZ)

2HP DUAL SEAL GRINDER PUMP, 1 OR 3 PHASE OPTIONS

-SL

-SLICER CUTTER HZ

-HORIZONTAL DISCHARGE X

- EXPLOSION PROOF (FM3615)

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





"Radial"Cutter (STANDARD)



"Slicer" (OPTION)

The Keen Pump KG(X)2 series centrifugal grinder pumps easily handle residential, and light commercial sanitary waste; such as small offices and single family homes.

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

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, or 240 Volt)
- 3 Phase Motor (208, 230 or 460 Volt)
- True "Explosion Proof" Service
- FM 3615 Listed

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 the power cable is cut or damaged. Stainless steel cord grip.

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 N 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 B-10 bearing life.

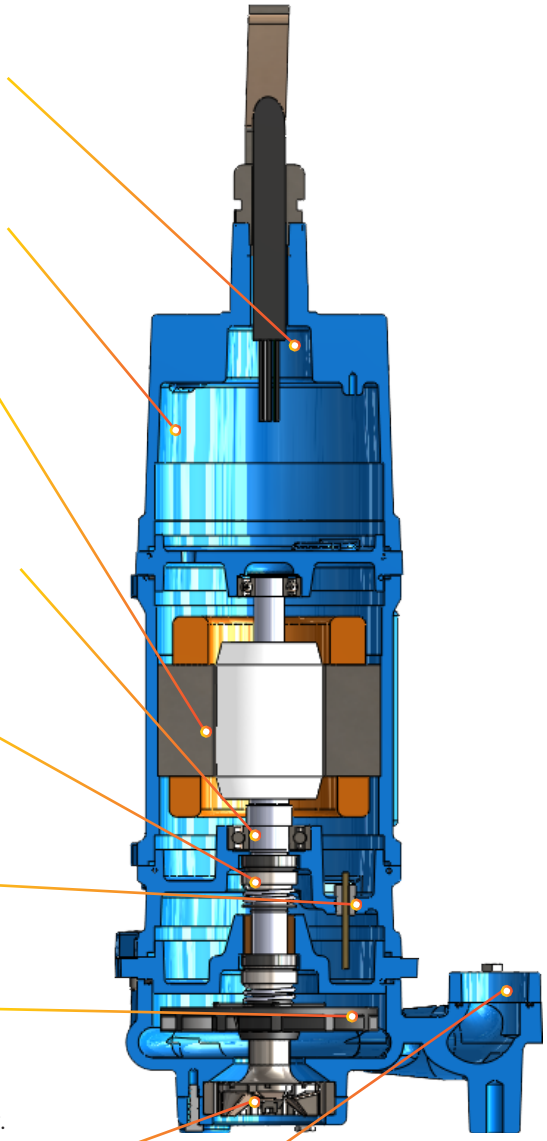
5. DOUBLE MECHANICAL SEAL PROTECTION
Dual silicon carbide mechanical shaft seals provide twice the moisture protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials.

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.

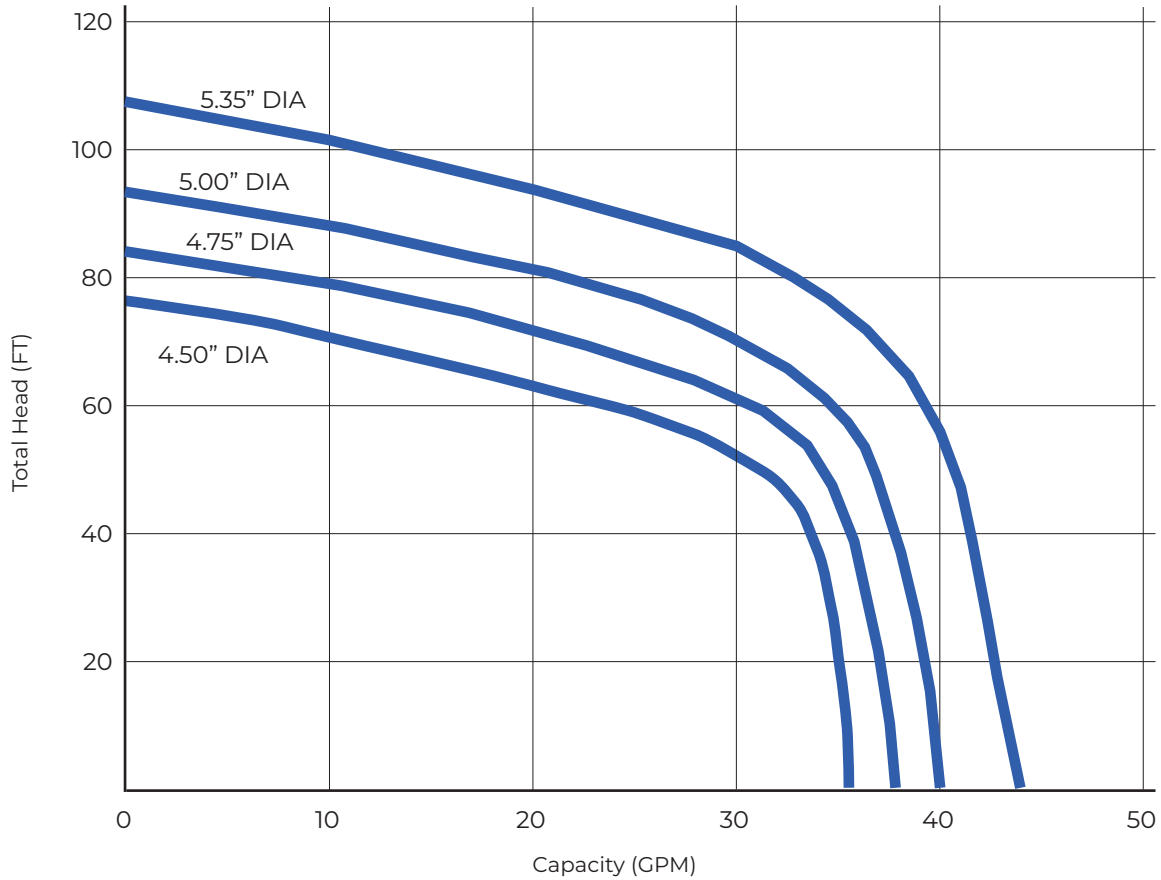


2HP SUBMERSIBLE GRINDER PUMP

GENERAL	KG(X)2(HZ)
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	1-1/4" NPT, Vertical
Grinder Ring	26 Slots
Impeller Type / Std. Dia.	Recessed / 5.35" Dia.
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	15.5 Amps
Full Load Amps 240V	14.5 Amps
Poles / Rated Speed	2P / 3450 rpm
Insulation Class	N Class
Start Capacitor	216 ufd, 250 VAC
Run Capacitor	25 ufd, 370 VAC

PERFORMANCE CURVE

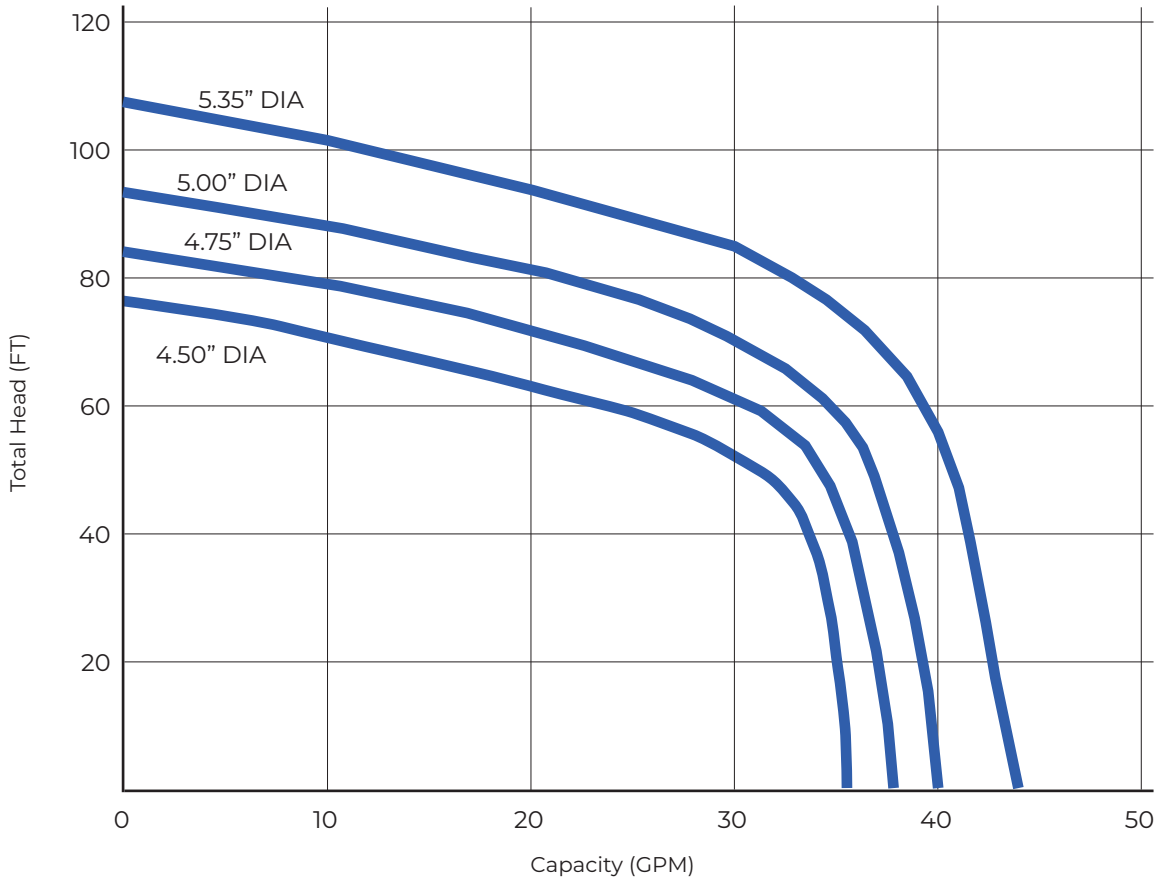


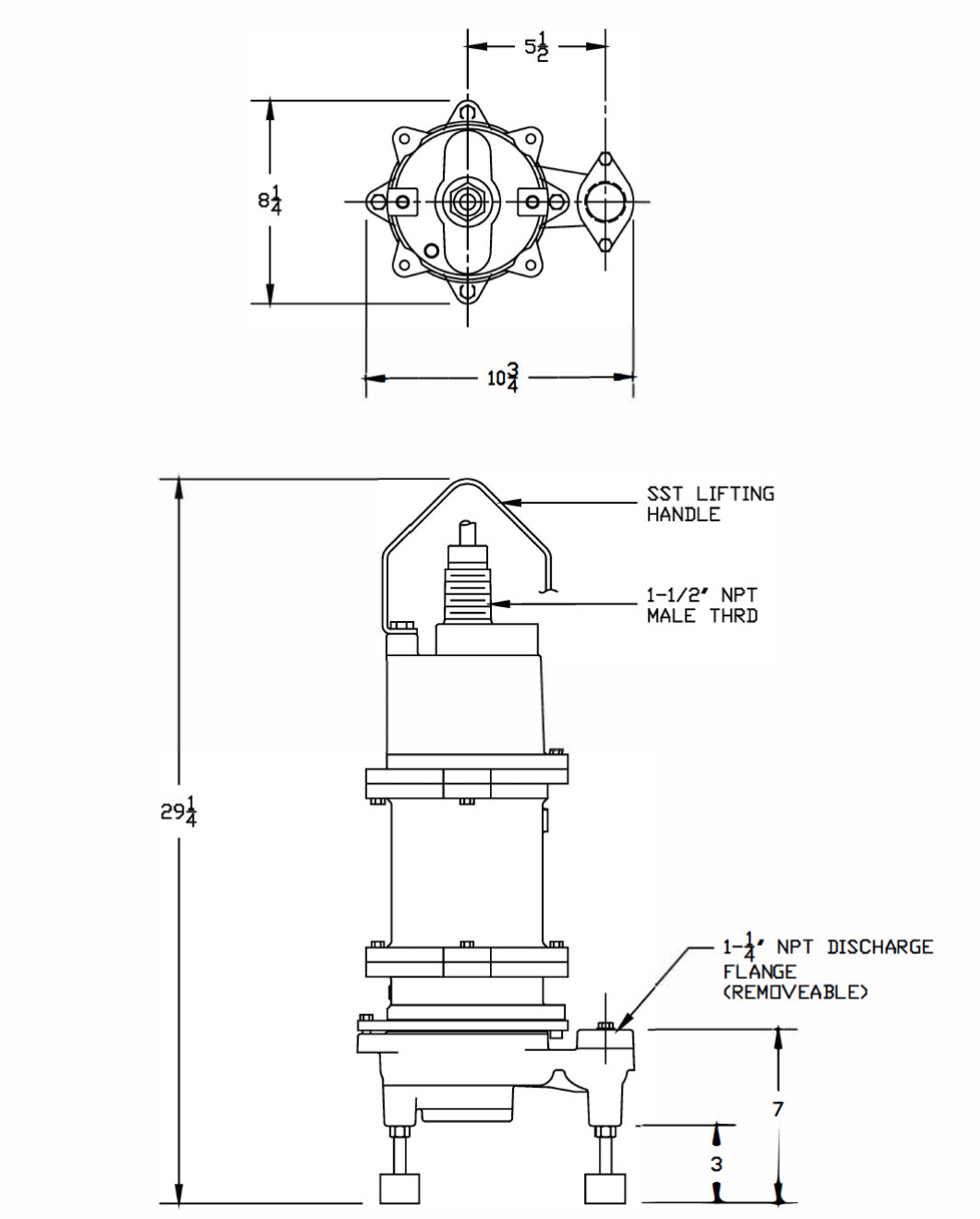
2HP SUBMERSIBLE GRINDER PUMP

GENERAL	KG(X)2(HZ)
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	1-1/4” NPT, Vertical
Grinder Ring	26 Slots
Impeller Type	Recessed / 5.35” Dia.
Three Phase	

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

PERFORMANCE CURVE




5 1/2
8 1/4
10 3/4
SST LIFTING HANDLE
1-1/2" NPT MALE THRD
29 1/4
1-1/4" NPT DISCHARGE FLANGE (REMOVEABLE)
7
3

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, Powder Coat Paint Finish

MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class N
Service Factor	1.2
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266°F (130°C)
Power Cord (Phase 1)	12-5 SOOW - 600V, 90° C
Power Cord (Phase 3)	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 "Radiall" Cutter	440 SST Hardened 58-60 Rockwell C
Stationary "Radiall" 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	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		266° F (130° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° C) Min.
Oil Flash Point		390° F (199° 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	START AMPS	FULL LOAD KW	FULL LOAD KVA
KG2-2081SL	KG2-2081	2	208	1	G	1.0	15.5	72	4.68	4.68
KG2-2401SL	KG2-2401		240				14.5	54	3.80	3.80
KG2-2083SL	KG2-2083	2	208	3	H	1.0	10	33	4.50	4.50
KG2-2303SL	KG2-2303		230				9	31	3.78	3.78
KG2-4603SL	KG2-4603		460				4.5	15	4.38	4.38

2 HP GRINDER PUMPS

MODEL NO. KG(X)2(HZ)

PUMP MODEL – Pump shall be of the centrifugal type, KG(X)2(HZ) with an integrally built-in grinder unit and submersible type motor. KG(X)2(HZ) 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, and 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 powder coat 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 Orings 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 (FM models only) 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, 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 N ratings.

The stator winding shall be of the open type with Class N 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.

MOISTURE PROBE – Rotor and stator in the motor housing shall be separated and protected from the pumped liquid by an oil filled seal housing incorporated two type 21, Silicon Carbide upper and lower mechanical seals. The seal housing shall be equipped with a moisture sensing probe installed between the seals, and the sensing of moisture in the seal chamber shall be automatic, continuous, and not require the pump to be stopped or removed from the wetwell.





"Radial"Cutter
(STANDARD)



"Slicer"
(OPTION)

SKG2

2HP Dual Seal Grinder Pump

POWERFUL

- Pressures to 47 psi (108 feet)
- Flows to 50 GPM
- High Torque Motor

RELIABLE

- Hardened Stainless Steel Cutter
- Dual Silicon Carbide Seals
- Class 35 Cast Iron Casing with Durable Powder Coat Finish

CONSTRUCTION

- Stainless Steel Lift Handle
- Lightweight, Only 72 pounds
- Stainless Steel Stand
- 30 foot Power Cord

REV 01/2024

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 the power cable is cut or damaged. Stainless steel cord grip.

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. 2-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 B-10 bearing life.

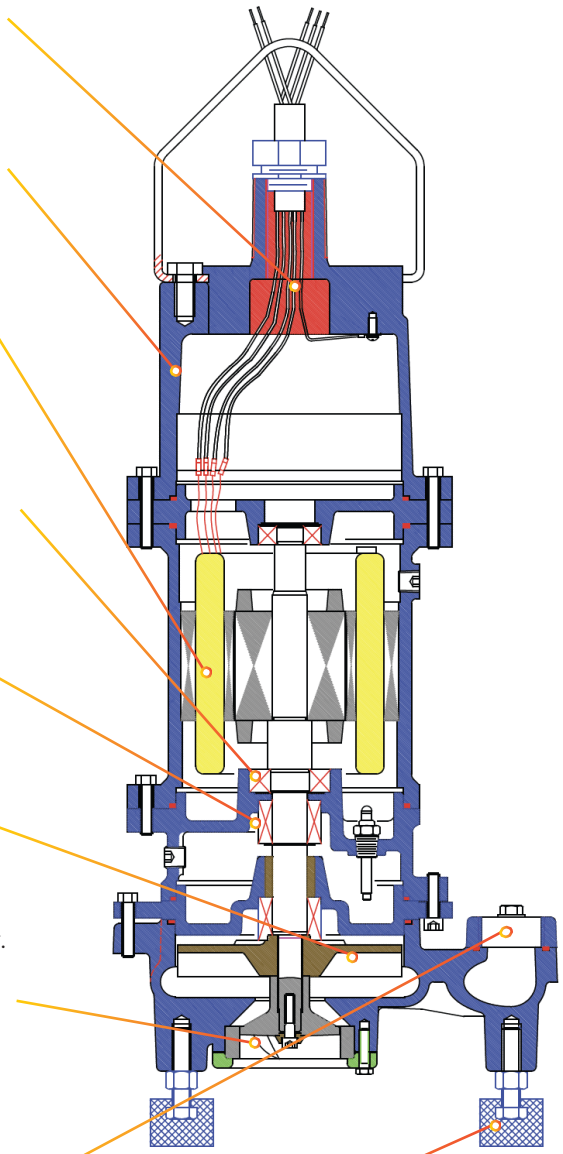
5. DOUBLE MECHANICAL SEAL PROTECTION
Dual silicon carbide mechanical shaft seals provide twice the moisture protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials.

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..

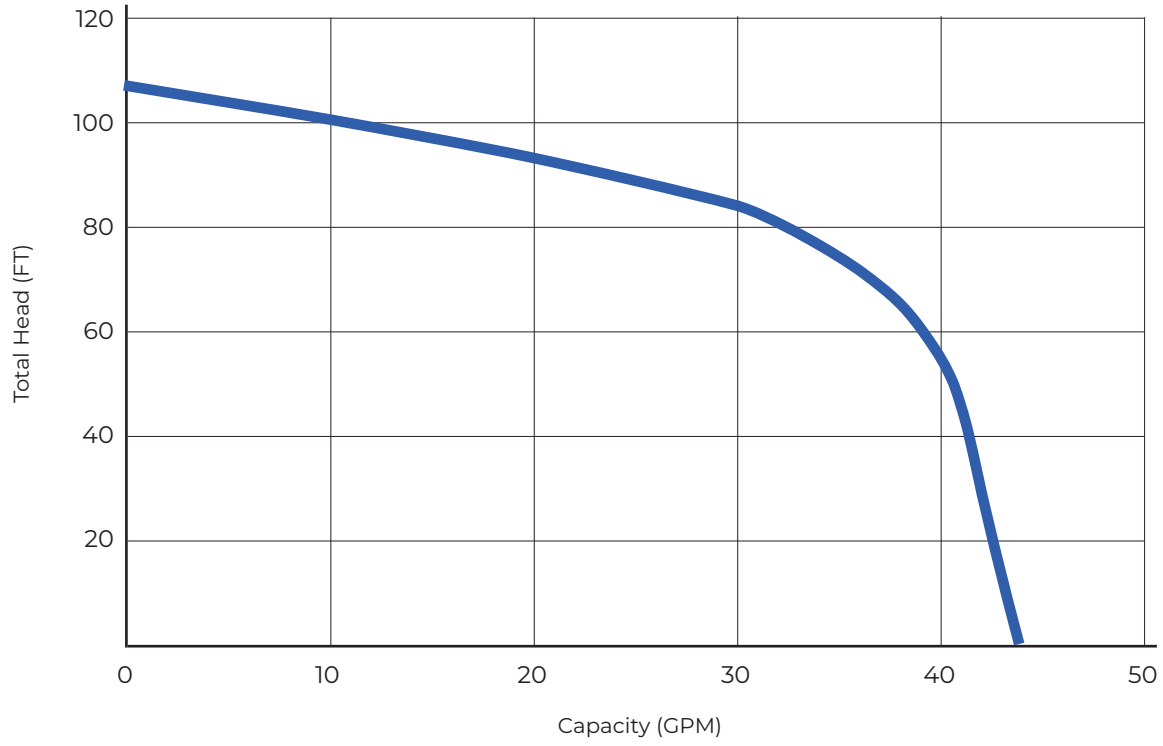


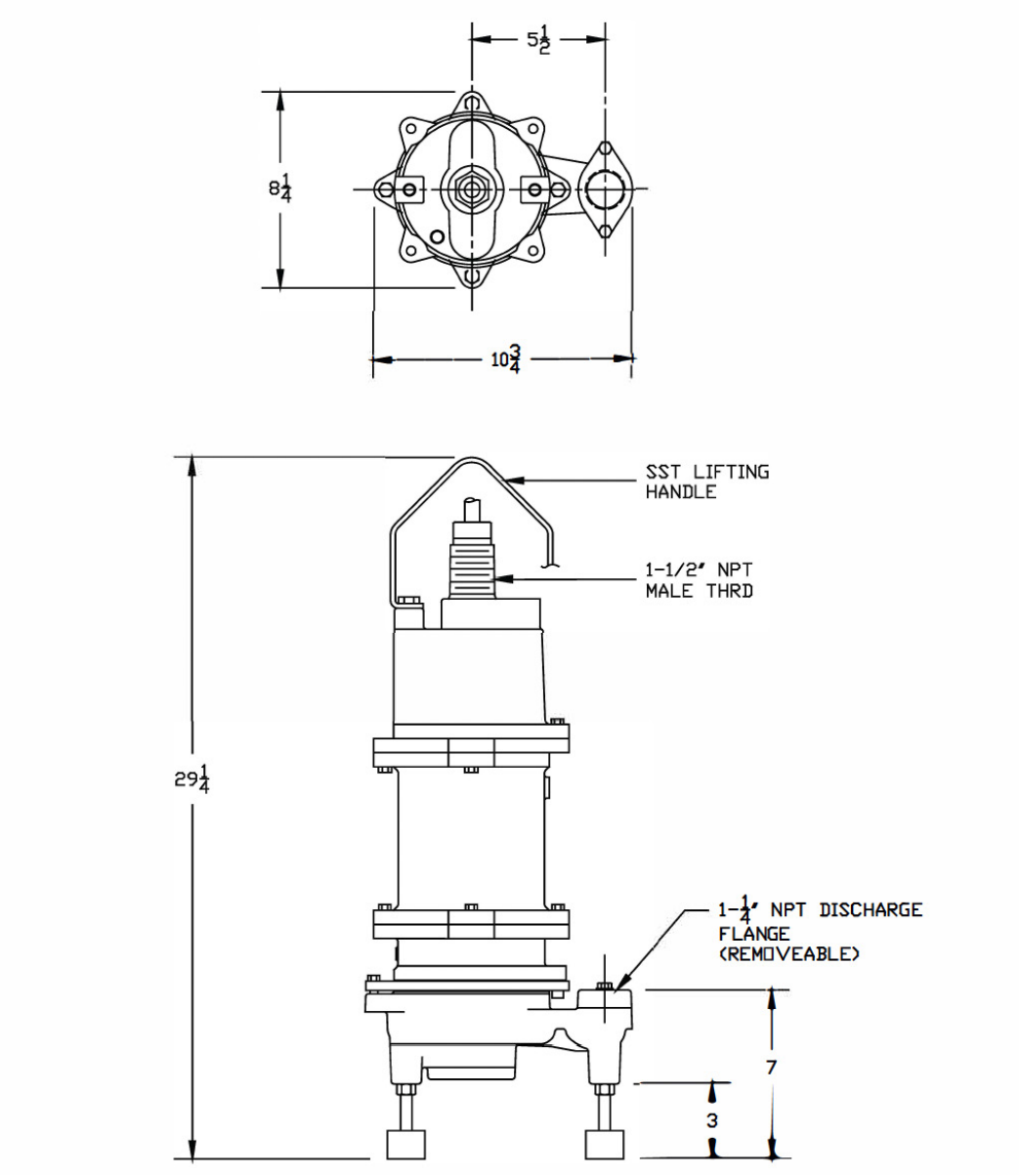
2HP SUBMERSIBLE GRINDER PUMP

GENERAL	SKG2
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	1-1/4" NPT, Vertical
Grinder Ring	26 Slots
Impeller Type	Recessed
SINGLE PHASE	START KIT SK-2 includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	2HP / 1 ϕ , 60 Hz
Full Load Amps 208V	15.5 Amps
Full Load Amps 240V	14.5 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	N Class
Start Capacitor	150 ufd, 250 VAC
Run Capacitor	30 ufd, 370 VAC

PERFORMANCE CURVE




5 1/2
8 1/4
10 3/4
SST LIFTING HANDLE
1-1/2" NPT MALE THRD
29 1/4
1-1/4" NPT DISCHARGE FLANGE (REMOVEABLE)
7
3

2 HP GRINDER PUMPS

MODEL NO. SKG2

PUMP MODEL – Pump shall be of the centrifugal type, SKG2 with an integrally built-in grinder unit and submersible type motor.

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 powder coat 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 (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.

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. 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, 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 N ratings.

The stator winding shall be of the open type with Class N 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.





"Radial"Cutter
(STANDARD)



"Slicer"
(OPTION)

KFG(X)2(HZ)

Centrifugal Grinder Series

2HP DUAL SEAL GRINDER PUMP, 1 OR 3 PHASE OPTIONS

-SL

-SLICER CUTTER HZ

-HORIZONTAL DISCHARGE X

- EXPLOSION PROOF (FM3615)

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

POWERFUL

- Flows to 68 GPM
- High Torque Motor

RELIABLE

- Hardened Stainless Steel Cutter
- Dual Silicon Carbide Seals
- Class 35 Cast Iron Casing with Durable Powder Coat Finish

CONSTRUCTION

- Stainless Steel Lift Handle
- Stainless Steel Stand
- 30 foot Power Cord

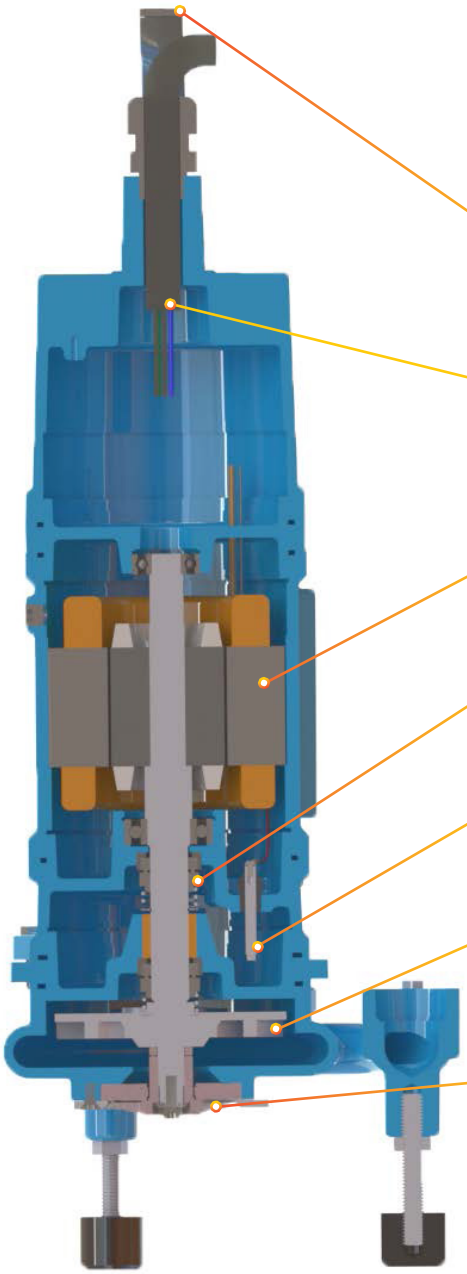
FM
APPROVED



"Radial"Cutter
50 Year Proven
Design



"Slicer" Cutter
Preventing Jamming
on Solids



STAINLESS STEEL LIFT HANDLE

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 Effecient Solids-Slicing
- User-Friendly Field Service
- Hardened Stainless Steel

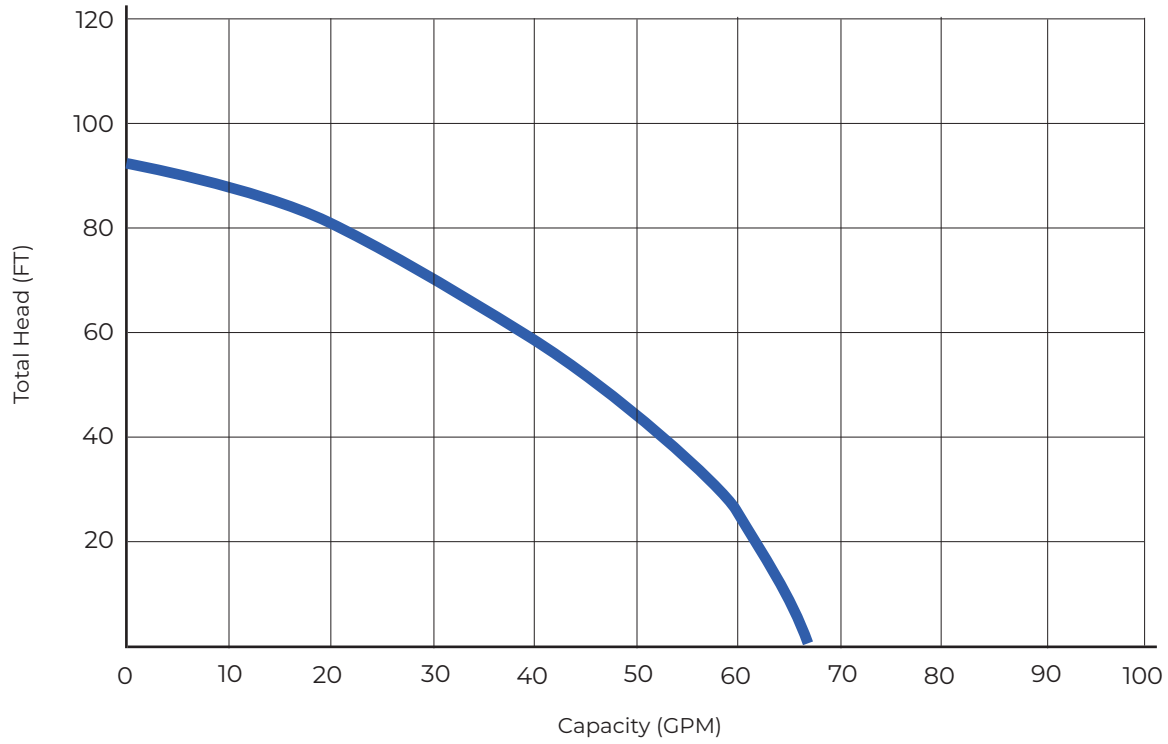
INTERCHANGEABILITY
- Radial Cutter or Optional Axial Slicer

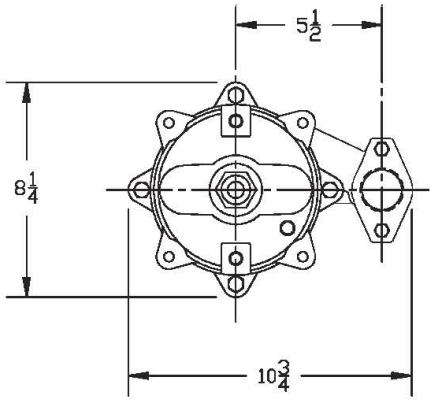
2HP SUBMERSIBLE GRINDER PUMP

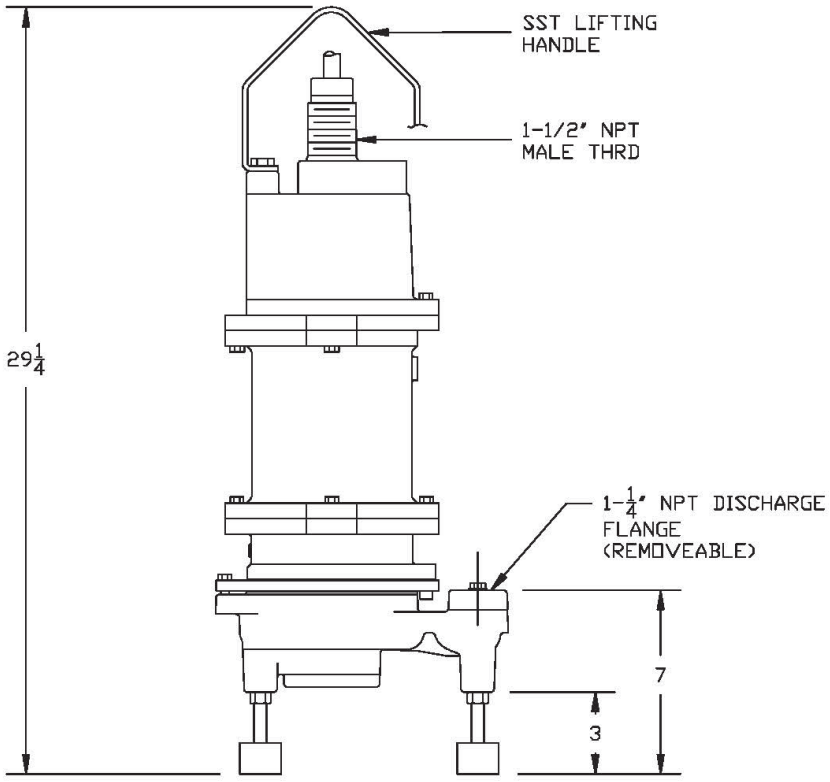
GENERAL	KFG(X)2(HZ)
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	1-1/4" NPT, Horizontal or Vertical
Grinder Construction	Stainless Steel
Grinder Hardness	58-60 Rockwell
Impeller Type	Recessed
SINGLE PHASE/ THREE PHASE	START KIT SK-2A includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	2HP / 1 ϕ , 60 Hz
Full Load Amps 208V	19.5 Amps
Full Load Amps 240V	16.5 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	F Class
Start Capacitor	216 ufd, 250 VAC
Run Capacitor	25 ufd, 370 VAC

PERFORMANCE CURVE




5 1/2
8 1/4
10 3/4


SST LIFTING HANDLE
1-1/2" NPT MALE THRD
29 1/4
1-1/4" NPT DISCHARGE FLANGE (REMOVEABLE)
7
3

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, Powder Coat Paint Finish

MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class F
Service Factor	1.2
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266°F (130°C)
Power Cord (Phase 1)	12-5 SOOW - 600V, 90° C
Power Cord (Phase 3)	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 “Radiall” Cutter	440 SST Hardened 58-60 Rockwell C
Stationary “Radiall” 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	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		266° F (130° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° C) Min.
Oil Flash Point		390° F (199° 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	START AMPS	FULL LOAD KW	FULL LOAD KVA
KFG2-2081SL	KFG2-2081	2	208	1	G	1.2	19.5	78.8	4.68	4.68
KFG2-2401SL	KFG2-2401		240				16.5	57.8	3.80	3.80
KFG2-2083SL	KFG2-2083	2	208	3	H	1.2	12.5	43.8	4.50	4.50
KFG2-2303SL	KFG2-2303		230				9.5	33.3	3.78	3.78
KFG2-4603SL	KFG2-4603		460				5.5	19.3	4.38	4.38

2 HP GRINDER PUMPS
MODEL NO. KFG2

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.

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 SRZGHUFRDW 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, 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 N ratings.

The stator winding shall be of the open type with Class N 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.

FM APPROVED



"Radial"Cutter (STANDARD)



"Slicer" (OPTION)



KGS(X)2

2HP Semi-Open Centrifugal Grinder, 1 OR 3 PHASE OPTIONS

-SL

-SLICER CUTTER HZ

-HORIZONTAL DISCHARGE X

- EXPLOSION PROOF (FM3615)

HIGH PRESSURE PUMPS

The Keen Pump KGS(X)2 series centrifugal grinder pumps easily handle residential, and light commercial sanitary waste; such as small offices and single family homes.

The KGS(X)2 grinder pump retro ts into many existing 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 47 GPM with Heads to 15.0 Amps!

THE KGS(X)2 SERIES PUMP FEATURES

- BOTH High Head and High Flow Capability!
- Class 1, Division 1 "Explosion-proof" Construction
- FM 3615 Listed
- 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

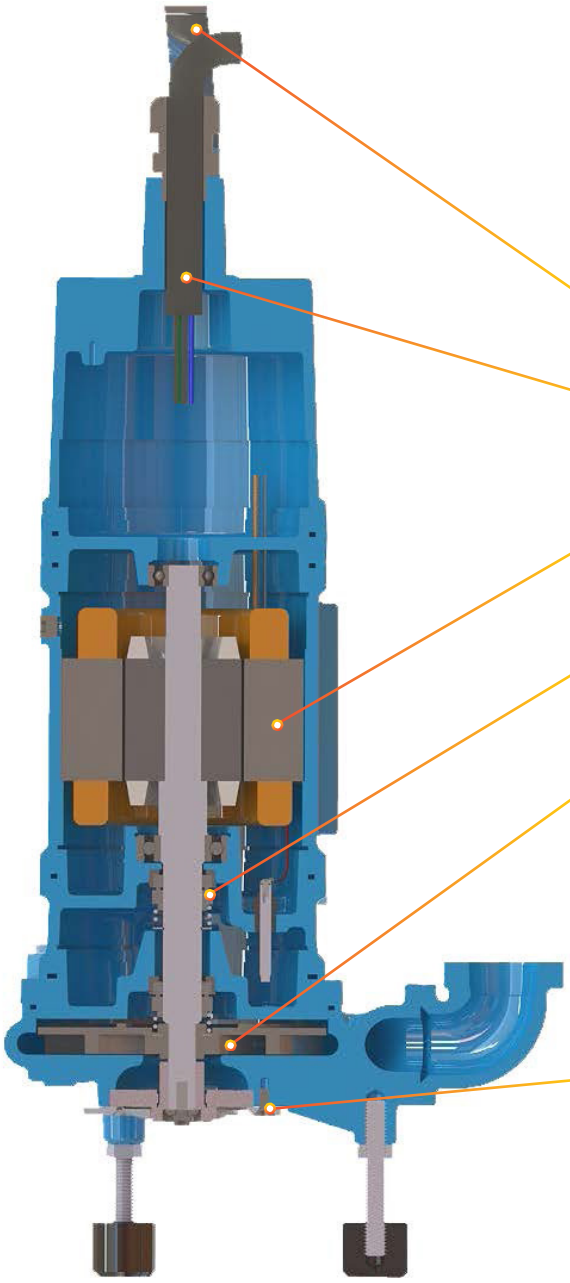
REV 01/2024



"Radial"Cutter
50 Year Proven
Design



"Slicer" Cutter
Preventing Jamming
on Solids



STAINLESS STEEL LIFT HANDLE

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

1-STAGE BRONZE IMPELLER

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

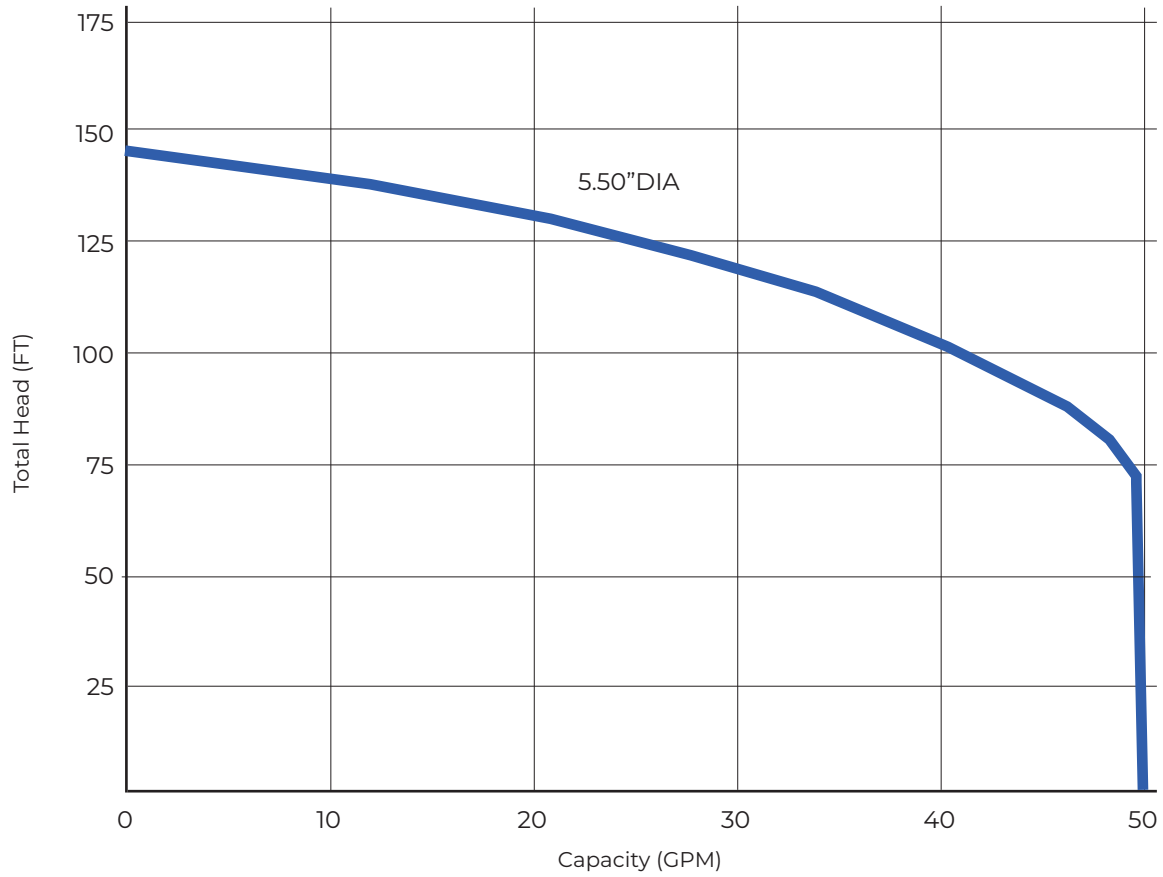
ADJUSTABLE SLICER ASSEMBLY
- Maintains Precision Clearances For Optimal Shredding Of Solids

2HP SUBMERSIBLE GRINDER PUMP

GENERAL	KGS(X)2
Pump Model	
PUMP DATA	
Date	02/2023
Discharge Flange	1-1/4" NPT
Grinder Ring	Stainless Steel
Grinder Hardness	58 - 60 Rockwell
Impeller Type	Semi - Open
SINGLE PHASE	START KIT SK-KGS includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	2HP / 1 ϕ , 60 Hz
Full Load Amps 240V	15.0 Amps
Full Load Amps 240V	16 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	N Class
Start Capacitor	216 ufd, 250 VAC
Run Capacitor	50 ufd, 370 VAC

PERFORMANCE CURVE

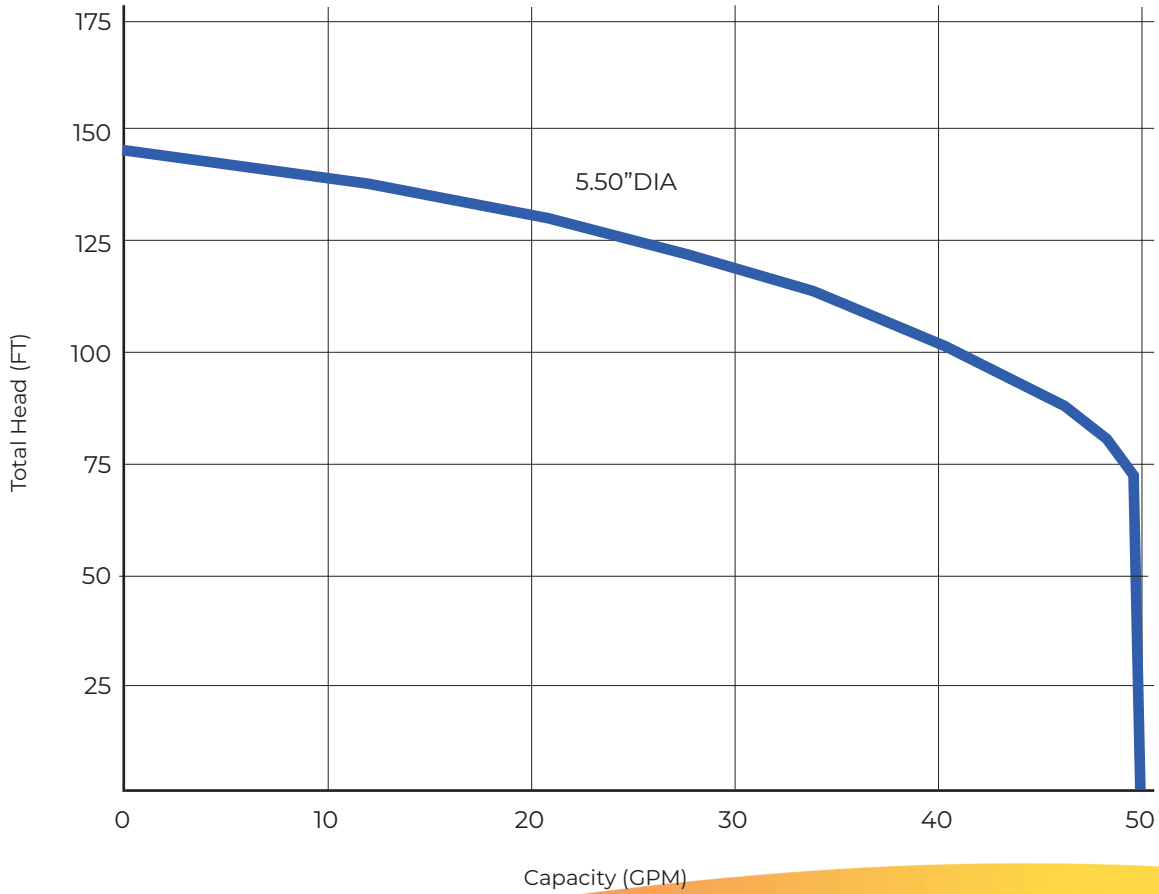


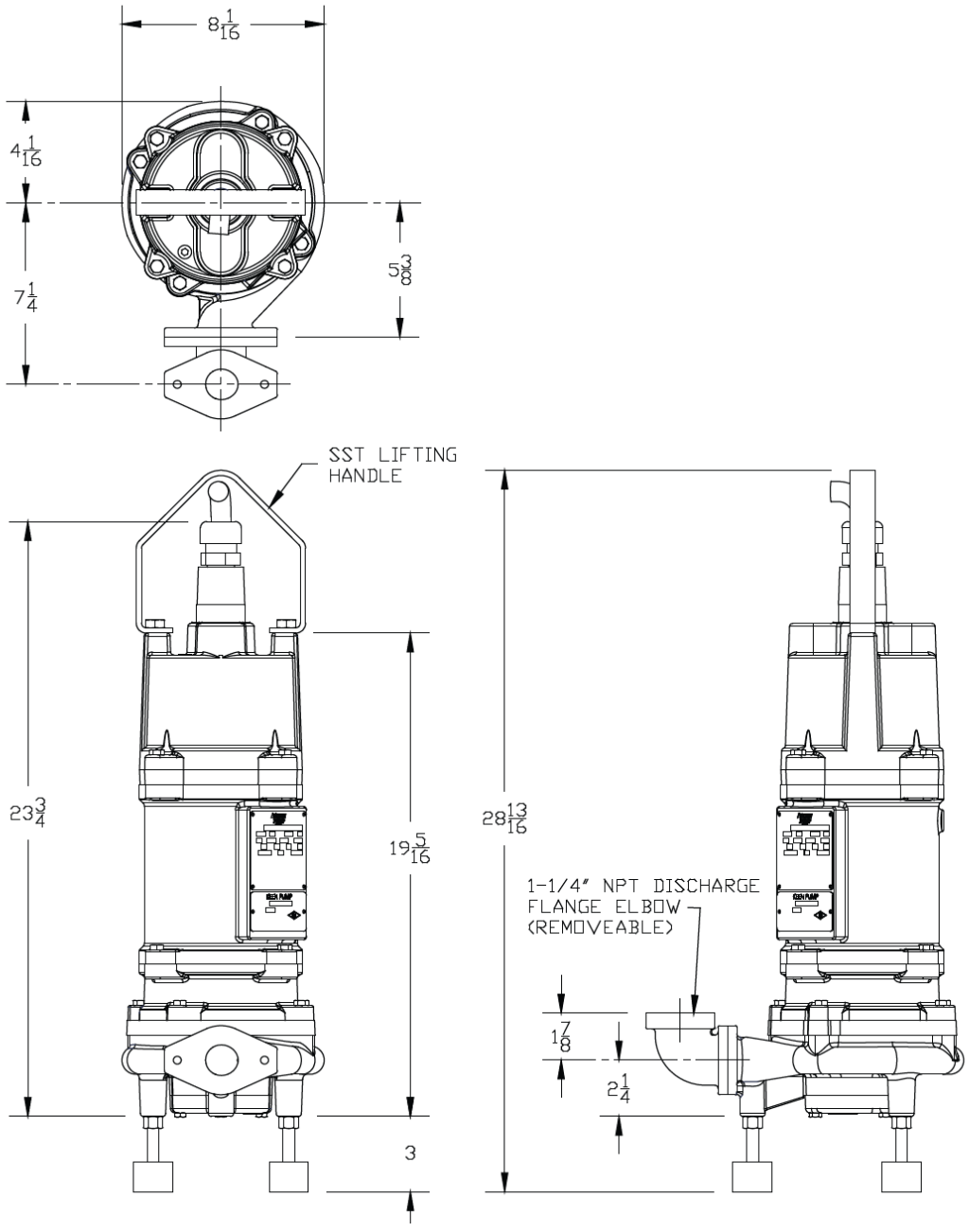
2HP SUBMERSIBLE GRINDER PUMP

GENERAL	KGS(X)2
Pump Model	
PUMP DATA	
Date	02/2023
Discharge Flange	1-1/4" NPT
Grinder Construction	Bronze
Grinder Hardness	58 - 60 Rockwell
Impeller Type	Semi - Open
THREE PHASE	

MOTOR DATA	
HP / Power Supply	2HP / 3 ϕ , 60 Hz
Full Load Amps 208V	11.0 Amps
Full Load Amps 230V	10 Amps
Full Load Amps 460V	5 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	N Class

PERFORMANCE CURVE




8 1/16
4 1/16
7 1/4
5 3/8
SST LIFTING HANDLE
23 3/4
19 5/16
3
28 13/16
1-1/4" NPT DISCHARGE FLANGE ELBOW (REMOVEABLE)
1 7/8
2 1/4

PHYSICAL DATA	
Discharge Size	1-1/4" NPT
Impeller Type	Balanced, Semi-Open
Power/Control Cable Length	30' Standard
Paint	Blue, Powder Coat Paint Finish

MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class N
Service Factor	1.2
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266°F (130°C)
Power Cord (1 Phase)	12-5 SOOW - 600V, 90° 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	(85-5-5-5) Bronze
Shaft	ANSI 400 Stainless Steel
Rotating "Axial" Cutter	440 SST Hardened 58-60 Rockwell C
Stationary "Axial" 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	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° C) Min.
Oil Flash Point		390° F (199° 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 HEAD (SLICER)	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
KGSL-2081	2	208	1	G	1.2	16.0	92.8	5.51	5.51
KGSL-2401		240				15.0	85.8	5.88	5.88
KGSL-2083	2	208	3	H	1.2	11.0	59.5	4.37	5.46
KGSL-2303		230				10.0	59.5	4.37	5.46
KGSL-4603		460				5.0	32.0	5.01	2.95

MODEL HIGH HEAD (GRINDER)	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
KGS2-2081	2	208	1	G	1.2	16.0	92.8	5.51	5.51
KGS2-2401		240				15.0	85.8	5.88	5.88
KGS2-2083	2	208	3	H	1.2	11.0	59.5	4.37	5.46
KGS2-2303		230				10.0	59.5	4.37	5.46
KGS2-4603		460				5.0	32.0	5.01	2.95

2 HP GRINDER PUMPS

MODEL NO. KGS(X)2

PUMP MODEL – Pump shall be of the semi-open, centrifugal type, KGS(X)2 with an integrally built-in grinder unit and submersible type motor. KGS(X)2 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 powder coat 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 Orings 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 bronze 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. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C. Clearance between rotary slicer and stationary plate shall be controlled by an adjustable design. No shims permitted.

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. 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.

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 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 N ratings.

The stator winding shall be of the open type with Class N 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.

Oil Filled Motor ensures industry-low operating temperatures. 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 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.

POWER CORD – The motor power cord shall be 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.

MOISTURE PROBE – Rotor and stator in the motor housing shall be separated and protected from the pumped liquid by an oil filled seal housing incorporated two type 21, Silicon Carbide upper and lower mechanical seals. The seal housing shall be equipped with a moisture sensing probe installed between the seals, and the sensing of moisture in the seal chamber shall be automatic, continuous, and not require





"Radial"Cutter
(STANDARD)



"Slicer"
(OPTION)

KHGS(X)2

High Pressure Grinder Pumps,
1 OR 3 PHASE OPTIONS
-SL
-SLICER CUTTER HZ
-HORIZONTAL DISCHARGE X
- EXPLOSION PROOF (FM3615)

INDUSTRY LEADING DESIGN

- High Head, 195 Feet Shut-Off
- Lower Amperage Draw (17.7 Max)

HIGH PERFORMANCE SLICING

- Adjustable "Slicer / Grinder" Assembly
- Maintains High Performance
- Unique Slicing Action Shreds "Flushables"
- Heat-Treated, All Stainless Steel Construction

HIGH QUALITY CONSTRUCTION

- FM 3615 Listed "Explosion-Proof"
- Class 1, Div. 1, Groups C & D
- Grit Resistant Silicon Carbide Seals With Viton® Elastomers
- 3 Bearing Design

FM APPROVED

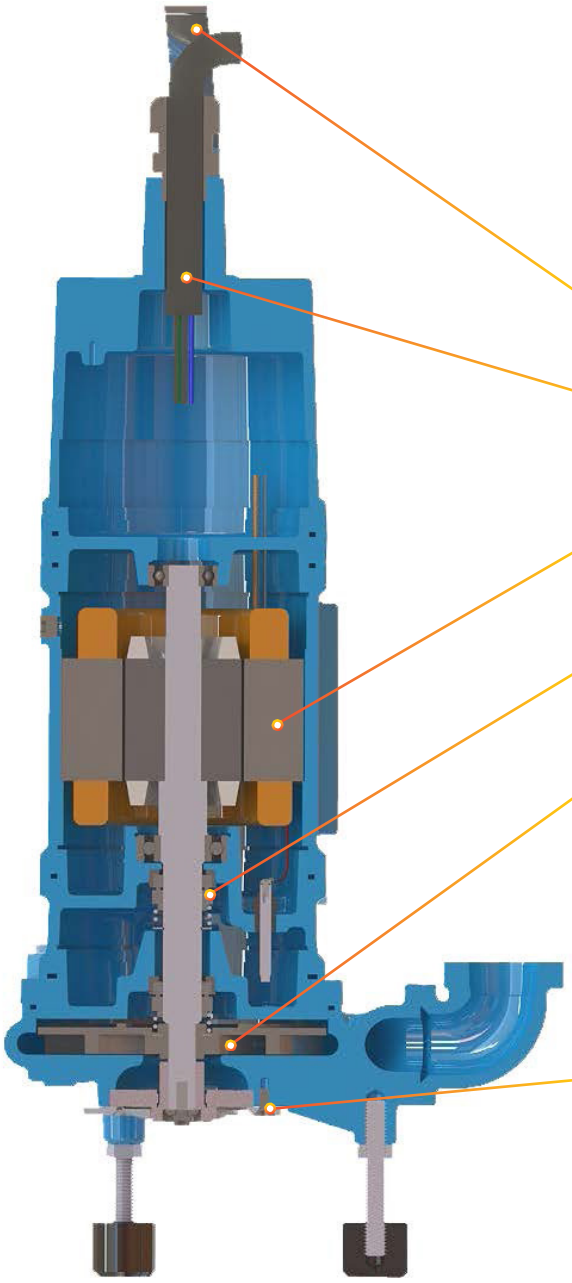
REV 01/2024



"Radial"Cutter
50 Year Proven
Design



"Slicer" Cutter
Preventing Jamming
on Solids



STAINLESS STEEL LIFT HANDLE

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

1-STAGE BRONZE IMPELLER

ADVANCED CUTTING SYSTEM

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

ADJUSTABLE SLICER ASSEMBLY

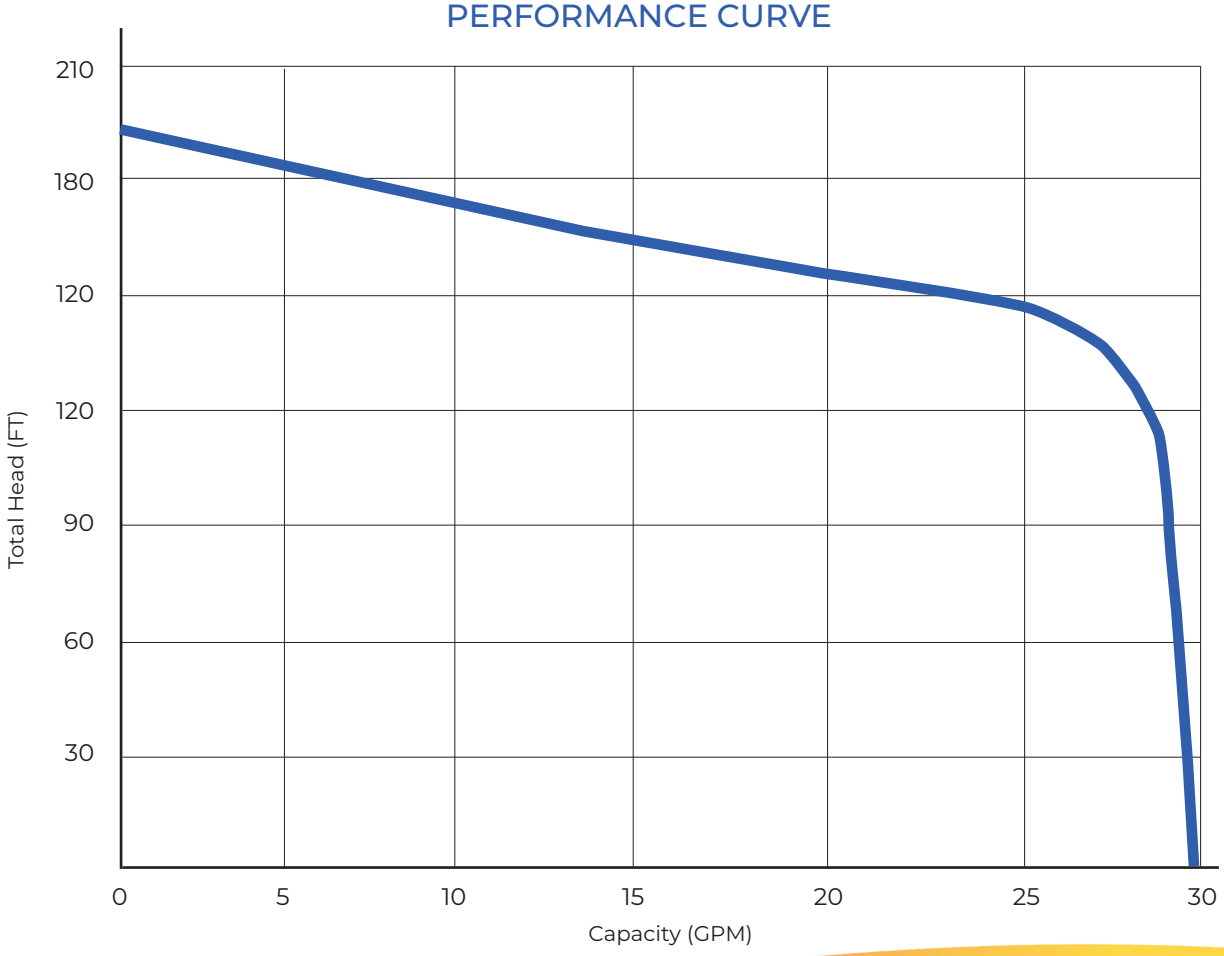
- Maintains Precision Clearances For Optimal Shredding Of Solids

2HP SUBMERSIBLE GRINDER PUMP

GENERAL	KHGS(X)2
Pump Model	
PUMP DATA	
Date	02/2023
Discharge Flange	1-1/4" NPT
Grinder Construction	Stainless Steel
Grinder Hardness	58 - 60 Rockwell
Impeller Type	Semi - Open
SINGLE PHASE/ THREE PHASE	START KIT SK-KGS includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	2HP / 1 ϕ , 60 Hz
Full Load Amps 240V	17.7 Amps
Full Load Amps 208V	18.9 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	N Class
Start Capacitor	216 ufd, 250 VAC
Run Capacitor	50 ufd, 370 VAC

PERFORMANCE CURVE



PHYSICAL DATA	
Discharge Size	1-1/4" NPT
Impeller Type	Balanced, Semi-Open
Power/Control Cable Length	30' Standard
Paint	Blue, Powder Coat Paint Finish

MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class N
Service Factor	1.2
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	392°F (200°C)
Power Cord (1 Phase)	12-5 SOOW - 600V, 90° 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	(85-5-5-5) Bronze
Shaft	ANSI 400 Stainless Steel
Rotating "Axial" Cutter	440 SST Hardened 58-60 Rockwell C
Stationary "Axial" 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	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		266° F (130° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° C) Min.
Oil Flash Point		390° F (199° 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 HEAD (SLICER)	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
KHGSL-2081	2	208	1	G	1.0	18.9	92.8	5.51	5.51
KHGSL-2401		240				17.7	85.8	5.88	5.88
KHGSL-2083	2	208	3	H	1.0	10.7	59.5	4.37	5.46
KHGSL-2303		230				10.0	59.5	4.37	5.46
KHGSL-4603		460				5.1	32.0	5.01	2.95

MODEL HIGH HEAD (SLICER)	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
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KHGS2-2083	2	208	3	H	1.0	10.7	59.5	4.37	5.46
KHGS2-2303		230				10.0	59.5	4.37	5.46
KHGS2-4603		460				5.1	32.0	5.01	2.95

2 HP GRINDER PUMPS

MODEL NO. KHGS(X)2

PUMP MODEL – Pump shall be of the semi-open, centrifugal type, KHGS2 (High Head), with an integrally built-in grinder unit and submersible type motor. KHGSX2 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 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 powder coat 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 Orings 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 bronze 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. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C. Clearance between rotary slicer and stationary plate shall be controlled by an adjustable design. No shims permitted.

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. 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.

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 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 N ratings.

The stator winding shall be of the open type with Class N 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.

Oil Filled Motor ensures industry-low operating temperatures 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 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.

POWER CORD – The motor power cord shall be 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.

MOISTURE PROBE – Rotor and stator in the motor housing shall be separated and protected from the pumped liquid by an oil filled seal housing incorporated two type 21, Silicon Carbide upper and lower mechanical seals. The seal housing shall be equipped with a moisture sensing probe installed between the seals, and the sensing of moisture in the seal chamber shall be automatic, continuous, and not require the pump to be stopped or removed from the wetwell.





"Radial"Cutter
(STANDARD)



"Slicer"
(OPTION)

LCHGS2

Semi-Open Grinder Series High Pressure Pump,
1 OR 3 PHASE OPTIONS
-SL

-SLICER CUTTER HZ

-HORIZONTAL DISCHARGE X

- EXPLOSION PROOF (FM3615)

HIGH FLOW & HIGH HEAD

- Up to 22 GPM
- Up to 195 Feet Shutoff

ADVANCED SLICING FOR "FLUSHABLES"

- Wipes, Floor Pads, etc.

SILICON CARBIDE DUAL SEALS

- Viton® Elastomers

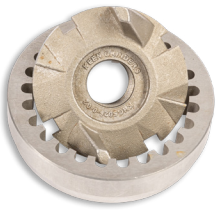
BEST MOTOR DESIGN

- Motor Pressed into Housing for Superior Heat Transfer
- Long Bearing & Seal Life

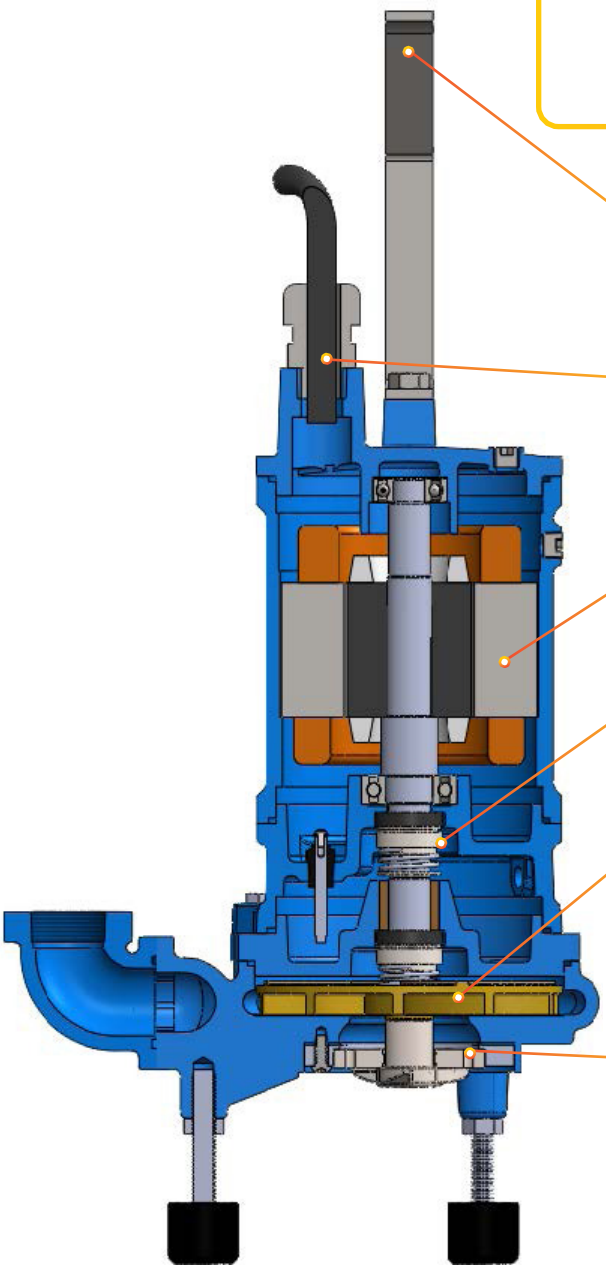
REV 01/2024



"Slicer" Cutter
Preventing Jamming
on Solids



"Radial" Cutter
50 Year Proven
Design



STAINLESS STEEL LIFT HANDLE

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

SINGLE-STAGE BRONZE IMPELLER

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

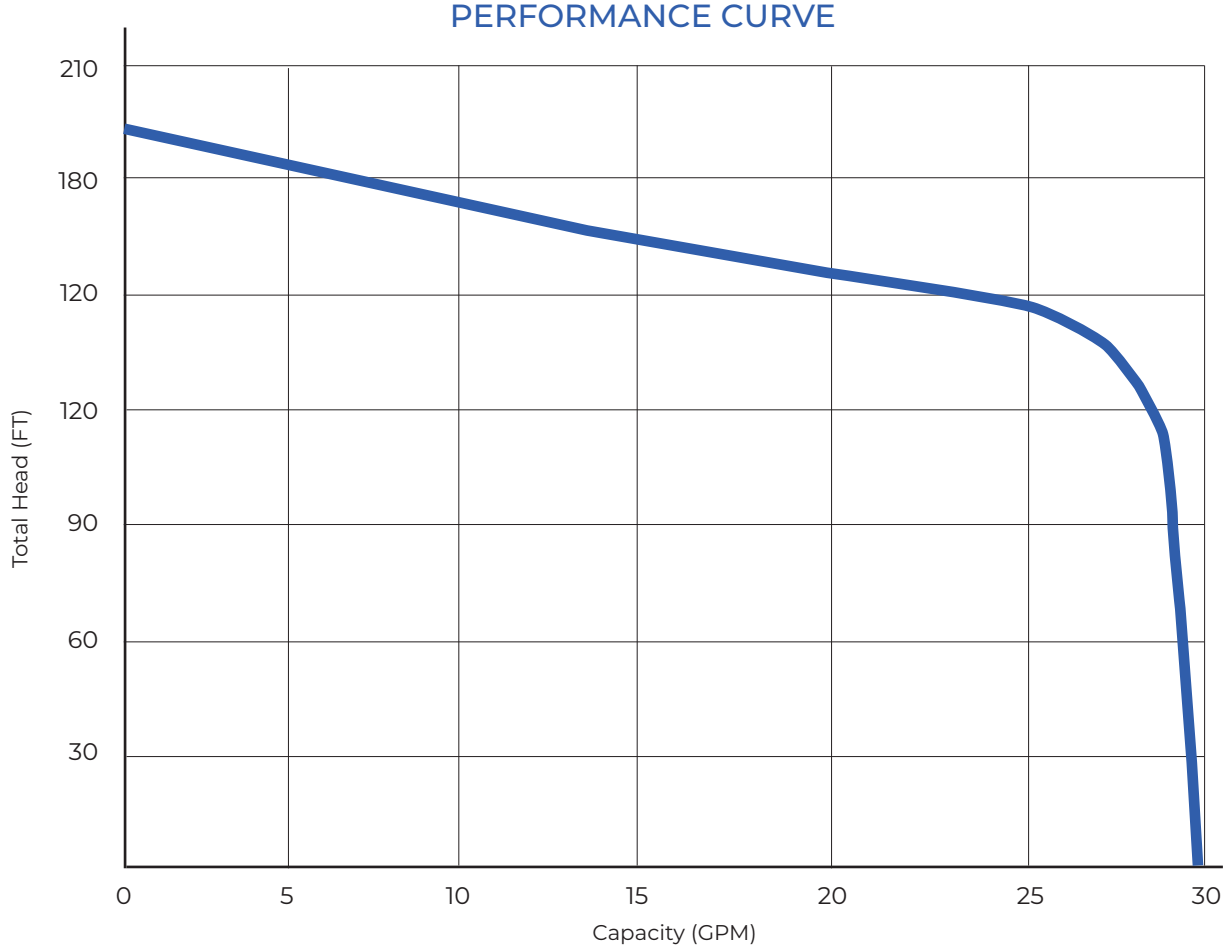
ADJUSTABLE SLICER ASSEMBLY
- Maintains Precision Clearances For Optimal Shredding Of Solids

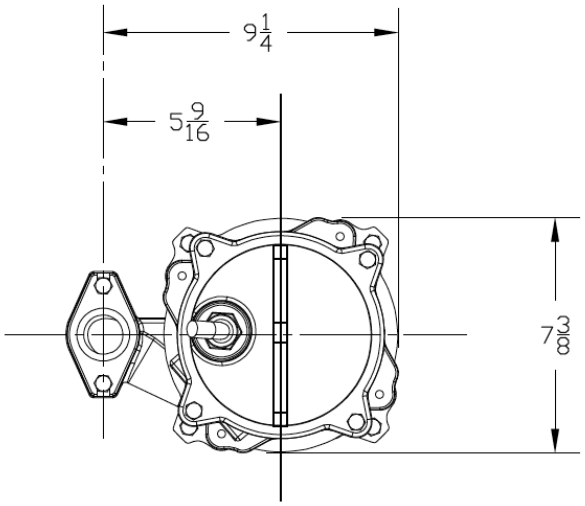
2HP SUBMERSIBLE GRINDER PUMP

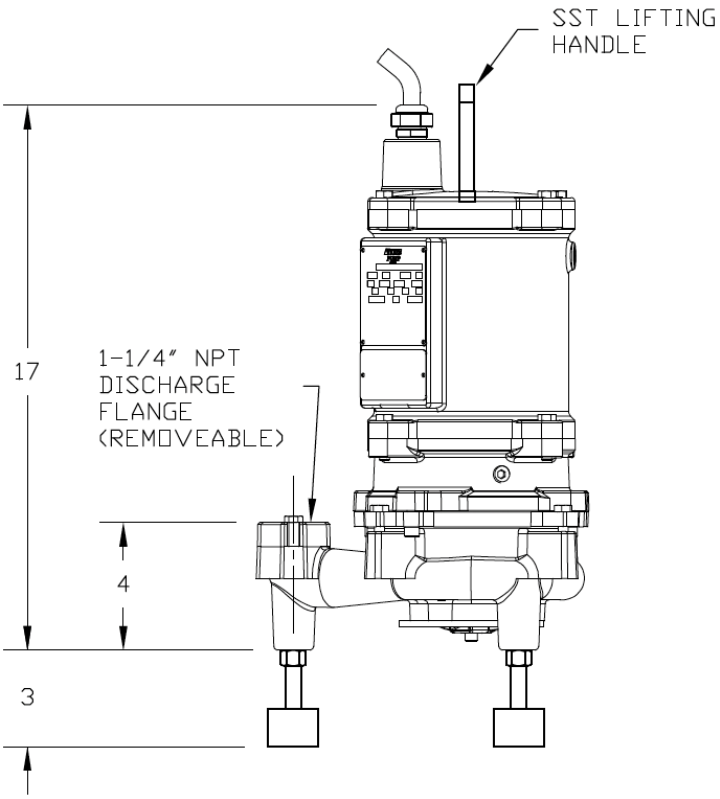
GENERAL	LCHGS2
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	1-1/4" NPT, Horizontal or Vertical
Grinder Construction	Stainless Steel
Grinder Hardness	58 - 60 Rockwell
Impeller Type	Semi - Open
SINGLE PHASE/ THREE PHASE	START KIT SK-KG5 includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	2HP / 1 ϕ , 60 Hz
Full Load Amps 208V	19 Amps
Full Load Amps 240V	17.7 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	N Class
Start Capacitor	216 ufd, 250 VAC
Run Capacitor	50 ufd, 370 VAC

PERFORMANCE CURVE




9 1/4
5 9/16
7 3/8


SST LIFTING HANDLE
17
1-1/4" NPT DISCHARGE FLANGE (REMOVEABLE)
4
3

PHYSICAL DATA	
Discharge Size	1-1/4” NPT
Impeller Type	Balanced, Semi-Open
Power/Control Cable Length	30’ Standard
Paint	Blue, Powder Coat Paint Finish

MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class N
Service Factor	1.2
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	392°F (200°C)
Power Cord	12-5 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	(85-5-5-5) Bronze
Shaft	ANSI 400 Stainless Steel
Rotating “Axial” Cutter	440 SST Hardened 58-60 Rockwell C
Stationary “Axial” 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	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° C) Min.
Oil Flash Point		390° F (199° 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 HEAD (SLICER)	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
LCHGSL2-2081	2	208	1	G	1.2	19.0	92.8	5.51	5.51
LCGHSL2-2401		240				17.7	85.8	5.88	5.88

MODEL HIGH HEAD (GRINDER)	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
LCHGS2-2081	2	208	1	G	1.2	19.0	92.8	5.51	5.51
LCGHS2-2401		240				17.7	85.8	5.88	5.88

2 HP GRINDER PUMPS

MODEL NO. LCHGS2

PUMP MODEL – Pump shall be of the semi-open, centrifugal type, LCHGS2 (High Head), with an integrally builtin grinder unit and submersible type motor.

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 powder coat 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 Orings 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 bronze 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. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C. Clearance between rotary slicer and stationary plate shall be controlled by an adjustable design. No shims permitted.

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. 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.

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, 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 N ratings.

The stator winding shall be of the open type with Class N 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.

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.

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 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.

POWER CORD – The motor power cord shall be 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.

MOISTURE PROBE – Rotor and stator in the motor housing shall be separated and protected from the pumped liquid by an oil filled seal housing incorporated two type 21, Silicon Carbide upper and lower mechanical seals. The seal housing shall be equipped with a moisture sensing probe installed between the seals, and the sensing of moisture in the seal chamber shall be automatic, continuous, and not require the pump to be stopped or removed from the wetwell.





"Radial"Cutter
(STANDARD)



"Slicer"
(OPTION)

KTG2

High Pressure Grinder Series

Highest Pressure Centrifical Grinder Pump in the Market

HIGHEST PUMP PERFORMANCE

- Flows to 30 GPM
- Pressure to 290 Feet
- Higher Flow Capacities to Keep Pipe Lines Scoured and Clean
- Strong Performance at High Pressures

FIELD PROVEN RELIABILITY & LONGEVITY

- Handles Extreme Operating Conditions
  - High Pressures
  - Long Run Times
  - Fluctuating System Requirements

ADVANCED GRINDER SLICING DESIGN

- Effectively Breaks Down Solids
- Prevents Jamming
- 100% Hardened Stainless Steel

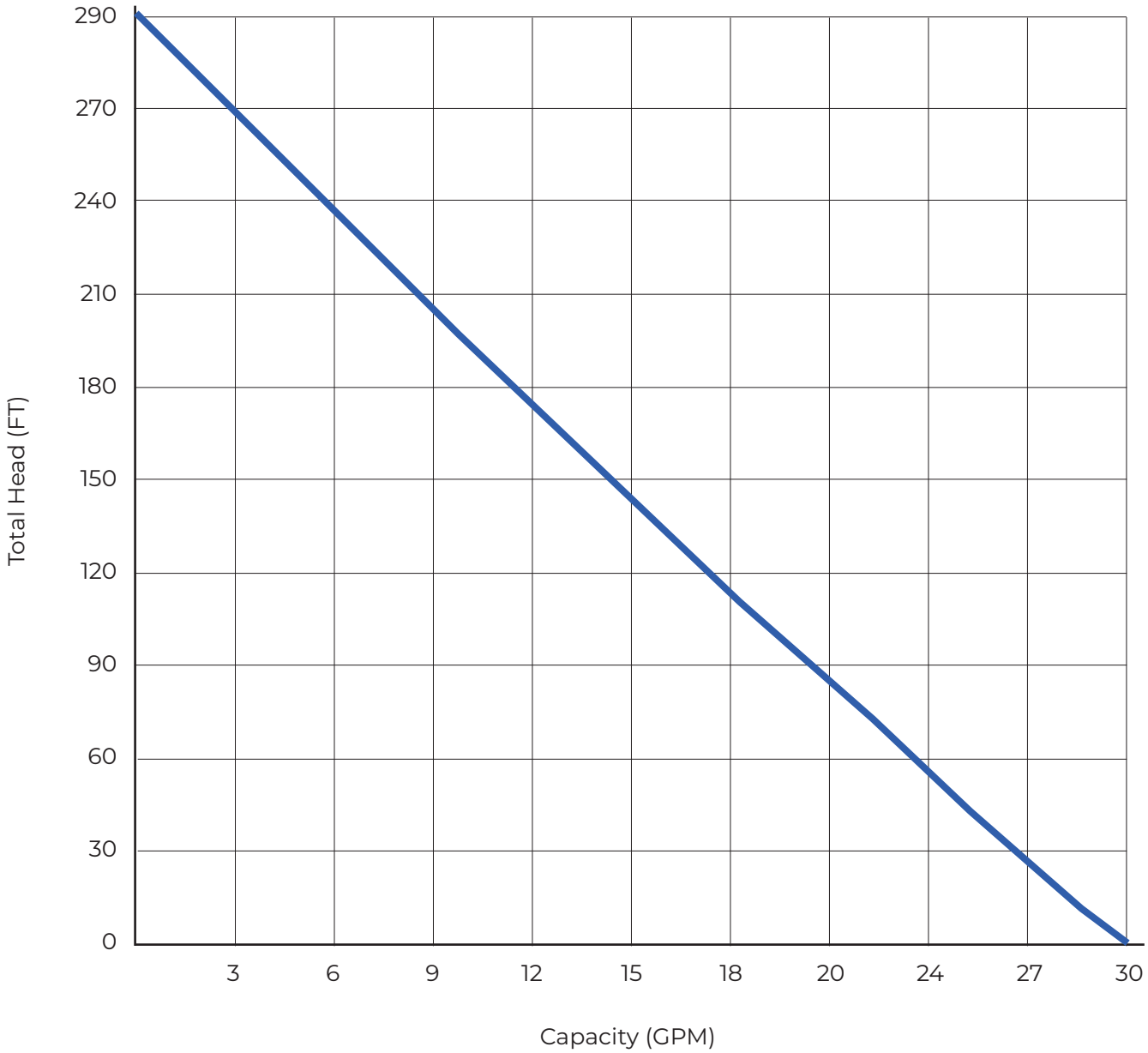
EASY INSTALLATION

- Compact Size, Easy to Handle
- Rugged Construction
- Easily Fits into Existing Pump Stations

REV 01/2024

PUMP SERIES	KTG2		2HP HIGH PRESSURE GRINDER	
Speed	3450 RPM	Discharge	1-1/4”	

BEST PUMP PERFORMANCE IN THE INDUSTRY!



PHYSICAL DATA	
Discharge Size	1-1/4" NPT or 2-Bolt Flange Horizontal
Impeller Type	Semi-Open, Stainless Steel
Power/Control Cable Length	30' Standard
Paint	Blue, Powder Coat Paint Finish

MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class N
Service Factor	1.2
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	392°F (200°C)
Power Cord	12-4 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
Impeller	Stainless Steel
Shaft	ANSI 400 Stainless Steel
Grinding Impeller	440 SST Hardened 58-60 Rockwell C
Grinding Ring	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	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° C) Min.
Oil Flash Point		390° F (199° 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 = 150 ufd, 250 VAC			
	Run Capacitor = 30 ufd, 370 VAC			

MODEL EXTERNAL CAPS	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
KTG2-2081	2	208	1	G	1.2	19.2	54.0	1.84	2.30
KTG2-2081SL	2	208	1	G	1.2	19.2	54.0	1.84	2.30
KTG2-2401	2	240	1	G	1.2	18.0	54.0	1.84	2.30
KTG2-2401SL	2	240	1	G	1.2	18.0	54.0	1.84	2.30

MODEL INTERNAL CAPS	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
KTG2-2081C	2	208	1	G	1.2	19.2	54.0	1.84	2.30
KTG2-2081CSL	2	208	1	G	1.2	19.2	54.0	1.84	2.30
KTG2-2401C	2	240	1	G	1.2	18.0	54.0	1.84	2.30
KTG2-2401CSL	2	240	1	G	1.2	18.0	54.0	1.84	2.30

2 HP GRINDER PUMPS

MODEL NO. KTG2

PUMP MODEL – Pump shall be of the semi-open, centrifugal type, KTG2 (High Head), with an integrally builtin grinder unit and submersible type motor.

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 powder coat 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 Orings 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 bronze 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. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C. Clearance between rotary slicer and stationary plate shall be controlled by an adjustable design. No shims permitted.

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).

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. 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.

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 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 N ratings.

The stator winding shall be of the open type with Class N 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.

Oil Filled Motor ensures industry-low operating temperature. 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 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.

POWER CORD – The motor power cord shall be 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.

FM APPROVED





"Radial"Cutter
(STANDARD)



"Slicer"
(OPTION)

KHHG2(H)(X)

Centrifugal 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!

HIGHEST PERFORMANCE GRINDERS

HIGH FLOW & HIGH HEAD

- Flows to 30 GPM
- Pressure to 225 Feet

SILICON CARBIDE DUAL SEALS

- Handles Extreme Operating Conditions

BEST MOTOR DESIGN

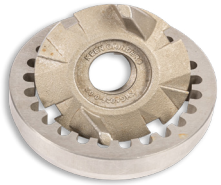
- Motor Pressed Housing For Superior Heat Transfer
- Long Bearing & Seal Life

HAZARDOUS LOCATION DESIGN

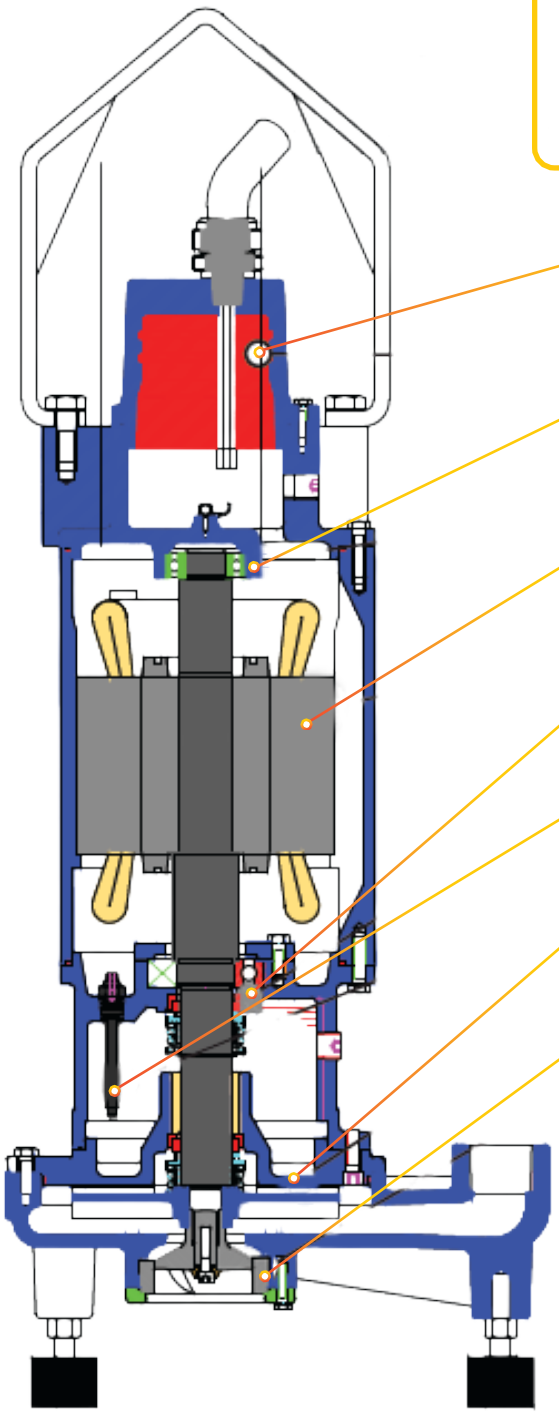
- True "Explosion-Proof" Service



"Slicer" Cutter
Preventing Jamming
on Solids



"Radial" Cutter
50 Year Proven
Design



EPOXY-POTTED CORD ENTRY

- Triple-Barrier Moisture Protection

3-BEARING SUPPORT

- Upper/Lower Ball Bearing
- Additional Lower Sleeve Bearing

HIGH-TORQUE MOTOR COOLED FOR SUPERIOR HEAT DISSIPATION

SUPERIOR DUAL MECHANICAL SEALS- SILICON CARBIDE W/VITON ELASTOMERS

SEAL LEAK DETECTION

RECESSED, VORTEX IMPELLER, DUCTILE IRON

- Allows 100% Preformance Curve Operation

PROVEN GRINDER ASSEMBLY

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

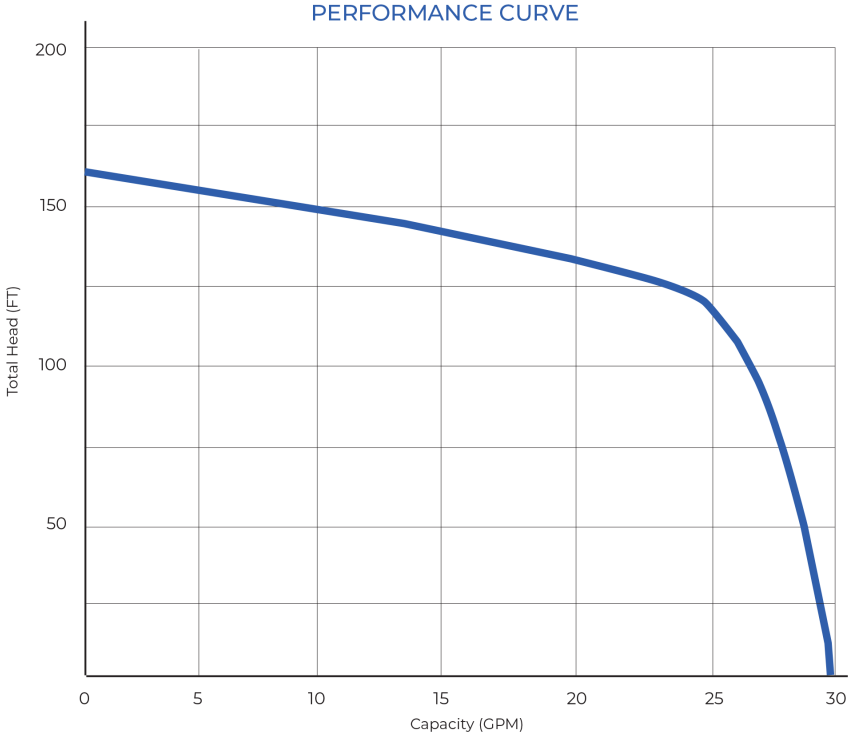
KHHG2H = HIGH HEAD
KHHG2 = HIGH FLOW
KHHG2(H)X = EXPLOSION PROOF

2HP SUBMERSIBLE GRINDER PUMP

GENERAL	KHHG2
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	1-1/4" NPT, Horizontal or Vertical
Grinder Construction	Stainless Steel
Grinder Hardness	58 - 60 Rockwell
Impeller Type	Semi - Open
SINGLE PHASE/ THREE PHASE	START KIT SK-KG5 includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	2HP / 1 ϕ , 60 Hz
Full Load Amps 208V	28 Amps
Start Amps 208V	100 Amps
Full Load Amps 230V	25 Amps
Start Amps 230V	89 Amps
Full Load Amps/ Start Amps 240V	9 Amps/ 45 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	N Class
Start Capacitor	216 ufd, 250 VAC
Run Capacitor	20 ufd, 370 VAC

PERFORMANCE CURVE



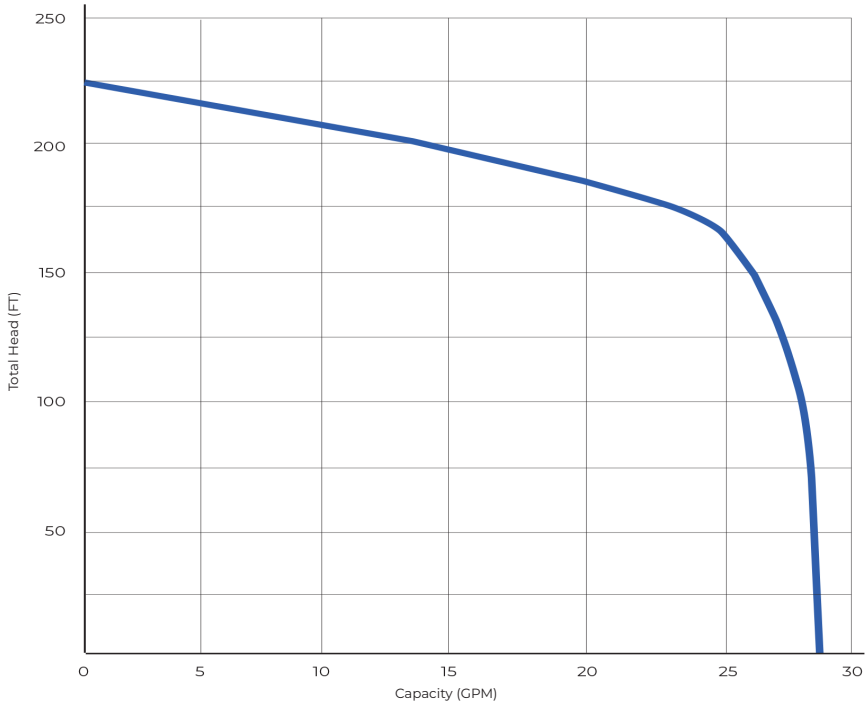
MODEL (HIGH FLOW RADIAL CUTTER)	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
KHHG2-2001	2	208	1	G	1.0	28.0	100.0	4.95	7.00
KHHG2-2301	2	230	1	G	1.0	25.0	89.0	4.89	7.18
KHHG2-2401	2	240	1	G	1.0	9.0	45.0	4.89	7.18
KHHG2-2003	2	208	3	H	1.0	21.0	105.0	6.43	7.56
KHHG2-2303	2	230	3	H	1.0	18.0	90.0	6.10	7.17
KHHG2-4603	2	460	3	H	1.0	9.0	45.0	6.10	7.17

2HP SUBMERSIBLE GRINDER PUMP

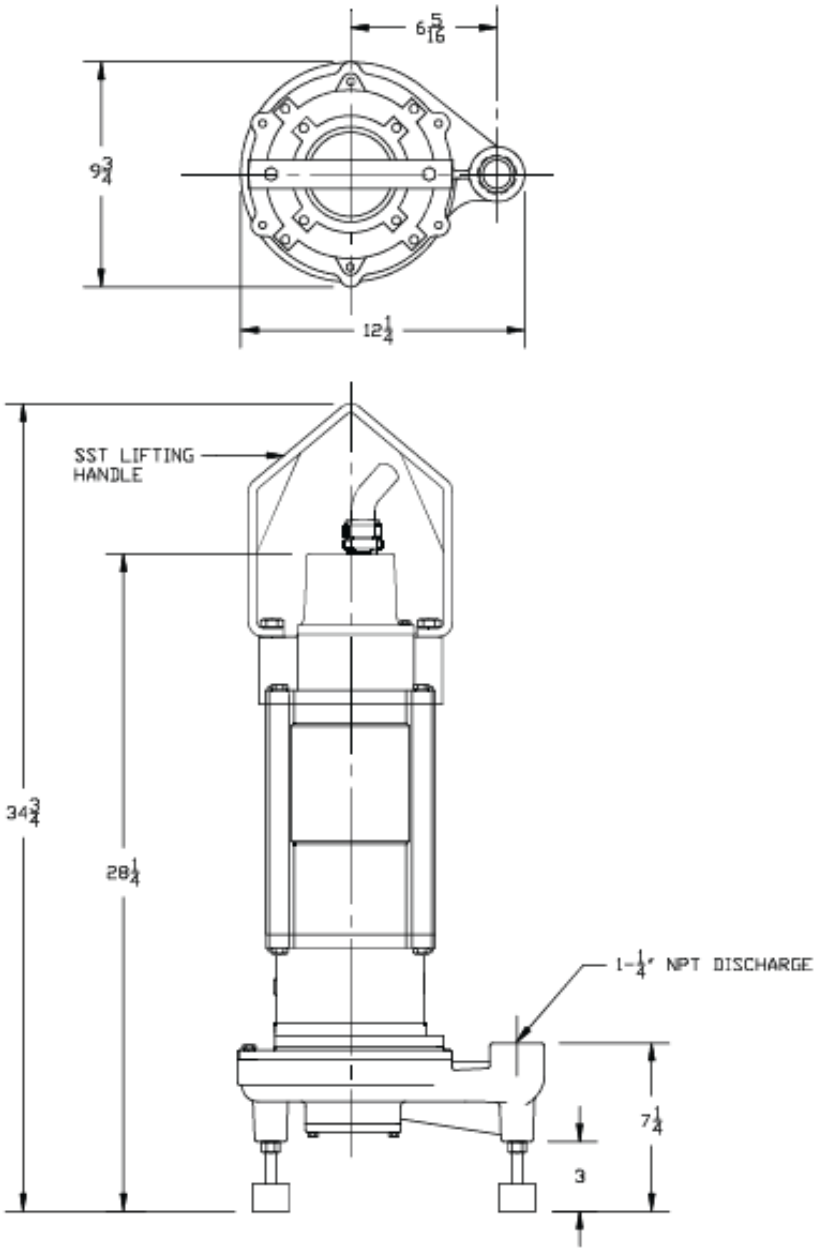
GENERAL	KHHG2H
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	1-1/4" NPT, Horizontal or Vertical
Grinder Construction	Stainless Steel
Grinder Hardness	58 - 60 Rockwell
Impeller Type	Semi - Open
SINGLE PHASE/ THREE PHASE	START KIT SK-KG5 includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	2HP / 1 ϕ , 60 Hz
Full Load Amps 208V	42 Amps
Start Amps 208V	148 Amps
Full Load Amps 230V	40 Amps
Start Amps 230V	142 Amps
Full Load Amps/ Start Amps 240V	12.5 Amps/ 44 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	N Class
Start Capacitor	216 ufd, 250 VAC
Run Capacitor	20 ufd, 370 VAC

PERFORMANCE CURVE



MODEL (HIGH HEAD RADIAL CUTTER)	HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	START AMPS	FULL LOAD KW	FULL LOAD KVA
KHHG2H-2001	2	208	1	G	1.0	42.0	148.0	7.43	8.74
KHHG2H-2301	2	230	1	G	1.0	40.0	142.0	7.82	9.20
KHHG2H-2003	2	208	3	H	1.0	29.0	106.0	8.88	10.45
KHHG2H-2303	2	230	3	H	1.0	25.0	88.0	8.47	9.96
KHHG2H-4603	2	460	3	H	1.0	12.5	44.0	8.47	9.96


6 5/16
9 3/4
12 1/4
SST LIFTING HANDLE
34 3/4
28 1/4
1-1/4" NPT DISCHARGE
7 1/4
3

PHYSICAL DATA	
Discharge Size	1-1/4" NPT Vertical
Impeller Type	Balenced, Recessed Vortex
Power/Control Cable Length	40' Standard
Paint	Blue, Powder Coat Paint Finish

MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class N
Service Factor	1.0
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	266°F (130°C)
Power Cord (1 Phase)	10-4 SOOW - 600V, 90° 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
Grinding Impeller	440 SST Hardened 58-60 Rockwell C
Grinding Ring	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	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° C) Min.
Oil Flash Point		390° F (199° 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 = 300 ufd, 250 VAC			
	Run Capacitor = 30 ufd, 370 VAC			

2 HP GRINDER PUMPS

MODEL NO. KHHG2(H)(X)

PUMP MODEL – Pump shall be of the semi-open, centrifugal type, KTG2 (High Head), with an integrally builtin grinder unit and submersible type motor.

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 powder coat 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 Orings 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 bronze 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. Both rotary slicer and slicer plate shall be 440C stainless steel hardened to 58-60 Rockwell C. Clearance between rotary slicer and stationary plate shall be controlled by an adjustable design. No shims permitted.

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).

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. 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.

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 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 N ratings.

The stator winding shall be of the open type with Class N 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.

Oil Filled Motor ensures industry-low operating temperature. 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 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.

POWER CORD – The motor power cord shall be 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.

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SECTION 4

Retro-Fits - EOne, Liberty, Abs, Hydromatic, Myers, Barnes

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E-ONE

Suspended System
1-2HP Grinders



MYERS KMR(RWG)

Liftout Check Valve





BARNES C CHANNEL

Channel Liftout
2HP Grinders



LIBERTY / ABS

Horizontal Discharge
2HP Grinders

Horizontal Discharge
2HP Grinders



HYDROMATIC HYDR-O-RAIL

Straddled Rails, 4” & 6”
Solids-Handling



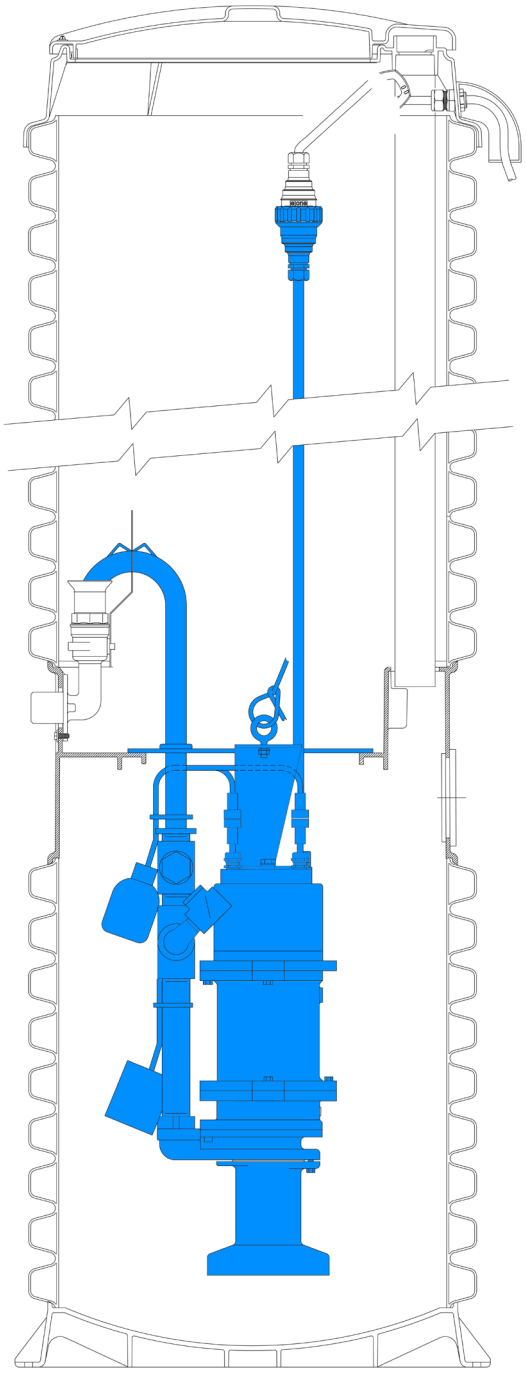
BARNES ECO TRAN

Suspended v.2
2HP Grinders



Custom Dry-Pit Replacements

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





KPCG-21CTSL Progressive Cavity



KG2-2301CSL Centrifugal

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MODEL	PUMP	HP	VOLTS	AMPS	HERTZ	WEIGHT
KER	KG2-2401CSL	2	230	15.5	60	130
KER-PC	KPCG 21CSL	1	208/230	8.0	60	135



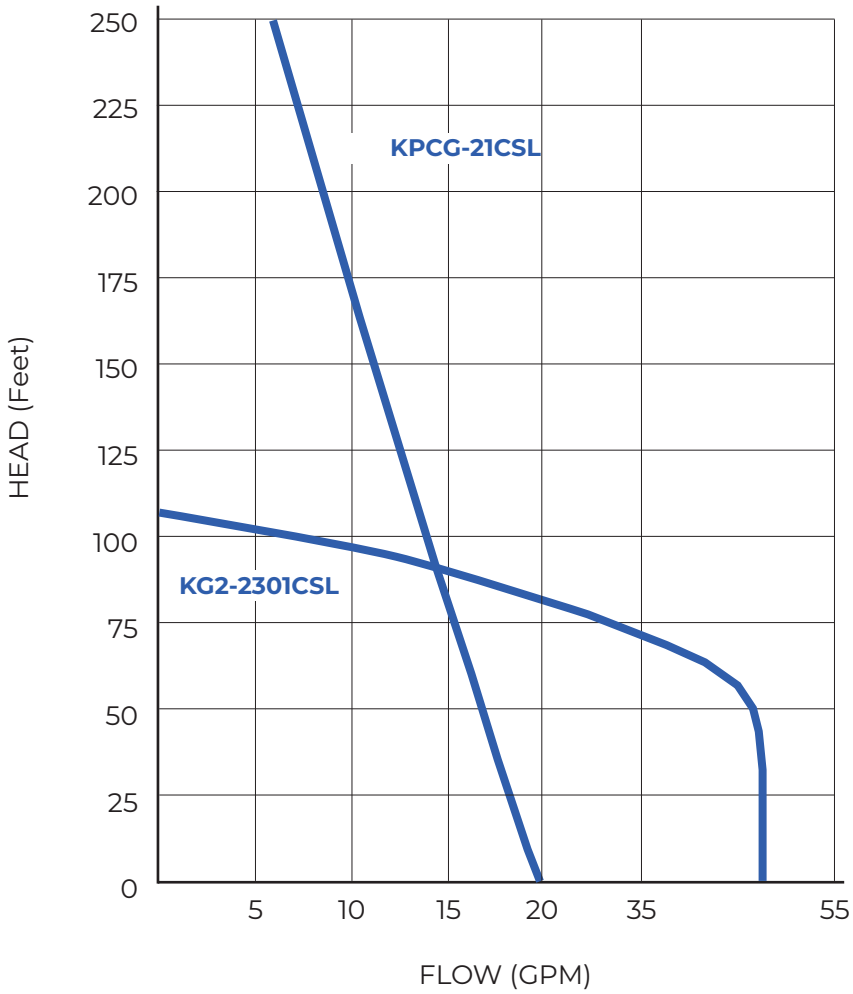
“EQD” (2000 Series)

-OR-



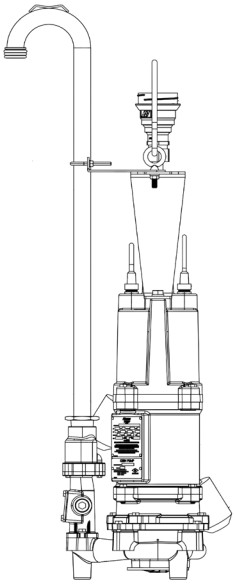
“EQD” (Extreme Series)



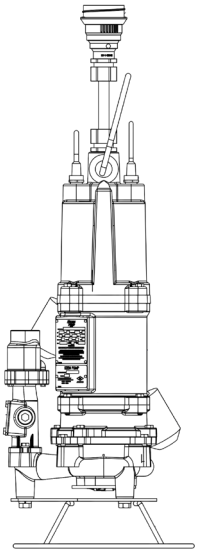


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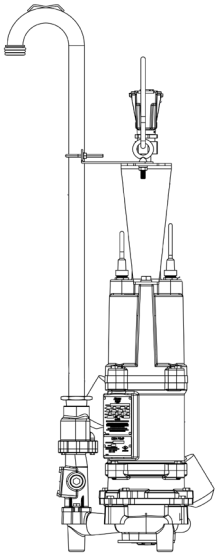
“KER” KEEN E/ONE® REPLACEMENT PACKAGES



“KER-0013”
“KERPC-0013”



“KER-0014”
“KERPC-0014”

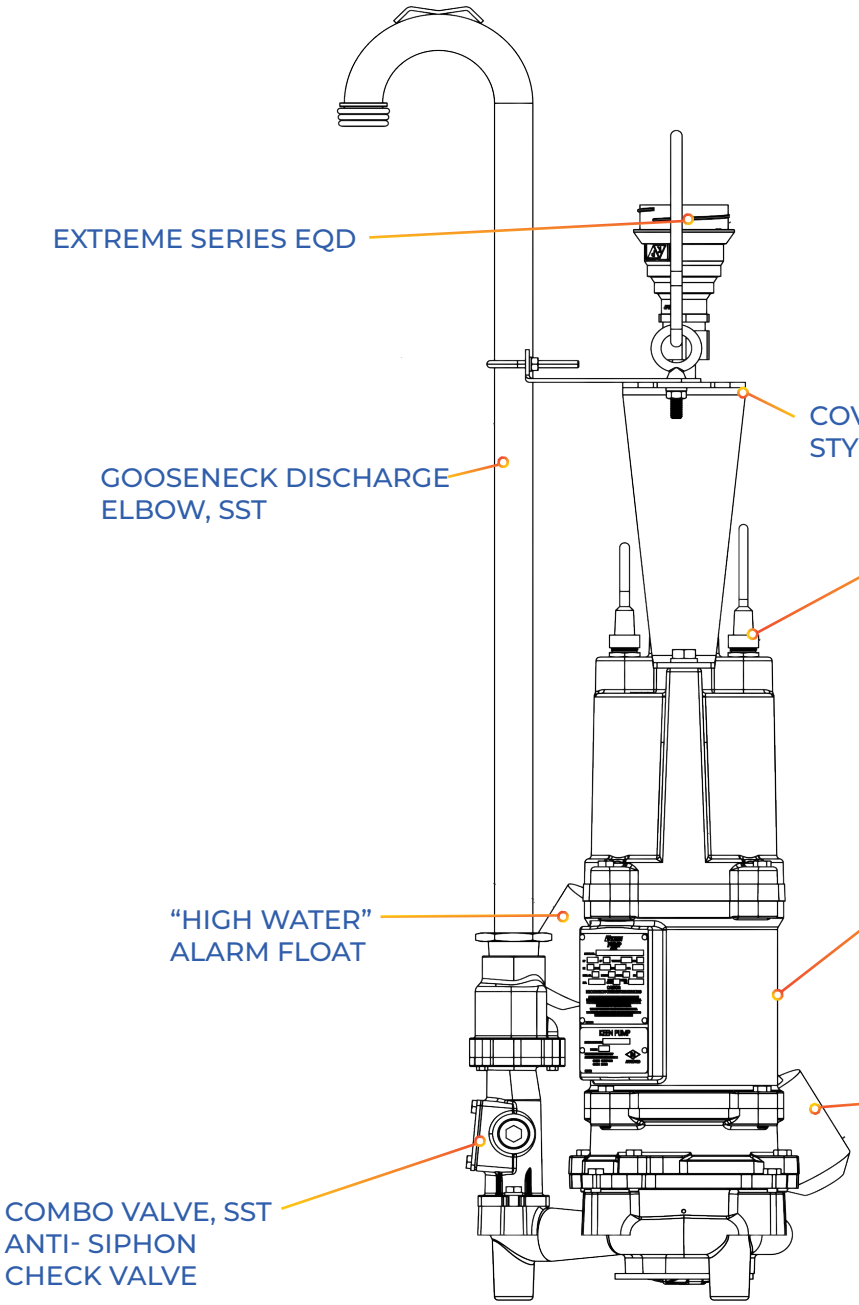


“KER-0022”
“KERPC-0022”

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MODEL NO. KER-0013

Includes: KG2-2401CSL-02, Stainless Steel "Open" Cover Support, SST Gooseneck, Check/Anti-Siphon Valves - Stainless Steel, Mechanical On-Off Float, Mechanical High Water Float, Single Cord Assembly with "Extreme" Series EQD



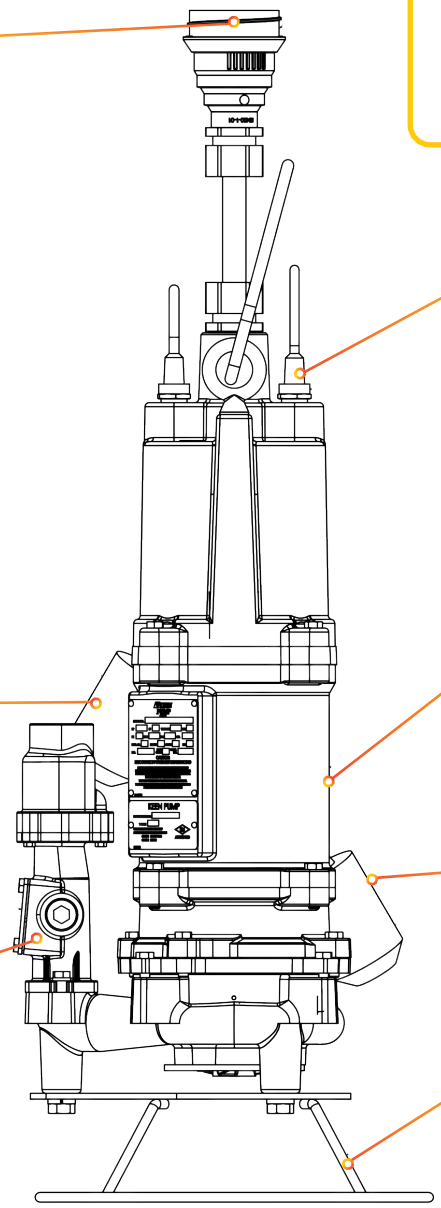
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REV 01/2024

MODEL NO. KER-0014 - KEEN e/One® Replacement

MODEL NO. KER-0014

Includes: KG2-2401CSL-02, Stainless Steel Stand, Check/Anti-Siphon Valves - Stainless Steel, Mechanical On-Off Float, Mechanical High Water Float, Single Cord Assembly with “Extreme” Series EQD.



EXTREME SERIES EQD

QUICK-DISCONNECT FLOATS WIRED INTO CORD CAP

KG2-2401CSL-02
2HP, 240V, 1PH
INTERNAL CAP KIT
SLICER

“HIGH WATER”
ALARM FLOAT

“ON-OFF” FLOAT

COMBO VALVE, SST
ANTI- SIPHON
CHECK VALVE

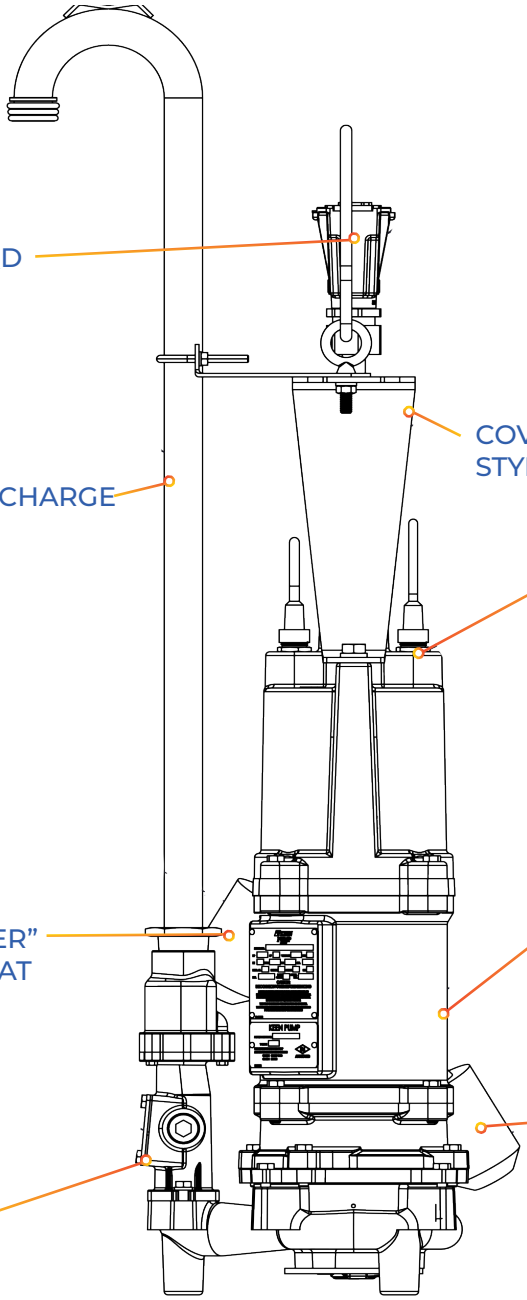
PUMP STAND, SST

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REV 01/2024

MODEL NO. KER-0022

Includes: Includes: KG2-2401CSL-02, Stainless Steel "Open" Cover Support, SST Gooseneck, Check/Anti-Siphon Valves - Stainless Steel, Mechanical On-Off Float, Mechanical High Water Float, Single Cord Assembly with "2000" Series EQD.

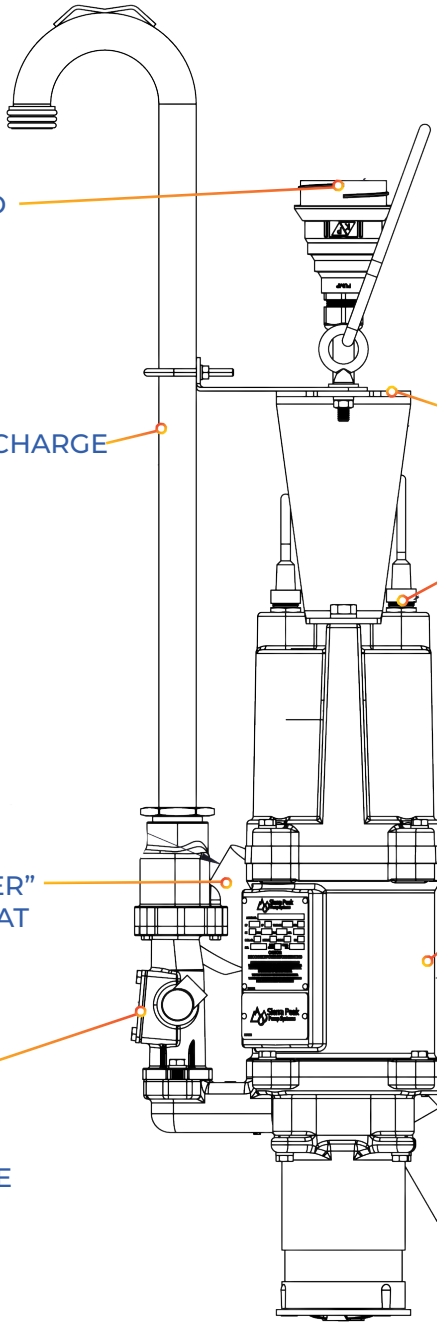


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MODEL NO. KERPC-0013 - KEEN e/One® Replacement

MODEL NO. KERPC-0013

Includes: EPCG15-21CSL-02, Stainless Steel "Open" Cover Support, SST Gooseneck, Check/Anti-Siphon/Pressure Relief Valves - Stainless Steel, Mechanical On-Off Float, Mechanical High Water Float, Single Cord Assembly with "Extreme" Series EQD.



EXTREME SERIES EQD

COVER SUPPORT "OPEN" STYLE, SST

GOOSENECK DISCHARGE ELBOW, SST

QUICK-DISCONNECT FLOATS WIRED INTO CORD CAP

EPCG 15-21C-02
2HP, 230V, 1HP
INTERNAL CAP KIT
SLICER

"HIGH WATER" ALARM FLOAT

COMBO VALVE, SST
ANTI- SIPHON
CHECK VALVE
PRESSURE RELIEF VALVE

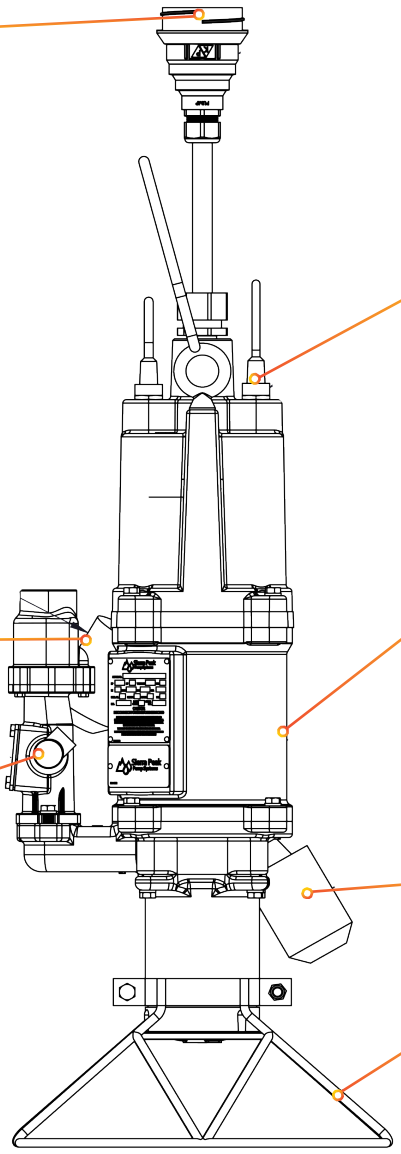
"ON-OFF" FLOAT

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REV 01/2024

MODEL NO. KERPC-0014

Includes: EPCG15-21CSL-02, Stainless Steel Stand, Check/Anti-Siphon/Pressure Relief Valves - Stainless Steel, Mechanical On-Off Float, Mechanical High Water Float, Single Cord Assembly with “Extreme” Series EQD.

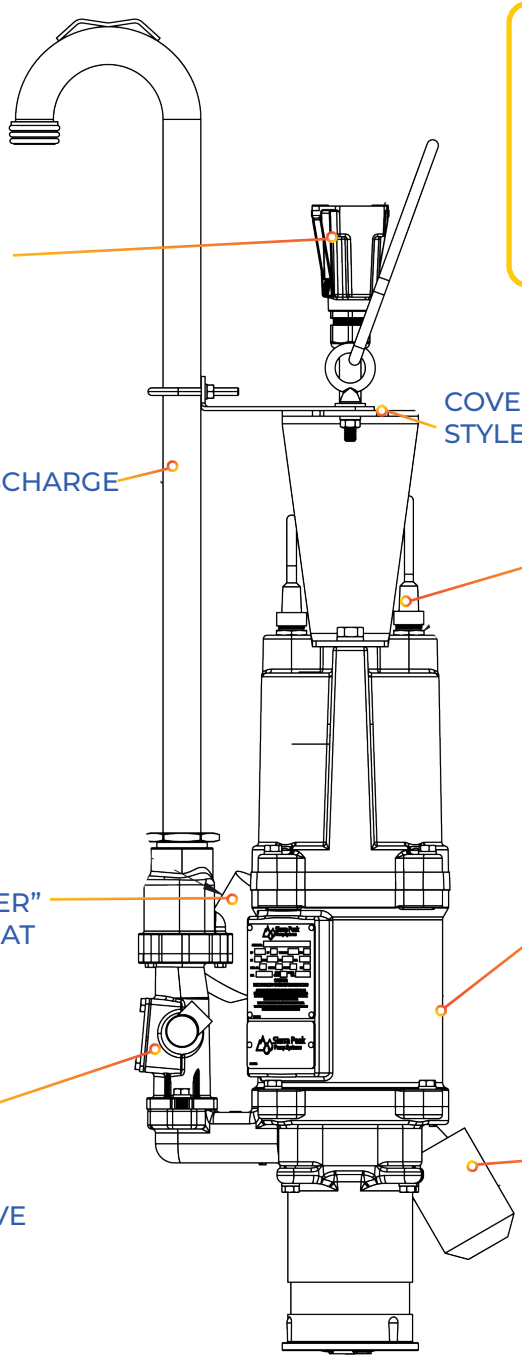


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MODEL NO. KERPC-0022 - KEEN e/One® Replacement

MODEL NO. KERPC-0022

Includes: Includes: EPCG15-21CSL-02, Stainless Steel “Open” Cover Support, SST Gooseneck, Check/Anti-Siphon/Pressure Relief Valves - Stainless Steel, Mechanical On-Off Float, Mechanical High Water Float, Single Cord Assembly with “2000” Series EQD.



SQUARE EQD

COVER SUPPORT “OPEN” STYLE, SST

GOOSENECK DISCHARGE ELBOW, SST

QUICK-DISCONNECT FLOATS WIRED INTO CORD CAP

EPCG 15-21C-02
2HP, 230V, 1HP
INTERNAL CAP KIT
SLICER

“HIGH WATER” ALARM FLOAT

COMBO VALVE, SST
ANTI- SIPHON
CHECK VALVE
PRESSURE RELIEF VALVE

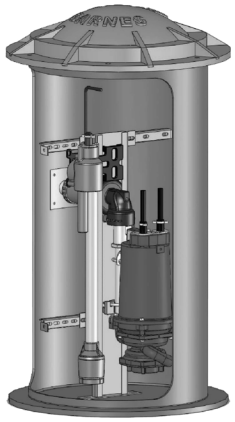
“ON-OFF” FLOAT

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REV 01/2024



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



INCLUDES

- 2HP Pump with Slicer or Grinder
- C Rail Piping Assy
- Keen 2HP Start Kit

FEATURES

- Centrifugal or Semi-Open 2hp Grinders
- High Flow or High Head Design
- Superior Dual Silicon-Carbide Seals
- Internal or External Start Components Available
- Stainless Steel Pipe & Discharge Elbow
- Liftout Designed to Match Existing System!
- Corrosion-Resistant Materials

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A Crane Co. Company and is not a liated with
Keen Pump Company, Inc.

2HP CENTRIFUGAL GRINDER

- KG2
- KHG2
- KFG2
- SKG2



HEADS TO 290 FT
FLOWS TO 68 GPM



2HP SEMI-OPEN GRINDER

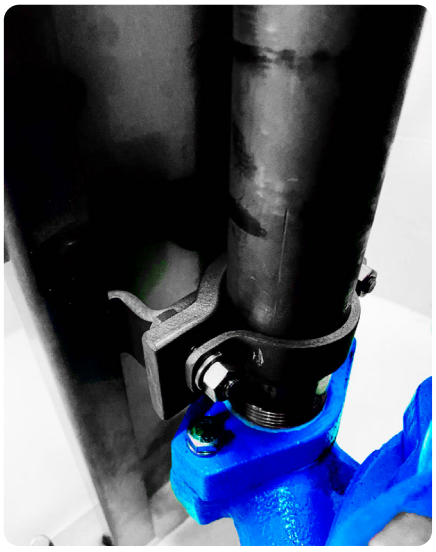
- KGS2
- KHGS2
- KTG2

ANY RESIDENTAL GRINDER SEE SECTION 3

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



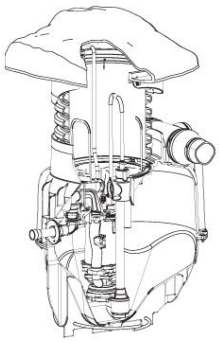




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Replace Any Exisiting EcoTRAN System with a KEEN PUMP Centrifugal 2hp Grinder Pump!



EcoTRAN System
BARNES®

FEATURES

- Pressed in, Heavy-Duty Motor
- Superior Single Silicon Carbide Seals
- 2-Bearing Design
- Internal Start Components Available
- Stainless Steel Pipe & Discharge Elbow
- Quick Disconnect Float Controls

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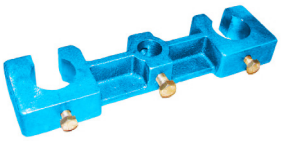
KMR-RWG

KEEN 2hp Grinder Liftout Replacement

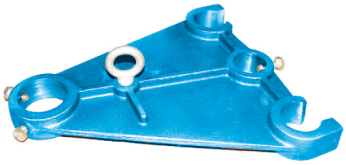
(Fits Any Keen Pump 2hp Centrifugal Grinder)



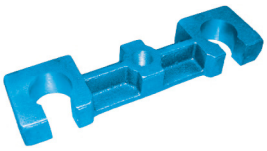
Part No. : K-RWG-CASE
Description: Discharge Case, C.I.



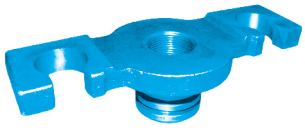
Part No. : K-RWG-THD
Description: Top Holddown, C.I.



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



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



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



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

KPG-LCG2-001

Myers 2hp Grinder Liftout Replacement

(Fits Any Keen Pump 2hp Centrifugal Grinder)



(Pump Included)

Part No. : KPG-LCG2-001
Description: Lift-out Discharge /Rail Kit

Features:

- Liftout Designed to Match Existing System
- Easy, Dependable “Slide-In” Pump Installation
- Available With a Variety of High Head or Flow Grinder Pumps

Includes:

- LCG2-2401(SL)
  - 2HP Pump w/ Slicer or Grinder
- KMR-RWGB
  - Myers Rail Assy.
- SK-2A
  -Keen 2HP Start Kit

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KEEN Pressure Sewer Solution
... for Your Site

5



SECTION 5

Low Pressure Sewer (LPS)

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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

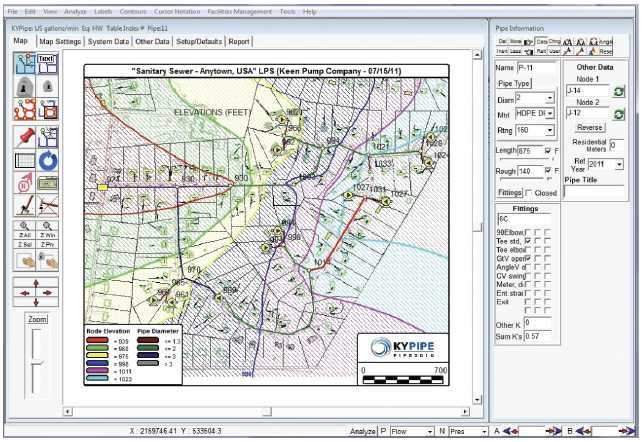
Decentralized Wastewater System

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.



Complete Package
w/ Stand / Flex Hose



The Keen Pump Lower 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



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 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 products!



2hp Centrifugal

- Heads up to 130 feet
- Flows up to 68 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 30 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

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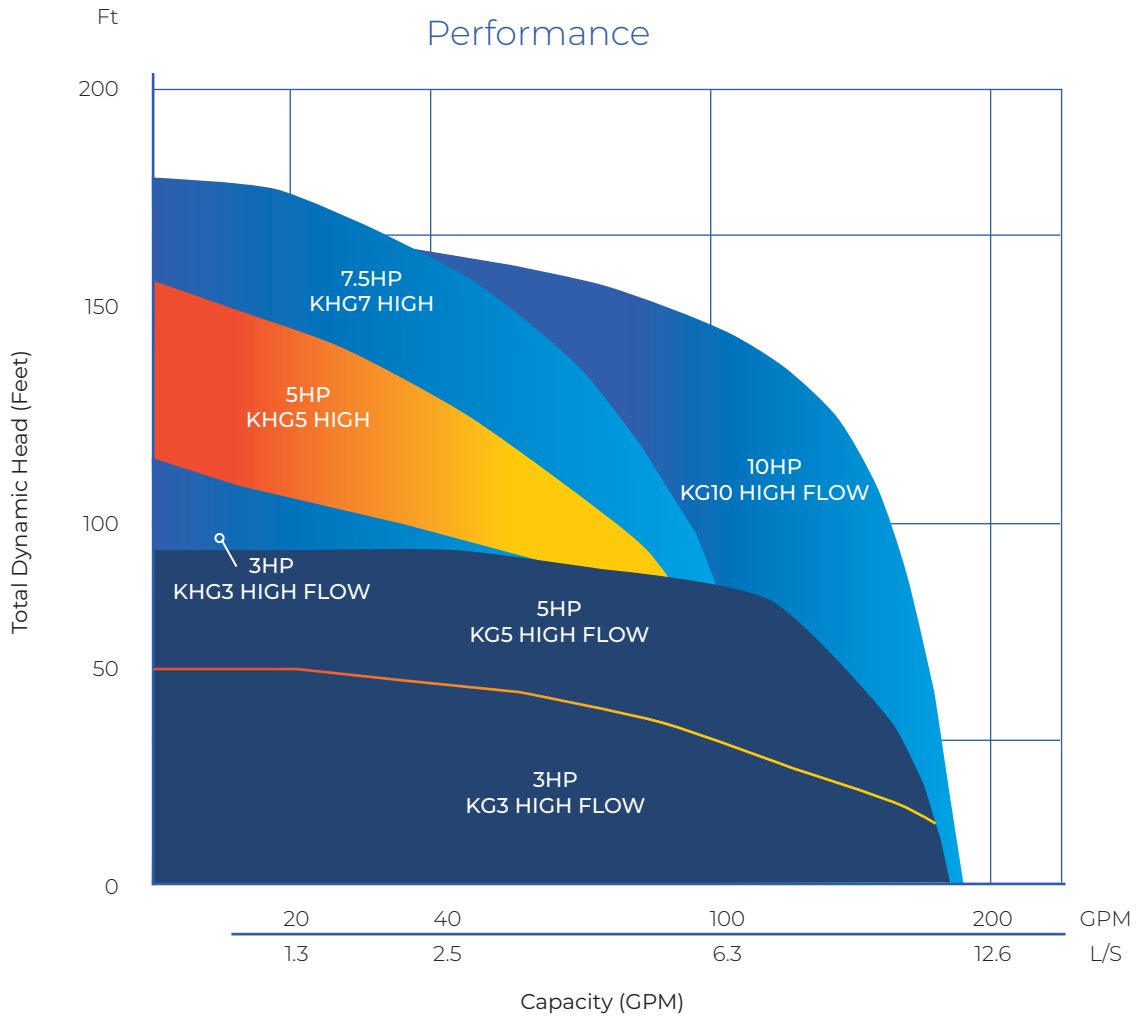
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SECTION 6

3-15 HP Centrifugal Grinder

Performance





Keen Pump GRINDERS Available in STAINLESS STEEL

304 Stainless Steel Construction

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.

REV 01/2024



FM APPROVED

KG(X)3

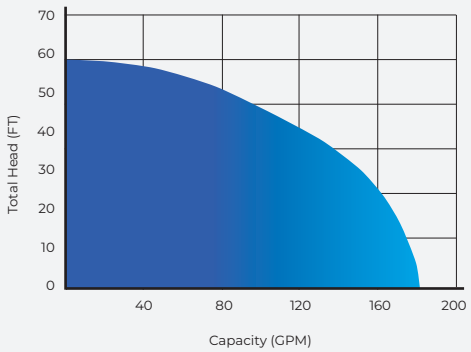
3HP High Flow Grinder Pump

(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 troublefree, non-overloading operation over the entire performance curve. The modular design provides quick and easy serviceability. The hardened

PERFORMANCE



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

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 the power cable is cut or damaged. Stainless steel cord grip.

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 N 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 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.

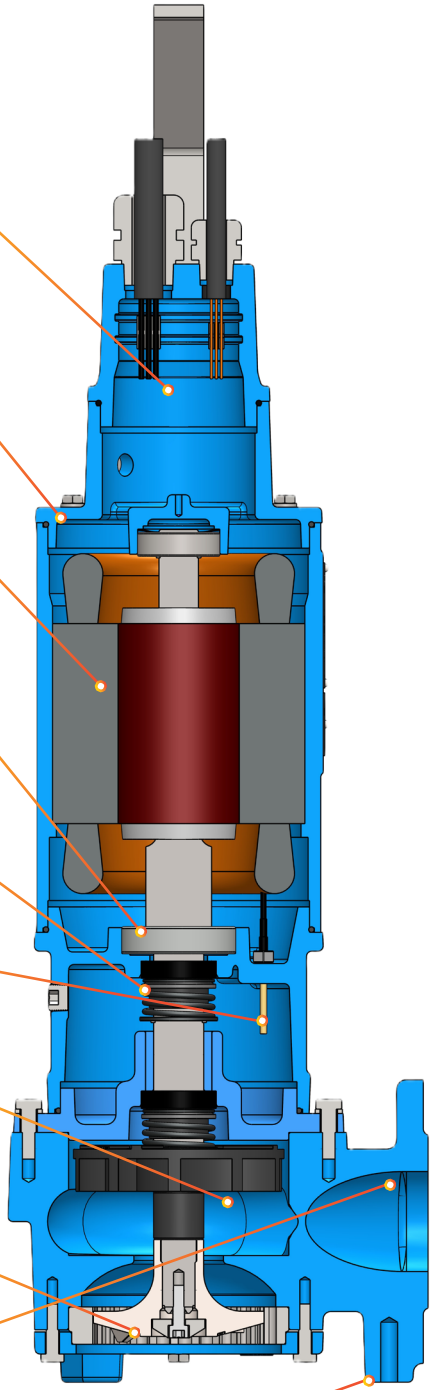
6. MOISTURE DETECTION
Seal leak probe signals alarm in control panel for scheduled maintenance.

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. 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 mounting feet OPTIONAL.

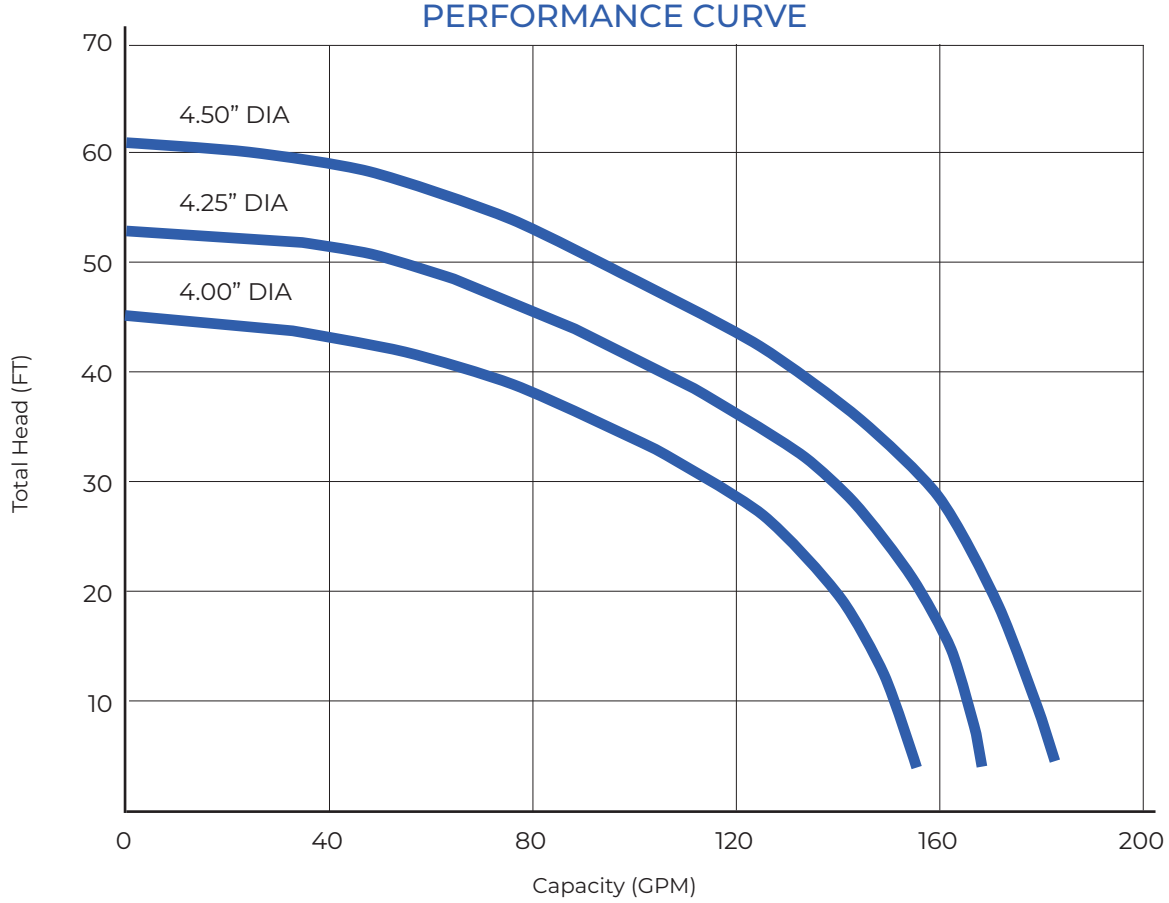


3HP SUBMERSIBLE GRINDER PUMP

GENERAL	KG(X)3
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	2-1/2 & 3” ANSI Horizontal
Grinder Ring	25 Slots
Impeller Type / Std. Dia.	Recessed / 4.50”
SINGLE PHASE	START KIT SK-5 includes: Start & Run Capacitors, Start Relay and Mounting Hardware

MOTOR DATA	
HP / Power Supply	3HP / 1 ϕ , 60 Hz
Full Load Amps 208V	37 Amps
Start Amps 208V	185 Amps
Full Load Amps 230V	34 Amps
Start Amps 230V	170 Amps
Poles / Rated Speed	2P / 3450 rpm
Insulation Class	N Class
Start Capacitor	300 ufd, 250 VAC
Run Capacitor	30 ufd, 370 VAC

PERFORMANCE CURVE

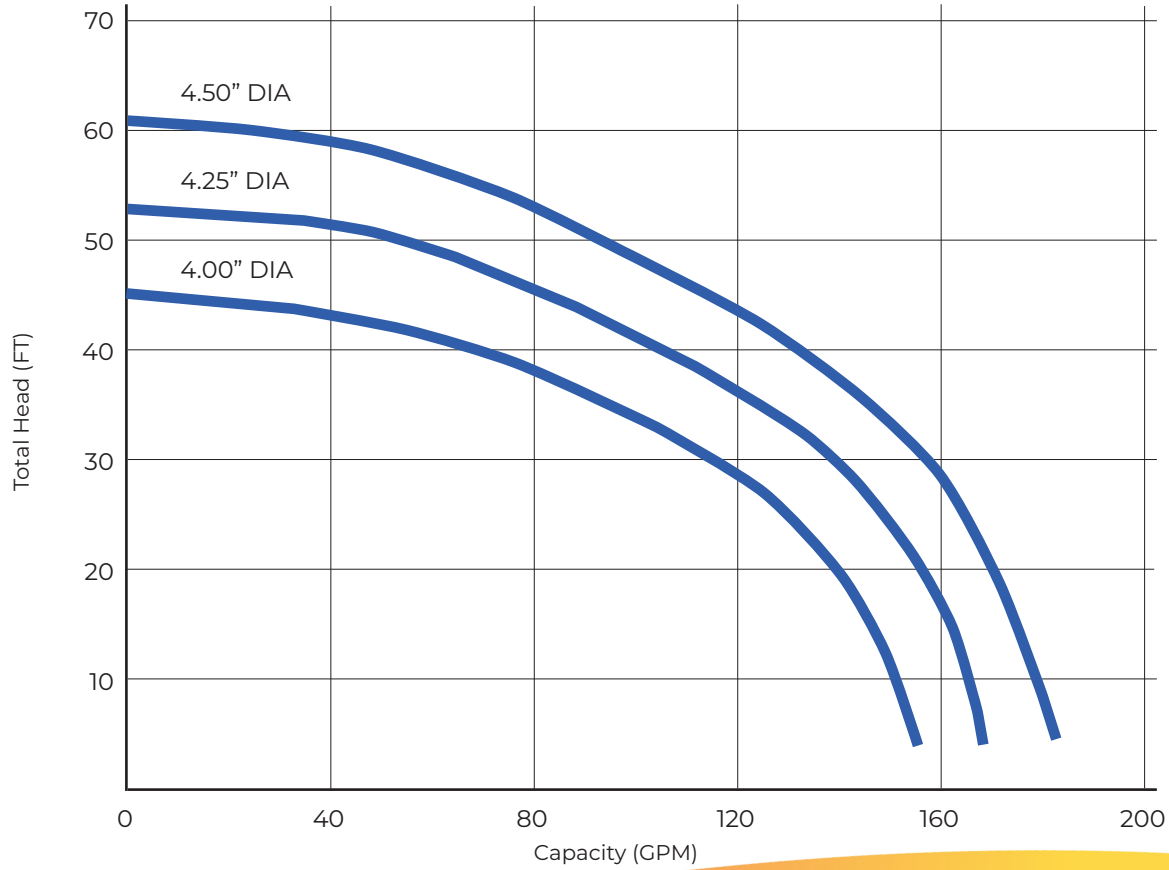


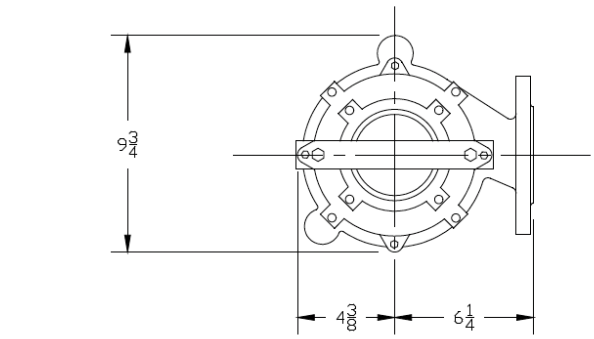
3HP SUBMERSIBLE GRINDER PUMP

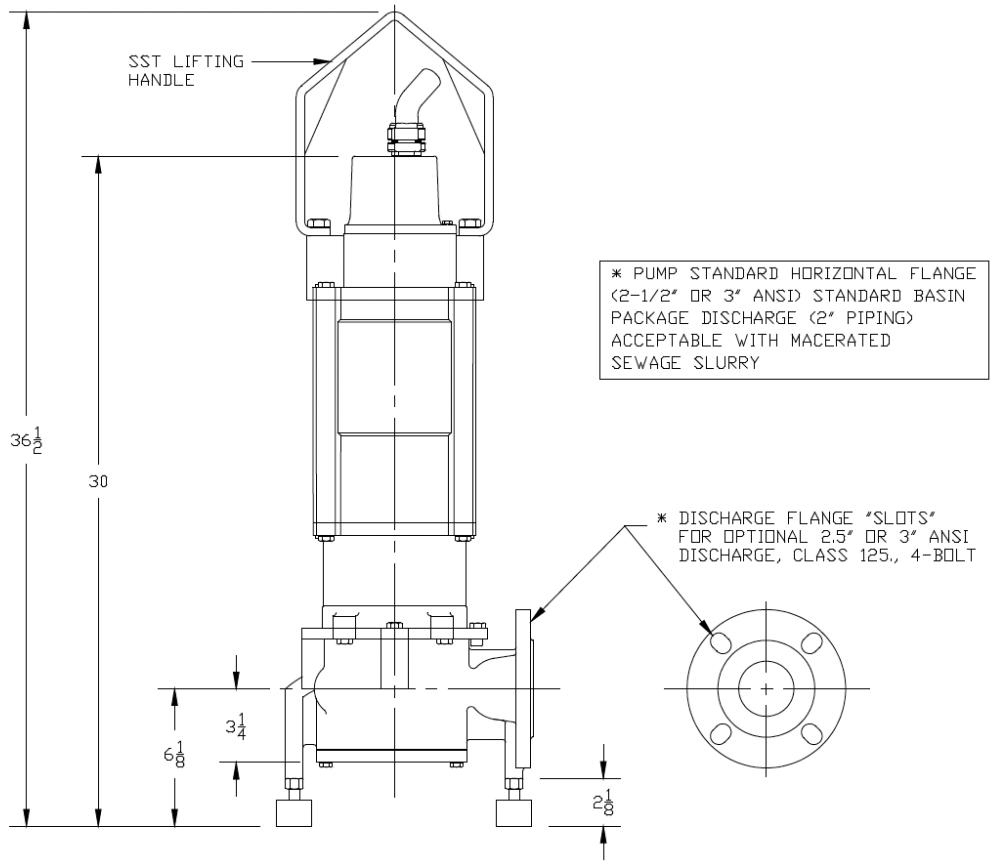
GENERAL	KG(X)3
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	2-1/2 & 3” ANSI Horizontal
Grinder Ring	25 Slots
Impeller Type / Std. Dia.	Recessed / 4.50”
THREE PHASE	

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	2P / 3450 rpm
Insulation Class	N Class

PERFORMANCE CURVE







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



FM APPROVED

KHG(X)3

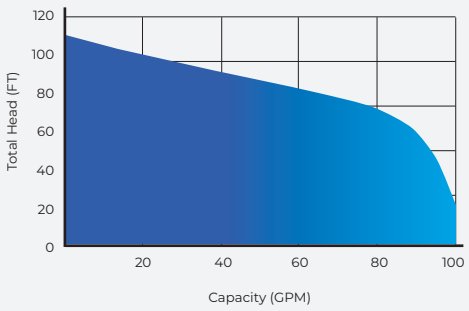
3HP High Head Grinder Pump, 1 or 3 Phase

(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 troublefree, 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.

PERFORMANCE



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

3HP GRINDER PUMP HIGH HEAD KHG(X)3 - 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 the 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 N 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 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.

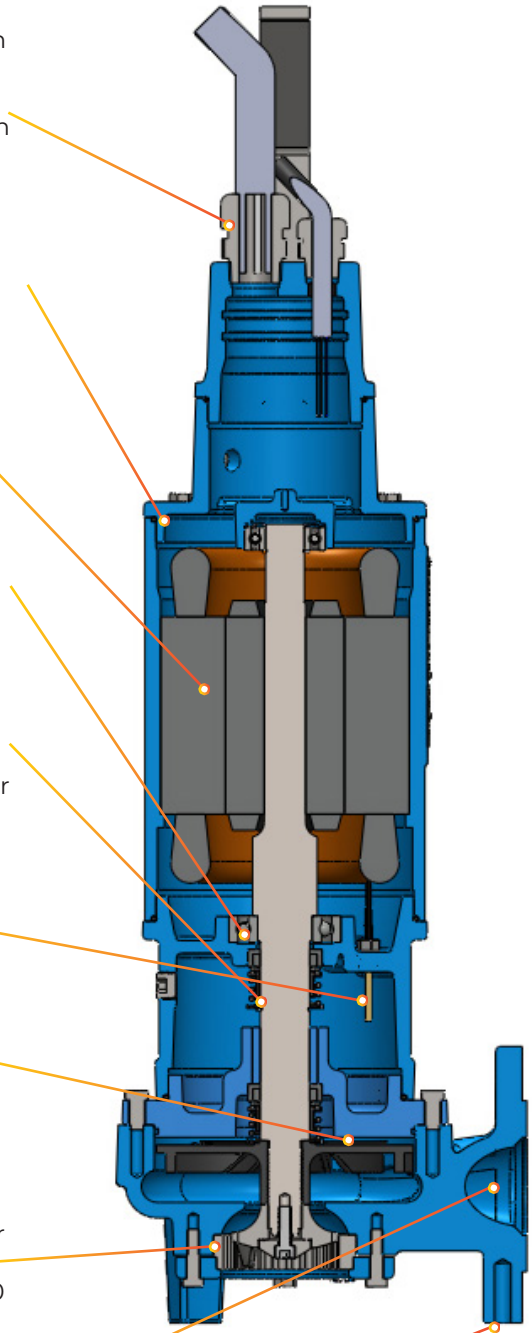
6. MOISTURE DETECTION
Seal leak probe signals alarm in control panel for scheduled maintenance.

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 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 mounting feet OPTIONAL.

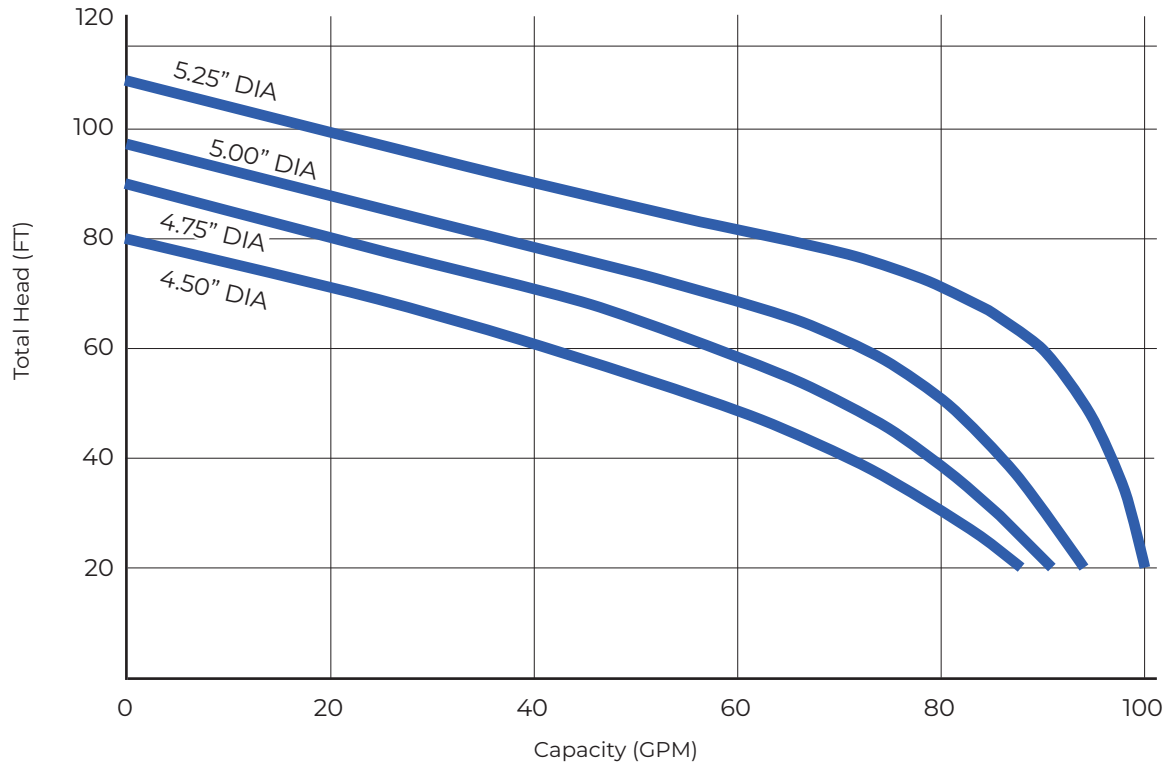


3HP SUBMERSIBLE GRINDER PUMP

GENERAL	KHG(X)3
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	2-1/2 & 3" ANSI Horizontal
Grinder Ring	25 Slots
Impeller Type / Std. Dia.	Recessed / 5.25"
SINGLE PHASE	START KIT SK-5 includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	3HP / 1 ϕ , 60 Hz
Full Load Amps 208V	27 Amps
Start Amps 208V	135 Amps
Full Load Amps 230V	25 Amps
Start Amps 230V	125 Amps
Poles / Rated Speed	2 P / 3450 rpm
Insulation Class	N
Start Capacitor	300 ufd, 250 VAC
Run Capacitor	30 ufd, 370 VAC

PERFORMANCE CURVE

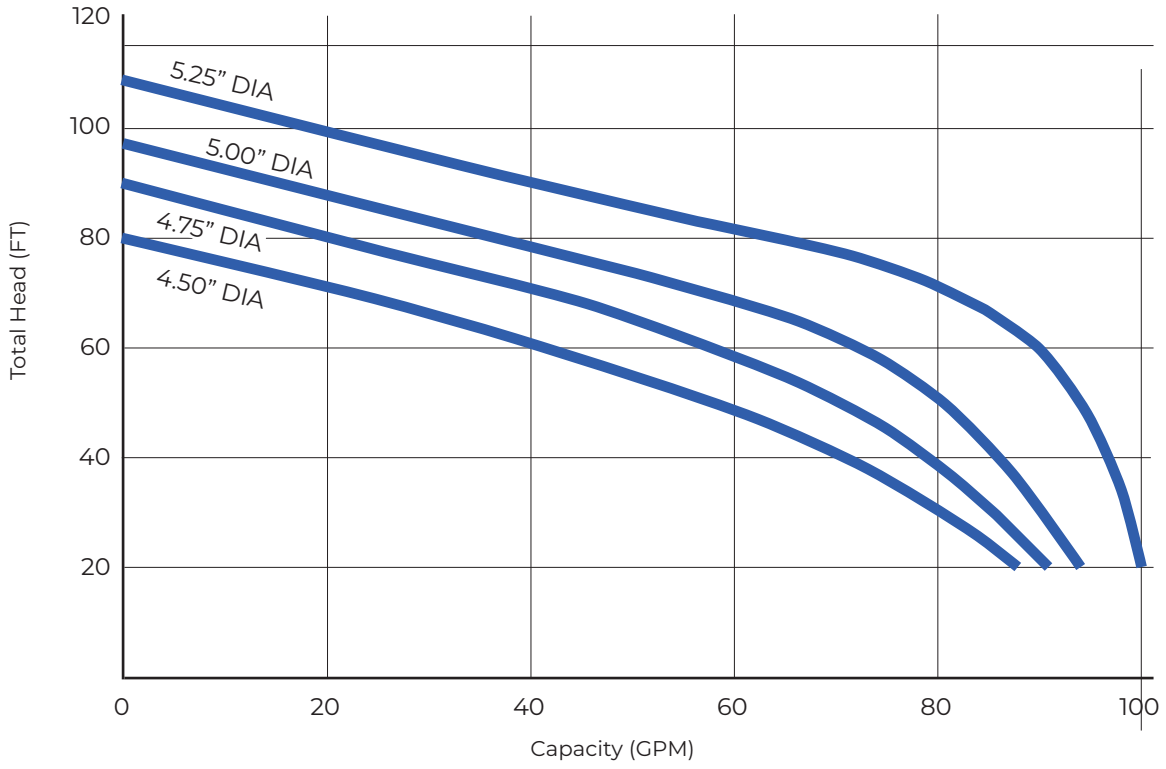


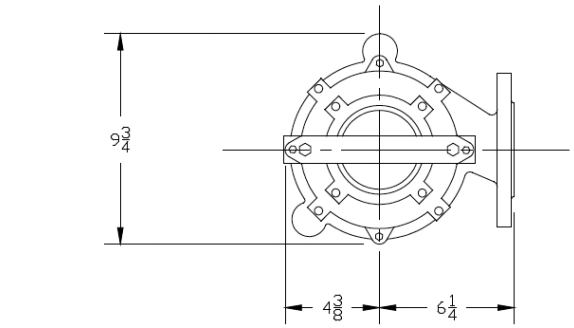
3HP SUBMERSIBLE GRINDER PUMP

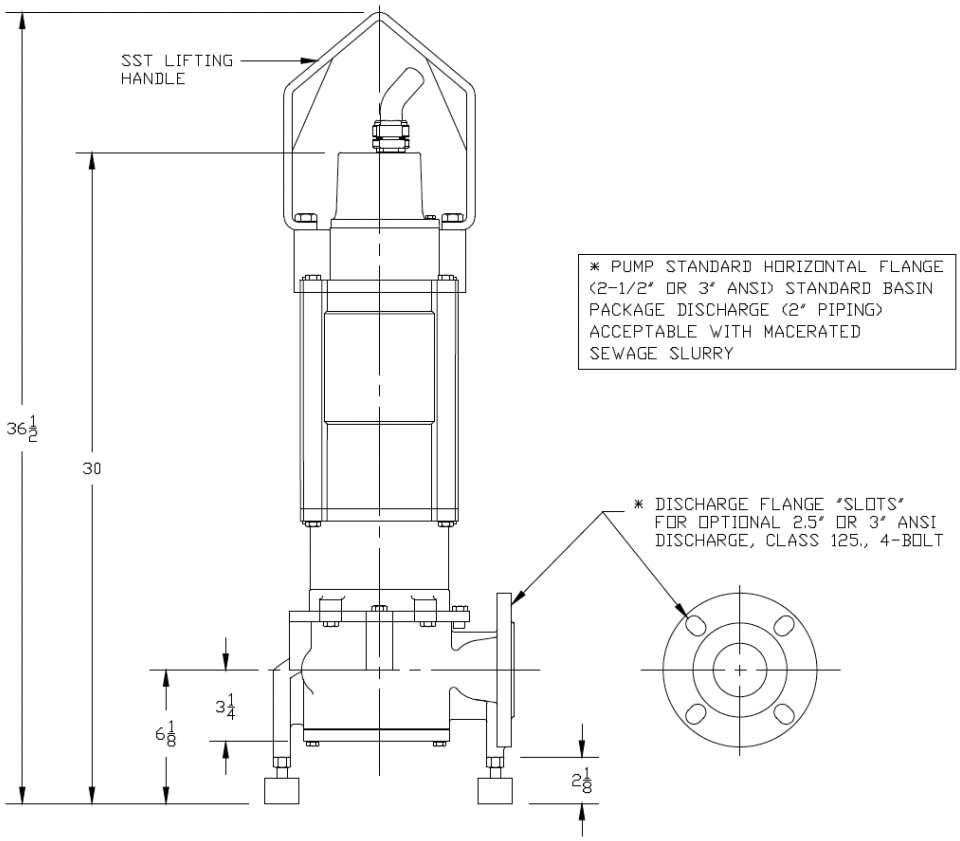
GENERAL	KHG(X)3
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	2-1/2 & 3” ANSI Horizontal
Grinder Ring	25 Slots
Impeller Type / Std. Dia.	Recessed / 5.25”
THREE PHASE	

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 460	9 Amps
Start Amps 460	45 Amps
Poles / Rated Speed	2P / 3450 rpm
Insulation Class	N

PERFORMANCE CURVE







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



FM APPROVED

KG(X)5

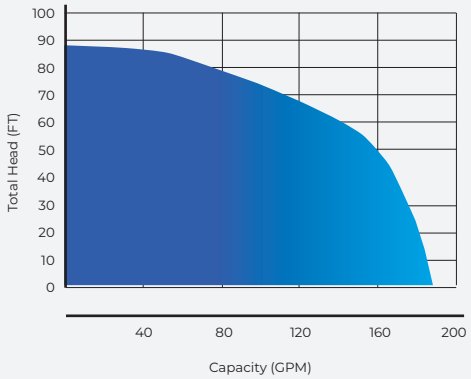
5HP High Flow Grinder Pump

(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 troublefree, 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.

PERFORMANCE



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

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 the power cable is cut or damaged. Stainless steel cord grip.

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 N 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 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.

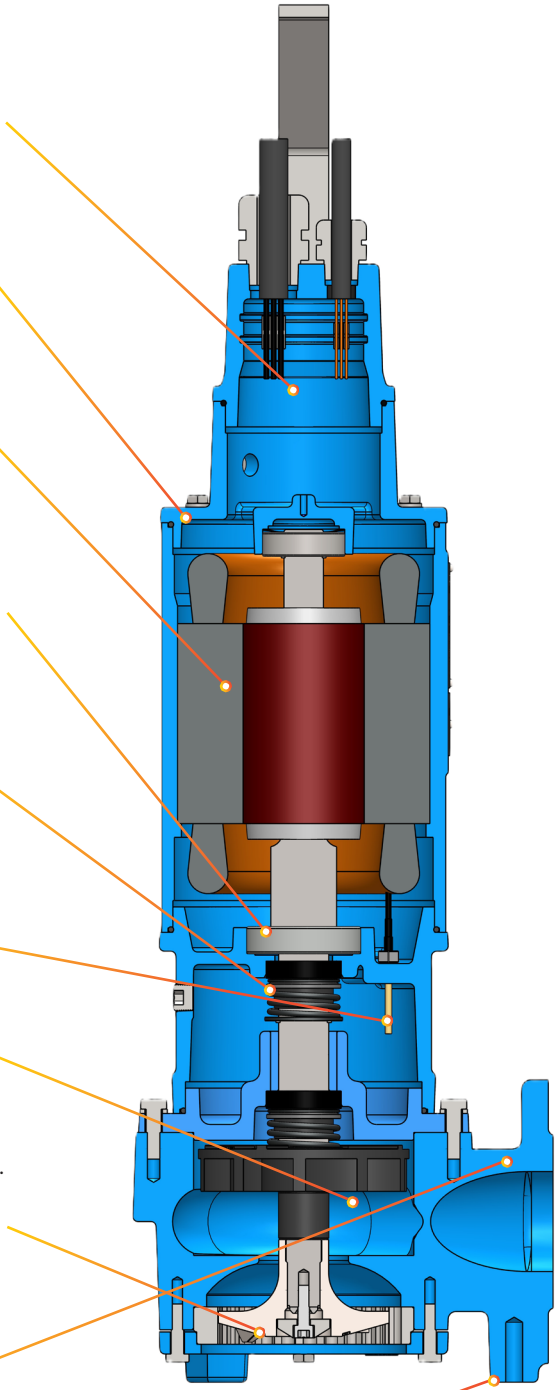
6. MOISTURE DETECTION
Seal leak probe signals alarm in control panel for scheduled maintenance.

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. 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 mounting feet OPTIONAL.

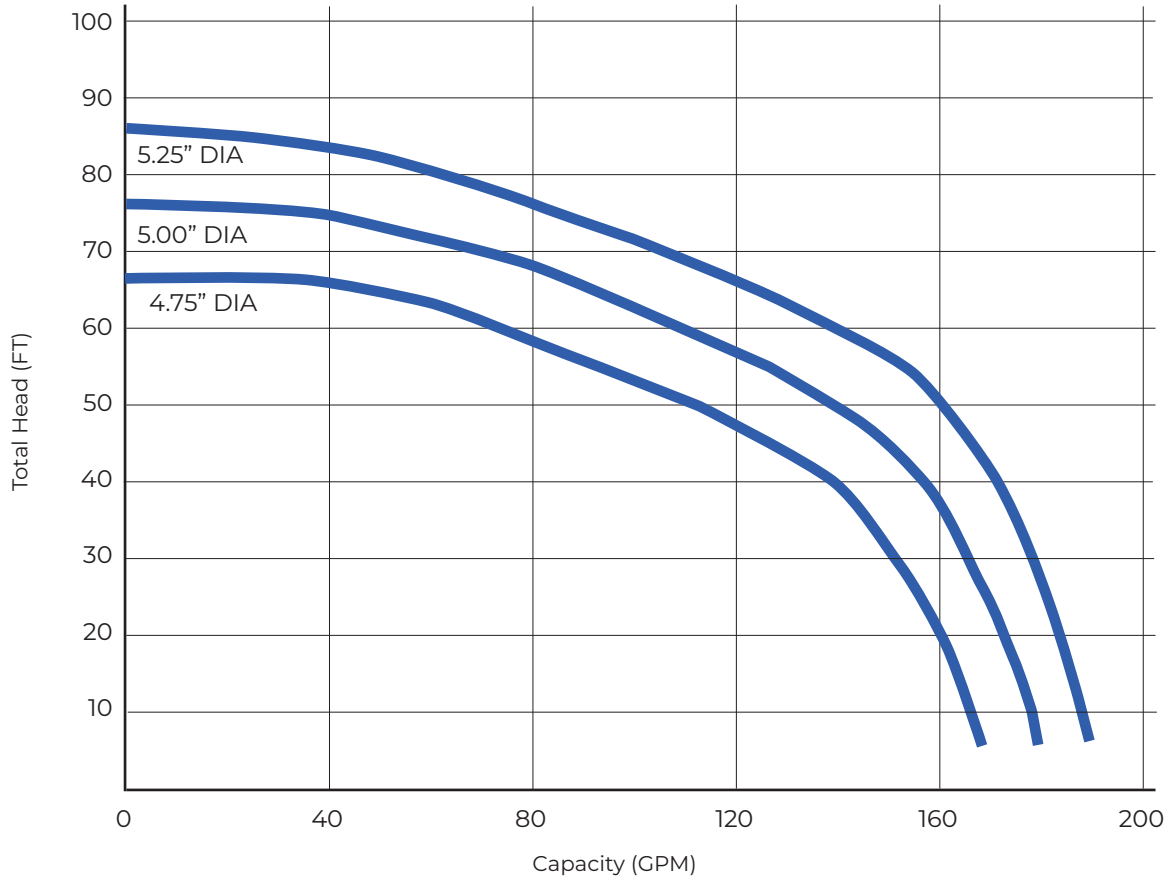


5HP SUBMERSIBLE GRINDER PUMP

GENERAL	KG(X)5
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	2-1/2 & 3” ANSI Horizontal
Grinder Ring	25 Slots
Impeller Type / Std. Dia.	Recessed / 5.25”
SINGLE PHASE	START KIT SK-5 includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	5HP / 1 ϕ , 60 Hz
Full Load Amps 208V	44 Amps
Start Amps 208V	220 Amps
Full Load Amps 230V	40 Amps
Start Amps 230V	200 Amps
Poles / Rated Speed	2P / 3450 rpm
Insulation Class	N
Start Capacitor	300 ufd, 250 VAC
Run Capacitor	30 ufd, 370 VAC

PERFORMANCE CURVE



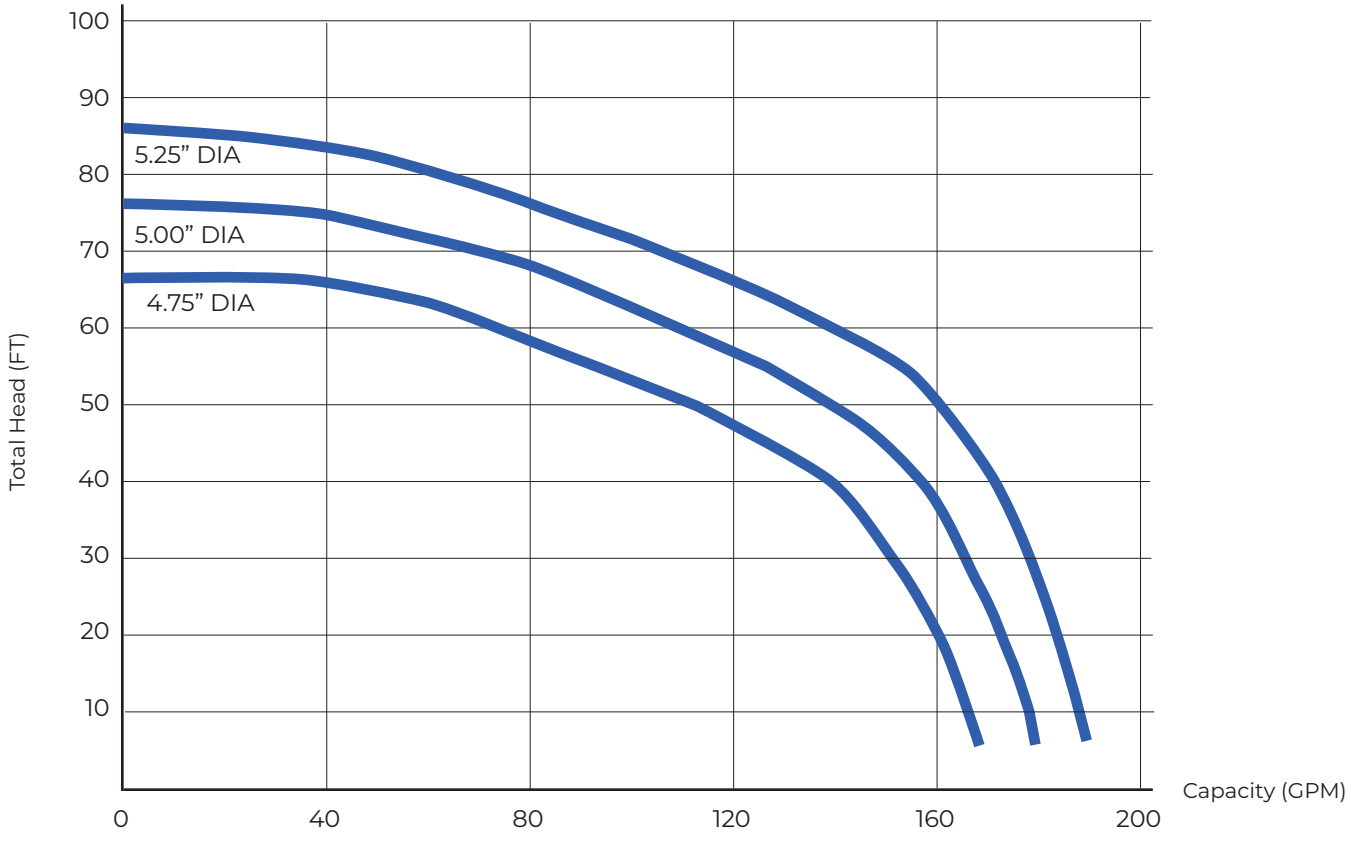
5HP SUBMERSIBLE GRINDER PUMP

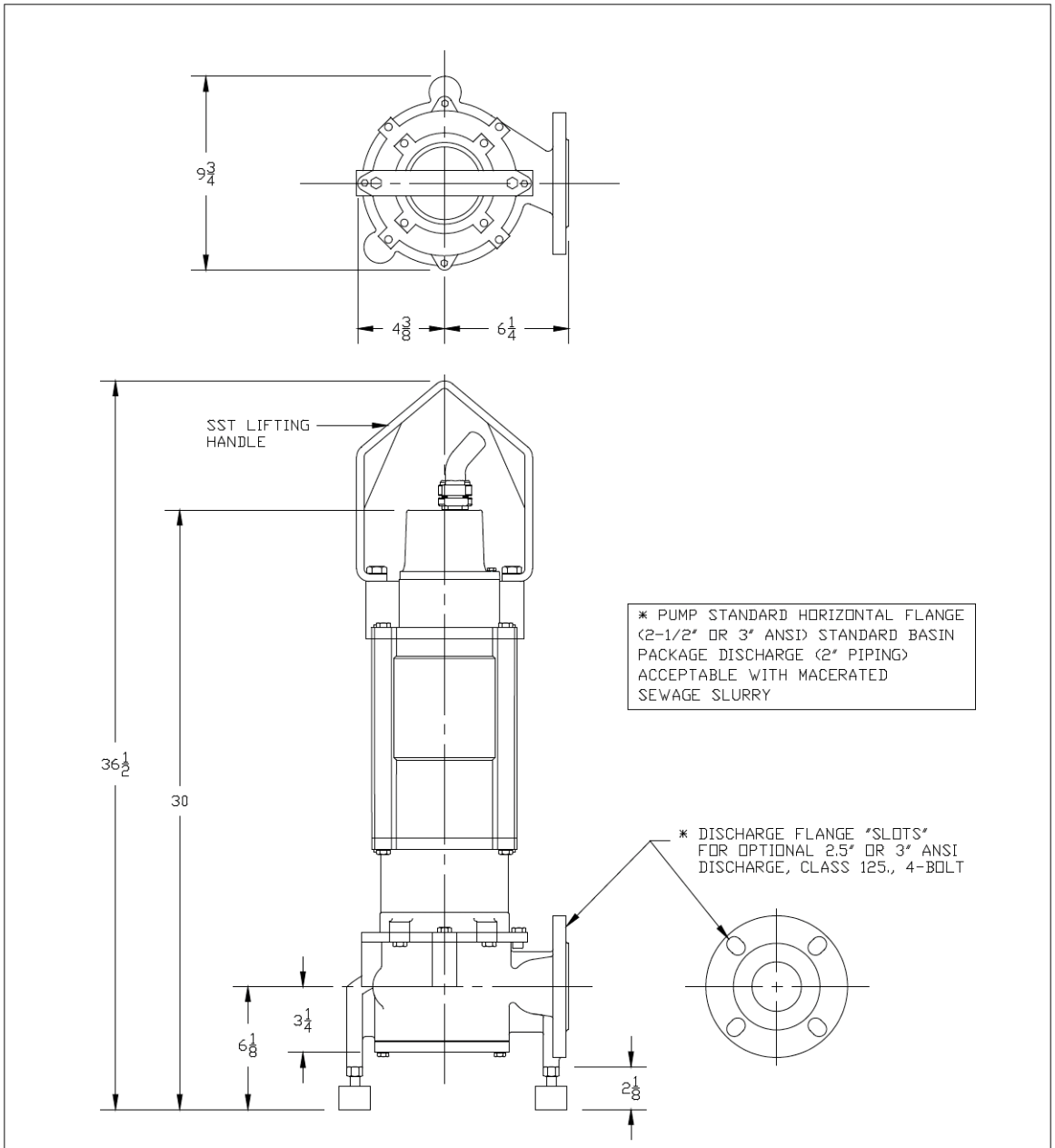
GENERAL	KG(X)5
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	2-1/2 & 3” ANSI Horizontal
Grinder Ring	25 Slots
Impeller Type / Std. Dia.	Recessed / 5.25”

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	2P / 3450 rpm
Insulation Class	N

PERFORMANCE CURVE





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



FM APPROVED

KHG(X)5

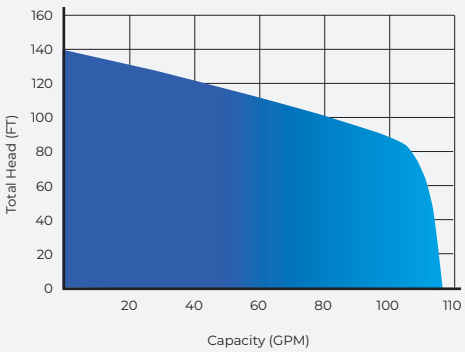
5HP High Head Grinder Pump, 1 or 3 Phase

(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 troublefree, 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.

PERFORMANCE



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

5HP GRINDER PUMP HIGH HEAD KHG(X)5 - 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 the 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 N 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 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.

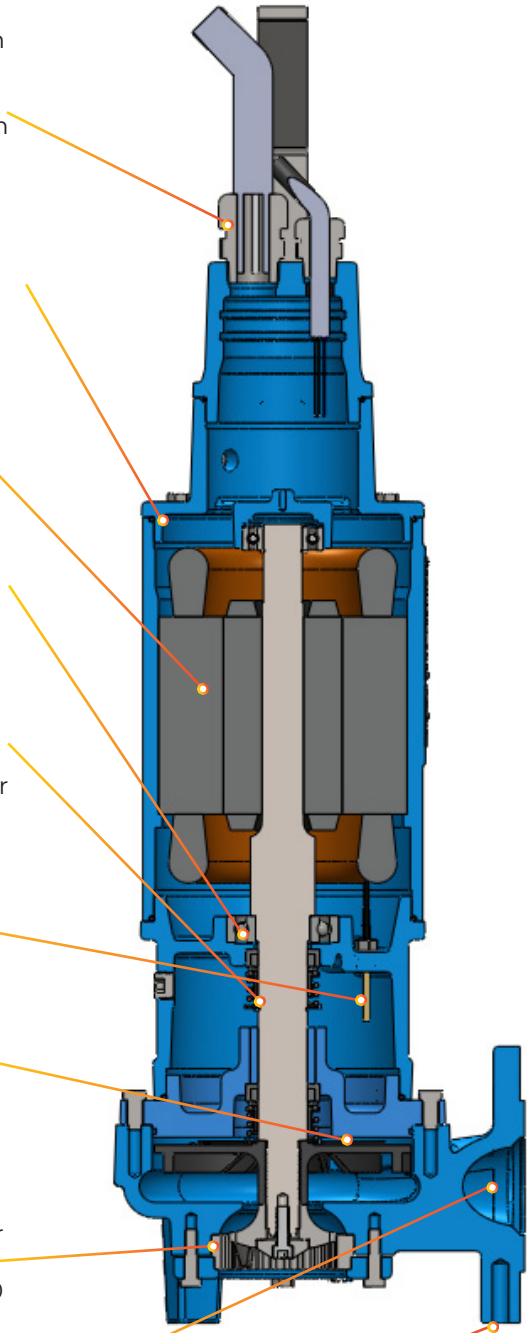
6. MOISTURE DETECTION
Seal leak probe signals alarm in control panel for scheduled maintenance.

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 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 mounting feet OPTIONAL.

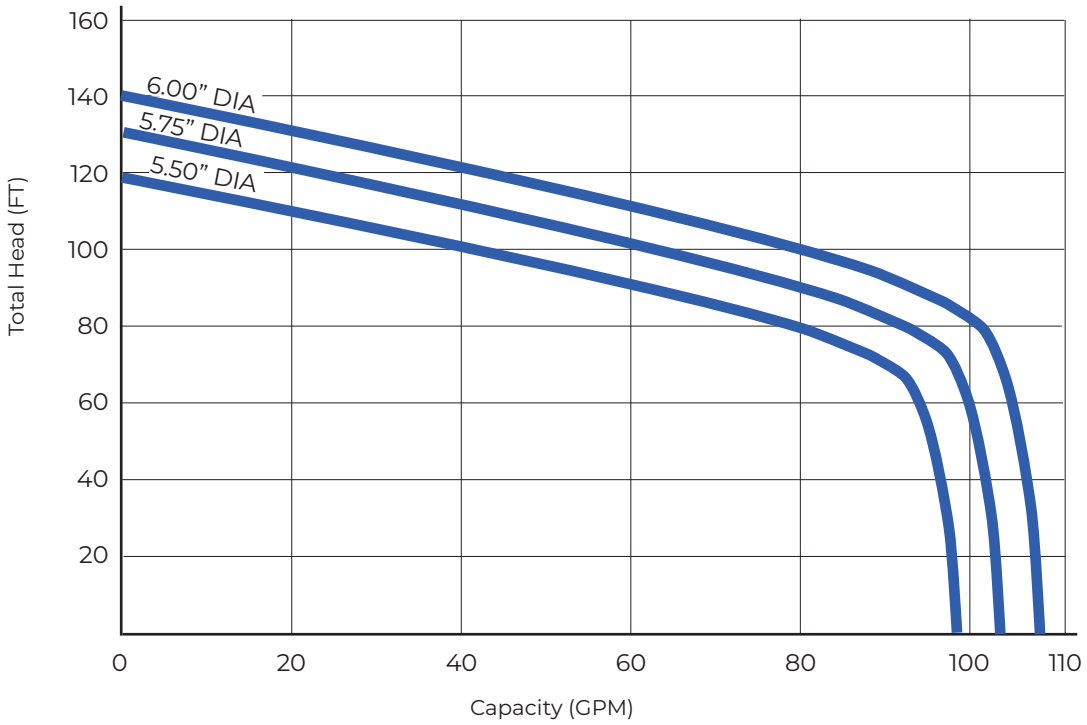


5HP SUBMERSIBLE GRINDER PUMP

GENERAL	KHG(X)5
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	2-1/2 & 3" ANSI Horizontal
Grinder Ring	25 Slots
Impeller Type / Std. Dia.	Recessed / 6.00"
SINGLE PHASE	START KIT SK-5 includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	5HP / 1 ϕ , 60 Hz
Full Load Amps 208V	40 Amps
Start Amps 208V	144 Amps
Full Load Amps 230V	34 Amps
Start Amps 230V	122 Amps
Poles / Rated Speed	2P / 3450 rpm
Insulation Class	N
Start Capacitor	300 ufd, 250 VAC
Run Capacitor	30 ufd, 370 VAC

PERFORMANCE CURVE



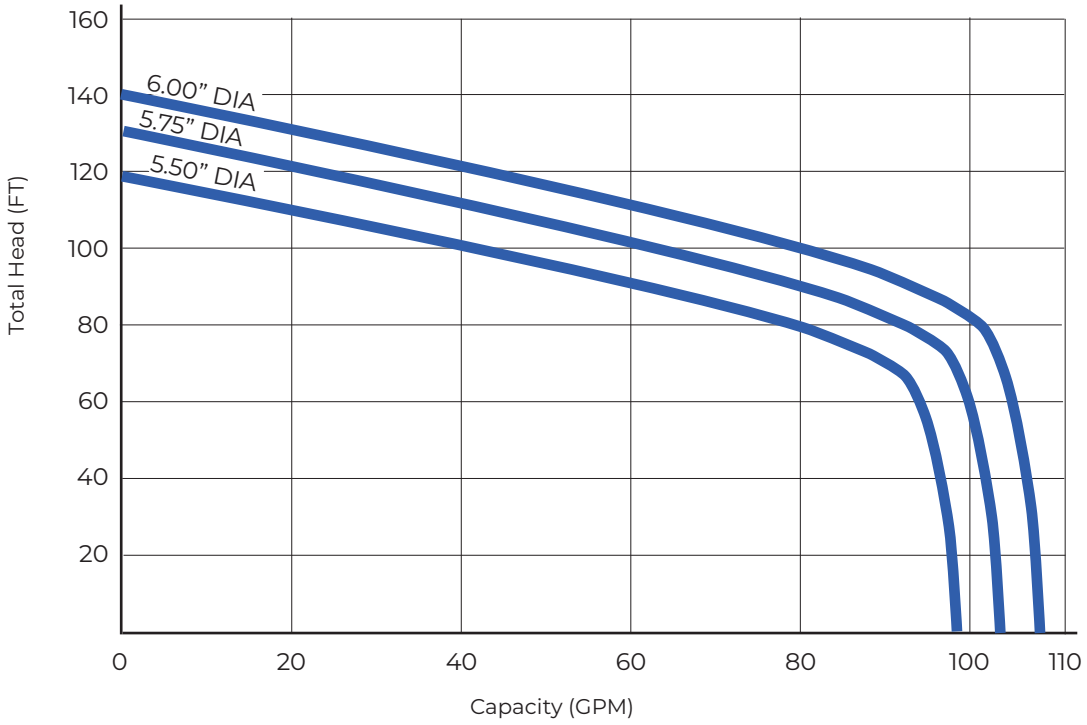
5HP SUBMERSIBLE GRINDER PUMP

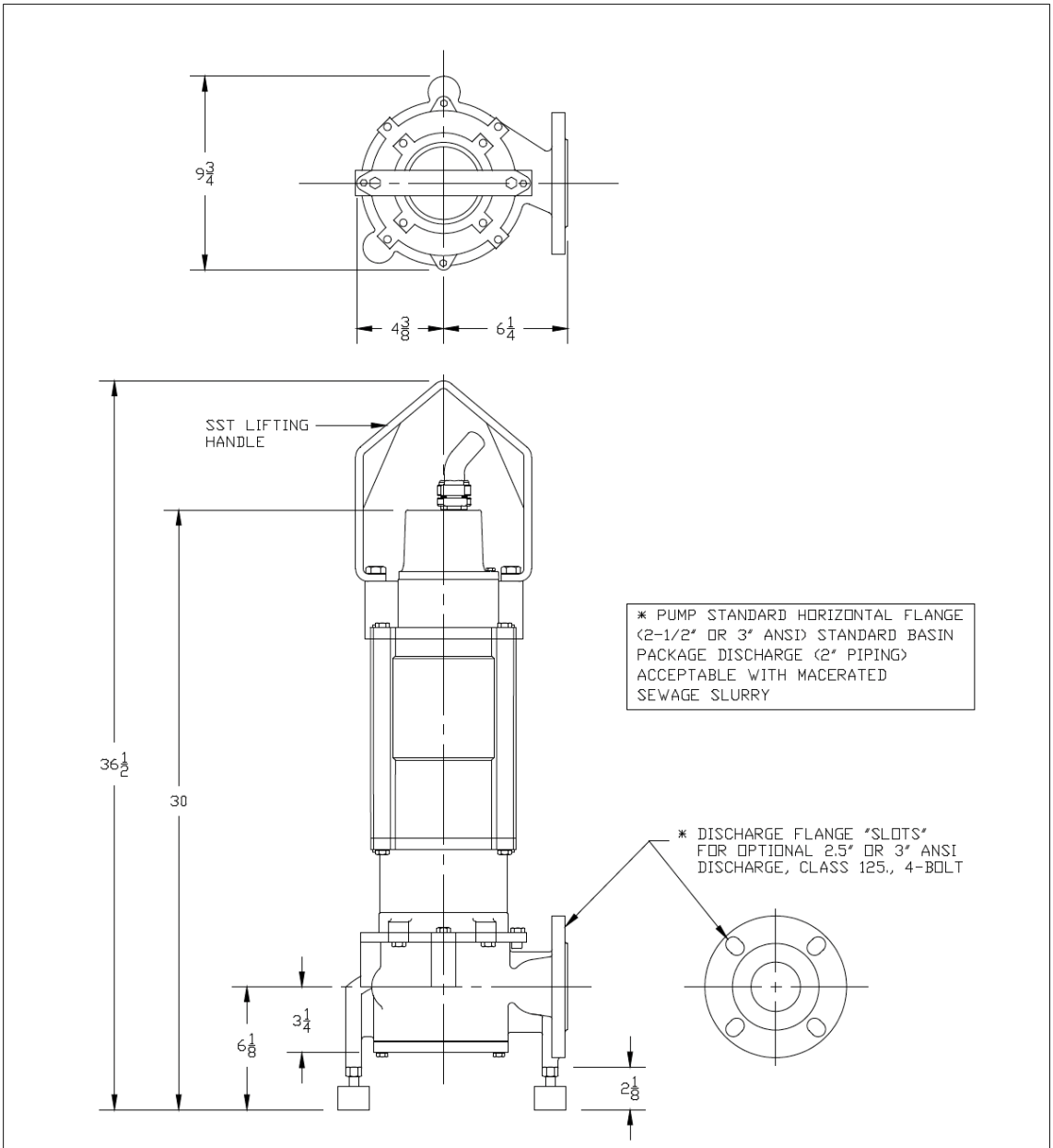
GENERAL	KHG(X)5
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	2-1/2 & 3” ANSI Horizontal
Grinder Ring	25 Slots
Impeller Type / Std. Dia.	Recessed / 6.00”

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	2P / 3450 rpm
Insulation Class	N

PERFORMANCE CURVE





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



FM APPROVED

KHG(X)7

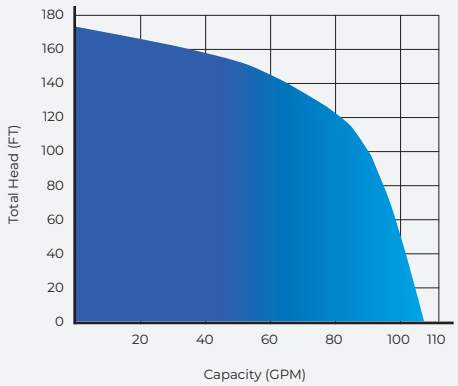
7.5HP High Head Grinder Pump, 1 or 3 Phase

(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 troublefree, 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.

PERFORMANCE



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) Volt or 3-Phase

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 the 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 N 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 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.

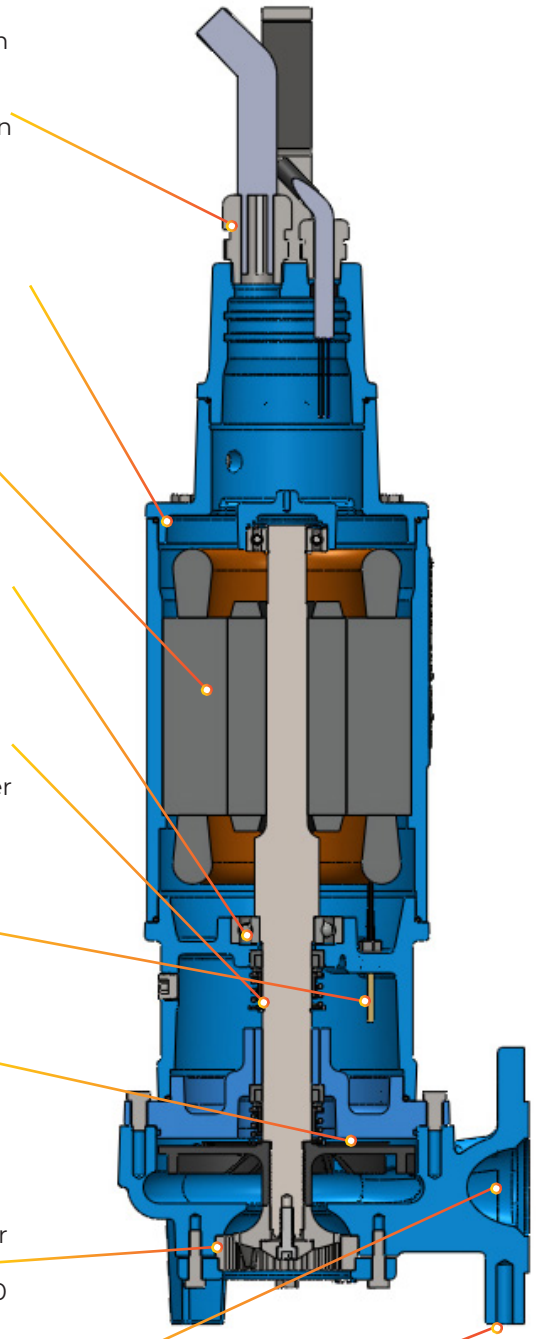
6. MOISTURE DETECTION
Seal leak probe signals alarm in control panel for scheduled maintenance.

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 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 mounting feet OPTIONAL.

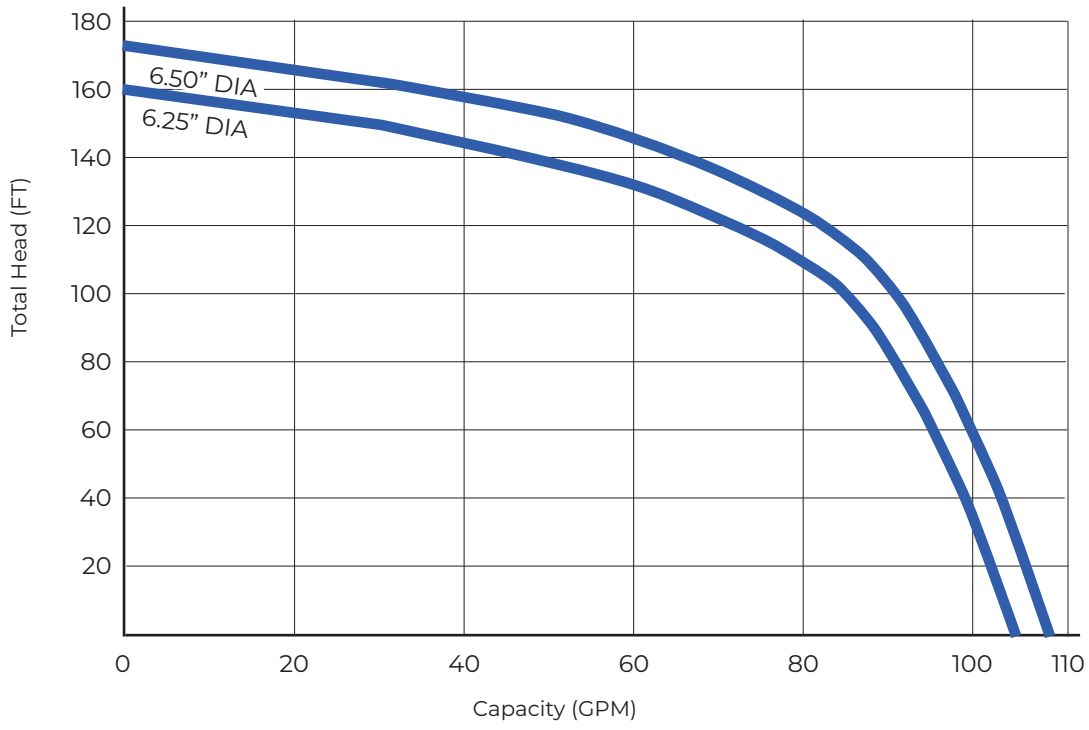


7.5HP SUBMERSIBLE GRINDER PUMP

GENERAL	KHG(X)7
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	2-1/2 & 3" ANSI Horizontal
Grinder Ring	25 Slots
Impeller Type / Std. Dia.	Recessed / 6.20"
SINGLE PHASE	START KIT SK-7 includes: Start & Run Capacitors, Relay, and Mounting Hardware

MOTOR DATA	
HP / Power Supply	7.5HP / 1 ϕ , 60 Hz
Full Load Amps 208V	52 Amps
Start Amps 208V	260 Amps
Full Load Amps 230V	47 Amps
Start Amps 230V	235 Amps
Poles / Rated Speed	2P / 3450 rpm
Insulation Class	N
Start Capacitor	300 ufd, 250 VAC
Run Capacitor	30 ufd, 370 VAC

PERFORMANCE CURVE

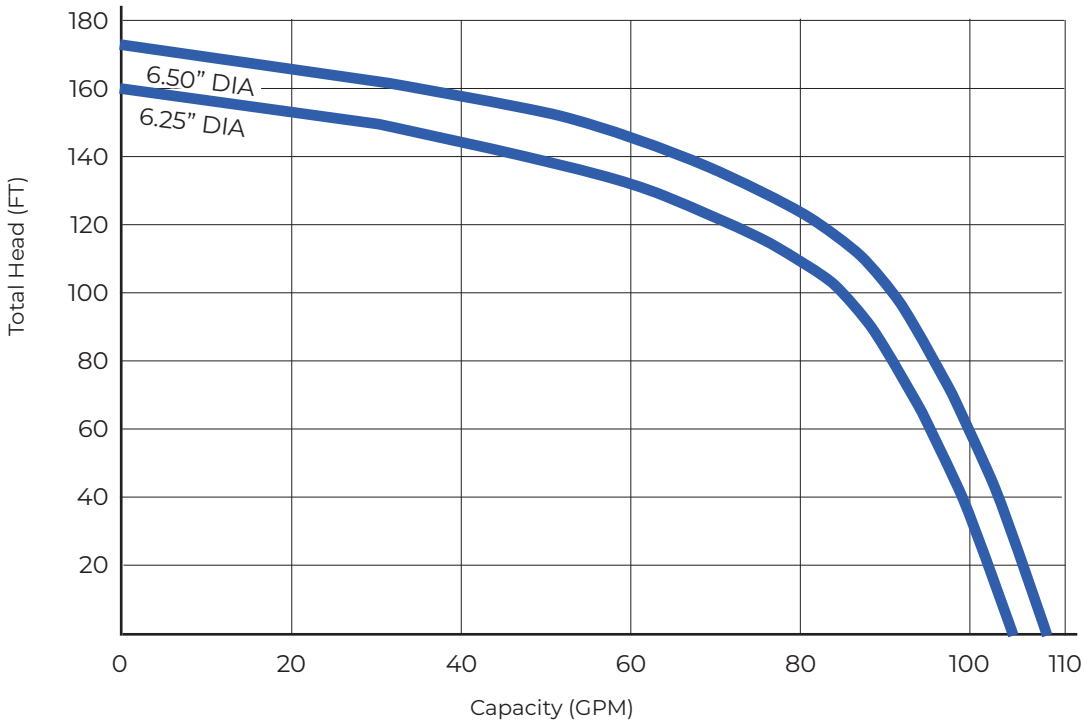


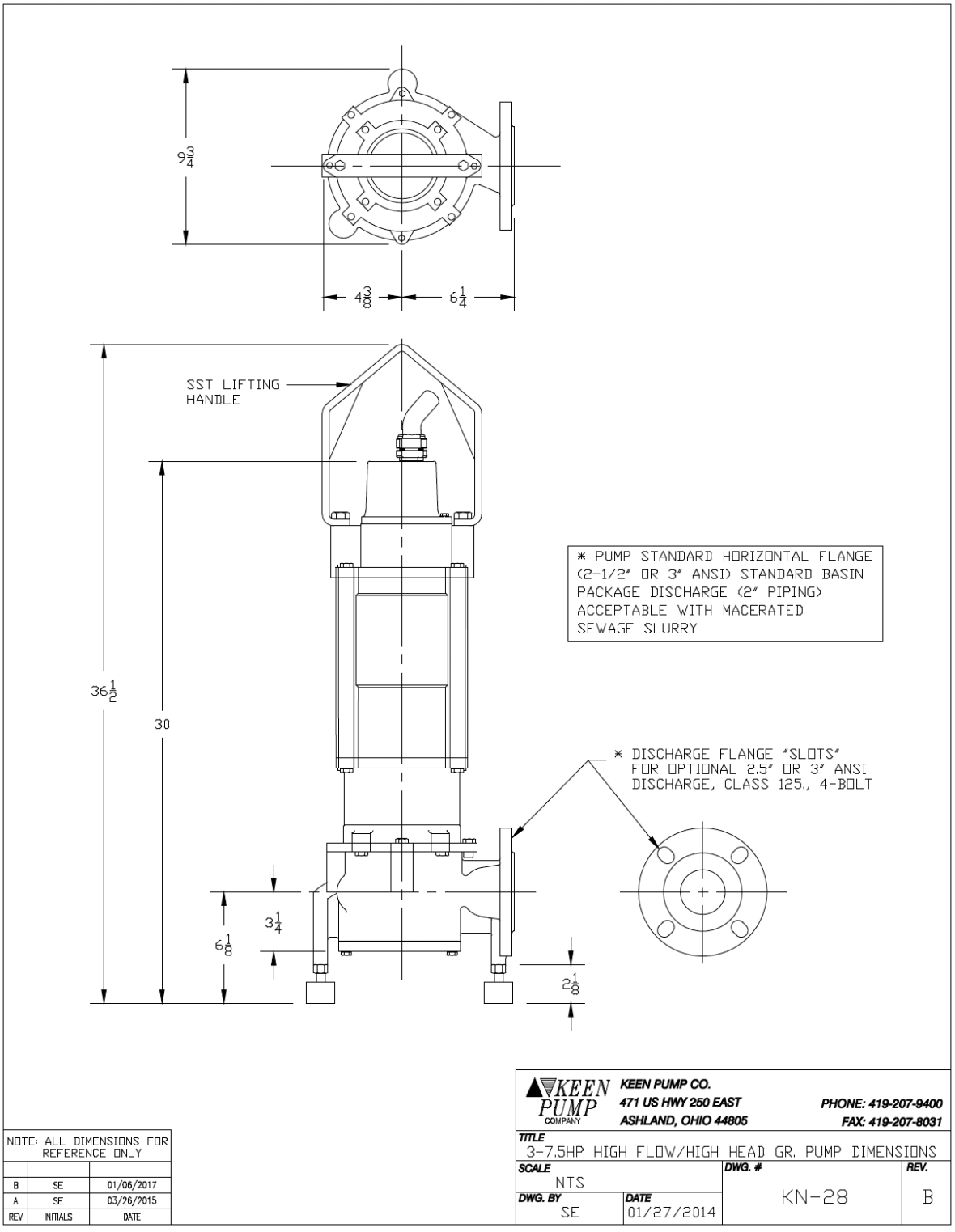
7.5HP SUBMERSIBLE GRINDER PUMP

GENERAL	KHG(X)7
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	2-1/2 & 3” ANSI Horizontal
Grinder Ring	25 Slots
Impeller Type / Std. Dia.	Recessed / 6.50”
THREE PHASE	

MOTOR DATA	
HP / Power Supply	7.5HP / 3 ϕ , 60 Hz
Full Load Amps 208V	37 Amps
Start Amps 208V	185 Amps
Full Load Amps 230V	32 Amps
Start Amps 230V	160 Amps
Full Load Amps 460V	16 Amps
Start Amps 460V	80 Amps
Poles / Rated Speed	2P / 3450 rpm
Insulation Class	N

PERFORMANCE CURVE





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. #	REV.
NTS	KN-28	B

DWG. BY	DATE
SE	01/27/2014



FM APPROVED

KG(X)10

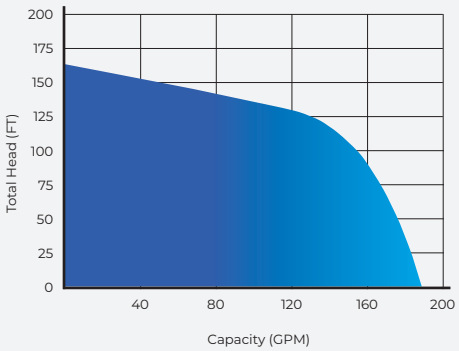
10HP High Flow Grinder Pump

(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 troublefree, 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.

PERFORMANCE



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

10HP GRINDER PUMP HIGH FLOW KG(X)10 - 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 the 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 N 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 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.

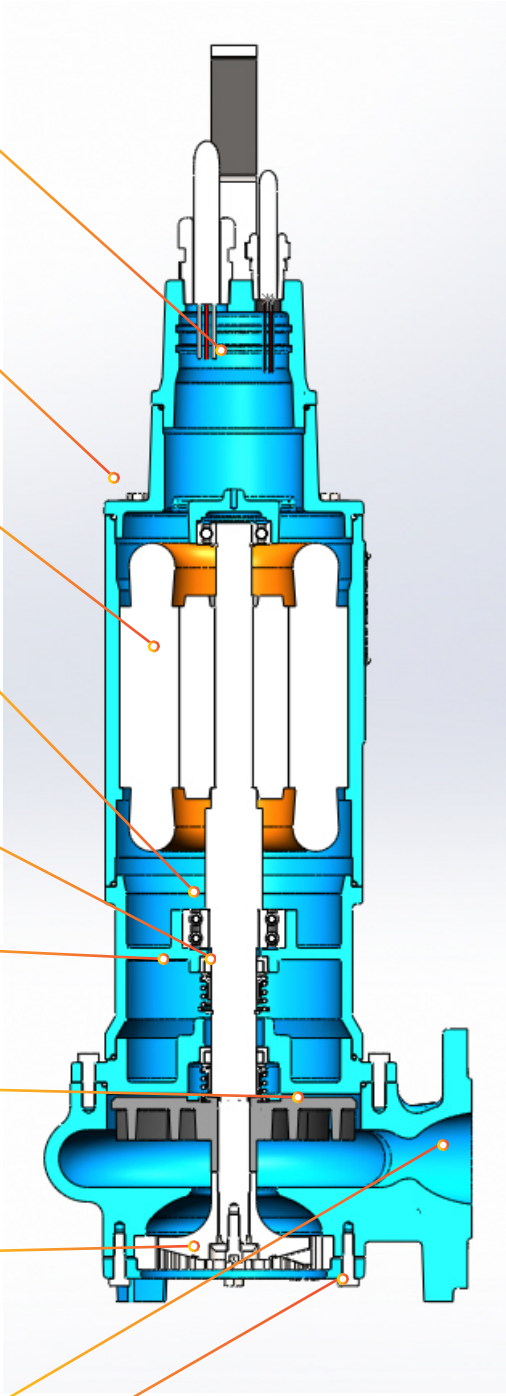
6. MOISTURE DETECTION
Seal leak probe signals alarm in control panel for scheduled maintenance.

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 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.

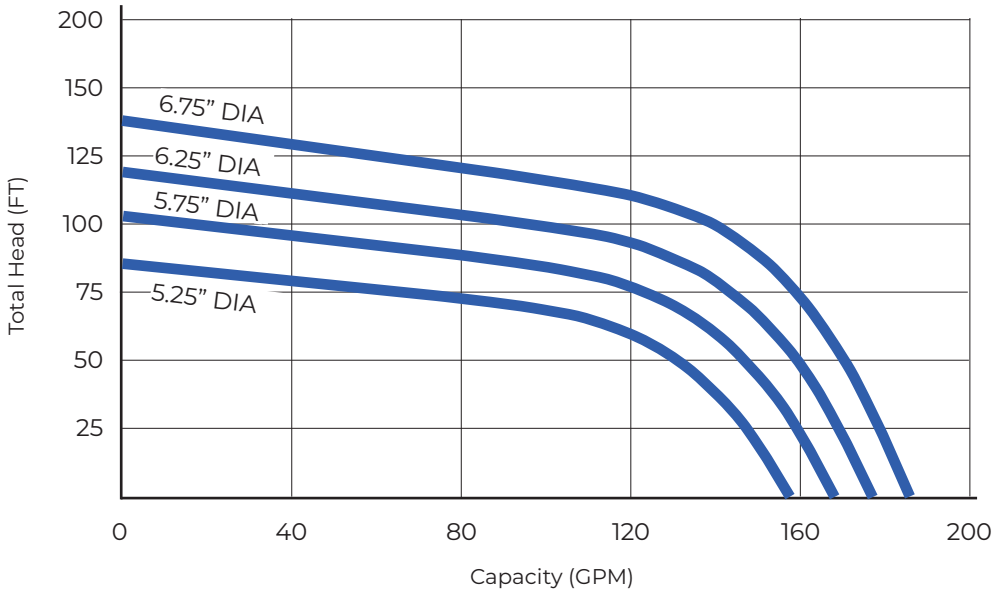


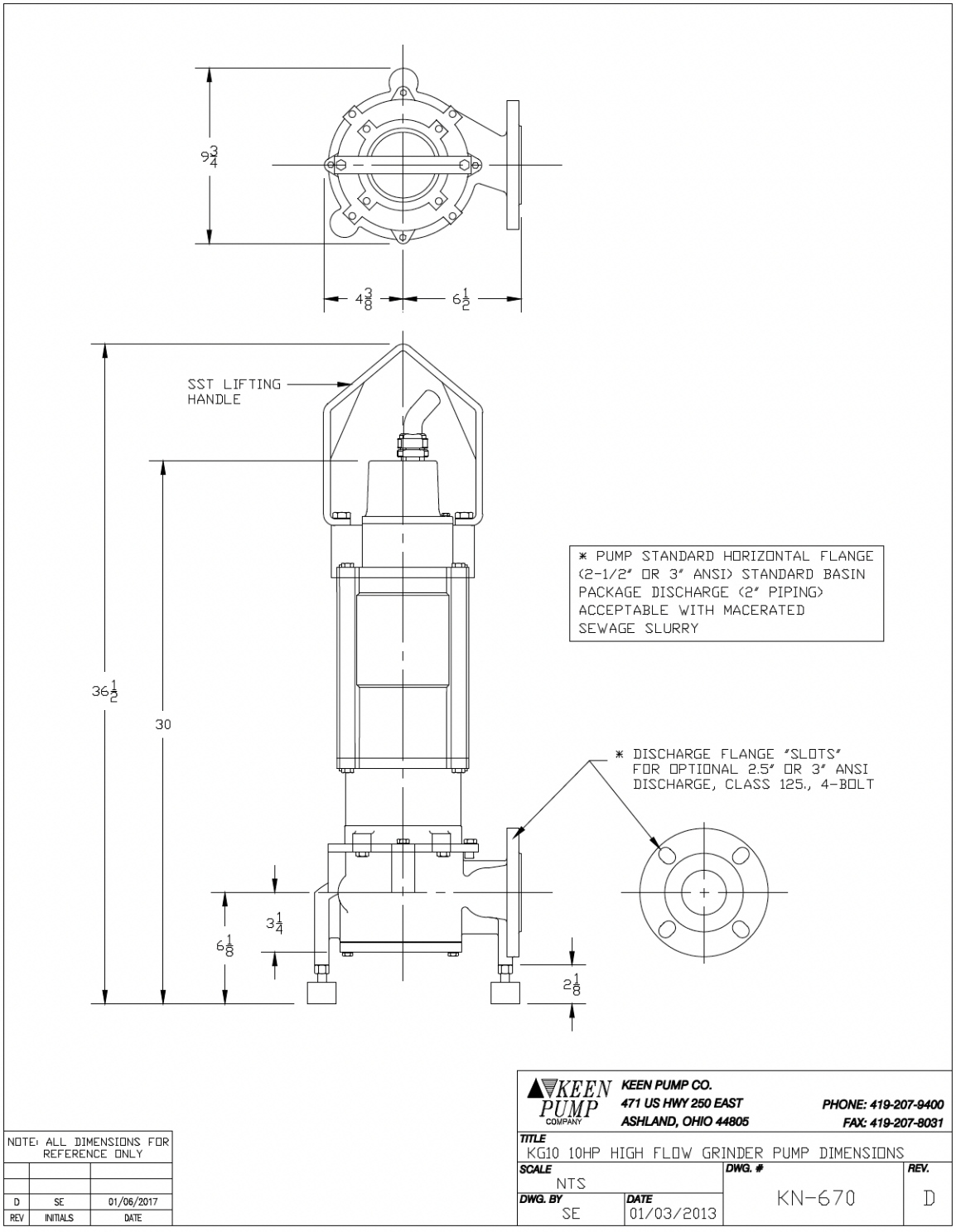
10HP SUBMERSIBLE GRINDER PUMP

GENERAL	KG(X)10
Pump Model	
PUMP DATA	
Date	09/2022
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 208V	47 Amps
Start Amps 208V	159 Amps
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	2P / 3450 rpm
Insulation Class	N

PERFORMANCE CURVE




9 3/4
4 3/8
6 1/2
SST LIFTING HANDLE
36 1/2
30
* 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
3 1/4
6 1/8
2 1/8
NOTE: ALL DIMENSIONS FOR REFERENCE ONLY
D SE 01/06/2017
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
KG10 10HP HIGH FLOW GRINDER PUMP DIMENSIONS
SCALE
NTS
DWG. BY
SE
DATE
01/03/2013
DWG. #
KN-670
REV.
D

3 & 5 HP GRINDER PUMPS

MODELS: KG(X)3, KG(X)5

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® L (Single-Phase) or NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be press-fit in watertight, oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200° C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class N insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient and shall not exceed NEMA® Class H operating temperature rise of 176° F (80° C).
  - Capable of 10 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.00.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Grey Cast Iron Class 35.
- 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.
  - 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.
  - 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.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.

- Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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.
- The line bearing seal will minimize shaft deflection and serve as the flame path for the motor assembly.

5.0 PUMP BEARINGS

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - 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 Conrad type, single row, deep groove ball bearing designed to adequately handle the required radial loads.
- 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.
- 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

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, 10-vane, vortex flow and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be threaded to the pump shaft.
  - All wetted fasteners shall be of a corrosion resistant stainless steel material.

