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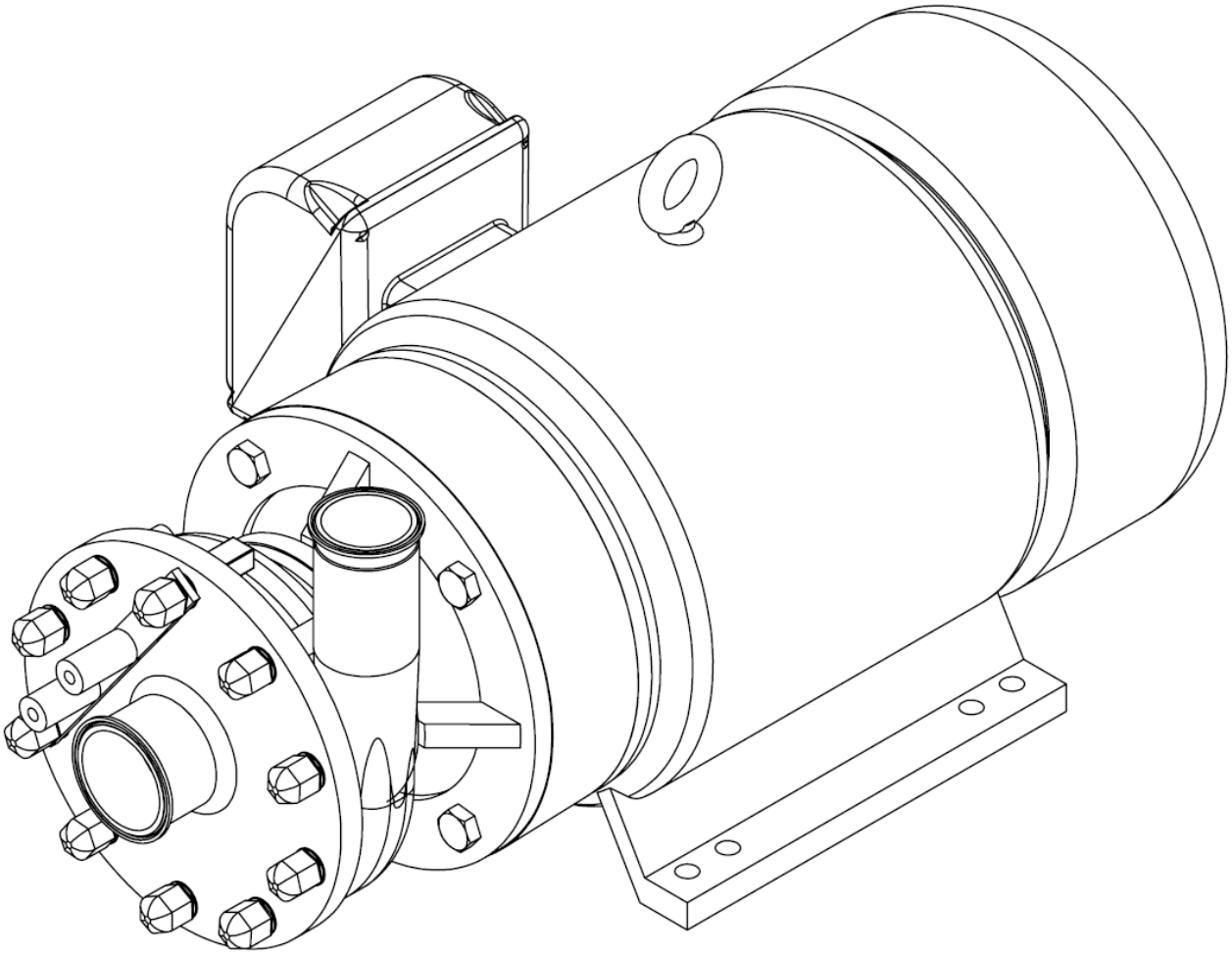
Ampco Pumps

LH Series Pump (High Pressure pump line)

Instruction & Maintenance Manual
For LH 532, 542, and 552 model pumps



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TECHNICAL DATA

SPECIFICATIONS

MAXIMUM INLET PRESSURE ..... 600 PSI
TEMPERATURE RANGE ..... -40° F —> 400° F/ -40° C – 204° C

MATERIALS OF CONSTRUCTION

Casing ..... AISI 316L STAINLESS STEEL
Cover ..... AISI 316L STAINLESS STEEL
Impeller ..... AISI 316L STAINLESS STEEL
Shaft Sleeve ..... AISI 316L STAINLESS STEEL
Seal Driver ..... AISI 316L STAINLESS STEEL
Adapter ..... AISI 304 STAINLESS STEEL
PRODUCT CONTACT SURFACE FINISH ..... 32Ra (standard)
Optional Finishes ..... 25Ra, 20Ra, 15Ra, ELECTRO POLISH
0-RINGS & GASKETS ..... EPDM (standard)
Optional Materials ..... VITON, BUNA (others per request)

SEAL

Type ..... INTERNAL SINGLE MECHANICAL
Optional ..... LIP SEAL
Pressure (lip seal flush) ..... < 1 BAR / 14.5 PSI
Water Consumption (lip seal flush) ..... 4-8 GPH
Stationary Seal Material ..... SILICON CARBIDE
Optional Material ..... TUNGSTEN
Rotating Seal Material ..... SILICON CARBIDE
Optional Material ..... CARBON

