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.

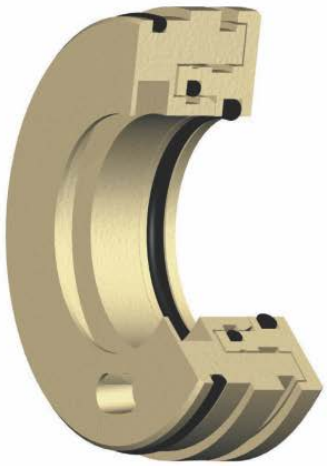
Keen pumps are your best choice.

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.

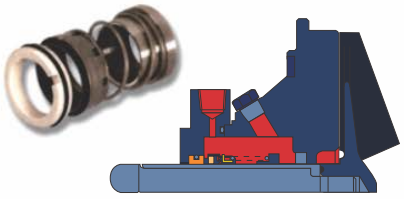
Multiport for proper drainage.

Seal solutions

The seal plate is designed to accept a variety of cooling plans to meet specific user requirements.

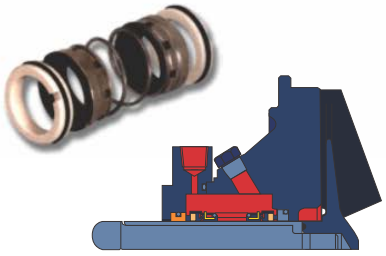
1 Single interior seal

- Non-corrosive liquids to moderately corrosive.
- Mild abrasives.
- Pumping liquids with good lubricating qualities.



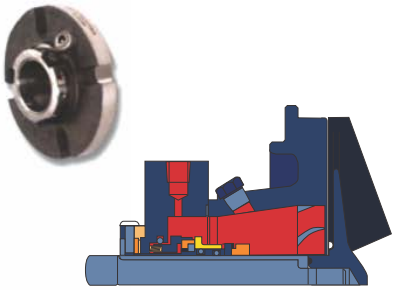
2 Conventional double seal

- Liquids not compatible with single seals.
- Toxic, hazardous, abrasive and corrosive liquids.
- When the pump is operating under low flow conditions.



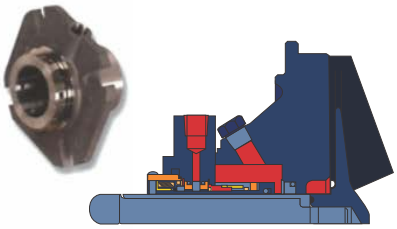
3 Single cartridge seal

- Non-corrosive liquids to moderately corrosive.
- Mild abrasives.
- Pumping liquids with good lubricating qualities.



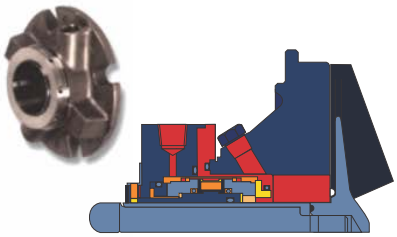
4 Double cartridge seal

- 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

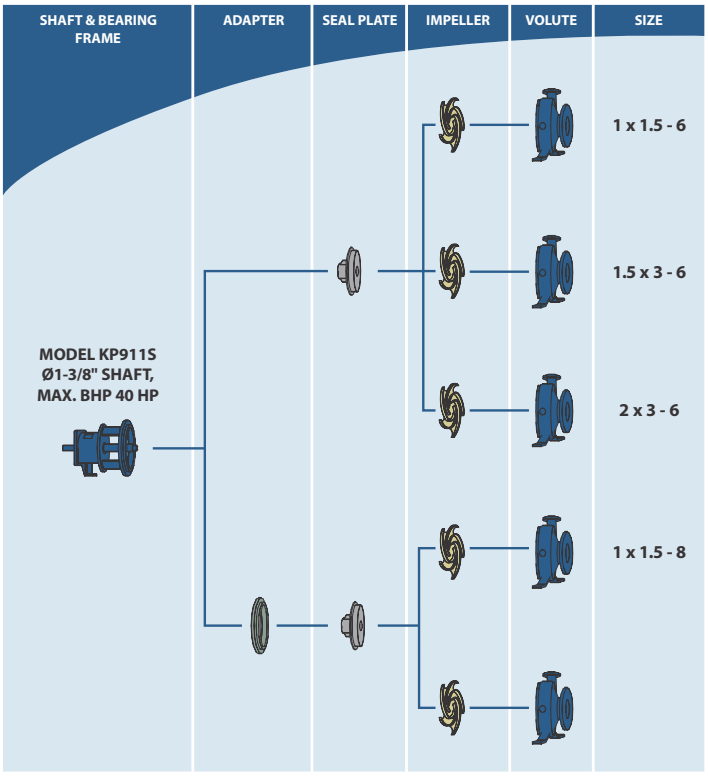
Increase the seal lifespan reducing maintenance costs.

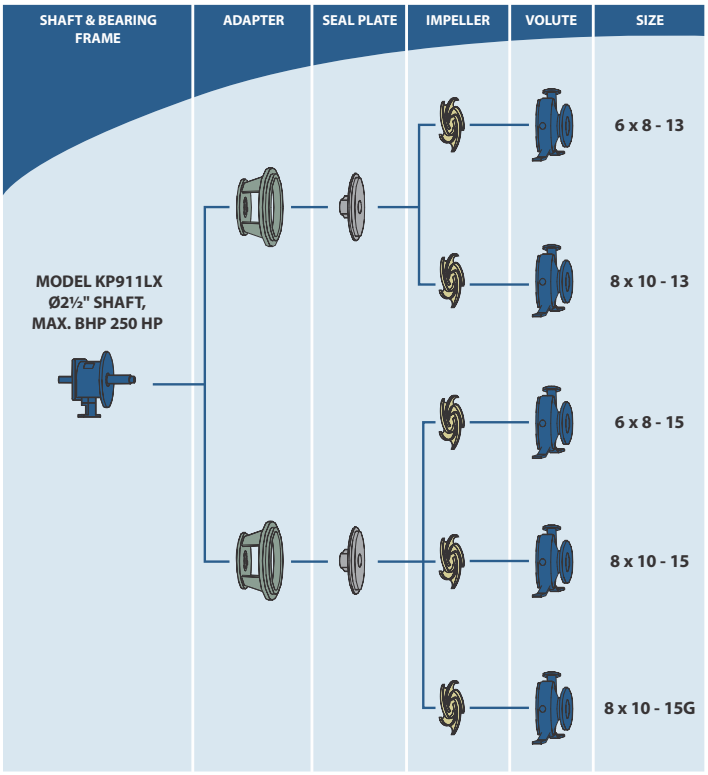
The most common cause of failure in a process pump is the mechanical seal.