8.0 GRINDING MECHANISM

- The grinder assembly shall consist of a single rotating grinding cutter and stationary grinding ring secured to the inlet of the volute case.
  - The rotating grinding cutter shall be threaded onto the pump shaft and secured with a washer and bolt.
  - The stationary grinding ring shall be secured in place with a metal clamping ring.
- Both the stationary and rotating grinding mechanisms shall be removable without disassembling the pump.
- No adjustment or shimming grinder assembly shall be necessary.
- The grinder components shall be constructed of a martensitic AISI 440C stainless steel hardened to 56-60C Rockwell.
- The grinder mechanism shall be capable of producing 17,250 cuts/second.

9.0 VOLUTE CASE

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two iDesign shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough that any macerated solid can enter the impeller.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 2-1/2” or 3” ANSI® standard Class 125, 4-bolt configuration.
- Optional - 2” NPT vertical connection.

SUBMERSIBLE SEWAGE GRINDER PUMPS

MODELS: KHG(X)3,5,7

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® L (Single-Phase) or NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be press-fit in watertight, oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200° C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class N insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient and shall not exceed NEMA® Class H operating temperature rise of 176° F (80° C).
  - Capable of 10 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.00.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Grey Cast Iron Class 35.
- 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.
  - 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.
  - 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.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.

- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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.
- The line bearing seal will minimize shaft deflection and serve as the flame path for the motor assembly.

5.0 PUMP BEARINGS

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
    - 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 Conrad type, single row, deep groove ball bearing designed to adequately handle the required radial loads.
- 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.
- 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

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
    - Pump shaft material crystal structure shall be body centered cubic (bcc).
    - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, 10-vane, vortex flow and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be threaded to the pump shaft.
    - All wetted fasteners shall be of a corrosion resistant stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

8.0 GRINDING MECHANISM

- The grinder assembly shall consist of a single rotating grinding cutter and stationary grinding ring secured to the inlet of the volute case.
  - The rotating grinding cutter shall be threaded onto the pump shaft and secured with a washer and bolt.
  - The stationary grinding ring shall be secured in place with a metal clamping ring.
- Both the stationary and rotating grinding mechanisms shall be removable without disassembling the pump.
- No adjustment or shimming grinder assembly shall be necessary.
- The grinder components shall be constructed of a martensitic AISI 440C stainless steel hardened to 56-60C Rockwell.
- The grinder mechanism shall be capable of producing 12,400 cuts/second.

9.0 VOLUTE CASE

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two iDesign shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough that any macerated solid can enter the impeller.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 2-1/2” or 3” ANSI® standard Class 125, 4-bolt configuration.
- Optional - 2” NPT vertical connection.

10 HP GRINDER PUMPS

MODELS: KG(X)10

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® L (Single-Phase) or NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be press-fit in watertight, oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200° C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class N insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient and shall not exceed NEMA® Class H operating temperature rise of 176° F (80° C).
  - Capable of 10 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.00.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Grey Cast Iron Class 35.
- 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.
  - 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.
  - 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.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.

- Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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.
- The line bearing seal will minimize shaft deflection and serve as the flame path for the motor assembly.

5.0 PUMP BEARINGS

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - 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 Conrad type, single row, deep groove ball bearing designed to adequately handle the required radial loads.
- 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.
- 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

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, 10-vane, vortex flow and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be threaded to the pump shaft.
  - All wetted fasteners shall be of a corrosion resistant stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

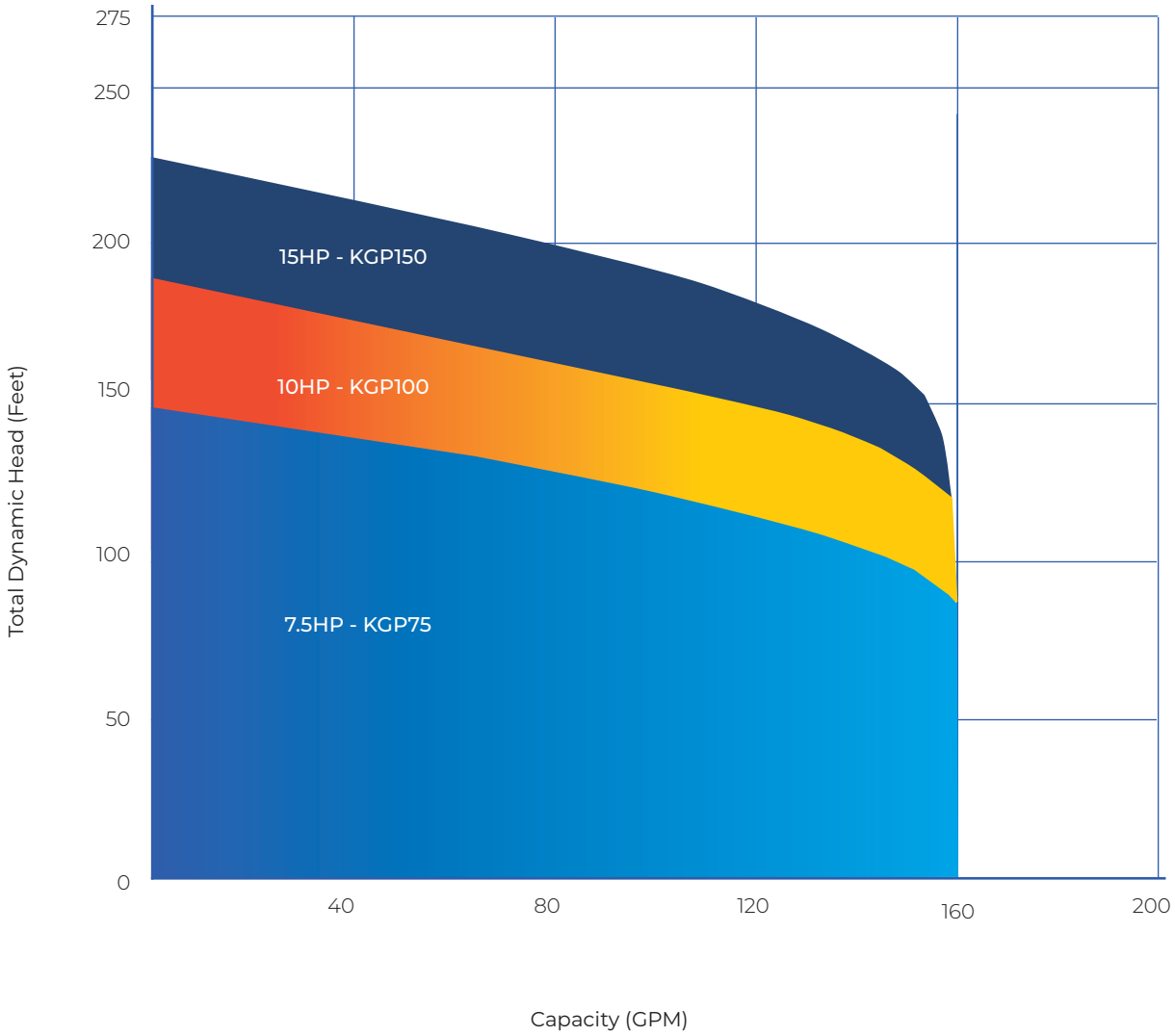
8.0 GRINDING MECHANISM

- The grinder assembly shall consist of a single rotating grinding cutter and stationary grinding ring secured to the inlet of the volute case.
  - The rotating grinding cutter shall be threaded onto the pump shaft and secured with a washer and bolt.
  - The stationary grinding ring shall be secured in place with a metal clamping ring.
- Both the stationary and rotating grinding mechanisms shall be removable without disassembling the pump.
- No adjustment or shimming grinder assembly shall be necessary.
- The grinder components shall be constructed of a martensitic AISI 440C stainless steel hardened to 56-60C Rockwell.
- The grinder mechanism shall be capable of producing 17,250 cuts/second.

9.0 VOLUTE CASE

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two iDesign shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough that any macerated solid can enter the impeller.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 2-1/2” or 3” ANSI® standard Class 125, 4-bolt configuration.
- Optional - 2” NPT vertical connection.

Family Curve Performance



FM PENDING



KGP(X)

7.5 - 15HP Grinder Pump, 3 Phase

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

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 the 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
Powerful high-torque motor for strong pumping. 208/230/460 Volt, 3-phase. Slip-Fit stator efficiently transfers heat to cast housing. Class N 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.

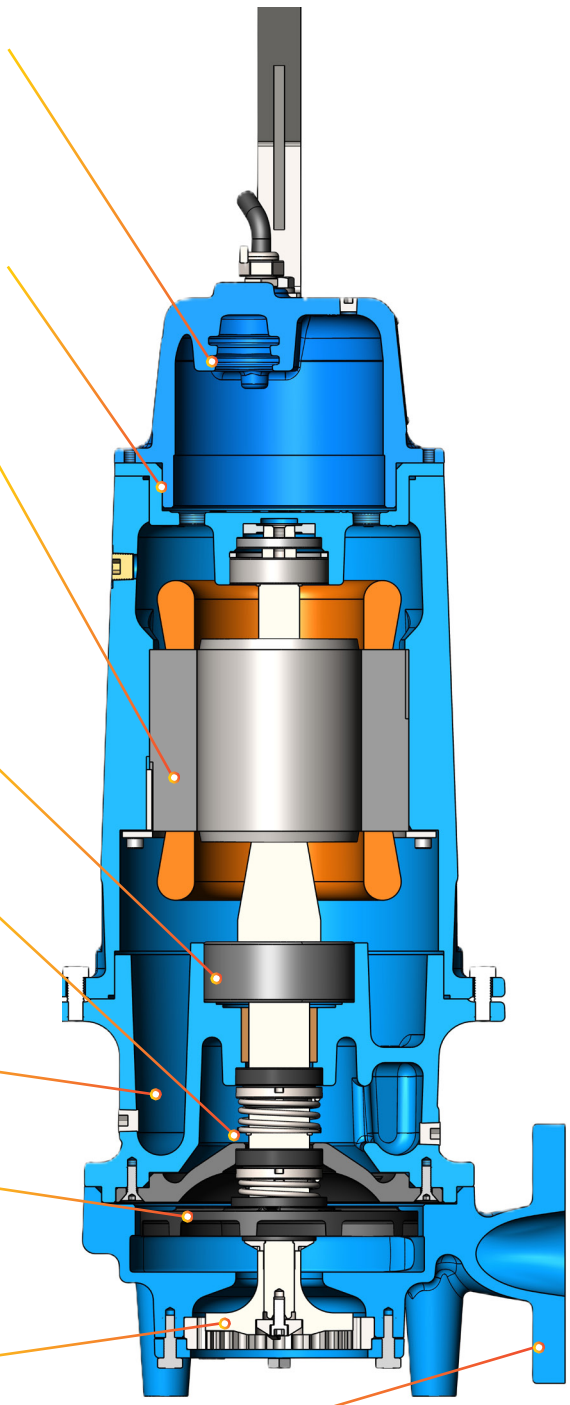
5. SEVERE DUTY DUAL MECHANICAL SEALS
Dual silicon carbide mechanical shaft seals w/ Viton® Elastomers provide twice the moisture and grit protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials.
** 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/second.

9. STANDARD FLANGE CONNECTION
2-1/2" / 3" Horizontal, Class 125 ANSI discharge flange. Industry standard, 4-bolt pattern.

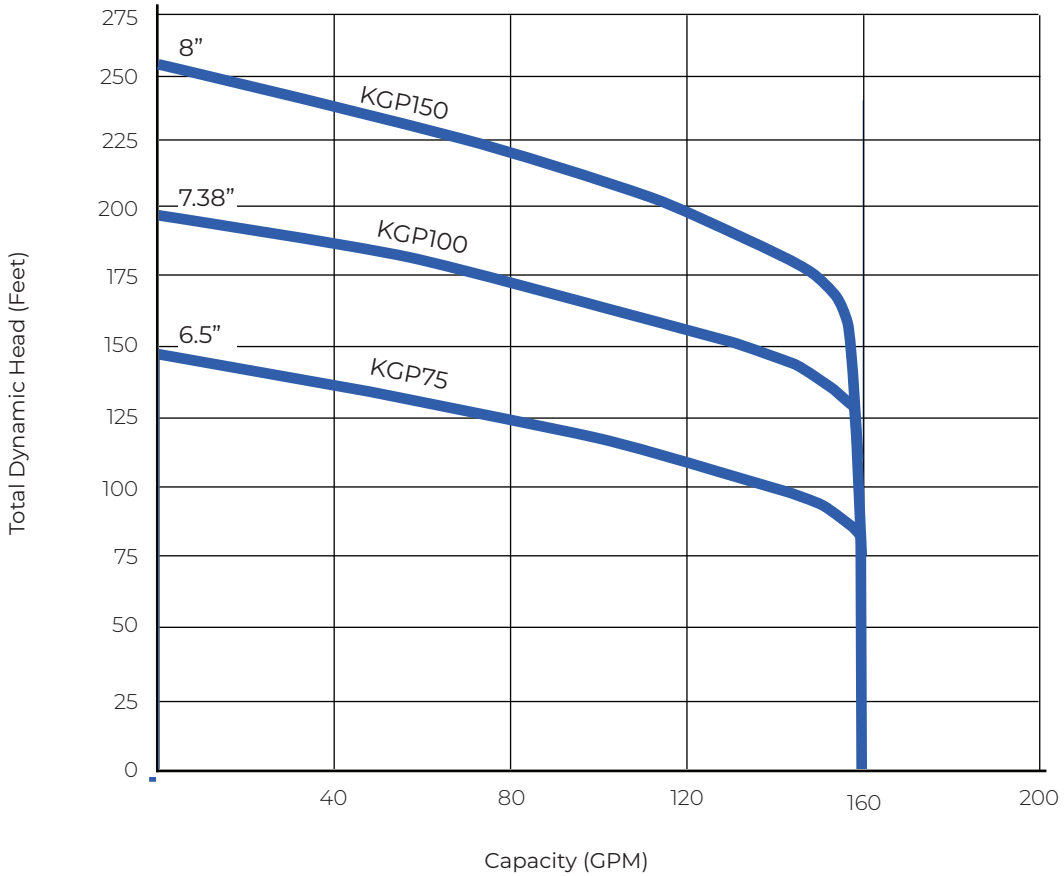


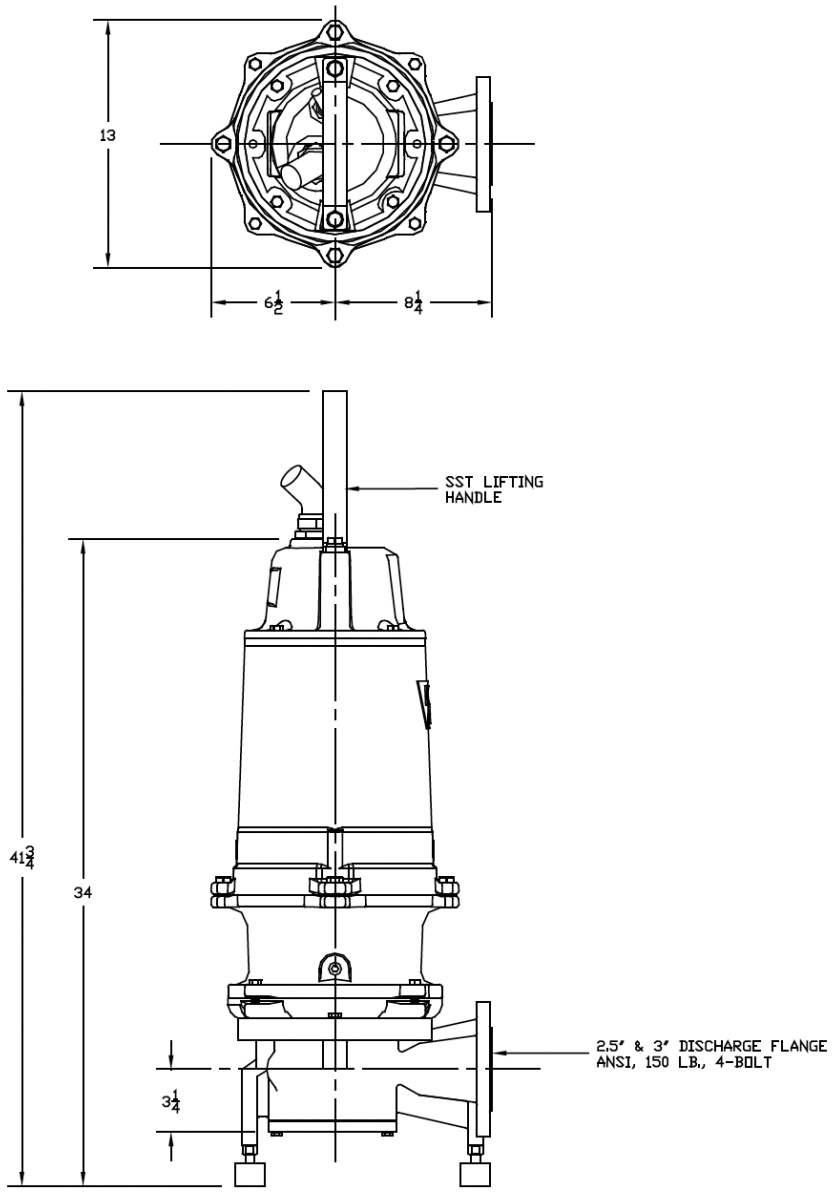
7.5 - 15HP GRINDER PUMP

GENERAL	KGP(X)75/100/150
Pump Model	
PUMP DATA	
Date	09/2022
Discharge Flange	2-1/2 & 3” ANSI Horizontal
Grinder Ring	Hardened SST
Impeller Type / Std. Dia.	Recessed / As Shown

MOTOR DATA	
HP / Power Supply	7.5-15HP / 3 ϕ , 60 Hz
Poles / Rated Speed	2P / 3450 rpm
Insulation Class	N

PERFORMANCE CURVE

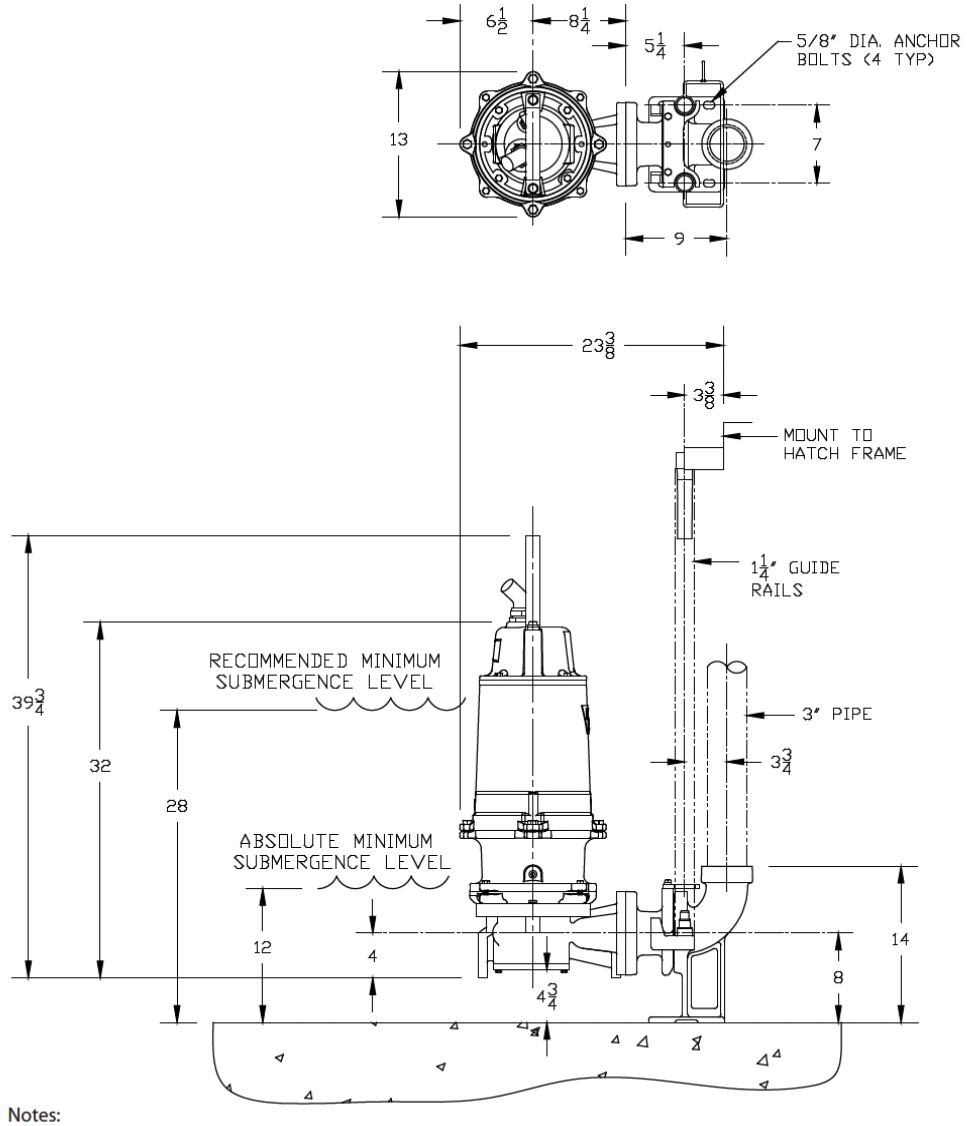




KEEN PUMP COMPANY	KEEN PUMP CO. 471E STATE ROUTE 250 EAST ASHLAND, OHIO 44805	PHONE: 419-207-9400 FAX: 419-207-8031	
TITLE: KGP75-150 7.5-15HP GRINDER PUMP OUTLINE			
SCALE: NTS		DWG. #: KN-919	REV.: -
DWG. BY: SE	DATE: 06/10/2014		

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

PHYSICAL DATA	
Discharge Size	ANSI 2-1/2 / 3" Horizontal
Impeller Type	Balanced, Recessed
Power/Control Cable Length	40' Standard
Paint	Baked on Powder Coat Finish

MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class N
Service Factor	1.2
NEMA Design Type	B (3Ø)
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	392° F (200° C)
Power Cord	Type SOOW-600V, 90° C , Type W-2000V
Control Cord Type	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
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	Fluorocarbon
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Double Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° C) Min.
Oil Flash Point		390° F (199° C)

ELECTRICAL DATA				
RPM	3450			
Electrical Ratings	Heat Sensor	24VDC, 5AMPS	115VAC, 5AMPS	230VAC, 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	LOCKED ROTOR AMPS	RUN KW	START KVA	RUN KVA
7.5	208	3	K	1.2	39.8	206.6	10.8	75.2	14.1
	230				34.5	186.1			
	460				17.3	93.0			
	575				13.9	74.4			
10	208	3	H	1.2	55.6	206.6	15.5	78.3	19.4
	230				48.5	186.1			
	460				24.3	93.0			
	575				19.4	74.4			
15	208	3	F	1.2	68.5	286.1	19.8	82.8	24.1
	230				59.5	257.8			
	460				29.8	128.9			
	575				23.9	103.1			

MOTOR EFFICIENCIES & POWER FACTOR									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		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

7.5 - 15HP GRINDER PUMPS

MODELS: KGP(X)75-150

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200° C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA MG-1 12.45.
    - Current unbalance must not exceed 5%.
  - 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.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
  - The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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.
- The labyrinth seal will minimize shaft deflection and serve as the flame path for the motor assembly.

5.0 PUMP BEARINGS

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - 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 double-row angular contact ball bearing designed to adequately compensate for the axial loads and radial forces.
- 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.
- 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

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - 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

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 grey cast iron shall be unacceptable.
- The design shall be one-piece, 10-vane, vortex flow and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
    - All wetted fasteners shall be of a corrosion resistant stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.

8.0 GRINDING MECHANISM

- The grinder assembly shall consist of a single rotating grinding cutter and stationary grinding ring secured to the inlet of the volute case.
    - The rotating grinding cutter shall be threaded onto the pump shaft and secured with a washer and bolt.
    - The stationary grinding ring shall be secured in place with a metal clamping ring.
- Both the stationary and rotating grinding mechanisms shall be removable without disassembling the pump.
- No adjustment or shimming grinder assembly shall be necessary.
- The grinder components shall be constructed of a martensitic AISI 440C stainless steel hardened to 56-60C Rockwell.
- The grinder mechanism shall be capable of producing 17,250 cuts/second.

9.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35 gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough that any solid can enter the impeller.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 2-1/2” or 3” ANSI® standard Class 125, 4-bolt configuration.

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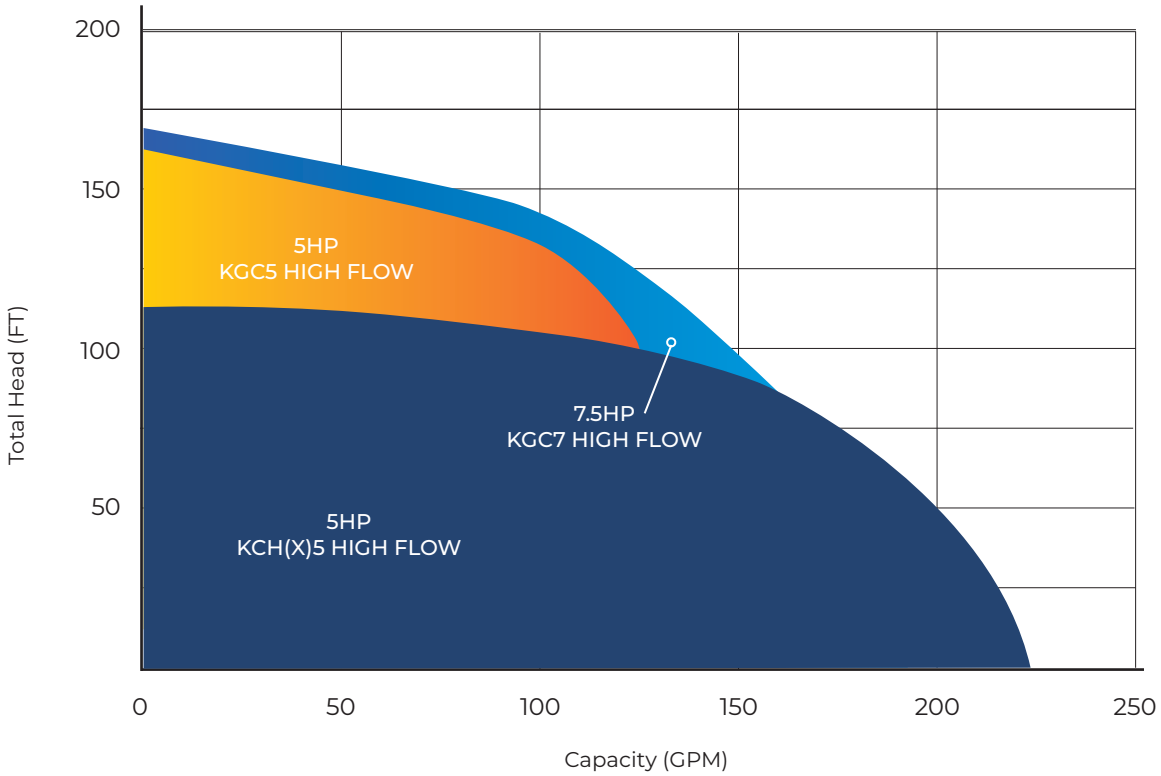
SECTION 7

Chopper/ Grinder Series

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Family Curve Performance





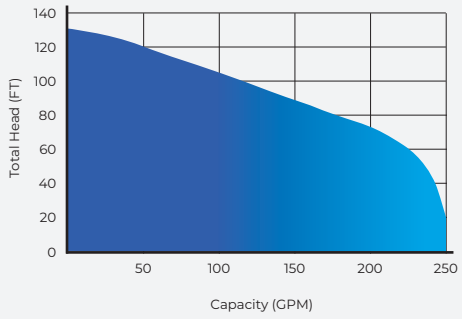
KCH(X)5

5HP Chopper Grinder Pump

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

The recessed impeller design of the KCH(X)5 chopper 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.

PERFORMANCE



THE KCH(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

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 N 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 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

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. ROBUST CHOPPER ASSEMBLY

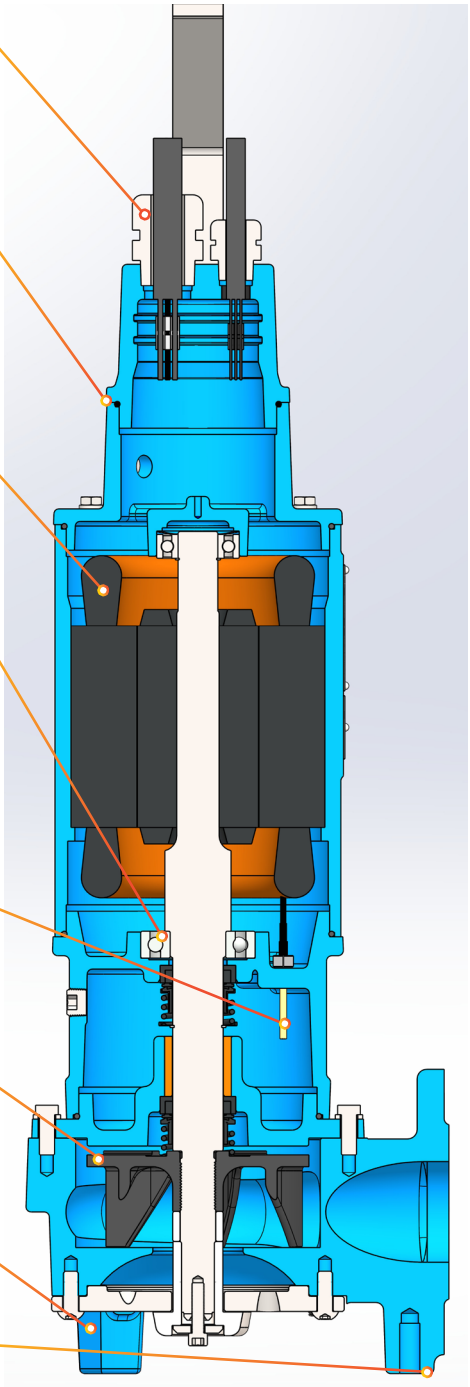
Hardened (Rockwell 56-60) stainless steel chopping assembly,designed to chop tough solids and prevent damage to downstream systems

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 mounting feet OPTIONAL.



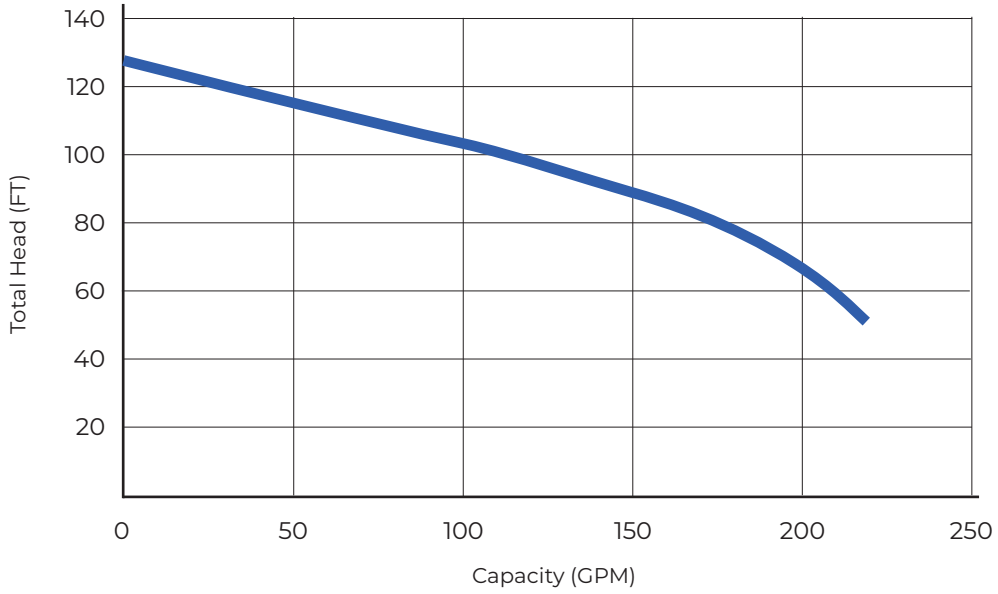
5HP SUBMERSIBLE CHOPPER GRINDER PUMP

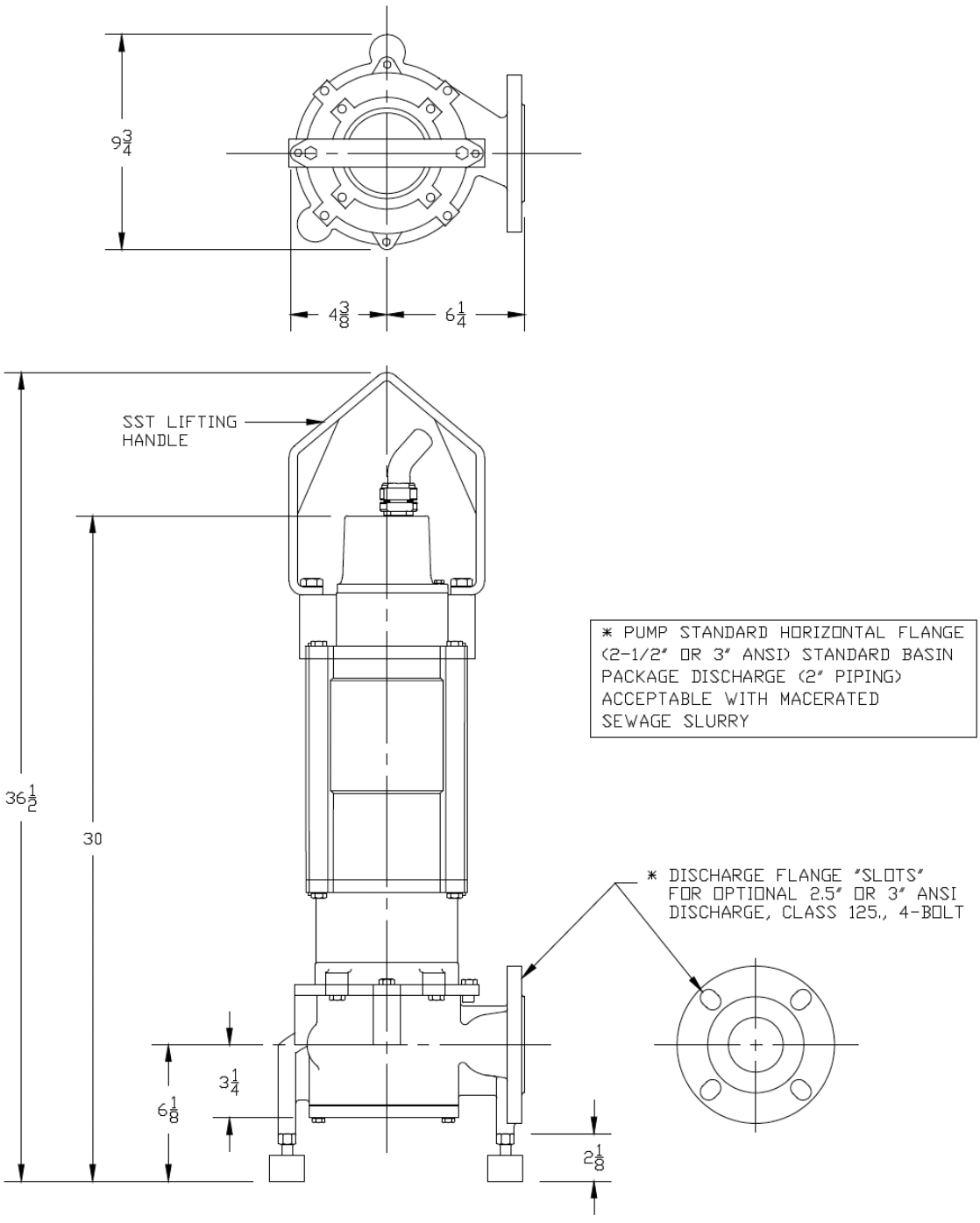
GENERAL	KCH(X)5
Pump Model	
PUMP DATA	
Date	2025
Discharge Flange	2-1/2 & 3” ANSI Horizontal
Grinder Ring	11 Holes
Impeller Type / Std. Dia.	Recessed/ 5.50”

THREE PHASE

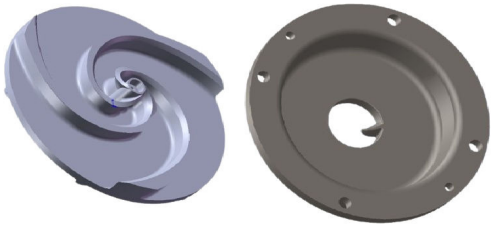
MOTOR DATA	
HP / Power Supply	5HP / 3 ϕ , 60 Hz
Full Load Amps 208V	35 Amps
Start Amps 208V	145 Amps
Full Load Amps 230V	32 Amps
Start Amps 230V	125 Amps
Full Load Amps 460V	16 Amps
Start Amps 460V	65 Amps
Poles / Rated Speed	2P / 3450 rpm
Insulation Class	N

PERFORMANCE CURVE




9 3/4
4 3/8
6 1/4
SST LIFTING HANDLE
36 1/2
30
3 1/4
6 1/8
2 1/8
* 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





KGC5/7

KGC Series 5/7HP Submersible Chopper Grinder Pump

APPLICATIONS

The KGC series centrifugal grinder/Chopper pumps easily handle residenial, commercial or industrial sanitary waste, reducing it to a fine slurry. The pump is designed for use in pressure sewer applications or any piping network. The recessed vortex impeller design provides trouble free, non-overloading operation over the enire performance curve.

The hardened stainless steel grinder assembly provides many years of dependable operation.

STRONG OIL FILLED MOTOR

DUAL SILICON-CARBIDE MECHANICAL SHAFT SEAL

PRESSED IN MOTOR

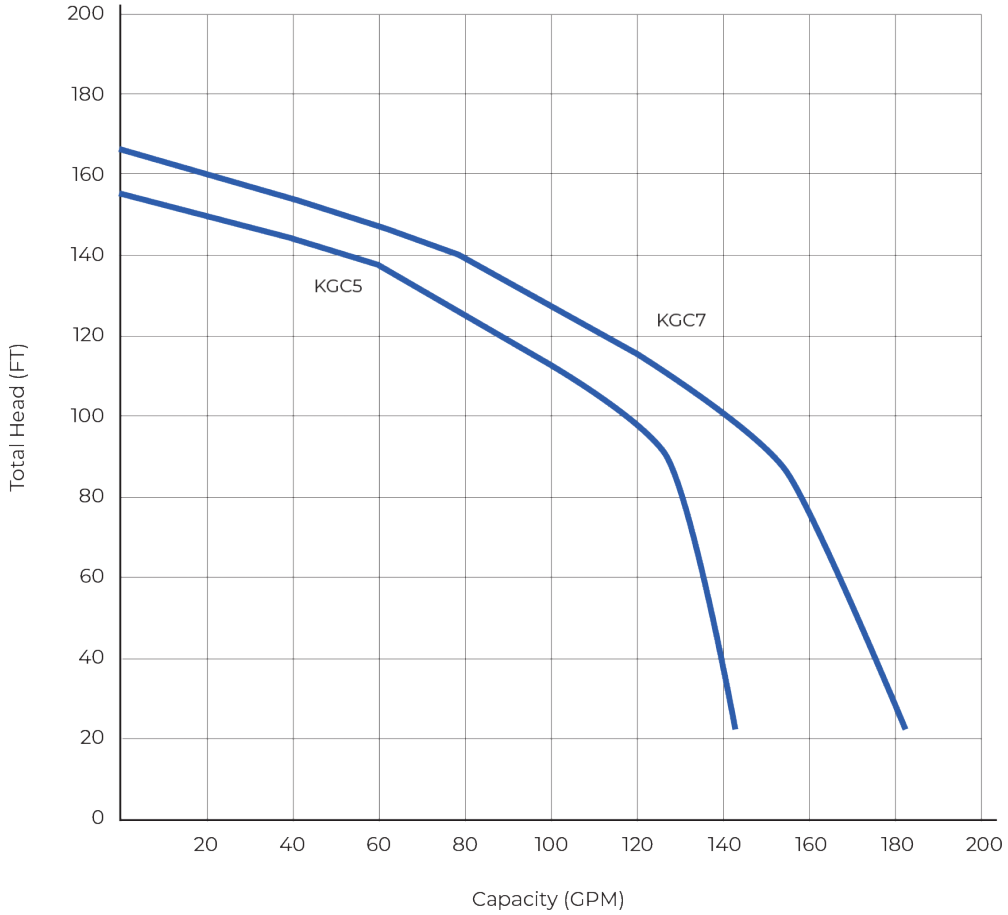
With Internal Overload Protection

INTERNAL MOISTURE DETECTION

REV 01/2024

PUMP SERIES	KGC5/7		2HP HIGH PRESSURE GRINDER	
Speed	3450 RPM	Discharge	2.5” & 3”	

PERFORMANCE CURVE

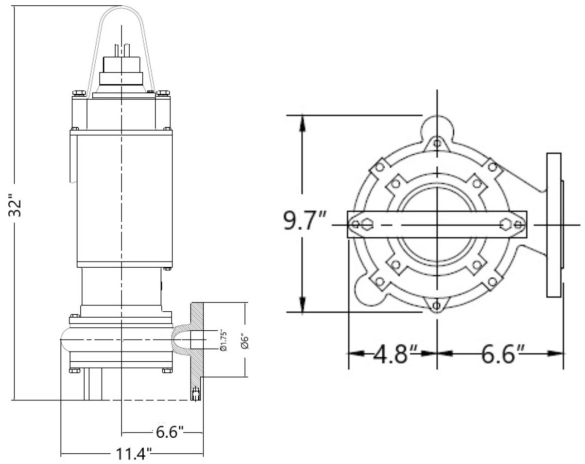


MODEL	HP	VOLTS	PHASE	CORD	DISCHARGE ANSI	WEIGHT	LIST
KGC5-2083	5	208	3	8-4	2.5”/3”	192	$6,238.00
KGC5-2303	5	230	3	8-4	2.5”/3”	192	$6,238.00
KGC5-4603	5	460	3	10-4	2.5”/3”	192	$6,238.00
KGC7-2083	7.5	208	3	8-4	2.5”/3”	196	$6,707.00
KGC7-2303	7.5	230	3	8-4	2.5”/3”	196	$6,707.00
KGC7-4603	7.5	460	3	10-4	2.5”/3”	196	$6,707.00

KGC5/7 - Specifications & Dimensions

Discharge:	2.5” & 3” ANSI, female, vertical.
Liquid temperature:	120 degrees F (Continuous), 140 degrees F.
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
Shredding Ring:	Hardened 440C Stainless Steel, 56-60 Rockwell C
Impeller:	Hardened 440C Stainless Steel, 56-60 Rockwell C
Shaft:	420 Stainless Steel.
O-rings:	Buna-N.
Seal:	(Motor Side) Rotating Face - Graphite, Stationary Face - Silicon Carbide
	(Pump Side) Rotating Face - Silicon Carbide, Stationary Face - Silicon Carbide, Elastomer - Buna -N
Hardware:	300 series stainless steel.
Cord entry:	Triple Sealed Design
	Compression Grommet – Outer Jacket Seal
	Epoxy Potted – Inner Conductor Seal
	Butt Connector – Inner Wire Strand Wicking Blockage
Upper bearing:	Single Row, Ball, Oil lubricated
Lower bearing:	Single Row, Ball, Oil Lubricated
Motor:	5 & 7.5 HP, 3450 RPM, 60 Hz
	Dual-voltage, 230 / 460 volts, Oil Filled, Class F
	On-Winding temperature sensor and water leakage probe
Optional Equipment:	Cord Lenght & Impeller Trim

MODEL	HP	VOLTS	PH/HZ	RPM	AMPS	IMPELLER SIZE (MM)	WEIGHT (POUNDS)
KGC5	5	230/460	3/60	3450	22/11	152.4	192
KGC7	7.5	230/460	3/60	3450	27/13.5	165.1	195



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The Industry Leader in Custom Engineered Packaged Systems

8





SECTION 8

Fiberglass Basin Package

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COMPLETE TURNKEY PACKAGES

- Pre-assembled
- Ready for Installation
- Quick, Easy, Convenient



BASINS

- Diameters to 120”
- Lengths to 30’

SYSTEMS

- Simplex
- Duplex
- Triplex
- Valve Boxes
  -Attached
  -Detached
  -Above Ground

PACKAGES

- Pumps
- Controls
- Junction Box
- Floats
- Rail System
- Special Piping
- Spec Driven
- Customizable







GENERAL – Furnish and install a fully assembled grinder pump package consisting of grinder pumps and motors, basin assembly, internal discharge piping, check valves, shut off valves, quick disconnect slide rail systems, lift chains, level controls, stainless steel level control bracket, junction box, inlet fitting, and control panel. All equipment shall be factory installed except for grinder pumps, inlet fitting, and externally mounted control panel.

Package System

FIBERGLASS BASIN

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.

PREFABRICATED FRP LIFT STATION SPECIFICATIONS

Description

1.0 SCOPE OF WORK

Contractor shall furnish all labor, materials, equipment and performance of all work necessary or incidental to furnish and install a simplex/duplex prefabricated fiberglass reinforced polyester (FRP) Lift station. The lift station shall be completely factory assembled unit, requiring minor adjustments and reassembly on site.

Quality Assurance

2.0 QUALIFICATIONS OF MANUFACTURER

The Manufacturer shall demonstrate the ability to fabricate the various lift station components, as shown in the plans and as specified herein. The complete Lift Station shall be manufactured by Keen Pump.

Standards

ASTM A36 : Standard Specification for Structural Steel (Most Recent Rev)

ASTM A283D: Standard Specification for Structural Steel (Most Recent Rev)

ASTM D883: Terms and Definitions relating to Plastics (Most Recent Rev)

ASTM D3753-99 American Society for Testing and materials for Glass Fiber-reinforced polyester.

3.0 MATERIALS

Unless otherwise indicated, The Plastic terminology used in this standard shall be in accordance with the definitions given in American Society for Testing and Materials (ASTM) D883. With a Pipe stiffness values as specified in (ASTM D3753-99).The Resin used shall be of commercial grade and shall either be evaluated as a laminate by test or determined by previous service to be acceptable for the environment. The Reinforcing material shall be a commercial grade of glass fiber (continuous strand, chop strand) having a coupling agent, which will provide a suitable bond between the glass reinforcement material and resin.

3.2 PHYSICAL PROPERTIES

Wet well FRP Wall Laminate must be designed to withstand wall collapse or buckling based on these assumptions and Third party specifications.

- **Hydrostatic Pressure** 62.4 lbs. Per SQ Ft.
- **Saturated soil weight** 120 lbs. Per Cubic Ft.
- **Soil Modulus of** 700 lbs Per SQ Ft.
- **Pipe Stiffness** As specified in ASTM D 3753

The wet well FRP laminate must be constructed to with stand or exceed two times the assumed loading on any depth of the wet well.

4.0 EXTERIOR LAYER

The exterior layer of body of laminate shall be of construction suitable for the service intended and contain sufficient glass by weight (50 TO 80 %) to provide the aggregate strength necessary to meet the tensile and flexural requirements. The exterior surface shall be relatively smooth with no exposed fibers or sharp projections. Hand work is acceptable, but enough resin shall be present to prevent fiber show.

5.0 INNER SURFACE

The resin rich inner surface shall be free of cracks and crazing with smooth finish with an average of not more than (2) two pits per square foot, providing the pits are less than 0.125 in diameter and 0.3125 inches in depth and are covered with sufficient resin to avoid exposure of any fiberglass reinforcement materials. Some waviness shall be permissible as long as the surface is smooth. A minimum of 0.100 inch of the laminate next to the inner surface shall be reinforced with not less than 20 percent nor more than 30 percent by weight of non continuous glass strands having fiber lengths from 0.5 to 2.0 inches. Both exterior and interior laminates shall have a Barcol Hardness of at least 90 percent of resin manufacture specified hardness for fully cured resin.

- Inner Surface – The inner surface shall be smooth and resin rich, free of cracks, exposed fibers, porosity and crazing.
- 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.
- 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)
    - Hydrostatic pressure (62.4 lbs per square foot)
    - Saturated soil weight (120 lbs per cubic foot)
    - Soil Modulus (700 lbs per square foot)
    - 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.

- **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.
- **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.
- **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.
- **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.
    - Optional steel covers with solid or access hatch design as required.
    - 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.

6.0 TANK BOTTOM

Must be constructed suitable for the service designated by the project engineer. Under total water submerged conditions. The center deflections of any basin bottom must be less than 3/8" in as not to interfere with the pump mounting requirements and Rail system. No bottom shall have a form of glue adhesive as attachment of the basin bottom and or anti floatation collar.

7.0 WET WELL TOP FLANGE

The wet well top flange shall have an outside diameter at least 4 inches greater than the inside diameter of the basin. A (6) six hole pattern shall accommodate the mounting of a cover with at least 3/8 inches in diameter 300 series stainless steel fasteners. Non –corroding stainless steel threaded inserts shall be fully encapsulated with non continuous mat or chop strand glass fiber reinforcement, The inserts shall have an offset tab to prevent stripping or spinning out when removing and reinserting cover fasteners.

8.0 FIBERGLASS ANTI-FLOATS

The fiberglass anti float shall be manufacture by way of (RTM) resin transferred molded Continuous Mat , and or chop spray, with an outside diameter no less than (4) inches larger than the ID of any basin. The anti-float shall have no glue adhesive in form of attachment to any basin. No more than 3/8 inch deflection in center of basin bottom.

9.0 SQUARE STEEL ANTI FLOATS

The steel anti-floatation shall be constructed from 0.187 inches this (ASTM A 36) structural steel plate, encapsulated in at least 0.125 inches of chopped-strand glass fiber reinforcement on all sides, The steel anti-floatation may be square and or round, with no less than 4 inches greater than the inside diameter of any basin. The steel antiflotation collar shall be attached to the basin bottom with chopped-strand glass fiber reinforcement. AK recommends basins over 10 feet in length to install steel anti-floatation.

10.0 PUMP DISCONNECT MOUNTING STUDS

The 300 series stainless steel threaded studs shall be no less than 3/8" in diameter. Once installed, shall be sealed with at least (2) two layers of non-continuous glass fiber mat or chopped-strand glass fiber reinforcement.

11.0 SOLID FIBERGLASS COVER

The solid fiberglass cover shall be constructed of continuous mat ASTM D3753-99 , (RTM) resin transferred molded manufacturing. No less than 3/8" inch thickness. The cover shall be green in color. The cover shall be mounted to the wet well with six 3/8 inch 300 series stainless steel fasteners.

12.0 SOLID ALUMINUM COVERS

The solid Aluminum cover shall be constructed to min load ratings per site engineers. Shall have either powder coated finish, enamel painted coating or epoxy painted coating. (ASTM A 36) structural Aluminum plate. The cover shall be mounted to the wet well with six 3/8" 300 series stainless steel fasteners.

13.0 FIBERGLASS HINGED DOOR COVERS

The fiberglass hinged door, cover shall be constructed of continuous mat, (RTM) resin transferred molded manufactured. No less than 3/8 inch thickness. The cover shall be green in color. The cover shall be mounted with min six 300 series stainless steel fasteners. The access hatch cover shall have a lift handle and a means of locking. The hatch shall have a positive means of holding door open in the vertical position (Locking hold open arm) made of a non- corrosive material. All hard ware shall be of 300 series stainless steel. The cover shall be mounted with minimum of six 300 series stainless steel fasteners.

14.0 STEEL HINGED DOOR COVERS

The cover shall be constructed of ¼ inch material for wet well of diameter from 24 inch to 48 inch. Material for 60 diameters and up will be of 3/8" all conforming to (ASTM A36). The hatch shall have a positive means of holding door open in the vertical position (Locking hold open arm) made of a non-corrosive material. All hardware shall be of 300 series stainless steel. The cover shall be mounted with minimum of six 300 series stainless steel fasteners. The access hatch cover shall have a lift handle and a means of locking.

15.0 ALUMINUM HINGED DOOR COVERS

The cover shall be constructed of ¼ inch thick material finish aluminum diamond plate pattern with 300 series stainless steel hardware. The hatch shall have a positive means of holding door open in the vertical position (Locking hold open arm) made of non-corrosive material. The cover shall be mounted with minimum of six 300 series stainless steel fasteners. The access hatch cover shall have a lift handle and a means of locking.

16.0 DISCHARGE COUPLING

Designated size NPT , 300 series stainless coupling, full welded in the center of a 300 series stainless steel plate. Mounted with 300 series stainless steel hardware. 1 ¼ inch thru 6 inch. Wet well penetrations to be sealed prior to mounting of coupling.

17.0 ELECTRIC COUPLING

A 1 ½" inch (simplex) and or 2 inch (duplex) Glass filled Nylon NPT full coupling. Mounted with 300 series stainless steel hardware. Wet well penetrations to be sealed prior to mounting of coupling.

18.0 INLET FITTING

The Cast Iron Caulking Hubs are made of cast iron conforming to radius of fiberglass basin, All fasteners to be 300 series stainless steel. Use local plumbing codes for approved sealing methods and materials.

- Adapta flex fittings, constructed of durable PVC Composition, The grommet shall provide a mechanical seal and shall not require any secondary sealing materials.
- Link Seals , provide a positive hydrostatic seal. Rated at 20 psig (40 feet of head) Hardness (shore A) ASTM D-2240 , Tensile ASTM D-412 , Elongation ASTM D-297.

19.0 FLOAT BRACKET

Float bracket shall be fabricated from 300 series stainless steel with compression style cord grips to maintain float level position. Install with 300 series stainless steel hardware.

20.0 VENTILATION

Wet well ventilation shall comply with all applicable codes.

21.0 SLIDE RAILS

Shall be 300 series stainless steel, size to match Quick Disconnect.

22.0 DISCHARGE PIPE

Shall be (PVC SCH 80, 300 Series Stainless Steel, Galv. Sch40 , and or Ductile Pipe) per engineer design. With means of positive seal joints per material.

- **KL3-H / KL3-V Rail Assemblies**
  - 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.
  - Discharge elbow shall be 3" NPT and shall be integral to the base assembly.
  - The elbow shall attach to the pump with provided flange, gasket and bolts. 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.
  - 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 1" or 1-1/4 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.

- 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.

23.0 PIPING

Discharge piping shall be 2" PVC Schedule 80 and shall connect to the stationary discharge base assembly and terminate at a 2" NPT flange mounted on the basin at the height shown in the plans.

- A. Standard flange: Manifold 2" NPT, stainless steel.
- B. Optional flange: Dual 2" NPT, stainless steel flanges.

24.0 CHECK VALVES

The 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.

25.0 SHUTOFF VALVES

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.

26.0 ANTI-SIPHON VALVES (OPTIONAL)

- The basin assembly shall include a PVC riser pipe for acceptance of an anti-siphon valve which may be factory installed or field installed.
- 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.
- 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.
- The anti-siphon valve shall mount horizontally, shall be made of PVC and will not interfere with pump removal and installation.

27.0 INLET FLANGE

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

28.0 JUNCTION BOX (AS REQ'D)

- 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, cover that is held in place by four (4) stainless steel screws.
- 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.
- 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.
- 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.
- 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.

29.0 ELECTRICAL CONTROL PANEL AND APPURTENANCES

- **Control Panel Model / General Construction**
  - Control Panel specs as required.
- **Level Controls**
  - Float Switch Control Operation
  - The control panel shall provide terminal strip inputs for: pumps off, lead pump on, lag pump on and alarm float controls.
- **Float Controls**
  - 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.
  - 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.
  - Float switches shall be of normally open type.
  - 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.
  - Float switch shall be third party safety listed by cUL,US and shall be capable of operating intrinsic safe relays.
  - 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.

- **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.

30.0 EXECUTION

- **START-UP INSTRUCTION SERVICES**
  - 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.
  - Extended training can be arranged for an additional fee.
  - 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.
  - 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.
  - Power will be supplied to the control panel and grinder pump system.
  - 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.
  - 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.

31.0 QUALITY ASSURANCE

- The grinder pump shall have an industry standard commercial test which consists of a run test, Hi Pot test, Hermetic leak decay test.
- **Panel Test**
- **Basin Test**
- Manufacture must have a Quality Assurance Manual

32.0 DELIVERY, STORAGE AND HANDLING

- 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.

- The pump supplier shall provide six (6) (XX) copies of Installation, Operations and Maintenance Manuals to the Authority.
- 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.
- 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.
- For ease of handling and storage, grinder pump and control panel shall ship mounted on wooden pallet.
- 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.
- Handling and unloading the basin assemblies shall be the responsibility of the contractor or owner. Lifting devices such as chain is prohibited.
- The basin assemblies, grinder pumps and control panels will be stored in a controlled environment to prevent weather conditions from damaging equipment.

GENERAL – Furnish and install a fully assembled grinder pump package consisting of grinder pumps and motors, basin assembly, internal discharge piping, check valves, shut off valves, quick disconnect slide rail systems, lift chains, level controls, stainless steel level control bracket, junction box, inlet fitting, and control panel. All equipment shall be factory installed except for grinder pumps, inlet fitting, and externally mounted control panel.

Package System

FIBERGLASS BASIN

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.

VALVE BOX PREFABRICATED FRP LIFT STATION SPECIFICATIONS

Description

1.0 SCOPE OF WORK

Contractor shall furnish all labor, materials, equipment and performance of all work necessary or incidental to furnish and install a simplex/duplex prefabricated fiberglass reinforced polyester (FRP) Lift station. The lift station shall be completely factory-assembled unit, requiring minor adjustments and reassembly on site.

Quality Assurance

2.0 QUALIFICATIONS OF MANUFACTURER

The Manufacturer shall demonstrate the ability to fabricate the various lift station components, as shown in the plans and as specified herein. The complete Lift Station shall be manufactured by KEEN PUMP.

Standards

ASTM A36 : Standard Specification for Structural Steel (Most Recent Rev)

ASTM A283D: Standard Specification for Structural Steel (Most Recent Rev)

ASTM D883: Terms and Definitions relating to Plastics (Most Recent Rev)

ASTM D3753-99 American Society for Testing and materials for Glass Fiber-reinforced polyester.

3.0 MATERIALS

Unless otherwise indicated, The Plastic terminology used in this standard shall be in accordance with the definitions given in American Society for Testing and Materials (ASTM) D883. With a Pipe stiffness values as specified in (ASTM D3753-99). The Resin used shall be of commercial grade and shall either be evaluated as a laminate by test or determined by previous service to be acceptable for the environment. The Reinforcing material shall be a commercial grade of glass fiber (continuous strand, chop strand) having a coupling agent, which will provide a suitable bond between the glass reinforcement material and resin.

3.2 PHYSICAL PROPERTIES

Wet well FRP Wall Laminate must be designed to withstand wall collapse or buckling based on these assumptions and Third-party specifications.

- **Hydrostatic Pressure** 62.4 lbs. Per SQ Ft.
- **Saturated soil weight** 120 lbs. Per Cubic Ft.
- **Soil Modulus of** 700 lbs Per SQ Ft.
- **Pipe Stiffness** As specified in ASTM D 3753

The wet well FRP laminate must be constructed to with stand or exceed two times the assumed loading on any depth of the wet well. These are built to a safety factor of two.

4.0 EXTERIOR LAYER

The exterior layer of body of laminate shall be of construction suitable for the service intended and contain sufficient glass by weight (50 TO 80 %) to provide the aggregate strength necessary to meet the tensile and flexural requirements. The exterior surface shall be relatively smooth with no exposed fibers or sharp projections. Hand work is acceptable, but enough resin shall be present to prevent fiber show.

5.0 INNER SURFACE

The resin rich inner surface shall be free of cracks and crazing with smooth finish with an average of not more than (2) two pits per square foot, providing the pits are less than 0.125 in diameter and 0.3125 inches in depth and are covered with sufficient resin to avoid exposure of any fiberglass reinforcement materials. Some waviness shall be permissible as long as the surface is smooth. A minimum of 0.100 inch of the laminate next to the inner surface shall be reinforced with not less than 20 percent nor more than 30 percent by weight of non-continuous glass strands having fiber lengths from 0.5 to 2.0 inches. Both exterior and interior laminates shall have a Barcol Hardness of at least 90 percent of resin manufacture specified hardness for fully cured resin.

- Inner Surface – The inner surface shall be smooth and resin rich, free of cracks, exposed fibers, porosity and crazing.
- 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.

- 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)
  - Hydrostatic pressure (62.4 lbs per square foot)
  - Saturated soil weight (120 lbs per cubic foot)
  - Soil Modulus (700 lbs per square foot)
  - 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.
- **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.
- **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.
- **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.
- **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.
  - Optional steel covers with solid or access hatch design as required.
  - 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.

6.0 TANK BOTTOM

Must be constructed suitable for the service designated by the project engineer. Under total water submerged conditions. The center deflections of any basin bottom must be less than 3/8" in as not to interfere with the pump mounting requirements and Rail system. No bottom shall have a form of glue adhesive as attachment of the basin bottom and or anti floatation collar.

7.0 WET WELL TOP FLANGE

The wet well top flange shall have an outside diameter at least 4 inches greater than the inside diameter of the basin. A (6) six hole pattern shall accommodate the mounting of a cover with at least 3/8 inches in diameter 300 series stainless steel fasteners. Non –corroding stainless steel threaded inserts shall be fully encapsulated with non continuous mat or chop strand glass fiber reinforcement, The inserts shall have an offset tab to prevent stripping or spinning out when removing and reinserting cover fasteners.

8.0 FIBERGLASS ANTI-FLOATS

The fiberglass anti float shall be manufacture by way of (RTM) resin transferred molded Continuous Mat , and or chop spray, with an outside diameter no less than (4) inches larger than the ID of any basin. The anti-float shall have no glue adhesive in form of attachment to any basin. No more than 3/8 inch deflection in center of basin bottom.

9.0 SQUARE STEEL ANTI FLOATS

The steel anti-floatation shall be constructed from 0.187 inches this (ASTM A 36) structural steel plate, encapsulated in at least 0.125 inches of chopped-strand glass fiber reinforcement on all sides, The steel anti-floatation may be square and or round, with no less than 4 inches greater than the inside diameter of any basin. The steel antiflotation collar shall be attached to the basin bottom with chopped-strand glass fiber reinforcement. AK recommends basins over 10 feet in length to install steel anti-floatation.

10.0 PUMP DISCONNECT MOUNTING STUDS

The 300 series stainless steel threaded studs shall be no less than 3/8” in diameter. Once installed, shall be sealed with at least (2) two layers of non-continuous glass fiber mat or chopped-strand glass fiber reinforcement.

11.0 SOLID FIBERGLASS COVER

The solid fiberglass cover shall be constructed of continuous mat ASTM D3753-99 , (RTM) resin transferred molded manufacturing. No less than 3/8” inch thickness. The cover shall be green in color. The cover shall be mounted to the wet well with six 3/8 inch 300 series stainless steel fasteners.

12.0 SOLID STEEL COVERS

The solid steel cover shall be constructed to min load ratings per site engineers. Shall have either powder coated finish, enamel painted coating or epoxy painted coating. (ASTM A 36) structural steel plate. The cover shall be mounted to the wet well with six 3/8” 300 series stainless steel fasteners.

13.0 FIBERGLASS HINGED DOOR COVERS

The fiberglass hinged door, cover shall be constructed of continuous mat, (RTM) resin transferred molded manufactured. No less than 3/8 inch thickness. The cover shall be green in color. The cover shall be mounted with min six 300 series stainless steel fasteners. The access hatch cover shall have a lift handle and a means of locking. The hatch shall have a positive means of holding door open in the vertical position (Locking hold open arm) made of a non- corrosive material. All hard ware shall be of 300 series stainless steel. The cover shall be mounted with minimum of six 300 series stainless steel fasteners.

14.0 STEEL HINGED DOOR COVERS

The cover shall be constructed of ¼ inch material for wet well of diameter from 24 inch to 48 inch. Material for 60 diameters and up will be of 3/8” all conforming to (ASTM A36). The hatch shall have a positive means of holding door open in the vertical position (Locking hold open arm) made of a non-corrosive material. All hardware shall be of 300 series stainless steel. The cover shall be mounted with minimum of six 300 series stainless steel fasteners. The access hatch cover shall have a lift handle and a means of locking.

15.0 ALUMINUM HINGED DOOR COVERS

The cover shall be constructed of ¼ inch thick material finish aluminum diamond plate pattern with 300 series stainless steel hardware. The hatch shall have a positive means of holding door open in the vertical position (Locking hold open arm) made of non-corrosive material. The cover shall be mounted with minimum of six 300 series stainless steel fasteners. The access hatch cover shall have a lift handle and a means of locking.

16.0 DISCHARGE COUPLING

Designated size NPT , 300 series stainless coupling, full welded in the center of a 300 series stainless steel plate. Mounted with 300 series stainless steel hardware. 1 ¼ inch thru 6 inch. Wet well penetrations to be sealed prior to mounting of coupling.

17.0 ELECTRIC COUPLING

A 1 ½" inch (simplex) and or 2 inch (duplex) Glass filled Nylon NPT full coupling. Mounted with 300 series stainless steel hardware. Wet well penetrations to be sealed prior to mounting of coupling.

18.0 INLET FITTING

The Cast Iron Caulking Hubs are made of cast iron conforming to radius of fiberglass basin, All fasteners to be 300 series stainless steel. Use local plumbing codes for approved sealing methods and materials.

- Adapta flex fittings, constructed of durable PVC Composition, The grommet shall provide a mechanical seal and shall not require any secondary sealing materials.
- Link Seals , provide a positive hydrostatic seal. Rated at 20 psig (40 feet of head) Hardness (shore A) ASTM D-2240 , Tensile ASTM D-412 , Elongation ASTM D-297.

19.0 FLOAT BRACKET

Float bracket shall be fabricated from 300 series stainless steel with compression style cord grips to maintain float level position. Install with 300 series stainless steel hardware.

20.0 VENTILATION

Wet well ventilation shall comply with all applicable codes.

21.0 SLIDE RAILS

Shall be 300 series stainless steel, size to match Quick Disconnect.

22.0 DISCHARGE PIPE

Shall be (PVC SCH 80, 300 Series Stainless Steel, Galv. Sch40 , and or Ductile Pipe) per engineer design. With means of positive seal joints per material.

- **KL3-H / KL3-V Assemblies**
  - 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.

- Discharge elbow shall be 3” NPT and shall be integral to the base assembly.
- The elbow shall attach to the pump with provided flange, gasket and bolts. 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.
- 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 1” or 1-1/4 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.
- 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.

23.0 PIPING

Discharge piping shall be 2” PVC Schedule 80 and shall connect to the stationary discharge base assembly and terminate at a 2” NPT flange mounted on the basin at the height shown in the plans.

- A. Standard flange: Manifold 2” NPT, stainless steel.
- B. Optional flange: Dual 2” NPT, stainless steel flanges.

24.0 CHECK VALVES

The 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.

25.0 SHUTOFF VALVES

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.

26.0 ANTI-SIPHON VALVES (OPTIONAL)

- The basin assembly shall include a PVC riser pipe for acceptance of an anti-siphon valve which may be factory installed or field installed.
- 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.
- 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.
- The anti-siphon valve shall mount horizontally, shall be made of PVC and will not interfere with pump removal and installation.

27.0 INLET FLANGE

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

28.0 JUNCTION BOX (AS REQ'D)

- 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, cover that is held in place by four (4) stainless steel screws.
- 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.
- 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.
- 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.
- 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.

29.0 ELECTRICAL CONTROL PANEL AND APPURTENANCES

- **Control Panel Model / General Construction**
  - Control Panel specs as required.
- **Level Controls**
  - Float Switch Control Operation
  - The control panel shall provide terminal strip inputs for: pumps off, lead pump on, lag pump on and alarm float controls.
- **Float Controls**
  - 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.
  - 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.

- Float switches shall be of normally open type.
- 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.
- Float switch shall be third party safety listed by cUL,US and shall be capable of operating intrinsic safe relays.
- 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.

- **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.

30.0 EXECUTION

- **START-UP INSTRUCTION SERVICES**
  - 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.
  - Extended training can be arranged for an additional fee.
  - 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.
  - 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.
  - Power will be supplied to the control panel and grinder pump system.
  - 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.
  - 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.

31.0 QUALITY ASSURANCE

- The grinder pump shall have an industry standard commercial test which consists of a run test, Hi Pot test, Hermetic leak decay test.
- **Panel Test**
- **Basin Test**

- Manufacture must have a Quality Assurance Manual

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- 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.
- The pump supplier shall provide six (6) (XX) copies of Installation, Operations and Maintenance Manuals to the Authority.
- 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.
- 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.
- For ease of handling and storage, grinder pump and control panel shall ship mounted on wooden pallet.
- 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.
- Handling and unloading the basin assemblies shall be the responsibility of the contractor or owner. Lifting devices such as chain is prohibited.
- The basin assemblies, grinder pumps and control panels will be stored in a controlled environment to prevent weather conditions from damaging equipment.

Package System

1.0 FIBERGLASS BASIN

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.

- Inner Surface – The inner surface shall be smooth and resin rich, free of cracks, exposed fibers, porosity and crazing.
- 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.
- 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)
    - Hydrostatic pressure (62.4 lbs per square foot)
    - Saturated soil weight (120 lbs per cubic foot)
    - Soil Modulus (700 lbs per square foot)
    - 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.

- **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.
- **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.
- **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.
- **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.
    - Optional steel covers with solid or access hatch design as required.
    - 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.

2.0 KL1-CV RAIL ASSEMBLIES

- 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.
- Discharge elbow shall be 1 ¼" X 2" NPT and shall be integral to the base assembly.
- 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.
- 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.
- 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.

3.0 PIPING

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.

4.0 CHECK VALVES

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.

5.0 SHUTOFF VALVES

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.

6.0 ANTI-SIPHON VALVES (OPTIONAL)

- The basin assembly shall include a PVC riser pipe for acceptance of an anti-siphon valve which may be factory installed or field installed.
- 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.

- 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.
- The anti-siphon valve shall mount horizontally, shall be made of PVC and will not interfere with pump removal and installation.

7.0 INLET FLANGE

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

8.0 JUNCTION BOX (AS REQ'D)

- 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.
- 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.
- 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.
- 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.
- 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.

9.0 ELECTRICAL CONTROL PANEL AND APPURTENANCES

- **Control Panel Model / General Construction**
  - Control Panel specs as required.
- **Level Controls**
  - Float Switch Control Operation
  - The control panel shall provide terminal strip inputs for: pumps off, lead pump on, lag pump on and alarm float controls.
- **Float Controls**
  - 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.

- 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.
- Float switches shall be of normally open type.
- 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.
- Float switch shall be third party safety listed by cUL,US and shall be capable of operating intrinsic safe relays.
- 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.
- **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.

10.0 EXECUTION

- **START-UP INSTRUCTION SERVICES**
  - 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.
  - Extended training can be arranged for an additional fee.
  - 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.
  - 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.
  - Power will be supplied to the control panel and grinder pump system.
  - 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.
  - 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.

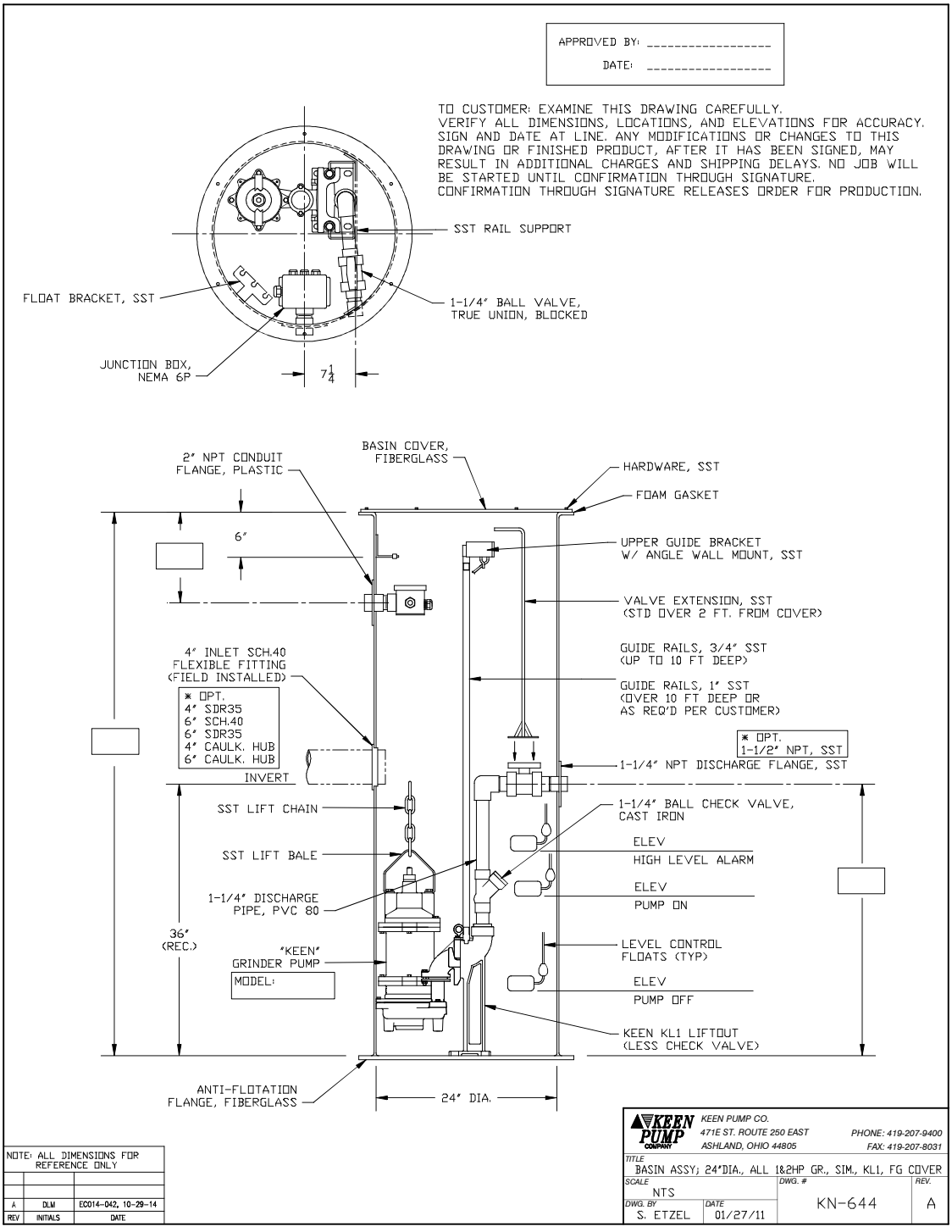
11.0 QUALITY ASSURANCE

- The grinder pump shall have an industry standard commercial test which consists of a run test, Hi Pot test, Hermetic leak decay test.
- **Panel Test**

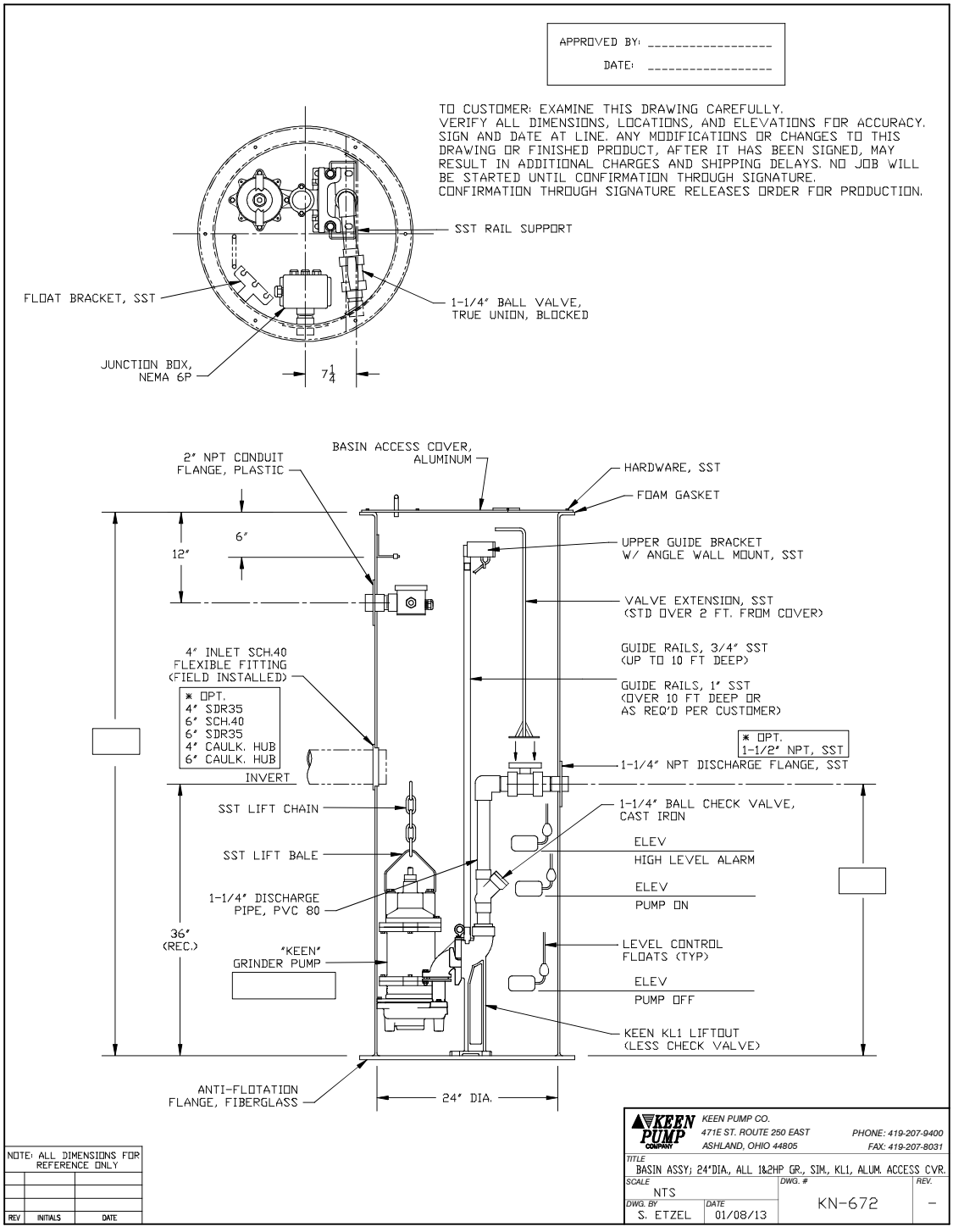
- **Basin Test**
- Manufacture must have a Quality Assurance Manual

12.0 DELIVERY, STORAGE AND HANDLING

- 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.
- The pump supplier shall provide six (6) (XX) copies of Installation, Operations and Maintenance Manuals to the Authority.
- 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.
- 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.
- For ease of handling and storage, grinder pump and control panel shall ship mounted on wooden pallet.
- 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.
- Handling and unloading the basin assemblies shall be the responsibility of the contractor or owner. Lifting devices such as chain is prohibited.
- The basin assemblies, grinder pumps and control panels will be stored in a controlled environment to prevent weather conditions from damaging equipment.


APPROVED BY: _____
DATE: _____
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SST RAIL SUPPORT
FLOAT BRACKET, SST
1-1/4" BALL VALVE, TRUE UNION, BLOCKED
JUNCTION BOX, NEMA 6P
7 1/4
2" NPT CONDUIT FLANGE, PLASTIC
BASIN COVER, FIBERGLASS
HARDWARE, SST
FOAM GASKET
6"
UPPER GUIDE BRACKET W/ ANGLE WALL MOUNT, SST
VALVE EXTENSION, SST (STD OVER 2 FT. FROM COVER)
GUIDE RAILS, 3/4" SST (UP TO 10 FT DEEP)
4" INLET SCH.40 FLEXIBLE FITTING (FIELD INSTALLED)
* OPT.
4" SDR35
6" SCH.40
6" SDR35
4" CAULK. HUB
6" CAULK. HUB
GUIDE RAILS, 1" SST (OVER 10 FT DEEP OR AS REQ'D PER CUSTOMER)
* OPT.
1-1/2" NPT, SST
1-1/4" NPT DISCHARGE FLANGE, SST
INVERT
SST LIFT CHAIN
1-1/4" BALL CHECK VALVE, CAST IRON
ELEV
HIGH LEVEL ALARM
SST LIFT BALE
ELEV
PUMP ON
1-1/4" DISCHARGE PIPE, PVC 80
36" (REC.)
"KEEN" GRINDER PUMP
MODEL:
LEVEL CONTROL FLOATS (TYP)
ELEV
PUMP OFF
KEEN KL1 LIFTOUT (LESS CHECK VALVE)
ANTI-FLOTATION FLANGE, FIBERGLASS
24" DIA.
NOTE: ALL DIMENSIONS FOR REFERENCE ONLY
REV | INITIALS | DATE
A | DLM | EC014-042, 10-29-14
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
NTS
DWG. #
KN-644
REV.
A
DWG. BY
S. ETZEL
DATE
01/27/11

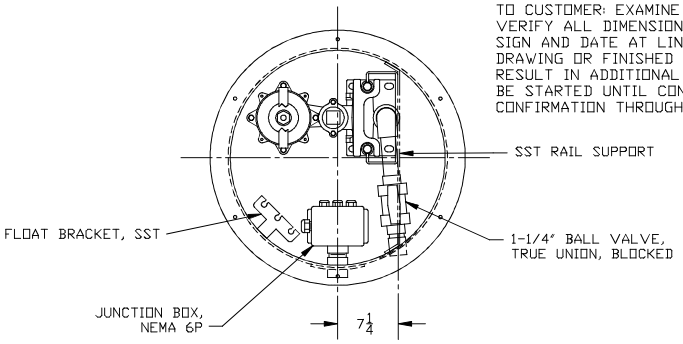
2HP GRINDER 24" BASIN KL1 ALUM COVER (REF ONLY)

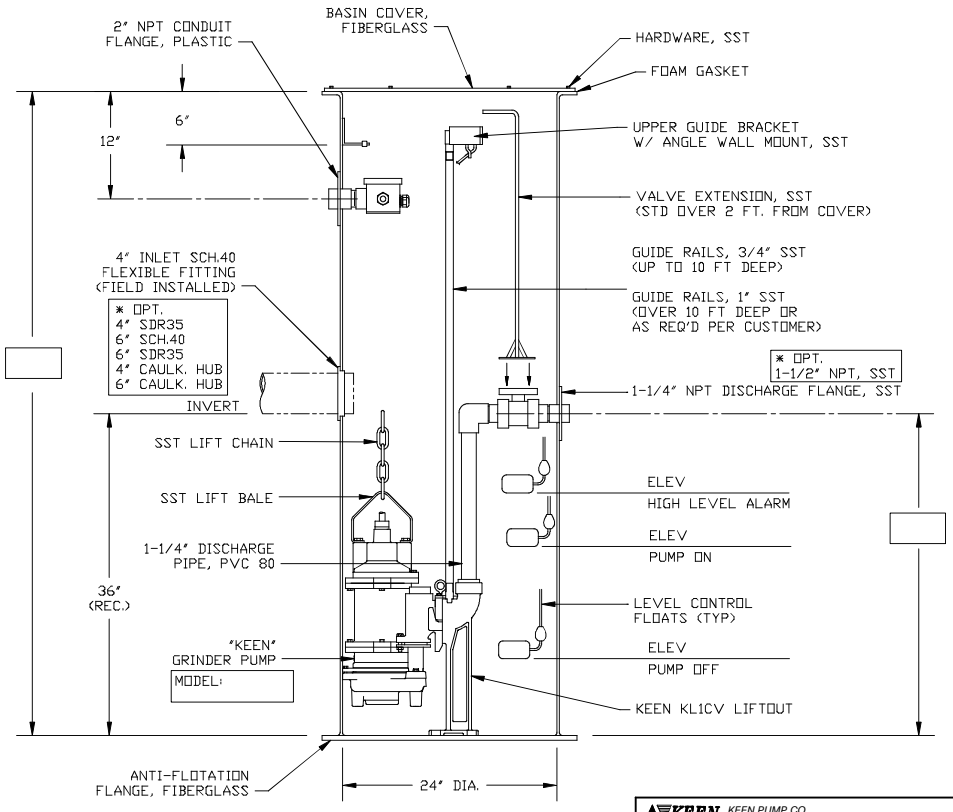


APPROVED BY: _____

DATE: _____

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NOTE: ALL DIMENSIONS FOR REFERENCE ONLY

REV	INITIALS	DATE

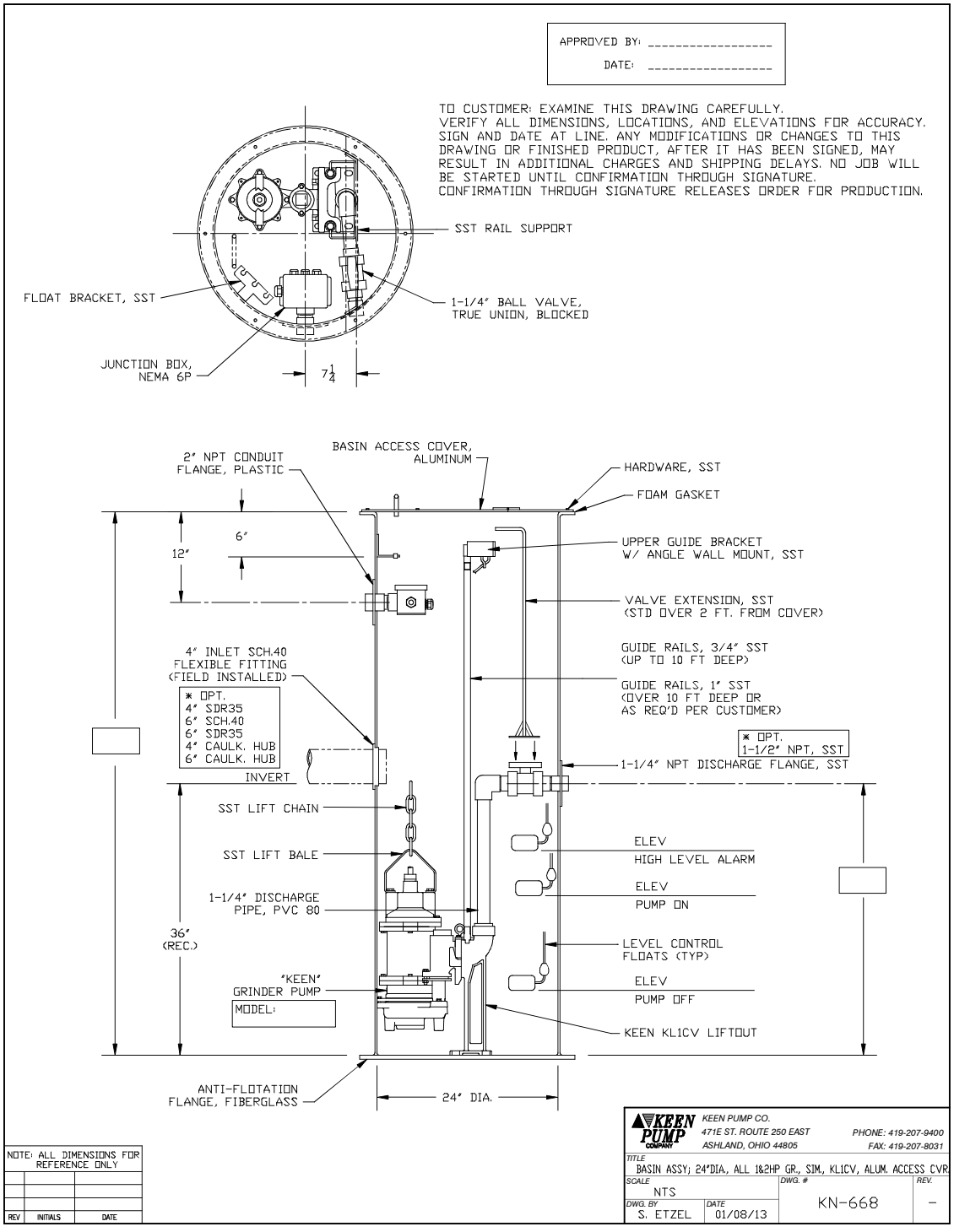
KEEN PUMP COMPANY
KEEN PUMP CO.
471E ST. ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

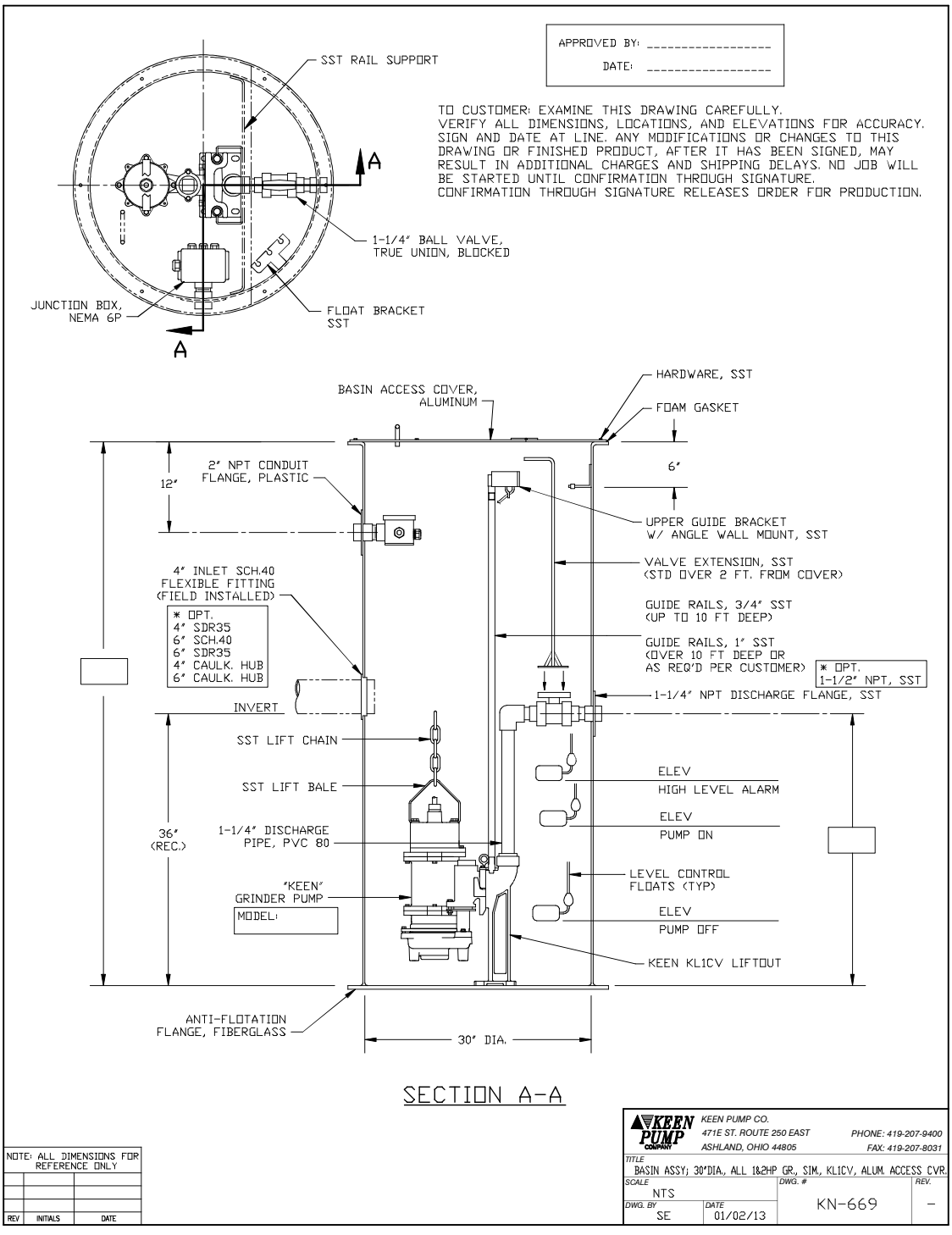
TITLE: BASIN ASSY; 24"DIA., ALL 1&2HP GR., SIM., KL1CV, FG CVR.

SCALE	DWG. #	REV.
NTS	KN-277	-

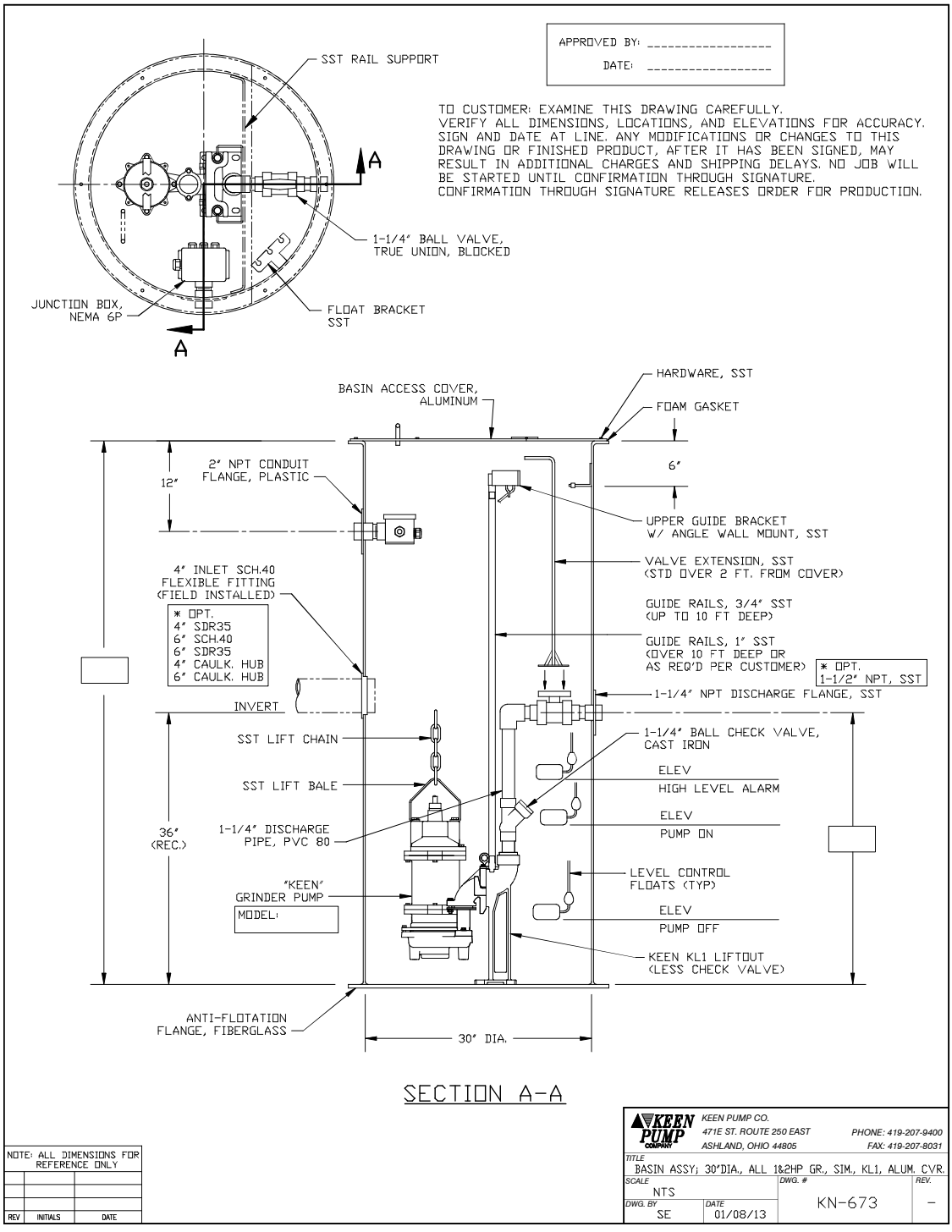
DWG. BY	DATE
S. ETZEL	01/27/11

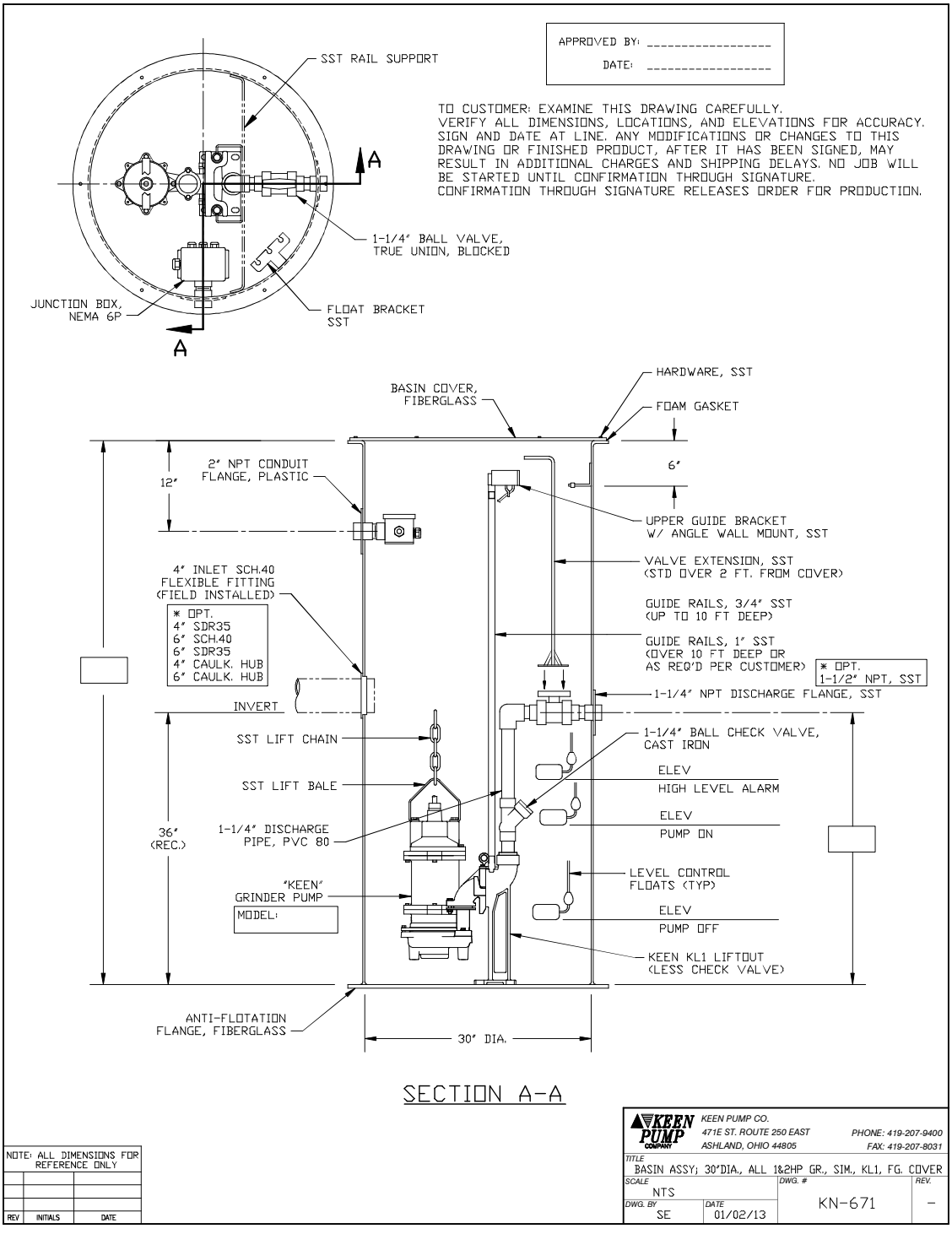
2HP GRINDER 24" BASIN KL1CV ALUM COVER (REF ONLY)

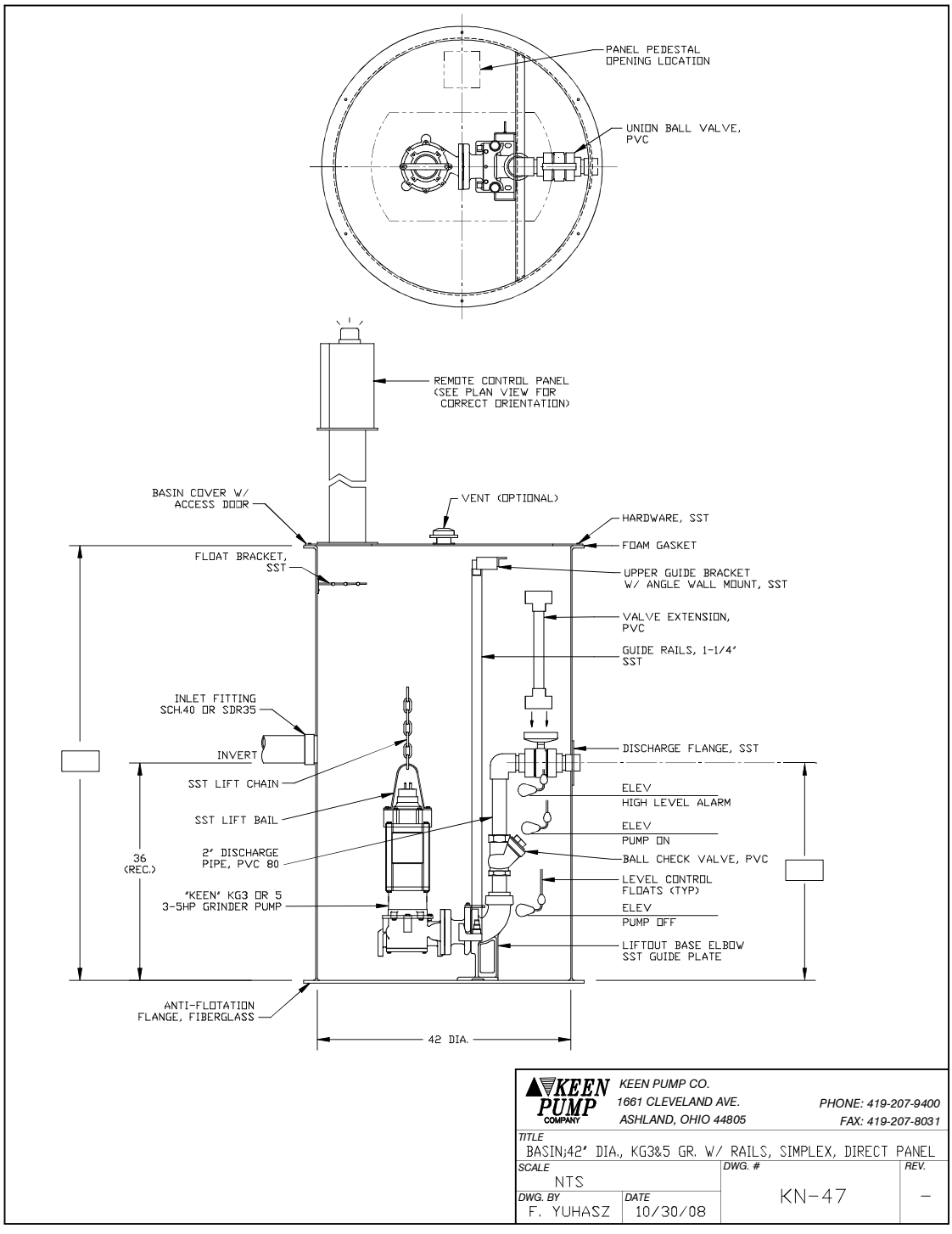


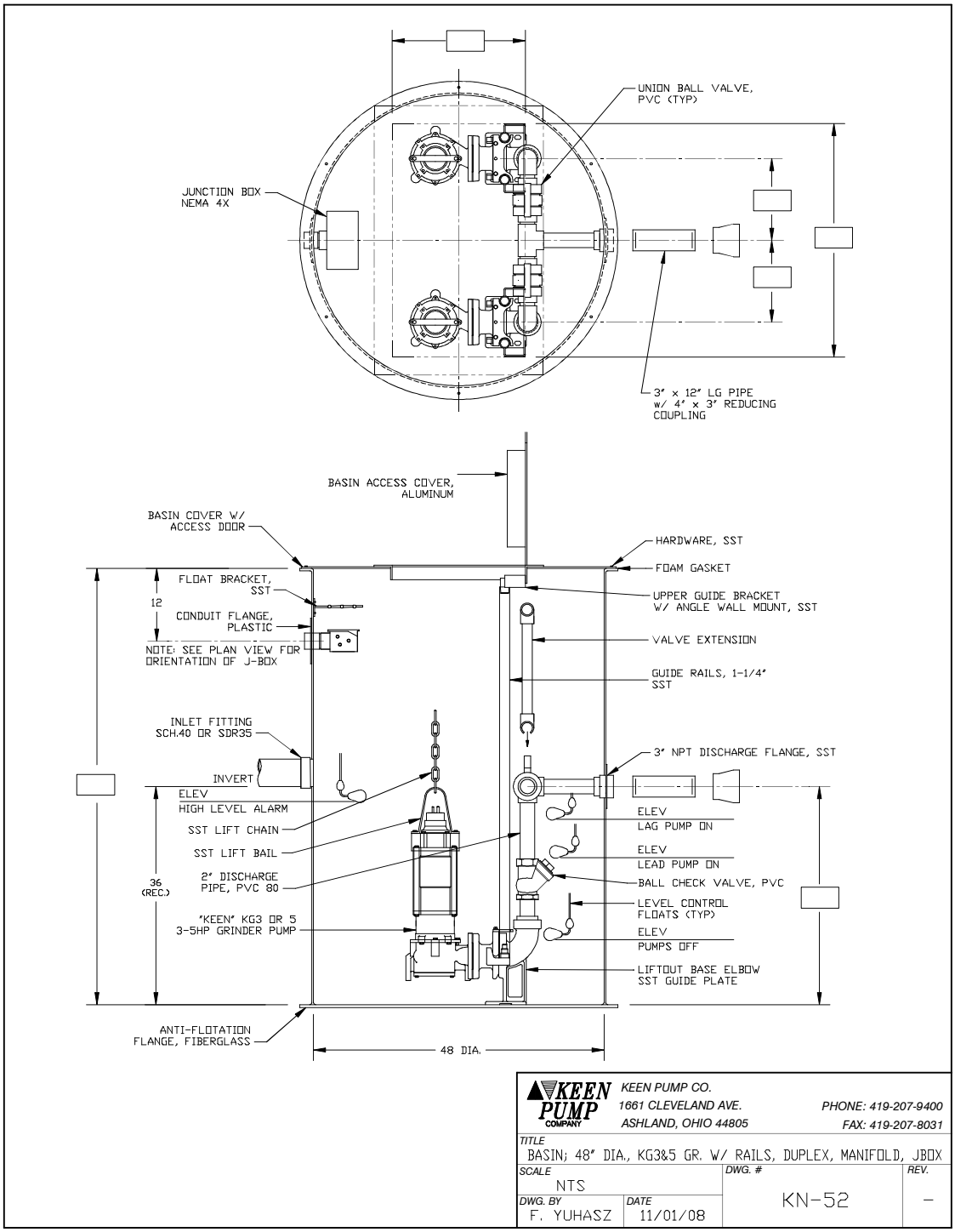

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DATE: _____
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SST RAIL SUPPORT
1-1/4" BALL VALVE, TRUE UNION, BLOCKED
JUNCTION BOX, NEMA 6P
FLOAT BRACKET SST
A
A
BASIN ACCESS COVER, ALUMINUM
HARDWARE, SST
FOAM GASKET
6"
12"
2" NPT CONDUIT FLANGE, PLASTIC
UPPER GUIDE BRACKET W/ ANGLE WALL MOUNT, SST
VALVE EXTENSION, SST (STD OVER 2 FT. FROM COVER)
4" INLET SCH.40 FLEXIBLE FITTING (FIELD INSTALLED)
* OPT.
4" SDR35
6" SCH.40
6" SDR35
4" CAULK. HUB
6" CAULK. HUB
GUIDE RAILS, 3/4" SST (UP TO 10 FT DEEP)
GUIDE RAILS, 1" SST (OVER 10 FT DEEP OR AS REQ'D PER CUSTOMER)
* OPT.
1-1/2" NPT, SST
1-1/4" NPT DISCHARGE FLANGE, SST
INVERT
SST LIFT CHAIN
ELEV
HIGH LEVEL ALARM
SST LIFT BALE
ELEV
PUMP ON
36" (REC.)
1-1/4" DISCHARGE PIPE, PVC 80
LEVEL CONTROL FLOATS (TYP)
"KEEN" GRINDER PUMP
MODEL:
ELEV
PUMP OFF
KEEN KL1CV LIFTOUT
ANTI-FLOTATION FLANGE, FIBERGLASS
30" DIA.
SECTION A-A
NOTE: ALL DIMENSIONS FOR REFERENCE ONLY
REV
INITIALS
DATE
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
NTS
DWG. #
KN-669
REV.
-
DWG. BY
SE
DATE
01/02/13

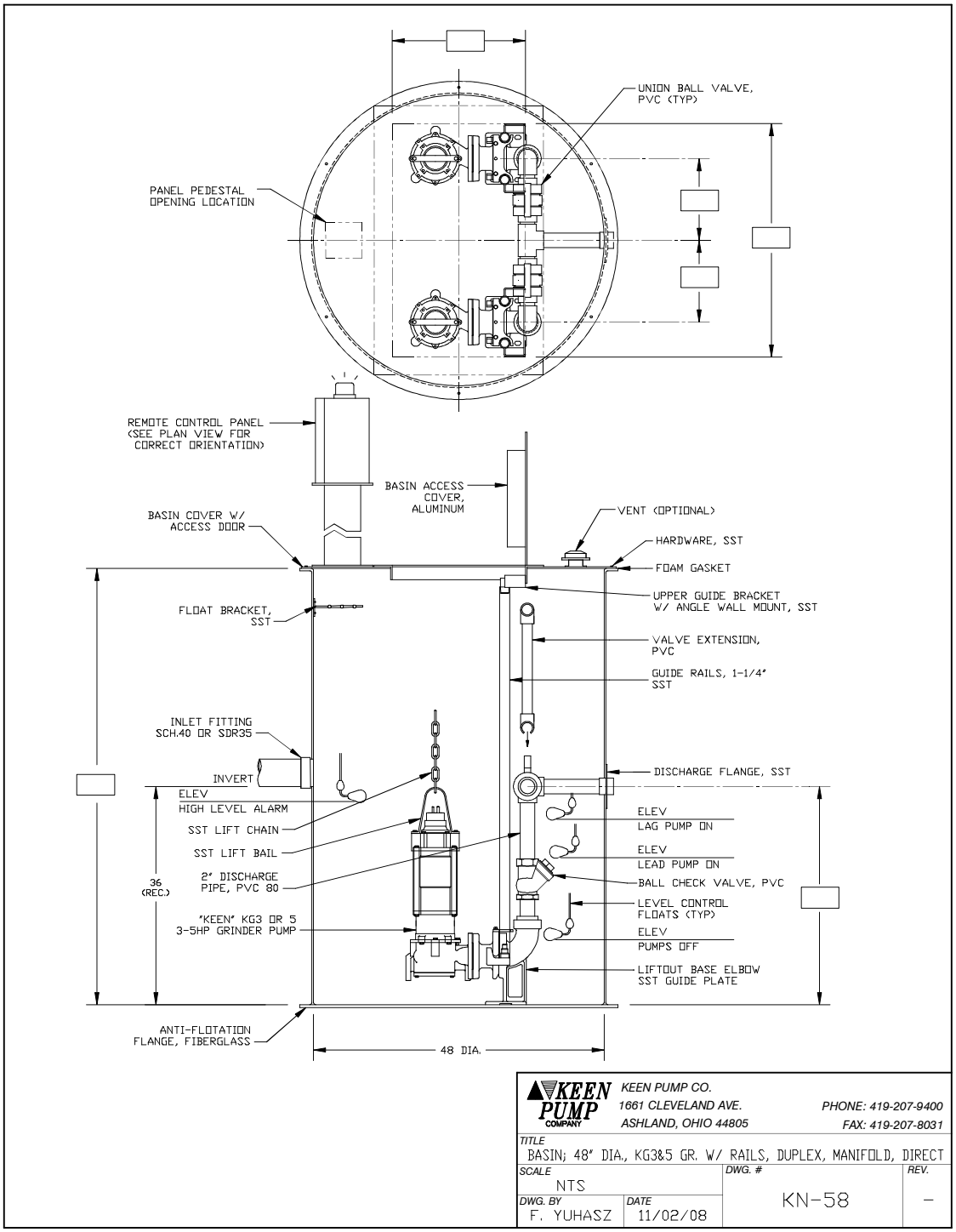
2HP GRINDER 30" BASIN KL1 FG ALUM (REF ONLY)

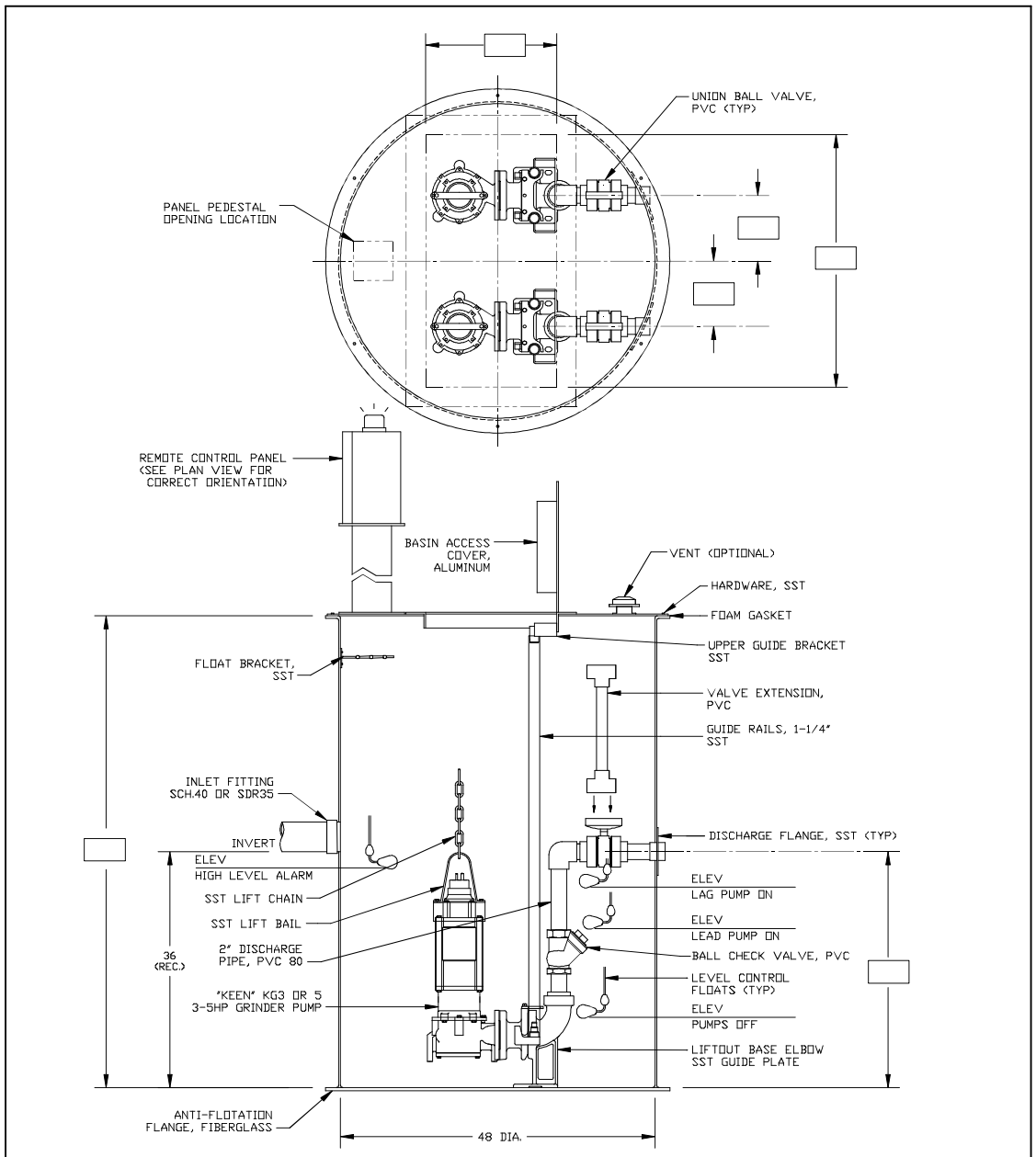



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DATE: _____
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SST RAIL SUPPORT
A
1-1/4" BALL VALVE, TRUE UNION, BLOCKED
JUNCTION BOX, NEMA 6P
FLOAT BRACKET SST
A
BASIN COVER, FIBERGLASS
HARDWARE, SST
FOAM GASKET
6"
12"
2" NPT CONDUIT FLANGE, PLASTIC
UPPER GUIDE BRACKET W/ ANGLE WALL MOUNT, SST
VALVE EXTENSION, SST (STD OVER 2 FT. FROM COVER)
4" INLET SCH.40 FLEXIBLE FITTING (FIELD INSTALLED)
* OPT.
4" SDR35
6" SCH.40
6" SDR35
4" CAULK. HUB
6" CAULK. HUB
GUIDE RAILS, 3/4" SST (UP TO 10 FT DEEP)
GUIDE RAILS, 1" SST (OVER 10 FT DEEP OR AS REQ'D PER CUSTOMER)
* OPT.
1-1/2" NPT, SST
1-1/4" NPT DISCHARGE FLANGE, SST
INVERT
SST LIFT CHAIN
1-1/4" BALL CHECK VALVE, CAST IRON
ELEV
HIGH LEVEL ALARM
SST LIFT BALE
ELEV
PUMP ON
36" (REC.)
1-1/4" DISCHARGE PIPE, PVC 80
LEVEL CONTROL FLOATS (TYP)
"KEEN" GRINDER PUMP
MODEL:
ELEV
PUMP OFF
KEEN KL1 LIFTOUT (LESS CHECK VALVE)
ANTI-FLOTATION FLANGE, FIBERGLASS
30" DIA.
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


PANEL PEDESTAL OPENING LOCATION
UNION BALL VALVE, PVC
REMOTE CONTROL PANEL (SEE PLAN VIEW FOR CORRECT ORIENTATION)
BASIN COVER W/ ACCESS DOOR
VENT (OPTIONAL)
HARDWARE, SST
FOAM GASKET
FLOAT BRACKET, SST
UPPER GUIDE BRACKET W/ ANGLE WALL MOUNT, SST
VALVE EXTENSION, PVC
GUIDE RAILS, 1-1/4" SST
INLET FITTING SCH.40 OR SDR35
INVERT
DISCHARGE FLANGE, SST
SST LIFT CHAIN
ELEV HIGH LEVEL ALARM
SST LIFT BAIL
ELEV PUMP ON
2" DISCHARGE PIPE, PVC 80
BALL CHECK VALVE, PVC
36 (REC.)
LEVEL CONTROL FLOATS (TYP)
"KEEN" KG3 OR 5 3-5HP GRINDER PUMP
ELEV PUMP OFF
LIFTOUT BASE ELBOW SST GUIDE PLATE
ANTI-FLOTATION FLANGE, FIBERGLASS
42 DIA.
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

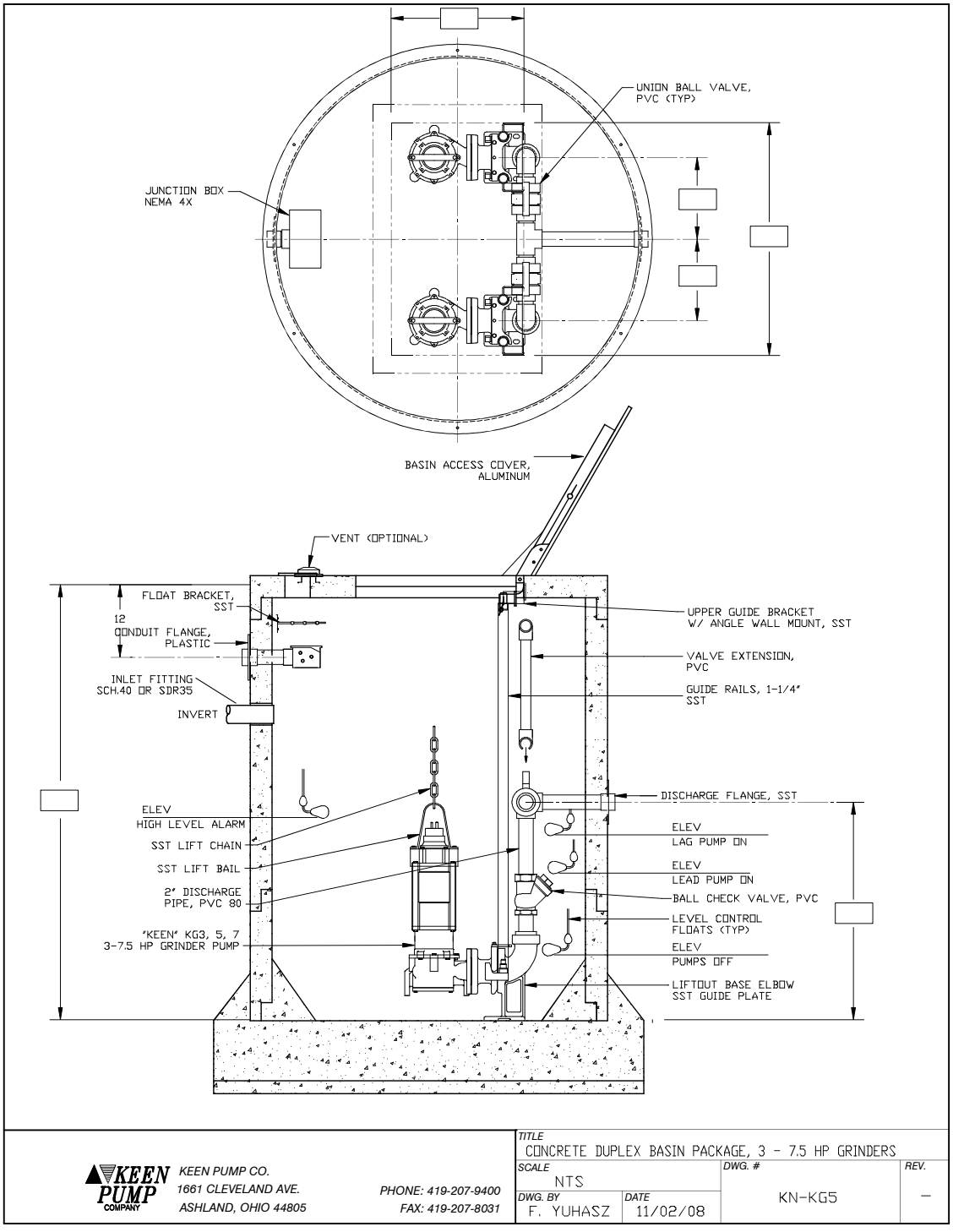

UNION BALL VALVE, PVC (TYP)
JUNCTION BOX NEMA 4X
3" x 12" LG PIPE w/ 4" x 3" REDUCING COUPLING
BASIN ACCESS COVER, ALUMINUM
BASIN COVER W/ ACCESS DOOR
HARDWARE, SST
FOAM GASKET
FLOAT BRACKET, SST
12
CONDUIT FLANGE, PLASTIC
NOTE: SEE PLAN VIEW FOR ORIENTATION OF J-BOX
UPPER GUIDE BRACKET W/ ANGLE WALL MOUNT, SST
VALVE EXTENSION
GUIDE RAILS, 1-1/4" SST
INLET FITTING SCH.40 OR SDR35
3" NPT DISCHARGE FLANGE, SST
INVERT ELEV
HIGH LEVEL ALARM
ELEV LAG PUMP ON
SST LIFT CHAIN
ELEV LEAD PUMP ON
SST LIFT BAIL
2" DISCHARGE PIPE, PVC 80
BALL CHECK VALVE, PVC
36 (REC.)
LEVEL CONTROL FLOATS (TYP)
"KEEN" KG3 OR 5 3-5HP GRINDER PUMP
ELEV PUMPS OFF
LIFTOUT BASE ELBOW SST GUIDE PLATE
ANTI-FLOTATION FLANGE, FIBERGLASS
48 DIA.
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


UNION BALL VALVE, PVC (TYP)
PANEL PEDESTAL OPENING LOCATION
REMOTE CONTROL PANEL (SEE PLAN VIEW FOR CORRECT ORIENTATION)
BASIN ACCESS COVER, ALUMINUM
VENT (OPTIONAL)
BASIN COVER W/ ACCESS DOOR
HARDWARE, SST
FOAM GASKET
UPPER GUIDE BRACKET W/ ANGLE WALL MOUNT, SST
FLOAT BRACKET, SST
VALVE EXTENSION, PVC
GUIDE RAILS, 1-1/4" SST
INLET FITTING SCH.40 OR SDR35
INVERT ELEV
DISCHARGE FLANGE, SST
HIGH LEVEL ALARM
ELEV LAG PUMP ON
SST LIFT CHAIN
SST LIFT BAIL
ELEV LEAD PUMP ON
36 (REC.)
2" DISCHARGE PIPE, PVC 80
BALL CHECK VALVE, PVC
LEVEL CONTROL FLOATS (TYP)
"KEEN" KG3 OR 5 3-5HP GRINDER PUMP
ELEV PUMPS OFF
LIFTOUT BASE ELBOW SST GUIDE PLATE
ANTI-FLOTATION FLANGE, FIBERGLASS
48 DIA.
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



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		DWG. #	REV.
NTS		KN-70	-
DWG. BY	DATE		
F. YUHASZ	11/10/08		



KEEN PUMP COMPANY
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		

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www.keenpump.com

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SUBMERSIBLE SEWAGE SOLIDS-HANDLING
OIL FILLED HAZARDOUS LOCATION

FM 3615 Elite Series & Impeller Design

9





SECTION 9

Solids-Handling - Elite Series

KEEN PUMP

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.

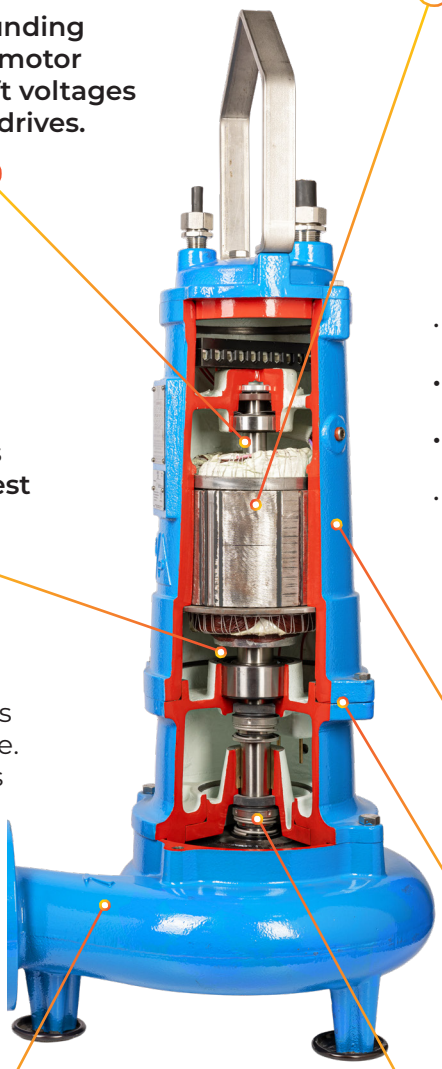
- **High Pressures**
- **High Flows**

- 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.

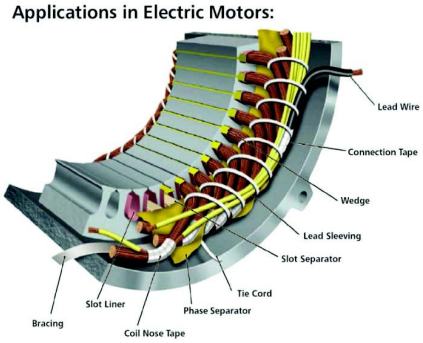


CERAMIC COATING - IMPELLER AND VOLUTE CASTING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!



HEAVY DUTY MOTOR



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

5 CASTINGS

ASTM - Class 35 high tensile strength castings.

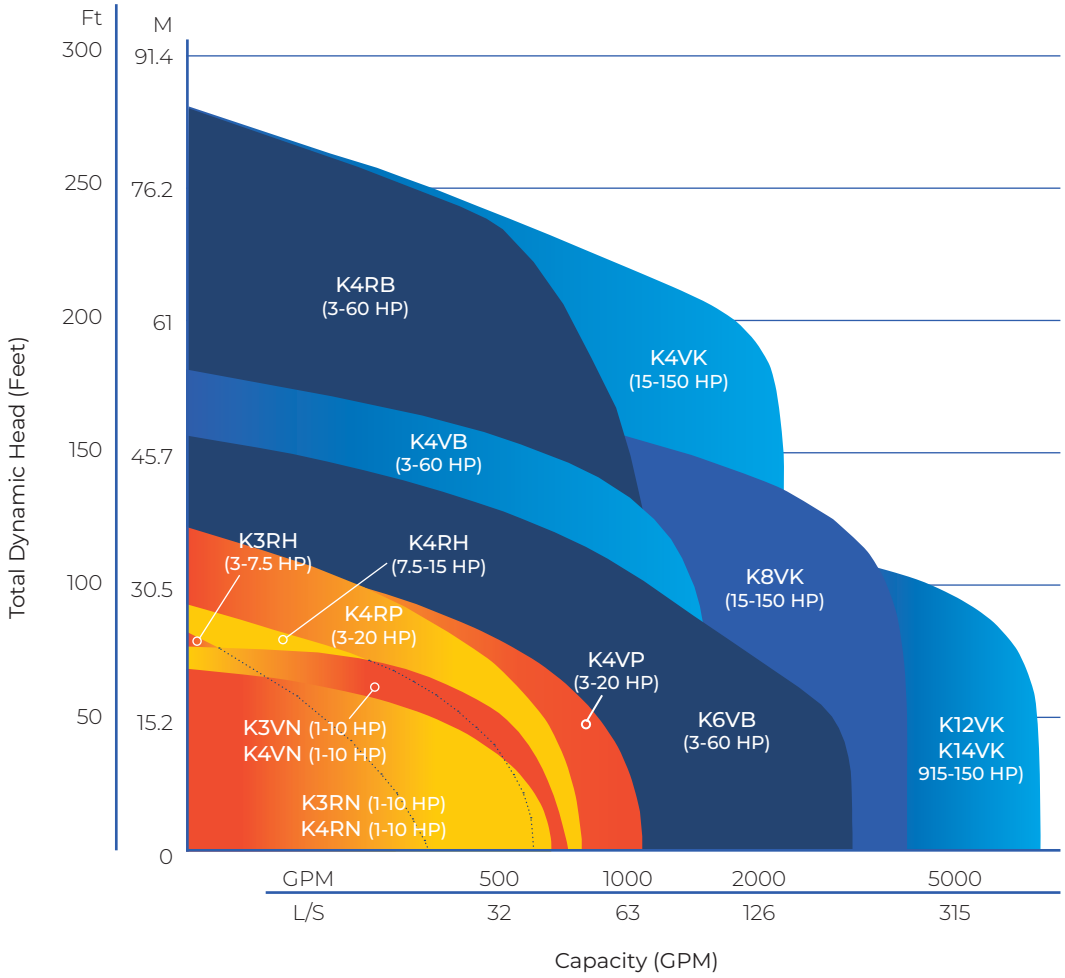
6 DURABLE POWDER COAT FINISH

Holds up to the toughest environmental conditions.

7 DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

Family Curve Performance



KEEN PUMP Designs Your Complete Pump Station

- Custom Engineered
- Unmatched Delivery
- Best Customer Service/

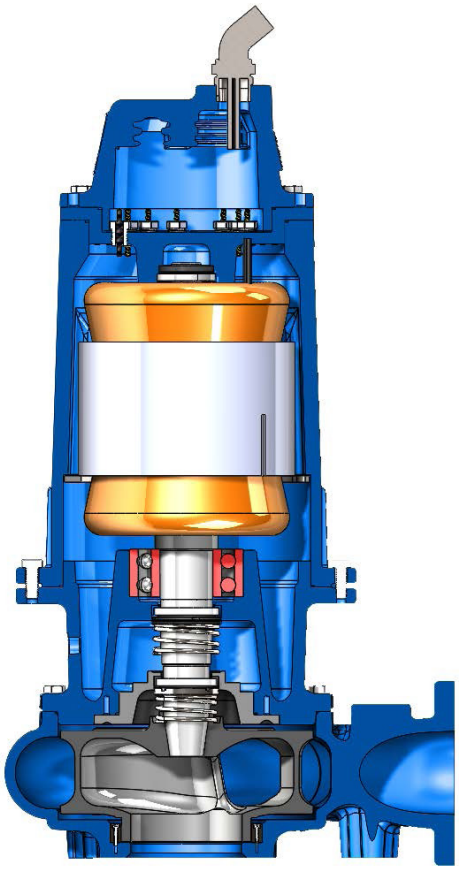
Pump Model	Horsepower	Impeller	Max. Flow (GPM)	Max. Head (TDH)
K3RN FM APPROVED	1 - 10	Vortex	665	58
K4RN FM APPROVED	1 - 10	Vortex	650	57
K3RH FM APPROVED	3 - 7.5	Vortex	275	97
K4RH FM APPROVED	7.5-15	Vortex	540	94
K3VN FM APPROVED	1 - 10	Enclosed	700	76
K3SP	30 - 15	Spiral	800	188
K4VN FM APPROVED	1 - 10	Enclosed	690	75
K4RP FM PENDING	3 - 20	Vortex	750	135
K4VP FM PENDING	3 - 20	Enclosed	1200	118
K4RB FM APPROVED	3 - 60	Vortex	1400	275
K4VB FM APPROVED	3 - 60	Enclosed	1675	183
K6VB FM APPROVED	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

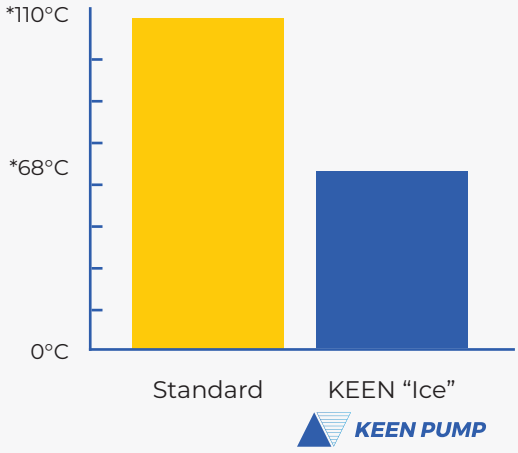
The ***KEEN PUMP DIFFERENCE*** is dedication to the highest quality of product and service in our industry along with the best customer care delivered with a sense of warmth, friendliness, individual pride, and company spirit.

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
- High Dielectric Strength Passes all FM Criteria!
- Promotes Longer Pump Life!
- Promotes Higher Efficiencies!



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.

3" Discharge - Recessed

2.5" Solids Handling

3450 & 1750 & 1150 RPM

This section contains the following material:

1. Pump Family Curves & Technical Data	• **K3RN** • **K3RH**
2. Indiviual Performance Curves	• **K3RN** • **K3RH**
3. Dimensional Drawings Pump Lift-out & Base Elbow Wet Well Installations	• **K3RN** • **K3RH**

OPTIONAL :
All Stainless Steel Construction

FM APPROVED



K3RN(X)

3” Submersible, Recessed Impeller (Class 1, Div. 1, Groups C & D Hazardous Location)

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

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

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

CAPABILITIES:

Flows	to 660 GPM
Heads	to 58 Feet
HP Range	1 - 10 HP
Voltage/Phase Options	208/230V, 1 Phase - 208/230/460 V, 3Phase
Discharge Connections	3” ANSI Class 125 Horizontal Flange
Motor Speeds	1150 / 1750 RPM
Solids Handling	3”
Impeller	Recessed, Vortex
Motor Service Factor	1.20

K3RN(X)



KEEN PUMP'S BEARING PROTECTION PROGRAM

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- Safely conducts the harmful voltages to the grounding ring adding protection for the bearings and extended life.

DOUBLE ROW BEARINGS

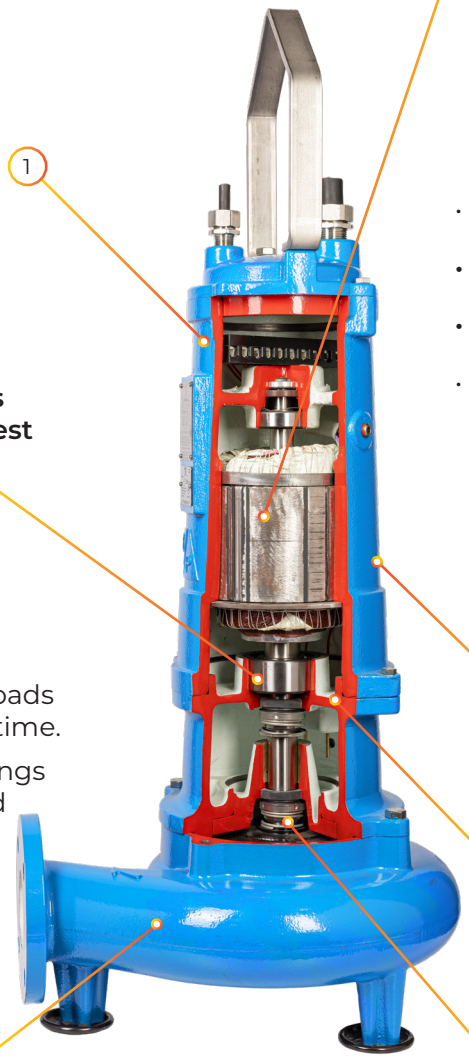


Heavy Duty Bearings to handle the toughest performances.

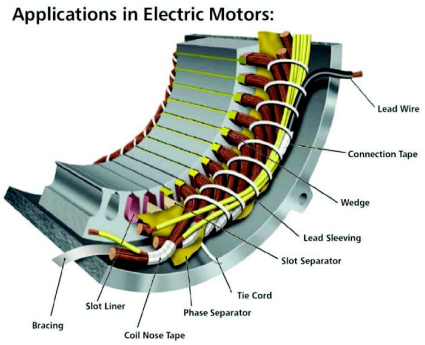
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CASTINGS

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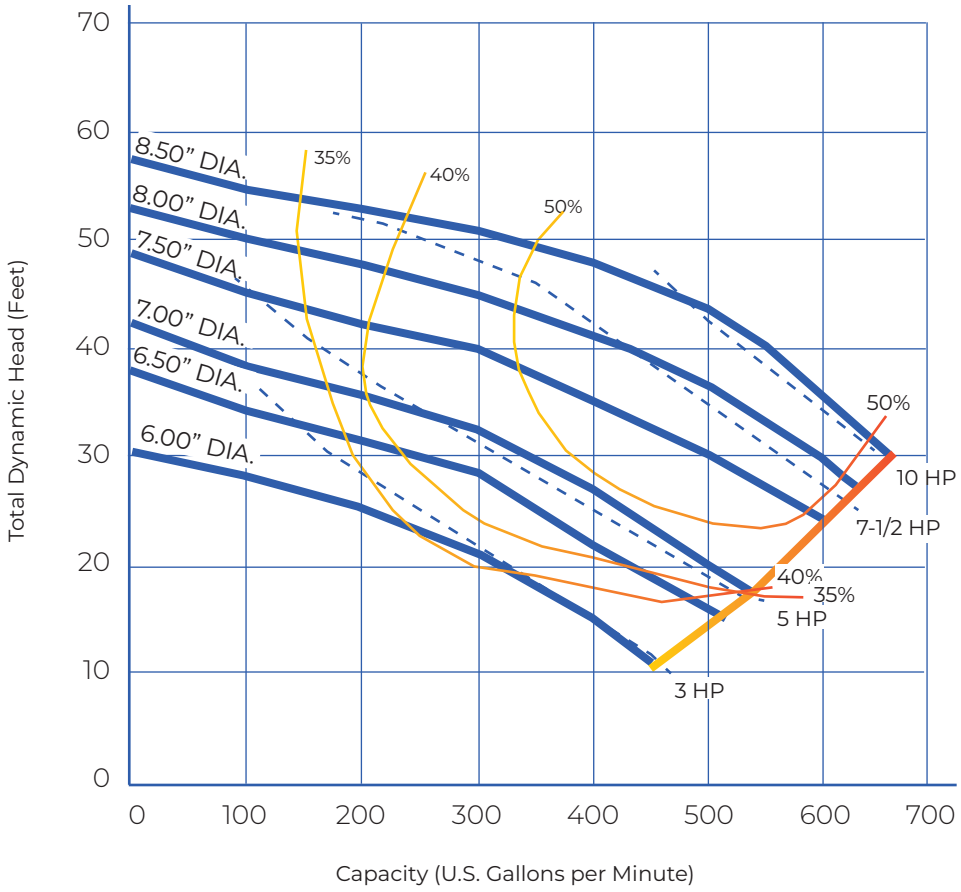
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PUMP SERIES	K3RN		3" SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	3"	Solids	3"

GPM: _____ TDH: _____

Performance

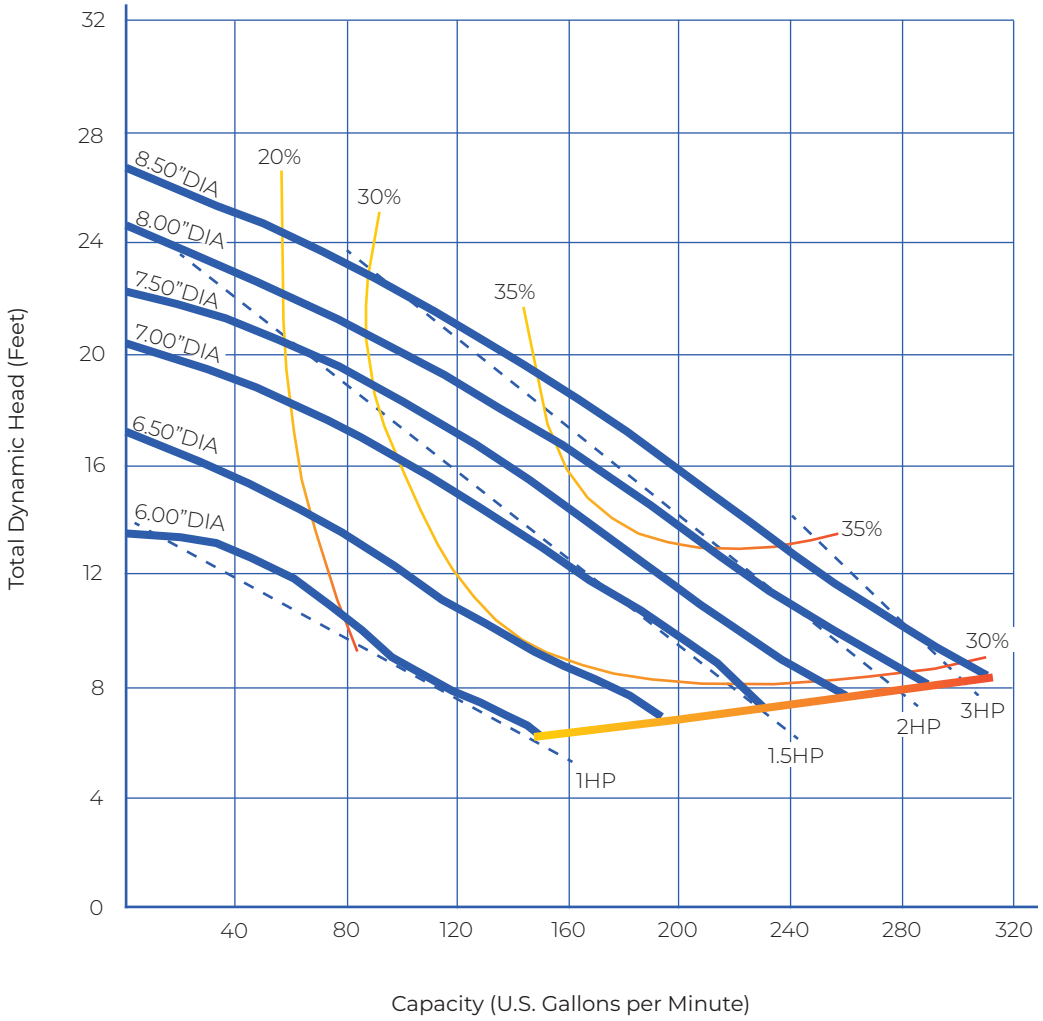


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K3RN		3" SUBMERSIBLE SEWAGE PUMPS		
Speed	1150 RPM	Discharge	3"	Solids	3"

GPM: _____ TDH: _____

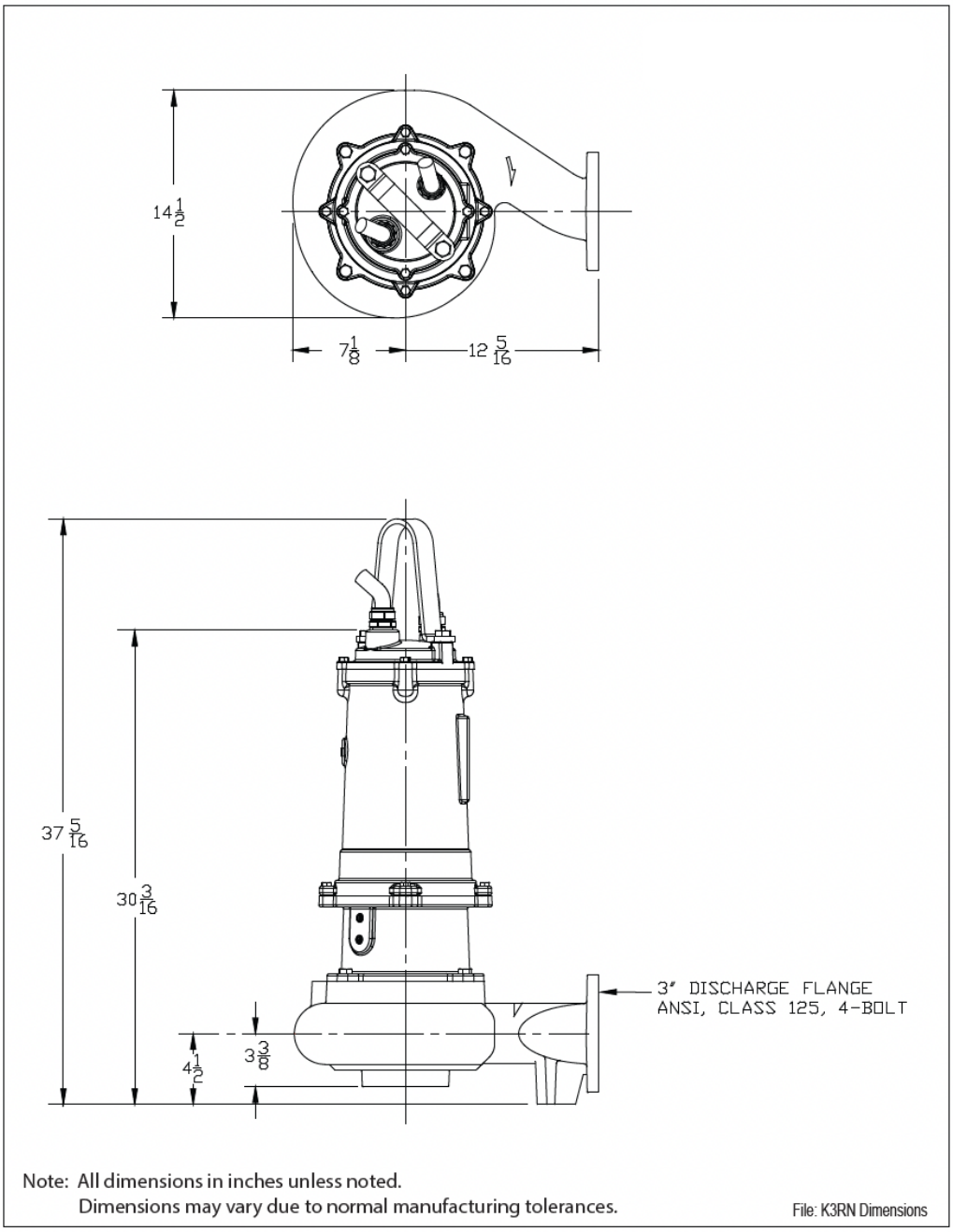
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PUMP SERIES	K3RN	3" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

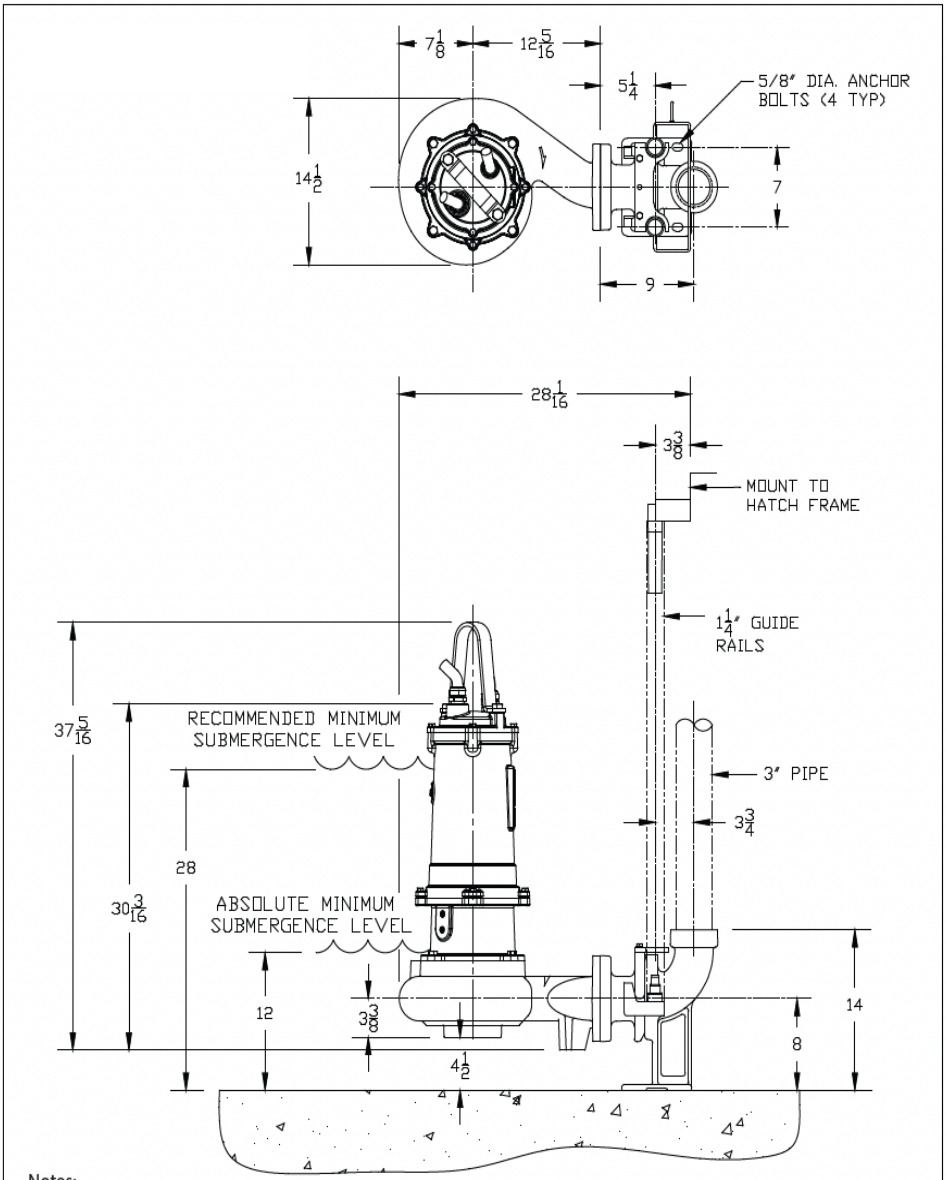


Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K3RN Dimensions

PUMP SERIES	K3RN	3" SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

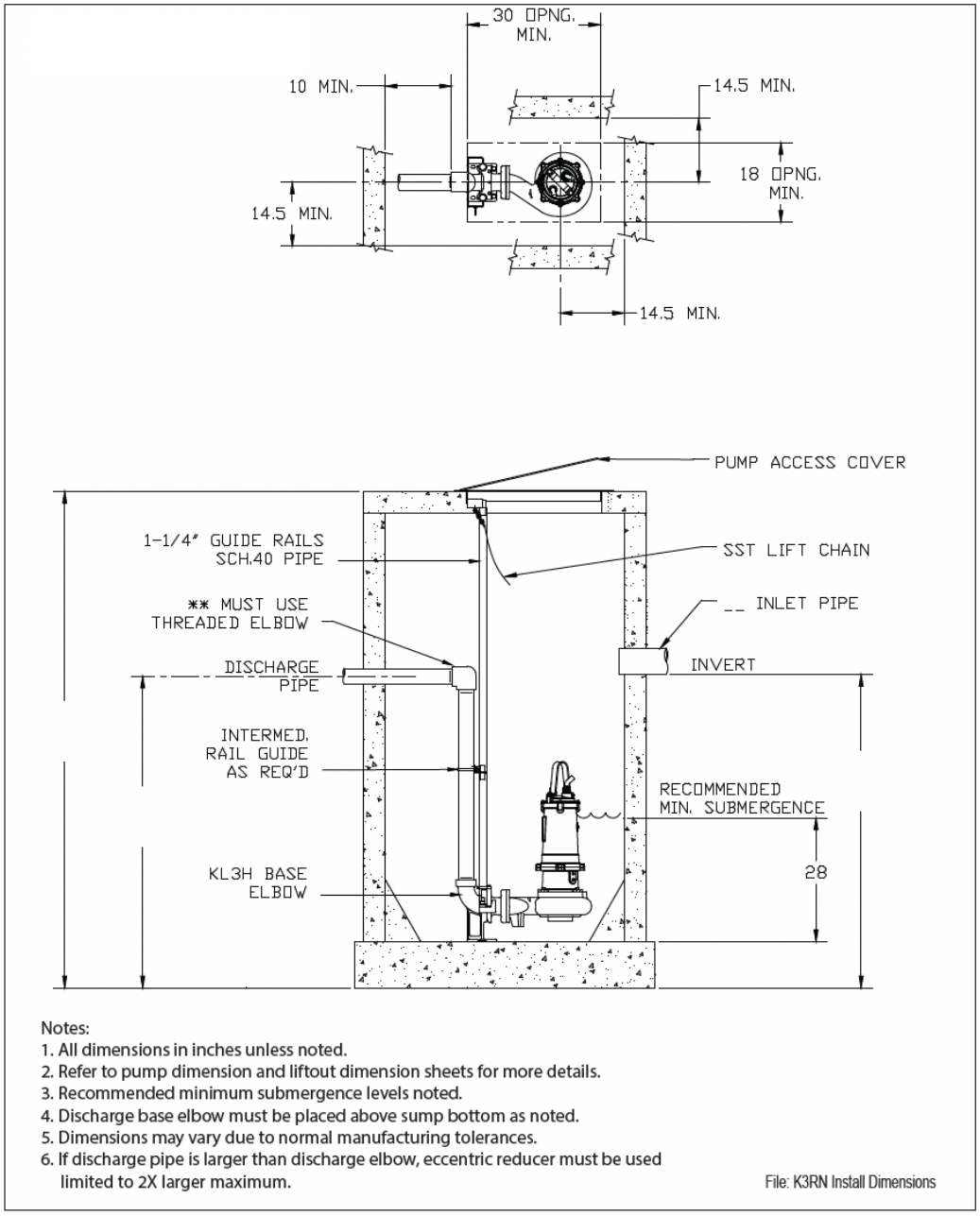


Notes:
1. All dimensions in inches unless noted.
2. Discharge flange 3"NPT.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Dimensions may vary due to normal manufacturing tolerances.
5. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K3RN Liftout Dimensions

PUMP SERIES	K3RN	3" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA

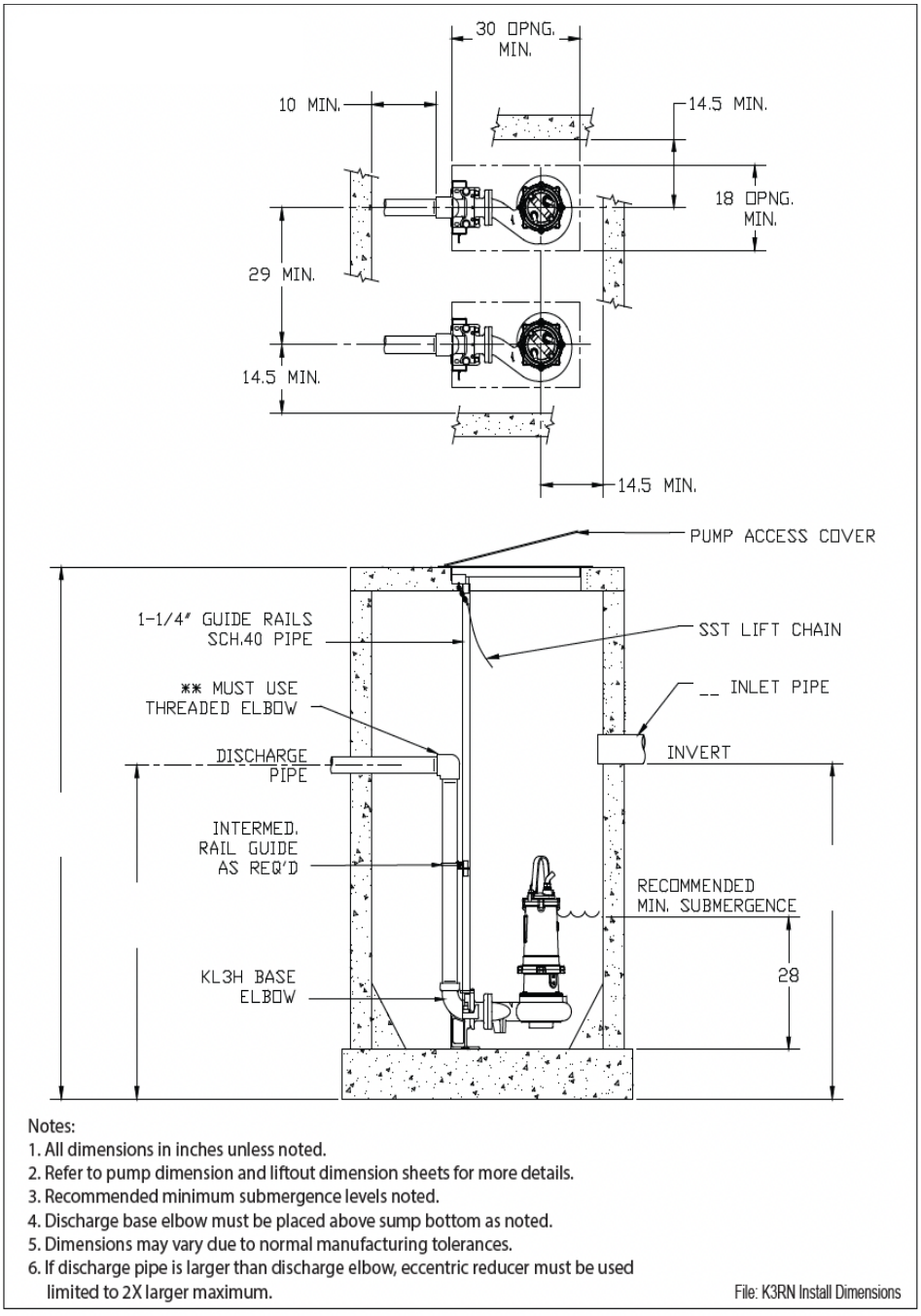


Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K3RN Install Dimensions

PUMP SERIES	K3RN	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.

File: K3RN Install Dimensions

PHYSICAL DATA	
Discharge Size	ANSI 3” 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 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	N: 392° F (200° C)
Power Cord Type	SOOW - 600V, 90° C; 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	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° 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	VOLTS	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	5.28
	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	77	77	87	83	79	70
3	3	86	85	79	79	81	80	79	71
5	1	88	89	82	82	86	83	76	62
5	3	89	88	82	82	79	76	71	60
7.5	3	89	88	82	82	75	70	64	54
10	3	90	89	83	83	79	78	71	59

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° 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	VOLTS	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

1.0 SCOPE

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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast IronClass 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B(Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:
  - _____ Horsepower
  - _____ RPM
  - _____ Voltage
  - _____ Phase
  - _____ Frequency
  - _____ 1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
    - The stator windings shall be constructed of material to meet the Class N insulation system.
    - The insulation varnish in the system must be applied in a dip and bake manner.
    - Stator lead material must meet or exceed Class N insulation system.
    - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class H insulation system.
      - The thermal limiting devices shall be attached to each phase winding.
      - 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.
- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
- A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
  - Acceptable voltage variation is +/- 10%.
  - Acceptable frequency variation is +/- 5%.

    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
- The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
    - All bolted connections in the submersible motor construction shall be:
        - Secured with 304 stainless steel fasteners.
        - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
    - 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.
    - 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.
- All bolted connections in the cord entry construction shall be:
    - Secured with 304 stainless steel fasteners.
    - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
    - Primary stationary ring shall be constructed of silicon carbide face material.
    - Primary rotating ring shall be constructed of silicon carbide face material.
    - Elastomers shall be constructed of Viton®.
    - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

5.0 PUMP BEARINGS

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a three-bearing design.
  - The upper bearing shall be a Conrad type, single row Radial, ball bearing designed to adequately handle the required radial loads.
  - 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.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

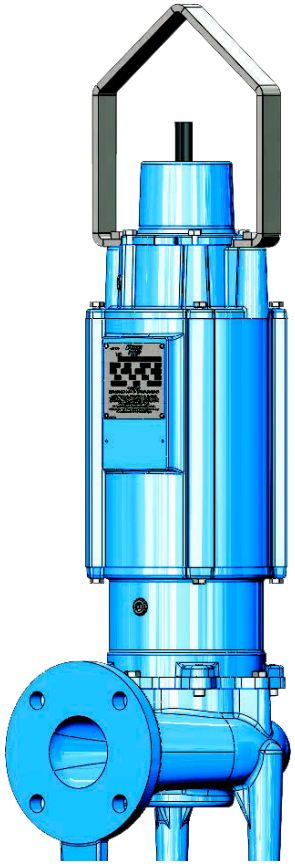
- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, 8-vane (1750 & 1150), vortex flow and dynamically balanced to ISO 1940 G6.3.
- The impeller shall be designed with pump out vanes on the back shroud of the pump impeller to prevent the pump media from entering the outboard seal cavity.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a centerline discharge configuration.
- The discharge is to be 3" ANSI® standard Class 125, 4-bolt configuration.
- Horizontal discharge is standard if specifying K3RN model.
- 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.

OPTIONAL :
All Stainless Steel Construction

FM APPROVED



K3RH(X)

3” Submersible, Recessed Impeller (Class 1, Div. 1, Groups C & D Hazardous Location)

CAPABILITIES:

Flows	to 275 GPM
Heads	to 97 Feet
HP Range	3 - 7.5 HP
Voltage/Phase Options	208/230V, 1 Phase - 208/230/460 V, 3Phase
Discharge Connections	3” ANSI Class 125 Horizontal Flange
Motor Speeds	3450 RPM
Solids Handling	2.5”
Impeller	Recessed, Vortex
Motor Service Factor	1.20

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

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

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

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.

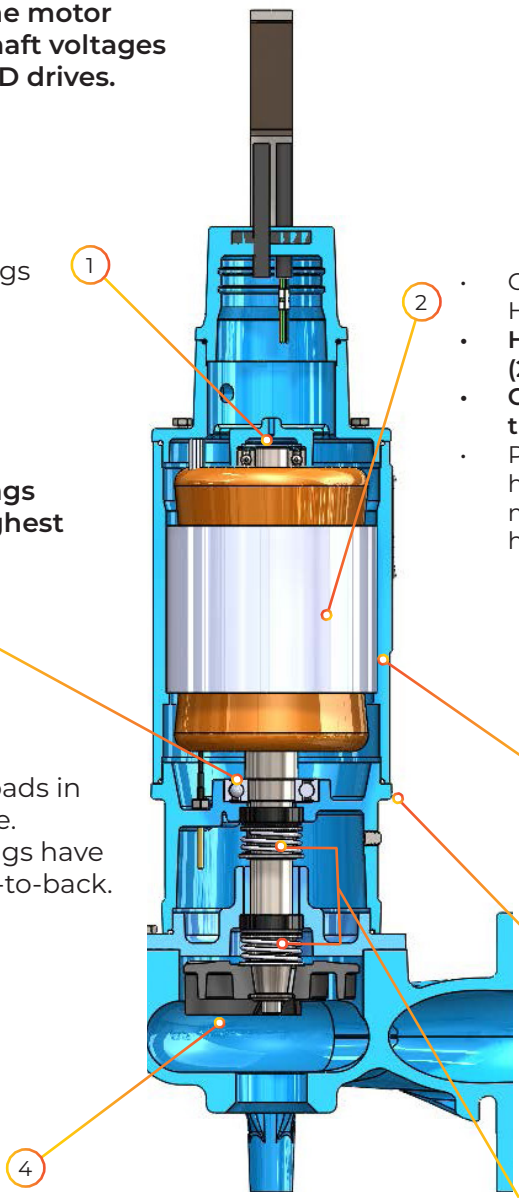
DOUBLE ROW BEARINGS



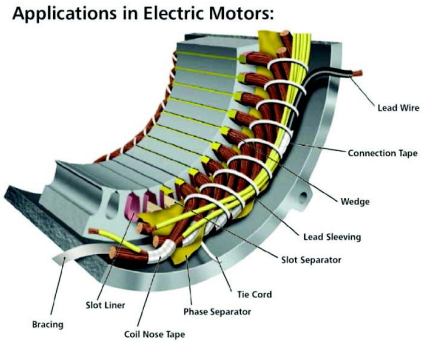
- **Heavy Duty Bearings to handle the toughest performances.**
- **High Pressures**
- **High Flows**

- Handles both Axial 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



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

5 CASTINGS

ASTM - Class 35 high tensile strength castings.

6 DURABLE POWDER COAT FINISH

- **Holds up to the toughest environmental**

7 DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

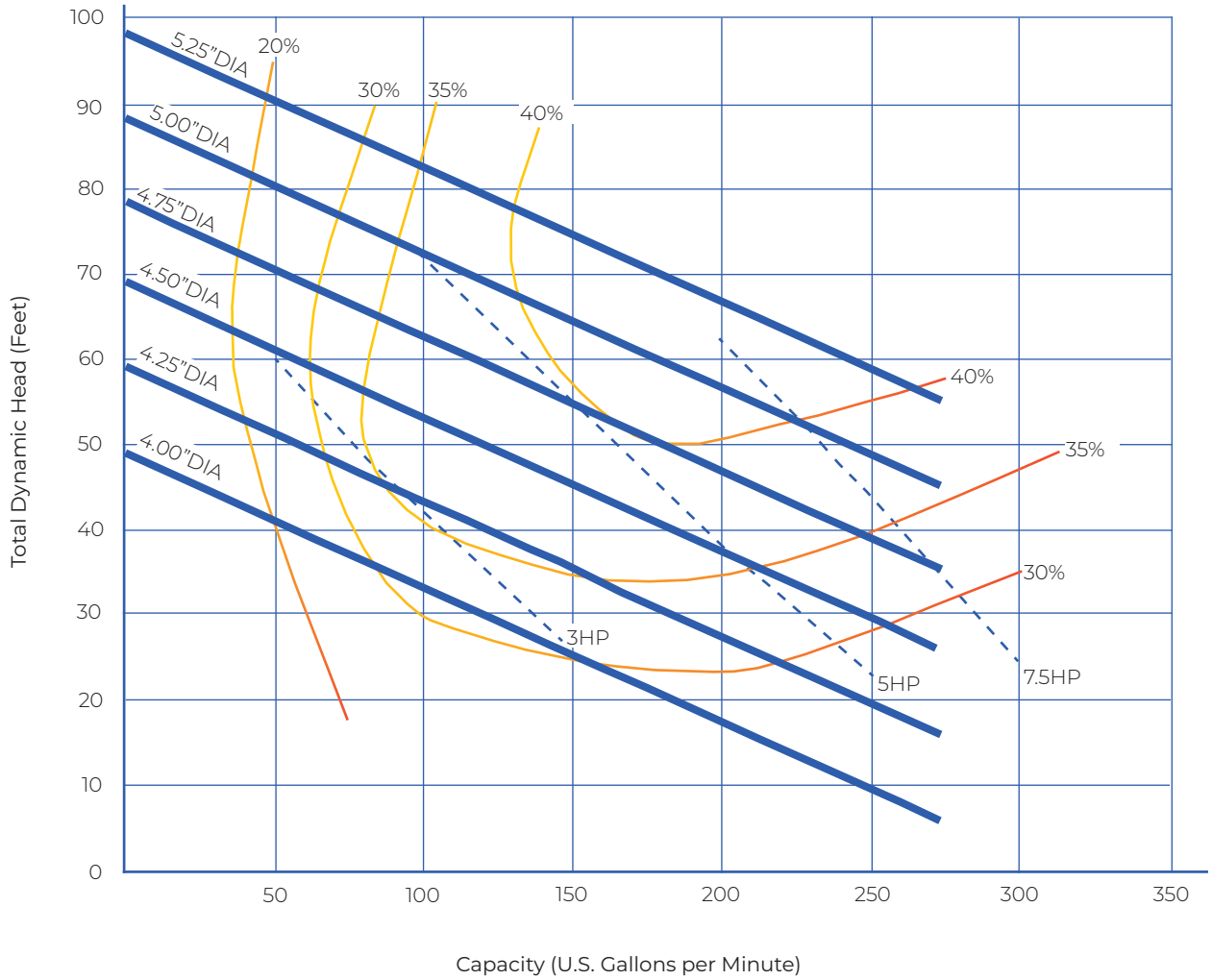
CERAMIC COATING - IMPELLER AND VOLUTE CASTING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

PUMP SERIES	K3RH		3" SUBMERSIBLE SEWAGE PUMPS		
Speed	3450 RPM	Discharge	3"	Solids	2.5"

GPM: _____ TDH: _____

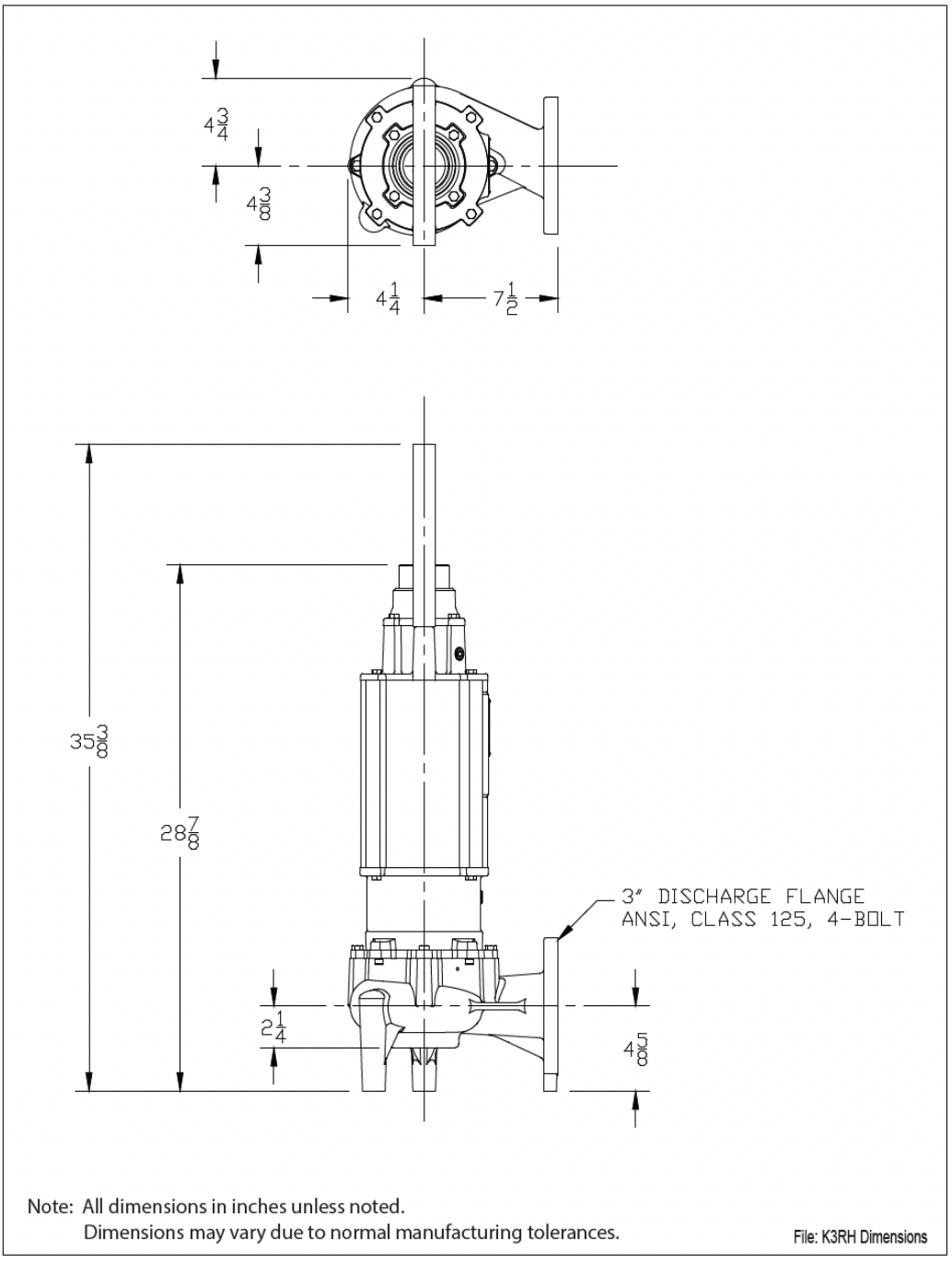
Performance



The curves refect 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	K3RH	3" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

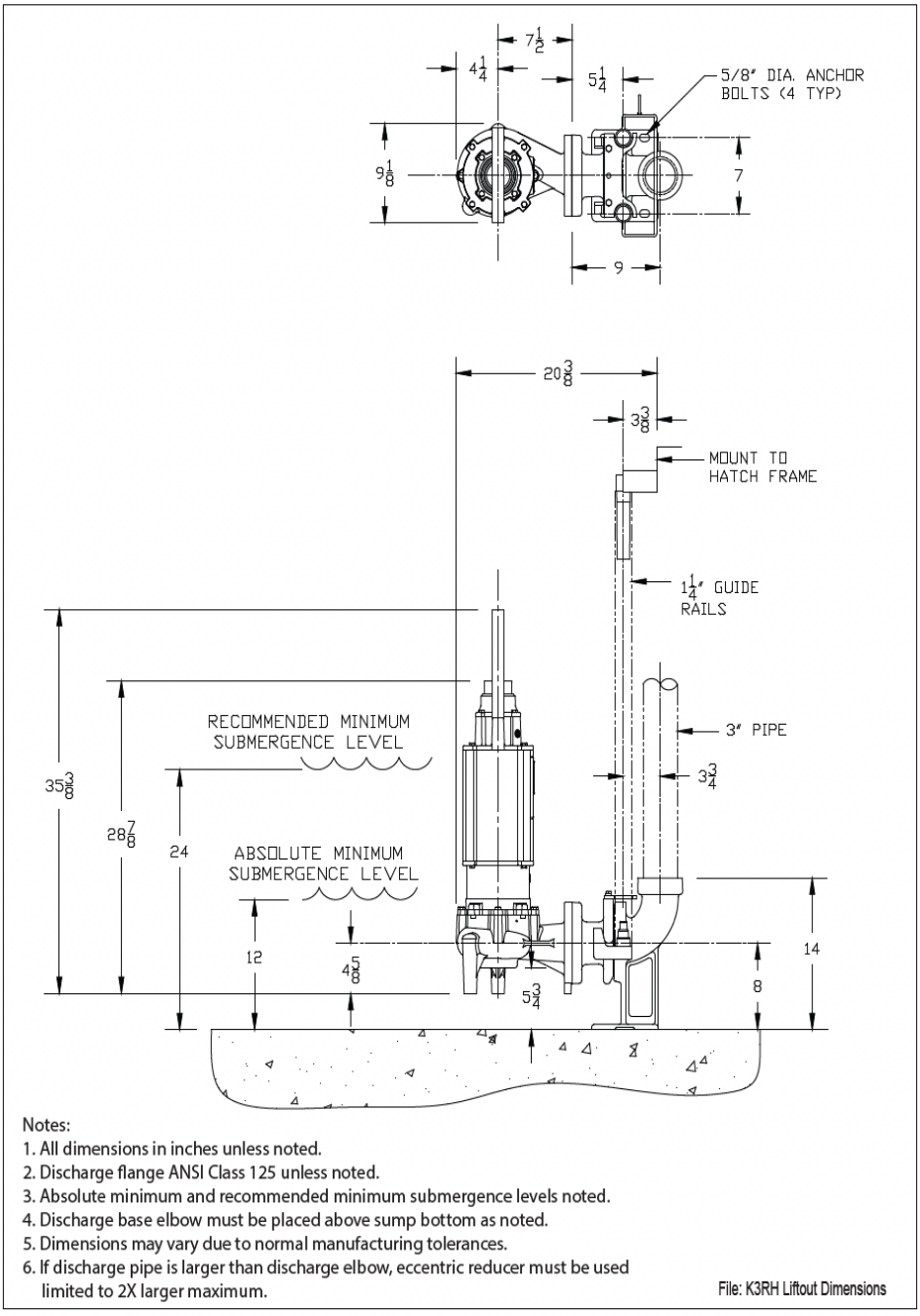


Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K3RH Dimensions

PUMP SERIES	K3RH	3" SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

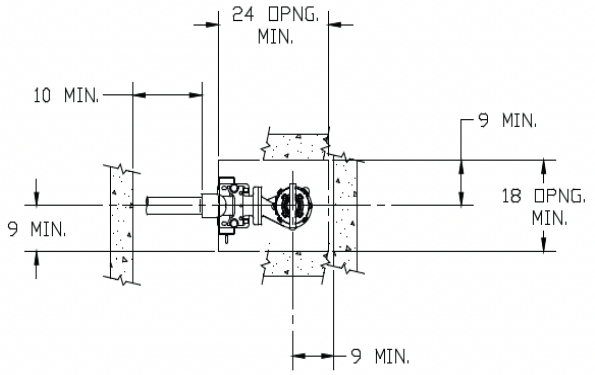


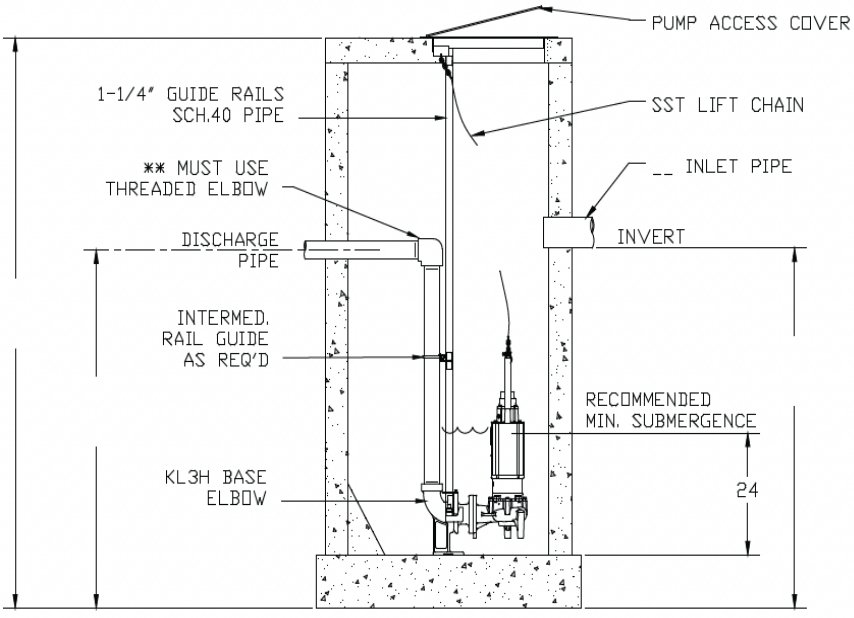
Notes:
1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. 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



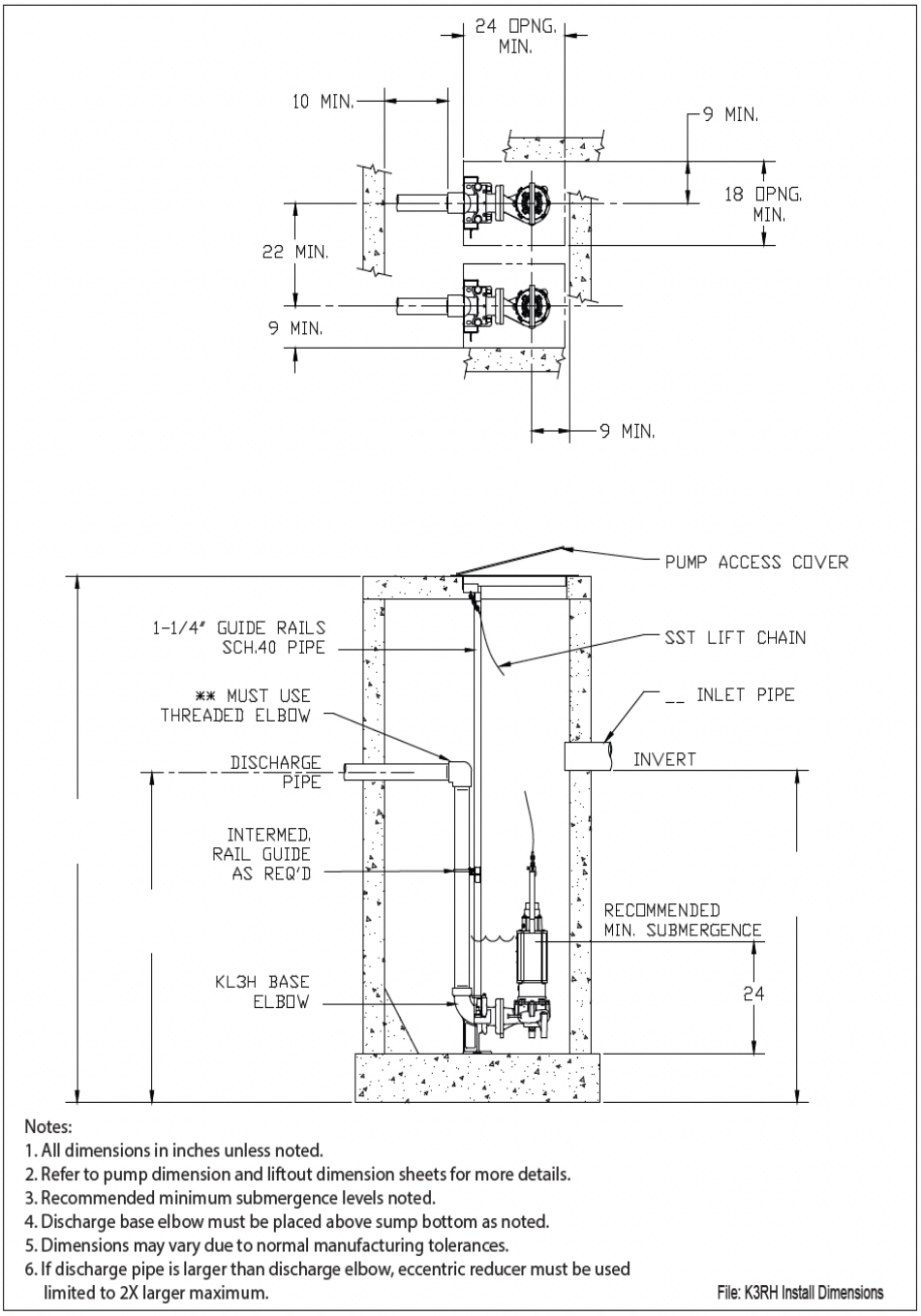


Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
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.

File: K3RH Install Dimensions

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 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	N: 392° F (200° C)
Power Cord Type	SOOW - 600V, 90° C; 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	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° 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	3450			
Electrical Ratings	Heat Sensor	24VDC, 5AMPS	115VAC, 5AMPS	230VAC, 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	VOLTS	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			

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	88	88	86	84	88	88	86	78
3	3	88	88	86	84	89	89	87	79
5	1	89	89	87	85	90	90	88	80
5	3	89	89	87	85	90	90	88	80
7.5	3	90	90	88	86	90	90	88	80

1.0 SCOPE

- 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.
- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:
  - _____ Horsepower
  - _____ RPM
  - _____ Voltage
  - _____ Phase
  - _____ Frequency
  - _____ 1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
    - The stator windings shall be constructed of material to meet the Class N insulation system.
    - The insulation varnish in the system must be applied in a dip and bake manner.
    - Stator lead material must meet or exceed Class N insulation system.
    - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
      - The thermal limiting devices shall be attached to each phase winding.
      - 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.
- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
- A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.

    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton®.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

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

5.0 PUMP BEARINGS

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a three-bearing design.
  - The upper bearing shall be a Conrad type, single row, Radial ball bearing designed to adequately handle the required radial loads.
  - 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.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, 10-vane (3450), vortex flow and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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

- Material shall be ASTM® class 35, A48 gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a centerline discharge configuration.
- The discharge is to be 3" ANSI® standard Class 125, 4-bolt configuration.
- 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 - Recessed

3” Solids Handling

3450 & 1750 & 1150 RPM

This section contains the following material:

1. Pump Family Curves & Technical Data	• **K4RH** • **K4RN** • **K4RP** • **K4RB**
2. Indiviual Performance Curves	• **K4RH** • **K4RN** • **K4RP** • **K4RB**
3. Dimensional Drawings Pump Lift-out & Base Elbow Wet Well Installations	• **K4RH** • **K4RN** • **K4RP** • **K4RB**

OPTIONAL :

All Stainless Steel

FM APPROVED



K4RH(X)

4” Submersible, Recessed Impeller (Class 1, Div. 1, Groups C & D Hazardous Location)

CERAMIC COATED RECESSED IMPELLER

- 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

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

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

CAPABILITIES:

Flows	to 540 GPM
Heads	to 94 Feet
HP Range	7.5-15 HP
Voltage/Phase Options	208/230/460 V, 3Phase
Discharge Connections	4” ANSI Class 125 Horizontal Flange
Motor Speeds	3450 RPM
Solids Handling	3”
Impeller	Recessed, Vortex
Motor Service Factor	1.20

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.

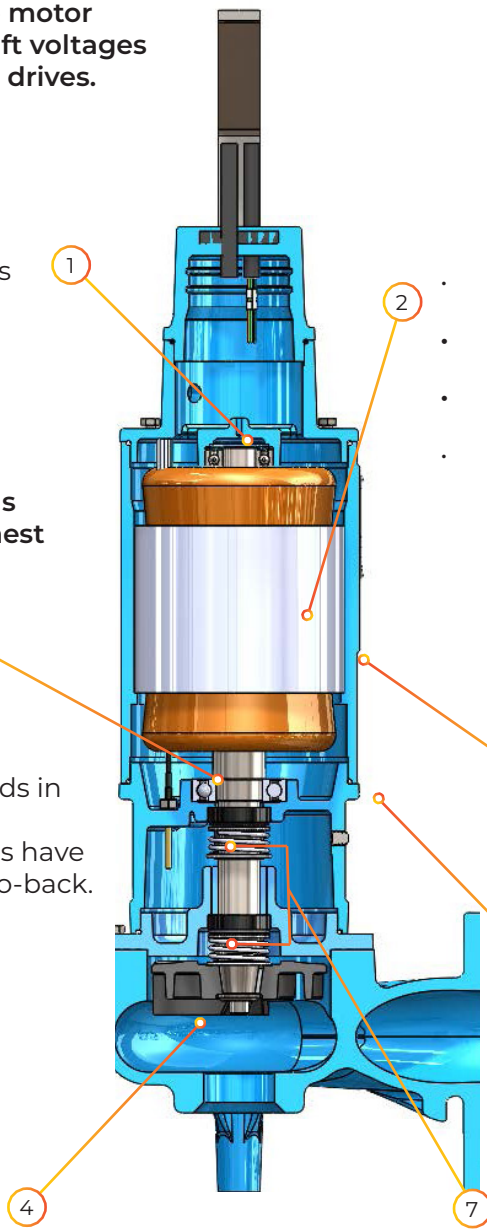
DOUBLE ROW BEARINGS



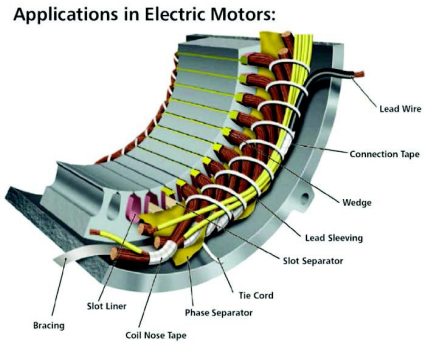
- **Heavy Duty Bearings to handle the toughest performances.**
- **High Pressures**
- **High Flows**

- Handles both Axial 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



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

CASTINGS

ASTM - Class 35 high tensile strength castings.

DURABLE POWDER COAT FINISH

- **Holds up to the toughest environmental**

CERAMIC COATING - IMPELLER AND VOLUTE CASTING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

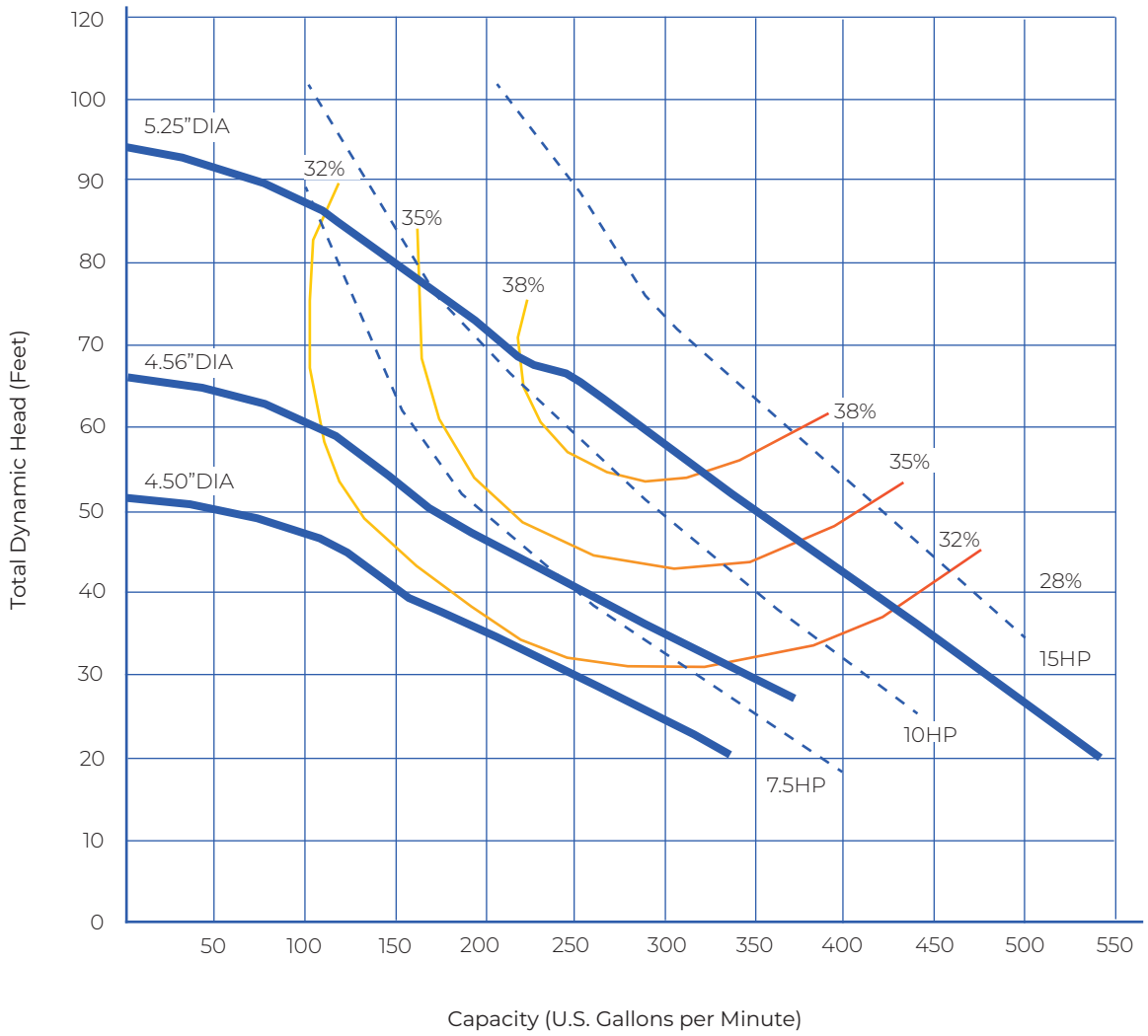
DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

PUMP SERIES	K4RH		4” SUBMERSIBLE SEWAGE PUMPS		
Speed	3450 RPM	Discharge	4”	Solids	3”

GPM:_____ TDH: _____

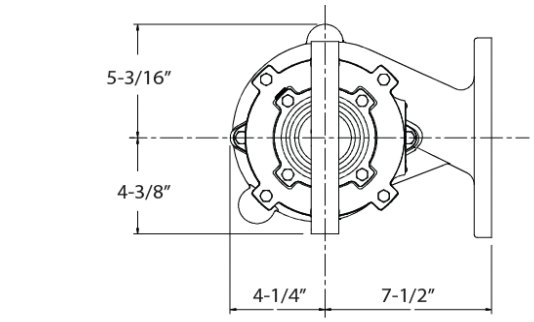
Performance

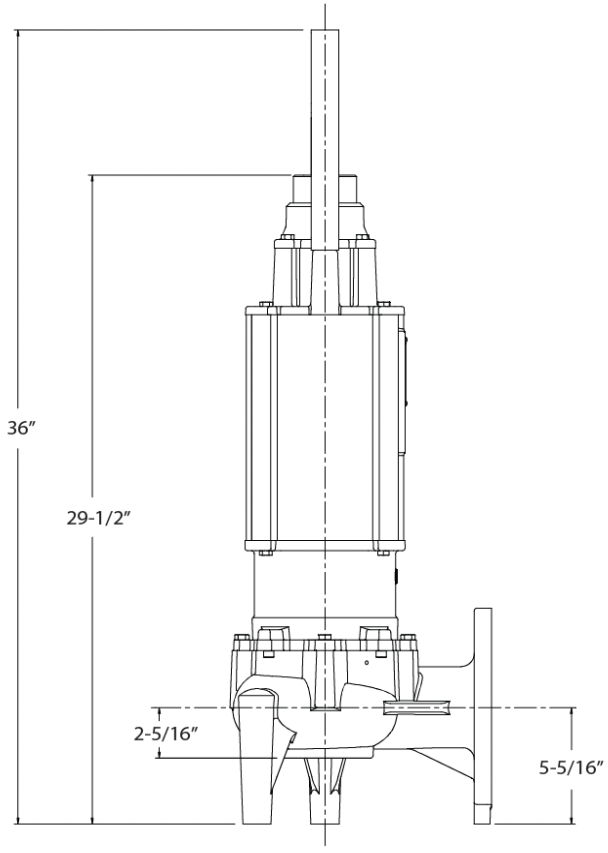


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	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

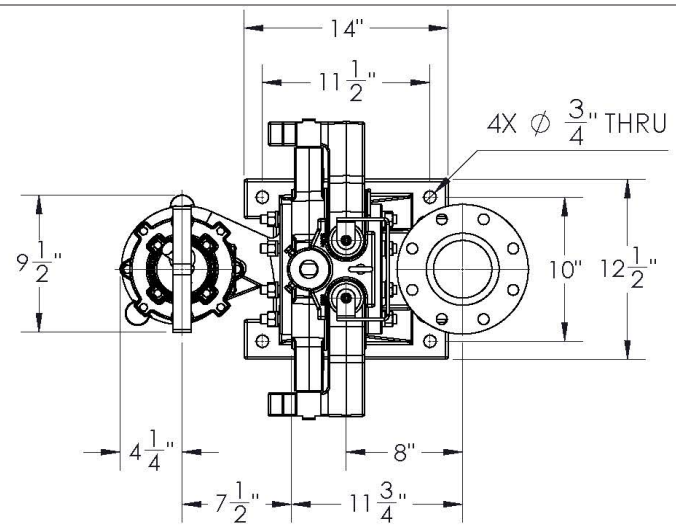
PUMP SERIES	K4RH	4" SUBMERSIBLE SEWAGE PUMPS

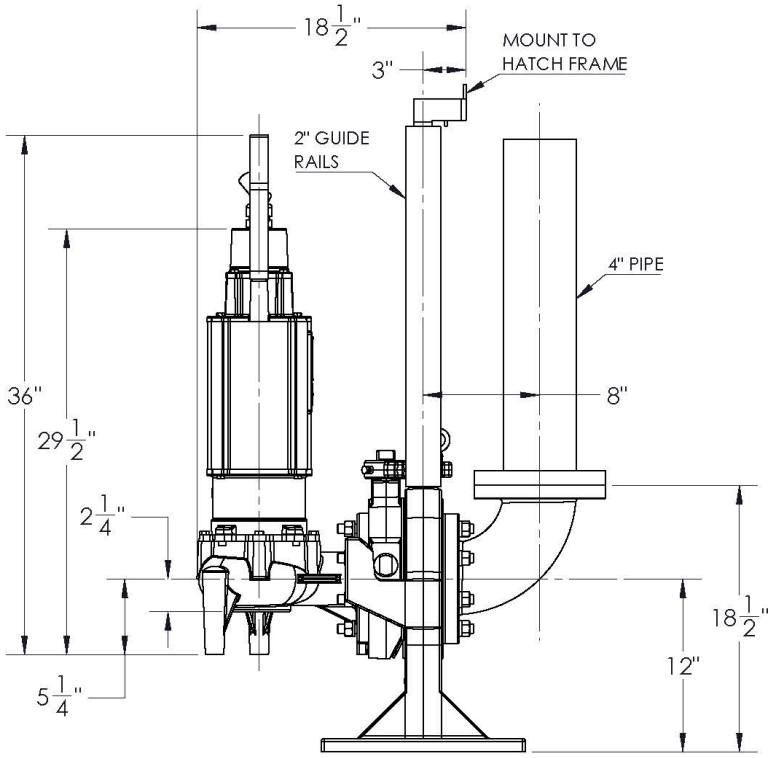
LIFTOUT DIMENSIONAL DATA

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.

ABSOLUTE MINIMUM SUBMERGENCE LEVEL:
16" FROM BOTTOM

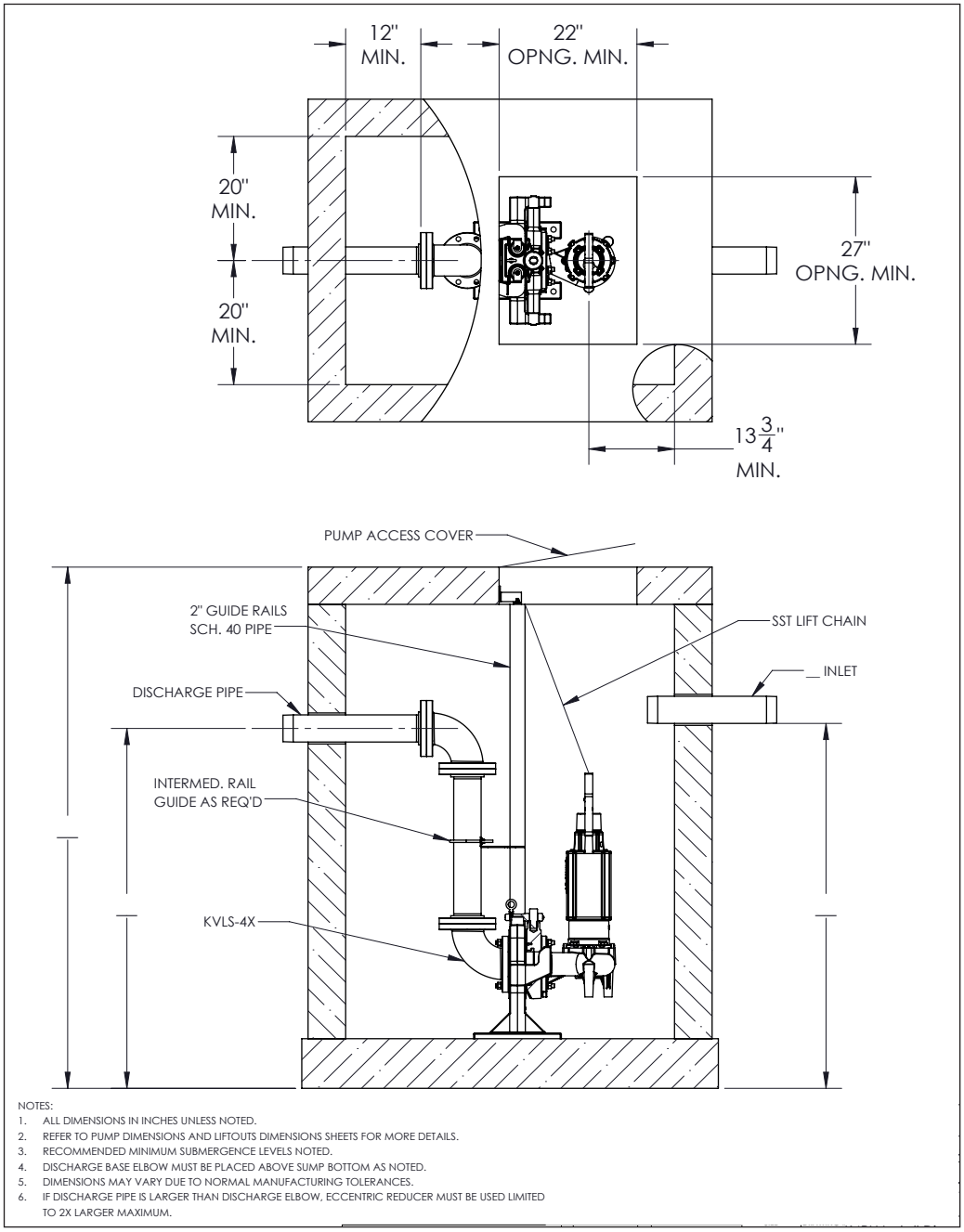
RECOMMENDED MINIMUM SUBMERGENCE LEVEL:
30" FROM BOTTOM





PUMP SERIES	K4RH	4" SUBMERSIBLE SEWAGE PUMPS

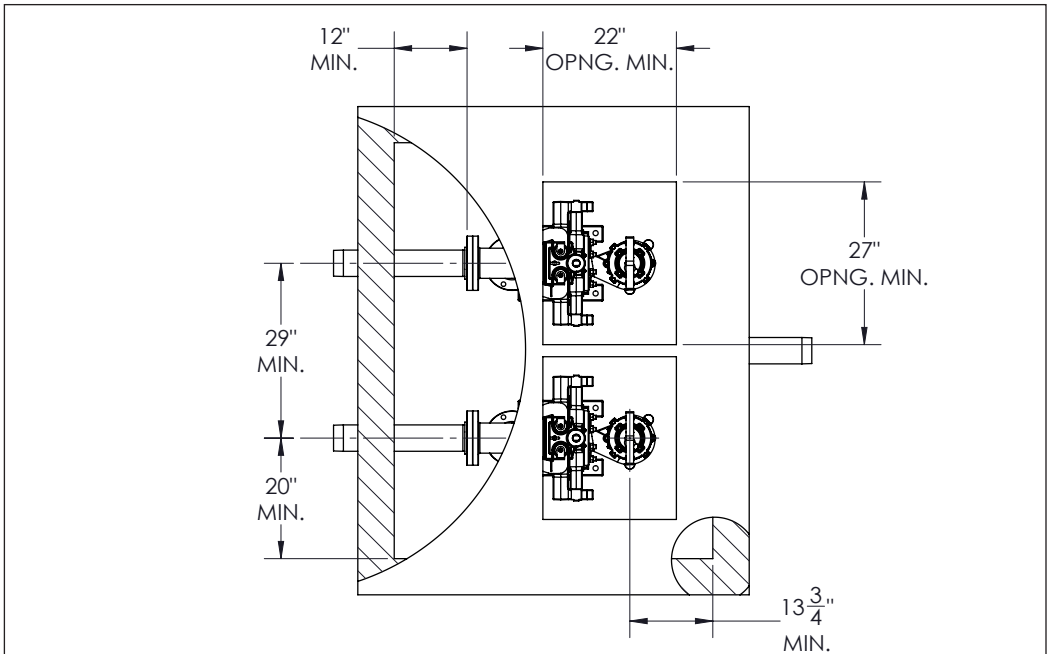
SIMPLEX INSTALLATION DIMENSIONAL DATA

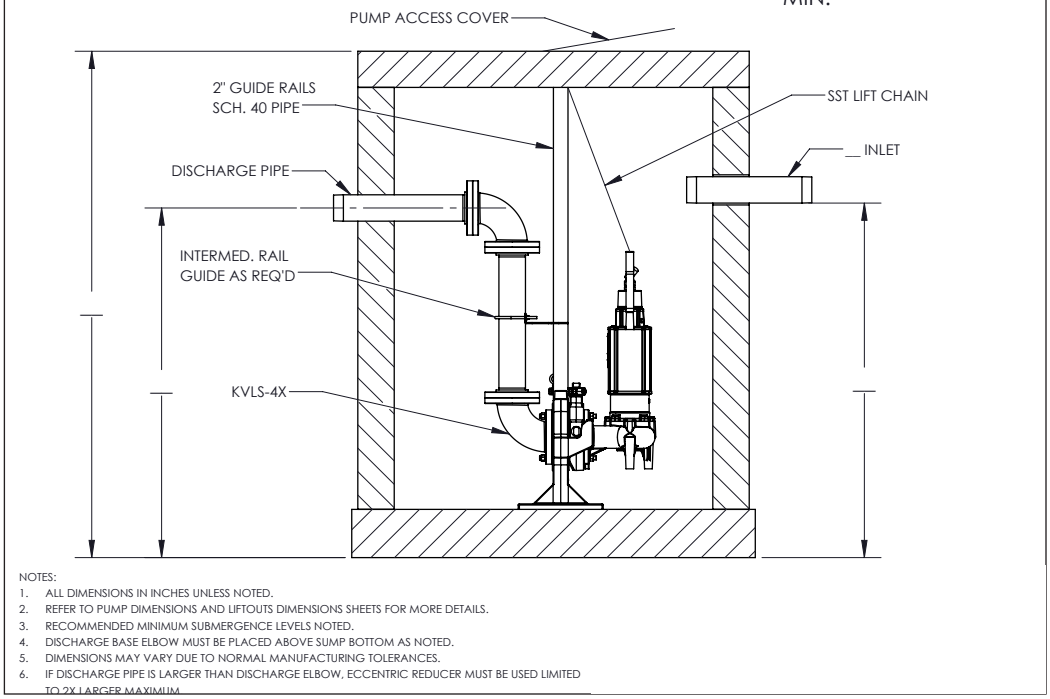


NOTES:
1. ALL DIMENSIONS IN INCHES UNLESS NOTED.
2. REFER TO PUMP DIMENSIONS AND LIFTOUTS DIMENSIONS SHEETS FOR MORE DETAILS.
3. RECOMMENDED MINIMUM SUBMERGENCE LEVELS NOTED.
4. DISCHARGE BASE ELBOW MUST BE PLACED ABOVE SUMP BOTTOM AS NOTED.
5. DIMENSIONS MAY VARY DUE TO NORMAL MANUFACTURING TOLERANCES.
6. IF DISCHARGE PIPE IS LARGER THAN DISCHARGE ELBOW, ECCENTRIC REDUCER MUST BE USED LIMITED TO 2X LARGER MAXIMUM.

PUMP SERIES	K4RH	4” SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA





NOTES:
1. ALL DIMENSIONS IN INCHES UNLESS NOTED.
2. REFER TO PUMP DIMENSIONS AND LIFTOUTS DIMENSIONS 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.

PHYSICAL DATA	
Discharge Size	ANSI 4” Horizontal
Solid 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 Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	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	392°F (200°C)
Power Cord Type	SOOW - 600V, 90° C; 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	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° 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	3450			
Electrical Ratings	Heat Sensor	24VDC, 5AMPS	115VAC, 5AMPS	230VAC, 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	VOLTS	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 71.3			
	460				22.1	24.4				

MOTOR EFFICIENCIES & POWER FACTOR									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
7.5	1	90	90	88	86	90	90	88	80
7.5	3	90	90	88	86	90	90	88	80
10	3	91	91	89	87	91	91	89	81
15	3	91	91	89	87	91	91	89	81

1.0 SCOPE

- 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.
- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.

5.0 PUMP BEARINGS

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a three-bearing system design.
  - 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 Conrad type, single row, deep groove ball bearing designed to adequately compensate for the axial loads and 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - 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

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, 10-vane (3450), vortex flow and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a centerline discharge configuration.
- The discharge is to be 4” ANSI® standard Class 125, 8-bolt configuration.
- 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/corrosion resistance including higher temperature application.

FM APPROVED

OPTIONAL :
All Stainless Steel Construction



K4RN(X)

4" Submersible, Recessed Impeller (Class 1, Div. 1, Groups C & D Hazardous Location)

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

BEST MOTOR CONSTRUCTION

- Class "N" (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

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

CAPABILITIES:

Flows	to 650 GPM
Heads	to 57 Feet
HP Range	1 - 10 HP
Voltage/Phase Options	208/230V, 1 Phase - 208/230/460 V, 3Phase
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

K4RN(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

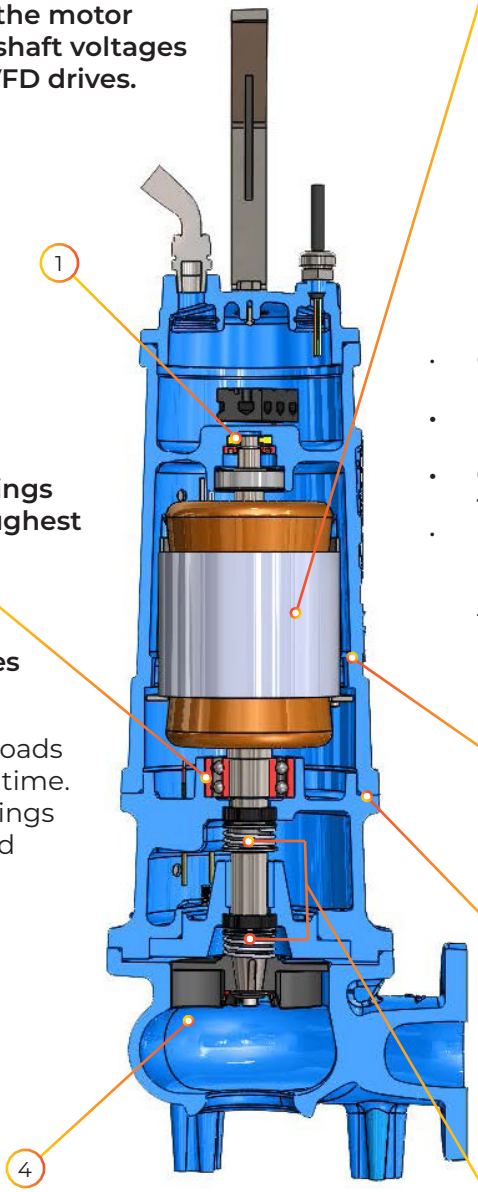


Heavy Duty Bearings to handle the toughest performances.