MOTOR

BALDOR SPECIAL JM NEMA FRAME HIGH THRUST BEARING MOTOR

VOLTAGE AND FREQUENCY

3 PHASE, 50 HZ, 208-220/330-415 VAC 2900RPM
3 PHASE, 60 HZ, 208-220/460 VAC 3500RPM
3 PHASE, 60 HZ, 575 VAC 3500RPM

RECOMMENDED TORQUE VALUES

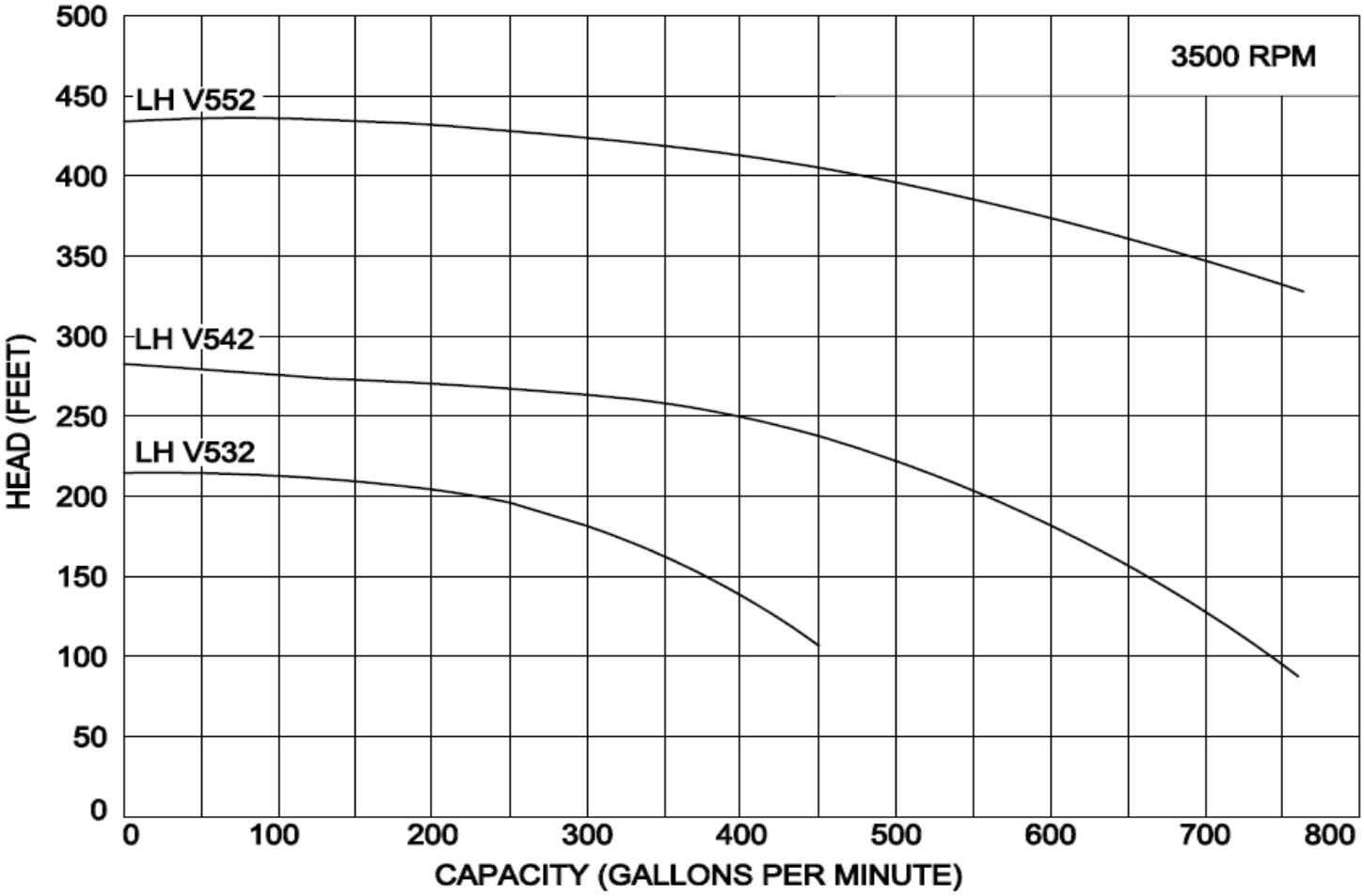
Impeller nut ..... 40ft-lbs.
Cover Nuts ..... 105ft-lbs.

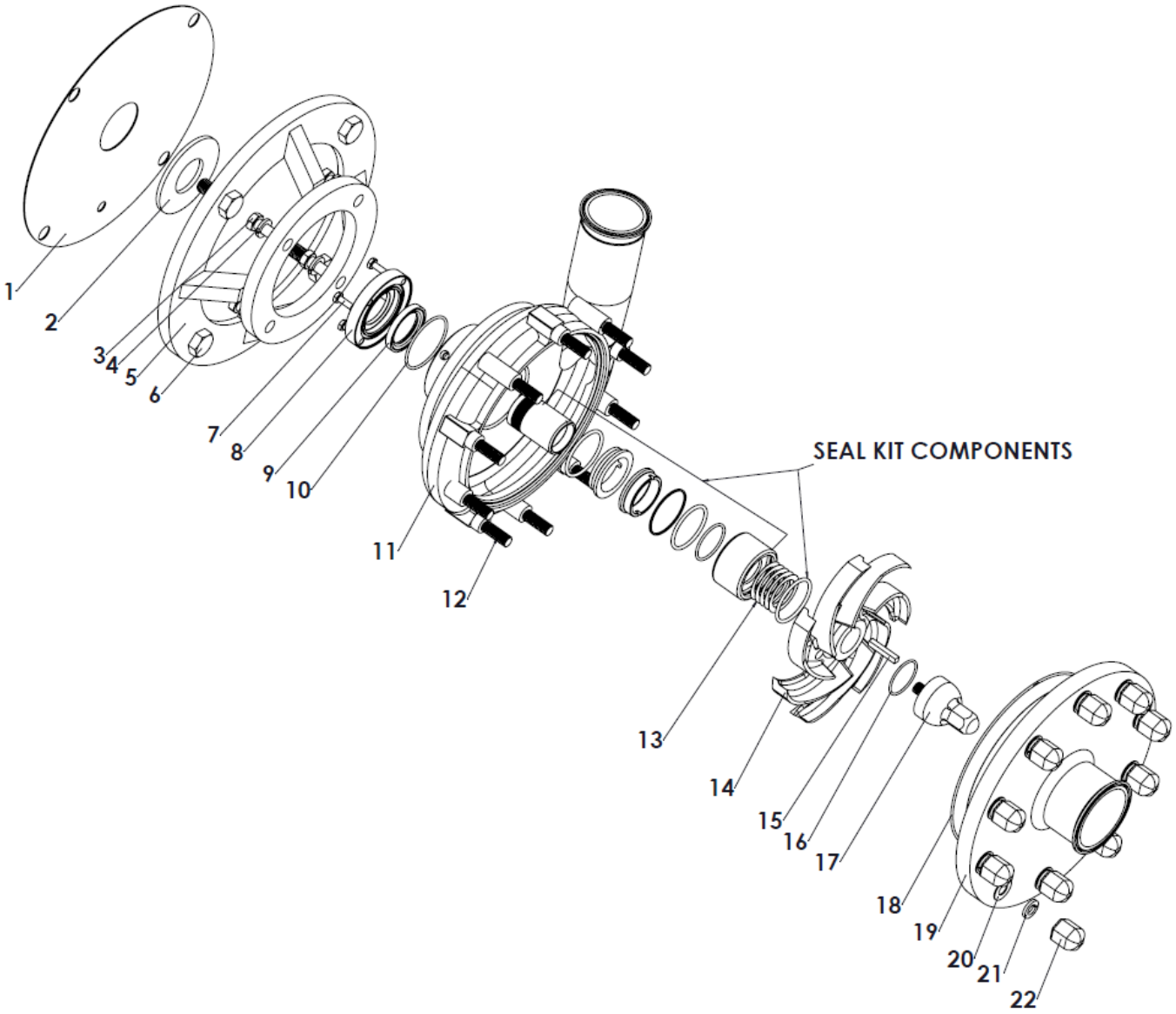
IMPELLER GAP 0.040"