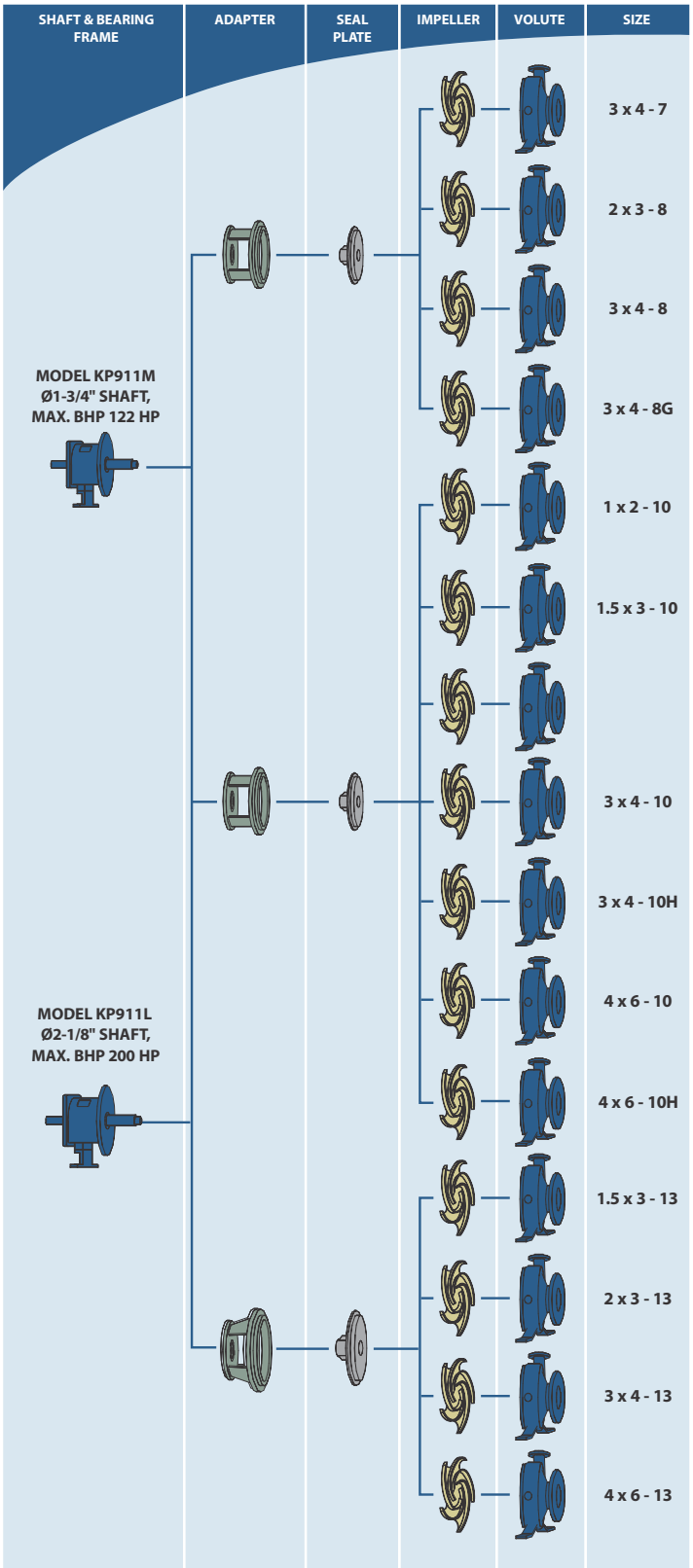
This failure is usually attributed to poor heat dissipation, poor lubrication on the seal faces or pumping liquids containing solids, air or vapors.

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.

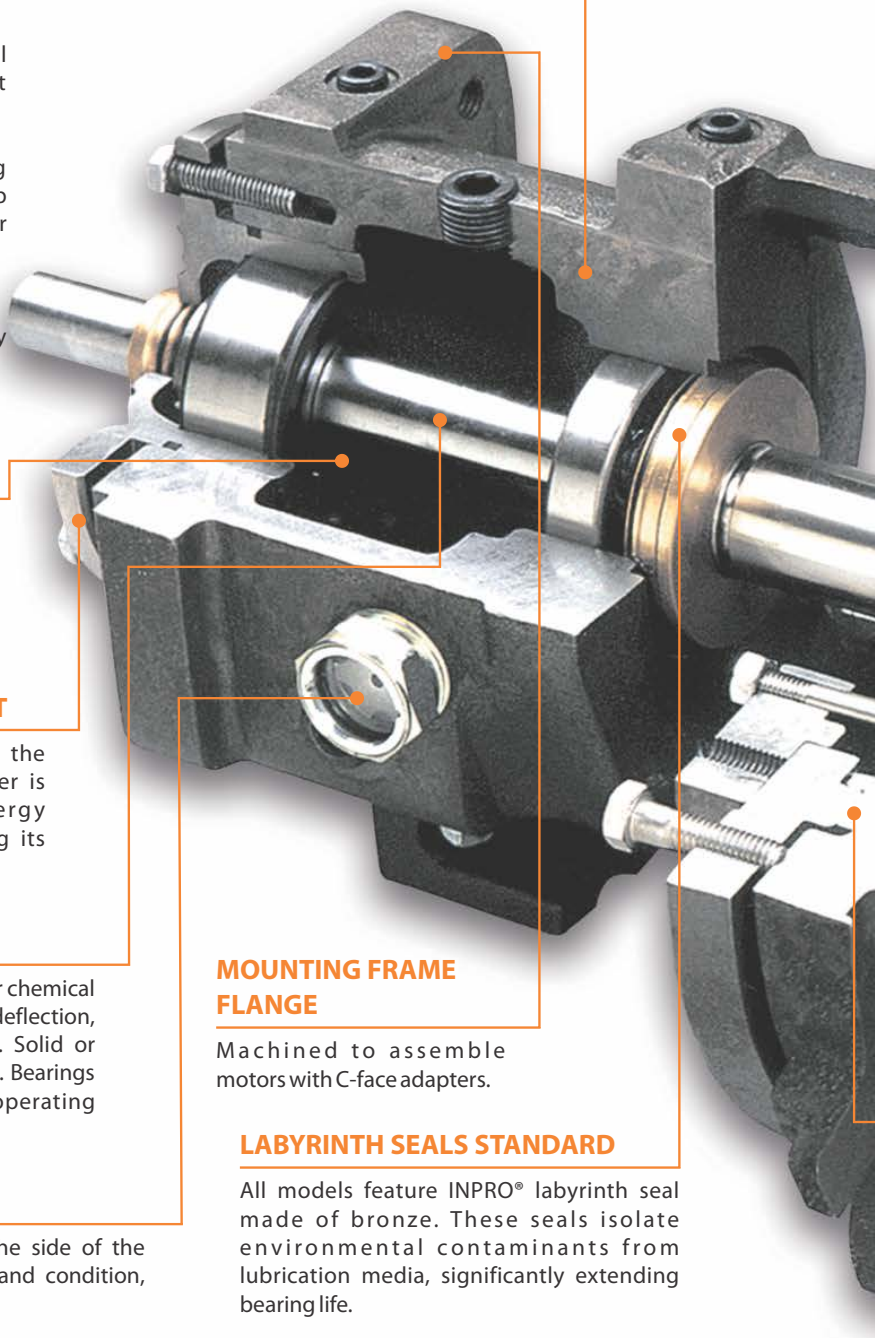
With controlled process in our manufacturing line we have structured a state-of-the-art pump to deliver high-level solutions meeting your most critical requirement.

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

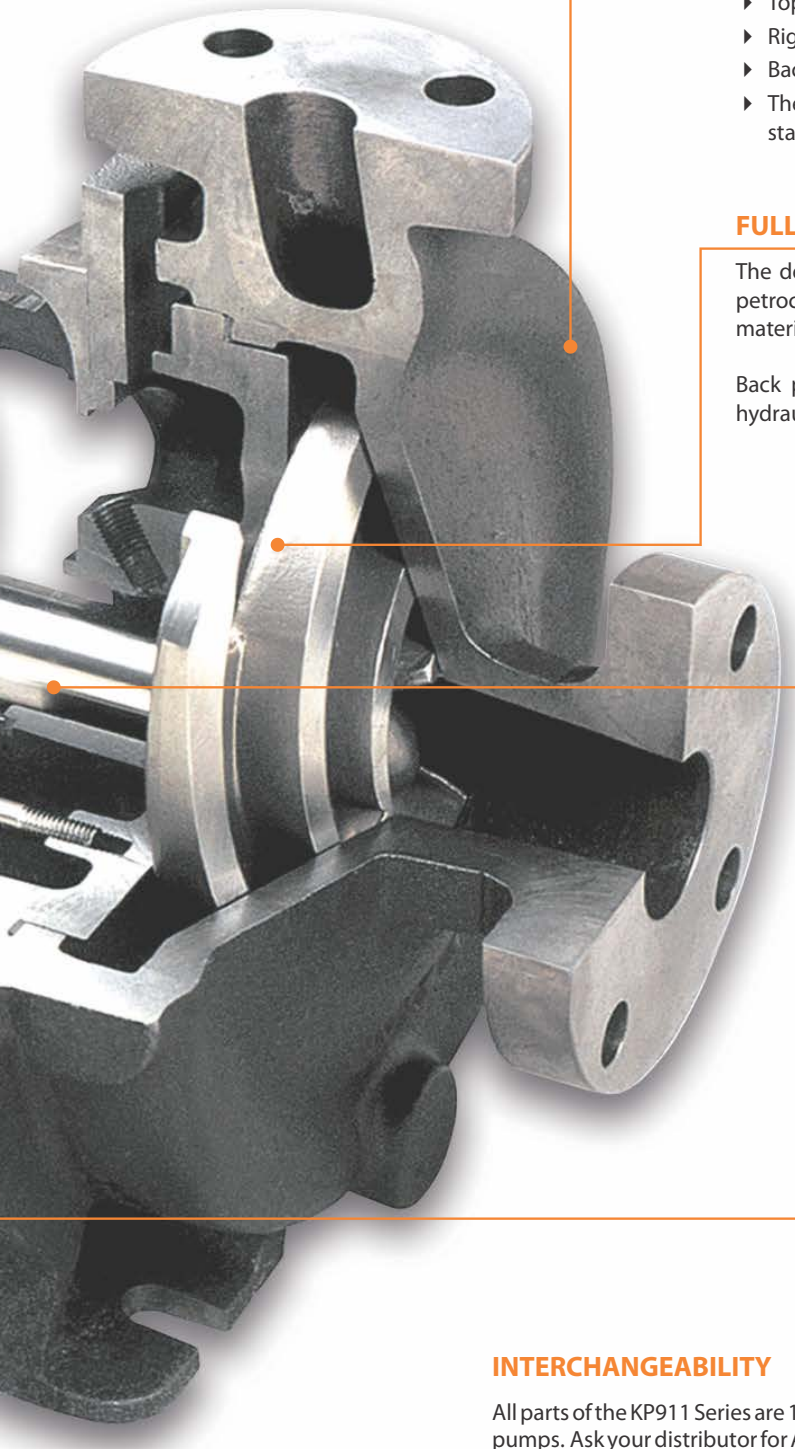
Machined to assemble motors with C-face adapters.