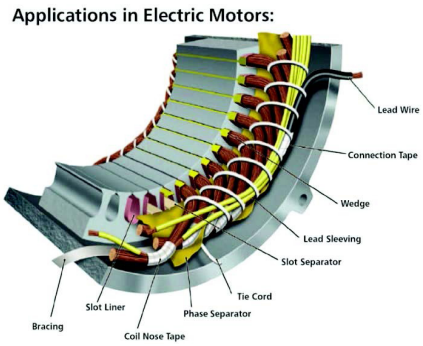
- **High Pressures**
- **High Flows**

- 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.





2 HEAVY DUTY MOTOR



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

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.

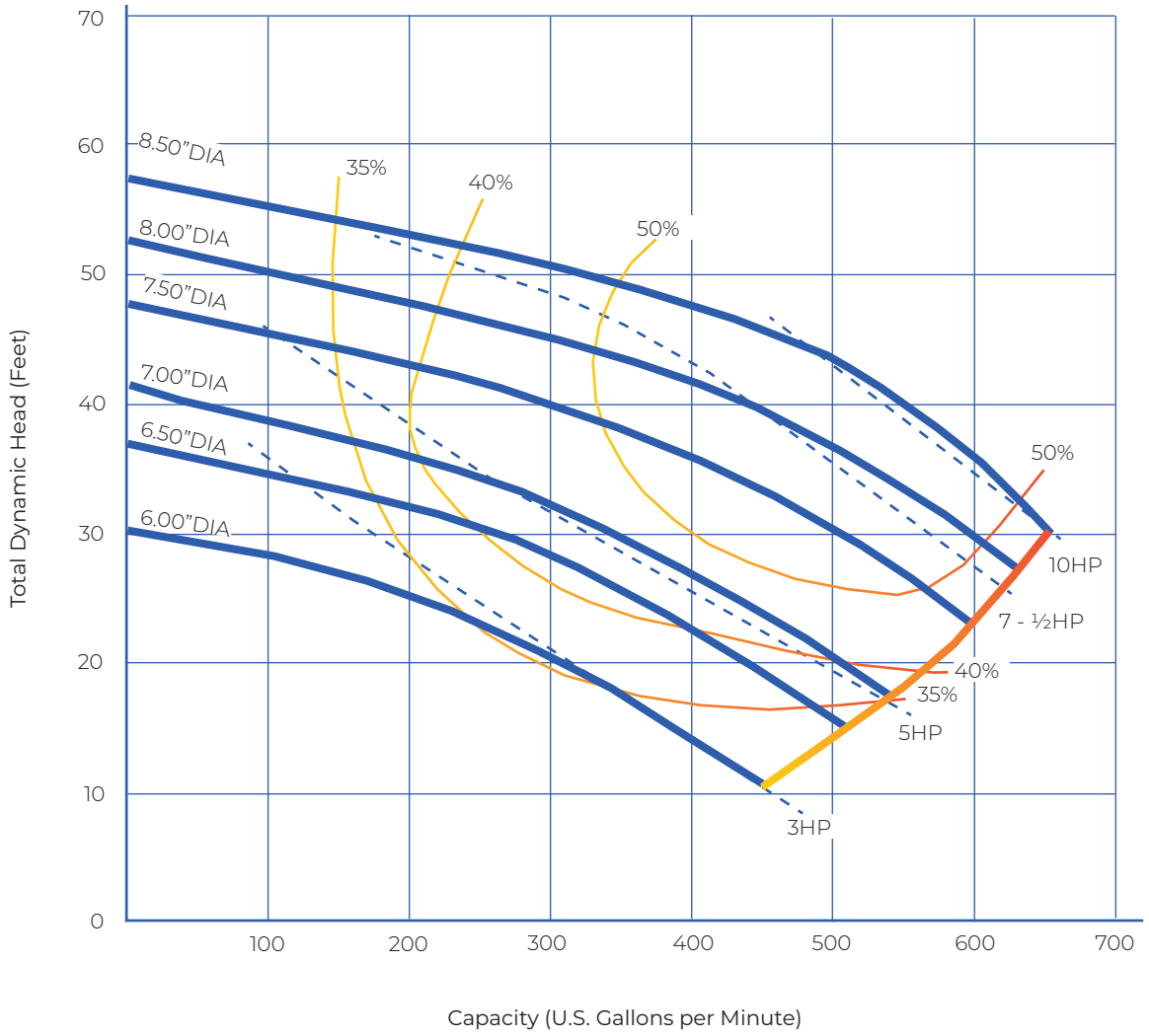
CERAMIC COATING - IMPELLER AND VOLUTE CASTING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!!

PUMP SERIES	K4RN		4" SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	4"	Solids	3"

GPM:_____ TDH: _____

Performance

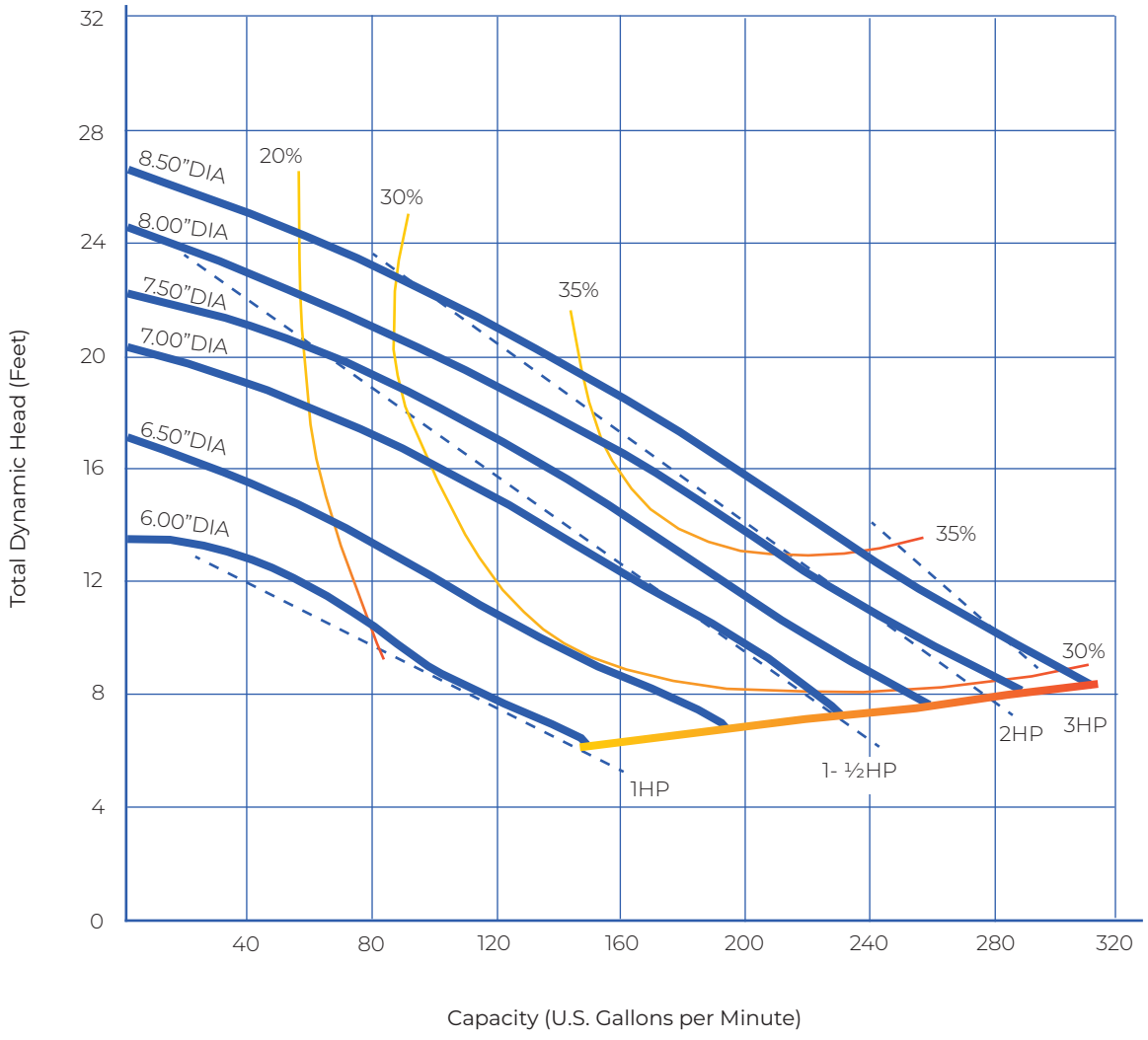


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K4RN		4" SUBMERSIBLE SEWAGE PUMPS		
Speed	1150 RPM	Discharge	4"	Solids	3"

GPM:_____ TDH: _____

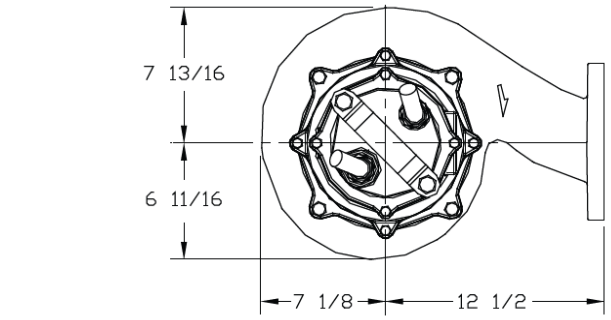
Performance

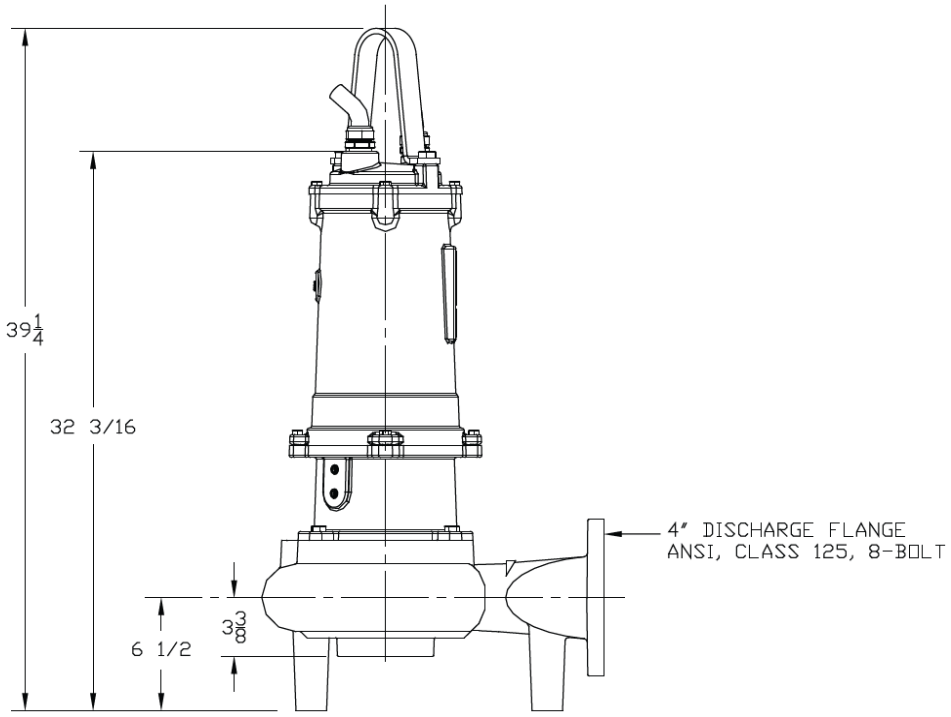


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

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

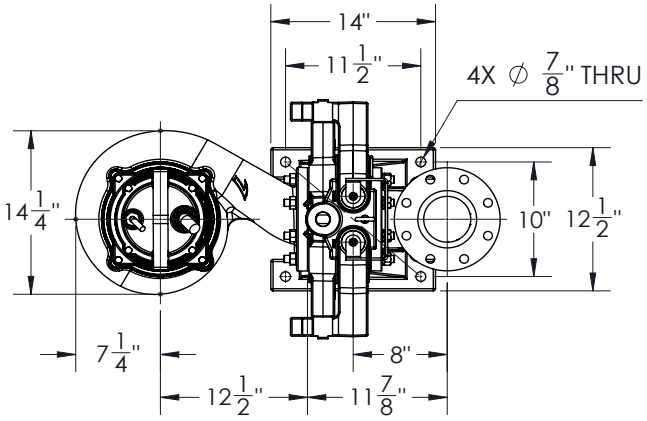
PUMP SERIES	K4RN	4" SUBMERSIBLE SEWAGE PUMPS

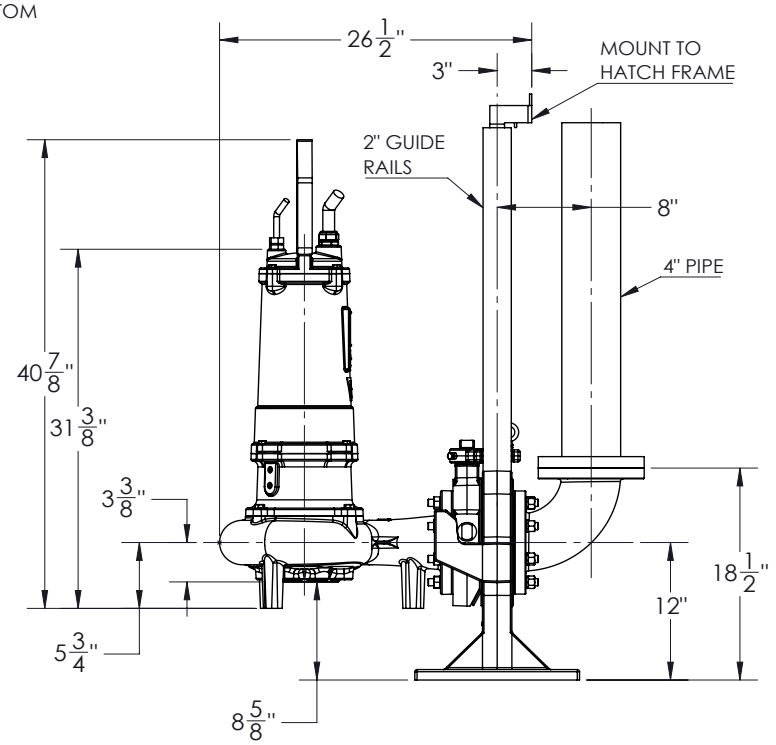
LIFTOUT DIMENSIONAL DATA

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.

ABSOLUTE MINIMUM SUBMERGENCE LEVEL:
16" FROM BOTTOM

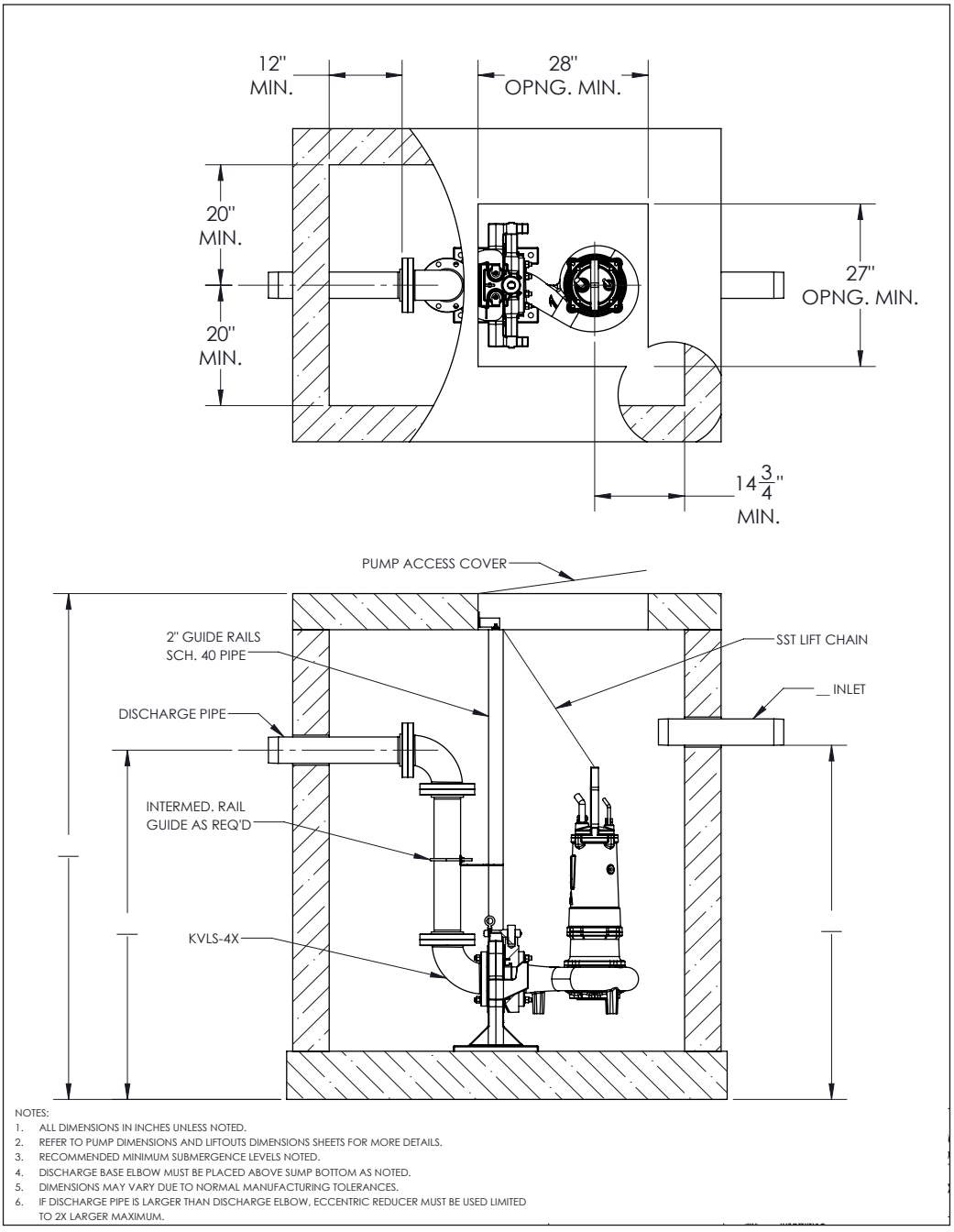
RECOMMENDED MINIMUM SUBMERGENCE LEVEL:
32" FROM BOTTOM





PUMP SERIES	K4RN	4” SUBMERSIBLE SEWAGE PUMPS

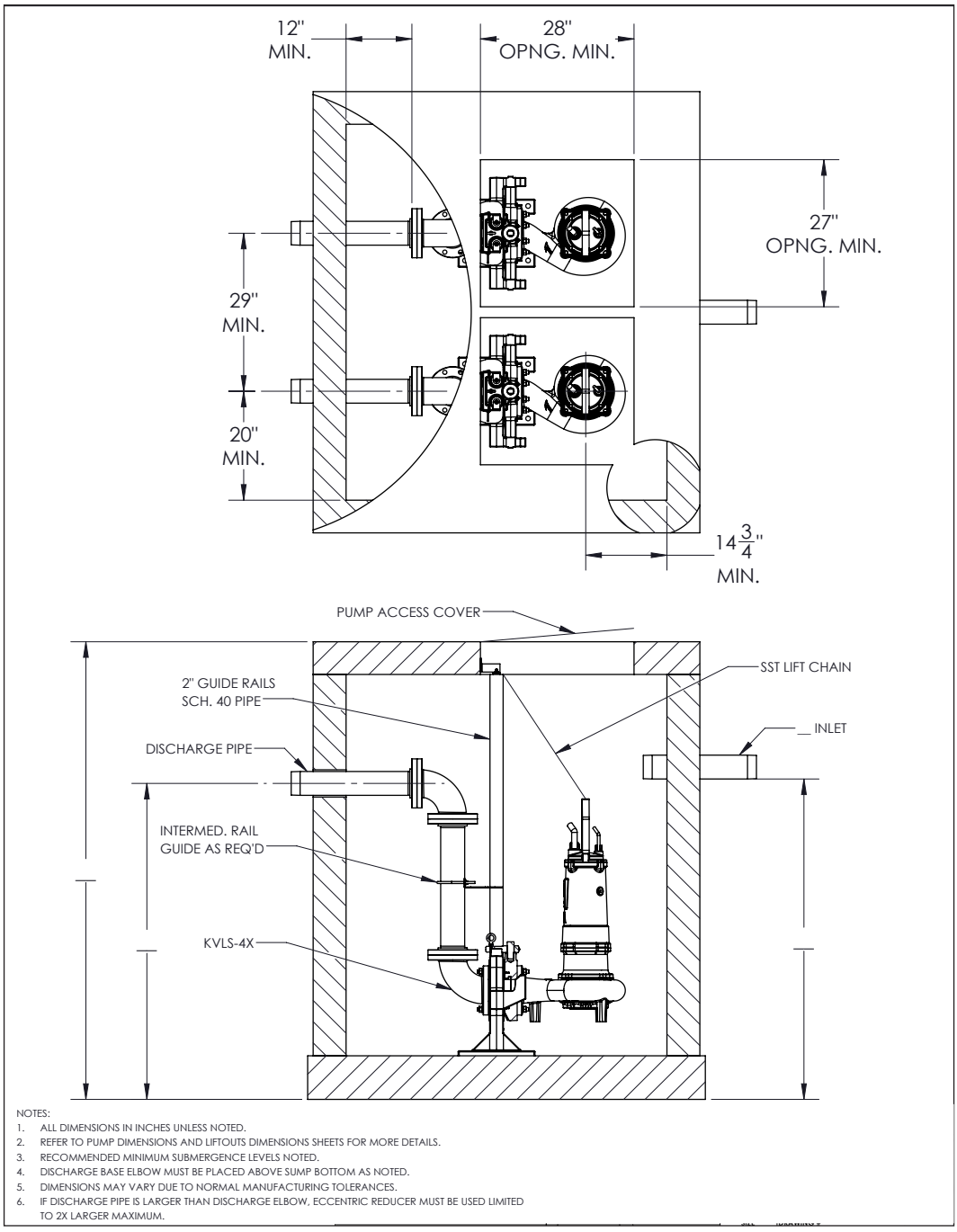
SIMPLEX INSTALLATION DIMENSIONAL DATA



NOTES:
1. ALL DIMENSIONS IN INCHES UNLESS NOTED.
2. REFER TO PUMP DIMENSIONS AND LIFTOUTS DIMENSIONS 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	K4RN	4" SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



NOTES:
1. ALL DIMENSIONS IN INCHES UNLESS NOTED.
2. REFER TO PUMP DIMENSIONS AND LIFTOUTS DIMENSIONS 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.

PHYSICAL DATA	
Discharge Size	ANSI 4” Horizontal
Solid 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 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	392°F (200°C)
Power Cord Type	Type SOOW-600V, 90° C, Type W - 2000V, 90° C
Control Cord Type	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	Fluorocarbon
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

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° 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	VOLTS	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
3	1	88	88	86	84	88	88	86	78
3	3	88	88	86	84	89	89	87	79
5	1	89	89	87	85	90	90	88	80
5	3	89	89	87	85	90	90	88	80
7.5	3	90	90	88	86	90	90	88	80
10	3	91	91	89	87	90	90	88	80

THERMAL DATA

Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° 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	VOLTS	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

HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
1	1	84	84	82	80	88	88	86	78
1	3	85	85	83	81	89	89	87	79
2	1	86	86	84	82	88	88	86	78
2	3	87	87	85	83	89	89	87	79
3	1	87	87	85	83	88	88	87	79
3	3	88	88	86	84	89	89	87	79

1.0 SCOPE

- 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.
- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class N insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.

5.0 PUMP BEARINGS

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a three-bearing system design.
  - The upper bearing shall be a Conrad type, single row, radial bearing designed to adequately handle the required radial loads.
  - 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.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, 10-vane (3450), vortex flow and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a centerline discharge configuration.
- The discharge is to be 4” ANSI® standard Class 125, 8-bolt configuration.
- 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/corrosion resistance including higher temperature application.

OPTIONAL :
All Stainless Steel Construction

FM PENDING



K4RP(X)

4” Submersible, Recessed Impeller

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

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

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

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

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

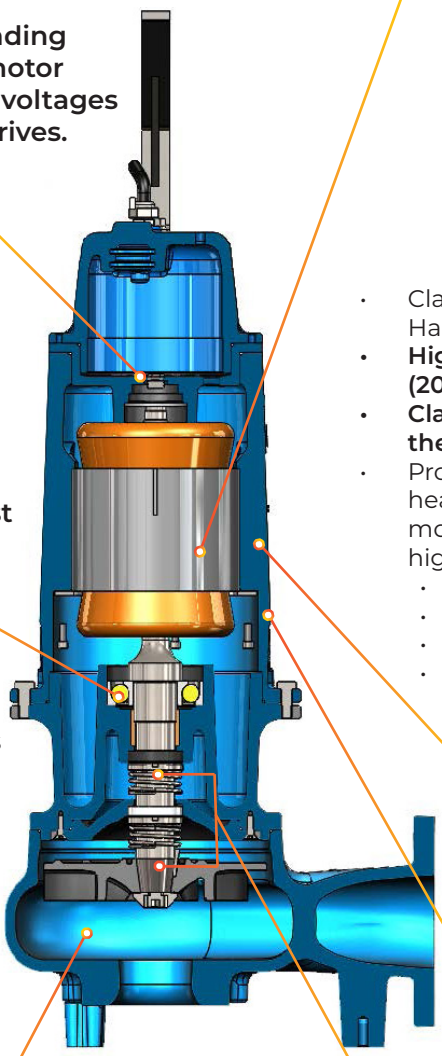


Heavy Duty Bearings to handle the toughest performances.

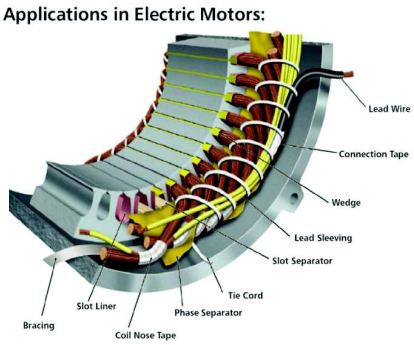
- **High Pressures**
- **High Flows**

- Handles both Axial 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



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

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.

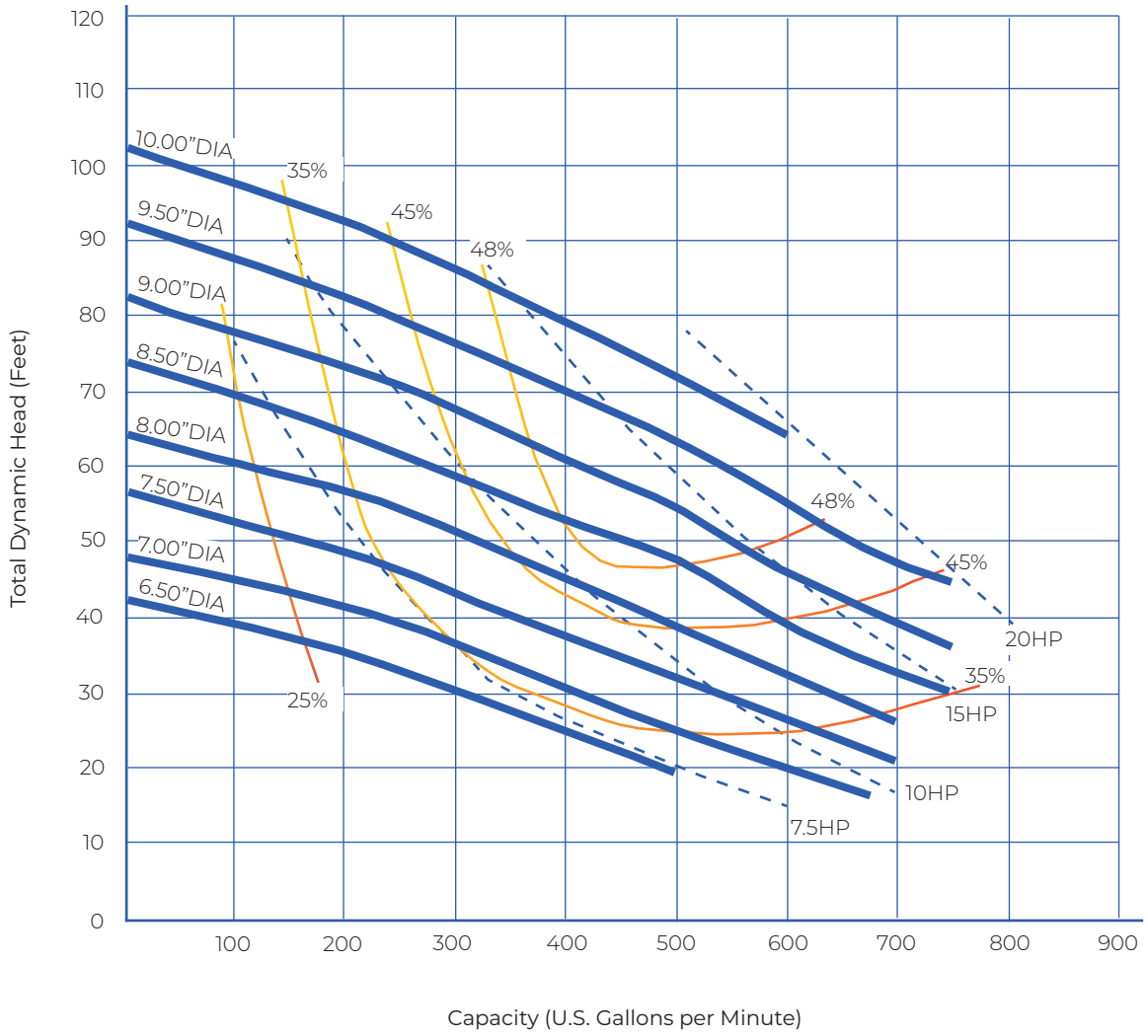
CERAMIC COATING - IMPELLER AND VOLUTE CASTING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

PUMP SERIES	K4RP		4" SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	4"	Solids	3"

GPM:_____ TDH: _____

Performance

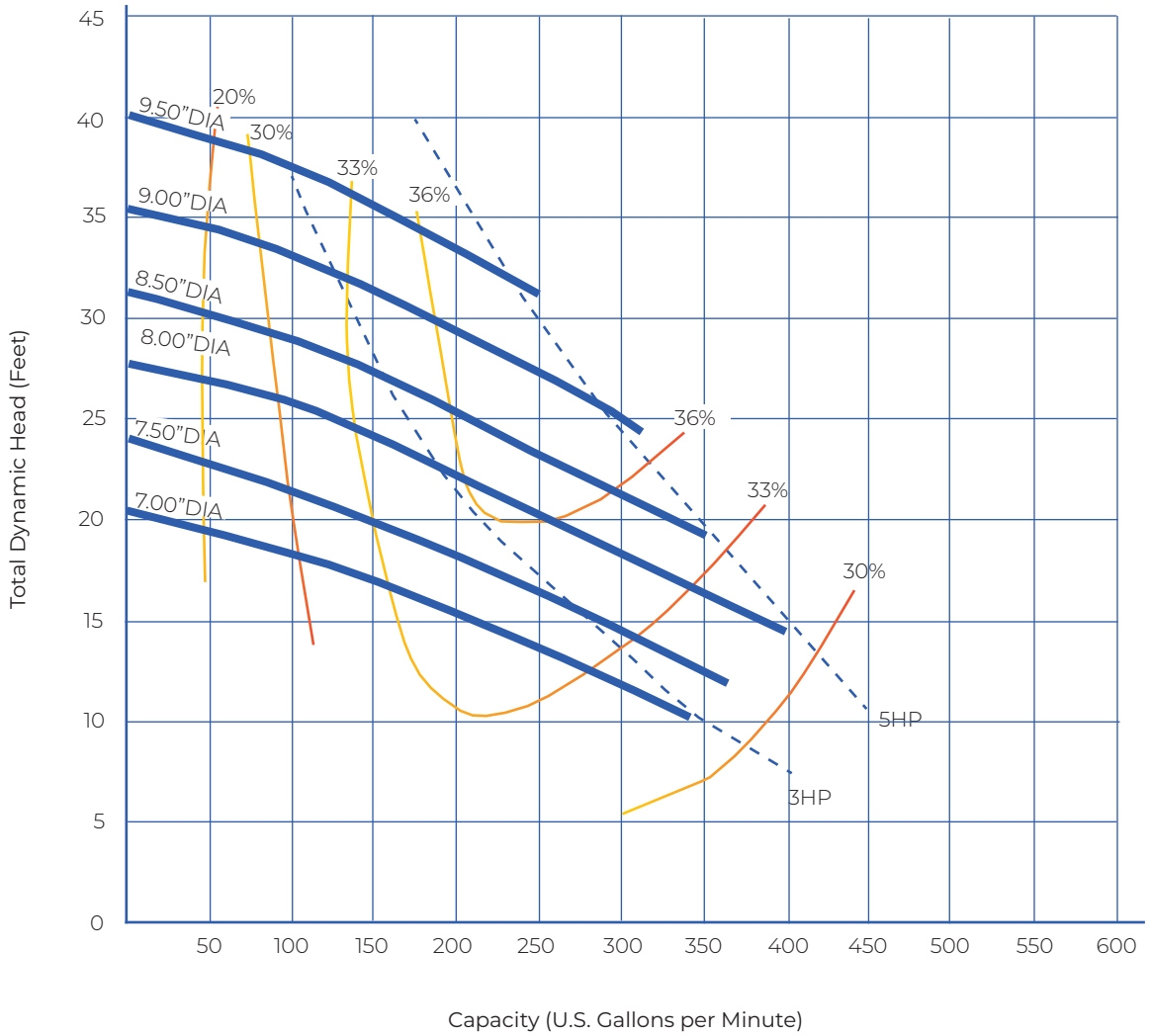


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K4RP		4" SUBMERSIBLE SEWAGE PUMPS		
Speed	1150 RPM	Discharge	4"	Solids	3"

GPM:_____ TDH: _____

Performance

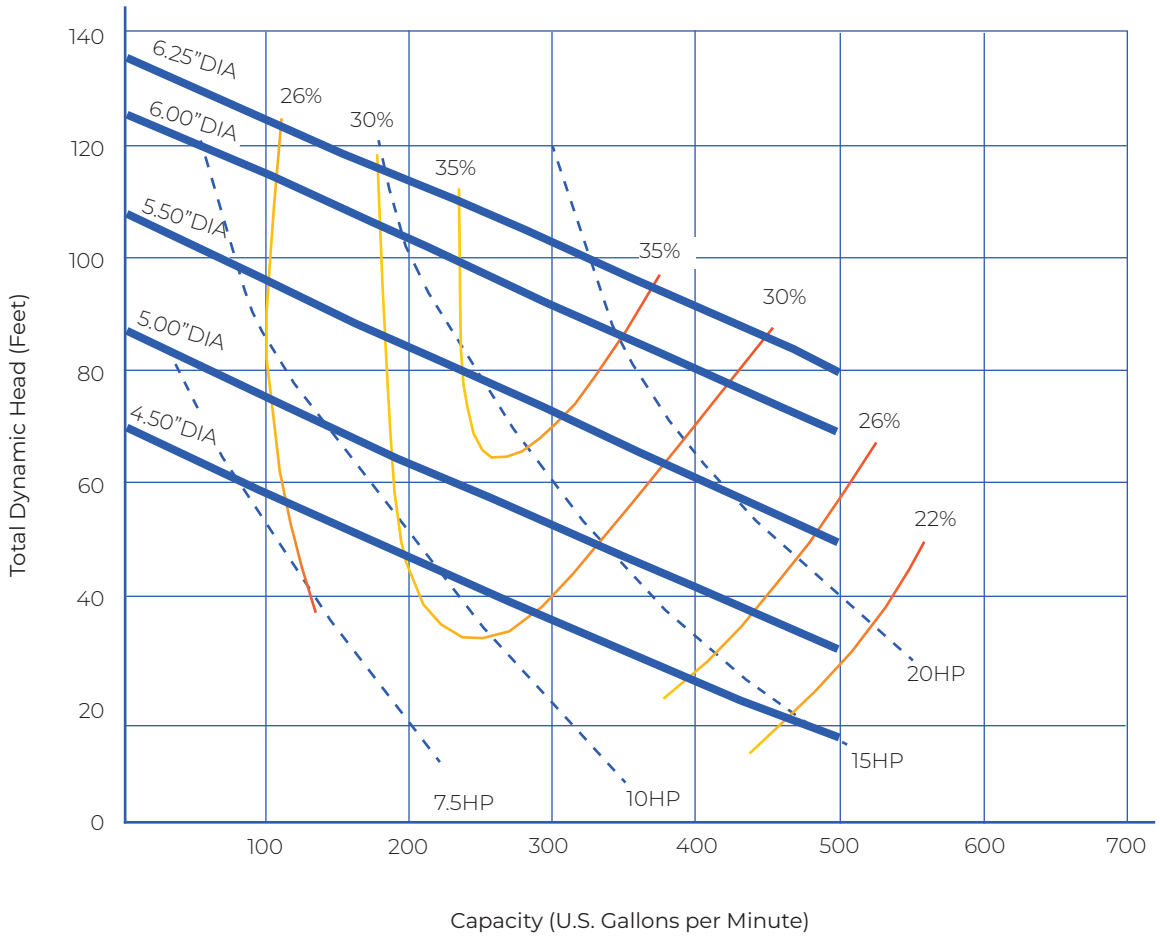


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K4RP		4” SUBMERSIBLE SEWAGE PUMPS		
Speed	3450 RPM	Discharge	4”	Solids	3”

GPM:_____ TDH: _____

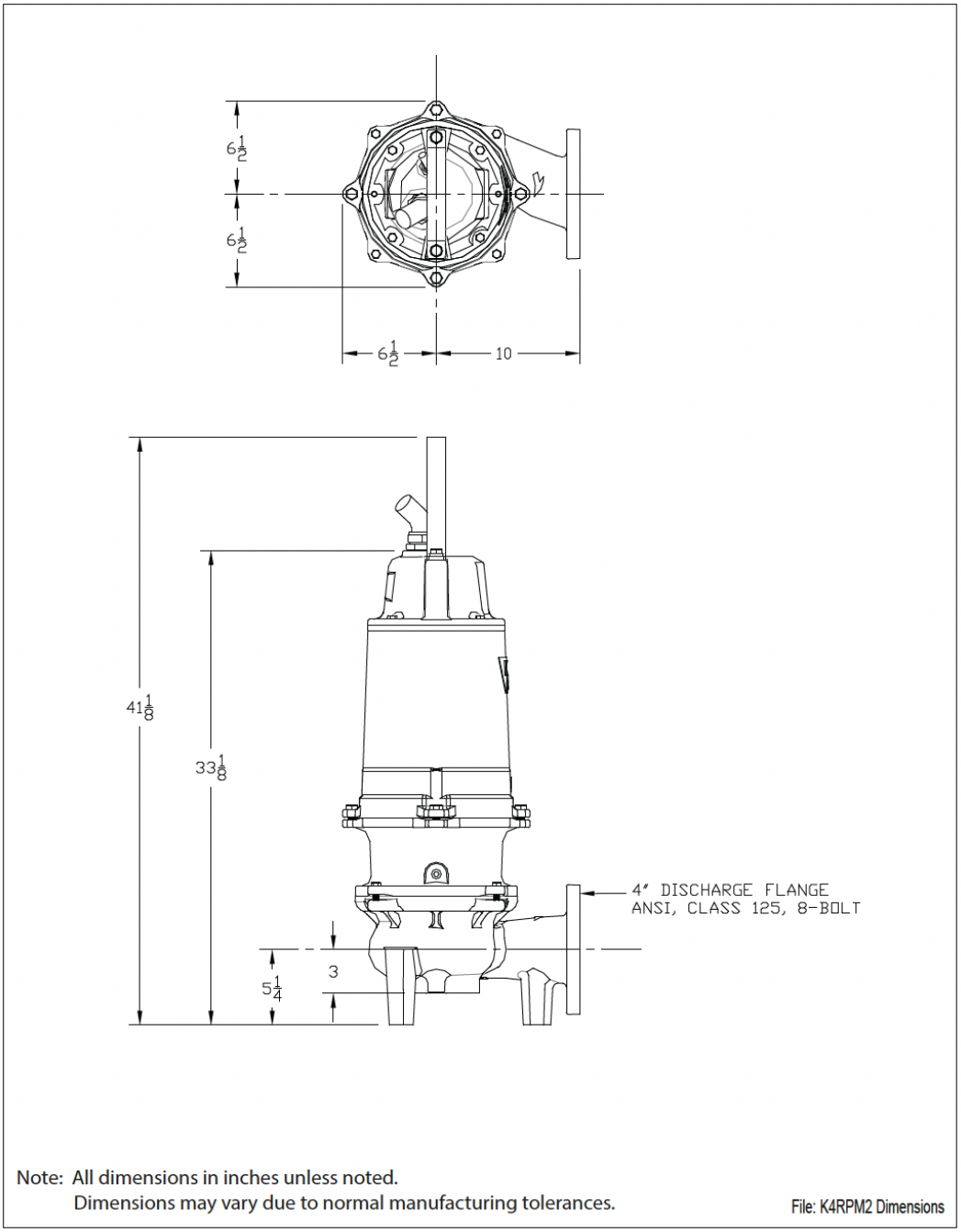
Performance



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

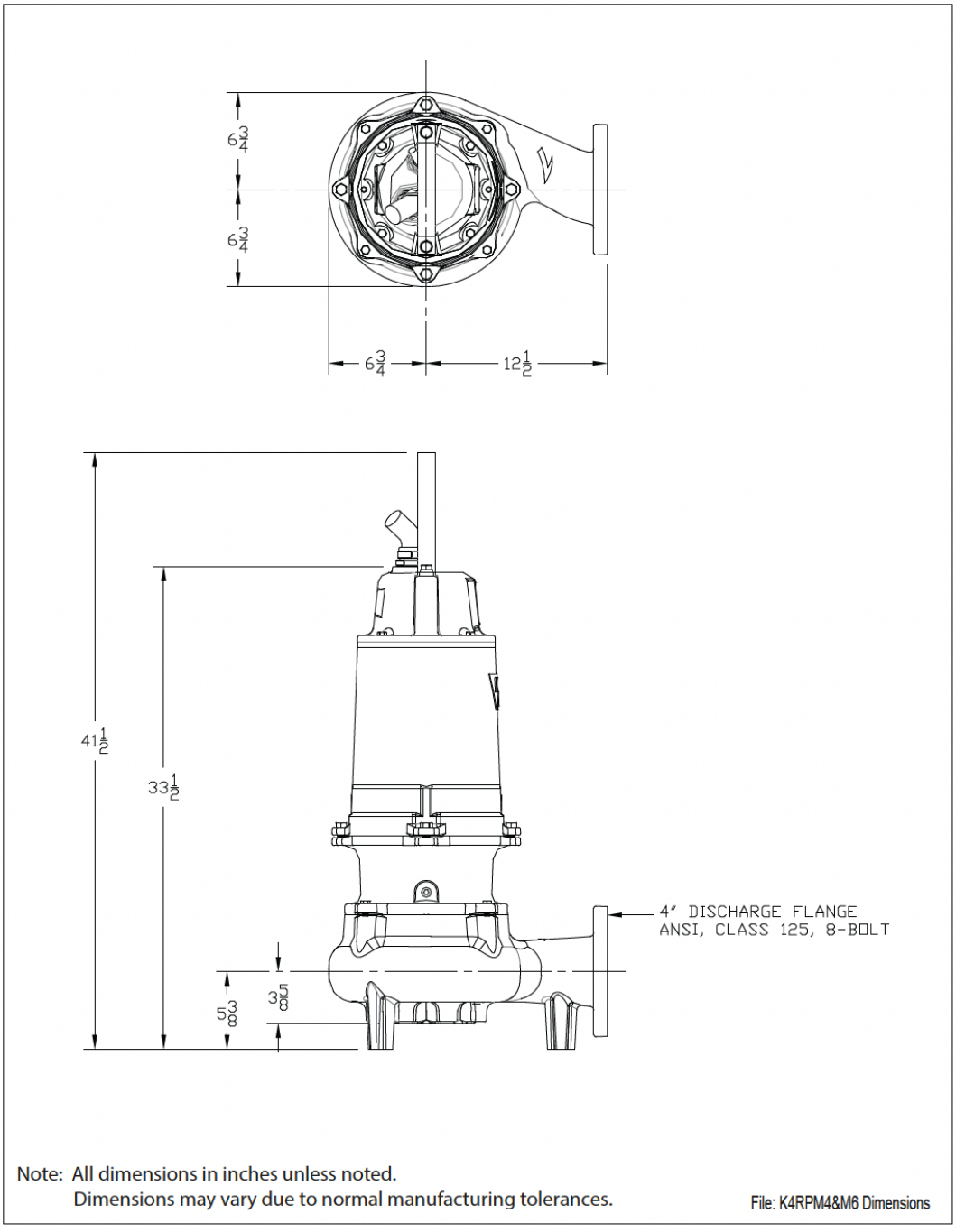


Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

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

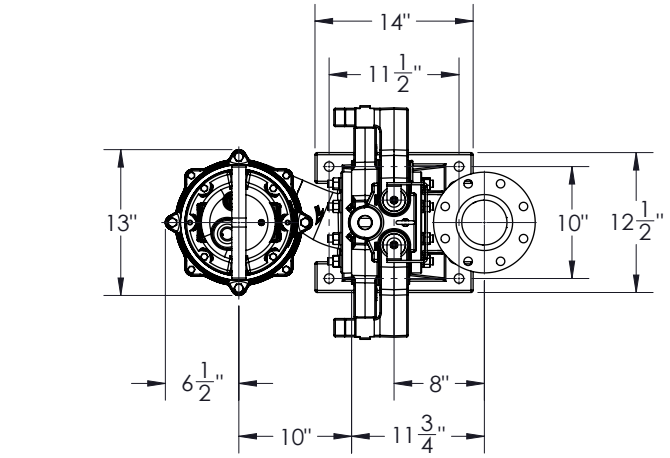
LIFTOUT DIMENSIONAL DATA

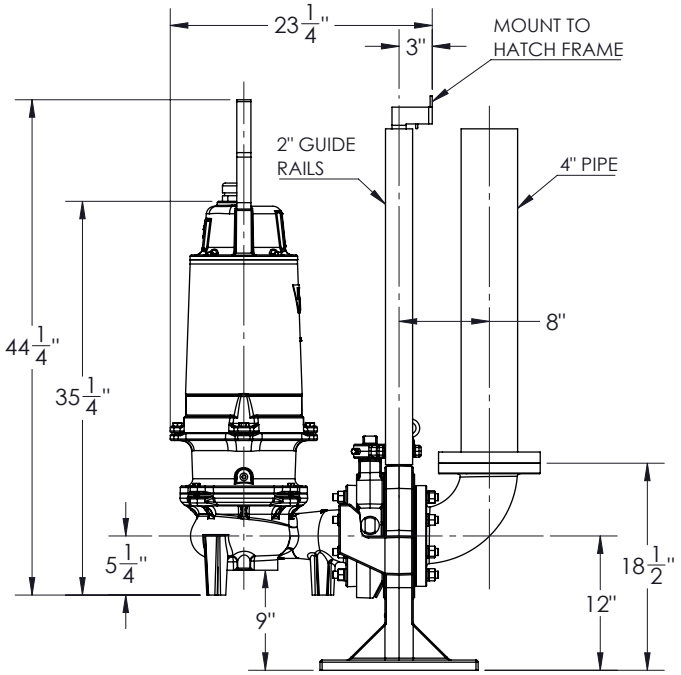
Notes:

1. All dimensions in inches unless noted.
2. 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.

ABSOLUTE MINIMUM SUBMERGENCE LEVEL:
17" FROM BOTTOM

RECOMMENDED MINIMUM SUBMERGENCE LEVEL:
33" FROM BOTTOM





K4RP (1150 & 1750) - Liftout Dimensional Data

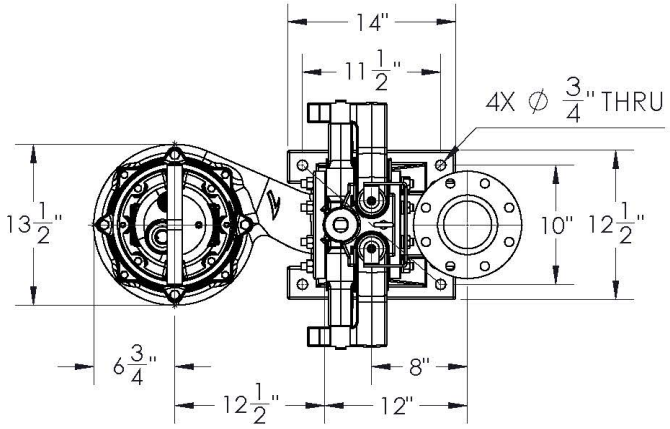
PUMP SERIES	K4RP (1150 & 1750)	4" SUBMERSIBLE SEWAGE PUMPS

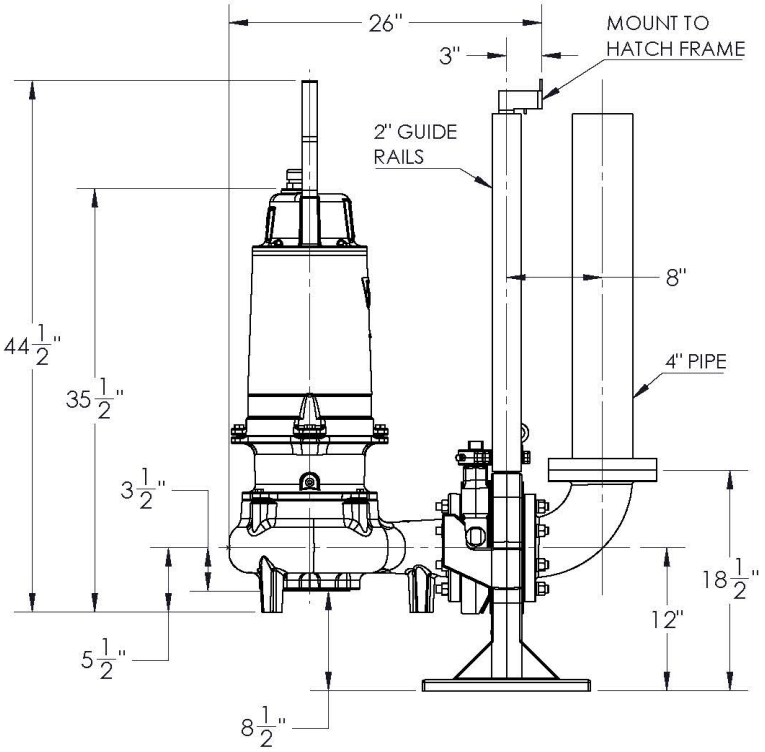
LIFTOUT DIMENSIONAL DATA

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.

ABSOLUTE MINIMUM SUBMERGENCE LEVEL:
16" FROM BOTTOM

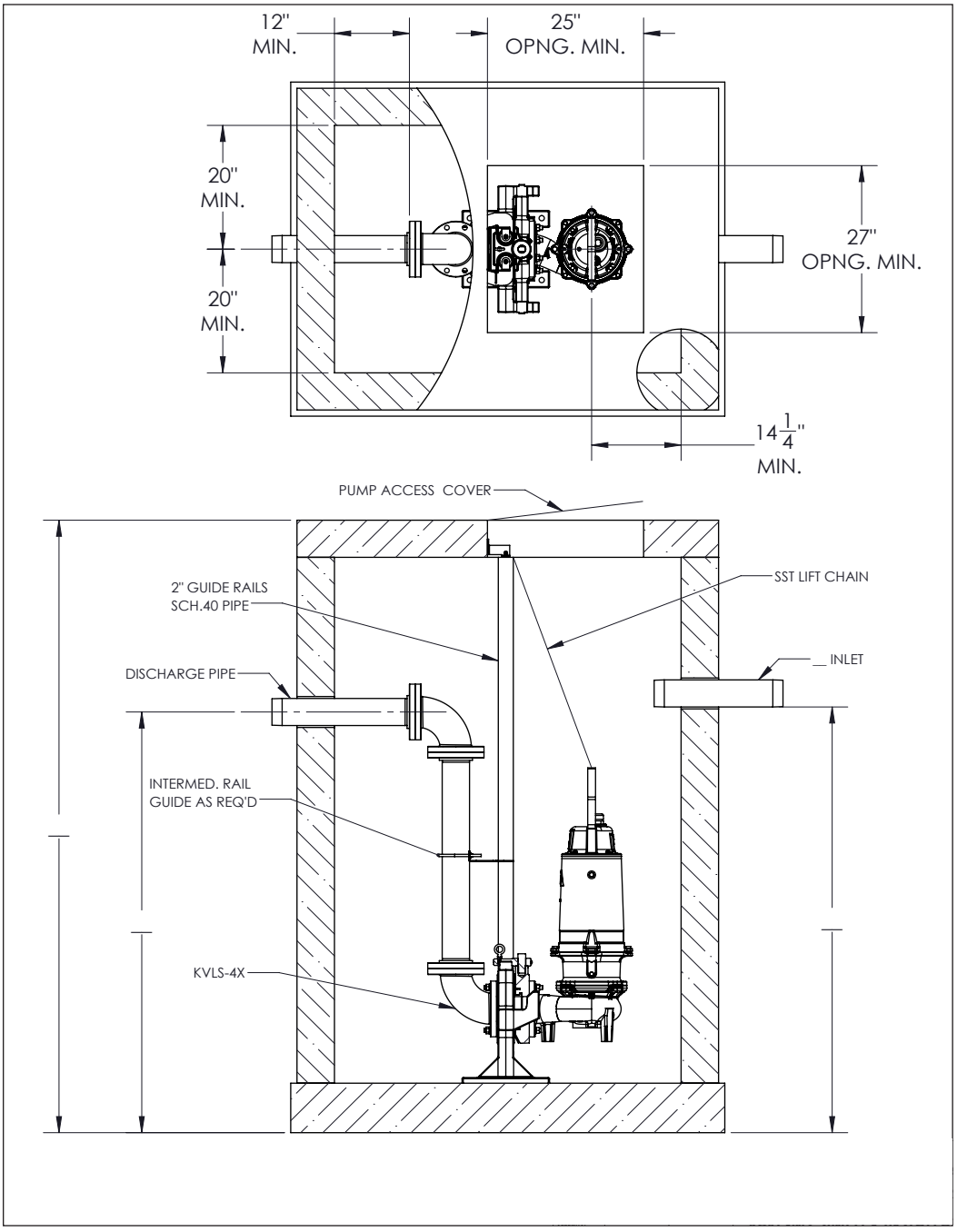
RECOMMENDED MINIMUM SUBMERGENCE LEVEL:
32" FROM BOTTOM





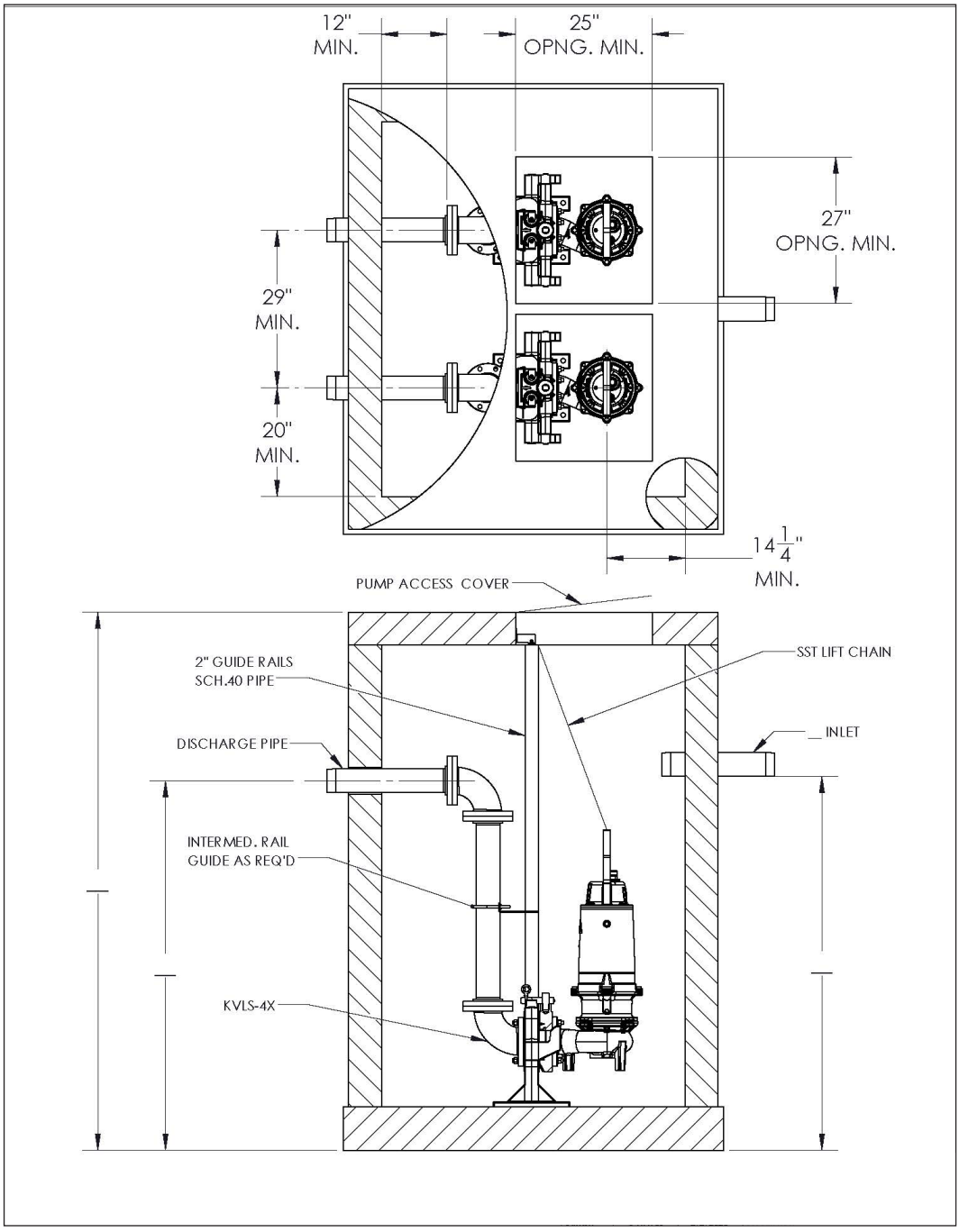
PUMP SERIES	K4RP (3450)	4" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



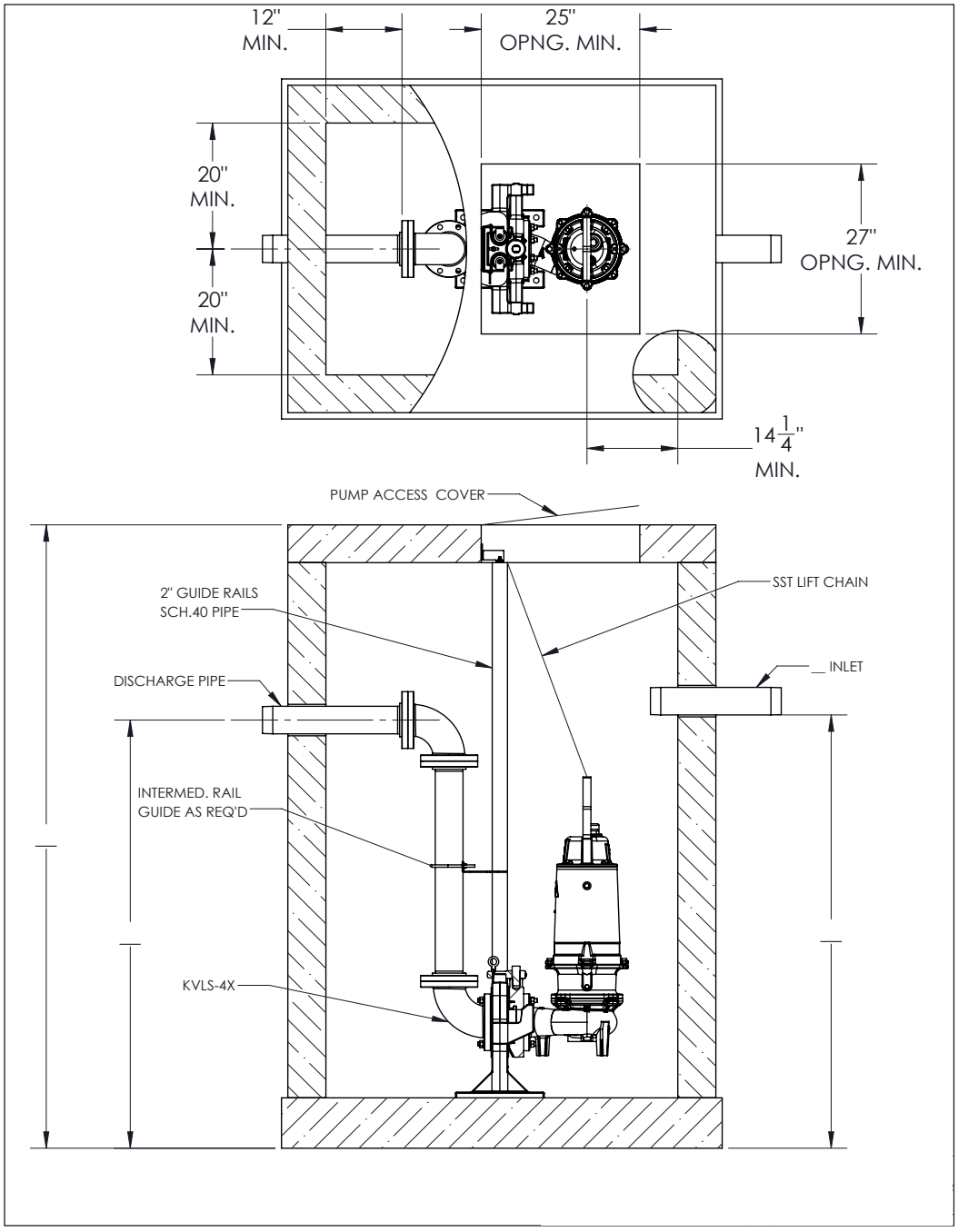
PUMP SERIES	K4RP (3450)	4" SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



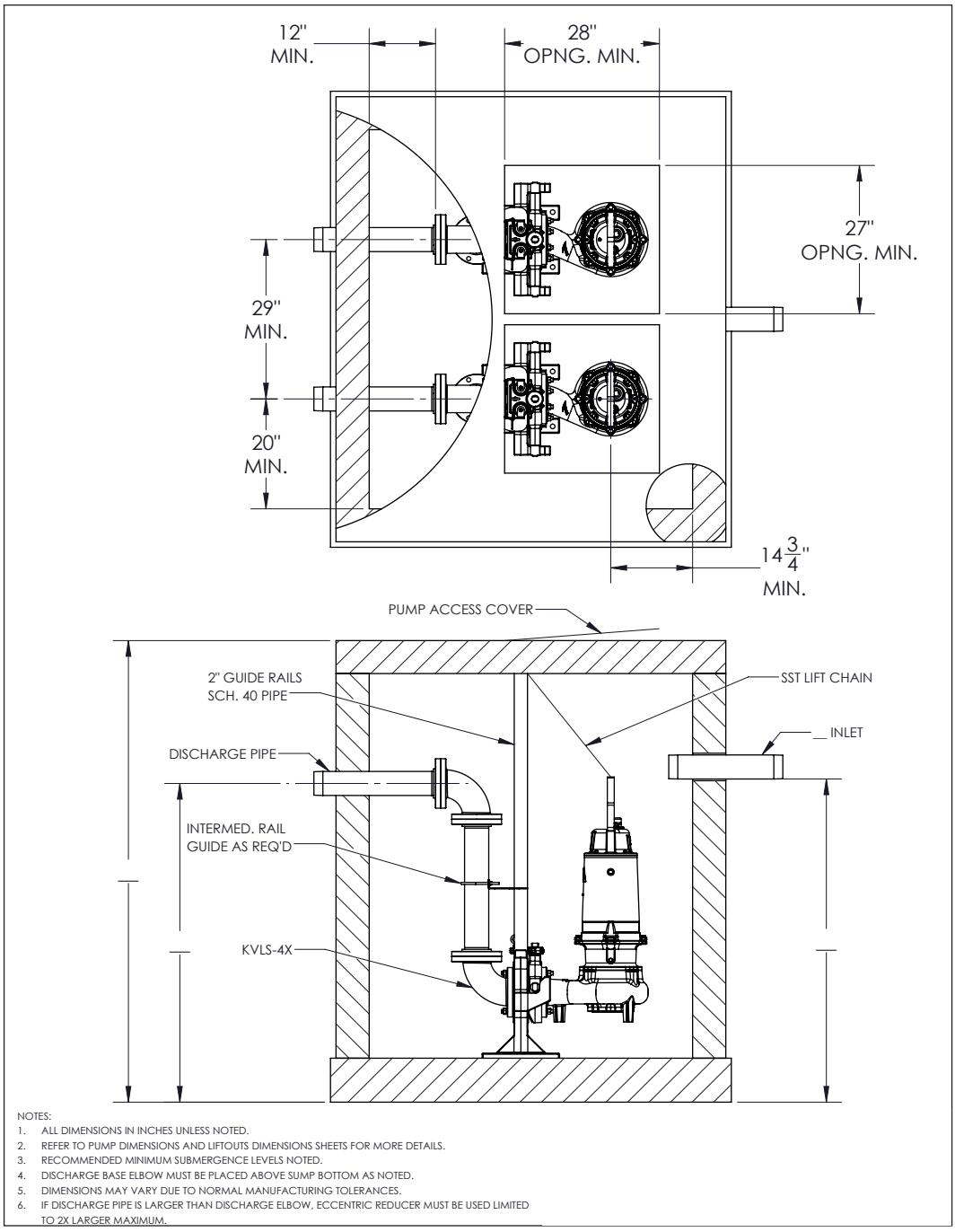
PUMP SERIES	K4RP (1150 & 1750)	4" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



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 DIMENSIONS AND LIFTOUTS DIMENSIONS 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.

PHYSICAL DATA	
Discharge Size	ANSI 4” Horizontal
Solid 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 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	392°F (200°C)
Power Cord Type	Type SOOW-600V, 90° C
Control Cord Type	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	Fluorocarbon
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

THERMAL DATA

Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° 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	VOLTS	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			

MOTOR EFFICIENCIES & POWER FACTOR

HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
5	1	88	88	87	86	88	88	86	85
5	3	89	89	87	86	89	89	88	87
7.5	1	89	89	88	87	88	88	86	85
7.5	3	90	90	89	88	90	90	89	88
10	3	91	91	90	89	90	90	89	88
15	3	92	92	91	90	91	91	90	89
10	3	92	92	91	90	91	91	90	89

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° 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	VOLTS	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	5	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
3	3	88	88	86	84	90	90	88	80
5	3	89	89	87	85	90	90	88	80

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° C) Min.
Oil Flash Point		390° F (199° C)

ELECTRICAL DATA				
RPM	3450			
Electrical Ratings	Heat Sensor	24VDC, 5AMPS	115VAC, 5AMPS	230VAC, 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	VOLTS	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			

MOTOR EFFICIENCIES & POWER FACTOR									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
7.5	90	90	90	88	86	90	90	88	80
10	91	91	91	89	87	90	90	88	81
15	91	91	91	89	87	90	90	89	81
20	92	92	92	90	88	91	91	89	81

1.0 SCOPE

- 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.
- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a three-bearing system design.
  - The upper bearing shall be a Conrad type, double row, radial ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, 10-vane (3450), vortex flow and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a centerline discharge configuration.
- The discharge is to be 4” ANSI® standard Class 125, 8-bolt configuration.
- 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/corrosion resistance including higher temperature application.

OPTIONAL :
All Stainless Steel Construction

FM APPROVED



K4RB(X)

4” Submersible, Recessed Impeller (Class 1, Div. 1, Groups C & D Hazardous Location)

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

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

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

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

K4RB(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.

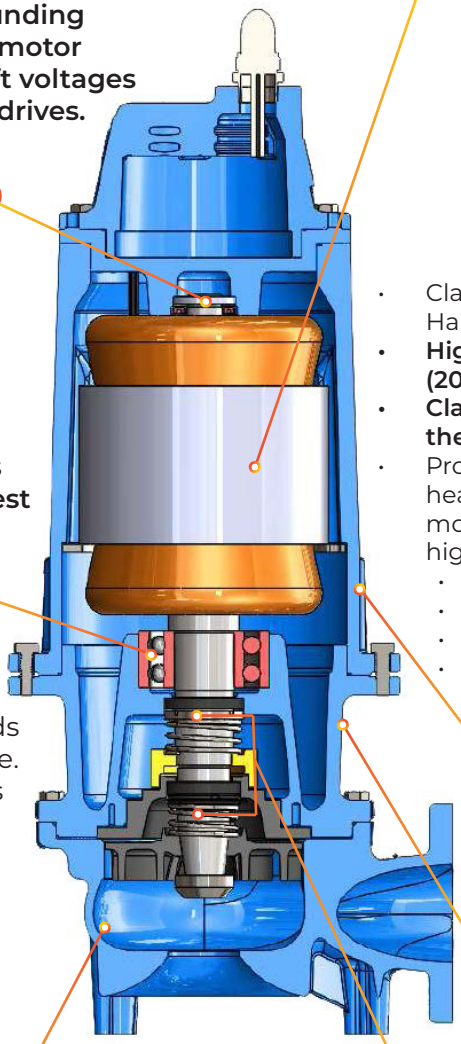
- **High Pressures**
- **High Flows**

- Handles both Axial and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.

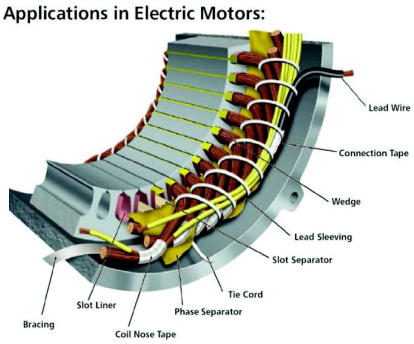


CERAMIC COATING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!



HEAVY DUTY MOTOR



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

5 CASTINGS

ASTM - Class 35 high tensile strength castings.

6 DURABLE POWDER COAT FINISH

Holds up to the toughest environmental conditions.

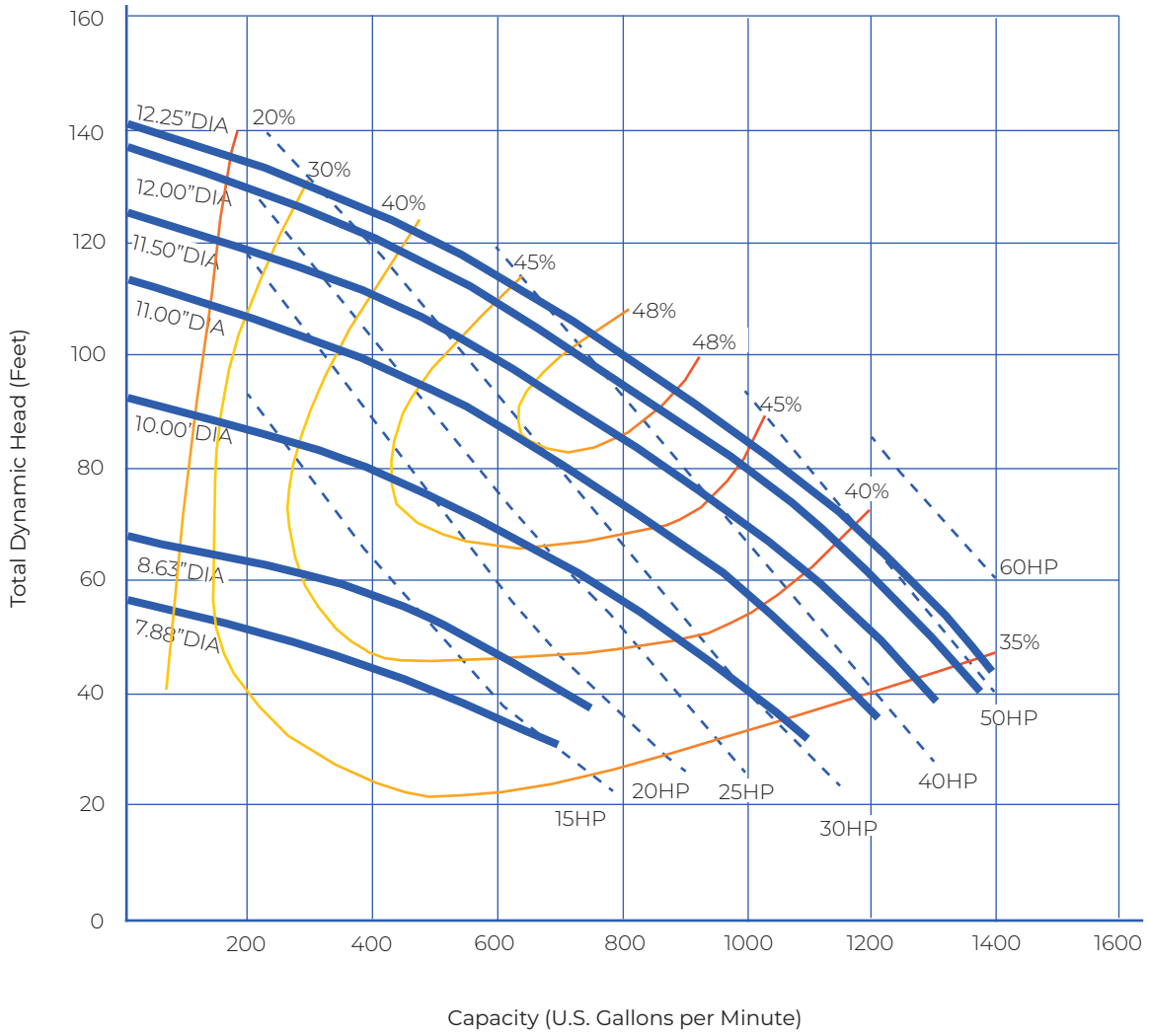
7 DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

PUMP SERIES	K4RB		4" SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	4"	Solids	3"

GPM:_____ TDH: _____

Performance

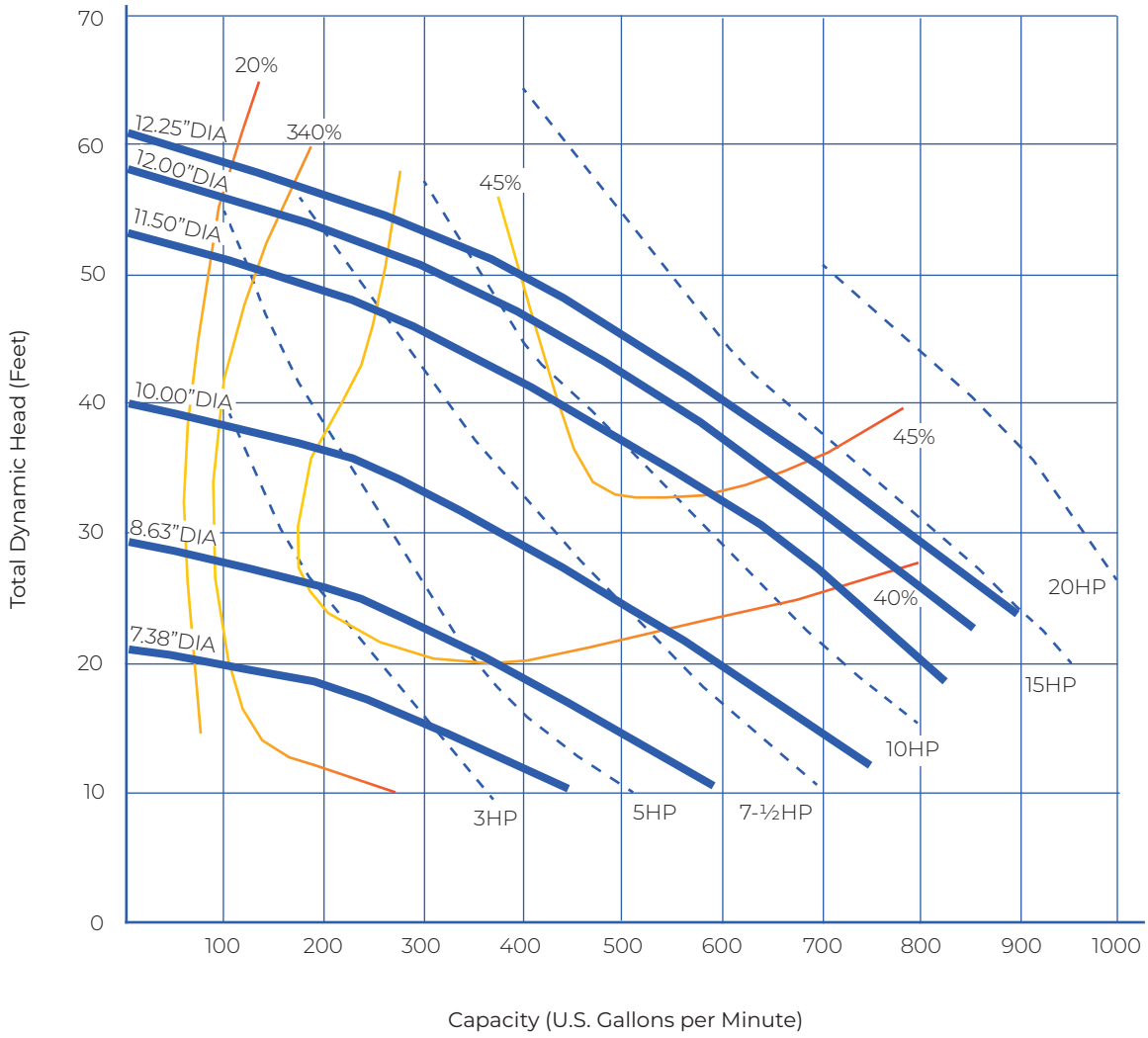


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K4RB		4" SUBMERSIBLE SEWAGE PUMPS		
Speed	1150 RPM	Discharge	4"	Solids	3"

GPM:_____ TDH: _____

Performance

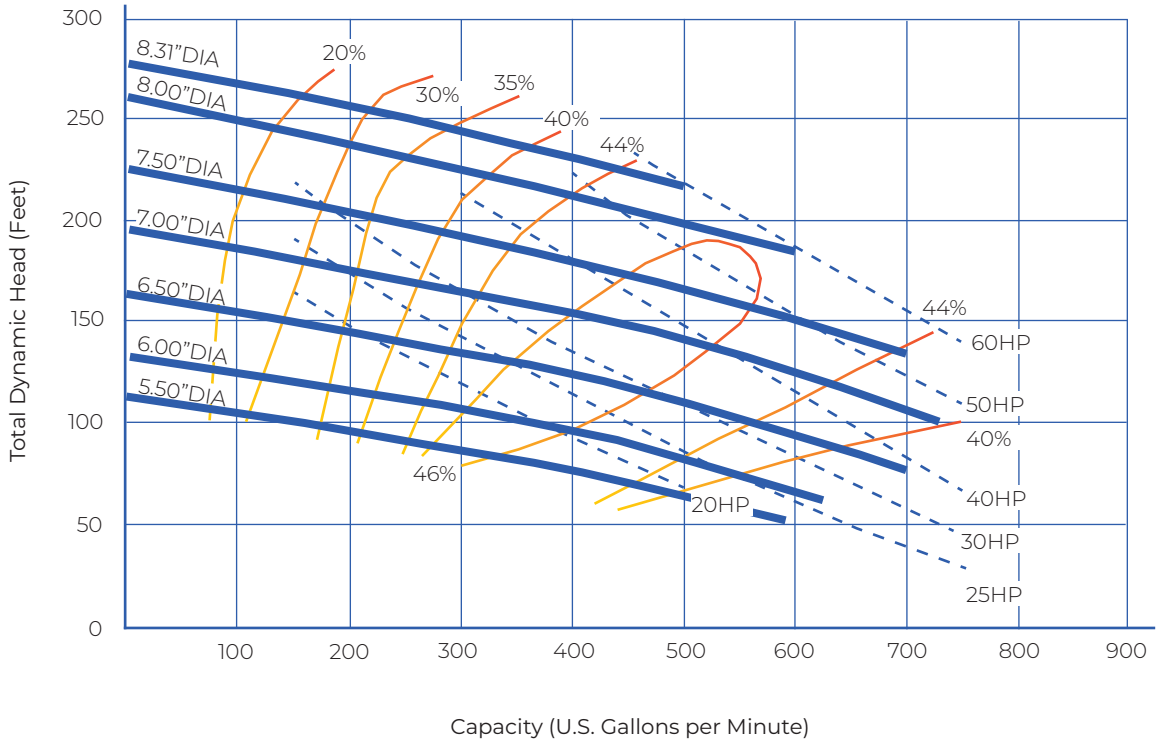


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K4RB		4” SUBMERSIBLE SEWAGE PUMPS		
Speed	3450 RPM	Discharge	4”	Solids	3”

GPM:_____ TDH: _____

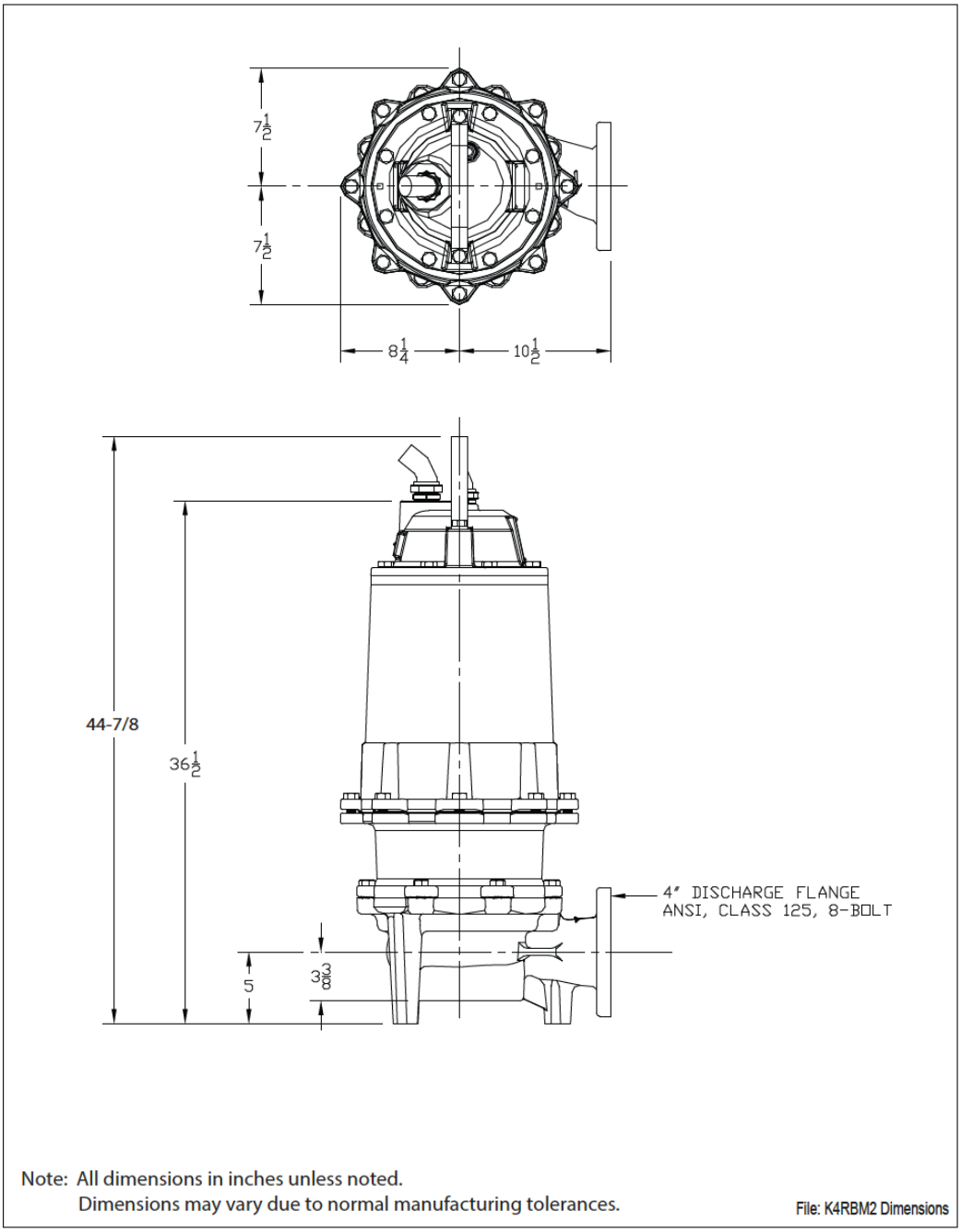
Performance



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

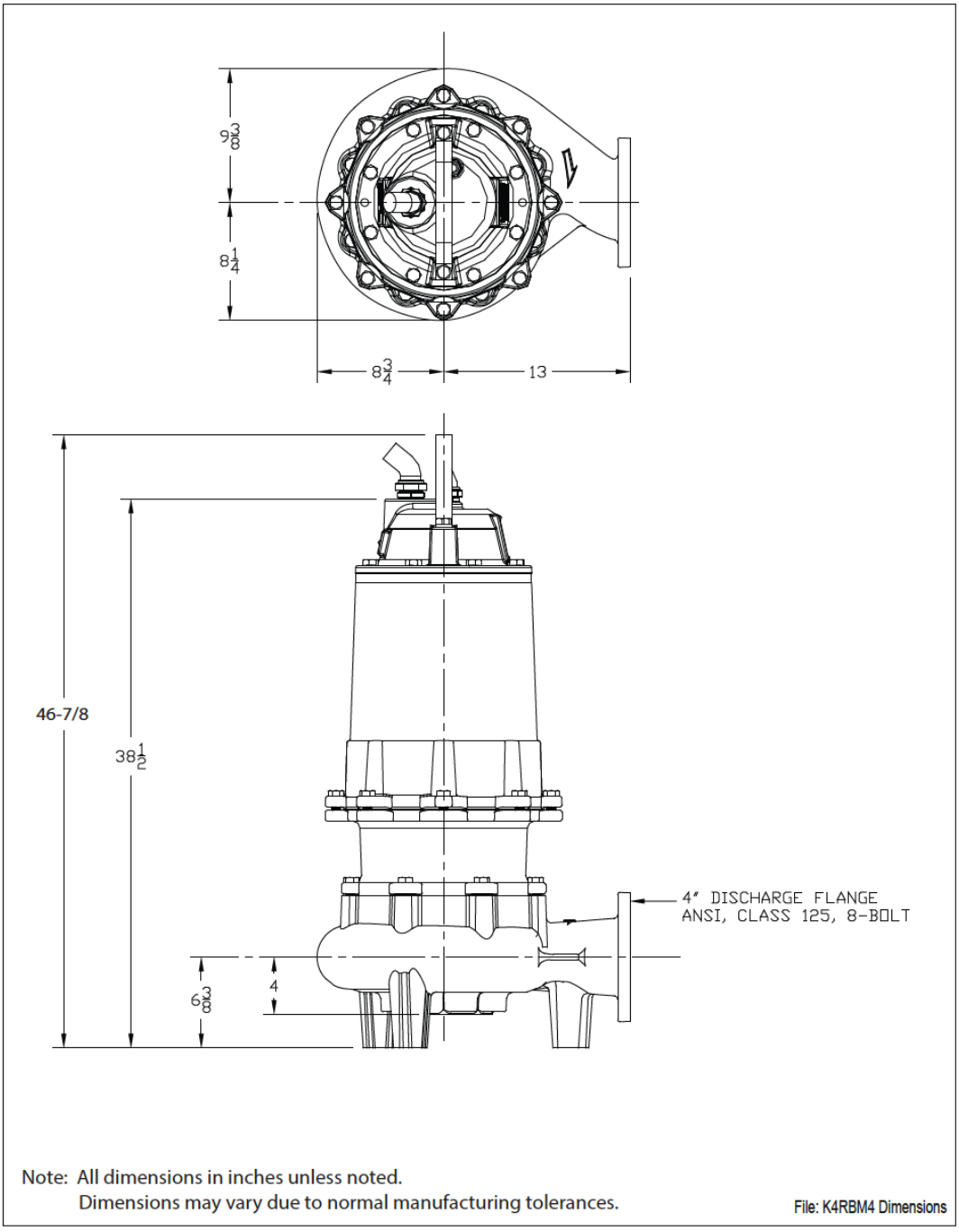


Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

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.

File: K4RBM4 Dimensions

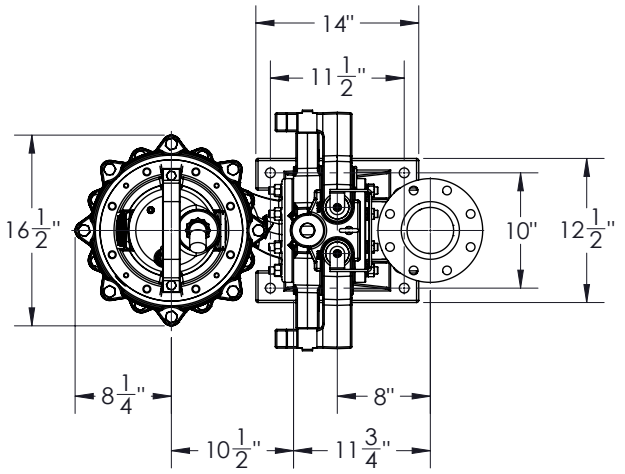
K4RB (3450) - Liftout Dimensional Data

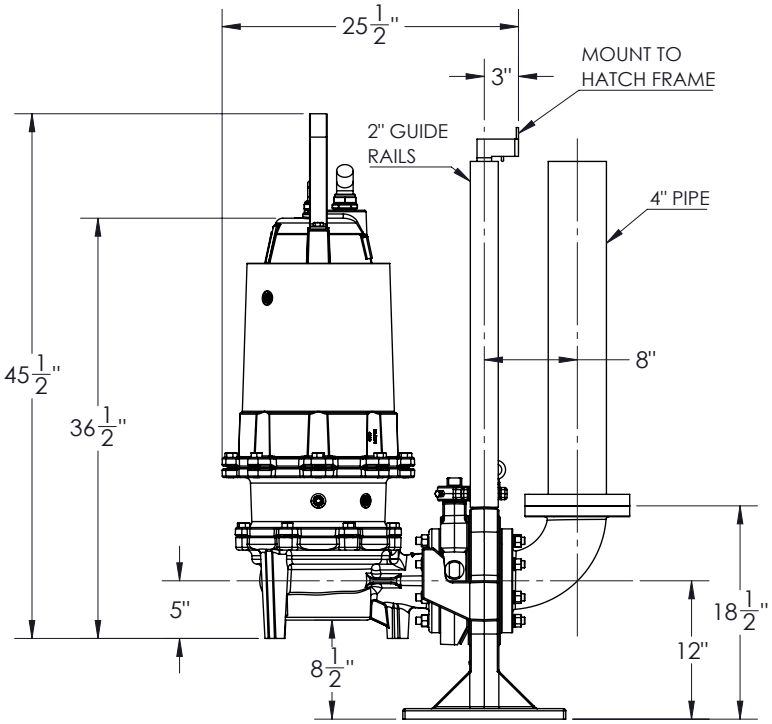
PUMP SERIES	K4RB (3450)	4" SUBMERSIBLE SEWAGE PUMPS

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.

ABSOLUTE MINIMUM SUBMERGENCE LEVEL:
22" FROM BOTTOM
RECOMMENDED MINIMUM SUBMERGENCE LEVEL:
40" FROM BOTTOM





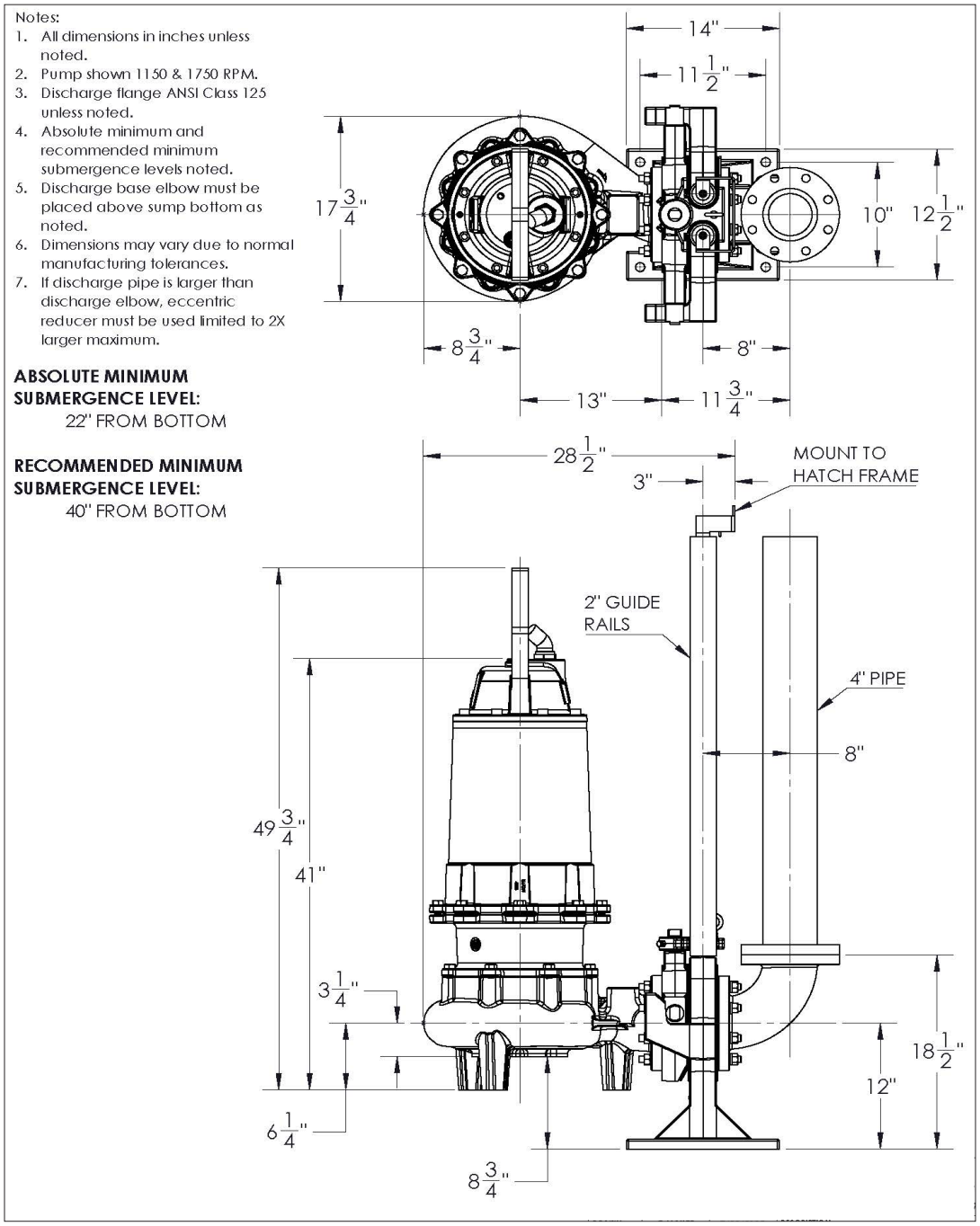
PUMP SERIES	K4RB (1150&1750)	4" SUBMERSIBLE SEWAGE PUMPS

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.

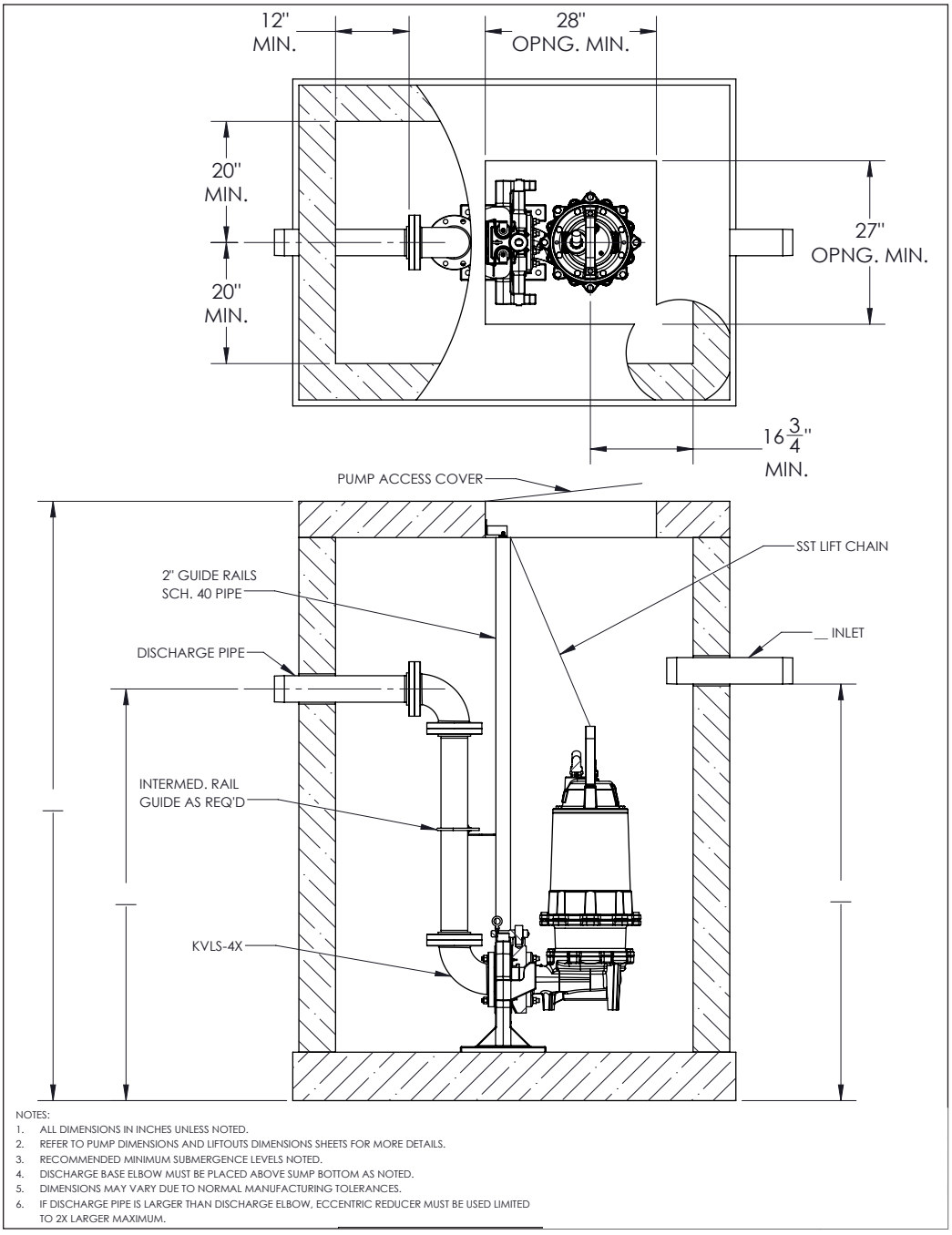
ABSOLUTE MINIMUM SUBMERGENCE LEVEL:
22" FROM BOTTOM

RECOMMENDED MINIMUM SUBMERGENCE LEVEL:
40" FROM BOTTOM



PUMP SERIES	K4RB (3450)	4” SUBMERSIBLE SEWAGE PUMPS

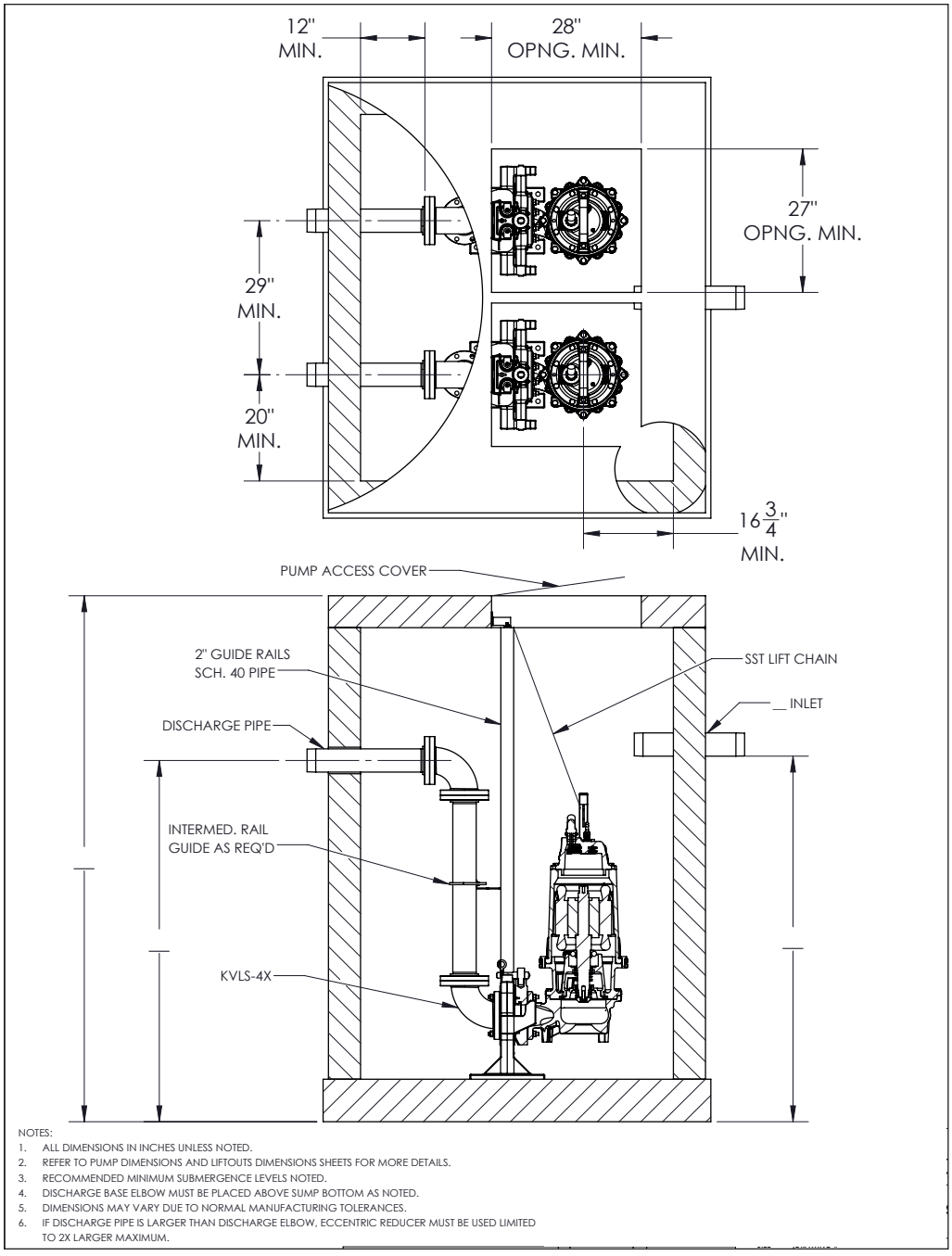
SIMPLEX INSTALLATION DIMENSIONAL DATA



NOTES:
1. ALL DIMENSIONS IN INCHES UNLESS NOTED.
2. REFER TO PUMP DIMENSIONS AND LIFTOUTS DIMENSIONS 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 (3450)	4” SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA

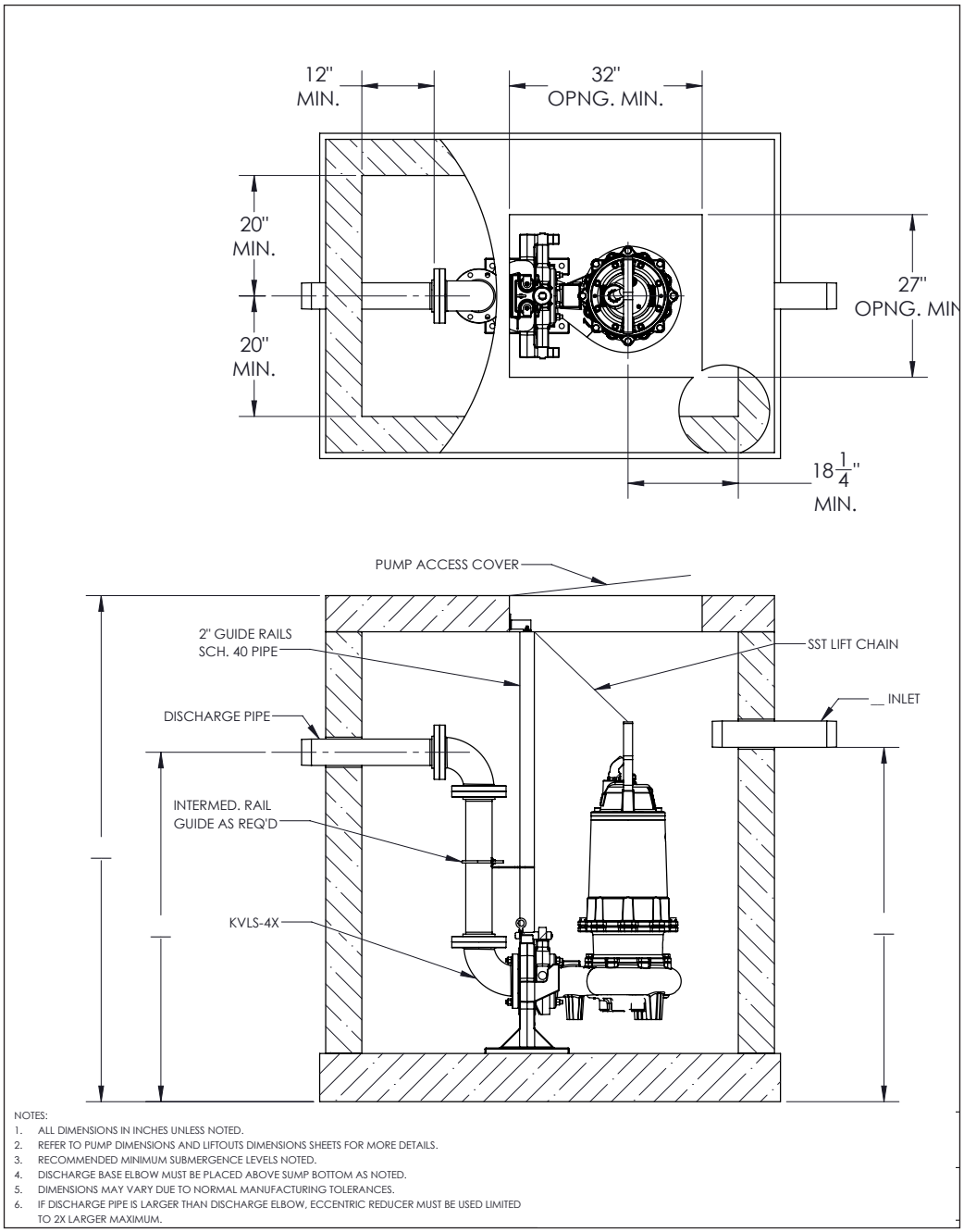


NOTES:
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K4RB (1150&1750) - Simplex Installation Dimensional Data

PUMP SERIES	K4RB (1150&1750)	4" SUBMERSIBLE SEWAGE PUMPS

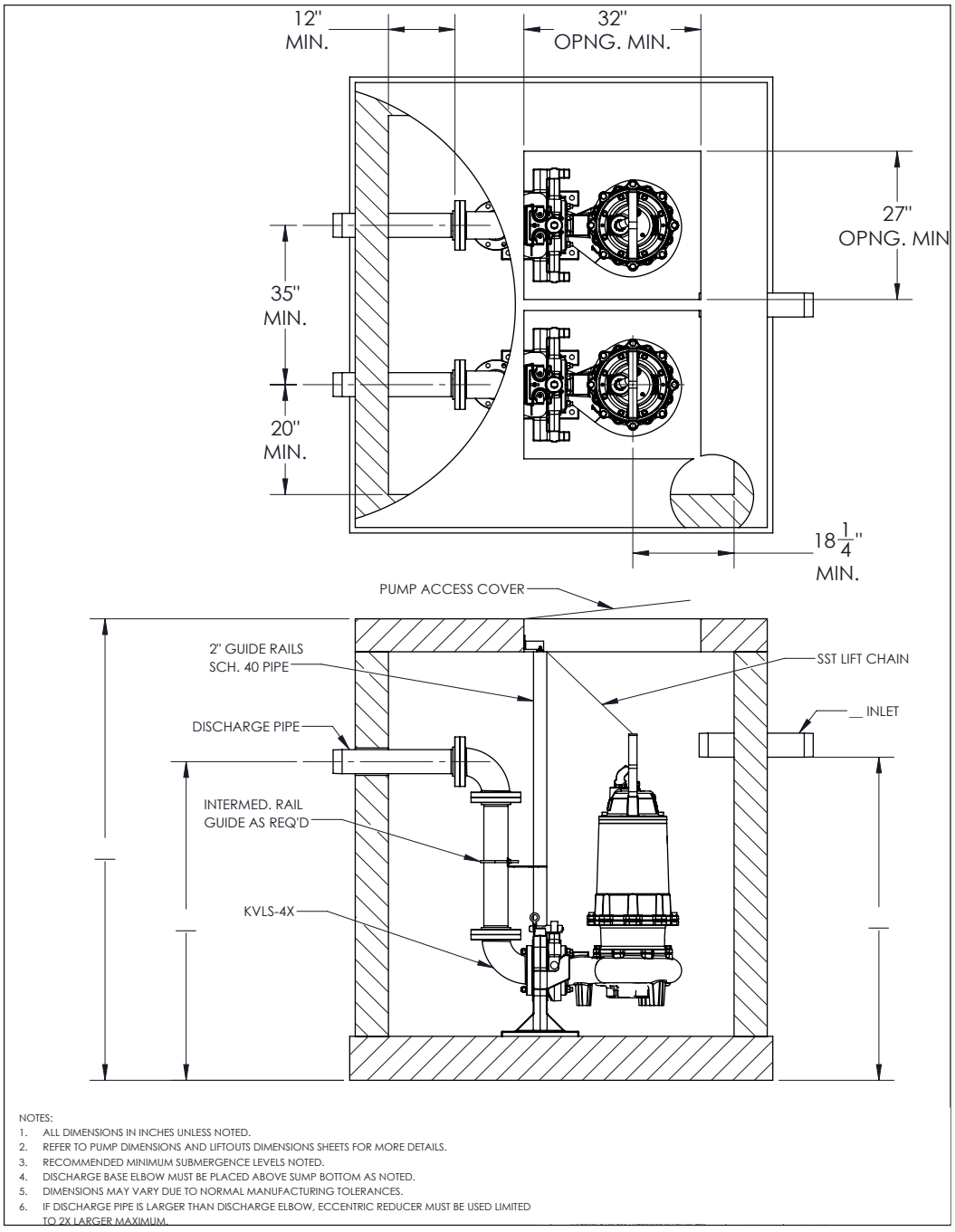
SIMPLEX INSTALLATION DIMENSIONAL DATA



NOTES:
1. ALL DIMENSIONS IN INCHES UNLESS NOTED.
2. REFER TO PUMP DIMENSIONS AND LIFTOUTS DIMENSIONS 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 DIMENSIONS AND LIFTOUTS DIMENSIONS 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.

PHYSICAL DATA	
Discharge Size	ANSI 4” Horizontal
Solid 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 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 N: 392°F (200°C)
Power Cord Type	SOOW - 600V, 90° C; Type W - 2000V, 90° C
Control Cord Type	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	Fluorocarbon
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

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	VOLTS	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	460	3	E	1.2	61.1	73.3	244.3	43.9	195.1	48.8
	575				48.9	58.6	195.5			
50	460	3	D	1.2	67.6	81.1	270.5	48.6	215.8	54.0
	575				54.1	64.9	216.4			
60	460	3	D	1.0	81.1	81.1	270.5	48.6	215.8	54.0
	575				64.9	64.9	216.4			

MOTOR EFFICIENCIES & POWER FACTOR									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
15	3	92	92	91	90	91	91	90	82
20	3	93	93	92	91	91	91	90	84
25	3	94	94	93	92	92	92	90	84
30	3	94	94	93	92	92	92	91	85
40	3	94	94	93	92	92	92	91	86
50	3	94	94	94	93	93	93	92	86

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		356° F (180° 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	VOLTS	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			

MOTOR EFFICIENCIES & POWER FACTOR									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
5	3	89	89	88	86	90	90	88	80
7.5	3	90	90	88	86	90	90	88	80
10	3	91	91	89	87	90	90	89	82
15	3	91	91	89	87	91	91	89	82
20	3	92	92	90	88	91	91	89	82

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	3450			
Electrical Ratings	Heat Sensor	24VDC, 5AMPS	115VAC, 5AMPS	230VAC, 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	SF AMPS	LOCKED ROTOR AMPS	RUN KW	START KVA	RUN KVA
20	208	3	J	1.2	76.3	91.6	424.8	24.7	152.8	27.5
	230				68.7	82.5	382.7			
	460				34.4	41.2	191.4			
	575				27.5	33.0	153.1			
25	208	3	G	1.2	92.6	111.1	424.8	29.9	152.8	33.3
	230				83.4	100.1	382.7			
	460				41.7	50.1	191.4			
	575				33.4	40.0	153.1			
30	208	3	F	1.2	106.2	127.4	424.8	34.4	152.8	38.2
	230				95.7	114.8	382.7			
	460				47.8	57.4	191.4			
	575				38.3	45.9	153.1			
40	208	3	G	1.2	131.4	157.7	656.0	42.5	235.8	47.3
	230				118.4	142.1	591.0			
	460				59.2	71.0	295.5			
	575				47.4	56.8	236.4			
50	230	3	E	1.2	147.7	177.3	591.0	53.1	235.8	59.0
	460				73.9	88.6	295.5			
	575				59.1	70.9	236.4			
60	460	3	C	1.0	89.2	89.2	295.5	64.1	235.8	71.2
	575				71.4	71.4	236.4			

MOTOR EFFICIENCIES & POWER FACTOR									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
20	3	92	92	91	90	91	91	90	82
25	3	92	92	91	90	92	92	91	84
30	3	92	92	91	90	92	92	91	84
40	3	93	93	92	91	92	92	91	85
50	3	93	93	92	91	93	93	92	85
60	3	94	94	92	91	93	93	92	86

1.0 SCOPE

- 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.
- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 3392° F (200°C). To include:
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a three-bearing system design.
  - The upper bearing shall be a Conrad type, single row Radial ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, 10-vane (3450) or 8-vane (1750 & 1150), vortex flow and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
    - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a centerline discharge configuration.
- The discharge is to be 4” ANSI® standard Class 125, 8-bolt configuration.
- 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/corrosion resistance including higher temperature application.

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. Indiviual Performance Curves	• **K3VN**
3. Dimensional Drawings Pump Lift-out & Base Elbow Wet Well Installations	• **K3VN**

OPTIONAL :

All Stainless Steel Construction

FM APPROVED



K3VN(X)

3” Submersible, Enclosed Impeller (Class 1, Div. 1, Groups C & D Hazardous Location)

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	4” ANSI Class 125 Horizontal Flange
Motor Speeds	1150 / 1750 RPM
Solids Handling	3”
Impeller	Balanced, Enclosed, 2-Vane
Motor Service Factor	1.20

CERAMIC COATED ENCLOSED 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

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

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

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.

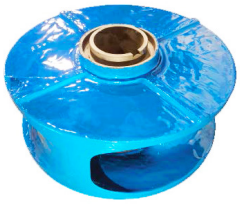
DOUBLE ROW BEARINGS

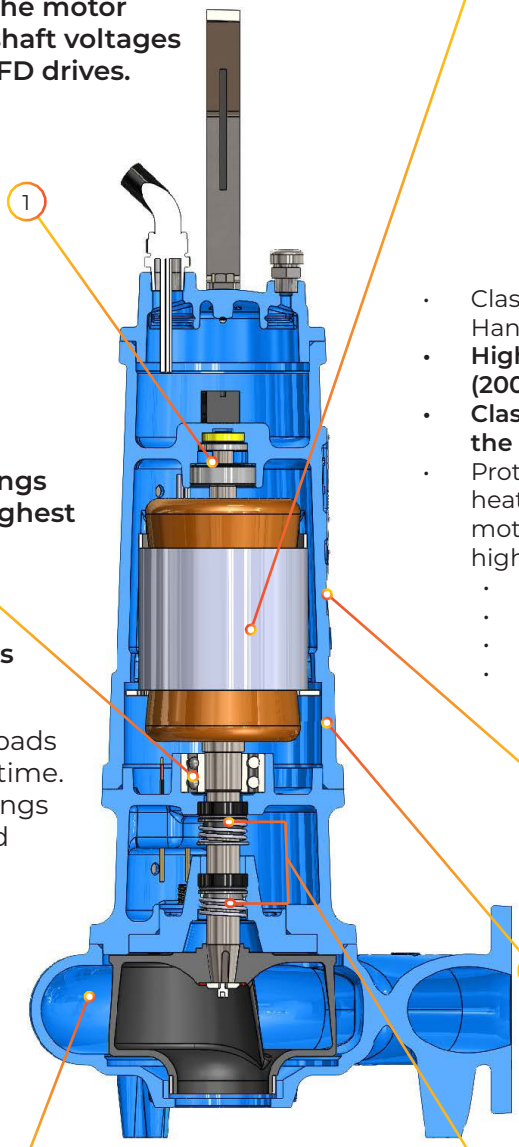


Heavy Duty Bearings to handle the toughest performances.

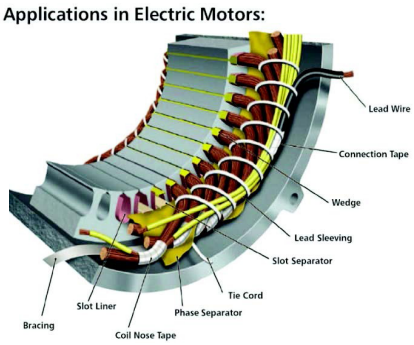
- **High Pressures**
- **High Flows**

- 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



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

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.

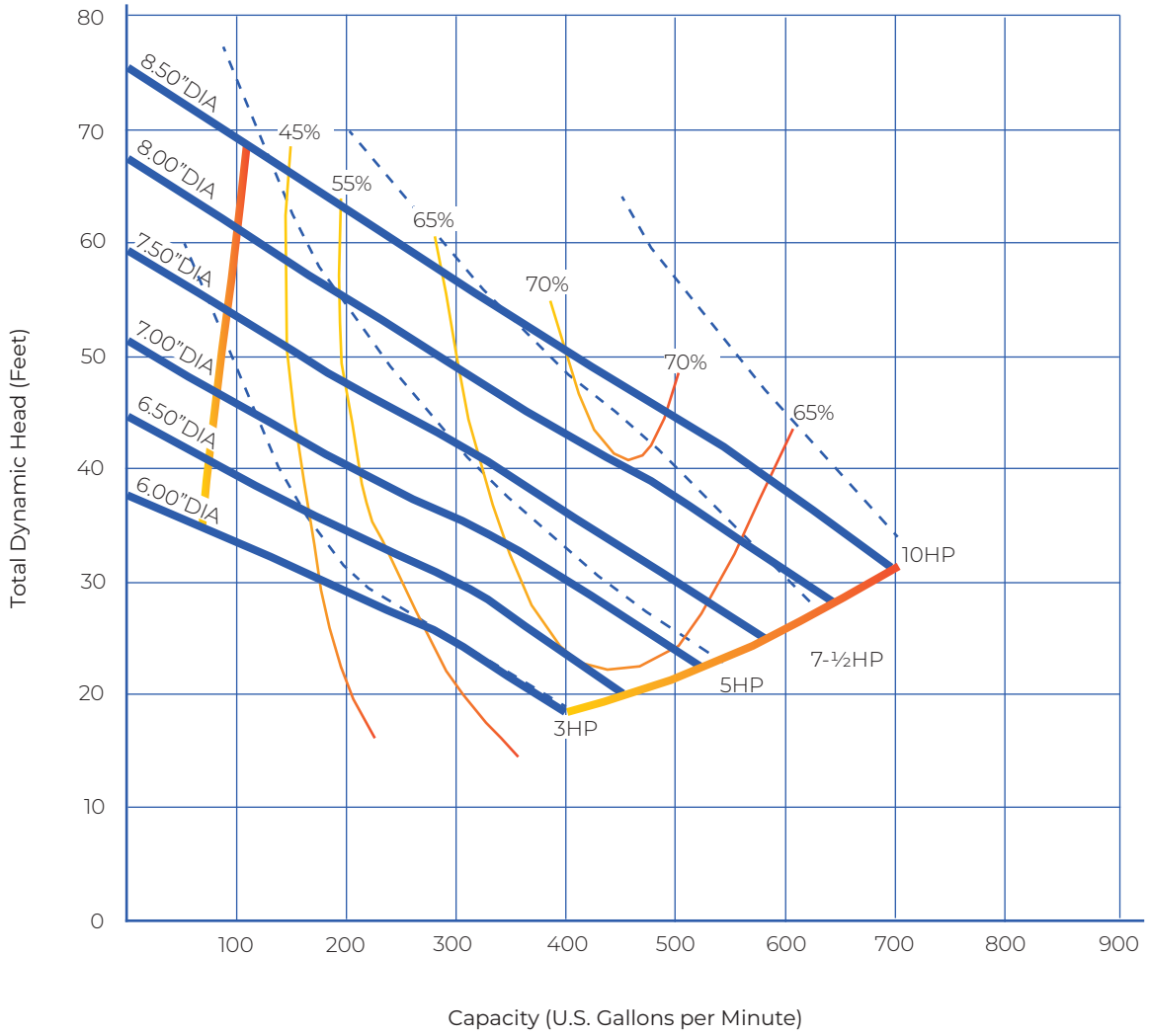
CERAMIC COATING - IMPELLER AND VOLUTE CASTING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

PUMP SERIES	K3VN		3” SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	3”	Solids	3”

GPM:_____ TDH: _____

Performance

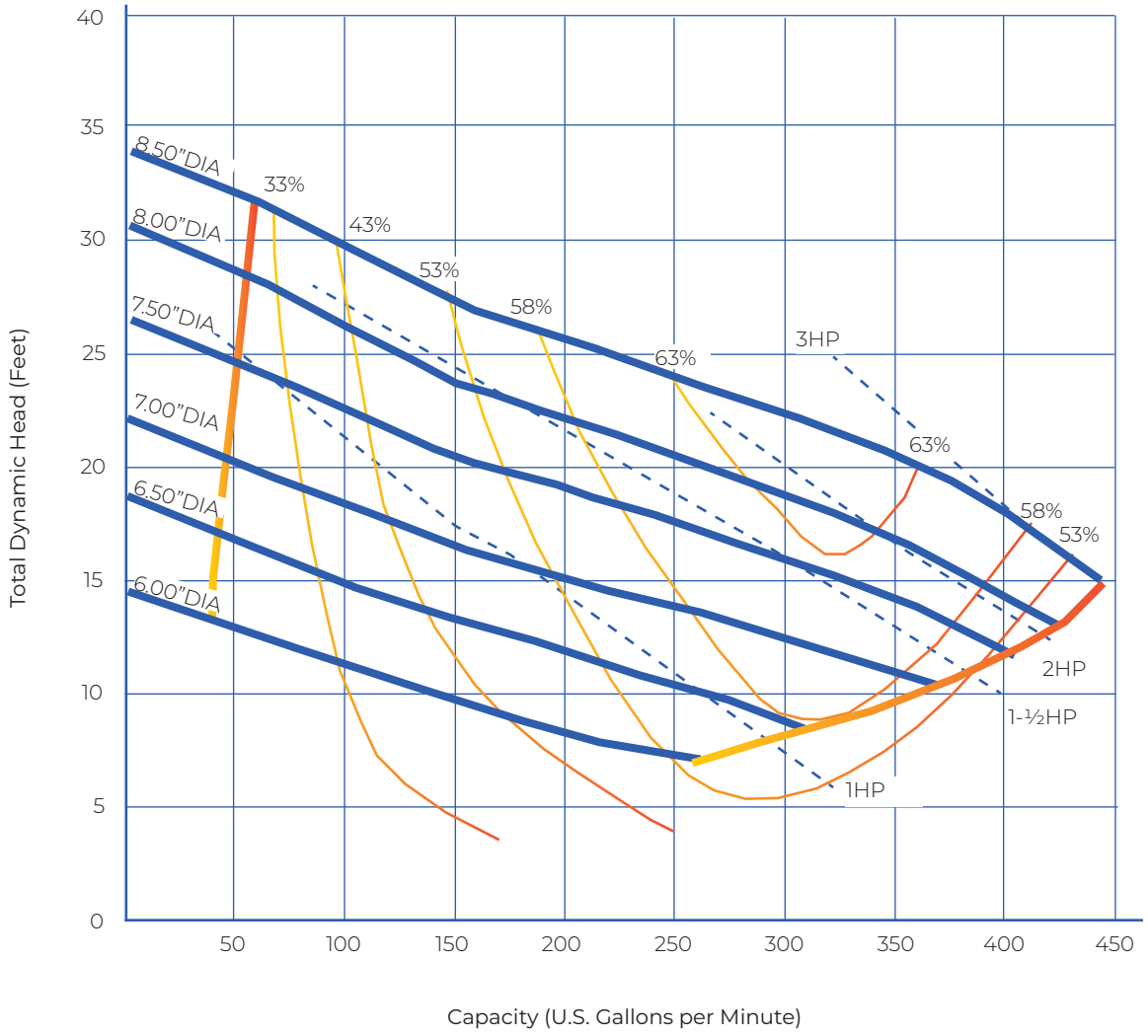


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K3VN		3" SUBMERSIBLE SEWAGE PUMPS		
Speed	1150 RPM	Discharge	3"	Solids	3"

GPM:_____ TDH: _____

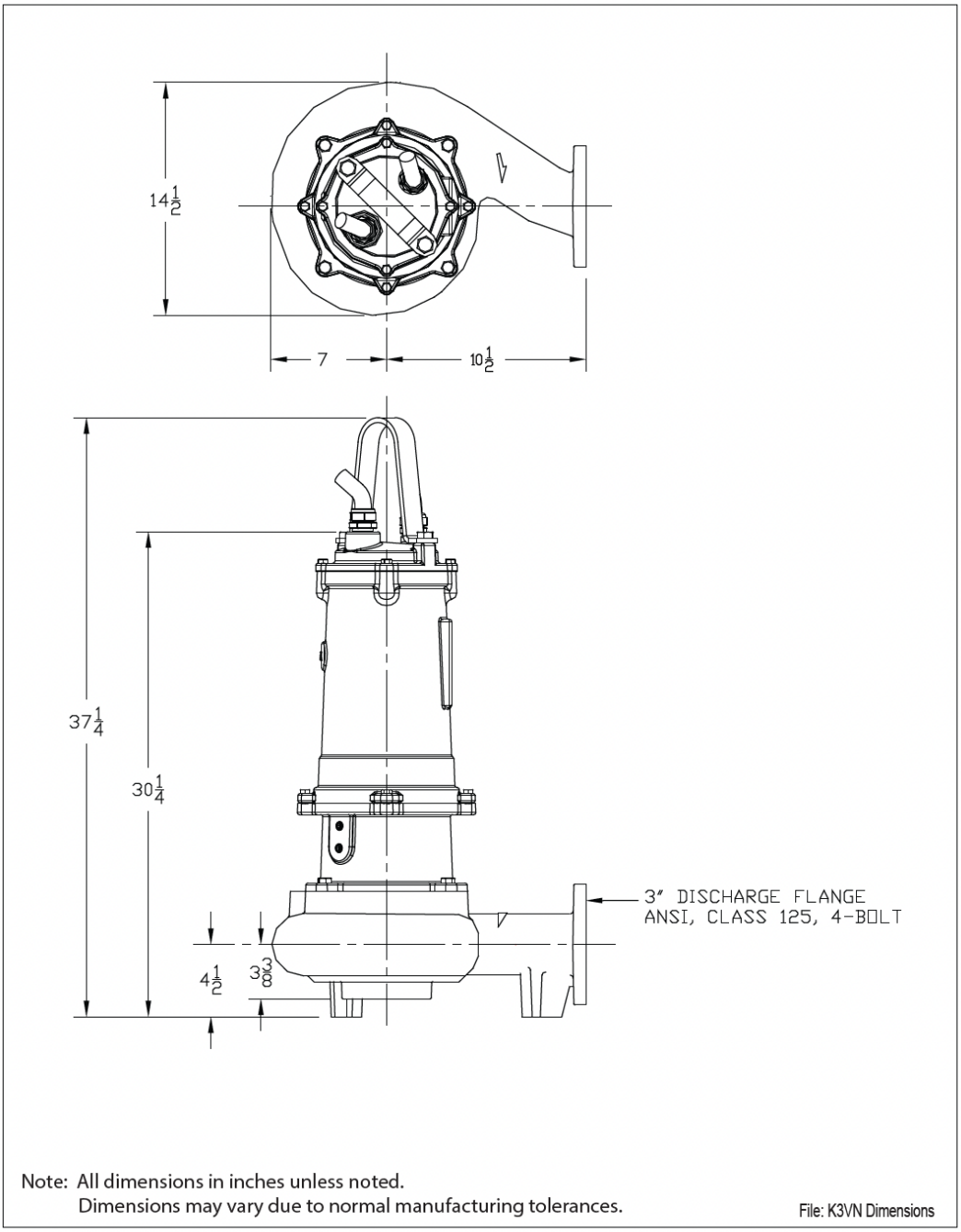
Performance



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	K3VN	3" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

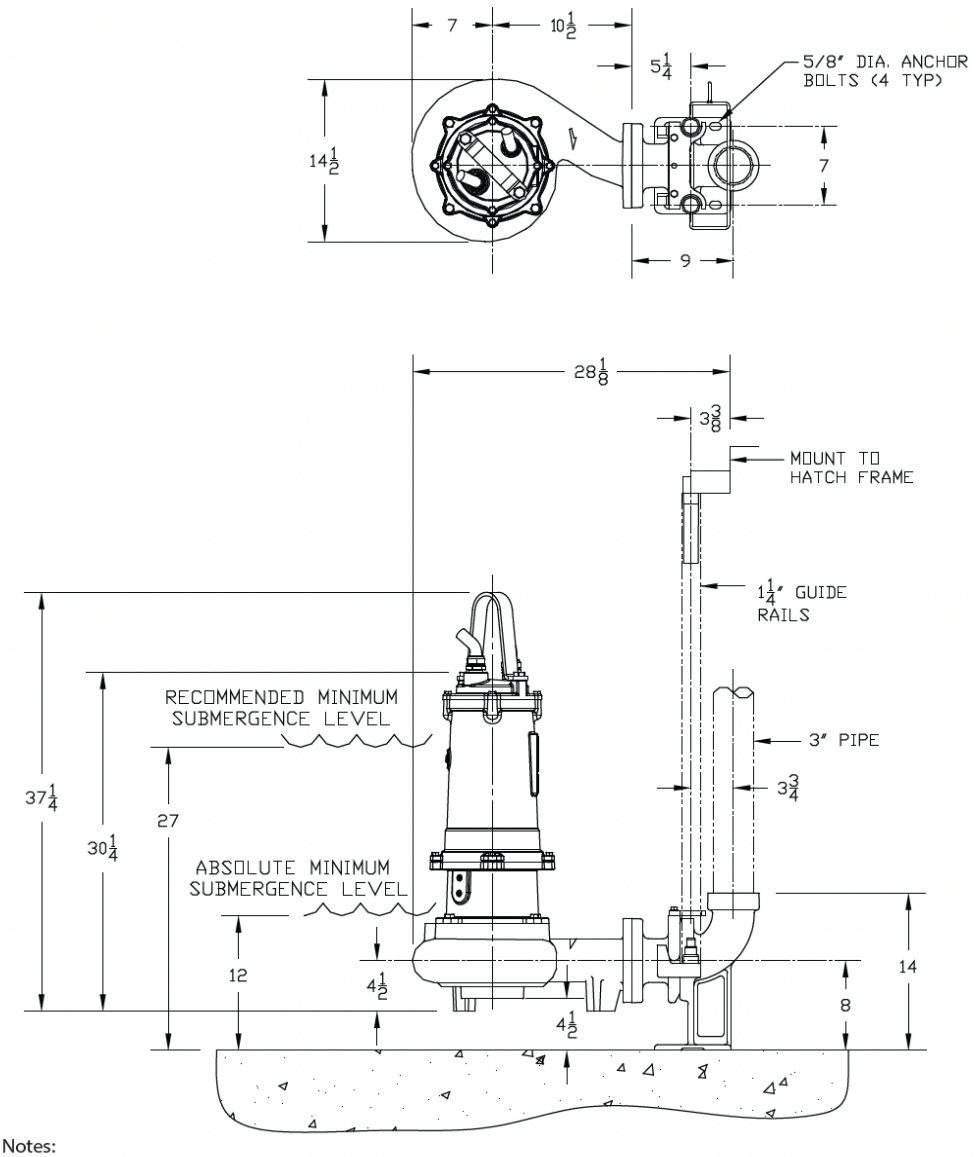


Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K3VN Dimensions

PUMP SERIES	K3VN	3" SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

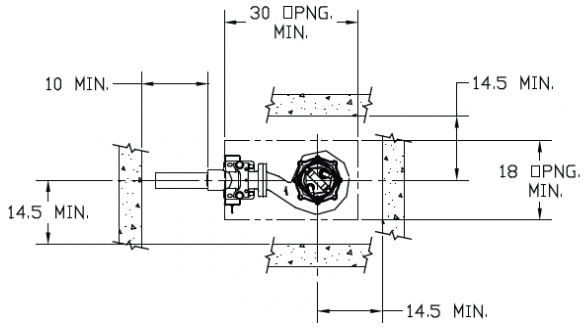


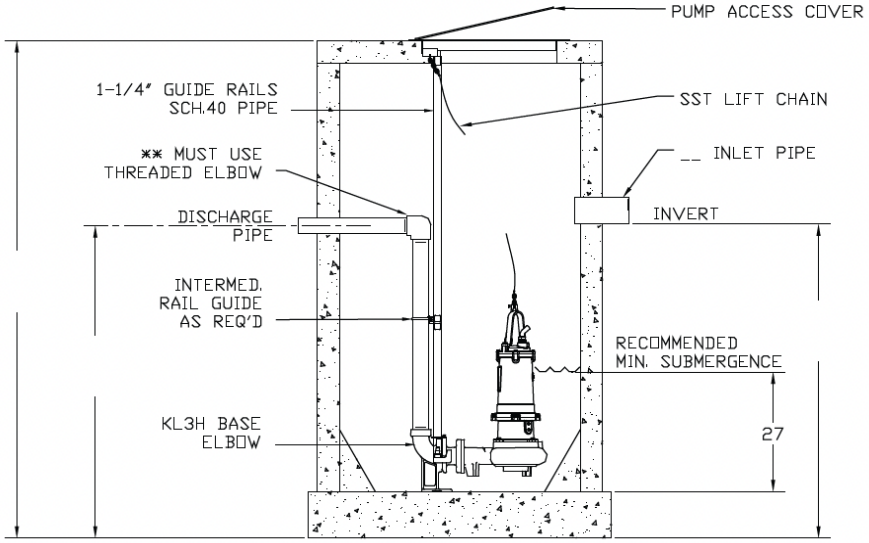
Notes:
1. All dimensions in inches unless noted.
2. Discharge flange 3" NPT.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Dimensions may vary due to normal manufacturing tolerances.
5. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K3VN Liftout Dimensions

PUMP SERIES	K3VN	3" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



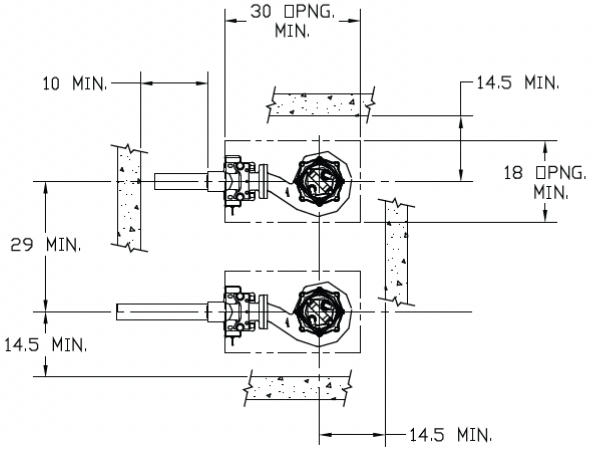


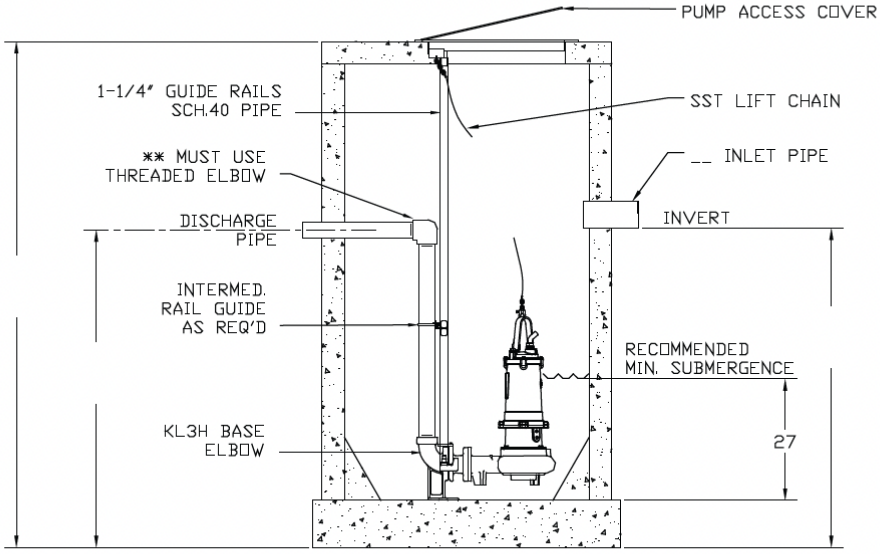
Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
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.

File: K3VN Install Dimensions

PHYSICAL DATA	
Discharge Size	ANSI 3” Horizontal
Solid 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 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 N: 392°F (200°C)
Power Cord Type	Type SOOW-600V, 90° C , TYPE W - 2000C, 90 C
Control Cord Type	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
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	Fluorocarbon
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

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	VOLTS	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	5	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
	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
3	1	88	88	86	84	88	88	86	78
3	3	88	88	86	84	89	89	87	79
5	1	89	89	87	85	90	90	88	80
5	3	89	89	87	85	90	90	88	80
7.5	3	90	90	88	86	90	90	88	80
10	3	91	91	89	87	90	90	88	80

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	VOLTS	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	6.0	7.2	21.0	1.7	7.6	2.1
	230				5.4	6.5	18.9			
	460				2.7	3.2	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
1	1	84	84	82	80	88	88	86	78
1	3	85	85	83	81	89	89	87	79
2	1	86	86	84	82	88	88	86	78
2	3	87	87	85	83	89	89	89	79
3	1	87	87	85	83	88	88	87	79
3	3	88	88	86	84	89	89	87	79

1.0 SCOPE

- 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.
- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.

5.0 PUMP BEARINGS

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a three-bearing system design.
  - The upper bearing shall be a Conrad type, single row Radial ball bearing designed to adequately handle the required radial loads.
  - 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. 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
    - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.
- The discharge is to be of a centerline discharge configuration.
- The discharge is to be 3” ANSI® standard Class 125, 4-bolt configuration.
- Horizontal discharge is standard if specifying K3VN model.
- 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/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. Indiviual Performance Curves	• **K4VN** • **K4VP** **K4VB** • **K4VK**
3. Dimensional Drawings Pump Lift-out & Base Elbow Wet Well Installations	• **K4VN** • **K4VP** **K4VB** • **K4VK**

OPTIONAL :
All Stainless Steel Construction

FM APPROVED



K4VN(X)

4" Submersible, Enclosed Impeller (Class 1, Div. 1, Groups C & D Hazardous Location)

CERAMIC COATED ENCLOSED 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

BEST MOTOR CONSTRUCTION

- Class "N" (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

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

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

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.

DOUBLE ROW BEARINGS

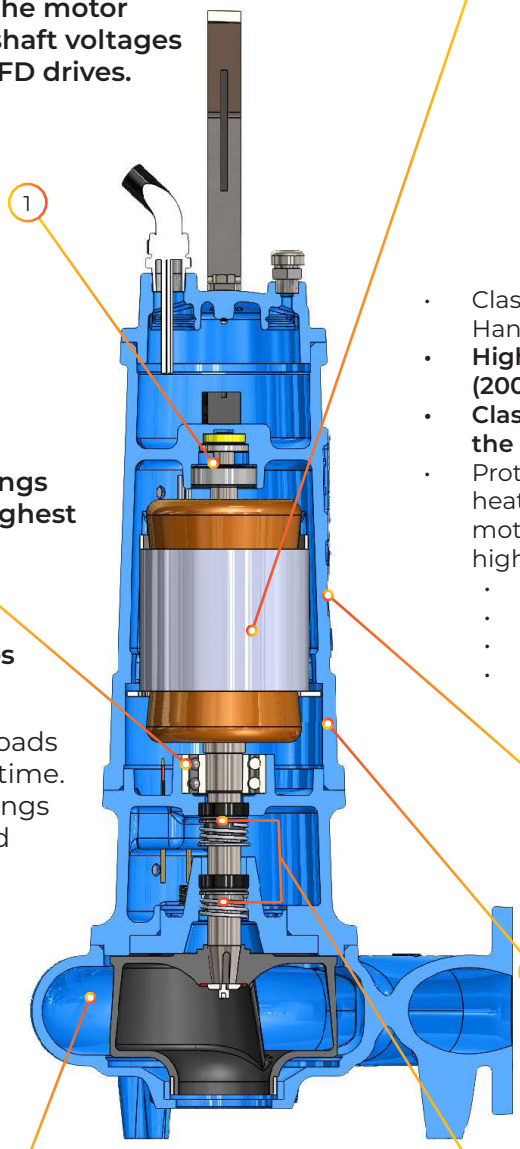


Heavy Duty Bearings to handle the toughest performances.

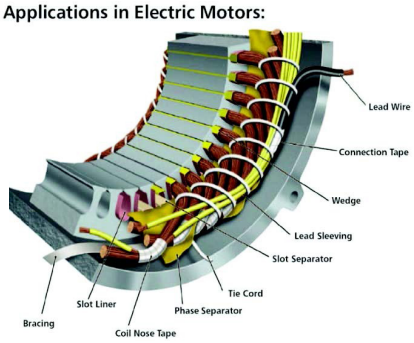
- **High Pressures**
- **High Flows**

- 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



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

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.

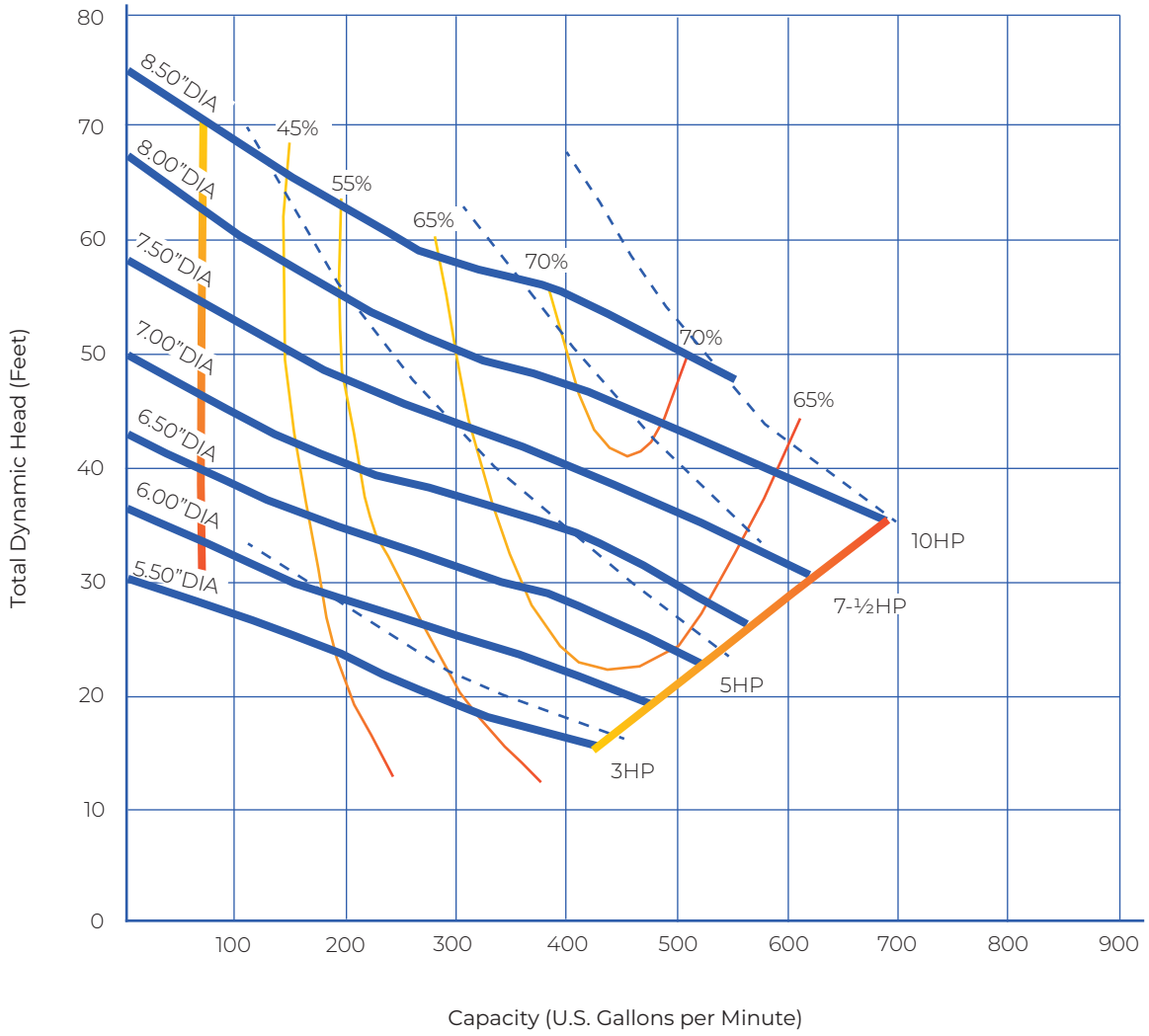
CERAMIC COATING - IMPELLER AND VOLUTE CASTING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

PUMP SERIES	K4VN		4" SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	4"	Solids	3"

GPM:_____ TDH: _____

Performance

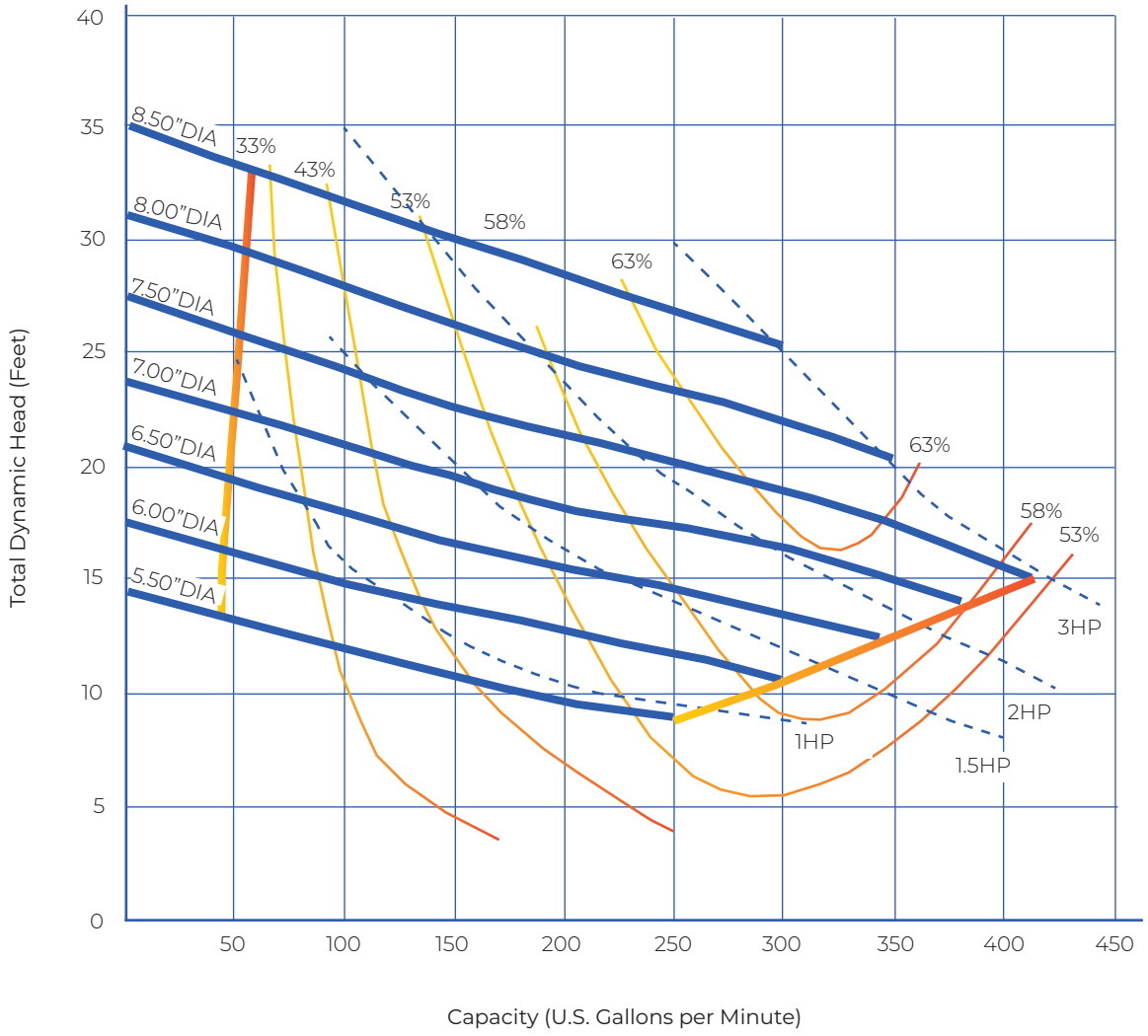


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K4VN		4” SUBMERSIBLE SEWAGE PUMPS		
Speed	1150 RPM	Discharge	4”	Solids	3”

GPM:_____ TDH: _____

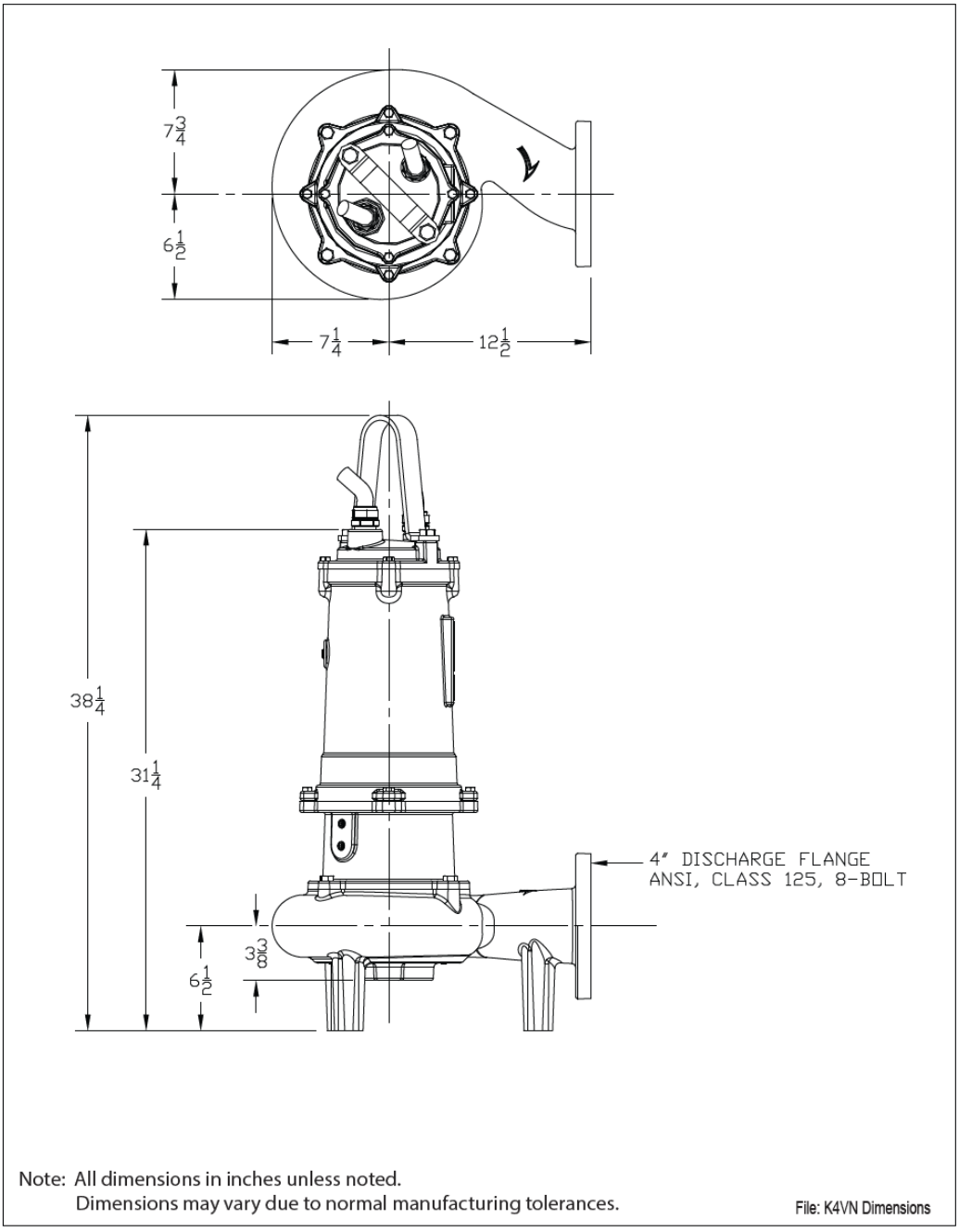
Performance



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	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

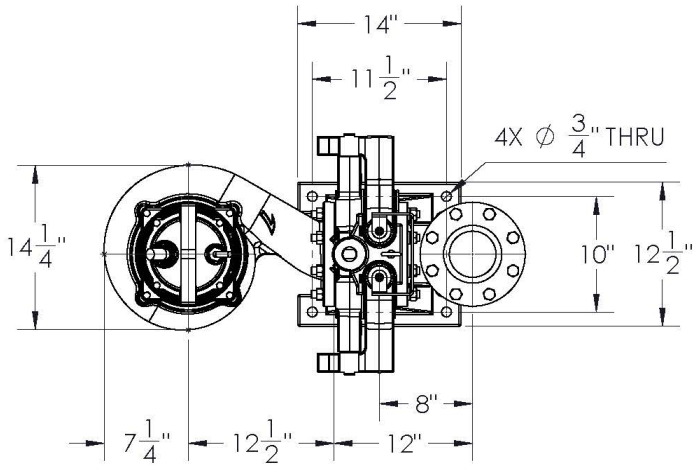
PUMP SERIES	K4VN	4" SUBMERSIBLE SEWAGE PUMPS

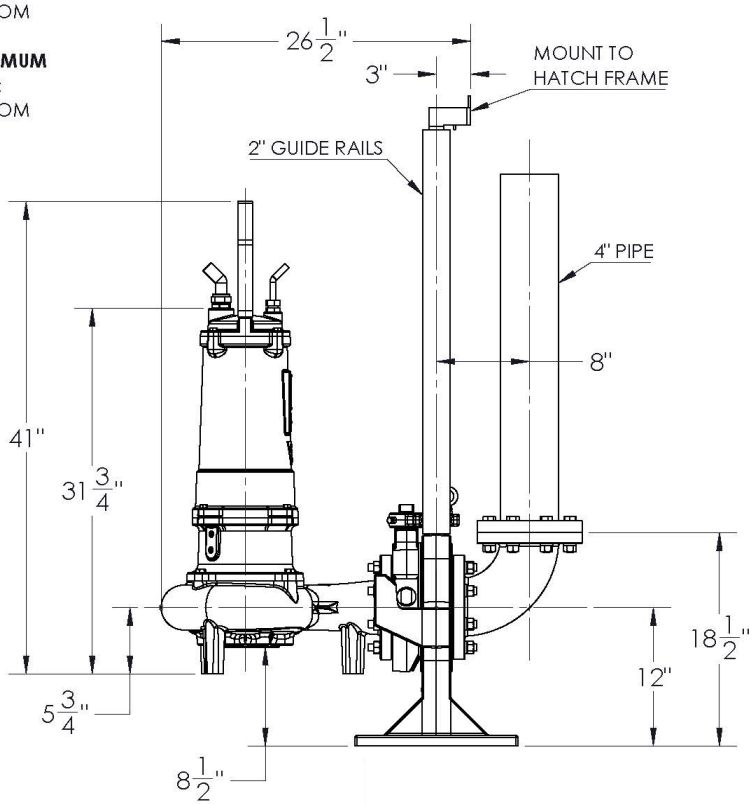
LIFTOUT DIMENSIONAL DATA

Notes:
1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manfacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2x larger maximum.

ABSOLUTE MINIMUM SUBMERGENCE LEVEL:
15" FROM BOTTOM

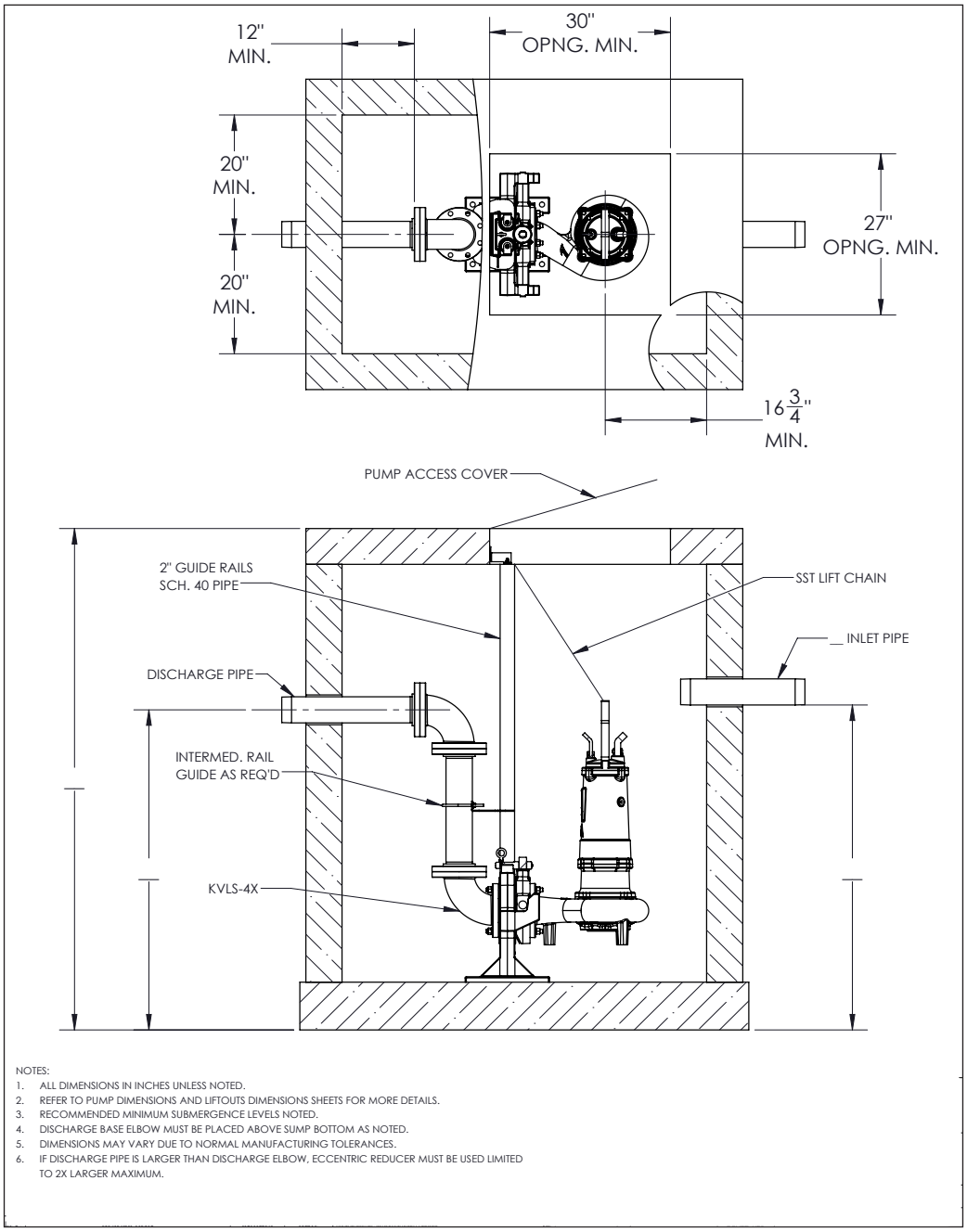
RECOMMENDED MINIMUM SUBMERGENCE LEVEL:
31" FROM BOTTOM





PUMP SERIES	K4VN	4” SUBMERSIBLE SEWAGE PUMPS

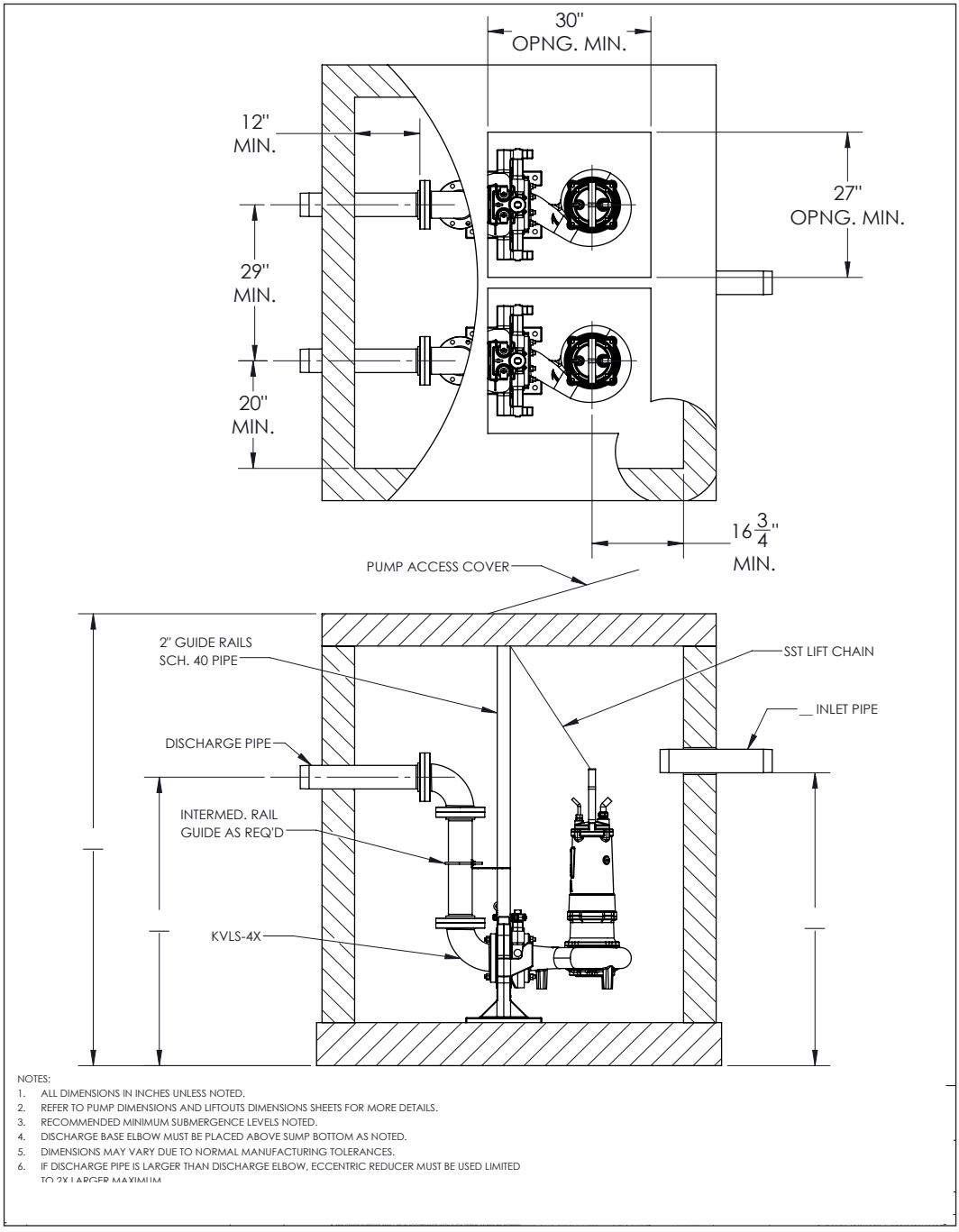
SIMPLEX INSTALLATION DIMENSIONAL DATA



NOTES:
1. ALL DIMENSIONS IN INCHES UNLESS NOTED.
2. REFER TO PUMP DIMENSIONS AND LIFTOUTS DIMENSIONS 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	K4VN	4" SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



NOTES:
1. ALL DIMENSIONS IN INCHES UNLESS NOTED.
2. REFER TO PUMP DIMENSIONS AND LIFTOUTS DIMENSIONS 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.

PHYSICAL DATA	
Discharge Size	ANSI 4” Horizontal
Solid 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 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 N: 392°F (200°C)
Power Cord Type	Type SOOW-600V, 90° C , TYPE W - 2000V, 90 C
Control Cord Type	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
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	Fluorocarbon
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

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	VOLTS	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

HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
3	1	85	85	83	78	87	86	82	71
3	3	86	85	84	79	86	85	81	70
5	1	87	86	84	79	86	85	82	70
5	3	88	87	86	81	86	85	81	70
7.5	3	88	87	87	82	86	85	81	71
10	3	89	88	88	82	87	86	82	73

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	VOLTS	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
1	1	81	81	80	76	84	83	79	68
1	3	83	82	81	77	84	83	79	68
2	1	84	83	82	78	84	83	80	69
2	3	84	84	83	79	85	84	80	69
3	1	86	85	84	80	84	85	79	68
3	3	86	86	85	81	86	87	81	69

1.0 SCOPE

- 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.
- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.

5.0 PUMP BEARINGS

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a three-bearing system design.
  - The upper bearing shall be a Conrad type, single row, Radial ball bearing designed to adequately handle the required radial loads.
  - 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.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
    - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.
- The discharge is to be of a centerline discharge configuration.
- The discharge is to be 4” ANSI® standard Class 125, 8-bolt configuration.
- Horizontal discharge is standard if specifying K4VN model.
- 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/corrosion resistance including higher temperature application.

K4VP(X)

4” Submersible, Enclosed Impeller

OPTIONAL :
All Stainless Steel Construction

FM PENDING



CAPABILITIES:

Flows	to 1200 GPM
Heads	to 118 Feet
HP Range	5 - 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

CERAMIC COATED ENCLOSED IMPELLER

- Superior Abrasion Resistance
- Allows The Pump To Operate Better In Any Pressure Or Flow Condition

HEAVY DUTY PUMP SERIES

- Handles Aggressive Pumping Applications
- Strong Pumping Capacities to 1200 GPM
- Smooth, Quiet Operation
- Centerline Volute Discharge

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Applications

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

K4VP(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.

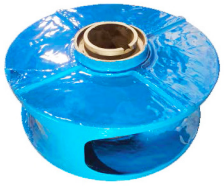
DOUBLE ROW BEARINGS

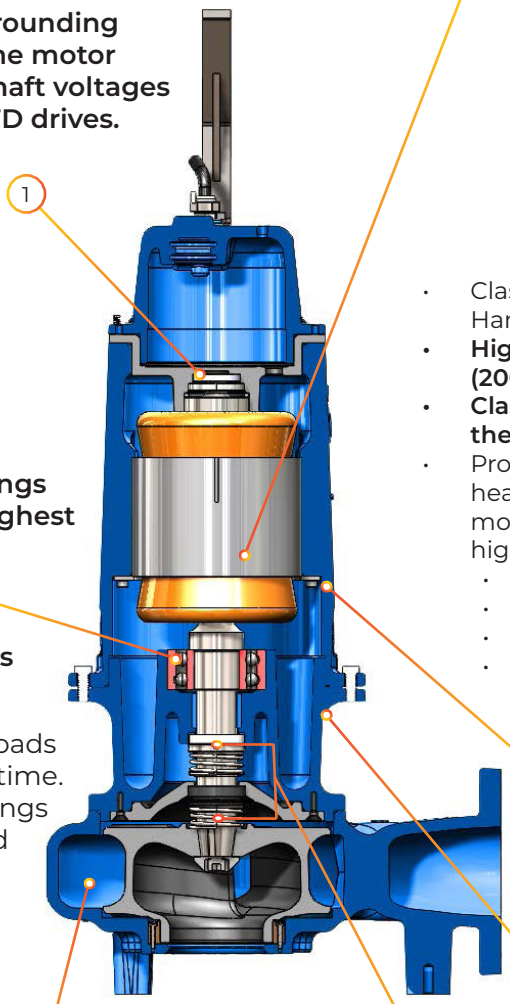


Heavy Duty Bearings to handle the toughest performances.

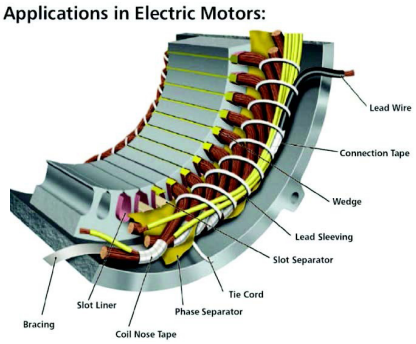
- **High Pressures**
- **High Flows**

- 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



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

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.

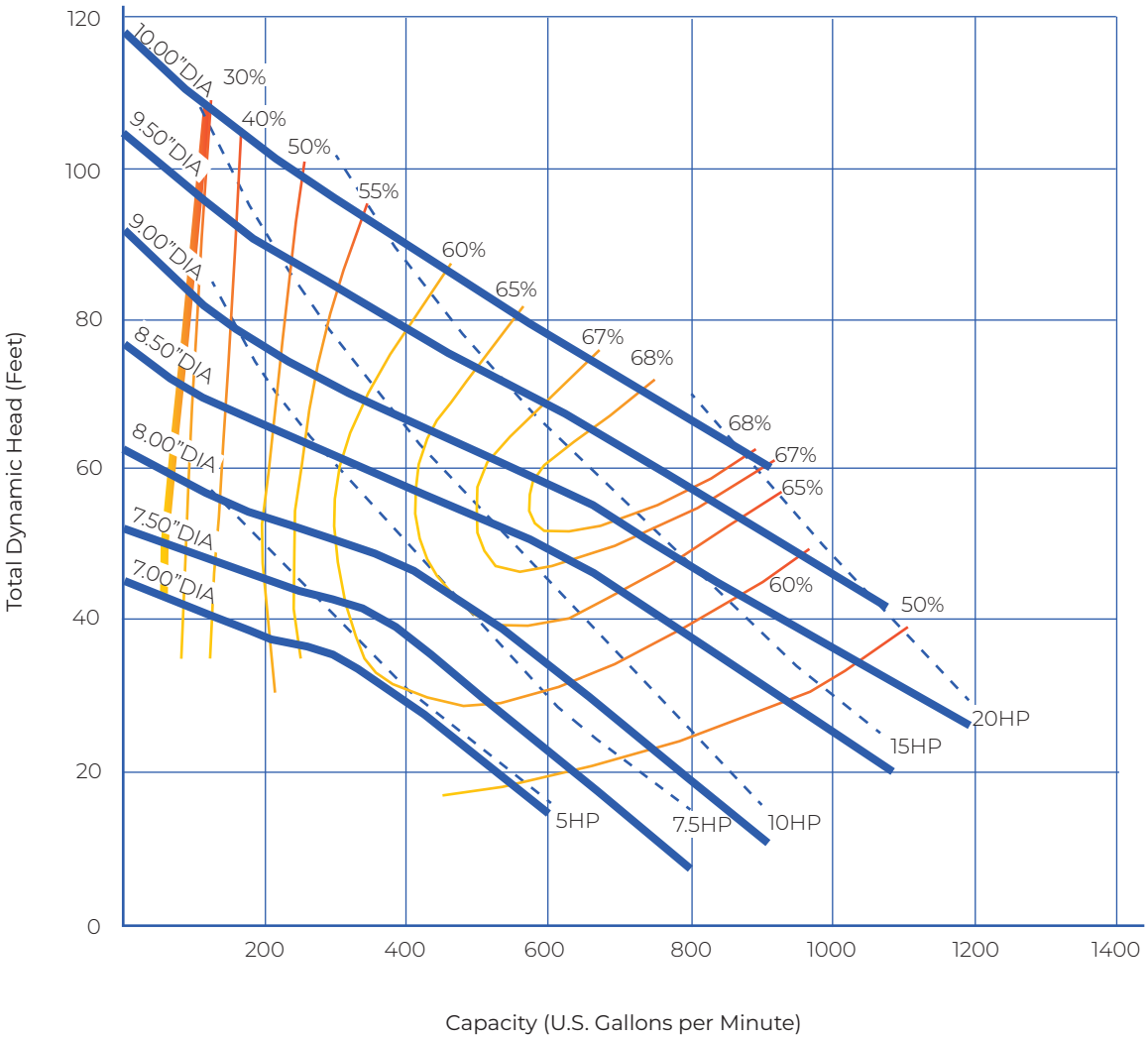
CERAMIC COATING - IMPELLER AND VOLUTE CASTING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!

PUMP SERIES	K4VP		4" SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	4"	Solids	3"

GPM:_____ TDH: _____

Performance

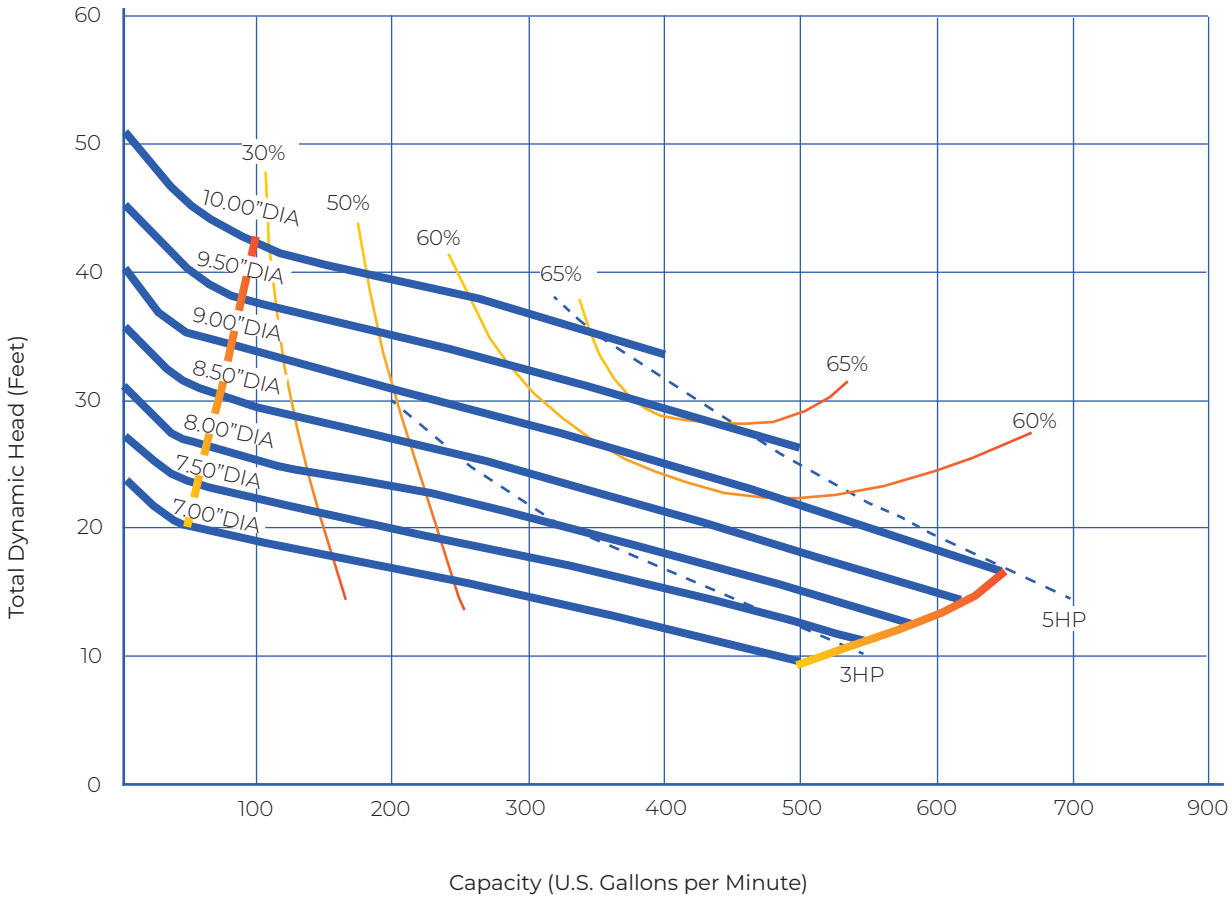


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K4VP		4” SUBMERSIBLE SEWAGE PUMPS		
Speed	1150 RPM	Discharge	4”	Solids	3”

GPM:_____ TDH: _____

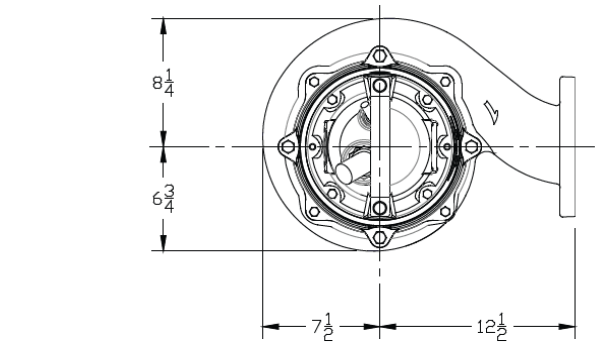
Performance

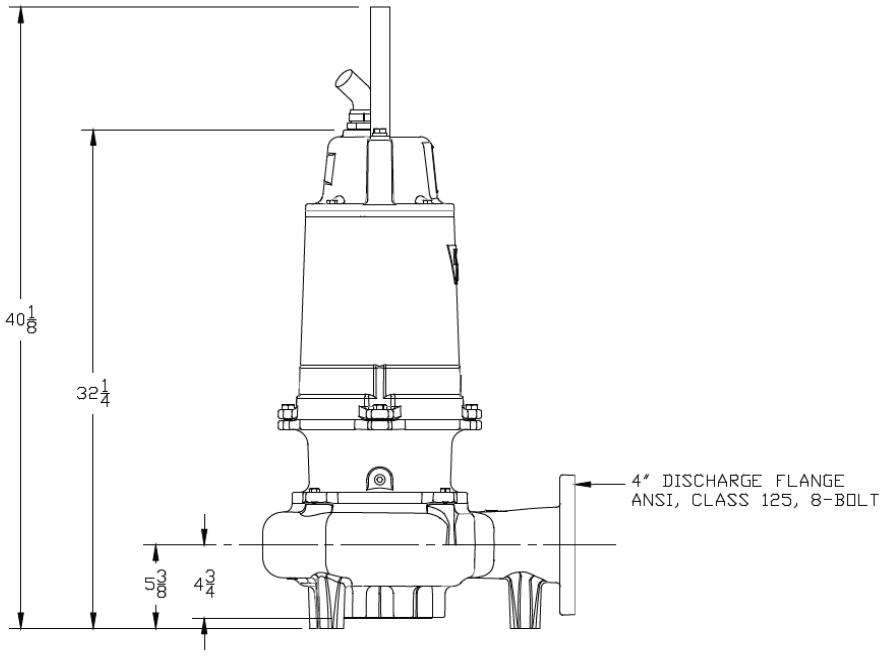


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K4VP	4" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA





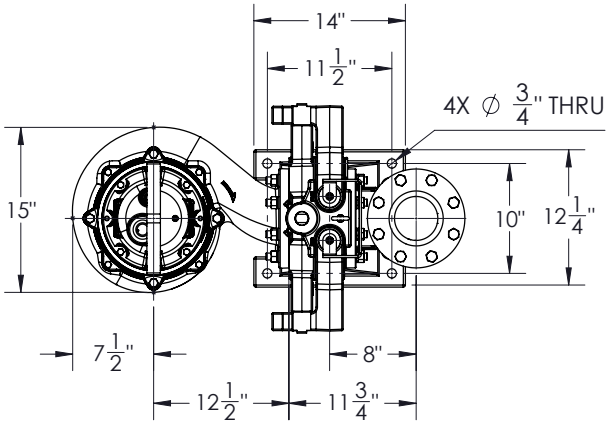
Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4VP Dimensions

PUMP SERIES	K4VP	4" SUBMERSIBLE SEWAGE PUMPS

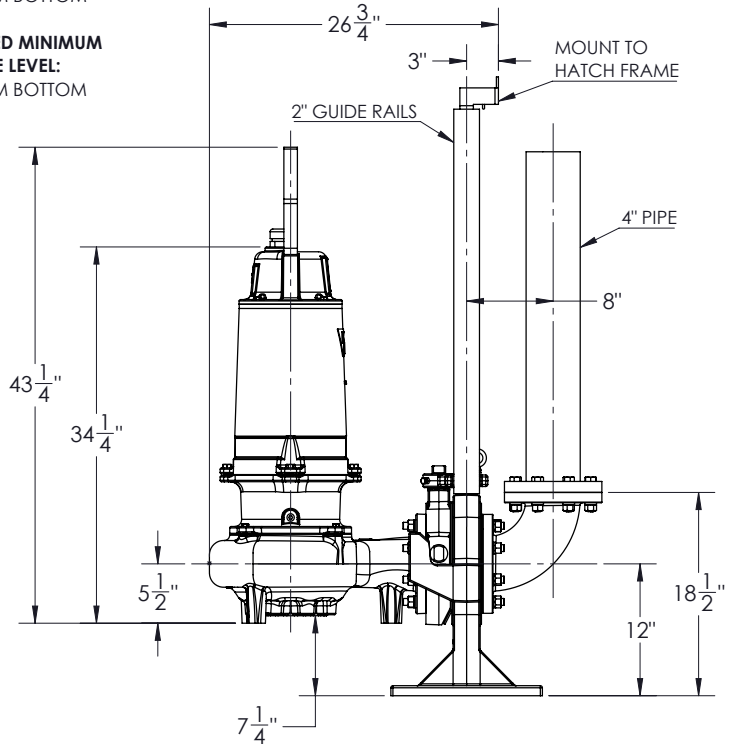
LIFTOUT DIMENSIONAL DATA

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2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum.
4. Discharge base elbow must be placed above sump bottom as noted.
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6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2x larger maximum.



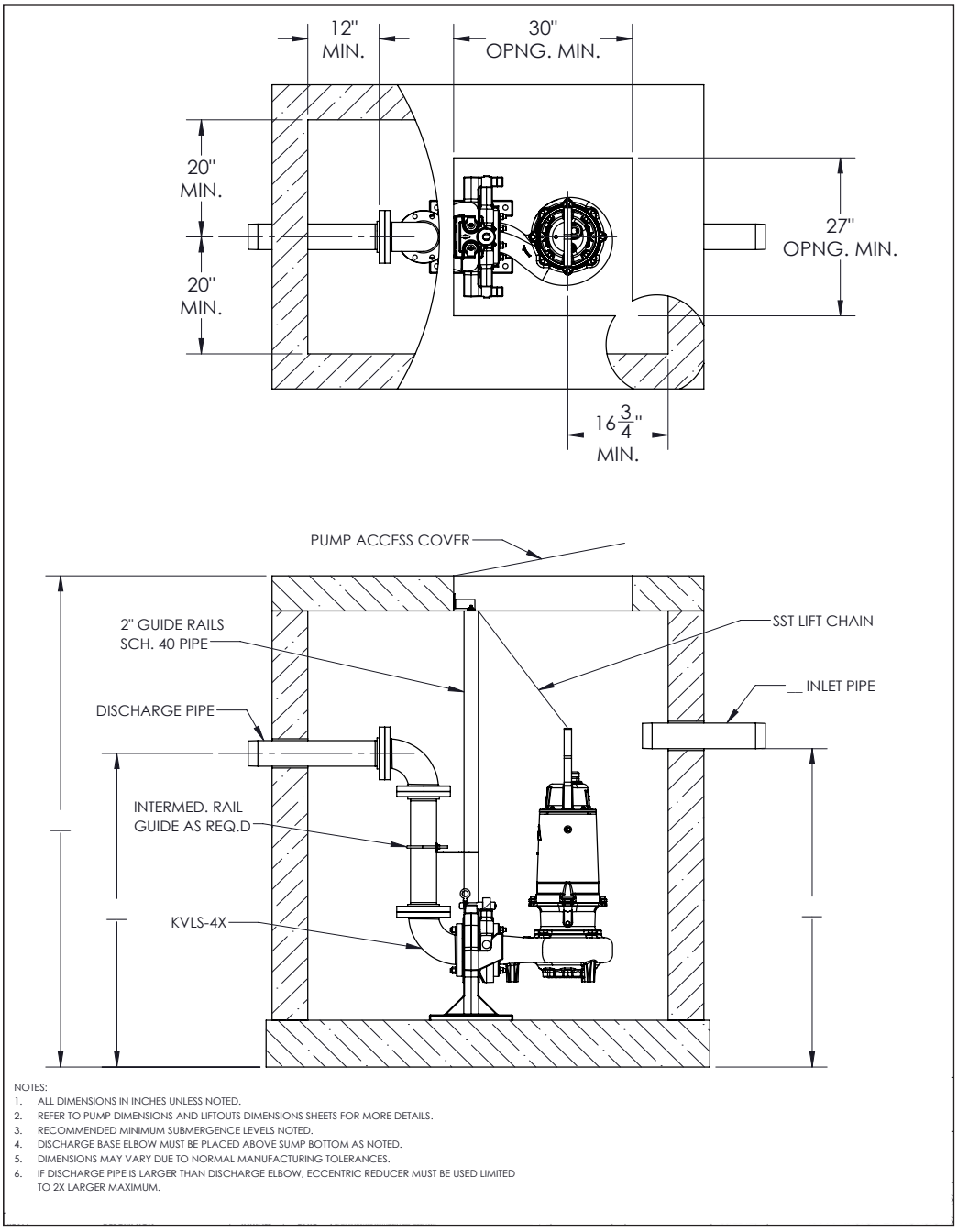
ABSOLUTE MINIMUM SUBMERGENCE LEVEL:
20" FROM BOTTOM

RECOMMENDED MINIMUM SUBMERGENCE LEVEL:
34" FROM BOTTOM



PUMP SERIES	K4VP	4" SUBMERSIBLE SEWAGE PUMPS

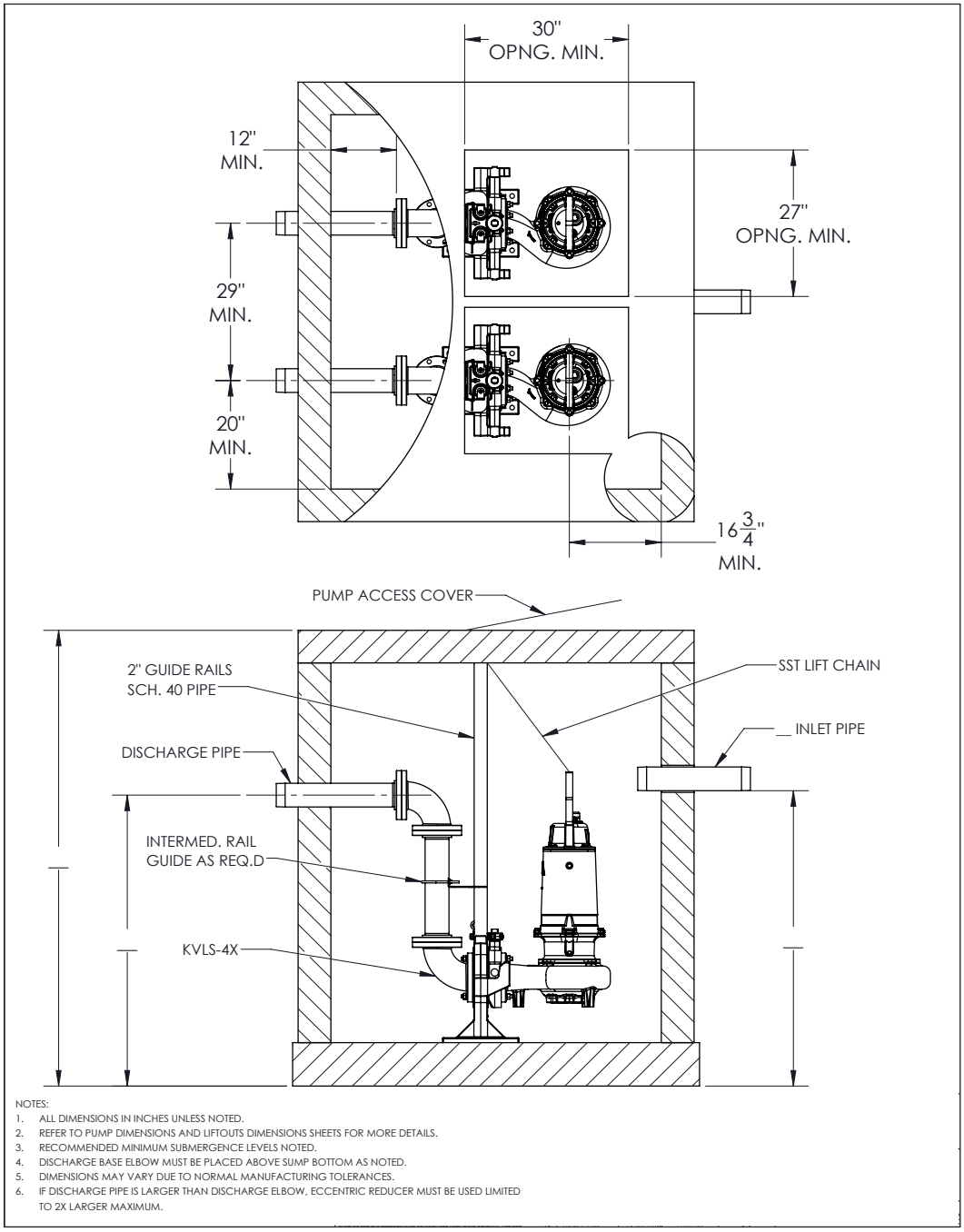
SIMPLEX INSTALLATION DIMENSIONAL DATA



NOTES:
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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	K4VP	4" SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



NOTES:
1. ALL DIMENSIONS IN INCHES UNLESS NOTED.
2. REFER TO PUMP DIMENSIONS AND LIFTOUTS DIMENSIONS 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.

PHYSICAL DATA	
Discharge Size	ANSI 4” Horizontal
Solid 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 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 N: 392°F (200°C)
Power Cord Type	Type SOOW-600V, 90° C, TYPE W - 2000V, 90 C
Control Cord Type	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
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	Fluorocarbon
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

THERMAL DATA

Maximum Liquid		140° F (60° C)
Maximum Stator		311° F (155° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° 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	VOLTS	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	66.5			
	460				11.4	13.7	116.8			
	575				9.1	10.9	58.1			
10	208	3	H	1.2	35.1	42.1	46.5	11.3	64.0	12.5
	230				31.6	37.9	179.0			
	460				15.7	18.8	161.2			
	575				12.5	15.0	80.1			
15	208	3	H	1.2	54.2	65.0	63.8	17.5	99.2	19.4
	230				48.9	58.7	276.4			
	460				24.4	29.3	249.4			
	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			

MOTOR EFFICIENCIES & POWER FACTOR									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
5	1	88	88	87	86	88	88	86	85
5	3	89	89	87	86	89	89	88	87
7.5	1	89	89	88	87	88	88	86	85
7.5	3	90	90	89	88	90	90	89	88
10	3	91	91	90	89	90	90	89	88
15	3	92	92	91	90	91	91	90	89
20	3	92	92	91	90	91	91	90	89

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		356° F (180° C)
Heat Sensor	Open:	275° F (135° C) Max. / 257° F (125° C) Min.
	Closed:	205° F (96° C) Max. / 154° F (68° 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	VOLTS	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	89.5			
	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
3	3	88	88	86	84	90	90	88	80
5	3	89	89	87	85	90	90	88	80

1.0 SCOPE

- 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.
- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.

5.0 PUMP BEARINGS

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single row, Radial ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
    - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.
- The discharge is to be of a centerline discharge configuration.
- The discharge is to be 4” ANSI® standard Class 125, 8-bolt configuration.
- Horizontal discharge is standard if specifying K4VN model.
- 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/corrosion resistance including higher temperature application.

OPTIONAL :

All Stainless Steel Construction

FM APPROVED



K4VB(X)

4” Submersible, Enclosed Impeller (Class 1, Div. 1, Groups C & D Hazardous Location)

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

CERAMIC COATED ENCLOSED 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

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Applications

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

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.

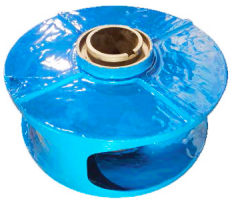
DOUBLE ROW BEARINGS



Heavy Duty Bearings to handle the toughest performances.

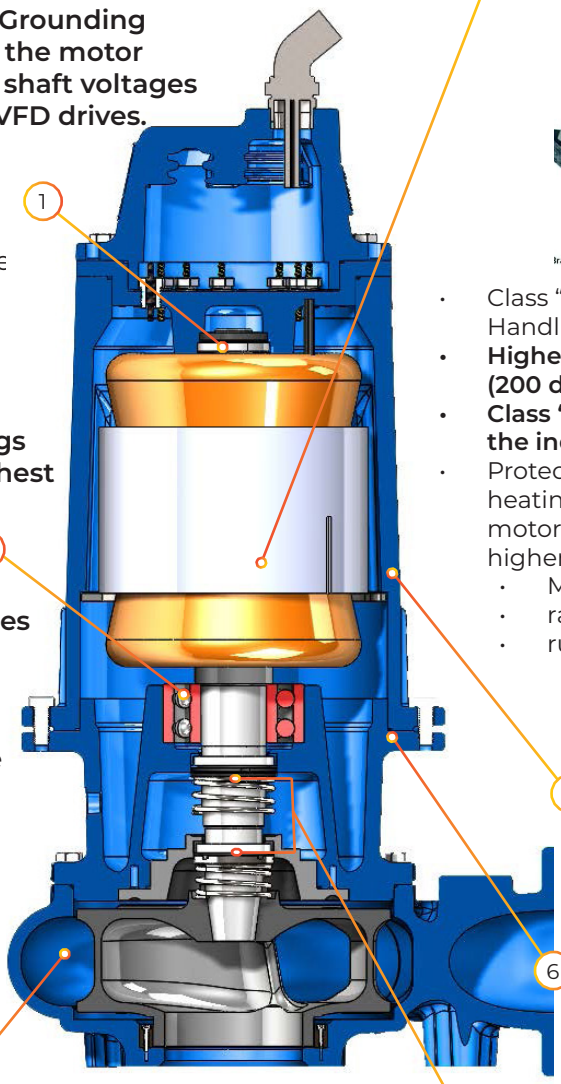
- **High Pressures**
- **High Flows**

- 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.

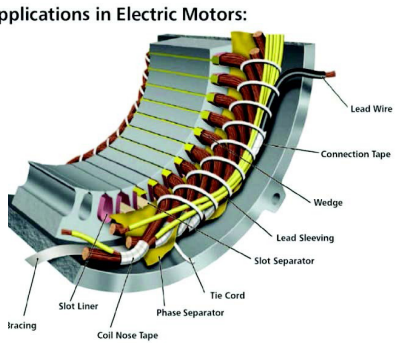


CERAMIC COATING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!



HEAVY DUTY MOTOR



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.

CASTINGS

ASTM - Class 35 high tensile strength castings.

DURABLE POWDER COAT FINISH

Holds up to the toughest environmental conditions.

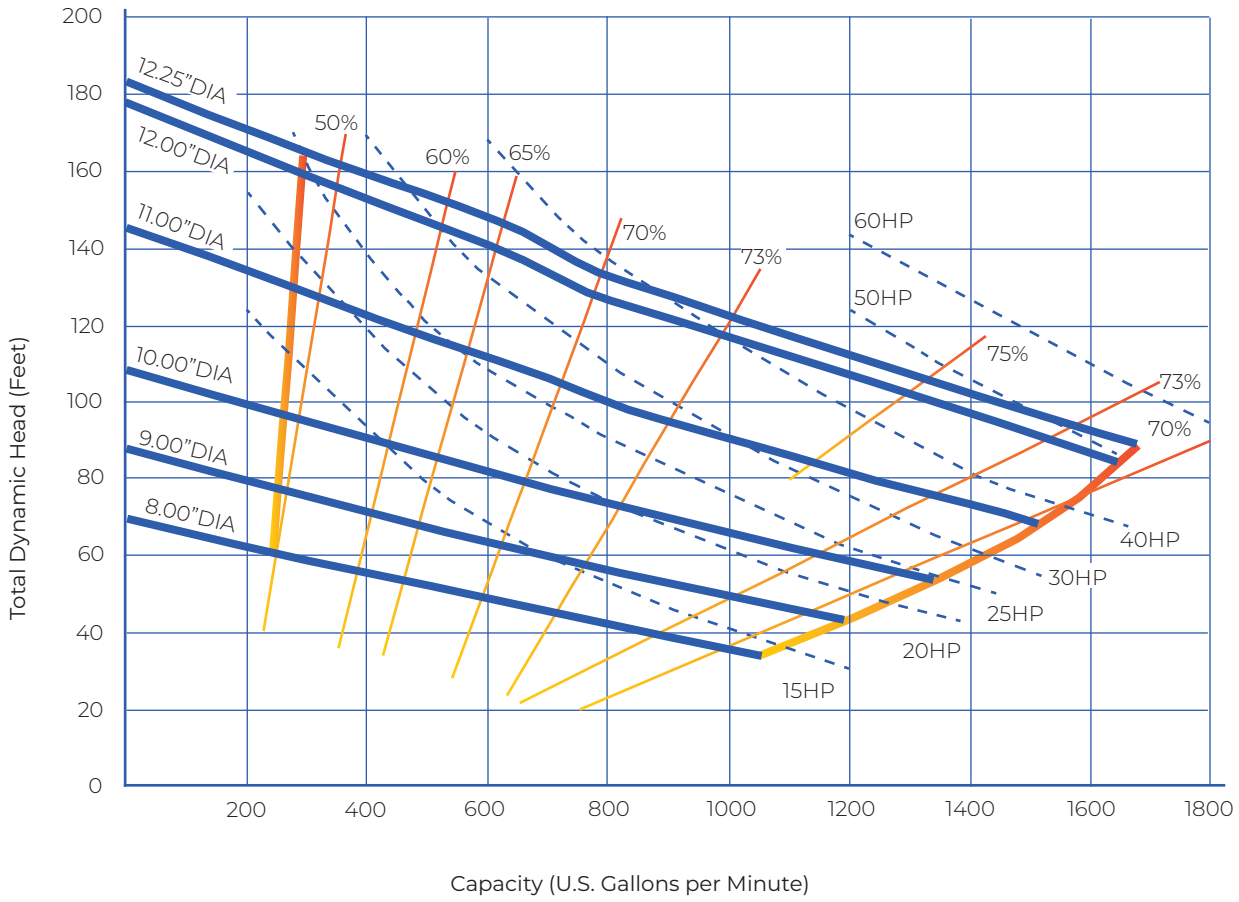
DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

PUMP SERIES	K4VB		4” SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	4”	Solids	3”

GPM:_____ TDH: _____

Performance

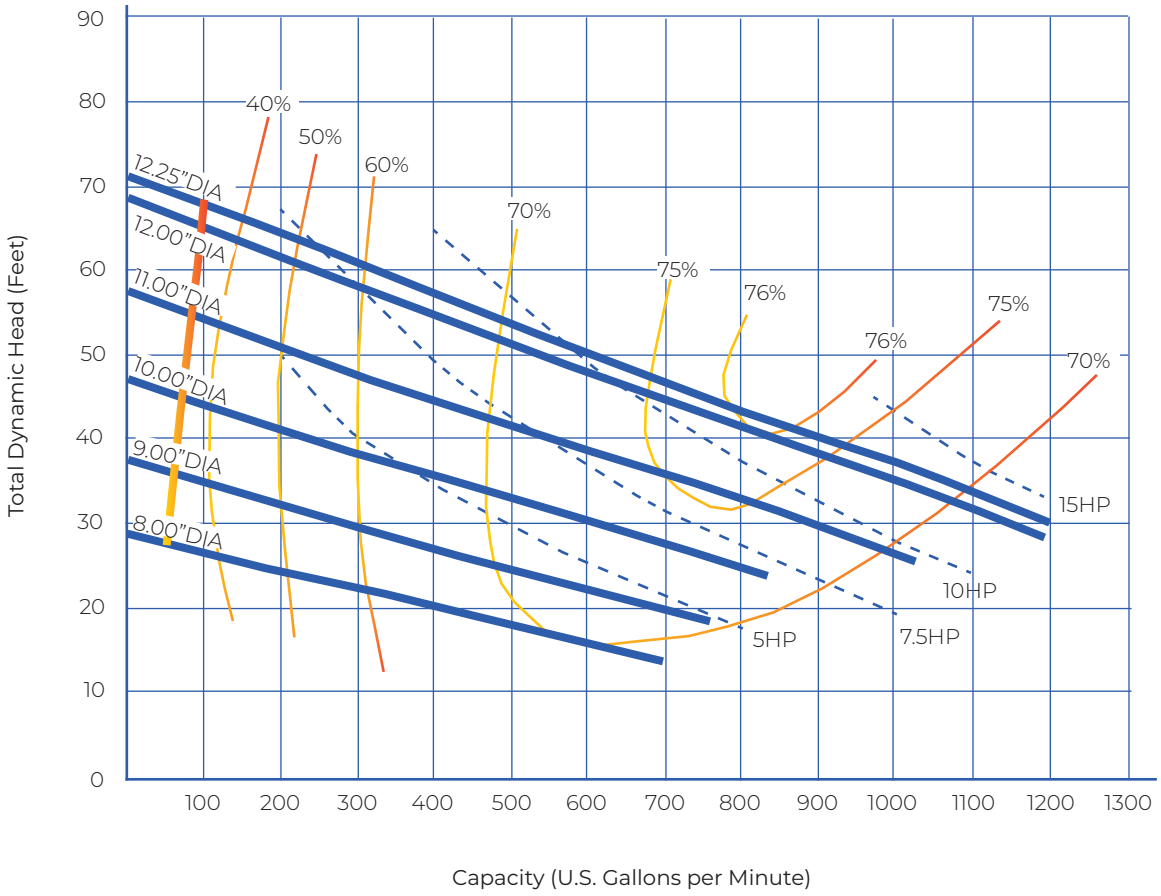


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K4VB		4” SUBMERSIBLE SEWAGE PUMPS		
Speed	1150 RPM	Discharge	4”	Solids	3”

GPM:_____ TDH: _____

Performance

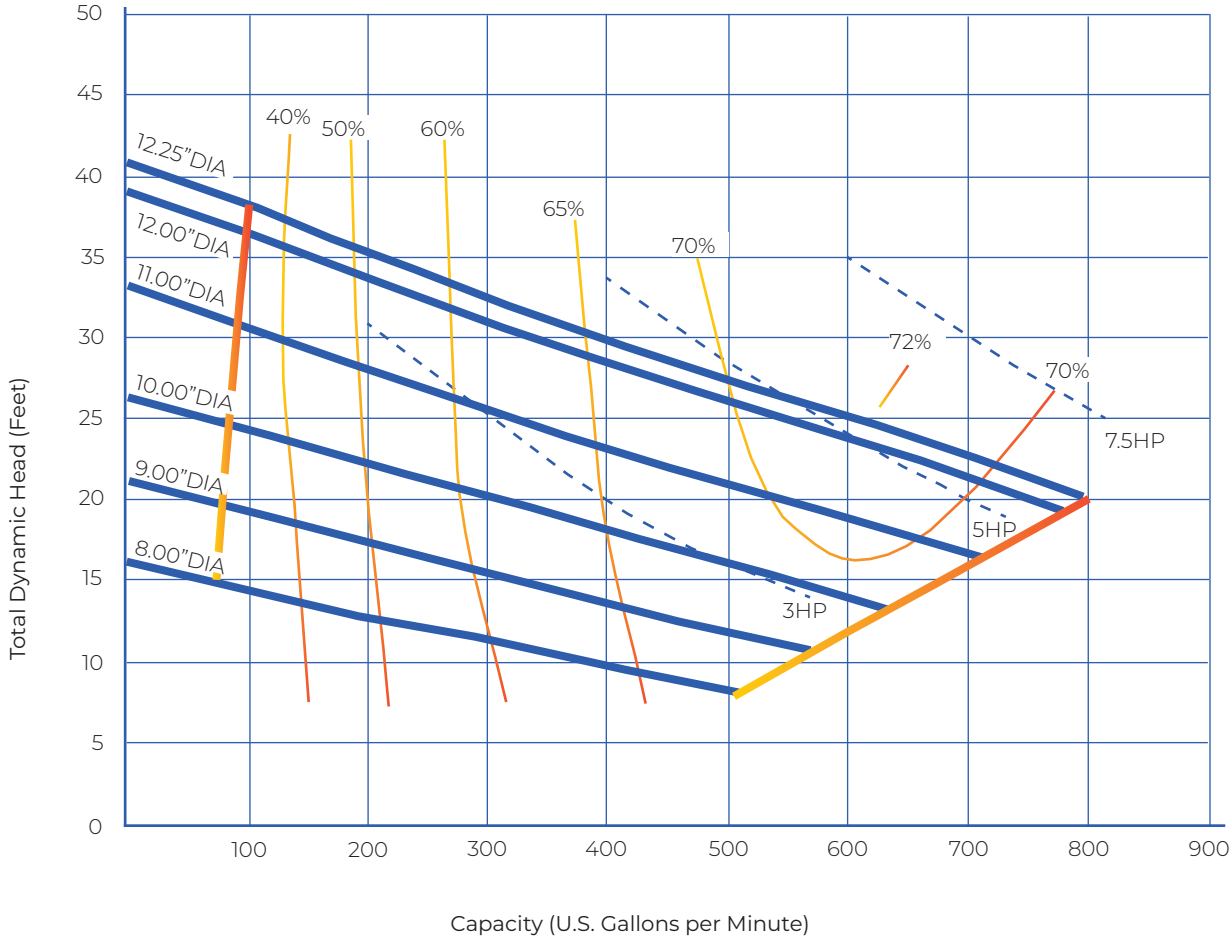


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K4VP		4” SUBMERSIBLE SEWAGE PUMPS		
Speed	870 RPM	Discharge	4”	Solids	3”

GPM:_____ TDH: _____

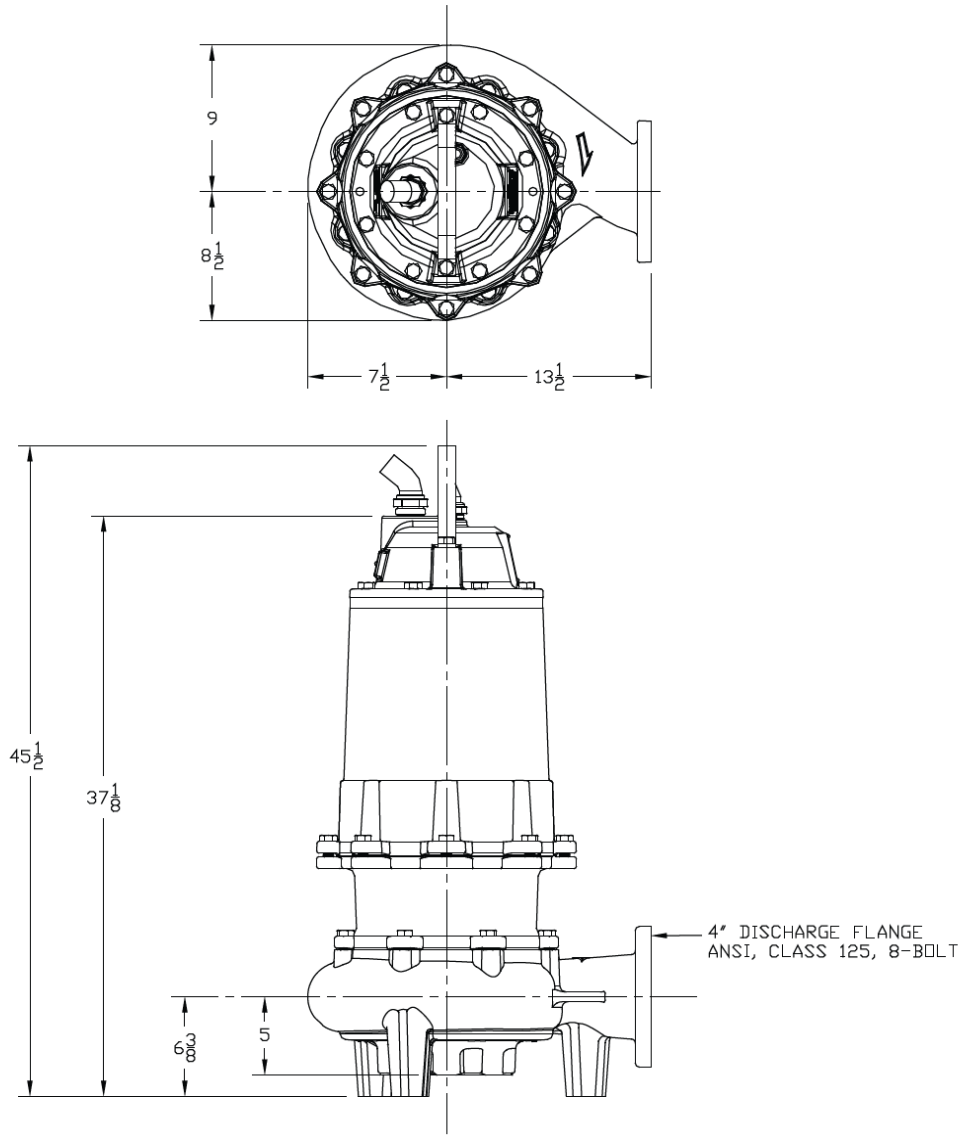
Performance



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	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

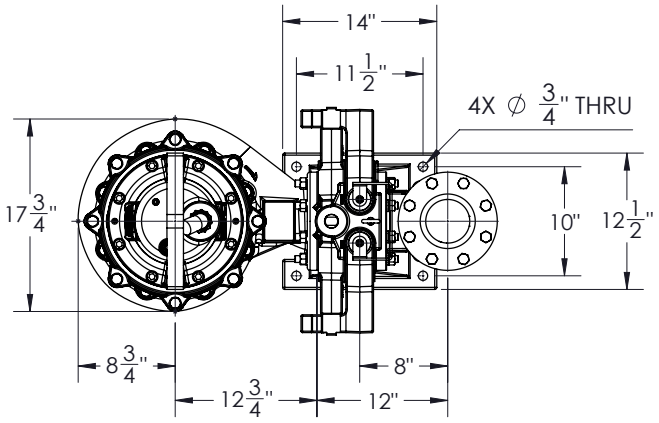
LIFTOUT DIMENSIONAL DATA

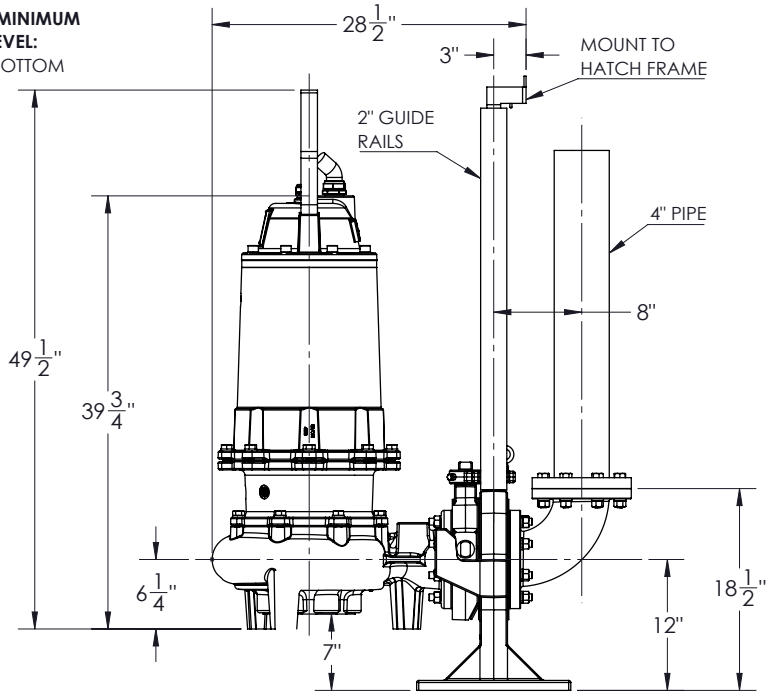
Notes:

1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manfacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2x larger maximum.