LH SERIES SUMMARY CURVE

Composite Performance Curve: 3500 RPM

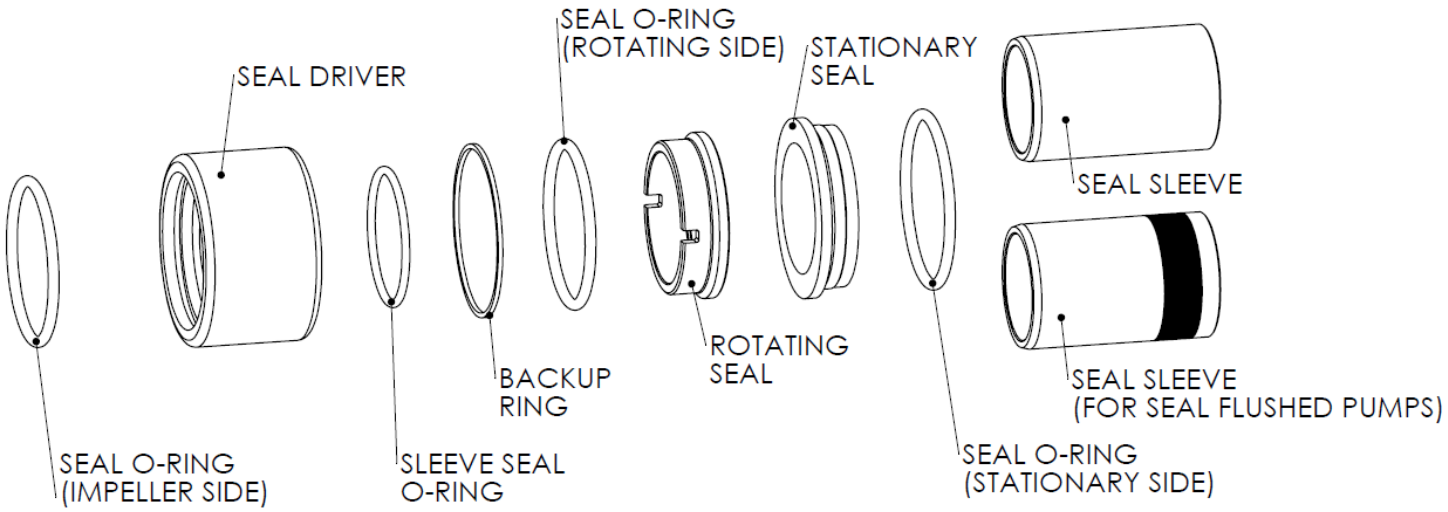
Performance curves are based on pumping water.
A tolerance of +/- 5% applies to all figures



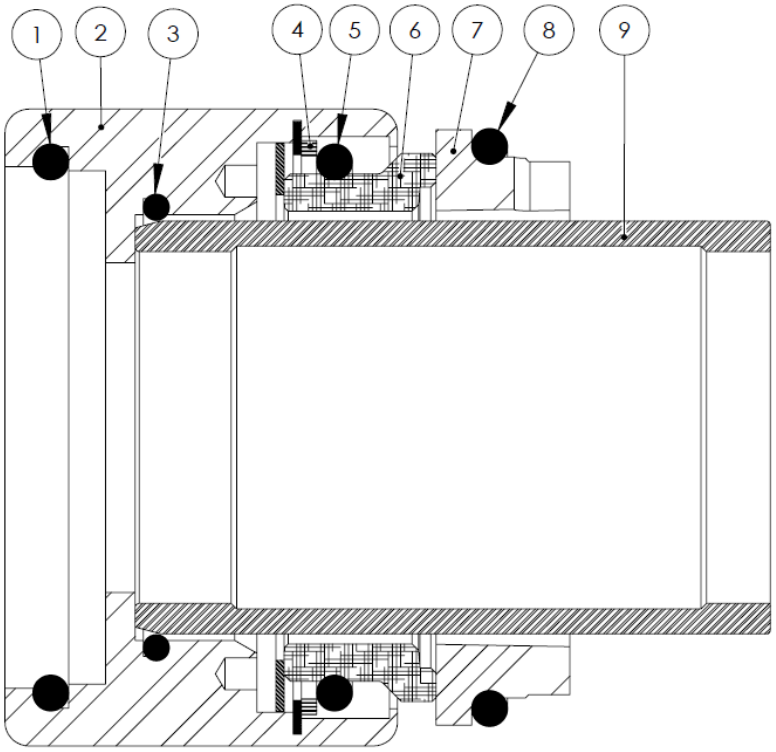


1 SPLASH PLATE	12 CASING STUD
2 SLINGER	13 IMPELLER SCREW SHIMS
3 HEX BOLT (M12-1.75 x 30mm)	14 IMPELLER
4 LOCKWASHER	15 KEY (for LH pumps)
5 ADAPTER	16 IMPELLER SCREW GASKET
6 5/8 HEX HEAD BOLT	17 IMPELLER SCREW
7 CAP SCREW (1/4-28 x 3/8")	18 GASKET (cover)
8 GLAND	19 COVER
9 LIP SEAL	20 FLATWASHER
10 GLAND O-RING	21 LOCKWASHER
11 CASING	22 COVER NUT

LH-SERIES MECHANICAL SEAL



LH-SERIES MECHANICAL SEAL SECTION



NO.	PART DESCRIPTION
1	SEAL O-RING IMPELLER
2	SEAL DRIVER
3	SLEEVE SEAL O-RING
4	BACKUP RING
5	SEAL O-RING (ROTATING SIDE)
6	ROTATING SEAL
7	STATIONARY SEAL
8	SEAL O-RING (STATIONARY)
9	SEAL SLEEVE

SERVICE MAINTENANCE AND SCHEDULING

DAILY PUMP MAINTENANCE CHECKS

1. Pump leakage (seal or otherwise)
2. Pressure reading and flow indication
3. Change in operating sound
4. Change in bearing temperature
5. Flow through lip seal lines

Motor lubrication schedule:
Every 2200Hrs of standard service.
Every 1100Hrs of severe service.
Every 220Hrs of extreme service.

Standard service is 8-16 hours of service and up to 104ºF/40ºC in a clean/little corrosion atmospheric contamination.

Severe service is 16+ hours of service per day up to 120ºF/50ºC in a moderate dirt/corrosion atmospheric contamination.

Extreme service is 8-16 hours of service per day over 120ºF/50ºC in a severe dirt, abrasive dust, corrosive heavy shock or vibration environment.

SEMI-ANNUAL PUMP MAINTENANCE CHECKS

1. Mechanical seal assembly
2. Motor bearing lubrication

ANNUAL PUMP MAINTENANCE CHECKS-INCLUDES SEMI-ANNUAL MAINTENANCE CHECKS PLUS:

3. Remove seal for inspection
4. Bearing check
5. Check of axis/running clearance of impeller

CONTINGENCY PLAN

FOR INSPECTION FINDINGS AND BREAKDOWNS, AN ADEQUATE SUPPLY OF PROBABLE REPLACEMENT PARTS SHOULD BE KEPT ON HAND.

THE MININMUM SPARE PARTS ARE AS FOLLOWS:

1. Single mechanical seal kit
2. Cover gasket
3. Impeller key

IN ADDITION AMPCO RECOMMENDS

4. Impeller
5. Impeller screw

Where service cannot be interrupted, a complete stand-by pump unit fully assembled (in a by-pass line) is recommended.

LH PUMP INSTALLATION

Receiving pumps:

Visually inspect shipping crate(s)/pallet(s) for damage. Ampco pumps will be shipped in boxes labeled Ampco Pumps or in crates. If there is any damage it is imperative to notify the driver at the time of delivery. Failure to do so will make it difficult, if not impossible, to file a damage claim and Ampco Pumps will not be held accountable. Please contact Ampco Pumps shipping department with damage details ASAP.

Once unpacked, carefully inspect the pump for any damage that may have occurred during shipping. Using a 15/16" socket, an extension drive and ratchet turn the impeller nut to make sure the impeller turns freely. There should be a little noise from the seal which is normal. If there is metal to metal contact when the impeller is turned shipping damage is likely. Leave the protective covers on the inlet and discharge connections until the pump is installed and is ready to be connected to piping.