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.

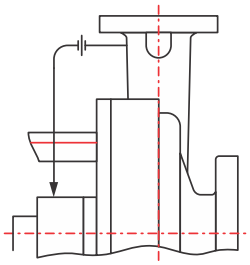
SELF-CONTAINED VOLUTE GASKET

Provides a positive seal between the volute and the seal plate, prevents "blow out" and facilitates disassembly.

INTERCHANGEABILITY

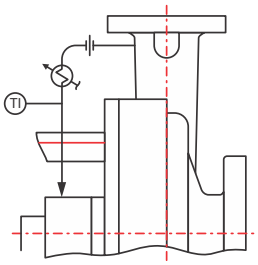
All parts of the KP911 Series are 100% interchangeable with other existing ANSI pumps. Ask your distributor for ANSI KP911 parts list.

1 PLAN 7311



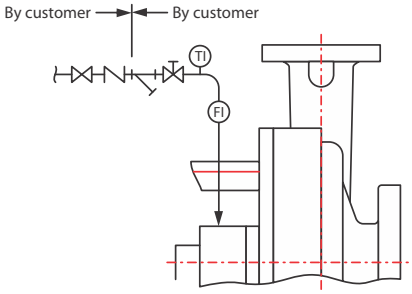
Recirculation from the volute to the mechanical seal flange.

2 PLAN 7321



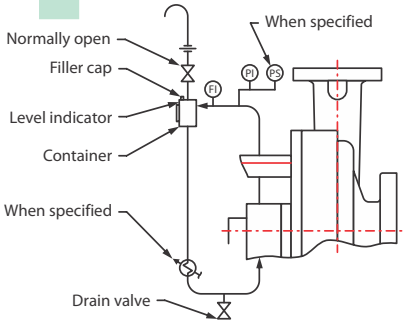
Recirculation of the volute to the heat exchanger and then to the mechanical seal flange.

3 PLAN 7332



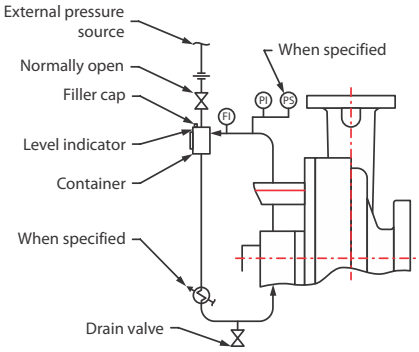
Injection in the mechanical seal from a source of clean fluid.

4 PLAN 7352



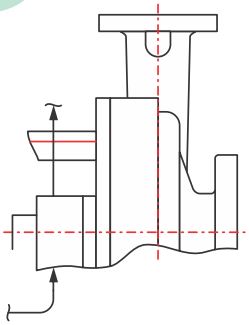
External fluid container without pressurizing; forced circulation.

5 PLAN 7353

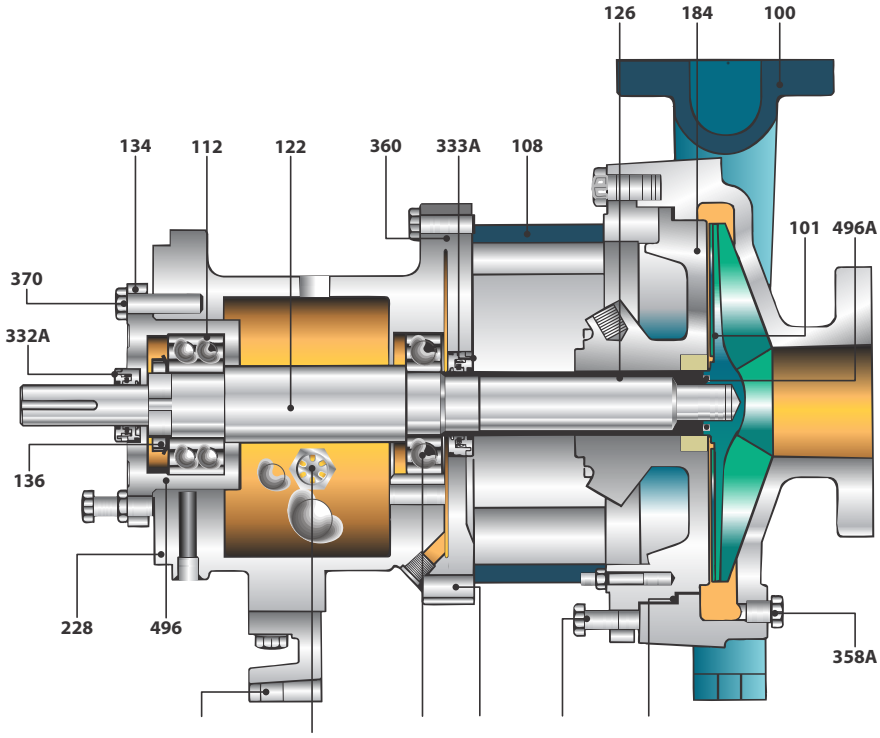


External pressurized fluid container; forced circulation.

6 PLAN 7354



Circulation of clean fluid from an external system.

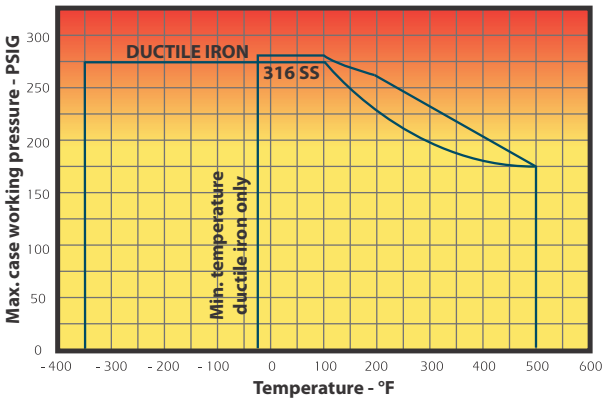


Item	Required per pump	Description	Material		
			Ductile iron	316 SS	CD4MCu
100	1	Casing	Ductile iron	316 SS	CD4MCu
101	1	Impeller	Ductile iron	316 SS	CD4MCu
108	1	Frame adapter	Ductile iron		
112	1	Outboard bearing	Steel		
122	1	Shaft - less sleeve (optional)	316 SS		
122	1	Shaft for sleeve design	AISI 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		