ABSOLUTE MINIMUM SUBMERGENCE LEVEL:
21" FROM BOTTOM

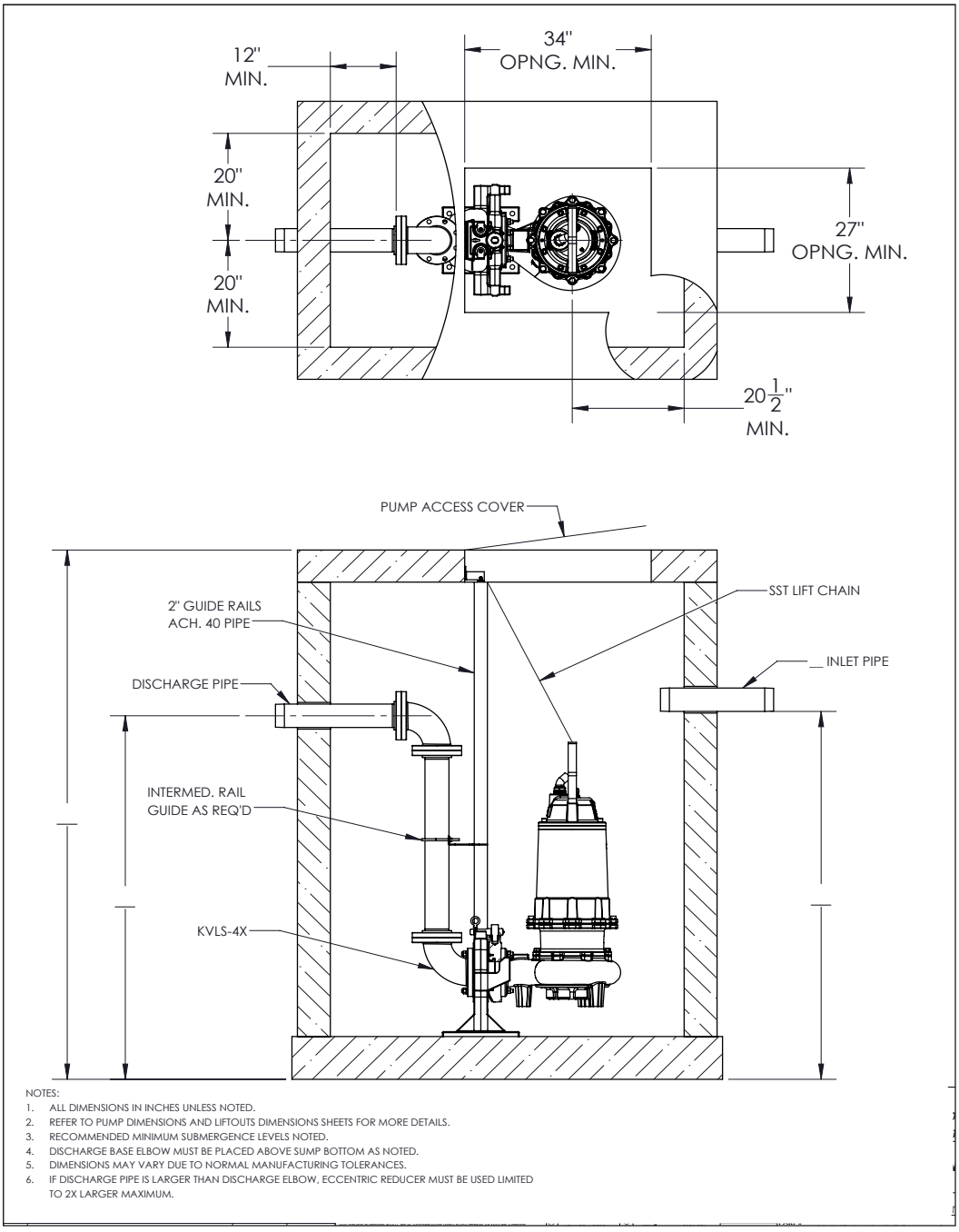
RECOMMENDED MINIMUM SUBMERGENCE LEVEL:
40" FROM BOTTOM





PUMP SERIES	K4VB	4” SUBMERSIBLE SEWAGE PUMPS

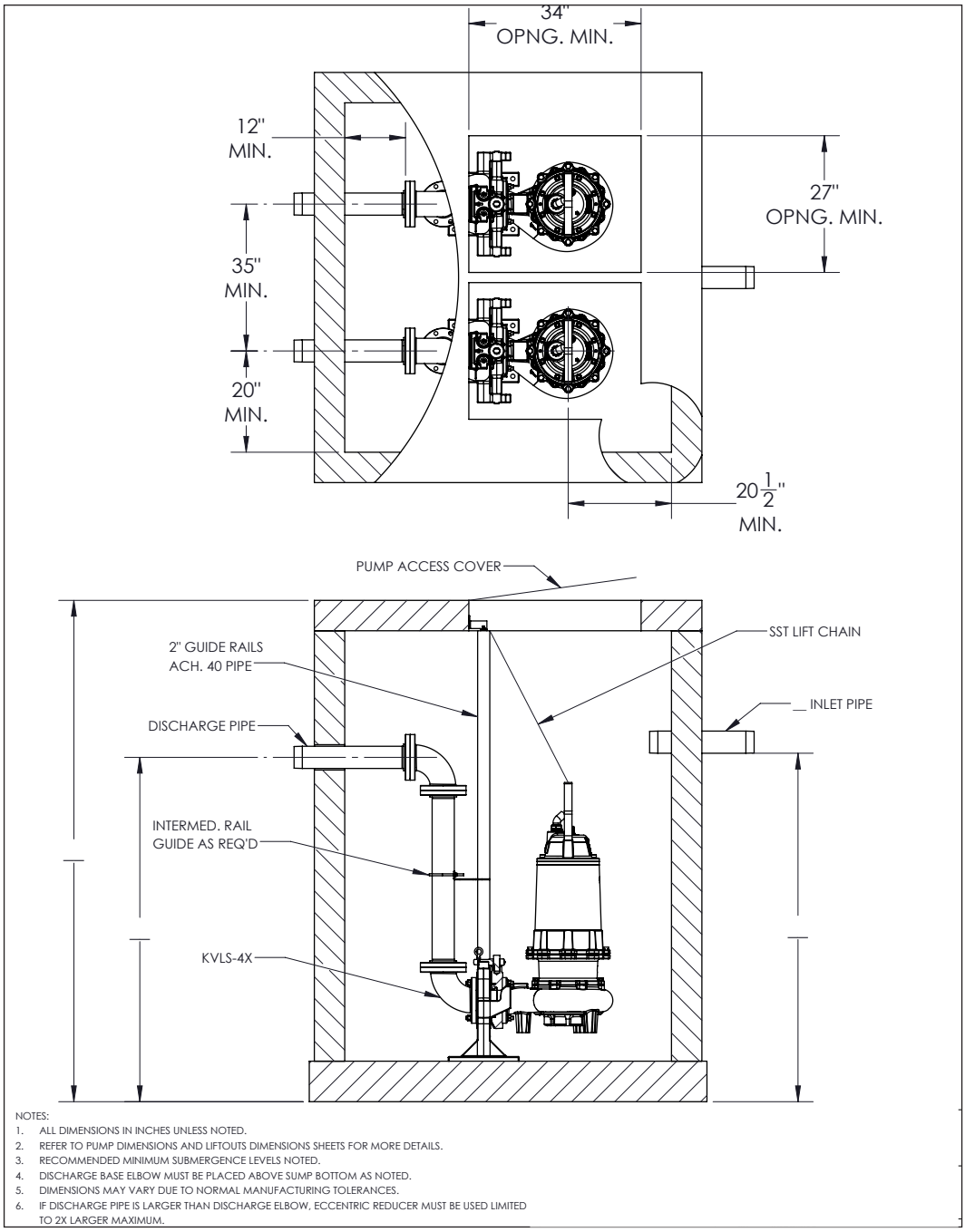
SIMPLEX INSTALLATION DIMENSIONAL DATA



NOTES:
1. ALL DIMENSIONS IN INCHES UNLESS NOTED.
2. REFER TO PUMP DIMENSIONS AND LIFTOUTS DIMENSIONS 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	K4VB	4” SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



NOTES:
1. ALL DIMENSIONS IN INCHES UNLESS NOTED.
2. REFER TO PUMP DIMENSIONS AND LIFTOUTS DIMENSIONS 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.

PHYSICAL DATA	
Discharge Size	ANSI 4” Horizontal
Solid Size	3-3/16”
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 N
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	311°F (155°C)
Power Cord Type	Type SOOW-600V, 90° C , TYPE W - 2000V, 90 C
Control Cord Type	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
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	Fluorocarbon
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Single Row Angular Contact Ball Bearing
Labyrinth Seal	Bronze, CDA 836

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	VOLTS	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			
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			

MOTOR EFFICIENCIES & POWER FACTOR									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		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	92	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

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	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	SF AMPS	LOCKED ROTOR AMPS	RUN KW	START KVA	RUN KVA
3	208	3	J	1.2	17.0	21.0	100.0	5.1	36.0	7.0
	230				15.8	19.3	90.1			
	460				7.9	8.8	45.0			
	575				6.3	7.1	36.0			
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				24.4	28.8	122.2			

MOTOR EFFICIENCIES & POWER FACTOR									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
3	3	89	89	88	86	90	90	88	80
5	3	89	89	88	86	90	90	88	80
7.5	3	90	90	88	86	90	90	88	80
10	3	91	91	89	87	90	90	89	82
15	3	91	91	89	87	91	91	89	82
20	3	92	92	90	88	91	91	89	82

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	870			
Electrical Ratings	Heat Sensor	24VDC, 5AMPS	115VAC, 5AMPS	230VAC, 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	VOLTS	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	29.9	97.2	7.9	34.9	8.8
	230				21.6	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
3	3	86	85	84	78	84	83	79	67
5	3	89	88	87	81	85	84	80	68
7.5	3	89	88	87	81	85	84	80	68

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
    - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 4” ANSI® standard Class 125, 8-bolt configuration.
- 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/corrosion resistance including higher temperature application.

OPTIONAL :
All Stainless Steel Construction

FM PENDING



K4VK

4” Submersible, Enclosed Impeller

CERAMIC COATED ENCLOSED 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

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Applications

MOTOR GROUND RING PROTECTION

- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

OIL SUBMERSIBLE BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates
- Angular Contact Bearings

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 Serice Factor	1.20

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.

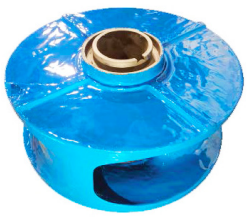
DOUBLE ROW BEARINGS



Heavy Duty Bearings to handle the toughest performances.

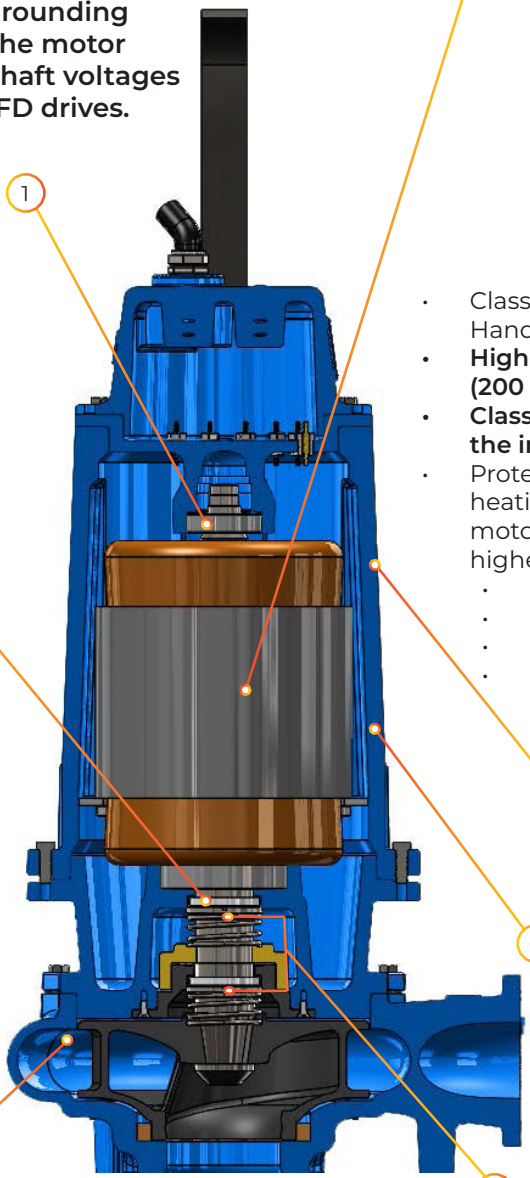
- **High Pressures**
- **High Flows**

- 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.

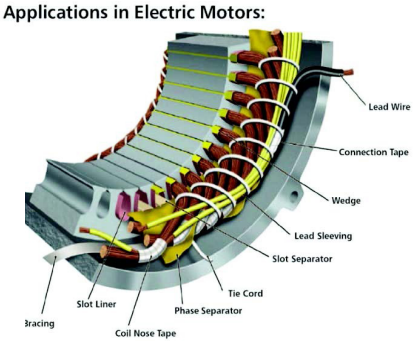


CERAMIC COATING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!



HEAVY DUTY MOTOR



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

5 CASTINGS

ASTM - Class 35 high tensile strength castings.

6 DURABLE POWDER COAT FINISH

Holds up to the toughest environmental conditions.

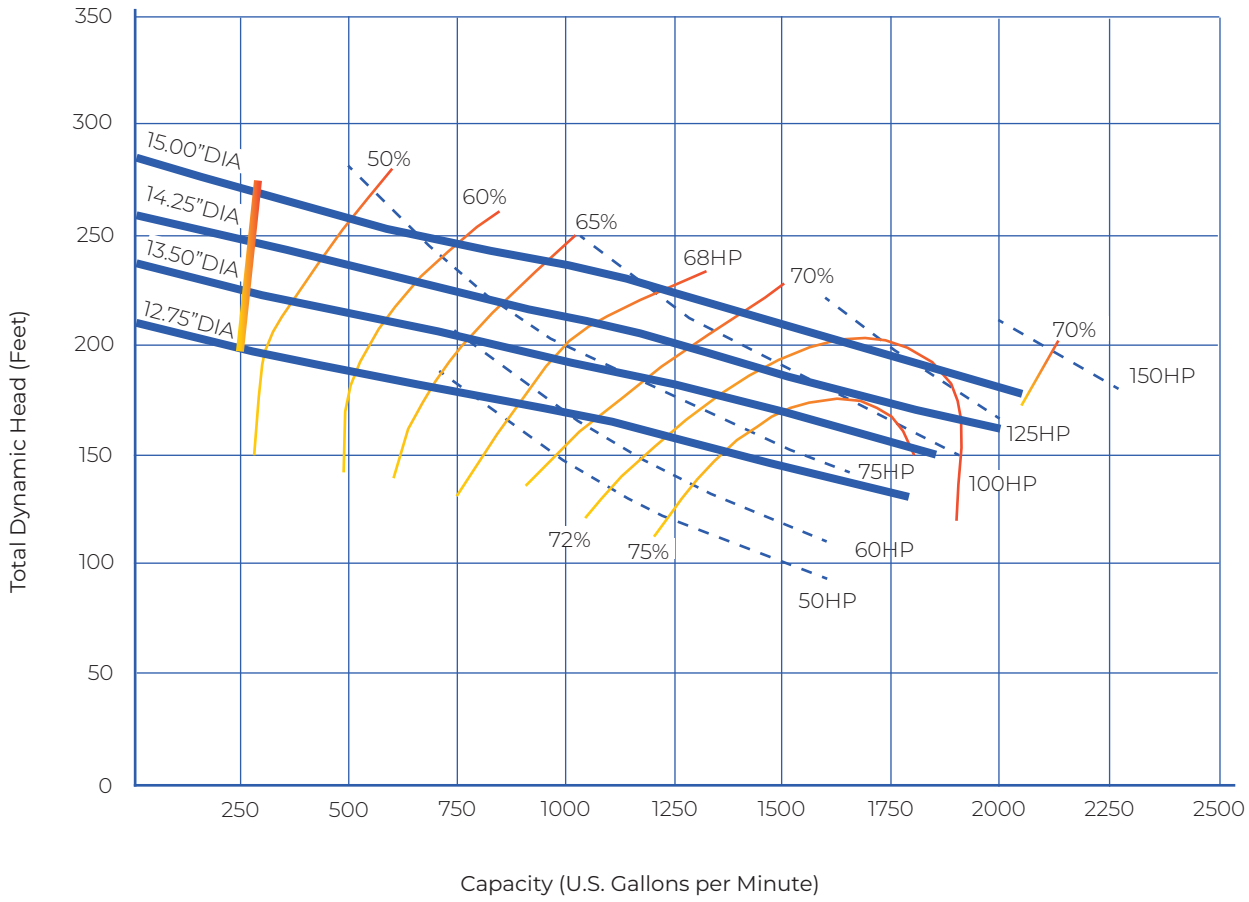
7 DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

PUMP SERIES	K4VK		4” SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	4”	Solids	3”

GPM:_____ TDH: _____

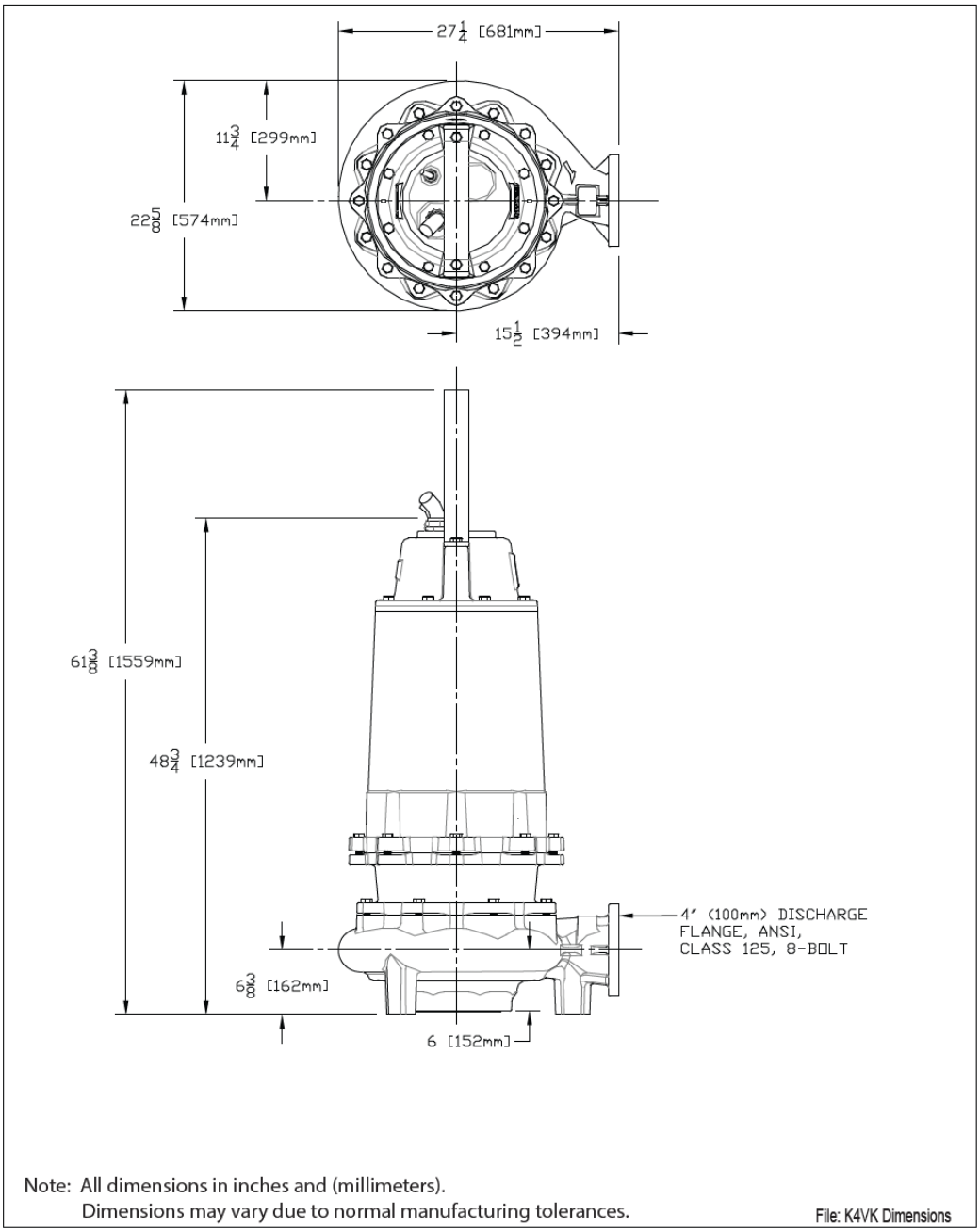
Performance



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	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

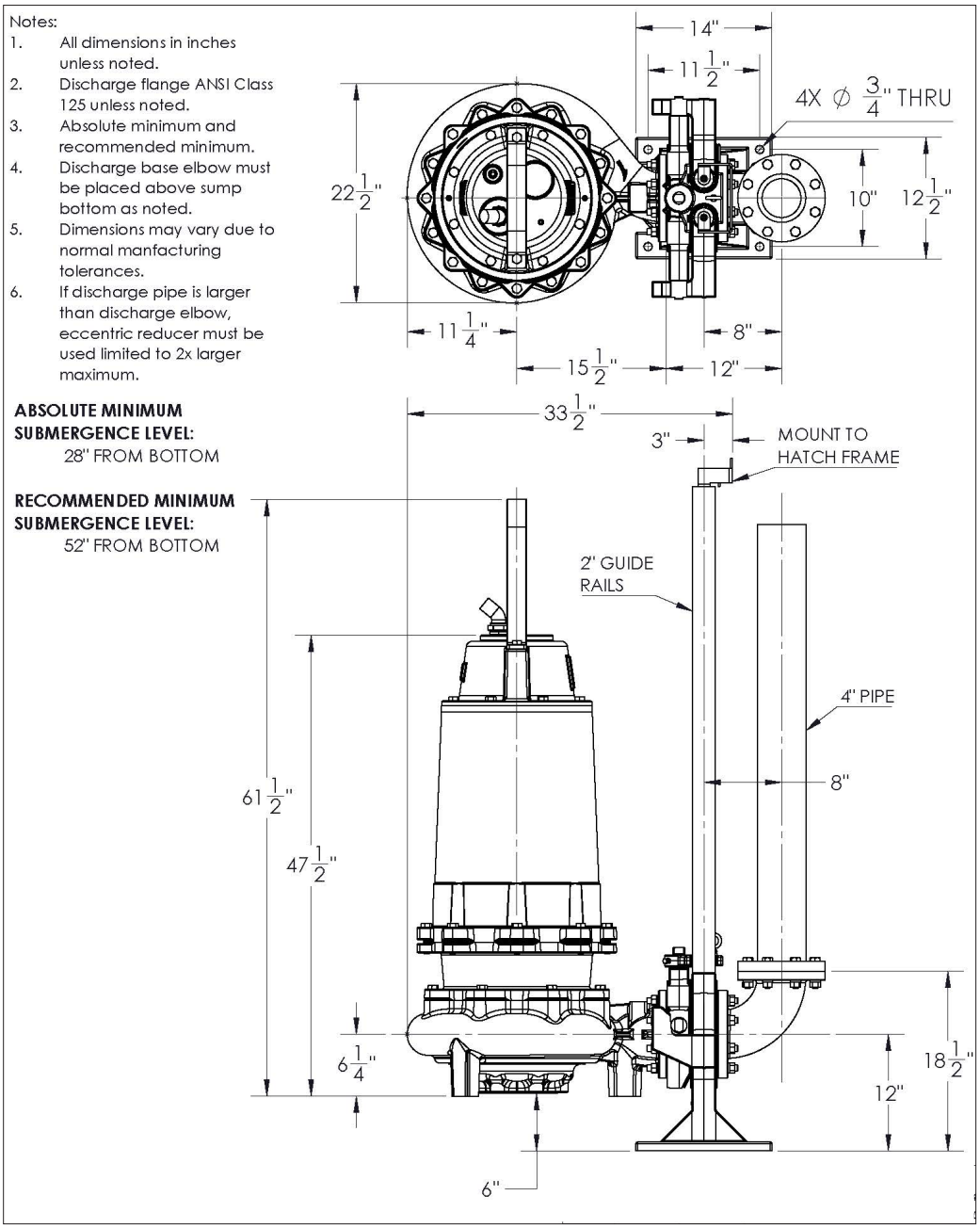
PUMP SERIES	K4VK	4" SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

Notes:
1. All dimensions in inches unless noted.
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manfacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2x larger maximum.

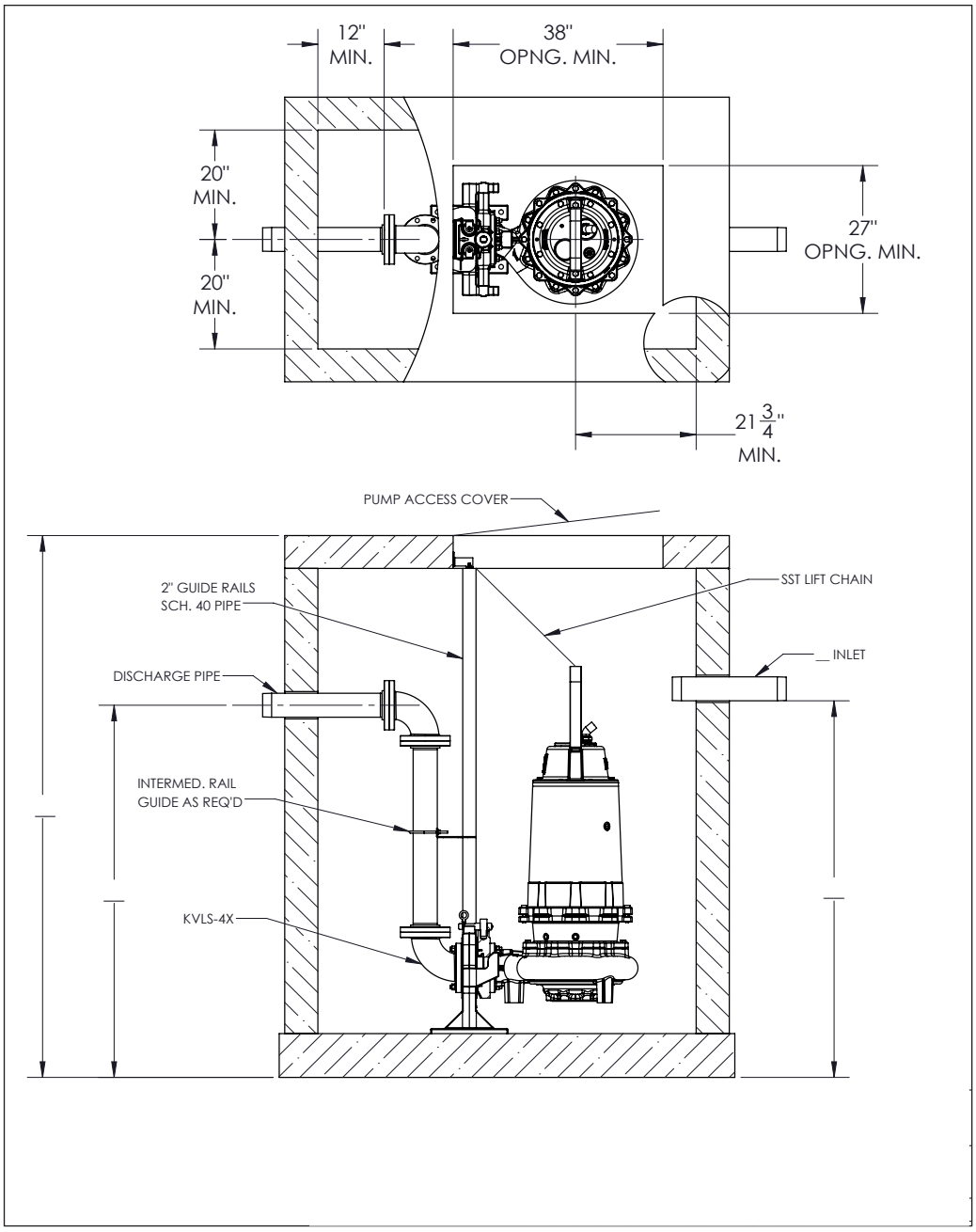
ABSOLUTE MINIMUM SUBMERGENCE LEVEL:
28" FROM BOTTOM

RECOMMENDED MINIMUM SUBMERGENCE LEVEL:
52" FROM BOTTOM



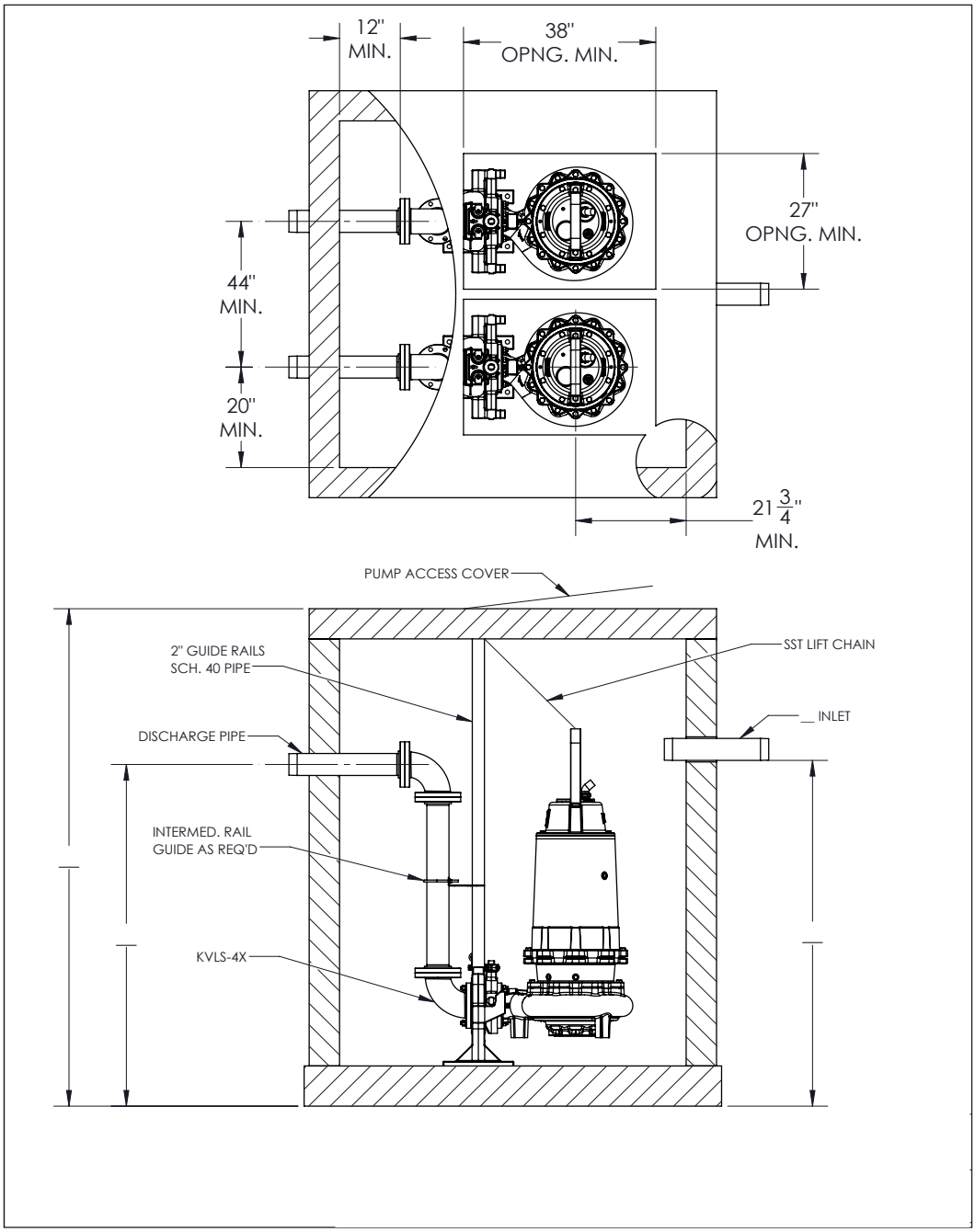
PUMP SERIES	K4VK	4" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



PUMP SERIES	K4VK	4" SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



PHYSICAL DATA	
Discharge Size	ANSI 4” Horizontal
Solid 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 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 N: 392°F (200°C)
Power Cord Type	Type W - 2000V, 90° C
Control Cord Type	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
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 / Viton Elastomers
Outboard Mechanical Seal	Silicone Carbide / Silicone Carbide / Viton Elastomers
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Fluorocarbon
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

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	VOLTS	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	63.3	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				137.1	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
50	3	93	92	89	84	88	86	83	74
60	3	93	92	89	84	89	87	84	74
75	3	94	93	90	85	89	87	84	75
100	3	94	93	90	85	89	87	84	75
125	3	94	93	91	85	89	87	84	75
150	3	95	94	92	86	90	88	85	76

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
    - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 4” ANSI® standard Class 125, 8-bolt configuration.
- 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/corrosion resistance including higher temperature application.

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. Indiviual Performance Curves	• **K6VB**
3. Dimensional Drawings Pump Lift-out & Base Elbow Wet Well Installations	• **K6VB**

OPTIONAL :

All Stainless Steel Construction

FM APPROVED



K6VB(X)

6” Submersible, Enclosed Impeller (Class 1, Div. 1, Groups C & D Hazardous Location)

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 Serice Factor	1.20

CERAMIC COATED ENCLOSED 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

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Applications

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

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.

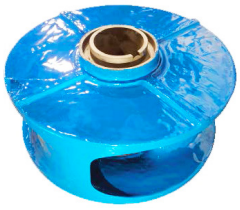
DOUBLE ROW BEARINGS



Heavy Duty Bearings to handle the toughest

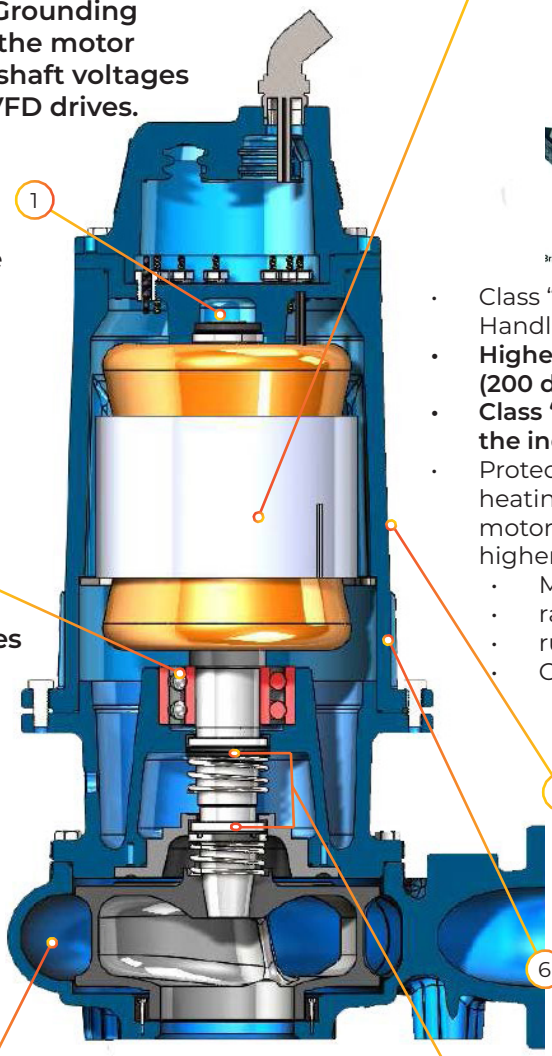
- **High Pressures**
- **High Flows**

- 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.

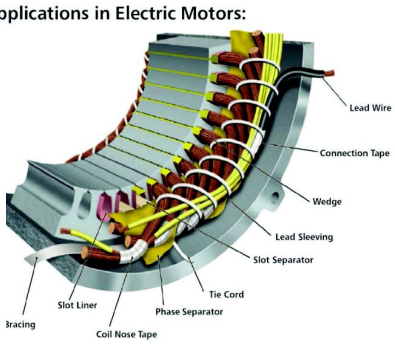


CERAMIC COATING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!



HEAVY DUTY MOTOR



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

5 CASTINGS

ASTM - Class 35 high tensile strength castings.

6 DURABLE POWDER COAT FINISH

Holds up to the toughest environmental conditions.

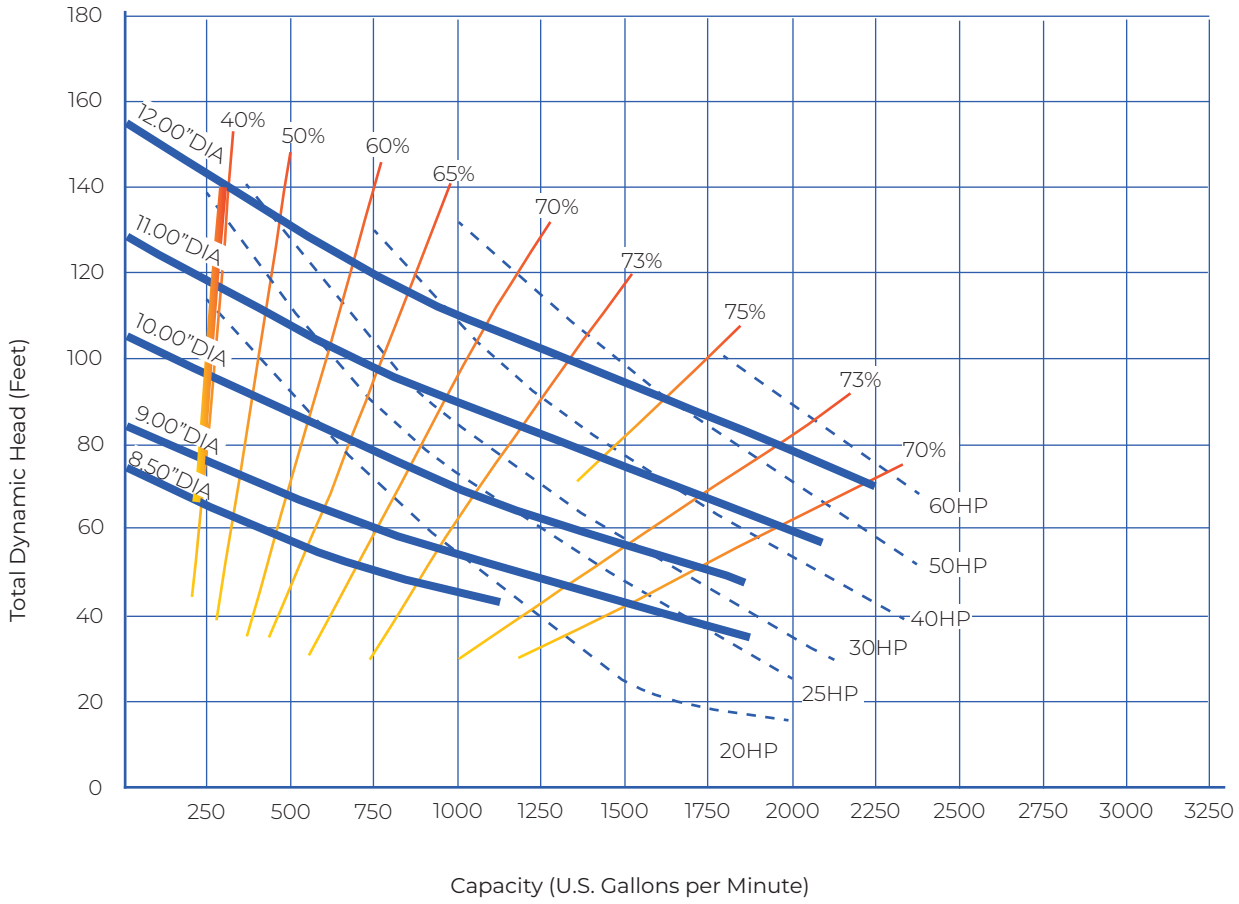
7 DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

PUMP SERIES	K6VB		6” SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	6”	Solids	3-1/2”

GPM:_____ TDH: _____

Performance

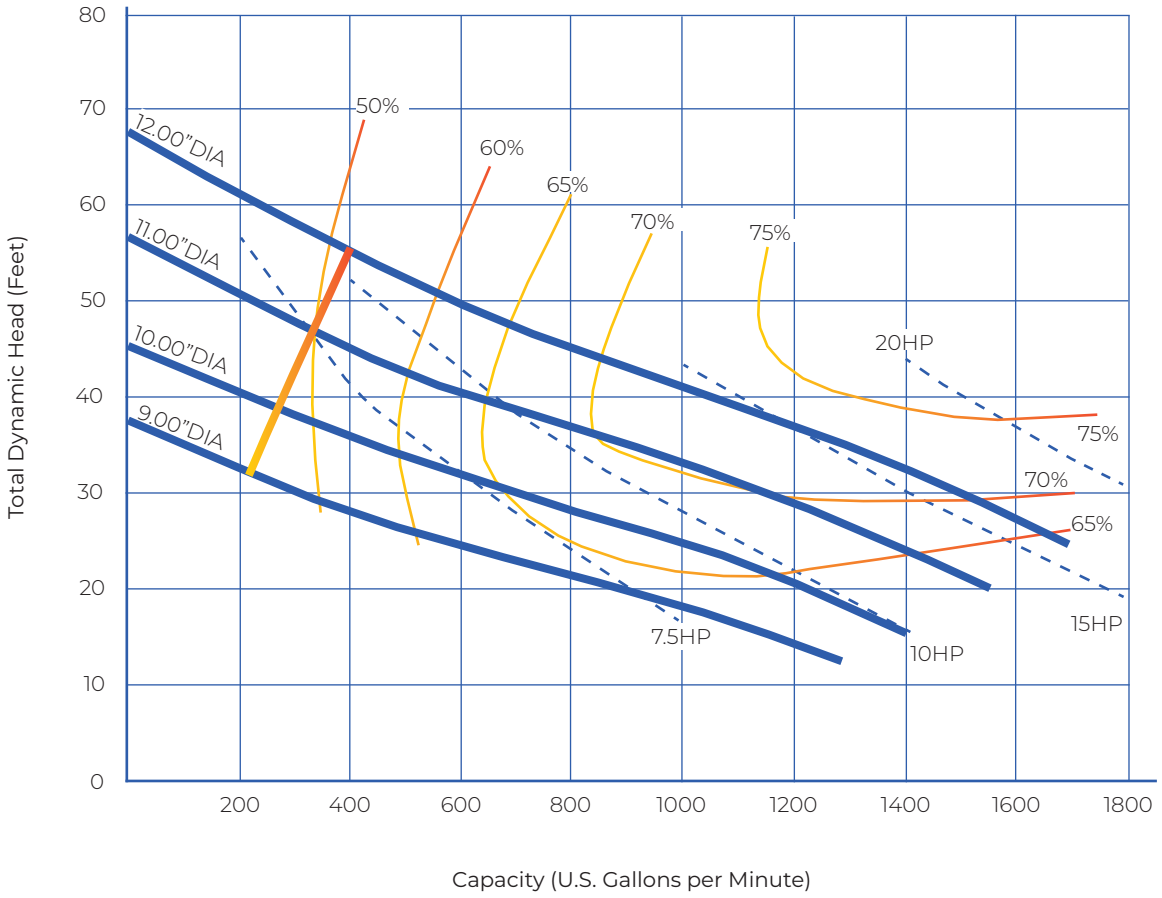


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K6VB		6” SUBMERSIBLE SEWAGE PUMPS		
Speed	1150 RPM	Discharge	6”	Solids	3-1/2”

GPM:_____ TDH: _____

Performance

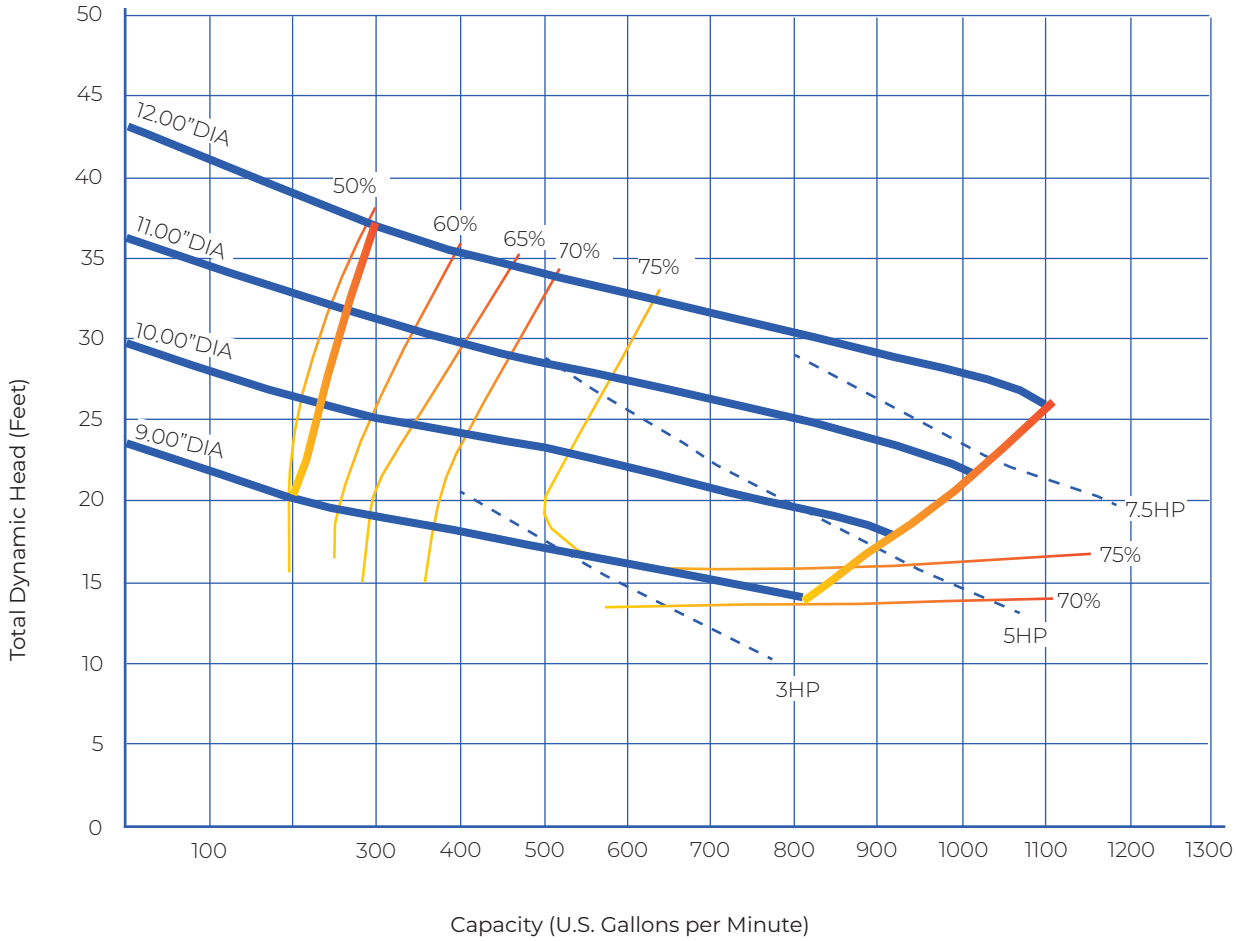


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K6VB		6” SUBMERSIBLE SEWAGE PUMPS		
Speed	870 RPM	Discharge	6”	Solids	3-1/2”

GPM:_____ TDH: _____

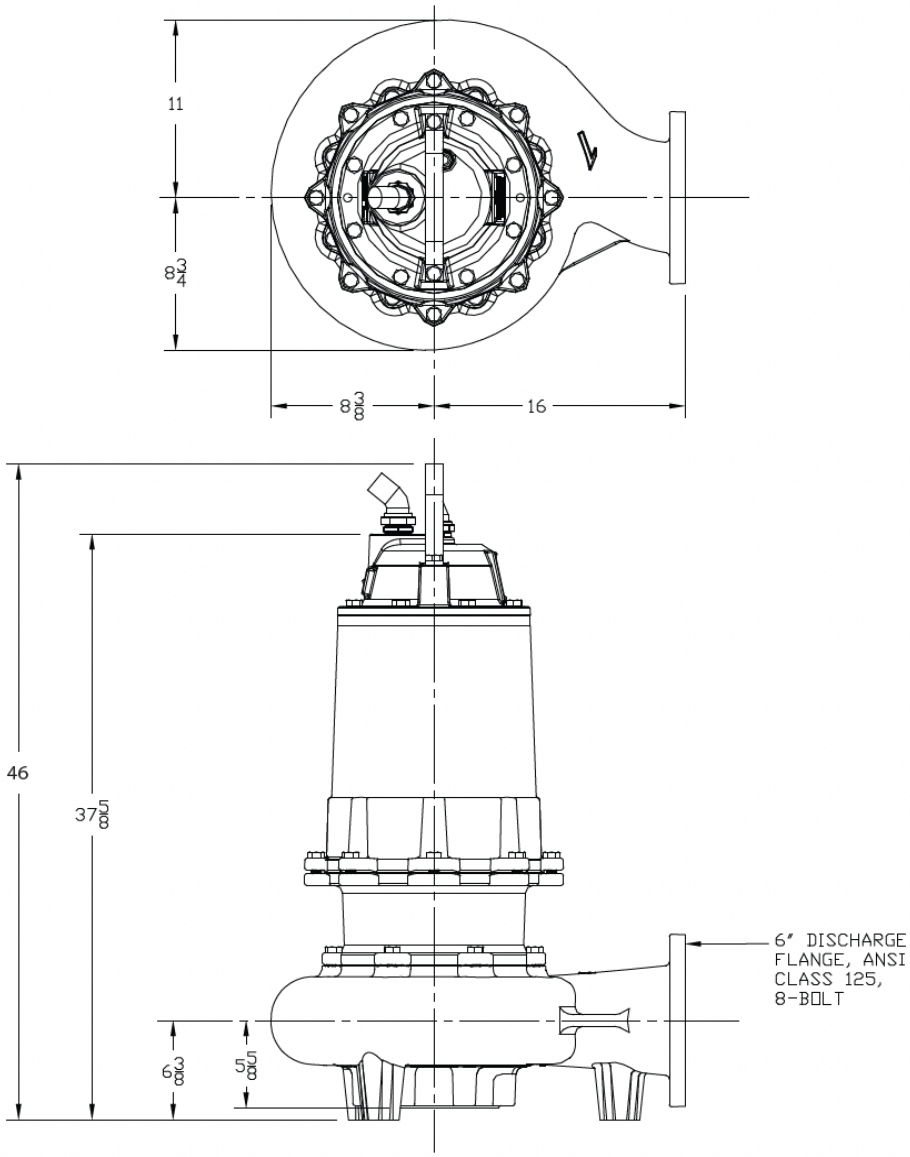
Performance



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	K6VB	6" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



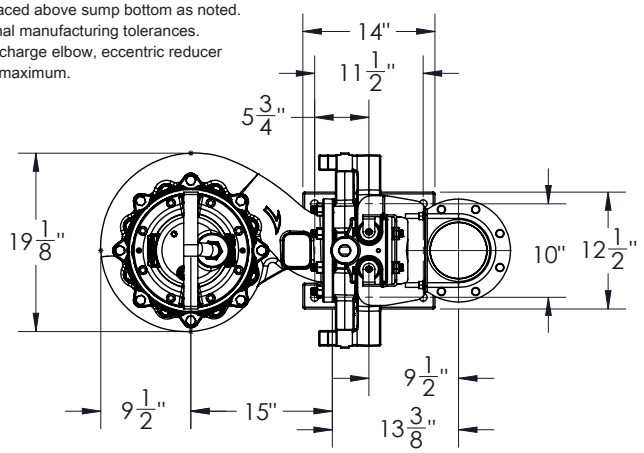
Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K6VB Dimensions

PUMP SERIES	K6VB	6" SUBMERSIBLE SEWAGE PUMPS

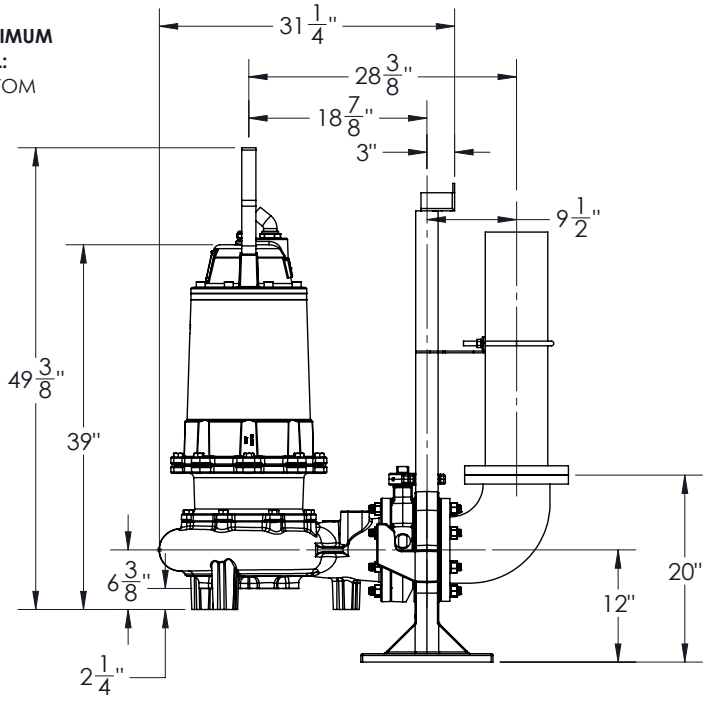
LIFTOUT DIMENSIONAL DATA

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.



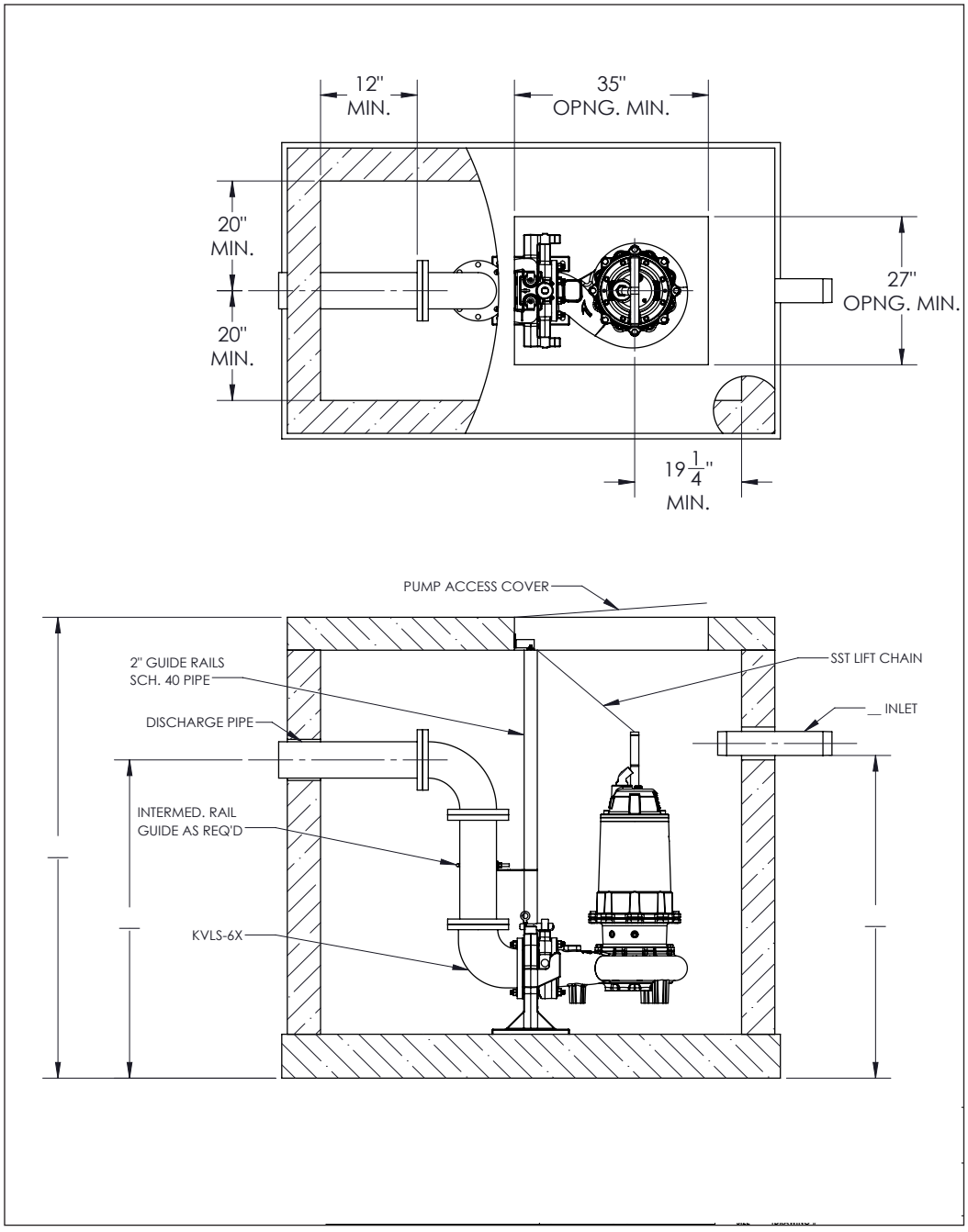
ABSOLUTE MINIMUM SUBMERGENCE LEVEL:
19" FROM BOTTOM

RECOMMENDED MINIMUM SUBMERGENCE LEVEL:
38" FROM BOTTOM



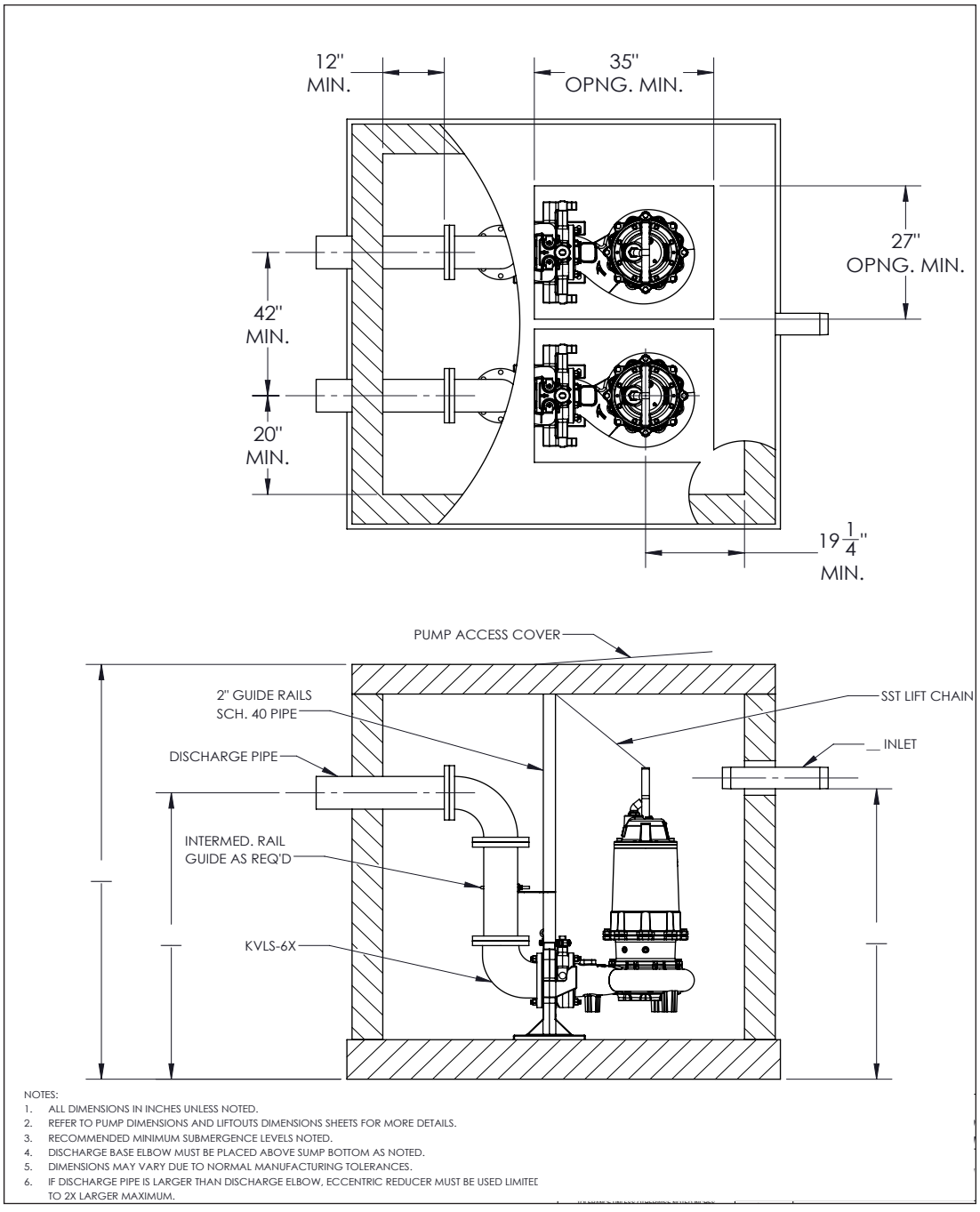
PUMP SERIES	K6VB	6” SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



PUMP SERIES	K6VB	6” SUBMERSIBLE SEWAGE PUMPS

DUPLEX INSTALLATION DIMENSIONAL DATA



NOTES:
1. ALL DIMENSIONS IN INCHES UNLESS NOTED.
2. REFER TO PUMP DIMENSIONS AND LIFTOUTS DIMENSIONS 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.

PHYSICAL DATA	
Discharge Size	ANSI 6” Horizontal
Solid Size	3-1/2”
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 N
Service Factor	1.2
NEMA Design Type	B (3Ø) L (1Ø)
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class N: 392°F (200°C)
Power Cord Type	Type SOOW-600V, 90° C, TYPE W - 2000V, 90 C
Control Cord Type	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
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	Fluorocarbon
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

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	VOLTS	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			
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			

MOTOR EFFICIENCIES & POWER FACTOR									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		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

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	VOLTS	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	230	3	G	1.0	79.8	79.8	339.2	21.6	122.5	24.0
	460				71.9	71.9	305.5			
	575				35.9	35.9	152.8			

MOTOR EFFICIENCIES & POWER FACTOR									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
5	3	89	89	88	86	90	90	88	80
7.5	3	90	90	88	86	90	90	88	80
10	3	91	91	89	87	90	90	89	82
15	3	91	91	89	87	91	91	89	82
20	3	92	92	90	88	91	91	89	82
25	3	92	92	90	88	91	91	89	82

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	870			
Electrical Ratings	Heat Sensor	24VDC, 5AMPS	115VAC, 5AMPS	230VAC, 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	VOLTS	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				21.6	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
3	3	86	85	84	78	84	83	79	67
5	3	89	88	87	81	85	84	80	68
7.5	3	89	88	87	81	85	84	80	68

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 420 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
    - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.
- Volute to be full, 6” discharge flow design.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 6” ANSI® standard Class 125, 8-bolt configuration.
- 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/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. Indiviual Performance Curves	• **K8VK**
3. Dimensional Drawings Pump Lift-out & Base Elbow Wet Well Installations	• **K8VK**

OPTIONAL :
All Stainless Steel Construction

FM PENDING



K8VK

8” Submersible, Enclosed Impeller

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 Serice Factor	1.20

CERAMIC COATED ENCLOSED 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

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Applications

MOTOR GROUND RING PROTECTION

- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

OIL SUBMERSIBLE BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates
- Angular Contact Bearings



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.

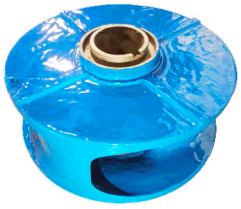
DOUBLE ROW BEARINGS



Heavy Duty Bearings to handle the toughest performances.

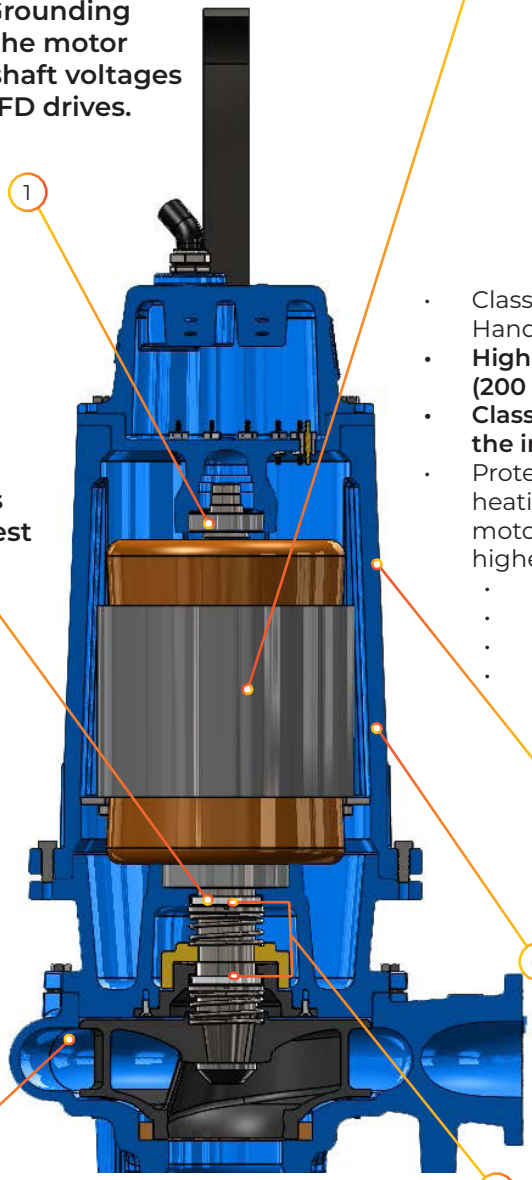
- **High Pressures**
- **High Flows**

- 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.

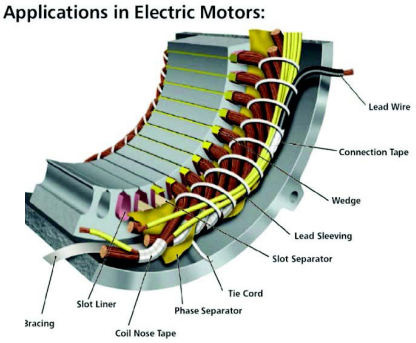


CERAMIC COATING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!



HEAVY DUTY MOTOR



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

5 CASTINGS

ASTM - Class 35 high tensile strength castings.

6 DURABLE POWDER COAT FINISH

Holds up to the toughest environmental conditions.

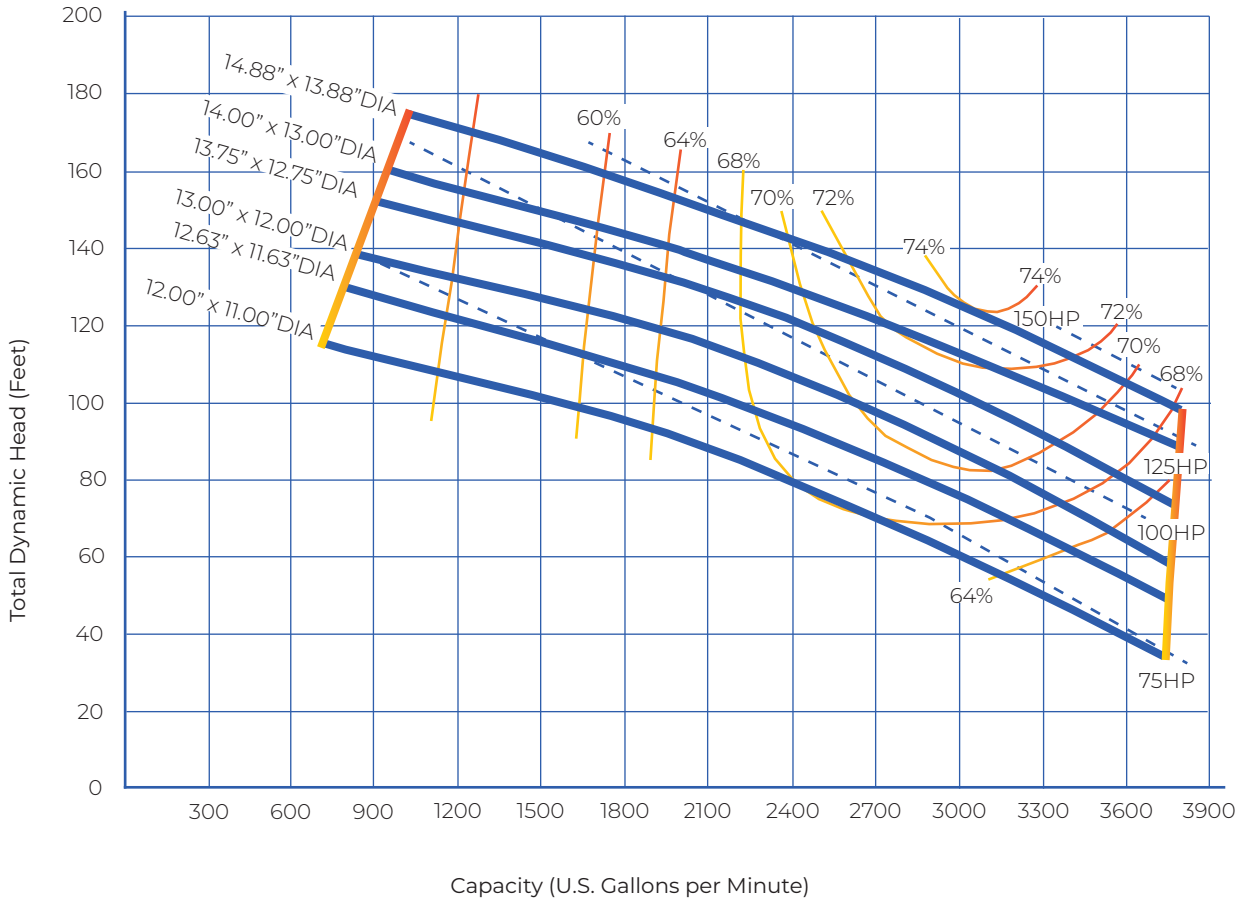
7 DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

PUMP SERIES	K8VK		8” SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	8”	Solids	4”

GPM:_____ TDH: _____

Performance

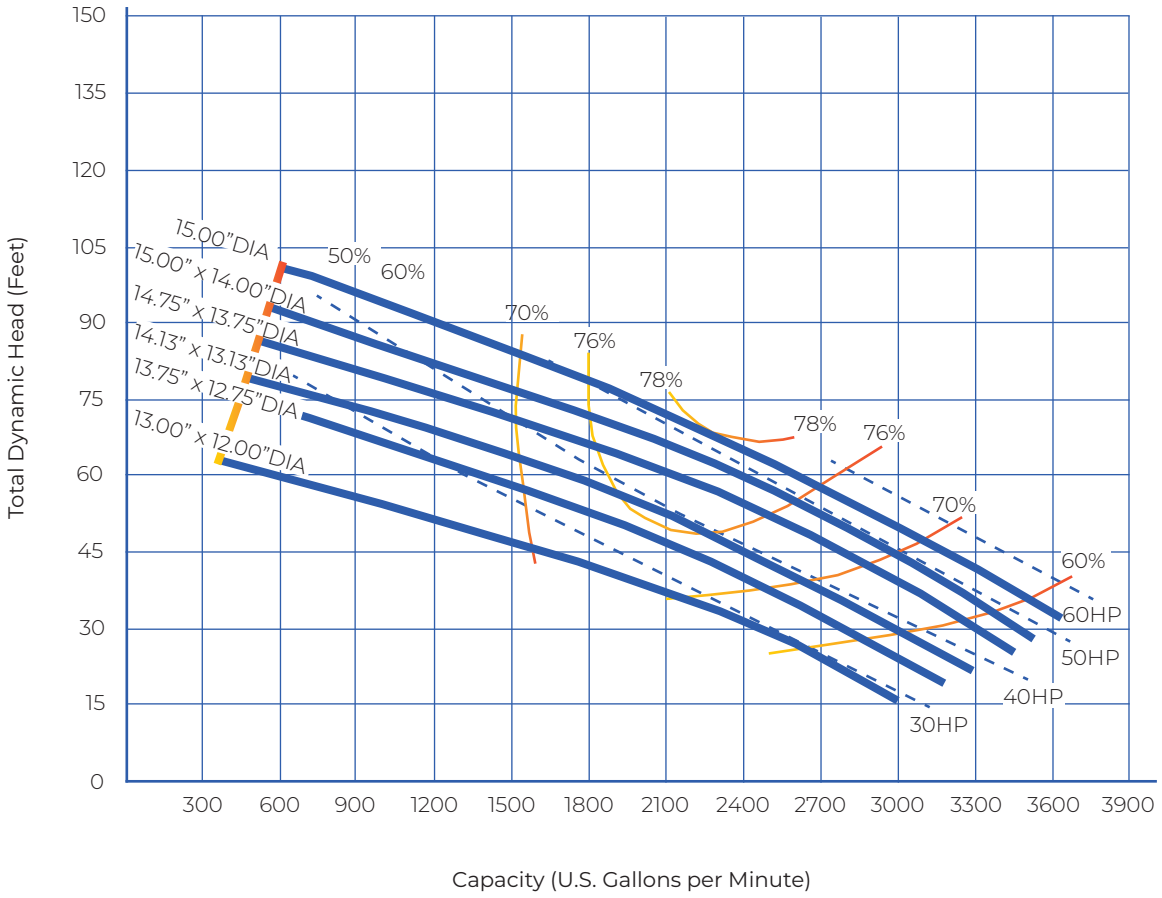


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K8VK		8” SUBMERSIBLE SEWAGE PUMPS		
Speed	1150 RPM	Discharge	8”	Solids	4”

GPM:_____ TDH: _____

Performance

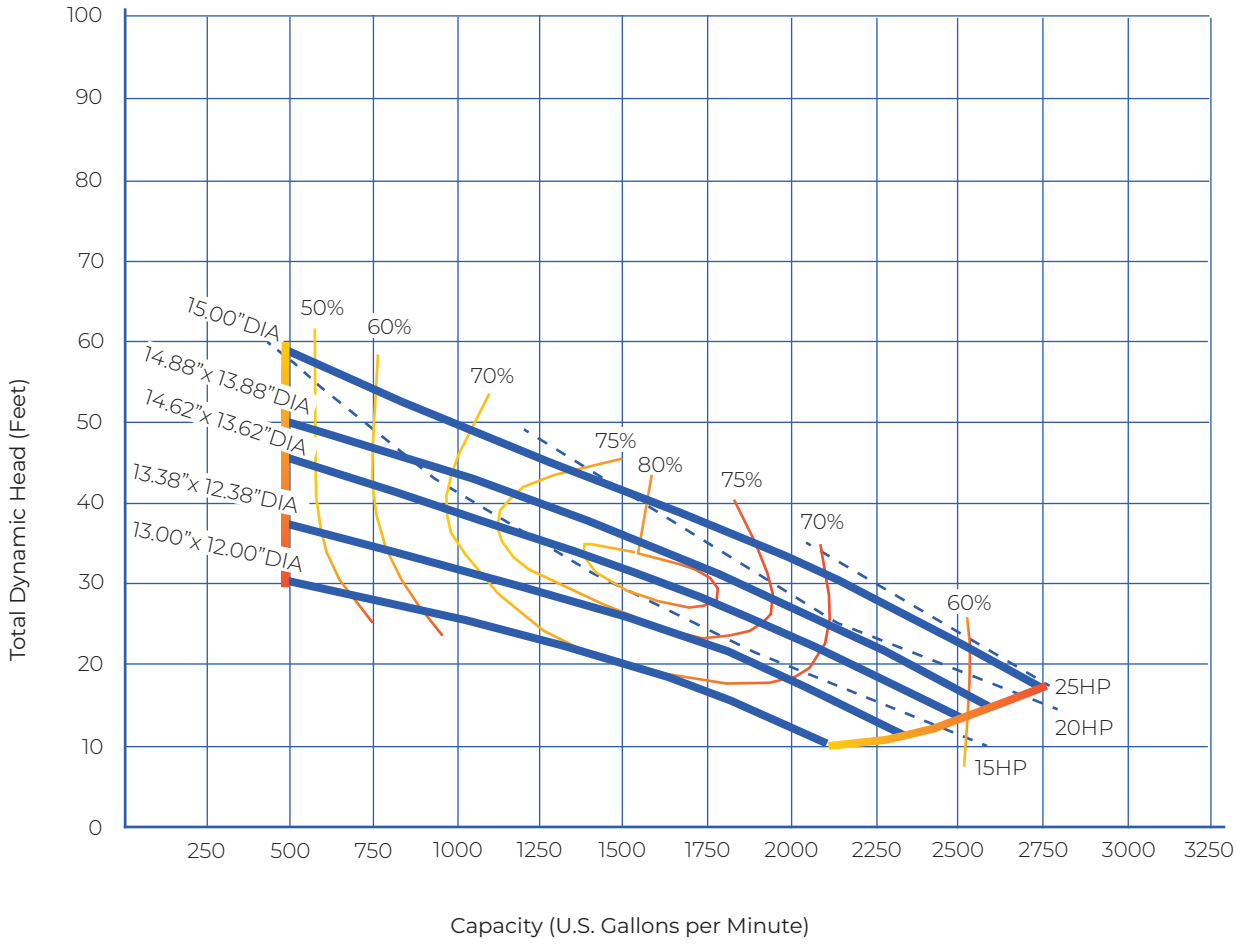


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K8VK		8” SUBMERSIBLE SEWAGE PUMPS		
Speed	870 RPM	Discharge	8”	Solids	4”

GPM:_____ TDH: _____

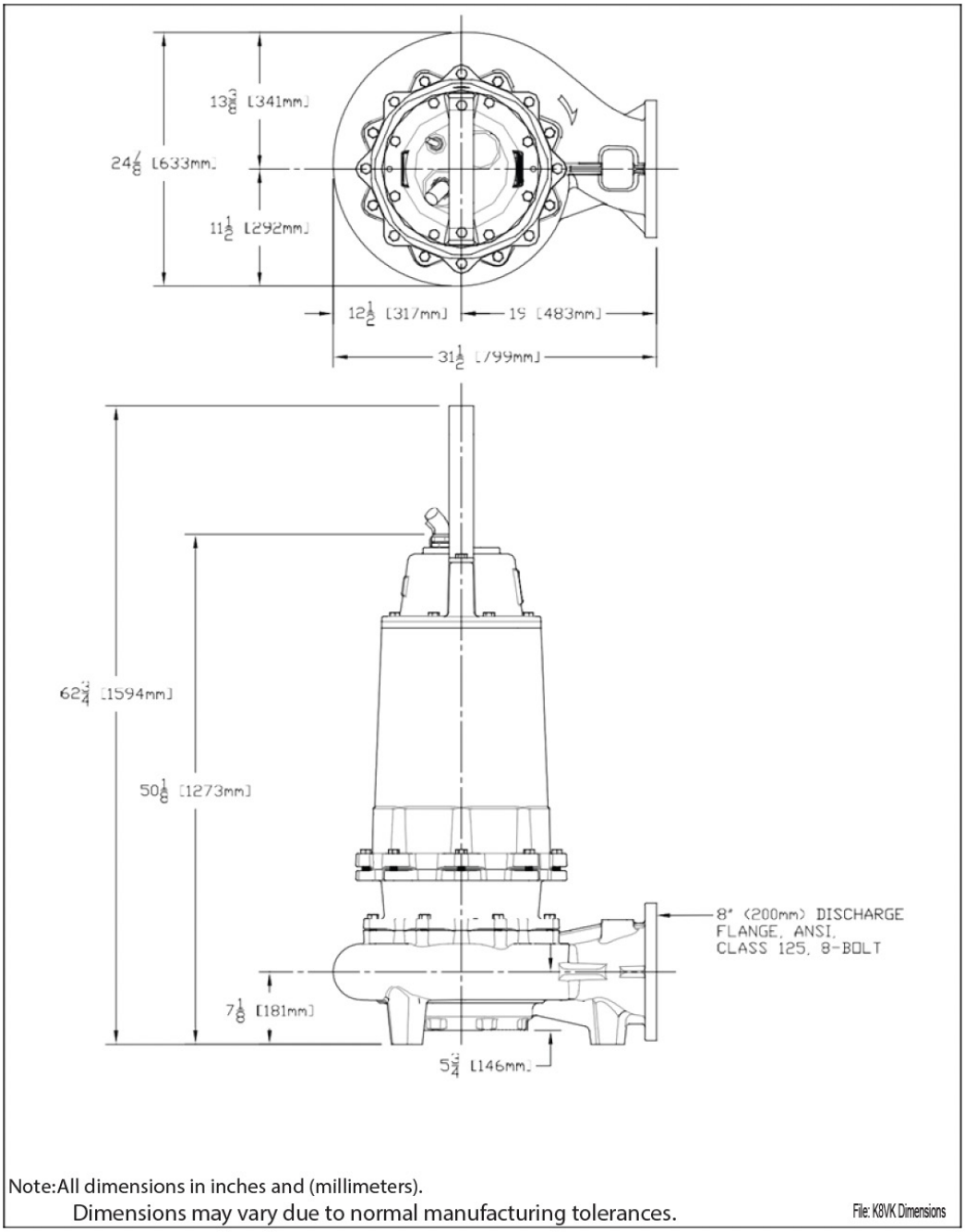
Performance



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	K8VK	8" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

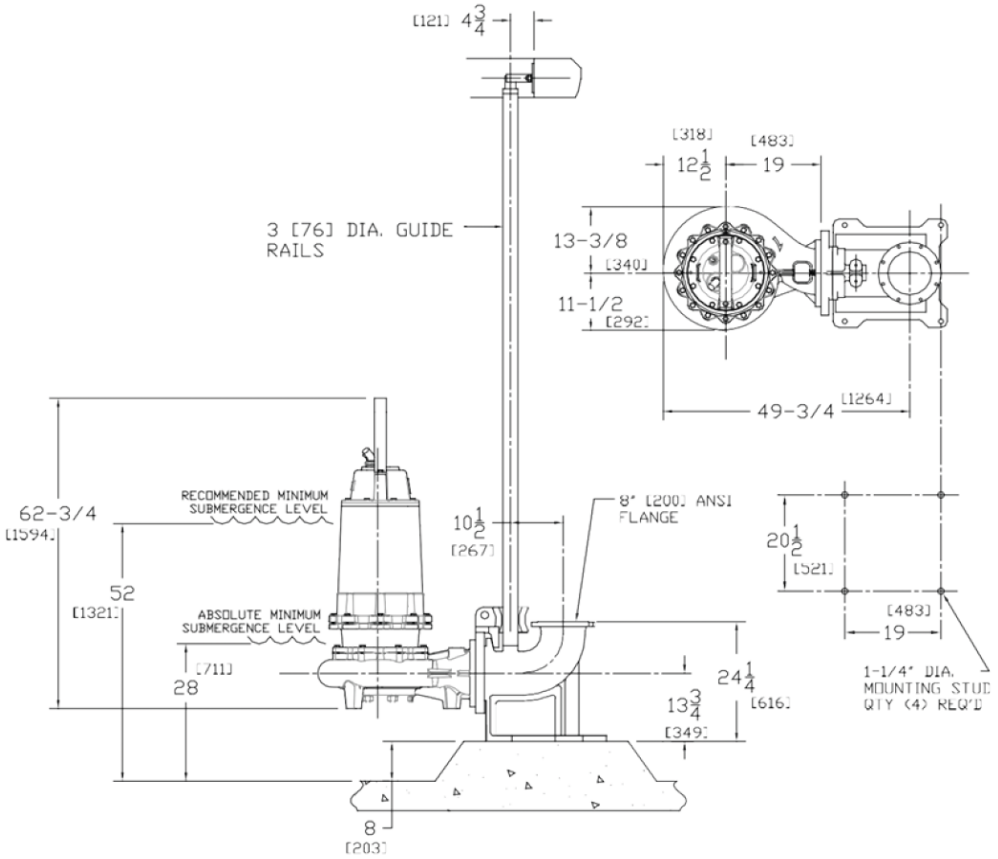


Note:All dimensions in inches and (millimeters).
Dimensions may vary due to normal manufacturing tolerances.

File: K8VK Dimensions

PUMP SERIES	K8VK	8" SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

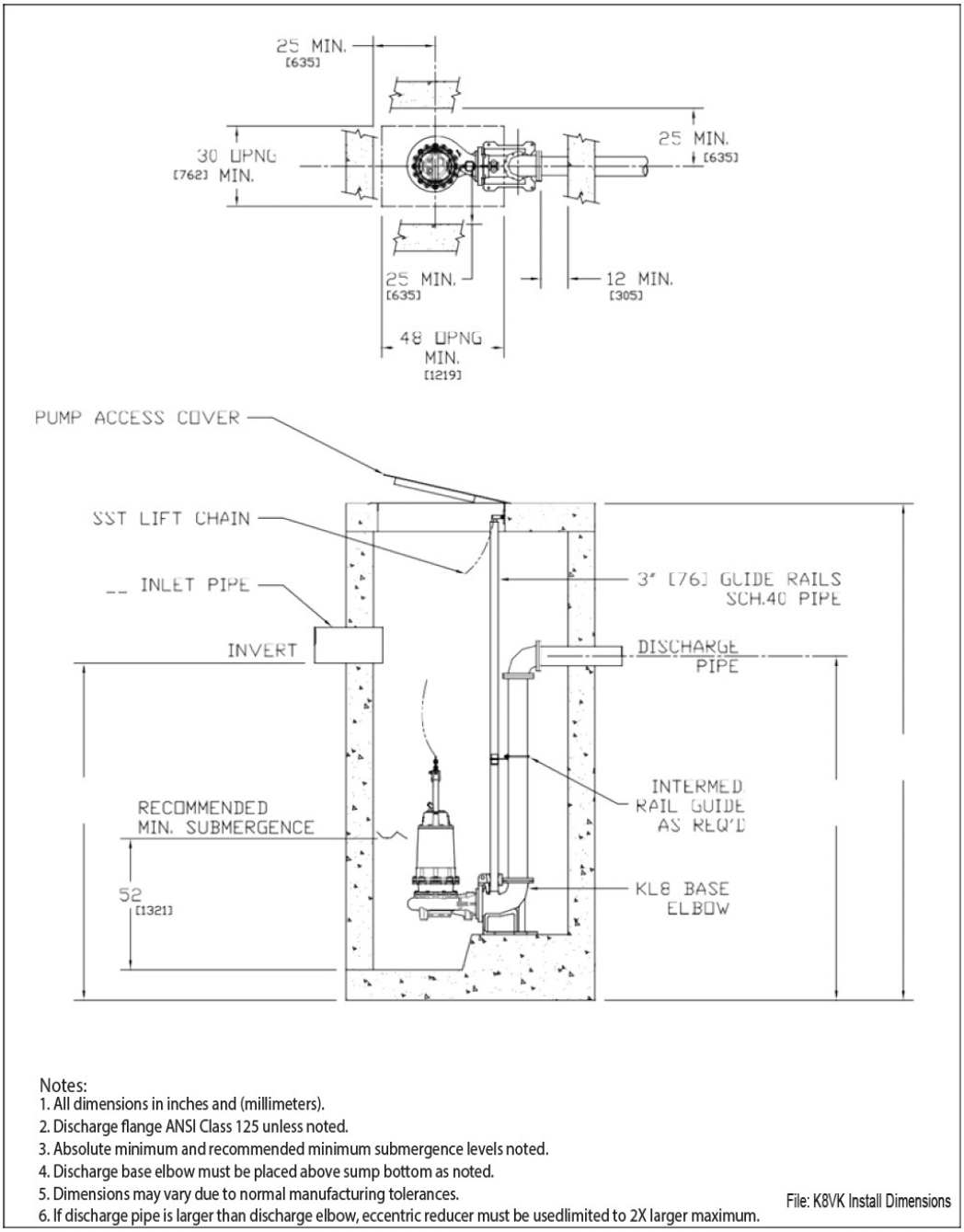


Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be usedlimited to 2X larger maximum.

File: K8VK Liftout Dimensions

PUMP SERIES	K8VK	8" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA

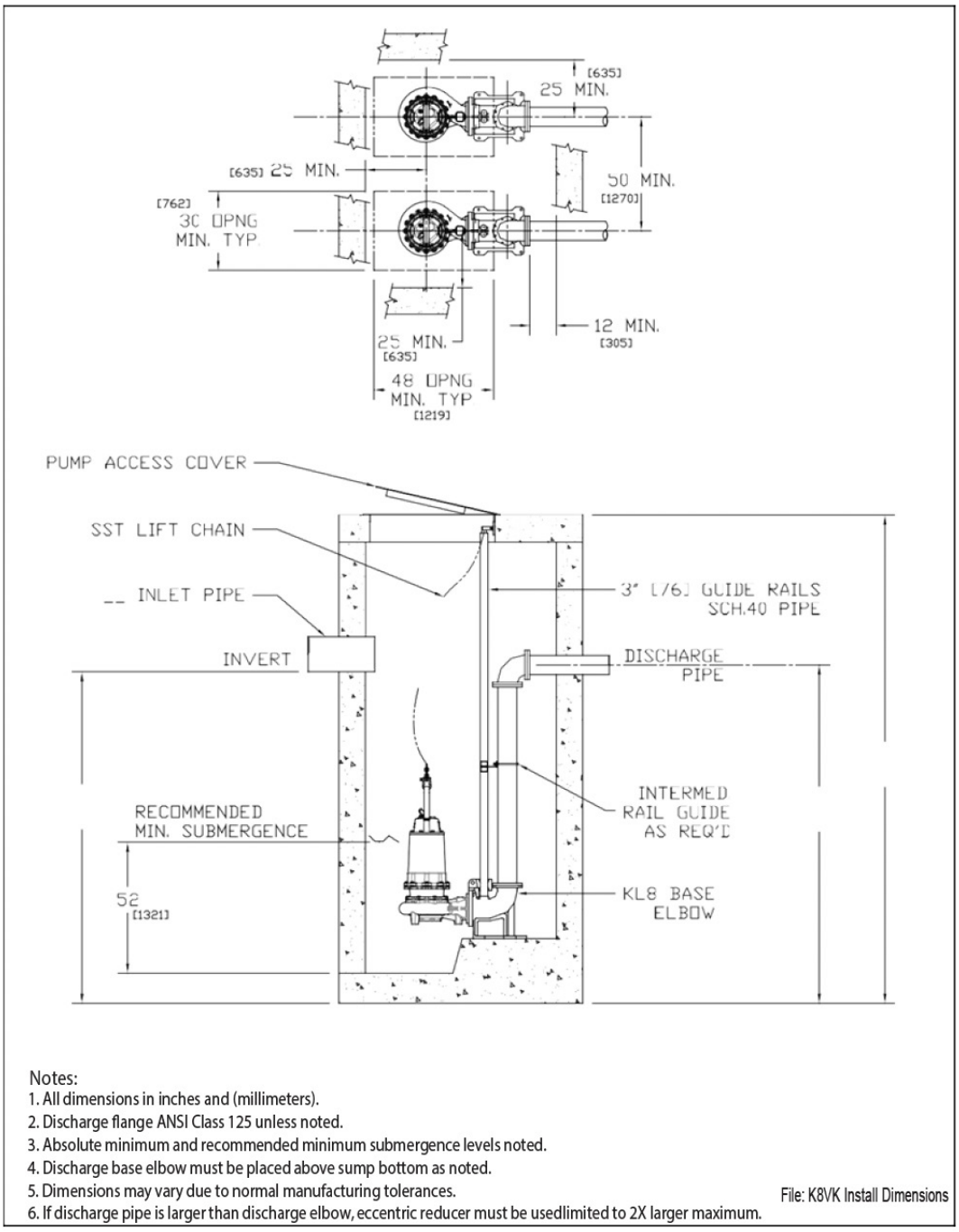


Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be usedlimited to 2X larger maximum.

File: K8VK Install Dimensions

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

PHYSICAL DATA	
Discharge Size	ANSI 8” Horizontal
Solid Size	4”
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 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 N: 392°F (200°C)
Power Cord Type	Type SOOW-600V, 90° C, TYPE W - 2000V, 90 C
Control Cord Type	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
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	Fluorocarbon
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Single Row Angular Contact Ball Bearing
Line Bearing	Bronze, CDA 836

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	VOLTS	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
75	3	94	93	90	85	89	87	84	75
100	3	94	93	90	85	89	87	84	75
125	3	94	93	91	85	89	87	84	75
150	3	95	94	92	86	90	88	85	76

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	VOLTS	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
30	3	92	91	88	83	87	85	81	72
40	3	92	91	88	83	87	85	81	73
50	3	93	92	89	84	88	86	83	74
60	3	93	92	89	84	89	87	84	74

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	870			
Electrical Ratings	Heat Sensor	24VDC, 5AMPS	115VAC, 5AMPS	230VAC, 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	VOLTS	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

HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
15	3	91	90	88	82	86	85	81	70
20	3	91	90	88	83	86	85	81	70
25	3	92	91	89	83	87	86	82	71

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
    - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 8” ANSI® standard Class 125, 8-bolt configuration.
- 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/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. Indiviual Performance Curves	• **K12VK**
3. Dimensional Drawings Pump Lift-out & Base Elbow Wet Well Installations	• **K12VK**

OPTIONAL :

All Stainless Steel Construction

FM PENDING



K12VK

12” Submersible, Enclosed Impeller

CERAMIC COATED ENCLOSED 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

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Applications

MOTOR GROUND RING PROTECTION

- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

OIL SUBMERSIBLE BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates
- Angular Contact Bearings

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



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.

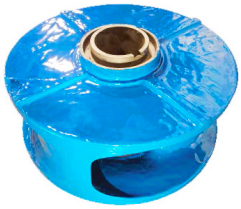
DOUBLE ROW BEARINGS



Heavy Duty Bearings to handle the toughest performances.

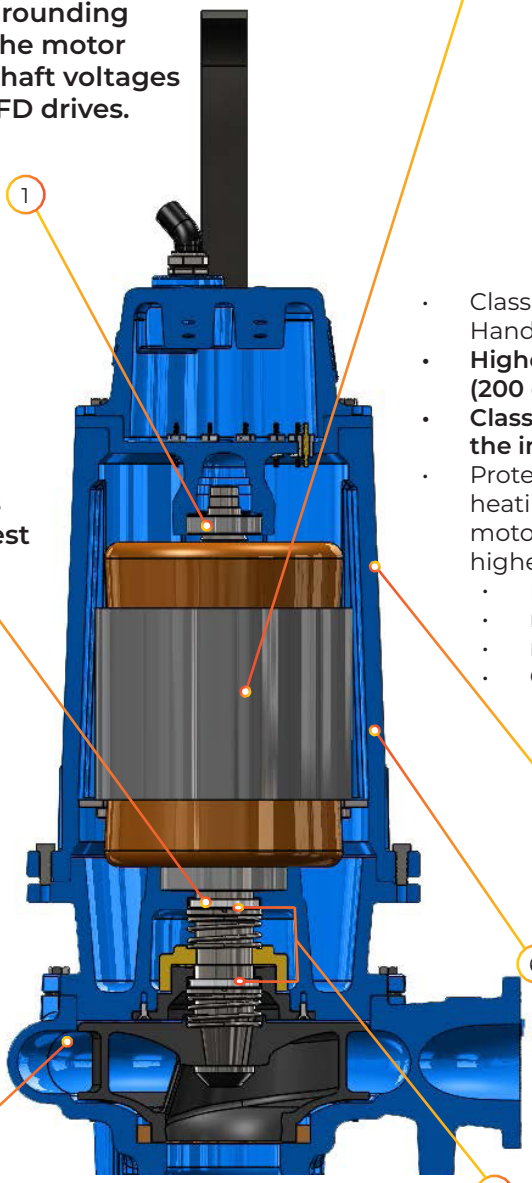
- **High Pressures**
- **High Flows**

- 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.

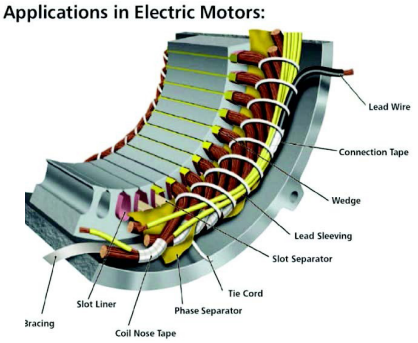


CERAMIC COATING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!



HEAVY DUTY MOTOR



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

5 CASTINGS

ASTM - Class 35 high tensile strength castings.

6 DURABLE POWDER COAT FINISH

Holds up to the toughest environmental conditions.

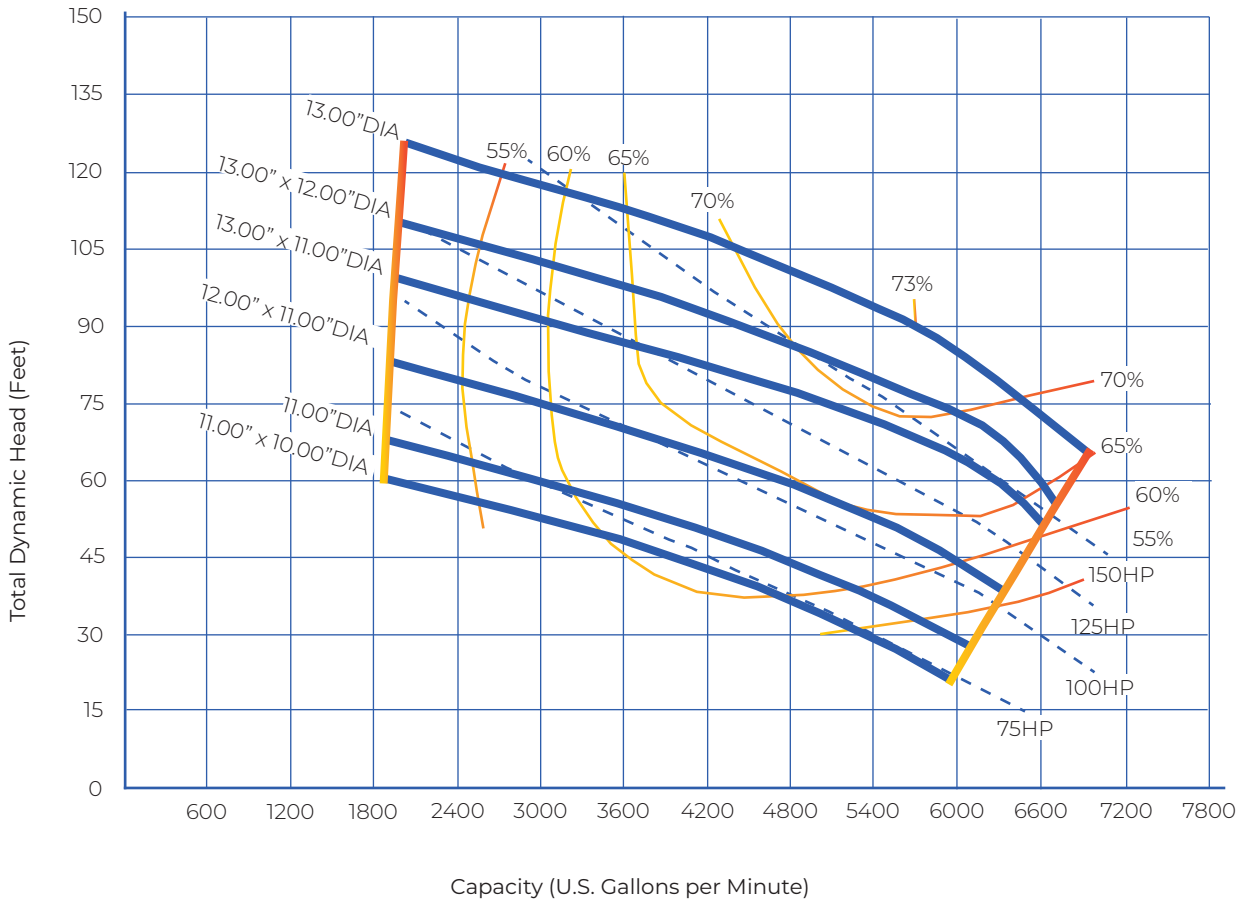
7 DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

PUMP SERIES	K12VK		12” SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	12”	Solids	6”

GPM:_____ TDH: _____

Performance

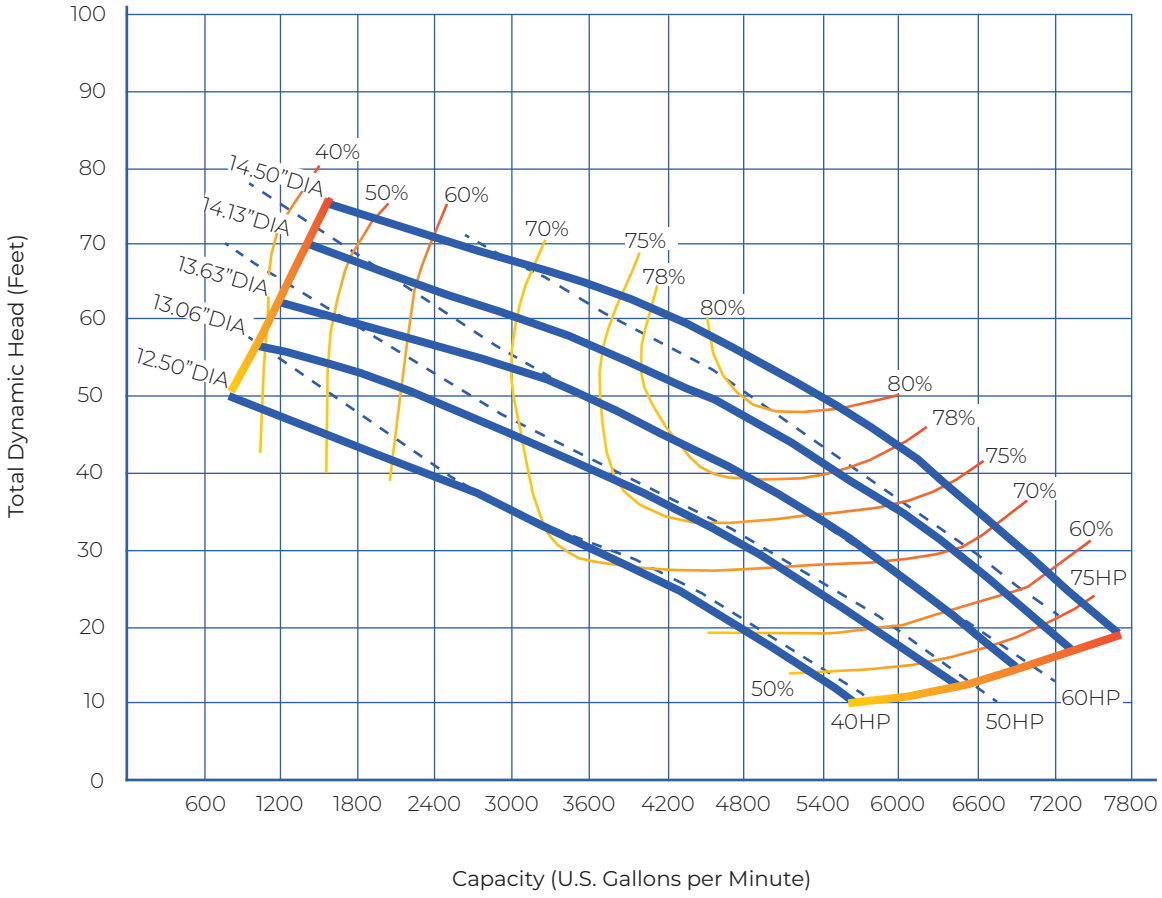


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K12VK		12” SUBMERSIBLE SEWAGE PUMPS		
Speed	1150 RPM	Discharge	12”	Solids	6”

GPM:_____ TDH: _____

Performance

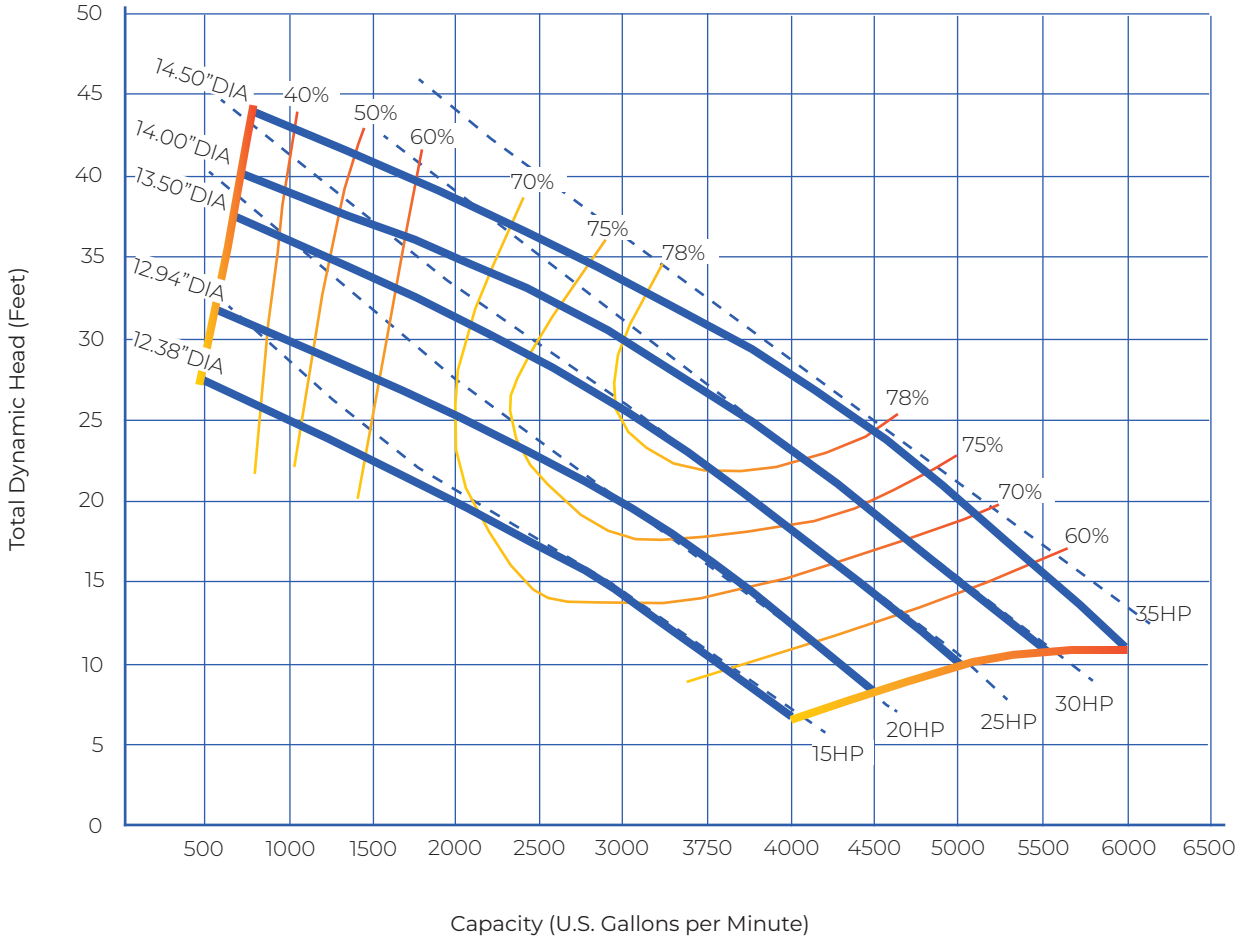


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K12VK		12" SUBMERSIBLE SEWAGE PUMPS		
Speed	870 RPM	Discharge	12"	Solids	6"

GPM:_____ TDH: _____

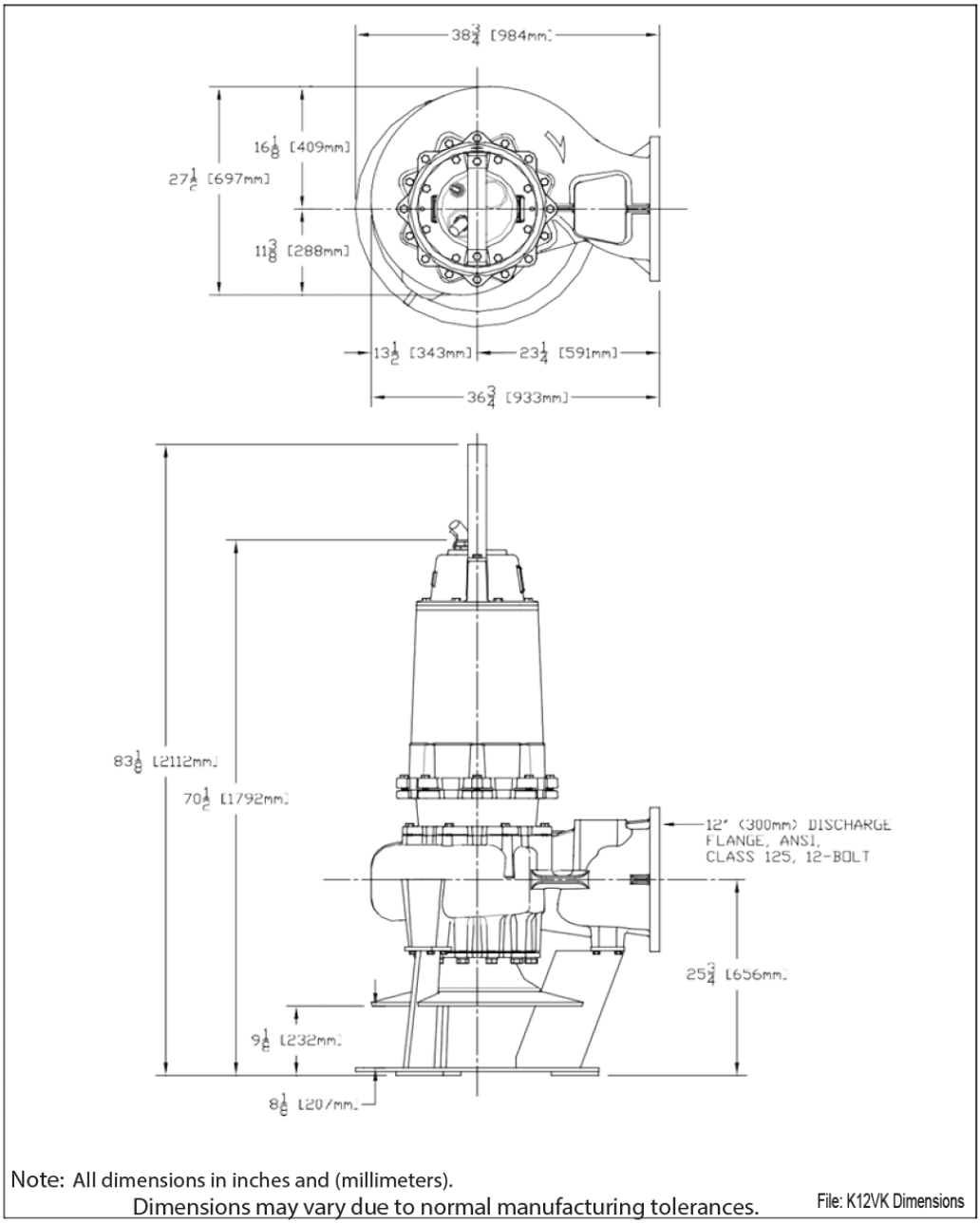
Performance



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	K12VK	12" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

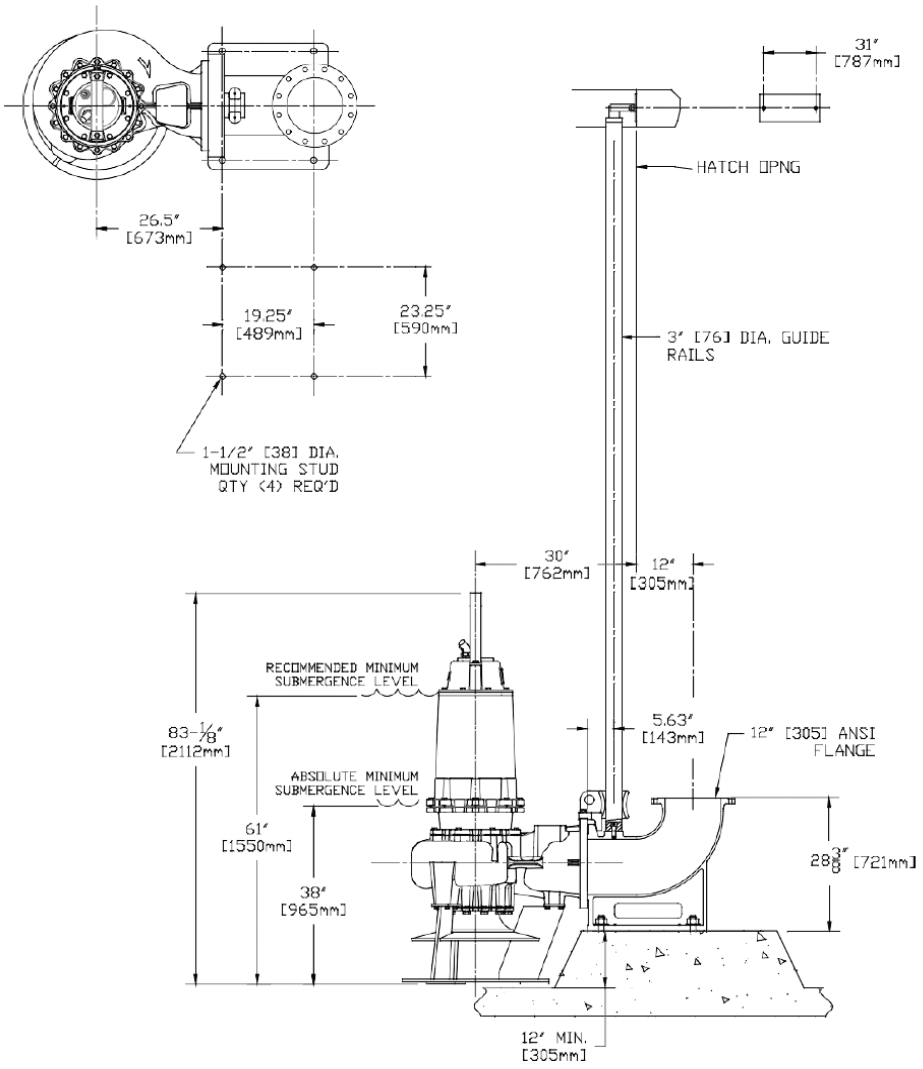


Note: All dimensions in inches and (millimeters).
Dimensions may vary due to normal manufacturing tolerances.

File: K12VK Dimensions

PUMP SERIES	K12VK	12” SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



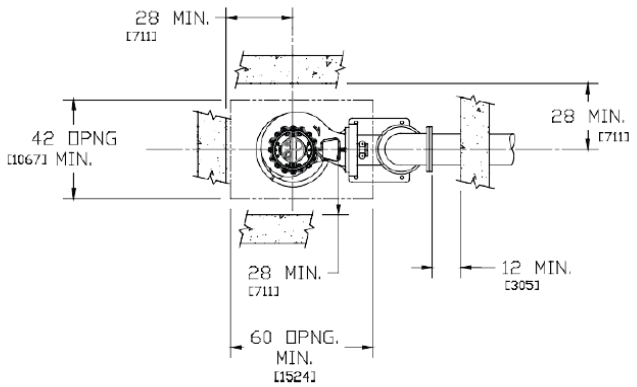
Notes:

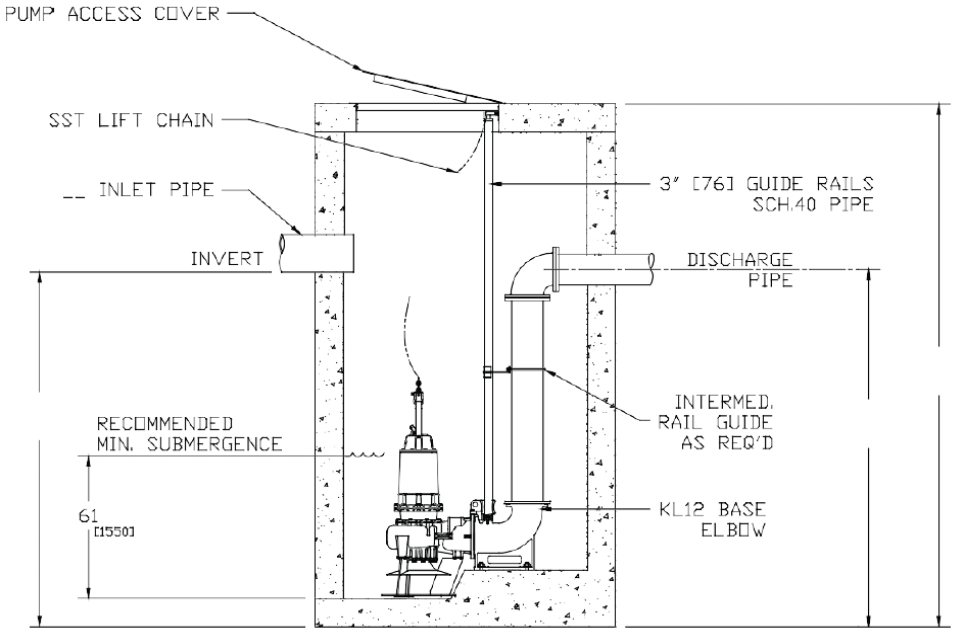
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be usedlimited to 2X larger maximum.

File: K12VK Liftout Dimensions

PUMP SERIES	K12VK	12" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



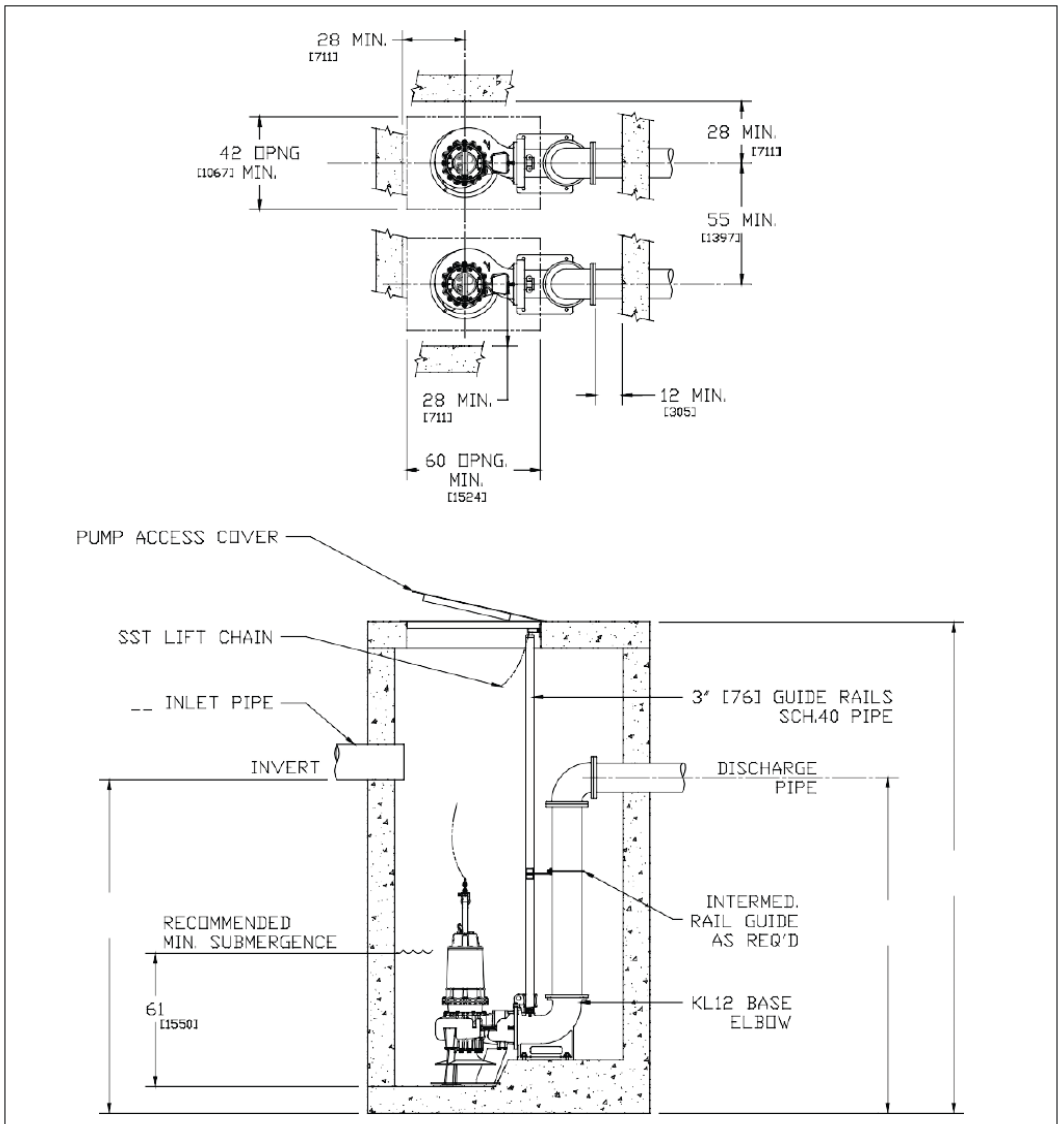


Notes:
1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. 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

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

PHYSICAL DATA	
Discharge Size	ANSI 12” Horizontal
Solid Size	6”
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 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 N: 392°F (200°C)
Power Cord Type	Type SOOW-600V, 90° C, ,TYPE W - 2000V, 90 C
Control Cord Type	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
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	Fluorocarbon
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Single Row Angular Contact Ball Bearing
Line Bearing	Bronze, CDA 836

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	VOLTS	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
75	3	94	93	90	85	89	87	84	75
100	3	94	93	90	85	89	87	84	75
125	3	94	93	91	85	89	87	84	75
150	3	95	94	92	86	90	88	85	76

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	VOLTS	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
40	3	92	91	88	83	87	85	81	73
50	3	93	92	89	84	88	86	83	74
60	3	93	92	89	84	89	87	84	74
75	3	94	93	90	85	89	87	84	75

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	VOLTS	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
15	3	91	90	88	82	86	85	81	70
20	3	91	90	88	83	86	85	81	70
25	3	92	91	89	83	87	86	82	71
30	3	92	91	89	83	87	86	82	71

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:
  _____ Horsepower
  _____ RPM
  _____ Voltage
  _____ Phase
  _____ Frequency
  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
    - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 12” ANSI® standard Class 125, 12-bolt configuration.
- 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/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. Indiviual Performance Curves	• **K14VK**
3. Dimensional Drawings Pump Lift-out & Base Elbow Wet Well Installations	• **K14VK**

OPTIONAL :
All Stainless Steel Construction

FM PENDING



K14VK

14” Submersible, Enclosed Impeller

CERAMIC COATED ENCLOSED 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

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Applications

MOTOR GROUND RING PROTECTION

- Allows Motor To Operate With VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

OIL SUBMERSIBLE BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates
- Angular Contact Bearings

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



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.

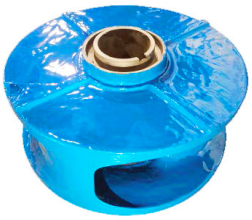
DOUBLE ROW BEARINGS



Heavy Duty Bearings to handle the toughest performances.

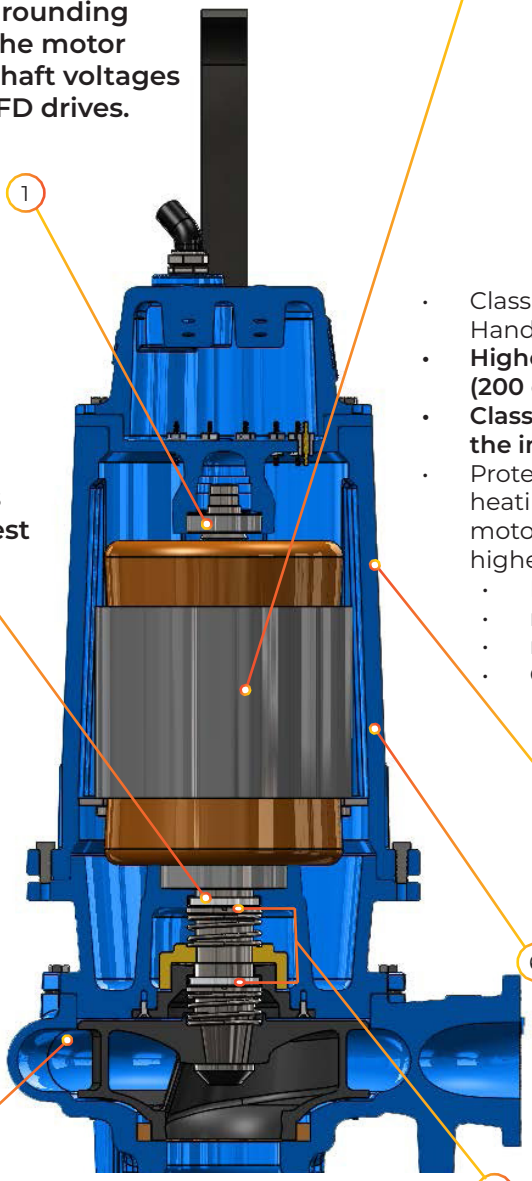
- **High Pressures**
- **High Flows**

- 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.

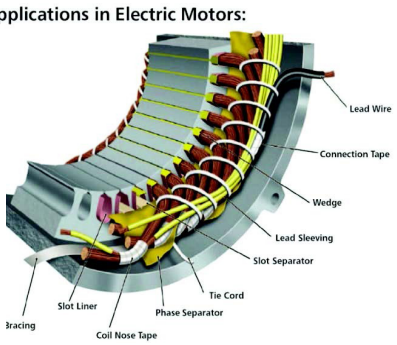


CERAMIC COATING

Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance. This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!



HEAVY DUTY MOTOR



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

5 CASTINGS

ASTM - Class 35 high tensile strength castings.

6 DURABLE POWDER COAT FINISH

Holds up to the toughest environmental conditions.

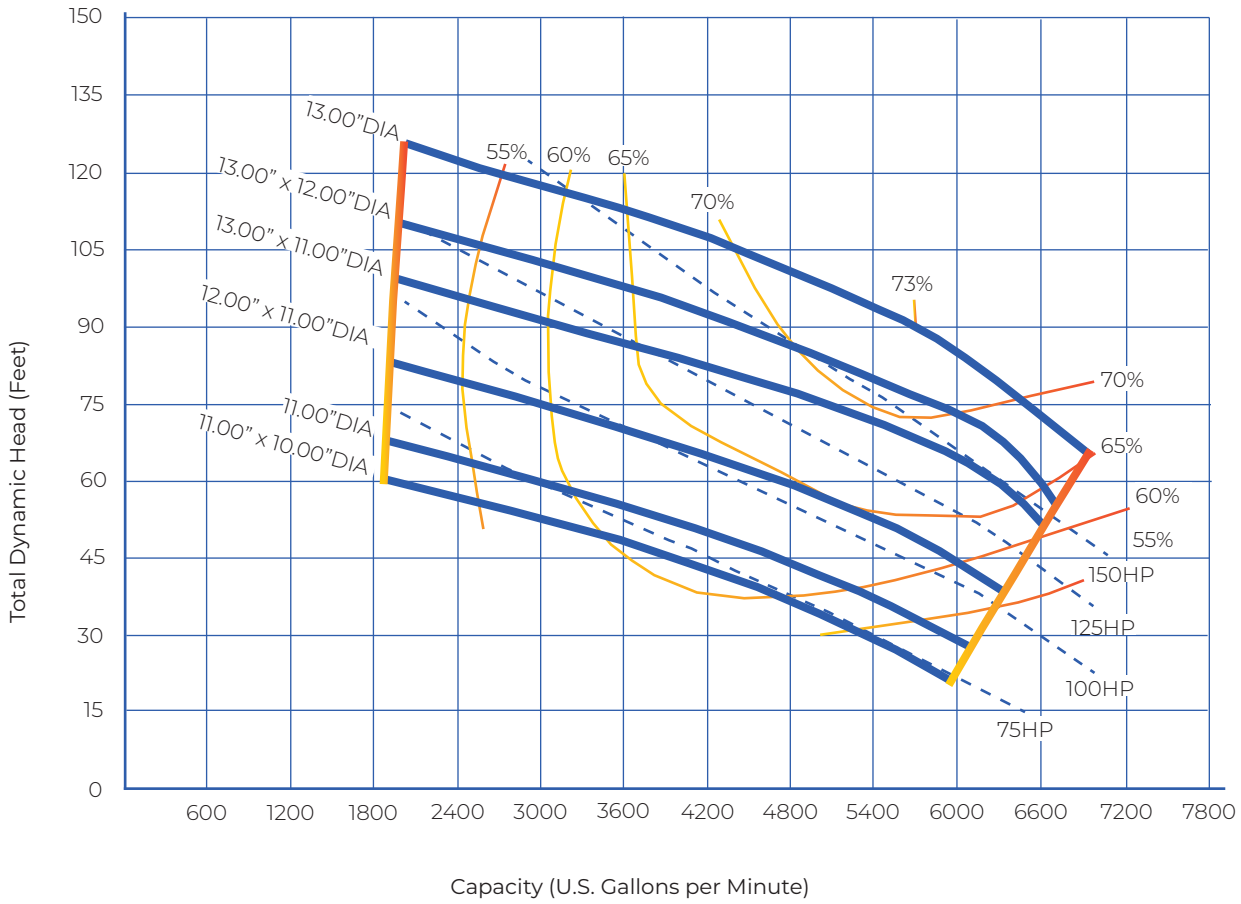
7 DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

PUMP SERIES	K14VK		14" SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	14"	Solids	6"

GPM:_____ TDH: _____

Performance

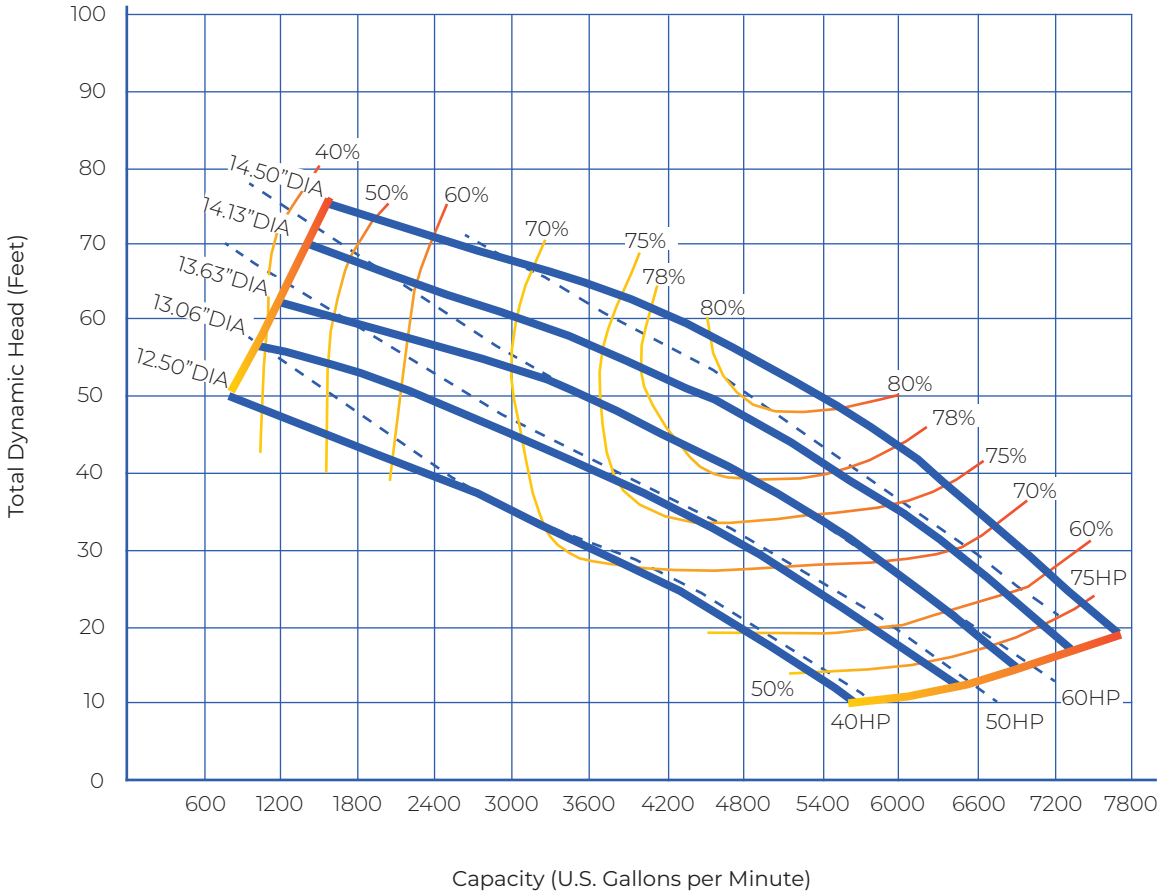


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K14VK		14" SUBMERSIBLE SEWAGE PUMPS		
Speed	1150 RPM	Discharge	14"	Solids	6"

GPM:_____ TDH: _____

Performance

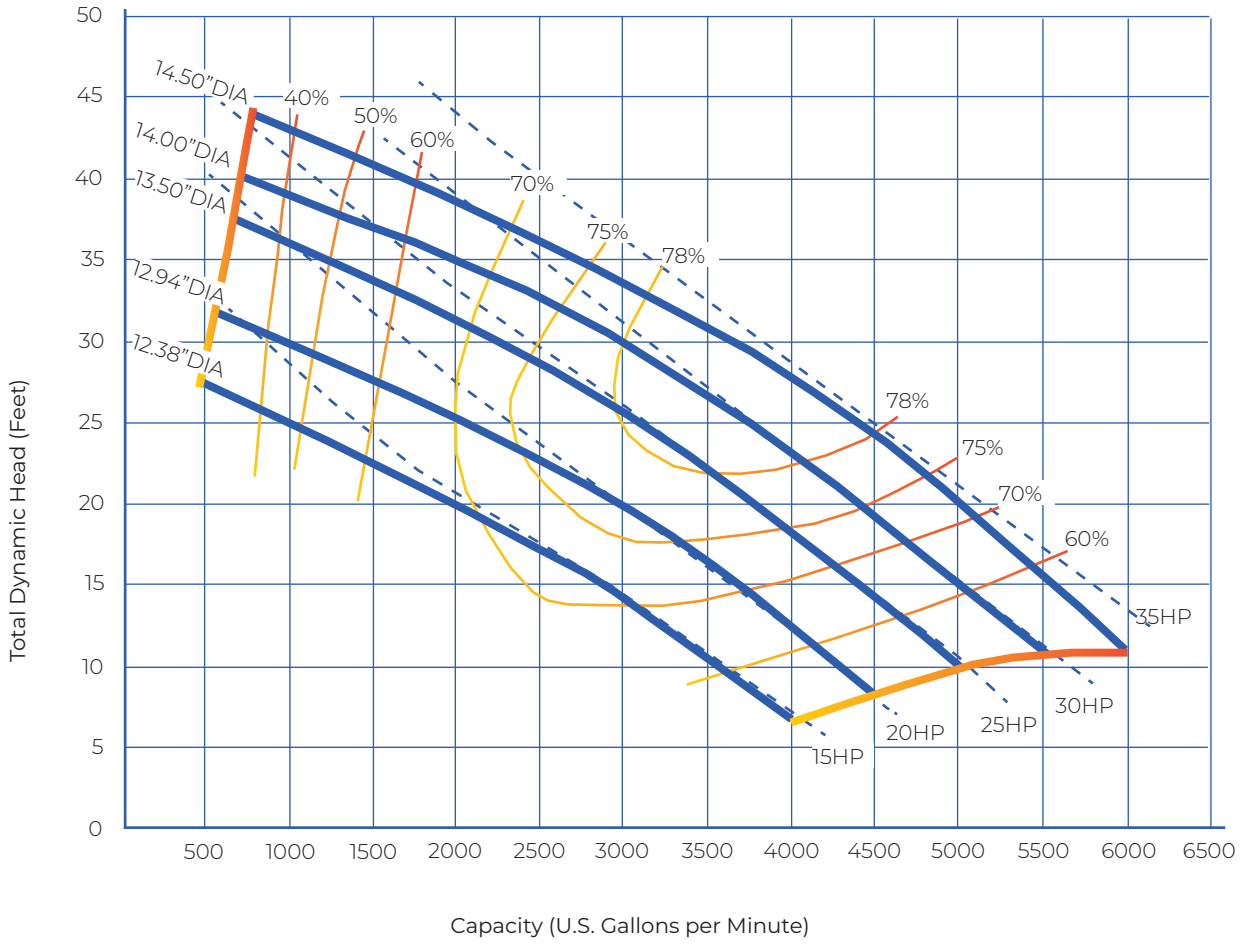


The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.

PUMP SERIES	K14VK		14" SUBMERSIBLE SEWAGE PUMPS		
Speed	870 RPM	Discharge	14"	Solids	6"

GPM:_____ TDH: _____

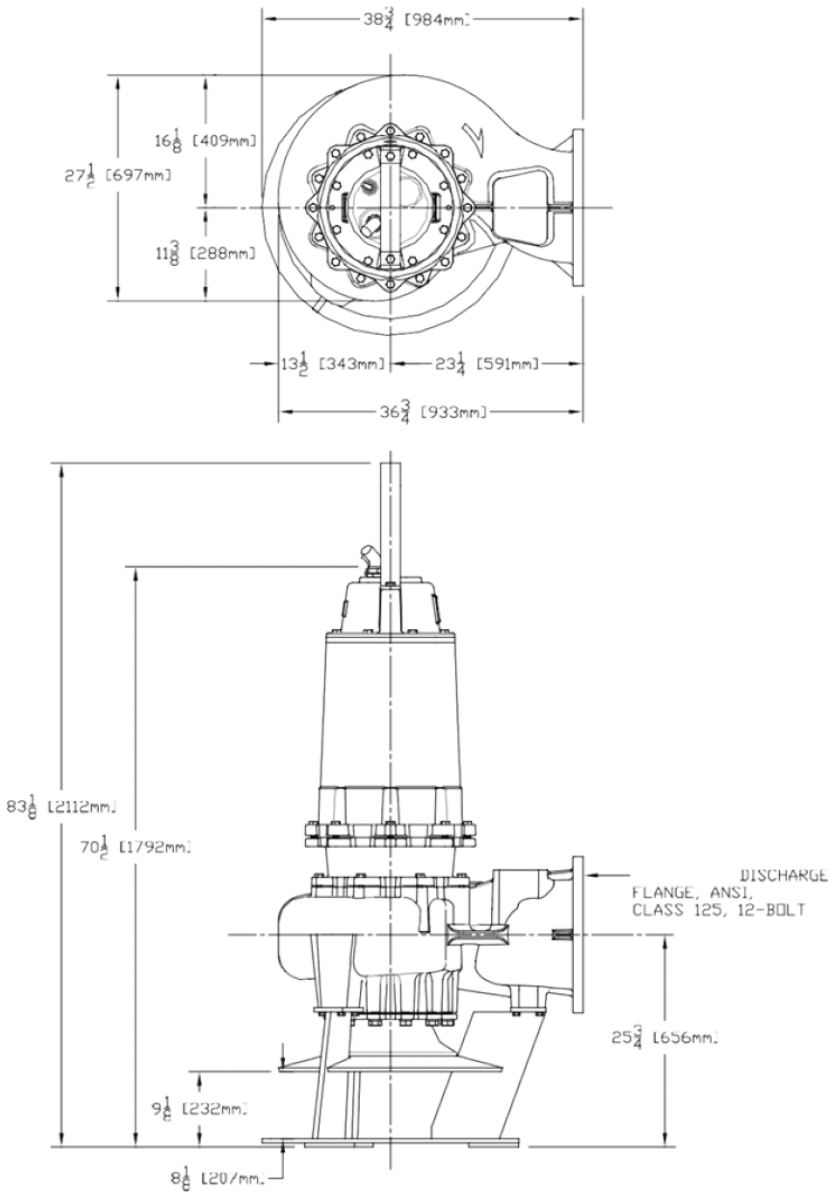
Performance



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	K14VK	14" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

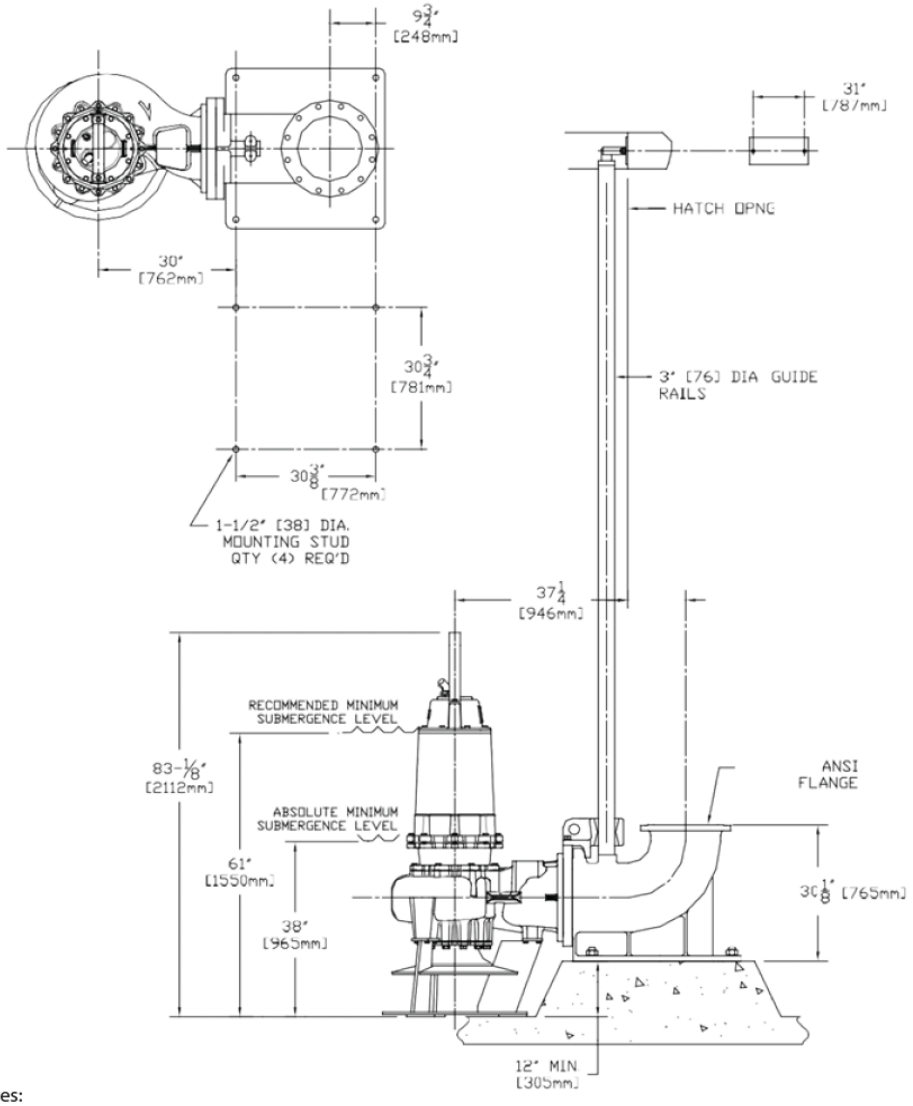


Note: All dimensions in inches and (millimeters).
Dimensions may vary due to normal manufacturing tolerances.

File: K14VK Dimensions

PUMP SERIES	K14VK	14" SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

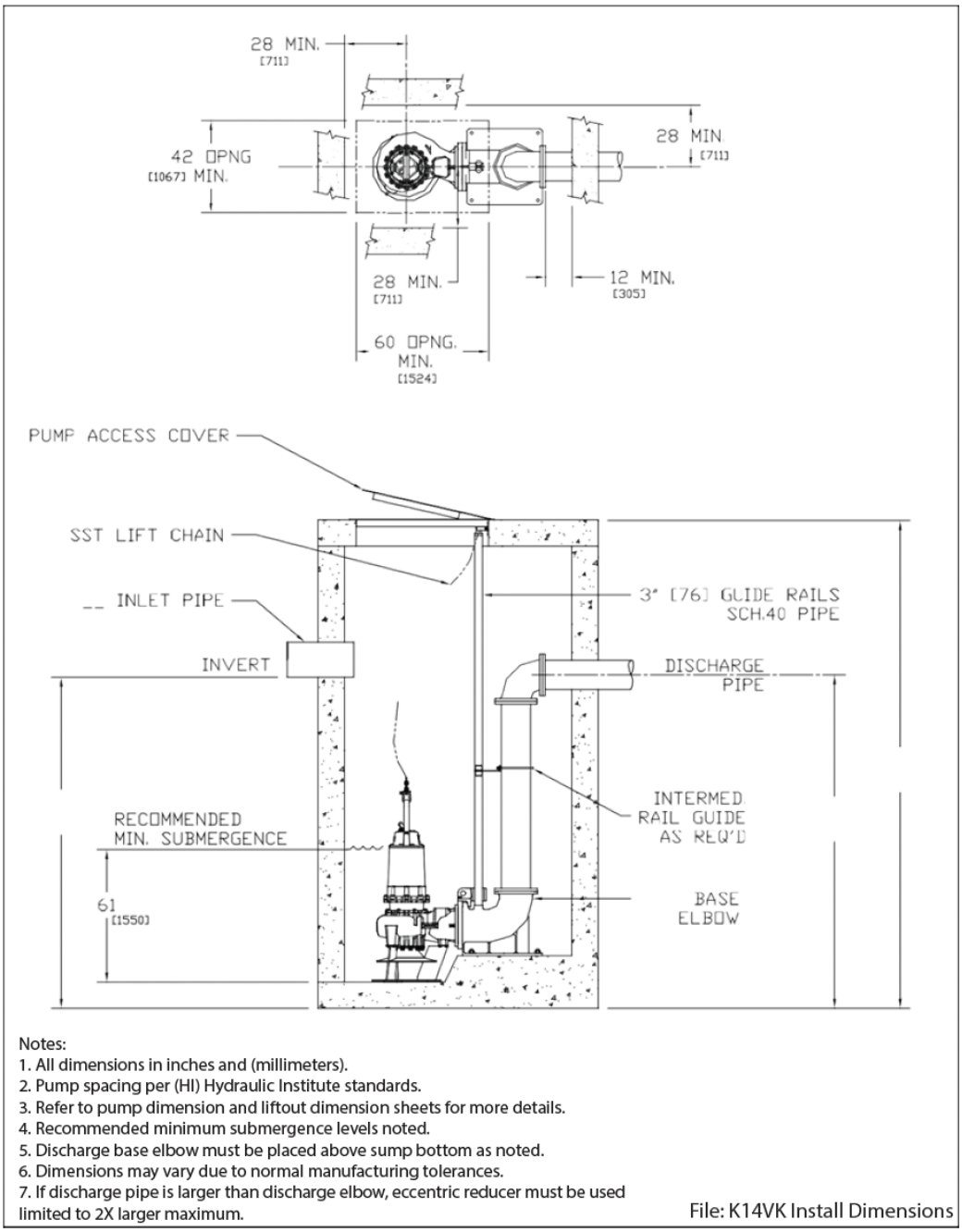


Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI Class 125 unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K14VK Liftout Dimensions

PUMP SERIES	K14VK	14" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA

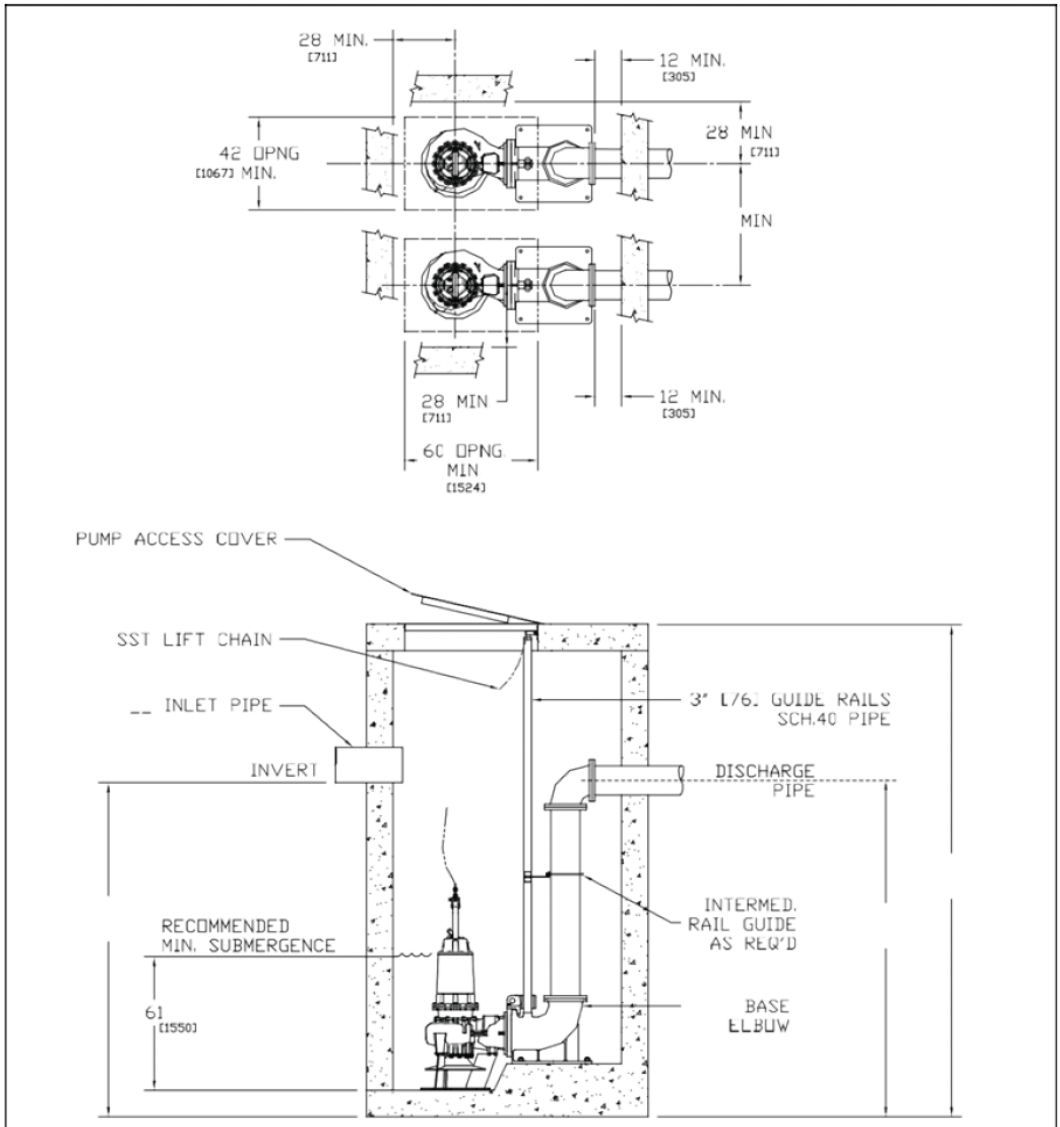


Notes:
1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. 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

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

PHYSICAL DATA	
Discharge Size	ANSI 14” Horizontal
Solid Size	6”
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 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 N: 392°F (200°C)
Power Cord Type	SOOW-600V, 90° C, TYPE W - 2000V, 90 C
Control Cord Type	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
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	Fluorocarbon
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Single Row Angular Contact Ball Bearing
Line Bearing	Bronze, CDA 836

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	VOLTS	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
75	3	94	93	90	85	89	87	84	75
100	3	94	93	90	85	89	87	84	75
125	3	94	93	91	85	89	87	84	75
150	3	95	94	92	86	90	88	85	76

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	VOLTS	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
40	3	92	91	88	83	87	85	81	73
50	3	93	92	89	84	88	86	83	74
60	3	93	92	89	84	89	87	84	74
75	3	94	93	90	85	89	87	84	75

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	VOLTS	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
15	3	91	90	88	82	86	85	81	70
20	3	91	90	88	83	86	85	81	70
25	3	92	91	89	83	87	86	82	71
30	3	92	91	89	83	87	86	82	71

1.0 SCOPE

- 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.
- 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.
- 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.

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- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:
  _____ Horsepower
  _____ RPM
  _____ Voltage
  _____ Phase
  _____ Frequency
  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

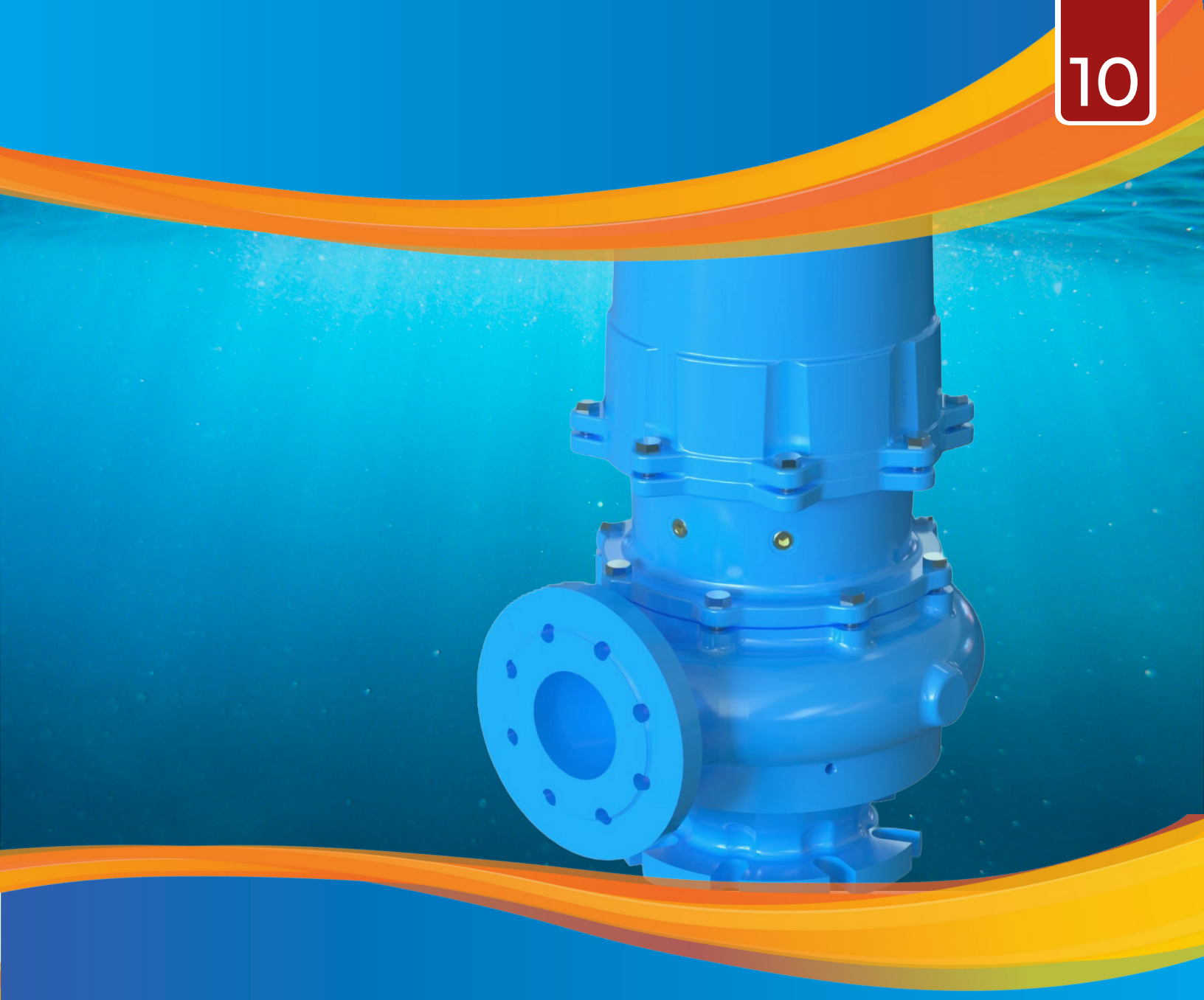
- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
    - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 14” ANSI® standard Class 125, 14-bolt configuration.
- 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/corrosion resistance including higher temperature application.



SECTION 10

K3SP300 Submersible Pump

KEEN PUMP

K3SP300
Submersible Pump

This submersible pump is equipped with the unique screw-centrifugal hydraulics. They are capable of pumping wastewater and effluent with high solids content.





Submersible Pumps Operate Continuously Submersed in the Process Fluid

Equipped with screw-centrifugal hydraulics, the submersible pumps are capable of pumping general effluent and process fluid containing large amounts of solids and fibrous material. The Pumping of viscous liquids and fluids requiring gentle handling are possible with this type of design for todays troublesome sewers that deal with a larger concentration of solids.

THE RELIABLE SUBMERSIBLE PUMP FOR ABRASIVE OR FIBOROUS MATERIALS

The submersible motor pumps by Keen Pump are Robust, clog-free and low maitenance. The submersible motors developed and manufactured by Keen Pump Co. fullfil the highest quality and efficiency standards. The mechanical seals manufactured by us guarantee a long service life. For permanent installations the guide rail mounting arrangement with automatic coupling simplifies installation and retrieval of submerged units. This minimizes the time required for inspection and maintenance. The adjustable entry cone and various material options are available for applications with abrasive and corrosive process fluid.



3” Discharge - Single Vane Spiral Impeller

2-1/4” Solids Handling

13450-850 RPM

This section contains the following material:

1. Pump Family Curves & Technical Data	• **K3SP300**
2. Indiviual Performance Curves	• **K3SP300**
3. Dimensional Drawings Pump Lift-out & Base Elbow Wet Well Installations	• **K3SP300**

OPTIONAL :
All Stainless Steel Construction

FM APPROVED



K3SP300

3” Submersible, Spiral Impeller (Class 1, Div. 1, Groups C & D Hazardous Location)

CAPABILITIES:

Flows	to 800 GPM
Heads	to 188 Feet
HP Range	30 HP
Voltage/Phase Options	230 / 460V, 3 Phase
Discharge Connections	3” ANSI Class 125 Horizontal Flange
Motor Speeds	3450 RPM
Solids Handling	2-1/4”
Impeller	Single Vane, Spiral
Motor Serice Factor	1.20

HARDENED IMPELLER

- Superior Abrasion Resistance
- Allows The Pump To Operate Better In Any Pressure or Flow Condition

BEST MOTOR CONSTRUCTION

- Class “N” (392° F) Highest Temperature
- Motor Will Not Overheat In Continuous Applications

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

K3SP(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



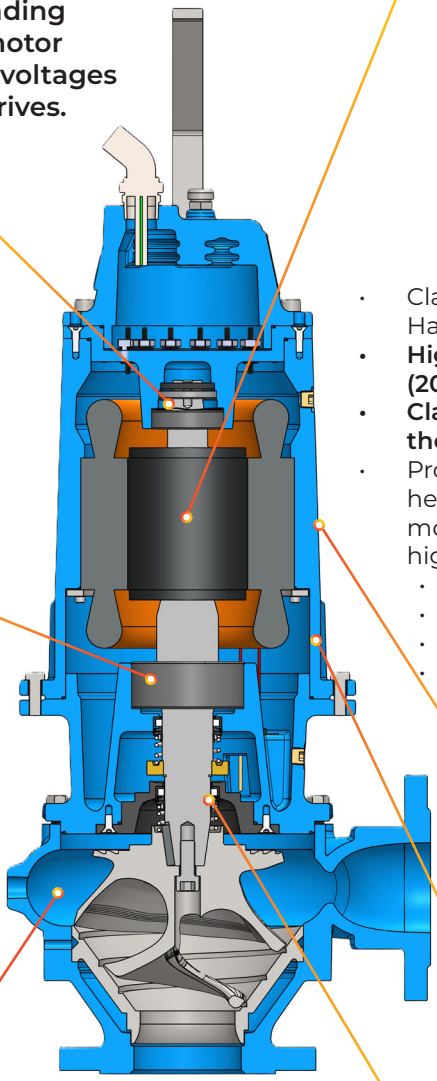
Heavy Duty Bearings to handle the toughest

- **High Pressures**
- **High Flows**

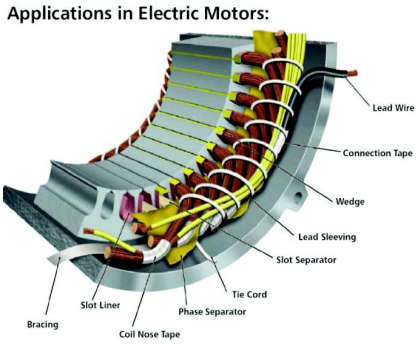
- Handles both Axal and Radial loads in both directions at the same time.
- Double Row Angular Ball Bearings have two rows of balls arranged back-to-back.

HYDRAULIC COMPONENTS

Hardened Impeller and Sleeve ensure long life and abrasion resistance



HEAVY DUTY MOTOR



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

5 CASTINGS

ASTM - Class 35 high tensile strength castings.

6 DURABLE POWDER COAT FINISH

Holds up to the toughest environmental conditions.

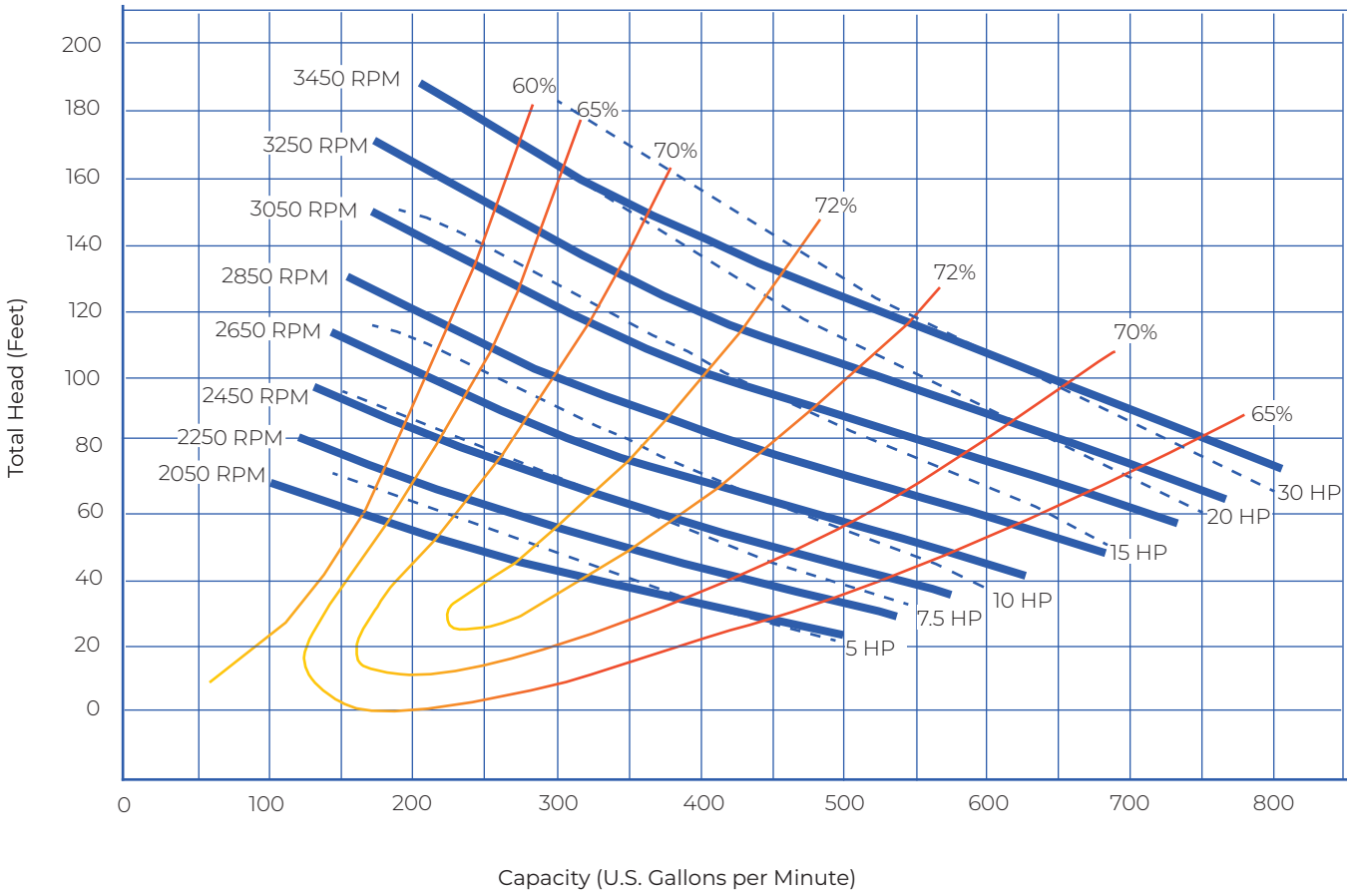
7 DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

PUMP SERIES	K3SP300		3" SUBMERSIBLE SEWAGE PUMPS		
Speed	3450 RPM	Discharge	3"	Solids	2-1/4"

GPM:_____ TDH: _____

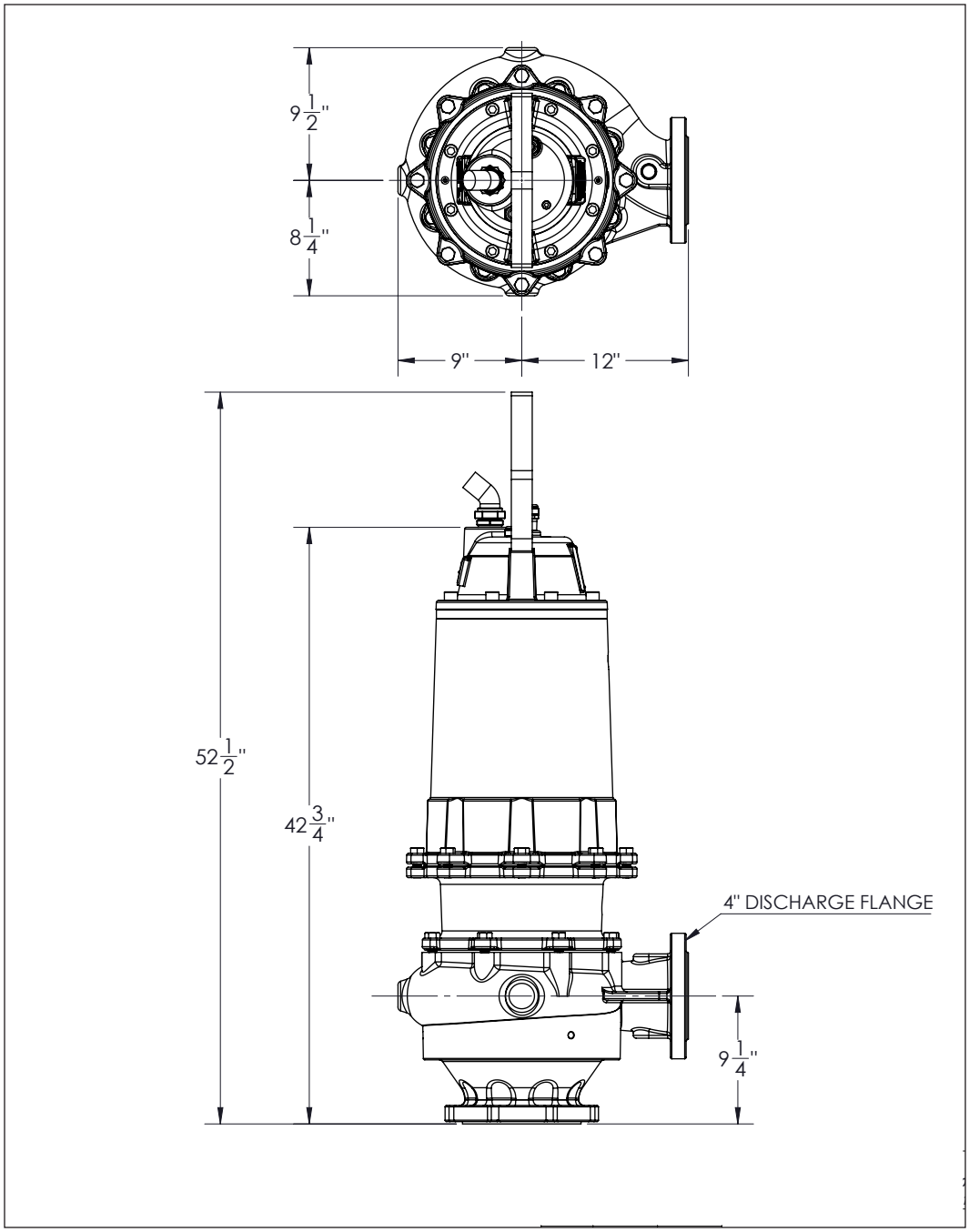
Performance



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.

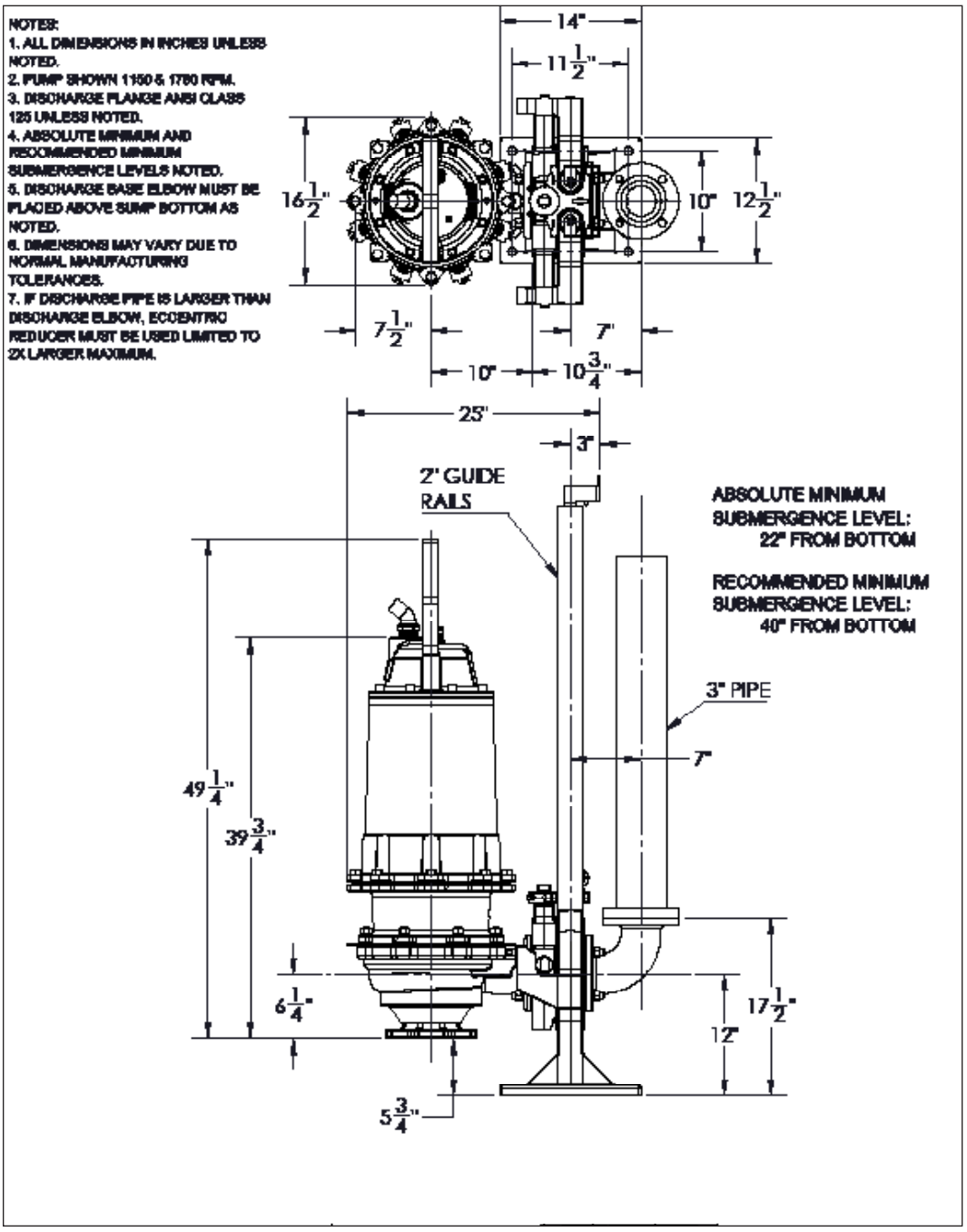
PUMP SERIES	K3SP300	3" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



PUMP SERIES	K3SP300	3” SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA



PHYSICAL DATA	
Discharge Size	ANSI 3” Horizontal
Solid Size	2-1/4”
Impeller Type	Balanced, Single 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 N
Service Factor	1.2
NEMA Design Type	B (3Ø)
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class N: 392°F (200°C)
Power Cord Type	TypeW - 2000V, 90° C
Control Cord Type	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
Impeller Sleeve	440C SST Hardened
Impeller	Duplex SST ASTM A890
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	Fluorocarbon
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

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	3450			
Electrical Ratings	Heat Sensor	24VDC, 5AMPS	115VAC, 5AMPS	230VAC, 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	SF AMPS	LOCKED ROTOR AMPS	RUN KW	START KVA	RUN KVA
30	230	3	F	1.2	75.0	112.9	376.2	33.8	150.3	37.6
	460				37.5	56.4	188.1			

MOTOR EFFICIENCIES & POWER FACTOR									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
30	3	91	90	90	88	92	91	89	87

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.

- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient. Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-112.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton® materials.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- 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.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, double row Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 420 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
    - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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/corrosion resistance including higher temperature application.

8.0 VOLUTE CASE

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- Replaceable, bronze wear ring to provide efficient sealing between volute and impeller suction inlet.
- Volute to be full, 3” discharge flow design.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 3” ANSI® standard Class 125, 8-bolt configuration.
- 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/corrosion resistance including higher temperature application.

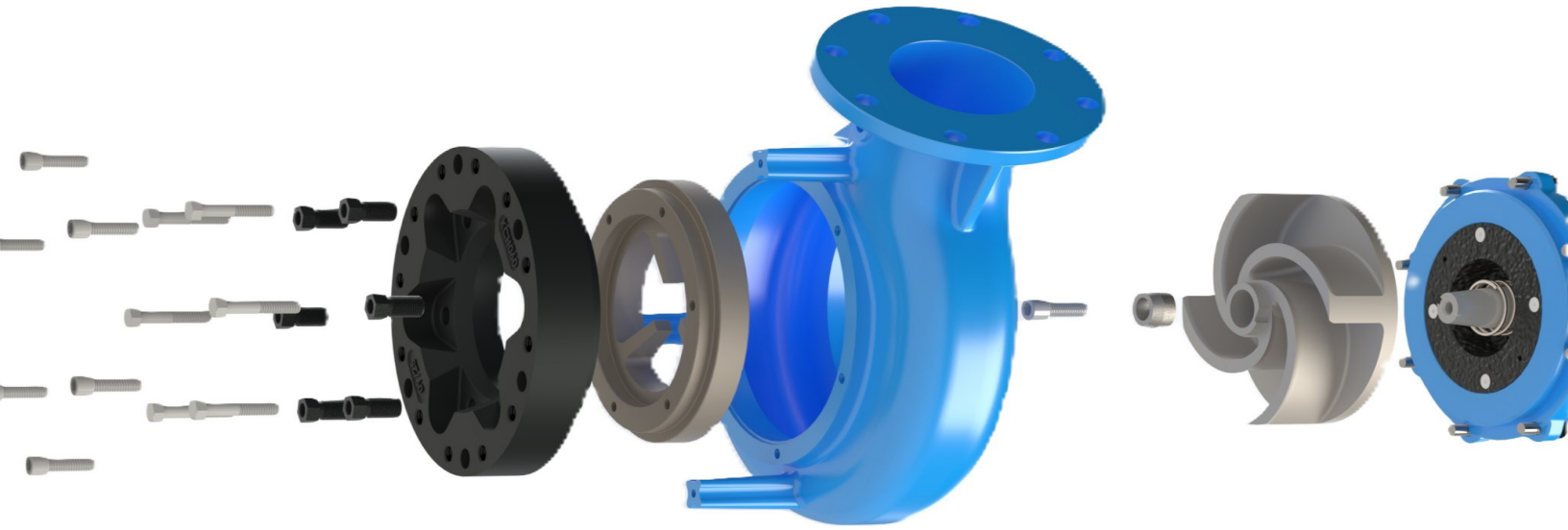
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SECTION 11

3-14 Inch Chopper Pumps

SOLIDS SIZE REDUCTION WHICH ENFORCES NON-CLOGGING

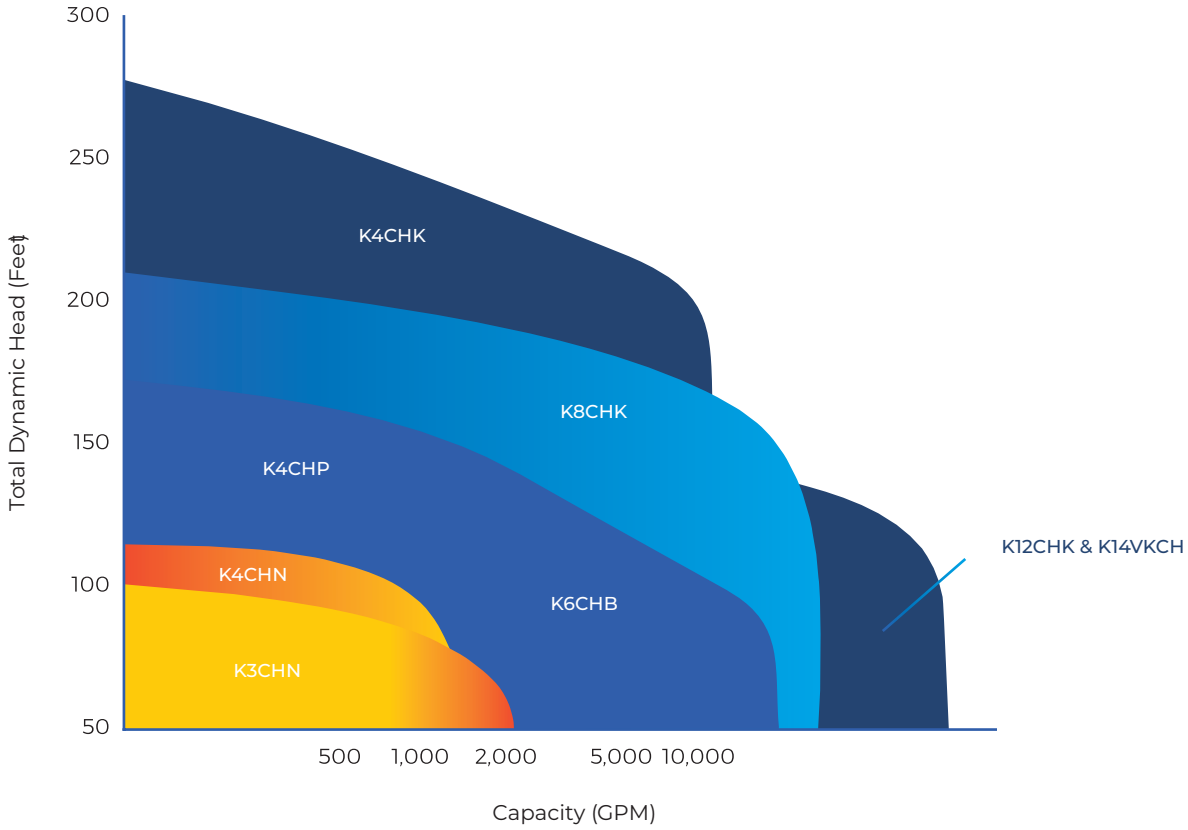
In today's sewers the amounts of solids introduced has increased to the highest levels in our industry and plugged pumps is becoming quite common. Keen Pump offers their new "Patented" Chopper pump that is unlike any other Chopper Pump in the Industry! It reduces solids to a slurry so that nothing gets caught in the pump volute or impeller. Even the toughest solids found today in wastewater like: Wet wipes, cloth from blue jeans, nylon rope, wood pieces, mop heads, large plastic bags, glass, even rocks greater than 3". The benefits of the Patented Keen design is that the cutting mechanism is totally independent from the pump and volute allowing the solids to be macerated into a slurry. This eliminates the worry of solids being caught in the impeller and volute and eventually causing a pump failure.

BEST RELIABILITY

Keen Pumps Patented Chopper offers a unique, effective and best design for not plugging the pump which causes pump failures. With Keen Pump's design the solids that are stopping competitors chopper pumps are being handled with the Keen Pump design. The heat treated cutting bar and micro-adjust plate handle macerating hard items with minimal impact so that the pump lasts longer than the competition. Keen Pump also offers Explosion-proof designs approved for Class 1, Division 1, Group C & D. Keen also protects the shaft and motor design by the heavy double row lower bearing. This helps in today's more polluted sewers with increased solids. Keen Pump also offers upper and lower silicon carbide mechanical seals for best anti-abrasion wear.

EASE OF SERVICING

Keen Pump's Choppers are very simple to service. With the simple cutter bar and micro-adjust plate there is less parts to service. There are no shims to adjust and therefore eliminating the need to spend extra time adjusting on and off with the shimming. The micro-adjust plate allows a simple method for adjusting the cutting bar and can be replaced in very little down time.



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

Powerful high-torque motor for strong pumping. 208/230/460/575 Volt, 3-phase. Slip-Fit stator efficiently transfers heat to cast housing. Class N 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

Semi-Open, 440C Stainless Steel, Heat Treated Impeller. Features backside pump-out vanes, keeping the lower seal clean. Dynamically balances for smooth, quite operation and long bearing life.

8. STANDARD FLANGE CONNECTION

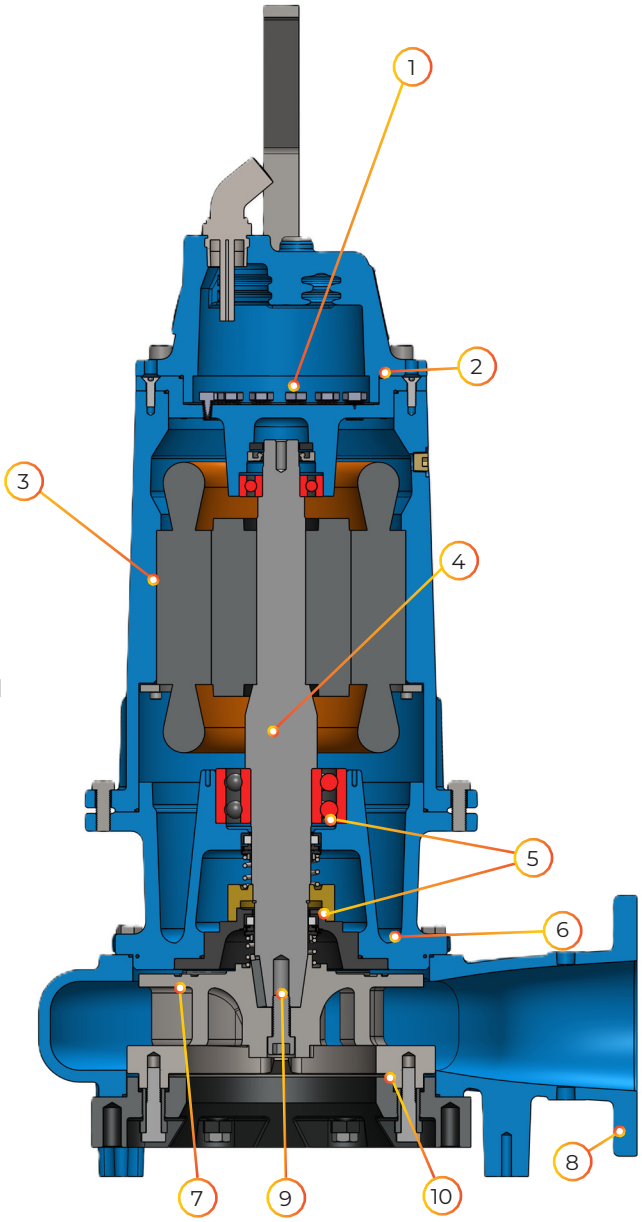
4" Horizontal, Class 125 ANSI discharge flange. Industry standard, 8-bolt pattern, Ductile Iron Casing.

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.

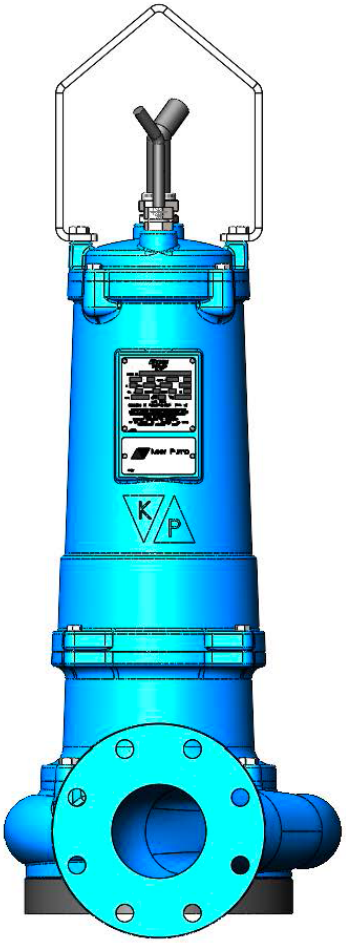


K3CHN(X)

3” Submersible, Chopper
(Class 1, Div. 1, Groups C & D
Hazardous Location)

OPTIONAL :
All Stainless Steel

FM APPROVED



CAPABILITIES:

Flows	to 700 GPM
Heads	to 70 Feet
HP Range	3 - 10 HP
Voltage/Phase Options	208/230/460 V, 3Phase
Discharge Connections	3” ANSI Class 125 Horizontal Flange
Motor Speeds	1750 RPM

HARDENED IMPELLER

- Heat Treated Cast 440C SST, Semi-Open
- Handles The Toughest Materials, Cuts into Pieces
- Works Efficiently with Stationary Cutter Bar

HARDENED CUTTER BAR

- Heat Treated 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

BEST MOTOR CONSTRUCTION

- Class “N” (392 F) Highest Temperature Motor Will Not Overheat In Continuous Applications

MOTOR GROUND RING PROTECTION

- Allows Motor to Operate with VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

OIL SUBMERSIBLE BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates
- Angular Contact Bearings

K3CHN(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.



SOLID BEARING SUPPORT

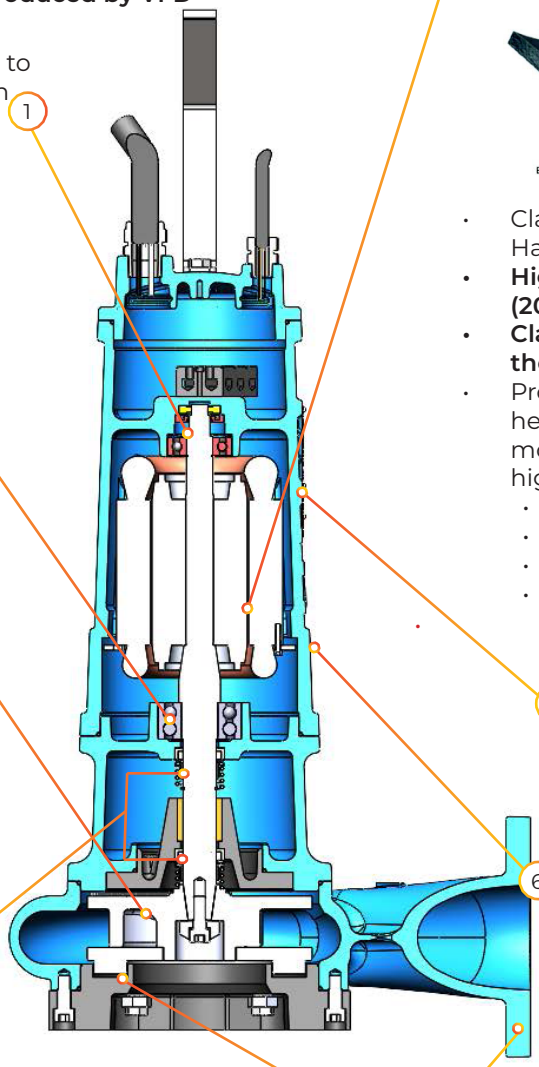
Two-bearing design featuring high load-rated angular contact bearings for 100,000 hour B-10 life.

HYDRAULIC DESIGN

Semi-Open, 440C Stainless Steel, Heat Treated Impeller. Features backside pump-out vanes, keeping the lower seal clean. Dynamically balances for smooth, quite operation and long bearing life.

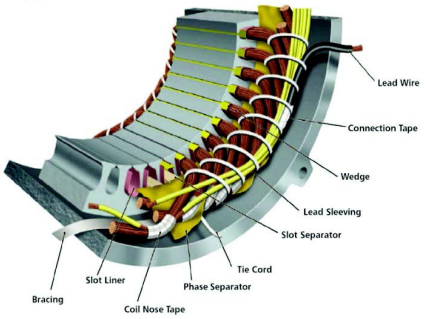
DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.



HEAVY DUTY MOTOR

Applications in Electric Motors:



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

CASTINGS

ASTM - Class 35 high tensile strength castings.

DURABLE POWDER COAT FINISH

Holds up to the toughest environmental conditions.

STANDARD FLANGE CONNECTION

4" Horizontal, Class 125 ANSI discharge flange. Industry standard, 8-bolt pattern, Ductile Iron Casing.

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.

PHYSICAL DATA	
Discharge Size	ANSI 3” Horizontal
Impeller Type	Balanced, Semi Open
Power/Control Cable Length	40’ Standard
Paint	Blue, Powder Coated - Inside Volute - Ceramic Coated For Abrasion Resistance
MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	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 N: 392° F (200° C)
Power Cord Type	SOOW - 600V, 90° C; Type W - 2000V, 90° C
Control Cord Type	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	440C SST Hardened
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	fluorocarbon 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
Chopper Bar	Heat Treated Tool Steel
Chopper Bar Retainer	Cast Iron, ASTM A48, Class 35

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%			

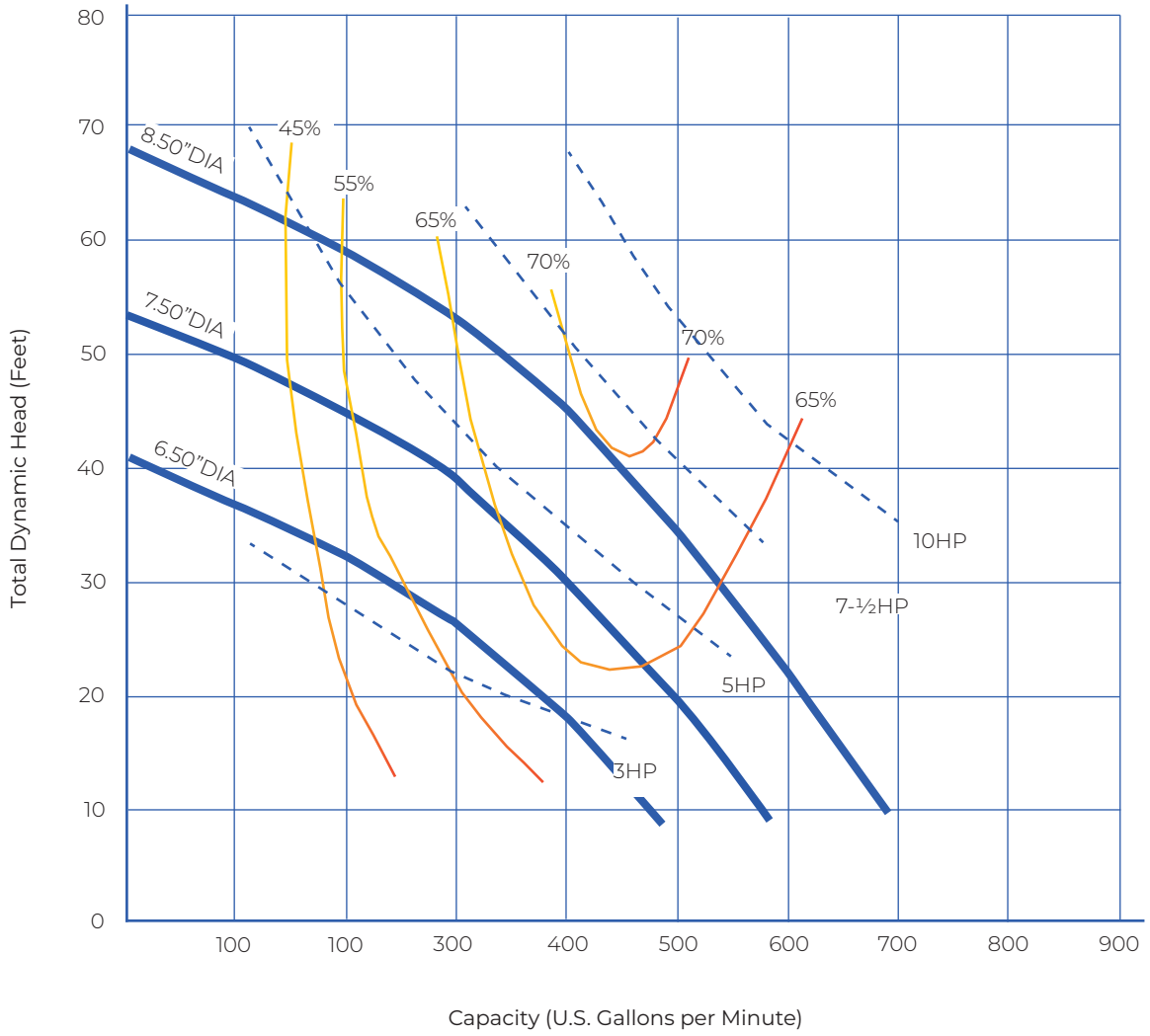
HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	SF AMPS	LOCKED ROTOR AMPS	RUN KW	START KVA	RUN KVA
5	208	3	F	1.2	23.1	25.3	73.9	6.0	26.5	7.5
	230				21	22.8	66.5			
	460				10.5	13.3	33.3			
7.5	208	3	F	1.2	28	38.5	112.4	9.1	40.4	11.3
	230				26	34.7	101.2			
	460				13	17.4	50.6			
10	208	3	E	1.2	36.8	38.5	134.8	11.0	48.5	13.6
	230				32	34.7	121.4			
	460				16	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
5	3	88	87	86	82	86	85	81	70
7.5	3	88	87	87	82	86	85	82	71
10	3	89	88	88	82	86	85	81	73

PUMP SERIES	K3CHN		3" SUBMERSIBLE CHOPPER PUMPS		
Speed	1750 RPM	Discharge	3"	Solids	3"

GPM:_____ TDH: _____

Performance



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.

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:
  - ____ Horsepower
  - ____ RPM
  - ____ Voltage
  - ____ Phase
  - ____ Frequency
  - 1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.
- Operation of the motor shall be designed for:
  - Handling pumped media of 140°F (60°C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.

    - Current unbalance must not exceed 5%.
    - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
    - Secured with 304 stainless steel fasteners.
    - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
    - 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.
    - 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.
    - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
    - Secured with 304 stainless steel fasteners.
    - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
    - Primary stationary ring shall be constructed of silicon carbide face material.
    - Primary rotating ring shall be constructed of silicon carbide face material.
    - Elastomers shall be constructed of Viton®.
    - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single ball row, Angular Contact deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be 440C, SST, hardened, heat treated. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, semi open, three vane design.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- Pump impeller shall be ceramic coated.
- 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

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 3" ANSI® standard Class 125, 4-bolt configuration..
- 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.

9.0 CUTTER BAR

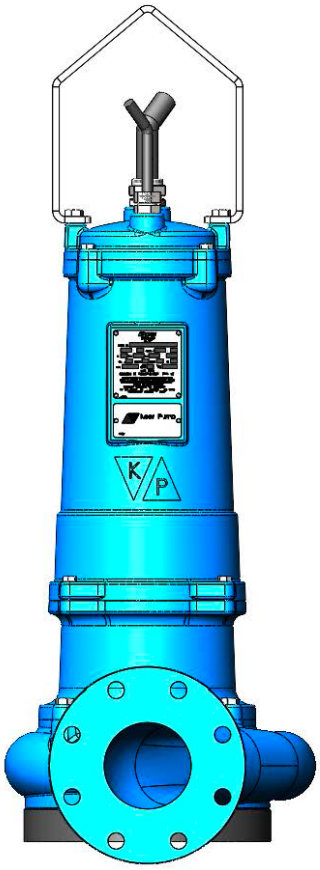
- Heat treated tool steel, 60 Rockwell C hardness.
- Adjustable feature to maintain clearances.

K4CHN(X)

4” Submersible, Chopper
(Class 1, Div. 1, Groups C & D
Hazardous Location)

OPTIONAL :
All Stainless
Steel Construction

FM APPROVED



CAPABILITIES:

Flows	
Heads	
HP Range	5 - 10 HP
Voltage/Phase Options	208/230/460 V, 3Phase
Discharge Connections	4” ANSI Class 125 Horizontal Flange
Motor Speeds	1750 RPM
Impeller	Balanced, Semi-Open

HARDENED IMPELLER

- Heat Treated Cast 440C SST, Semi-Open
- Handles The Toughest Materials, Cuts into Pieces
- Works Efficiently with Stationary Cutter Bar

HARDENED CUTTER BAR

- Heat Treated 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

BEST MOTOR CONSTRUCTION

- Class “N” (392 F) Highest Temperature Motor Will Not Overheat In Continuous Applications

MOTOR GROUND RING PROTECTION

- Allows Motor to Operate with VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

OIL SUBMERSIBLE BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates
- Angular Contact Bearings

K4CHN(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.



SOLID BEARING SUPPORT

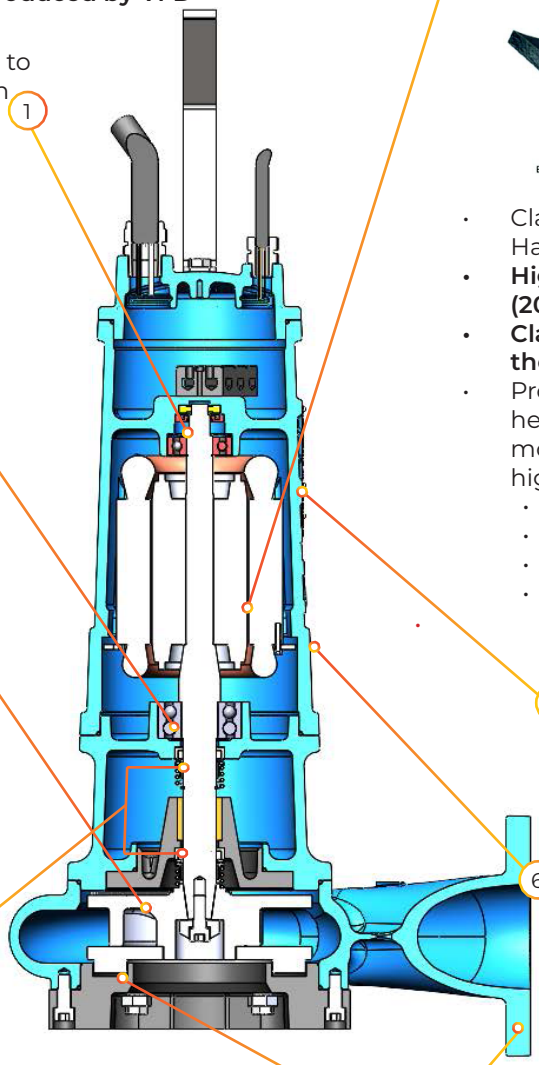
Two-bearing design featuring high load-rated angular contact bearings for 100,000 hour B-10 life.

HYDRAULIC DESIGN

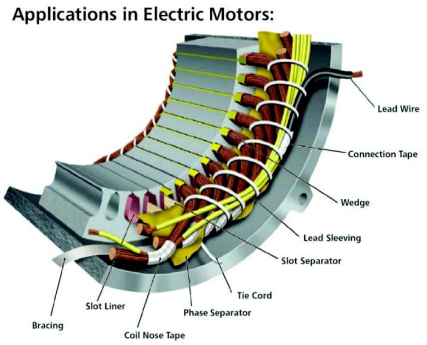
Semi-Open, 440C Stainless Steel, Heat Treated Impeller. Features backside pump-out vanes, keeping the lower seal clean. Dynamically balances for smooth, quite operation and long bearing life.

DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.



HEAVY DUTY MOTOR



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

CASTINGS

ASTM - Class 35 high tensile strength castings.

DURABLE POWDER COAT FINISH

Holds up to the toughest environmental conditions.

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.

STANDARD FLANGE CONNECTION

4" Horizontal, Class 125 ANSI discharge flange. Industry standard, 8-bolt pattern, Ductile Iron Casing.

PHYSICAL DATA	
Discharge Size	ANSI 4” Horizontal
Impeller Type	Balanced, Semi Open
Power/Control Cable Length	40’ Standard
Paint	Blue, Powder Coated - Inside Volute - Ceramic Coated For Abrasion Resistance
MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	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 N: 392° F (200° C)
Power Cord Type	SOOW-600V, 90° C, TYPE W - 2000V, 90 C
Control Cord Type	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	440C SST, Hardened
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	fluorocarbon 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
Chopper Bar	Tool Steel, Hardened
Chopper Bar Retainer	Cast Iron, ASTM A48. Class 35

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%			

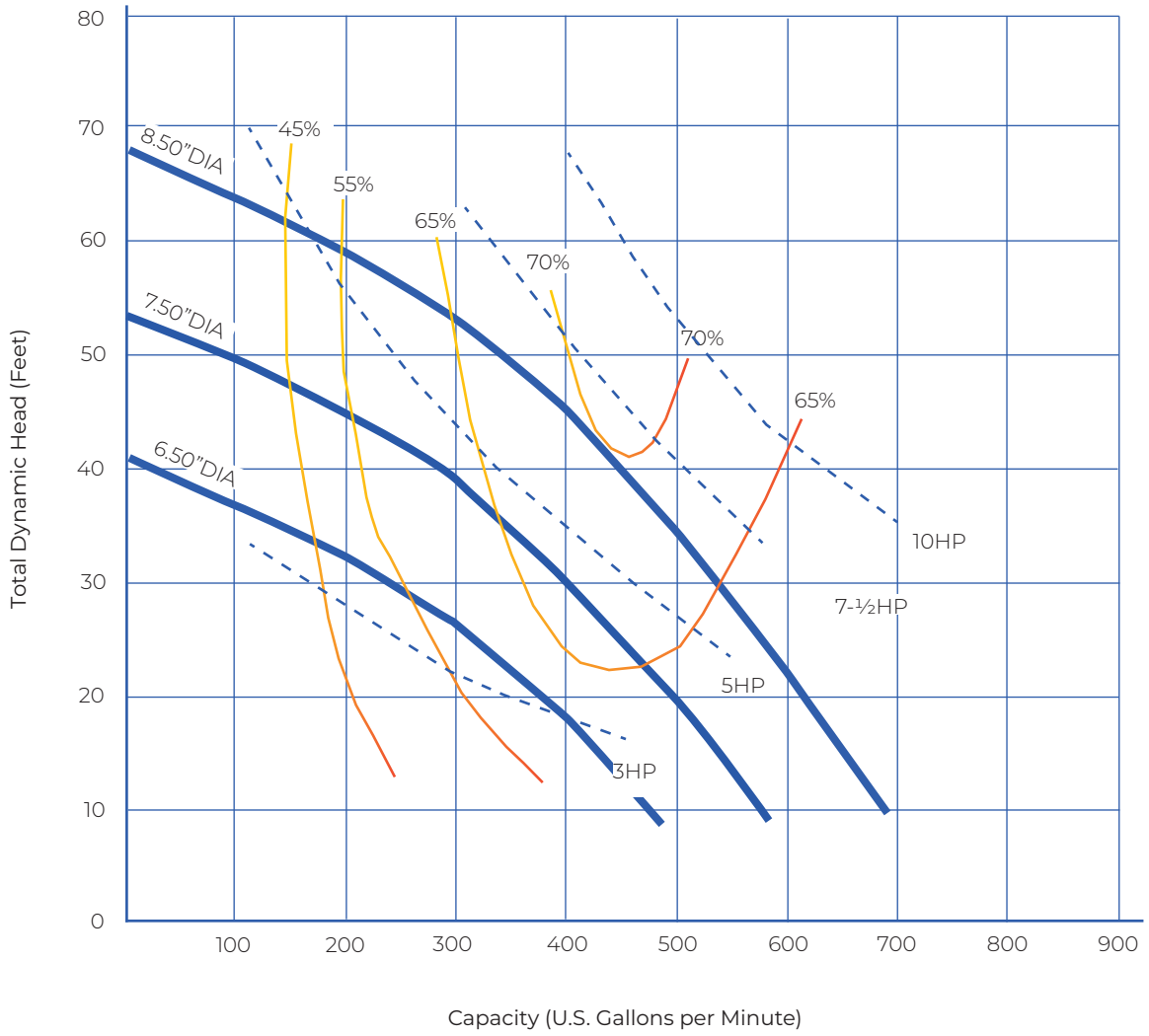
HP	VOLTS	PHASE	NEC CODE	SERVICE FACTOR	FULL LOAD AMPS	SF AMPS	LOCKED ROTOR AMPS	RUN KW	START KVA	RUN KVA
5	208	3	F	1.2	23.1	25.3	73.9	6.0	26.5	7.5
	230				21	22.8	66.5			
	460				10.5	13.3	33.3			
7.5	208	3	F	1.2	28	38.5	112.4	9.1	40.4	11.3
	230				26	34.7	101.2			
	460				13	17.4	50.6			
10	208	3	E	1.2	36.8	38.5	134.8	11.0	48.5	13.6
	230				32	34.7	121.4			
	460				16	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
5	3	88	87	86	82	86	85	81	70
7.5	3	88	87	87	82	86	85	82	71
10	3	89	88	88	82	86	85	81	73

PUMP SERIES	K4CHN		4" SUBMERSIBLE CHOPPER PUMPS		
Speed	1750 RPM	Discharge	4"	Solids	3"

GPM:_____ TDH: _____

Performance



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.

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:
  - ____ Horsepower
  - ____ RPM
  - ____ Voltage
  - ____ Phase
  - ____ Frequency
  - 1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.
- Operation of the motor shall be designed for:
  - Handling pumped media of 140°F (60°C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.
    - Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
    - Current unbalance must not exceed 5%.

- The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton®.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.

- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single ball row, Angular Contact deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be 440C, SST, hardened, heat treated. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, semi open, three vane design.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- Pump impeller shall be ceramic coated.
- 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

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 4" ANSI® standard Class 125 8-bolt configuration..
- 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.

9.0 CUTTER BAR

- Heat treated tool steel, 60 Rockwell C hardness.
- Adjustable feature to maintain clearances.

PATENTED

63/323,239



K4VCH

4” Submersible, Chopper

CAPABILITIES:

Flows	to 625 GPM
Heads	to 53 Feet
HP Range	7.5 HP
Voltage/Phase Options	208/230/460 V, 3Phase
Discharge Connections	4” ANSI 150 lb Horizontal Flange
Motor Speeds	1750 RPM
Impeller	2-Vane, Enclosed, Dynamically Balanced

HARDENED CUTTING PLATE

- Heat Treated 440 C Stainless Steel
- Handles The Toughest Materials
- Works Efficiently To Pulverize and Reduce Solid Size

HARDENED CUTTER IMPELLER

- Heat Treated 440 C, Stainless Steel
- Easily Adjustable To Maintain Optimal Chopping Performance

SUPERIOR MOTOR CONSTRUCTION

- Class N Windings (Standard)
- Class “N” (392°F) Highest Temperature
- Motor Will Not Overheat In Continuous Or Dry Pit Applications

CERAMIC COATED PUMP END

- Durable Double Ceramic Coating On Impeller and Volute
- Prevents Wear From Abrasions, Cavitation, and Media Being Pumped

K4VCH

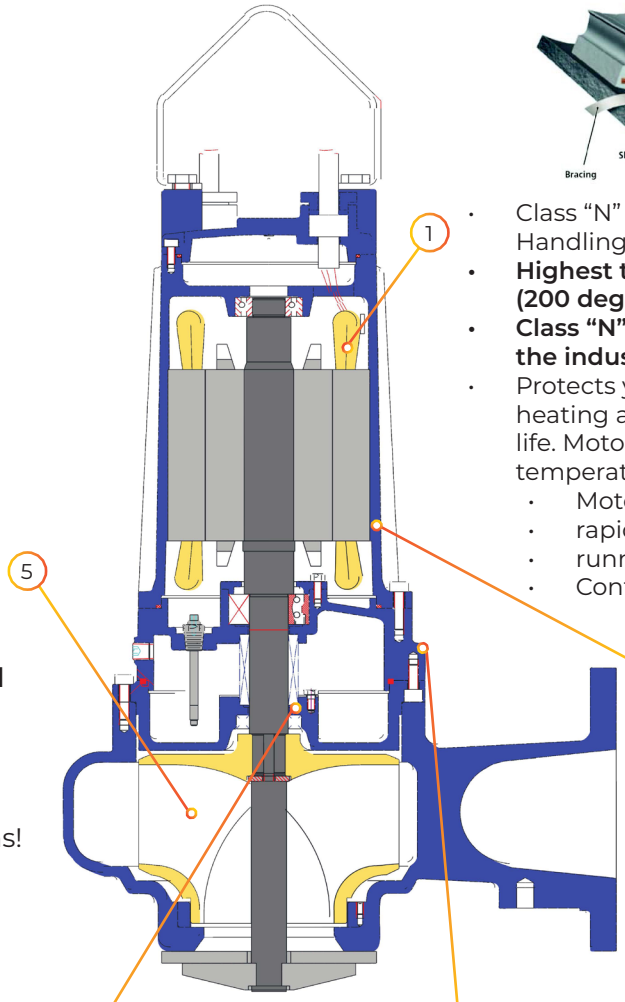
PATENTED

63/323,239



CERAMIC COATING

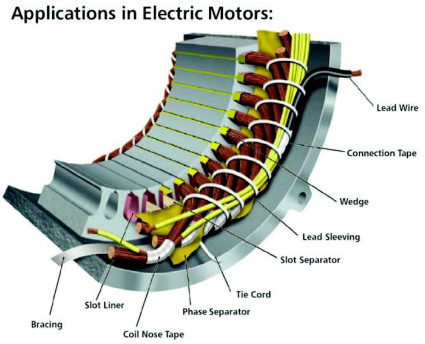
Ceramic-coated impellers and volutes for Keen's Solids Handling pumps are designed for superior protection and optimized for long-lasting performance, This allows the pump to operate in any condition without any problems! Impressive sand, grit, abrasion and cavitation resistance!