Pump location:

Install pump in an optimal location. Be sure that there is room around the pump so it can be accessed readily for maintenance. Ensure that the motor has adequate ventilation. Make sure the motor type is suitable for the environment in which it is installed.

Electrical installation:

Have a qualified electrician connect the motor using sound electrical practices. Do not test run the motor with the pump dry. Mechanical seals can be damaged running dry even momentarily. The pump must be flooded and the flush must be connected with flushing water flowing before starting the pump. The pump and motor has been selected for a specific environment and system application. Changing the environment or system conditions (i.e. change of fluid, change in head losses, change in NPSHr) can overload the motor. When changing system conditions or when in doubt, contact Ampco Pumps Company for technical assistance and someone will be ready to assist.

Flush for lip seal:

Install flush piping as shown in figure 23. The regulating valve must be on the inlet end of the flush. The flush requires 4-8 gallons per hour at 1 BAR or 14.5 PSI. The tubing on the exit side of the flush has a least 2 ft of height so once the flush has ran there will be a small amount of water on the seal and it will not run dry. Direction of flow should always be from a lower elevation inlet to a higher elevation outlet to evacuate air.

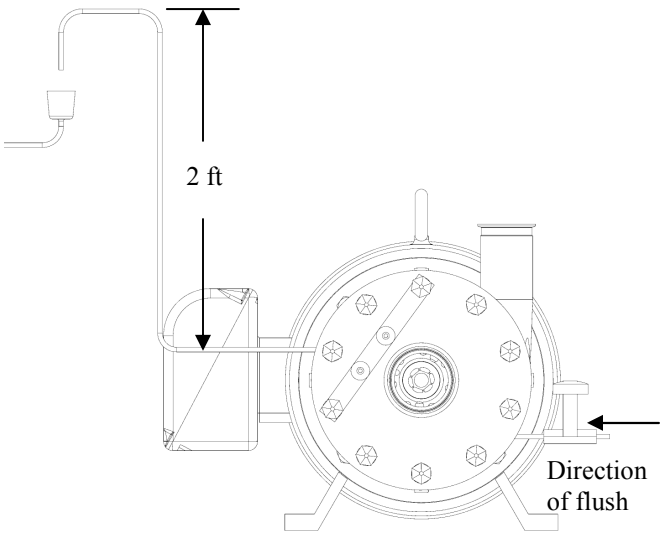
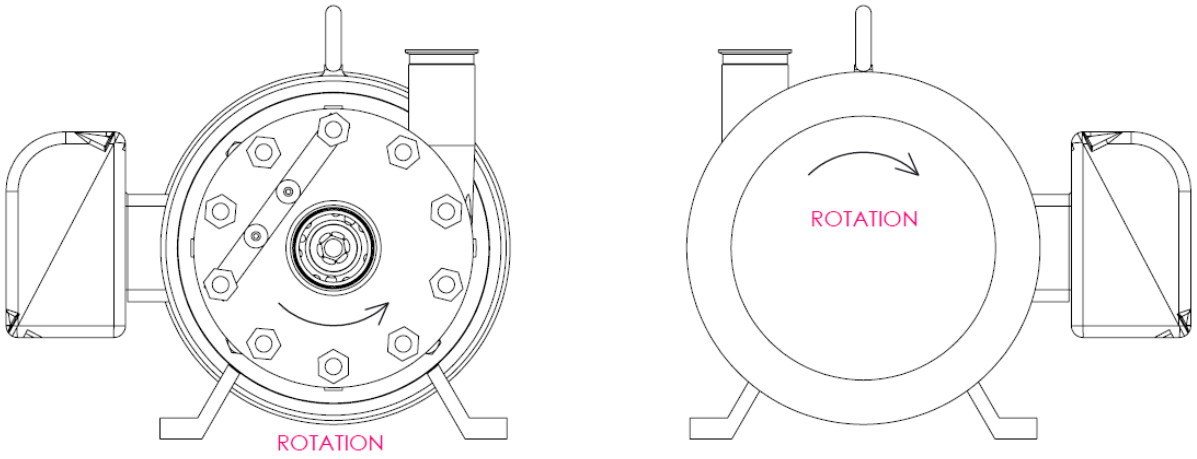


Figure 23

Pump operation:

Make sure the pump is clean and free of any foreign matter.

Once the motor, flush and piping all have been properly connected, the flush is turned on and is visibly flowing (if the pump has a flush option) and the pump has been flooded, the pump can be momentarily turned on to check the motor rotation. The correct rotation is counter-clock wise while looking at the pump from the suction end clock wise if looking at the pump from the motor end.



SUCTION END MOTOR END

When the rotation of the motor has been verified to be correct the pump is ready to run continuously for service.

Shut down instructions:

Turn off power supply to the pump.
Close shut-off valves.
Drain and clean pump.

PUMP DISASSEMBLY AND SEAL REMOVAL

<u>ATTENTION!</u> BEFORE ATTEMPTING ANY SEVICE ON ANY PUMP OR MOTOR, DISCONNECT OR LOCKOUT ELECTRICAL POWER TO THE PUMP MOTOR. IF THE PUMP AND MOTOR ARE TO BE REMOVED AS A UNIT, NOTE THE WIRING AND CONFIGURATION. USE COLORED OR NUMBERED TAPE TO MARK THE WIRE CONNECTIONS OF THE PUMP MOTOR AND POWER SOURCE, FOR RE-CONNECTION.

TOOLS REQUIRED TO DISASSEMBLE AND REMOVE SEAL

1-1/4" wrench 15/16" socket wrench
90 degree o-ring pick 0.040" feeler gage
impeller stop tool (one provided with pump).

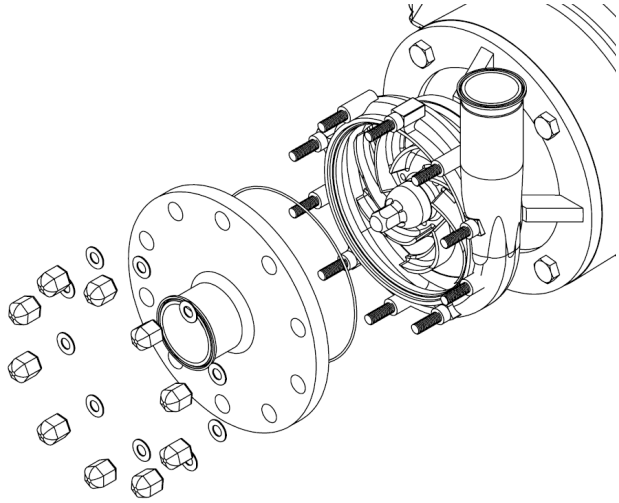


Figure 1

1. Disconnect electrical power to the pump motor and follow any lockout / tag-out procedures in place at your facility.

2. Disconnect pump from the suction piping. Drain all fluids from the pump.

3. Loosen cover nuts with a 1-1/4" wrench. Remove cover nuts, flat washers (if provided), lock washers (if provided), cover and cover gasket. See figure 1.