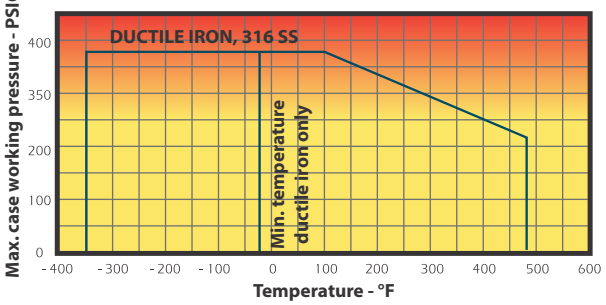
MAX. WORKING PRESSURE LIMITS

MODELS KP911S, M, L, LX

CLASS 150 FLANGES

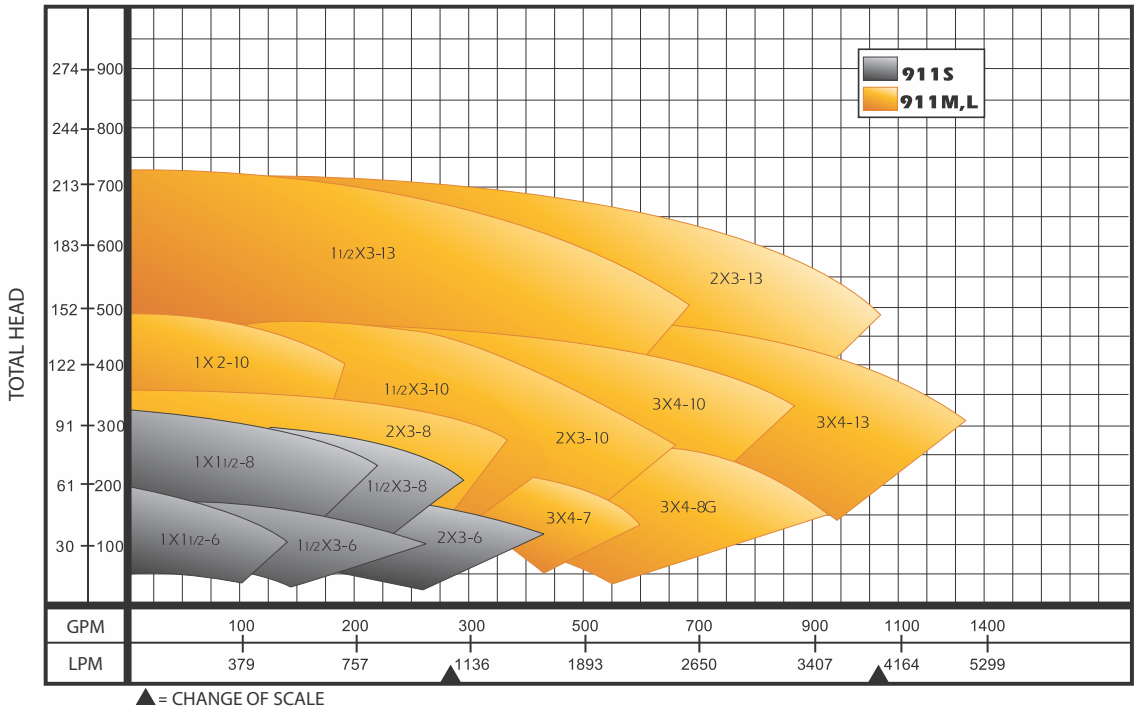


CLASS 300 FLANGES

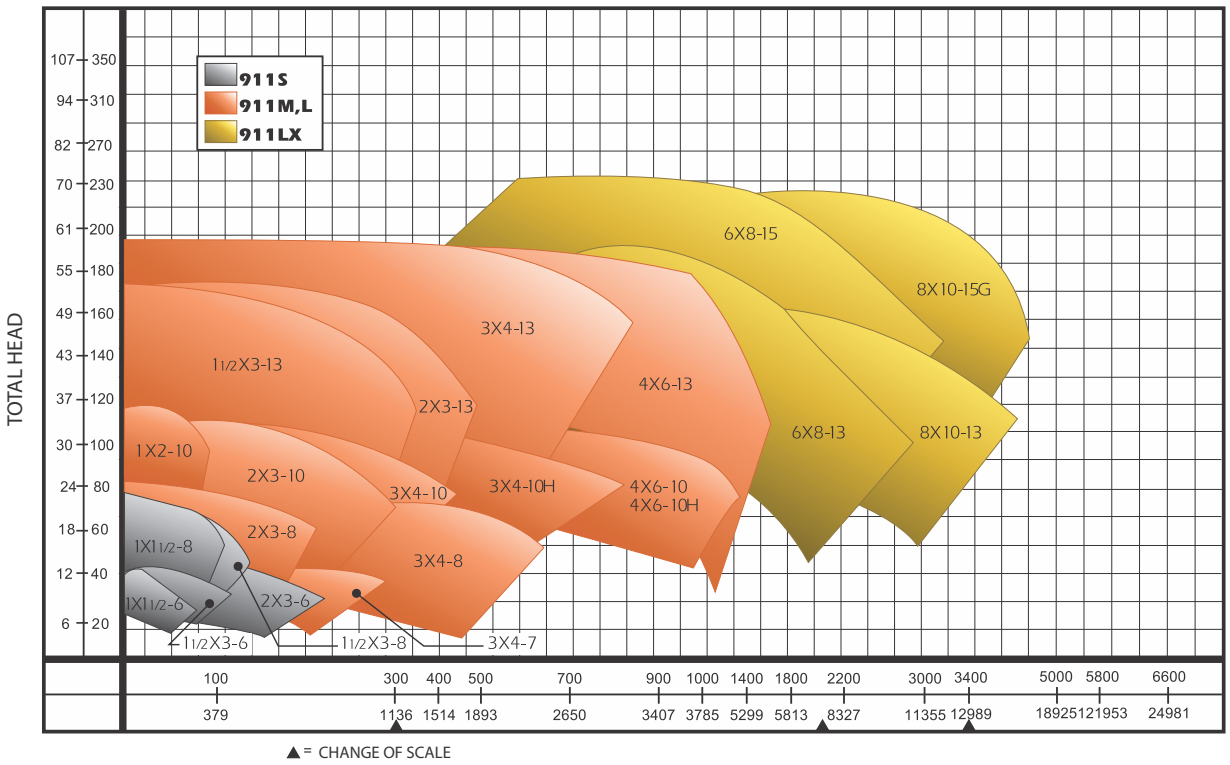


Performance curve

3500 RPM

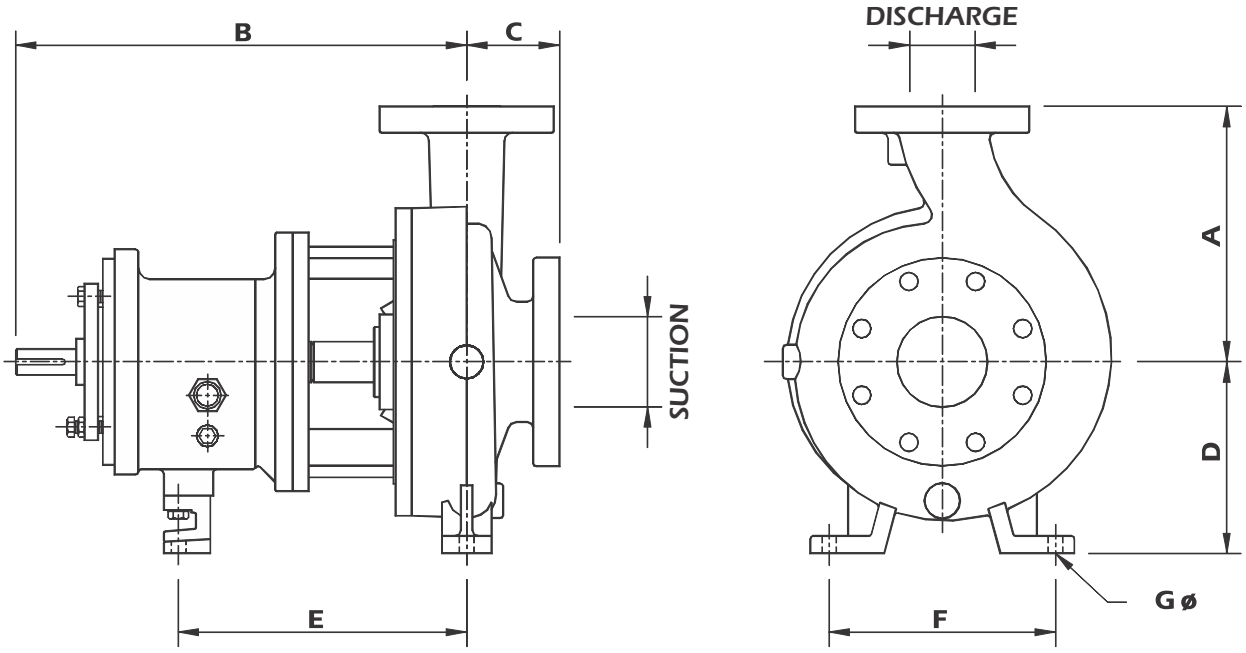


1750 RPM

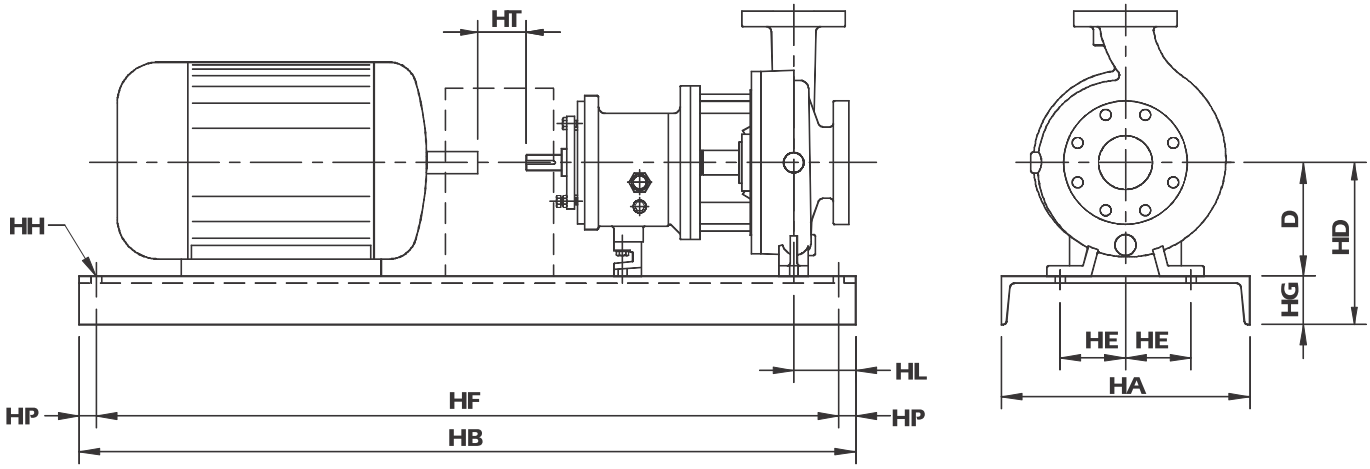


CONSTRUCTION DETAILS

	SIZE & ANSI DESIGNATION	1 x 1.5 - 6 AA	1.5 x 3 - 6 AB	2 x 3 - 6	1 x 1.5 - 8 AA	1.5 x 3 - 8 AB	3 x 4 - 7 A70	2 x 3 - 8 A60	3 x 4 - 8 A70	3 x 4 - 8G A70	1 x 2 - 10 A05	1.5 x 3 - 10 A50	2 x 3 - 10 A60	3 x 4 - 10 A70	3 x 4 - 10H A40	4 x 6 - 10 A80	4 x 6 - 10H A80	1.5 x 3 - 13 A20	2 x 3 - 13 A30	3 x 4 - 13 A40	4 x 6 - 13 A80	1 x 2 - 10 A05	1.5 x 3 - 10 A50	2 x 3 - 10 A60	3 x 4 - 10 A70	3 x 4 - 10H A40	4 x 6 - 10 A80	4 x 6 - 10H A80	1.5 x 3 - 13 A20	2 x 3 - 13 A30	3 x 4 - 13 A40	4 x 6 - 13 A80	6 x 8 - 13 A90	8 x 10 - 13 A100	6 x 8 - 15 A110	8 x 10 - 15 A120	8 x 10 - 15G A120
	MODEL	**911 S**					**911 M (max. BHP 122 HP)**															**911 L (max. BHP 200 HP)**											**911 LX**				
CASING	NOMINAL CASE THICKNESS	3/8"					1/2"											9/16"				1/2"							9/16"				1/2"				
CASING	CORROSIVE ALLOWANCE @ MAX.	1/8"																																			