DUAL SHAFT SEALS

Twice the protection quality silicon carbide faces, viton elastomers, stainless steel construction.

HEAVY DUTY MOTOR



- 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:
  - Motor housing not submerged
  - rapid cycling,
  - running on VFD drives.
  - Continuous longer run times

CASTINGS

ASTM - Class 35 high tensile strength castings.

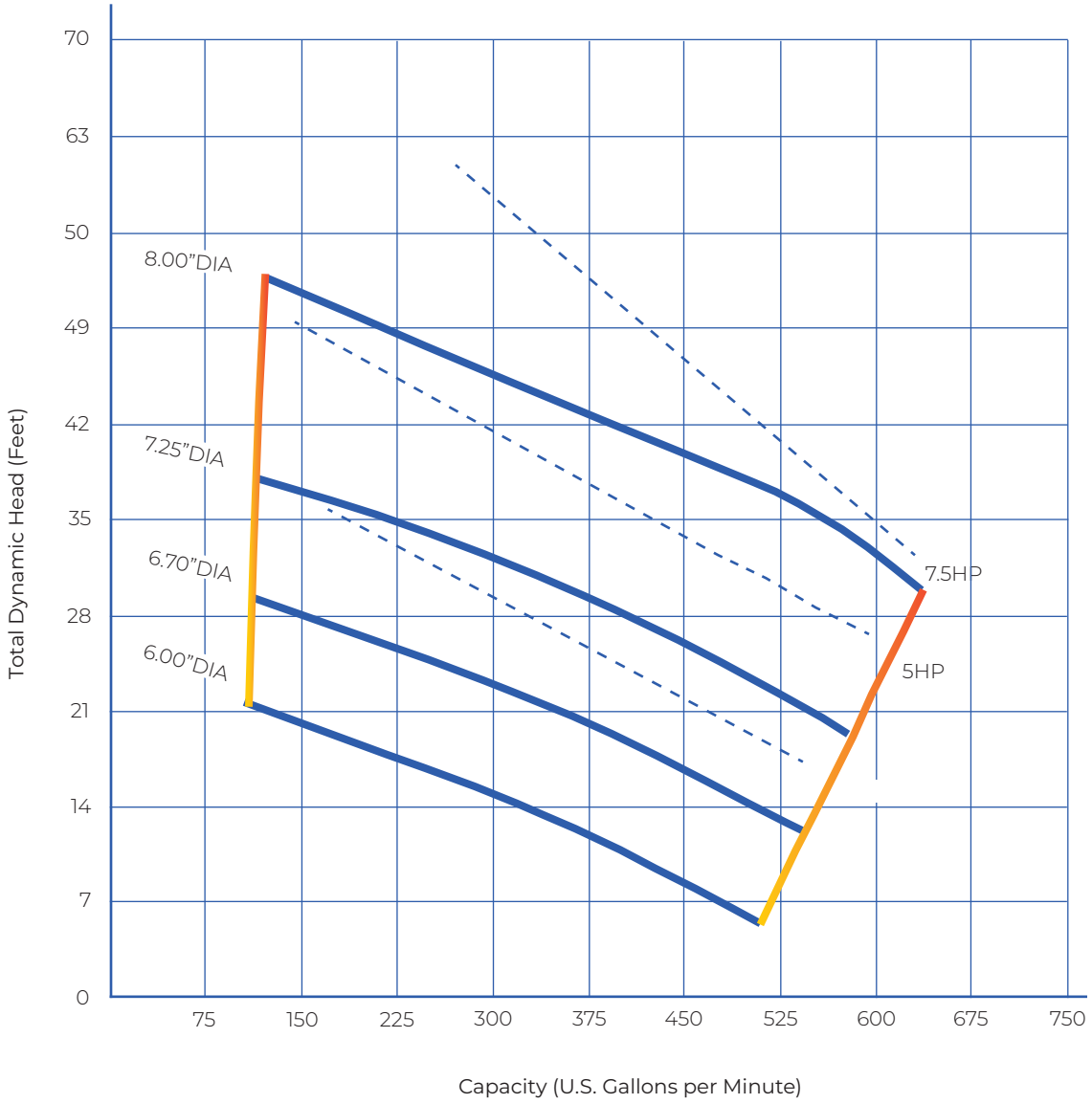
DURABLE POWDER COAT FINISH

• Holds up to the toughest environmental conditions.

PUMP SERIES	K4VNCH		4” SUBMERSIBLE SEWAGE PUMPS
Speed	1750 RPM	Discharge	4”

GPM: _____ TDH: _____

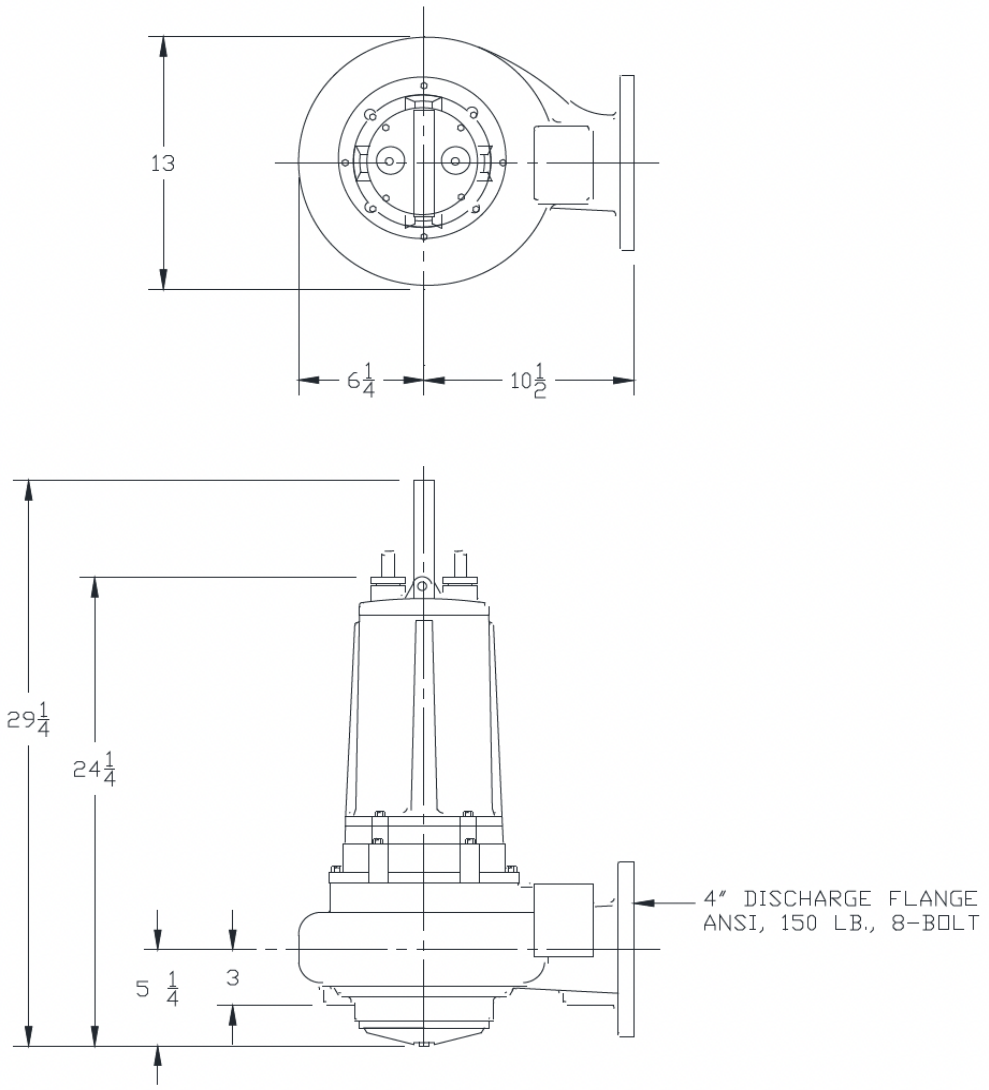
Performance



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	K4VNCH	4" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4V Dimensions

THERMAL DATA		
Maximum Liquid		140° F (60° C)
Maximum Stator		392° F (200° C)
Heat Sensor	Open:	338° F (170° C)
	Closed:	275° F (135° C)
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	VOLTS	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	85	85	83	78	87	86	82	71
3	3	86	85	84	79	86	85	81	70
5	1	87	86	84	79	86	85	82	70
5	3	88	87	86	81	86	85	81	70
7.5	3	88	87	87	82	86	85	81	71

1.0 SCOPE

- 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.
- 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.

2.0 SUBMERSIBLE MOTOR CONSTRUCTION

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) or NEMA® L (Single-Phase) squirrel cage design.
- The stator is to be pressed in watertight air-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.
- Operation of the motor shall be designed for:
    - Handling pumped media of 140° F (60° C) ambient.
    - Capable of 15 evenly spaced starts per hour.
    - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
      - Acceptable voltage variation is +/- 10%.
      - Acceptable frequency variation is +/- 5%.

        - Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
        - Current unbalance must not exceed 5%.
    - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
    - Secured with 304 stainless steel fasteners.
    - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
    - 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.
- All bolted connections in the cord entry construction shall be:
    - Secured with 304 stainless steel fasteners.
    - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
    - Primary stationary ring shall be constructed of silicon carbide face material.
    - Primary rotating ring shall be constructed of silicon carbide face material.
    - Elastomers shall be constructed of Viton®.
    - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.

5.0 PUMP BEARINGS

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single ball Angular Contact, deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 420 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be ASTM® A536 ductile cast iron. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, enclosed, 2-vane, double-shrouded and dynamically balanced to ISO 1940 G6.3.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- 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

- Material shall be ATM A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- Replaceable, bronze wear wing to provide efficient sealing between volute and impeller suction inlet.
- Volute to be full, 4" discharge flow design.
- The discharge is to a horizontal centerline configuration.
- The discharge is to be of 4" ANSI® standard Class 125, 8-bolt configuration.
- 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 erosion and corrosion resistance including higher temperature application.

9.0 CHOPPER IMPELLER AND VOLUTE

- Material shall be 440 series stainless steel, heat treated and hardened to Rockwell 56-60.



OPTIONAL :
All Stainless Steel

K4CHP

4” Submersible, Chopper

HARDENED IMPELLER

- Heat Treated Cast 440C SST, Semi-Open
- Handles The Toughest Materials, Cuts into Pieces
- Works Efficiently with Stationary Cutter Bar

HARDENED CUTTER BAR

- Heat Treated 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

BEST MOTOR CONSTRUCTION

- Class “N” (392 F) Highest Temperature Motor Will Not Overheat In Continuous Applications

MOTOR GROUND RING PROTECTION

- Allows Motor to Operate with VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

OIL SUBMERSIBLE BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates
- Angular Contact Bearings

CAPABILITIES:

Flows	to 690 GPM
Heads	to 70 Feet
HP Range	3-20 HP
Voltage/Phase Options	208/230/460 V, 3 Phase
Discharge Connections	4” ANSI Class 125 Horizontal Flange
Motor Speeds	1750 RPM
Impeller	Balanced, Semi-Open

K4CHP

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

Powerful high-torque motor for strong pumping. 208/230/460/575 Volt, 3-phase. Slip-Fit stator efficiently transfers heat to cast housing. Class N 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

Semi-Open, 440C Stainless Steel, Heat Treated Impeller. Features backside pump-out vanes, keeping the lower seal clean. Dynamically balances for smooth, quite operation and long bearing life.

8. STANDARD FLANGE CONNECTION

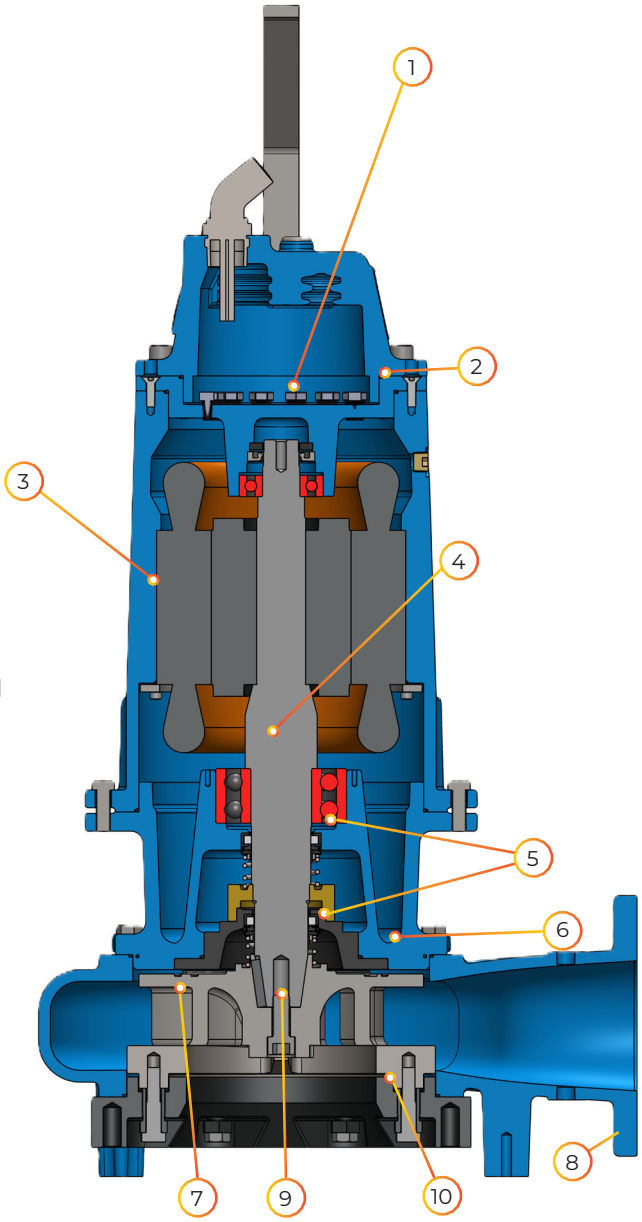
4" Horizontal, Class 125 ANSI discharge flange. Industry standard, 8-bolt pattern, Ductile Iron Casing.

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.



PUMP SERIES	K4CHP		4” SUBMERSIBLE CHOPPER PUMPS
Speed	1750 RPM	Discharge	4”

PHYSICAL DATA	
Discharge Size	ANSI 4” Horizontal
Impeller Type	Balanced, Semi Open
Power/Control Cable Length	40’ Standard
Paint	Blue, Powder Coated - Inside Volute - Ceramic Coated For Abrasion Resistance
MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	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 N: 392° F (200° C)
Power Cord Type	SOOW-600V, 90° C
Control Cord Type	SOOW - 600V, 90° C, TYPE W - 2000V, 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	440C SST, Hardened
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	fluorocarbon 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
Chopper Bar	Tool Steel, Hardened
Chopper Bar Retainer	Cast Iron, ASTM A48. Class 35

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%			

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	86	85	84	79	86	85	81	70
5	1	87	86	84	79	86	85	82	70
5	3	88	87	86	82	86	85	81	70
7.5	3	88	87	87	82	86	85	81	71
10	3	89	88	88	82	87	86	82	73

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:
    - ____ Horsepower
    - ____ RPM
    - ____ Voltage
    - ____ Phase
    - ____ Frequency
    - 1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
    - The stator windings shall be constructed of material to meet the Class N insulation system.
    - The insulation varnish in the system must be applied in a dip and bake manner.
    - Stator lead material must meet or exceed Class N insulation system.
    - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
        - The thermal limiting devices shall be attached to each phase winding.
        - 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.
- Operation of the motor shall be designed for:
    - Handling pumped media of 140°F (60°C) ambient.
    - Capable of 15 evenly spaced starts per hour.
    - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
        - Acceptable voltage variation is +/- 10%.
        - Acceptable frequency variation is +/- 5%.

- Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
- Current unbalance must not exceed 5%.
- The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
- Secured with 304 stainless steel fasteners.
- Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.

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

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton®.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.

- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single ball row, Angular Contact deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be 440C, SST, hardened, heat treated. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, semi open, three vane design.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- Pump impeller shall be ceramic coated.
- 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

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 4" ANSI® standard Class 125 8-bolt configuration..
- 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.

9.0 CUTTER BAR

- Heat treated tool steel, 60 Rockwell C hardness.
- Adjustable feature to maintain clearances.



K4CHB(X)

4” Submersible, Heavy Duty Chopper Pump
(Class 1, Div. 1, Groups C & D Hazardous Location)

RUGGED, TOUGH, ABRASIVE RESISTANT CONSTRUCTION!

HARDENED IMPELLER

- Heat Treated Cast 440C SST, Semi-Open
- Handles The Toughest Materials, Cuts into Pieces
- Works Efficiently with Stationary Cutter Bar

HARDENED CUTTER BAR

- Heat Treated 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

BEST MOTOR CONSTRUCTION

- Class “N” (392 F) Highest Temperature Motor Will Not Overheat In Continuous Applications

MOTOR GROUND RING PROTECTION

- Allows Motor to Operate with VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

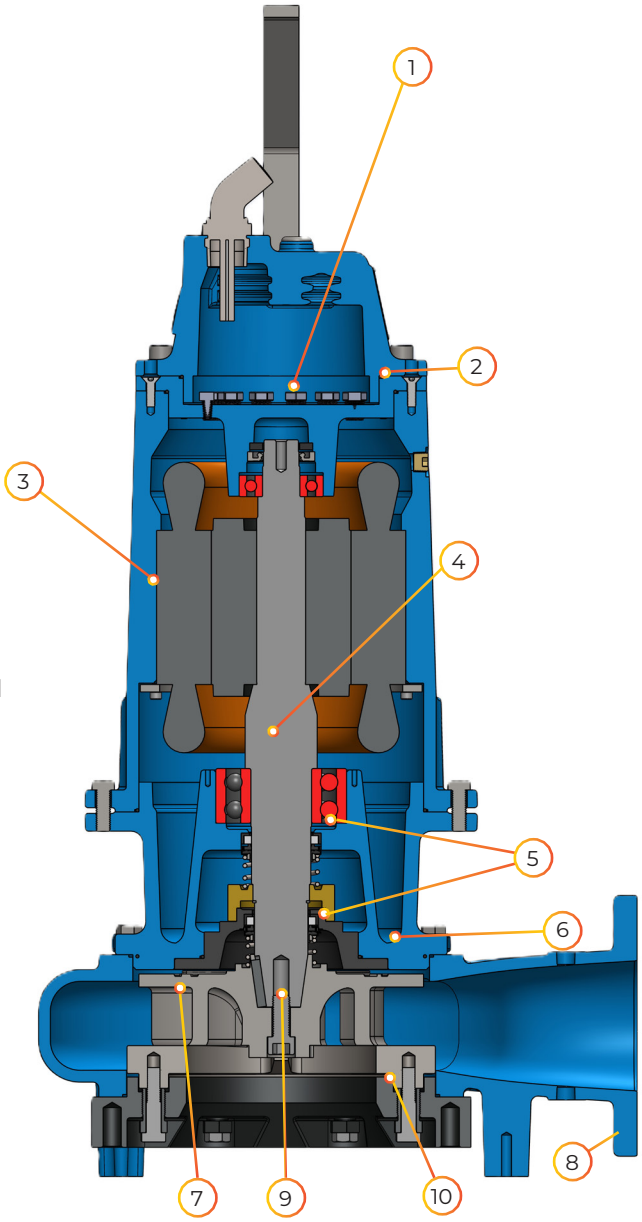
OIL SUBMERSIBLE BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates
- Angular Contact Bearings

CAPABILITIES:

Flows	to 2200 GPM
Heads	to 165 Feet
HP Range	15-60 HP
Voltage/Phase Options	208/230/460/575V, 3 Phase
Discharge Connections	4” ANSI 125 Horizontal Flange
Motor Speeds	1750 RPM
Impeller	Balanced, Semi-Open, 3-Vane
3rd Party Approval	FM 3615, Class 1, Div. 1, Groups C &

K4CHB



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

Powerful high-torque motor for strong pumping. 208/230/460/575 Volt, 3-phase. Slip-Fit stator efficiently transfers heat to cast housing. Class N 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

Semi-Open, 440C Stainless Steel, Heat Treated Impeller. Features backside pump-out vanes, keeping the lower seal clean. Dynamically balances for smooth, quite 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.

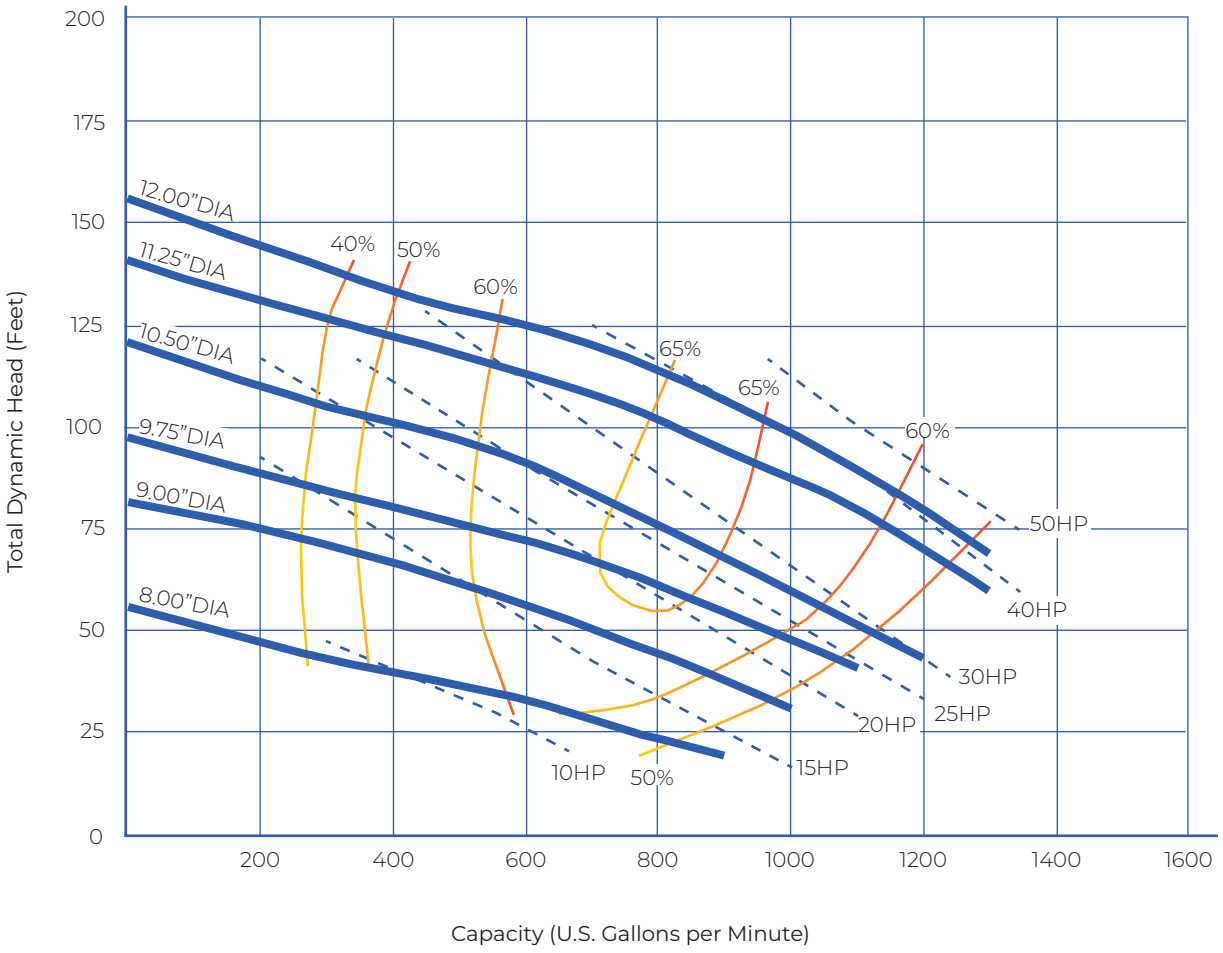
10. CHOPPER RETAINING PLATE

Retains and adjusts cutter bar according to field conditions.

PUMP SERIES	K4CHB		4" SUBMERSIBLE SEWAGE PUMPS
Speed	1750 RPM	Discharge	4"

GPM: _____ TDH: _____

Performance



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.

PHYSICAL DATA	
Discharge Size	ANSI 4” Horizontal
Impeller Type	Semi-Open three vane design
Power/Control Cable Length	40’ Standard
Paint	Blue, Powder Coated - Inside Volute - Ceramic Coated For Abrasion Resistance
MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class N
Service Factor	1.2
NEMA Design Type	B (3ø)
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class N: 392° F (200° C)
Power Cord Type	SOOW-600V, 90° C, , TYPE W - 2000V, 90 C
Control Cord Type	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	440C SST, Hardened
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	fluorocarbon Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Labryinth Seal	Bronze, CDA 836
Chopper Impeller	440C SST, Heat Treated
Cutter Bar	Tool Steel, Heat Treated

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%			

PUMP MODEL: K4CHB - 1750 RPM

HP	VOLTS	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			
60	460	3	C	1.0	81.1	81.1	270.5	58.2	215.8	64.6

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	91	90	88	82	86	85	81	74
20	3	91	90	88	83	86	85	81	74
25	3	92	91	89	83	87	86	82	74
30	3	92	91	89	83	87	86	82	74
40	3	93	92	89	84	88	86	83	74
50	3	93	92	89	84	88	86	83	74
60	3	93	92	89	84	89	87	84	74

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- 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 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.
- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%

    - Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton®.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single ball row, Angular Contact deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be 440C, SST, hardened, heat treated. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, semi open, three vane design.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- Pump impeller shall be ceramic coated.
- 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

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 4" ANSI® standard Class 125, 8-bolt configuration..
- 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.

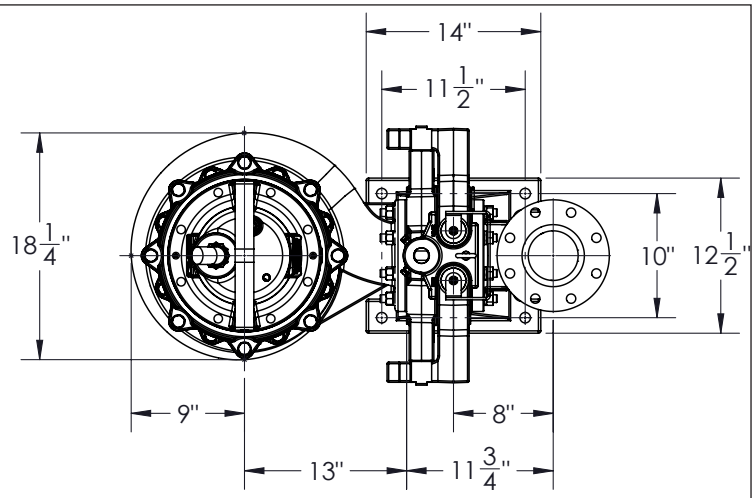
9.0 CUTTER BAR

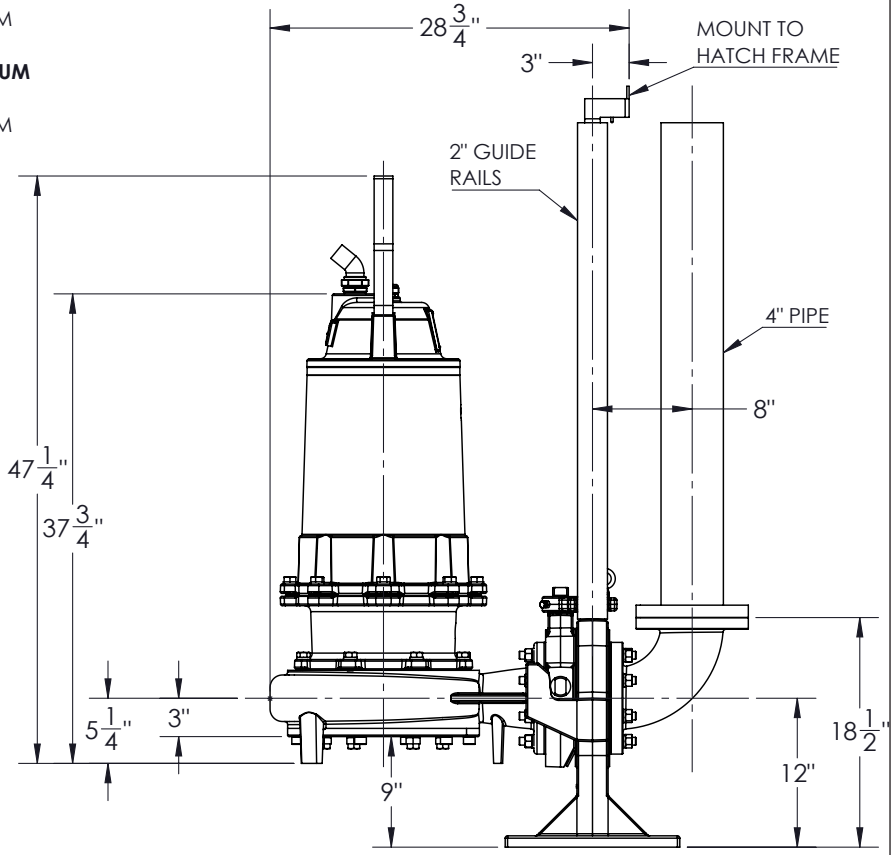
- Heat treated tool steel, 60 Rockwell C hardness.
- Adjustable feature to maintain clearances.

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.

ABSOLUTE MINIMUM SUBMERGENCE LEVEL:
22" FROM BOTTOM

RECOMMENDED MINIMUM SUBMERGENCE LEVEL:
40" FROM BOTTOM





K4CHK

4” Submersible, Chopper



OPTIONAL :
All Stainless Steel Construction

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
Motor Speeds	1750 RPM
Impeller	Balanced, Semi-Open

HARDENED IMPELLER

- Heat Treated Cast 440C SST, Semi-Open
- Handles The Toughest Materials, Cuts into Pieces
- Works Efficiently with Stationary Cutter Bar

HARDENED CUTTER BAR

- Heat Treated 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

BEST MOTOR CONSTRUCTION

- Class “N” (392 F) Highest Temperature Motor Will Not Overheat In Continuous Applications

MOTOR GROUND RING PROTECTION

- Allows Motor to Operate with VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

OIL SUBMERSIBLE BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates
- Angular Contact Bearings

K4CHK

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

Powerful high-torque motor for strong pumping. 208/230/460/575 Volt, 3-phase. Slip-Fit stator efficiently transfers heat to cast housing. Class N 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

Semi-Open, 440C Stainless Steel, Heat Treated Impeller. Features backside pump-out vanes, keeping the lower seal clean. Dynamically balances for smooth, quite operation and long bearing life.

8. STANDARD FLANGE CONNECTION

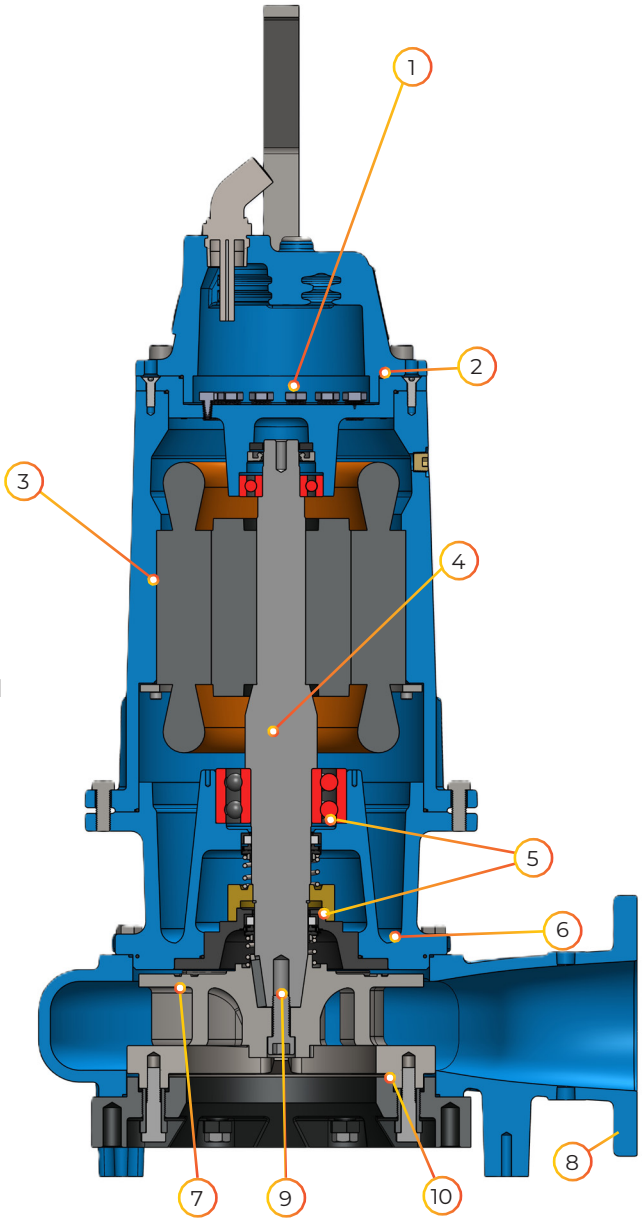
4" Horizontal, Class 125 ANSI discharge flange. Industry standard, 8-bolt pattern, Ductile Iron Casing.

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.



PUMP SE-	K4CHP		4” SUBMERSIBLE CHOPPER PUMPS
Speed	1750 RPM	Discharge	4”

GPM: _____ TDH: _____

PHYSICAL DATA	
Discharge Size	ANSI 4” Horizontal
Impeller Type	Semi Open
Power/Control Cable Length	40’ Standard
Paint	Blue, Powder Coated - Inside Volute - Ceramic Coated For Abrasion Resistance
MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class N
Service Factor	1.2
NEMA Design Type	B (3ø)
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class N: 392° F (200° C)
Power Cord Type	SOOW-600V, 90° C, TYPE W - 2000V, 90 C
Control Cord Type	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	Cast Steel, AISI 8630 / Ceramic Coated
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	ANSO 18-8 Stainless Steel
O-Rings	fluorocarbon Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Labryinth Seal	Bronze, CDA 836
Chopper Impeller	440C SST, Heat Treated
Cutter Bar	Tool Steel, Heat Treted

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%			

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:
  - ____ Horsepower
  - ____ RPM
  - ____ Voltage
  - ____ Phase
  - ____ Frequency
  - 1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.
- Operation of the motor shall be designed for:
  - Handling pumped media of 140°F (60°C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.

- Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
- Current unbalance must not exceed 5%.
- The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.

- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton®.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.

- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single ball row, Angular Contact deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be 440C, SST, hardened, heat treated. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, semi open, three vane design.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- Pump impeller shall be ceramic coated.
- 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

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 4" ANSI® standard Class 125 8-bolt configuration..
- 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.

9.0 CUTTER BAR

- Heat treated tool steel, 60 Rockwell C hardness.
- Adjustable feature to maintain clearances.



K6CHB

6” Submersible, Heavy Duty Chopper Pump
(Class 1, Div. 1, Groups C & D Hazardous Location)

RUGGED, TOUGH, ABRASIVE RESISTANT CONSTRUCTION!

HARDENED IMPELLER

- Heat Treated Cast 440C SST, Semi-Open
- Handles The Toughest Materials, Cuts into Pieces
- Works Efficiently with Stationary Cutter Bar

HARDENED CUTTER BAR

- Heat Treated 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

BEST MOTOR CONSTRUCTION

- Class “N” (392 F) Highest Temperature Motor Will Not Overheat In Continuous Applications

MOTOR GROUND RING PROTECTION

- Allows Motor to Operate with VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

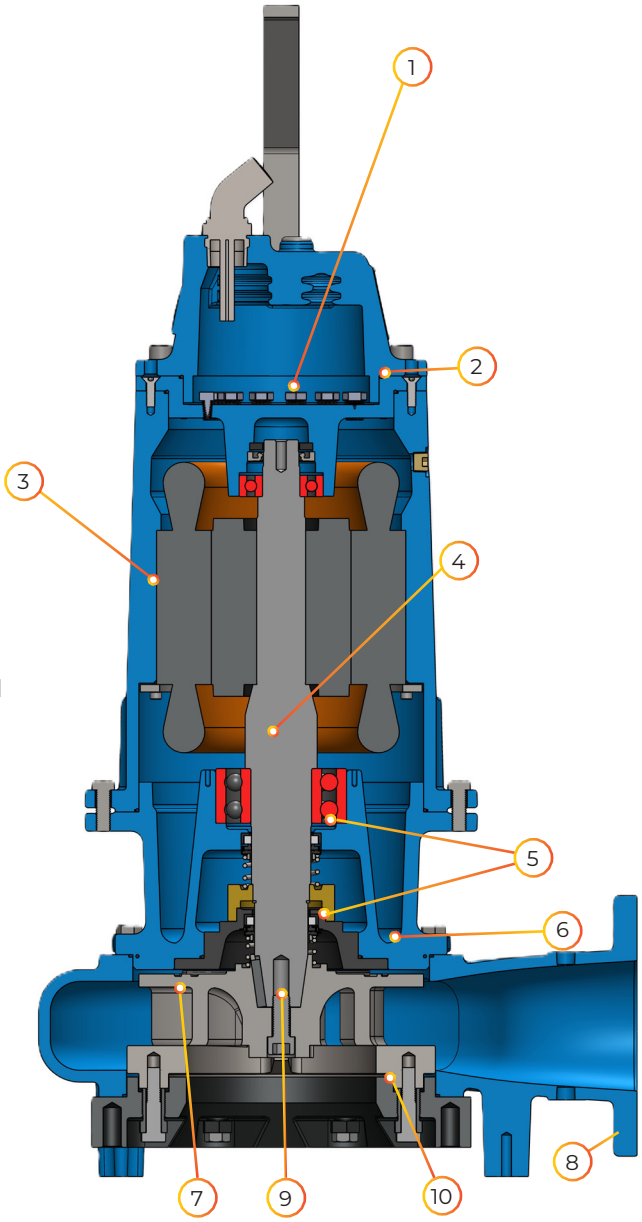
OIL SUBMERSIBLE BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates
- Angular Contact Bearings

CAPABILITIES:

Flows	to 2100 GPM
Heads	to 155 Feet
HP Range	15-60 HP
Voltage/Phase Options	208/230/460, 3 Phase
Discharge Connections	4” ANSI 125 Horizontal Flange
Motor Speeds	1750 RPM
Impeller	Balanced, Semi-Open, 3-Vane
3rd Party Approval	FM 3615, Class 1, Div. 1, Groups C & D

K6CHB



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

Powerful high-torque motor for strong pumping. 208/230/460/575 Volt, 3-phase. Slip-Fit stator efficiently transfers heat to cast housing. Class N 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

Semi-Open, 440C Stainless Steel, Heat Treated Impeller. Features backside pump-out vanes, keeping the lower seal clean. Dynamically balances for smooth, quite 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.

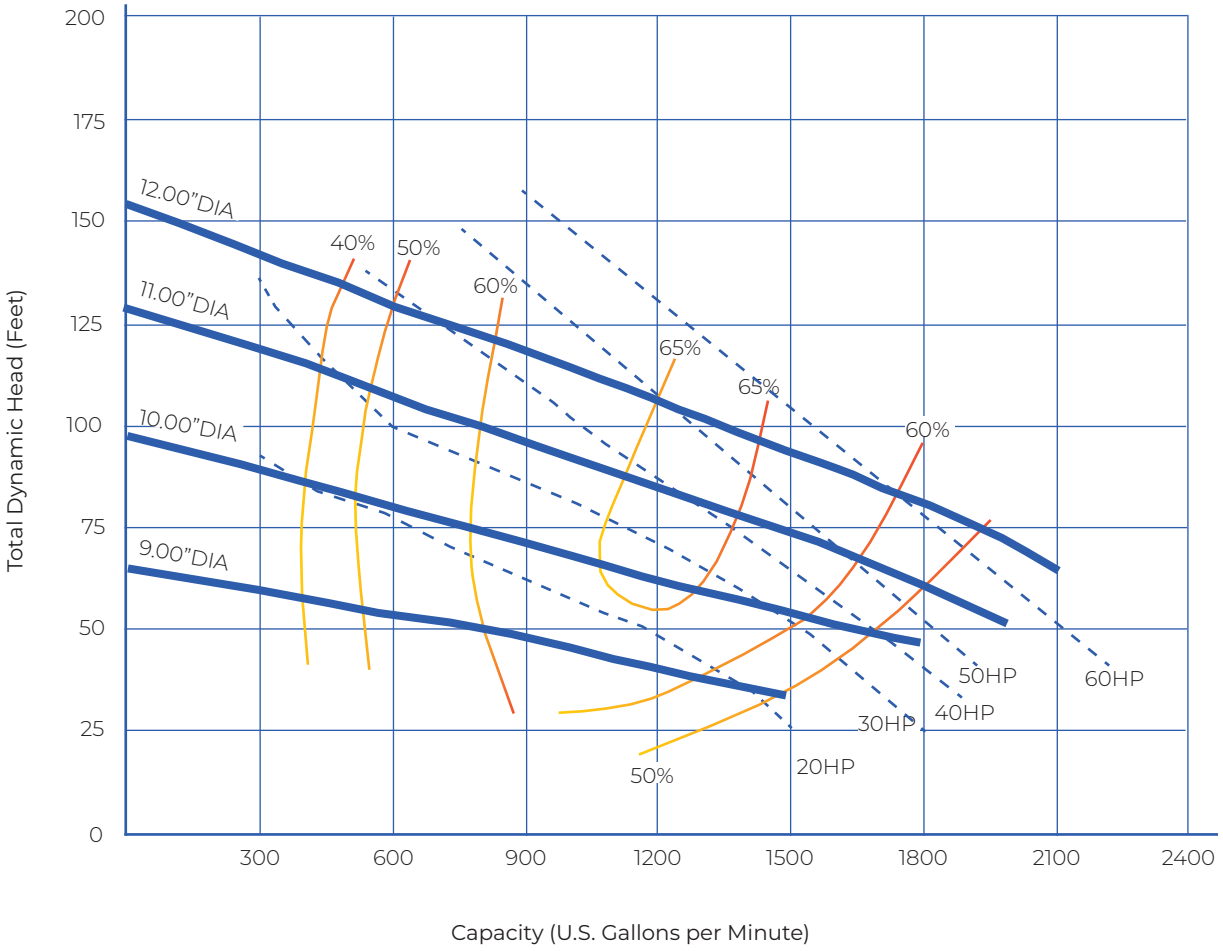
10. CHOPPER RETAINING PLATE

Retains and adjusts cutter bar according to field conditions.

PUMP SERIES	K6CHB		6” SUBMERSIBLE SEWAGE PUMPS
Speed	1750 RPM	Discharge	6”

GPM: _____ TDH: _____

Performance



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.

PHYSICAL DATA	
Discharge Size	ANSI 6” Horizontal
Impeller Type	Semi-Open three vane design
Power/Control Cable Length	40’ Standard
Paint	Blue, Powder Coated - Inside Volute - Ceramic Coated For Abrasion Resistance
MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Oil Filled
NEMA Insulation Code	Class N
Service Factor	1.2
NEMA Design Type	B (3ø)
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	Class N: 392° F (200° C)
Power Cord Type	SOOW-600V, 90° C , TYPE W - 2000V, 90 C
Control Cord Type	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	440C SST, Hardened
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	fluorocarbon Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Double Row Angular Contact Ball Bearing
Labryinth Seal	Bronze, CDA 836
Chopper Impeller	440C SST, Heat Treated
Cutter Bar	Tool Steel, Heat Treated

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	VOLTS	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			
60	460	3	C	1.0	81.1	81.1	270.5	58.2	215.8	64.6

		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	91	90	88	82	86	85	81	74
20	3	91	90	88	83	86	85	81	74
25	3	92	91	89	83	87	86	82	74
30	3	92	91	89	83	87	86	82	74
40	3	93	92	89	84	88	86	83	74
50	3	93	92	89	84	88	86	83	74
60	3	93	92	89	84	89	87	84	74

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:

  _____ Horsepower

  _____ RPM

  _____ Voltage

  _____ Phase

  _____ Frequency

  1.20 Service Factor
- 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 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.
- Operation of the motor shall be designed for:
  - Handling pumped media of 140° F (60° C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%

    - Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton®.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.
- The pump shall be capable of operating in a dry environment without damage to the seal faces.
- 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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single ball row, Angular Contact deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be 440C, SST, hardened, heat treated. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, semi open, three vane design.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- Pump impeller shall be ceramic coated.
- 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.

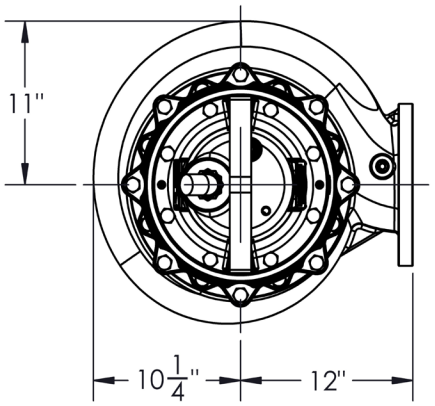
8.0 VOLUTE CASE

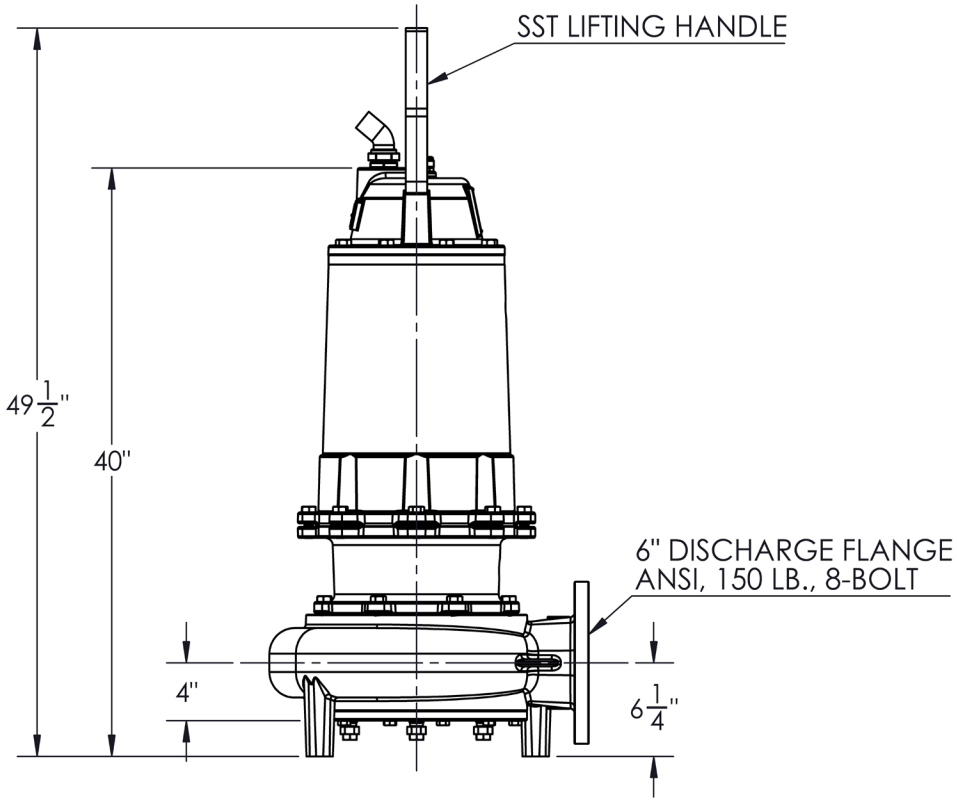
- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 6" ANSI® standard Class 125, 8-bolt configuration..
- 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.

9.0 CUTTER BAR

- Heat treated tool steel, 60 Rockwell C hardness.
- Adjustable feature to maintain clearances.

PUMP SERIES	K6CHB	6” SUBMERSIBLE SEWAGE PUMPS
DIMENSIONAL DATA		

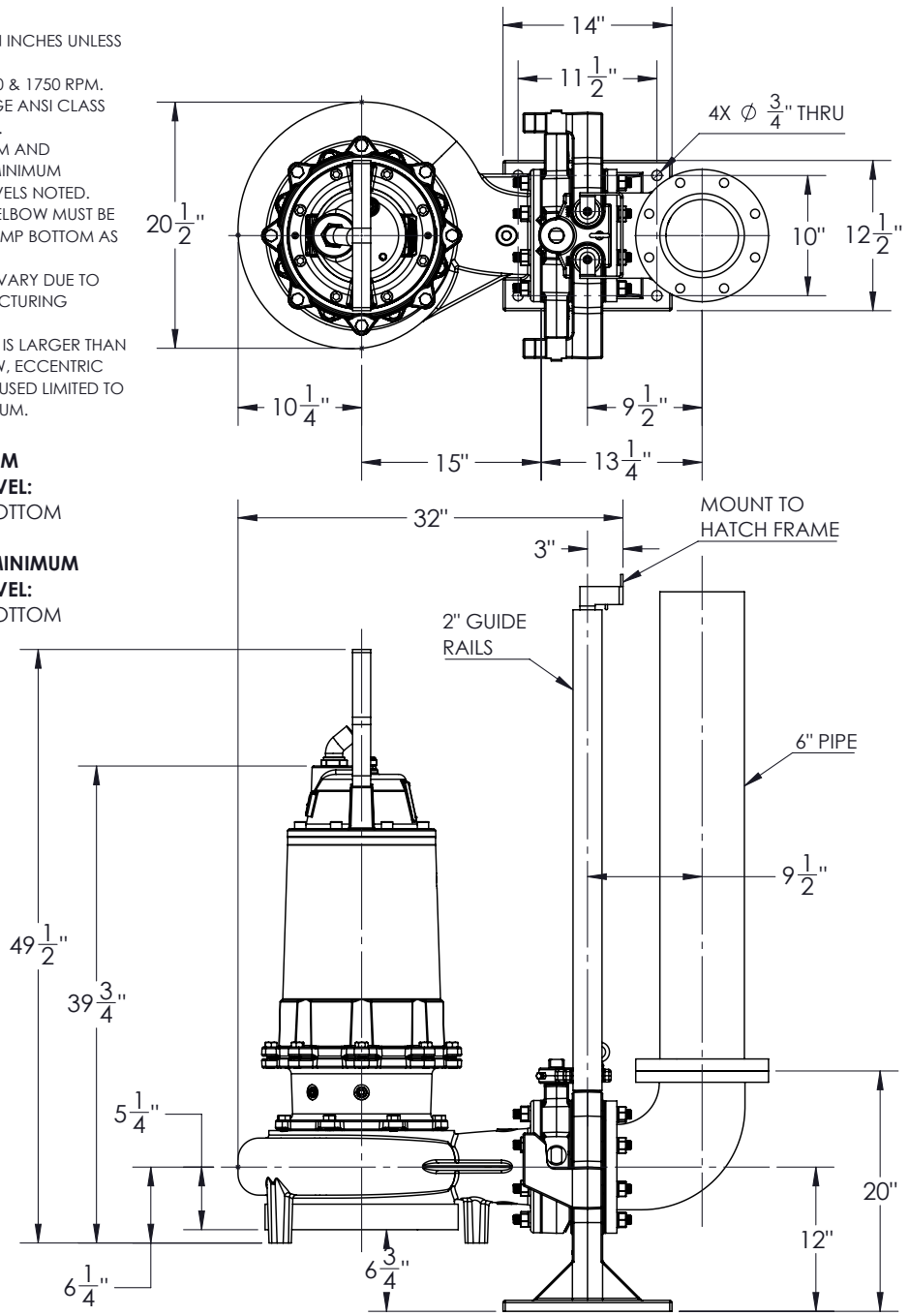




NOTES:
1. ALL DIMENSIONS IN INCHES UNLESS NOTED.
2. PUMP SHOWN 1150 & 1750 RPM.
3. DISCHARGE FLANGE ANSI CLASS 125 UNLESS NOTED.
4. ABSOLUTE MINIMUM AND RECOMMENDED MINIMUM SUBMERGENCE LEVELS NOTED.
5. DISCHARGE BASE ELBOW MUST BE PLACED ABOVE SUMP BOTTOM AS NOTED.
6. DIMENSIONS MAY VARY DUE TO NORMAL MANUFACTURING TOLERANCES.
7. IF DISCHARGE PIPE IS LARGER THAN DISCHARGE ELBOW, ECCENTRIC REDUCER MUST BE USED LIMITED TO 2X LARGER MAXIMUM.

ABSOLUTE MINIMUM SUBMERGENCE LEVEL:
22" FROM BOTTOM

RECOMMENDED MINIMUM SUBMERGENCE LEVEL:
40" FROM BOTTOM



OPTIONAL :
All Stainless Steel Construction



K8CHK

8” Submersible, Semi Open Impeller

CAPABILITIES:

Flows	to 3800 GMP
Heads	to 175 Feet
HP Range	30 - 150 HP
Voltage/Phase Options	208 / 230 / 460 / 575V, 3 Phase
Discharge Connections	8” ANSI Class 125 Horizontal Flange
Motor Speeds	1150 / 1750 RPM
Impeller	Balanced, Semi Open
Motor Serice Factor	1.20

HARDENED IMPELLER

- Heat Treated Cast 440C SST, Semi-Open
- Handles The Toughest Materials, Cuts into Pieces
- Works Efficiently with Stationary Cutter Bar

HARDENED CUTTER BAR

- Heat Treated 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

BEST MOTOR CONSTRUCTION

- Class “N” (392 F) Highest Temperature Motor Will Not Overheat In Continuous Applications

MOTOR GROUND RING PROTECTION

- Allows Motor to Operate with VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

OIL SUBMERSIBLE BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates
- Angular Contact Bearings

K8CHK

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

Powerful high-torque motor for strong pumping. 208/230/460/575 Volt, 3-phase. Slip-Fit stator efficiently transfers heat to cast housing. Class N 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

Semi-Open, 440C Stainless Steel, Heat Treated Impeller. Features backside pump-out vanes, keeping the lower seal clean. Dynamically balances for smooth, quite operation and long bearing life.

8. STANDARD FLANGE CONNECTION

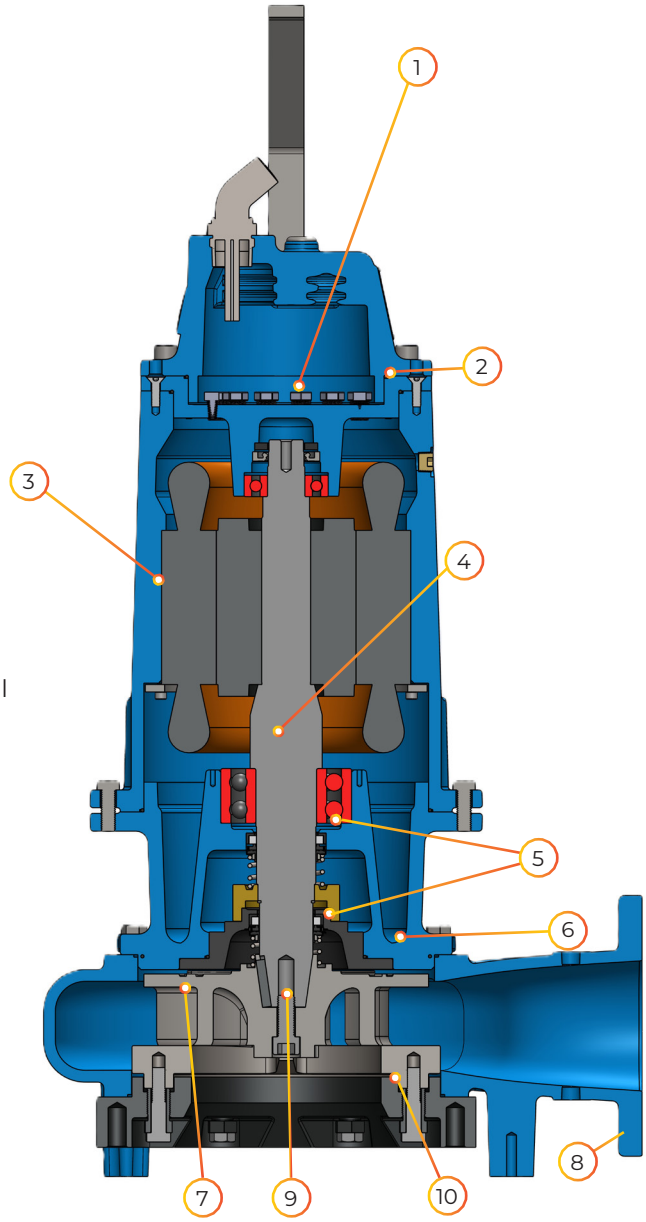
4" Horizontal, Class 125 ANSI discharge flange. Industry standard, 8-bolt pattern, Ductile Iron Casing.

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.



PHYSICAL DATA	
Discharge Size	ANSI 8” Horizontal
Solid Size	4”
Impeller Type	Balanced, Semi Open, 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 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 N: 392°F (200°C)
Power Cord Type	Type SOOW-600V, 90° C , TYPE W - 2000V, 90 C
Control Cord Type	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
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	fluorocarbon Rubber
Upper Bearing	Conrad Style Single Row Deep Groove Ball Bearing
Lower Bearing	Conrad Style Single Row Angular Contact Ball Bearing
Line Bearing	Bronze, CDA 836

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	VOLTS	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
75	3	94	93	90	85	89	87	84	75
100	3	94	93	90	85	89	87	84	75
125	3	94	93	91	85	89	87	84	75
150	3	95	94	92	86	90	88	85	76

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	VOLTS	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
30	3	92	91	88	83	87	85	81	72
40	3	92	91	88	83	87	85	81	73
50	3	93	92	89	84	88	86	83	74
60	3	93	92	89	84	89	87	84	74

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	870			
Electrical Ratings	Heat Sensor	24VDC, 5AMPS	115VAC, 5AMPS	230VAC, 5AMPS
	Seal Fail	300VAC 5mAMPS		
Voltage Tolerance	± 10%			

HP	VOLTS	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

HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD	SERVICE FACTOR LOAD	100% LOAD	75% LOAD	50% LOAD
15	3	91	90	88	82	86	85	81	70
20	3	91	90	88	83	86	85	81	70
25	3	92	91	89	83	87	86	82	71

1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:
    - ____ Horsepower
    - ____ RPM
    - ____ Voltage
    - ____ Phase
    - ____ Frequency
    - 1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
    - The stator windings shall be constructed of material to meet the Class F insulation system.
    - The insulation varnish in the system must be applied in a dip and bake manner.
    - Stator lead material must meet or exceed Class N insulation system.
    - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class N insulation system.
        - The thermal limiting devices shall be attached to each phase winding.
        - 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.
- Operation of the motor shall be designed for:
    - Handling pumped media of 140°F (60°C) ambient.
    - Capable of 15 evenly spaced starts per hour.
    - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
        - Acceptable voltage variation is +/- 10%.
        - Acceptable frequency variation is +/- 5%.
        - Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
        - Current unbalance must not exceed 5%.
    - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.

- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton®.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single ball row, Angular Contact deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be 440C, SST, hardened, heat treated. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, semi open, three vane design.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- Pump impeller shall be ceramic coated.
- 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

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 8" ANSI® standard Class 125 8-bolt configuration..
- 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.

9.0 CUTTER BAR

- Heat treated tool steel, 60 Rockwell C hardness.
- Adjustable feature to maintain clearances.

OPTIONAL :
All Stainless Steel Construction



K12CHK

12” Submersible, Semi Open Impeller

CAPABILITIES:

Flows	to 7700 GPM
Heads	to 125 Feet
HP Range	40 - 150 HP
Voltage/Phase Options	208 / 230 / 460, 3 Phase
Discharge Connections	12” ANSI Class 125 Horizontal Flange
Motor Speeds	1150 / 1750 RPM
Impeller	Balanced, Semi Open
Motor Service Factor	1.20

HARDENED IMPELLER

- Heat Treated Cast 440C SST, Semi-Open
- Handles The Toughest Materials, Cuts into Pieces
- Works Efficiently with Stationary Cutter Bar

HARDENED CUTTER BAR

- Heat Treated 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

BEST MOTOR CONSTRUCTION

- Class “N” (392 F) Highest Temperature Motor Will Not Overheat In Continuous Applications

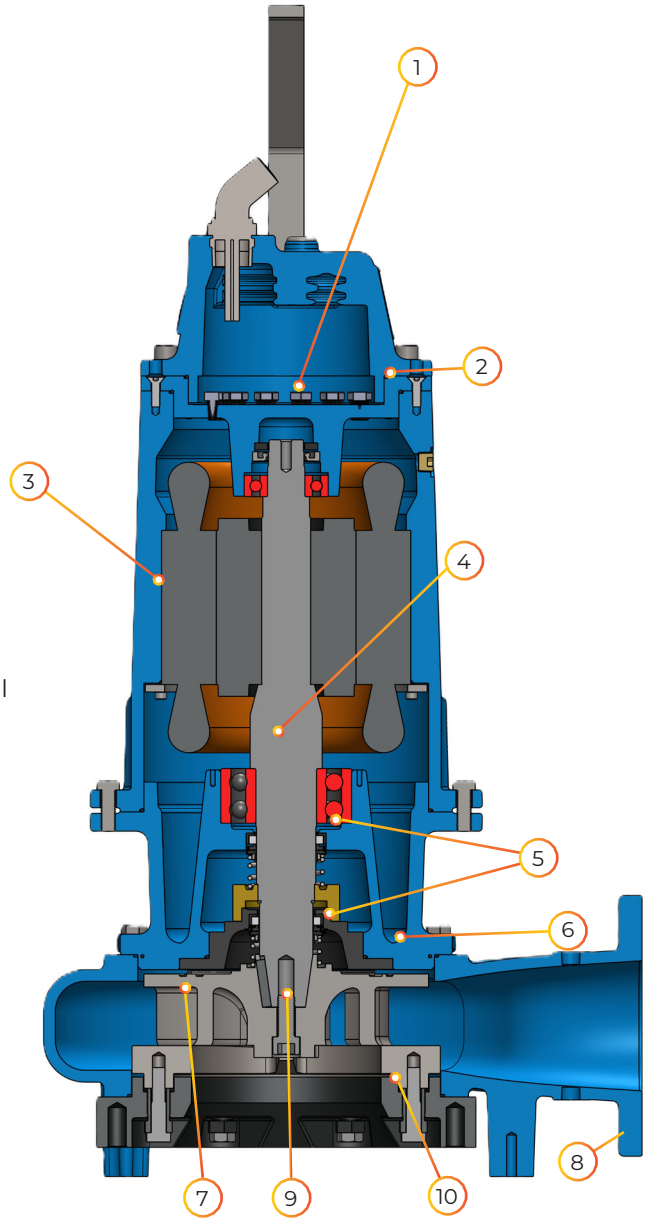
MOTOR GROUND RING PROTECTION

- Allows Motor to Operate with VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

OIL SUBMERSIBLE BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates
- Angular Contact Bearings

K12CHK



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.

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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 strong pumping. 208/230/460/575 Volt, 3-phase. Slip-Fit stator efficiently transfers heat to cast housing. Class N 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

Semi-Open, 440C Stainless Steel, Heat Treated Impeller. Features backside pump-out vanes, keeping the lower seal clean. Dynamically balances for smooth, quite 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.

1.0 SCOPE

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- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:
  - ____ Horsepower
  - ____ RPM
  - ____ Voltage
  - ____ Phase
  - ____ Frequency
  - 1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.
- Operation of the motor shall be designed for:
  - Handling pumped media of 140°F (60°C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.

    - Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
    - Current unbalance must not exceed 5%.
  - The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.
- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton®.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single ball row, Angular Contact deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be 440C, SST, hardened, heat treated. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, semi open, three vane design.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- Pump impeller shall be ceramic coated.
- 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

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 12" ANSI® standard Class 125 12-bolt configuration..
- 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.

9.0 CUTTER BAR

- Heat treated tool steel, 60 Rockwell C hardness.
- Adjustable feature to maintain clearances.

OPTIONAL :
All Stainless Steel Construction



K14CHK

14” Submersible, Semi Open Impeller

CAPABILITIES:

Flows	to 125 Feet
Heads	to 125 Feet
HP Range	30 - 150 HP
Voltage/Phase Options	208 / 230 / 460, 3Phase
Discharge Connections	14” ANSI Class 125 Horizontal Flange
Motor Speeds	1150 / 1750 RPM
Impeller	Balanced, Semi Open
Motor Service Factor	1.20

HARDENED IMPELLER

- Heat Treated Cast 440C SST, Semi-Open
- Handles The Toughest Materials, Cuts into Pieces
- Works Efficiently with Stationary Cutter Bar

HARDENED CUTTER BAR

- Heat Treated 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

BEST MOTOR CONSTRUCTION

- Class “N” (392 F) Highest Temperature Motor Will Not Overheat In Continuous Applications

MOTOR GROUND RING PROTECTION

- Allows Motor to Operate with VFD Without Damaging Bearings and Motor
- Ground Ring Safely Diverts Harmful Voltages Away From Bearings

OIL SUBMERSIBLE BEARINGS

- Heavy Duty Bearings Handle The Toughest Applications of High Pressure and Flow Rates
- Angular Contact Bearings

K14CHK

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

Powerful high-torque motor for strong pumping. 208/230/460/575 Volt, 3-phase. Slip-Fit stator efficiently transfers heat to cast housing. Class N 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

Semi-Open, 440C Stainless Steel, Heat Treated Impeller. Features backside pump-out vanes, keeping the lower seal clean. Dynamically balances for smooth, quite operation and long bearing life.

8. STANDARD FLANGE CONNECTION

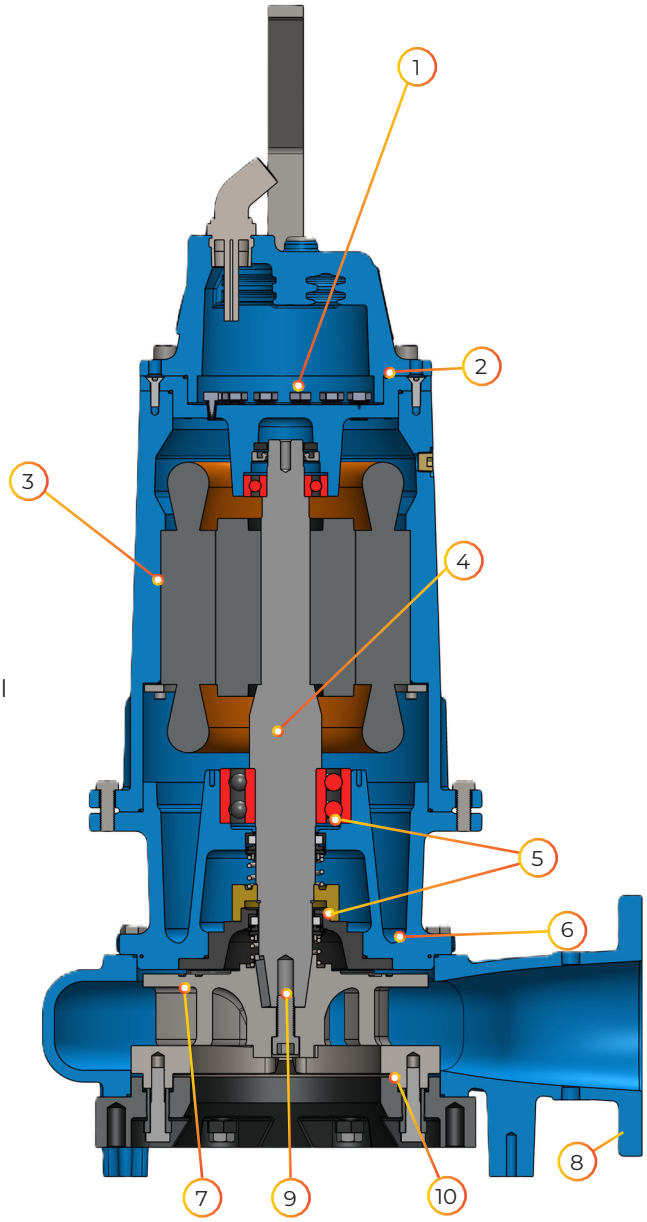
4" Horizontal, Class 125 ANSI discharge flange. Industry standard, 8-bolt pattern, Ductile Iron Casing.

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.



1.0 SCOPE

- 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.
- 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.
- 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

- All castings in the stator housing construction shall be ASTM A48 Gray Cast Iron Class 35.
- The submersible motor stator and rotor shall be of an induction type, NEMA® B (Three-Phase) squirrel cage design.
- The stator is to be slip-fit in watertight oil-filled, TENV chamber to provide the maximum heat dissipation.
- The armature assembly of the motor must meet or exceed the balance specification as defined in ISO 1940 G2.5.
- 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.
- Submersible motor design:
  - ____ Horsepower
  - ____ RPM
  - ____ Voltage
  - ____ Phase
  - ____ Frequency
  - 1.20 Service Factor
- Insulation system of the submersible motor design shall be of Class N as defined in NEMA® MG-1 and established in accordance with IEEE® std. 1 rated for 392° F (200°C). To include:
  - The stator windings shall be constructed of material to meet the Class N insulation system.
  - The insulation varnish in the system must be applied in a dip and bake manner.
  - Stator lead material must meet or exceed Class N insulation system.
  - Thermal limiting device shall be designed, secured to the stator and constructed to meet the Class F insulation system.
    - The thermal limiting devices shall be attached to each phase winding.
    - 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.
- Operation of the motor shall be designed for:
  - Handling pumped media of 140°F (60°C) ambient.
  - Capable of 15 evenly spaced starts per hour.
  - A combined service factor, in combination with effect of voltage, frequency and specific gravity, shall be at a minimum of 1.20.
    - Acceptable voltage variation is +/- 10%.
    - Acceptable frequency variation is +/- 5%.

- Voltage unbalance must not exceed 1% as defined per NEMA M6-1 12.45.
- Current unbalance must not exceed 5%.
- The horsepower of the motor shall be adequately designed to be nonoverloading across the entire pump performance curve, to include pump shutoff and pump run-out.

- All bolted connections in the submersible motor construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- The submersible motor and pump must be designed, constructed and assembled by the same manufacturer.

3.0 SUBMERSIBLE MOTOR CORD ENTRY CONSTRUCTION

- The cord entry housing shall be ASTM® A48 Gray Cast Iron Class 35.
- 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.
  - 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.
  - 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.
  - Additional sealing is provided by pump terminal plate, which separates cord cap from motor housing, by PBT encapsulated terminal studs.
- All bolted connections in the cord entry construction shall be:
  - Secured with 304 stainless steel fasteners.
  - Secured joints in the construction shall be compression fitted with fluorocarbon o-rings.
- 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.
- 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.
- The power and control cables shall be jacketed in a material suitable for submersion, oil resistant, and be flexible for portable installation.
- Cable sizing shall be in accordance to NEC® specifications.

4.0 MECHANICAL SEALS

- Each pump shall be constructed with a tandem mechanical shaft seal system incorporating two independent shaft seal assemblies.
- Seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the seal faces at a constant rate.
- Inboard and outboard seal construction shall be of the following material:
  - Primary stationary ring shall be constructed of silicon carbide face material.
  - Primary rotating ring shall be constructed of silicon carbide face material.
  - Elastomers shall be constructed of Viton®.
  - Metal components shall be constructed of stainless steel for corrosion resistance.
- The inboard shall be hydro-dynamically lubricated and operated in a sealed oil reservoir.
- The inboard seal chamber seal shall be designed and constructed to prevent lubricant over filling and provide adequate lubricant expansion to avoid overpressuring of the seal.
- The pump shall be capable of operating in the clockwise or counter clockwise direction without damaging the seal faces.

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

- Bearings shall be designed to an ABEC® System 1 or better.
- Each pump shall be constructed with a two-bearing system design.
  - The upper bearing shall be a Conrad type, single ball row, Angular Contact deep groove ball bearing designed to adequately handle the required radial loads.
  - 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.
- 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.
- Bearings shall be protected from VFD controllers with AEGIS® grounding ring.

6.0 PUMP SHAFT

- The pump shaft shall be an extension of the motor shaft. Any other construction that would include coupling of two shafts is not acceptable.
- The pump shaft shall be a Ferritic grade AISI® Type 400 series stainless steel.
  - Pump shaft material crystal structure shall be body centered cubic (bcc).
  - Pump shaft shall be of a ferromagnetic material.

7.0 IMPELLER

- Material shall be 440C, SST, hardened, heat treated. ASTM® A48 gray cast iron shall be unacceptable.
- The design shall be one-piece, semi open, three vane design.
- 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.
- The impeller shall be keyed to the pump shaft and retained with a bolt and washer.
  - All wetted fasteners shall be of a corrosion restraint stainless steel material.
- The mass moment of inertia calculations shall be provided by the pump manufacturer upon request.
- Pump impeller shall be ceramic coated.
- 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

- Material shall be ASTM® A48 class 35, gray cast iron.
- Design shall be a single piece and a modified constant velocity.
- Constructed of smooth passage ways large enough any solid that can enter the impeller.
- The discharge is to be of a horizontal centerline configuration.
- The discharge is to be 14" ANSI® standard Class 125 12-bolt configuration..
- 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.

9.0 CUTTER BAR

- Heat treated tool steel, 60 Rockwell C hardness.
- Adjustable feature to maintain clearances.

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SECTION 12

3-20HP Air Filled 4” Solids Handling

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OPTIONAL :
All Stainless Steel Construction



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 PREFORMANCE

- 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

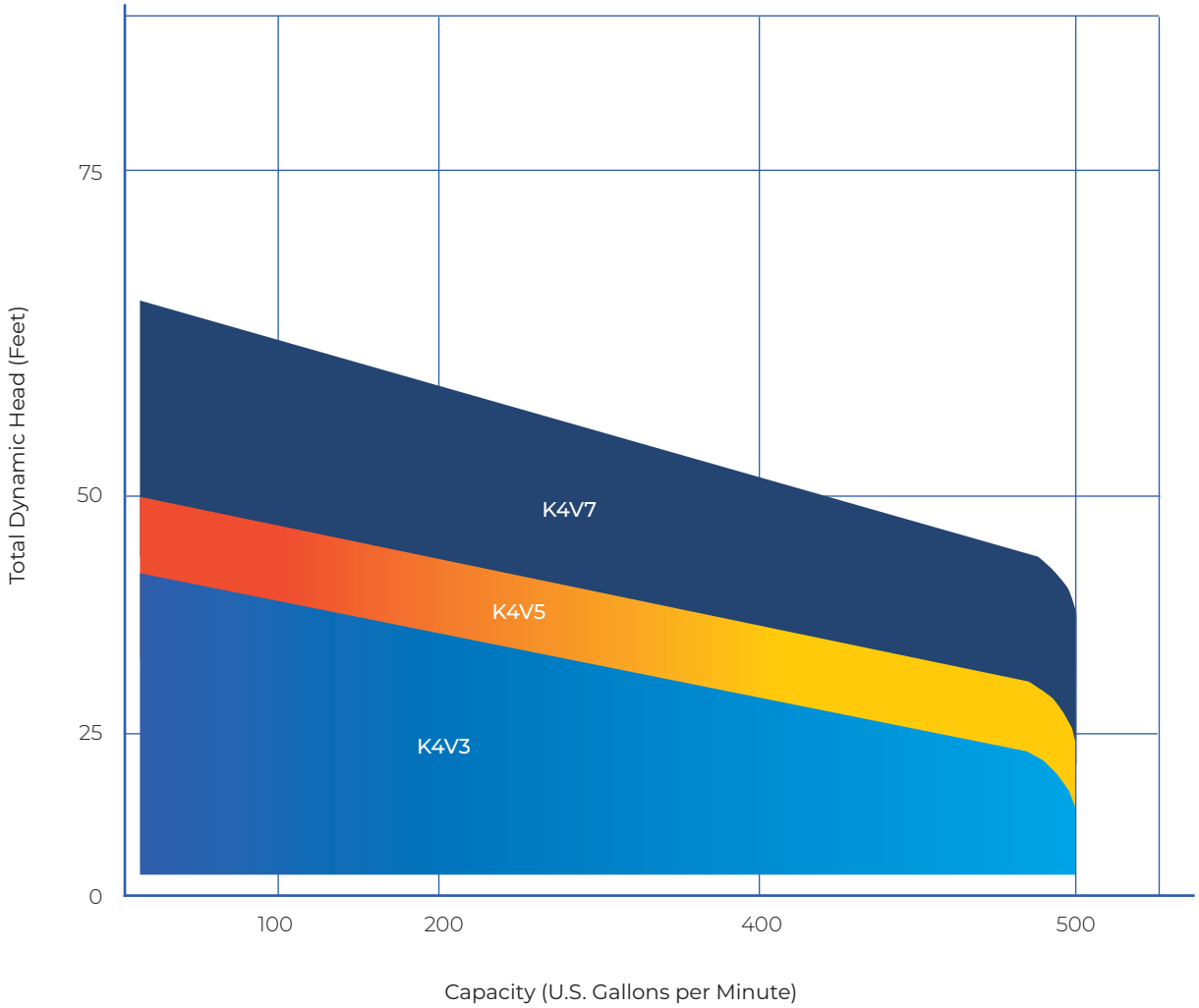
LOW MAINTENANCE

- 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 - 7.5 HP
Voltage/Phase Options	200 / 230 / 460, 1 or 3 Phase
Discharge Connections	4” ANSI Class 150lb Horizontal Flange
Motor Speeds	1150 / 1750 RPM
Solids Handling	3”
Impeller	2 Vane, Enclosed, Balanced
Motor Service Factor	1.15

Performance



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 35 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.

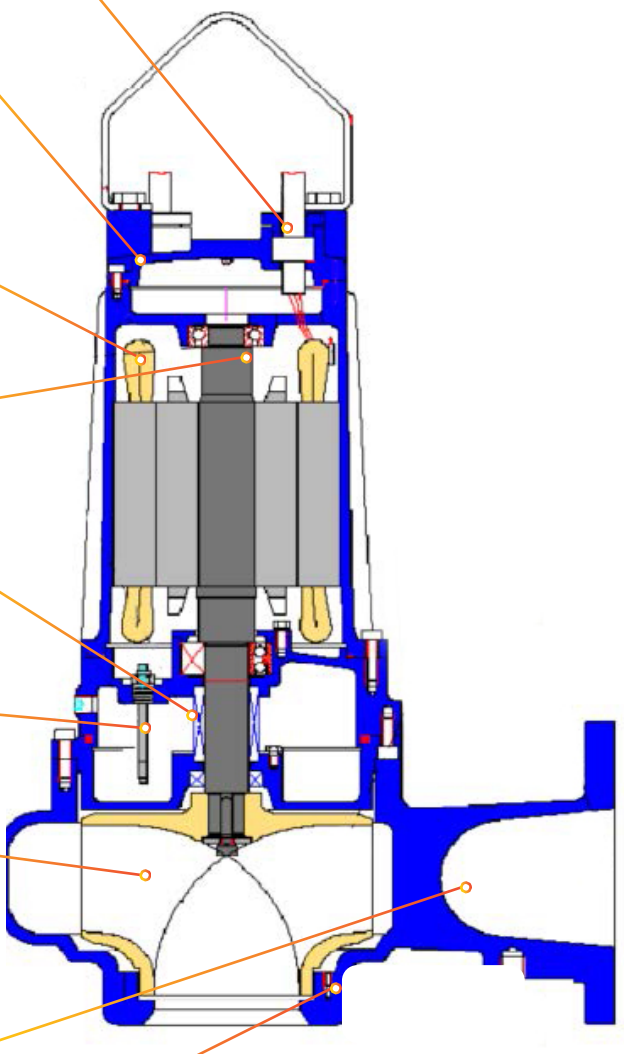
5. SEVERE DUTY DUAL MECHANICAL SEALS
Dual silicon carbide mechanical shaft seals provide twice the moisture and grit protection for the motor. Dual seals are housed in a secondary oil filled seal chamber. Tougher silicon carbide seals better handles sand, grit and abrasive materials.

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.

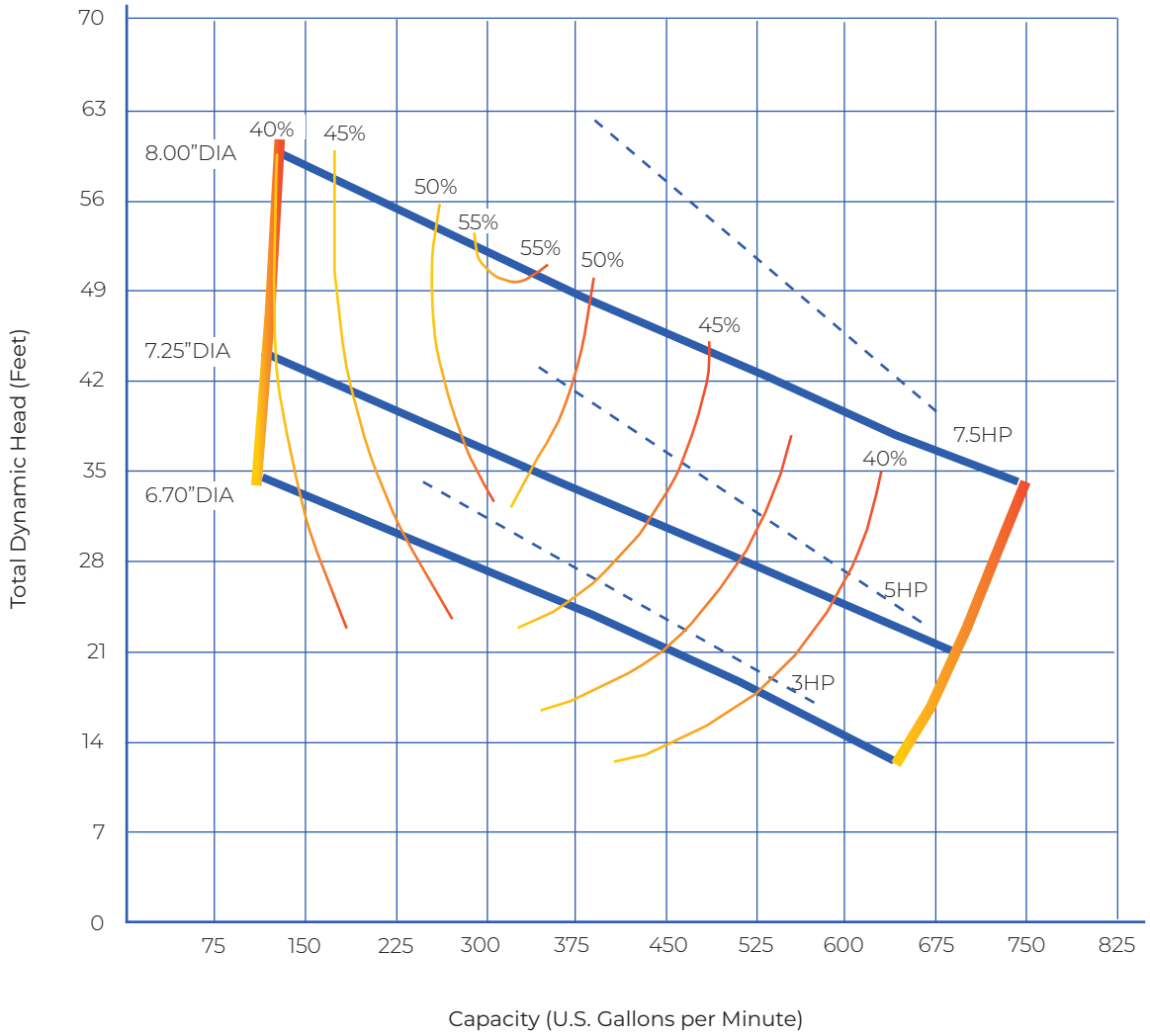
9. HIGH PERFORMANCE WEAR RING
Assists impeller in providing higher performance efficiencies and prevention of recirculation losses. Bronze ring will not corrode or deteriorate from liquid being pumped. Bronze ring reduces wear to stronger ductile iron impeller in sandy or gritty applications. Easily serviceable and replaceable.



PUMP SERIES	K4V		4” SUBMERSIBLE SEWAGE PUMPS		
Speed	1750 RPM	Discharge	4”	Solids	3”

GPM:_____ TDH: _____

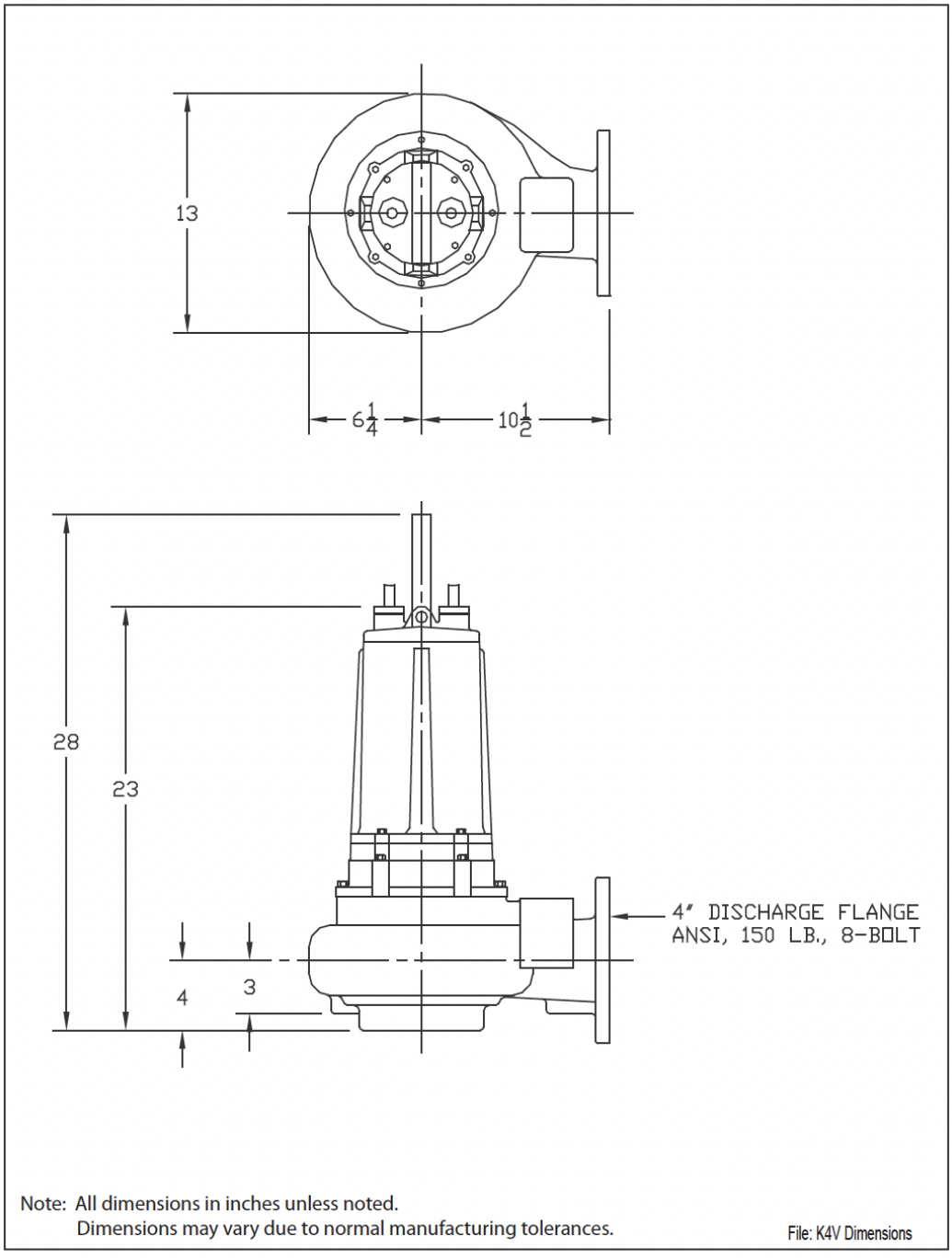
Performance



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	K4V	4" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

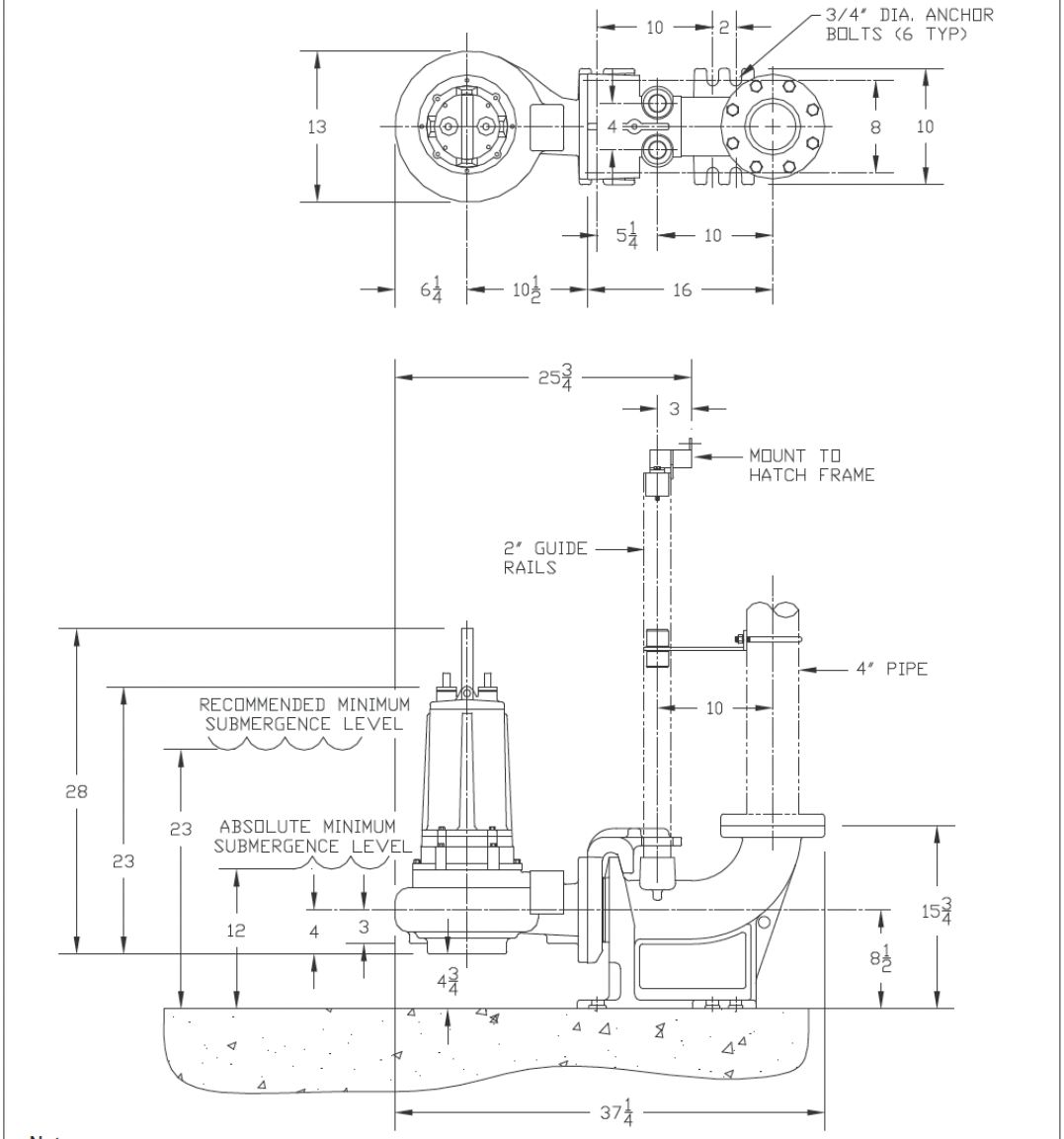


Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4V Dimensions

PUMP SERIES	K4V	4" SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

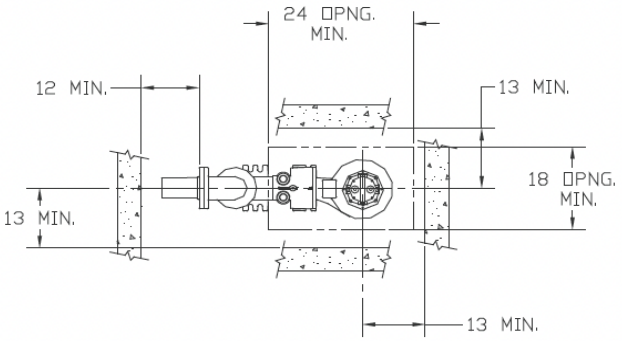


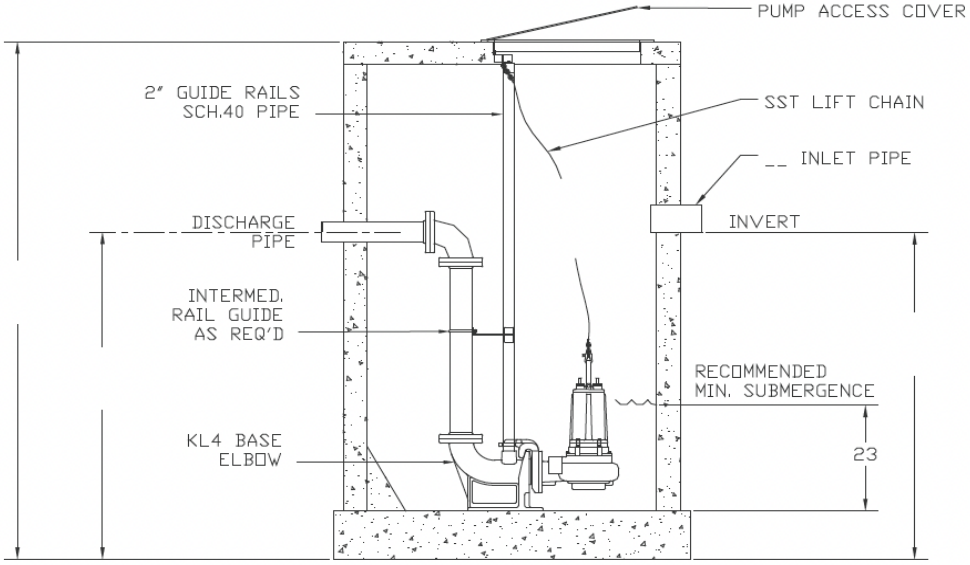
Notes:
1. All dimensions in inches unless noted.
2. Discharge flange 150 Lb. ANSI unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4V Liftout Dimensions

PUMP SERIES	K4V	4" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



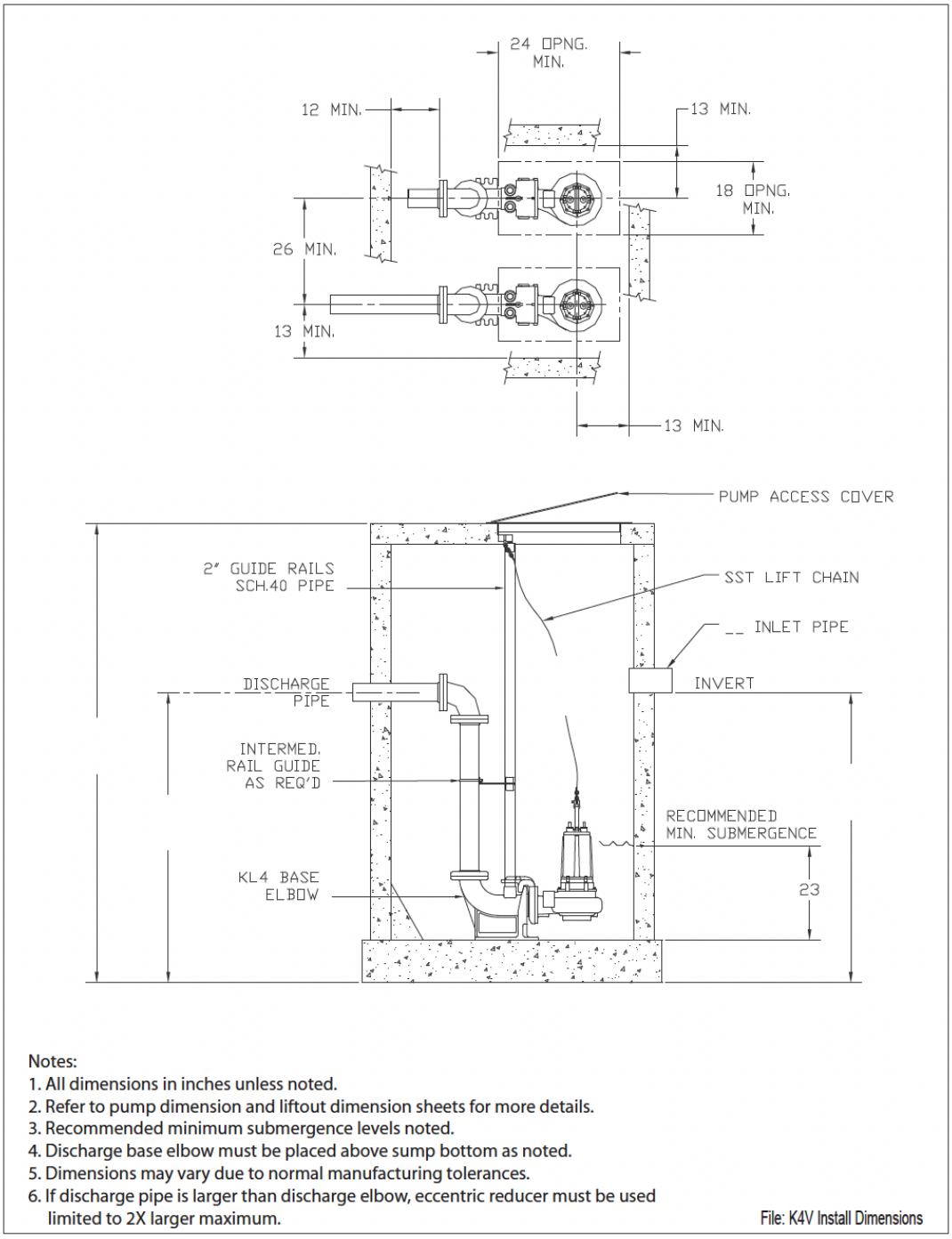


Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K4V Install Dimensions

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

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	VOLTS	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									
HP	PHASE	MOTOR EFFICIENCY %				POWER FACTOR %			
		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	76	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 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 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.

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 double-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.

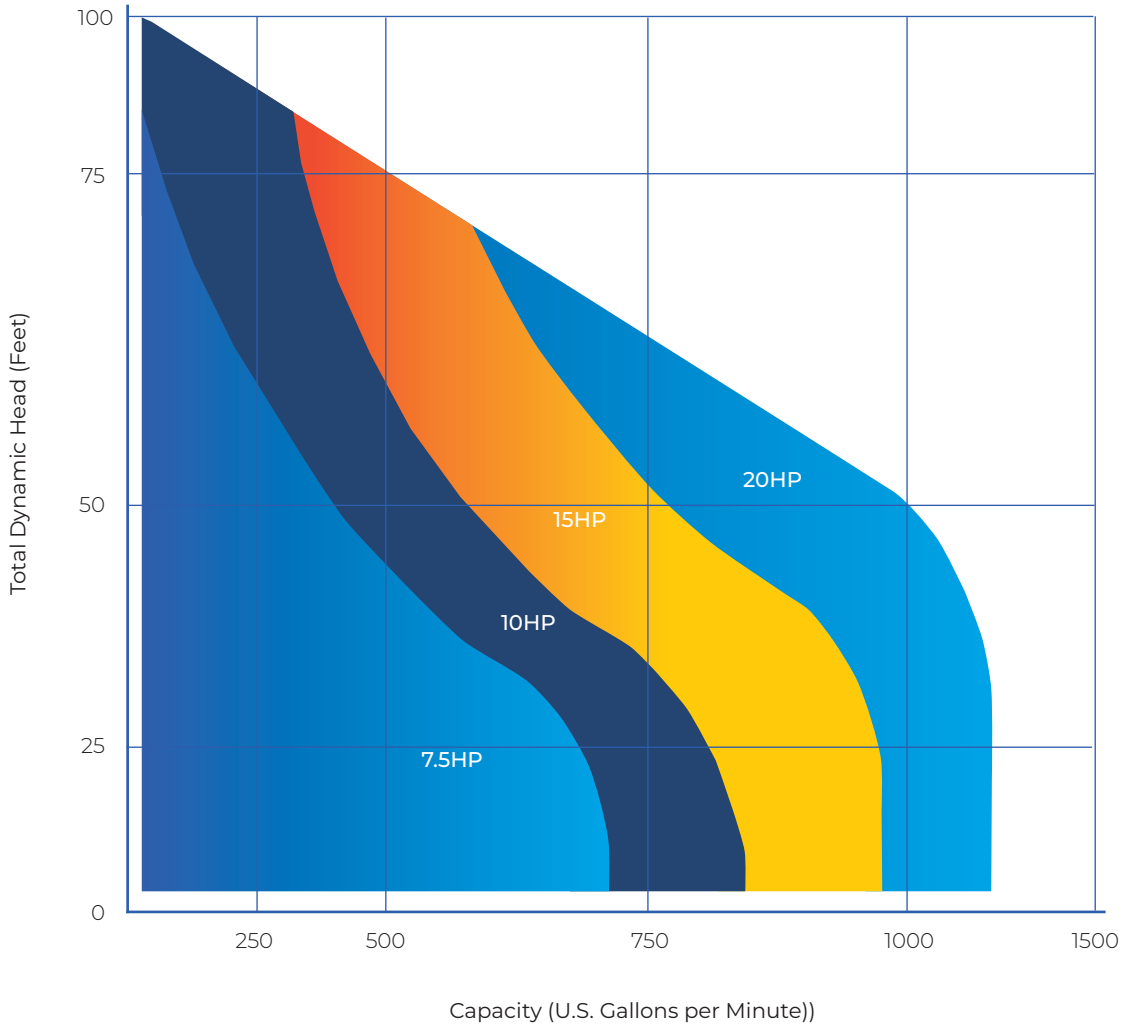
PUMP SHAFT – The pump shaft and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft; couplings shall not be acceptable. The pump shaft shall be 410 stainless steel.

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 35, 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.

Performance



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13



SECTION 13

Air Filled - KH Series 6-24 Inch, 20-350HP

KEEN PUMP

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KH Series

Solids-Handling Pumps



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.

CAPABILITIES:

• Flows	Up to 20,000 GPM
• Heads	Up to 150 Feet
• HP Range	Up to 350 HP
• Voltage Options	460volt, 3 phase
• Discharge Connections	6” to 24”
• Motor Speeds	1150/1750/3450 rpm
• Solids Handling	3.5” to 6”
• Impeller	
• Motor Service Factor	1.15



K8H 500HP

8” Recessed Impeller High Head Sewage 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 (195° 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	500 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	1.15

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 35 cast iron components.

3. STRONG MOTOR
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.

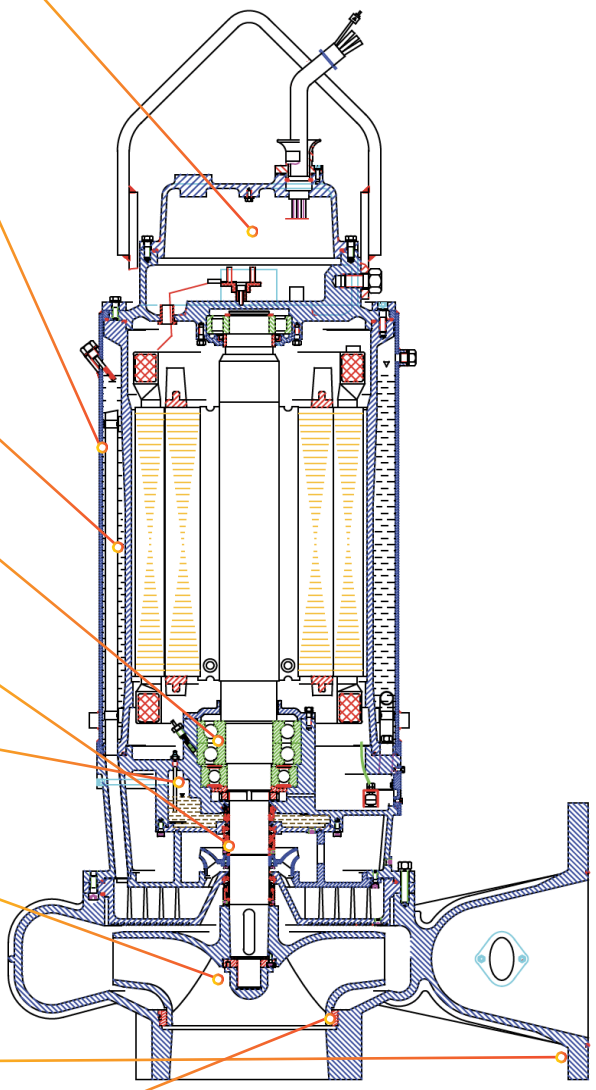
5. SEVERE DUTY DUAL MECHANICAL SEALS
Dual mechanical shaft seals provide twice the moisture and grit protection for the motor. Silicon-Carbide Upper and Tungsten-Carbide Lower seals are housed in a secondary oil-filled seal chamber. Tougher material seals better handle sand, grit and abrasive materials.

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 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.

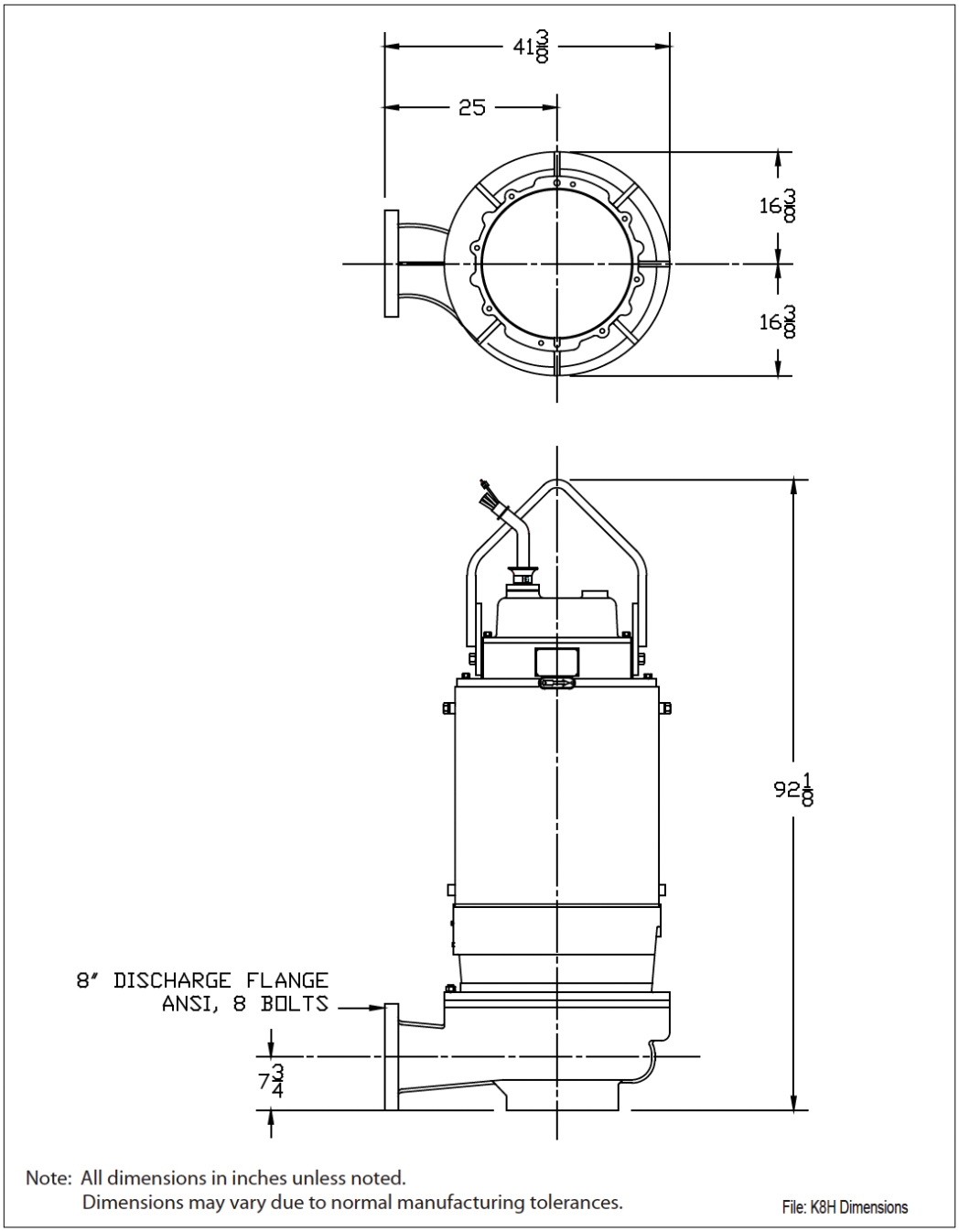
8. 8" STANDARD FLANGE CONNECTION
8" Horizontal, 150 Lb., ANSI discharge flange. Industry standard, 8-bolt pattern.

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.



PUMP SERIES	K4VL	8" SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA



Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K8H Dimensions

K14H

14” Recessed Impeller High Head Sewage 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 exhanger plate and liquid refrigerant with a high boiling point (195° C). Standard construction allows for submersible and dry pit installations.

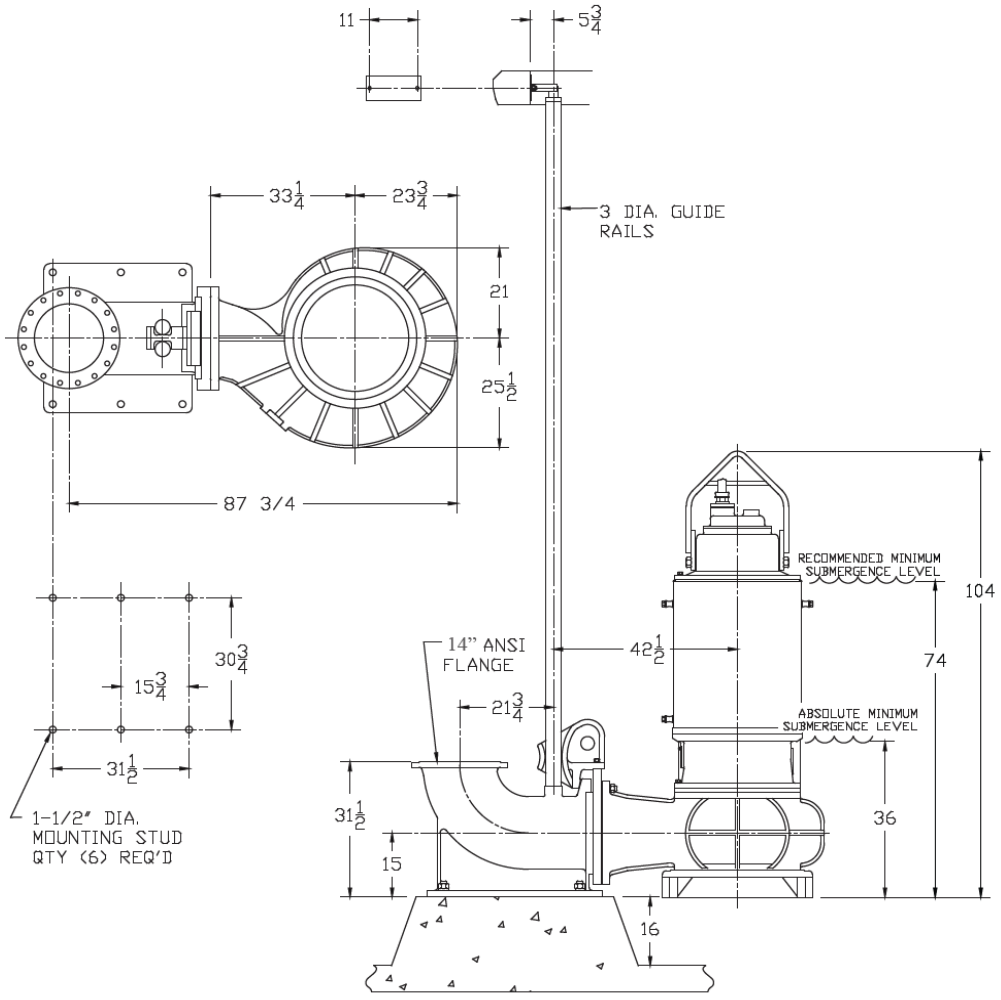
“KH” pumps are equipped with high-efficiency, inverter-duty rated, Class H insulation motors. Electrical features include fully automatic alarm protection system and liquid level control system, protecting the motor from water, oil, phase loss, overheating and grounding.

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

PUMP SERIES	K14H	14" SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

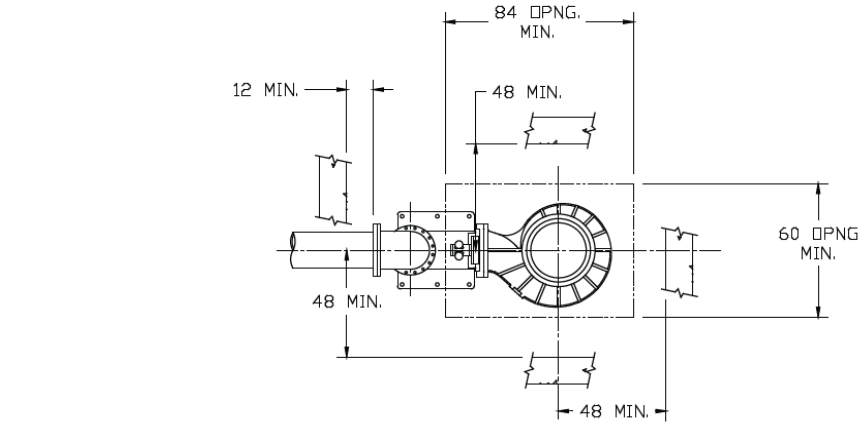


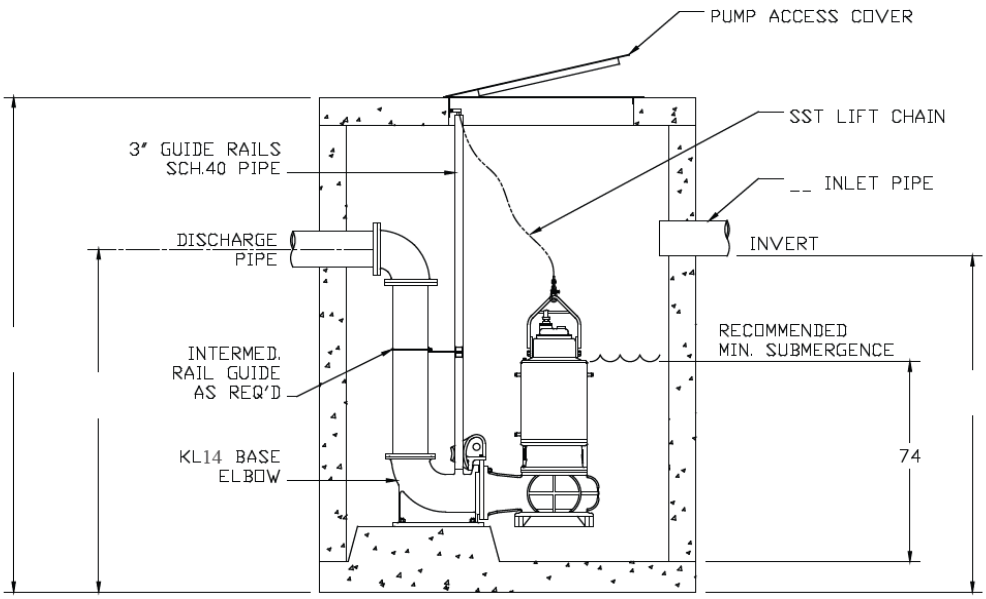
Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI 150 lb. unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K14H Liftout Dimensions

PUMP SERIES	K14H	4" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA



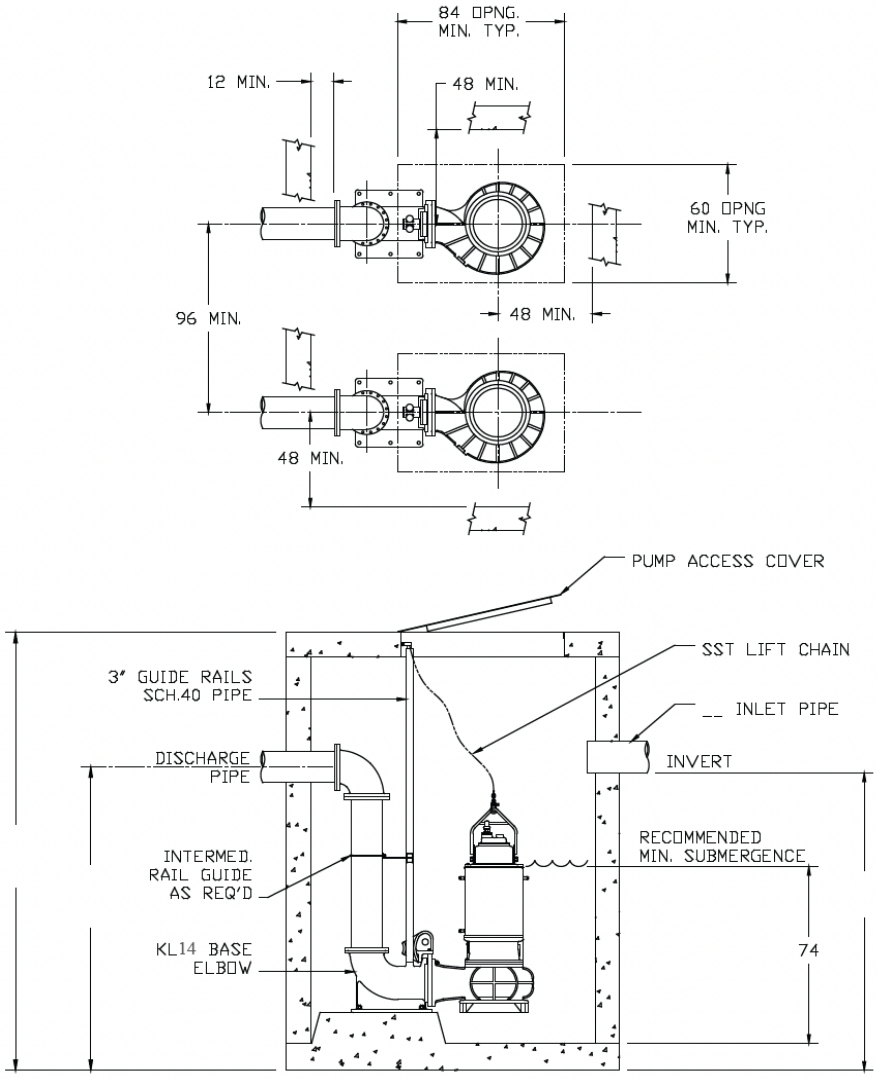


Notes:
1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. 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.

File: K14H Install Dimensions

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

K16H

16” Recessed Impeller High Head Sewage 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 (195° 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

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 35 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.

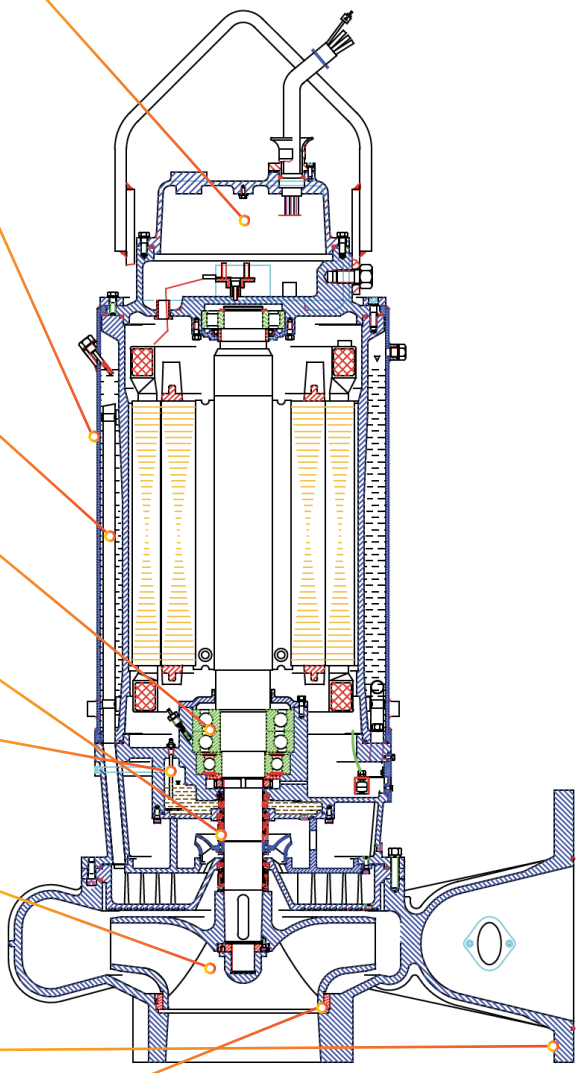
5. SEVERE DUTY DUAL MECHANICAL SEALS
Dual mechanical shaft seals provide twice the moisture and grit protection for the motor. Silicon-Carbide Upper and Tungsten-Carbide Lower seals are housed in a secondary oil-filled seal chamber. Tougher material seals better handle sand, grit and abrasive materials.

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.

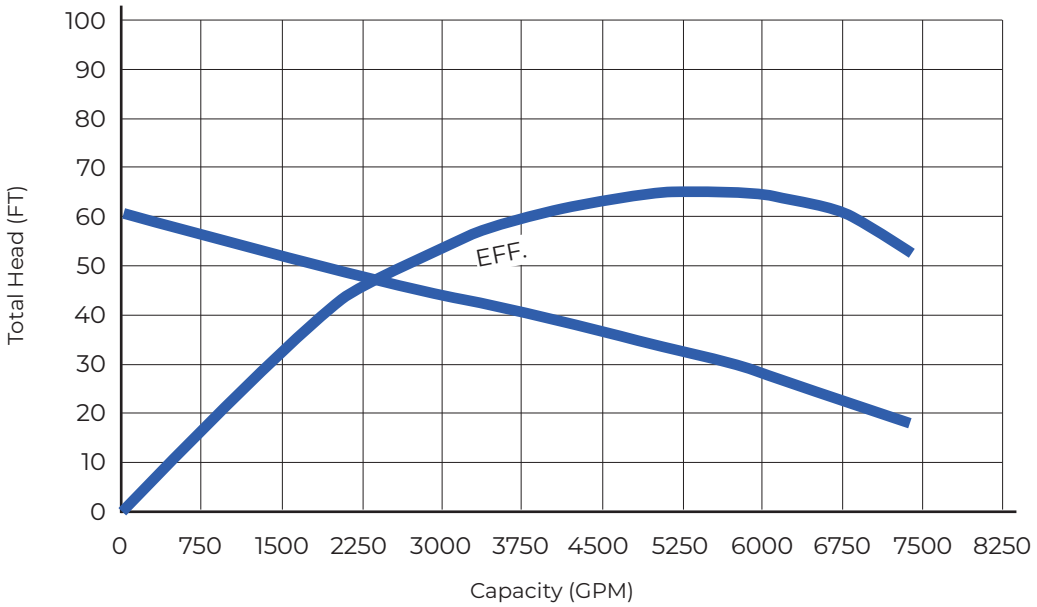
9. HIGH PERFORMANCE WEAR RING
Assists impeller in providing higher performance efficiencies and
prevention of recirculation losses. Ring will not corrode or deteriorate from liquid being pumped. Ring reduces wear to stronger ductile iron impeller in sandy or gritty applications. Easily serviceable and replaceable.

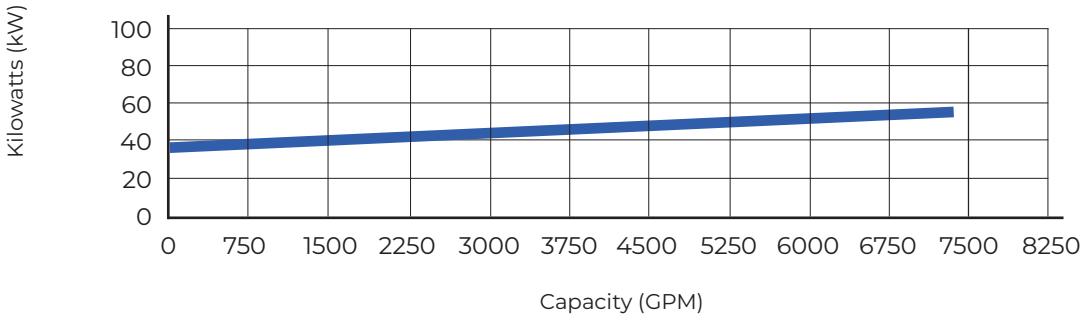


GENERAL	K16H750M8-43
Pump Model	
PUMP DATA	
Date	02/2023
Discharge Flange	16” ANSI, 150lb
Solids Size	5 inch
Impeller Type	Enclosed 2-Vane

MOTOR DATA			
Load	1/1	3/4	1/2
Efficiency (%)	85	87	86
Power Supply	3 ϕ, 460 V, 60 Hz		
HP / Amps	75 HP / 119 A		
Poles / Rated Speed	8P / 870 rpm		
Insulation Class	H Class		

	HEAD (FT)	CAPACITY	KILOWATTS [KW]	EFFICIENCY [%]
Best Efficiency Point	32	5425	51	65

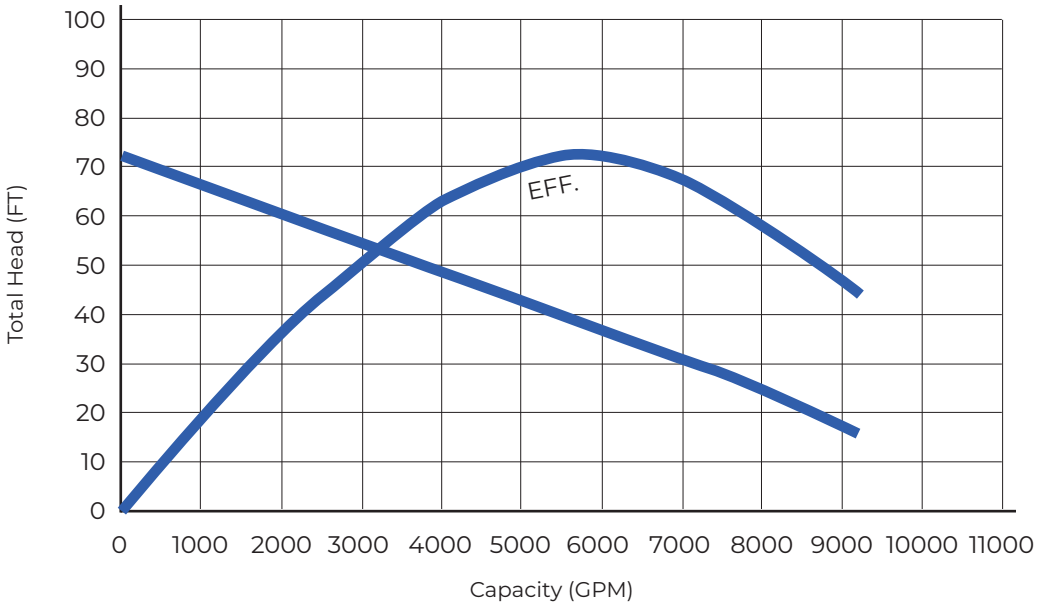


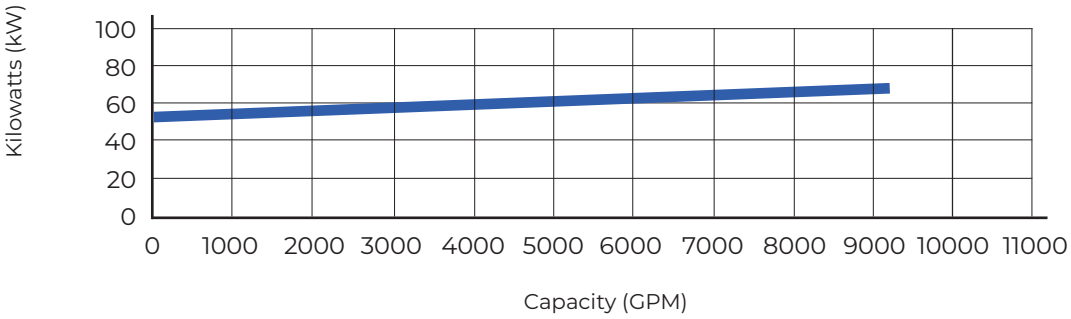


GENERAL	K16H1000M8-43
Pump Model	
PUMP DATA	
Date	02/2023
Discharge Flange	16” ANSI, 150lb
Solids Size	5 inch
Impeller Type	Enclosed 2-Vane

MOTOR DATA			
Load	1/1	3/4	1/2
Efficiency (%)	85	87	86
Power Supply	3 ϕ, 460 V, 60 Hz		
HP / Amps	100 HP / 155 A		
Poles / Rated Speed	8P / 870 rpm		
Insulation Class	H Class		

	HEAD (FT)	CAPACITY	KILOWATTS [KW]	EFFICIENCY [%]
Best Efficiency Point	40	5500	63	72

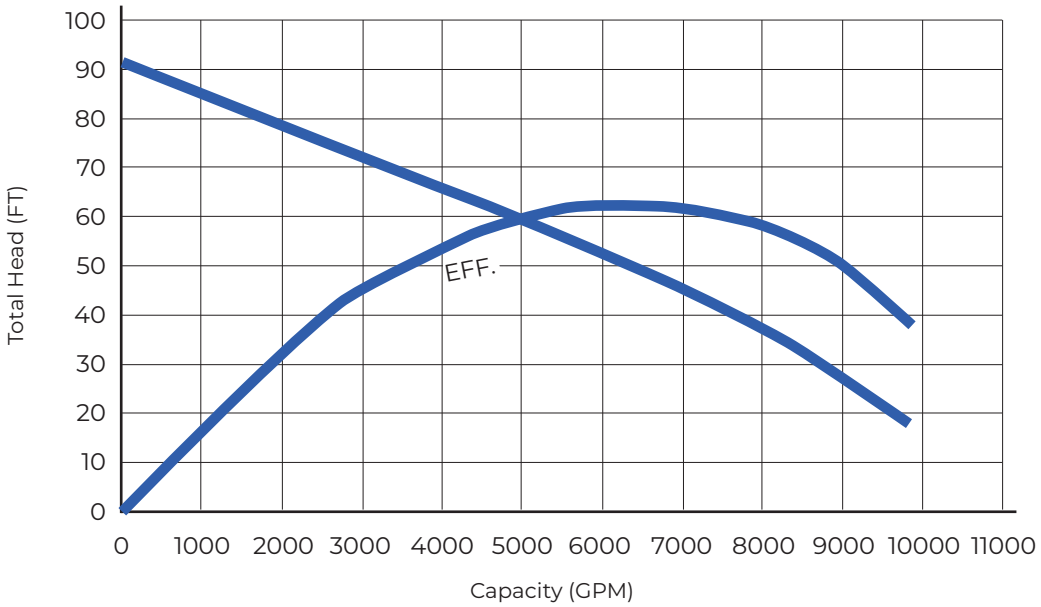


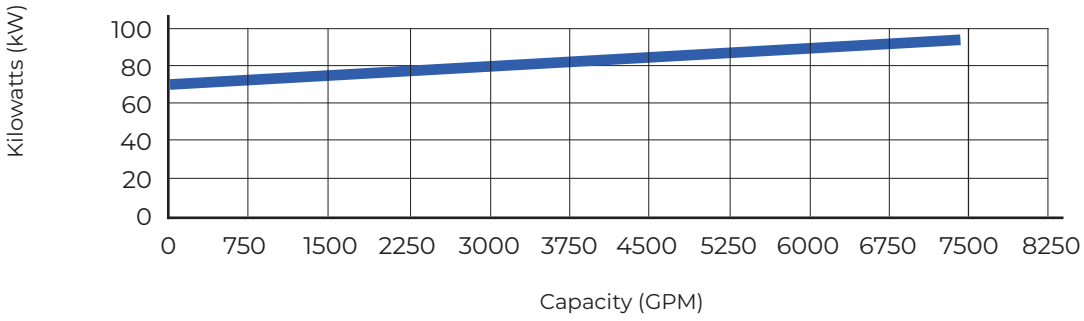


GENERAL	K16H1250M6-43
Pump Model	
PUMP DATA	
Date	02/2023
Discharge Flange	16” ANSI, 150lb
Solids Size	5 inch
Impeller Type	Enclosed 2-Vane

MOTOR DATA			
Load	1/1	3/4	1/2
Efficiency (%)	85	87	86
Power Supply	3 ϕ, 460 V, 60 Hz		
HP / Amps	125 HP / 192 A		
Poles / Rated Speed	6P / 1150 rpm		
Insulation Class	H Class		

	HEAD (FT)	CAPACITY	KILOWATTS [KW]	EFFICIENCY [%]
Best Efficiency Point	48	6500	95	62

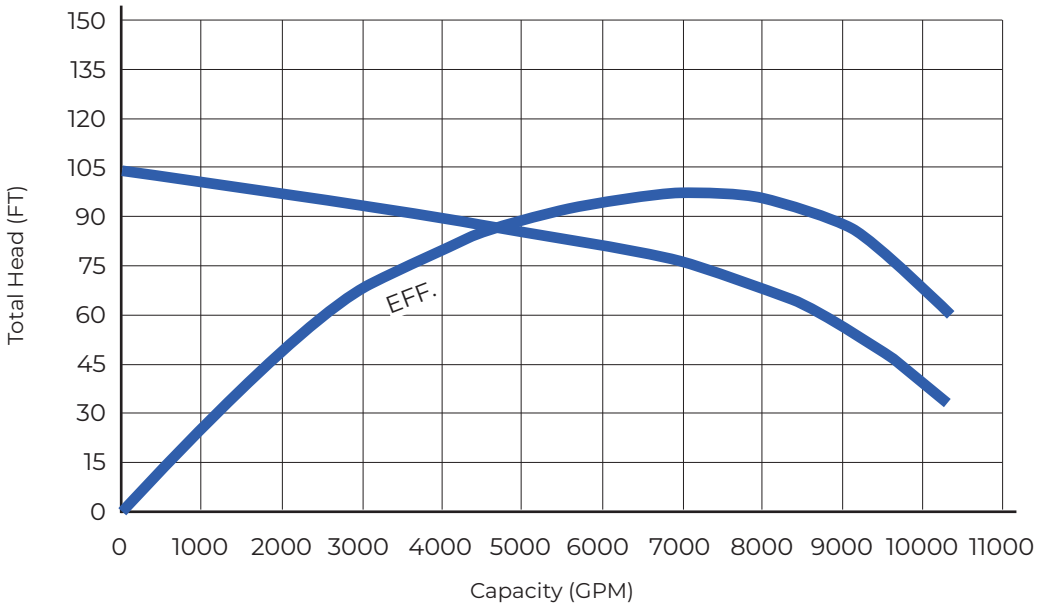


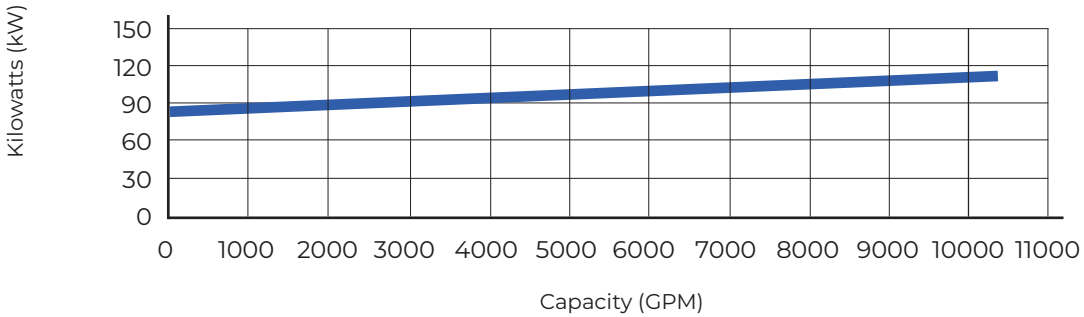


GENERAL	K16H1500M6-43
Pump Model	
PUMP DATA	
Date	02/2023
Discharge Flange	16” ANSI, 150lb
Solids Size	5 inch
Impeller Type	Enclosed 2-Vane

MOTOR DATA			
Load	1/1	3/4	1/2
Efficiency (%)	85	87	86
Power Supply	3 ϕ, 460 V, 60 Hz		
HP / Amps	150 HP / 237 A		
Poles / Rated Speed	6P / 1150 rpm		
Insulation Class	H Class		

	HEAD (FT)	CAPACITY	KILOWATTS [KW]	EFFICIENCY [%]
Best Efficiency Point	72	7480	117	65

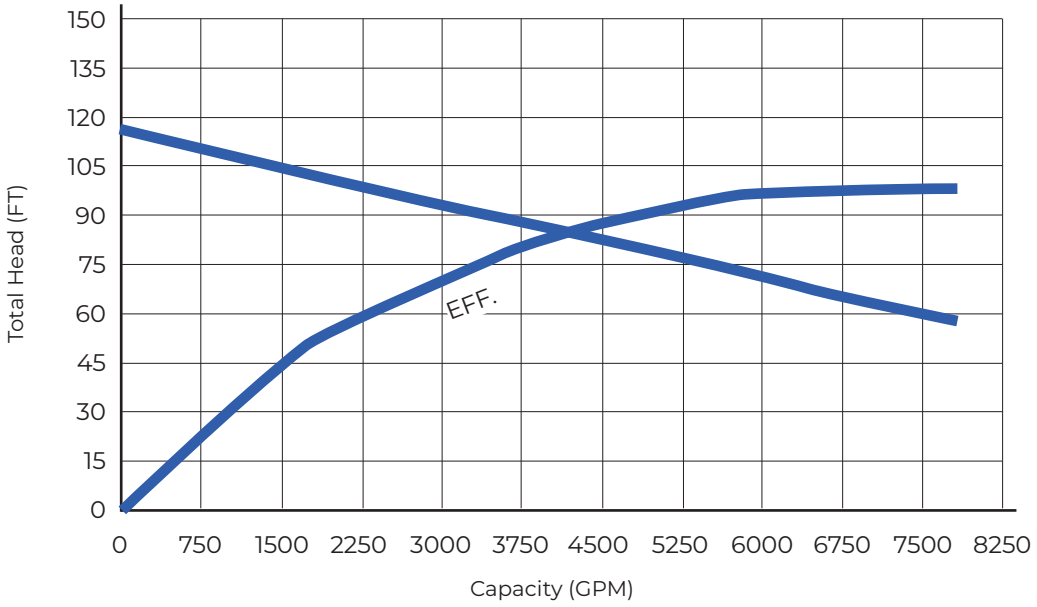


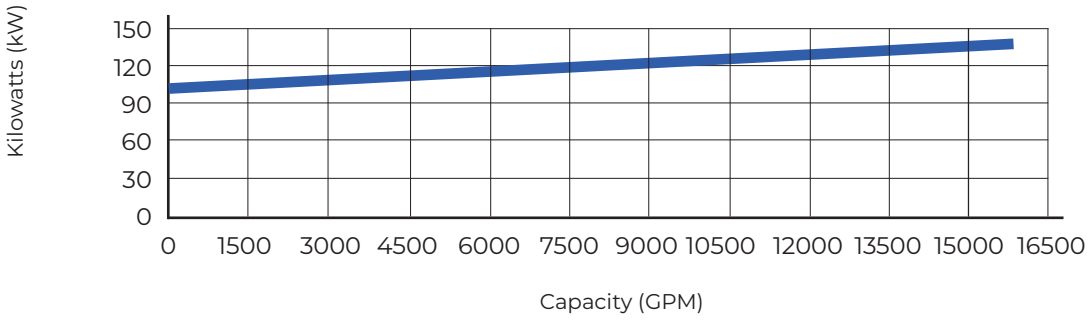


GENERAL	K16H2000M6-43
Pump Model	
PUMP DATA	
Date	02/2023
Discharge Flange	16” ANSI, 150lb
Solids Size	5 inch
Impeller Type	Enclosed 2-Vane

MOTOR DATA			
Load	1/1	3/4	1/2
Efficiency (%)	85	87	86
Power Supply	3 ϕ, 460 V, 60 Hz		
HP / Amps	200 HP / 288 A		
Poles / Rated Speed	6P / 1150 rpm		
Insulation Class	H Class		

	HEAD (FT)	CAPACITY	KILOWATTS [KW]	EFFICIENCY [%]
Best Efficiency Point	63	7435	132	66

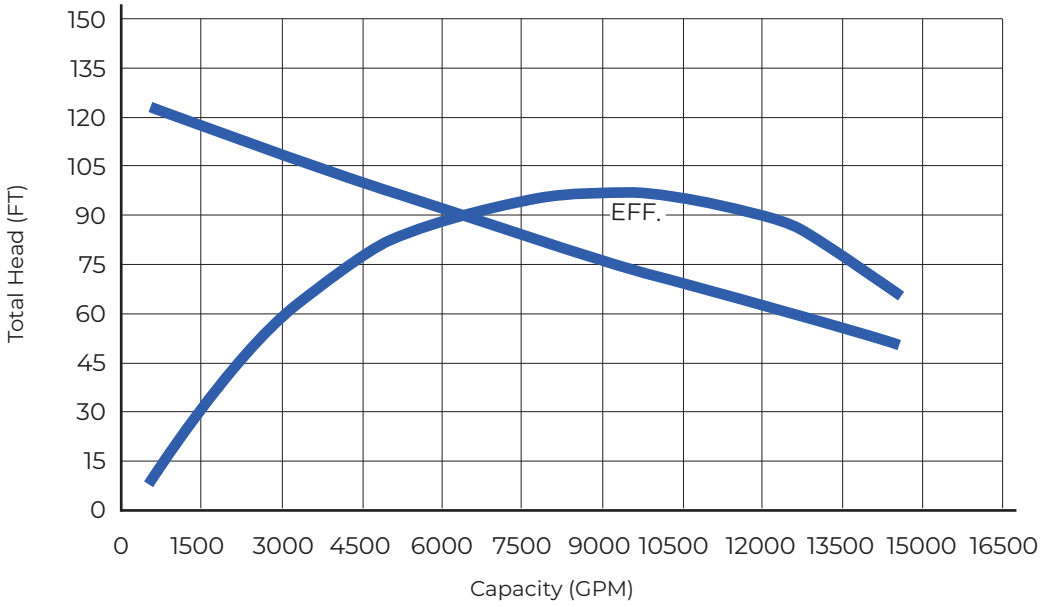


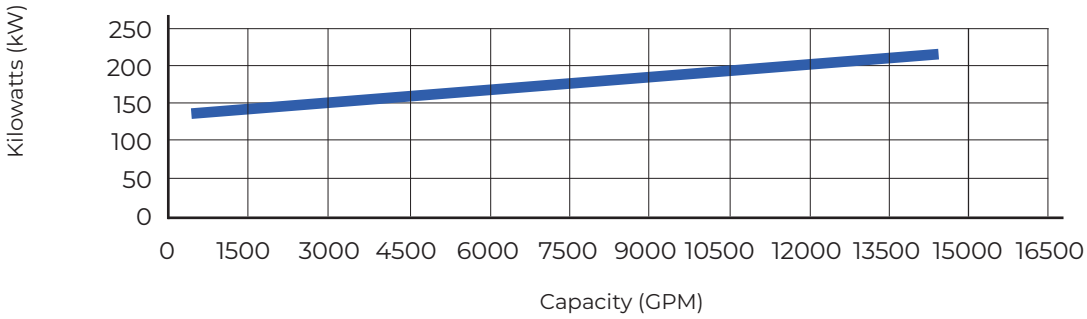


GENERAL	K16H2500M6-43
Pump Model	
PUMP DATA	
Date	02/2023
Discharge Flange	16” ANSI, 150lb
Solids Size	5 inch
Impeller Type	Enclosed 2-Vane

MOTOR DATA			
Load	1/1	3/4	1/2
Efficiency (%)	85	87	86
Power Supply	3 ϕ, 460 V, 60 Hz		
HP / Amps	250 HP / 428 A		
Poles / Rated Speed	6P / 1150 rpm		
Insulation Class	H Class		

	HEAD (FT)	CAPACITY	KILOWATTS [KW]	EFFICIENCY [%]
Best Efficiency Point	75	9055	196	65

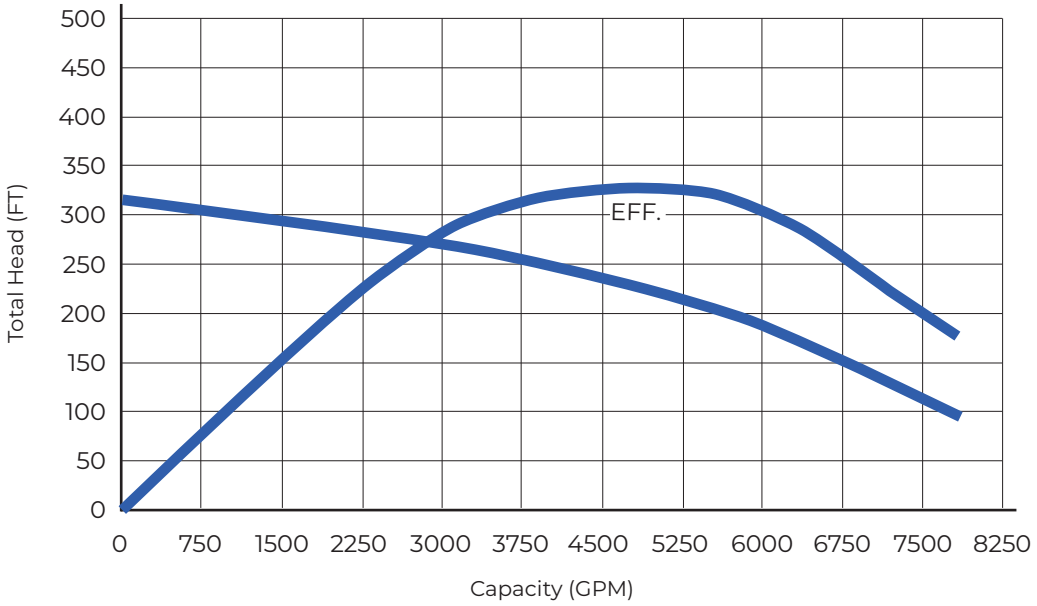


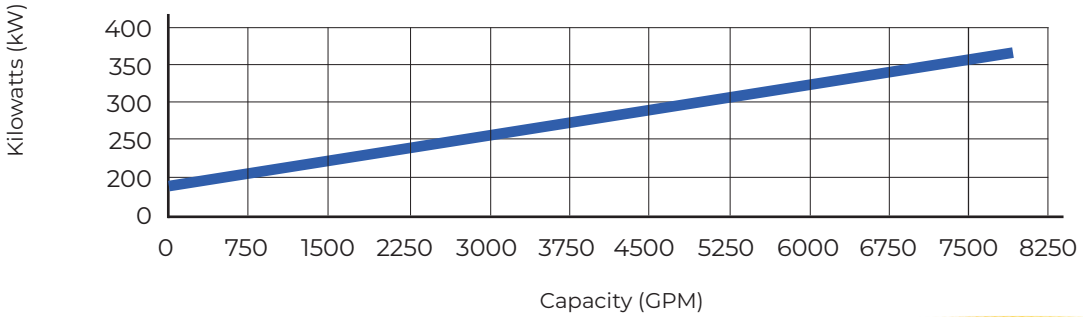


GENERAL	K16H4250M4-43
Pump Model	
PUMP DATA	
Date	02/2023
Discharge Flange	16” ANSI, 150lb
Solids Size	5 inch
Impeller Type	Enclosed 2-Vane

MOTOR DATA			
Load	1/1	3/4	1/2
Efficiency (%)	85	87	86
Power Supply	3 ϕ, 460 V, 60 Hz		
HP / Amps	425 HP / 746 A		
Poles / Rated Speed	4P / 1750 rpm		
Insulation Class	H Class		

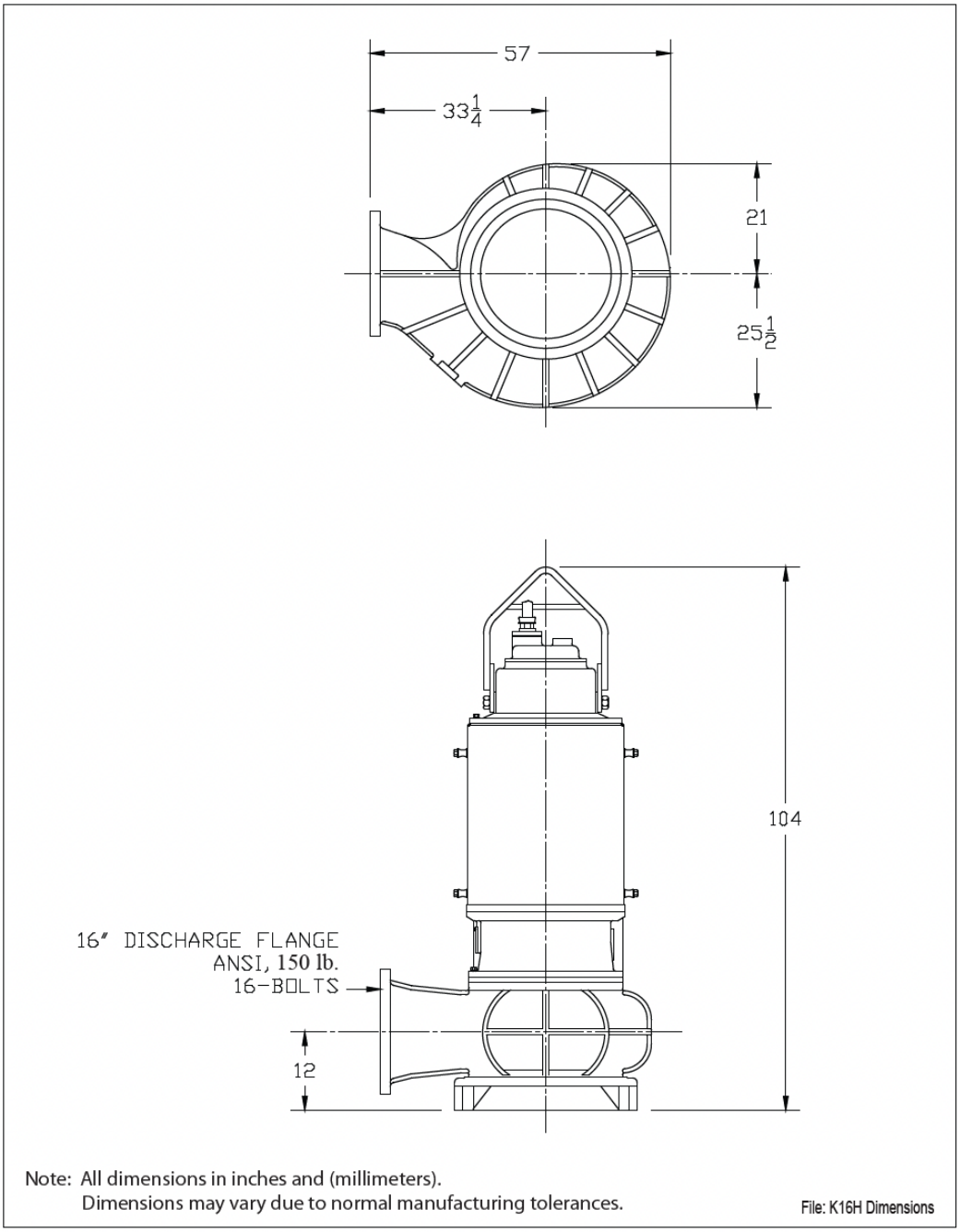
	HEAD (FT)	CAPACITY	KILOWATTS [KW]	EFFICIENCY [%]
Best Efficiency Point	222	5000	319	66





PUMP SERIES	K16H	16” SUBMERSIBLE SEWAGE PUMPS

DIMENSIONAL DATA

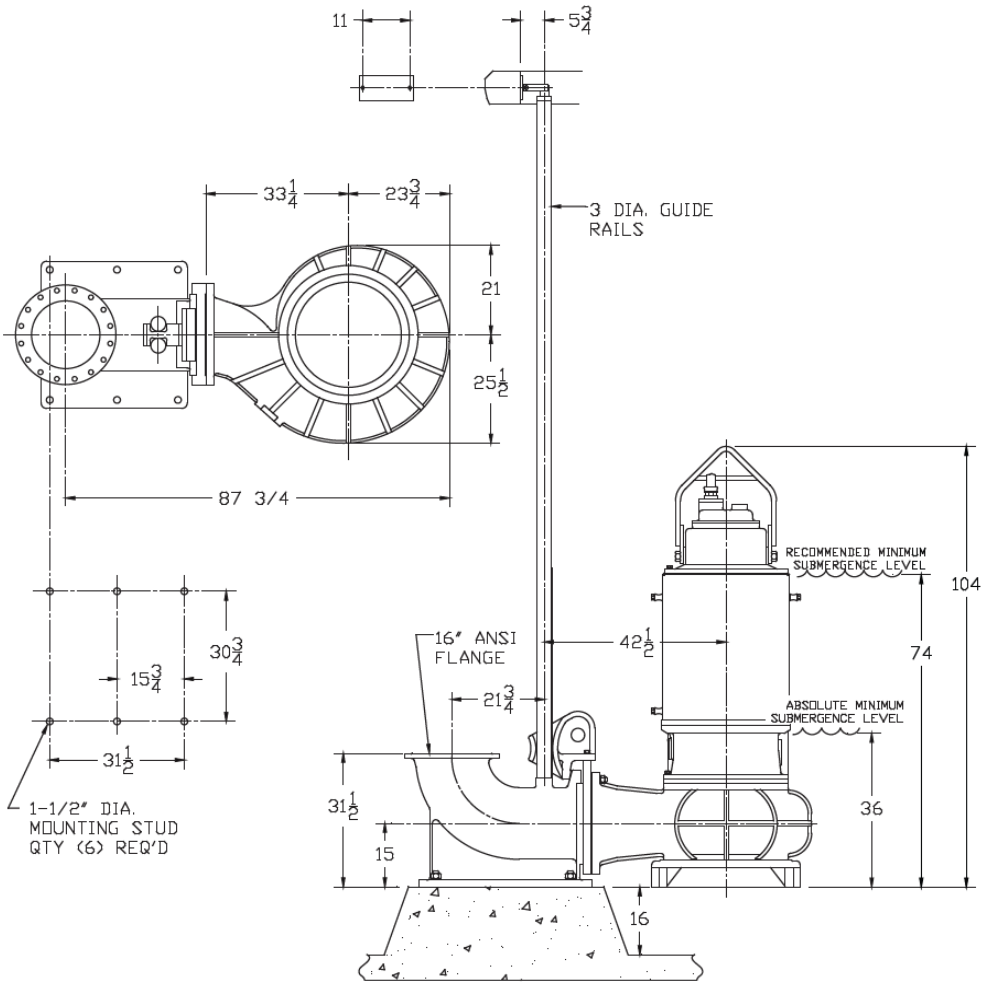


Note: All dimensions in inches and (millimeters).
Dimensions may vary due to normal manufacturing tolerances.

File: K16H Dimensions

PUMP SERIES	K16H	16” SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

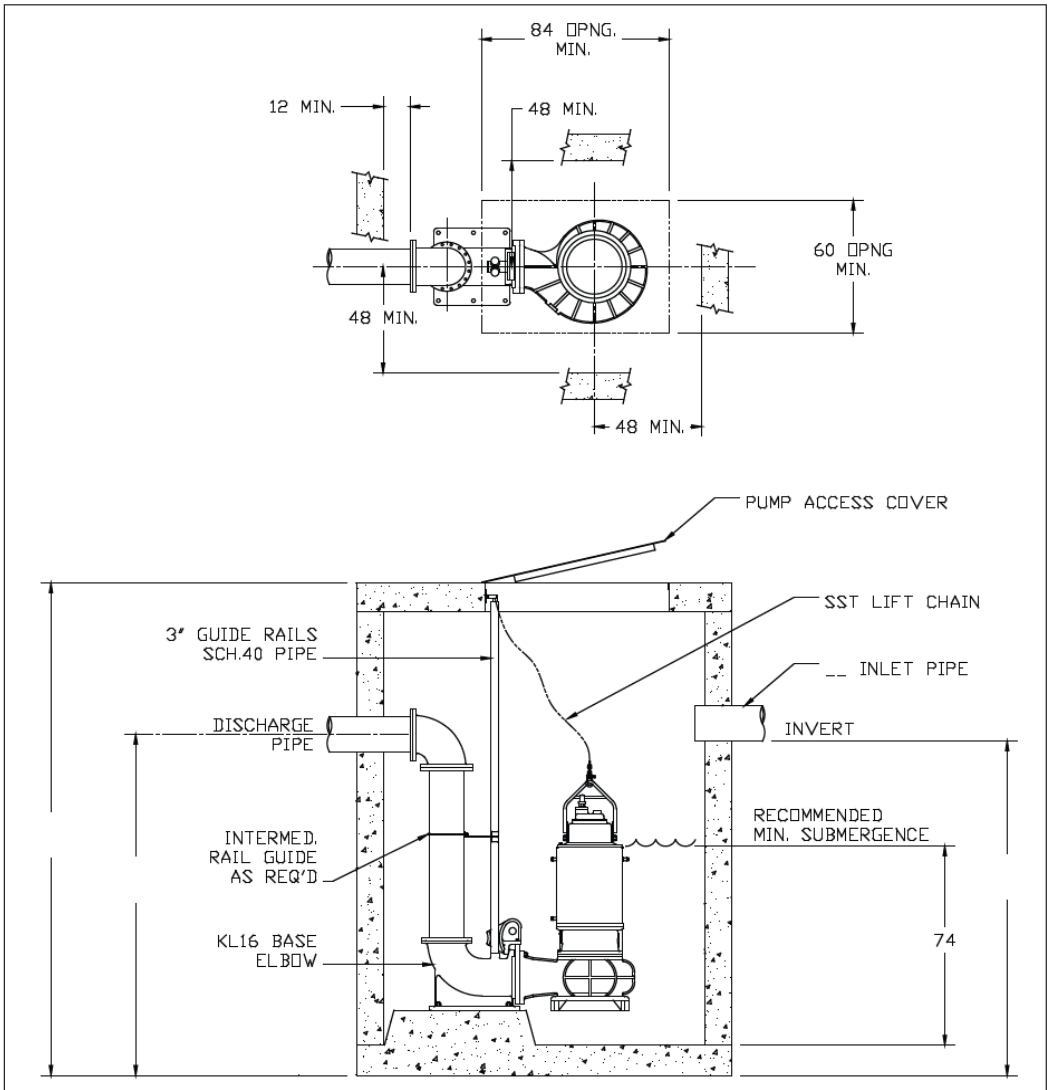


Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI 150 lb. unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K16H Liftout Dimensions

PUMP SERIES	K16H	16" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA

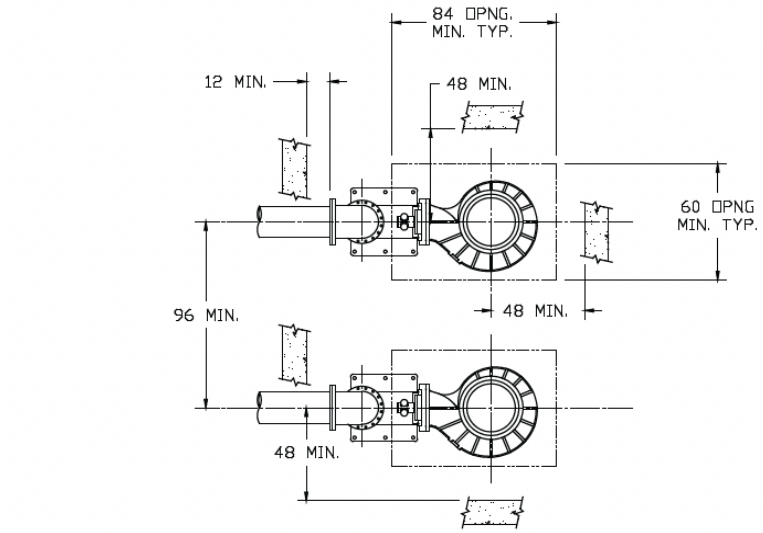


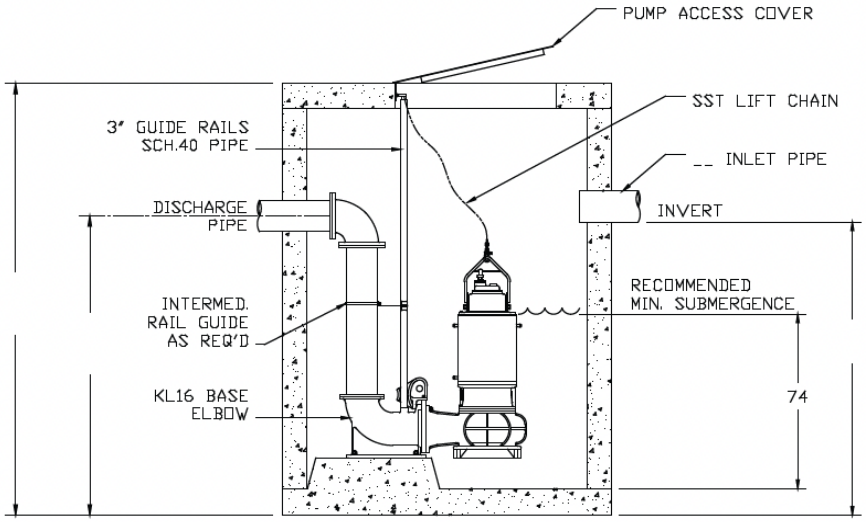
Notes:
1. All dimensions in inches and (millimeters).
2. Pump spacing per (HI) Hydraulic Institute standards.
3. Refer to pump dimension and liftout dimension sheets for more details.
4. Recommended minimum submergence levels noted.
5. Discharge base elbow must be placed above sump bottom as noted.
6. 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.

File: K16H Install Dimensions

PHYSICAL DATA	
Discharge Size	ANSI 16” Horizontal
Solid Size	6”
Impeller Type	Balanced, Enclosed, 4 Vane
Power/Control Cable Length	40’ Standard
Paint	Blue, Powder Coat Paint Finish

MOTOR CONSTRUCTION	
Motor Type	Enclosed Submersible Air Filled
NEMA Insulation Code	Class H
Service Factor	1.2
NEMA Design Type	B
Cooling System	Internal Closed Loop
Cooling Liquid	Glycol
Motor Protection	Thermal Sensors Embedded in the Windings
Maximum Stator Temperature	311°F (155°C)
Power Cord Type	SOOW - 600V, 90° C; Type W - 2000V, 90° C
Control Cord Type	16-4 or 18-5 - SOOW - 600V, 90° C

MATERIALS OF CONSTRUCTION	
Cord Entry	Cast Iron, ASTM A48, Class 30
Upper Bearing Housing	Cast Iron, ASTM A48, Class 30
Upper Bearing Plate	Cast Iron, ASTM A48, Class 30
Motor Housing	Cast Iron, ASTM A48, Class 30
Cooling Jacket	Steel
Lower Bearing Housing	Cast Iron, ASTM A48, Class 30
Lower Bearing Plate	Cast Iron, ASTM A48, Class 30
Volute	Cast Iron, ASTM A48, Class 30
Wear Ring	Cast Iron, ASTM A48, Class 35
Impeller	Ductile Iron, ASTM A48, Class 30
Shaft	ANSI 420 Stainless Steel
Inboard Mechanical Seal	Silicone - Carbide / Carbon - Ceramic
Outboard Mechanical Seal	Tungsten - Carbide / Silicone - Carbide
Fasteners	ANSI 18-8 Stainless Steel
O-Rings	Nitrile Rubber
Upper Bearing	Single Row Cylindrical Roller Bearing
Lower Bearing	Two (2) Single Row Angular Contact Ball Bearing One (1) Single Row Deep Groove Ball Bearing
Cooling Impeller	Bronze, CDA 836
Seal Plate	Cast Iron, ASTM A48, Class 30
Heat Exchanger Plate	Cast Iron, ASTM A48, Class 30



K24VK

24” Recessed Impeller High Head Sewage Pump

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 exchanger plate and liquid refrigerant with a high boiling point (195° 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

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 35 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.

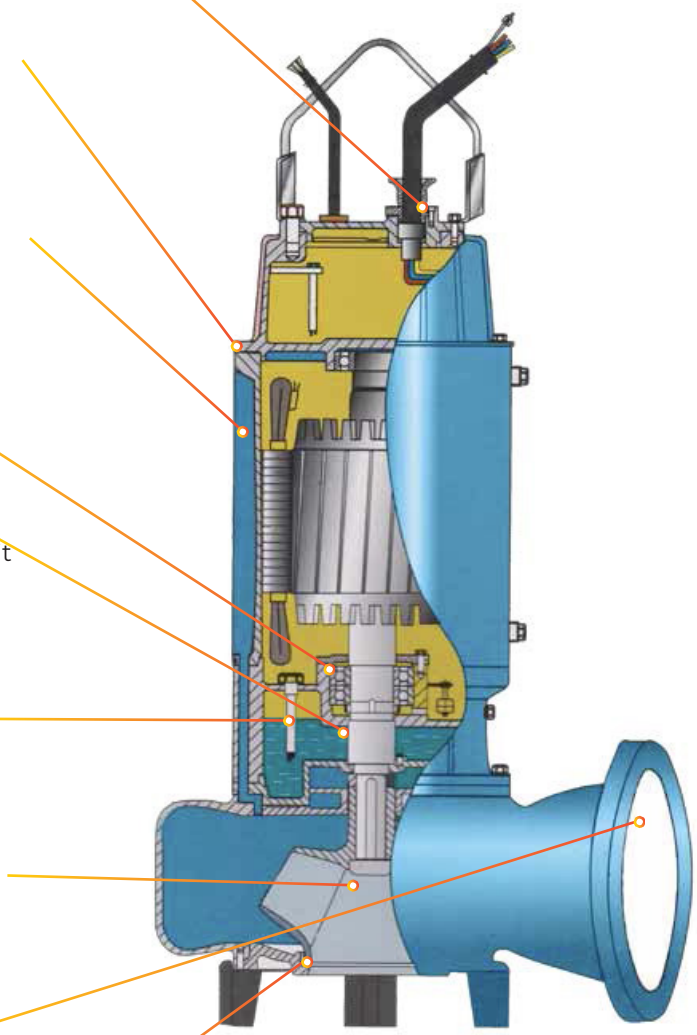
5. SEVERE DUTY DUAL MECHANICAL SEALS
Dual mechanical shaft seals provide twice the moisture and grit protection for the motor. Silicon-Carbide Upper and Tungsten-Carbide Lower seals are housed in a secondary oil-filled seal chamber. Tougher material seals better handle sand, grit and abrasive materials.

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.

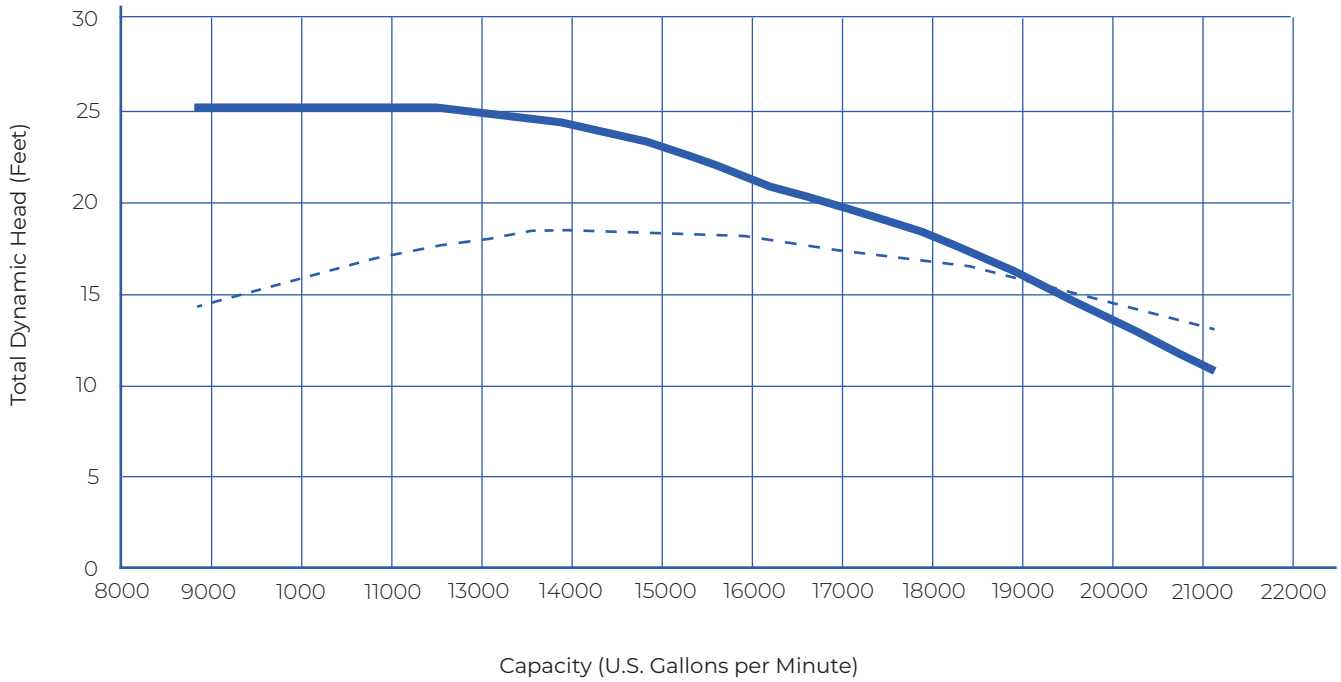
8. STANDARD FLANGE CONNECTION
24" Horizontal, 150 Lb., ANSI discharge flange. Industry standard, 20-bolt pattern.

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.



PUMP SERIES	K24VK		14” SUBMERSIBLE SEWAGE PUMPS		
Speed	600 RPM	Discharge	24”	Solids	6”

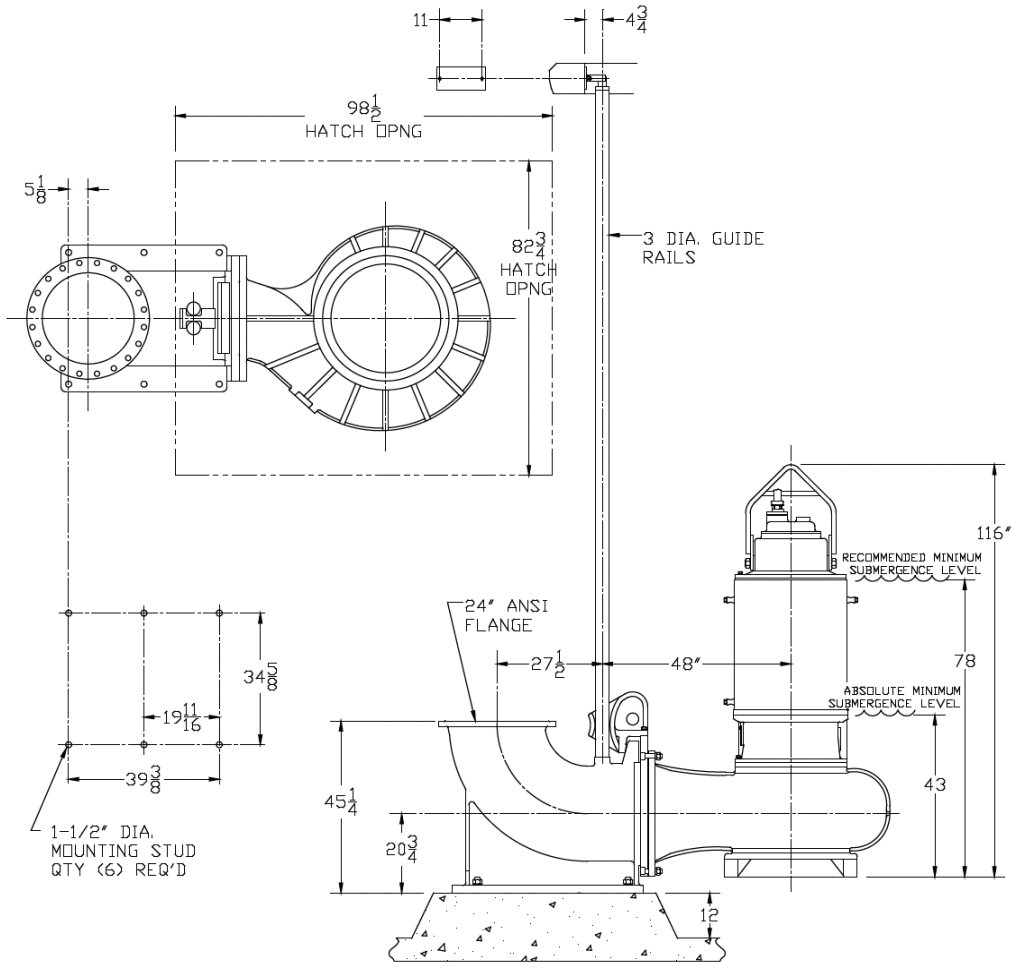
GPM:_____ TDH: _____



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.

PUMP SERIES	K24VK	24" SUBMERSIBLE SEWAGE PUMPS

LIFTOUT DIMENSIONAL DATA

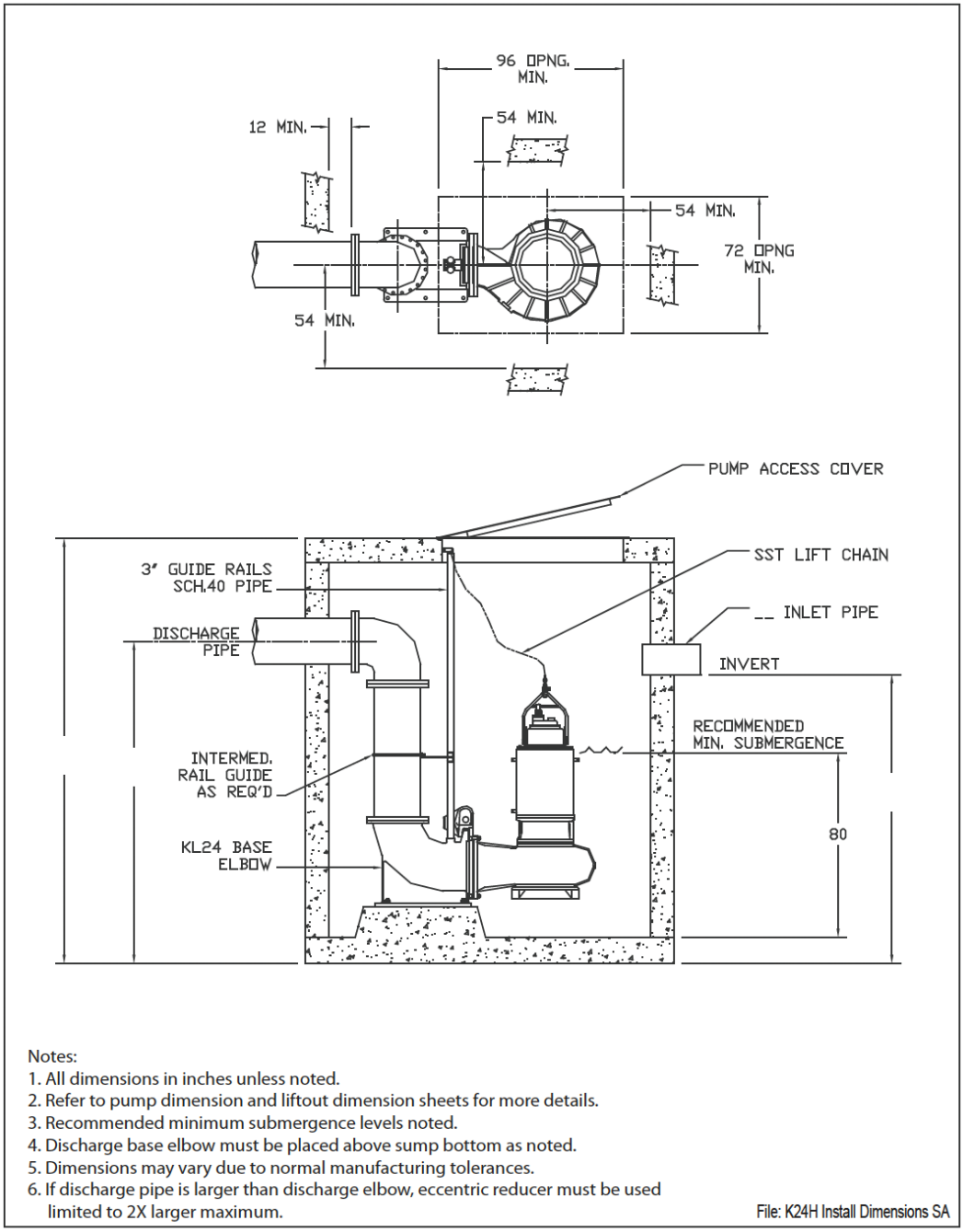


Notes:
1. All dimensions in inches and (millimeters).
2. Discharge flange ANSI 150 lb. unless noted.
3. Absolute minimum and recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K24VK Liftout Dimensions

PUMP SERIES	K24VK	24" SUBMERSIBLE SEWAGE PUMPS

SIMPLEX INSTALLATION DIMENSIONAL DATA

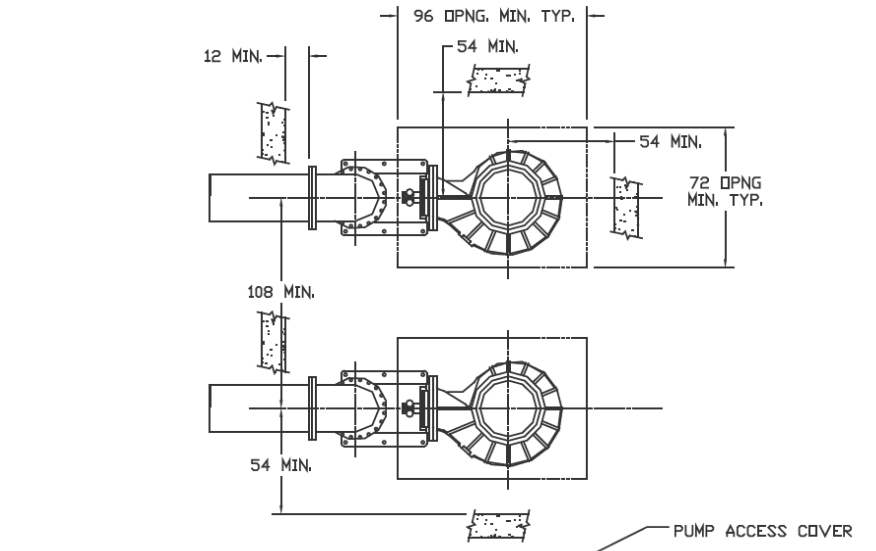


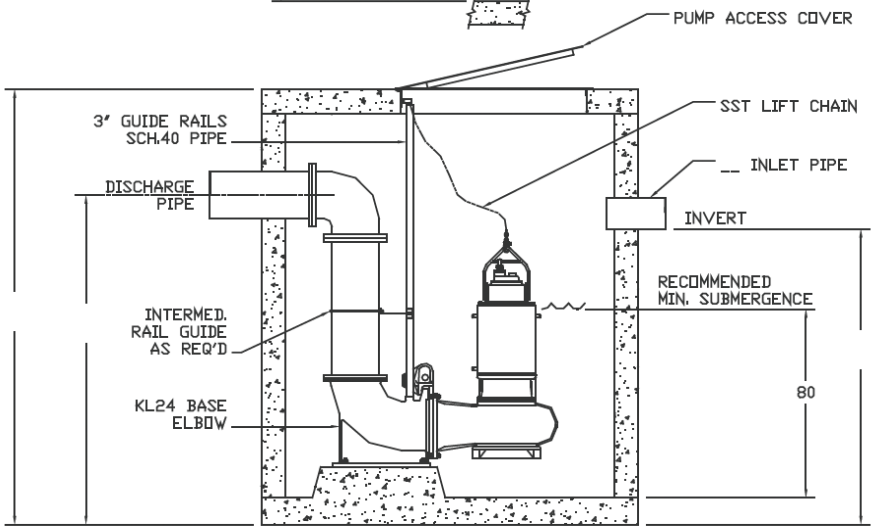
Notes:
1. All dimensions in inches unless noted.
2. Refer to pump dimension and liftout dimension sheets for more details.
3. Recommended minimum submergence levels noted.
4. Discharge base elbow must be placed above sump bottom as noted.
5. Dimensions may vary due to normal manufacturing tolerances.
6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K24H Install Dimensions SA

PUMP SERIES	K24VK	16" 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: K24H Install Dimensions SA

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 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 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 and 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 heatshrink 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.

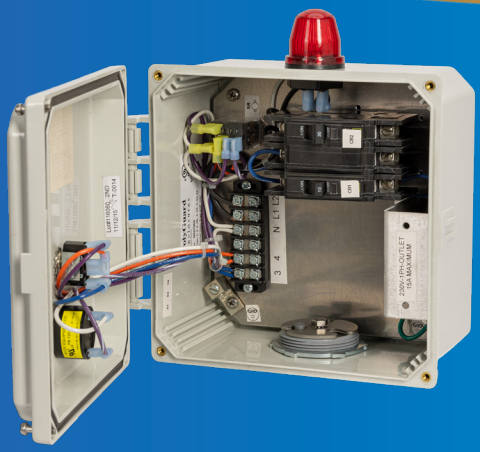
IMPELLER – The enclosed, 2-vane impeller shall be of ductile iron, Class 35B, dynamically balanced, double shrouded non-clogging design having long through-let without acute turns. The impeller shall be capable of handling solids, fibrous materials, heavy sludge and other material found in wastewater. 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 35, 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.

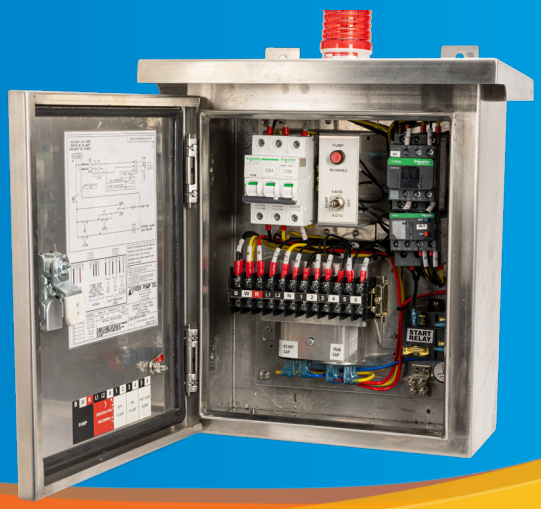
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SECTION 14

Control Panels

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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 Poly Enclosure
- Pump Circuit Breaker (2 Pole)
- Control Circuit Breaker
- Motor Contactor
- Start Capacitor Kit
- External Alarm Light
  - Flashing (Optional) – High Water Level
- Audible Alarm – Buzzer
- Alarm Test / Silence Switch
- Control Circuit Relay
- DIN Rail Mounted Components
- Back plate
  - (Steel for Stainless Option)
- Internal HOA Switch
- External Lockable Hasps
- Easy Wiring Terminal Blocks
- Grounding Lugs

THREE PHASE

- NEMA 4X Poly Enclosure
- Pump Circuit Breakers (3 Pole)
- Internal Pump Run Light
- Control Circuit Breaker
- Motor Starter
- External Alarm Light
  - Flashing (Optional) – High Water Level
- Audible Alarm – Buzzer
- Alarm Test / Silence Switch
- Motor Temperature Sensing Control
- Control Circuit Relay
- DIN Rail Mounted Components
- Back plate
  - (Steel for Stainless Option)
- Internal HOA Switch
- External Lockable Hasps
- Easy Wiring Terminal Blocks
- Grounding Lugs
- Transformer (460 volts panels only)

SIMPLEX CONTROL PANEL SINGLE PHASE

3 FLOATS – CAPACITORS IN PANEL TECHNICAL SPECIFICATIONS

A NEMA 4X poly 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 poly, 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 hinge. The cover shall be lockable by means of two (2) high quality combination 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, pump control 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 bottom 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, 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. 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. The red indicator light will remain illuminated as long as the alarm condition persists. Both the 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 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.

SIMPLEX CONTROL PANEL SPECIFICATION – MODEL KCG2-21S-LC

(SINGLE PHASE - 3 FLOATS – CAPACITORS IN PANEL)

A NEMA 4X polycarbonate 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 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, pump control 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, 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. 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. The red indicator light will remain illuminated as long as the alarm condition persists. Both the 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 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 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 – Buzzer
- Alarm Test Switch
- 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 – Buzzer
- Alarm Test Switch
- Control Circuit Relays
- DIN Rail Mounted Components
- Aluminum Back plate
- (2) Internal HOA Switches
- External Lockable Hasps
- Easy Wiring Terminal Blocks
- Grounding Lugs
- Transformer (460 volt panels only)

DUPLEX CONTROL PANEL SINGLE PHASE

4 FLOATS - CAPACITORS IN PANEL TECHNICAL SPECIFICATIONS

A NEMA 4X poly 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 poly, 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 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 bottom 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, 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 or lens shall be easily replaced. 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 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.

DUPLEX CONTROL PANEL SINGLE PHASE

4 FLOATS - CAPACITORS IN PUMP TECHNICAL SPECIFICATION

A NEMA 4X poly 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 poly, 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 piano hinge. The cover shall be lockable by means of two (2) high quality combination 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 (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 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 or lens shall be easily replaced. 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 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.

DUPLEX CONTROL PANEL THREE PHASE

4 FLOAT OPERATION TECHNICAL SPECIFICATIONS

A NEMA 4X poly 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 poly, 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 piano hinge. The cover shall be lockable by means of two (2) high quality combination 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 molded.

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 overload relay, (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 resume once overheating conditions have passed.

The control panel shall be fitted with a red lexan alarm light. The light shall remain solidly illuminated, 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. The lens shall be mounted on top of the enclosure.

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. 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 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.

A1	AUDIBLE ALARM HORN
A	AUDIBLE ALARM BELL (TYPE 3R ONLY)
A3	AUDIBLE ALARM SONALERT
CX	AUXILIARY CONTACTS (DRY FORM A)
B	ELAPSED TIME METER (PER METER)
G	CYCLE COUNTER (PER COUNTER)
M	DEAD FRONT DOOR
I	GENERATOR RECEPTACLE
F	LIGHTNING ARRESTOR
K	REDUNDANT LOW LEVEL OFF
S	MAIN DISCONNECT
PM	PHASE / VOLTAGE MONITOR
W	REMOTE DIALER
P	UL 508A SERIALIZED LABELING

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15



SECTION 15

K3PL-S Solids Handling, Single Seal



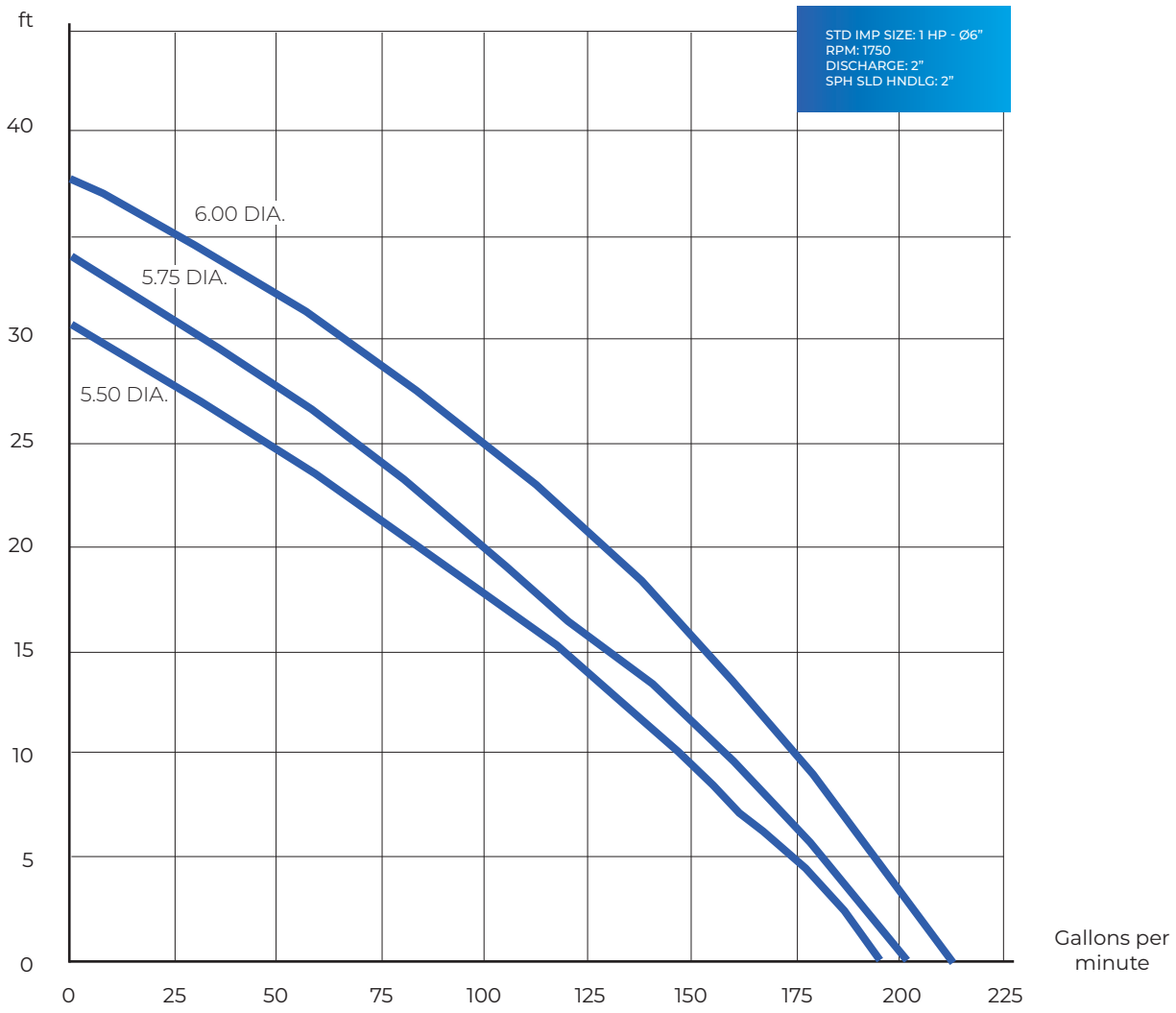
K3PL-S

1HP Solids Handling

- 2” Solids Handling
- 2“ - 3” NPT Vertical Discharge
- Please Specify
- Inboard Single Mechanical Seal
- Durable Cast Iron Construction
- Manual Models

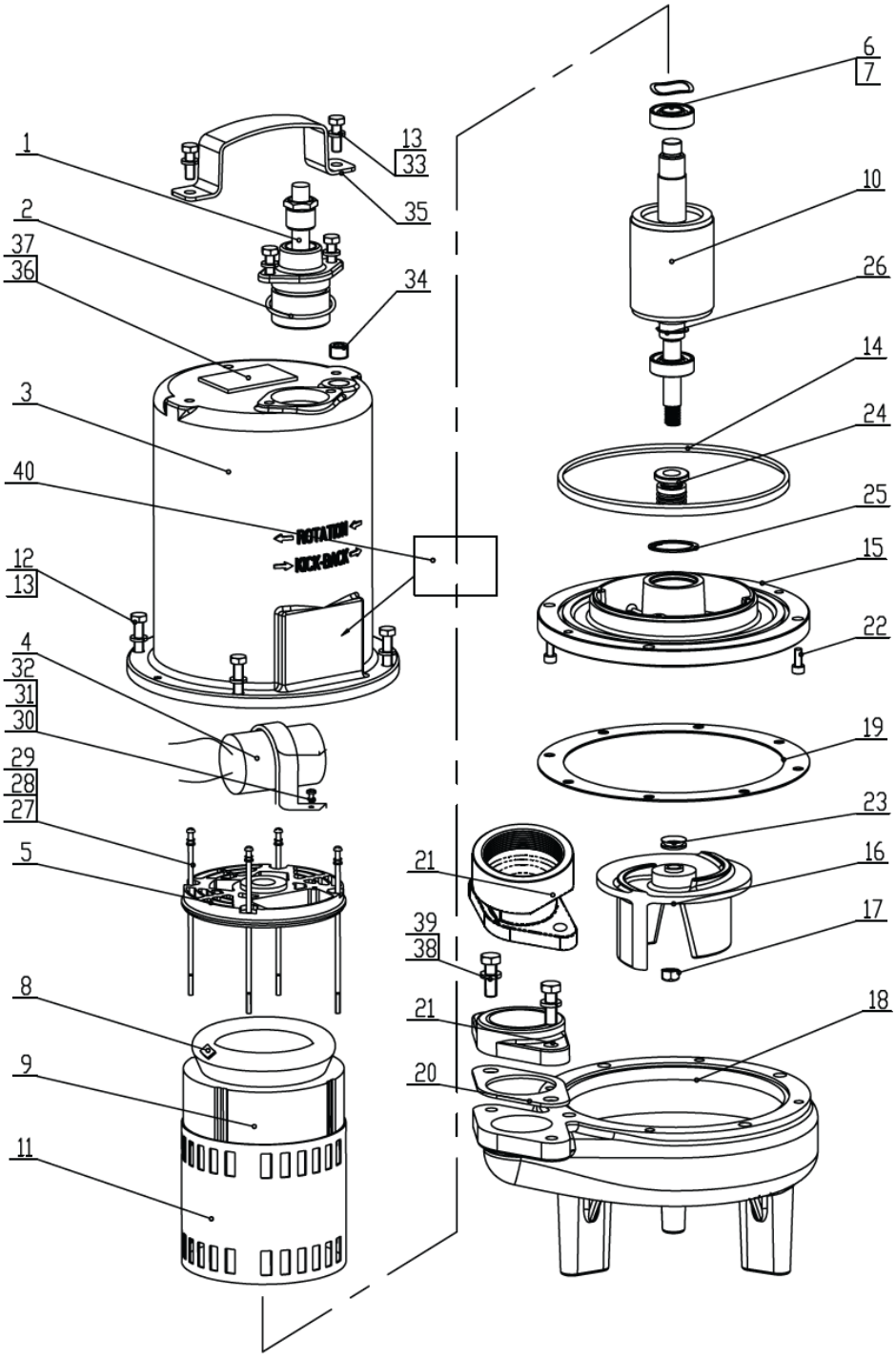
PUMP SERIES	K3PL-S		1HP 2 VANE SEMI-OPEN IMPELLER	
Speed	1750 RPM	Discharge	2”/3”	FULL IMPEL-

GPM:_____ TDH: _____



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.



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.

MODEL	PART NO.	HP	VOLTS		RPM	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	62180509	1	200	3	1750	6	16	B	14/4	SO	0.75”	82
K3PL10M4-23S	62180509	1	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

Available in 2” and 3” discharge - please specify

Installation, Operation & Maintenance Manual

SUBMERISIBLE SOLIDS HANDLING PUMPS

K2PLSE-SS & K3PL-S

0.5, 0.75 & 1 HP @ 1750 RPM

K2PLSE51SS
K2PLSE51A
K2PLSE52SS
K2PLSE53SS
K2PLSE54SS

0.5HP

K2SE72S
K2SE73S
K2SE74S

0.75HP



K3PL10M4-21S
K3PL10M4-03S
K3PL10M4-23S
K3PL10M4-43S

1HP



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 104º 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.

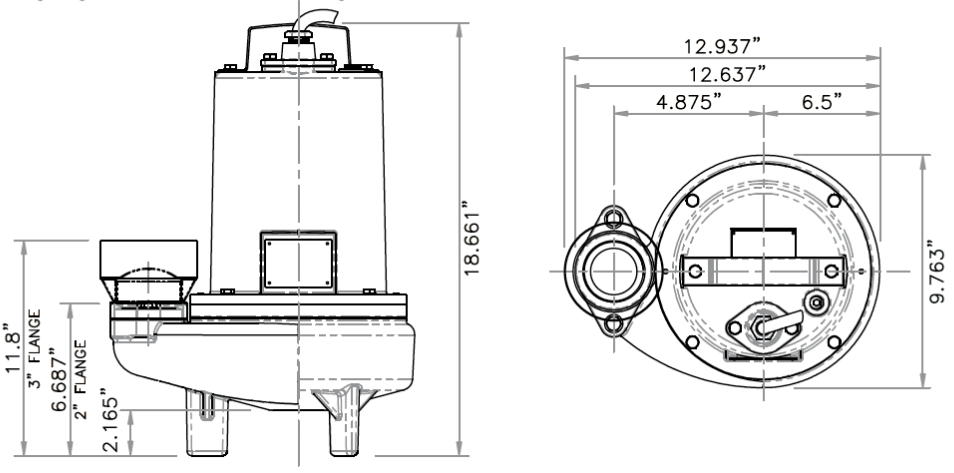
LOWER BEARING: Ball, single row, oil lubricated, for radial and thrust load.

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)
K2PLSE51SS	62180501	0.5	115	1	1750	11.6	18.4	D	14/3	SJO	0.5"	91
K2PLSE51A	62180501A	0.5	115	1	1750	11.6	18.4	D	14/4	SJO	0.5"	93
K2PLSE52SS	62180502	0.5	200/230	1	1750	5.9	14.9	B	14/3	SJO	0.5"	93
K2PLSE53SS	62180503	0.5	200/230	3	1750	4.6/4.2	9.7/11.1	K	14/3	SJO	0.5"	95
K2PLSE54SS	62180504	0.5	460	3	1750	2.2	5.3	K	14/3	SJO	0.5"	95
K2PLSE72SS	62180505	0.75	230	1	1750	10.5	17.5	D	14/3	SJO	0.5"	95
K2PLSE73SS	62180506	0.75	200/230	3	1750	5.5	16	D	12/4	SJO	0.625"	96
K2PLSE74SS	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 K2PLSE-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).

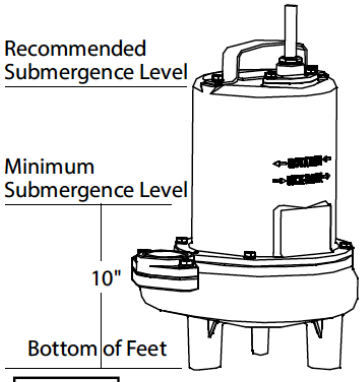


Figure 1

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.

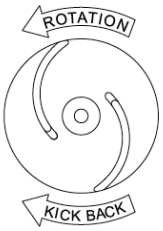
Temperature sensor electrical ratings		
Volts	Continuous amps	Starting amps
110-120	3	30
220 - 240	1.5	15
440 - 480	0.75	7.5
600	0.6	6

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.

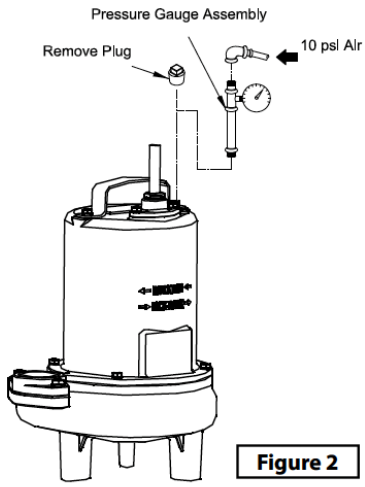


Figure 2

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.

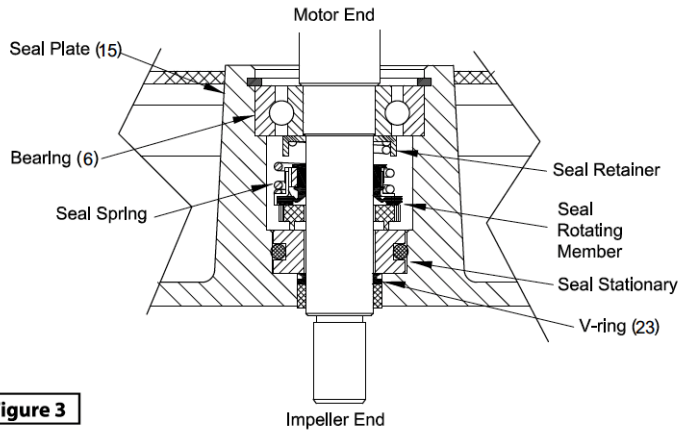
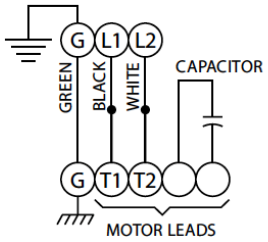


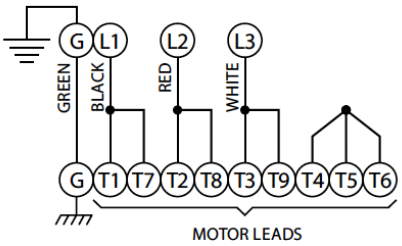
Figure 3

SINGLE-PHASE 115/230V AC
POWER CORD 3x14



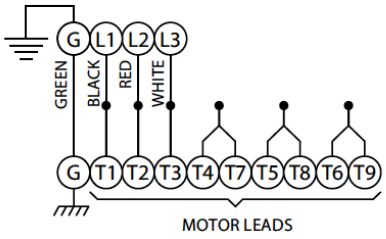
Single phase 115 - 230 VAC	
Cable	# motor line
Green	Green
Black	1
White	2
Female terminal	Capacitor
Male terminal	Capacitor

THREE-PHASE 208/230V AC
POWER CORD 4x12



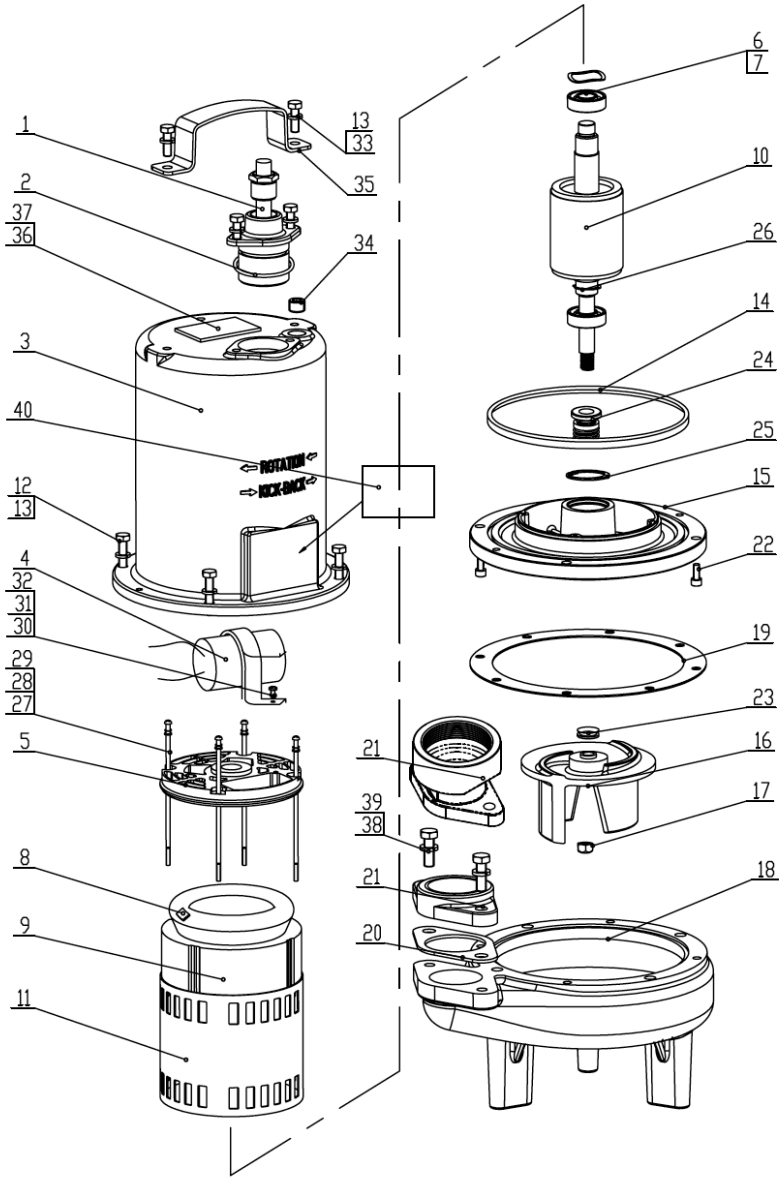
Three phase, 230 VAC	
Cable	# motor line
Green	Green
Black	1 & 7
Red	2 & 8
White	3 & 9
	4, 5 & 6 together

THREE-PHASE 460V AC
POWER CORD 4x12



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		CORRECTIVE ACTION
A) Pump will not run.	Poor electrical connection, blown fuse, tripped breaker or other interruption of power; improper power supply.	(1)	**(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.
	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)	

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.

K3PL - Troubleshooting Chart

SYMPTOM	POSSIBLE CAUSE		CORRECTIVE ACTION
D) Pump delivers insufficient capacity.	Incorrect low voltage.	(1)	**(9)** Open the valve.
	Discharge restricted.	(7)	
	Check valve is partially closed or installed backward.	(8)	**(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.
	Shut-off valve closed.	(9)	
	The impeller is jammed or the shaft is loose, worn or damaged, or inlet plugged.	(10)	**(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.
	Pump may be air locked casuing pump not to flow.	(11)	**(12)** Check rotation. If power supply is three phase, reverse any two of three power supply leads to ensure proper impeller rotation.
	Pumprunning backwards.	(12)	**(13)** Repair fixtures as required to eliminate leakage.
E) The pump turns on and off very frequently (more than usual).	Check valve is partially closed or installed backward.	(8)	**(14)** Check the temperature of the liquid to be pumped, which must not exceed 160 ° F (71 ° C).
	fixtures are leaking.	(13)	**(15)** Replace portion of discharge pipe with flexible connector or tighten existing piping..
	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)	**(17)** Check for leaks around basin inlet and outlets.
	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)	

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.

KEEN PUMP'S 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 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 range 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.

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 ts 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 speci cations.

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 nonoverloading 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 – 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.



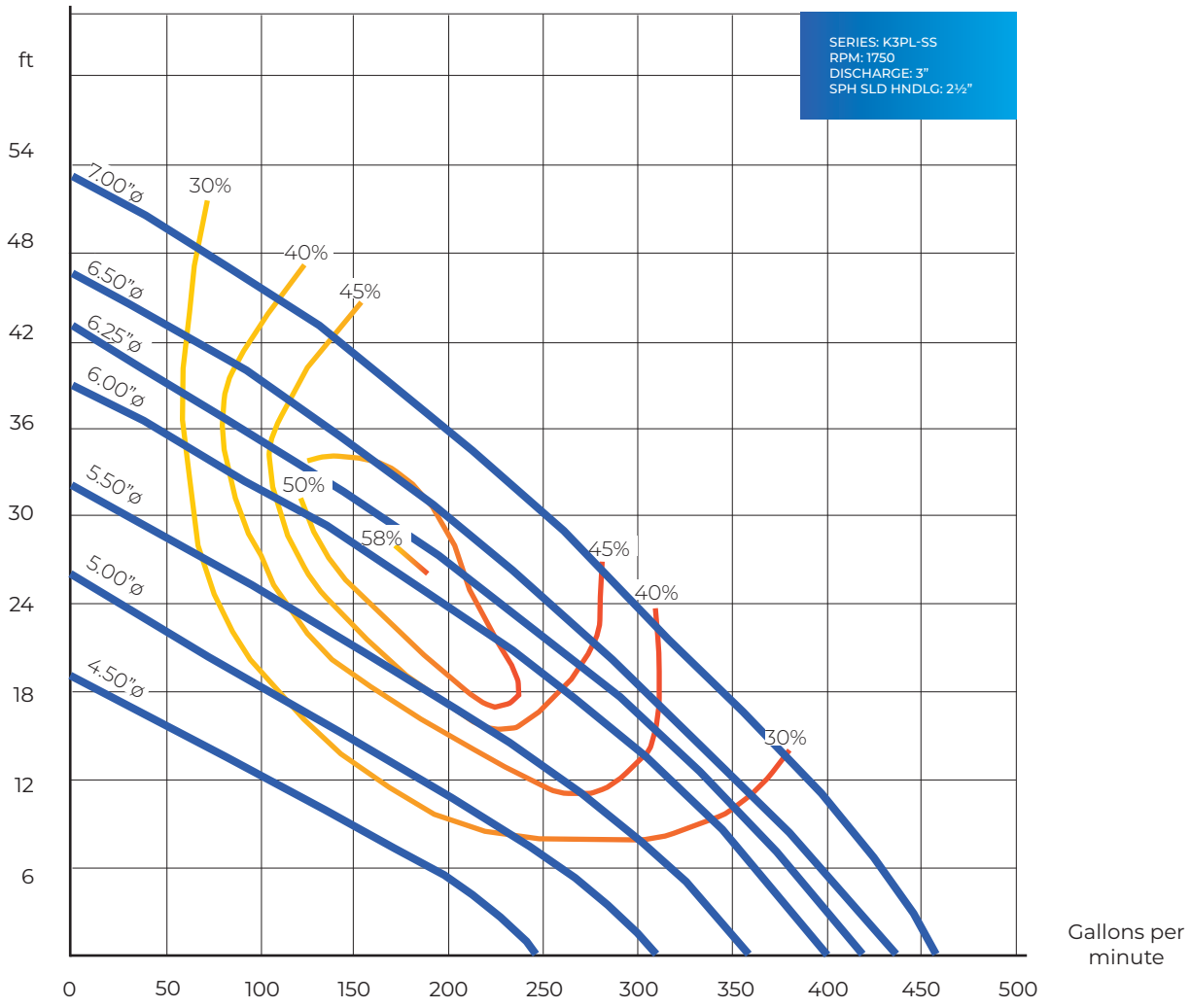
K3PL-S

1.5HP & 2HP Solids Handling

- 2 1/2” Solids Handling
- 3” NPT Vertical Discharge
- Inboard Single Mechanical Seal
- Durable Cast Iron Construction
- Manual Models

PUMP SERIES	K3PL-S		1.5HP & 2HP 2 VANE SEMI-OPEN IMPELLER	
Speed	1750 RPM	Discharge	3”	FULL IMPELLER

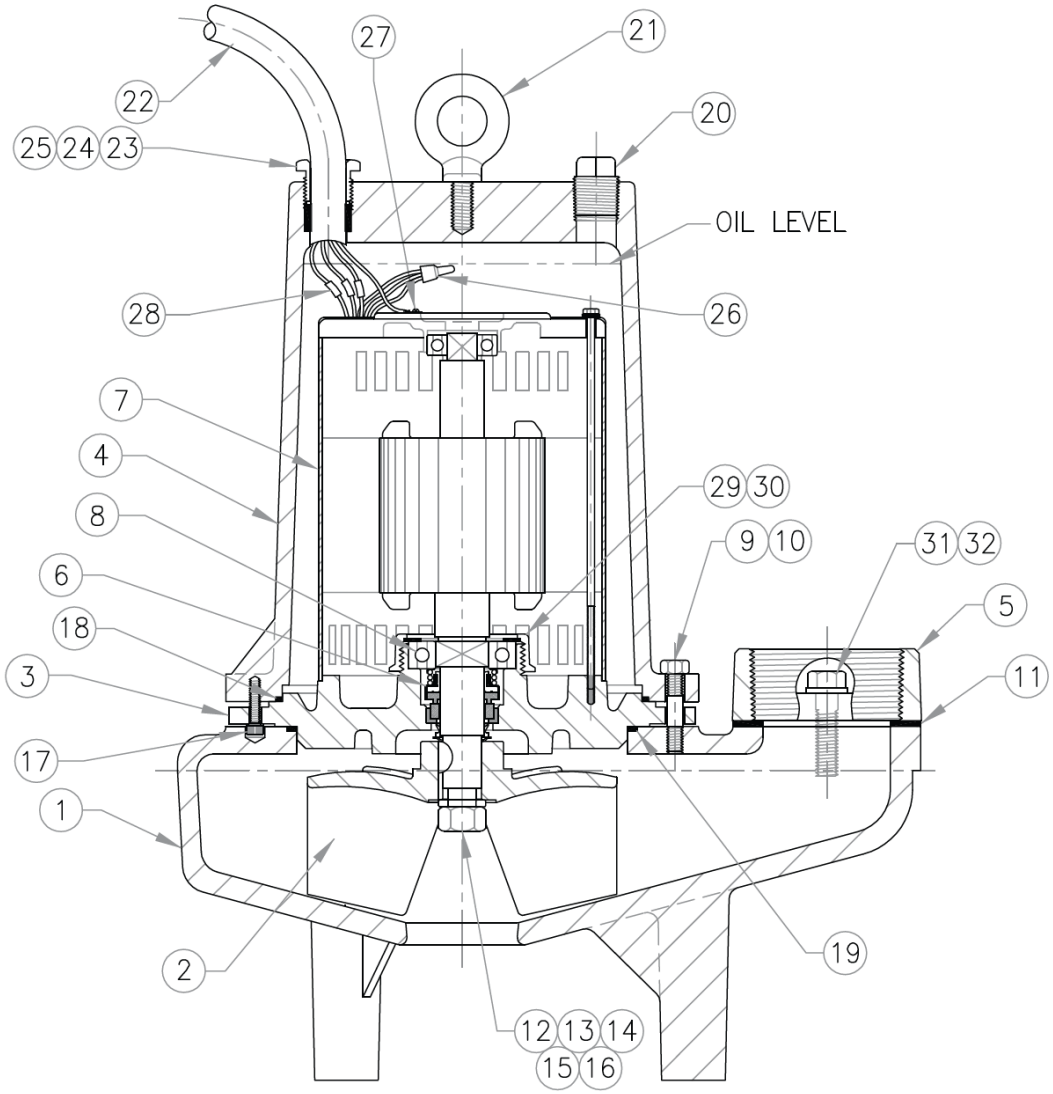
GPM:_____ TDH: _____



IMPORTANT!