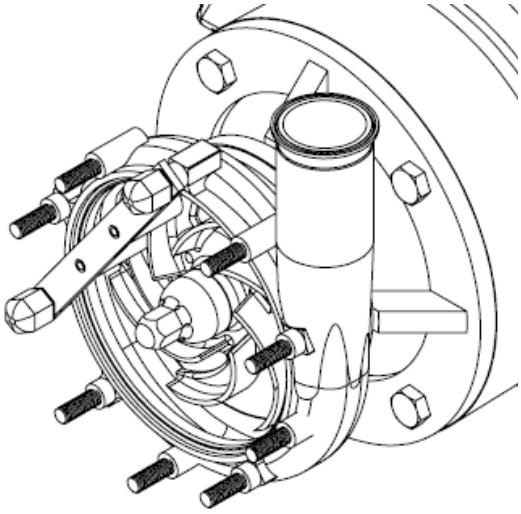
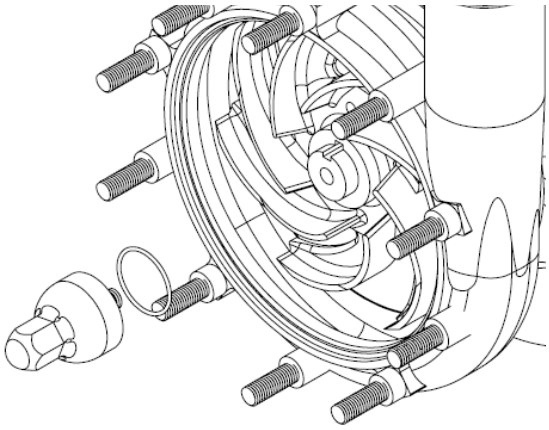


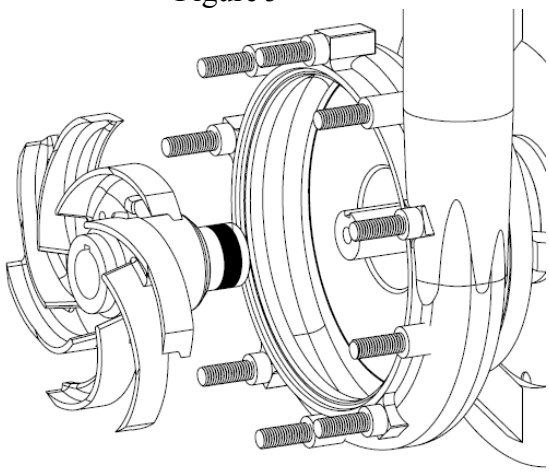
Figure 2

4. Place impeller stop tool over casing studs though the two holes in both ends of the tool as shown in figure 2. Rotate the impeller so a vane of the impeller is between the impeller stop tool's bronze pegs. Use two (2) cover nuts to hold the stop tool in place to securely hold the impeller and shaft. See figure 2. Loosen the impeller screw turning a 15/16" wrench counterclockwise.



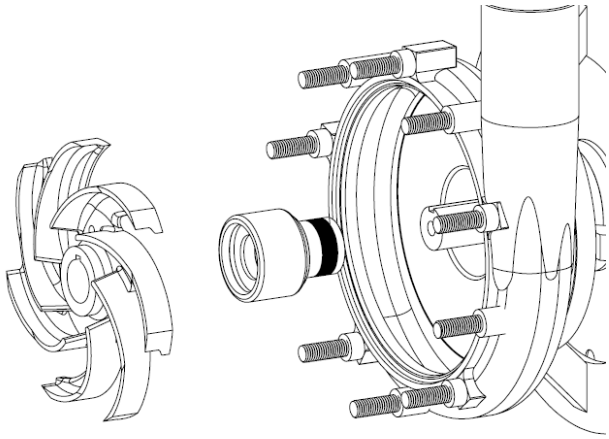
5. Once the impeller nut has been loosened, the impeller stop tool may be removed. Remove the impeller nut and the nut gasket. This process can be seen in Figure 3.

Figure 3



6. Remove impeller. The seal driver and rotating parts of the seal will come off the motor shaft and adhere to the hub of the impeller. The key will fall into the bore of the impeller. Figure 4.

Figure 4



7. Pull seal driver off the back of the impeller. Figure 5.

Figure 5

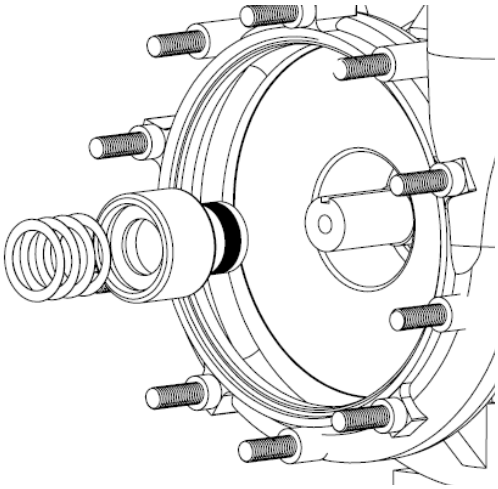


Figure 6

8. There will be a number of thin spacers located between the impeller and seal driver. Figure 6. These spacers give the appropriate impeller gap. When the seal assembly is being removed from the impeller, extra **CAUTION** should be taken to avoid losing the spacers. The loss of these spacers will result in an inaccurate gap between the impeller and the casing. Once the seal assembly and impeller are separated, place the impeller on a clean flat surface with the blades facing down.

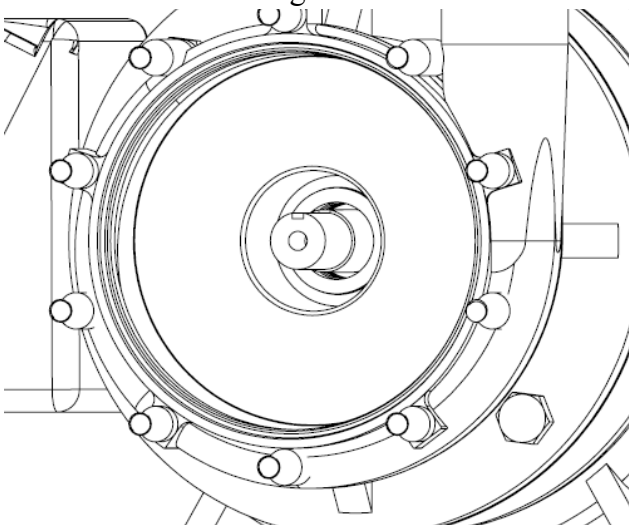


Figure 7

9. The stationary half of the seal will stick inside the casing. To remove this half of the seal use an o-ring pick. Carefully pull on the back of the seal alternating sides to avoid cocking the seal the casing. Figure 7.