CASING	WORKING PRESSURE	LIMITS SET BY ANSI B16.5																																			
CASING	MAX. WORKING PSIG	SEE PRESSURE / TEMPERATURE CHARTS																																			
CASING	HYDRO TEST PSIG @ 100 °F	150% OF WORKING PRESSURE																																			
CASING	MAX. LIQUID TEMPERATURE	350 °F WITHOUT COOLING																																			
SHAFT	DIAMETER AT COUPLING	7/8"					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"

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.

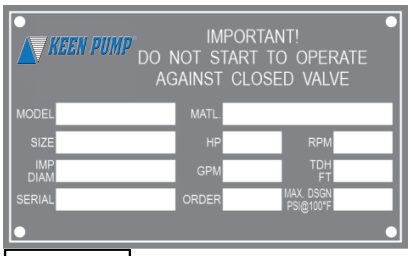


Figure 1

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

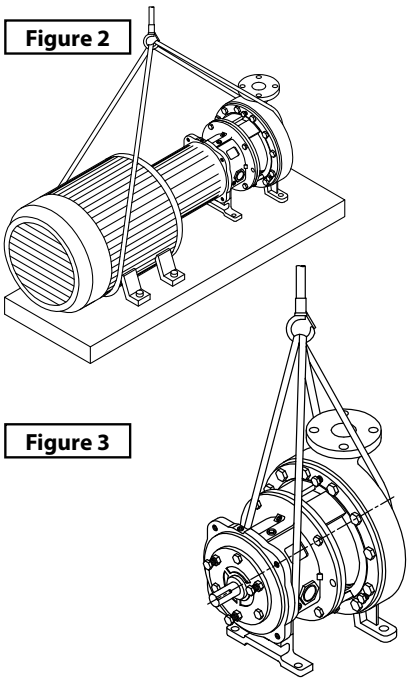


Figure 3

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:

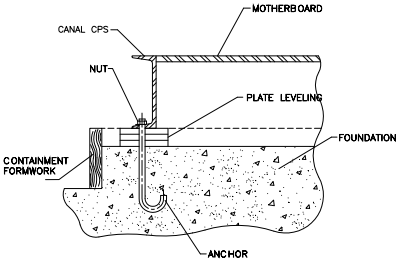


Figure 4

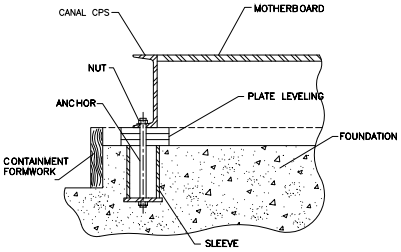


Figure 5

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.

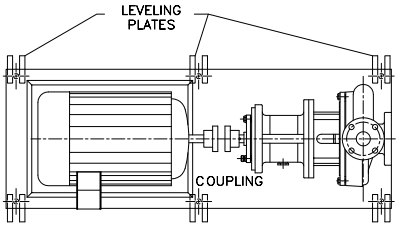


Figure 6

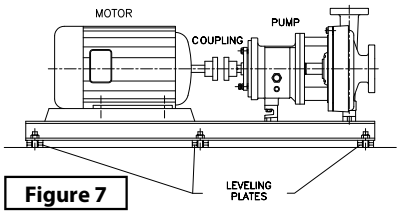


Figure 7

Alignment procedure

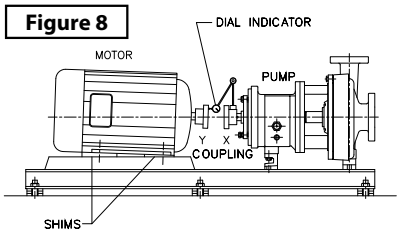
Initial alignment: this is done before putting into operation the pump and is divided into three stages:

- 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.