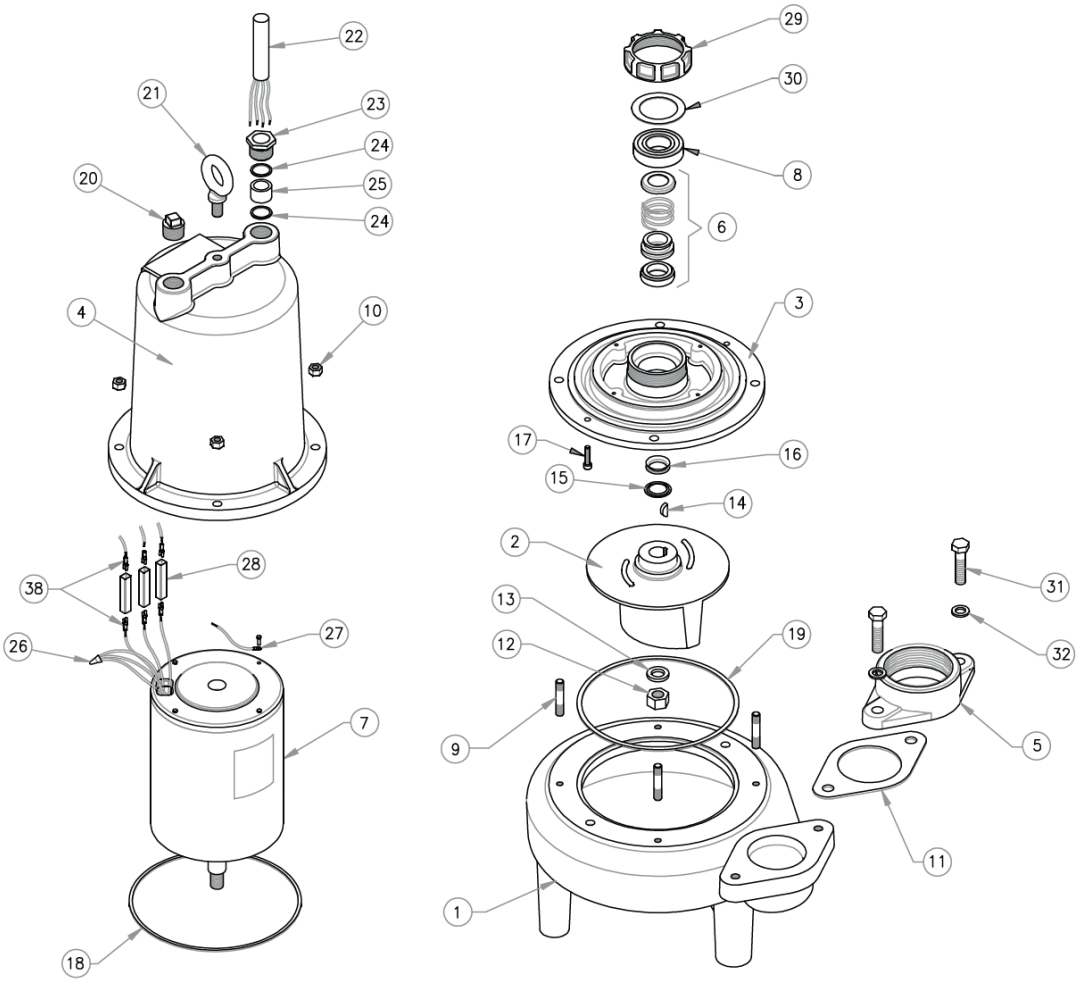
1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated “dry” for extended periods without damage to motor and or/seals.
4. Testing is performed with water specific gravity of 1.0 @ 68°F (20°C); other fluids may vary performance.

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



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.

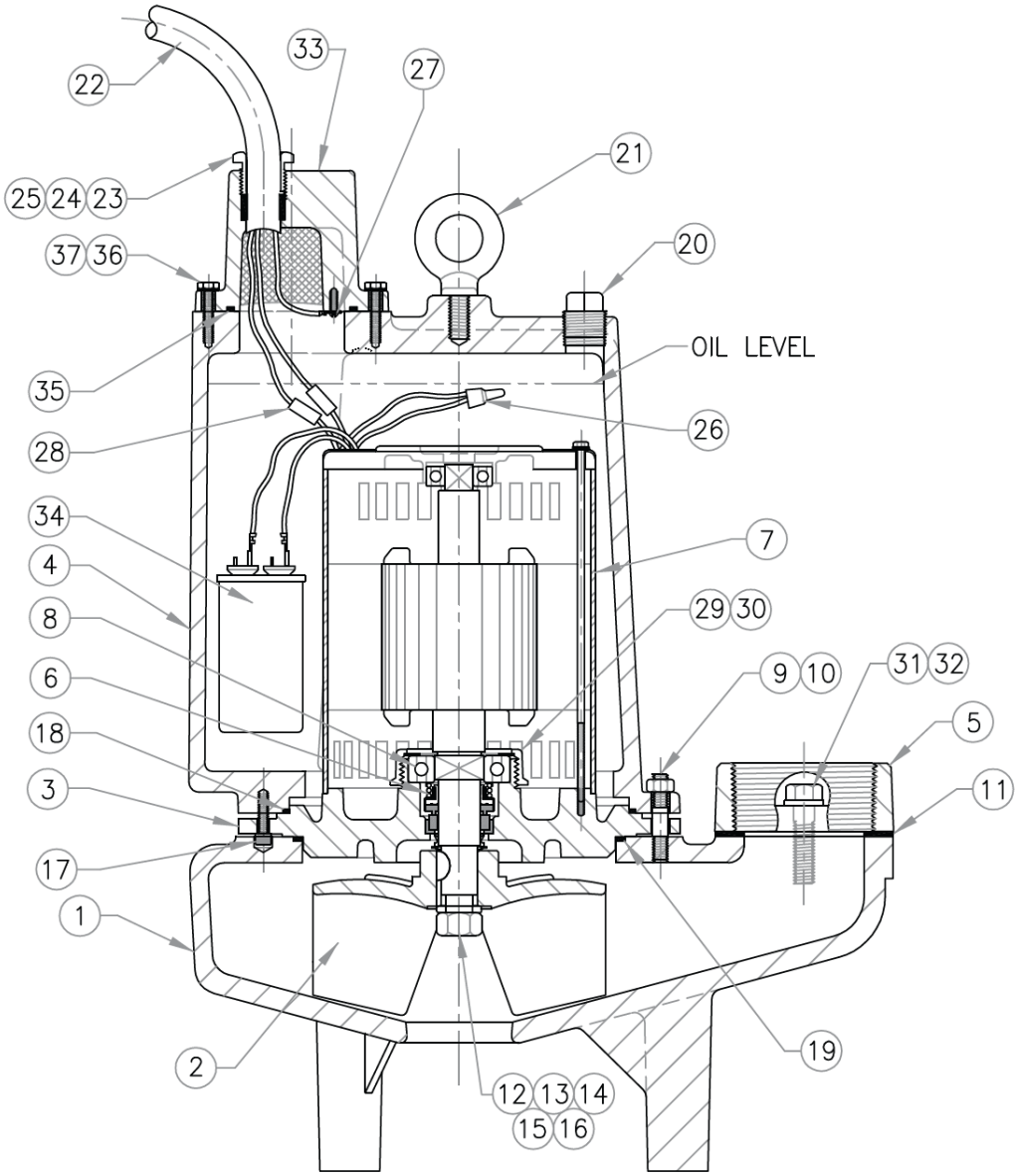
K3PL15M4-03S. K3PL15M4-23S, K3PL15M4-43S, K3PL20M4-03S, K3PL20M4-23S, K3PL20M4-43S

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.

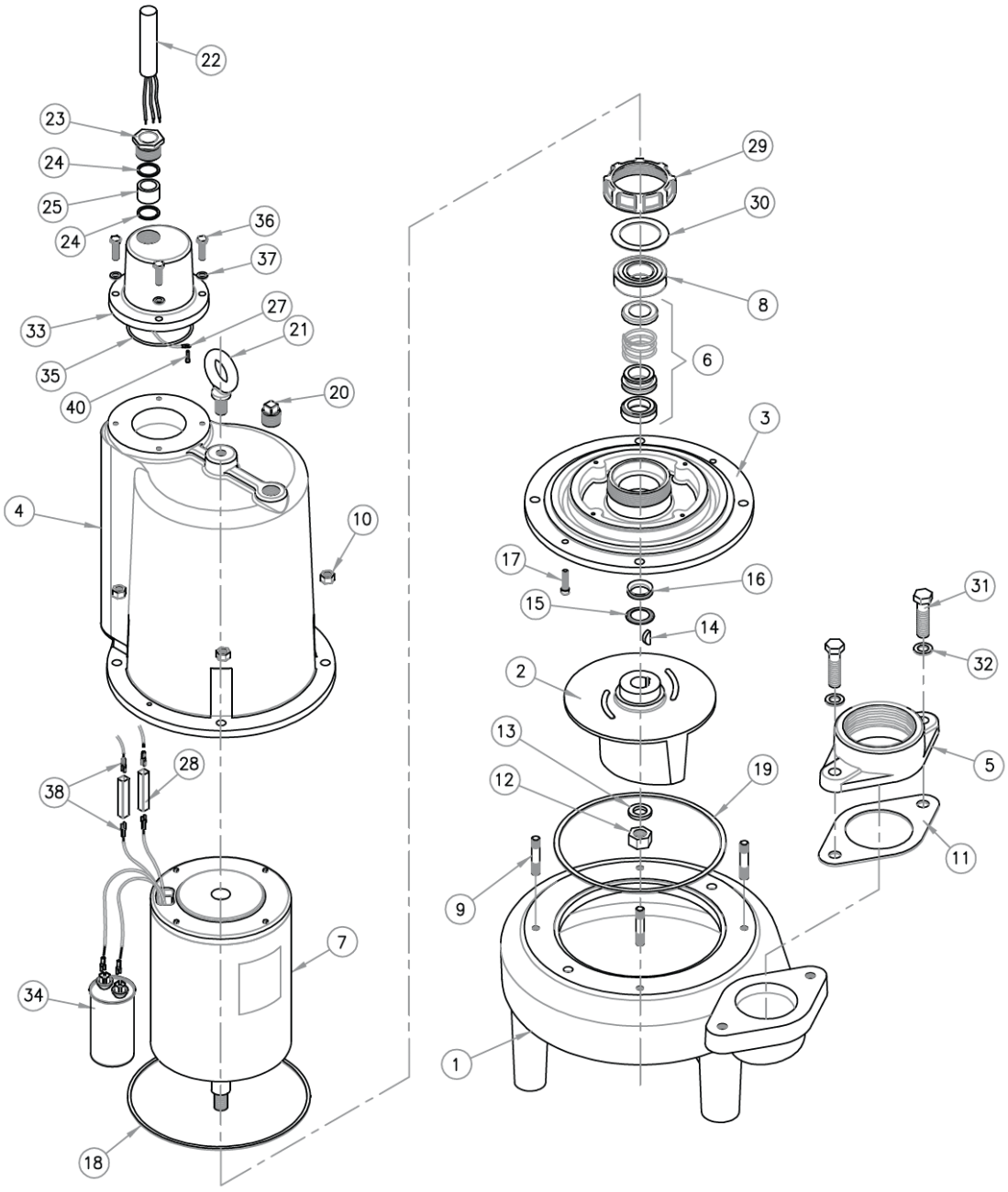
For Repair Part Please Supply:
Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

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



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.

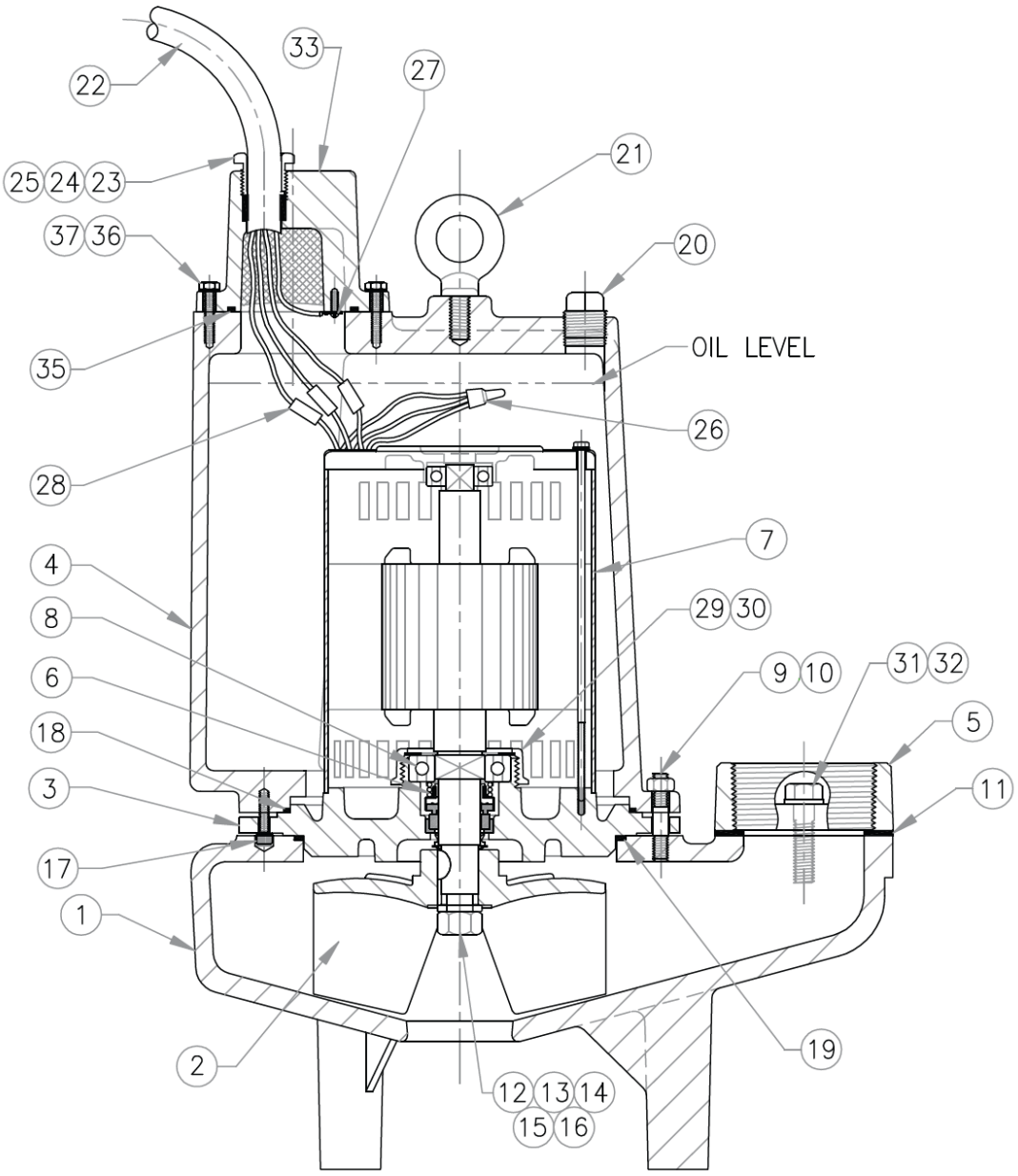
K3PL15M4-21S, K3PL20M4-21S, K3PL30M4-21S

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.

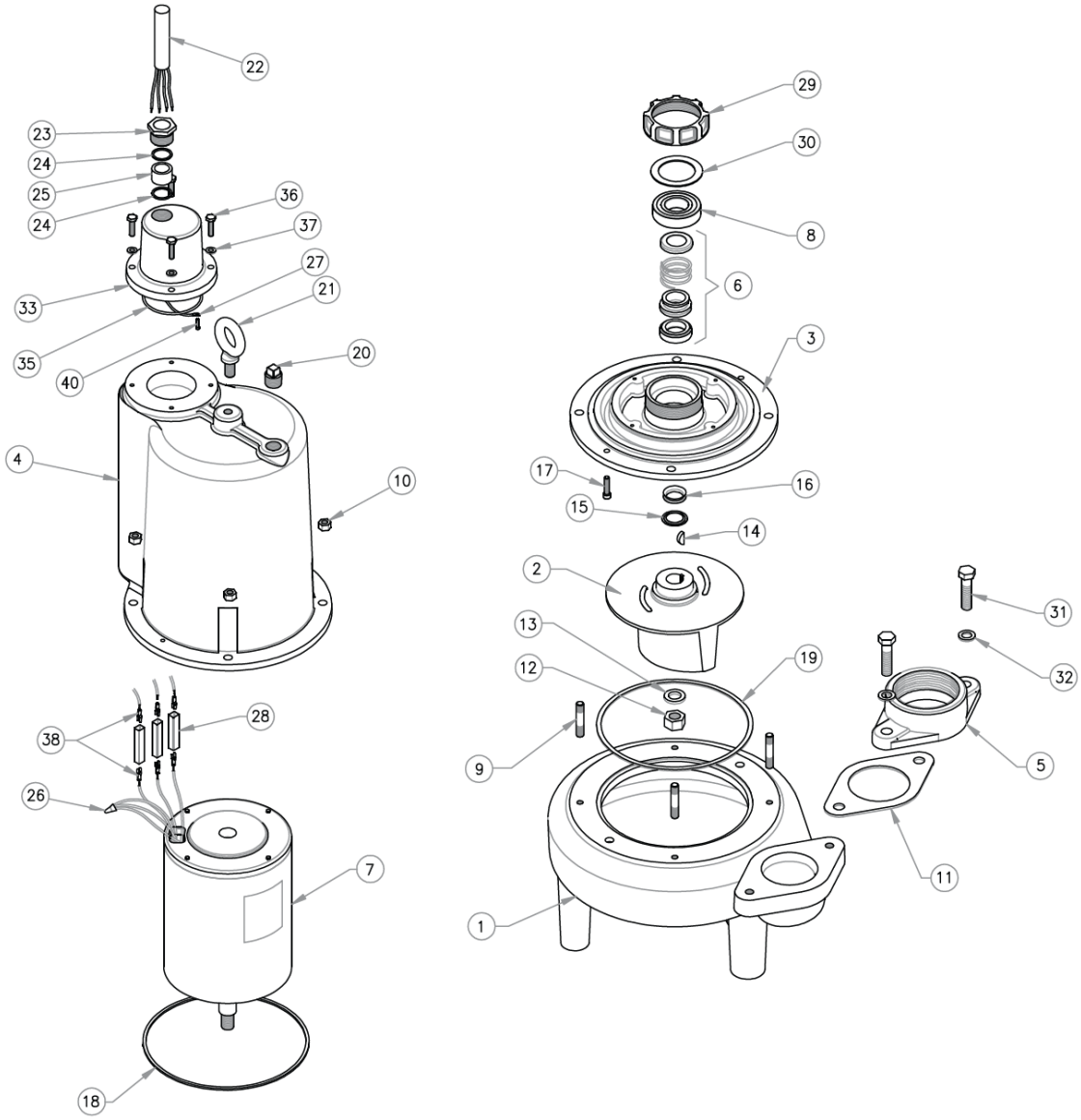
For Repair Part Please Supply:
Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

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



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.

MODEL	PART NO.	HP	VOLTS	PHASE	RPM	MAX AMPS	LOCKED ROTOR AMPS	NEMA CODE	CORD SIZE	CORD TYPE	CORD O.D.	WEIGHT (POUNDS)
K3PL15M4-21S	62170010	1.5	230	1	1750	12.6	23	B	10/3	SJO	25'	225
K3PL15M4-03S	62170011	1.5	200	3	1750	11.6	36	H/L	10/4	SJO	25'	207
K3PL15M4-23S	62170011	1.5	230	3	1750	11.6	36	H/L	10/4	SJO	25'	207
K3PL15M4-43S	62170012	1.5	460	3	1750	5.8	17.5	L	10/4	SJO	25'	229
K3PL20M4-21S	62170013	2	230	1	230	14.5	29	B	10/3	SJO	25'	207
K3PL20M4-03S	62170014	2	200	3	200	14	50.8	J/M	10/4	SJO	25'	207
K3PL20M4-23S	62170014	2	230	3	230	14	50.8	J/M	10/4	SJO	25'	207
K3PL20M4-43S	62170015	2	460	3	460	7	25.4	M	10/4	SJO	25'	207

Installation, Operation & Maintenance Manual

SUBMERISIBLE SOLIDS HANDLING PUMPS

K2PLSE-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

1.5-2HP



K3PL30M4-21S
K3PL30M4-03S
K3PL30M4-23S
K3PL30M4-43S

3HP



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 104º 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.

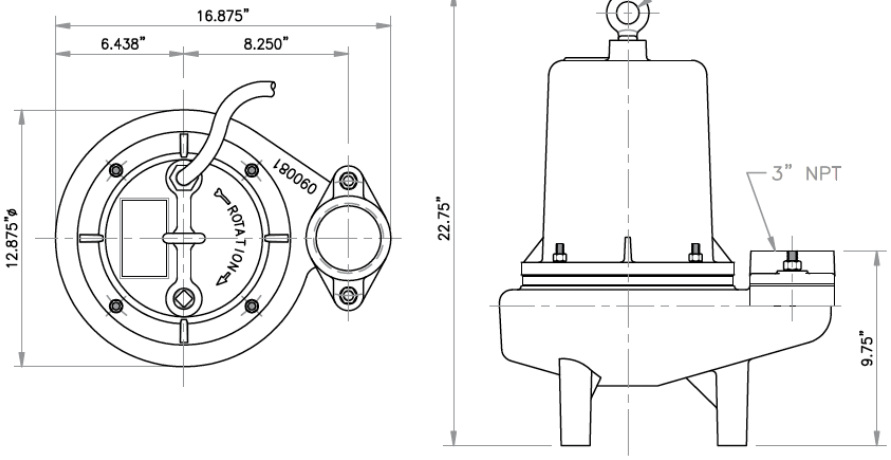
LOWER BEARING: Ball, single row, oil lubricated, for radial and thrust load.

MOTOR: ***Single phase:*** NEMA L, permanent split capacitor, oil filled, with overload protection in motor.

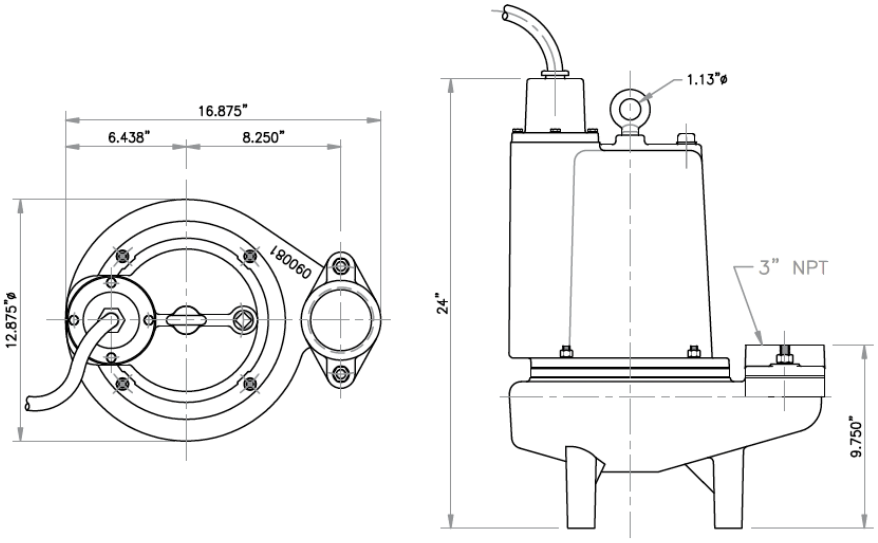
Three phase: NEMA B, oil filled. Requires overload protection to be included in control panel.

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).

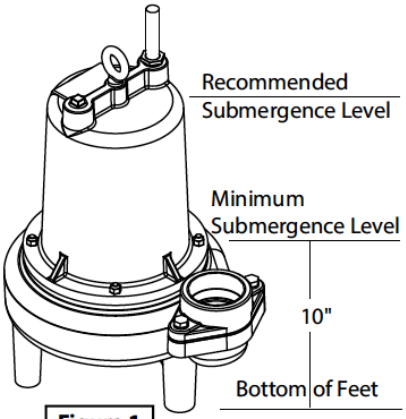


Figure 1

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.

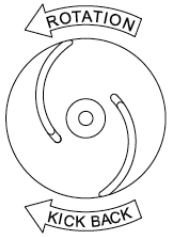
TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
110-120	3.00	30.0
220-240	1.50	15.0
440-480	0.75	7.5
600	0.60	6.0

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.

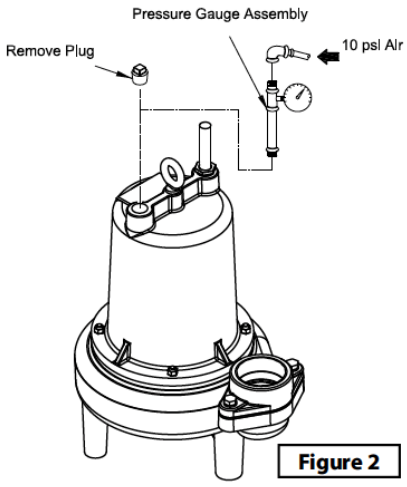


Figure 2

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.

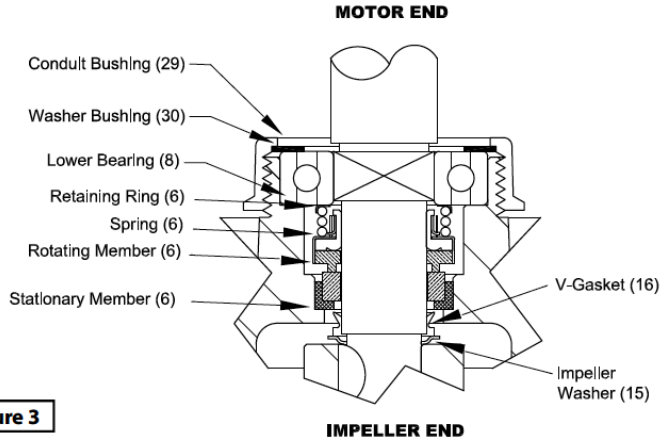


Figure 3

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.

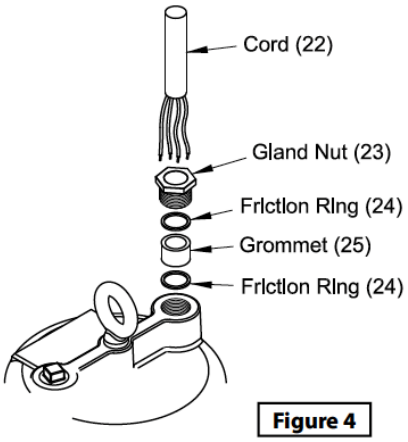


Figure 4

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

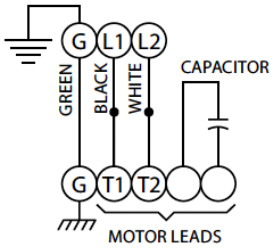


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1
White	2
Flag terminal	Capacitor
Flag terminal	Capacitor

THREE-PHASE 460V AC
POWER CORD 4x12

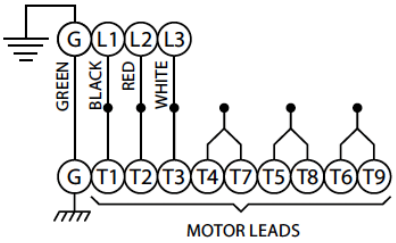


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1
Red	2
White	3
	4 and 7 together
	5 and 8 together
	6 and 9 together

THREE-PHASE 208/230V AC
POWER CORD 4x12

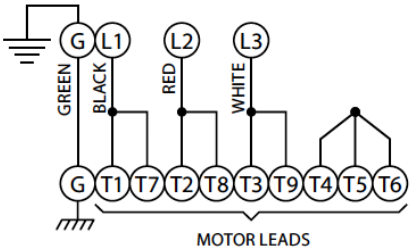
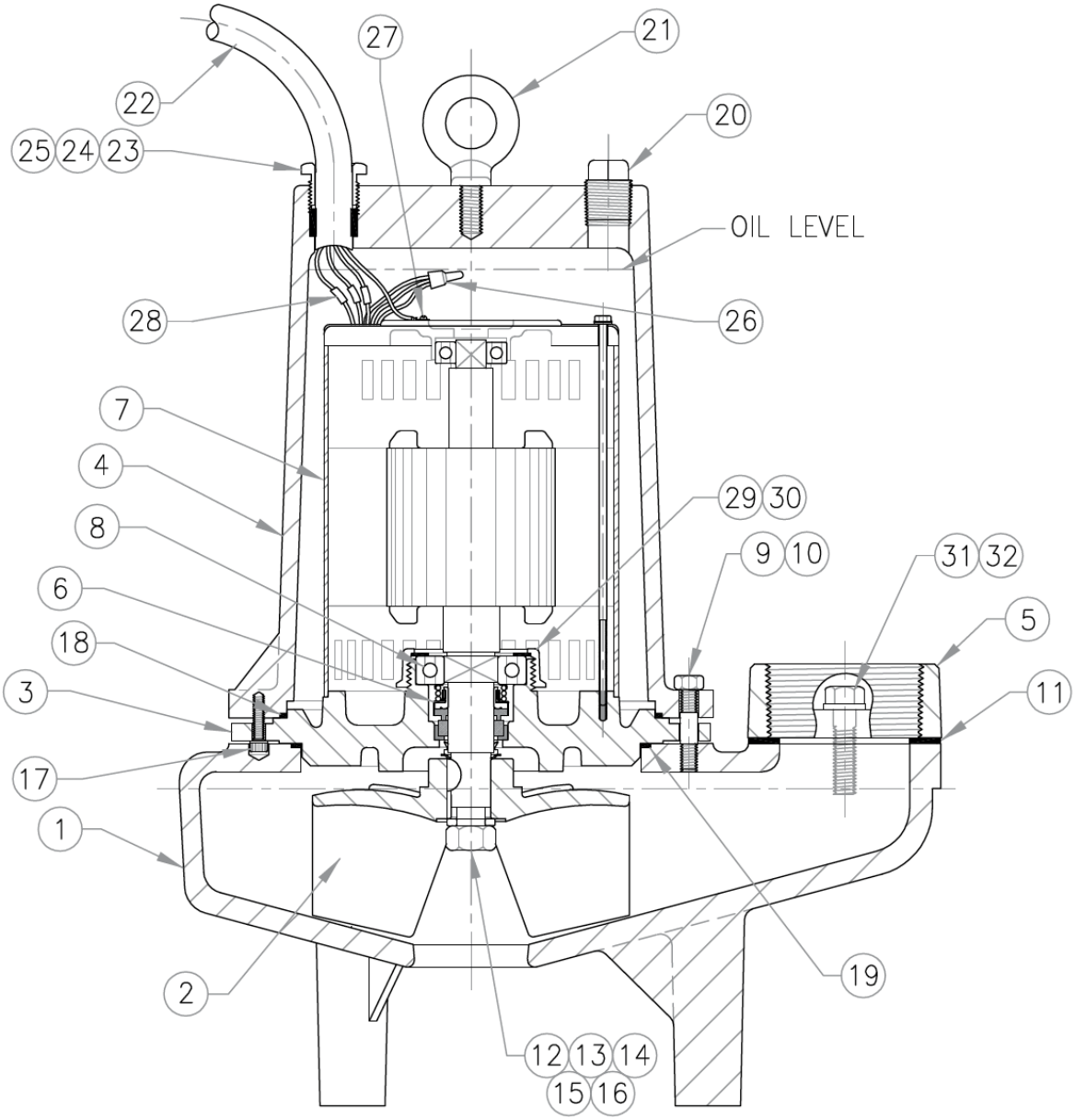


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1 and 7
Red	2 and 8
White	3 and 9
	4, 5 and 6 together

Figure 8

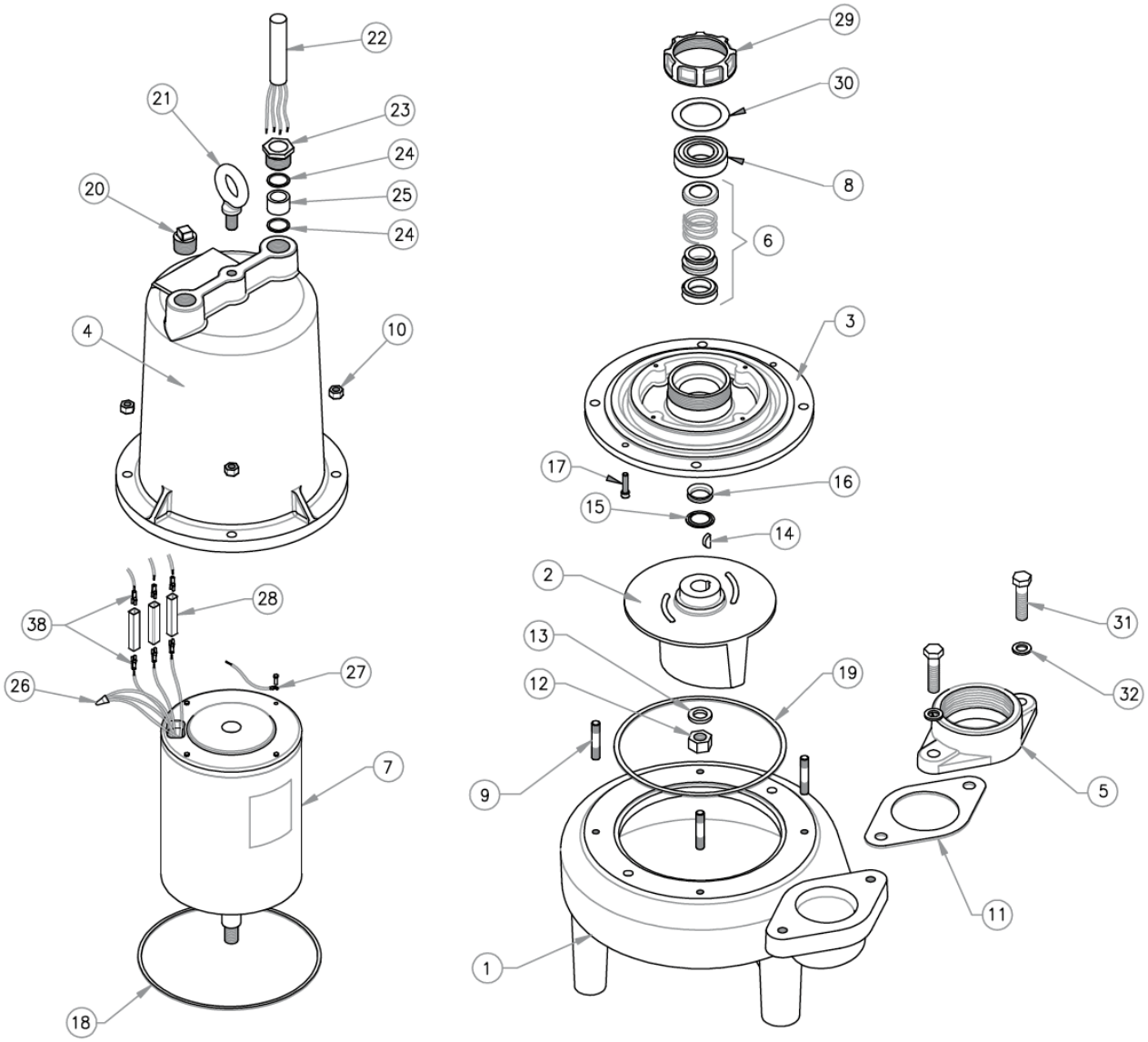
K3PL15M4-03S, K3PL15M4-23S, K3PL15M4-43S, K3PL20M4-03S, K3PL20M4-23S, K3PL20M4-43S



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

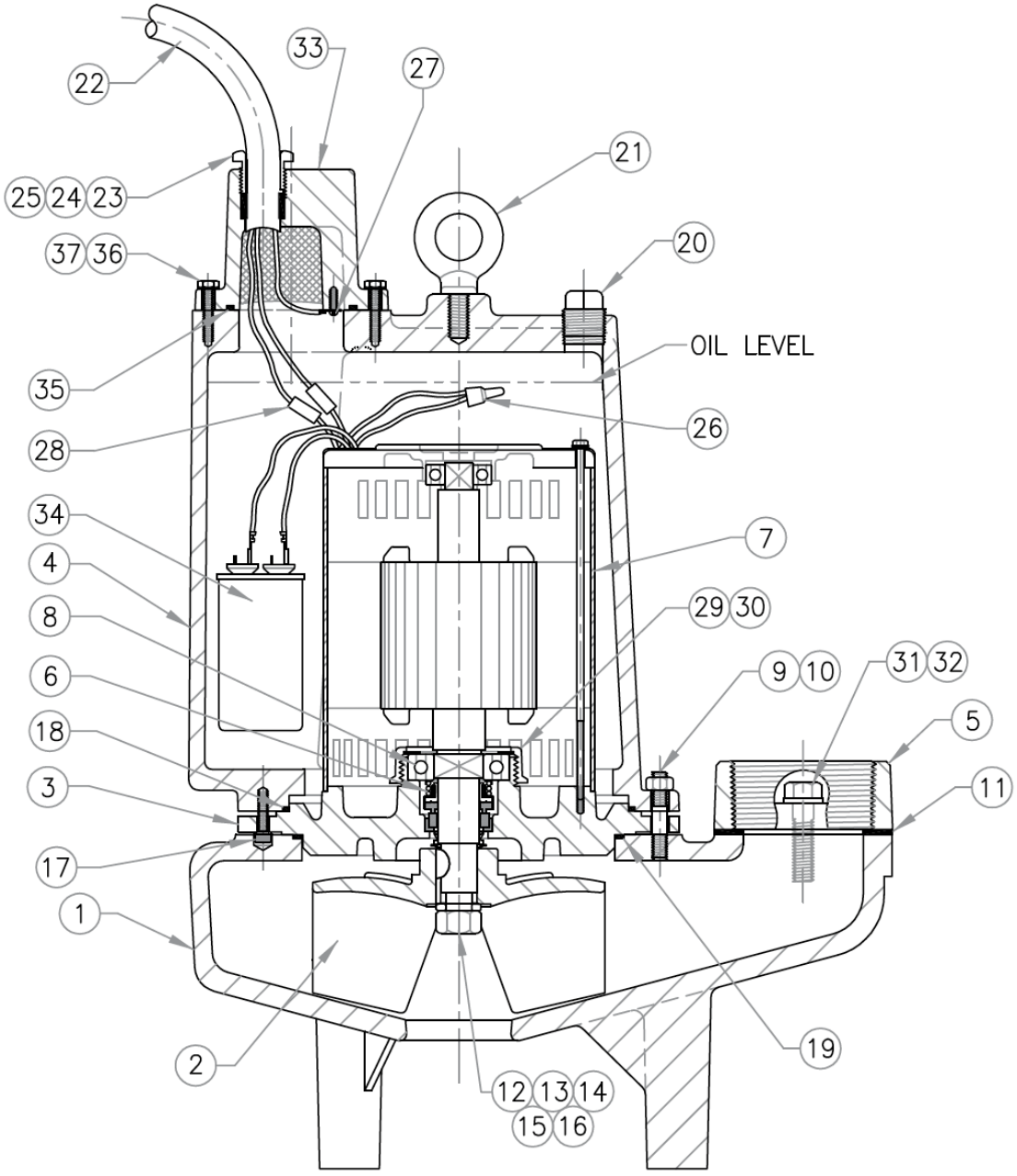
ITEM	QTY.		DESCRIPTION	PART No.
1	1		Volute	03090034
2	1	■	Impeller 6.25"Ø (For K3PL15M4-03/23S & K3PL15M4-43S)	03140029B
			Impeller 7.00"Ø (For K3PL20M4-03/23S & K3PL20M4-43S)	03140029
3	1		Seal Plate	03180012
4	1		Motor Housing	03100002
5	1		Discharge Flange	03060014
6	1	▲	Shaft Seal - Silicon Carbide	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

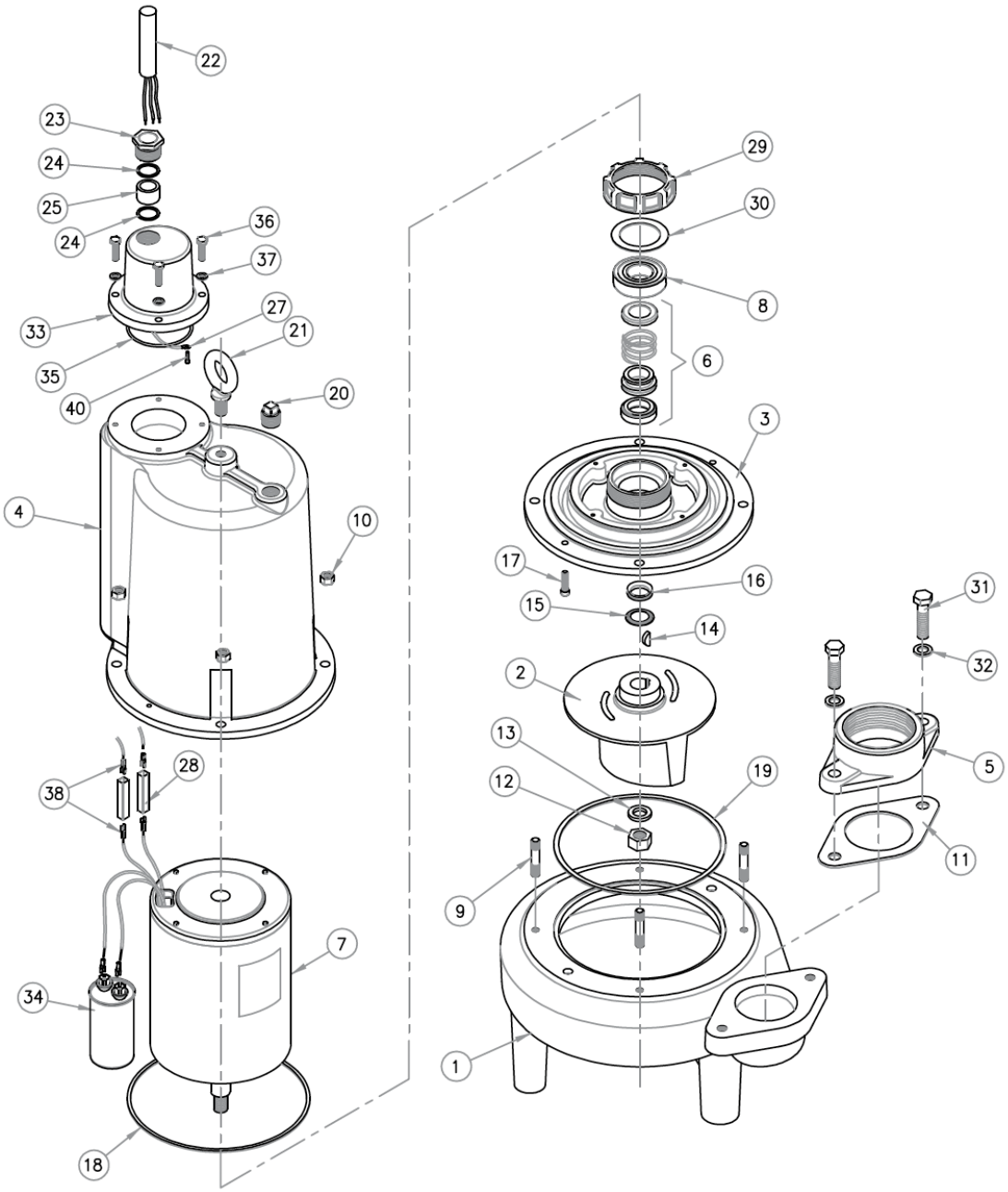
▸ **K3PL15M4-21S, K3PL20M4-21S, K3PL30M4-21S**



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

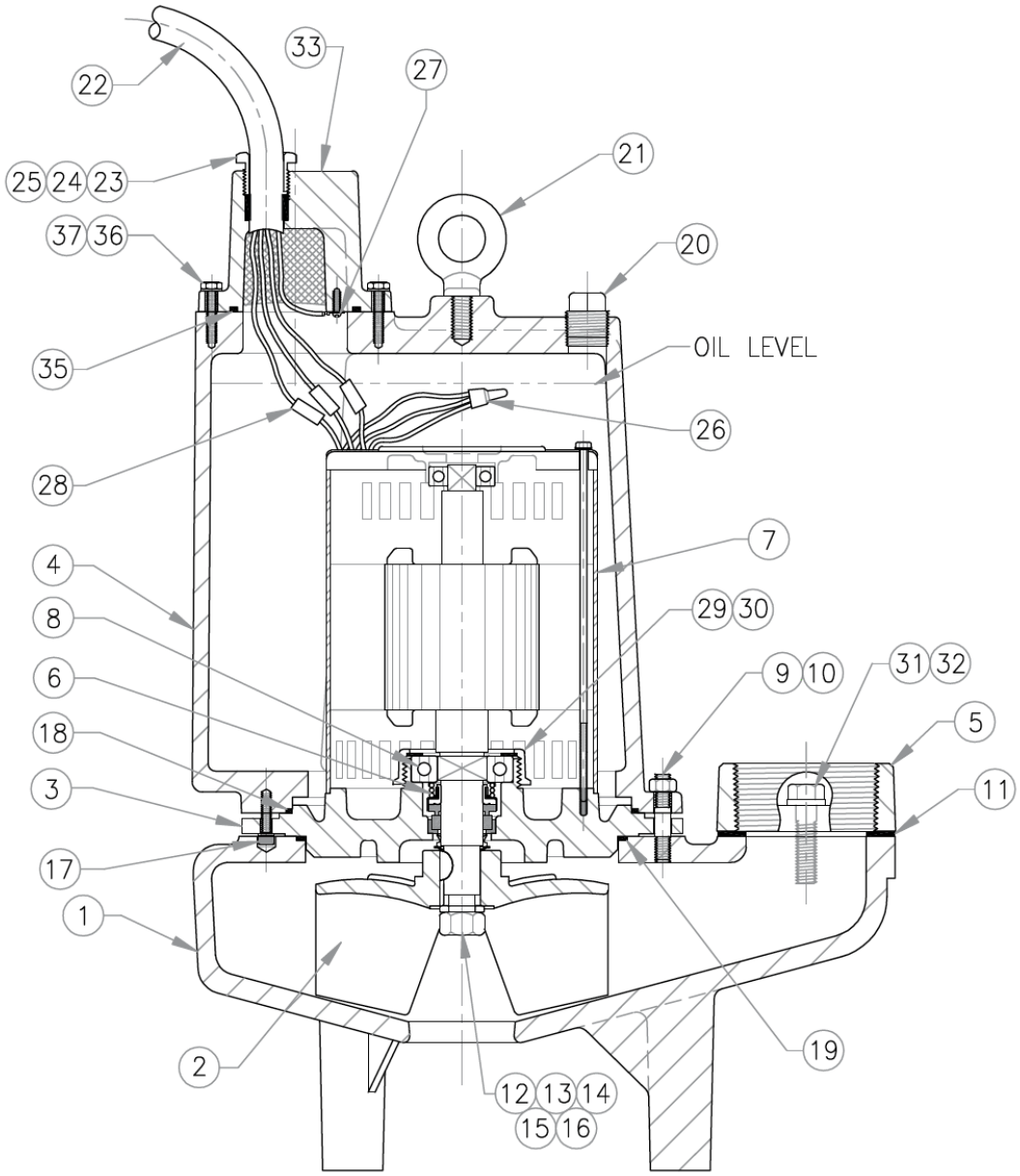
ITEM	QTY.		DESCRIPTION	PART No.
1	1		Volute	03090034
2	1	■	Impeller 6.25"Ø (For K3PL15M4-21S)	03140029B
			Impeller 7.00"Ø (For K3PL20M4-21S)	03140029
			Impeller 7.50"Ø (For K3PL30M4-21S)	03140093
3	1		Seal Plate	03180012
4	1		Motor Housing	03100009
5	1		Discharge Flange	03060014
6	1	▲	Shaft Seal - 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

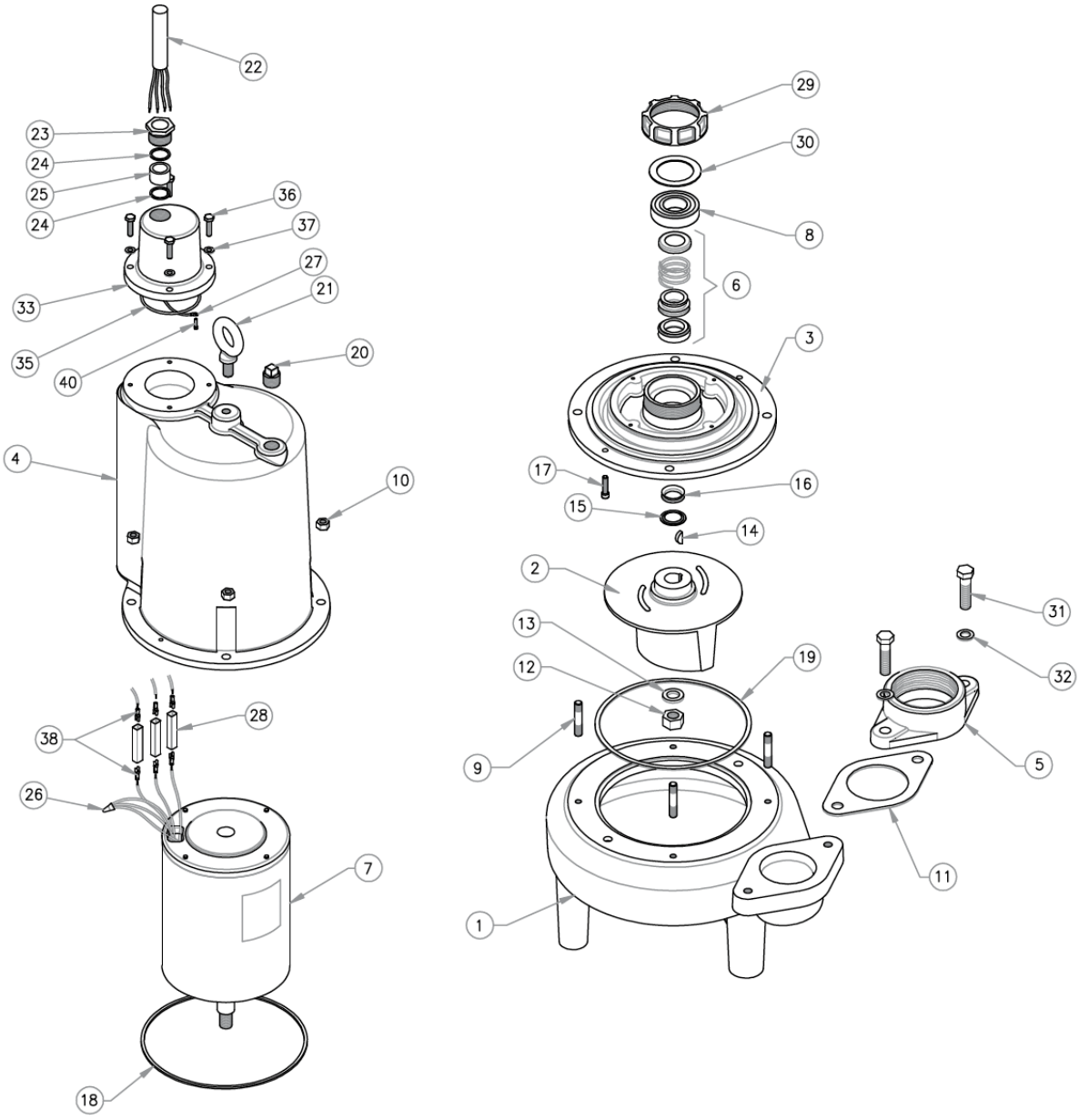
▸ **K3PL30M4-03S, K3PL30M4-23S, K3PL30M4-43S**



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)	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 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 PUMP'S 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 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 range 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.

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 ts 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 speci cations.

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 nonoverloading 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 – 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.



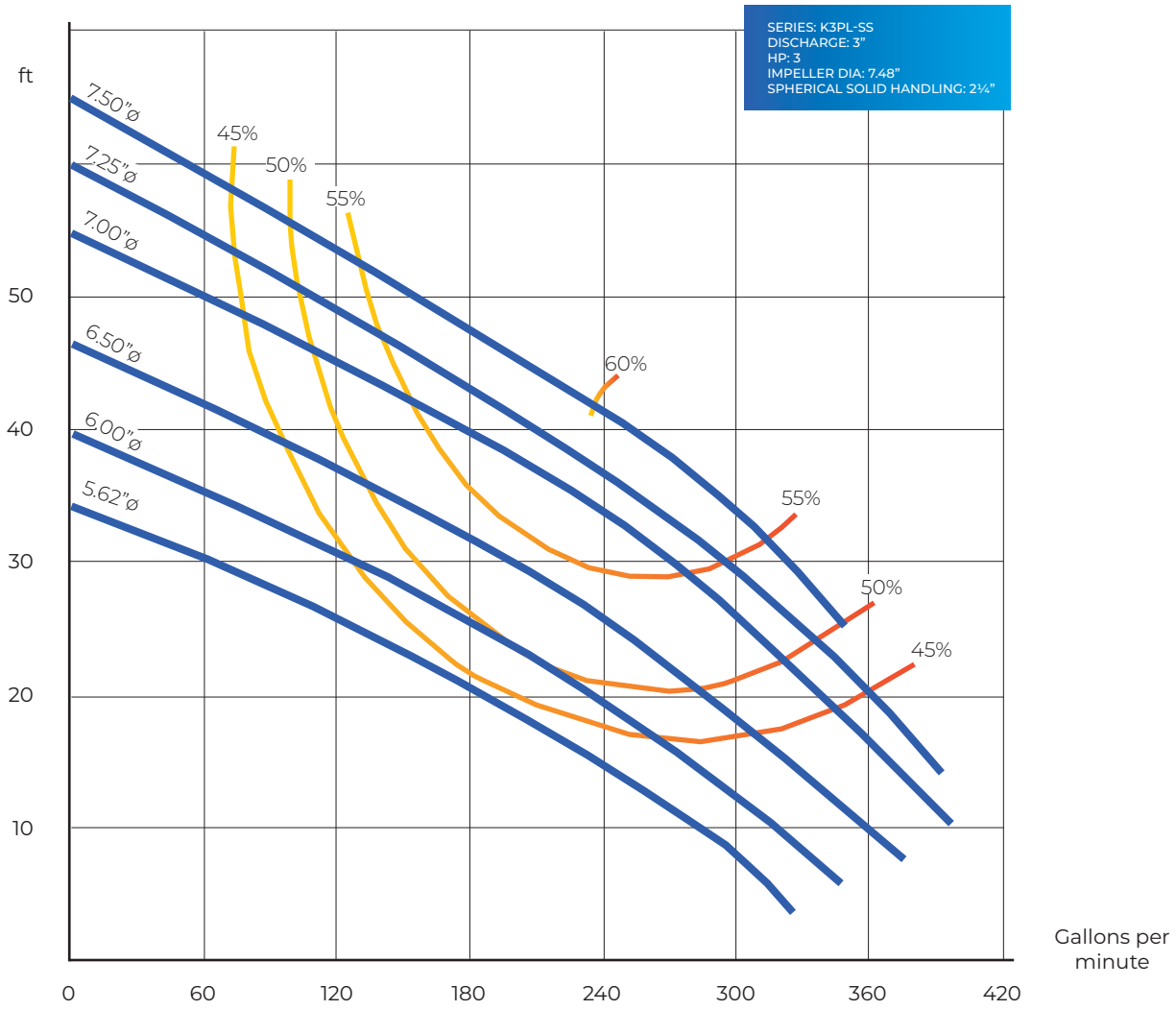
K3PL-S

3HP Solids Handling

- 2 1/2” Solids Handling
- 3” NPT Vertical Discharge
- Inboard Single Mechanical Seal
- Durable Cast Iron Construction
- Manual Models

PUMP SERIES	K3PL-S		3HP 2 VANE SEMI-OPEN IMPELLER	
Speed	1750 RPM	Discharge	3”	FULL IMPELLER

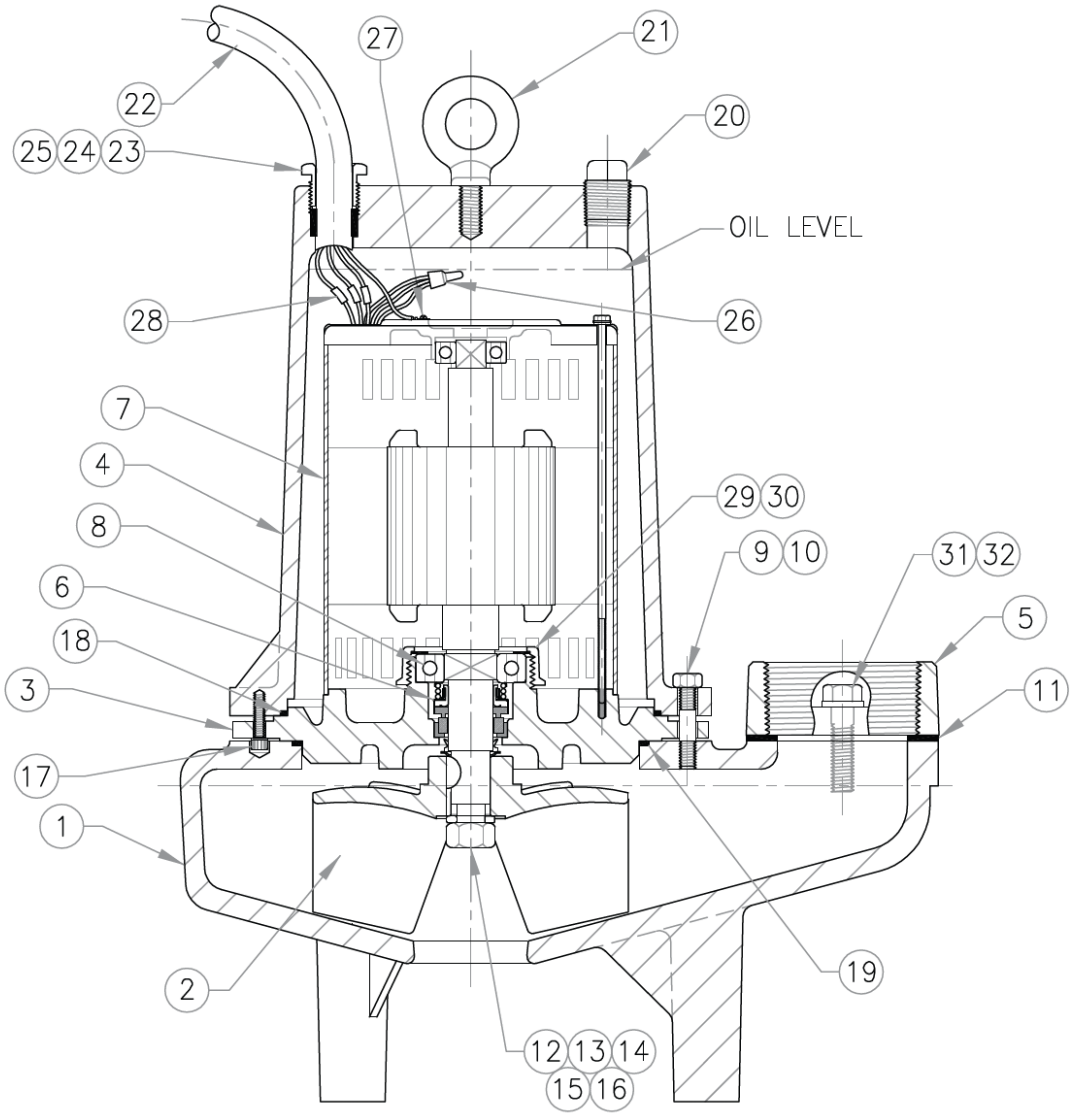
GPM:_____ TDH: _____



IMPORTANT!

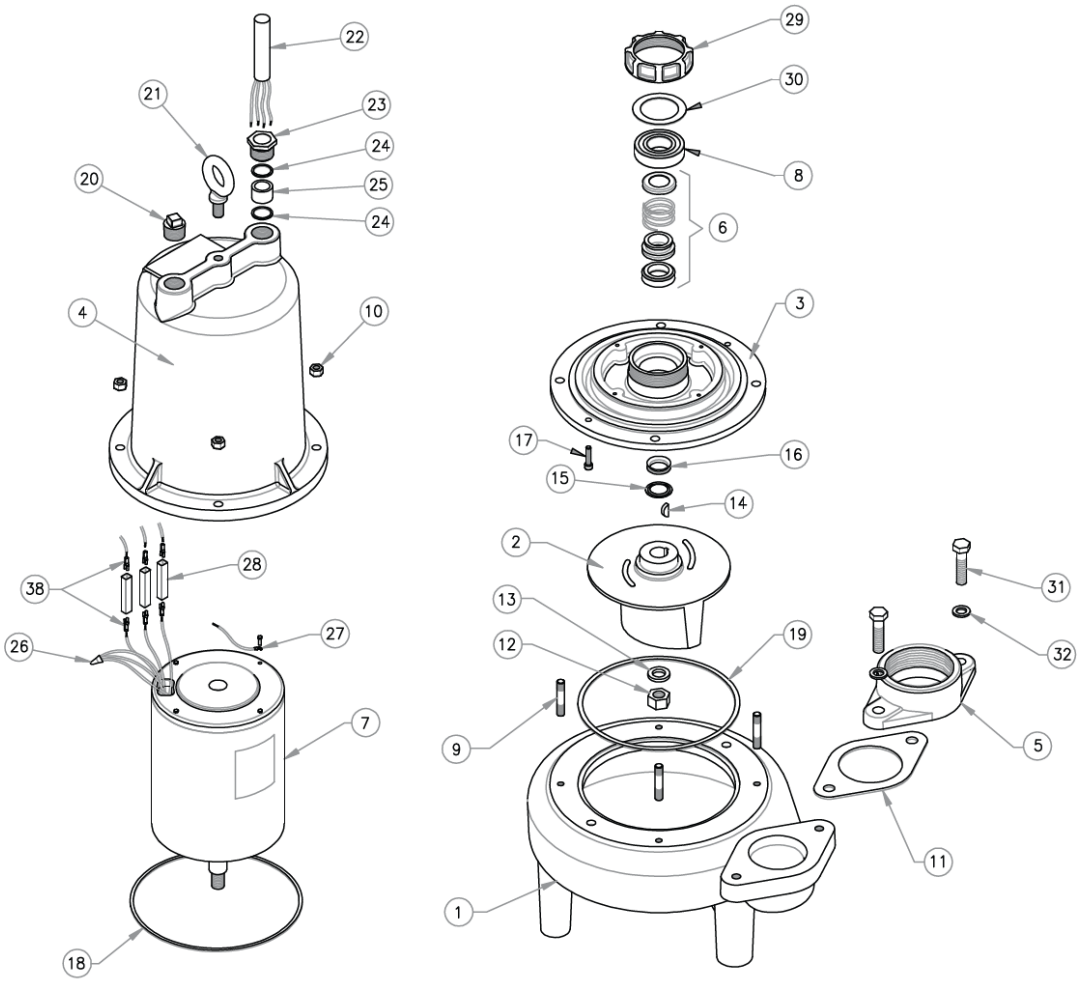
1. Never use this pump to handle explosive liquids.
2. This pump is not approved to be used in swimming pools, recreational installations or any application where human contact may be common.
3. Pump may be operated “dry” for extended periods without damage to motor and or/seals.
4. Testing is performed with water specific gravity of 1.0 @ 68°F (20°C); other fluids may vary performance.

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



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.

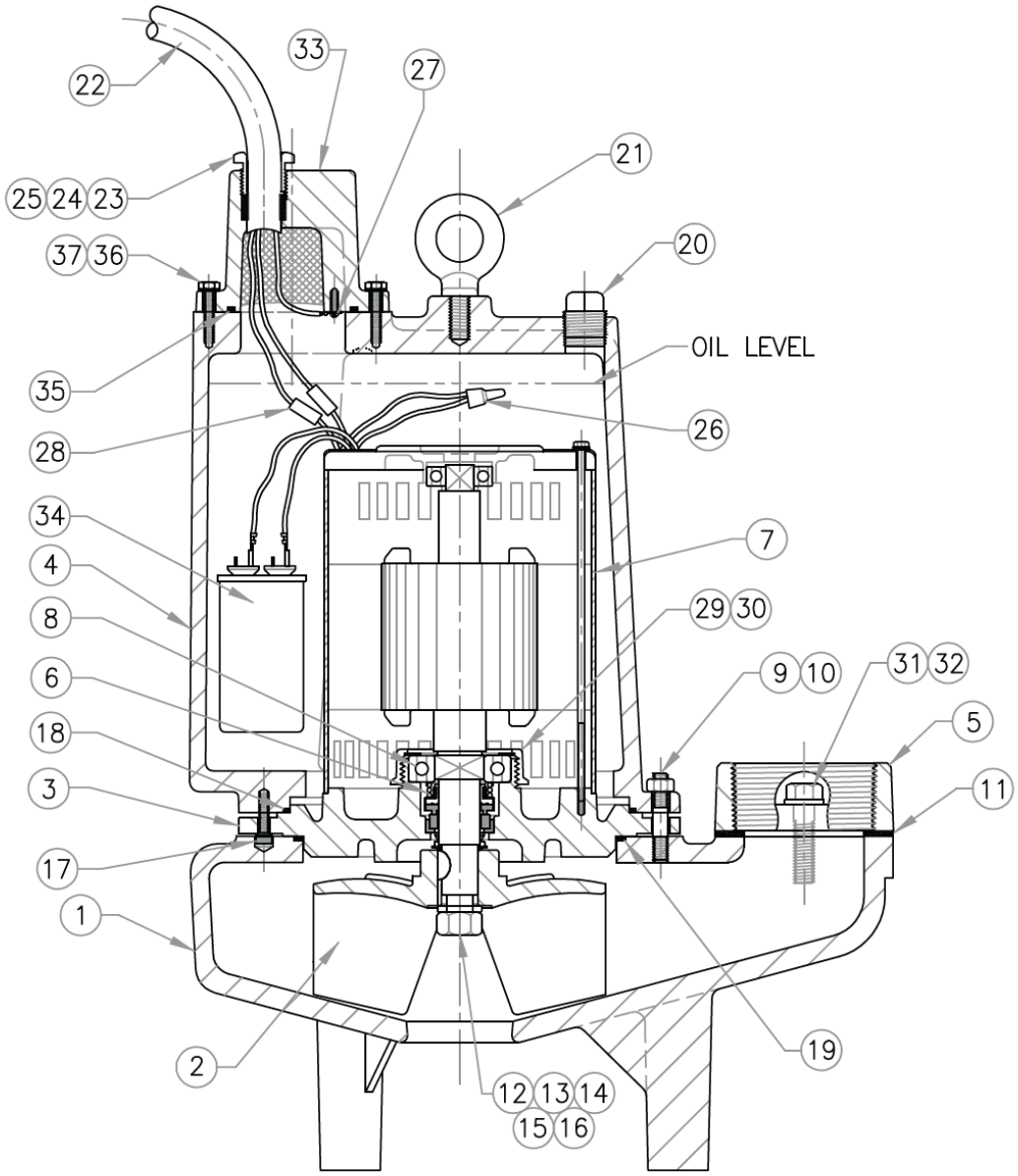
K3PL15M4-03S, K3PL15M4-23S, K3PL15M4-43S, K3PL20M4-03S, K3PL20M4-23S, K3PL20M4-43S

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.

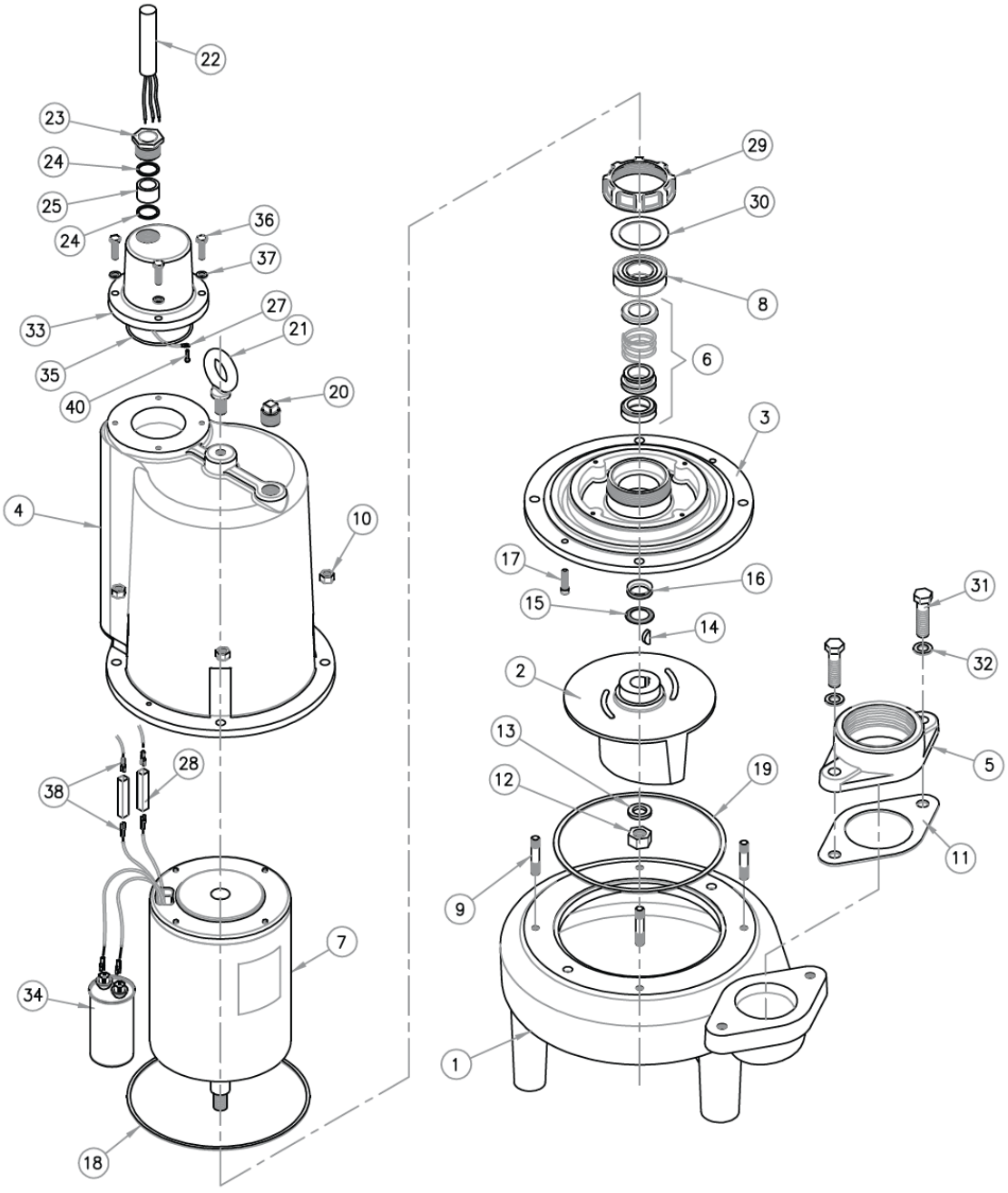
For Repair Part Please Supply:
Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

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



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.

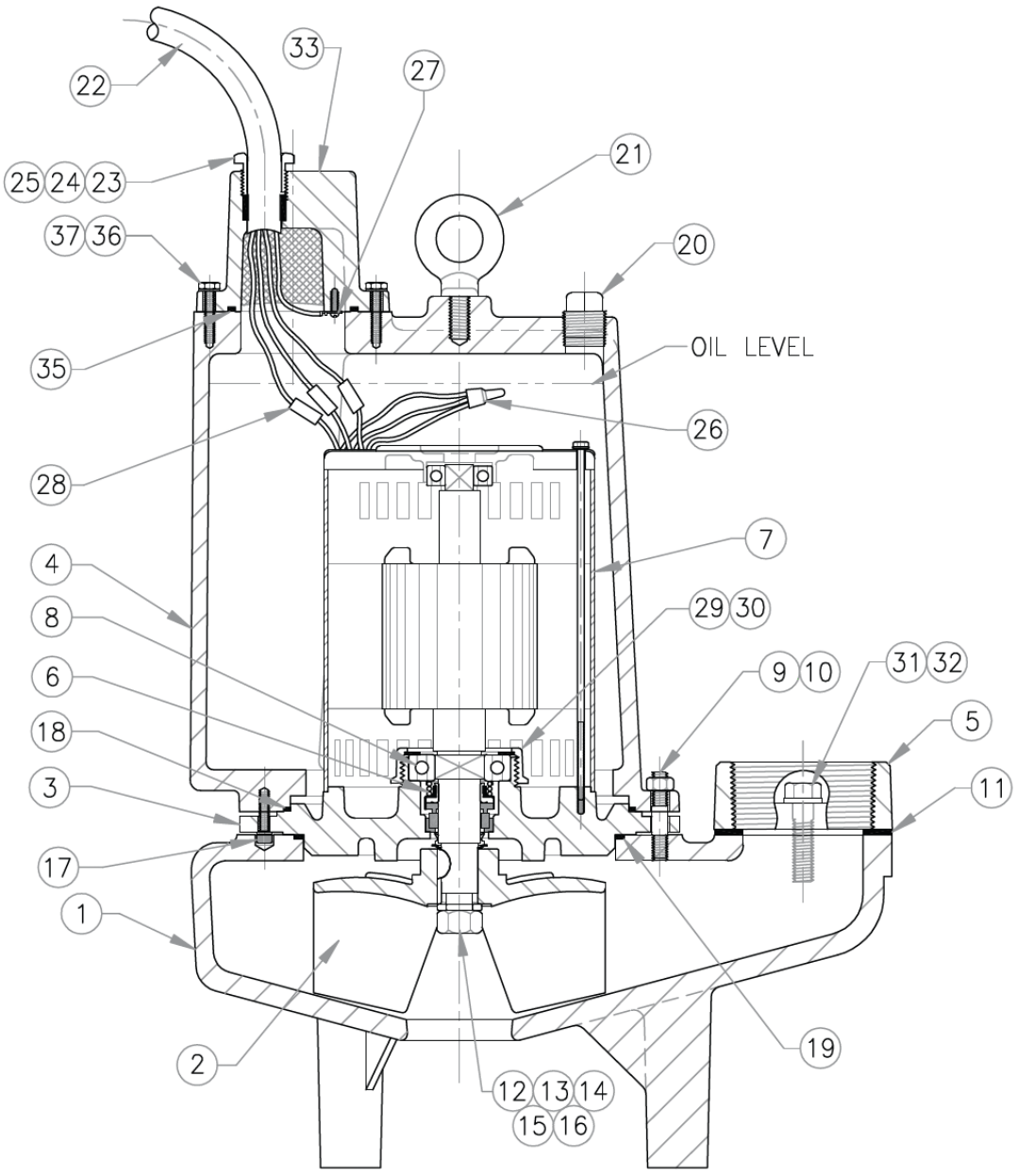
K3PL15M4-21S, K3PL20M4-21S, K3PL30M4-21S

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.

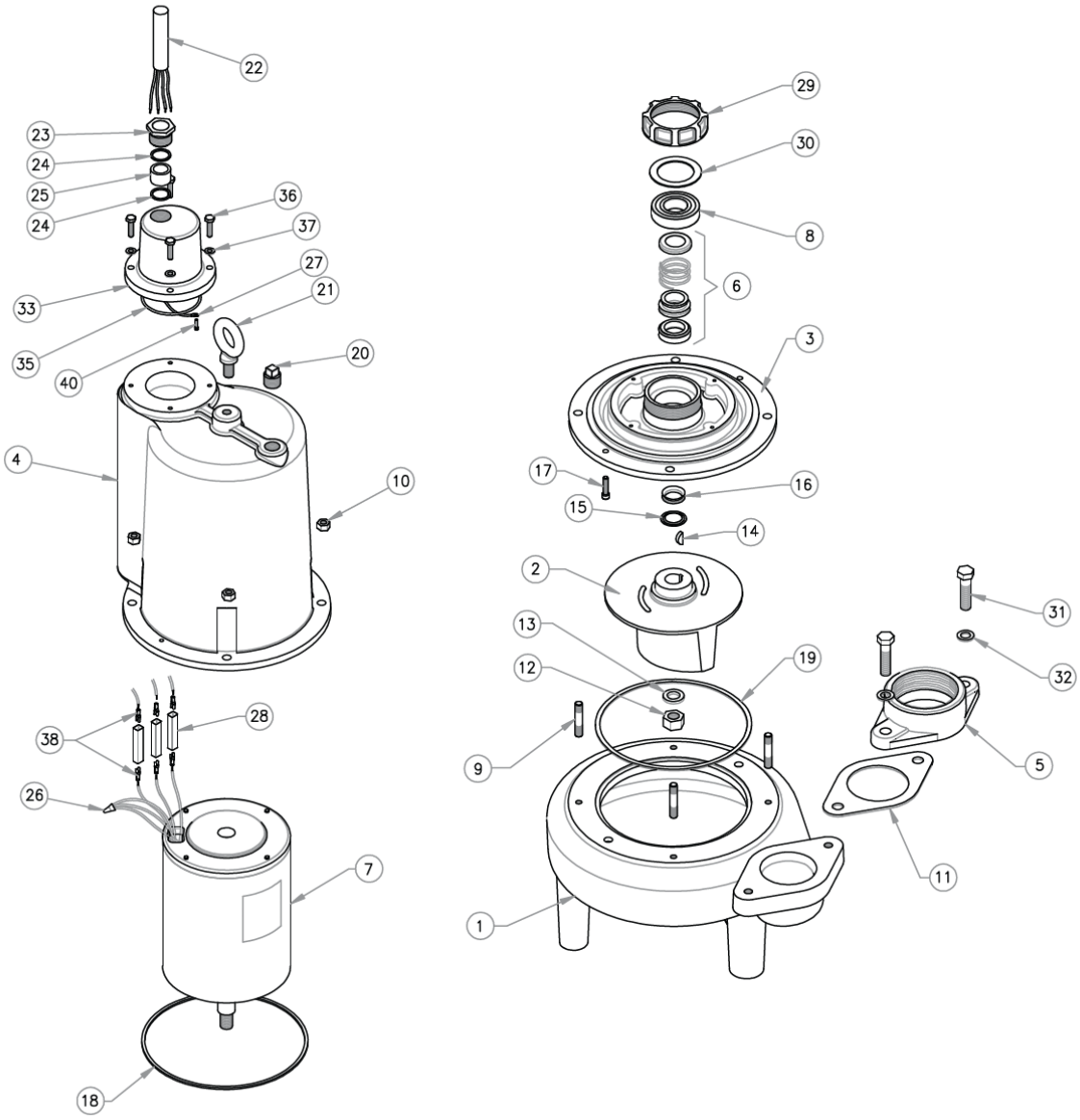
For Repair Part Please Supply:
Model Number and Serial as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

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



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.

MODEL	PART NO.	HP	VOLTS		RPM	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	62170017	3	200/230	3	1750	19	56	D	14/4	SJO	0.75”	170
K3PL30M4-23S	62170017	3	200/230	3	1750	19	56	D	14/4	SJO	0.75”	170
K3PL30M4-43S	62170018	3	460	3	1750	9	28	D	14/4	SJO	0.75”	170

Installation, Operation & Maintenance Manual

SUBMERISIBLE 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

3HP



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 104º 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: _____

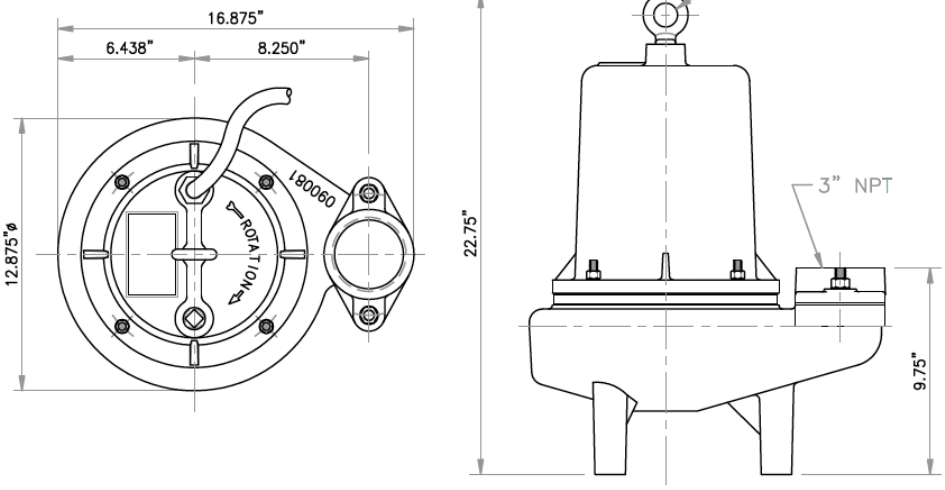
Serial: _____

PHASE: _____ HP: _____

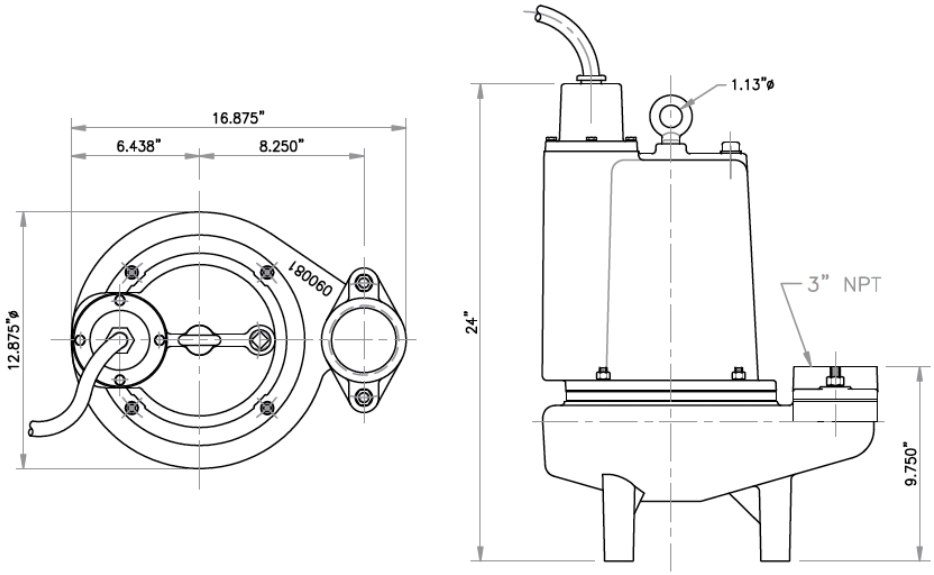
DISCHARGE: 3" NPT female, vertical, bolt on flange.
SPHERICAL SLD HNDLG: 2½"
LIQUID TEMPERATURE: 104° F (40° C) max.
VOLUTE: Cast iron ASTM A-48 class 30.
MOTOR HOUSING: Cast iron ASTM A-48 class 30.
SEAL PLATE: Cast iron ASTM A-48 class 30.
IMPELLER: 2 vane, open, with vanes on back side. Cast iron 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).

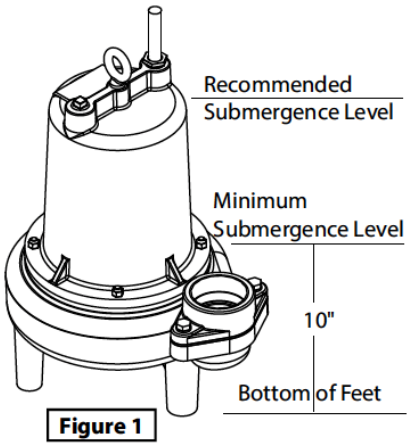


Figure 1

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.

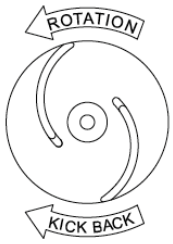
TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
110-120	3.00	30.0
220-240	1.50	15.0
440-480	0.75	7.5
600	0.60	6.0

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.

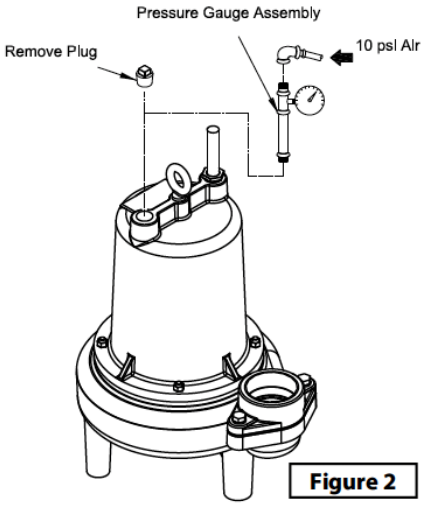


Figure 2

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.

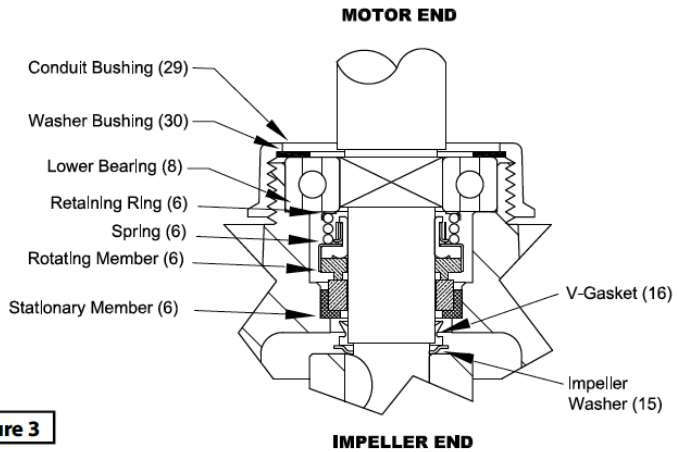


Figure 3

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.

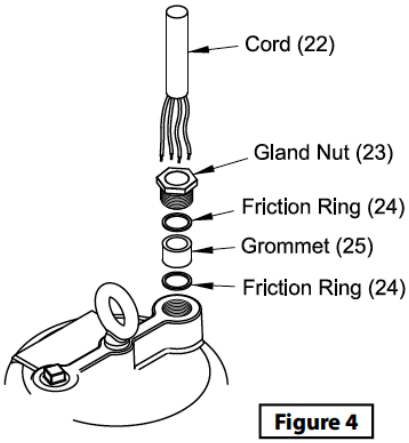


Figure 4

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

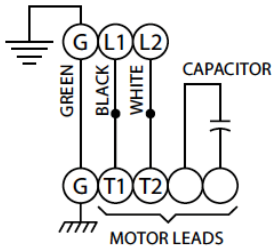


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1
White	2
Flag terminal	Capacitor
Flag terminal	Capacitor

THREE-PHASE 460V AC
POWER CORD 4x12

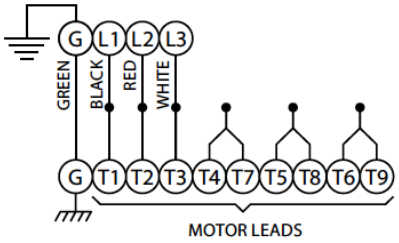


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1
Red	2
White	3
	4 and 7 together
	5 and 8 together
	6 and 9 together

THREE-PHASE 208/230V AC
POWER CORD 4x12

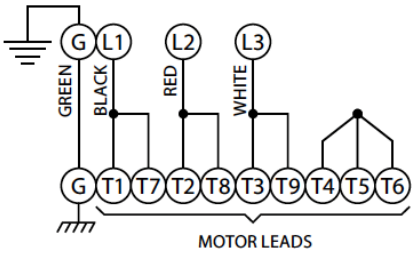
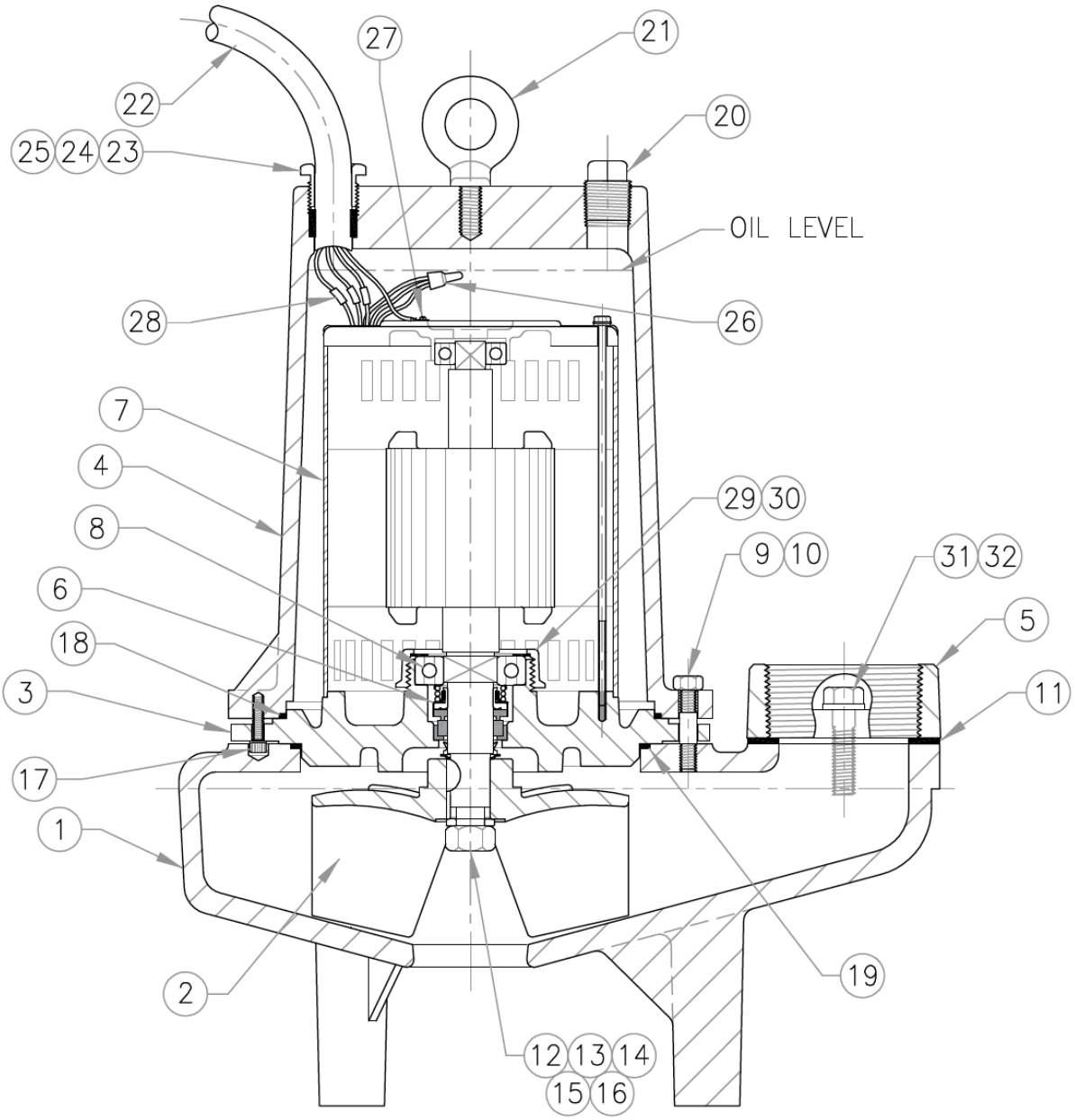


Figure 5	
Cable	Motor Lead Number
Green	Green
Black	1 and 7
Red	2 and 8
White	3 and 9
	4, 5 and 6 together

Figure 8

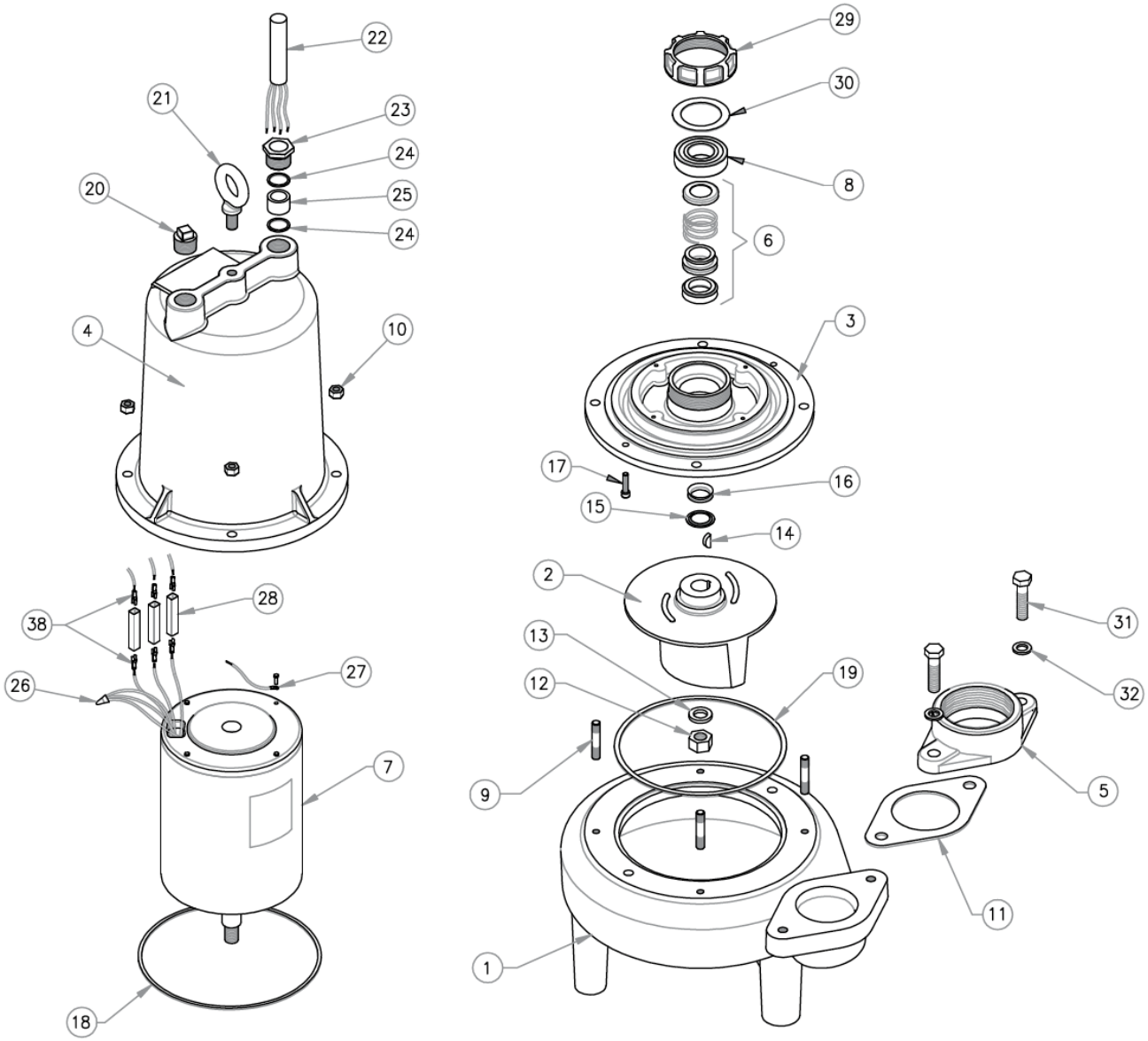
- **K3PL15M4-03S, K3PL15M4-23S, K3PL15M4-43S, K3PL20M4-03S, K3PL20M4-23S, K3PL20M4-43S**



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.

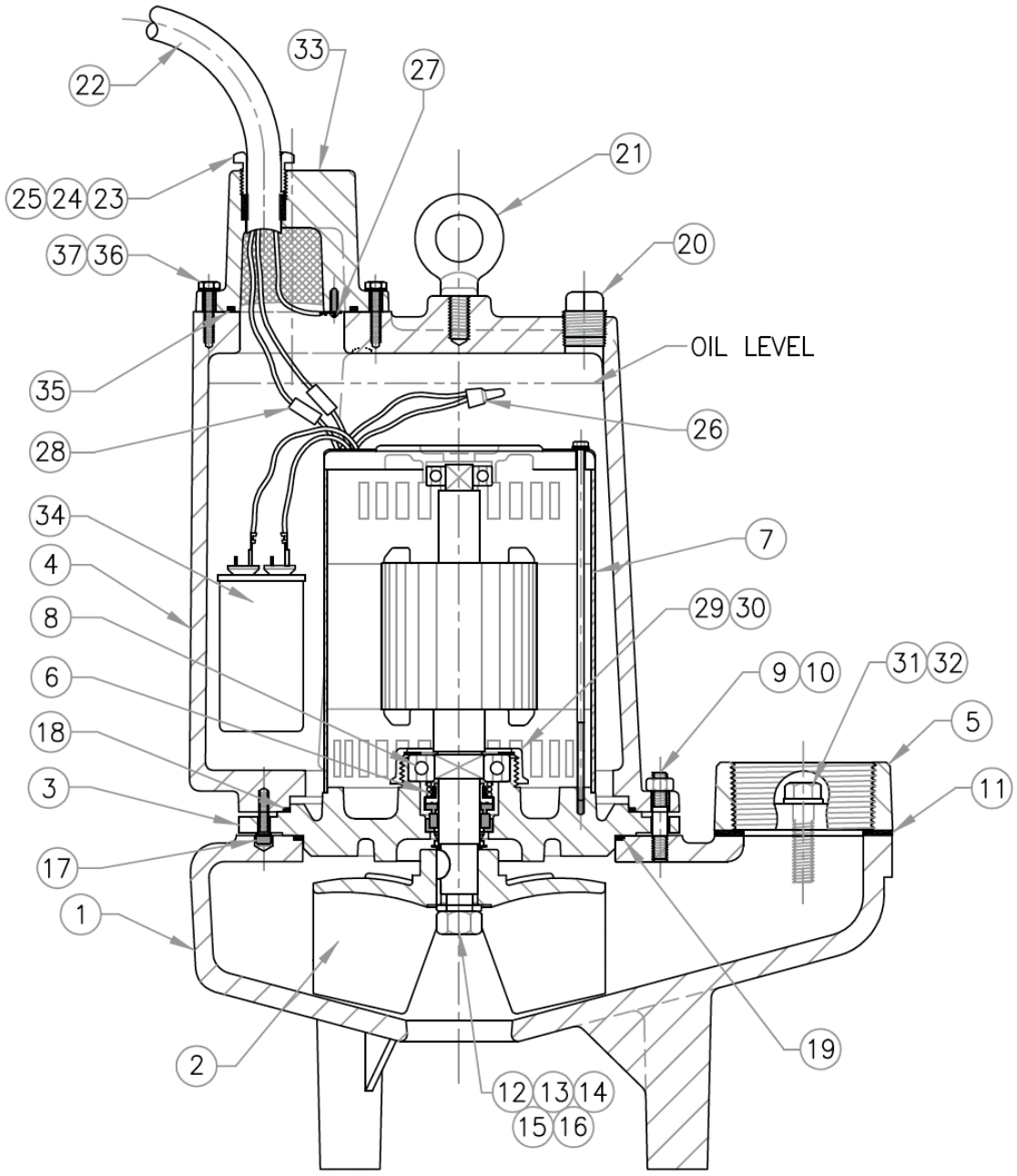
▲ = Overhaul Kit.

■ = 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

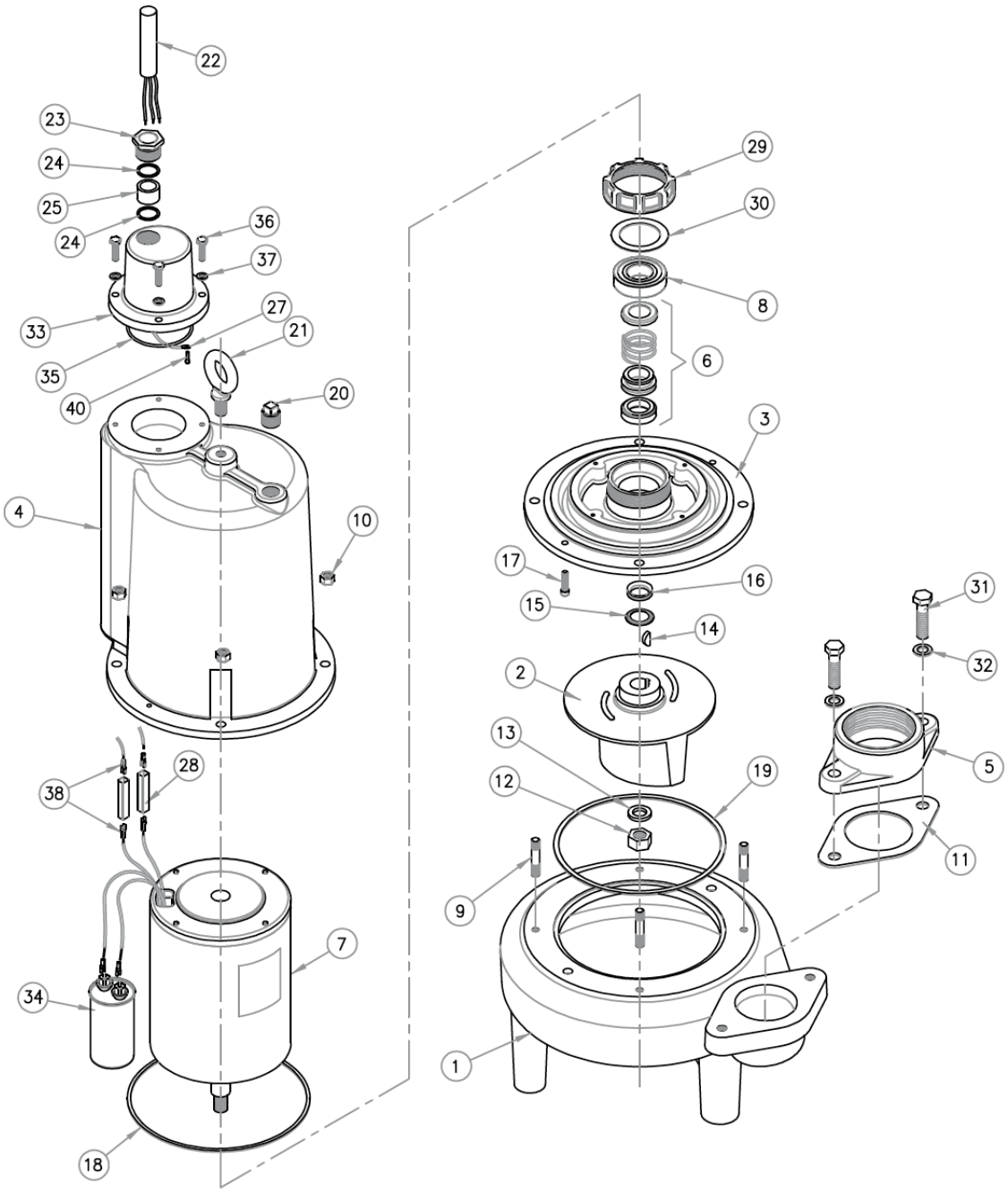
▸ **K3PL15M4-21S, K3PL20M4-21S, K3PL30M4-21S**



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

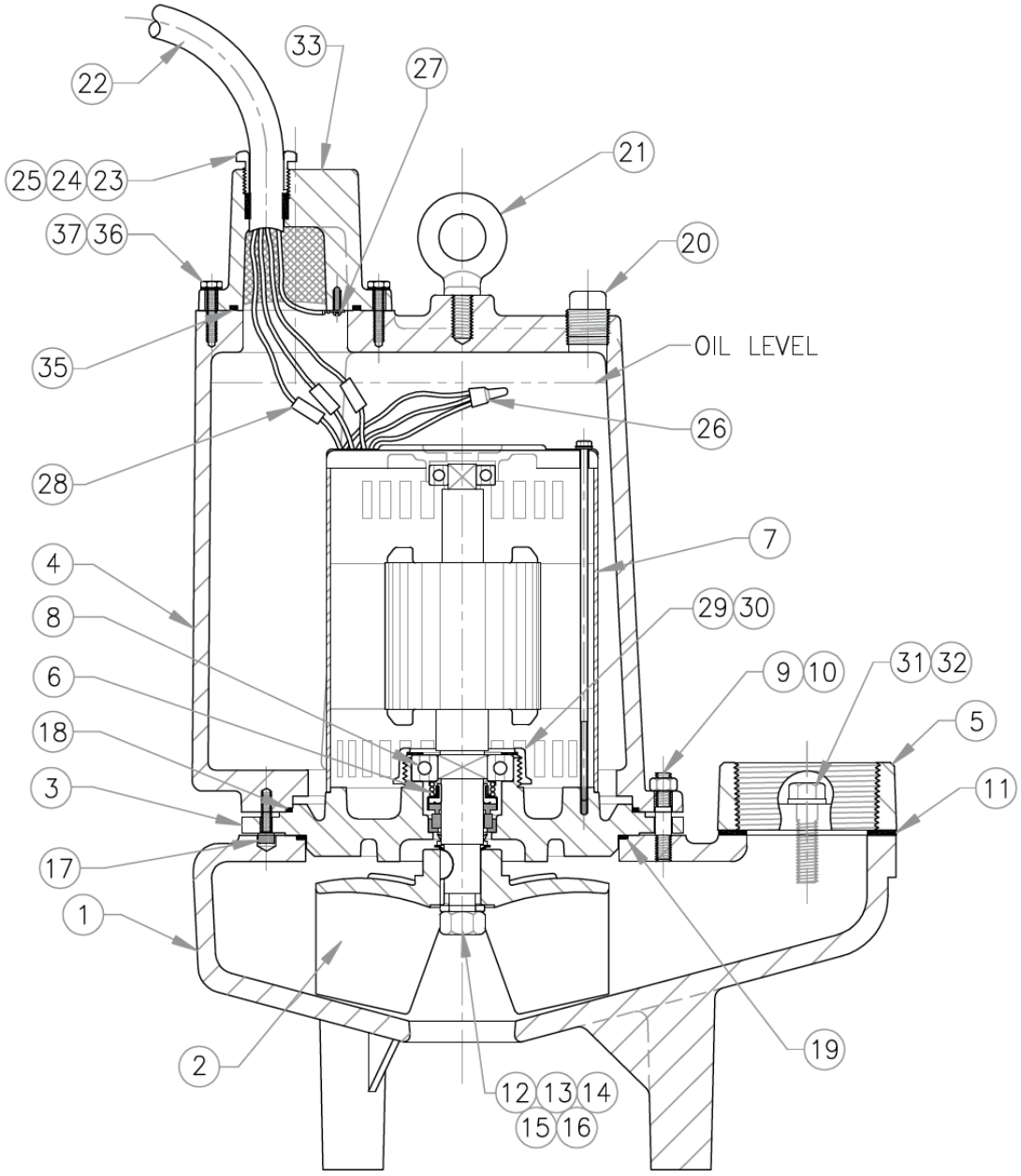
ITEM	QTY.		DESCRIPTION	PART No.
1	1		Volute	03090034
2	1	■	Impeller 6.25"Ø (For K3PL15M4-21S)	03140029B
			Impeller 7.00"Ø (For K3PL20M4-21S)	03140029
			Impeller 7.50"Ø (For K3PL30M4-21S)	03140093
3	1		Seal Plate	03180012
4	1		Motor Housing	03100009
5	1		Discharge Flange	03060014
6	1	▲	Shaft Seal - 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

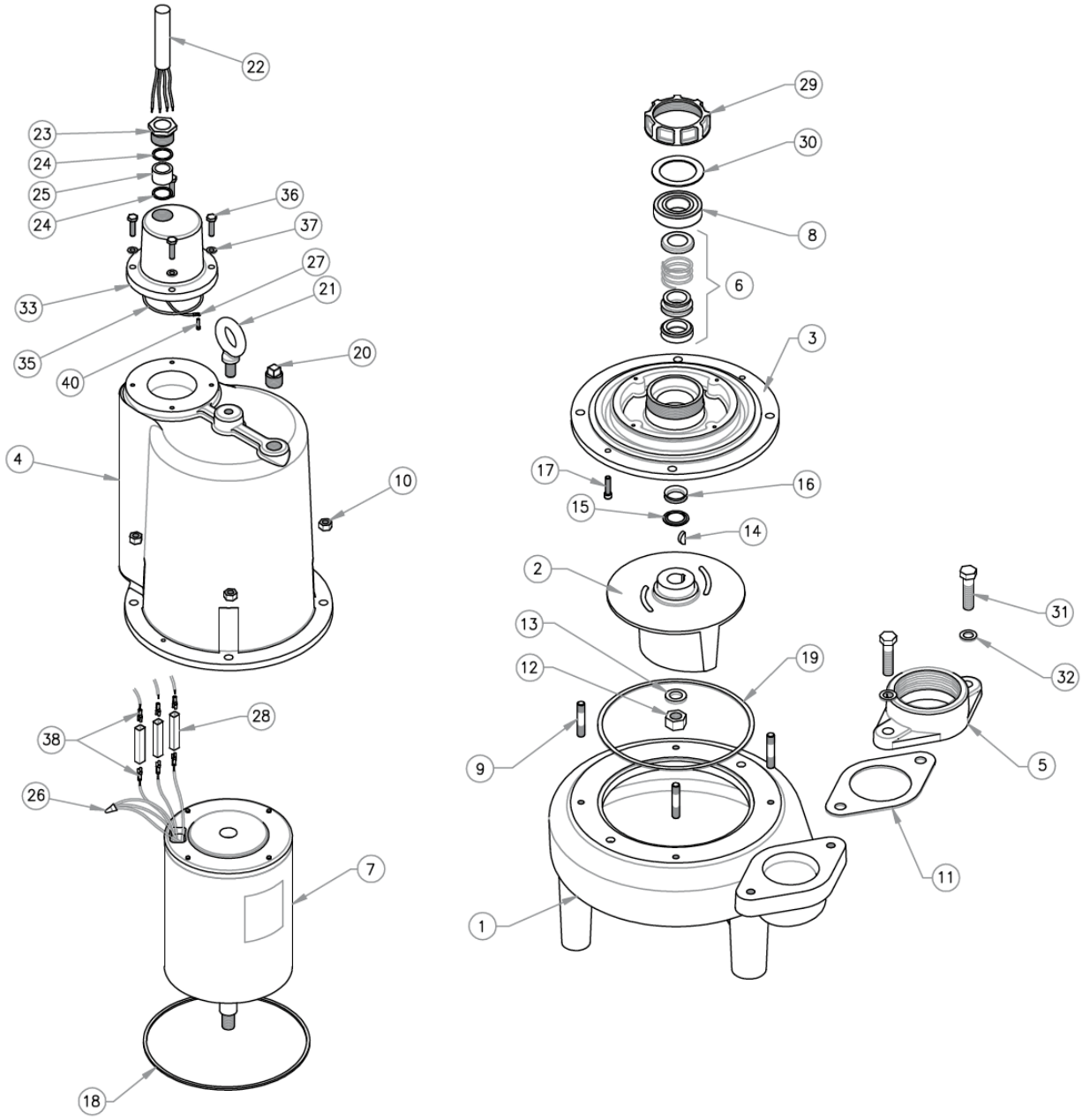
▸ **K3PL30M4-03S, K3PL30M4-23S, K3PL30M4-43S**



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)	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 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 PUMP'S 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 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 range 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.

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 ts 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 speci cations.

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 nonoverloading 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 – 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.

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SECTION 16

End Suction Centrifugal Pumps

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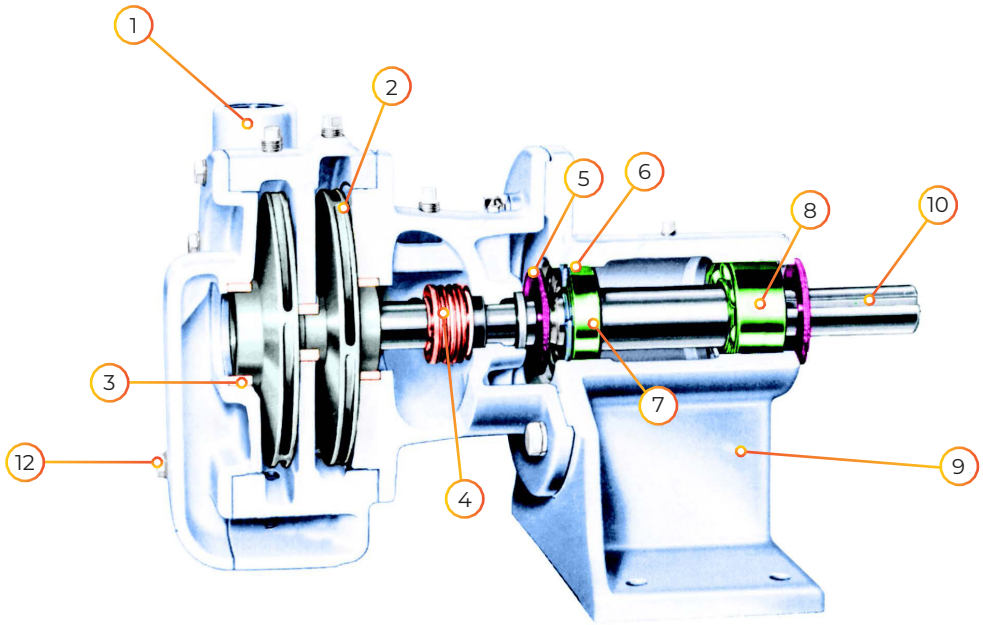
HIGH PRESSURE PUMPS

"2-Stage Centrifugal"



NEWLY UPGRADED CONSTRUCTION TO INCLUDE:

- Powder Coat Paint Finish
- Double Row Rear Bearing For Stronger Loading
- O-ring Seal For Best Design
- Upgrate From ASTM Class 30 to 35 For Stronger Casting Construction



1) VOLUTE CASE

- Versatile (8) position discharge orientation for convenient adaptation to your piping requirements. 1-1/2" NPT discharge. Cast iron case with 400 series stainless steel or brass wear ring options.

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. We offer impellers in both 300 series stainless steel or brass.

3) WEAR RINGS

- (3) Bronze, 400 series stainless steel, or Brass wear rings, (2) for impeller inlets, (1) common bushing for impeller heads. Maintains peak pump operating performance. Our wear ring options are easily replaceable and eliminate 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.

5) SLINGERS

- Rubber slingers shield bearings from moisture, dirt and other impurities.

6) SNAP RING

- Holds bearing and shaft assembly in place, preventing axial movement.

7) SHAFT BEARING

- Heavy-duty ball bearing, regreasable, greased during assembly. Bearing sealed on outboard side.

8) * NEW & IMPROVED SHAFT BEARING

- DOUBLE-ROW, HEAVY-DUTY ball bearing, regreasable, greased during assembly. Bearing sealed on outboard side.

9) BEARING BRACKET

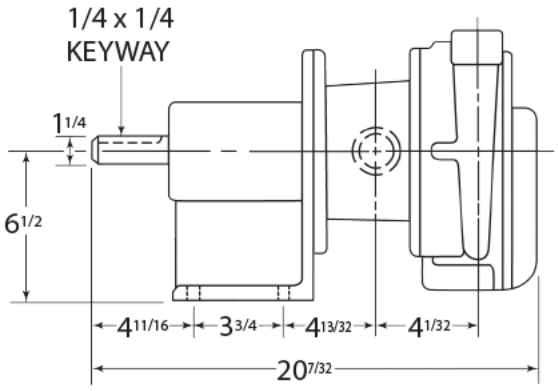
- Heavy-duty cast iron bracket holds (2) shaft ball bearings in exact alignment, keeping shaft and impeller assembly running quiet and vibration-free. Bracket provides rigid support for pump end.

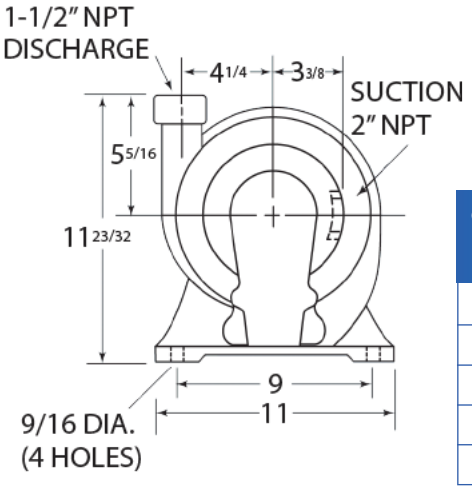
10) PUMP SHAFT

- Corrosion-resistant stainless steel provides long life in many applications.

11) DRAIN PLUGS

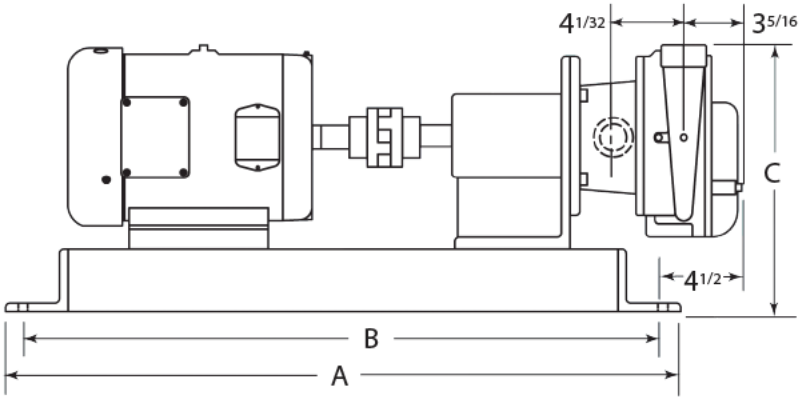
- Conveniently located, allowing (8) position discharge orientation and always providing for liquid draining capabilities.

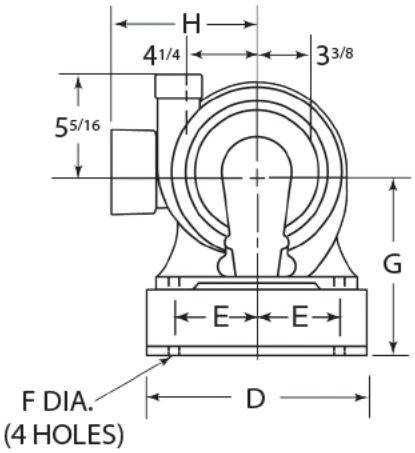




BASIC PUMPS

CATALOG NO.	STANDARD IMPELLER DIA.	APPROX. SHIP WT. LBS.
KI-TSC-5	4¾"	130
KI-TSC-7	5¼"	130
KI-TSC-10	5¾"	130
KI-TSC-15	6½"	130
KI-TSC-20	7"	130





CATALOG NO.	PUMP MOTOR HP	MOTOR FRAME	PUMP SHAFT DIA.	MOTOR SHAFT DIA.	MOTOR SHAFT DIA.									APPROX. SHIP WT. LBS.
					A	B	C	D	E	F	G	H	I	
KI-TSC-5P	5	184T	1¼	1⅛	37	35	14 13/16	12	5	⅝	9½	8 1/16	14 13/16	365
KI-TSC-5P	7½	213T	1¼	1⅛	37	35	14 13/16	12	5	⅝	9½	8 1/16	14 13/16	375
KI-TSC-5P	10	215T	1¼	1⅜	42	40	15 5/16	15	6½	1 1/16	10	8⅞	15 5/16	410
KI-TSC-5P	15	254T	1¼	1⅜	42	40	15 5/16	15	6½	1 1/16	10	8⅞	15 5/16	450
KI-TSC-5P	20	256T	1¼	1⅜	42	40	15 5/16	15	6½	1 1/16	10	9 1/16	15 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!

HIGH HEAD PERFORMANCE

- 510 feet (220 psi) @



RUGGED CONSTRUCTION

- High Tensile Strength Cast Iron Castings
- 300 Series Stainless Steel or Brass Impeller Options
- 400 Series Stainless Steel, Brass, or Bronze Wear Ring Options

VERSATILE CONSTRUCTION OPTIONS

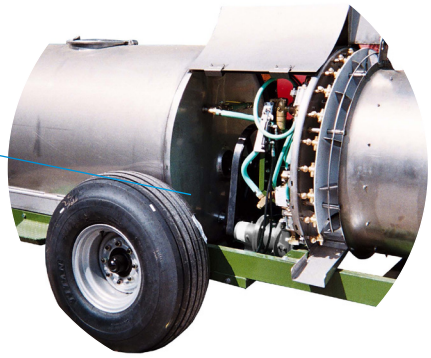
- Pump End Only (1-1/4" Keyed Shaft End)

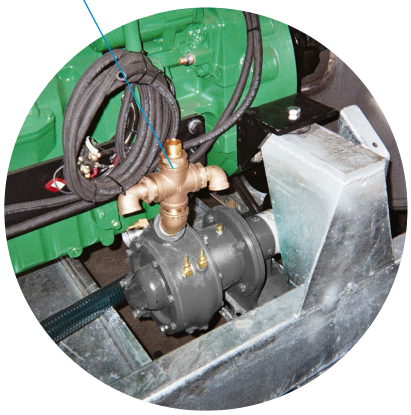
VALUE

- Immediately Available for Quick Shipment
- Priced to Save You Money

APPLICATIONS

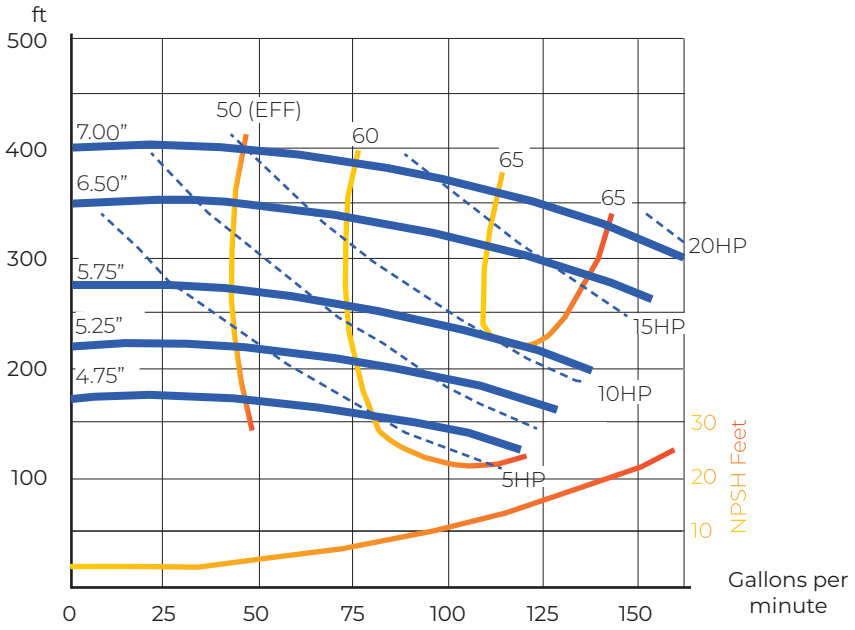
- Agricultural
- Spraying
- Car Wash
- OEM Deicing
- Equipment
- Booster Service

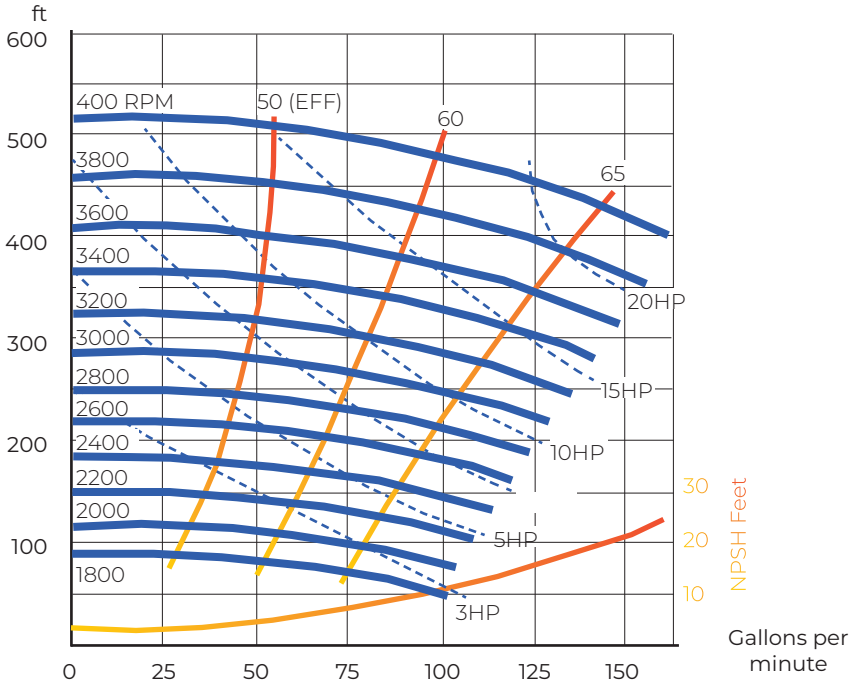




VARIABLE RPM • 7" IMPELLER • 2" SUCTION • 1-1/2" DISCHARGE

3450 RPM • IMPELLER AS NOTED • 2" SUCTION • 1-1/2" DISCHARGE


ft
500
400
300
200
100
50 (EFF)
60
65
65
7.00"
6.50"
5.75"
5.25"
4.75"
20HP
15HP
10HP
5HP
30
20
10
NPSH Feet
0
25
50
75
100
125
150
Gallons per minute


ft
600
500
400
300
200
100
400 RPM
50 (EFF)
60
65
3800
3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
20HP
15HP
10HP
5HP
3HP
30
20
10
NPSH Feet
0
25
50
75
100
125
150
Gallons per minute



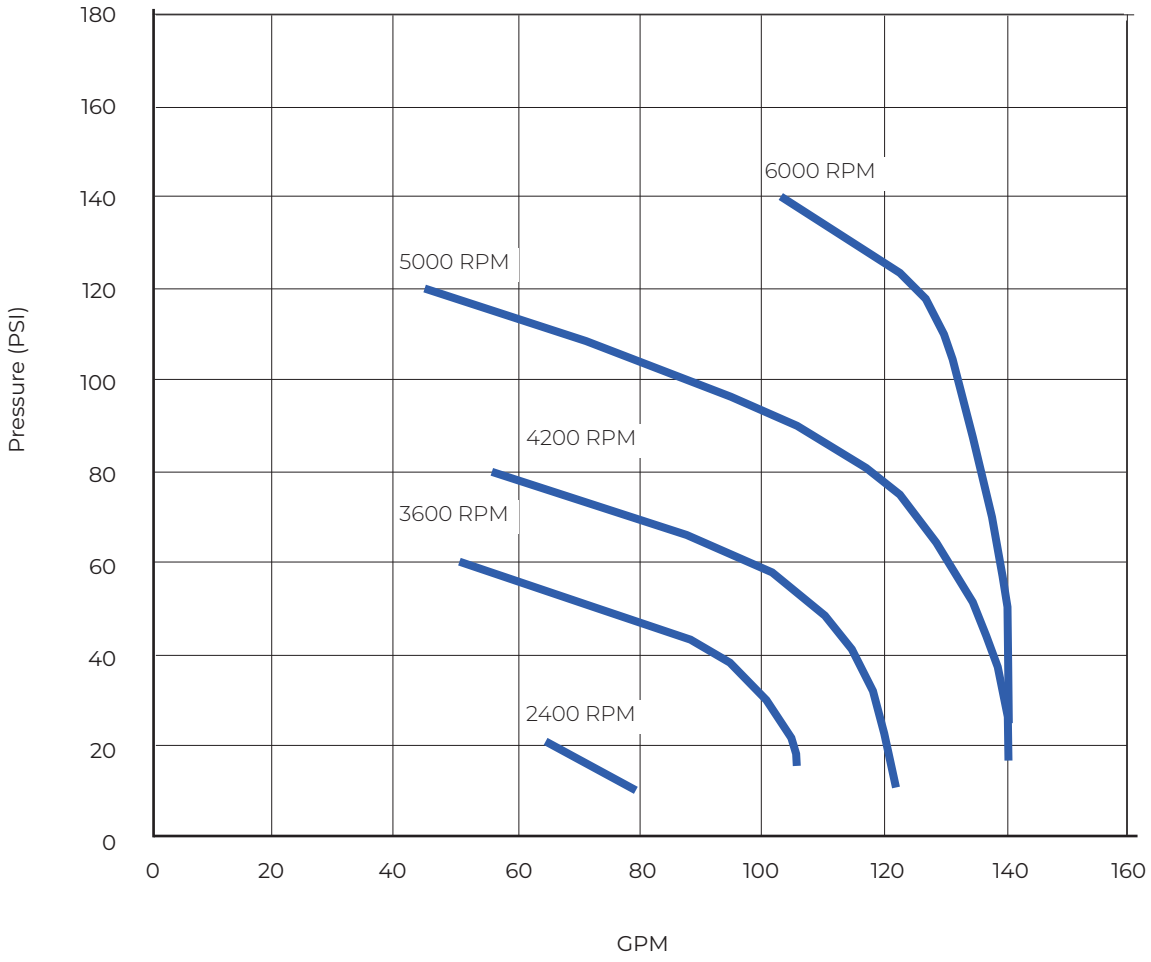
KCPMSST

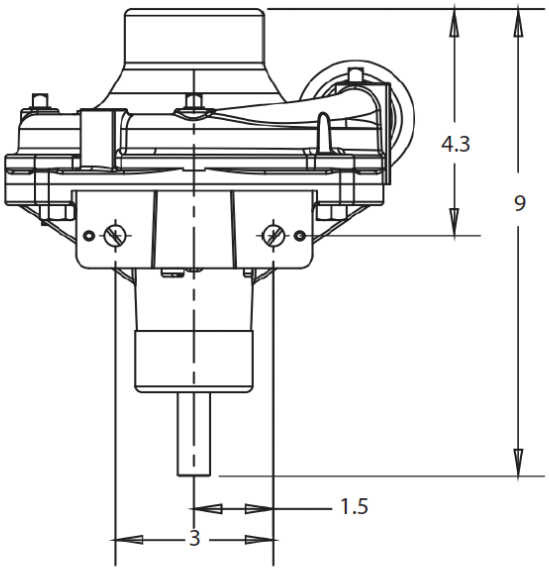
Pedestal Mounted Centrifugal Pump

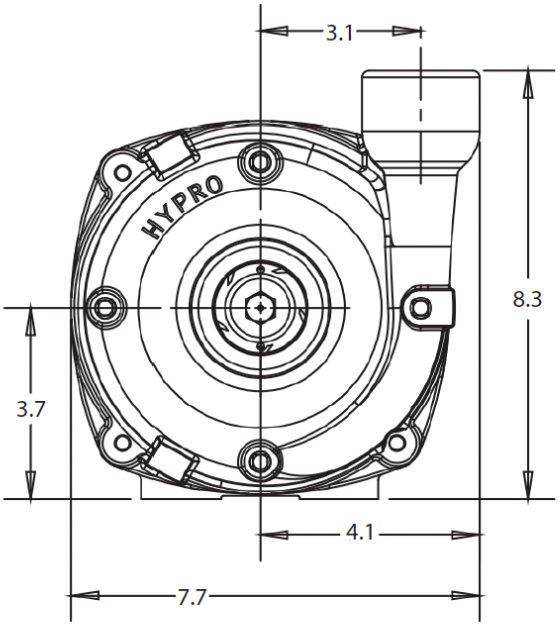
- Full Stainless Steel Design
- Up To 6000 RPM
- Flows Up To 140 GPM
- Pressure Up To 323 TDH
- Shaft Size : 5/8 “ Solid

PUMP SERIES	KCPMSST		KEEN CENTRIFUGAL END SUCTION PUMP		
Inlet	1.5”	Discharge	1.25”	Max RPM	6000

GPM:_____ TDH: _____







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		

KP911 SERIES



ANSI CENTRIFUGAL PROCESS PUMPS

WHAT IS AN ANSI PUMP?

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.



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.

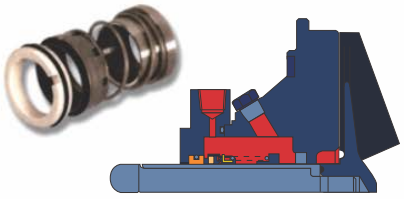
Multiport for proper drainage.

Seal solutions

The seal plate is designed to accept a variety of cooling plans to meet specific user requirements.

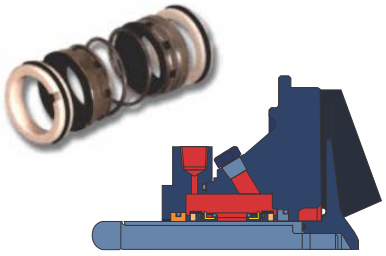
1 Single interior seal

- Non-corrosive liquids to moderately corrosive.
- Mild abrasives.
- Pumping liquids with good lubricating qualities.



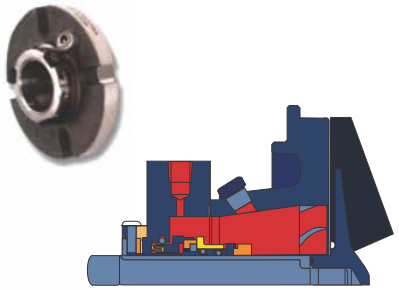
2 Conventional double seal

- Liquids not compatible with single seals.
- Toxic, hazardous, abrasive and corrosive liquids.
- When the pump is operating under low flow conditions.



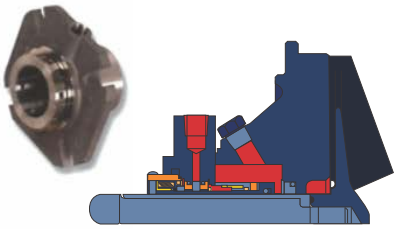
3 Single cartridge seal

- Non-corrosive liquids to moderately corrosive.
- Mild abrasives.
- Pumping liquids with good lubricating qualities.



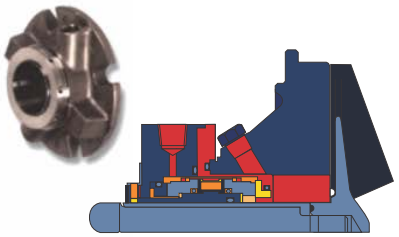
4 Double cartridge seal

- Same applications as conventional double seal.
- Reduced maintenance costs.
- No error when installing the seal.



5 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

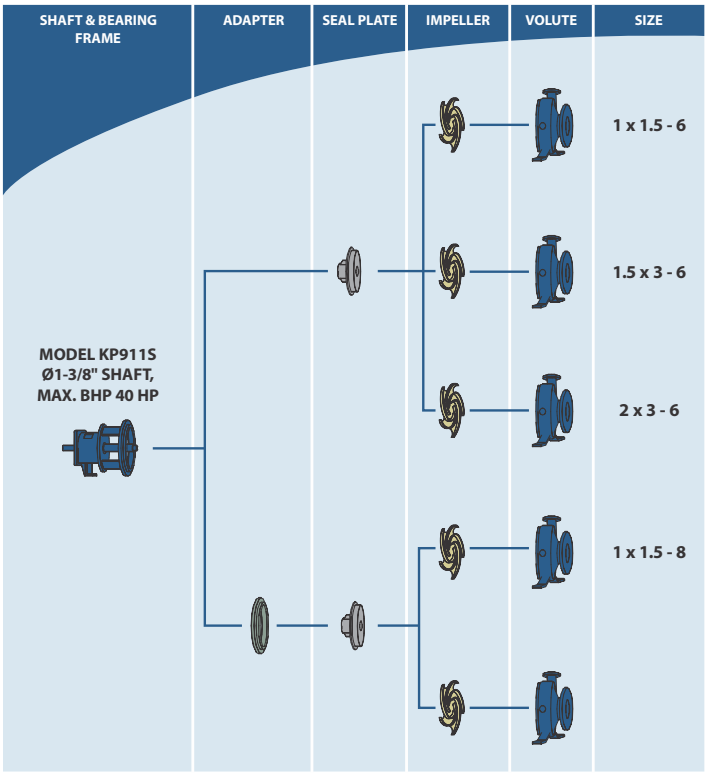
Increase the seal lifespan reducing maintenance costs.

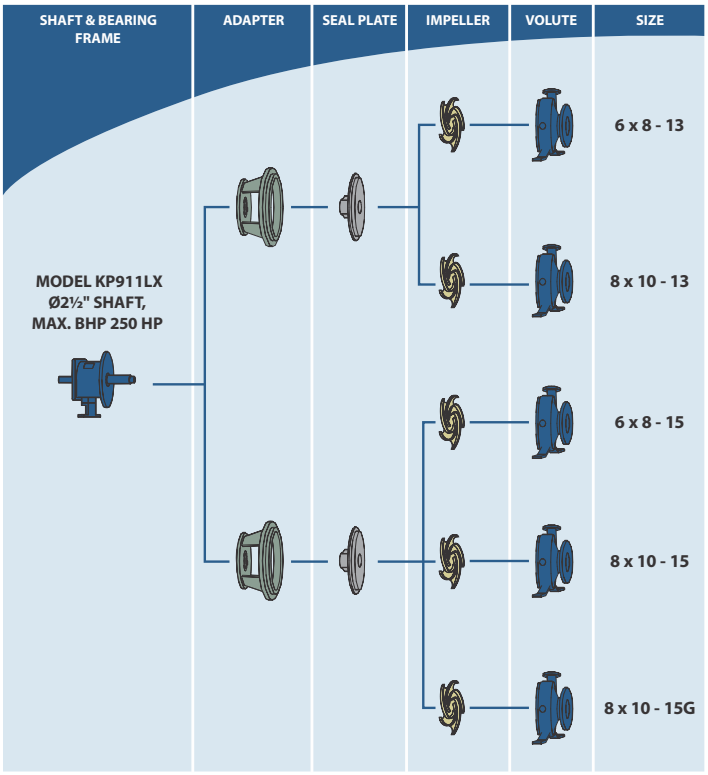
The most common cause of failure in a process pump is the mechanical seal.

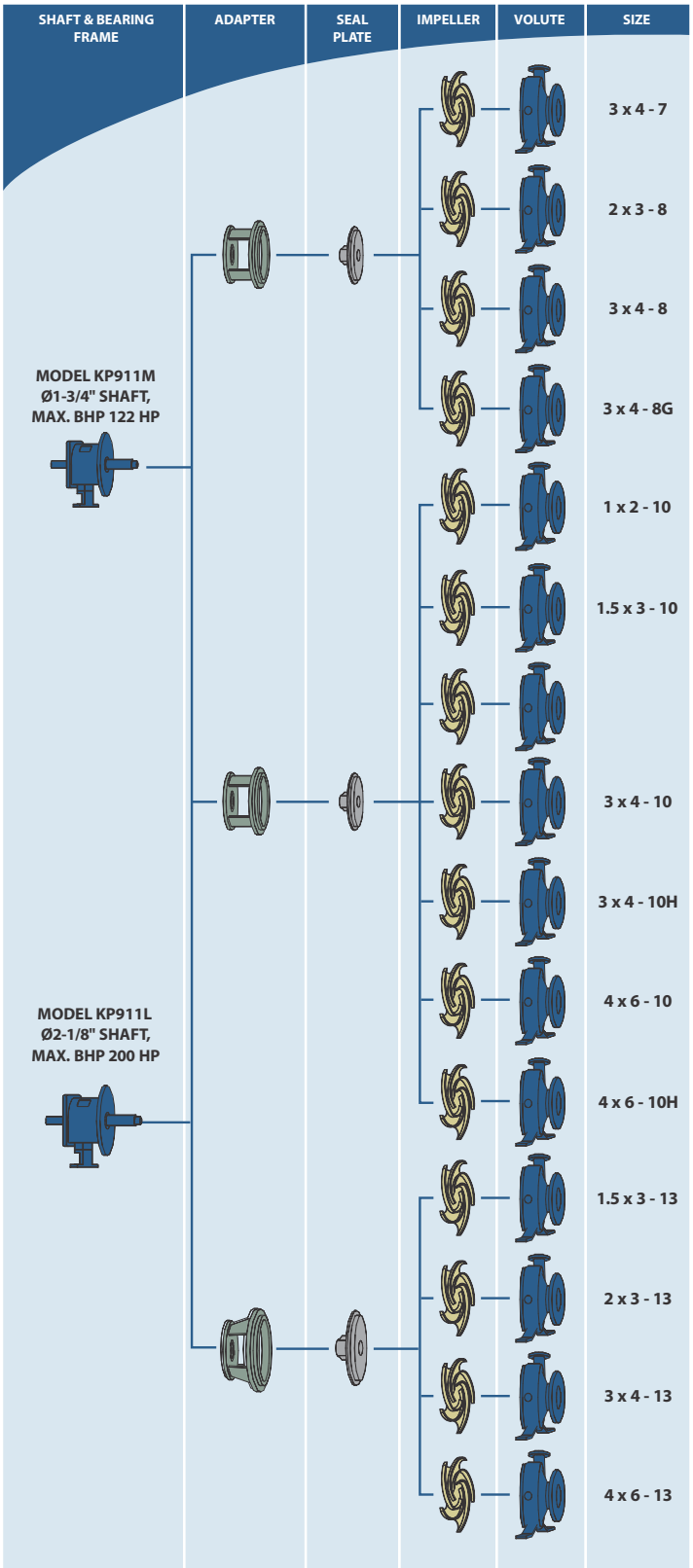
This failure is usually attributed to poor heat dissipation, poor lubrication on the seal faces or pumping liquids containing solids, air or vapors.

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.


SHAFT & BEARING FRAME
ADAPTER
SEAL PLATE
IMPELLER
VOLUTE
SIZE
MODEL KP911S
Ø1-3/8" SHAFT,
MAX. BHP 40 HP
1 x 1.5 - 6
1.5 x 3 - 6
2 x 3 - 6
1 x 1.5 - 8


SHAFT & BEARING FRAME
ADAPTER
SEAL PLATE
IMPELLER
VOLUTE
SIZE
MODEL KP911LX
Ø2½" SHAFT,
MAX. BHP 250 HP
6 x 8 - 13
8 x 10 - 13
6 x 8 - 15
8 x 10 - 15
8 x 10 - 15G


SHAFT & BEARING FRAME
ADAPTER
SEAL PLATE
IMPELLER
VOLUTE
SIZE
MODEL KP911M Ø1-3/4" SHAFT, MAX. BHP 122 HP
MODEL KP911L Ø2-1/8" SHAFT, MAX. BHP 200 HP
3 x 4 - 7
2 x 3 - 8
3 x 4 - 8
3 x 4 - 8G
1 x 2 - 10
1.5 x 3 - 10
3 x 4 - 10
3 x 4 - 10H
4 x 6 - 10
4 x 6 - 10H
1.5 x 3 - 13
2 x 3 - 13
3 x 4 - 13
4 x 6 - 13

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.

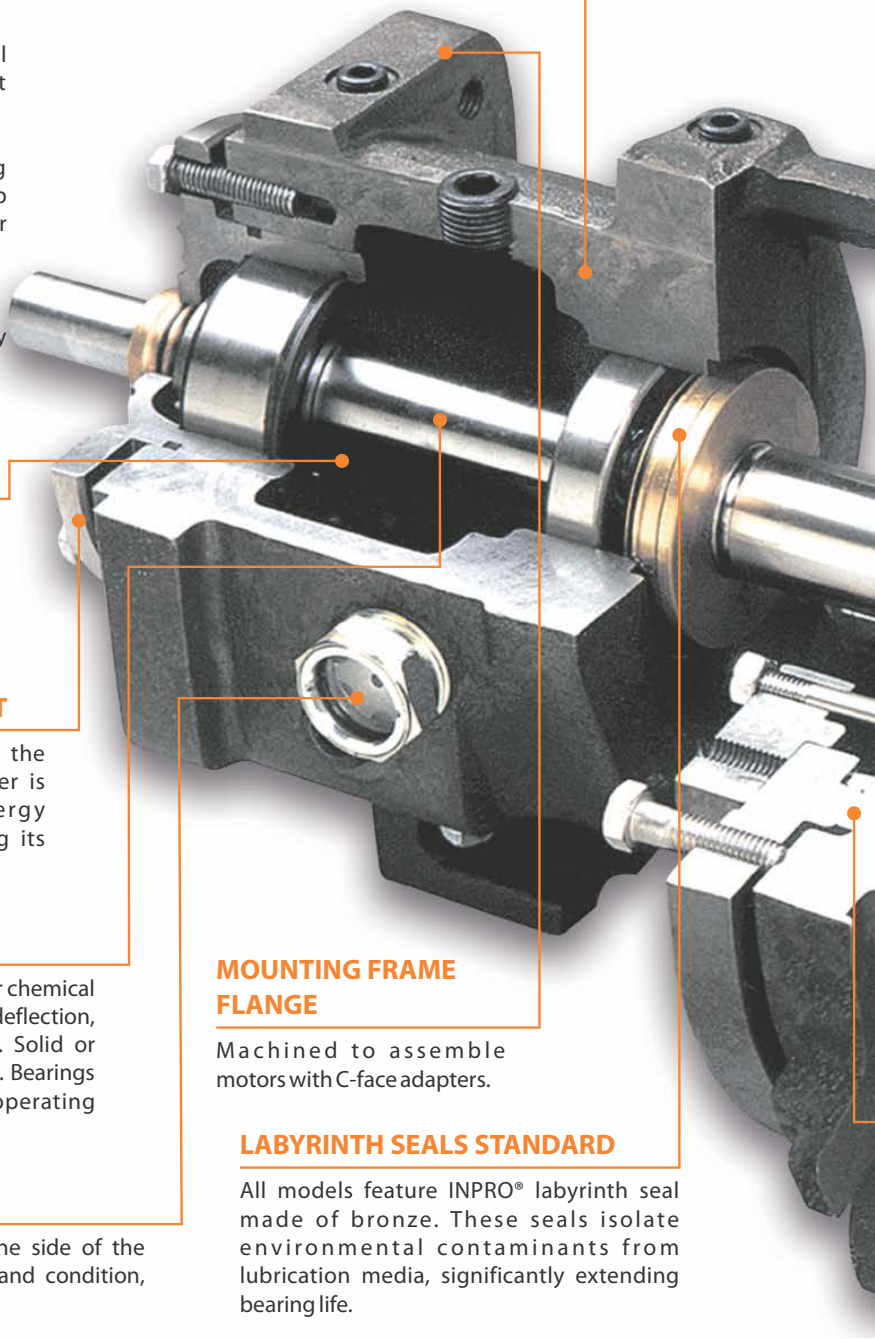
With controlled process in our manufacturing line we have structured a state-of-the-art pump to deliver high-level solutions meeting your most critical requirement.

CNC (computer numerically controlled machining equipment guarantees consistency for all parts.

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.



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.

MOUNTING FRAME FLANGE

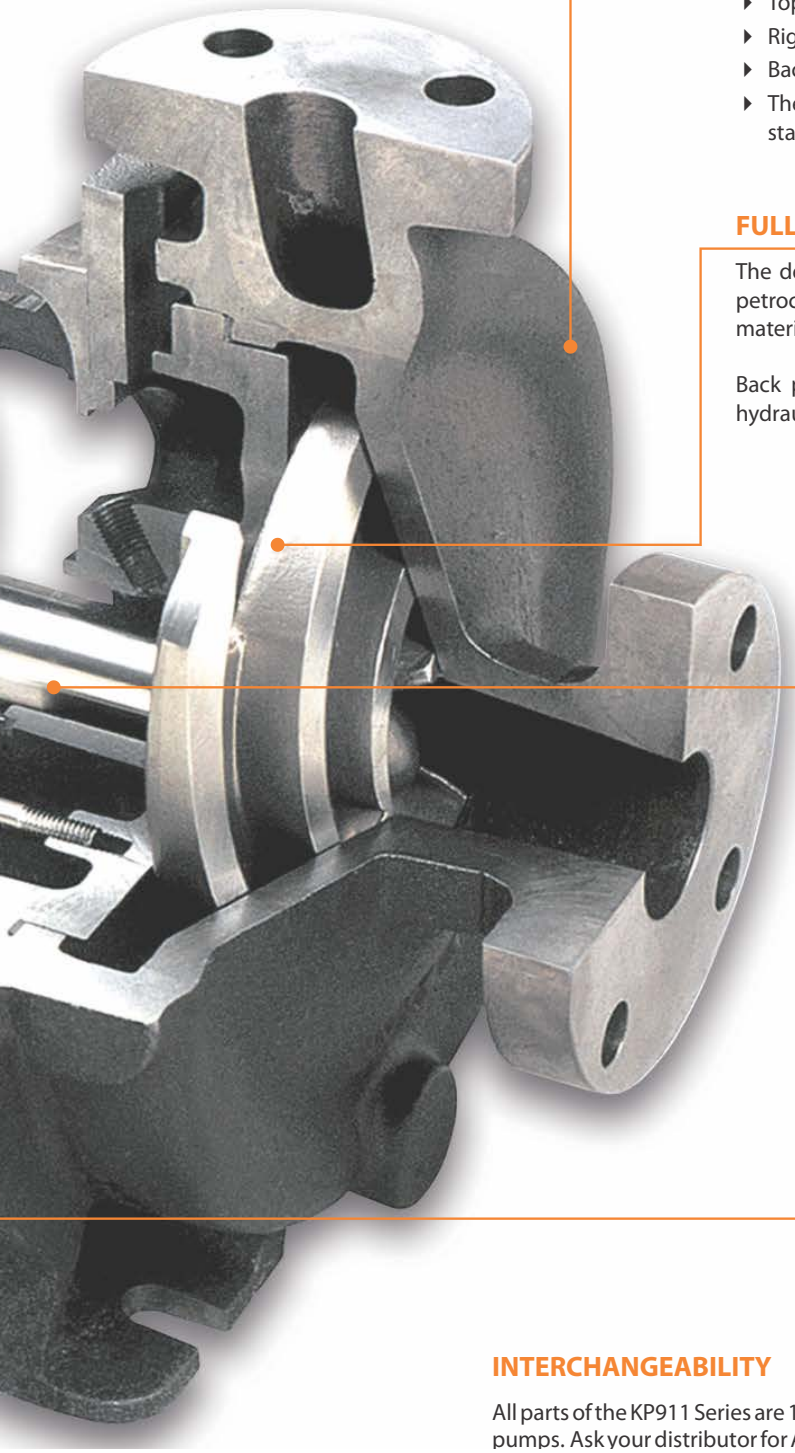
Machined to assemble motors with C-face adapters.

LABYRINTH SEALS STANDARD

All models feature INPRO® labyrinth seal made of bronze. These seals isolate environmental contaminants from lubrication media, significantly extending bearing life.

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.



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.

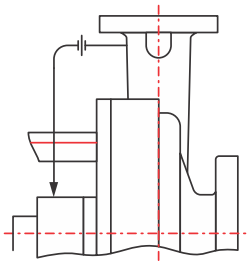
SELF-CONTAINED VOLUTE GASKET

Provides a positive seal between the volute and the seal plate, prevents "blow out" and facilitates disassembly.

INTERCHANGEABILITY

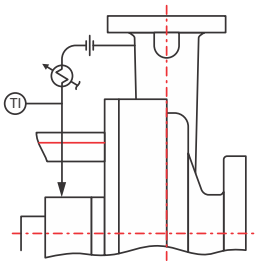
All parts of the KP911 Series are 100% interchangeable with other existing ANSI pumps. Ask your distributor for ANSI KP911 parts list.

1 PLAN 7311



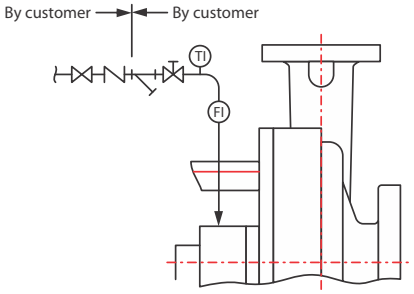
Recirculation from the volute to the mechanical seal flange.

2 PLAN 7321



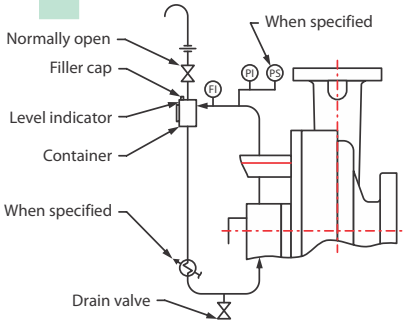
Recirculation of the volute to the heat exchanger and then to the mechanical seal flange.

3 PLAN 7332



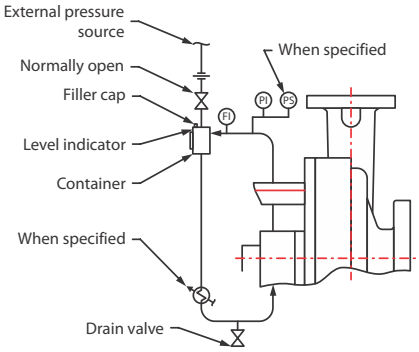
Injection in the mechanical seal from a source of clean fluid.

4 PLAN 7352



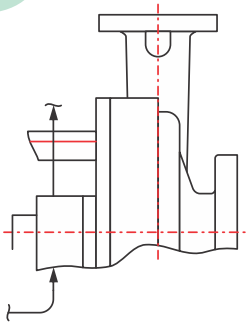
External fluid container without pressurizing; forced circulation.

5 PLAN 7353

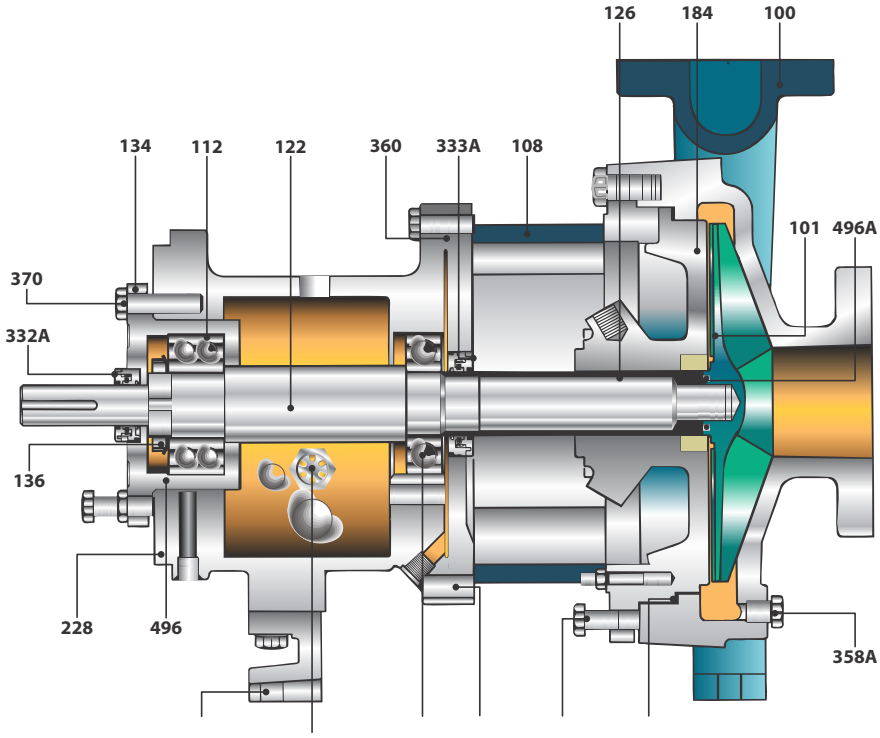


External pressurized fluid container; forced circulation.

6 PLAN 7354



Circulation of clean fluid from an external system.

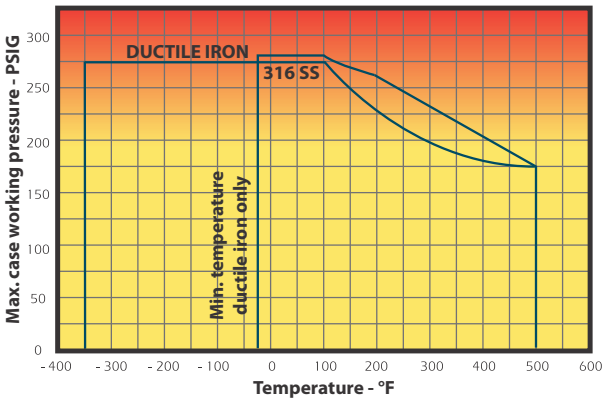


Item	Required per pump	Description	Material		
			Ductile iron	316 SS	CD4MCu
100	1	Casing	Ductile iron	316 SS	CD4MCu
101	1	Impeller	Ductile iron	316 SS	CD4MCu
108	1	Frame adapter	Ductile iron		
112	1	Outboard bearing	Steel		
122	1	Shaft - less sleeve (optional)	316 SS		
122	1	Shaft for sleeve design	AISI 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		

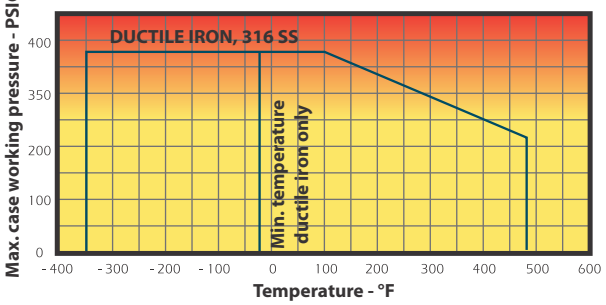
MAX. WORKING PRESSURE LIMITS

MODELS KP911S, M, L, LX

CLASS 150 FLANGES



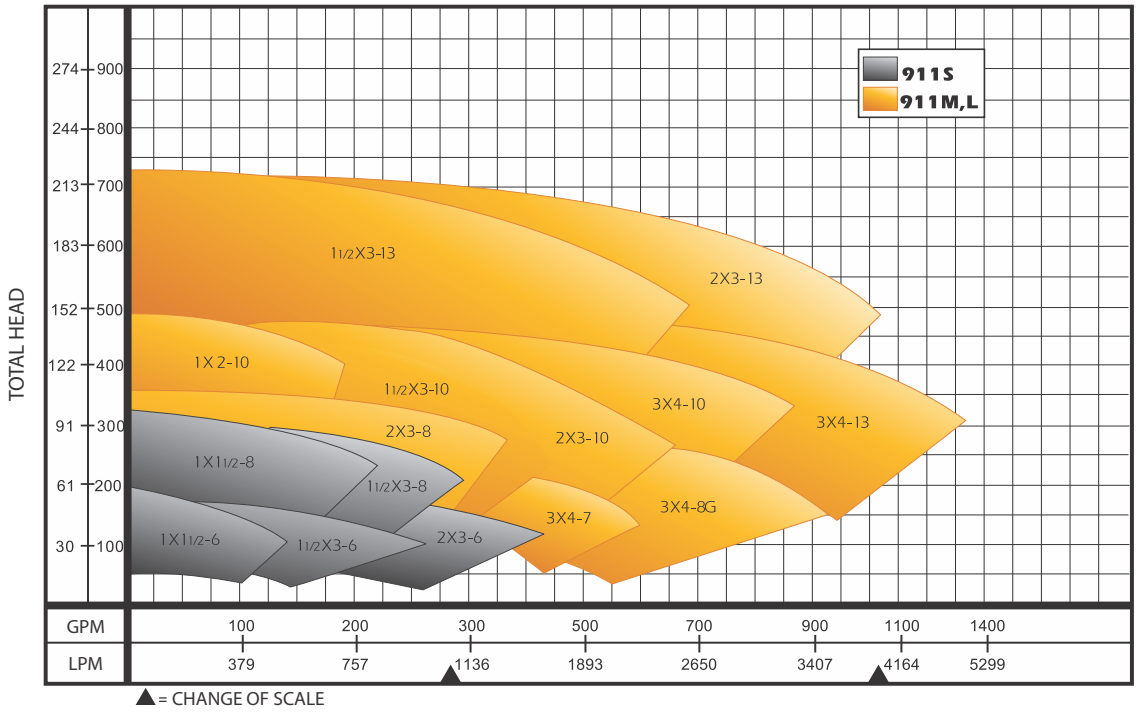
CLASS 300 FLANGES



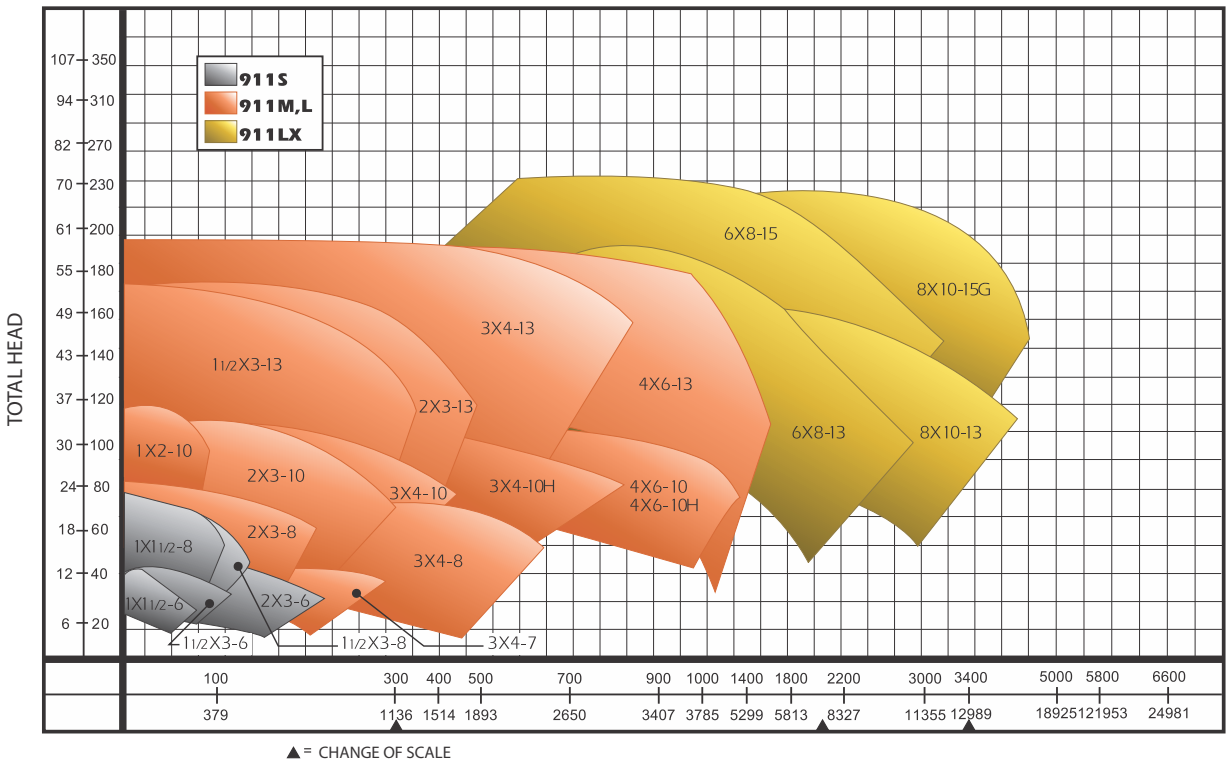


Performance curve

3500 RPM



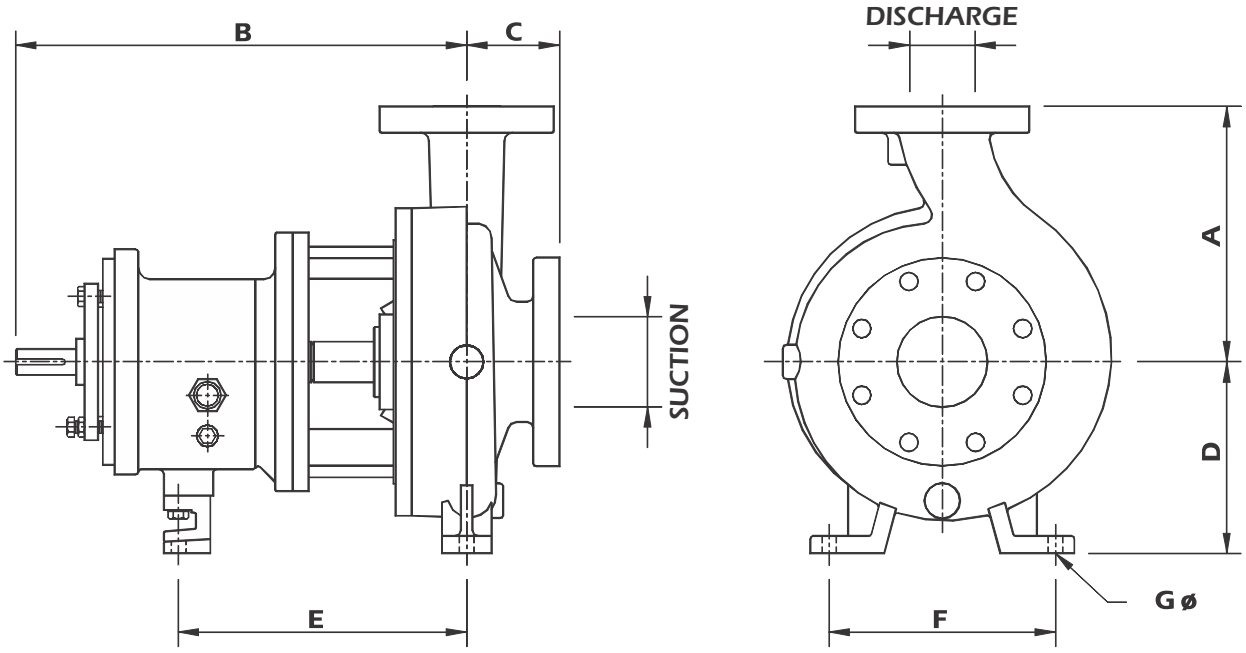
1750 RPM



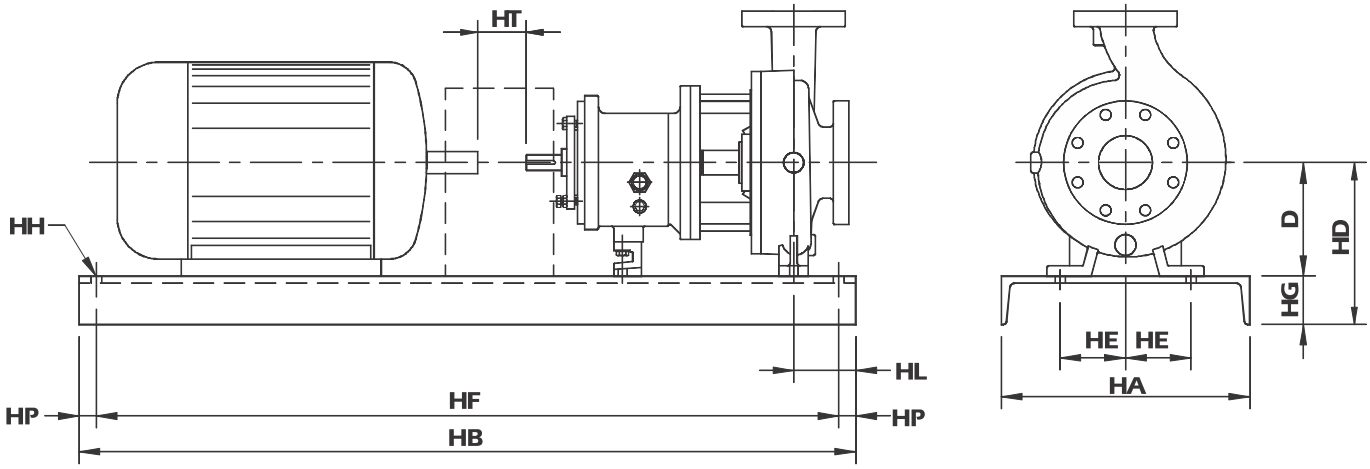
▲= CHANGE OF SCALE

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	2 x 3 - 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"					1 1/8"															1 7/8"											2 3/8"				
SHAFT	SLEEVE DIAMETER UNDER SEAL	1 3/8"					1¾"															2 1/8"											2½"				
SHAFT	IMPELLER THREAD	3/4"					1"															1¼"											1½"				
SHAFT	DIAMETER WITHOUT SLEEVE	1 1/8"					1½"															1 7/8"											2"				
SHAFT	OVERHANG	6"					7 7/8"															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 1/16"															4¼"											5"				
	MECHANICAL SEAL SIZE	1 3/8"					1¾"															2 1/8"											2½"				
STUFFING BOX STD.	INSIDE DIAMETER	2"					2½"															2 7/8"											3 3/8"				
STUFFING BOX STD.	DEPTH	2 1/8"					2 5/8"																										3"				
STUFFING BOX STD.	DISTANCE END OF BOX TO NEAREST OBSTRUCTION	2 3/8"					2 13/16"																										2 7/8"				
	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



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"

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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.

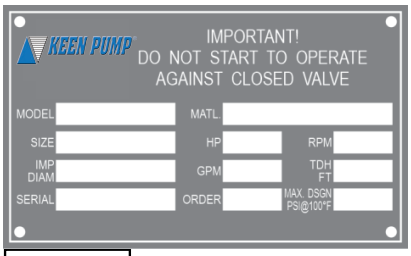


Figure 1

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

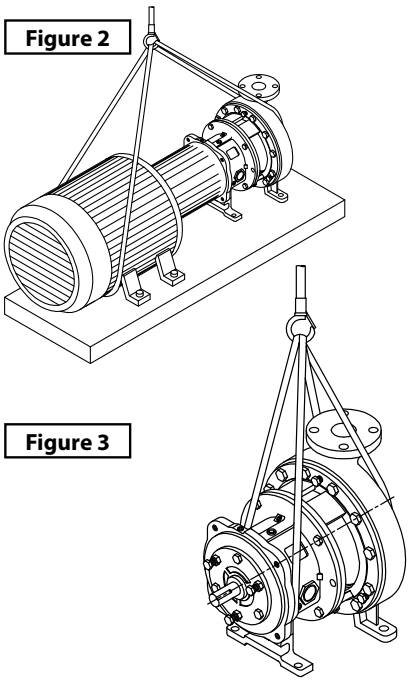


Figure 3

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:

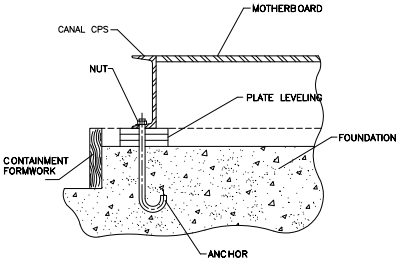


Figure 4

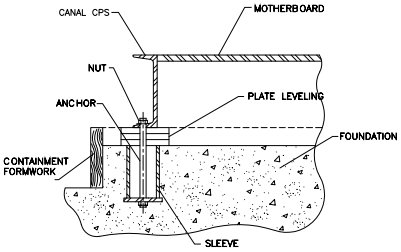


Figure 5

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.

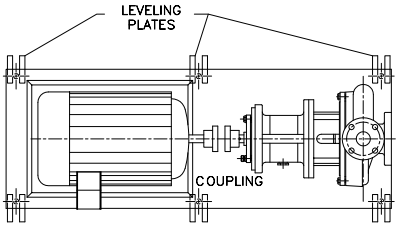


Figure 6

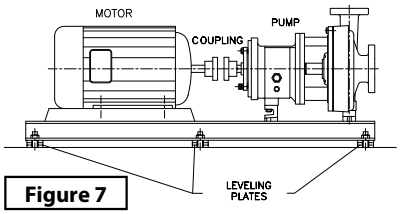


Figure 7

Alignment procedure

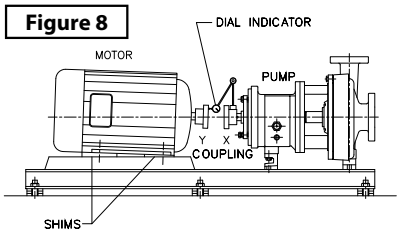
Initial alignment: this is done before putting into operation the pump and is divided into three stages:

- 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.

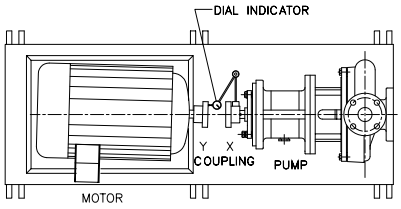
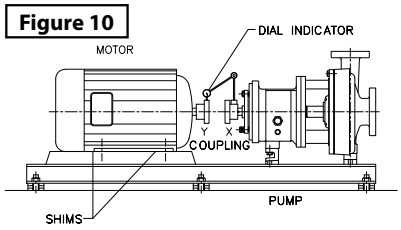


Figure 9

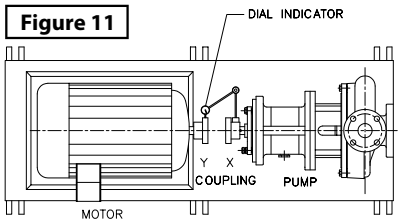
Parallel alignment.
Vertical: Consist of installing a dial indicator (see Figure 10) in the top half of the coupling "X" leaving it fixed, and four cardinal points in the half of the "Y" coupling are inspected. If readings exceed 0.002" (0.05mm), means that the motor is offset from the top down, install 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

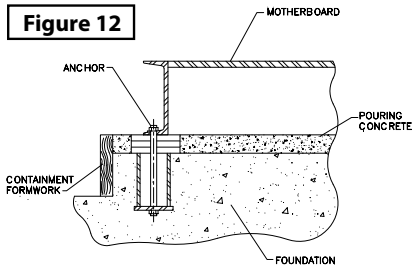
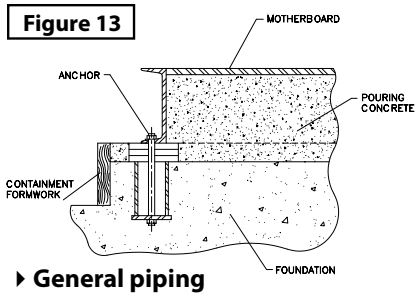


Figure 13



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

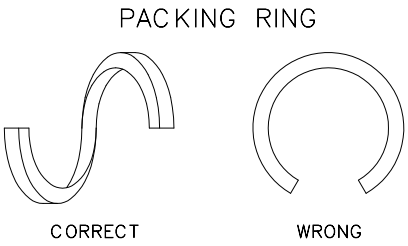
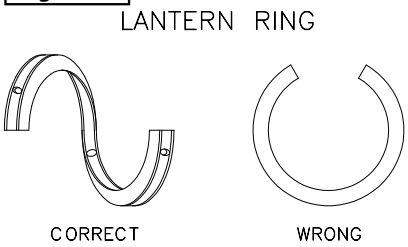


Figure 15



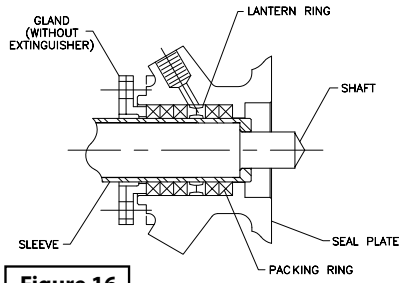


Figure 16

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

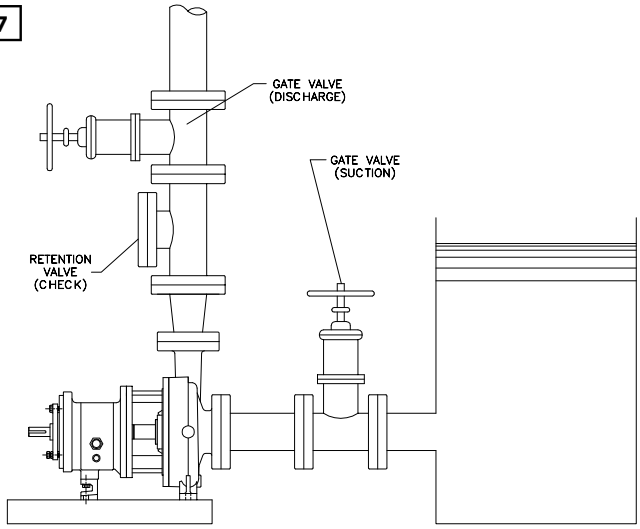


Figure 18

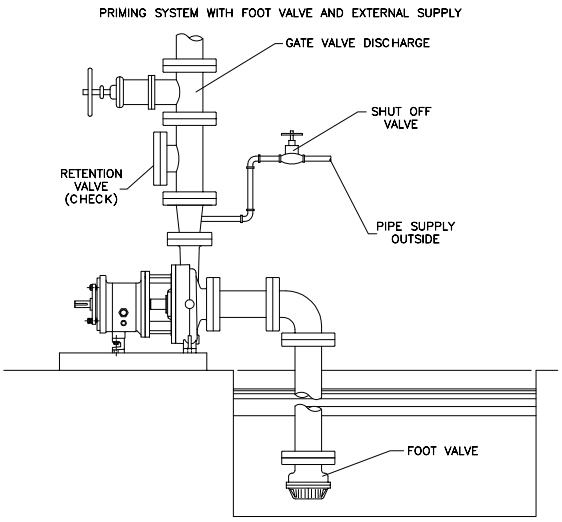
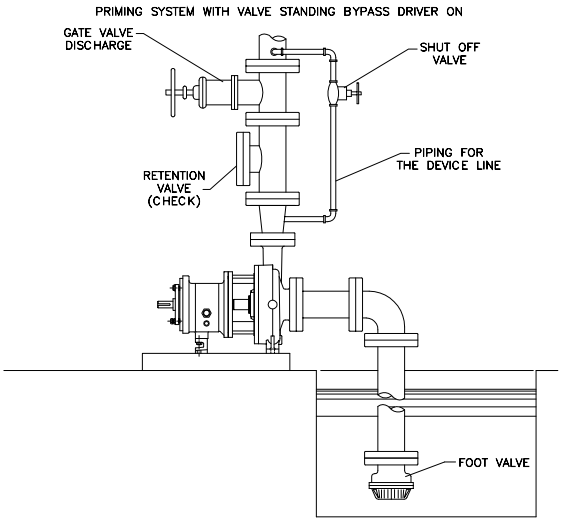


Figure 19



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	KP911S	10.04	5.02	2.9	1.05	-	-
1½ x 3 - 6		20.08	8.9	5.02	2.11	-	-
2 x 3 - 6		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	KP911M	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		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	KP911LX	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		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

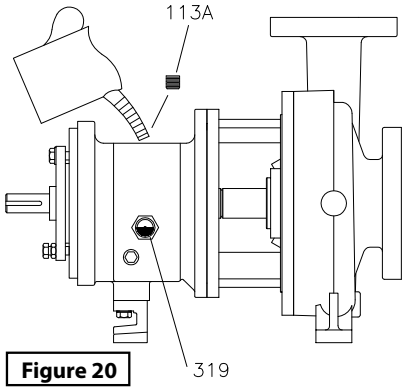


Figure 20

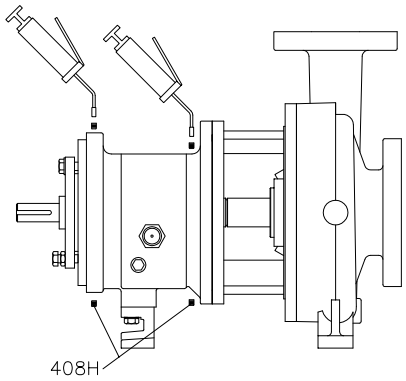


Figure 21

Grease lubricated bearings

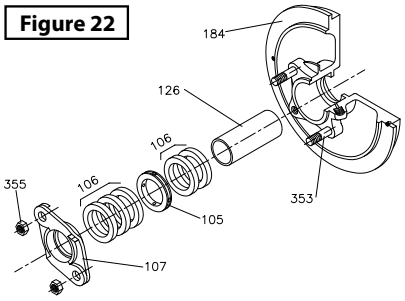
1. Clean and wipe out all elements such as: the grease container, relief plugs, etc. to prevent dirt from entering the bearing support.
2. Fill both grease cavities through the greased ducts until fresh grease comes out the relief holes.
3. Reinstall relief plugs in place.

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

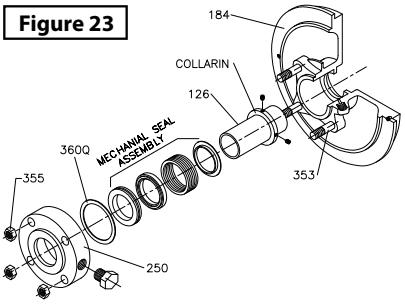


Mechanical seal

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.

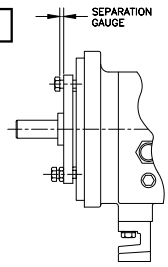
Impeller clearings adjustment

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

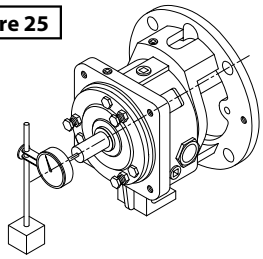


Dial indicator method

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 inmediately.
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 911M 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.

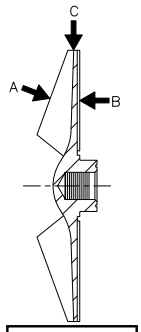


Figure 26

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).

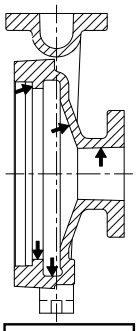


Figure 27

Adapter:

- When inspecting the adapter, you should check for any cracks or excessive corrosion damage, must be replaced (see Figure 28).

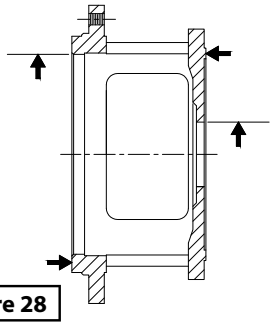
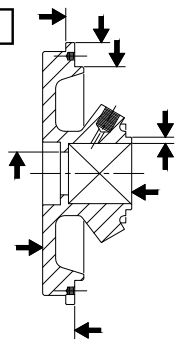


Figure 28

Seal plate:

- When inspecting the seal plate should check the packaing 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).

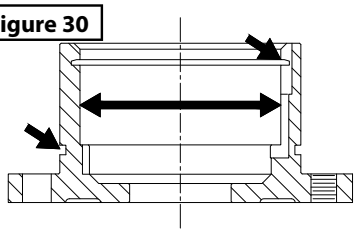
Figure 29



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.

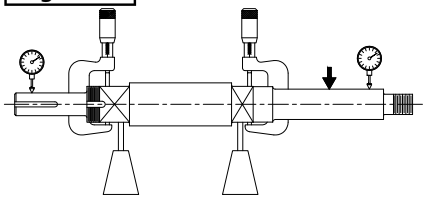
Figure 30



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).

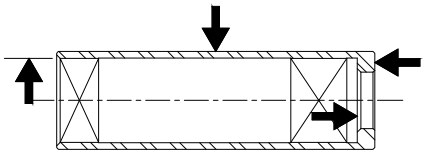


Figure 32

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.

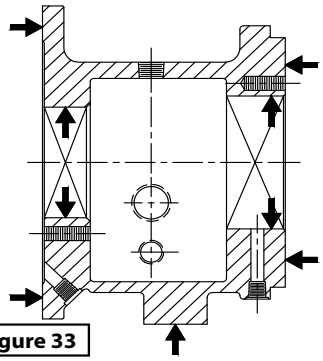


Figure 33

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.

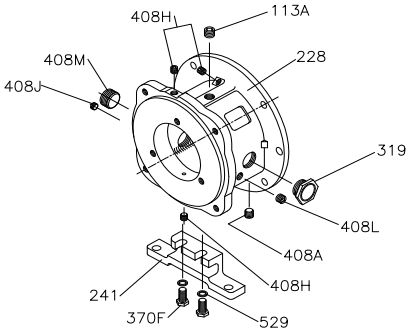


Figure 34

Mounting the coupling and rotating elements

1.- For the KP911S and KP911M models: Install the outer bearing on the shaft, before installing moisten the inner ring of the bearing with the same oil use during 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 911L 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 911M 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

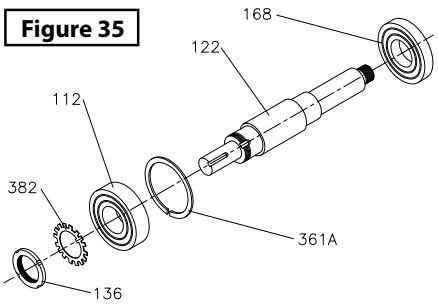


Figure 36

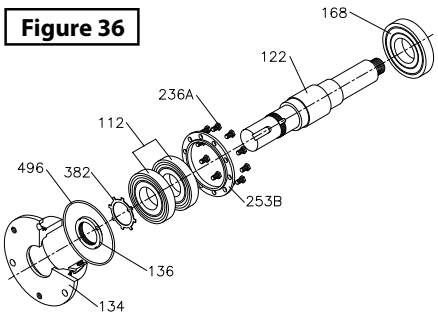
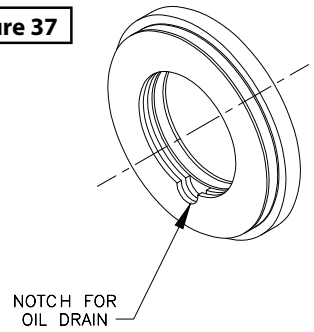


Figure 37



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.

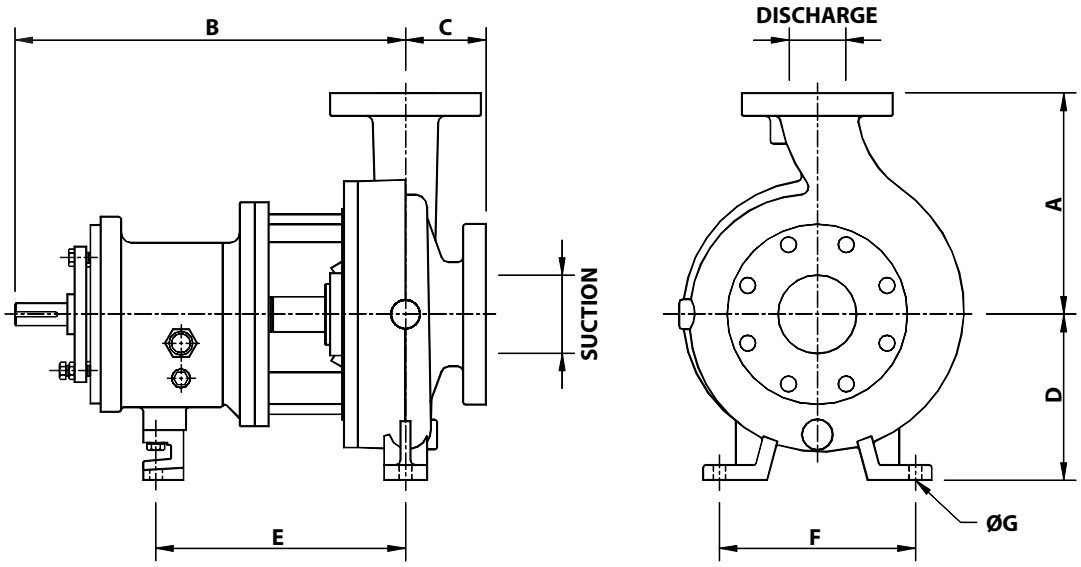
8.- Verify perpendicular and eccentric impeller adjustments, with a dial indicator, checking the 360° between the tips of each blade, if the readings are higher than 0.005" (0.13 mm), remove the impeller and determine the cause.
9.- Mark the sleeve on the outer face, this will serve as a reference when 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).

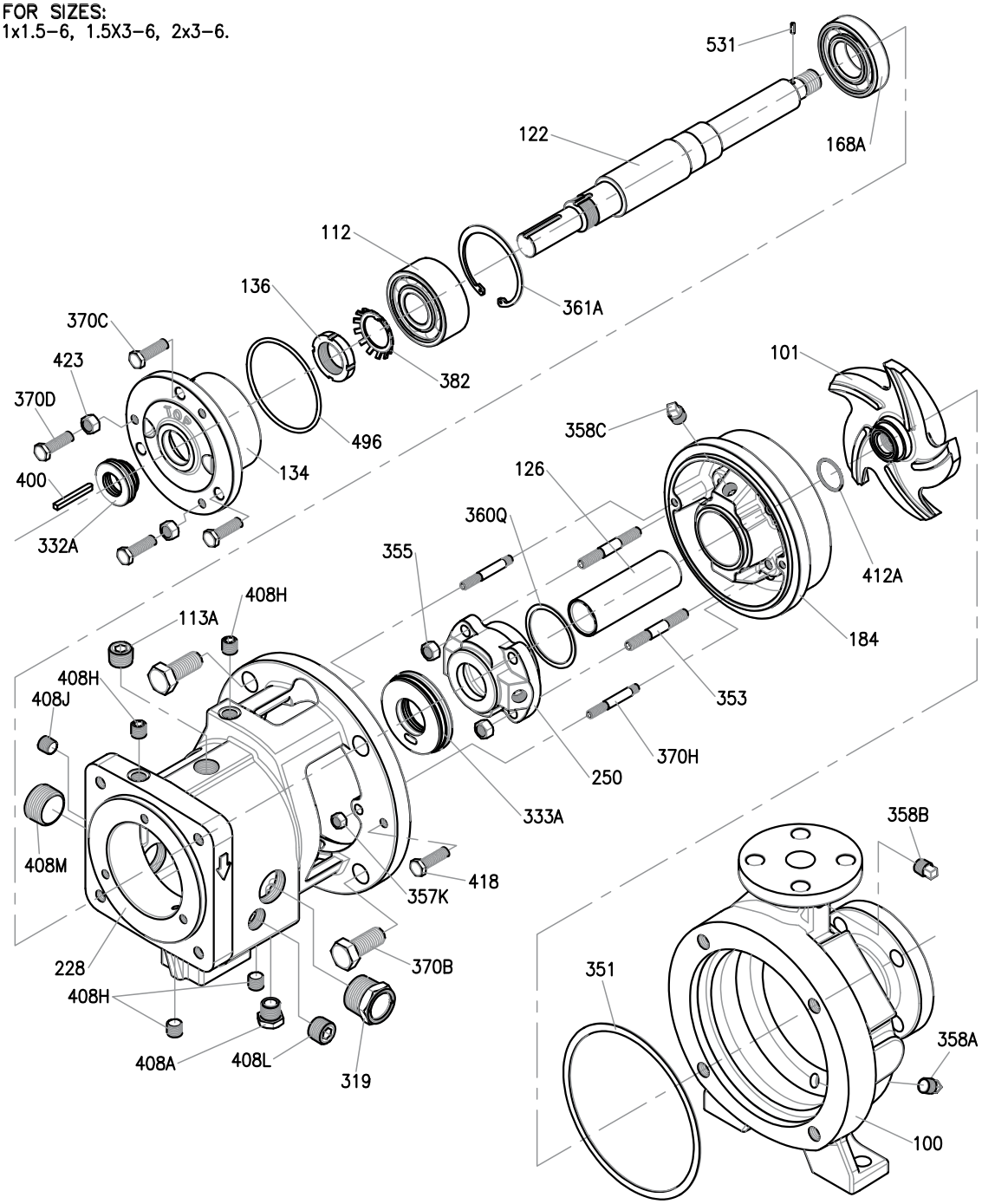


MODEL	PUMP SIZE	ANSI DESIGNATION	DISCHARGE DIAM.	SUCTION DIAM.	A	B	C	D	E	F	ØG HOLES	APROX. WEIGHT (kg)
KP911S	1 x 1.5 - 6	AA	1	1.5	6.5"	13.5"	4"	5.25"	7.25"	6"	0.625"	38
	1.5 x 3 - 6	AB	1.5	3								42
	2 x 3 - 6	-	2	3								43
	1 x 1.5 - 8	AA	1	1.5							0.563"	45
	1.5 x 3 - 8	AB	1.2	3								49
KP911M & 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
KP911LX	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

EXPLODED VIEW DRAWING

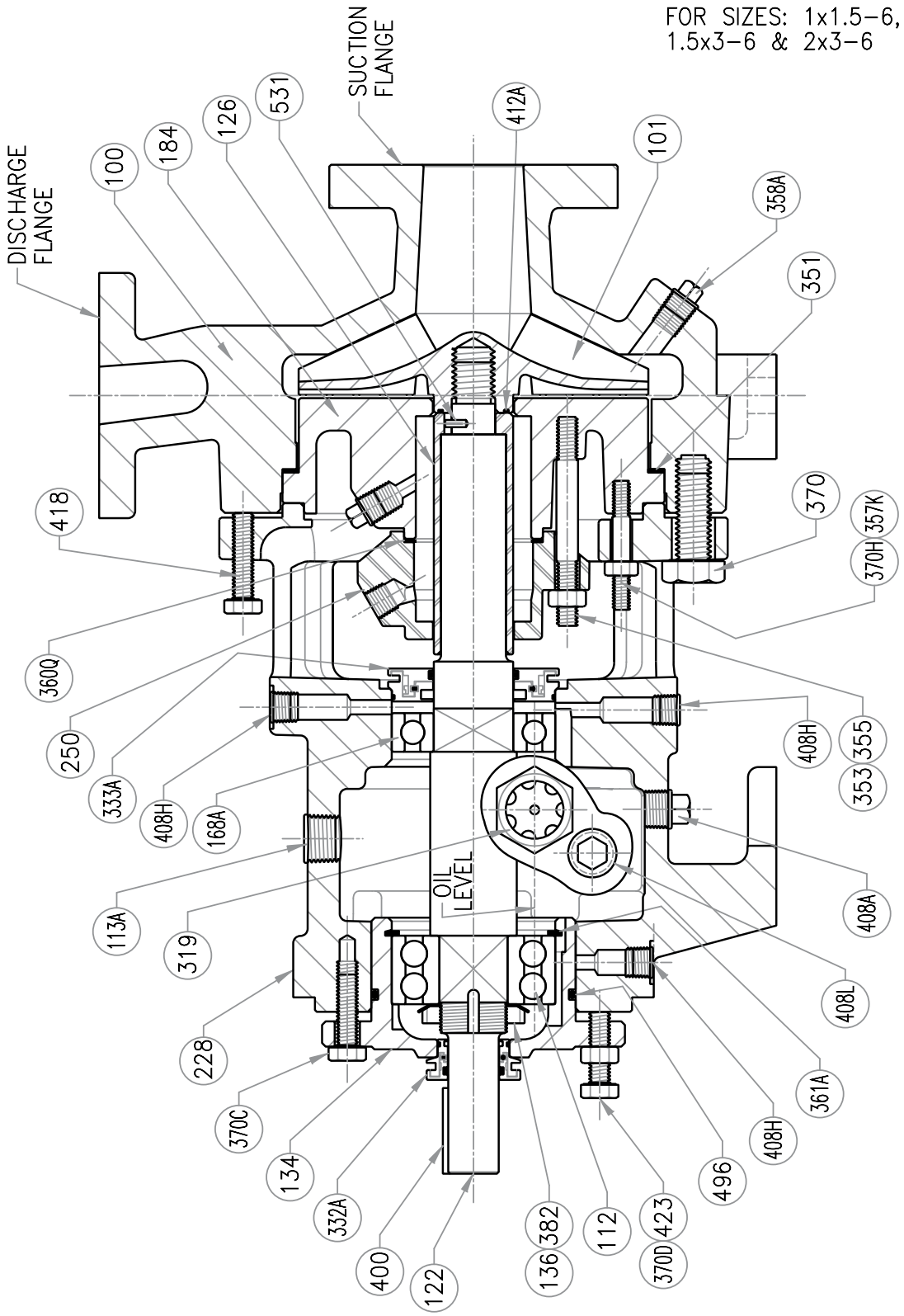
Series: **KP911S**

FOR SIZES:
1x1.5-6, 1.5X3-6, 2x3-6.