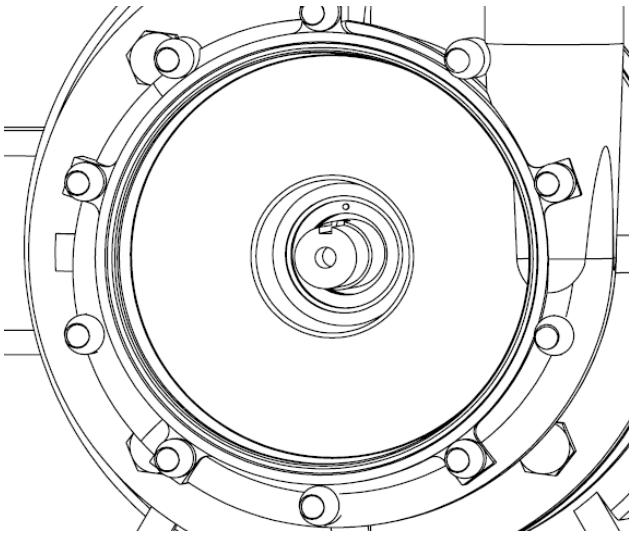


Figure 8

10. Check the condition of the casing and seal locating pin. Clean and remove any foreign matter before installing the seal.

PUMP ASSEMBLY AND SEAL INSTALLATION

LH-SERIES MECHANICAL SEAL

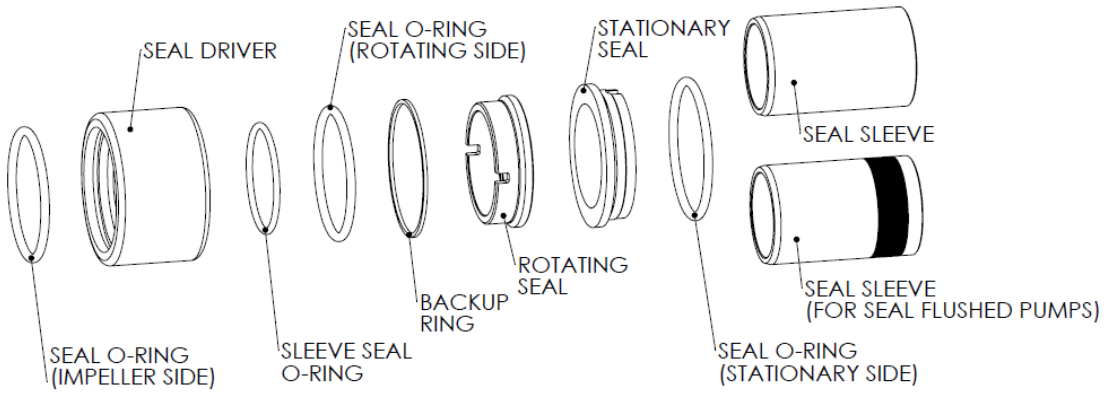


Figure 8

When replacing the seal assembly make sure that you use all of the components supplied with the replacement seal kit. Figure 8. Failure to do so may result in reduced seal life.

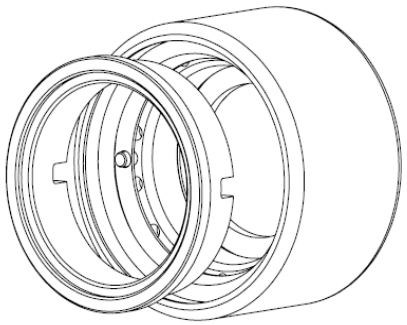


Figure 9

1. Use a food grade lubricant to lubricate all o-rings. The seal driver should have the rotating seal o-ring (impeller side), sleeve seal o-ring, Teflon ring and the rotating seal o-ring already assembled. It is important that the rotating seal o-ring is lubricated to ease assembly.

2. Slide the rotating seal into the seal driver making sure to align the pins inside the driver with the slots on the seal. Figure 9. Push the rotating seal half into the seal driver a few times watching the pins fit into the slots of the rotating seal while compressing the seal driver springs. Figure 10.

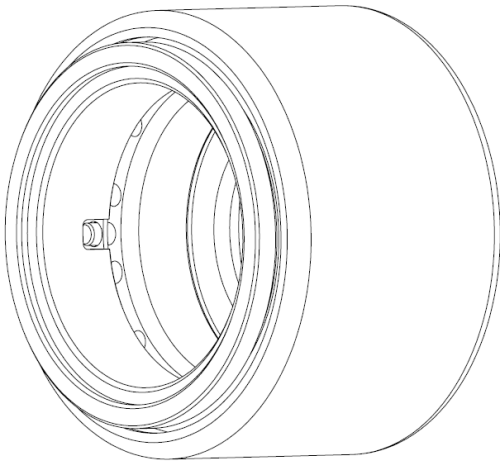
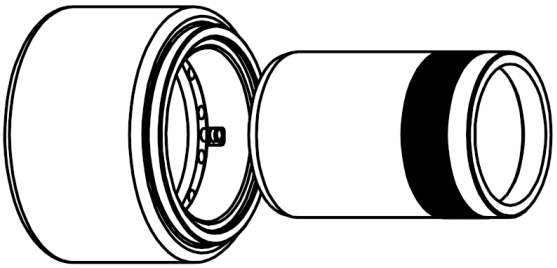
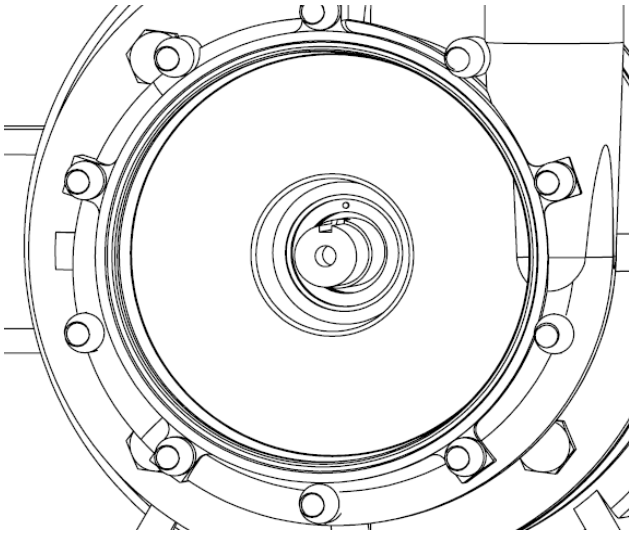


Figure 10



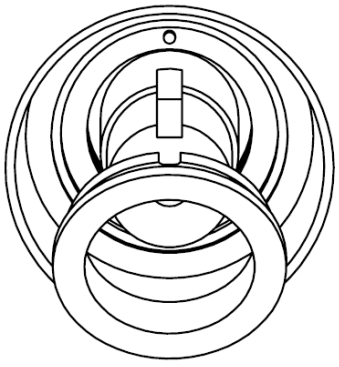
3. Slide the chamfered end of the seal sleeve into the seal driver assembly as seen in Figure 11. If your pump does not come with a seal flush the shaft sleeve will not have a coated band at the opposite end of the sleeve.

Figure 11



4. Rotate the motor shaft so the keyway is on top (at the 12:00 position) so that the key way is inline with the seal pin. Figure 12.

Figure 12



5. Line up the slot on the stationary seal with the keyway of the motor shaft so that the slot on the stationary seal aligns with the pin inside of the pump casing. Figure 13. Carefully slide the stationary seal half over the motor shaft and push the seal into its cavity.