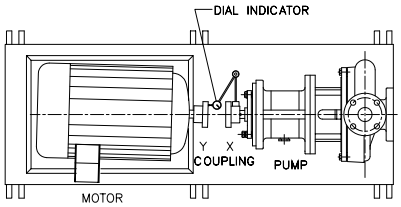
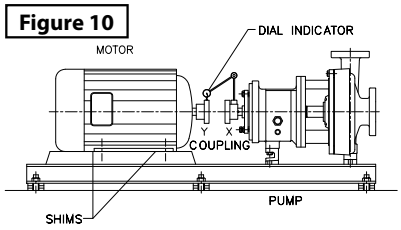


Figure 9

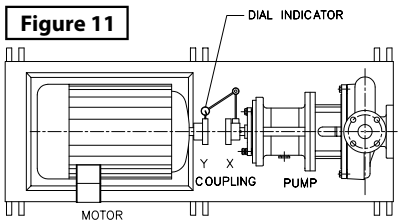
Parallel alignment.
Vertical: Consist of installing a dial indicator (see Figure 10) in the top half of the coupling "X" leaving it fixed, and four cardinal points in the half of the "Y" coupling are inspected. If readings exceed 0.002" (0.05mm), means that the motor is offset from the top down, install 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

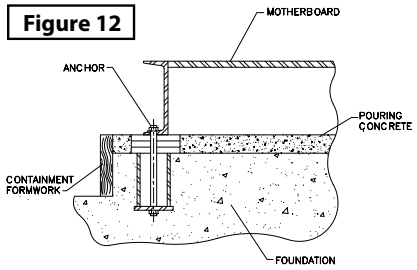
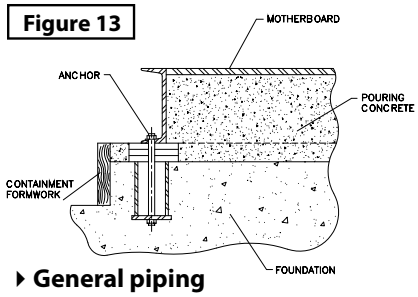


Figure 13



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

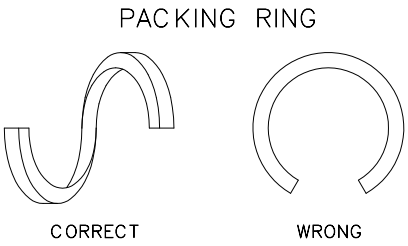
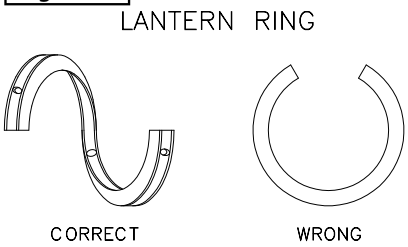


Figure 15



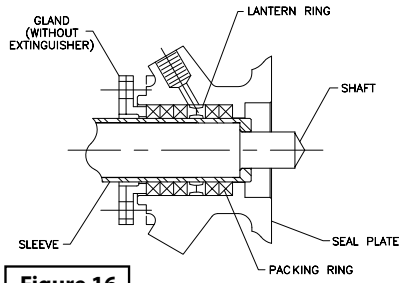


Figure 16

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

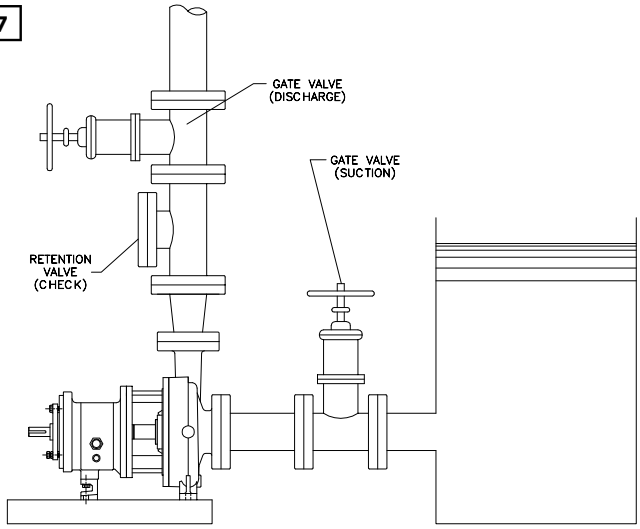


Figure 18

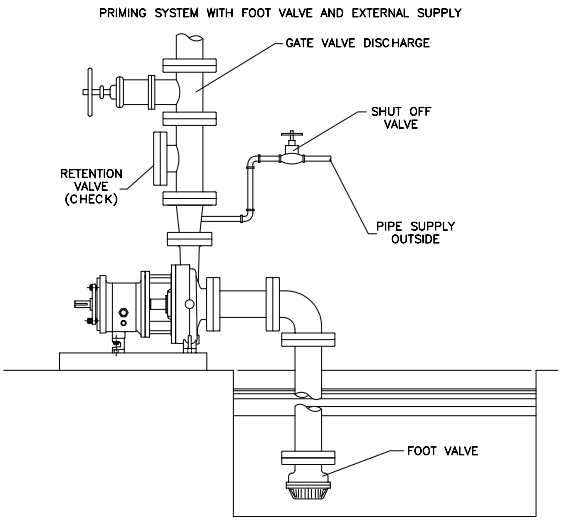
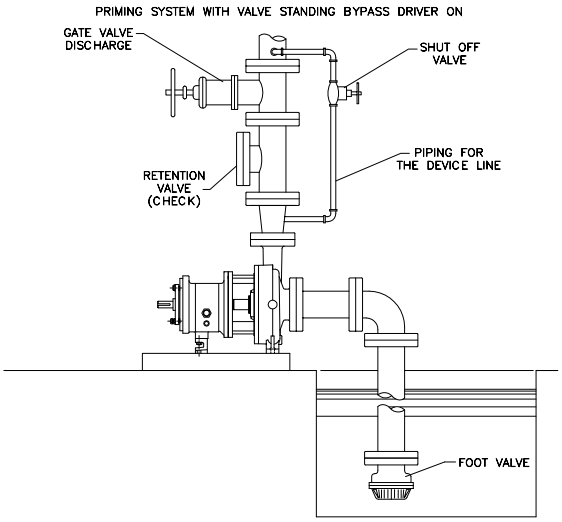


Figure 19



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

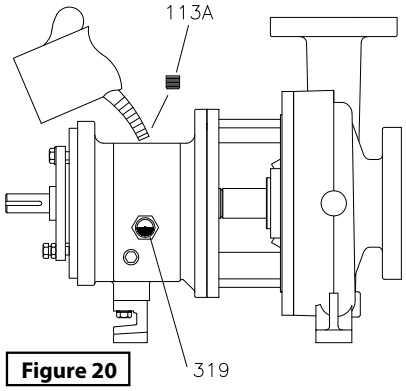


Figure 20

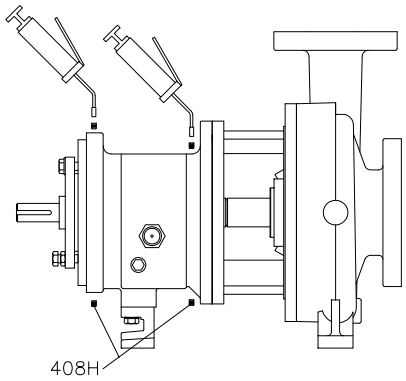


Figure 21

Grease lubricated bearings

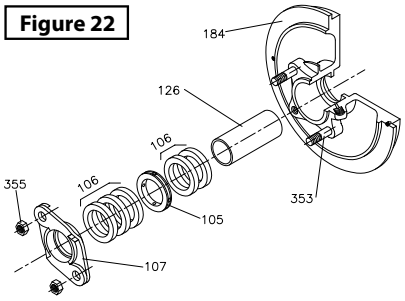
1. Clean and wipe out all elements such as: the grease container, relief plugs, etc. to prevent dirt from entering the bearing support.
2. Fill both grease cavities through the greased ducts until fresh grease comes out the relief holes.
3. Reinstall relief plugs in place.