SECTIONAL VIEW DRAWING

Series: **KP911S**

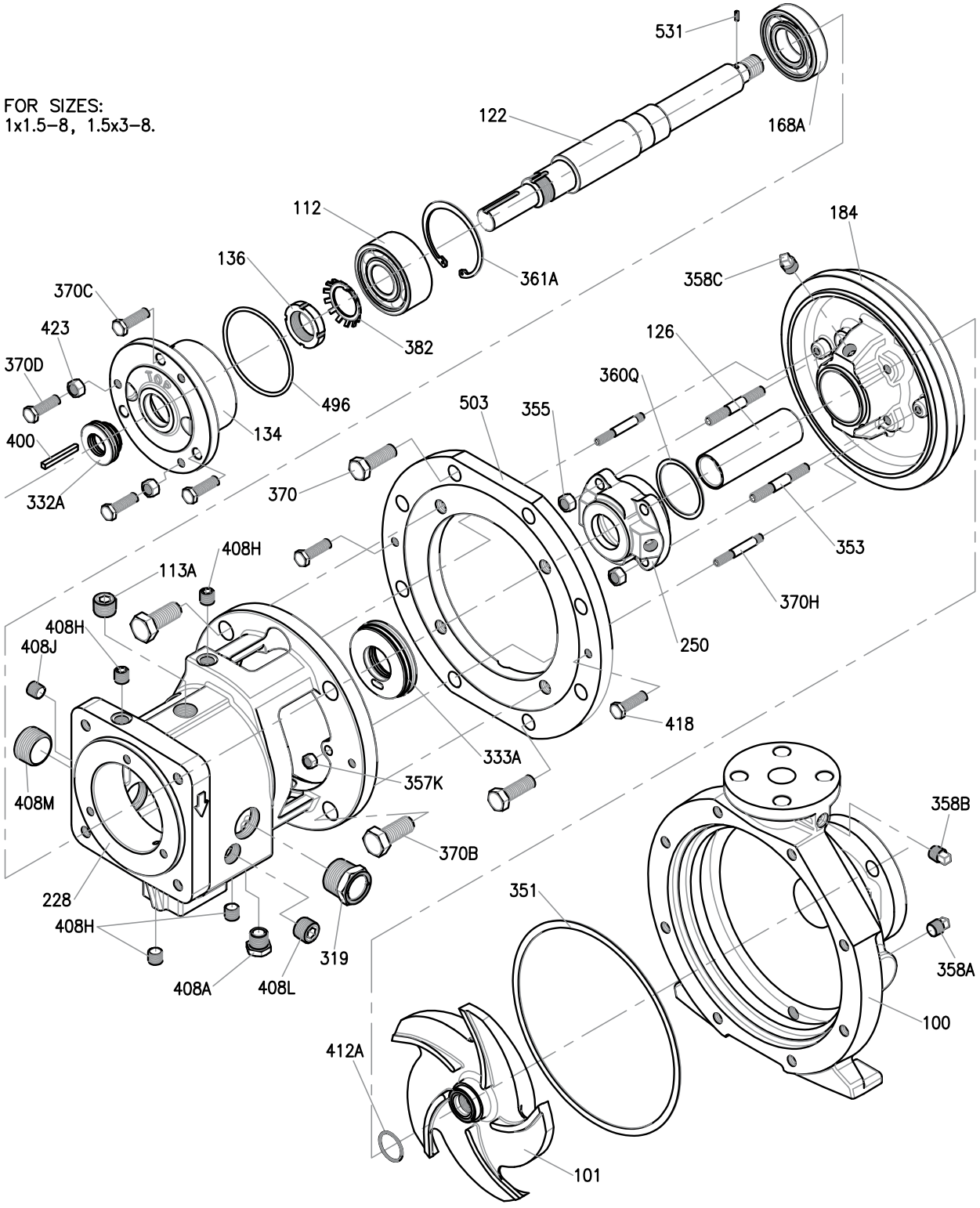


PART LIST
Series: **KP911S**

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 911 S	Teflon®	31010026
106	5	Cord ring 5/16"	Teflon®	92010135
107	1	Stuffing box 911 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 911 S	Bronze	31030202
333A	1	Inboard lab'y seal 911 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

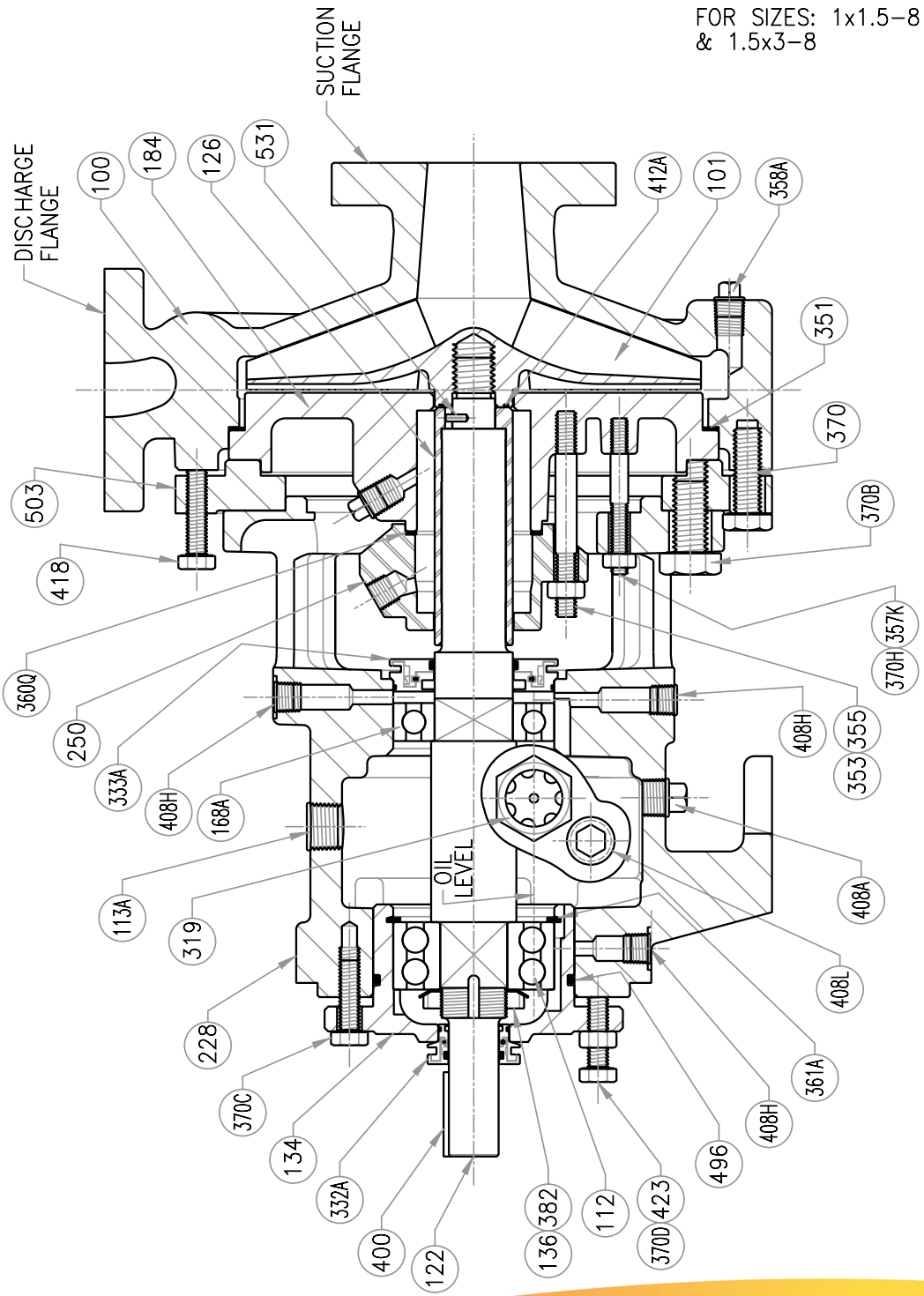
EXPLODED VIEW DRAWING

Series: **KP911S**



SECTIONAL VIEW DRAWING

Series: **KP911S**



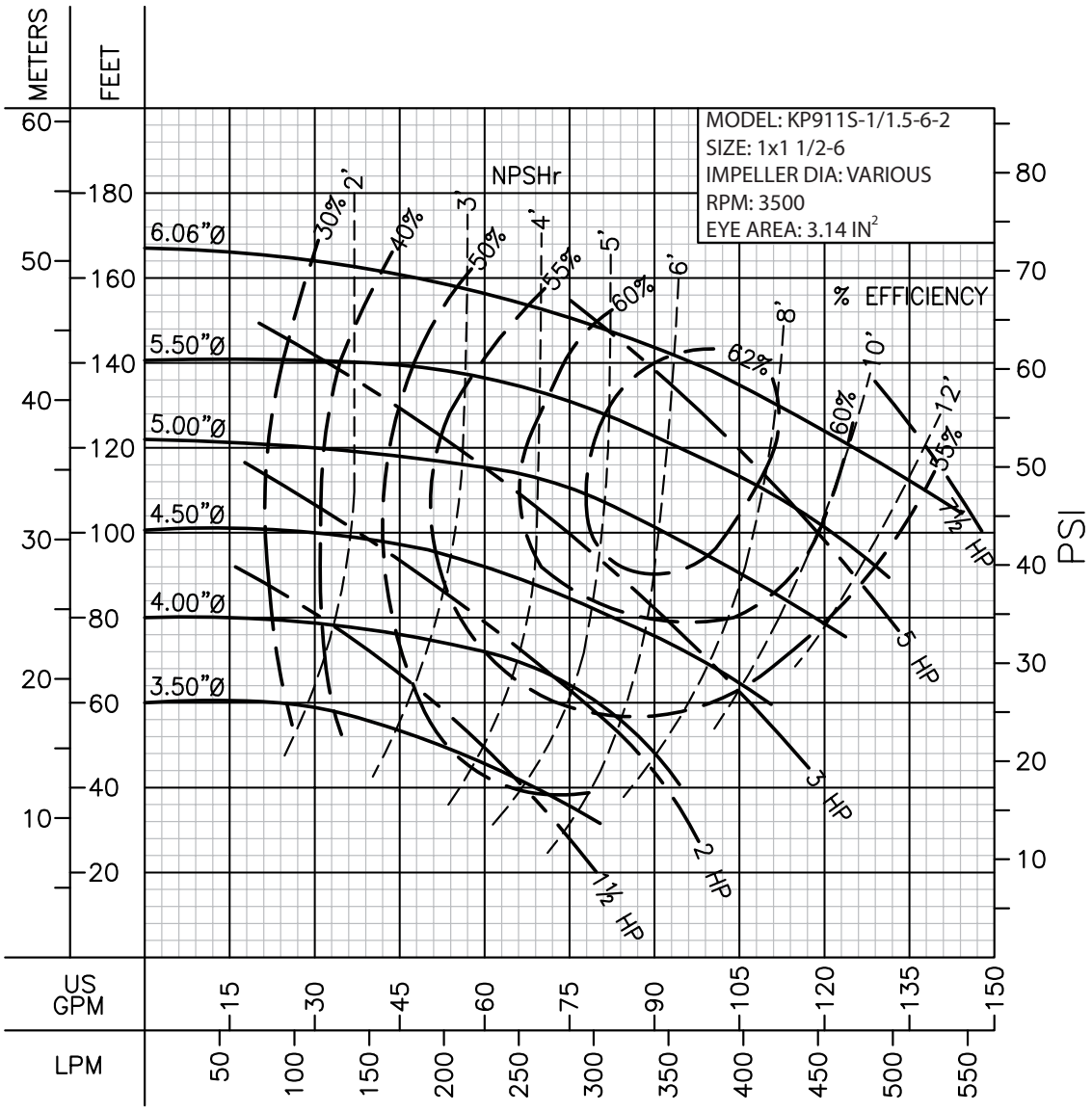
PART LIST
Series: **KP911S**

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 911 S	Teflon®	31010026
106	5	Cord ring 5/16"	Teflon®	92010135
107	1	Stuffing box 911 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 911 S	Bronze	31030202
333A	1	Inboard lab'y seal 911 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

KEEN PUMP®

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911S**



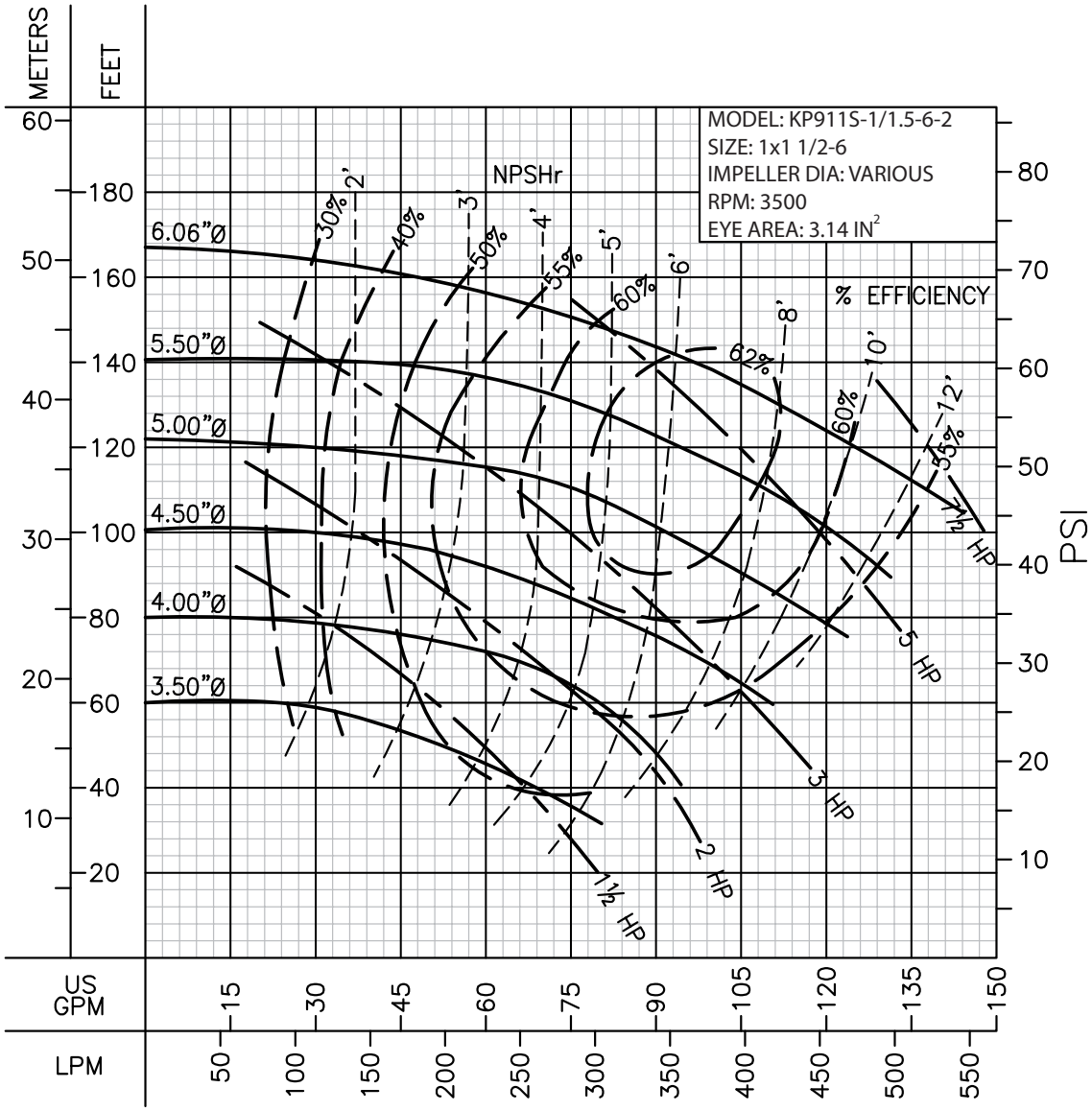
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SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

KEEN PUMP®

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911S**



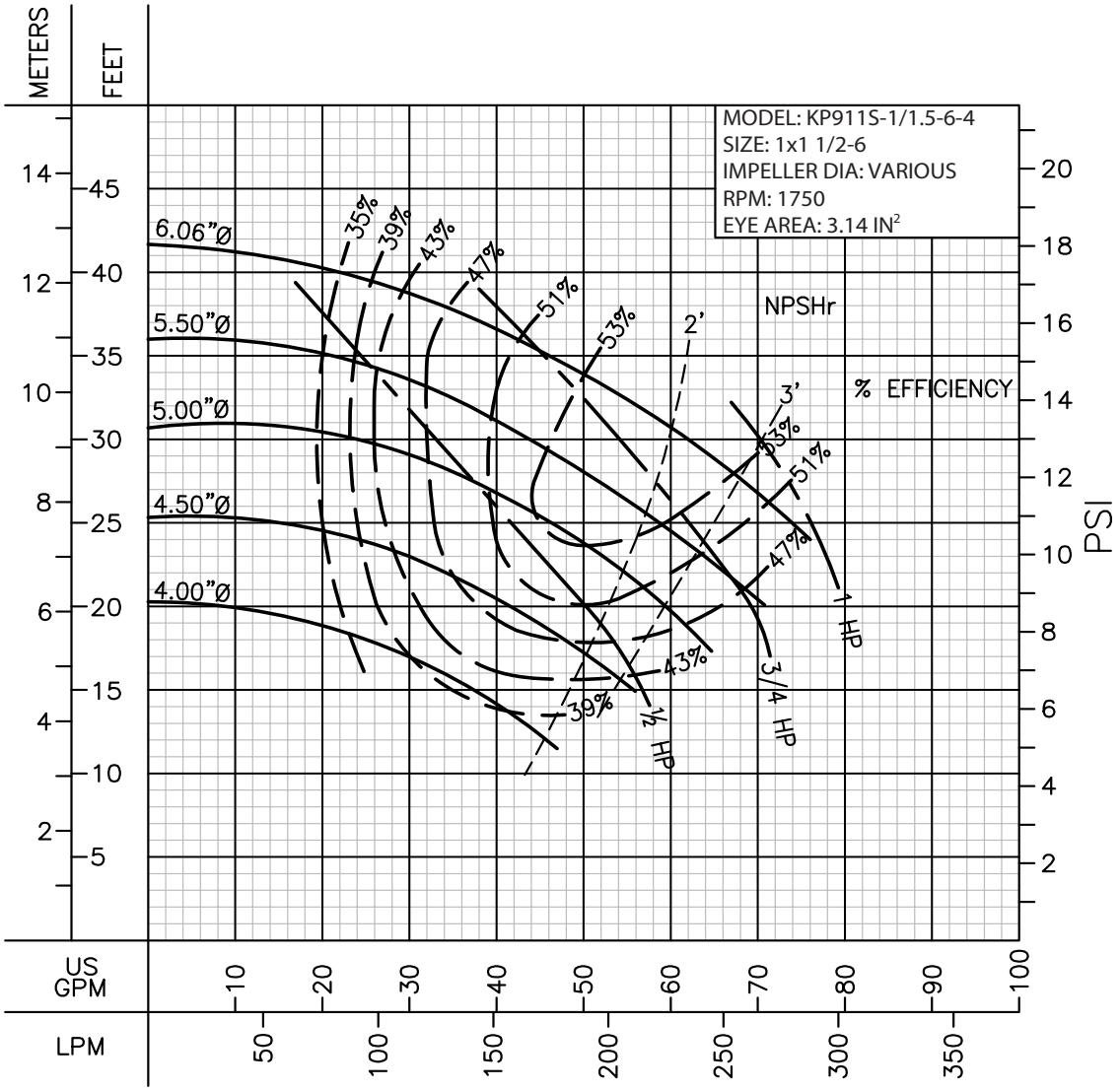
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SPECIFIC GRAVITY: 1.00

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MAX. SOLID SIZE: .500 in

KEEN PUMP®

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911S**



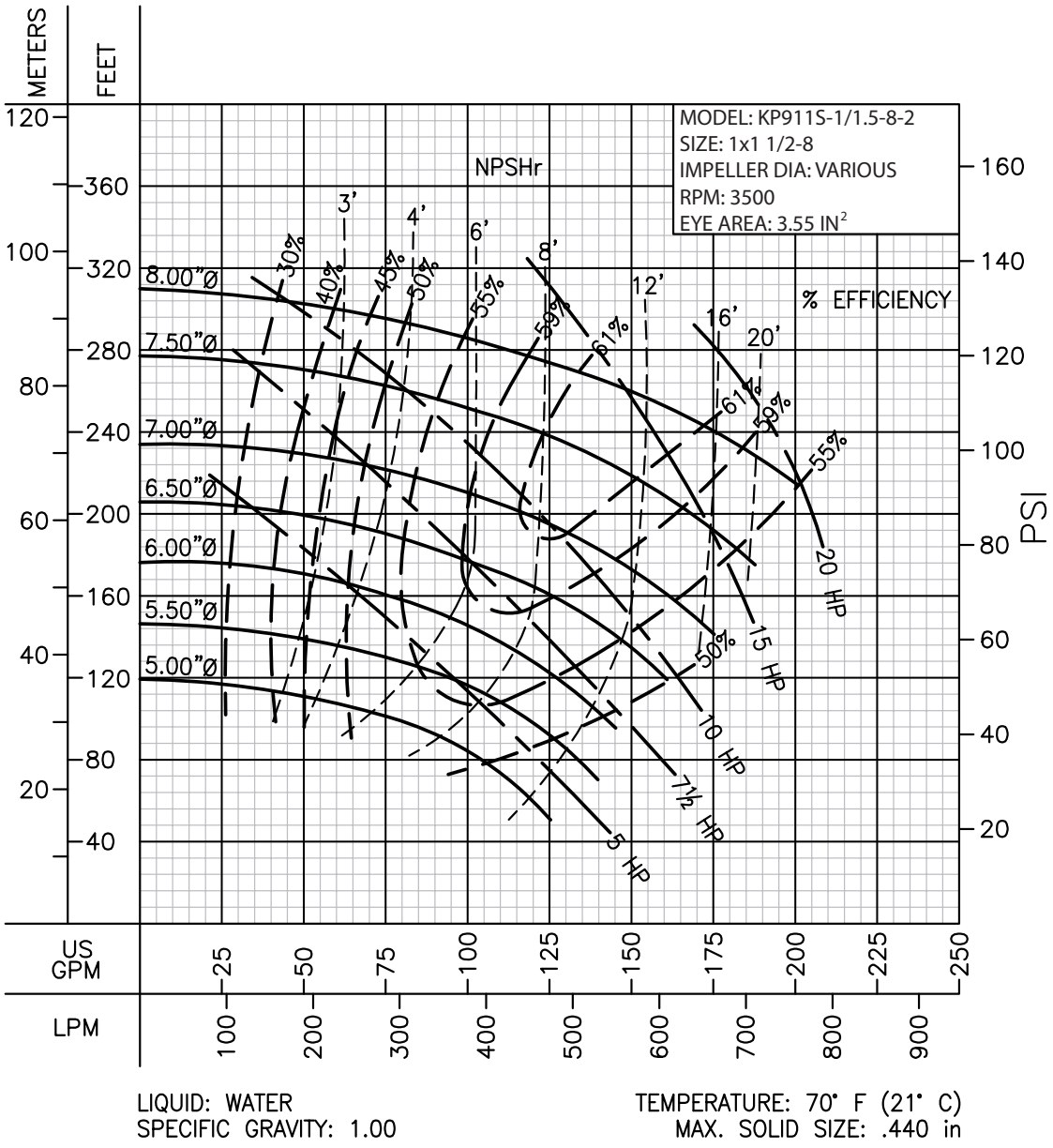
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .440 in

KEEN PUMP®

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911S**



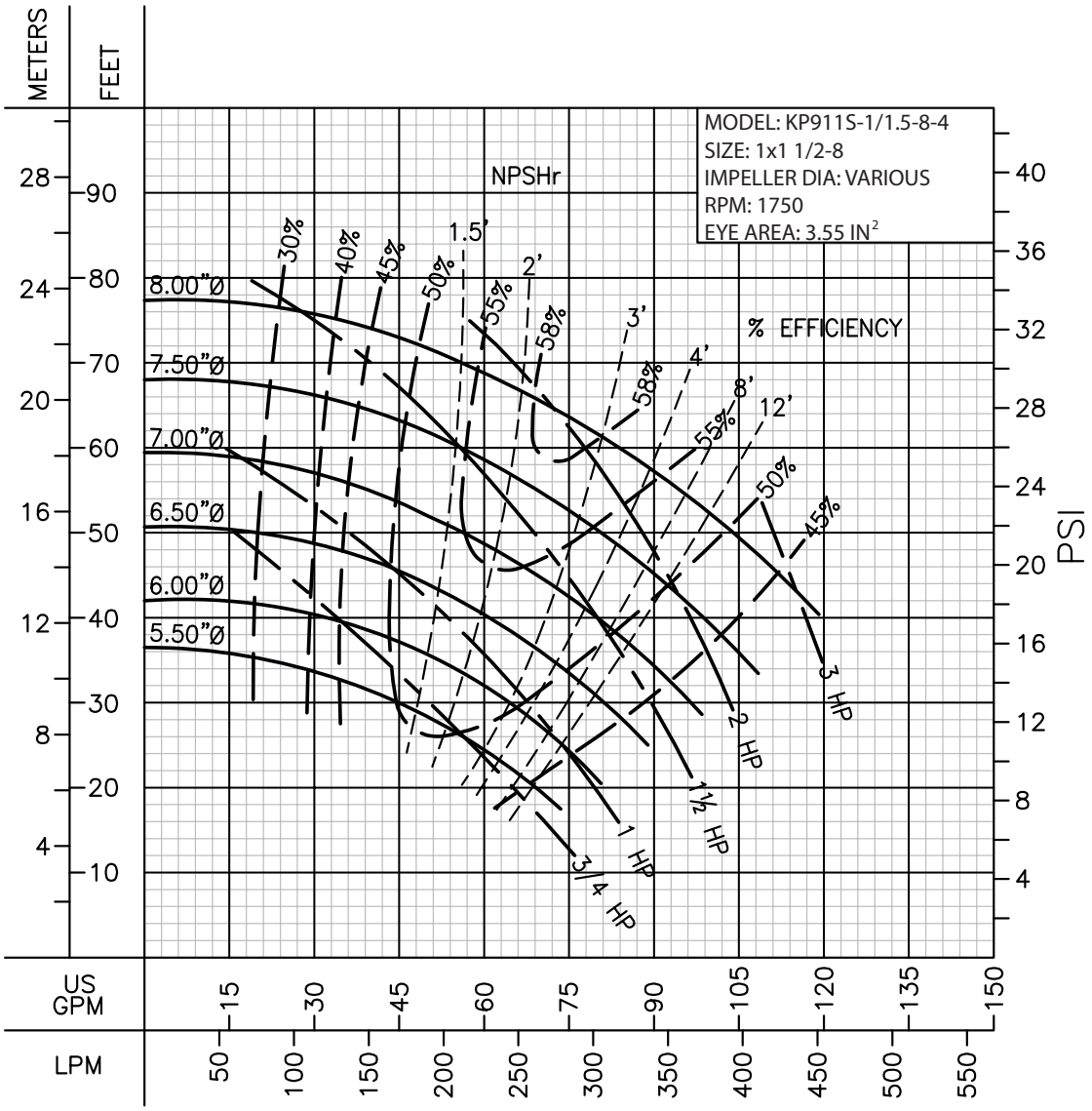
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SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .440 in

KEEN PUMP®

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911S**

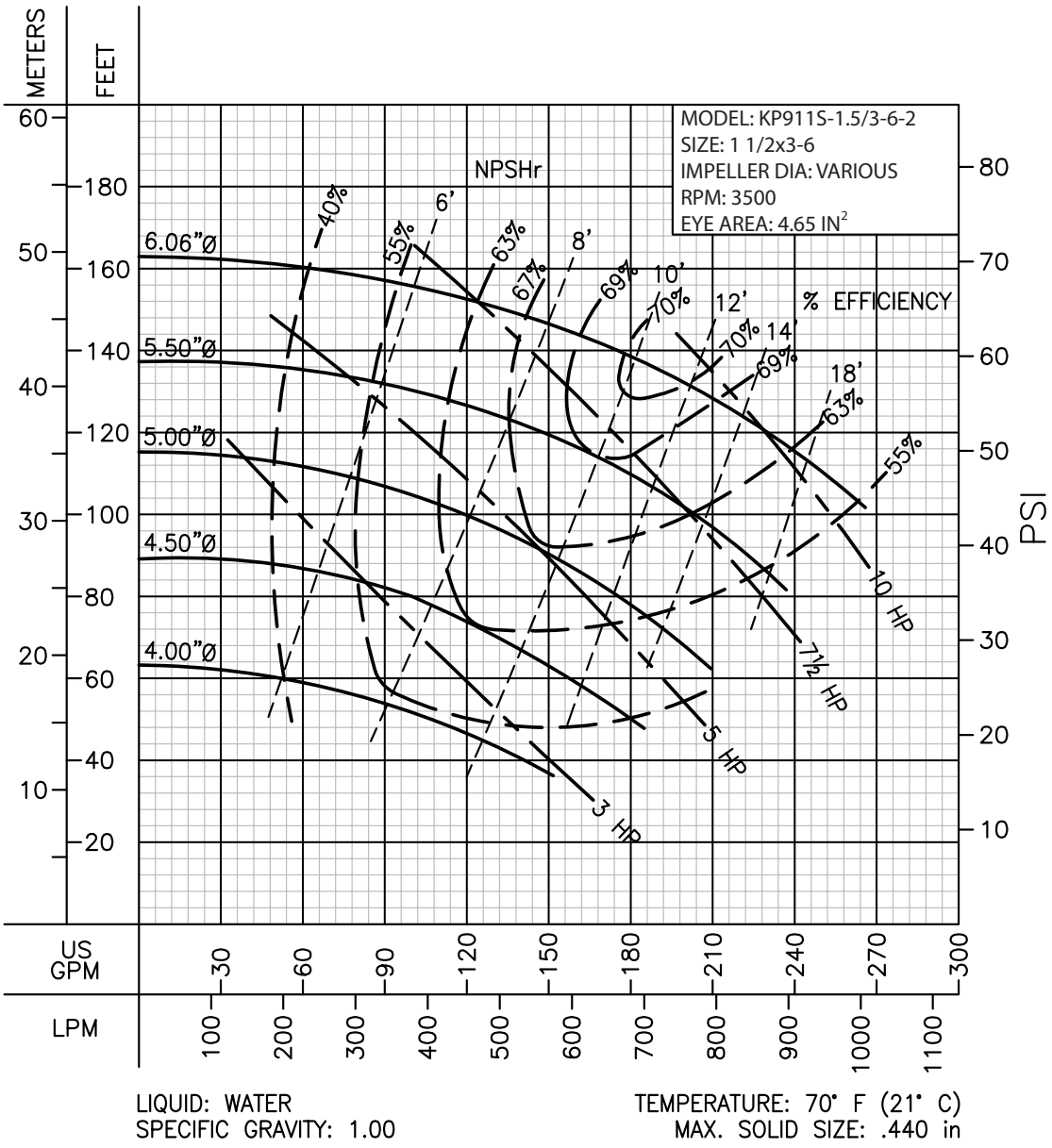


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .440 in

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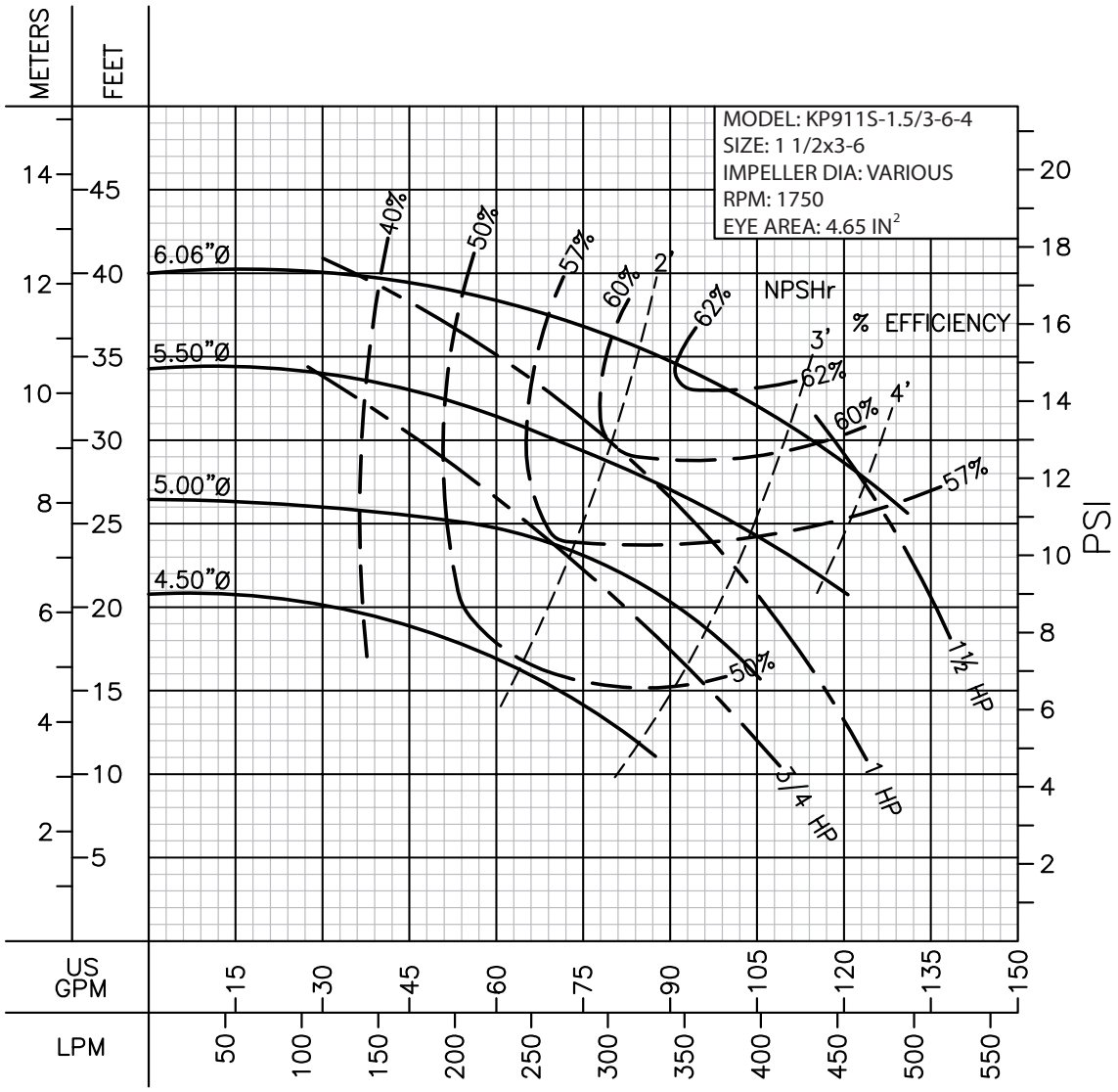
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911S**



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PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911S**



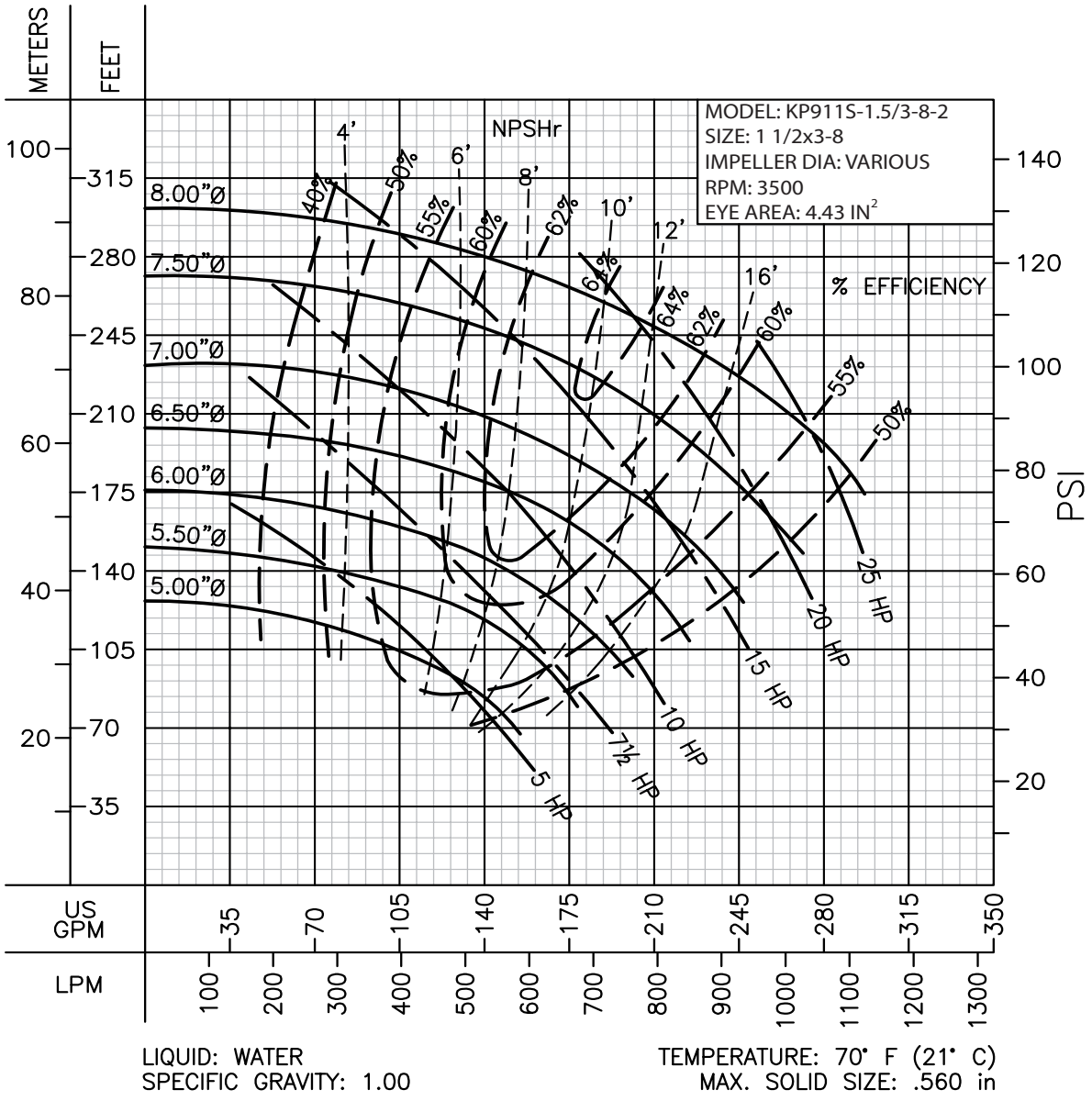
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SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .440 in

KEEN PUMP®

PERFORMANCE CURVES

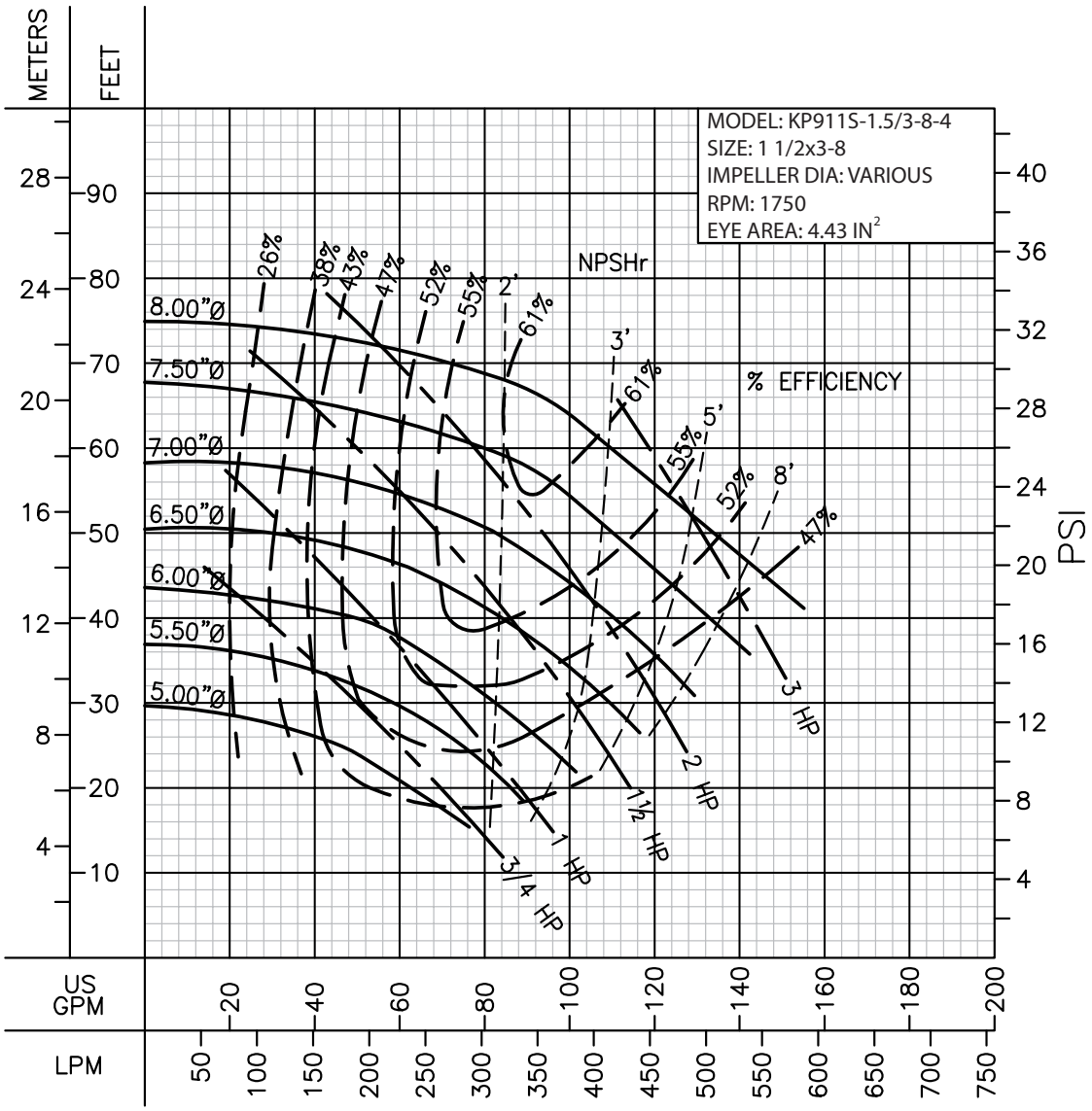
ANSI Centrifugal
Process Pumps
Series: **KP911S**



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PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911S**

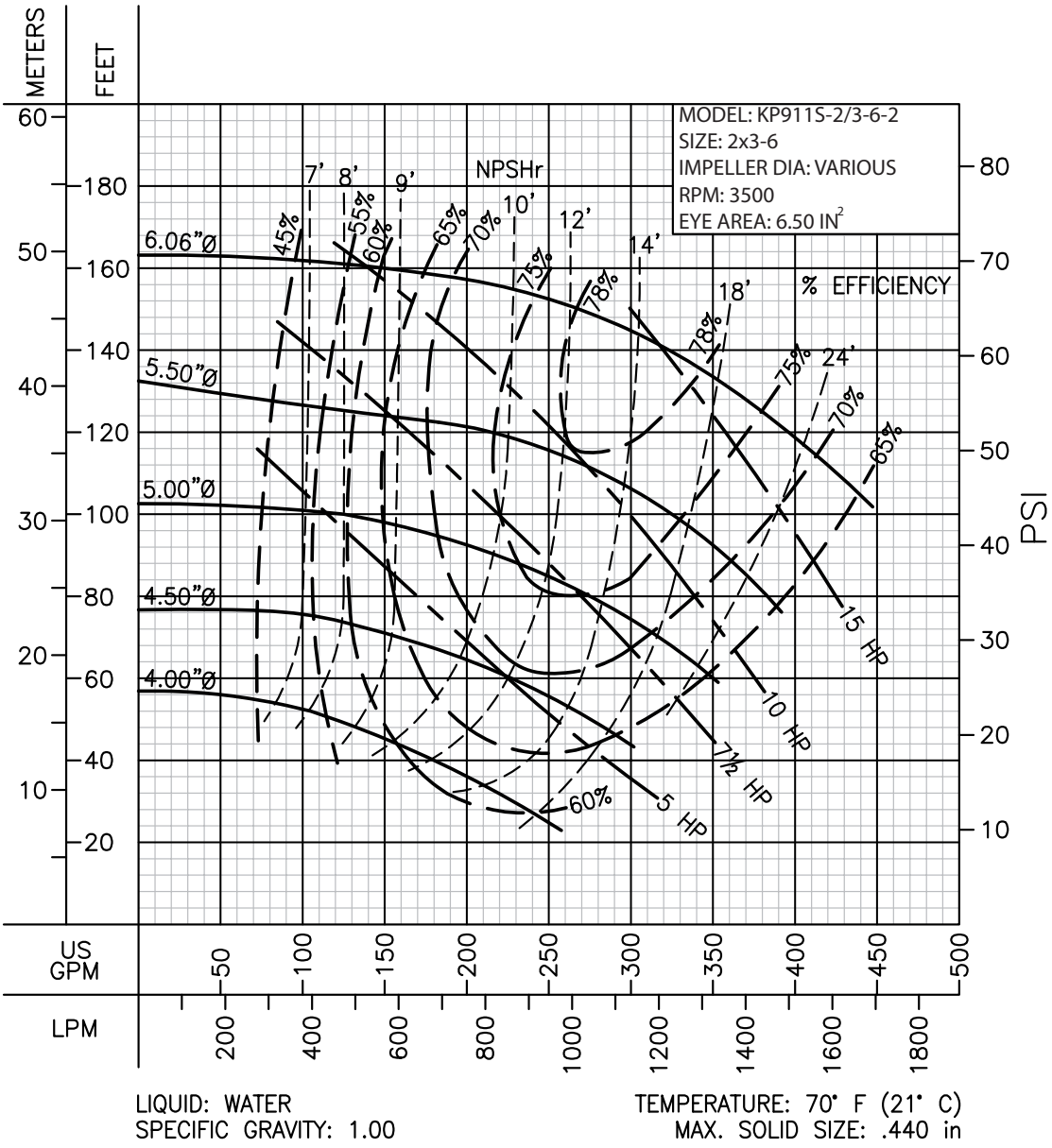


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SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .560 in

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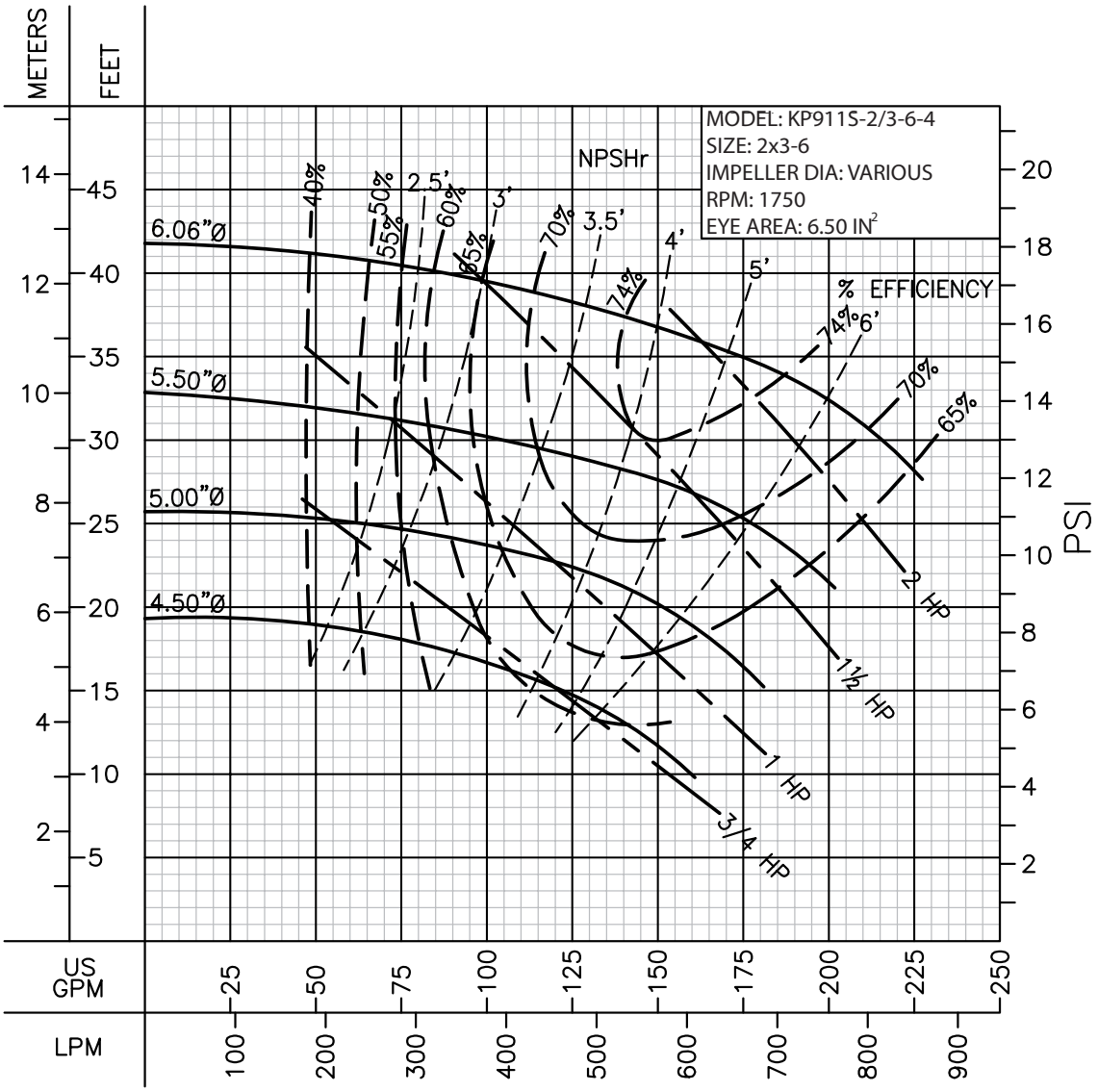
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911S**



KEEN PUMP®

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911S**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

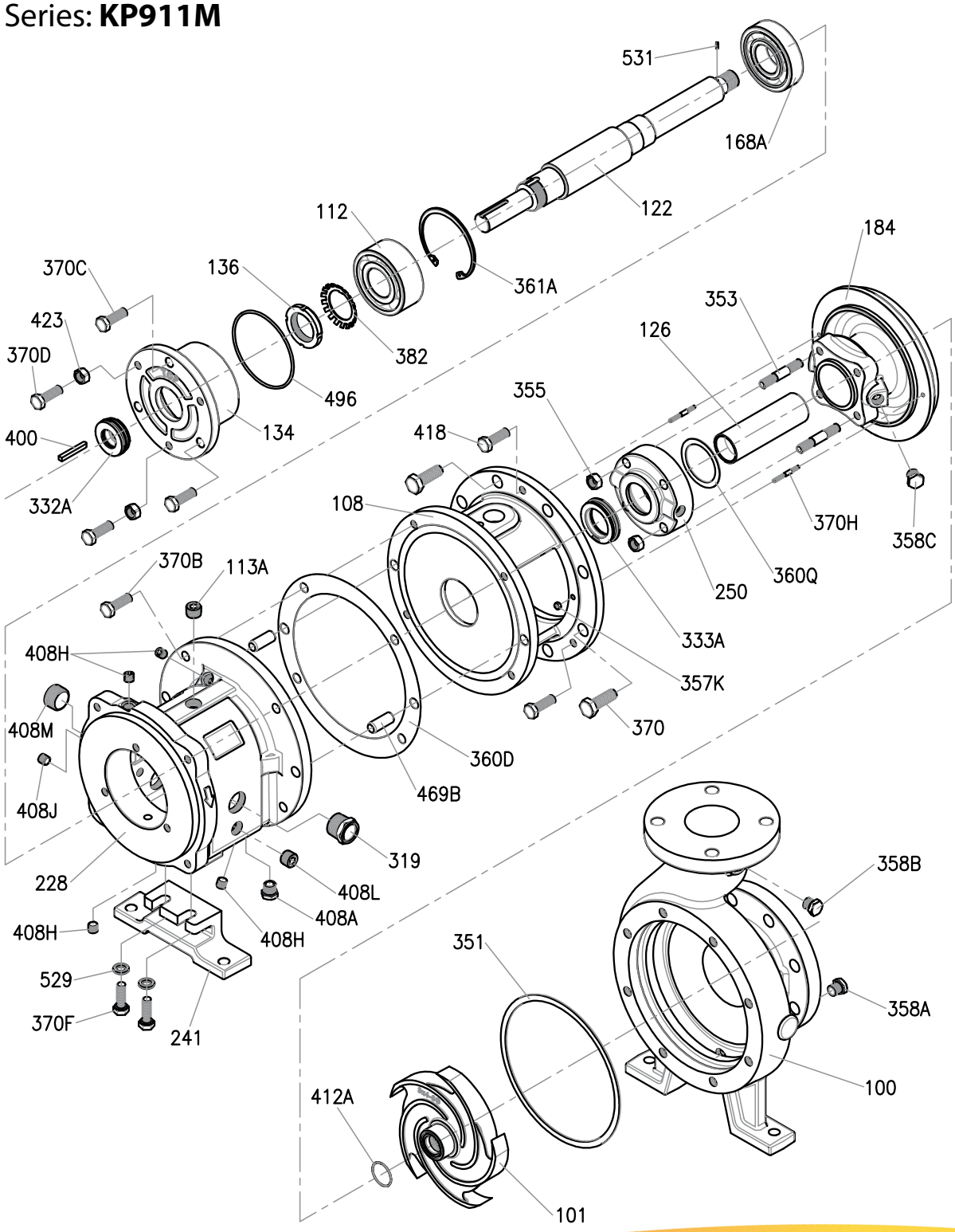
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MAX. SOLID SIZE: .440 in

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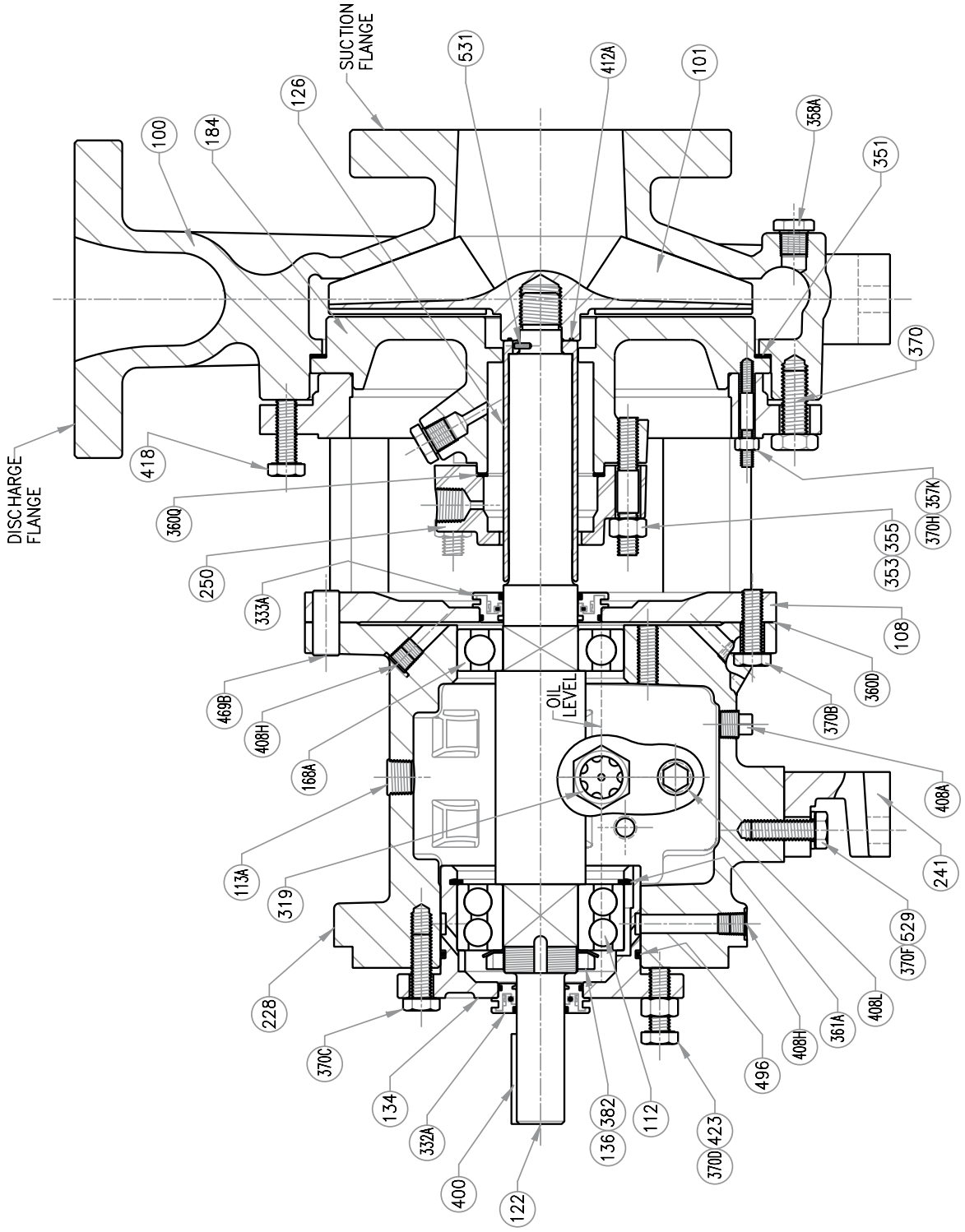
EXPLODED VIEW DRAWING

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 911 M	Teflon®	31010027
106	5	Cord ring 3/8"	Teflon®	92010134
107	1	Stuffing box 911 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 911 M	Bronze	31030203
333A	1	Inboard lab'y seal 911 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 911 M	Teflon®	31010027
106	5	Cord ring 3/8"	Teflon®	92010134
107	1	Stuffing box 911 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 911 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 911 M	Bronze	31030203
333A	1	Inboard lab'y seal 911 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

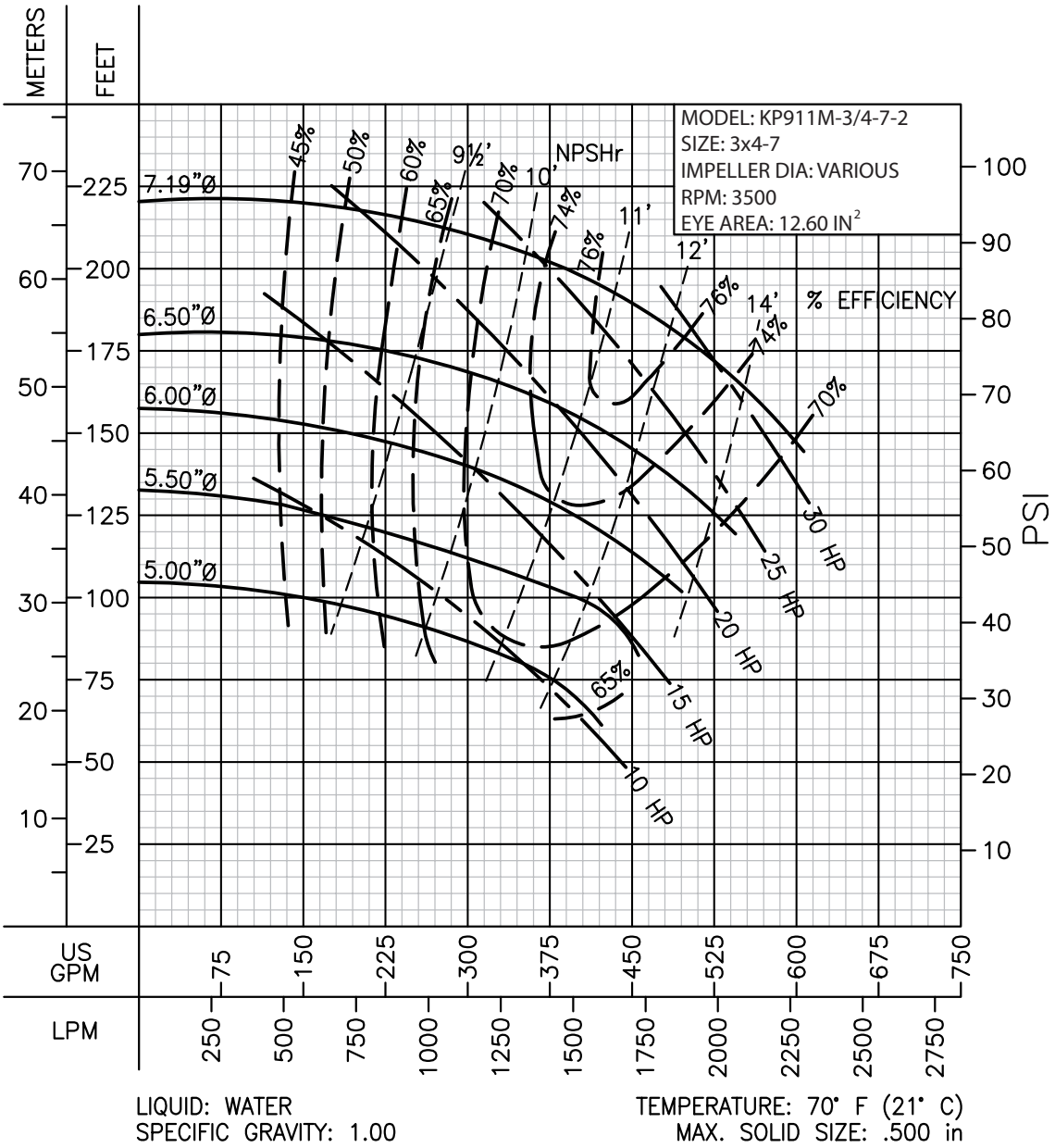
ITEM	QTY.	DESCRIPTION	MATERIAL	PART No.
400	1	Key ¼"	Steel 1018	30400633
408A	1	Plug 3/8"	Cast iron	93010149
408H	4	Dry seal cap ¼"	Steel	93010113
408J	1	Dry seal cap ¼"	Steel	93010113
408L	1	Dry seal cap ½"	Steel	93010112
408M	1	Dry seal cap 1"	Steel	93010111
412A	1	Impeller gasket	Teflon®	92010058
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 911 M	Teflon®	31010027
106	5	Cord ring 3/8"	Teflon®	92010134
107	1	Stuffing box 911 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 911 M	Bronze	31030203
333A	1	Inboard lab'y seal 911 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

KEEN PUMP®

PERFORMANCE CURVES

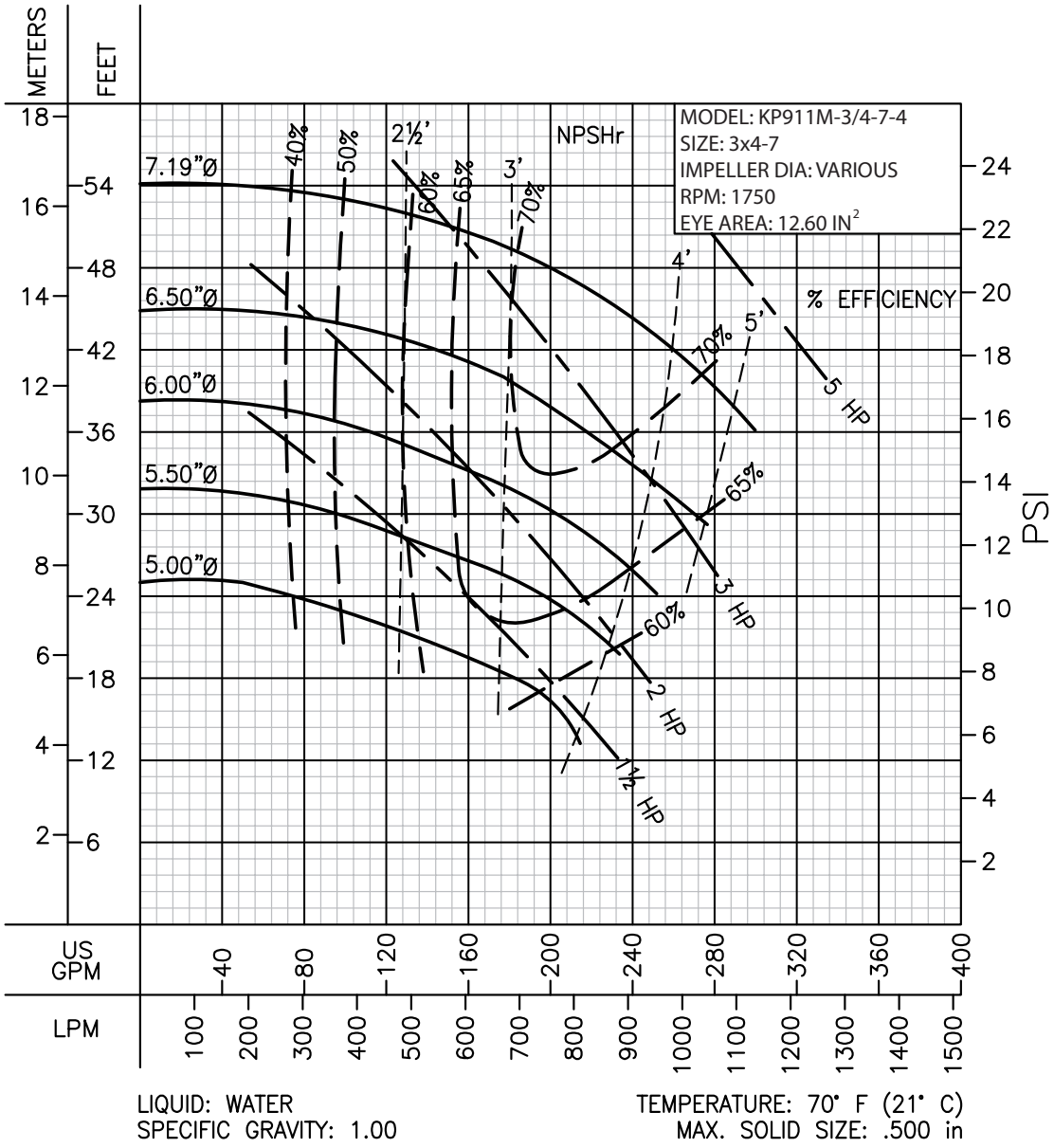
ANSI Centrifugal
Process Pumps
Series: **KP911M**



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PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**



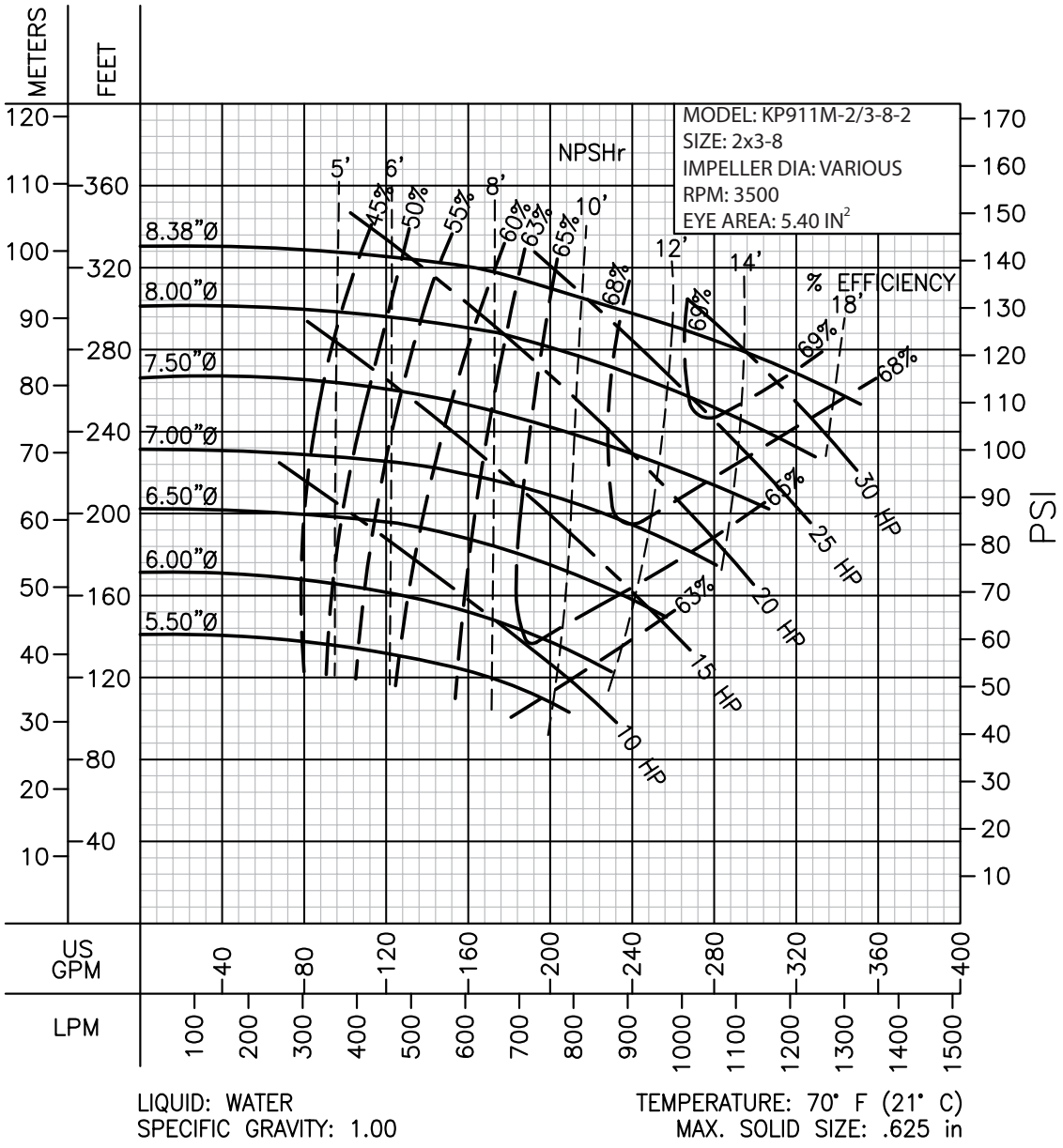
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

KEEN PUMP®

PERFORMANCE CURVES

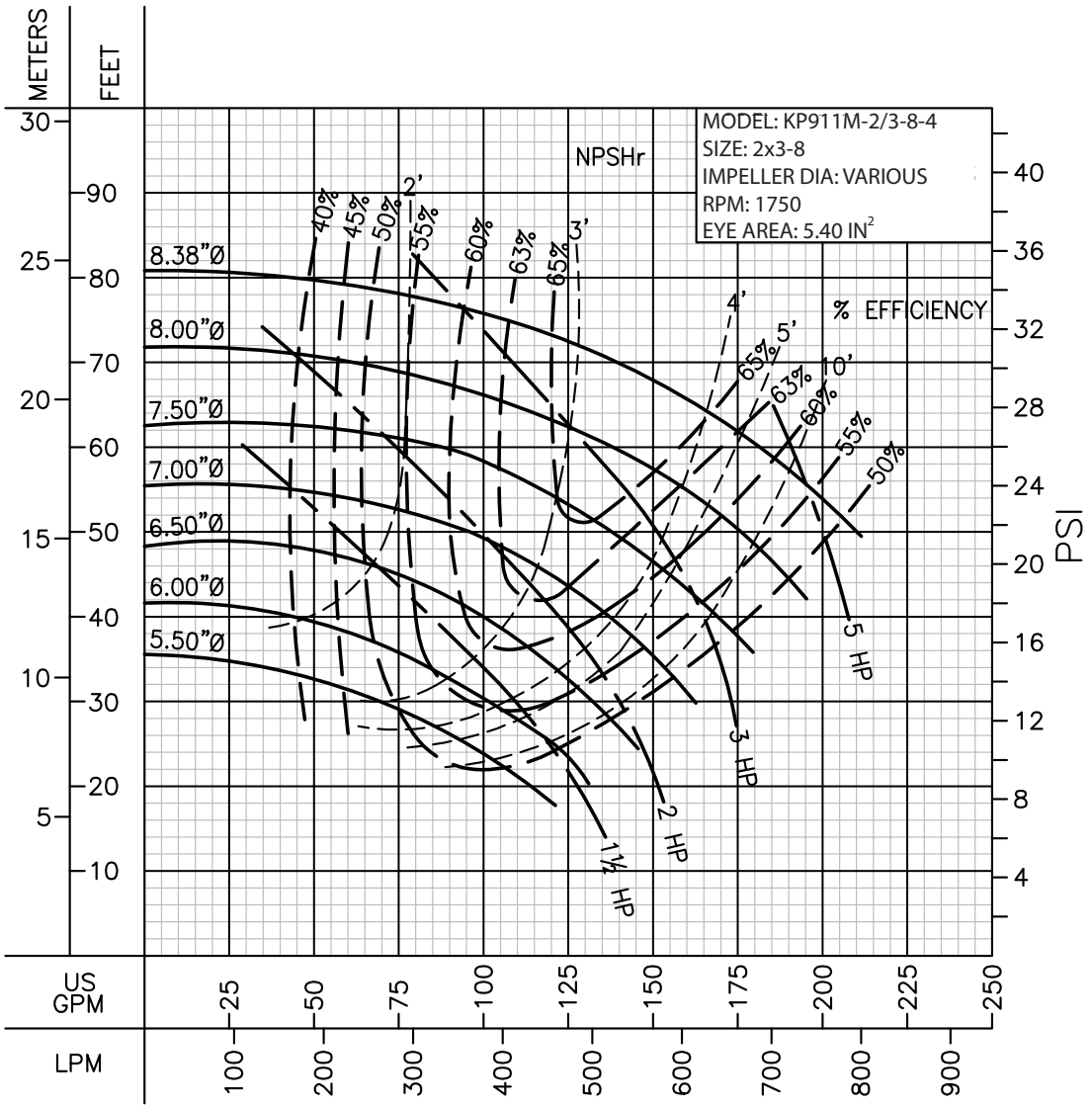
ANSI Centrifugal
Process Pumps
Series: **KP911M**



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PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**



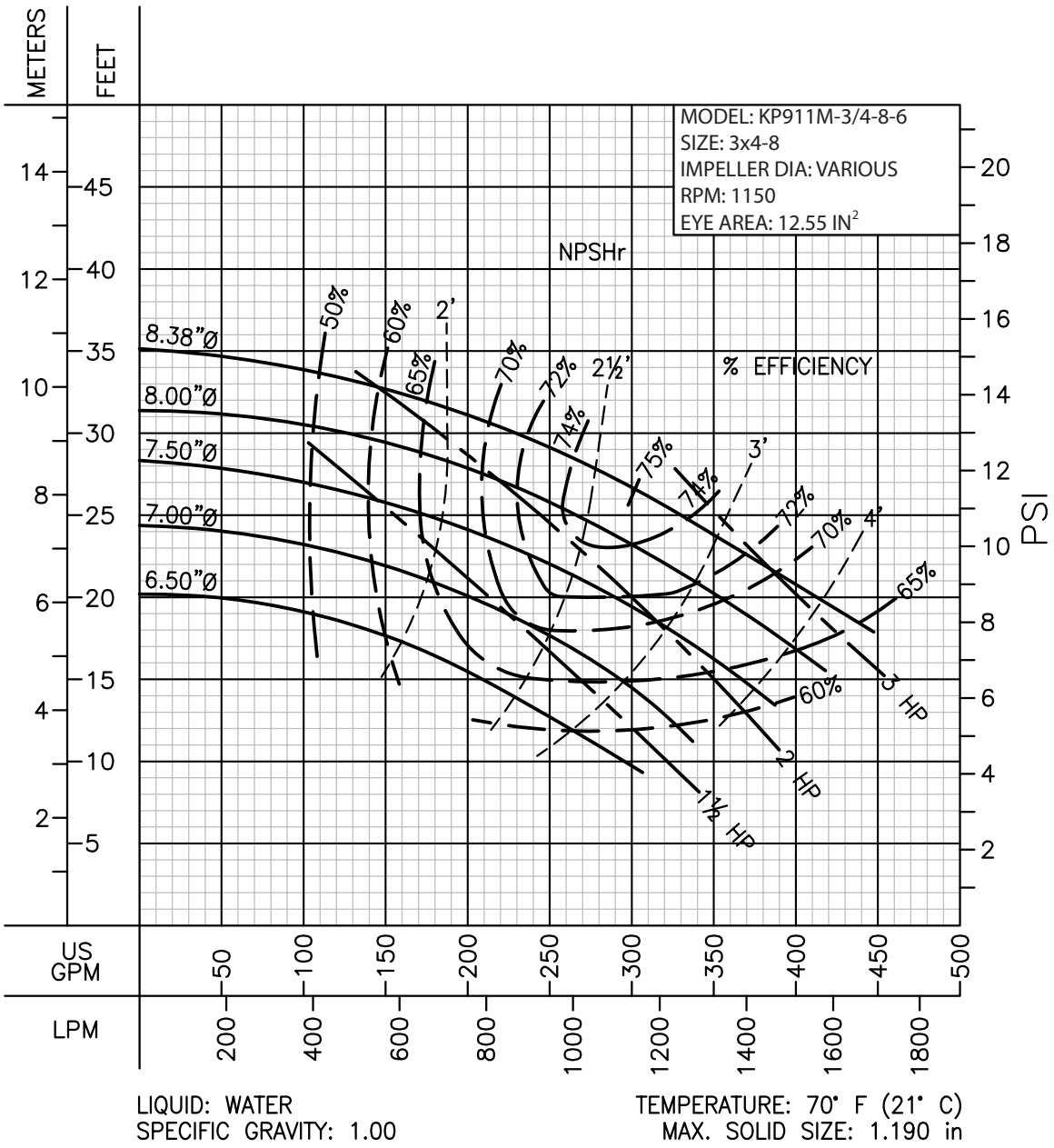
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .625 in

KEEN PUMP®

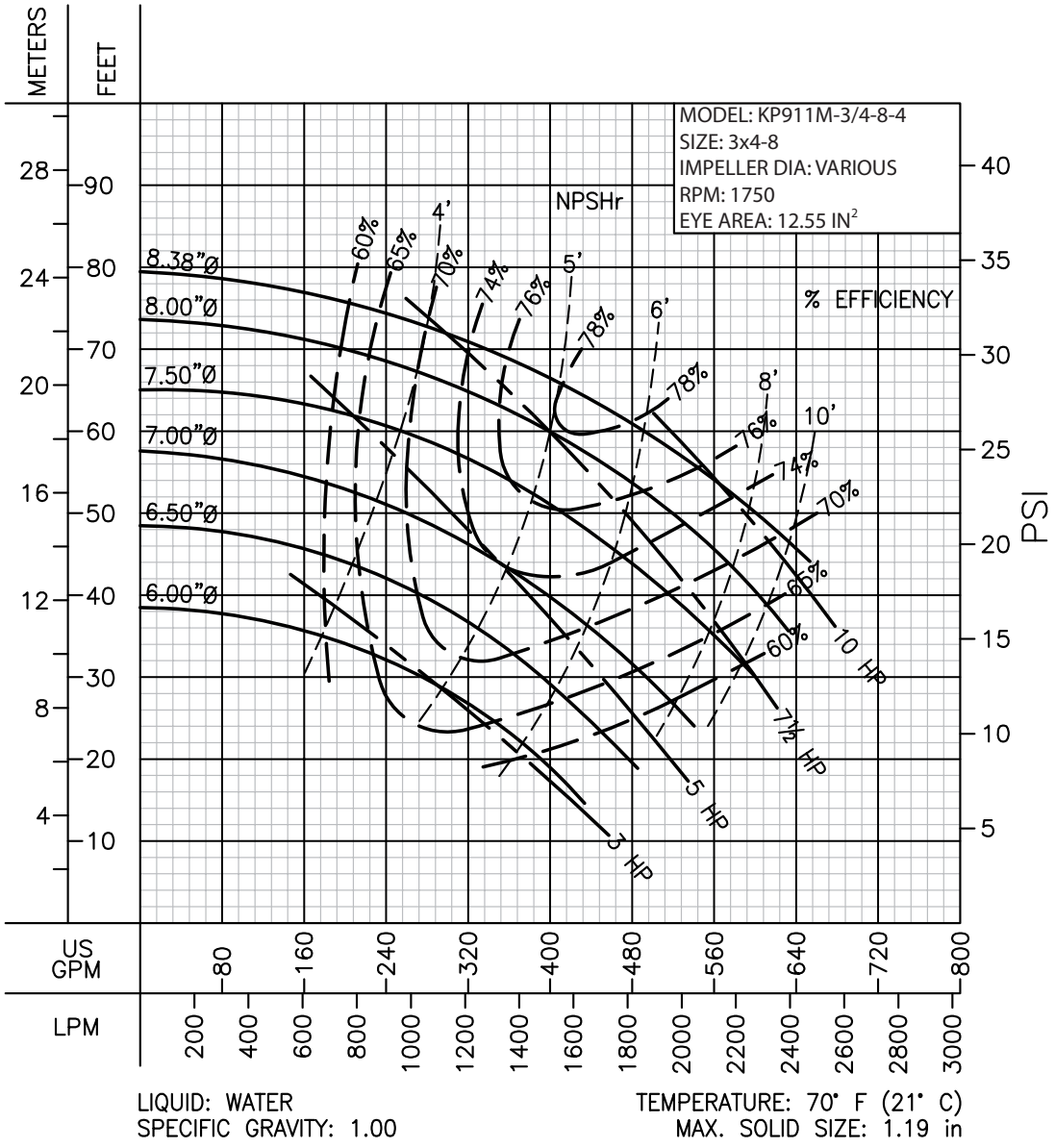
PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**



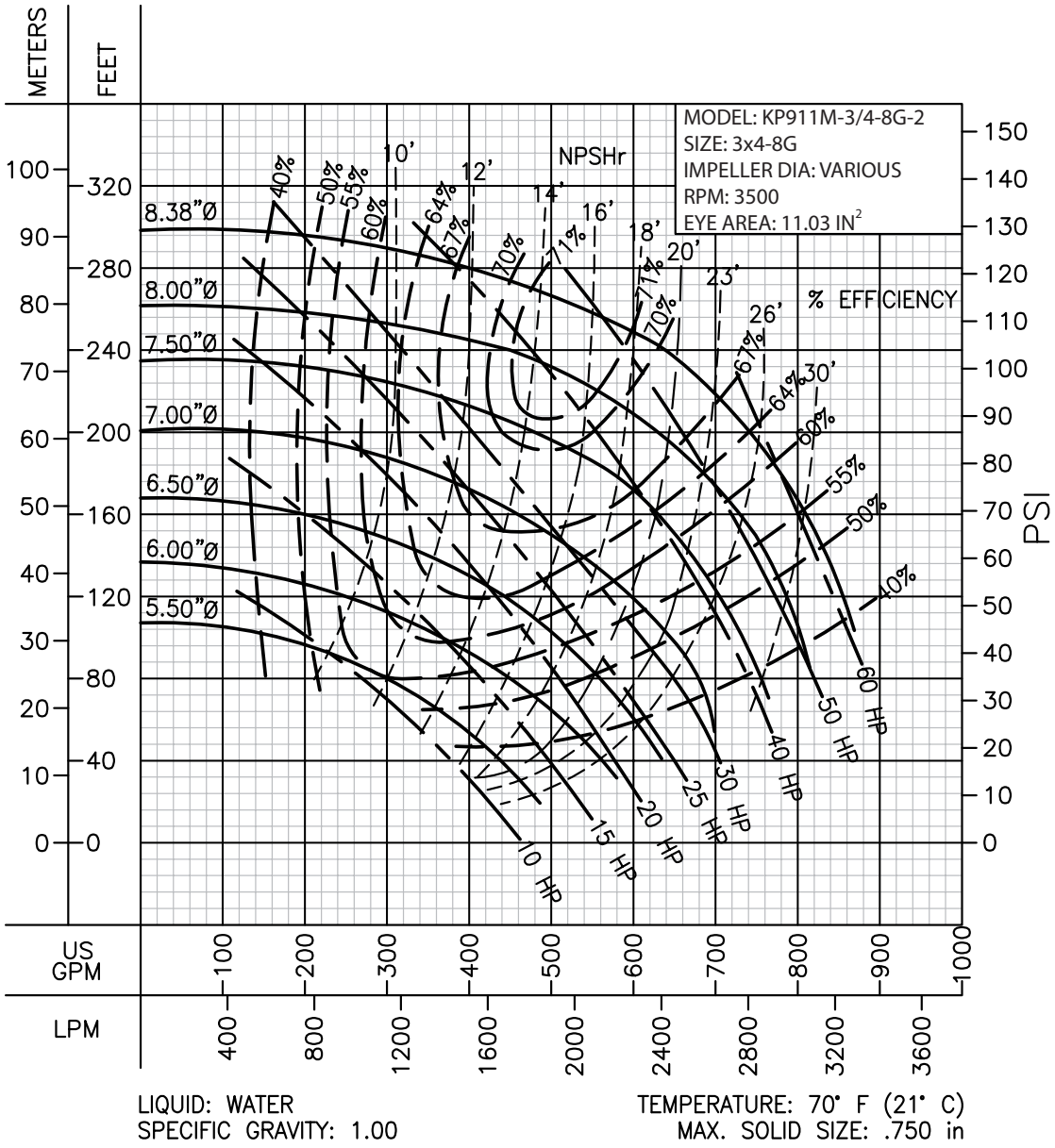
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PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



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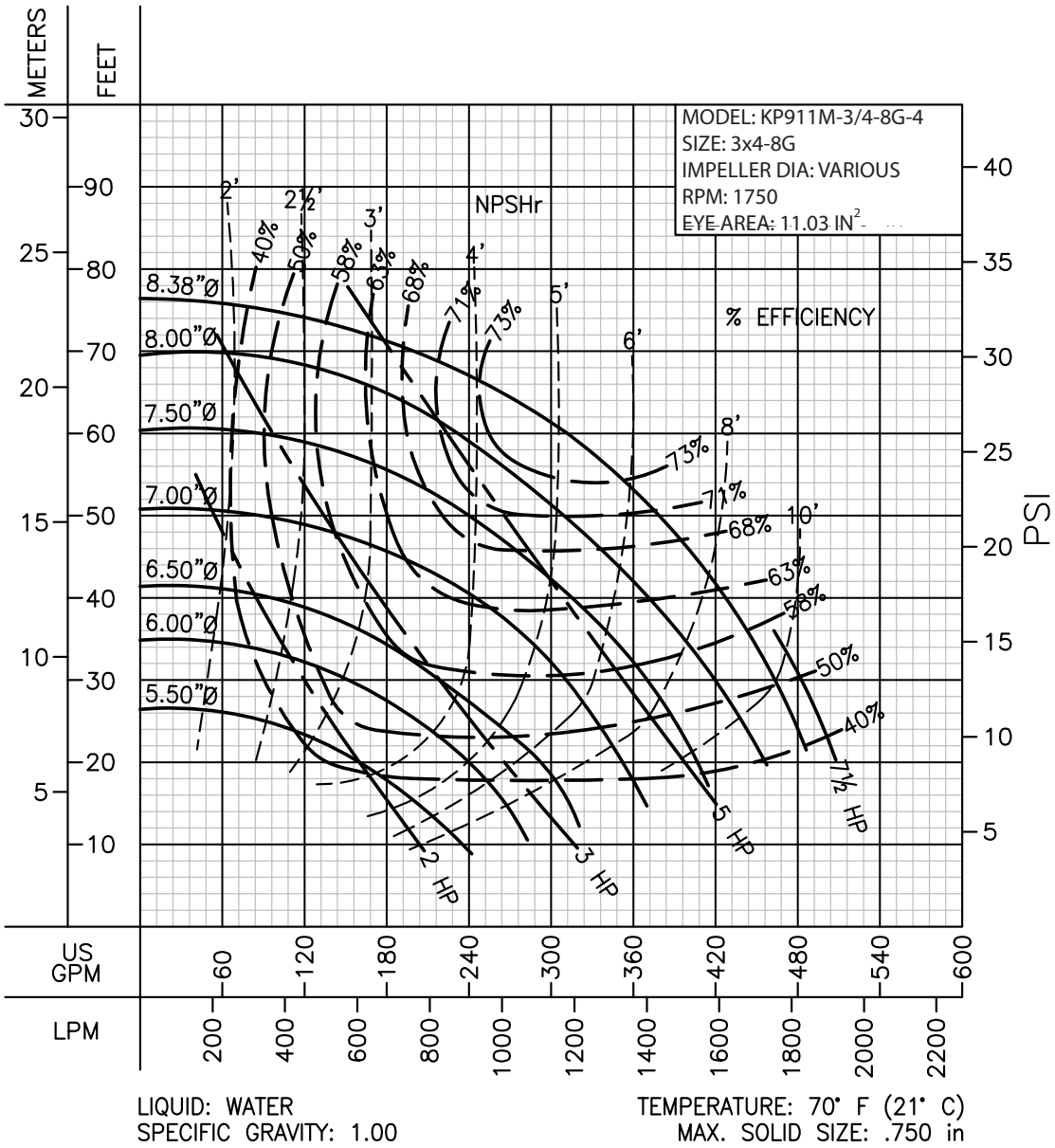
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



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PERFORMANCE CURVES

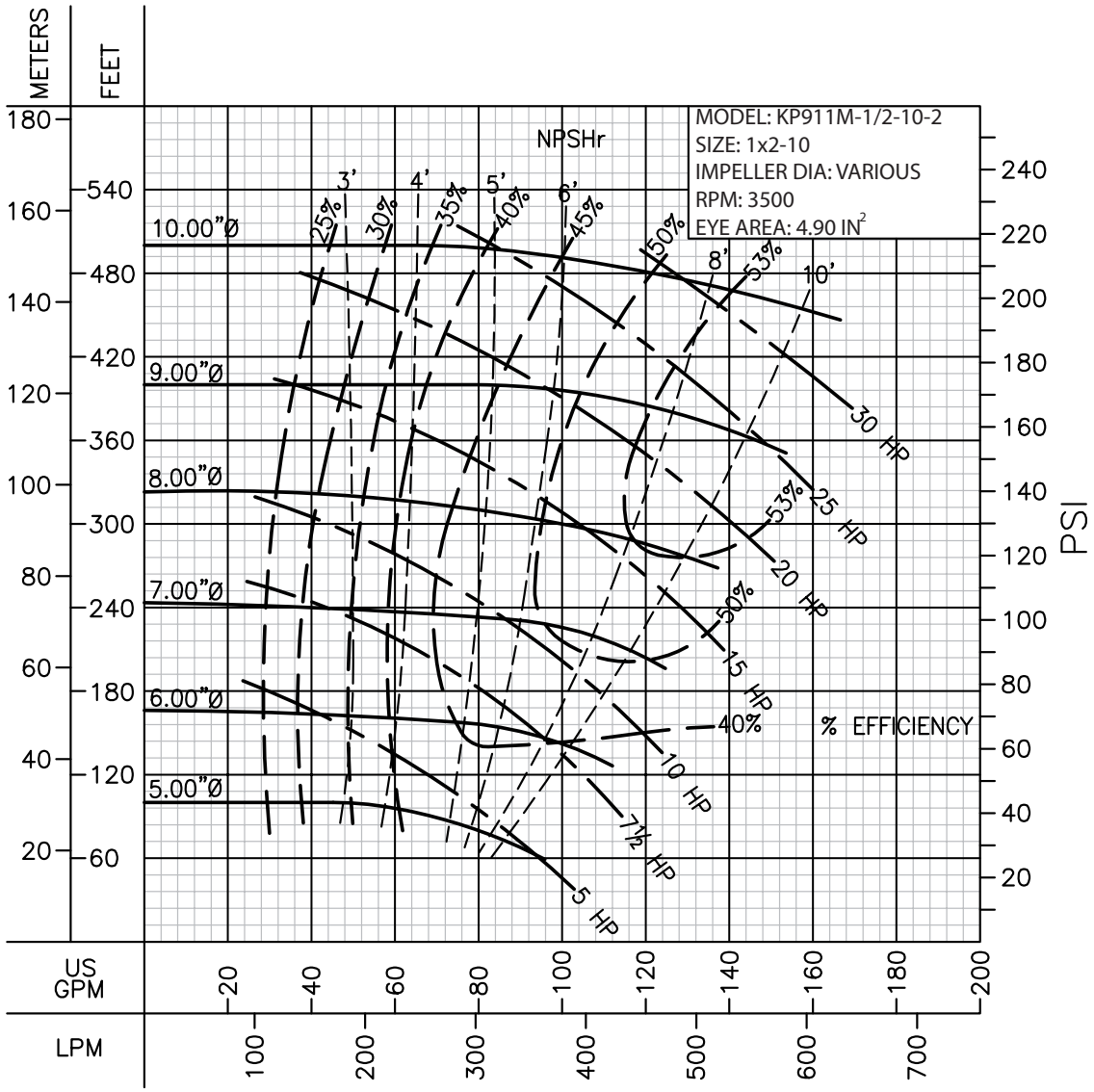
ANSI Centrifugal
Process Pumps
Series: **KP911M**



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PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**

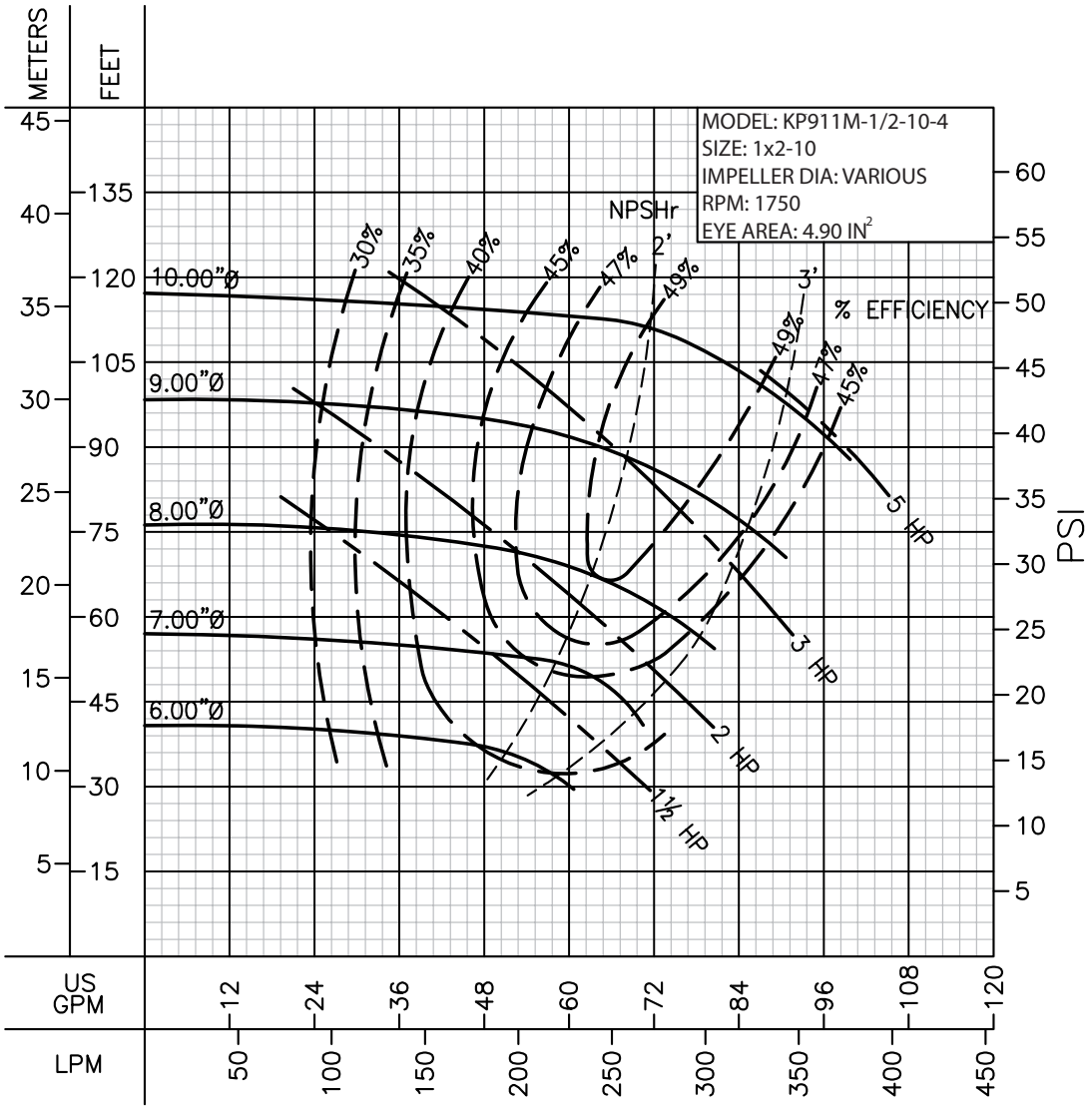


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

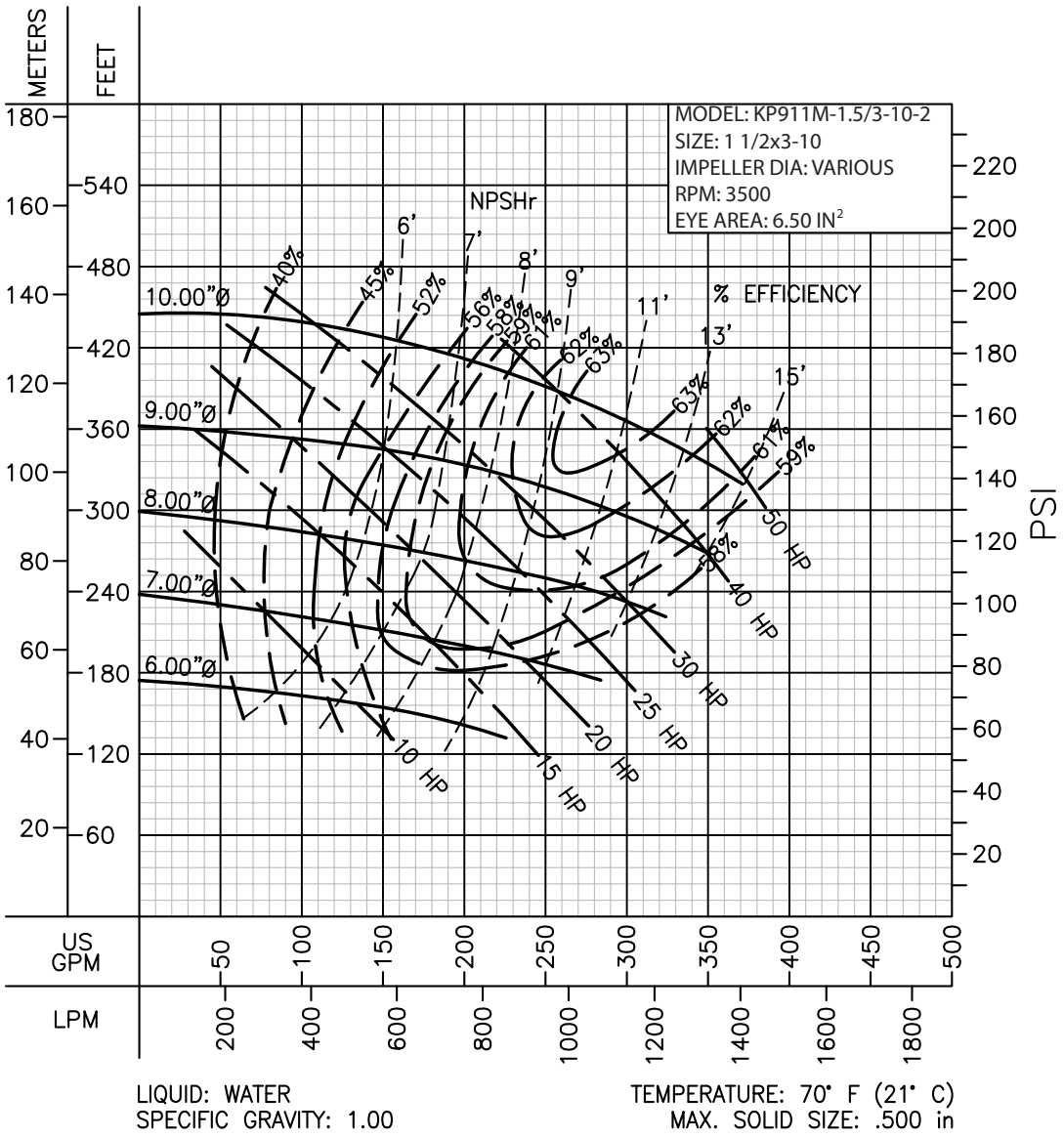


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

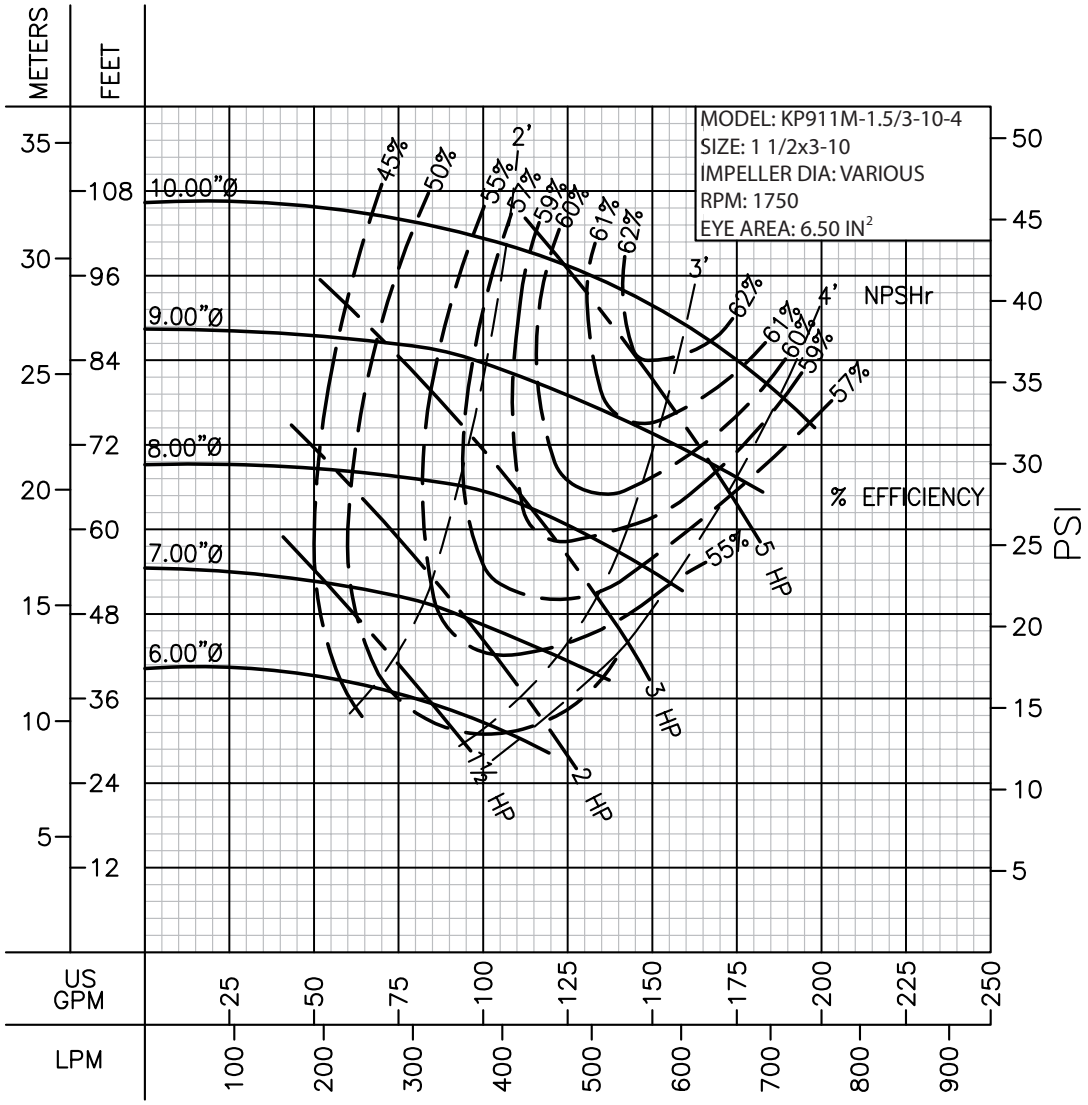
KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



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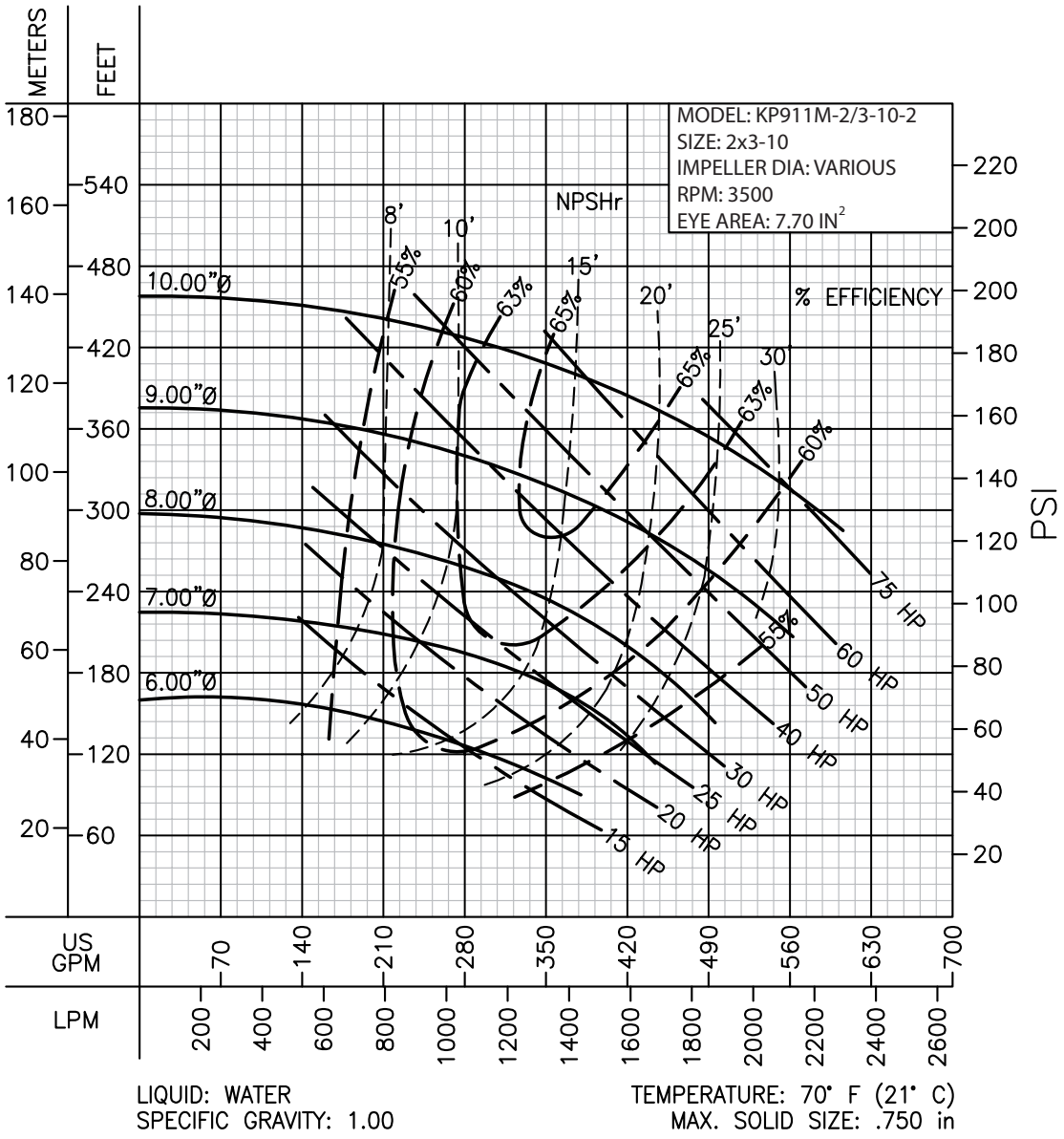
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



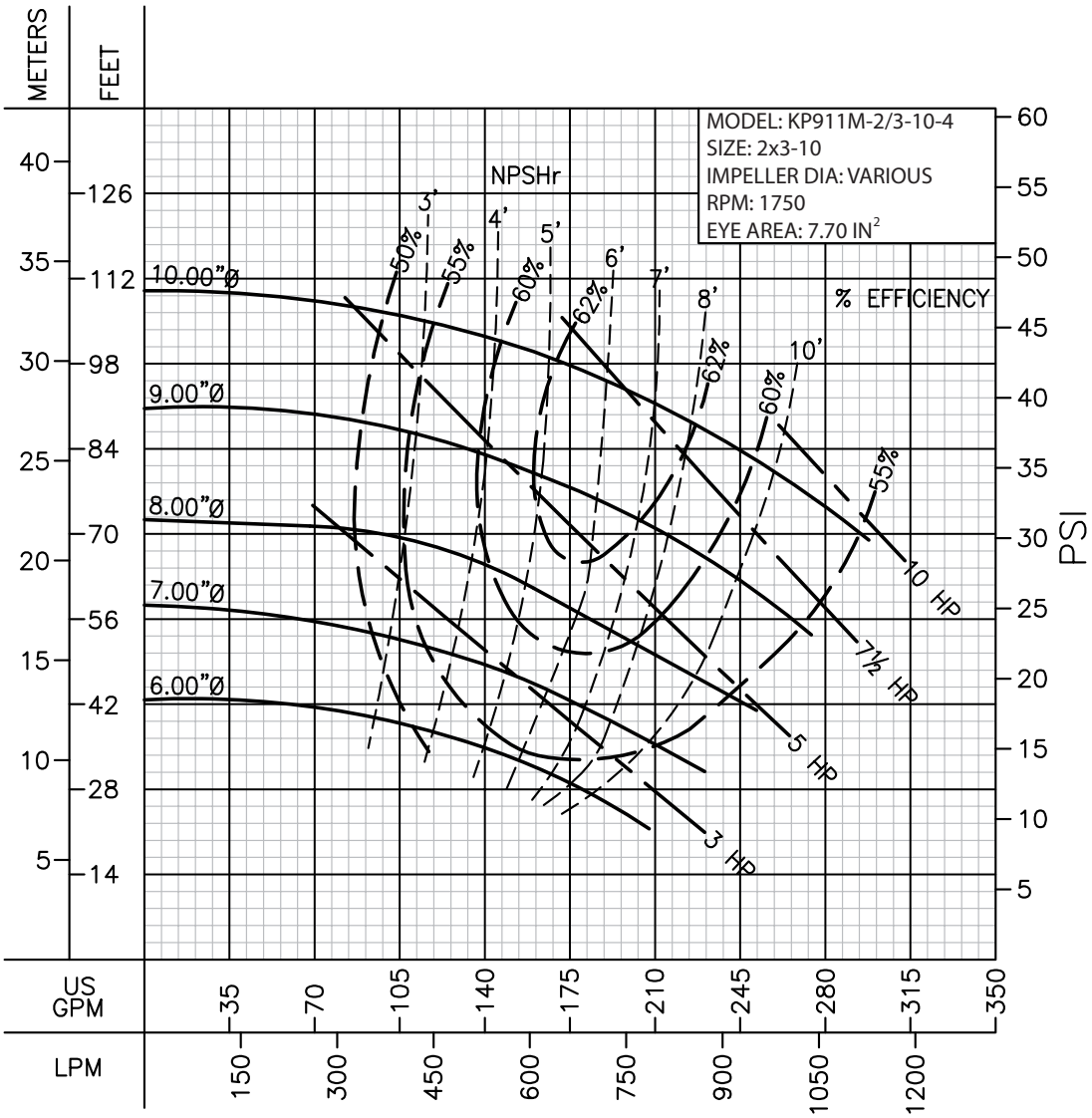
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

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**

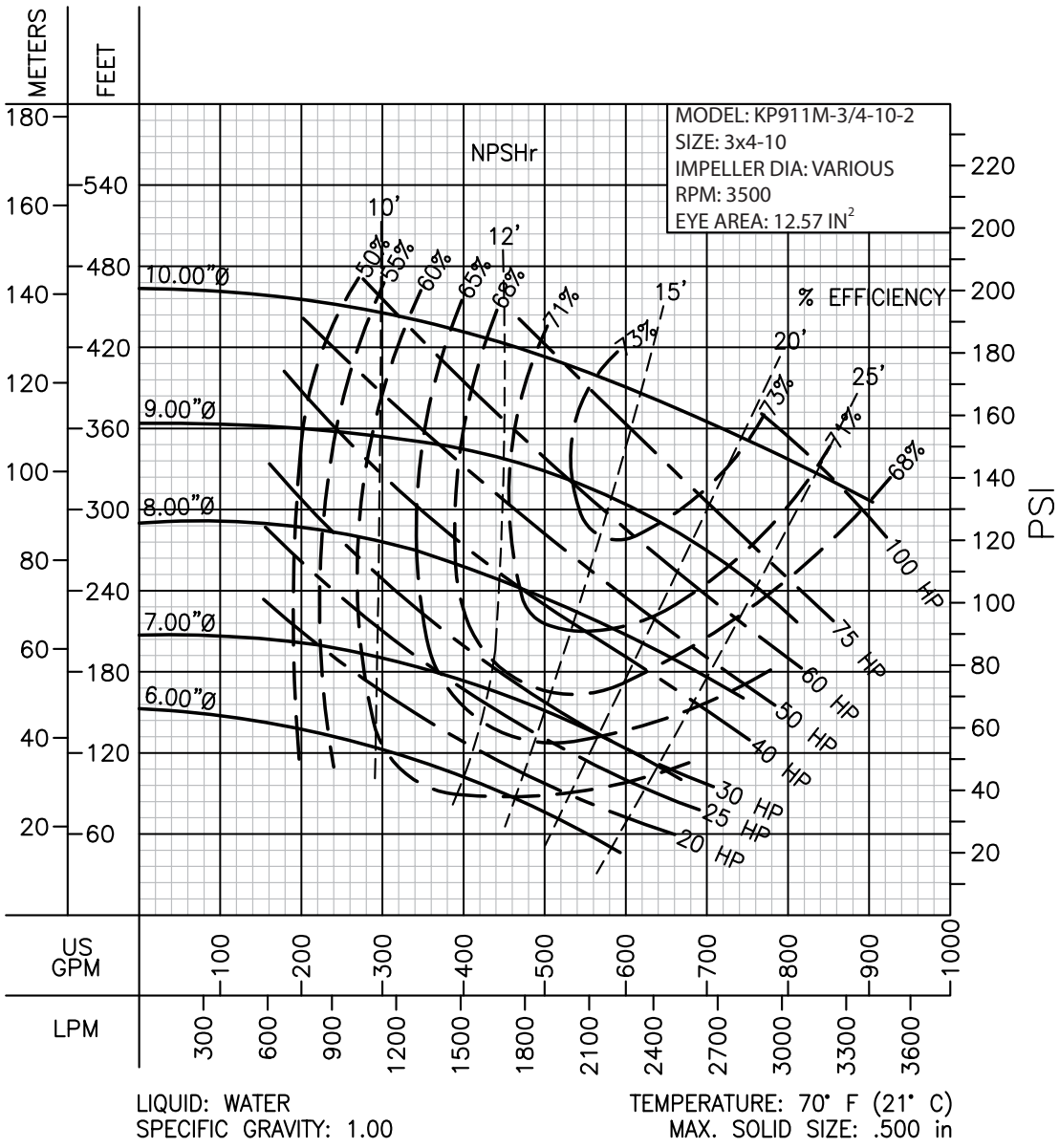


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

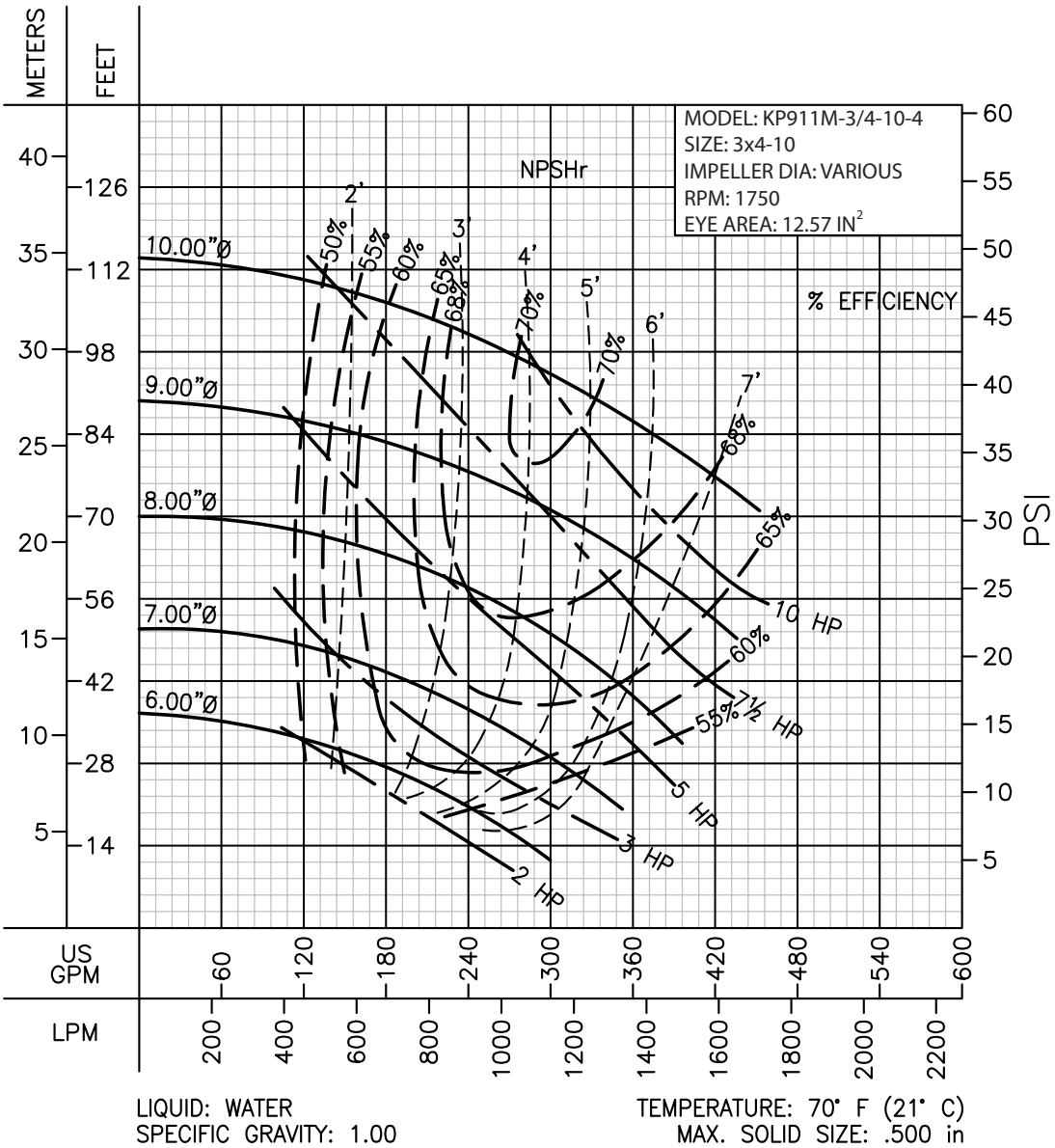
PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**



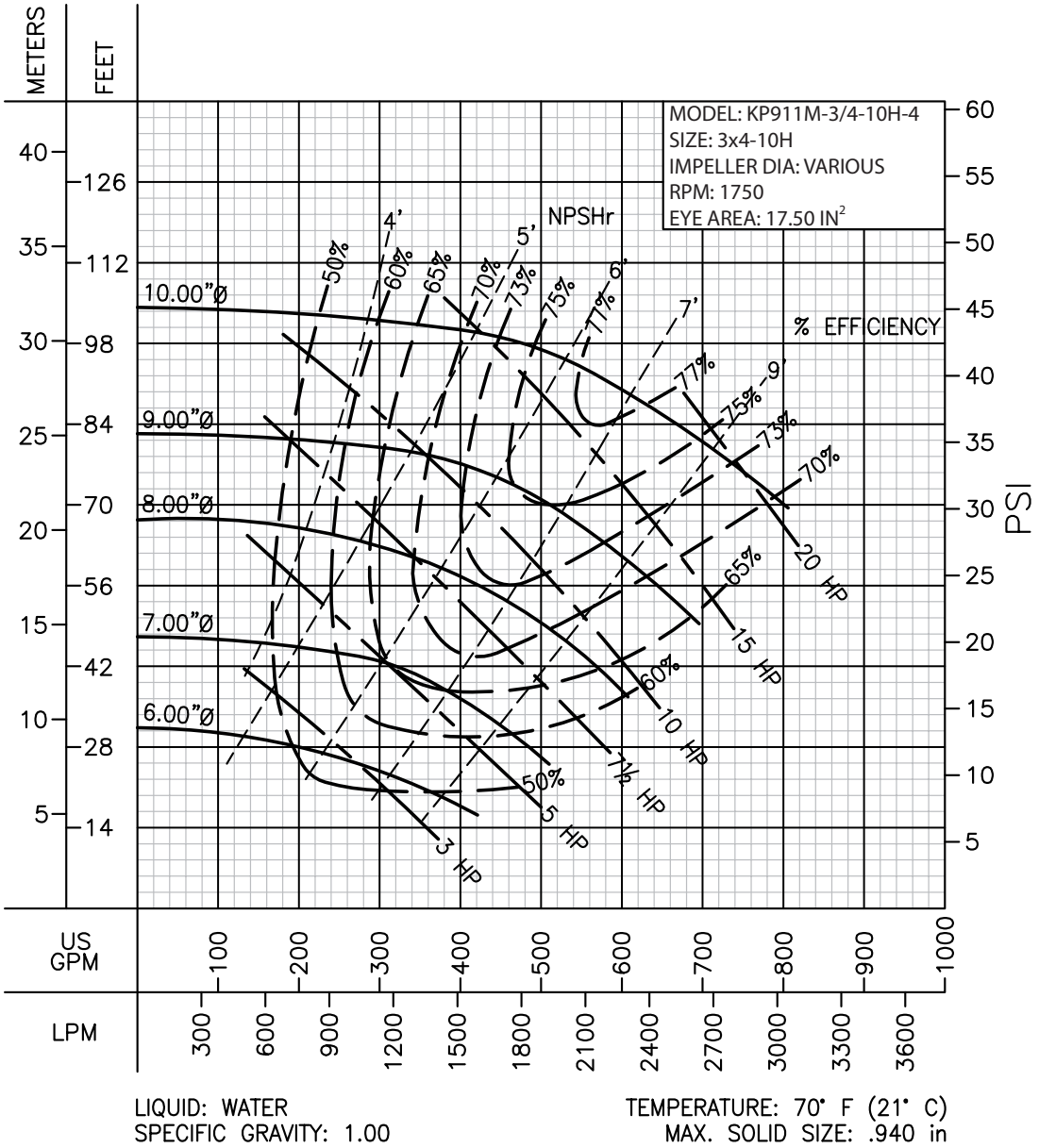
PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**



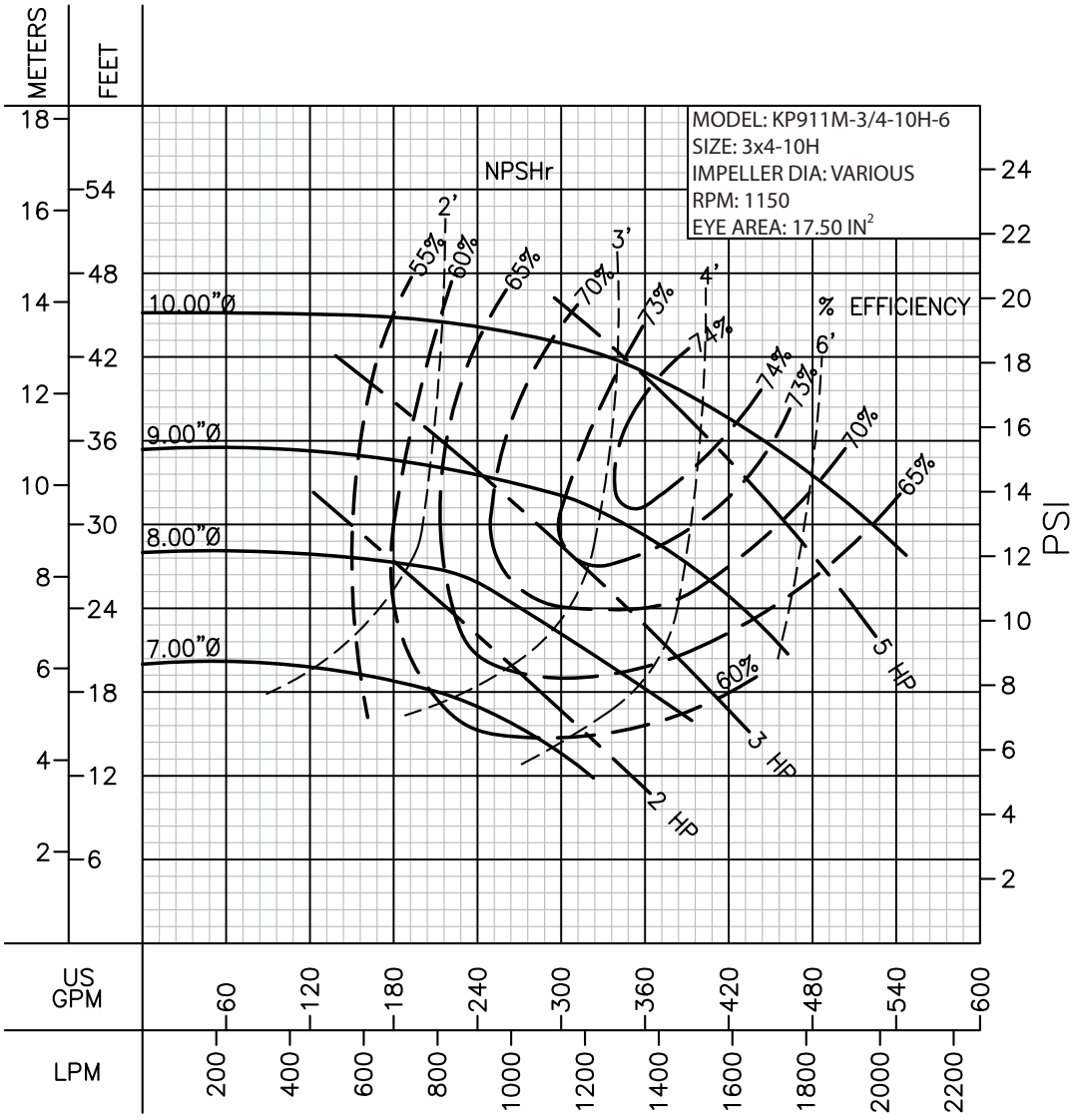
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

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PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

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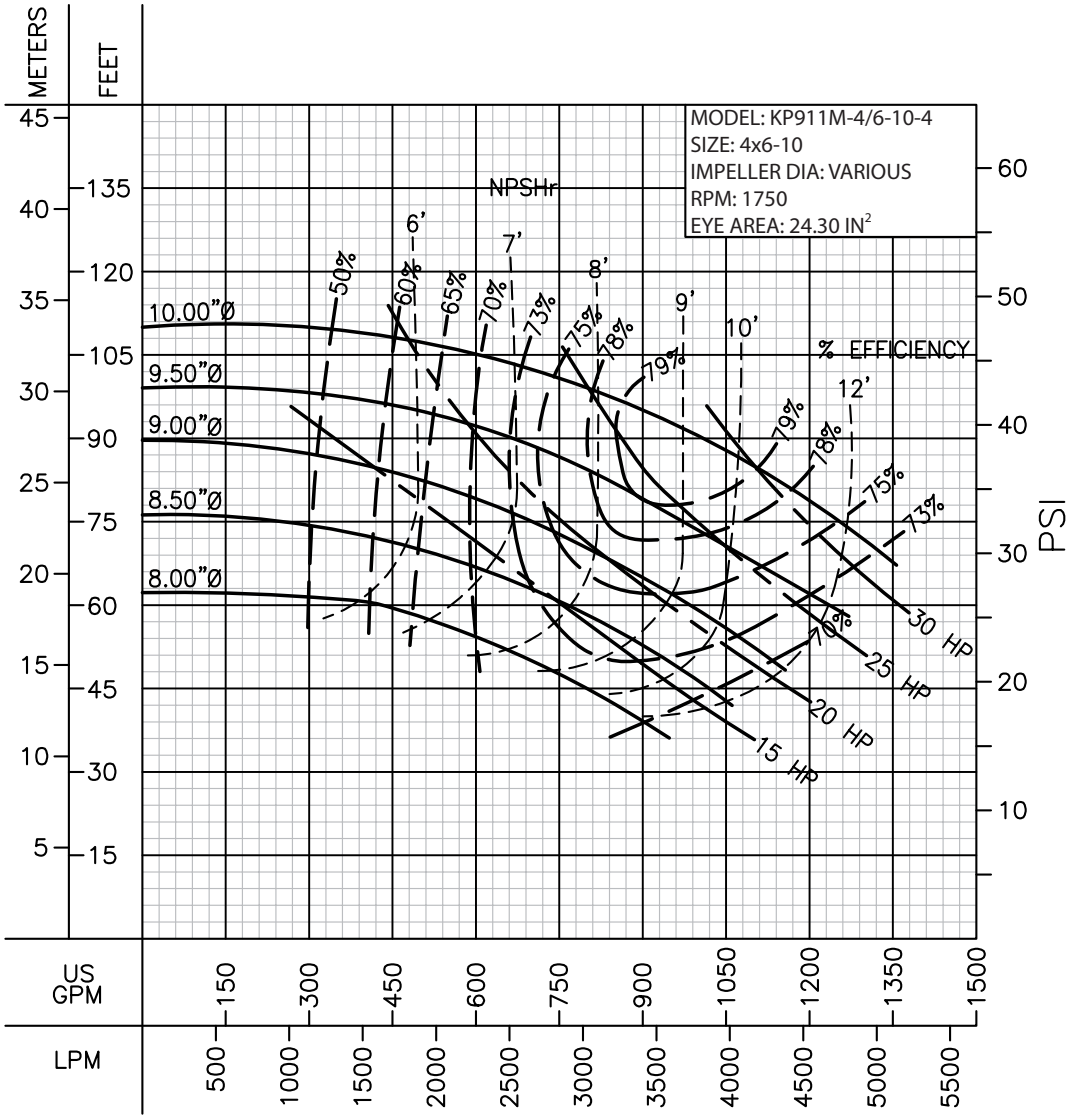


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

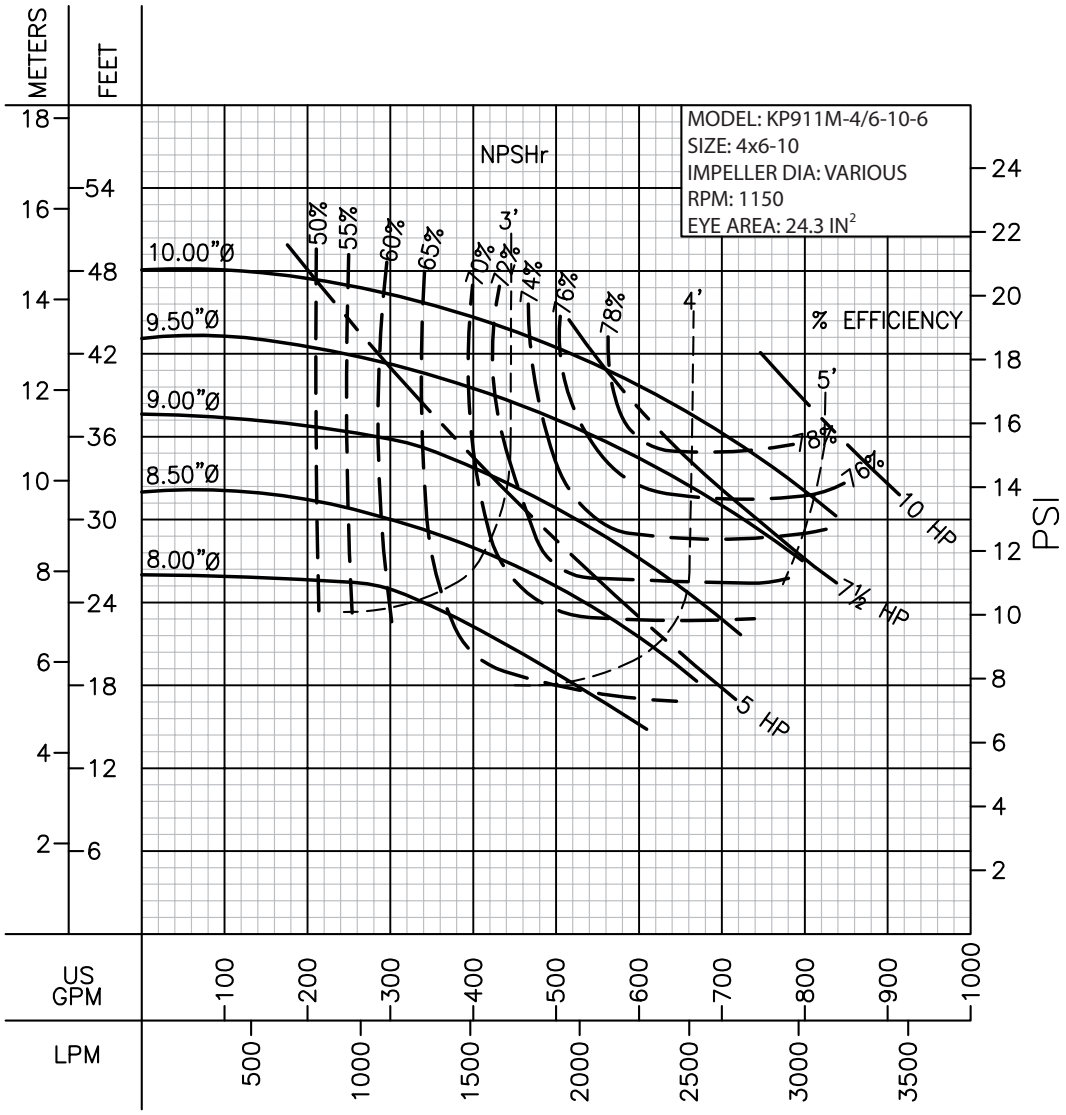


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .875 in

KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

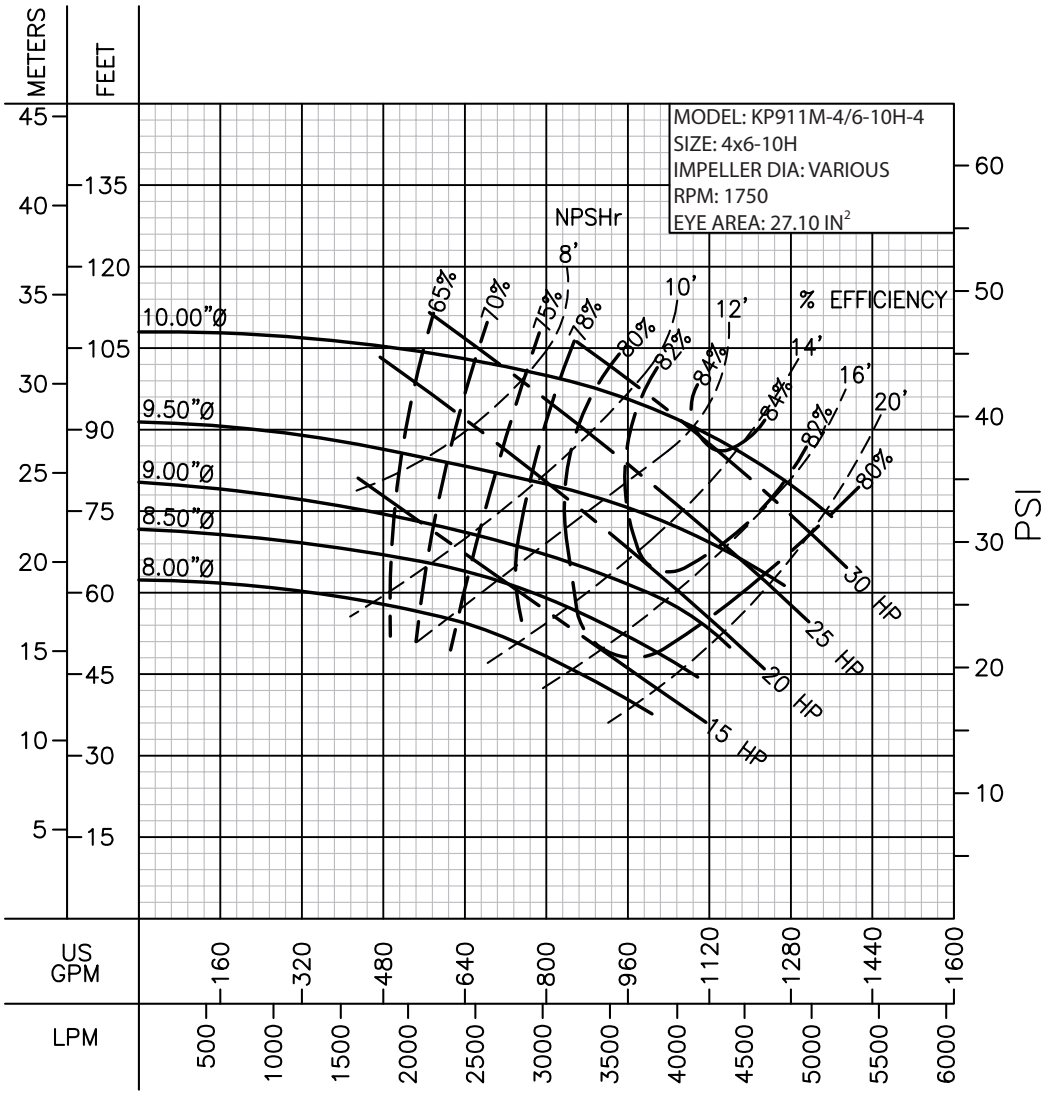


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .875 in

KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

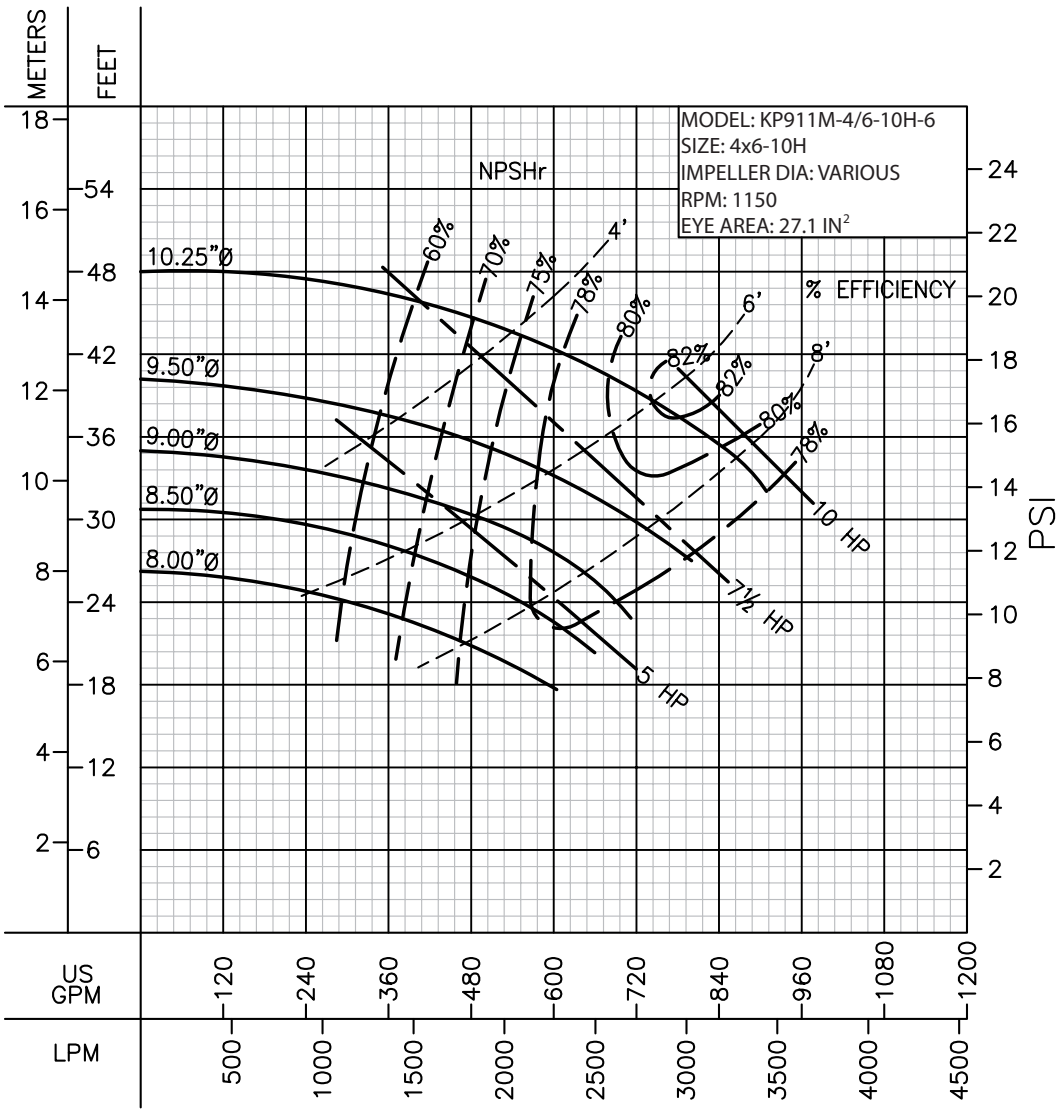


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

KEEN PUMP®

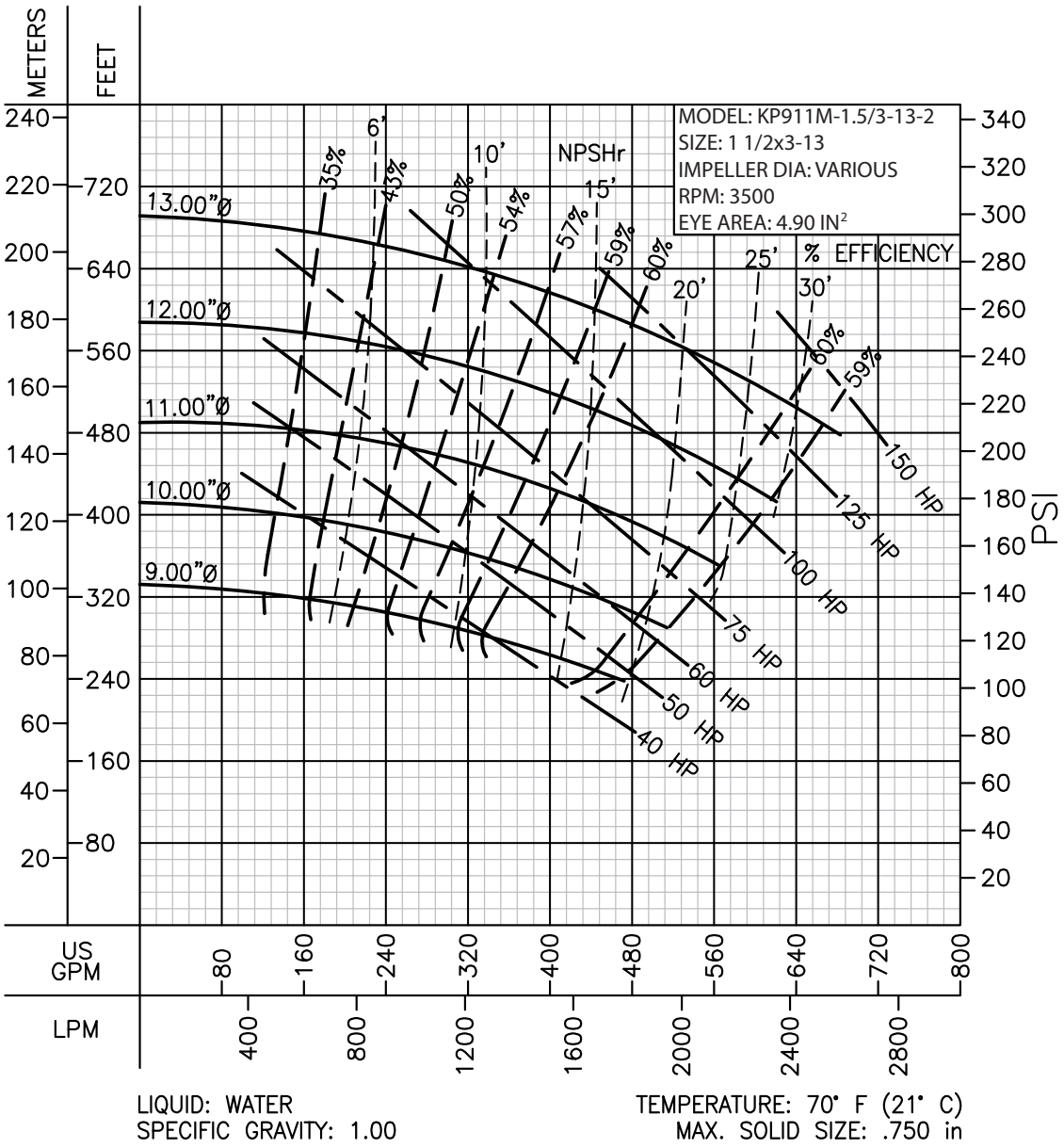
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

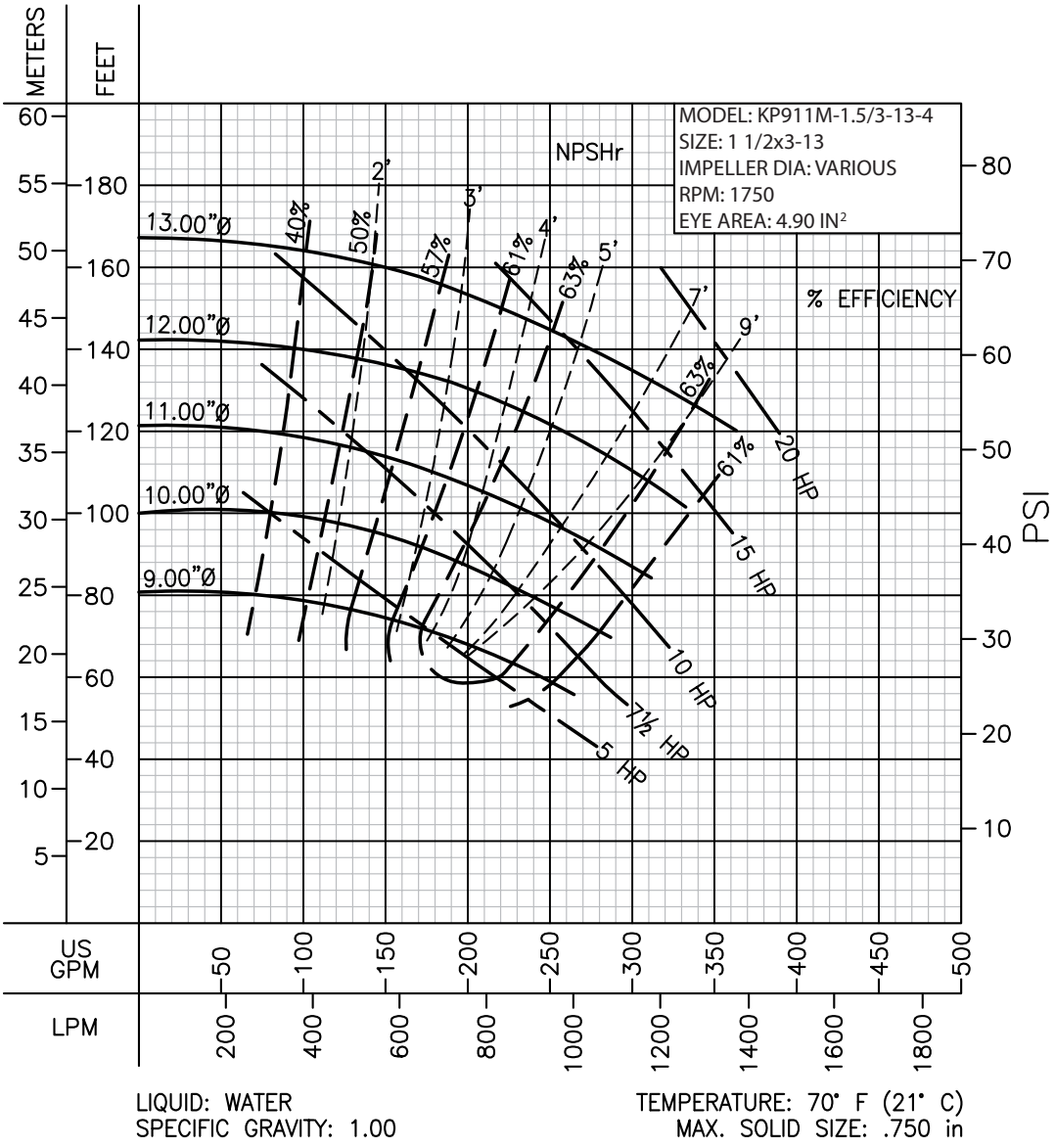
TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

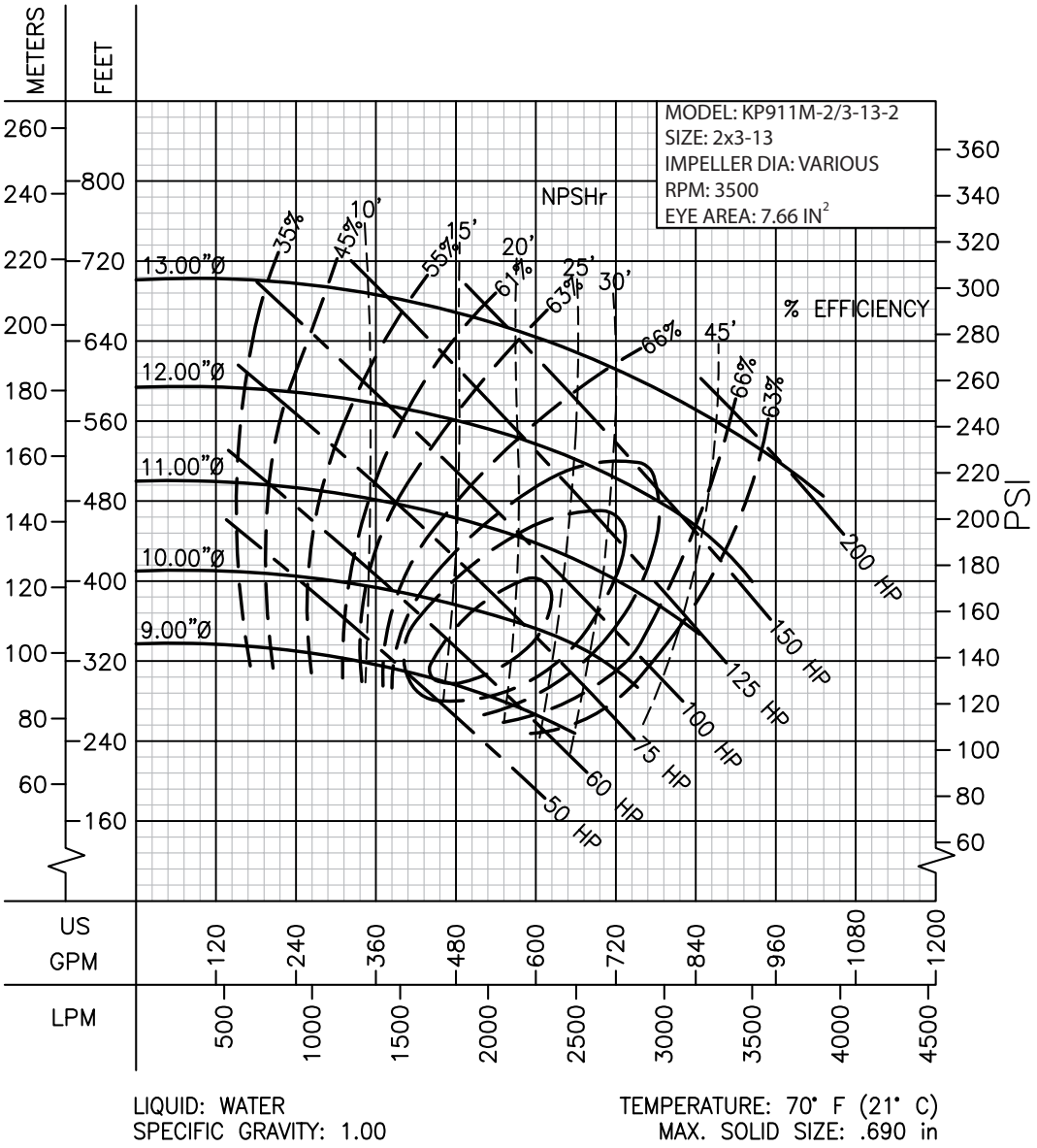


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

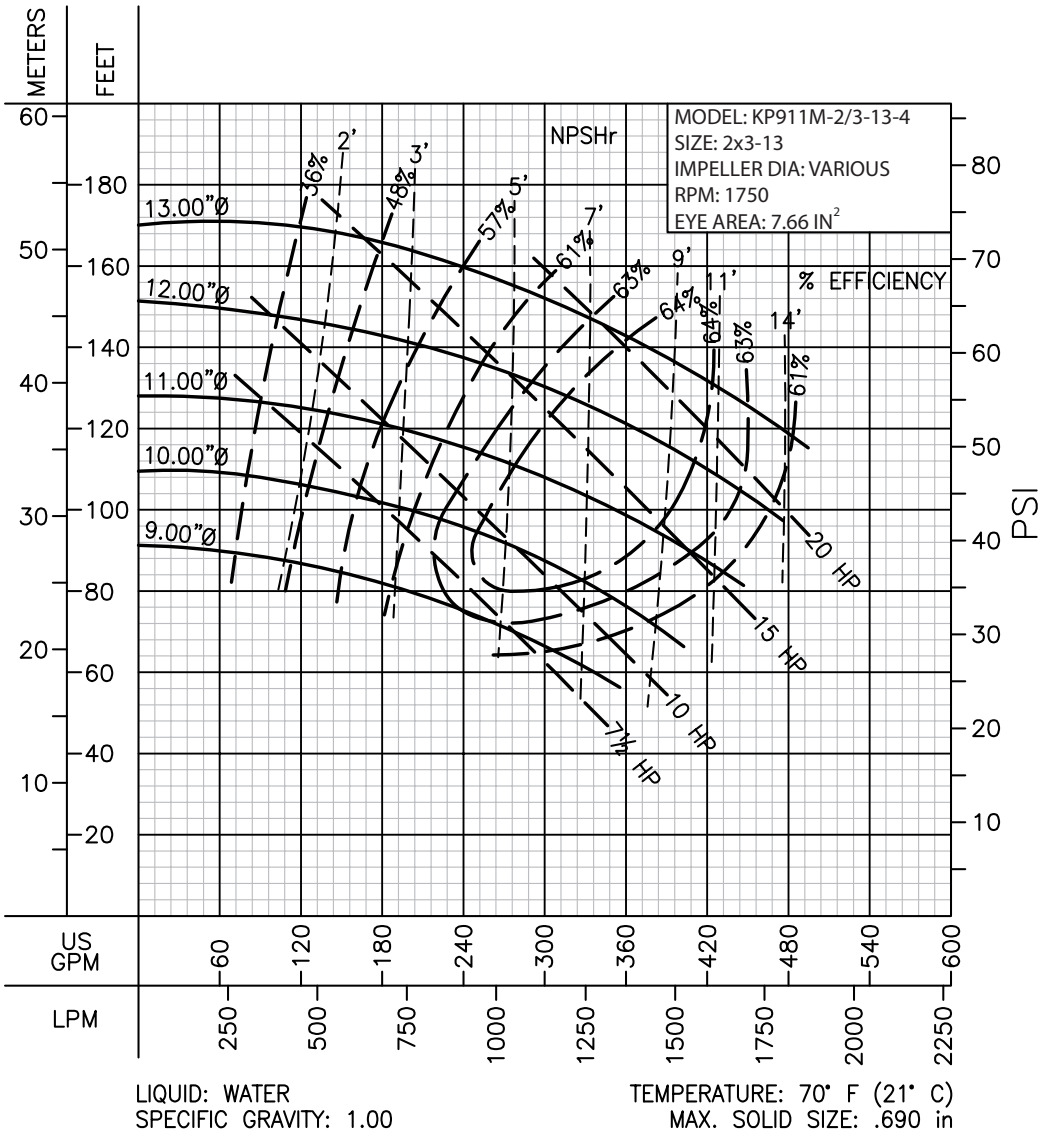


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .690 in

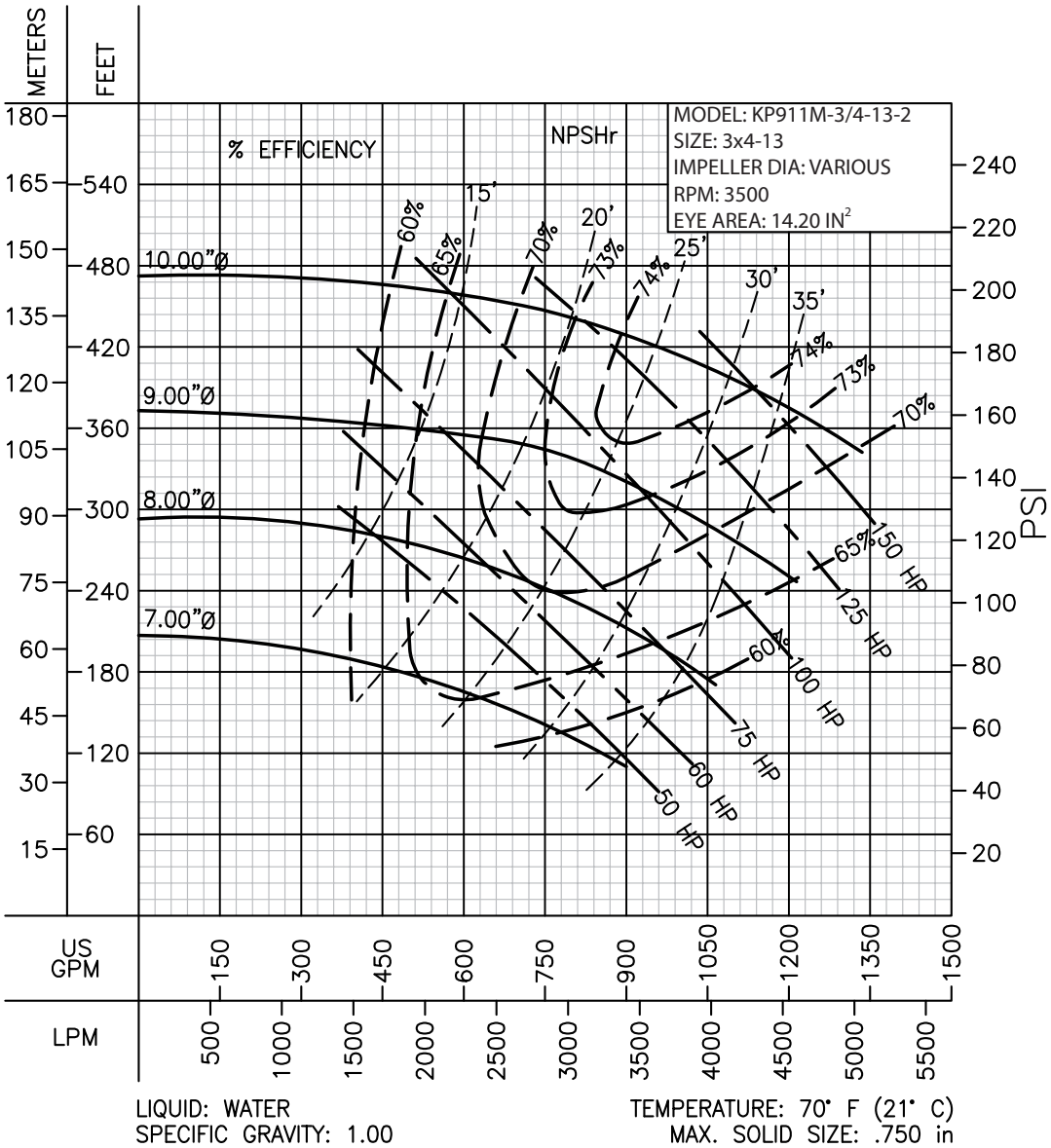
KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



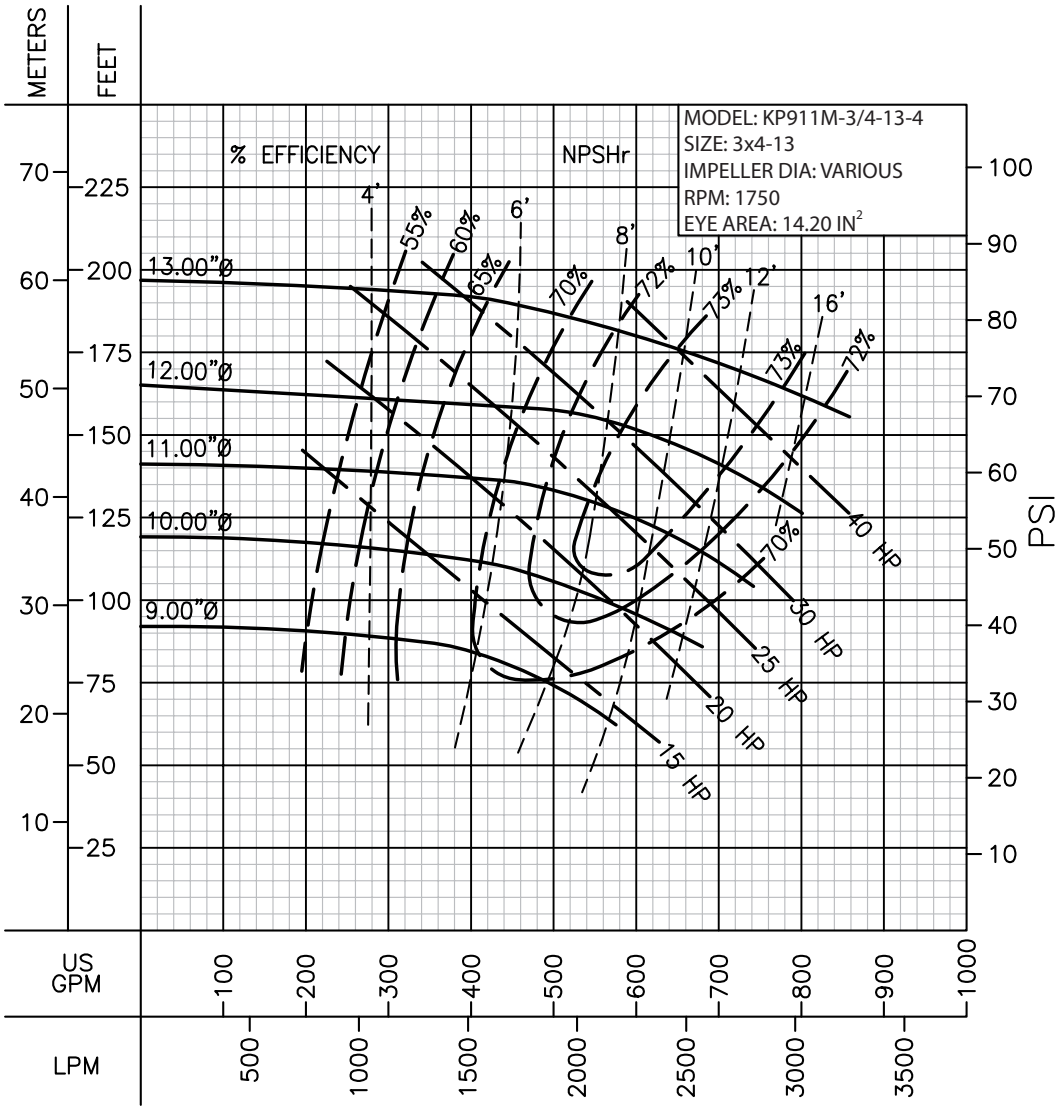
KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



KEEN PUMP®

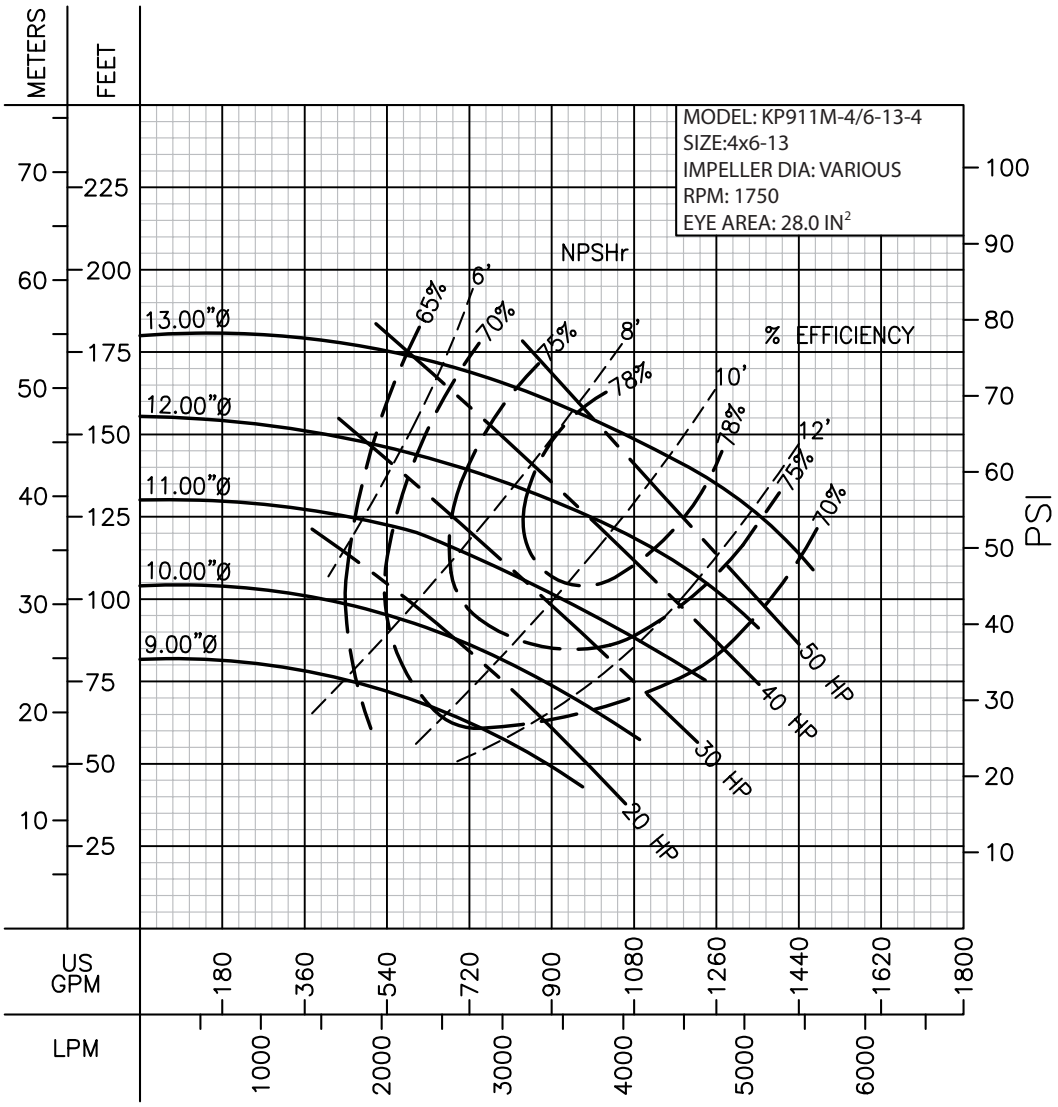
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

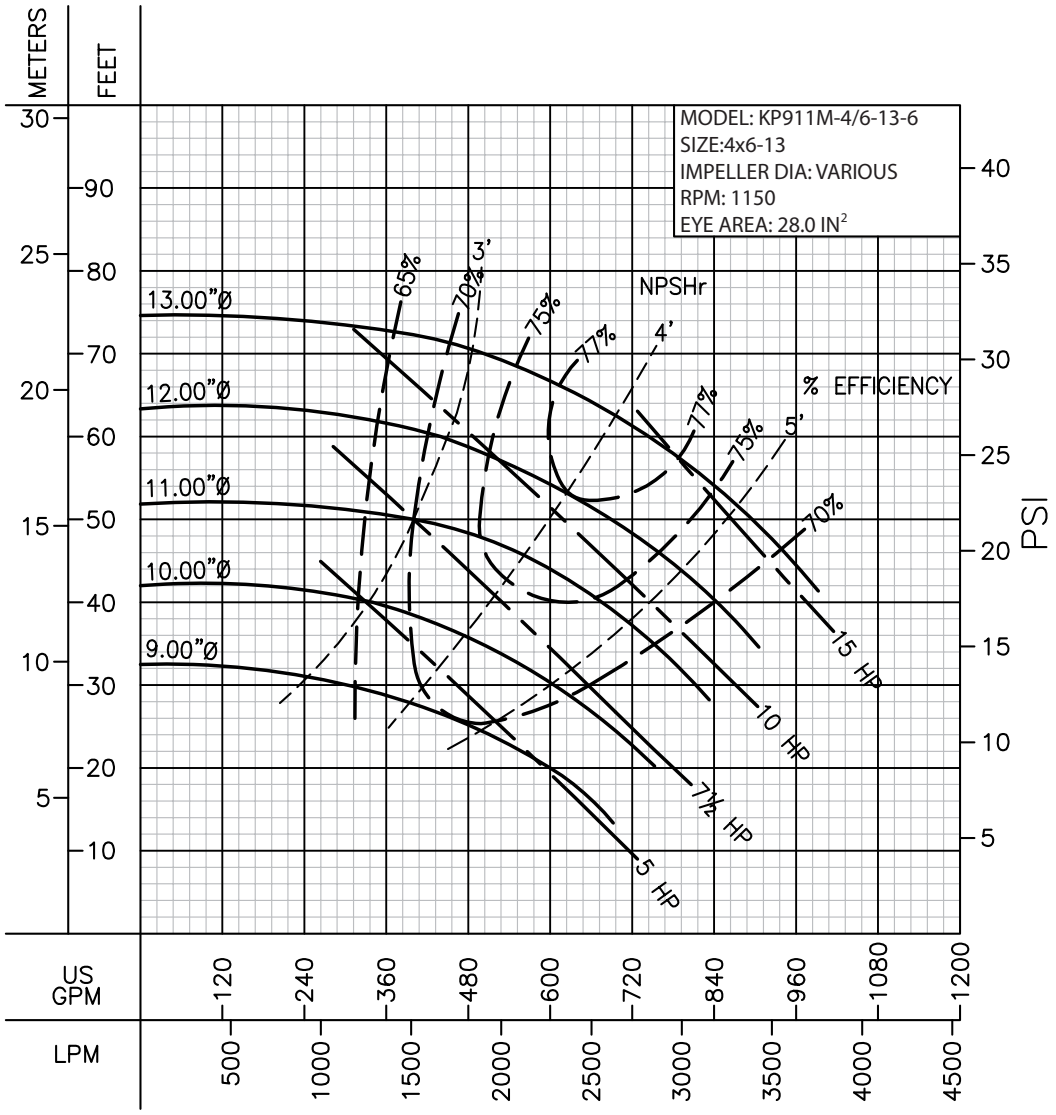


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .930 in

KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



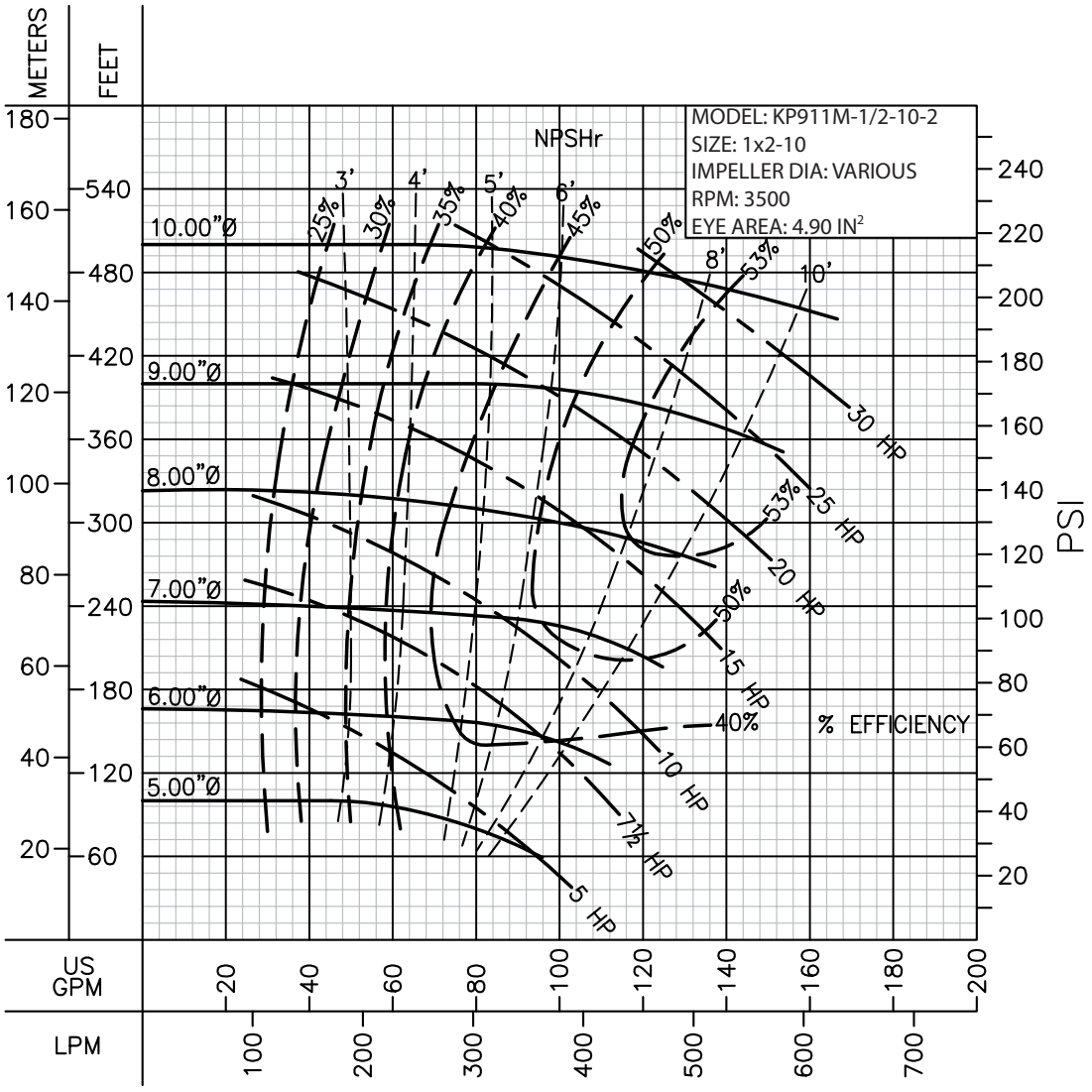
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .930 in

KEEN PUMP®

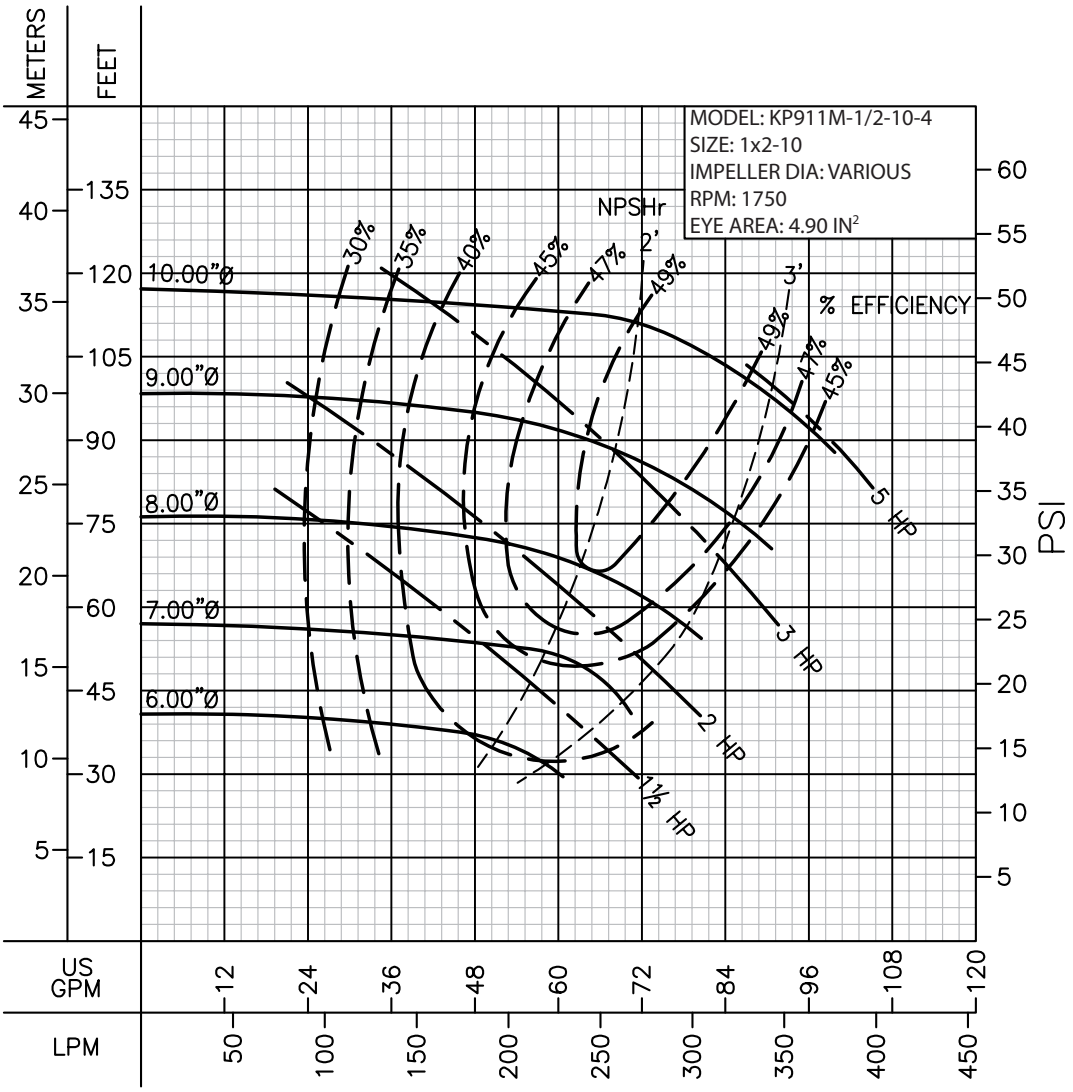
PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**



KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

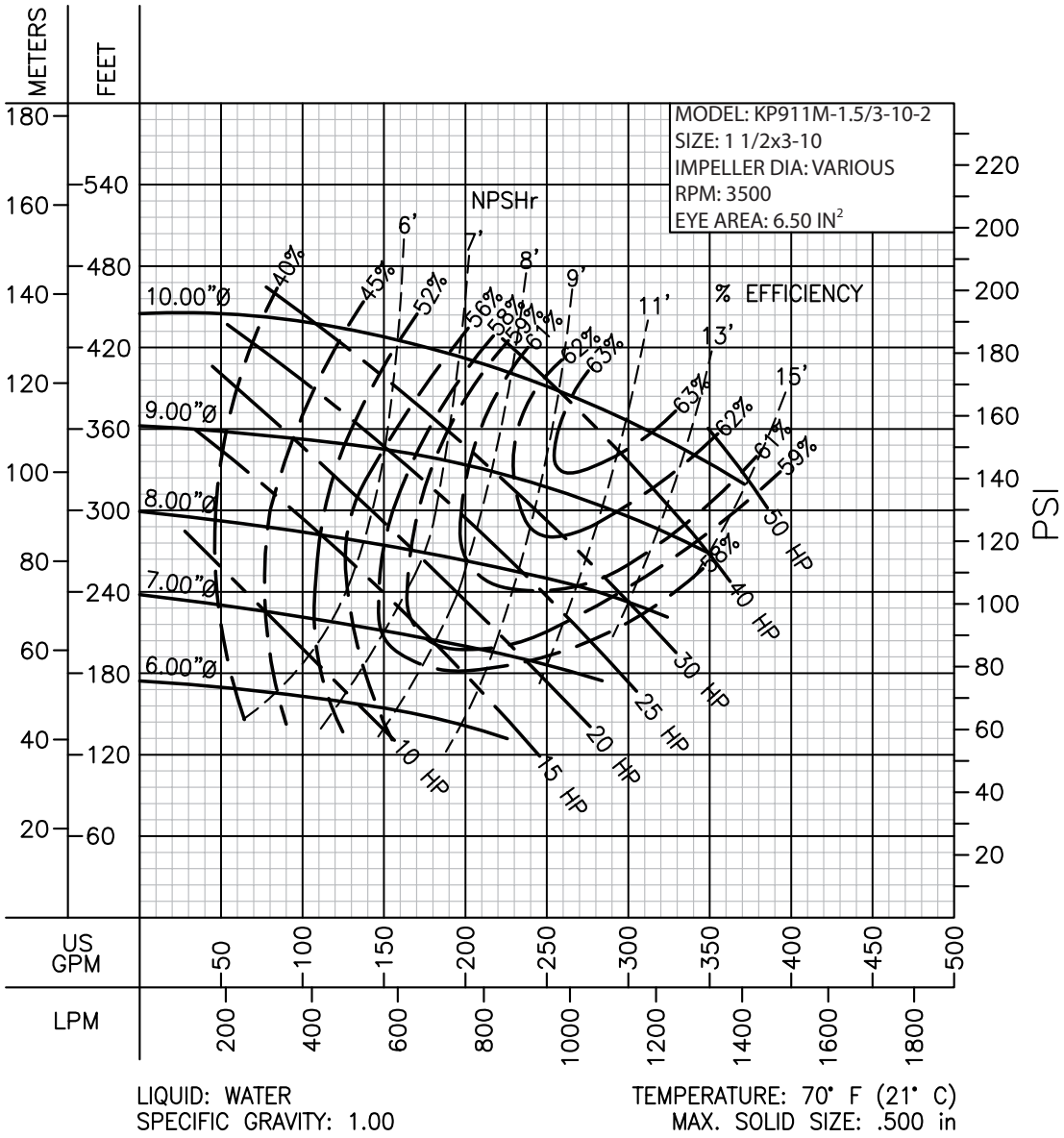


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

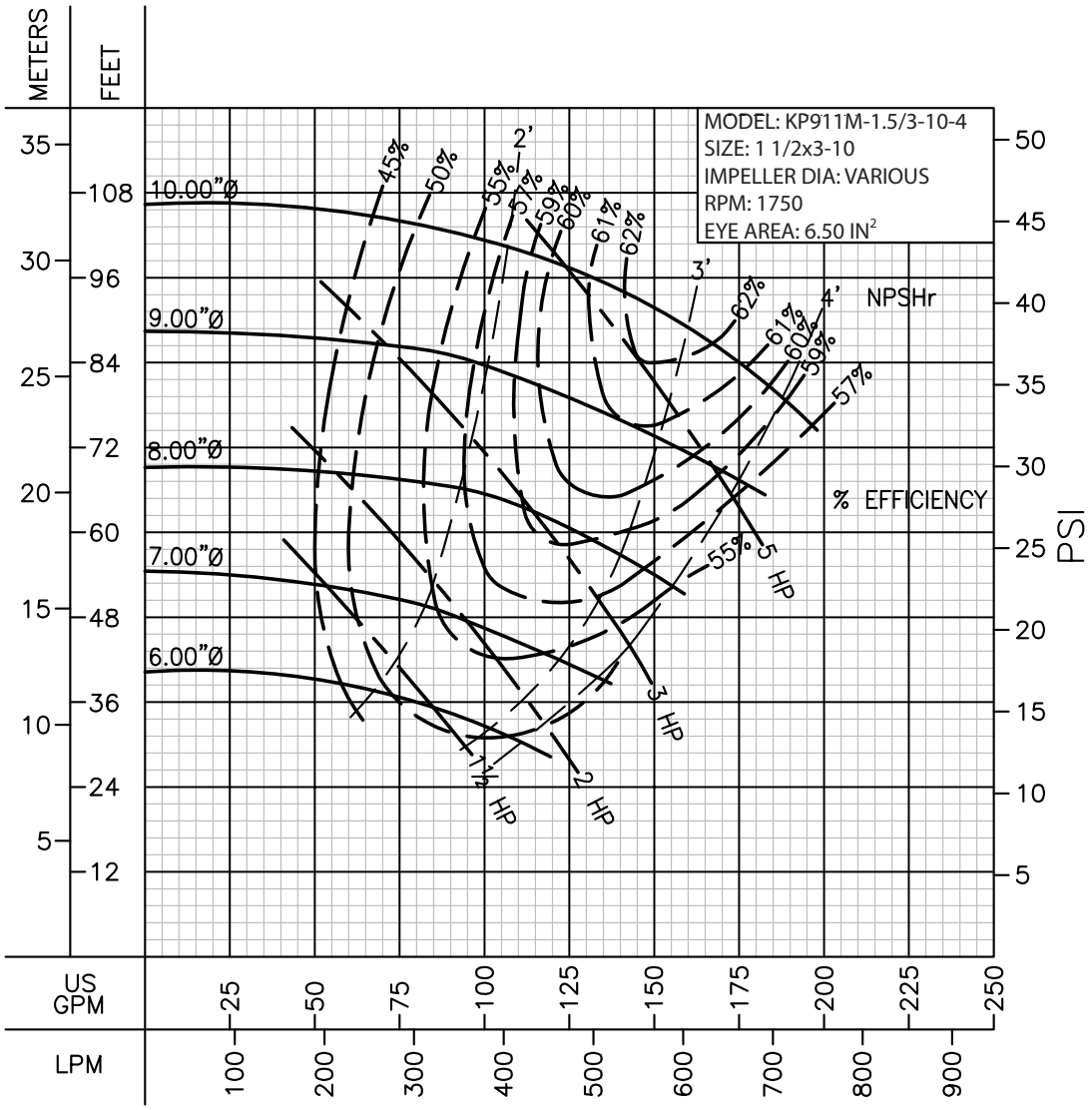
KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

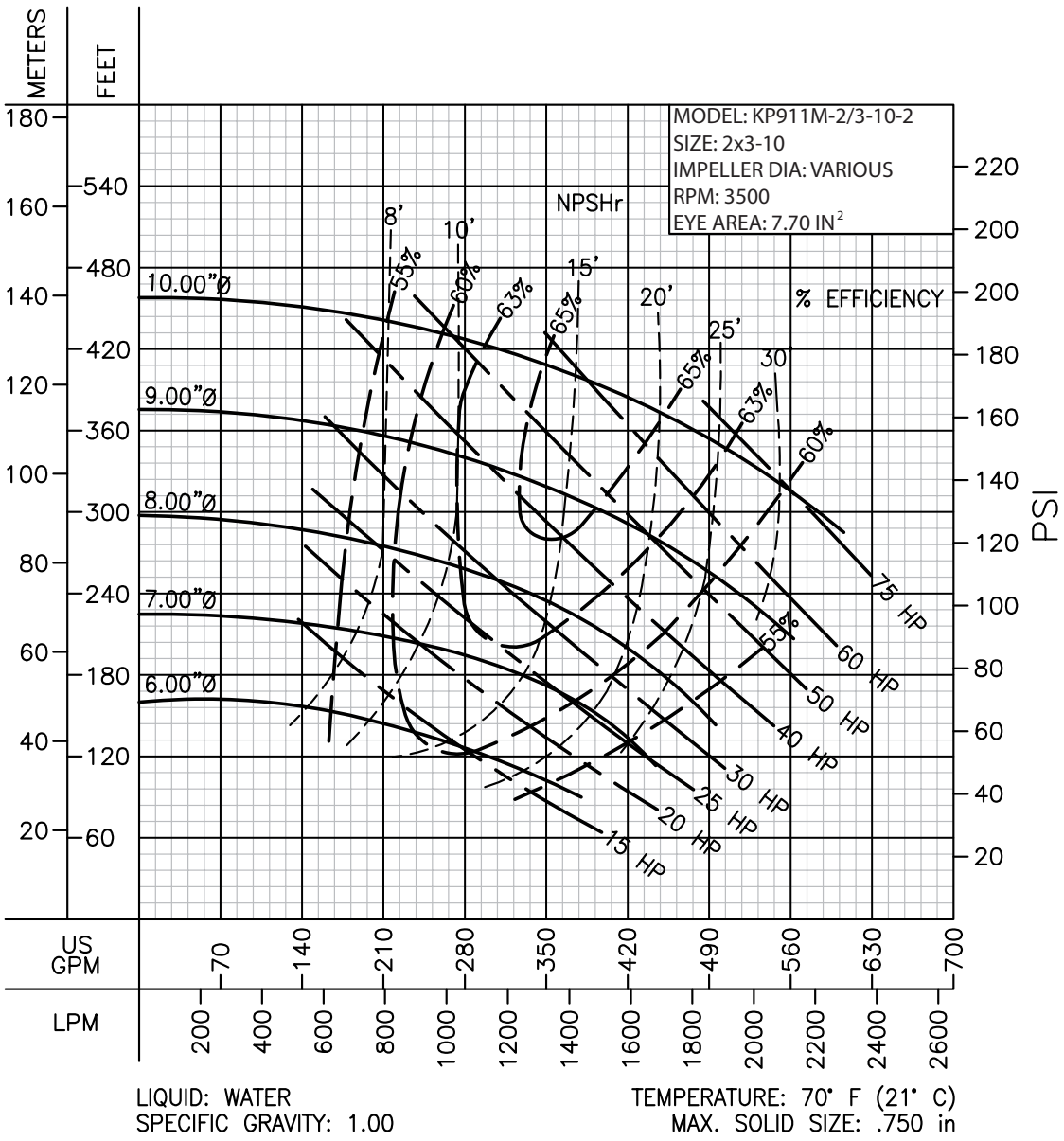


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .500 in

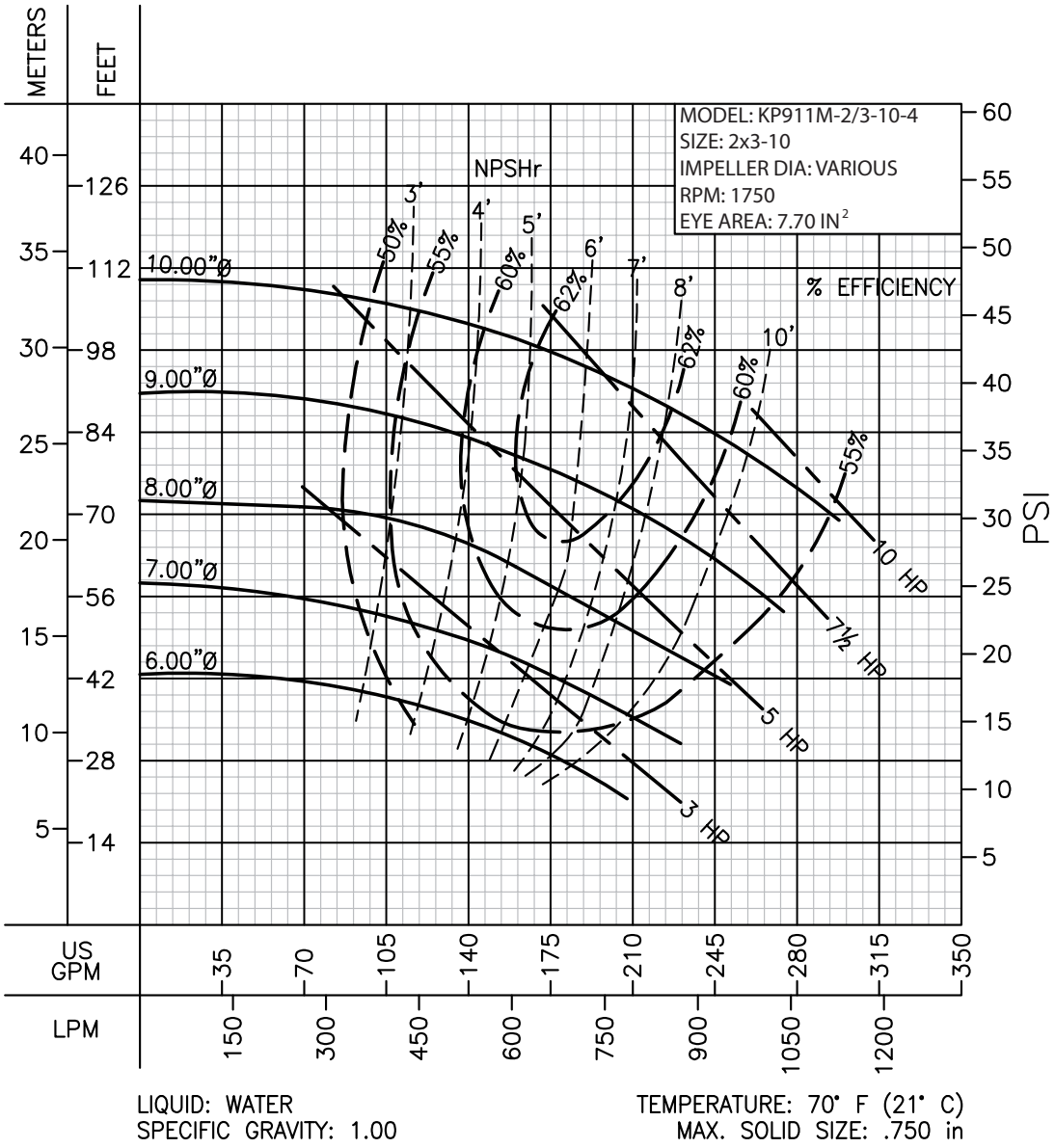
KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



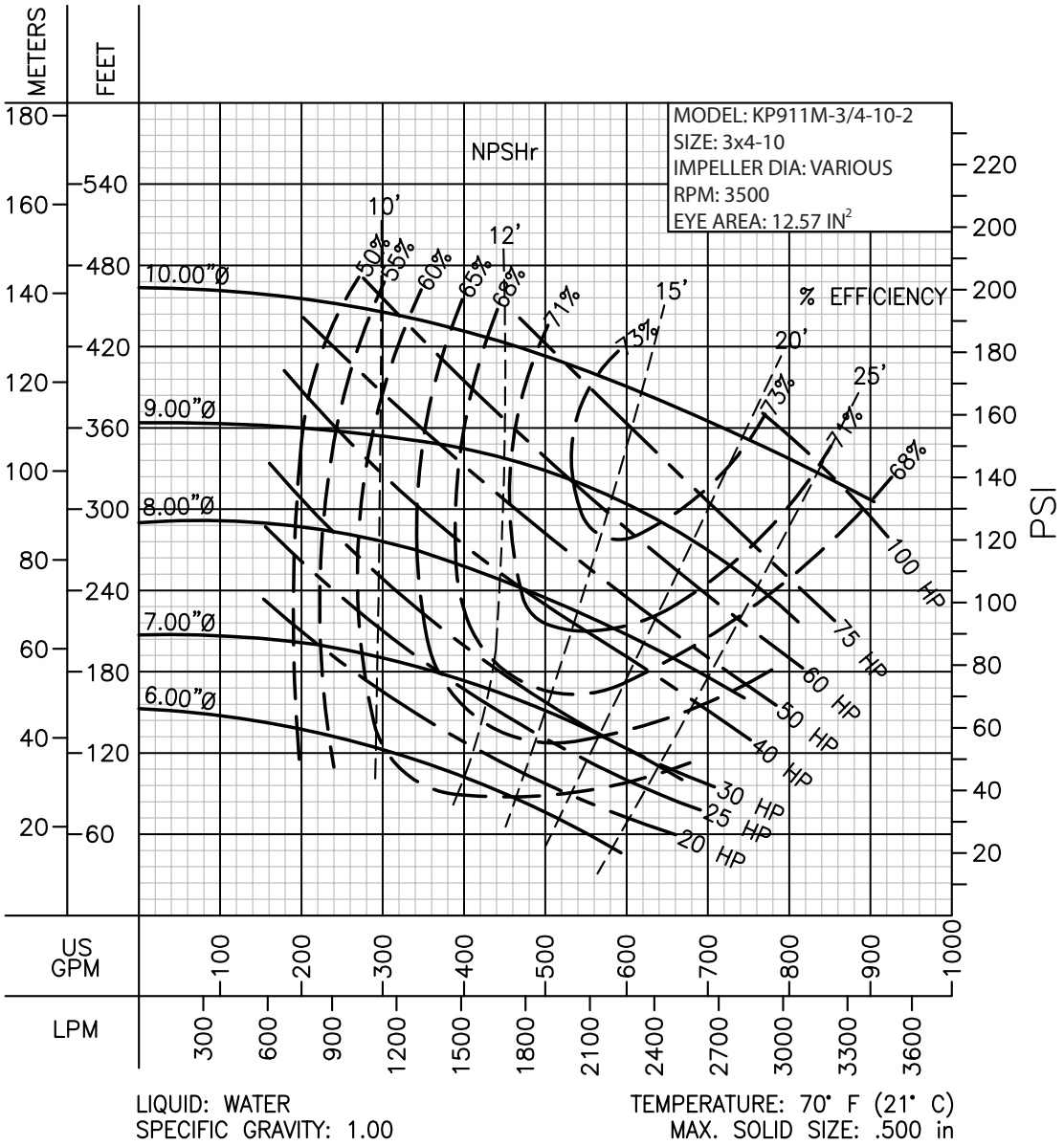
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

KEEN PUMP®

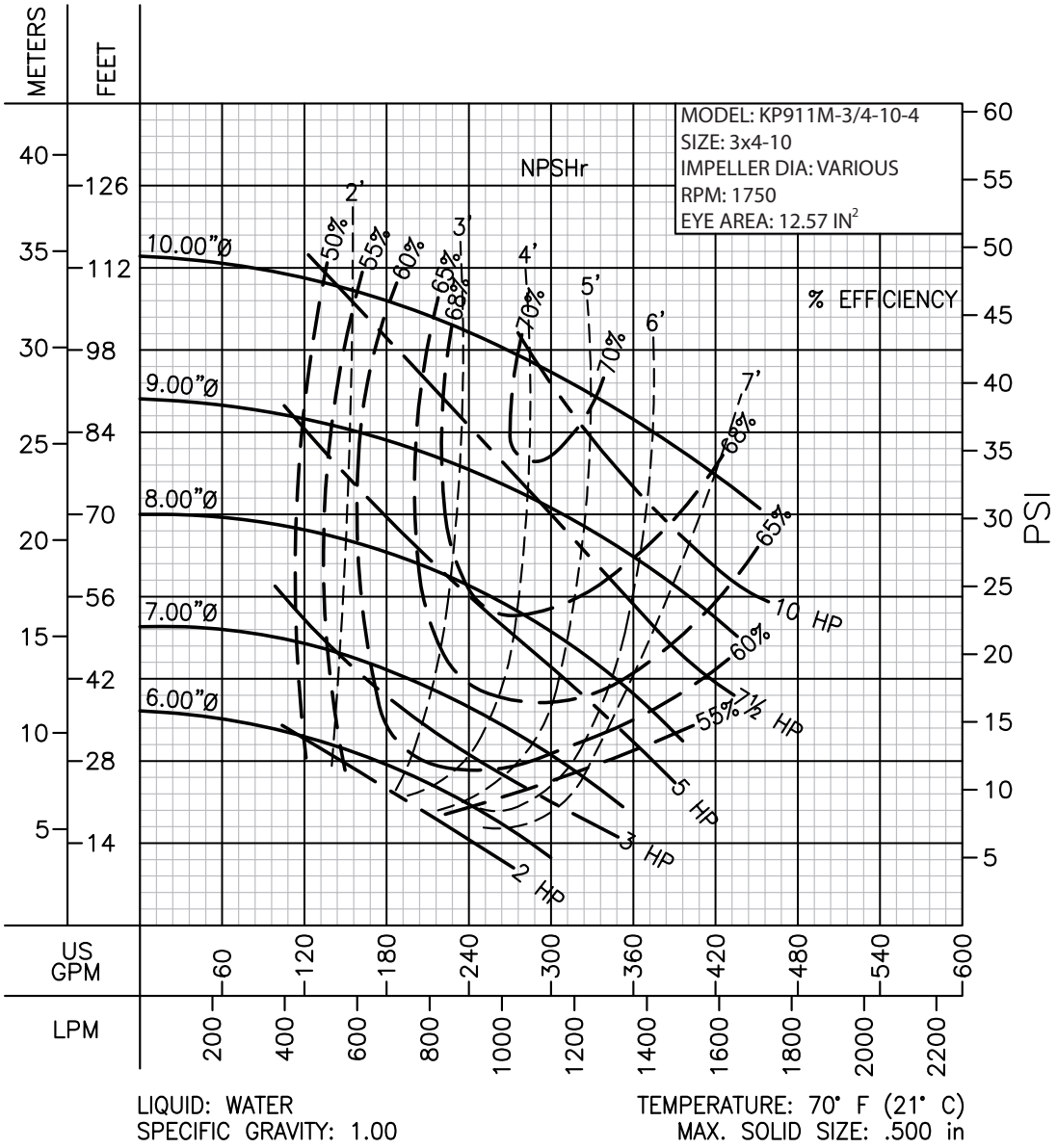
PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**



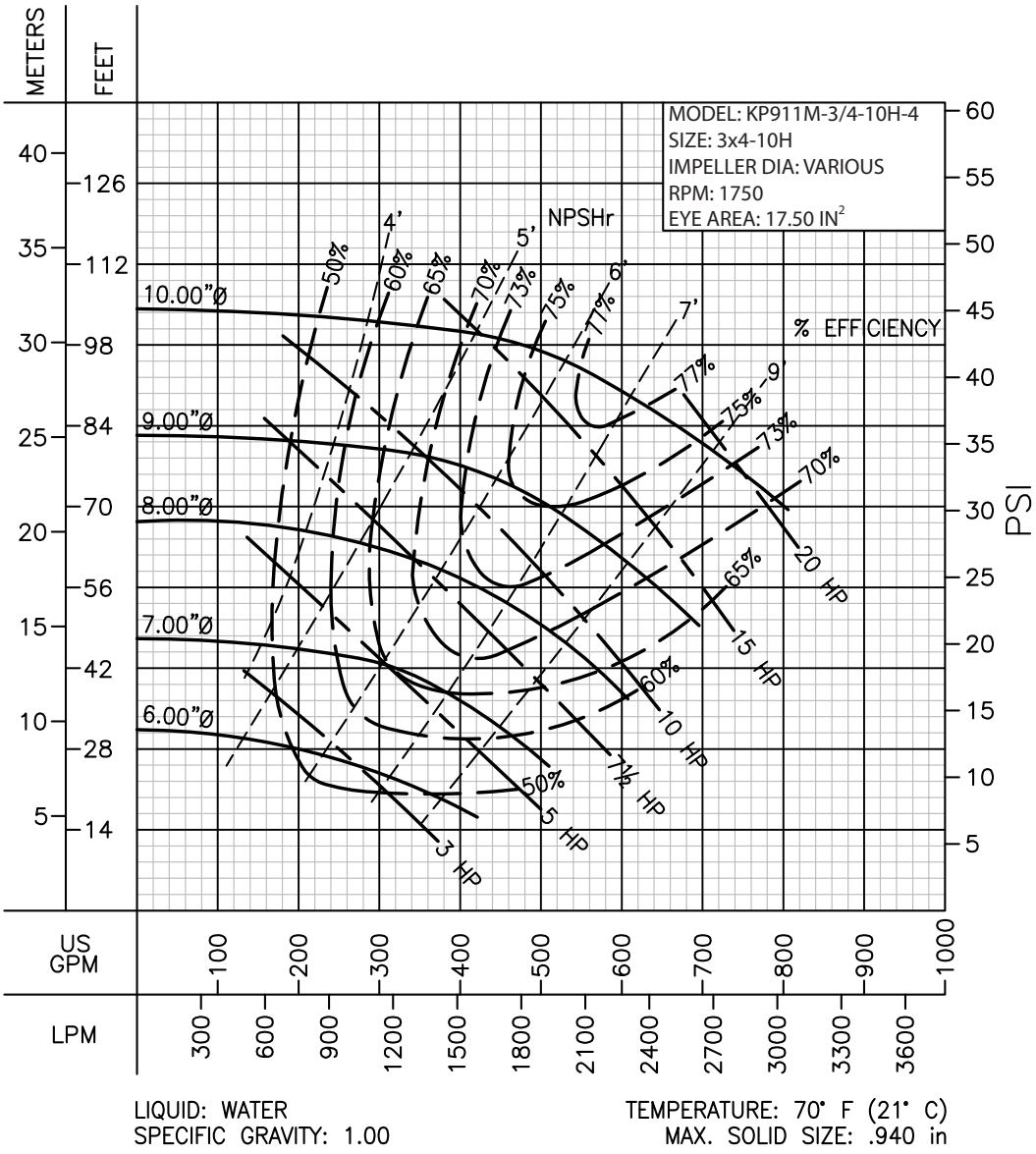
KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

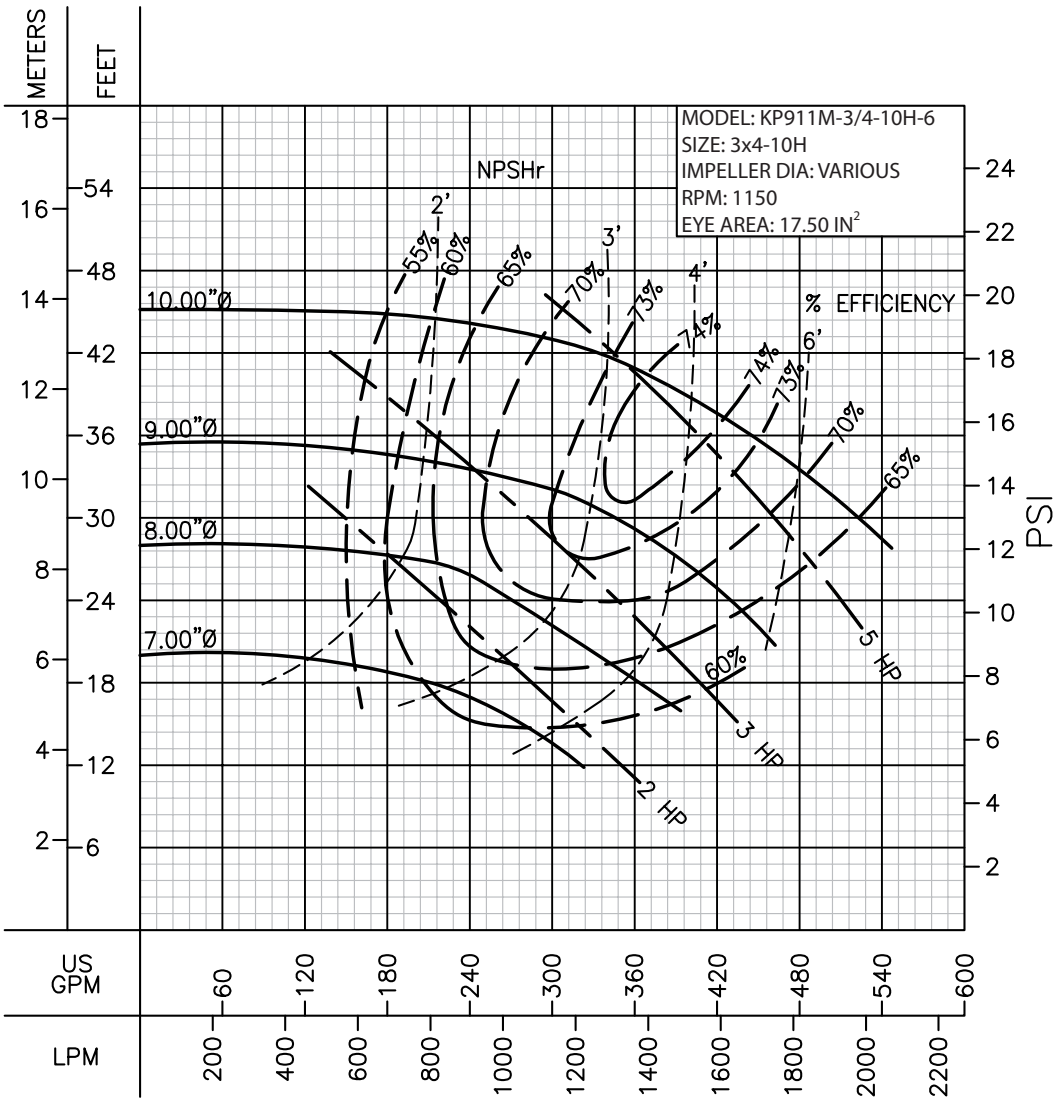


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

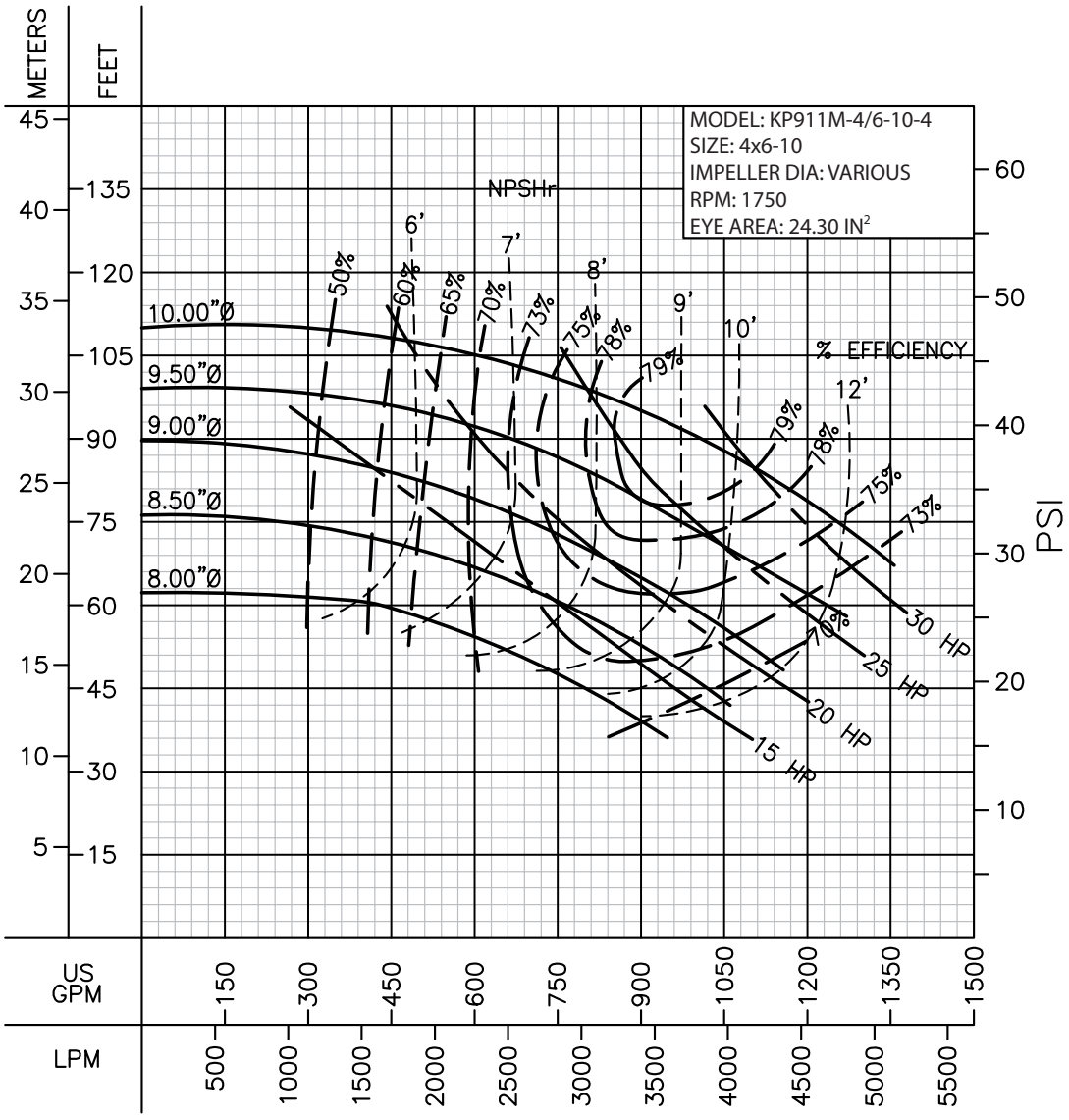


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

KEEN PUMP®

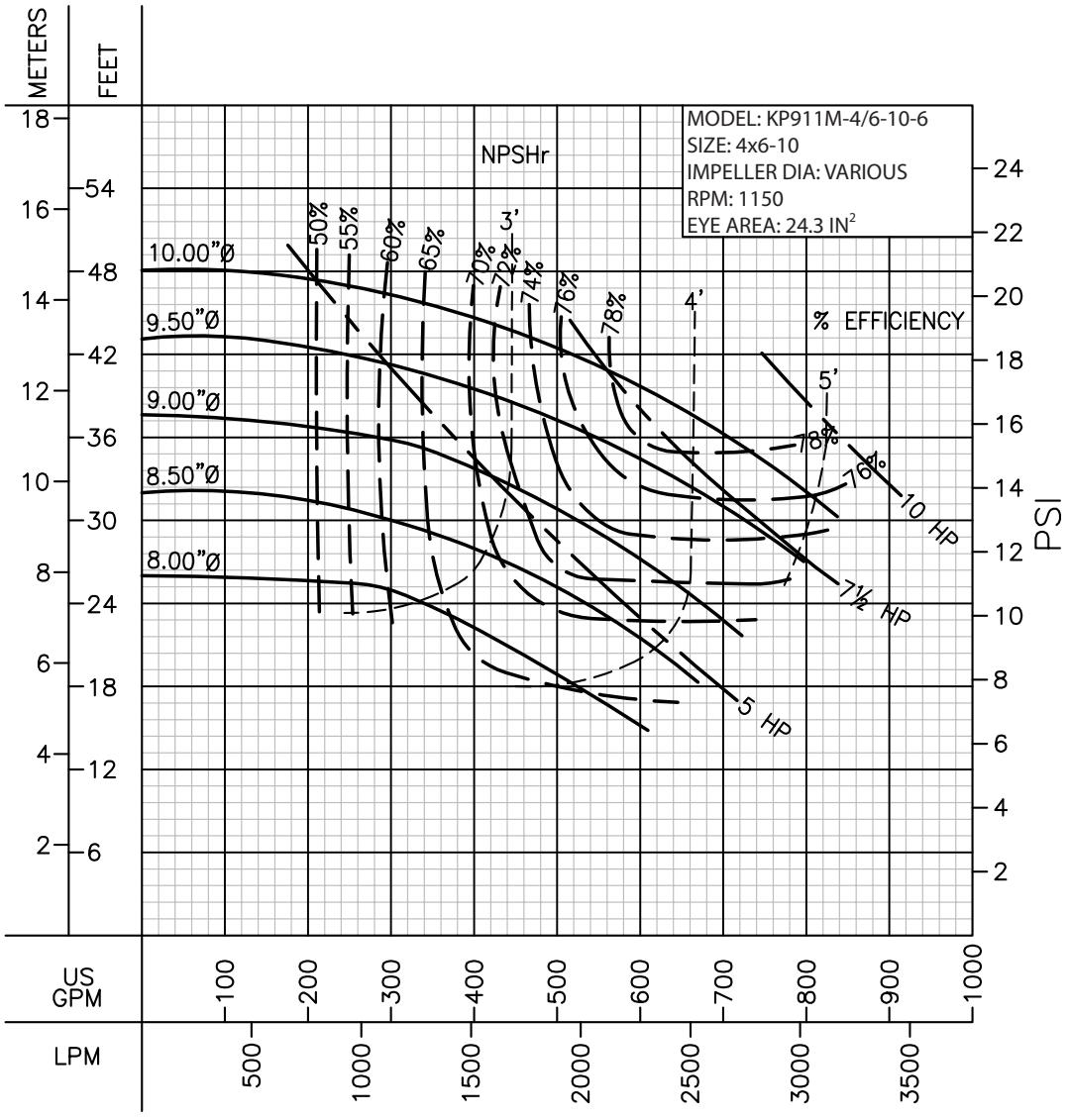


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .875 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