Figure 13

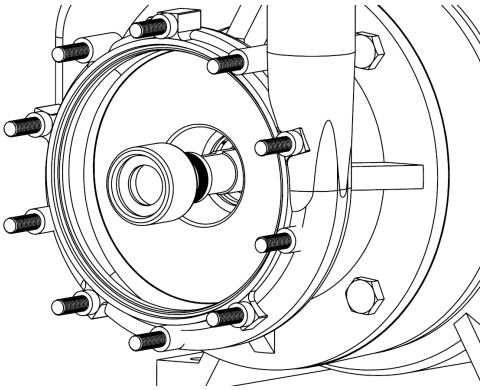


Figure 14

6. Slide seal driver assembly over shaft. Figure 14. The sleeve will pass through the stationary half of the seal that is already in the casing, through the lip seal and gland (for pumps with a seal flush) and butt up against the shoulder of the motor shaft. Figure 15.

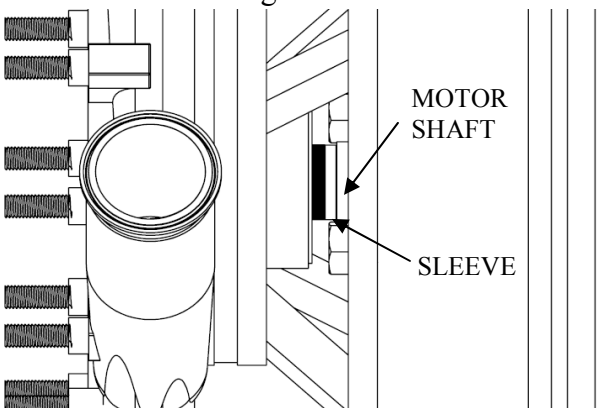


Figure 15

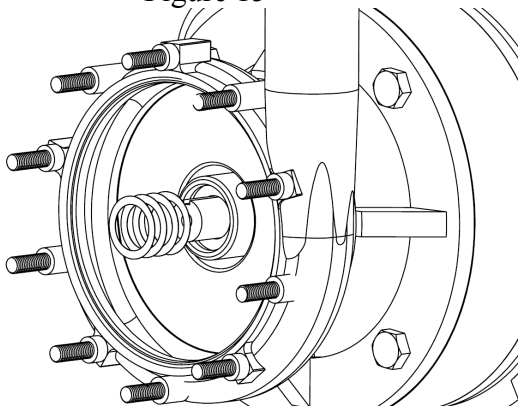


Figure 16

7) <u>IMPORTANT!</u> Once the seal assembly is installed the impeller spacers must be slid over the shaft and into the cavity of the seal driver. Figure 16.

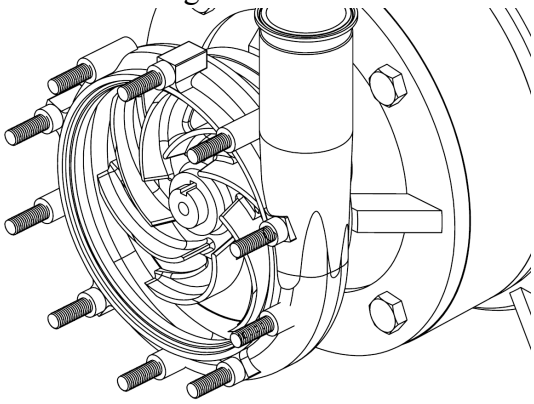
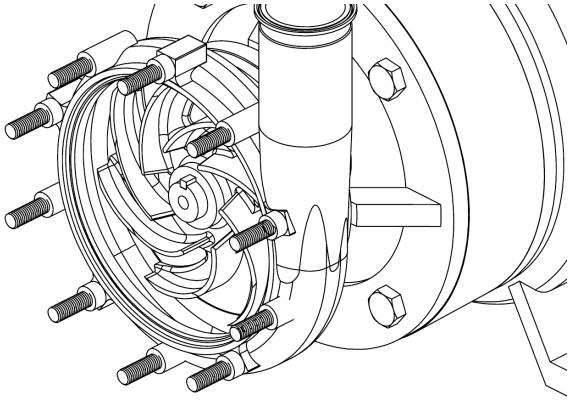


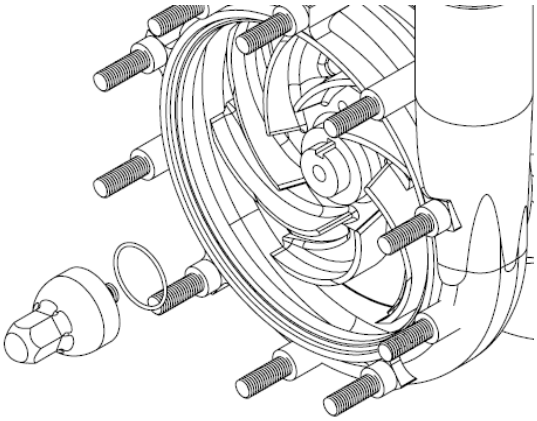
Figure 17

8. Install the impeller. Slide the impeller onto the shaft making sure to align the keyway in the impeller with the keyway in the shaft. Push the impeller into the seal driver. Figure 17.



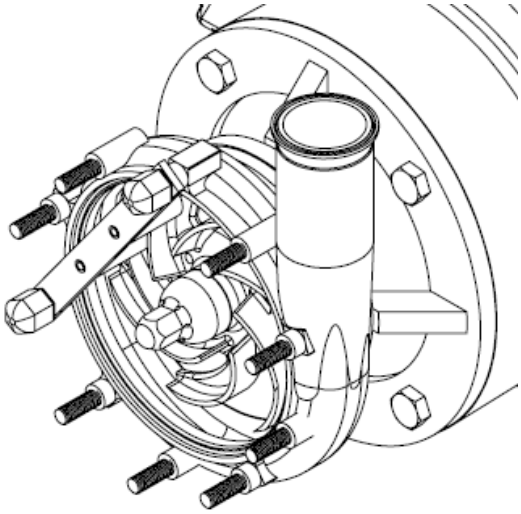
9. Once the impeller is on, insert the key into the keyway of the motor shaft and impeller. Figure 18.

Figure 18



10.Lubricate the impeller screw gasket and place it on the impeller screw. Start to thread the impeller nut onto the motor shaft by hand.
Figure 19.

Figure 19



11. Put the impeller stop tool over two casing studs as shown to hold the impeller while tightening the impeller screw. Torque the **15/16"** impeller screw to 40 ft-lbs. Figure 20.

Figure 20

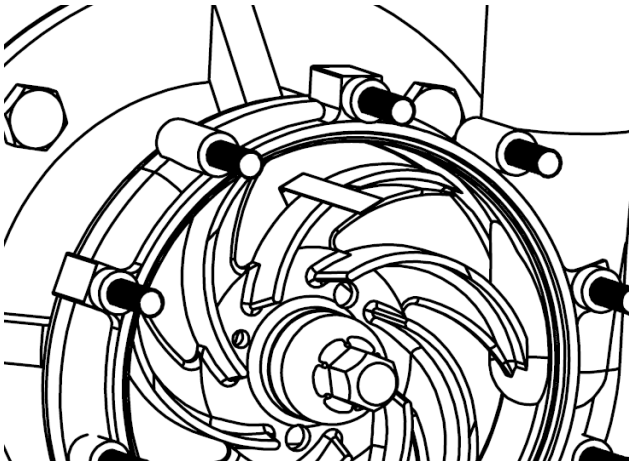


Figure 21

12. Remove the impeller stop tool and rotate the impeller to make sure that it moves freely.

13. Slide a feeler gauge between the impeller and the casing to ensure that the clearance is still set from the factory (feeler gauge thickness should be 0.04") as seen in figure 21.