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

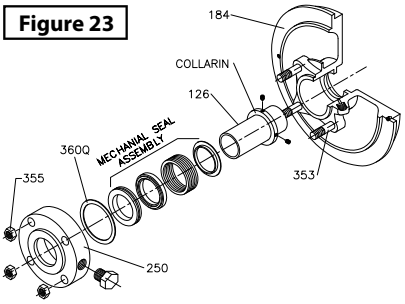


Mechanical seal

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.

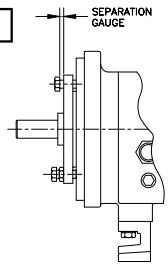
Impeller clearings adjustment

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

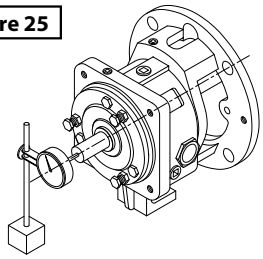


Dial indicator method

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.

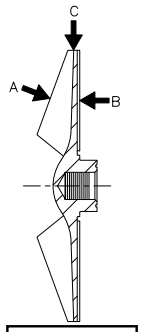


Figure 26

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).

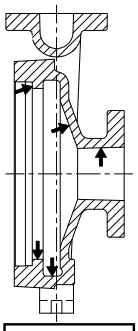


Figure 27

Adapter:

- When inspecting the adapter, you should check for any cracks or excessive corrosion damage, must be replaced (see Figure 28).

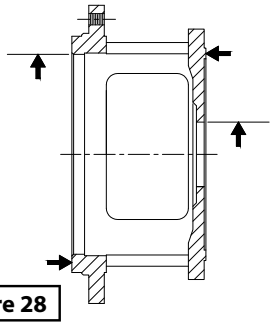
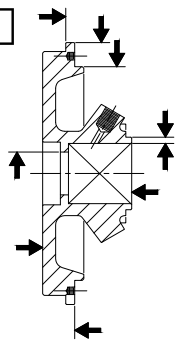


Figure 28

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).

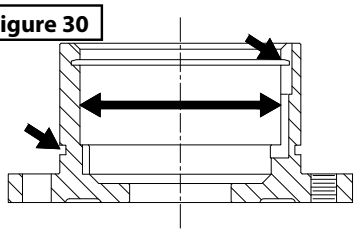
Figure 29



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.

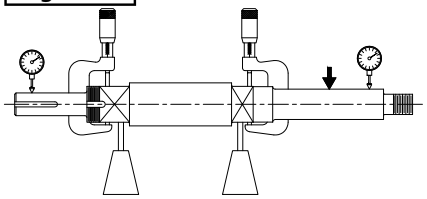
Figure 30



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).

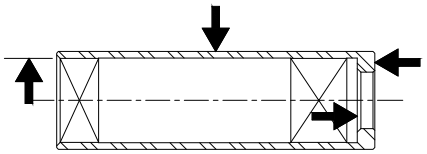


Figure 32

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.

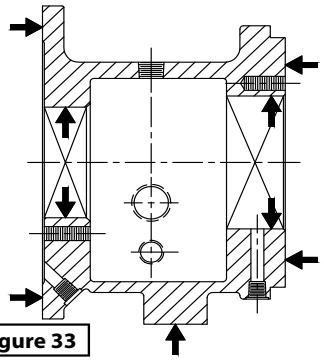


Figure 33

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.

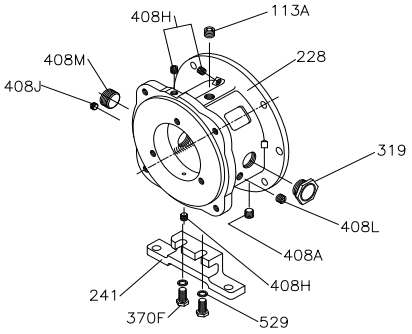


Figure 34

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

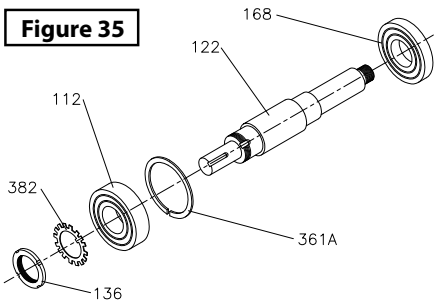


Figure 36

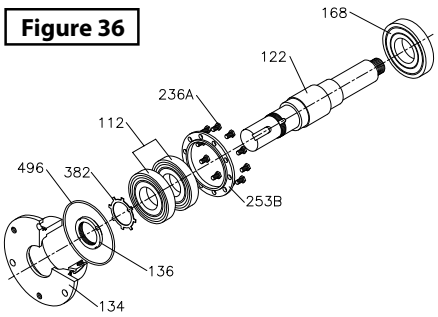
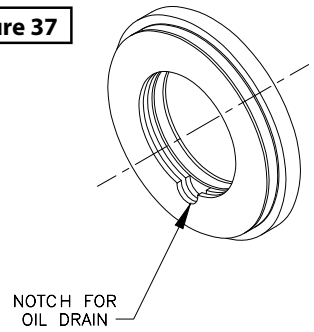


Figure 37



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.

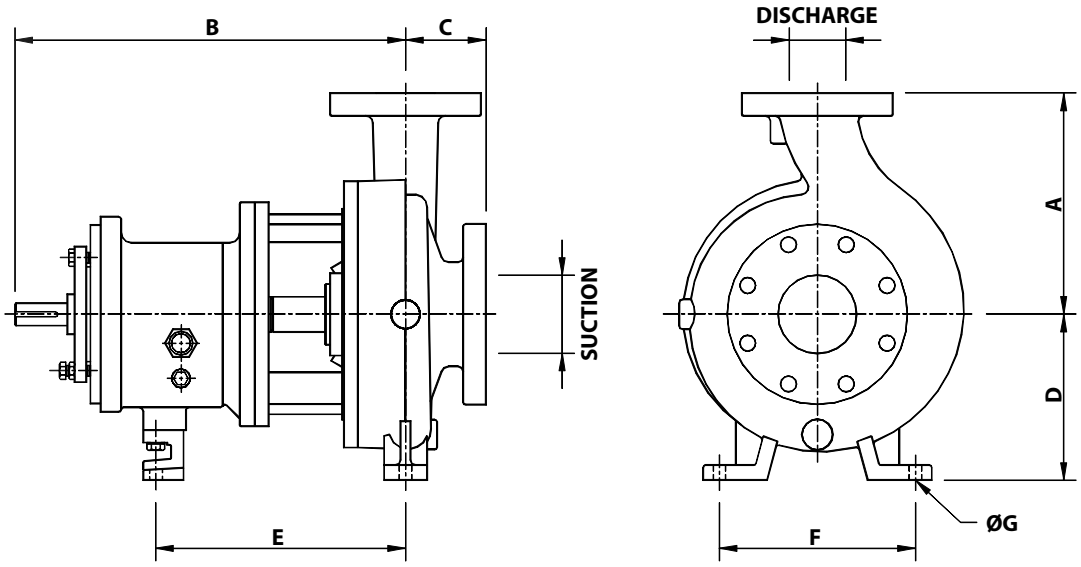
8.- Verify perpendicular and eccentric impeller adjustments, with a dial indicator, checking the 360° between the tips of each blade, if the readings are higher than 0.005" (0.13 mm), remove the impeller and determine the cause.
9.- Mark the sleeve on the outer face, this will serve as a reference when 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).