KEEN PUMP®

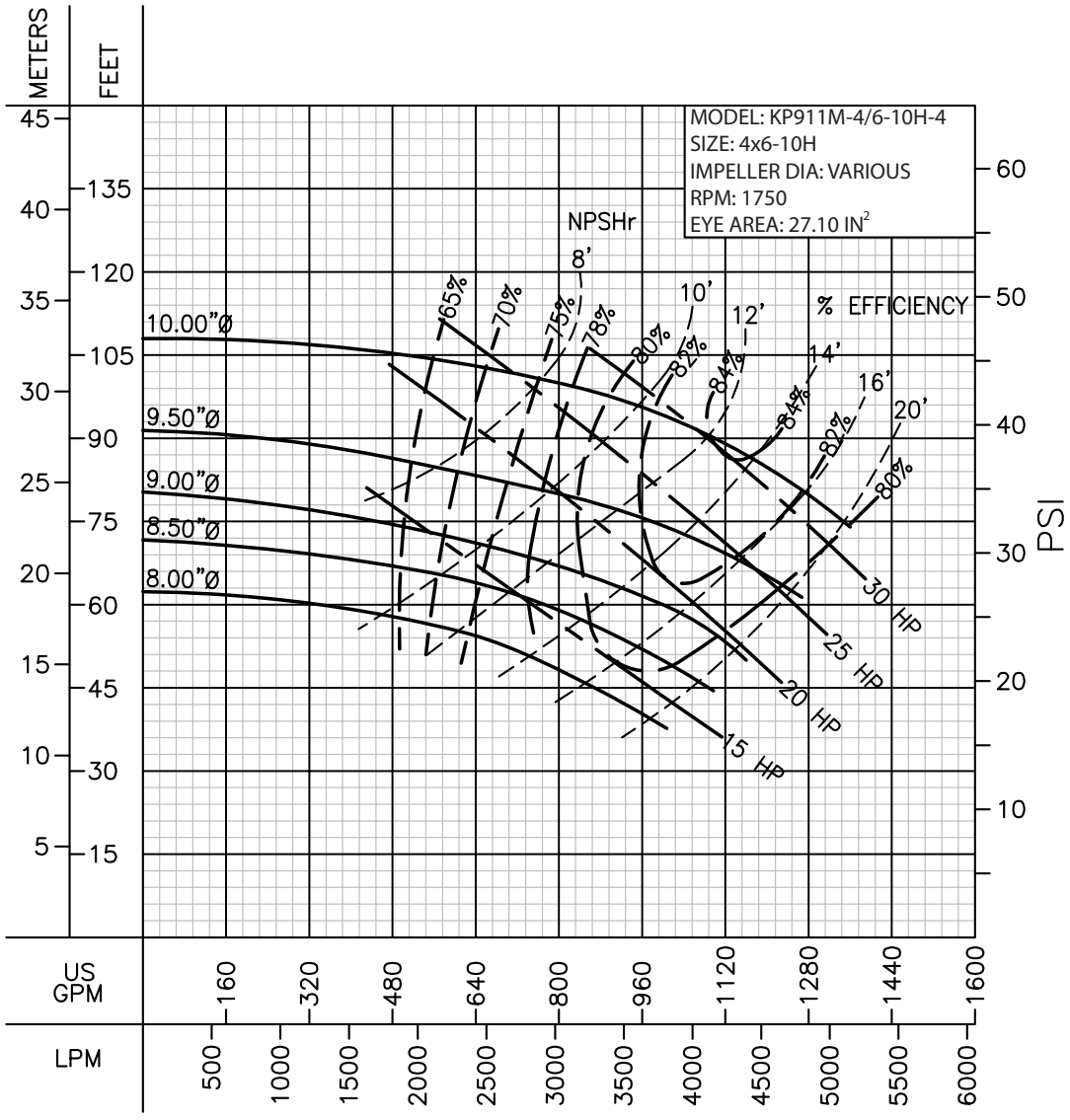


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .875 in

KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

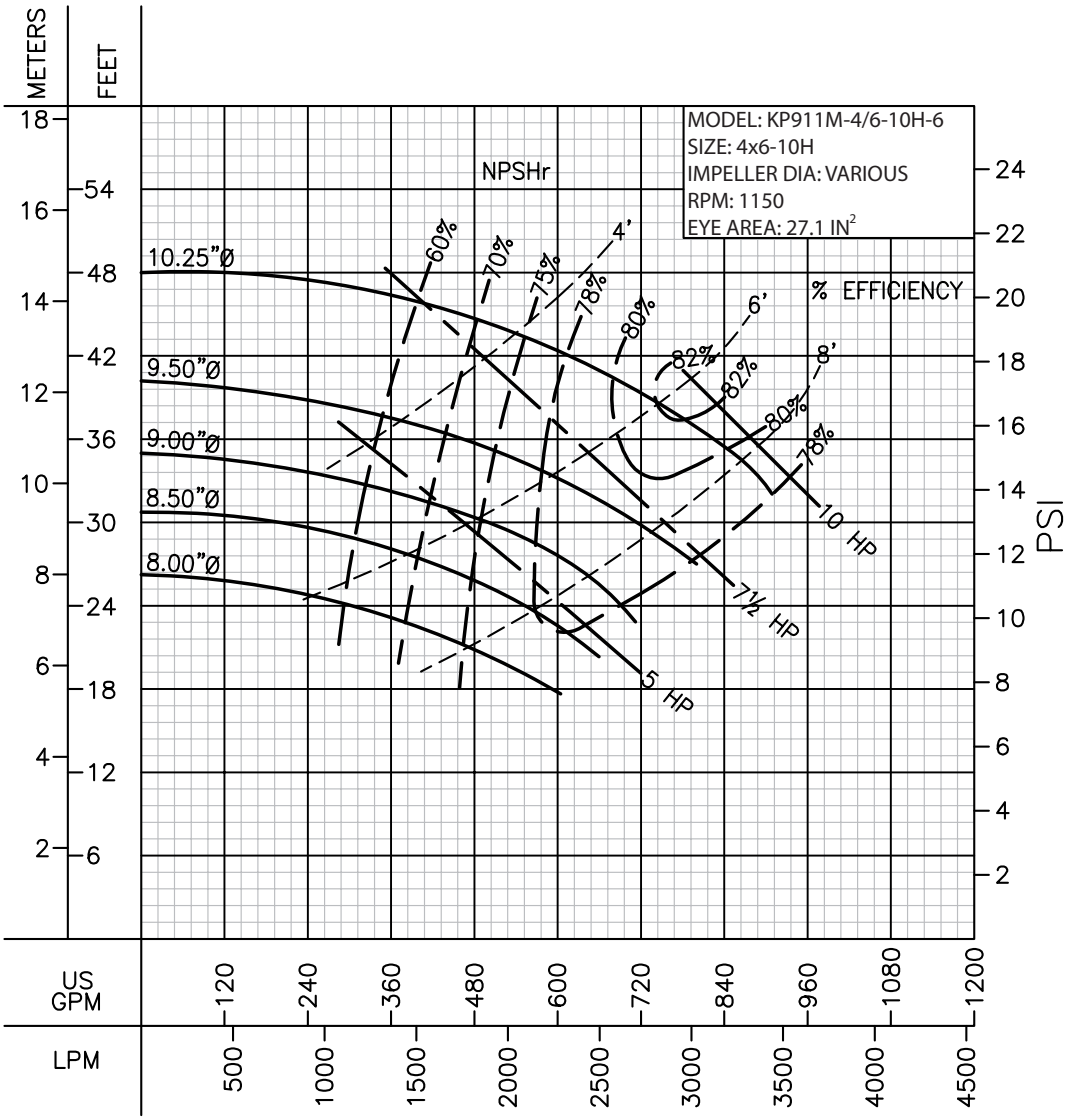


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

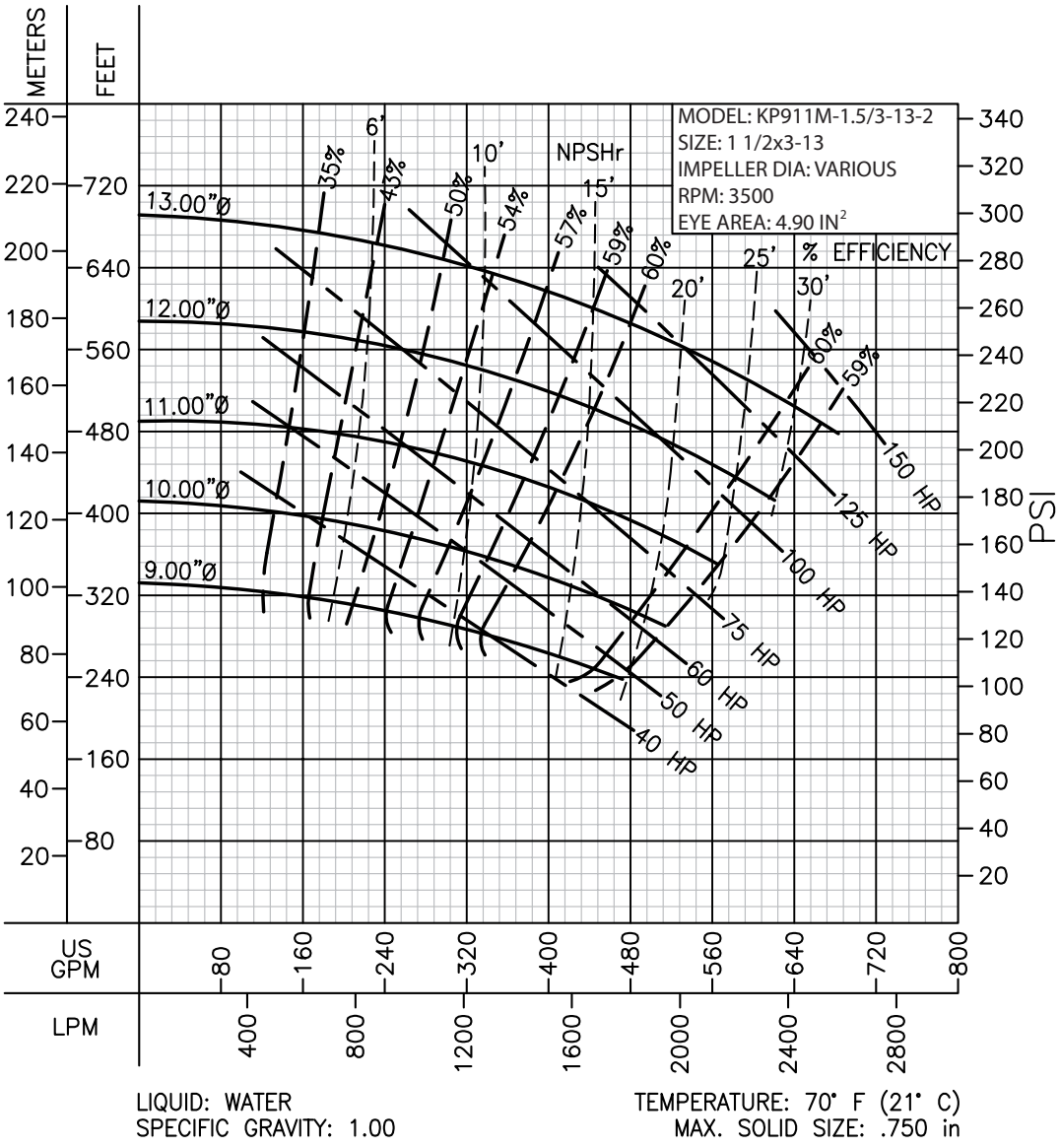


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

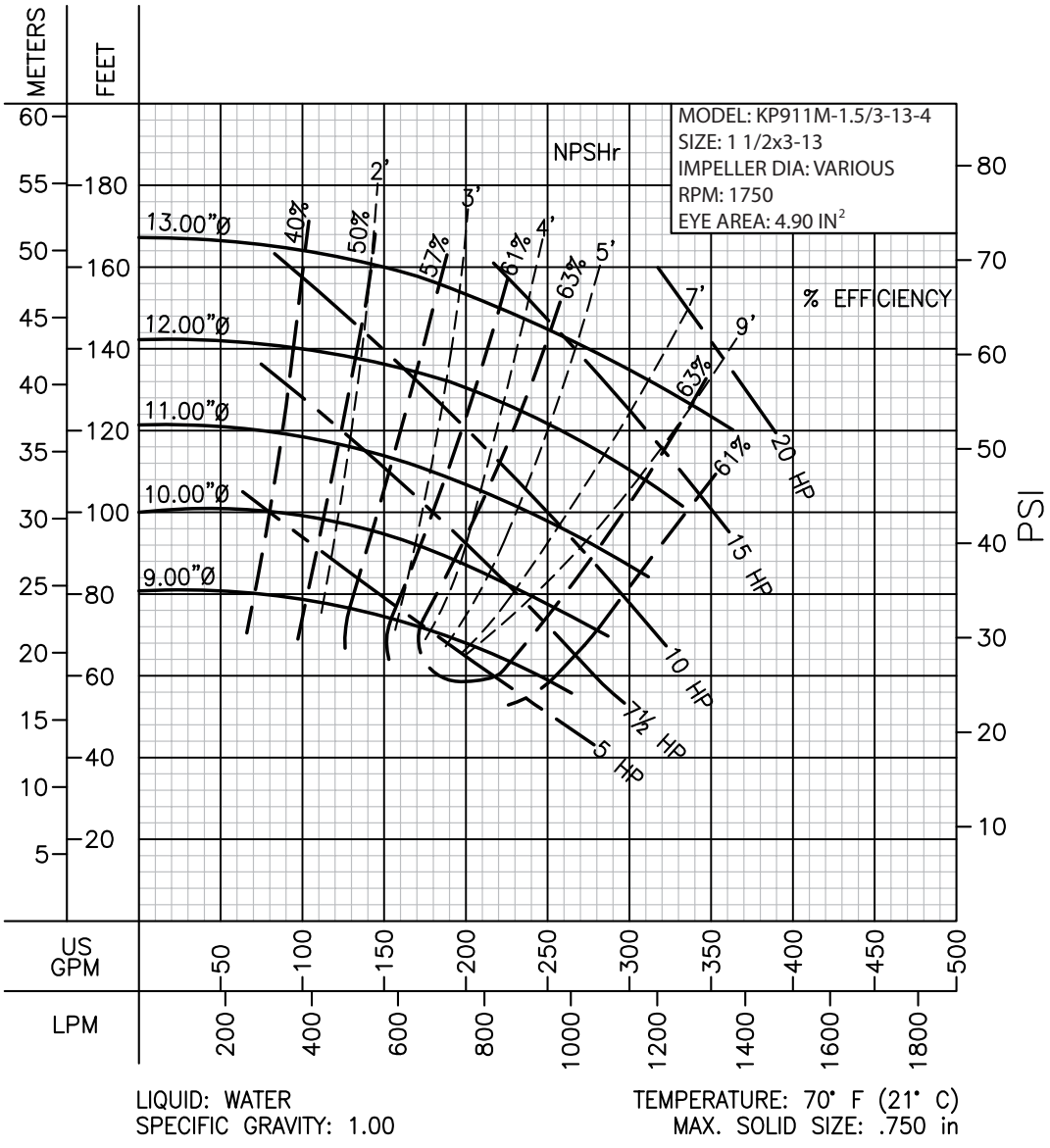
TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .940 in

PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911M**

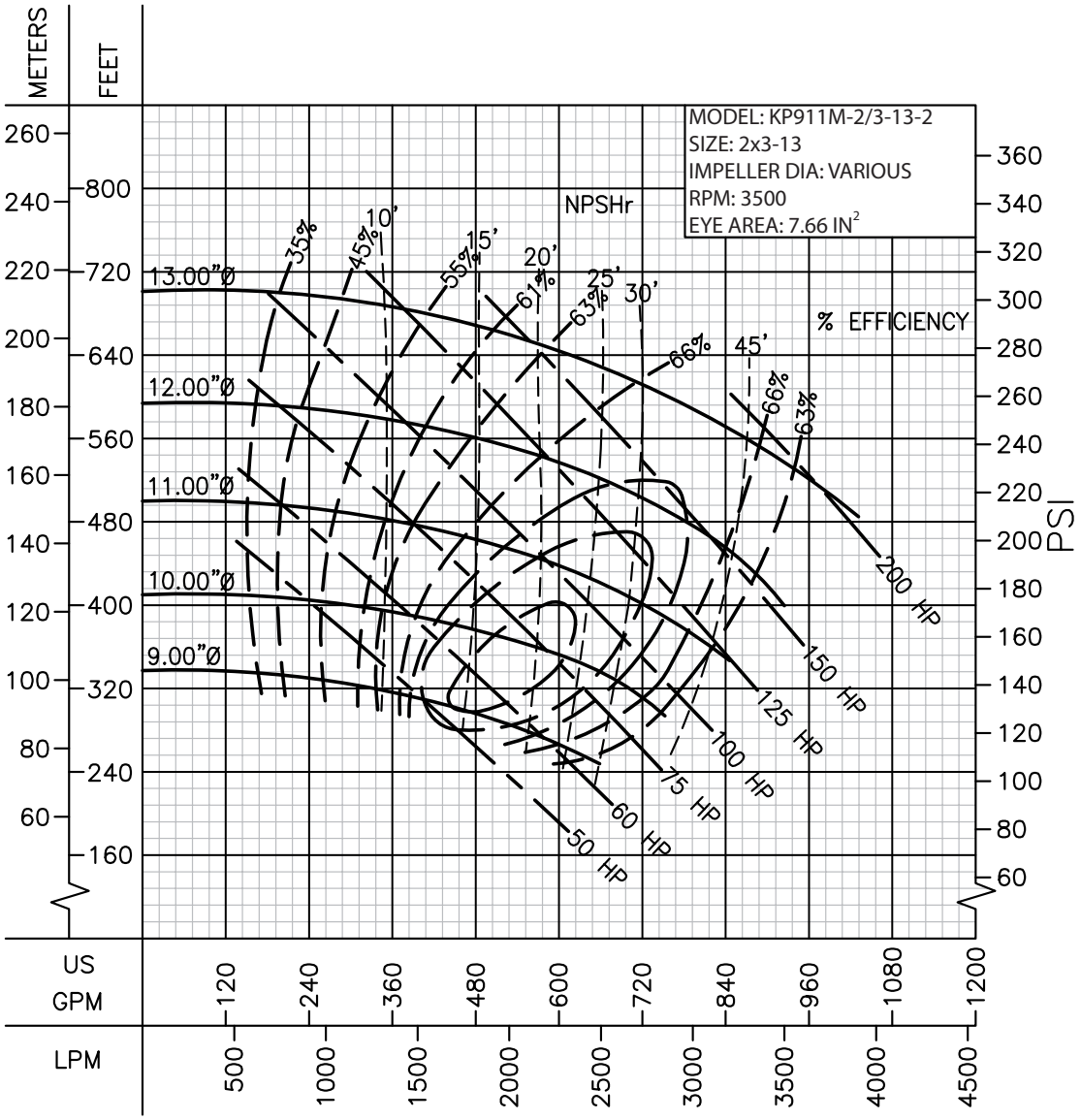


PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

KEEN PUMP®



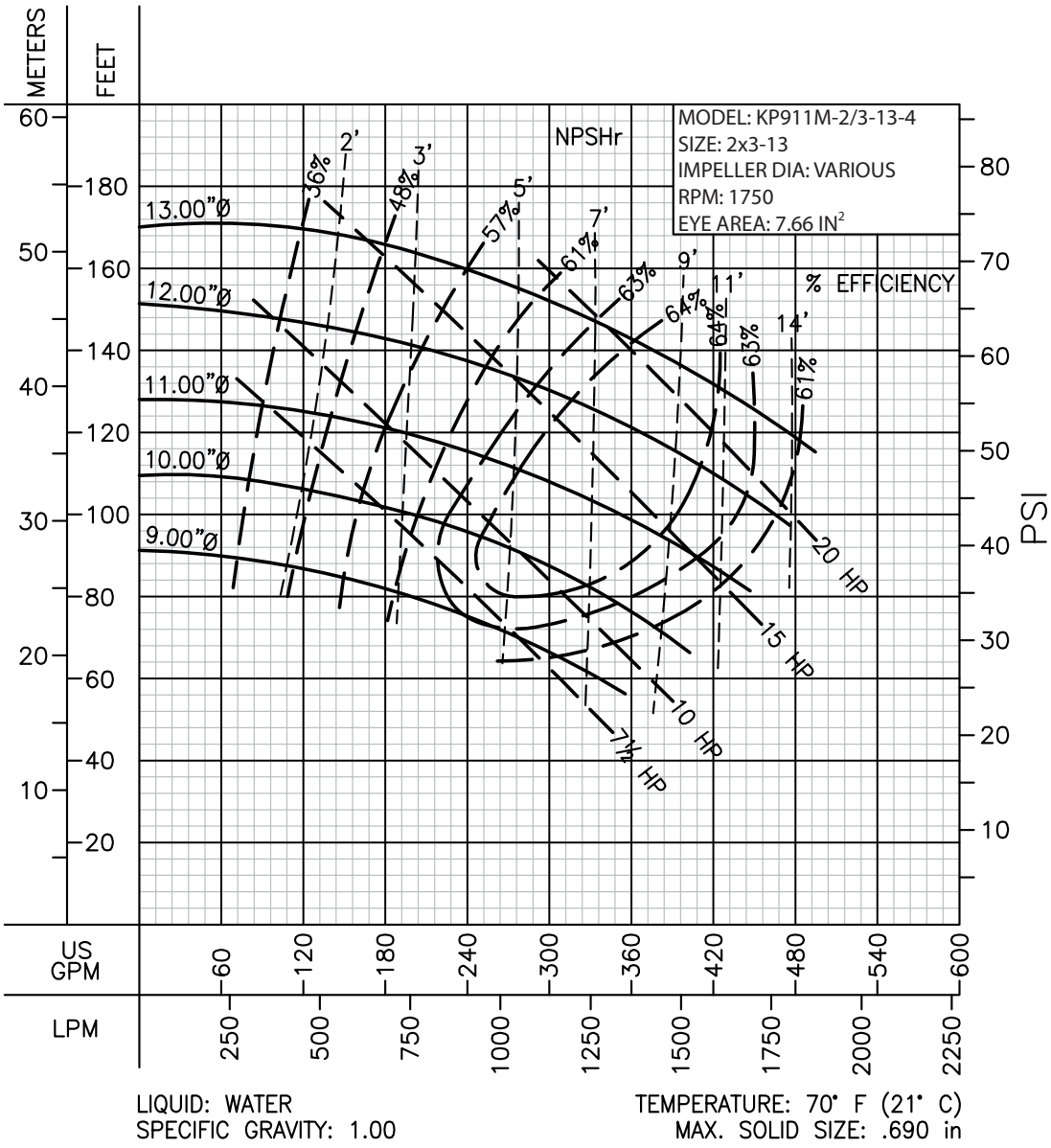
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .690 in

PERFORMANCE CURVES

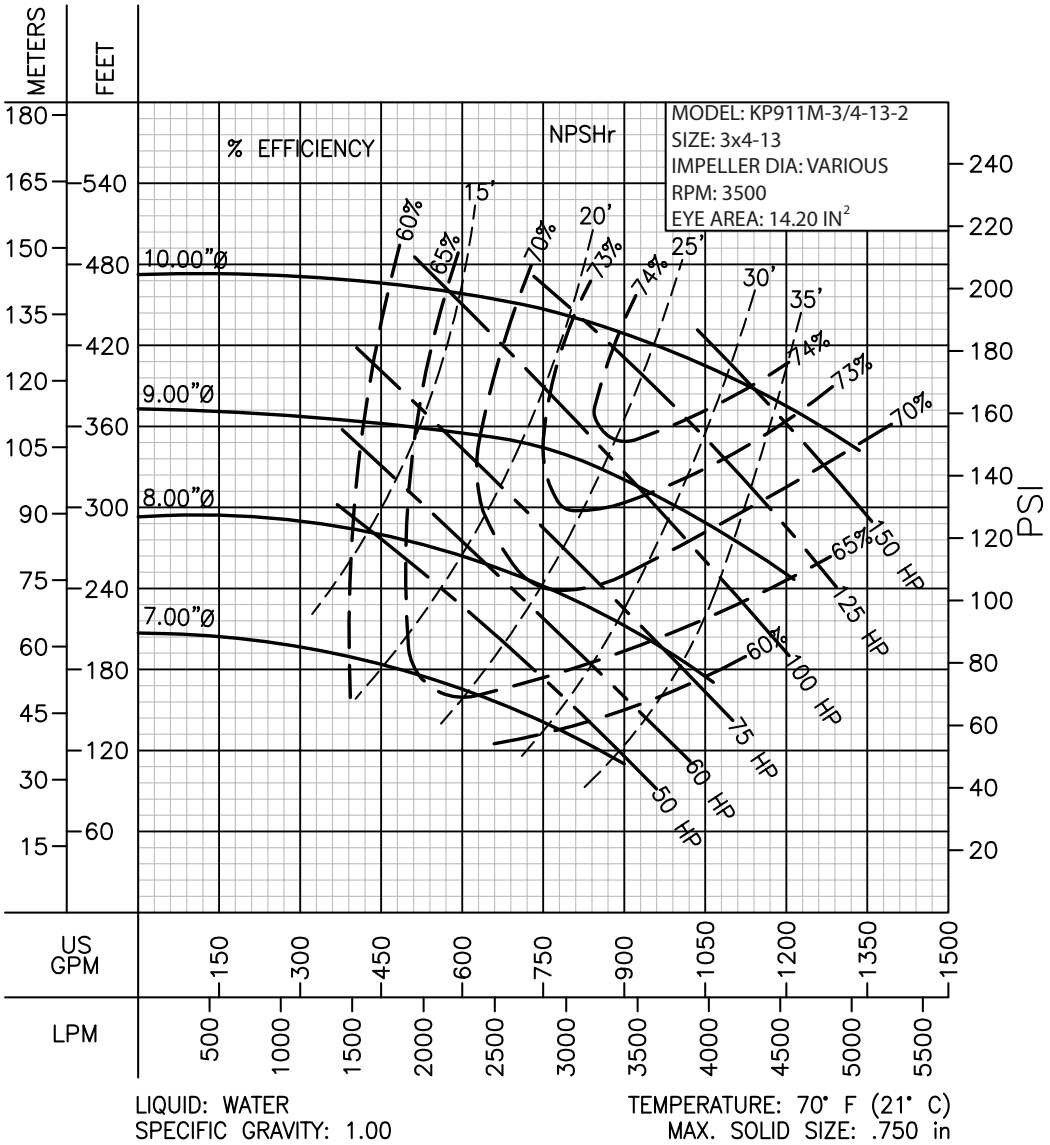
ANSI Centrifugal
Process Pumps
Series: **KP911M**

KEEN PUMP®



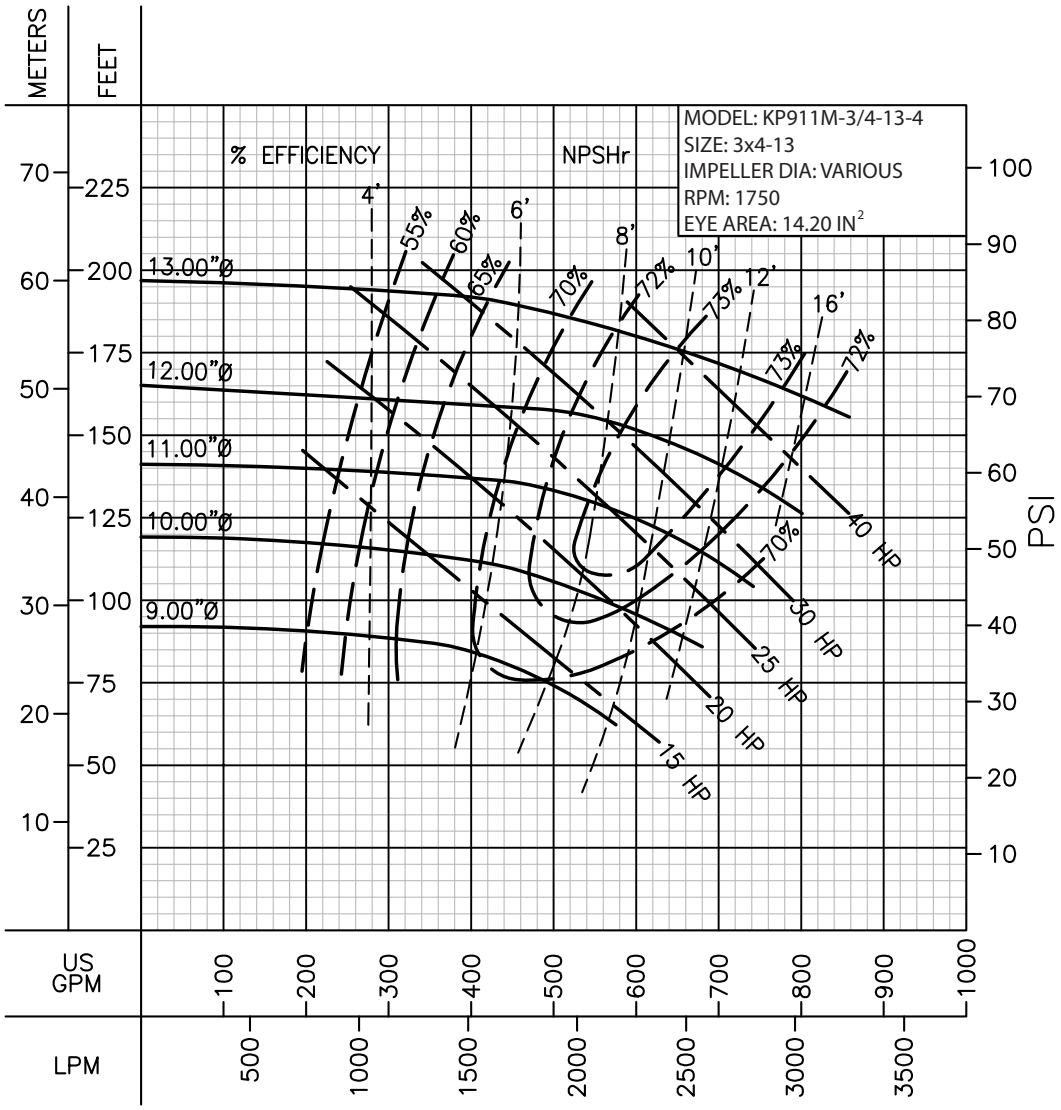
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

KEEN PUMP®



PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

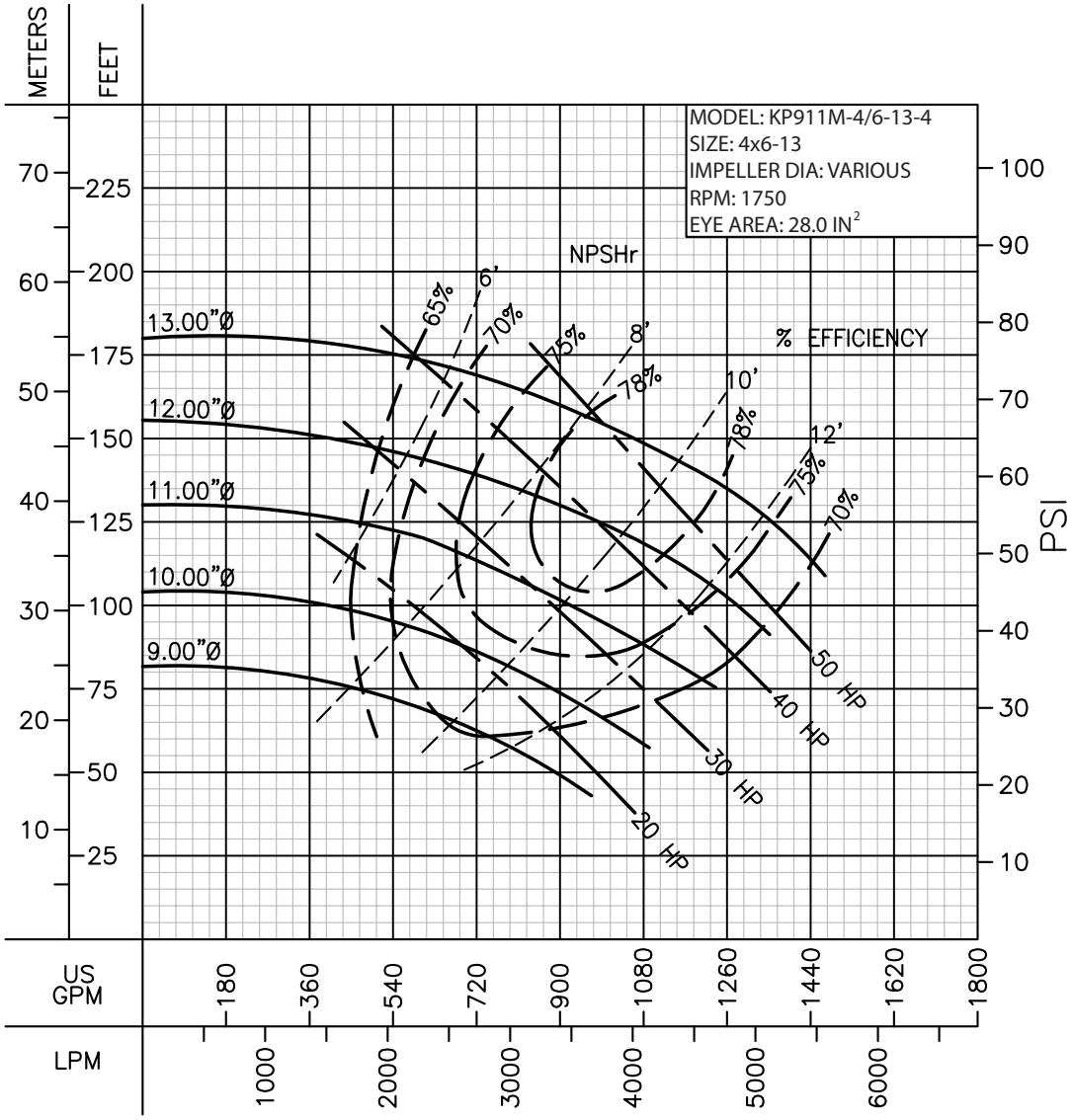
KEEN PUMP®



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .750 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**

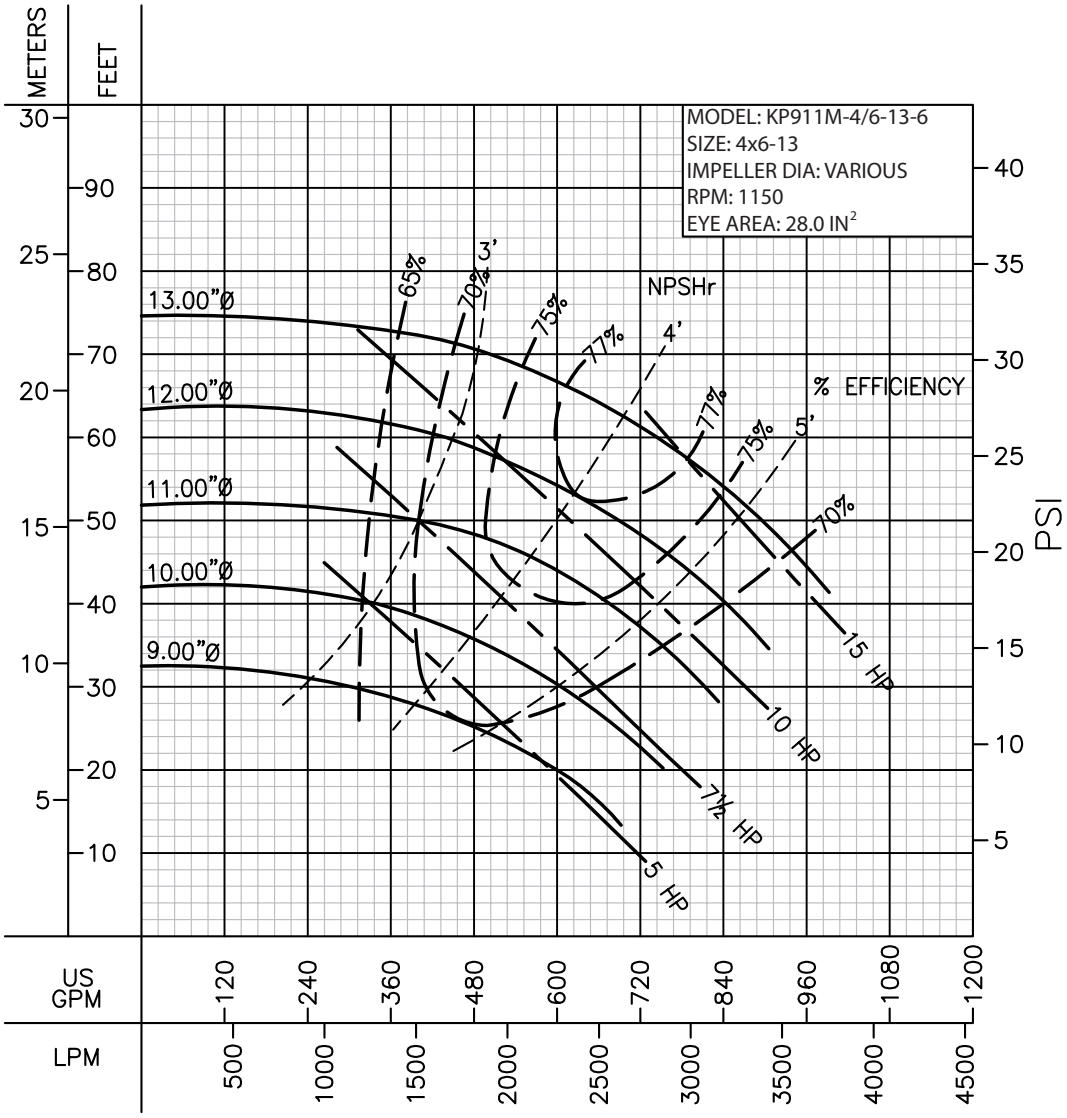


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .930 in

KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911M**



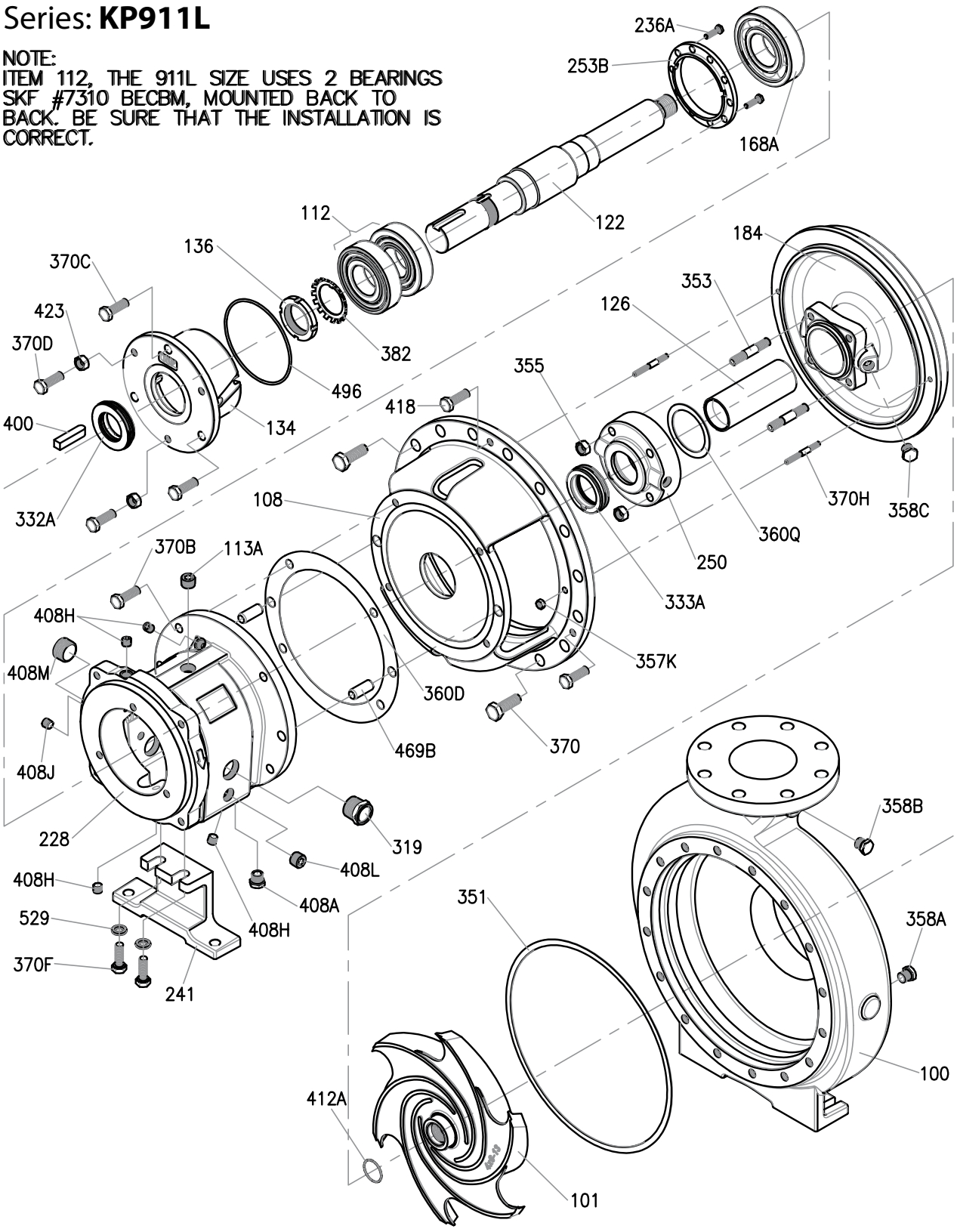
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .930 in

EXPLODED VIEW DRAWING

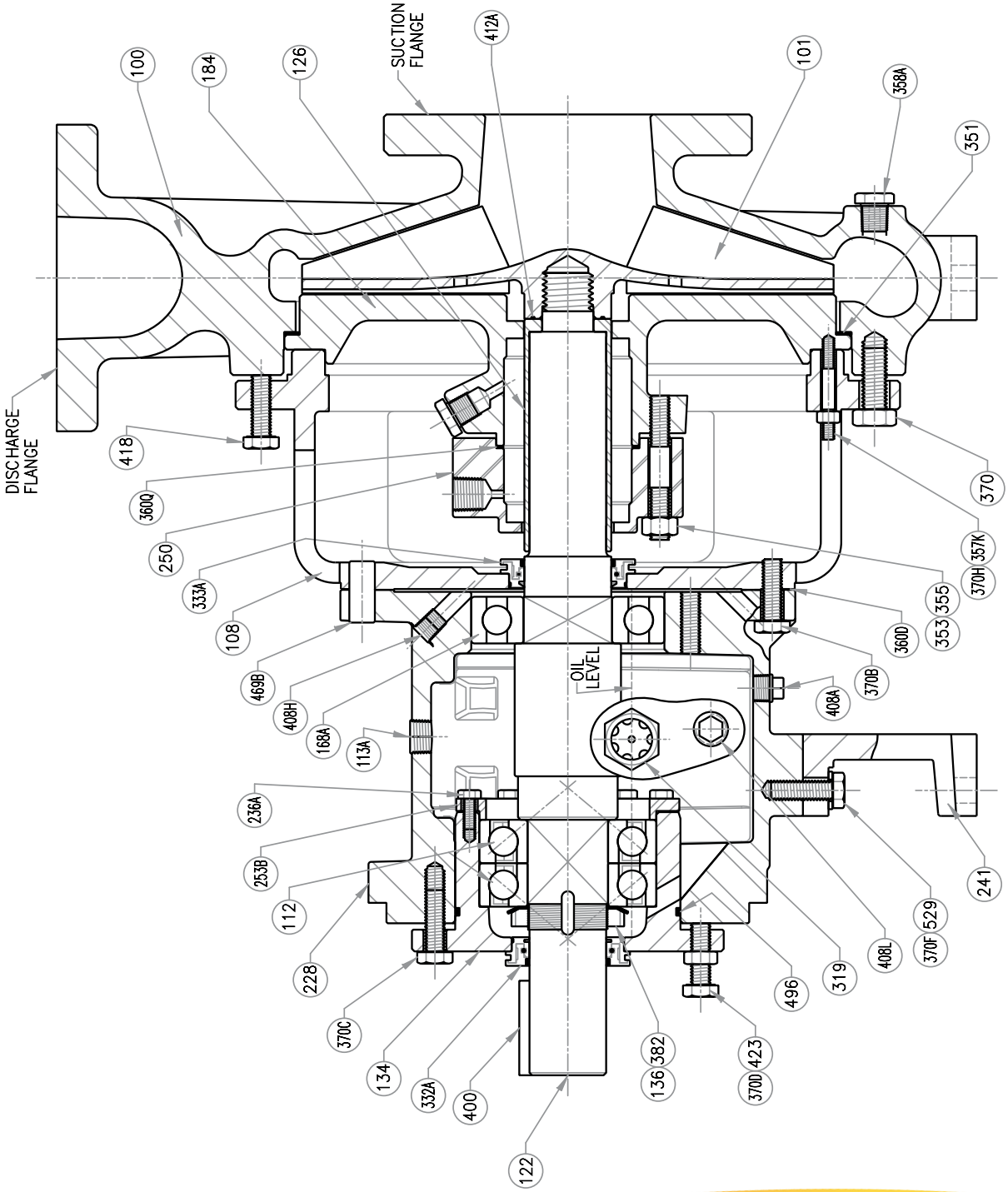
Series: **KP911L**

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**

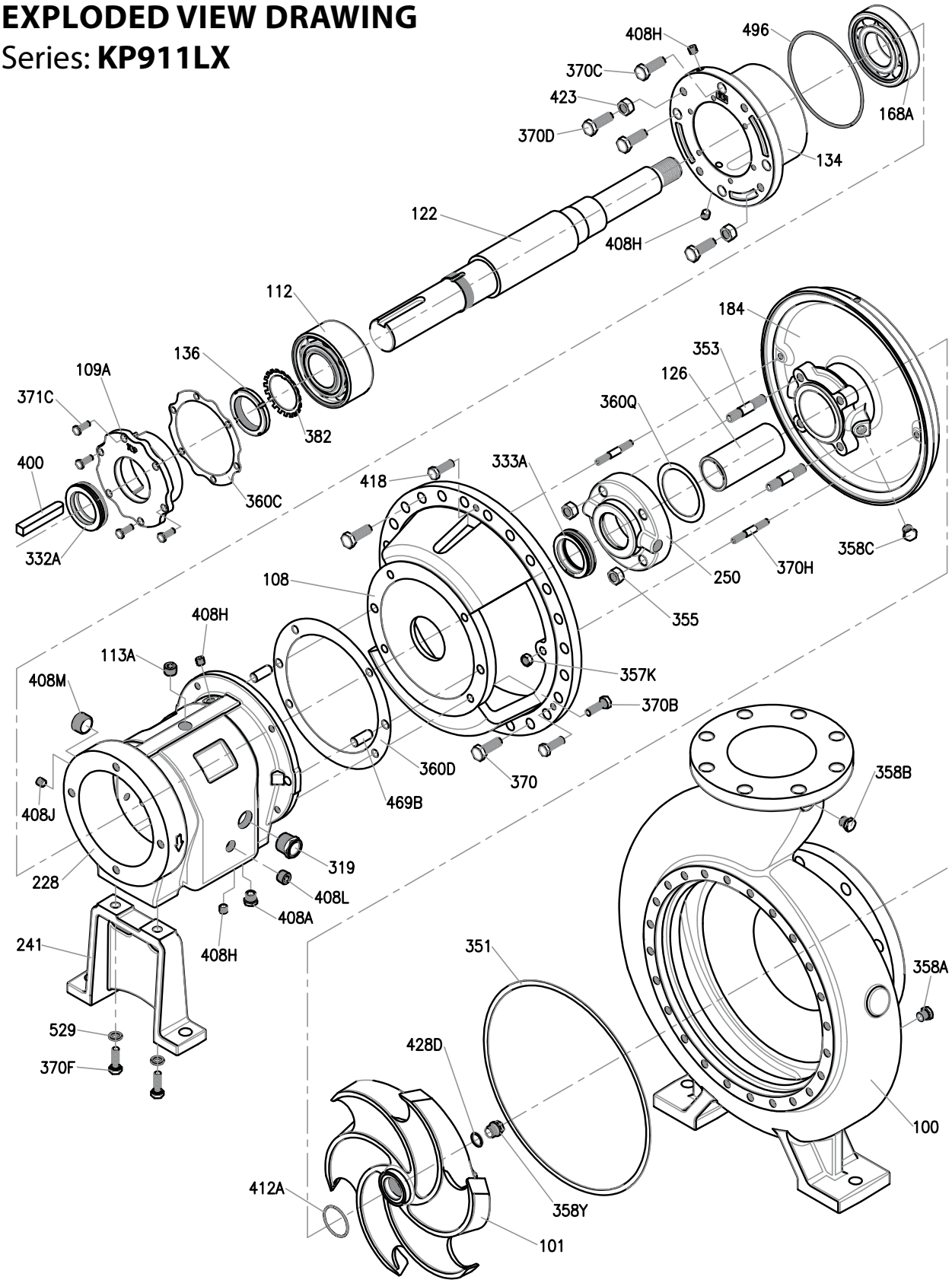
ITEM	QTY.	DESCRIPTION	MATERIAL	PART No.
100	1	Casing 1x2-10	Cast iron	03730100
			CF8M	03730101
		Casing 1.5x3-10	Cast iron	03730110
			CF8M	03730111
		Casing 2x3-10	Cast iron	03730120
			CF8M	03730121
		Casing 3x4-10	Cast iron	03730130
			CF8M	03730131
		Casing 3x4-10H	Cast iron	03730140
			CF8M	03730141
		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 911 L	Teflon®	S/N
106	5	Cord ring 3/8"	Teflon®	S/N
107	1	Stuffing box 911 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 911 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 911 L	Steel	30400352
319	1	Oil sight glass	Steel/Glass	31120011
332A	1	Outboard lab'y seal 911 L	Bronze	31030206
333A	1	Inboard lab'y seal 911 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 911 L	Teflon®	S/N
106	5	Cord ring 3/8"	Teflon®	S/N
107	1	Stuffing box 911 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 911 L	Steel 4140	30300353
		Solid shaft 911 L	316 SS	30300361
126	1	Sleeve 911 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 911 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 911 L	Steel	30400352
319	1	Oil sight glass	Steel/Glass	31120011
332A	1	Outboard lab'y seal 911 L	Bronze	31030206
333A	1	Inboard lab'y seal 911 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

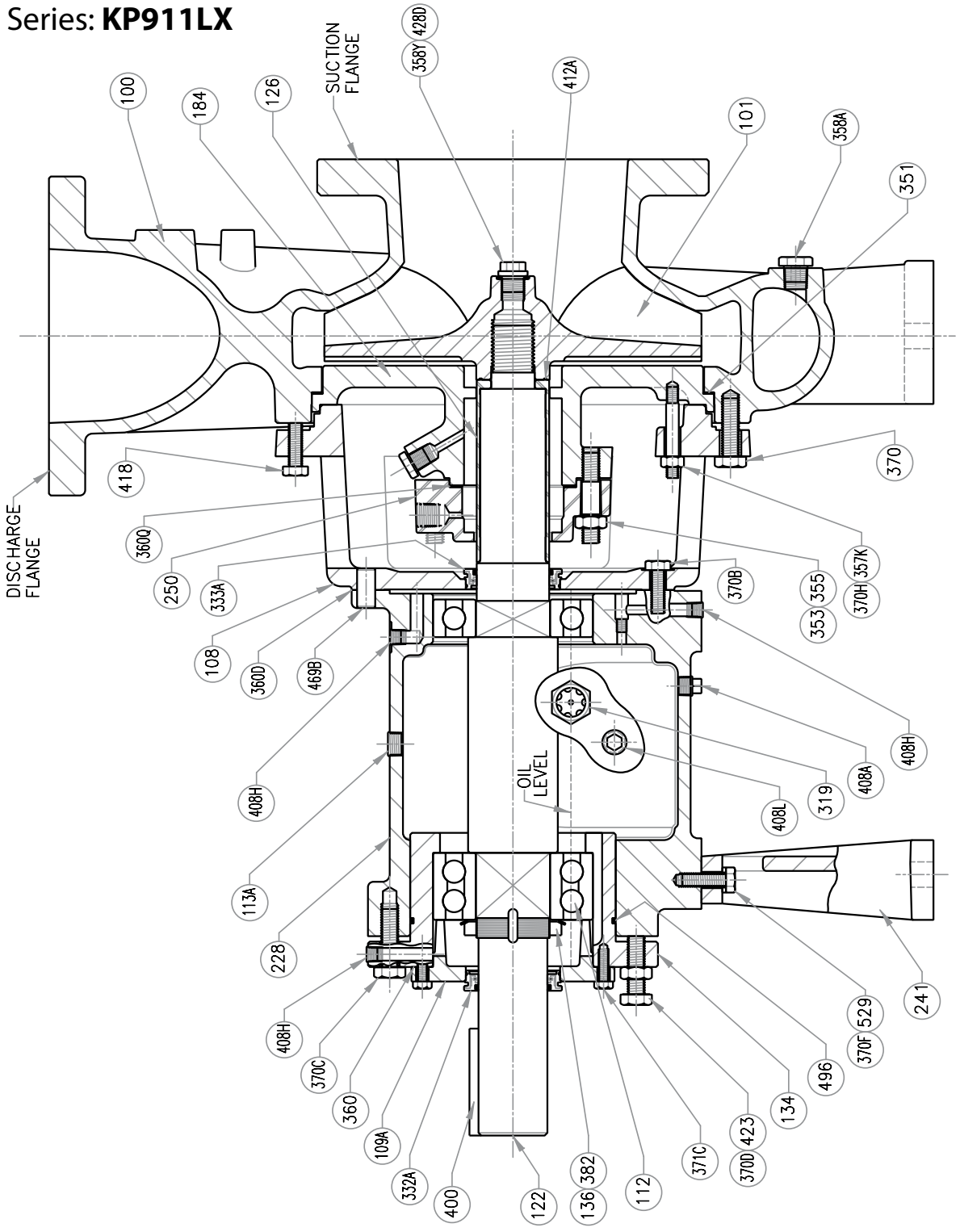
EXPLODED VIEW DRAWING

Series: **KP911LX**



SECTIONAL VIEW DRAWING

Series: **KP911LX**

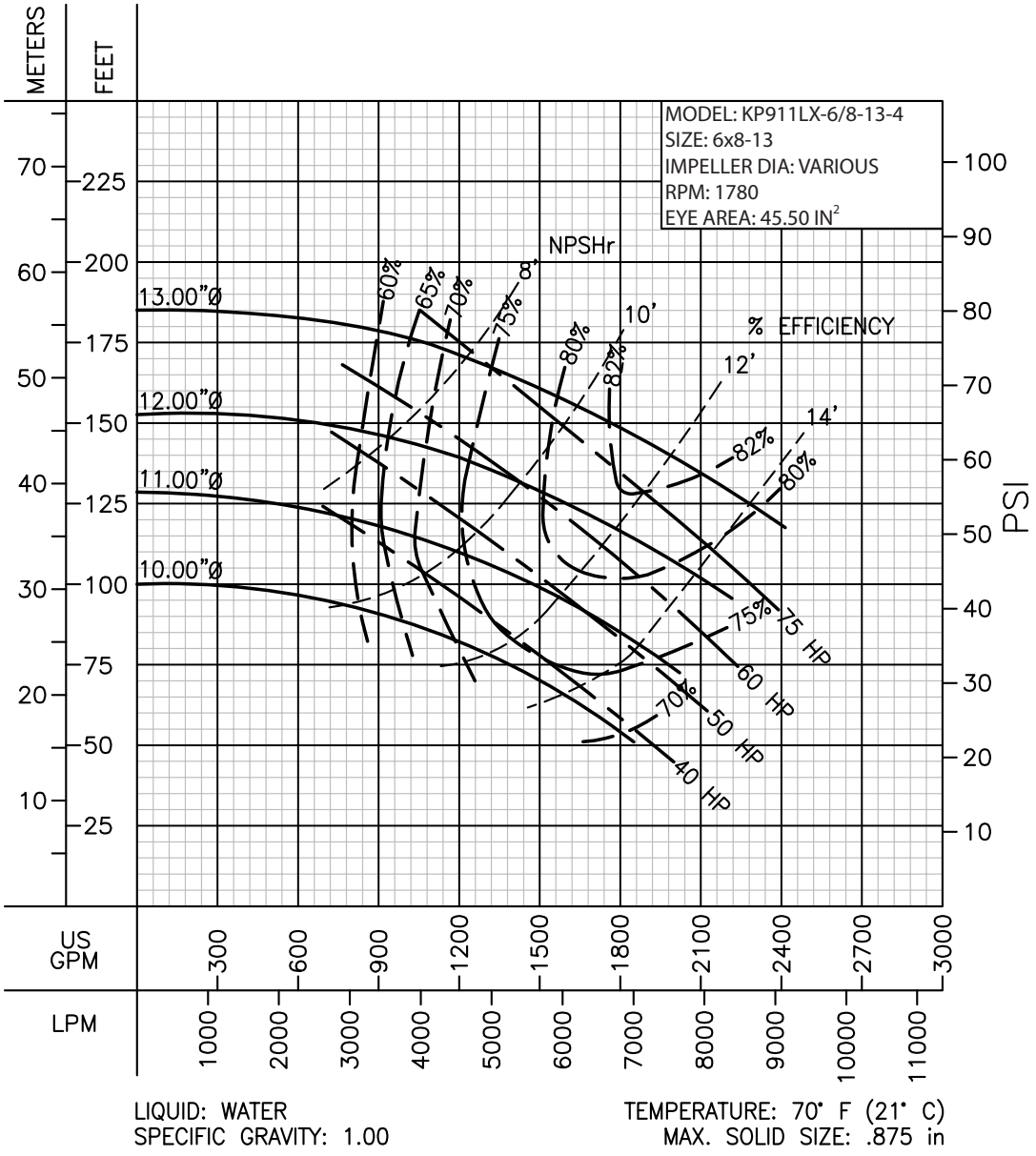


PART LIST
Series: **KP911LX**

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 911 LX	Teflon®	S/N
106	5	cord ring 7/16"	Teflon®	S/N
107	1	Stuffing box 911 LX	CF8M	S/N
108	1	Adapter of 13", 911 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 911 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 911 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 911 LX	Bronze	31030207
333A	1	Inboard lab'y seal 911 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 911 LX	Teflon®	S/N
106	5	cord ring 7/16"	Teflon®	S/N
107	1	Stuffing box 911 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 911 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 911 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 911 LX	Bronze	31030207
333A	1	Inboard lab'y seal 911 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

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**

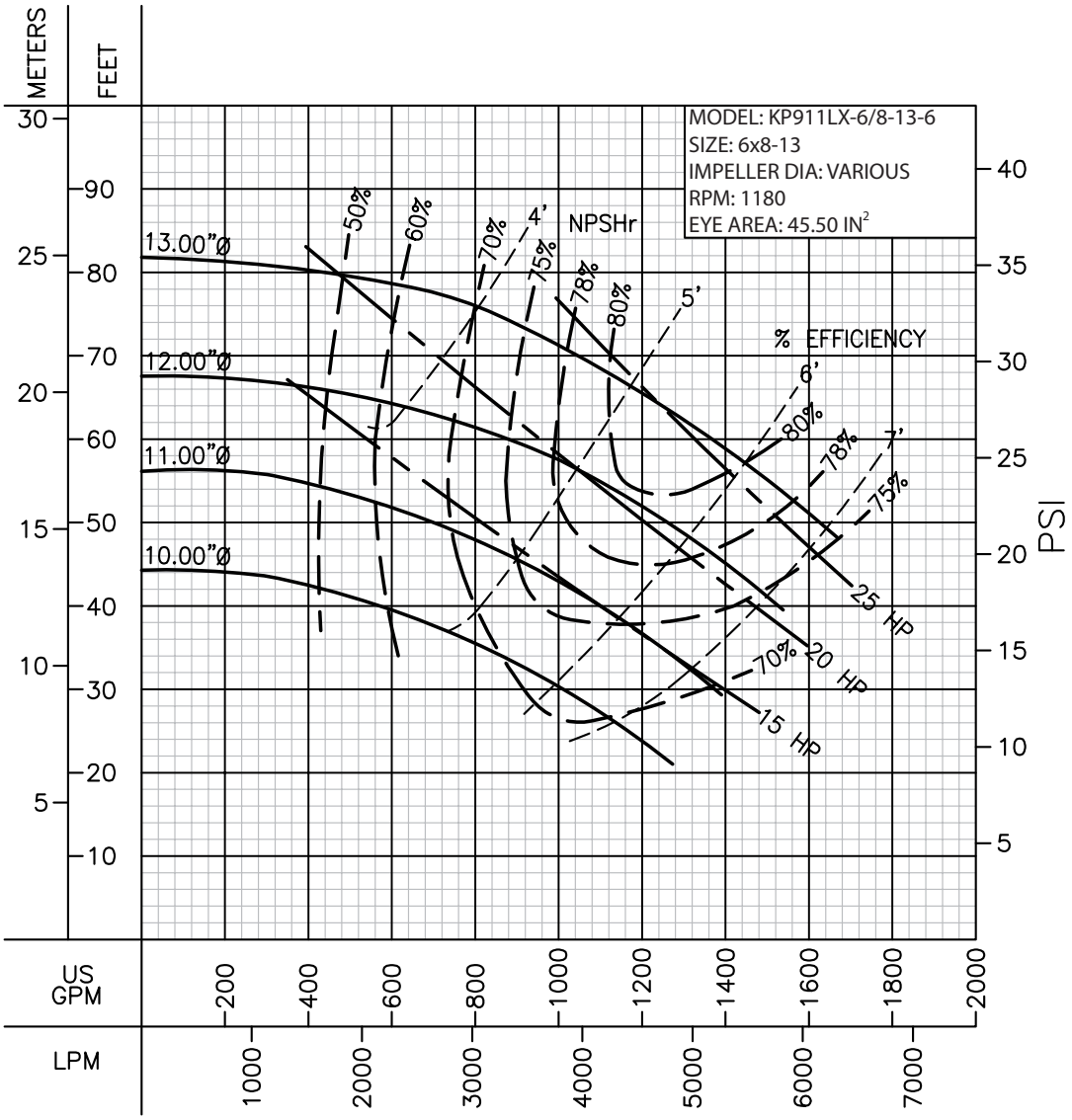


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .875 in

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**

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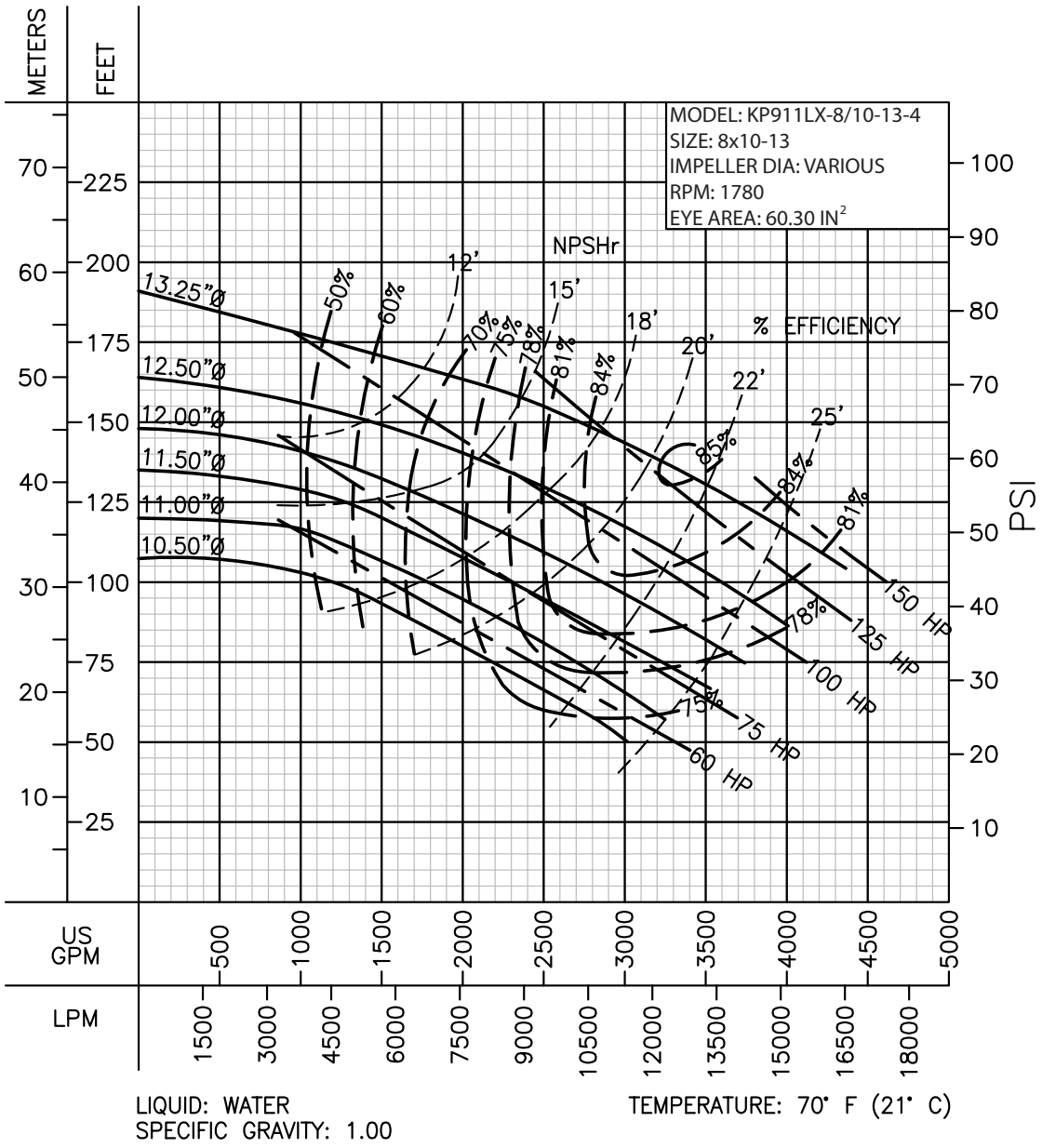


LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: .875 in

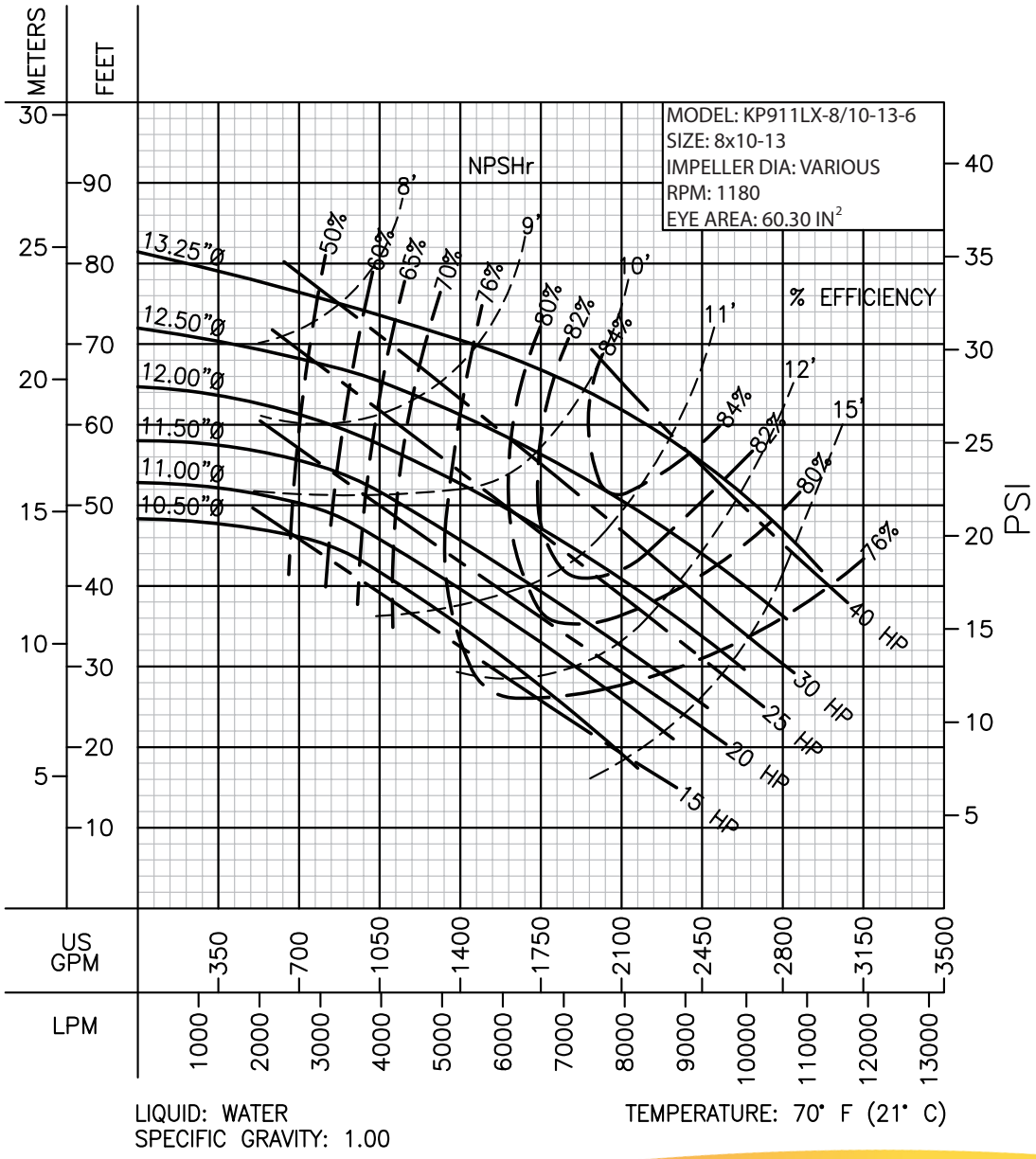
KEEN PUMP®

PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**

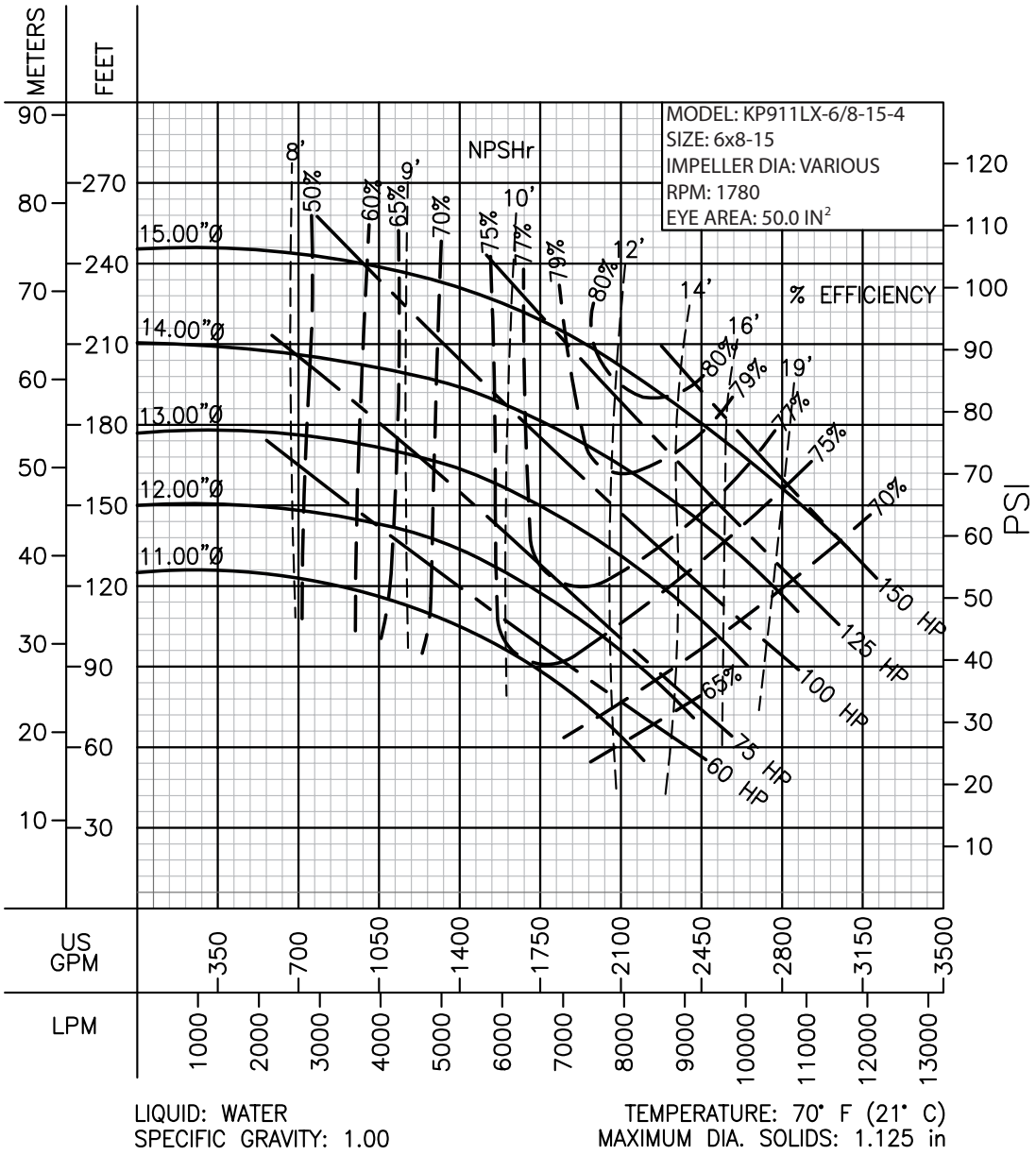


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PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**



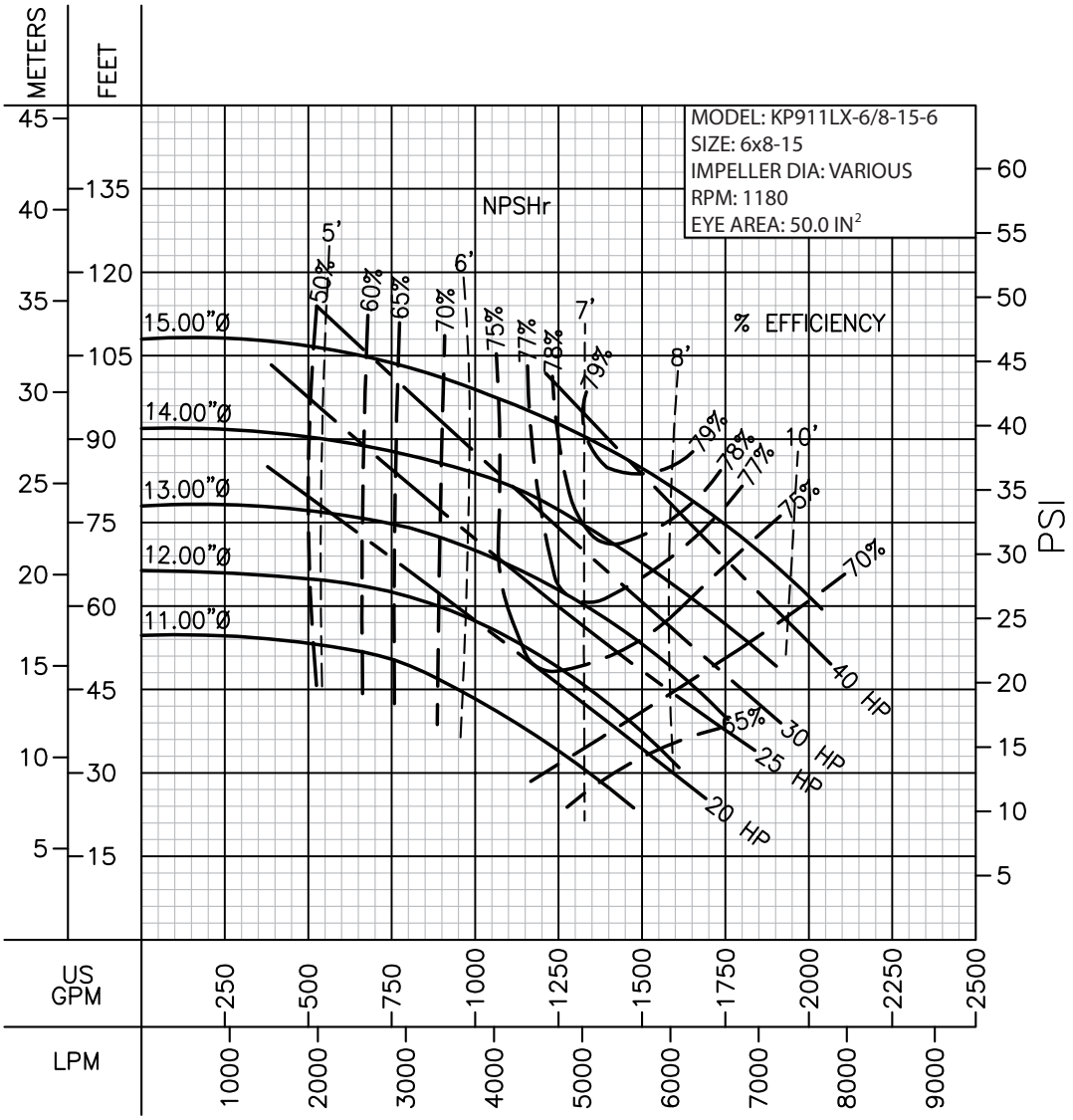
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**



PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911LX**

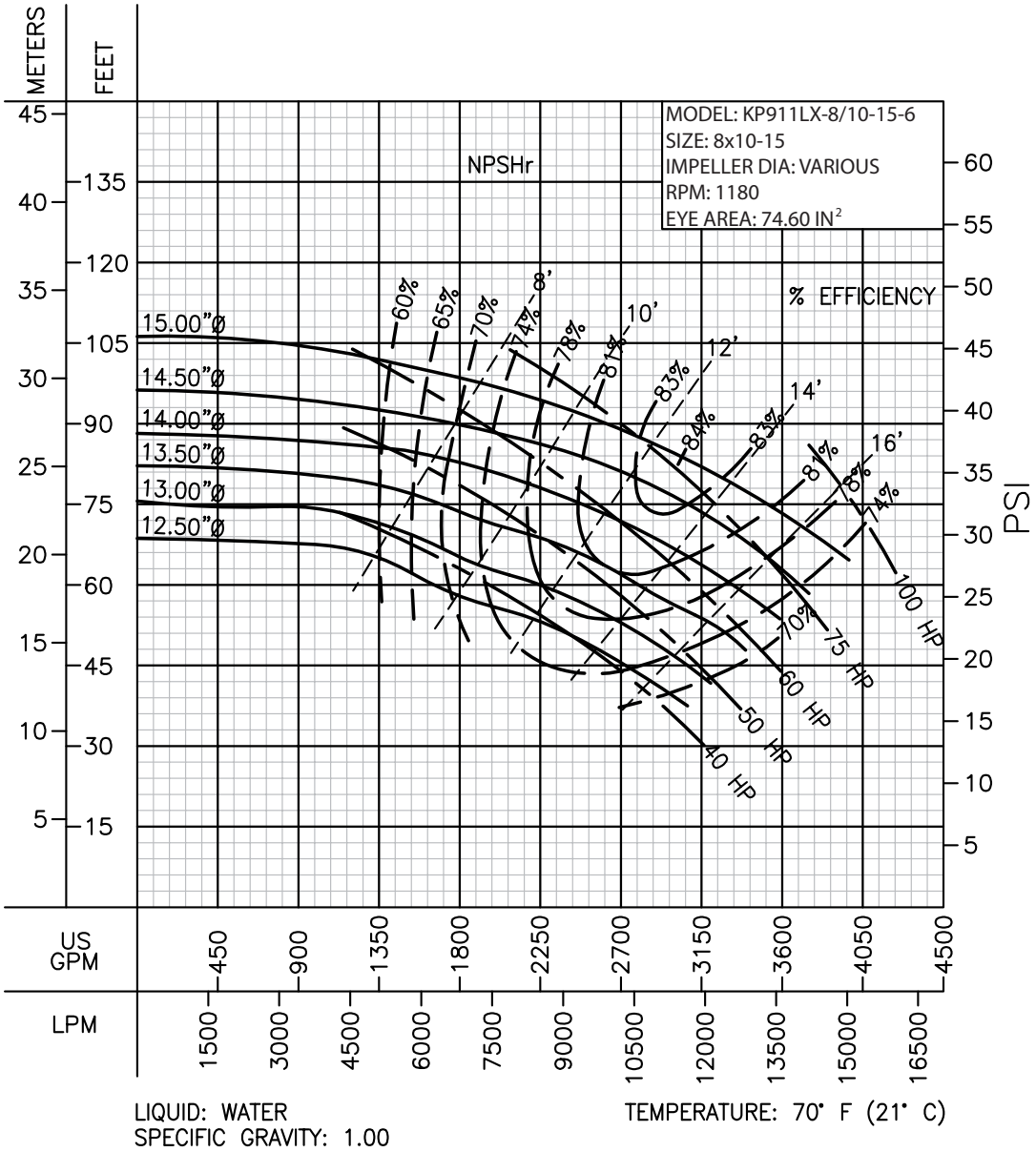
KEEN PUMP®



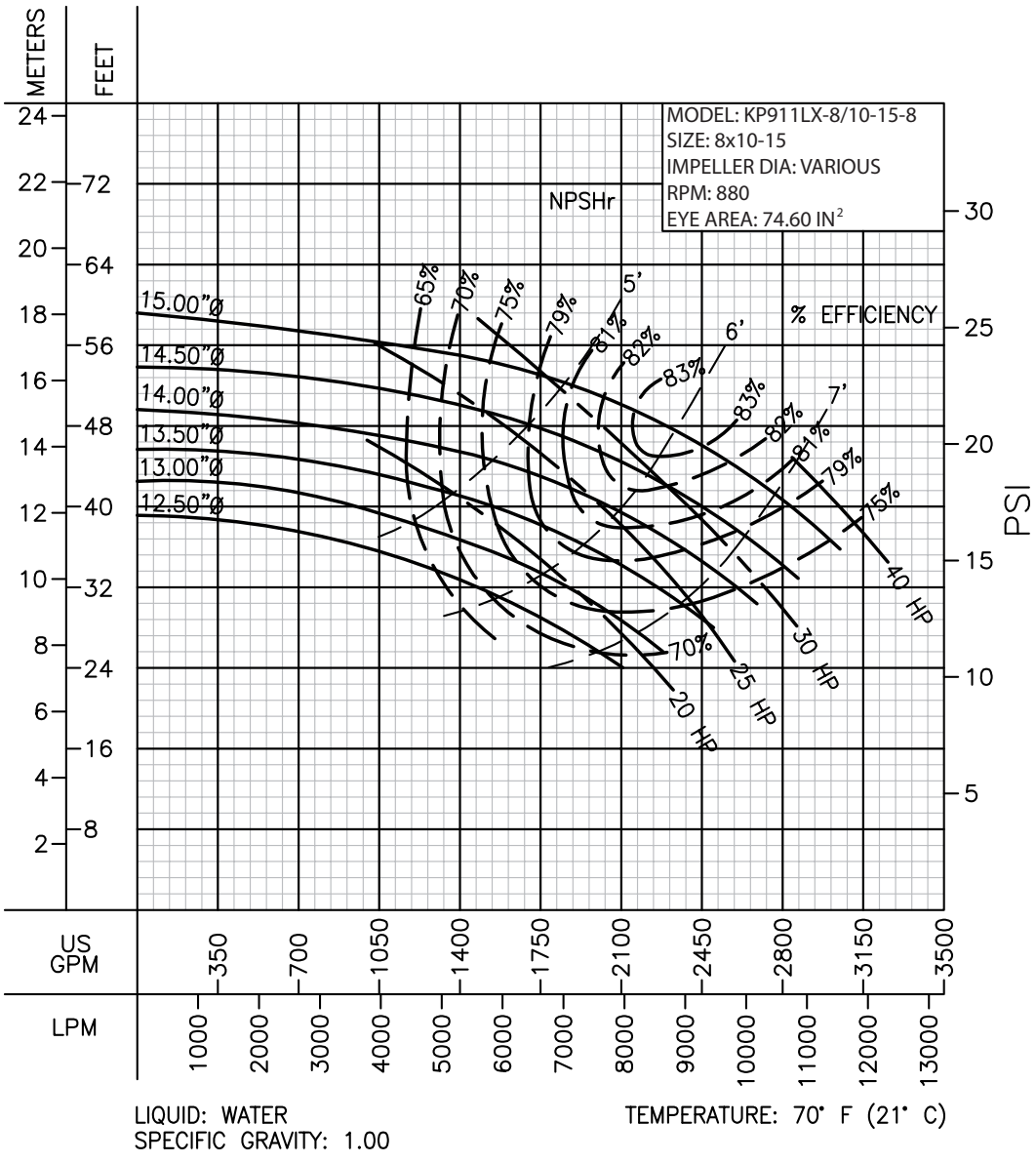
LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAX. SOLID SIZE: 1.125 in

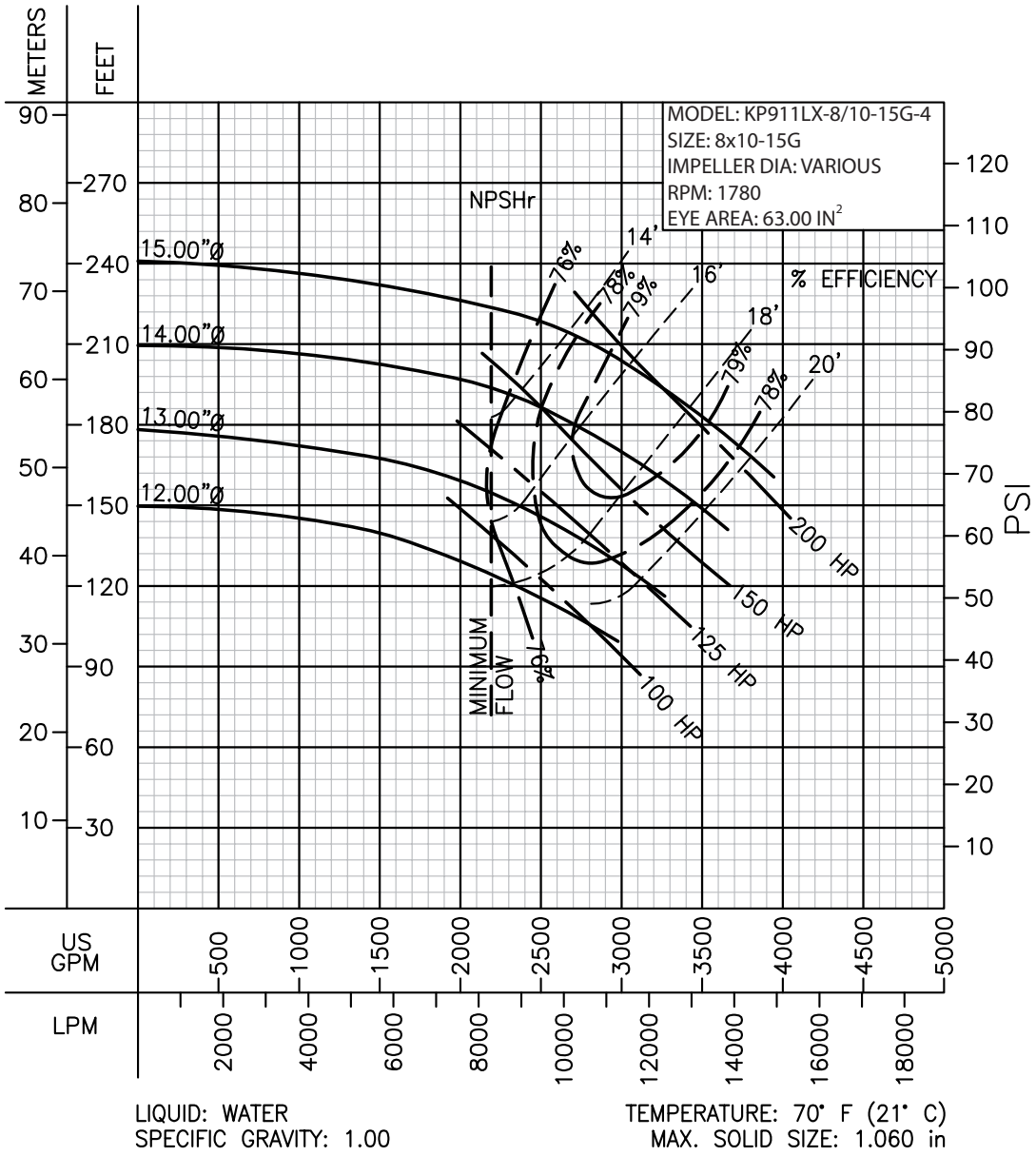
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**



PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**

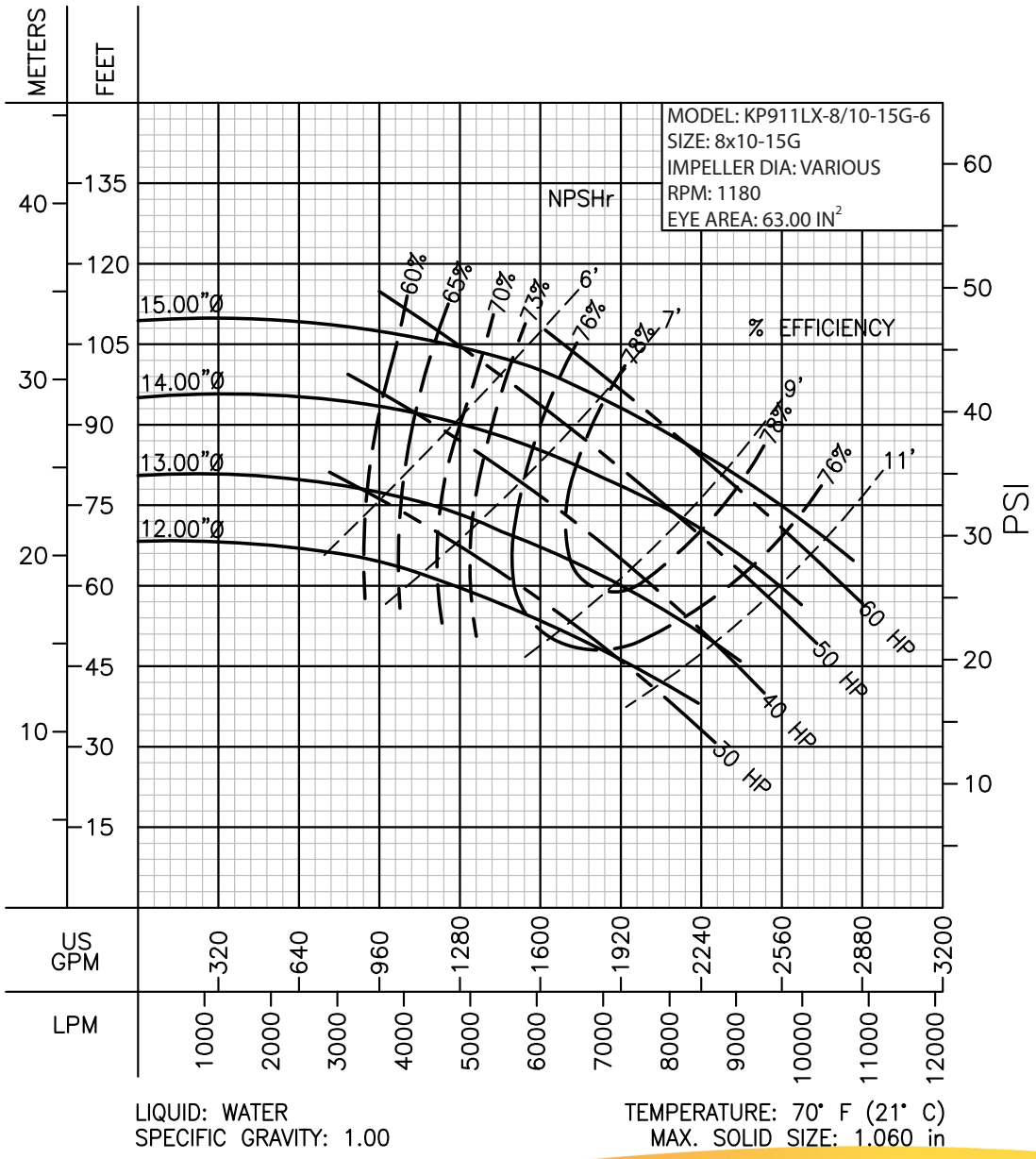


PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**



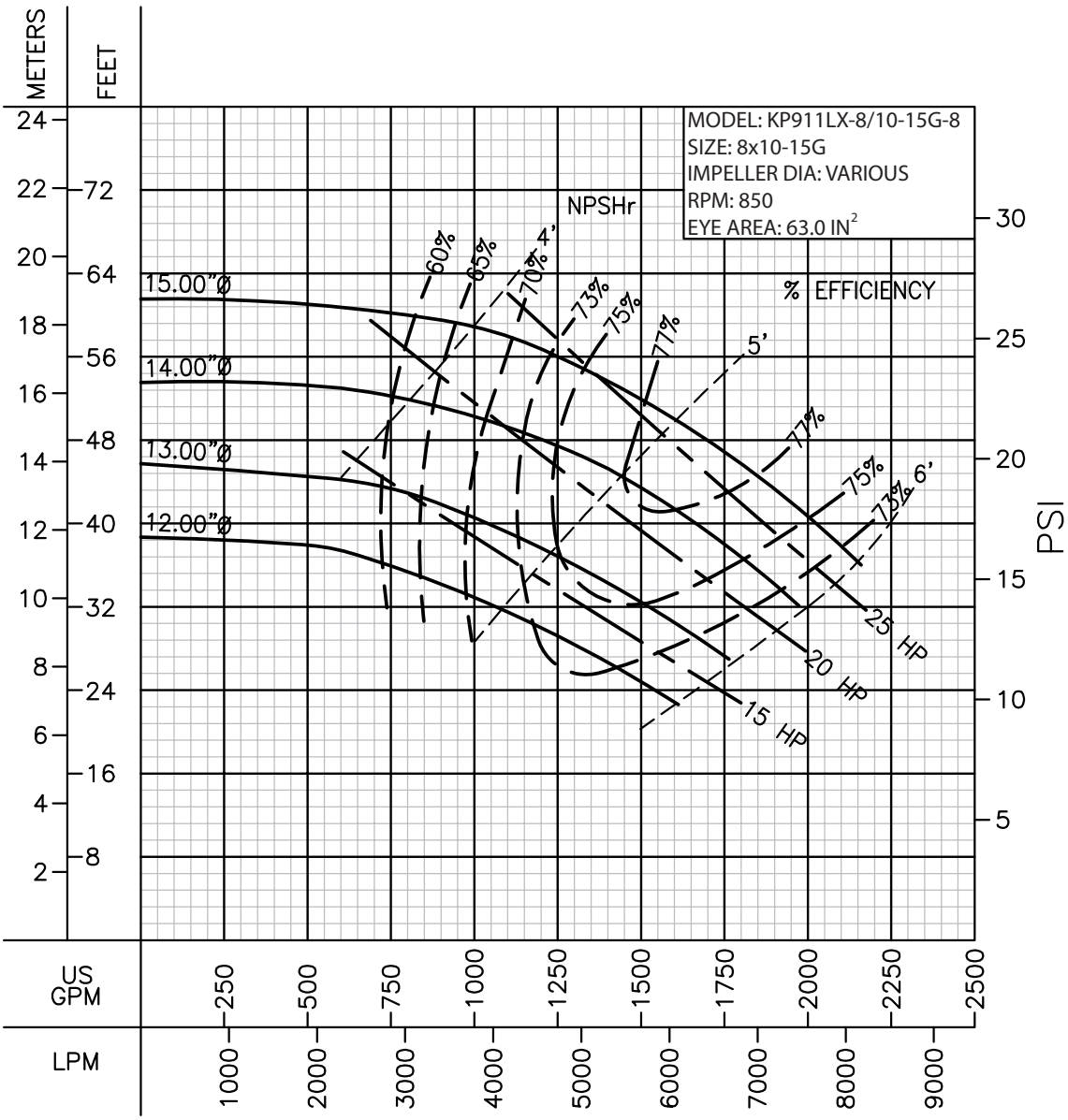
PERFORMANCE CURVES
ANSI Centrifugal
Process Pumps
Series: **KP911LX**

KEEN PUMP®



PERFORMANCE CURVES

ANSI Centrifugal
Process Pumps
Series: **KP911LX**



LIQUID: WATER
SPECIFIC GRAVITY: 1.00

TEMPERATURE: 70° F (21° C)
MAXIMUM DIA. SOLIDS: 1.060 in

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TROUBLESHOOTING CHART

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.

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17



SECTION 17

DRY PIT

KEEN PUMP

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FM APPROVED



K4RNDP

4" Dry-Pit, Solids-Handling Pump

(CLASS 1, DIV. 1, GROUPS C & D HAZARDOUS LOCATION)

CAPABILITIES:

Flows	to 620 GPM
Heads	to 96 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
Inlet Elbow Options	3" x 3" or 4" x 3" ANSI

RECESSED IMPELLER

- Handles Stringy and Fibrous Materials
- Passes Large Solids
- Pumps Heavier Solids Concentrations
- Ideal for Grit and Abrasive Solids
- Pumping via Vortex Action
- Solids Do Not Pass through Impeller
- Virtually Impossible to Clog

STRONG PERFORMANCE

- Ideal for Higher heads, Lower flows
- Operate to Shut-off Head without Damage
- Non-overloading Performance Curve

LONG SERVICE LIFE

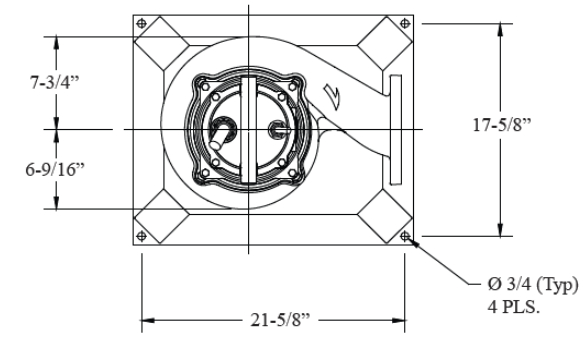
- Dual Silicon Carbide Shaft Seals
- Low Motor Operation Temperatures
- Continuously Lubricated Bearings
- Premium 3-Bearing Construction
- Epoxy Potted Cord Entry

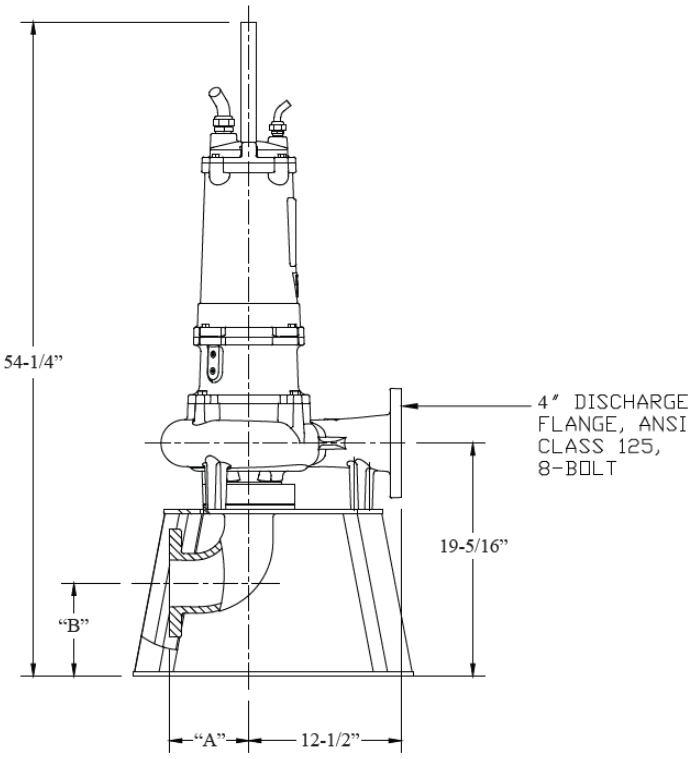
LOW MAINTENANCE

- No Wear Components
- Recessed Impeller out of Passageway
- Grit-Resistant Silicon Carbide Shaft Seals

PUMP SERIES	K4RNDP	4” DRY-PIT SEWAGE PUMPS

DIMENSIONAL DATA





DISCHARGE SIZE	“A”	“B”
3 x 3 ELBOW	5-1/2	8-11/16
4 x 3 ELBOW	6-1/2	7-11/16

Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4RNDP Dimensions



K4RPDP-M4

4” Dry-Pit, Solids-Handling, Recessed Impeller

CAPABILITIES:

Flows	to 800 GPM
Heads	to 93 Feet
HP Range	3 - 15 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	3450 RPM
Solids Handling	3”
Impeller	Recessed, Vortex
Motor Service Factor	1.20
Inlet Elbow Options	4” x 4” ANSI

RECESSED IMPELLER

- Handles Stringy and Fibrous Materials
- Passes Large Solids
- Pumps Heavier Solids Concentrations
- Ideal for Grit and Abrasive Solids
- Pumping via Vortex Action
- Solids Do Not Pass through Impeller
- Virtually Impossible to Clog

STRONG PERFORMANCE

- Ideal for Higher heads, Lower flows
- Operate to Shut-off Head without Damage
- Non-overloading Performance Curve

LONG SERVICE LIFE

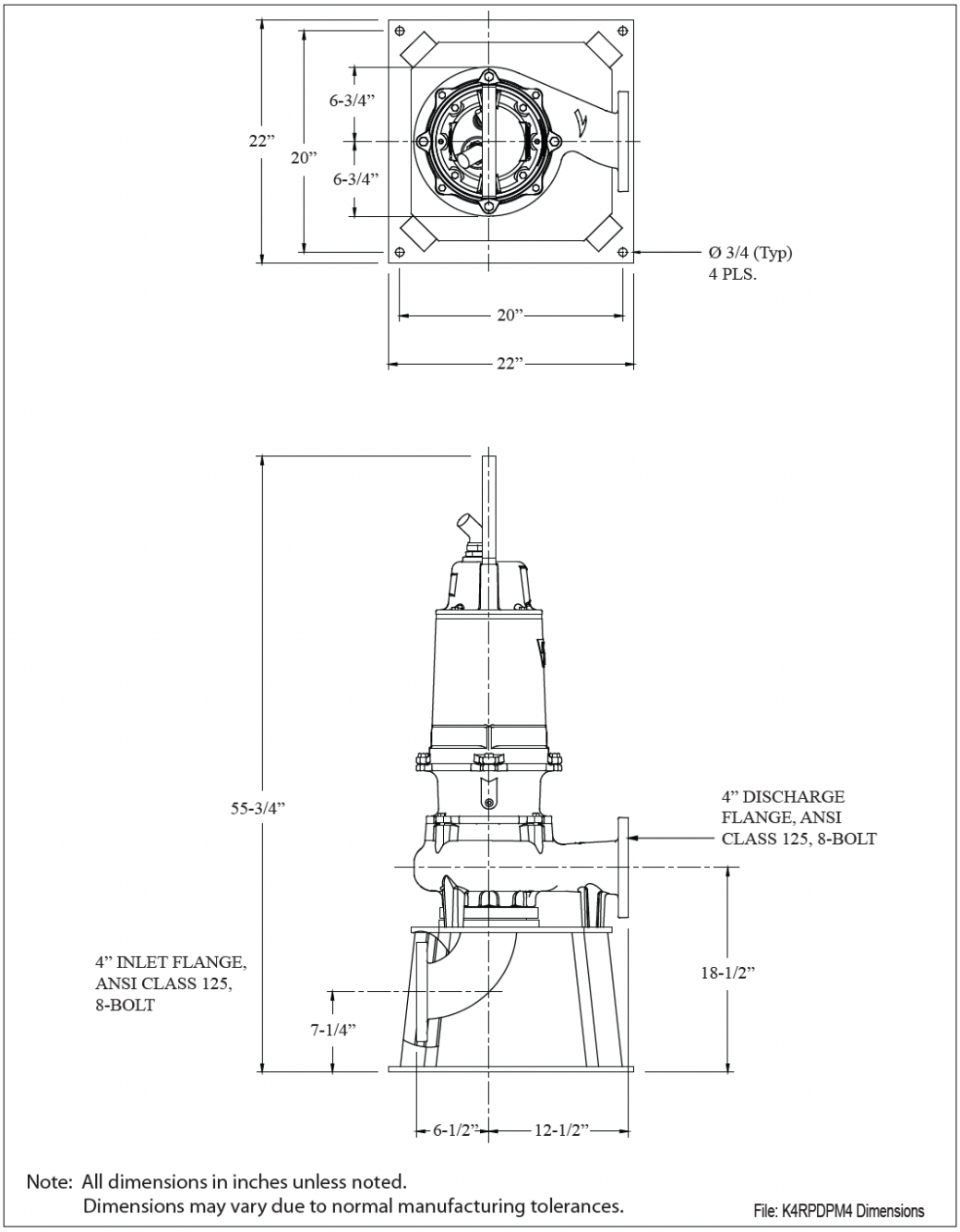
- Dual Silicon Carbide Shaft Seals
- Low Motor Operation Temperatures
- Continuously Lubricated Bearings
- Premium 3-Bearing Construction
- Epoxy Potted Cord Entry

LOW MAINTENANCE

- No Wear Components
- Recessed Impeller out of Passageway
- Grit-Resistant Silicon Carbide Shaft Seals

PUMP SERIES	K4RPDP-M4	4” DRY-PIT SEWAGE PUMPS

DIMENSIONAL DATA



Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4RPDPM4 Dimensions

FM APPROVED

CLASS 1, DIV. 1
GROUPS C & D
CONSTRUCTION



K4VBDP

4” Dry-Pit Solids-Handling Pump

HEAVY DUTY PUMP SERIES

- Handles Aggressive Pumping Applications
- Strong Pumping Capacities to 1850 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

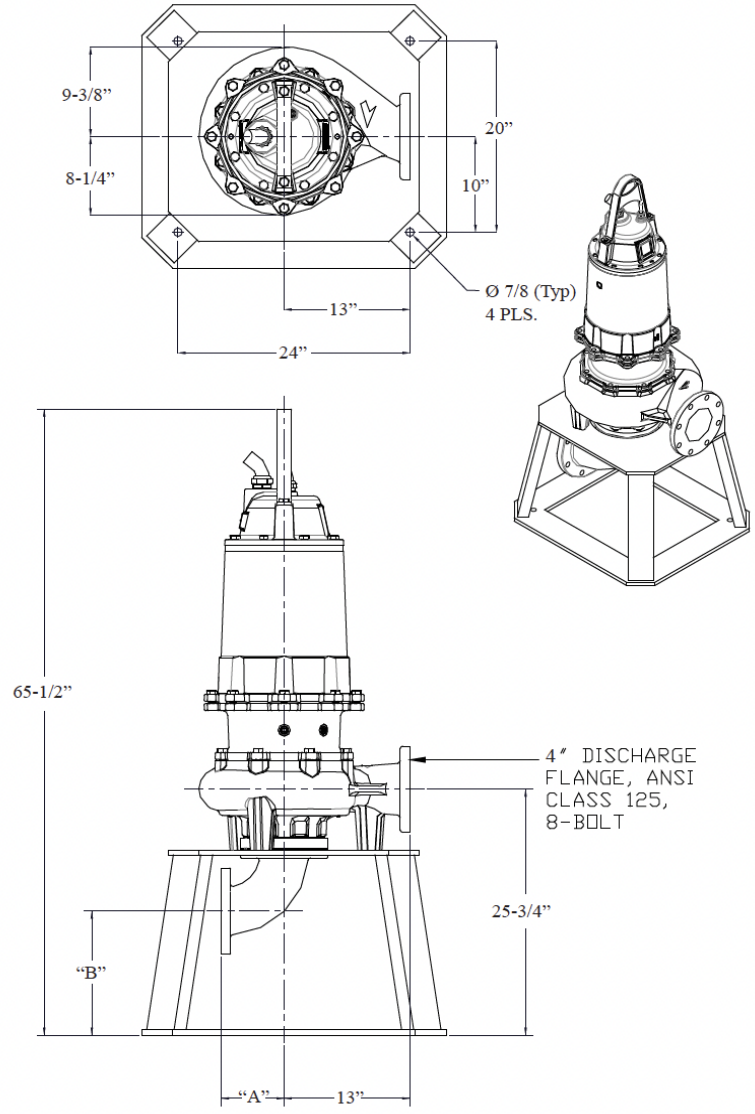
- Easily Replaceable Impeller Wear Ring Restores Original Pump Performance
- Unobstructed Impeller Passageway
- Grit-Resistant Silicon Carbide Shaft Seals
- Large, 3-3/16” diameter Solids-Handling
- High Service Factor Motor Handles Tough Electrical Operating Conditions

CAPABILITIES:

Flows	to 1850 GPM
Heads	to 165 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
Inlet Elbow Options	

PUMP SERIES	K4VBDP	4" DRY-PIT SEWAGE PUMPS

DIMENSIONAL DATA



DISCHARGE SIZE	"A"	"B"
4 x 4 ELBOW	6-1/2	13
6 x 4 ELBOW	8	12-5/8

Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4VBDP Dimensions



K4VKDP

4” Dry-Pit Solids-Handling Pump

HEAVY DUTY PUMP SERIES

- Handles Aggressive Pumping Applications
- Strong Pumping Capacities to 2100 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

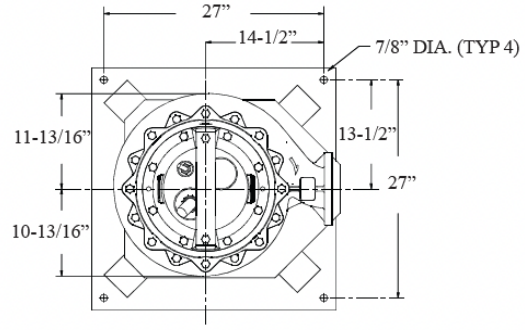
- Easily Replaceable Impeller Wear Ring Restores Original Pump Performance
- Unobstructed Impeller Passageway
- Grit-Resistant Silicon Carbide Shaft Seals
- Large, 3” diameter Solids-Handling
- High Service Factor Motor Handles Tough Electrical Operating Conditions

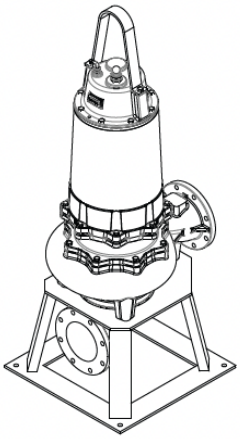
CAPABILITIES:

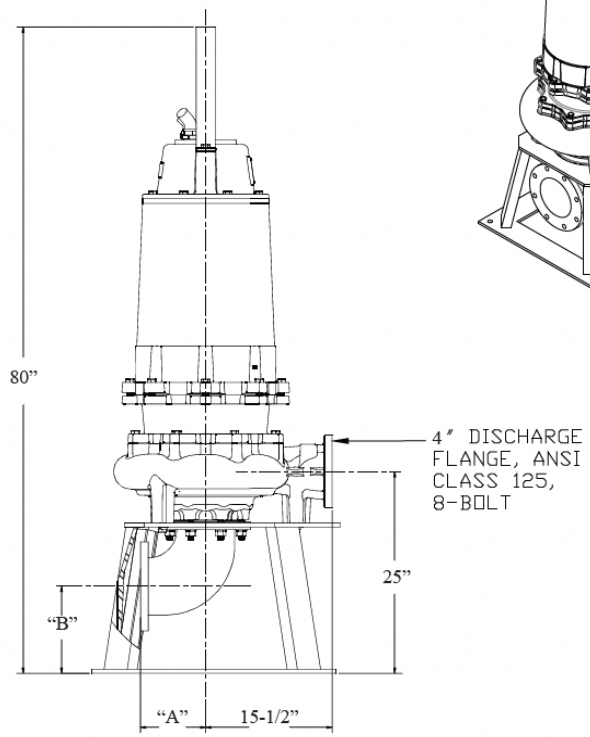
Flows	to 2100 GPM
Heads	to 275 Feet
HP Range	50 - 150 HP
Voltage/Phase Options	460 / 575V, 3 Phase
Discharge Connections	4” ANSI Class 125 Horizontal Flange
Motor Speeds	1750 RPM
Solids Handling	3”
Impeller	Balanced, Enclosed, 2-Vane
Motor Serice Factor	1.20
Inlet Elbow Options	

PUMP SERIES	K4VKDP	4" DRY-PIT SEWAGE PUMPS

DIMENSIONAL DATA







SUCTION ELBOW	'A'	'B'
6 x 6	8"	10-3/4"
6 X 8	9"	9-3/4"

Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K4VKDP Dimensions

K6VBDP

6” Dry-Pit Solids-Handling Pump

CLASS 1, DIV. 1
GROUPS C & D
CONSTRUCTION



CAPABILITIES:

Flows	to 3125 GPM
Heads	to 140 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
Inlet Elbow Options	

HEAVY DUTY PUMP SERIES

- Handles Aggressive Pumping Applications
- Strong Pumping Capacities to 3125 GPM
- Smooth, Quiet Operation
- Full, 6” Discharge Volute Flow Design

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

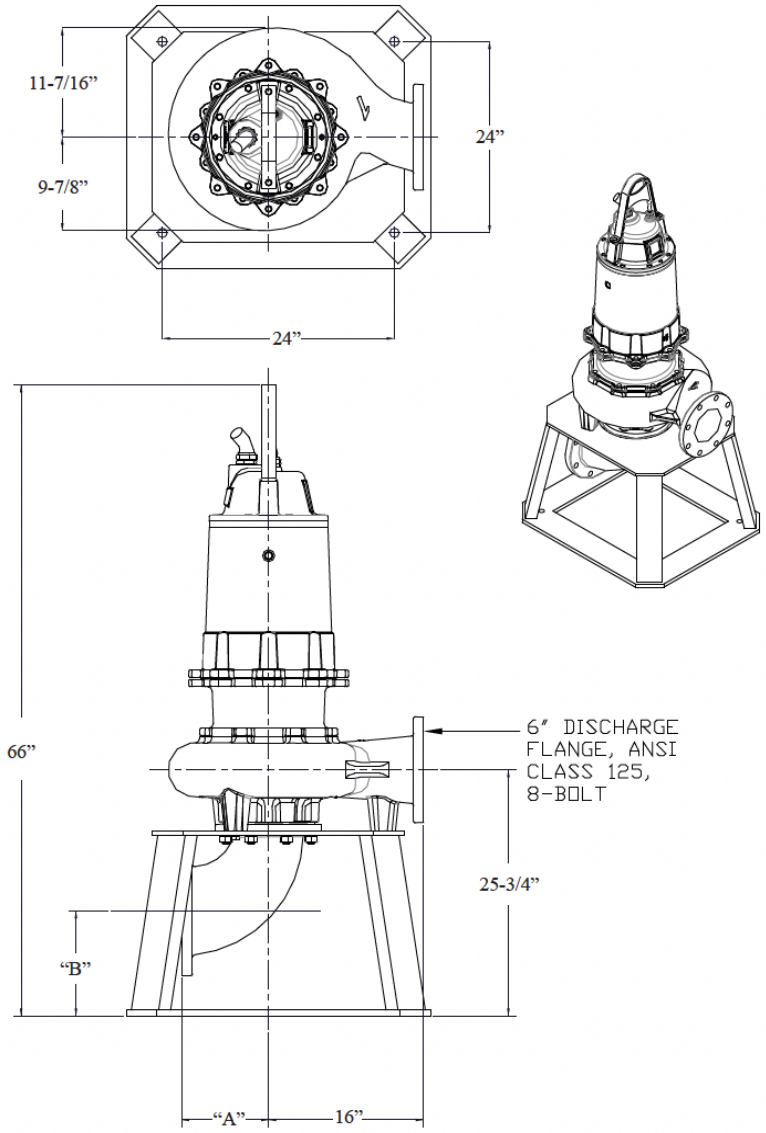
- Dual Silicon Carbide Shaft Seals
- Low Motor Operation Temperatures
- Continuously Lubricated Angular Contact Bearings

LOW MAINTENANCE

- Easily Replaceable Impeller Wear Ring Restores Original Pump Performance
- Unobstructed Impeller Passageway
- Grit-Resistant Silicon Carbide Shaft Seals
- Large, 3-1/2” diameter Solids-Handling
- High Service Factor Motor Handles Tough Electrical Operating Conditions

PUMP SERIES	K6VBDP	6” DRY-PIT SEWAGE PUMPS

DIMENSIONAL DATA



DISCHARGE SIZE	"A"	"B"
6X6 ELBOW	8	12
6X8 ELBOW	9	11

Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K6VBDP Dimensions

K8VKDP

8” Dry-Pit Solids-Handling Pump



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

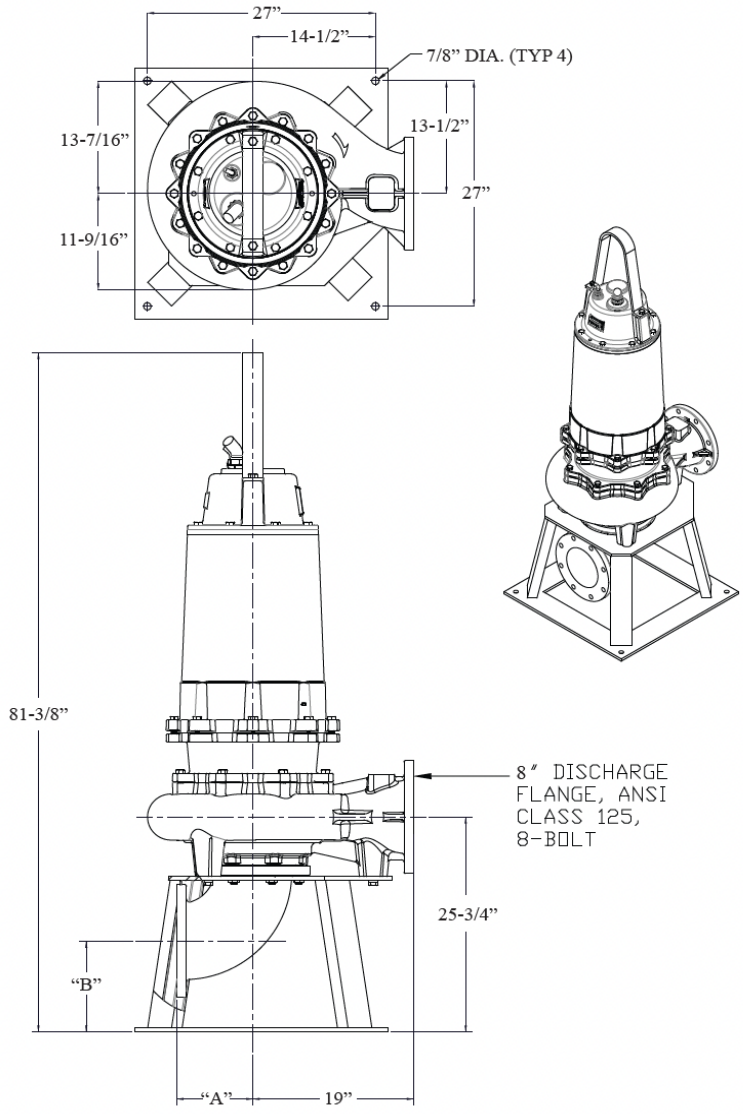
- Easily Replaceable Impeller Wear Ring Restores Original Pump Performance
- Unobstructed Impeller Passageway
- Grit-Resistant Silicon Carbide Shaft Seals
- Large, 4” diameter Solids-Handling
- High Service Factor Motor Handles Tough Electrical Operating Conditions

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
Inlet Elbow Options	8” x 8” or 10” x 8” ANSI Elbow

PUMP SERIES	K8VKDP	8" DRY-PIT SEWAGE PUMPS

DIMENSIONAL DATA



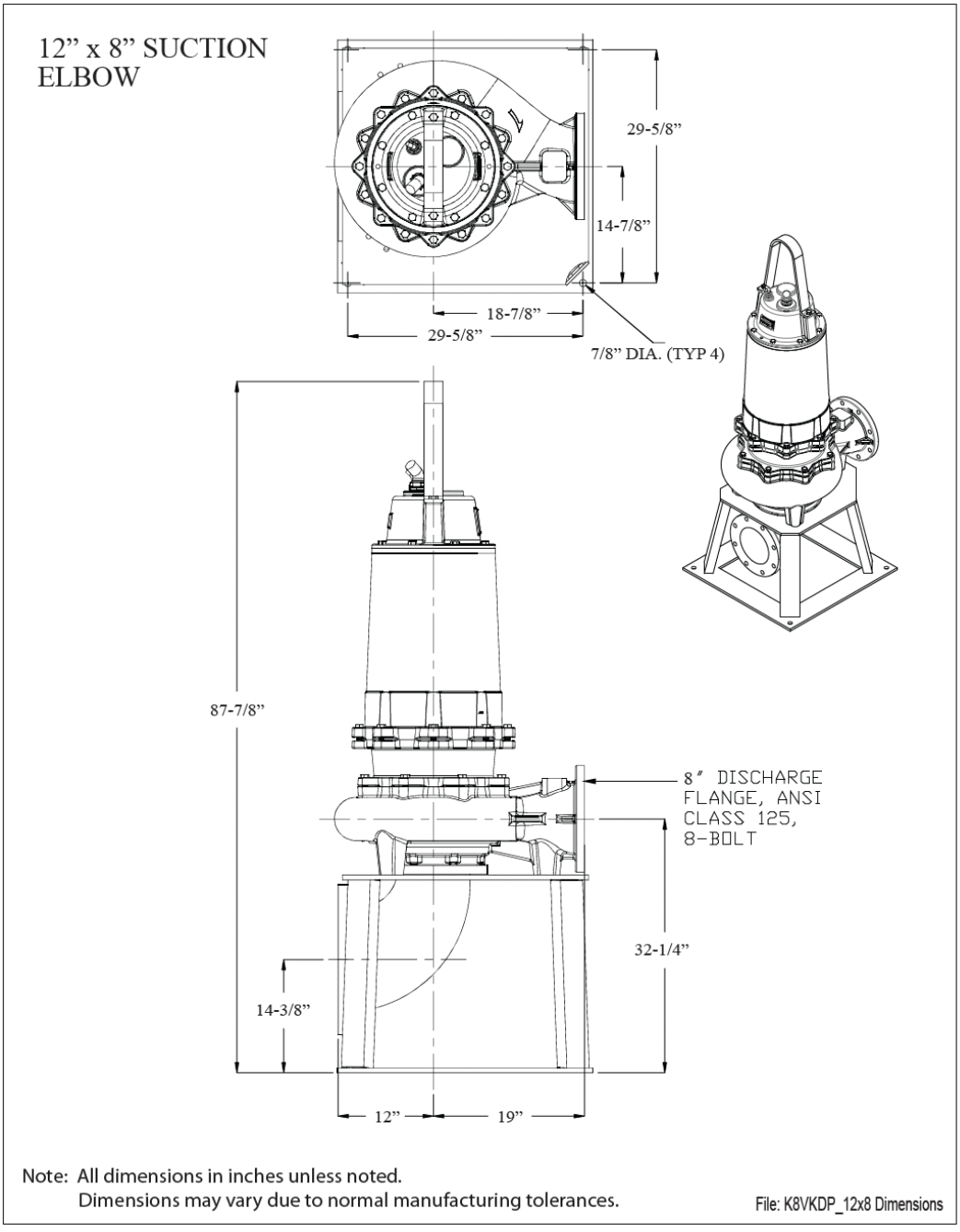
DISCHARGE SIZE	"A"	"B"
8X8 ELBOW	9"	10-7/8"
8X10 ELBOW	11"	8-7/8"

Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

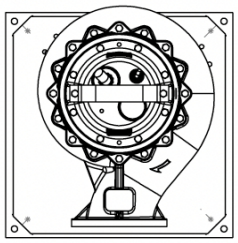
File: K8VKDP Dimensions

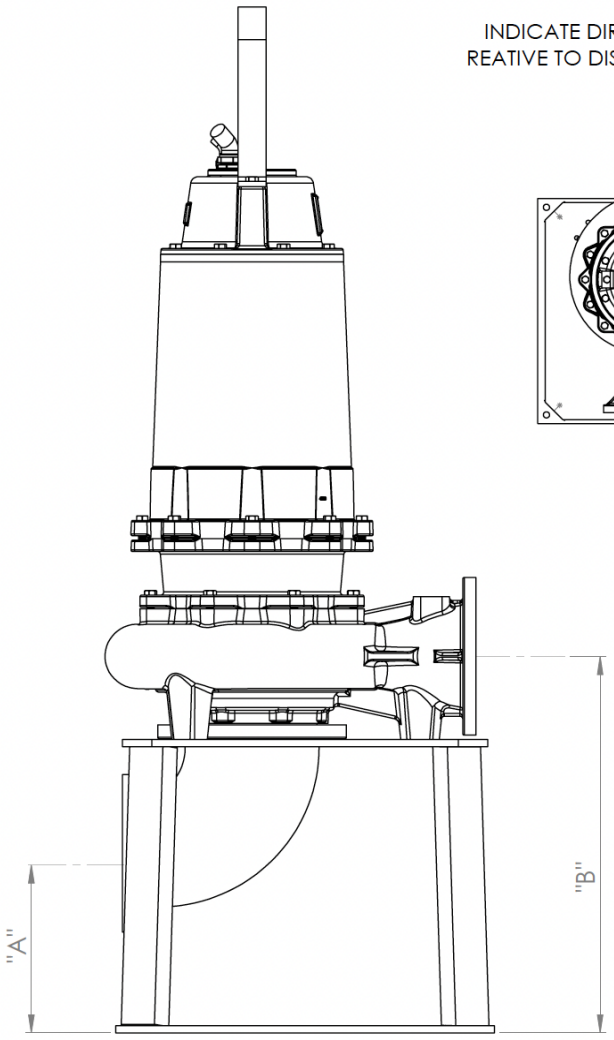
PUMP SERIES	K8VKDP	8" DRY-PIT SEWAGE PUMPS

DIMENSIONAL DATA



INDICATE DIRECTION OF SUCTION
REATIVE TO DISCHARGE WITH ARROW





REQUESTED SUCTION HEIGHT_____

REQUESTED DISCHARGE HEIGHT_____

SIGNATURE APPROVAL_____

DISCHARGE SIZE	MIN "A"	MIN "B"
8X8	7.5	22.5

	NAME	DATE
DRAWN		
CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		
COMMENTS:		

K8VK Dry Pit

SIZE A | DWG. NO. K8VK Dry Pit | REV.
SCALE:1:50 | WEIGHT: | SHEET 1 OF 1



K12VKDP

12” Dry-Pit Solids-Handling Pump

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

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
Inlet Elbow Options	10” x 10” or 12” x 10” ANSI Elbow

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

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 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 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.

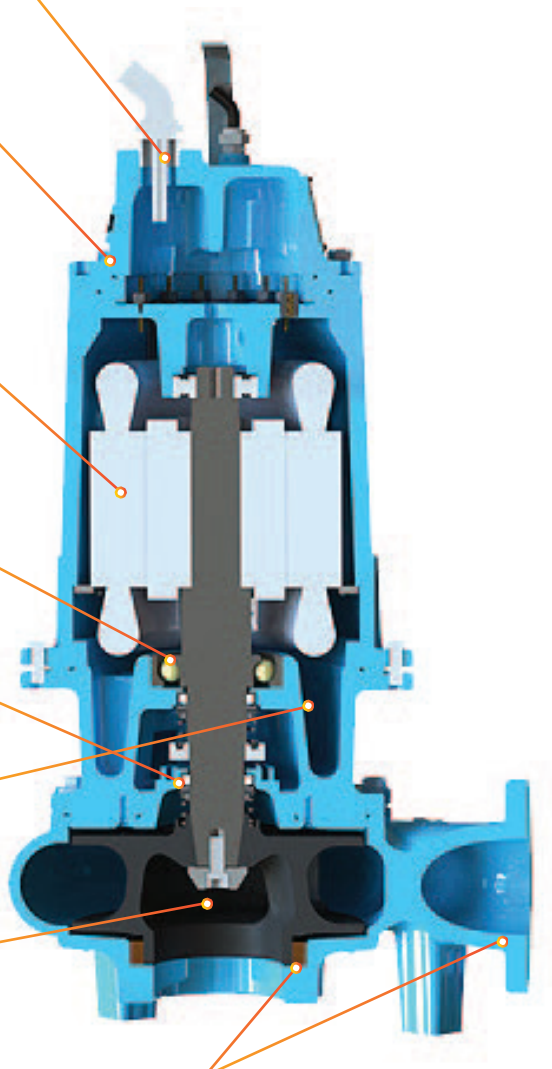
5. SEVERE DUTY DUAL MECHANICAL SEALS
Dual silicon carbide mechanical shaft seals provide twice the moisture and grit protection for the motor. Dual seals are housed in a secondary oil-filled seal chamber. Tougher silicon carbide seals better handle sand, grit and abrasive materials. ** Additional bronze 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.

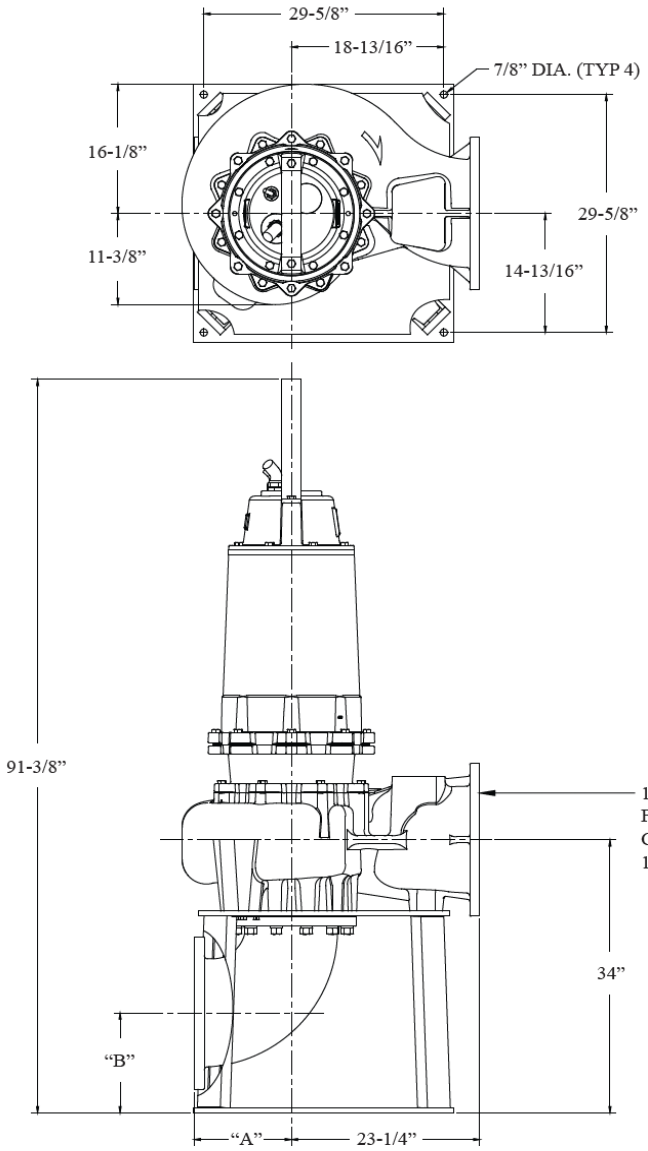
8. STANDARD FLANGE CONNECTION
12" Horizontal, Class 125 ANSI discharge flange. Industry standard, 12-bolt pattern.

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.



PUMP SERIES	K12VKDP	12" DRY-PIT SEWAGE PUMPS

DIMENSIONAL DATA



DISCHARGE SIZE	"A"	"B"
10 X 10 ELBOW	11"	13-7/16"
10 X 12 ELBOW	12"	12-7/16"

Note: All dimensions in inches unless noted.
Dimensions may vary due to normal manufacturing tolerances.

File: K12VKDP Dimensions

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SECTION 18

Accessories

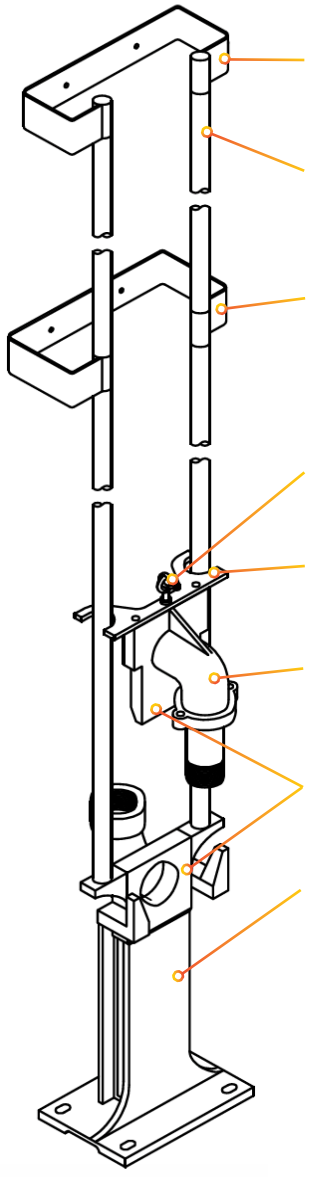
KEEN PUMP

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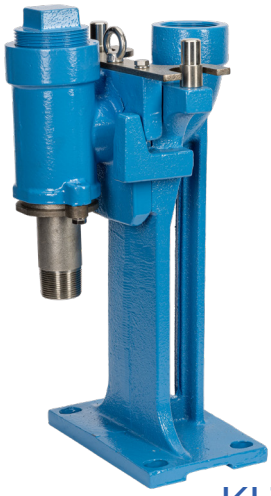
KL1 & KL1CV

KEEN 2hp Grinder Liftout





KL1

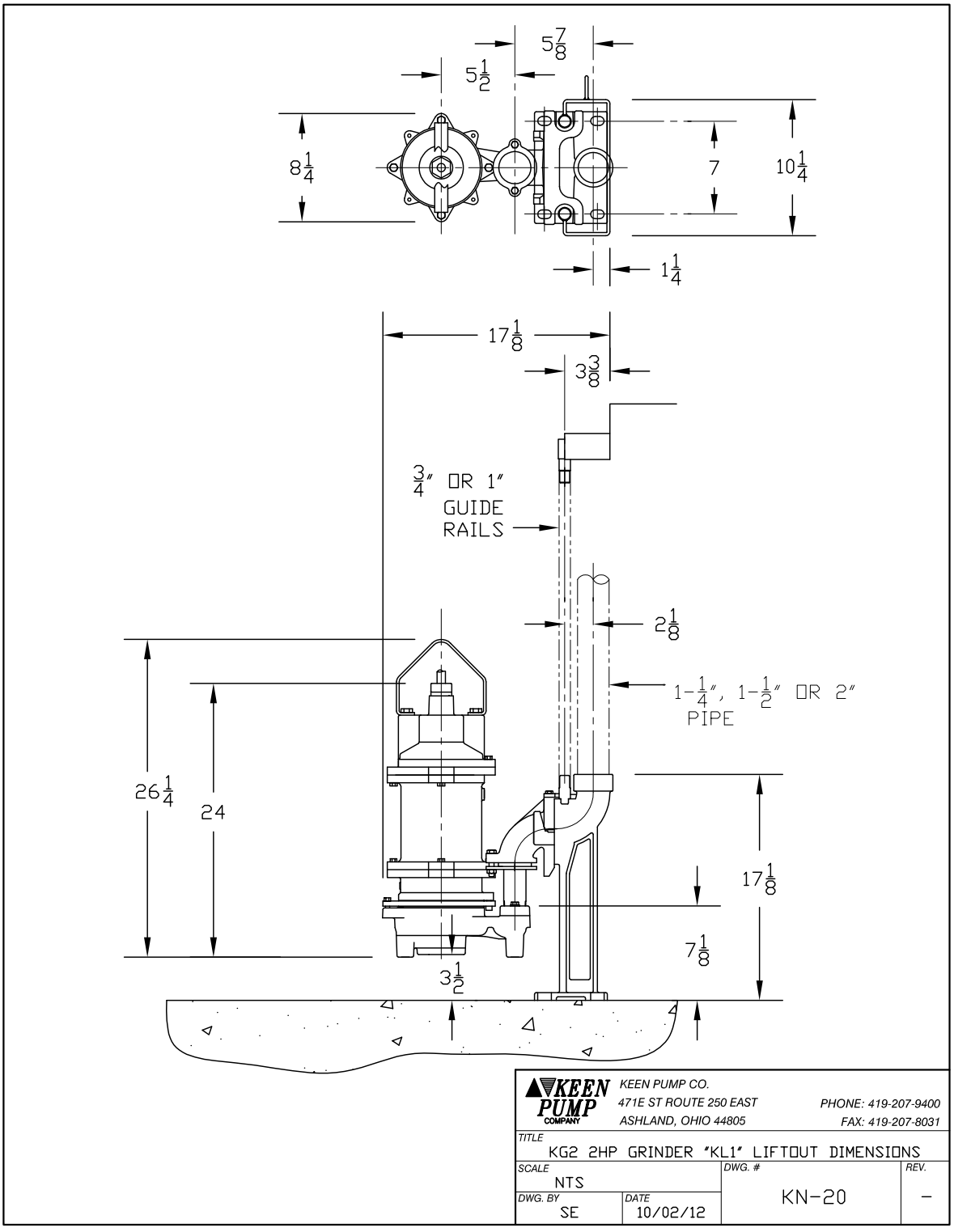


KL1CV

- 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

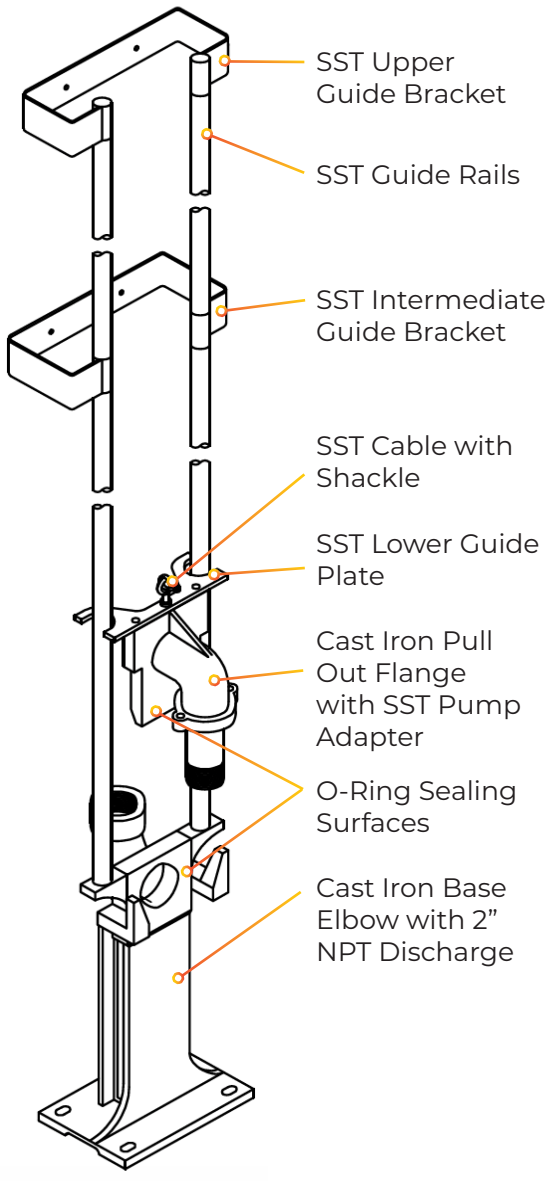
- Base elbow provides quick and easy installation and removal of vertical discharge 1 or 2HP Grinder Pumps
- Quick-connect stainless steel pump adapters
- Taper-base arms support liftout elbow and pump
- Positive O-ring sealing face
- Automatic sealing pulls mating faces together
- Carries 100% pump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

REV 01/2024


5 7/8
5 1/2
8 1/4
7
10 1/4
1 1/4
17 1/8
3 3/8
3/4" OR 1" GUIDE RAILS
2 1/8
1-1/4", 1-1/2" OR 2" PIPE
26 1/4
24
17 1/8
7 1/8
3 1/2
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

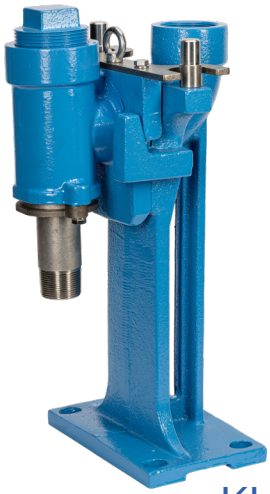
KL2 & KL2CV

KEEN 2hp Grinder Liftout





KL2



KL2CV

- 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

REV 01/2024



START KITS (PANEL)

(Includes Start Capacitor, Run Capacitor, Start Relay)

KIT	PUMP
SK-2A	K(F)(H)2-2401
SK-KPC	KPCG-21
SK-2A-01	K(F)(H)G2-2081
SK-KGS	K(H)GS2-2001 / 2401
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)M2-21/01
SK-K0170	K3/4RN(30/50)M4-21/01
SK-K0170	K3/4VN(30/50)M4-21/01
SK-K0172	K3/4RN75M4-21/01
SK-K0172	K3/4VN75M4-21/01
SK-K0178	K3/4RN75M6-21/01
SK-K0178	K3/4VN75M6-2101

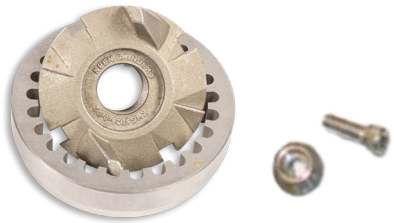
Consult Factory for Additional Available Kits

GRINDER CUTTER KITS

(Includes Grinding Impeller, Stationary Cutter Ring, Impeller Screw and Washer)

KIT	PUMP	KIT	PUMP
2CA	KG2	2CAM	* Myers WG, WGL *
2CAH	KG2-115, KHG2	5CA	KG3, 5, 103
2CAHH	KHHG2, KHHG2H	5CAH	KHG3, 5, 7.5
2CAF	KFG2		

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

Stainless Steel Combo Valve

Check Valve
Anti-Siphon Valve
Pressure Relief Valve

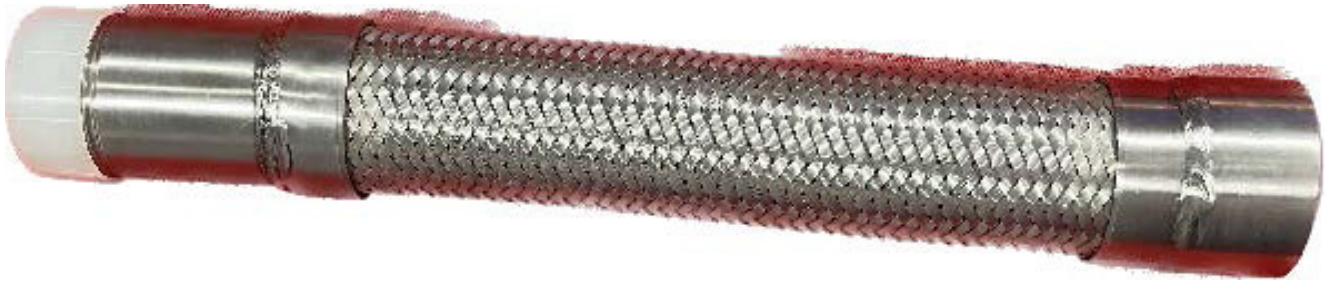


Ultimate Pump Protection

Check Valve, Anti-Siphon Valve, Pressure Relief Valve

COMBO VALVE FEATURES & BENEFITS

- 1-1/4” NPT Connections on Both Ends
- Rugged 304 stainless steel material
- Protects Pumps from Running Dry and
- Over-pressurizing
- Serviceable



Connects the Pump Station to the Underground Piping

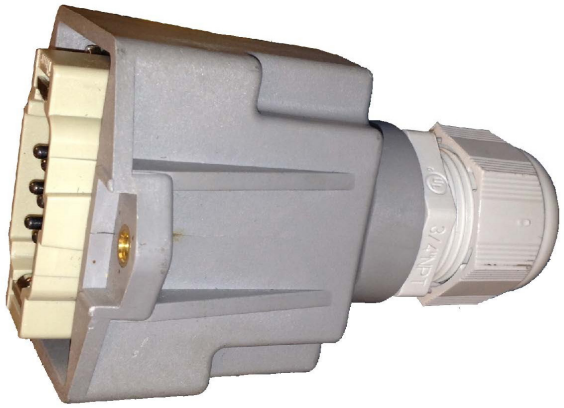
Makes Sure All Piping Remains in Place During The Ground Settling Process After Excavation

MEETS ALL SPECIFICATIONS FOR UNDERGROUND PIPING APPLICATIONS COMPLIES WITH:

- NFPA Codes
- UFC Codes

FLEX PIPE FEATURES & BENEFITS

- Male or Female Connection Options on Both Ends
- Various Lengths Available
- Rugged 304 Stainless Steel Material
- Allows For Easy Connection to Uneven Pipe



FITS DIRECTLY TO E-ONE® SYSTEMS

Provides Quick and Easy Servicing in Pump Station

PLUG ASSEMBLY FOR:

- Pump
- Control Floats

ELECTRICAL DISCONNECT FEATURES & BENEFITS

- Eliminates Pulling Wires Through Conduit

Stainless Steel Slide Face

Disconnect Valve Assembly

SLIDE FACE FEATURES & BENEFITS

- 1-1/4” NPT Discharge and Barbed Connection
- Rugged 304 stainless steel material
- Stainless Steel or Sch.80 PVC Lifting Handle
- Corrosion Resistant
- Integral Shut Off Valve

Quickly Disconnect or Shut Off the Pump Station with this Corrosion Resistant, Rugged Design

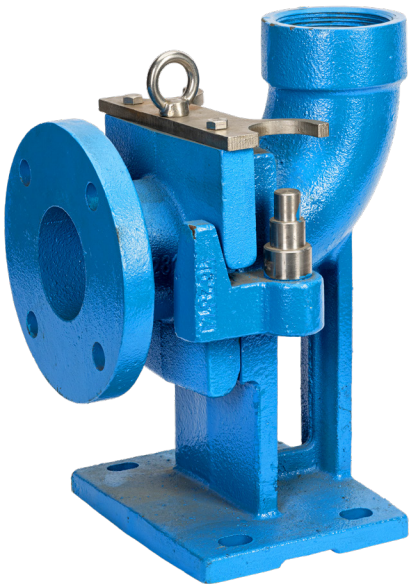


Direct Replacement for E-One® Plastic Slide Face

Quickly Disconnect or Shut Off the Pump Station with this Corrosion Resistant, Rugged Design

SLIDE FACE FEATURES & BENEFITS

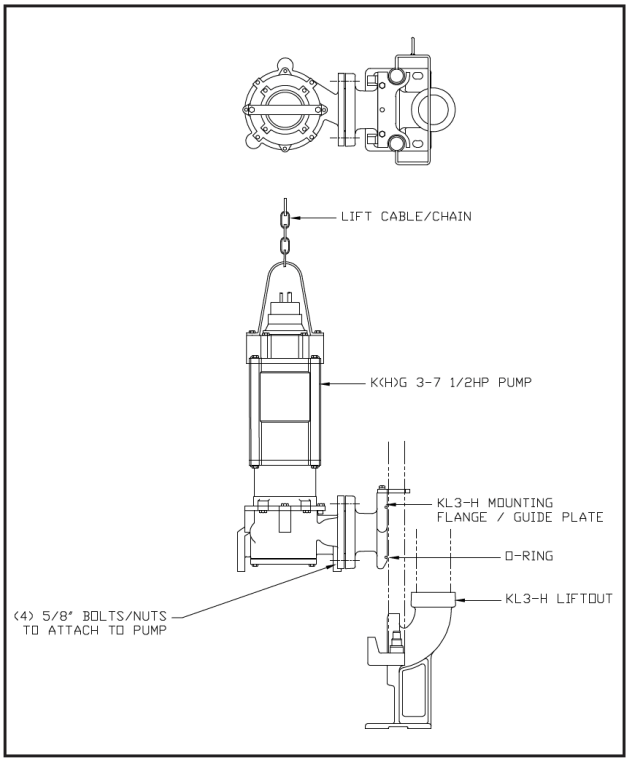
- 1-1/4” NPT Discharge and Barbed Connection
- Rugged 304 stainless steel material
- Stainless Steel or Sch.80 PVC Lifting Handle
- Corrosion Resistant
- Integral Shut Off Valve



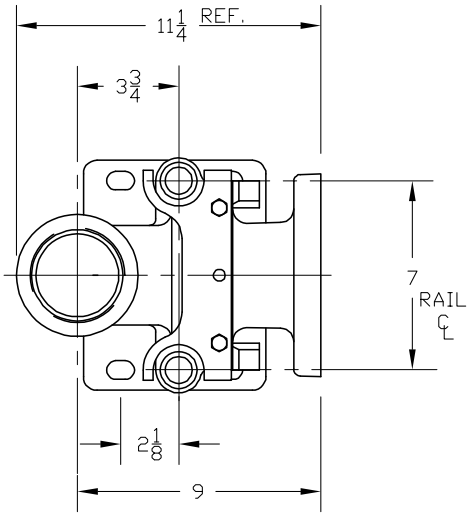
KL3H

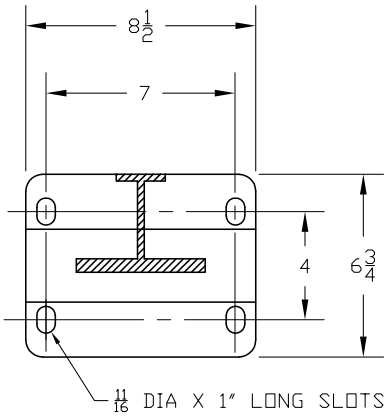
KEEN 3” Horizontal Liftout

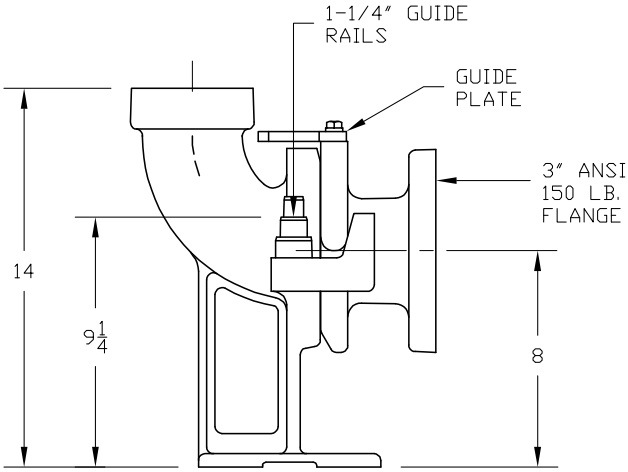
- Horizontal Flange, 3” ANSI, Class 125
- 3” NPT Female Vertical Discharge
- 1” or 1-1/4” Guide Rails
- Stress-Free Rail System
- Durable Cast Iron Base and Lift-Out Flange
- Stainless Steel Guide Plate

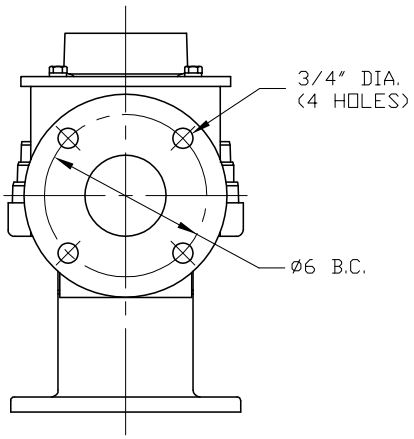


- Base elbow provides quick and easy installation and removal of horizontal discharge 1-10HP Pumps
- Taper-base arms support liftout elbow and pump
- Positive O-ring sealing face
- Automatic sealing pulls mating faces together
- Carries 100% pump load - no stress on rails







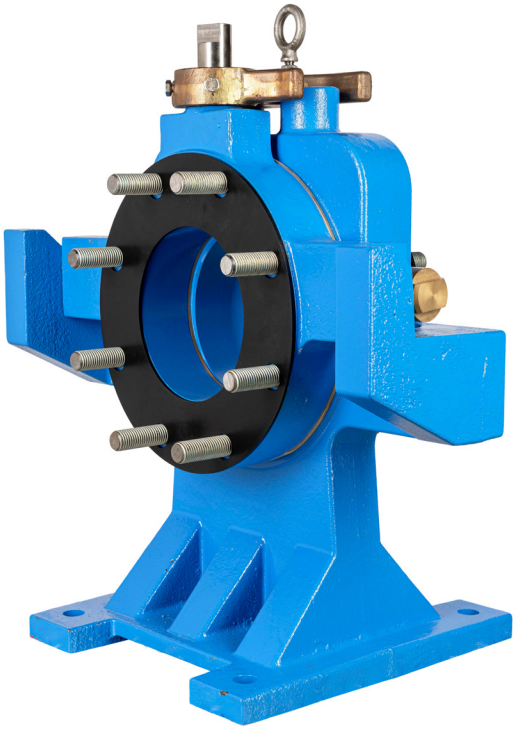


MATERIAL
ELBOW/FLANGE: CLASS 30 IRON
PAINT: POWDER COAT BLUE
GUIDE PLATE: SST
FASTENERS: SST

NOTE: ALL DIMENSIONS FOR REFERENCE ONLY		
A	FY	
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			
KL3H 3" PUMP LIFTOUT BASE/DISCONNECT			
SCALE: NTS		DWG. #: KN-6	REV.: A
DWG. BY: F. YUHASZ	DATE: 9/03/08		

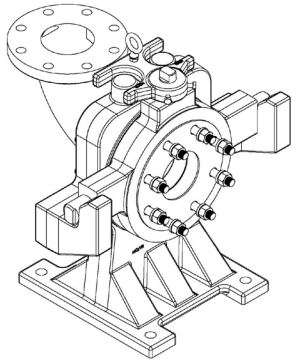


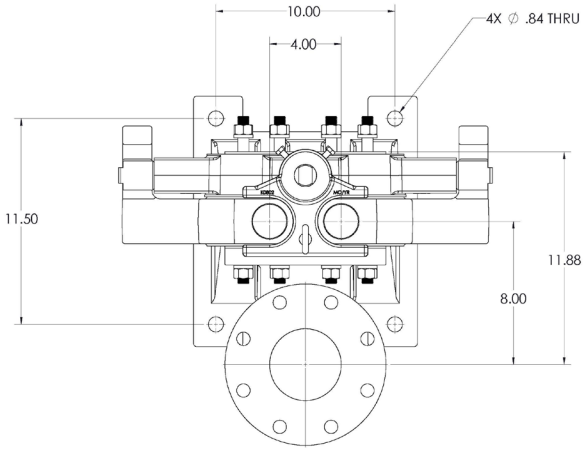
KVLS

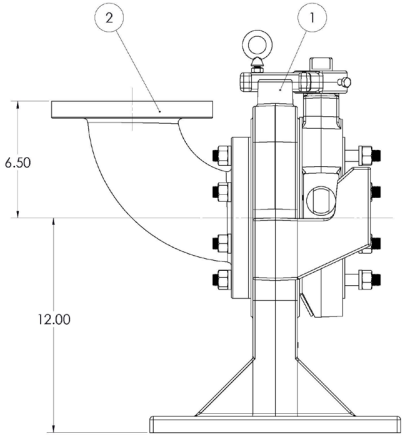
Universal Liftout Assembles

- Fits 4” & 6” Pumps
- Standard and Non-Sparking
- Reliable Sealing for High Pressure Applications
- Heavy Duty Construction Handles Pumps up to 2000 LBS Weight
- Compact Universal Design Allows for a Variety of Different Ansi Flange Elbows to Bolt on for Different Discharge Piping Connections

SHEET 1 OF







ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	K0818-5-01	4 INCH LIFT OUT ASSEMBLY	1
2	K0305-1-01	4 X 4 C.I. ELBOW	1

LIFT OUT ASSEMBLY SUPPLIED WITH UPPER GUID BRACKET
PART NUMBER: UGB-200-ASSY

NOTE: ALL DIMENSIONS ARE FOR REFERENCE ONLY, DO NOT SCALE DRAWING

MATERIAL: CHARTED
WEIGHT: N/A
FINISH: RMS # 125 MICROINCHES UNLESS OTHERWISE SPECIFIED

REV	DESCRIPTION	INITIALS	DATE
A	RELEASED TO PRODUCTION	JML	5/23/17

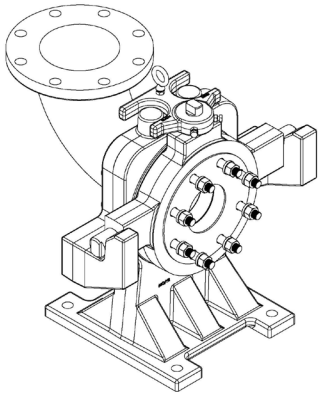
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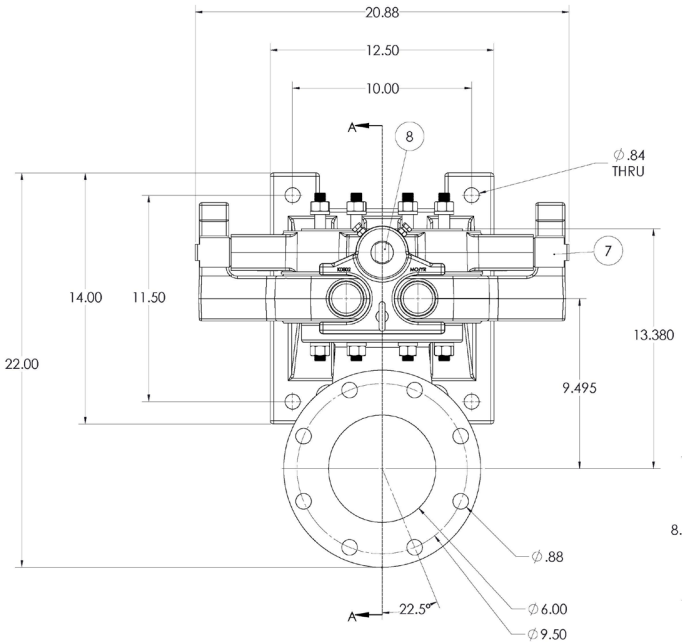
KEEN PUMP COMPANY
KEEN PUMP CO.
471E STATE ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

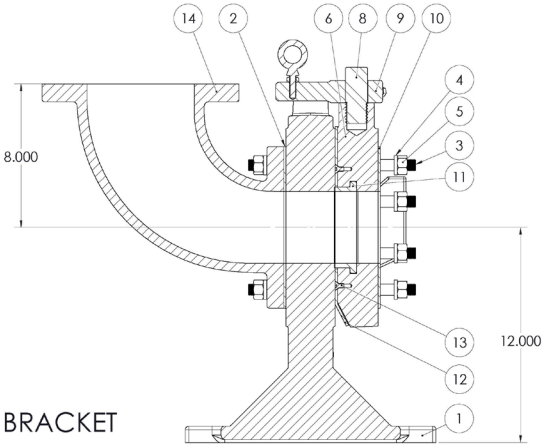
DRAWN	J.LINDER	5/23/17
ENGINEERING APPROVAL		
REVISED		

TOLERANCE UNLESS OTHERWISE NOTED INCHES
DECIMAL: 2 PLACE ± .01; 3 PLACE ± .005; 4 PLACE ± .0025
FRACTIONS: 0-.250 ± .004; .251-.500 ± .008; > .500 ± .016

DESCRIPTION: 4" KVLS ASSEMBLIES
SIZE: D
SCALE 1:3
DRAWING #: KVLS-44
PART #: CHARTED







M NO.	PART NUMBER	DESCRIPTION	QTY.
1	K0796-2-04		1
2	GASK4RED	Default	1
3	K0308-1-00		16
4	LWASH5_8SS	LWASH5/8SS	16
5	91845A325	5/8 NUT	16
6	K0797-2-01		1
7	K0799-1-01		2
8	K0800-1-01		1
9	K0802-2-01		1
10	GASK4RED		1
11	K0862-1		1
12	K0804-1-01		1
13	K0317-1-03	1/4-20 x 1/2 inch SST, countersunk, Hex drive	8
14	K0377-1-04	4" X 6" CAST ELBOW	1
15	EYEB3_8X1.25SS	3/8X1.25 EYE BOLT SST	1
16	nut 3_8	3/8" Hex Nut	1
17	CS5_16X1.25SS	SCREW CAP, 5/16 X 1.25	2
18	nut 5_16		2

LIFT OUT ASSEMBLY SUPPLIED WITH UPPER GUID BRACKET
PART NUMBER: UGB-200-ASSY

SECTION A-A

SHEET 1 OF

NOTE: ALL DIMENSIONS ARE FOR REFERENCE ONLY, DO NOT SCALE DRAWING

REV	DESCRIPTION	INITIALS	DATE
A	RELEASED TO PRODUCTION	JML	5/23/17

MATERIAL: CHARTED
WEIGHT: N/A
FINISH: RMS = 125 MICROINCHES UNLESS OTHERWISE SPECIFIED

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

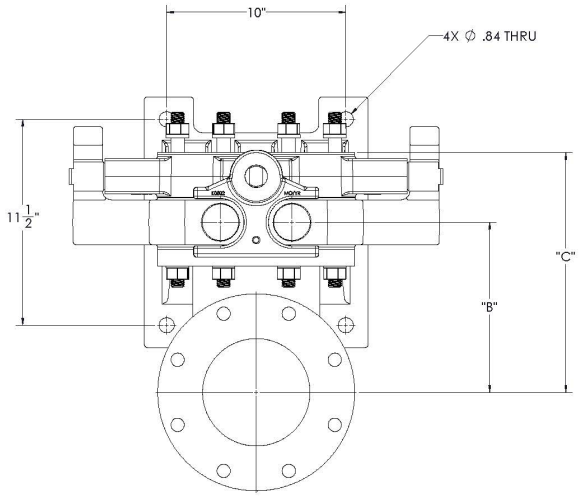
DRAWN	J.LINDER	5/23/17
ENGINEERING APPROVAL		
REVISED		

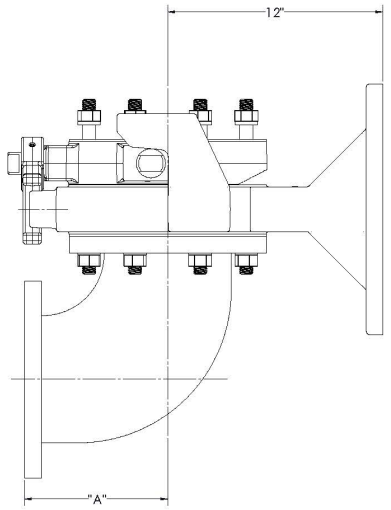
TOLERANCE UNLESS OTHERWISE NOTED INCHES
DECIMALS: 2 PLACE ± .01; 3 PLACE ± .005; 4 PLACE ± .0025
ANGLES: 0-230 ± .5DEG; 230-300 ± .25DEG; > 300 ± .0125DEG

DESCRIPTION: KVLS LIFT OUT 4 INCH TO 6 INCH ELBOW
SIZE: D
DRAWING #: KVLS-46
PART #: KVLS-46
SCALE 1:3

KEEN PUMP







CATALOG NUMBER	DESCRIPTION	ITEM 1 BASE ASS'Y	ITEM 2 LOF	ITEM 3 ELBOW	"A"	"B"	"C"
KABS66	6" KEEN ADAPTIVE BASIN SYSTEM W/ 6X6 ANSI ELBOW	K0796-5-06	K0798-5-01	K0305-1-02	8"	9-1/2"	13-3/8"
KABSX66	6" KEEN ADAPTIVE BASIN SYSTEM - NON-SPARKING W/ 6X6 ANSI ELBOW	K0796-5-06	K0798-5-10	K0305-1-02	8"	9-1/2"	13-3/8"
KABS66L	6" KEEN ADAPTIVE BASIN SYSTEM W/ 6X6 ANSI LONG RADIUS ELBOW	K0796-5-06	K0798-5-01	K0820-1-02	11-1/2"	13"	16-7/8"
KABSX66L	6" KEEN ADAPTIVE BASIN SYSTEM NON-SPARKING W/ 6X6 ANSI LONG RADIUS ELBOW	K0796-5-06	K0798-5-10	K0820-1-02	11-1/2"	13"	16-7/8"
KABS68	6" KEEN ADAPTIVE BASIN SYSTEM W/ 6X6 ANSI ELBOW	K0796-5-06	K0798-5-01	K0377-1-01	9"	10-1/2"	14-3/8"
KABSX68	6" KEEN ADAPTIVE BASIN SYSTEM - NON-SPARKING W/ 6X8 ANSI ELBOW	K0796-5-06	K0798-5-10	K0377-1-01	9'	10-1/2"	14-3/8"
KABS68L	6" KEEN ADAPTIVE BASIN SYSTEM W/ 6X8 ANSI LONG RADIUS ELBOW	K0796-5-06	K0798-5-01	K0821-1-02	14"	15-1/2"	19-3/8"
KABSX68L	6" KEEN ADAPTIVE BASIN SYSTEM NON-SPARKING W/ 6X8 ANSI LONG RADIUS ELBOW	K0796-5-06	K0798-5-10	K0821-1-02	14"	15-1/2"	19-3/8"

SHEET 1 OF

KEEN PUMP COMPANY
KEEN PUMP CO.
471E STATE ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8037

NOTE: ALL DIMENSIONS ARE FOR REFERENCE ONLY, DO NOT SCALE DRAWING

REV	DESCRIPTION	INITIALS	DATE
A	RELEASED TO PRODUCTION	JML	5/23/17

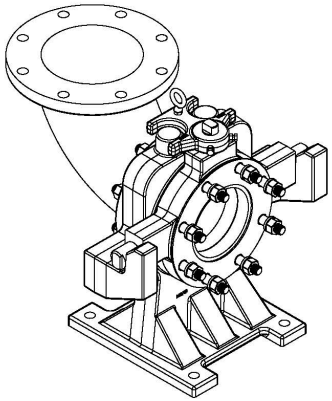
MATERIAL: CHARTED
WEIGHT: N/A
FINISH: RMS = 125 MICROINCHES UNLESS OTHERWISE SPECIFIED

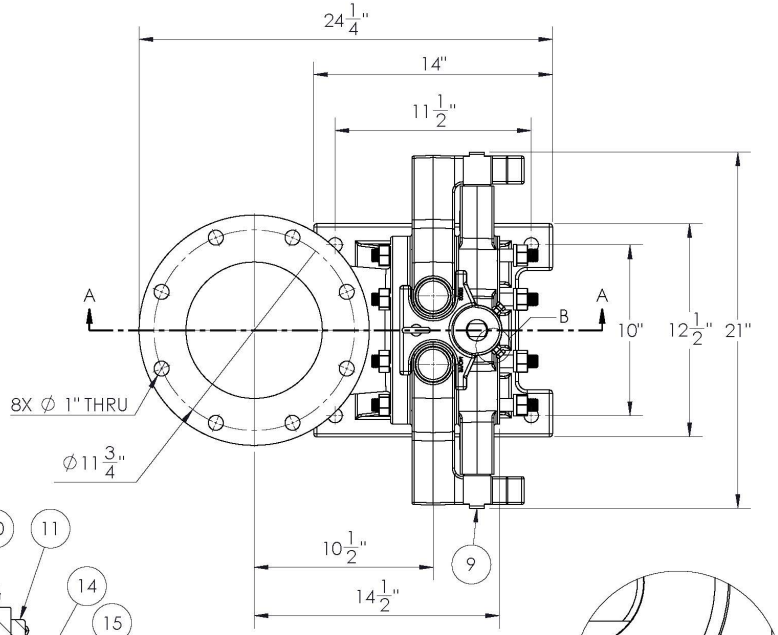
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		DATE
DRAWN	J.LINDER	5/23/17
ENGINEERING APPROVAL		
REVISED		

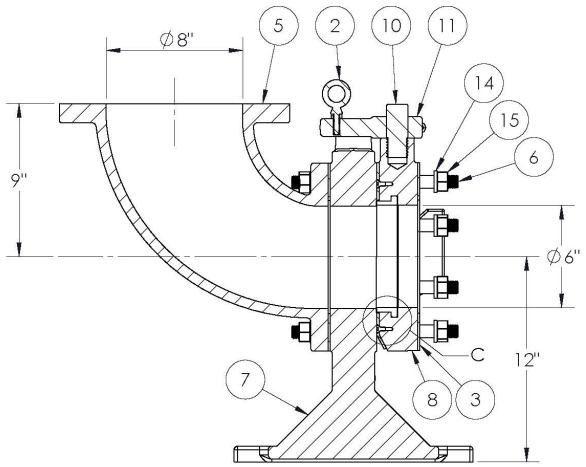
TOLERANCE UNLESS OTHERWISE NOTED INCHES
DECIMAL: 2 PLACE ±.01 | 3 PLACE ±.005 | 4 PLACE ±.0005
BREAKS: 0-.250 ∅ ±.010/.004 | .250-.500 ∅ ±.015/.005 | >.500 ∅ ±.020/.010

DESCRIPTION: 6" KABS ASSEMBLIES
SIZE: D
SCALE 1:3
DRAWING #: KABS-66
PART #: CHARTED

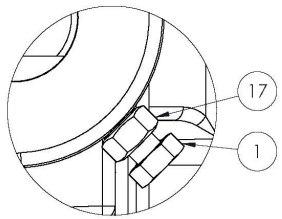




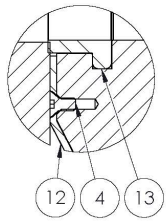
ITEM NO.	PART NUMBER	DESCRIPTION
1	CS5/16X1-1/4SS	SCREW,CAP
2	EYEB3/8X1 1/4SS	EYE BOLT SST
3	GASK6RED	6" RED GASKET
4	K0317-1-03	SCREW, COUNTERSINK
5	K0377-1-01	6" X 8" CLASS 125# FLANGED E
6	K0378-1-01	SST STUD 3/4 X 3 1/2 LG
7	K0796-2-06	6" LIFT OUT BASE
8	K0797-2-02	6" SEALING FLANGE
9	K0799-1-01	LOCATING PIN SST
10	K0800-1-01	GUID BRACKET PIN SST
11	K0802-2-01	RAIL GUIDE CAST IRON
12	K0805-1-01	6" SEALING FACE PLATE SS
13	K0862-2	6" GROMMET INSERT
14	LWASH3/4SS	3/4" LOCK WASHER SST
15	NUT3/4SS	3/4" HEX NUT
16	NUT3/8SS	3/8" Hex Nut
17	NUT5/16SS	5/16" HEX NUT



SECTION A-A



DETAIL B
SCALE 1 : 1



DETAIL C
SCALE 1 : 2

KEEN PUMP COMPANY
KEEN PUMP CO.
471E STATE ROUTE 250 EAST
ASHLAND, OHIO 44805
PHONE:
FAX:

NOTE: ALL DIMENSIONS ARE FOR REFERENCE ONLY. DO NOT SCALE DRAWING

MATERIAL: Charted
WEIGHT: 345.03 lbs
FINISH: RMS = 125 MICROINCHES UNLESS OTHERWISE SPECIFIED

DRAWN: C HAYES 7/28/2025
ENGINEERING APPROVAL:
REVISED:

TOLERANCE UNLESS OTHERWISE NOTED INCHES
DECIMAL: 2 PLACE ± .01 / 3 PLACE ± .005 / 4 PLACE ± .0005
HOLE: R .249 Ø +.004/-.004; .250-.260 Ø +.010/-.004; > .261 Ø +.012/-.004

DESCRIPTION: KVLS LIFT OUT 6" TO

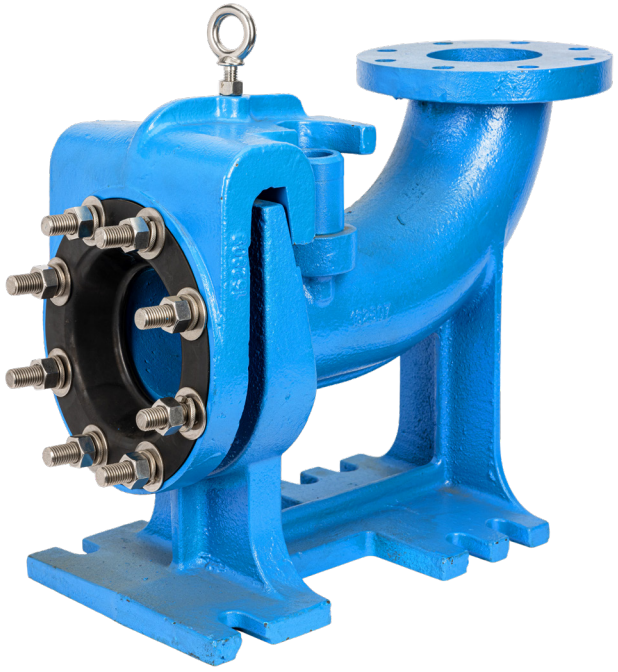
SIZE: B
DRAWING #: KVLS
PART#: KVLS
SCALE: 1:6

SHEET 1 OF 1

REV.	DESCRIPTION	INITIALS	DATE

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KEEN PUMP

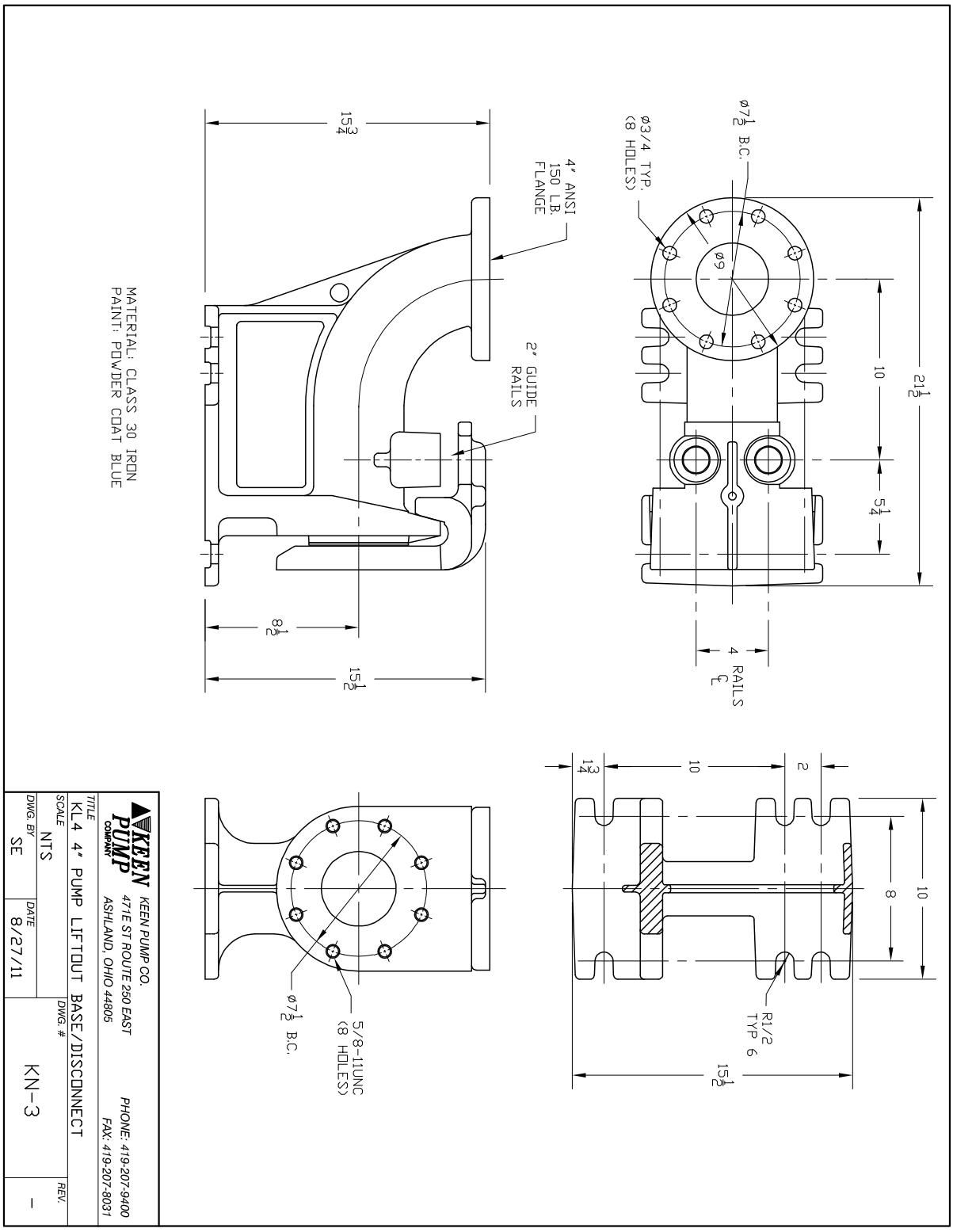


KL4

KEEN 4” Horizontal Liftout

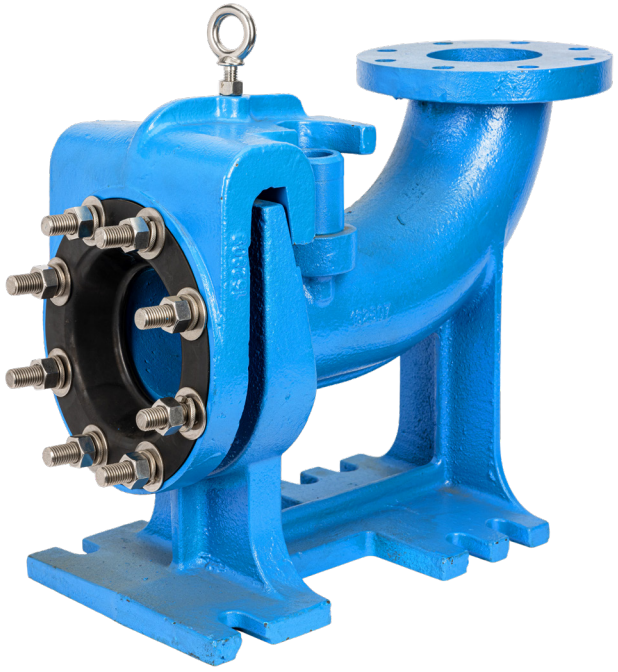
- 4” Class 125 ANSI Flange (Pump Connection Discharge)
- 1-1/2” or 2” Guide Rails
- Rated for Pumps up to 2,000 lbs.
- Dimensionally Interchangeable with Flygt

- 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 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		DWG. #	REV.
NTS		KN-3	-
DWG. BY	DATE		
SE	8/27/11		

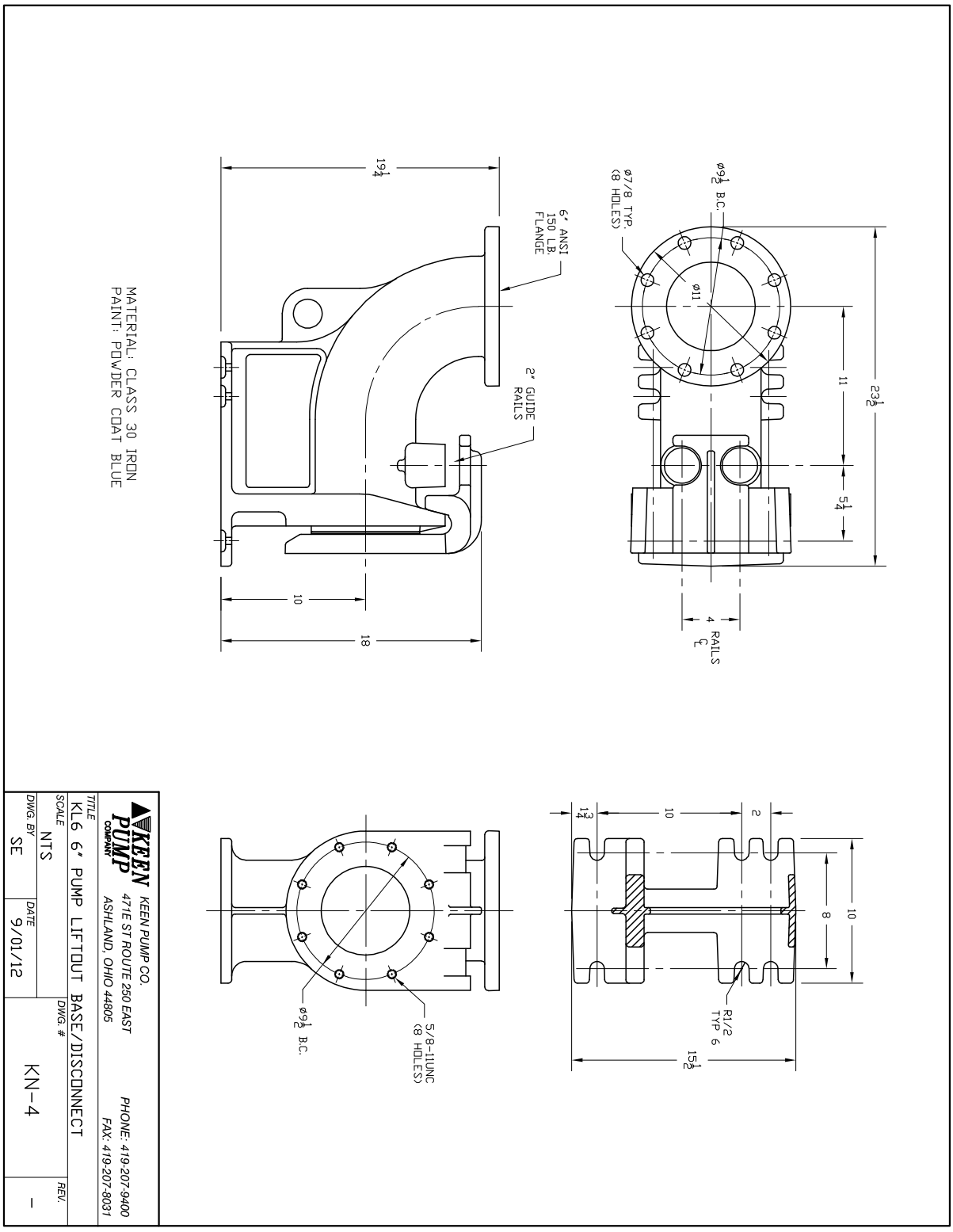


KL6

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 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	DATE	DWG. #	REV.
NTS	9/01/12	KN-4	-
DWG. BY			
SE			

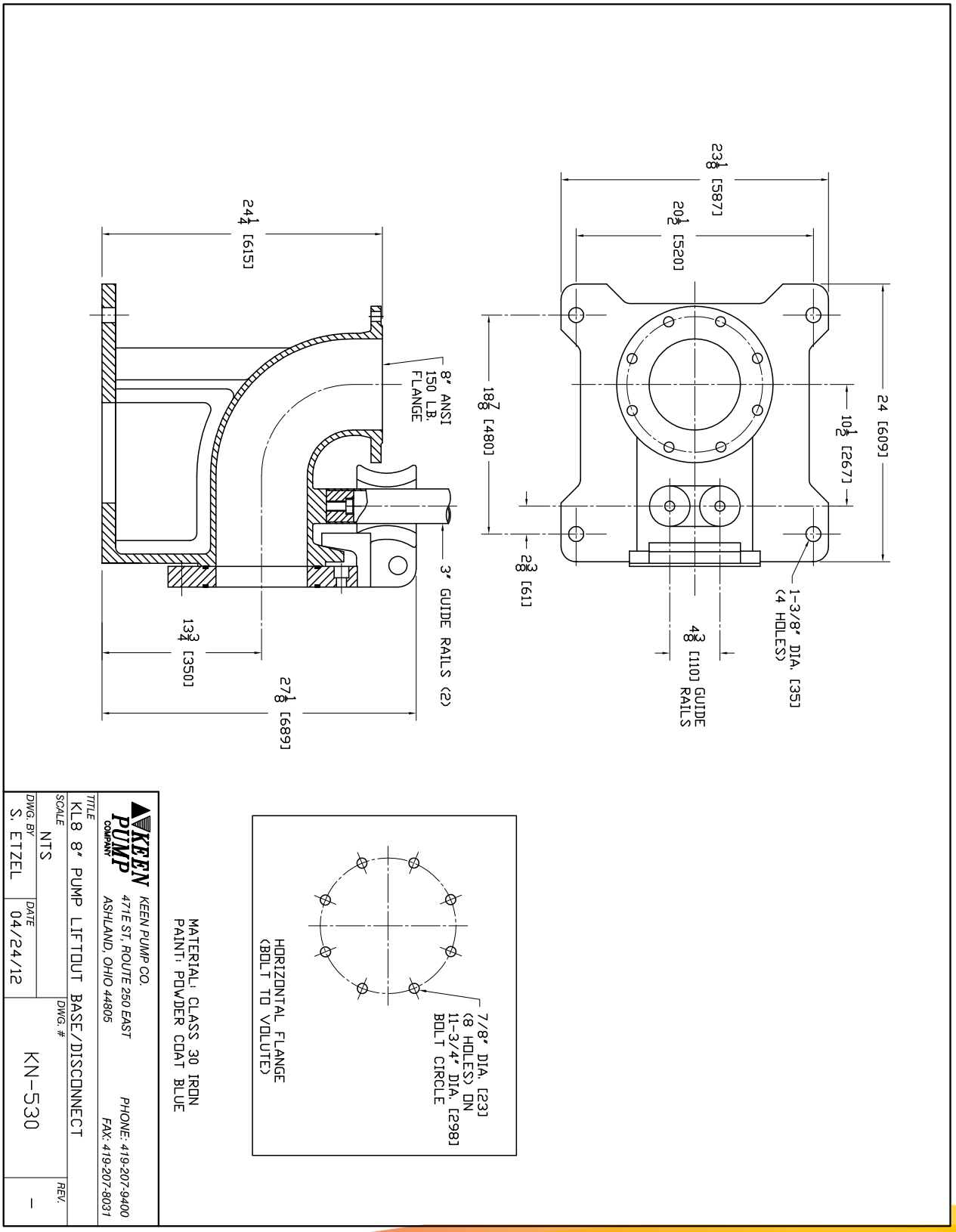


KL8

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


23 1/8 [587]
20 1/2 [520]
24 [609]
10 1/2 [267]
18 7/8 [480]
2 3/8 [61]
1-3/8" DIA. [35]
(4 HOLES)
4 3/8 [110] GUIDE
RAILS
24 1/4 [615]
8" ANSI
150 LB.
FLANGE
3" GUIDE RAILS (2)
13 3/4 [350]
27 1/8 [689]
7/8" DIA [23]
(8 HOLES) ON
11-3/4" DIA. [298]
BOLT CIRCLE
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. BY
S. ETZEL
DATE
04/24/12
DWG. #
KN-530
REV.
-



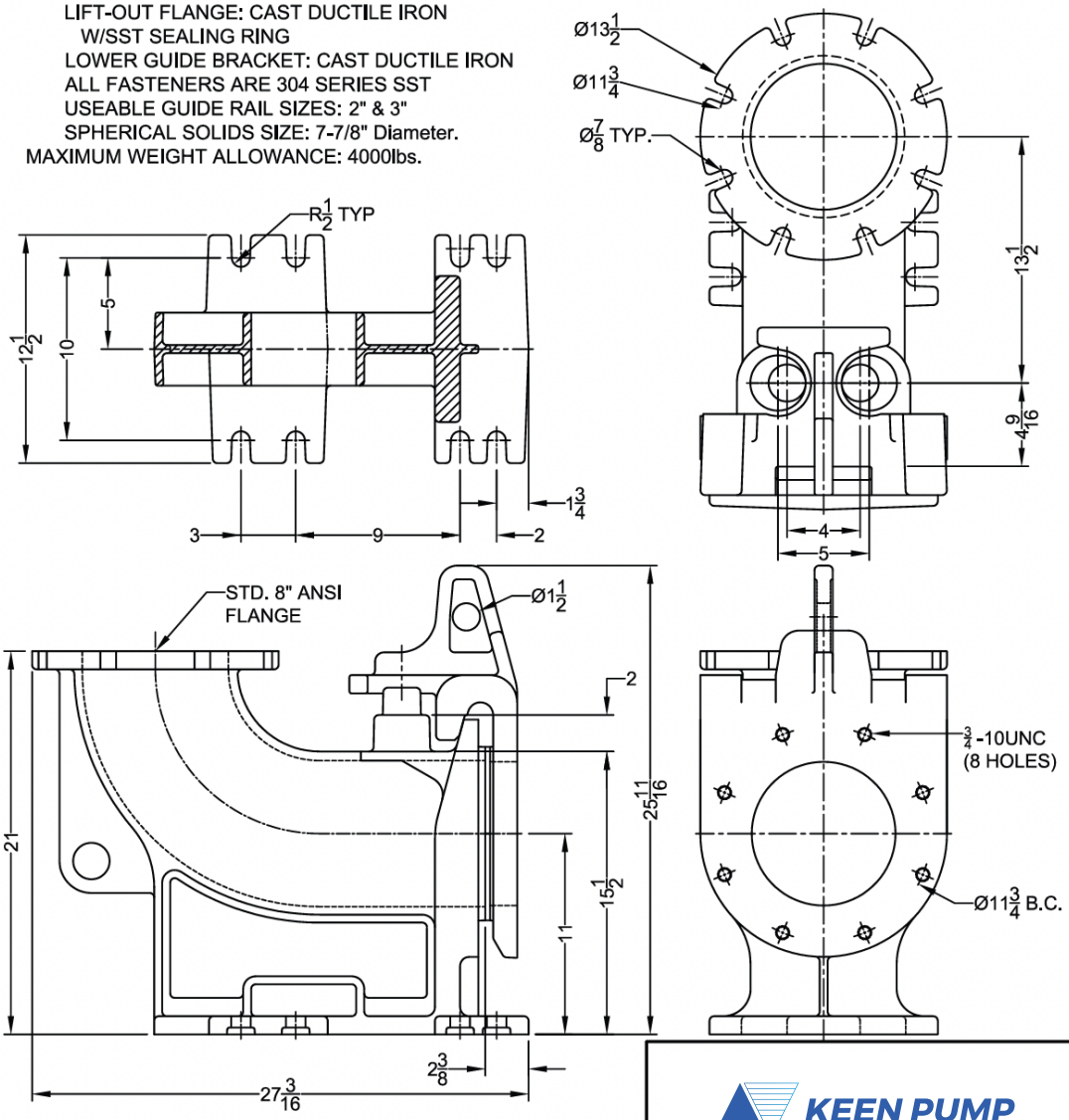
KL8-C

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

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: AS NOTED	
D			
C			
B			
A			

LIFT-OUT, 8" SPECS/CUT SHEET

SCALE: 1/8

PART NO. KL8-C

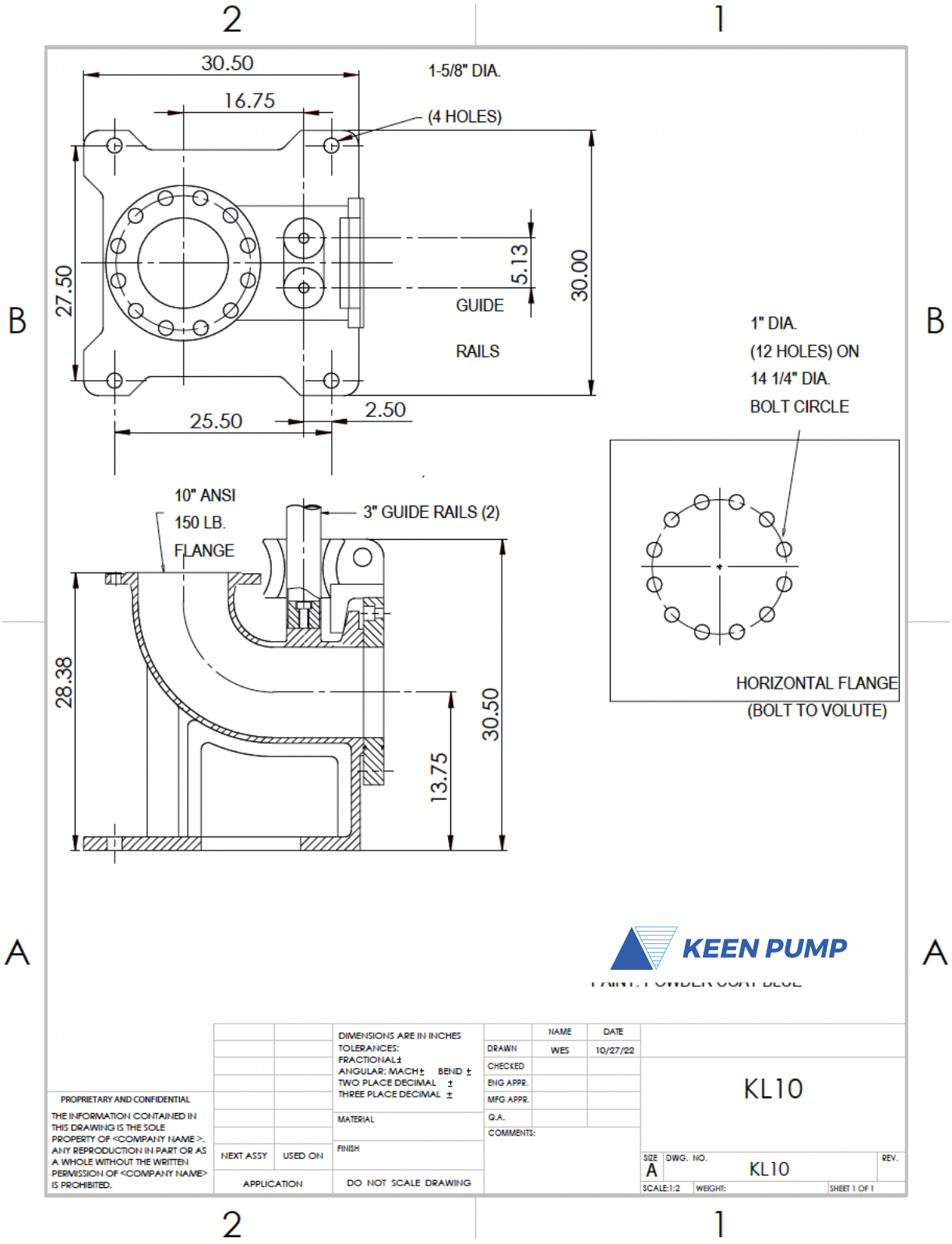


KL10

KEEN 10” Horizontal Liftout

- 10” Class 125 ANSI Flange (Pump Connection Discharge)
- 3” Guide Rails
- Rated for Pumps up to 4,000 lbs.

- 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
- Rugged Ductile Iron Construction with Durable Powder Coating


2
1
30.50
16.75
1-5/8" DIA.
(4 HOLES)
27.50
5.13
30.00
GUIDE
RAILS
25.50
2.50
B
1" DIA.
(12 HOLES) ON
14 1/4" DIA.
BOLT CIRCLE
10" ANSI
150 LB.
FLANGE
3" GUIDE RAILS (2)
28.38
13.75
30.50
HORIZONTAL FLANGE
(BOLT TO VOLUTE)
A
KEEN PUMP
PROPRIETARY AND CONFIDENTIAL
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DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
MATERIAL
FINISH
NEXT ASSY
USED ON
APPLICATION
DO NOT SCALE DRAWING
NAME
DATE
DRAWN
WES
10/27/22
CHECKED
ENG APPR.
MFG APPR.
Q.A.
COMMENTS:
KL10
SIZE
A
DWG. NO.
KL10
REV.
SCALE:1:2
WEIGHT:
SHEET 1 OF 1

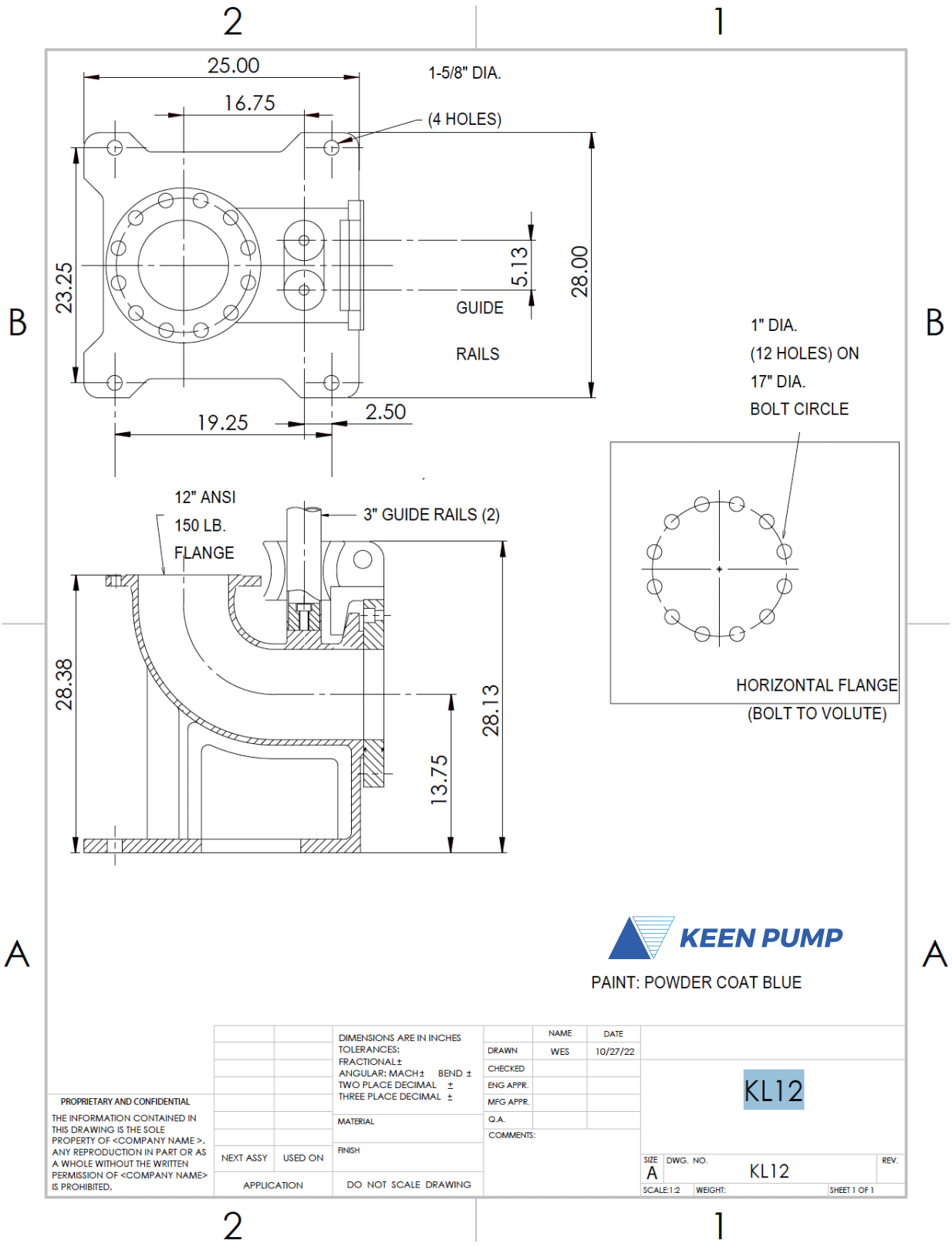


KL12

KEEN 12” Horizontal Liftout

- 12” Class 125 ANSI Flange (Pump Connection Discharge)
- 3” Guide Rails
- Rated for Pumps up to 4,000 lbs.

- 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
- Rugged Ductile Iron Construction with Durable Powder Coating


2
1
25.00
16.75
1-5/8" DIA.
(4 HOLES)
23.25
5.13
28.00
GUIDE
RAILS
19.25
2.50
B
1" DIA.
(12 HOLES) ON
17" DIA.
BOLT CIRCLE
12" ANSI
150 LB.
FLANGE
3" GUIDE RAILS (2)
28.38
28.13
13.75
HORIZONTAL FLANGE
(BOLT TO VOLUTE)
A
KEEN PUMP
PAINT: POWDER COAT BLUE
PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <COMPANY NAME >. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <COMPANY NAME> IS PROHIBITED.
NEXT ASSY
USED ON
APPLICATION
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
MATERIAL
FINISH
DO NOT SCALE DRAWING
NAME
DATE
DRAWN
WES
10/27/22
CHECKED
ENG APPR.
MFG APPR.
Q.A.
COMMENTS:
KL12
SIZE
A
DWG. NO.
KL12
REV.
SCALE:1:2
WEIGHT:
SHEET 1 OF 1

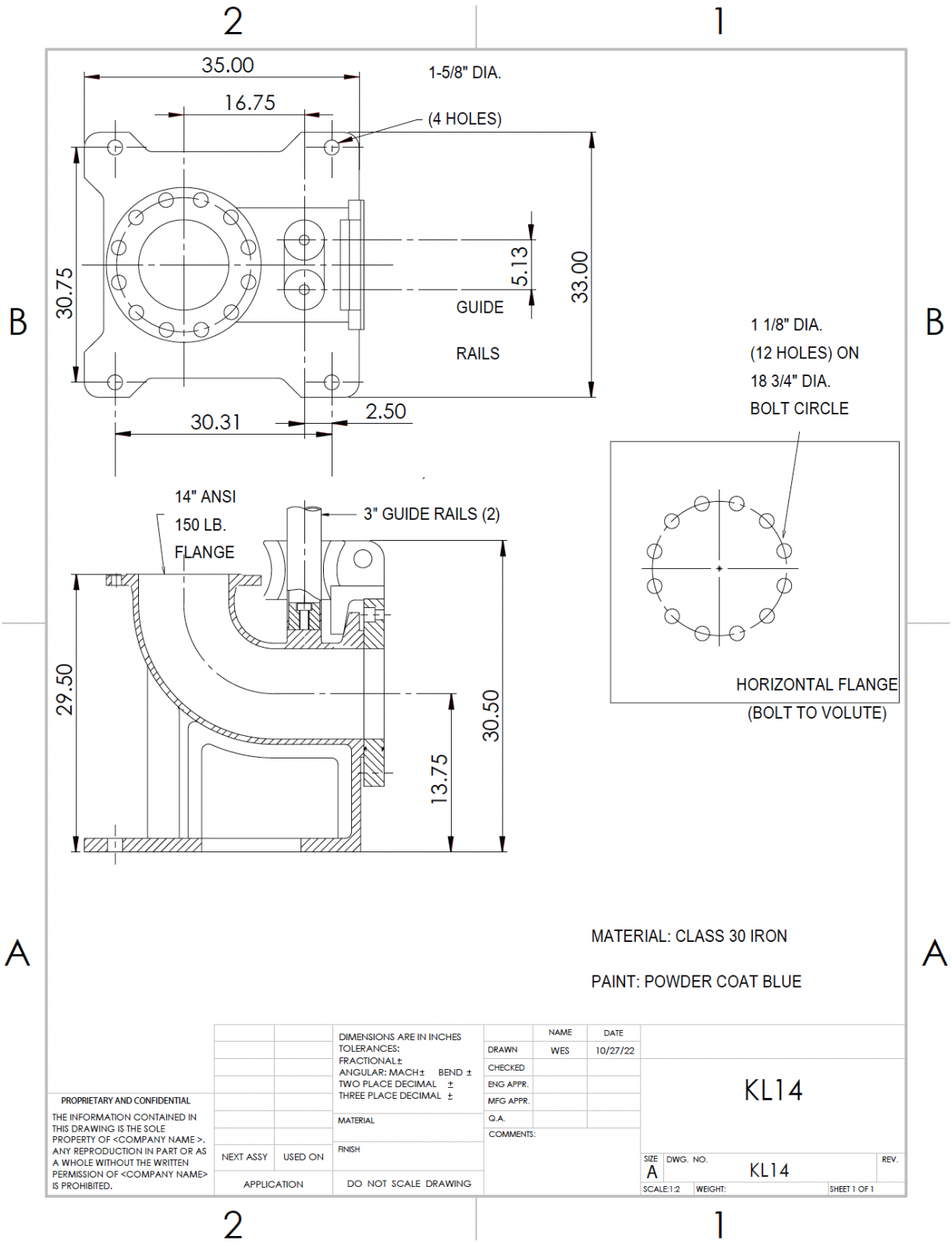


KL14

KEEN 14” Horizontal Liftout

- 14” Class 125 ANSI Flange (Pump Connection Discharge)
- 3” Guide Rails
- Rated for Pumps up to 4,000 lbs.

- 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
- Rugged Ductile Iron Construction with Durable Powder Coating


2
1
35.00
16.75
1-5/8" DIA.
(4 HOLES)
30.75
5.13
33.00
GUIDE
RAILS
30.31
2.50
B
B
1 1/8" DIA.
(12 HOLES) ON
18 3/4" DIA.
BOLT CIRCLE
HORIZONTAL FLANGE
(BOLT TO VOLUTE)
14" ANSI
150 LB.
FLANGE
3" GUIDE RAILS (2)
29.50
30.50
13.75
A
A
MATERIAL: CLASS 30 IRON
PAINT: POWDER COAT BLUE
PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <COMPANY NAME>. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <COMPANY NAME> IS PROHIBITED.
NEXT ASSY
USED ON
APPLICATION
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL±
ANGULAR: MACH± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
MATERIAL
FINISH
DO NOT SCALE DRAWING
NAME
DATE
DRAWN
WES
10/27/22
CHECKED
ENG APPR.
MFG APPR.
Q.A.
COMMENTS:
KL14
SIZE
A
DWG. NO.
KL14
REV.
SCALE:1:2
WEIGHT:
SHEET 1 OF 1
2
1

LIFTOUTS KL8, KL8-C, KL10, KL10, KL12, KL14

SPECIFICATIONS

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.

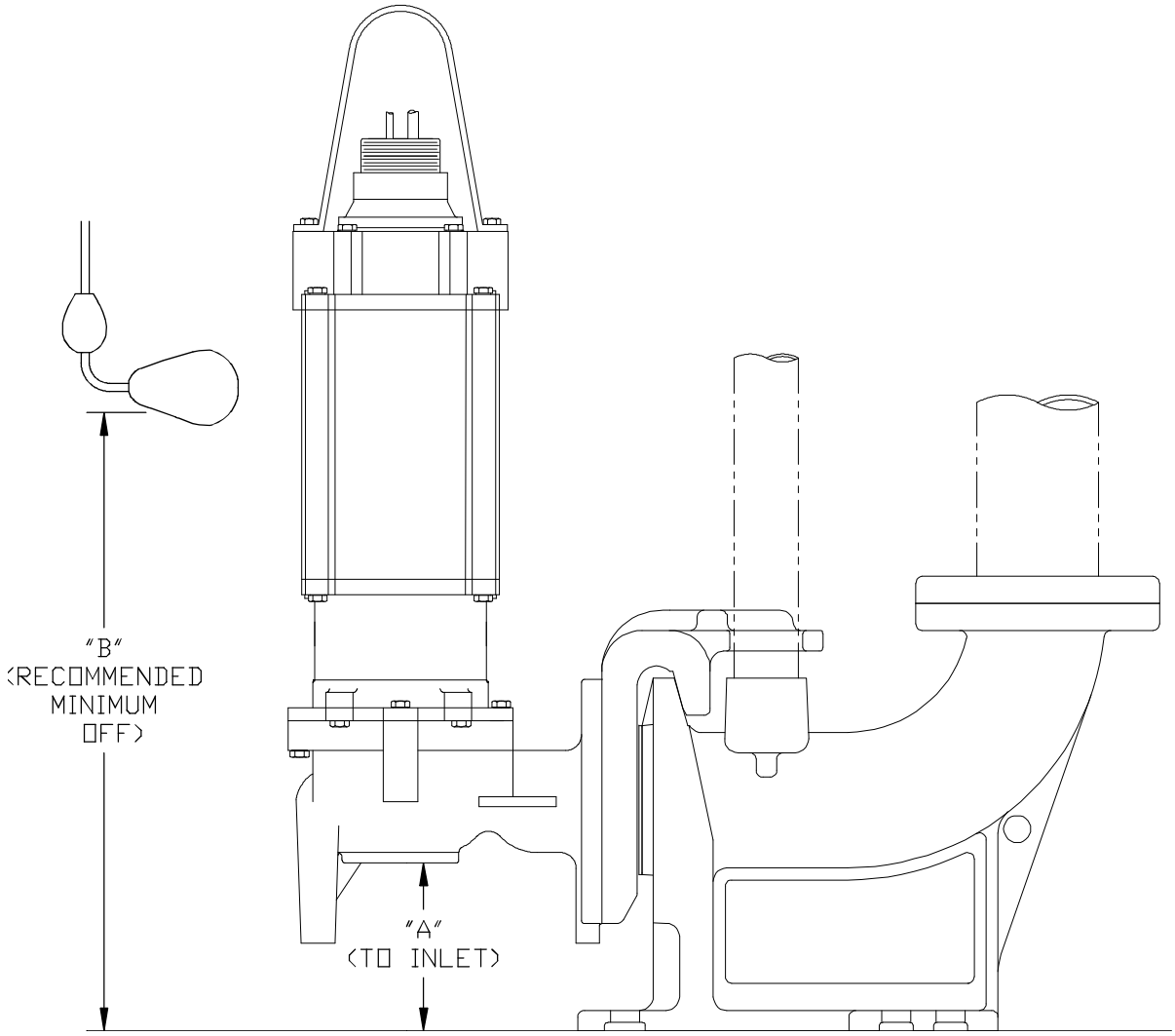
BASE ELBOW – A one-piece, cast iron (ASTM A48-35) machined casting. The discharge shall be vertical, __" ANSI 150# connection, located at an elevation of __" from the floor of the station. The inlet side shall have a horizontal configuration for mating to the lift-out flange portion of the assembly. 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 A48-35) 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 li ft-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 av ailable. Coal-Tar epoxies, chemically resistant epoxies & marine coatings.


"B"
(RECOMMENDED
MINIMUM
OFF)
"A"
(TO INLET)

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"



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, pressurized pure argon gas for mercury provides clean, spark extinguishing atmosphere for long life
Mechanical Switch Cord	Snap-action switch, steel ball in switching tube Flexible SJOW in lengths to 50 ' Epoxy potted and bonded to float for watertight seal
Weights	Provided (attached) with all float controls

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SECTION 19

Warranties

KEEN PUMP

LIMITED 3 - YEAR WARRANTY

KEEN PUMP

Grinder 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

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 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: 0105 =Month-Year = January, 2005.

WARRANTY QUALIFICATIONS

A Keen Pump Co. Inc. pump start-up report, filled out by a qualified installer, is required for warranty to take effect. The start-up report in downloadable PDF form can be found on Keen Pump's website homepage **www.Keenpump.com** , or one can be requested directly from Keen Pump Co. service manager. The report must be submitted within 30 days from the installation date and submitted to Keen Pump Co. Inc. Attn: Service Manager. Completed start-up reports can be returned by normal mail or emailed to service manager. The manufacture shall not be liable under this warranty if the product has not been properly installed, operated, or maintained per manufacturer instructions; if it has been disassembled, modified, abused, or tampered with; the electrical cord has been cut, damaged, or spliced; if the pump discharge has been reduced in size; if the pump has been used in water temperatures above the advertised rating; if the pump has been used in water containing sand, lime, cement, gravel, or other abrasives; if the product has been used to pump chemicals, grease, or hydrocarbons; or if the label bearing the model and serial number has been removed. Wear Parts: This limited warranty does not cover parts by nature of their function require replacement as the result of normal wear and tear (seals, wear rings, wear plates, slicer plates, chopper plates, slicers, choppers, or other parts subjected to abrasion, cavitation, or corrosion) unless a defect in materials or workmanship can be determined by Keen Pump Co. Inc.

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.

WARRANTY QUALIFICATIONS

A Keen Pump Co. Inc. pump start-up report, filled out by a qualified installer, is required for warranty to take effect. The start-up report in downloadable PDF form can be found on Keen Pump's website homepage **www.Keenpump.com** , or one can be requested directly from Keen Pump Co. service manager. The report must be submitted within 30 days from the installation date and submitted to Keen Pump Co. Inc. Attn: Service Manager. Completed start-up reports can be returned by normal mail or emailed to service manager. The manufacture shall not be liable under this warranty if the product has not been properly installed, operated, or maintained per manufacturer instructions; if it has been disassembled, modified, abused, or tampered with; the electrical cord has been cut, damaged, or spliced; if the pump discharge has been reduced in size; if the pump has been used in water temperatures above the advertised rating; if the pump has been used in water containing sand, lime, cement, gravel, or other abrasives; if the product has been used to pump chemicals, grease, or hydrocarbons; or if the label bearing the model and serial number has been removed. Wear Parts: This limited warranty does not cover parts by nature of their function require replacement as the result of normal wear and tear (seals, wear rings, wear plates, slicer plates, chopper plates, slicers, choppers, or other parts subjected to abrasion, cavitation, or corrosion) unless a defect in materials or workmanship can be determined by Keen Pump Co. Inc.

KEEN PUMP

SUMP, SEWAGE AND EFFLUENT 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 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 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.

WARRANTY QUALIFICATIONS

A Keen Pump Co. Inc. pump start-up report, filled out by a qualified installer, is required for warranty to take effect. The start-up report in downloadable PDF form can be found on Keen Pump's website homepage **www.Keenpump.com** , or one can be requested directly from Keen Pump Co. service manager. The report must be submitted within 30 days from the installation date and submitted to Keen Pump Co. Inc. Attn: Service Manager. Completed start-up reports can be returned by normal mail or emailed to service manager. The manufacture shall not be liable under this warranty if the product has not been properly installed, operated, or maintained per manufacturer instructions; if it has been disassembled, modified, abused, or tampered with; the electrical cord has been cut, damaged, or spliced; if the pump discharge has been reduced in size; if the pump has been used in water temperatures above the advertised rating; if the pump has been used in water containing sand, lime, cement, gravel, or other abrasives; if the product has been used to pump chemicals, grease, or hydrocarbons; or if the label bearing the model and serial number has been removed. Wear Parts: This limited warranty does not cover parts by nature of their function require replacement as the result of normal wear and tear (seals, wear rings, wear plates, slicer plates, chopper plates, slicers, choppers, or other parts subjected to abrasion, cavitation, or corrosion) unless a defect in materials or workmanship can be determined by Keen Pump Co. Inc.

IMPORTANT!

If you have a claim under the provision of the warranty, contact Keen Pump or your authorized Keen Pump Distributor: www.keenpump.com

02 — RESIDENTIAL SUMP, SEWAGE & EFFLUENT PUMPS

K2PLEN
K2PL
K2PLEH
K2PLEV512
K2PLSE
K2PLEP
K2PLSE-SS
KE5
KW5
KE(C)
KWSE5
KW-52
K5/7/10 SDS
KW

03 — 1-2HP GRINDER PUMPS

KPCGX- (C)
KPCLG
LCG2(HZ)(SL)
KG2-115
KG(X)2(HZ)
SKG2
KFG(X)2(HZ)
KGS(X)2
KHGS(X)2
LCHGS2
KTG2
KHHG2(H)(X)

04 — RETRO-FITS

Myers KMR (RWG)
Barnes C Channel
Liberty/ Abs
Hydromatic Hydr-O-Rail
Barnes Eco Tran
Custom Dry-Pit Replacement

E-One: KPCG-21CTSL, KG2-2301CSL

- KER-0013
- KER-0014
- KER-0022
- KERPC-0013
- KERPC-0014
- KERPC-0022

"KBR-CH" KEEN/"C" Rail Replacement
"KBR" KEEN/"C" Rail Replacement
"KBR-ET" KEEN/ ECOTRAN Replacement
KMR-RWG-Replacement Kit
KPG-LCG2-001-Replacement Kit

05 — LOW PRESSURE SEWER (LPS) DESIGN

2HP Centrifugal
2HP Semi-Open, Centrifugal
1HP Semi-Positive Displacement (Progessive Cavity)

06 — 3-15HP CENTRIFUGAL GRINDER SERIES

KG(X)3
KHG(X)3
KG(X)5
KHG(X)5
KHG(X)7
KG(X)10
KGP(X)

07 — CHOPPER/ GRINDER SERIES

KCH(X)5
KGC 5/7

08 — FIBERGLASS BASIN PACKAGE

3-10HP Grinder Pump Basin Package
3-10HP Grinder Pump Basin Package w/Valve Box
2HP Grinder Pump Basin Package

09 — SOLIDS HANDLING - ELITE SERIES

K3RN(X)
K3RH(X)
K4RH(X)
K4RN(X)
K4RP(X)
K4RB(X)
K3VN(X)
K4VN(X)
K4VP(X)
K4VB(X)
K4VK(X)
K6VB(X)
K8VK(X)
K12VK(X)
K14VK(X)

10 — K3SP300 SUBMERSIBLE PUMP

K3SP300

11 — 3-14 INCH CHOPPER PUMPS

K3CHN(X)
K4CHN(X)
K4VCH
K4CHP
K4CHB(X)
K4CHK
K6CHB
K8CHK
K12CHK
K14CHK

12 — 3-20HP AIRFILLED 4 INCH SOLIDS HANDLING

K4V

13 — AIRFILLED - KH SERIES 6-24 INCH/ 20-350HP

KH Series
K8H 500HP
K14H
K16H
K24VK

14 — CONTROL PANELS

Simplex Control Panels -
2 or 3 Float Operation

Duplex Control Panels -
4 Float Operation

15 — K3PL-S SOLIDS HANDLING, SINGLE SEAL

K3PL-S (1HP) Solids Handling
K3PL-S (1.5 & 2HP) Solids Handling
K3PL-S (3HP) Solids Handling

16 — END SUCTION CENTRIFUGAL PUMPS

2-Stage Centrifugal Pumps

KCPMSST - Pedestal Mounted Centrifugal Pump
ANSI KP911 Series
- K911S
- K911M
- K911L
- K911LX

17 — DRY PIT

K4RNDP
K4RPDP-M4
K4VBDP
K4VKDP
K6VBDP
K8VKDP
K12VKDP

18 — ACCESSORIES

KL1&KL1CV
KL2&KL2CV
Pump Service Kits
- Start Kits
- Grinder Cutter Kits
- Service Kits

Stainless Steel Flex Pipe
Electrical Quick Disconnect (EQD)
Stainless Steel Slideface
KL3H
KVLS
KL4
KL6
KL8
KL8-C
KL10
KL12
KL14
KPCF(M)

19 —WARRANTIES

3 Year Limited Warranty
5 Year Limited Warranty
Sump, Sewage, Effuent Warranty