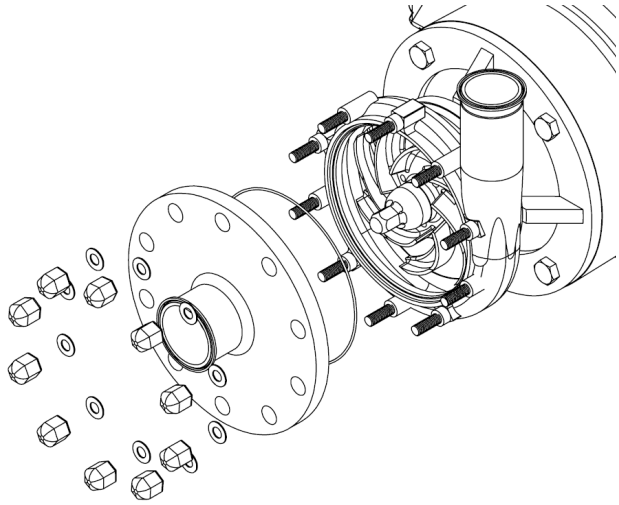


Figure 22

14. Put the cover gasket on the cover. Install the cover on to the casing. Install flat washers and cover nuts on to the pump. Tighten the cover nuts first by hand then torque the nuts to 45 ft-lbs. Reattach the suction and discharge piping and set the pump back up for operational use.

WARNING: Mechanical seal must never run dry. Seal damage will result.

Sound piping practices

Suction and discharge piping must be properly supported and aligned with the pumps suction and discharge ports.

Avoid throttling valves in the suction line of the system.

Check valves must be at a minimum of 5feet from the pump's discharge. Figure 23.

Keep the suction piping short and direct as possible. Avoid elbows in the suction line of the system. If this is unavoidable, locate the elbow as least 5 pipe diameters away from the pumps inlet and elbows should not have a radii less than twice the diameter of pipe. Figure 23.

Make sure that the NPSH available is always greater than the system's NPSH required.

Avoid bending piping over piping as this will cause the formation of an air pocket in the suction line. Figure 24. Route piping under any obstructions whenever possible. Figure 25.

When using a reducer on the suction end the reduced centerline should not be below the suction centerline as in figure 26. The centerline of the small diameter end of the reducer should be above the centerline of the suction line as in figure 27.

Injection line angles should be 45º or less. Figure 28.

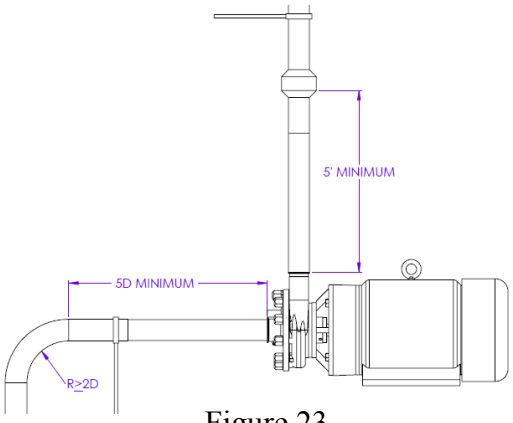


Figure 23

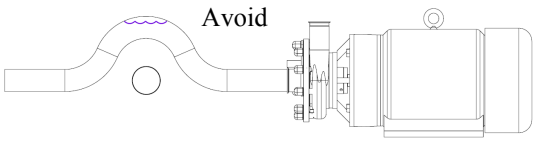


Figure 24

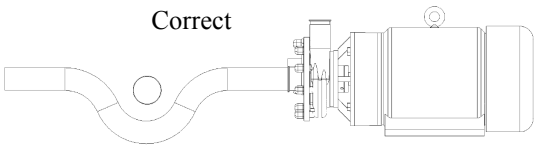


Figure 25

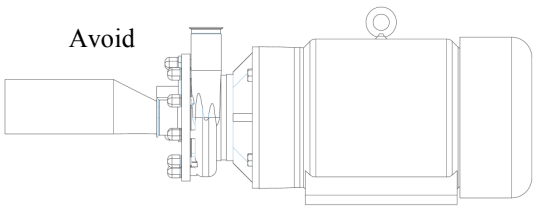


Figure 26

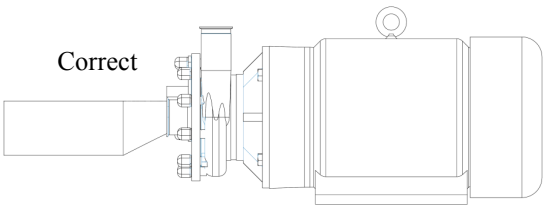


Figure 27

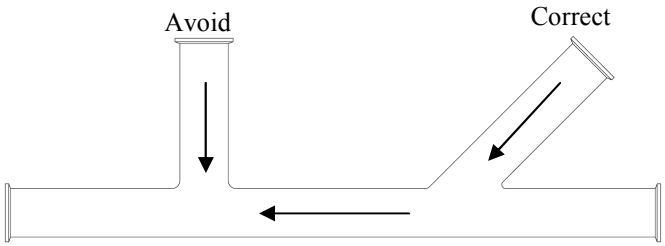


Figure 28

TROUBLESHOOTING

COMMON TROUBLES AND THEIR CAUSES

It is to the user's advantage to be familiar with a systematic procedure to determine reasons and causes for unsatisfactory pump operation. The following list of troubles and causes is intended to assist users in determining the cause of any pumping trouble. Faulty installations can then be corrected and clear description given the manufacturer if assistance is required. Human judgment should not be relied on to measure operating conditions. Use proper instruments to measure values of pressure,, suction lift, speeds, temperature rise of motors, etc. When motor speeds are incorrect, check connections and measure voltage at motor terminals.

1. No liquid delivered

- Pump and suction line not completely primed
- Speed too low
- Required discharge too high
- Impeller, piping, or fittings completely plugged up
- Wrong direction of rotation

2. Not sufficient capacity

- Air leaks in suction pipe for shaft seal
- Speed too low
- Required discharge head too high
- Suction lift too high or insufficient NPSH available
- Impeller, piping, or fittings partially plugged
- Insufficient positive suction head for how water or other volatile liquids
- Liquid viscosity too high
- Mechanical problems-impeller damaged, shaft seal defective
- Wrong direction of rotation suction pipe entrance too close to surface of liquid
- Air pockets in pipe high points

3. Not sufficient pressure

- Speed too low
- Mechanical problems– impeller damaged, shaft seal defective
- Small impeller diameter
- Air or gas in liquid
- Wrong direction of rotation air pockets in pipe high points

4. pump operates for a while, then quits

- Leaky suction line
- Air leaking in through shaft seal
- Suction lift too high or insufficient NPSH available
- Air or gas in liquid
- Suction piping and fitting not completely freed of air during priming
- Air pockets in pipe high points

5. Pump takes too much power

- Speed too high
- Pumping too much liquid because required head is lower than anticipated.
- Viscosity and / or specific gravity is higher than specified
- Mechanical problems—binding inside seal from distortion due to piping strains, shaft bent impeller rubbing casing
- Wrong direction of rotation

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