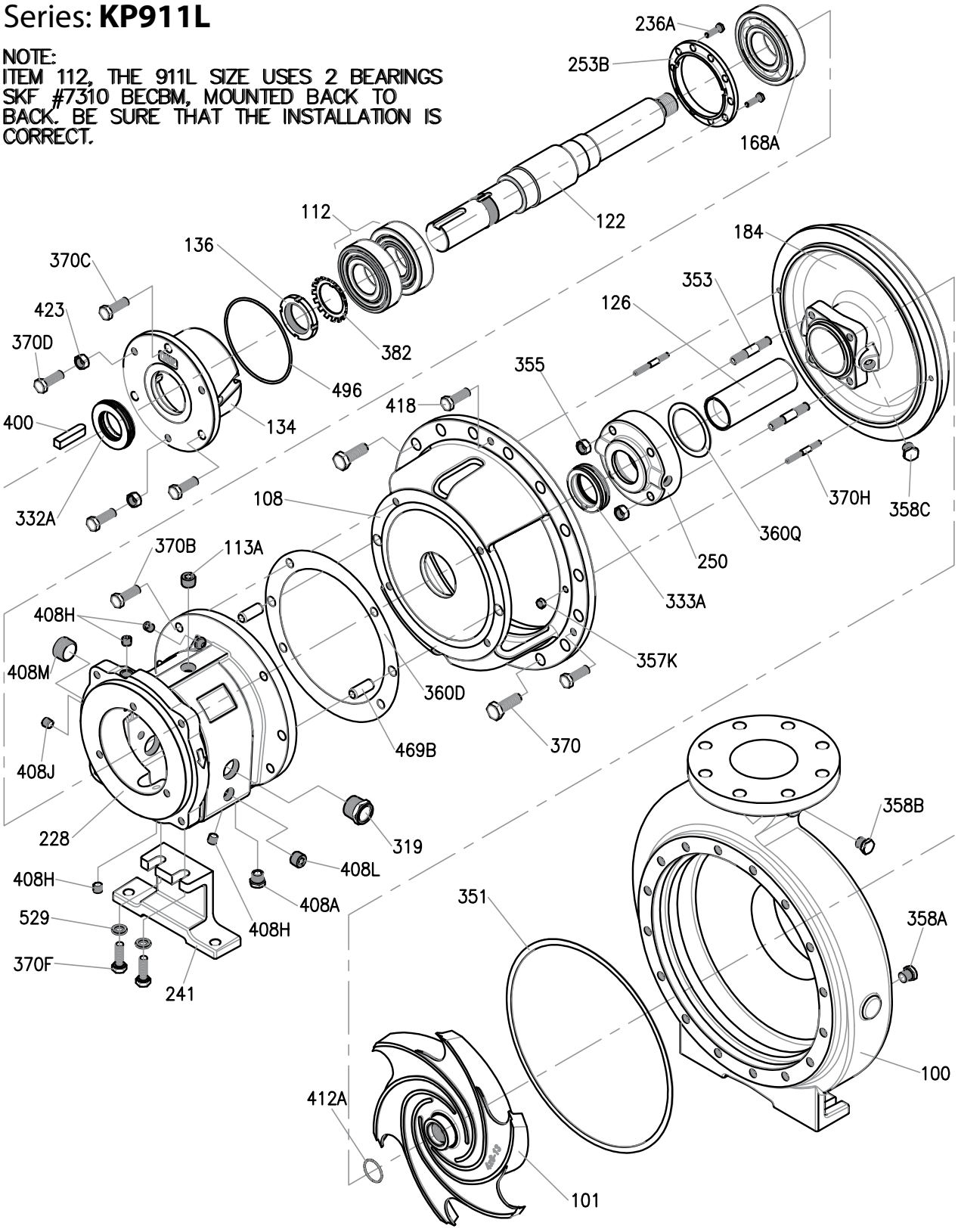


MODEL	PUMP SIZE	ANSI DESIGNATION	DISCHARGE DIAM.	SUCTION DIAM.	A	B	C	D	E	F	ØG HOLES	APROX. WEIGHT (kg)
KP911S	1 x 1.5 - 6	AA	1	1.5	6.5"	13.5"	4"	5.25"	7.25"	6"	0.625"	38
	1.5 x 3 - 6	AB	1.5	3								42
	2 x 3 - 6	-	2	3								43
	1 x 1.5 - 8	AA	1	1.5							0.563"	45
	1.5 x 3 - 8	AB	1.2	3								49
KP911M & 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

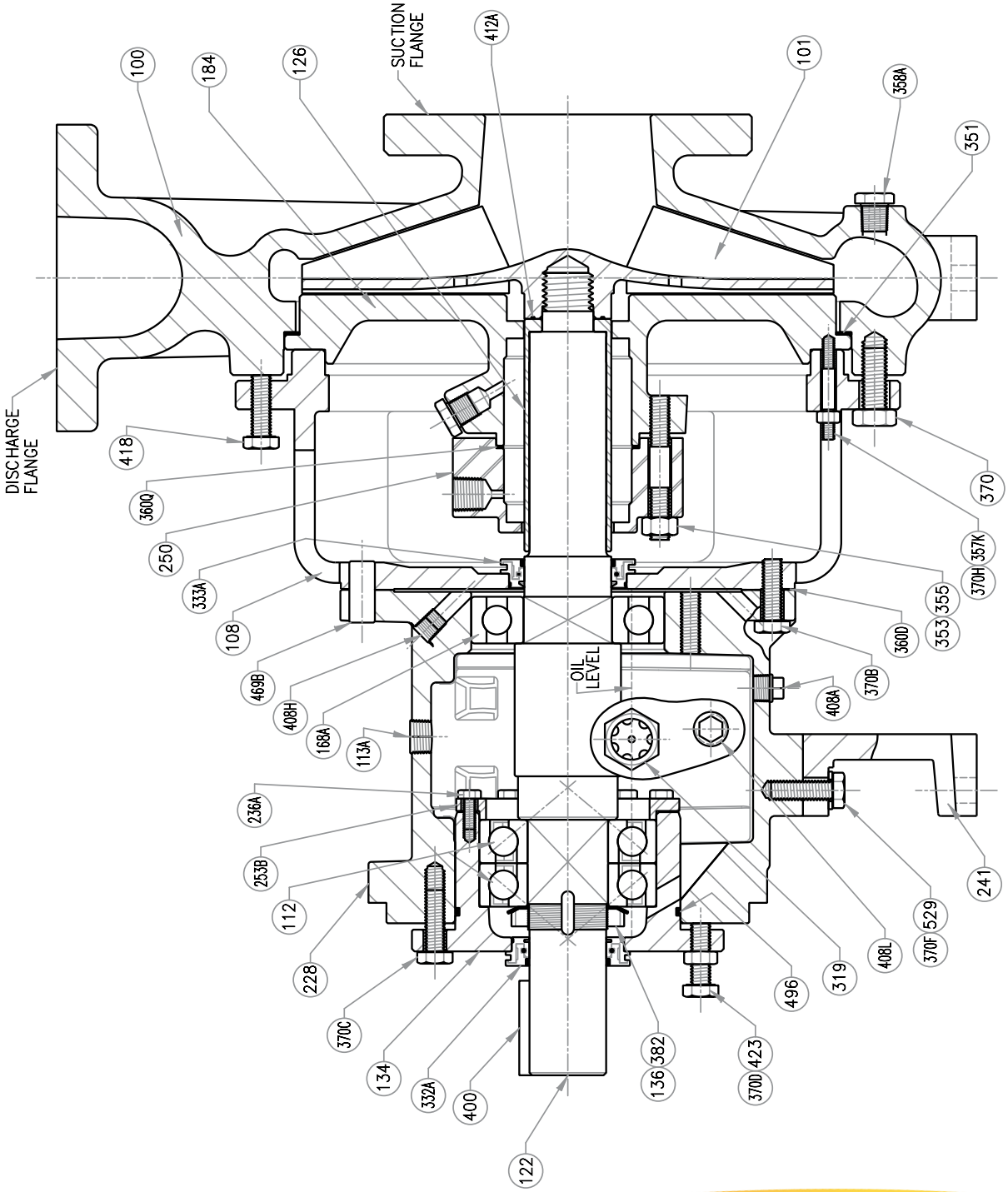
Series: **KP911L**

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

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.