



Glasgow Water System Improvements Sections 11032, 11032A

Prepared for Sletten Construction

Company

O&M Manual

April 2019

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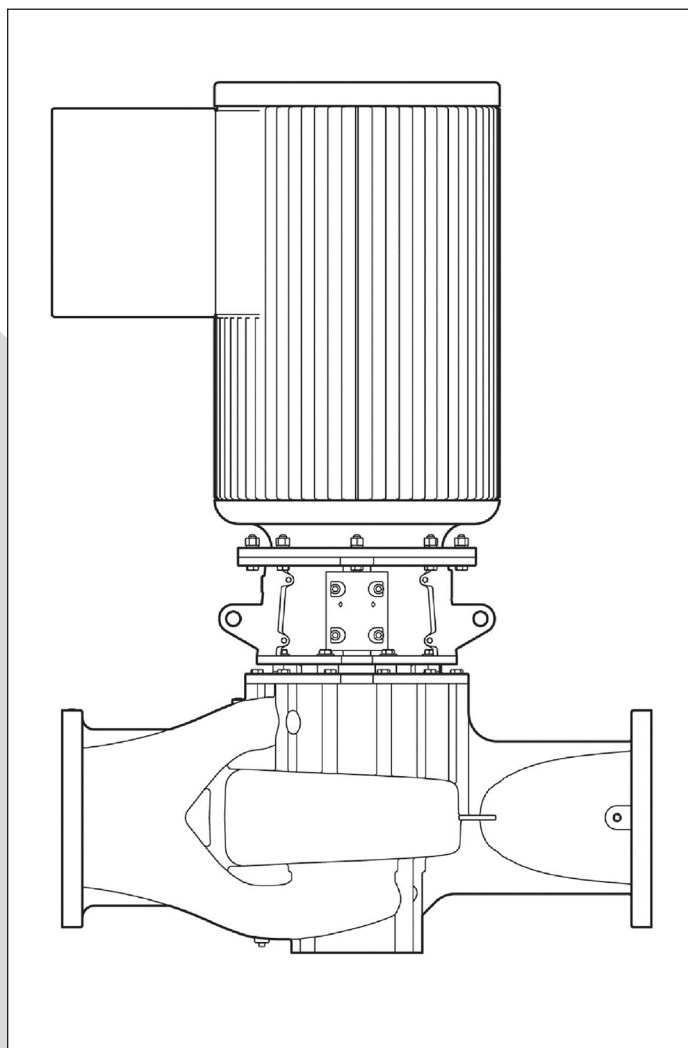
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Pumpss

VERTICAL INLINE SPLIT COUPLED PUMPS



ENGLISH: PAGES 2-12

Installation Operation and Maintenance Instructions

NOTE! To the installer: Please make sure you provide this manual to the owner of the equipment or to the responsible party who maintains the system.



IMPORTANT NOTE TO THE INSTALLER:

This manual contains important information about the installation, handling, operation and safe use of Pentair vertical in-line pumps. This information should be given to the owner/operator of this equipment. The following instructions must be strictly adhered to get a safe and failure-free operation.

APPLICATIONS:

The 382 SC series pumps are superior commercial in-line pumps which have been manufactured and field tested under the severest demands. Pumping applications for the 382 SC include: hot or chilled water circulation, pressure booster systems and cooling towers for office buildings, hotels, hospitals, universities and warehouses.

ATTENTION: SAFETY WARNINGS:

Read and understand all the warnings before installation or servicing pump.

- Handling, transportation and installation of this equipment should only be undertaken by trained personnel with proper use of lifting equipment. (Refer lifting arrangements "FIG. 3A & FIG. 3B")
- Only water or other suitable HVAC media may be circulated through the use of these pumps. Circulation of hazardous, corrosive or flammable liquids by using these pumps is strictly prohibited.
- DO NOT turn on the electrical supply to the pump until all the plumbing connections and commissioning procedure have been accomplished.
- The pump must not be operated dry without fluid.
- Pipe systems must be installed in such a manner so that minimum load is transferred on pump flanges.
- Ensure that the motor installation instruction manual has been followed for determining the proper terminal connections so that correct pump rotation is obtained.

OPERATIONAL LIMITS: *

- Maximum operating pressure at temperature 150°F (65.6°C) is:
 - i. 125# Flanges: 175 PSI
 - ii. Up to 250 PSI dependent on the Mechanical Seal
- Maximum operating temperature: 225°F (107°C) (Standard Seal)
- Pump Speed and Head: Refer the pump nameplate

*See ASTM A126/ANSI B16.1 for pressure/temperature ratings of flanges

NOISE & VIBRATION LEVELS:

382 SC pumps have been designed to meet the noise and vibration levels as per HI standard 9.6.4.

ELECTRICAL SAFETY:

WARNING Sudden Start-Up Hazard

Disconnect and lockout power source before servicing. Failure to follow these instructions could result in serious personal injury, death or property damage.

WARNING Electrical Shock Hazard

All electrical connections are to be made by a qualified electrician in accordance with all codes and ordinances. Failure to follow these instructions could result in serious personal injury, death or property damage.

WARNING Electrical Overload Hazard

Insure all motors have properly sized overload protection. Failure to follow these instructions could result in serious personal injury, death or property damage

HIGH TEMPERATURE SAFETY:

WARNING Hot Surface Hazard

If pumping hot water, insure guards or proper insulation is installed to protect against skin contact to hot piping or pump components. Failure to follow these instructions could result in serious personal injury, death or property damage.

WARNING Spraying Water Hazard

When servicing pump replace all gaskets and seals. Do not re-use old gaskets or seals. Failure to follow these instructions could result in serious personal injury, death or property damage.

HIGH PRESSURE SAFETY:

WARNING High Pressure Hazard

All single suction pumps are rated at a maximum of 175 psi and double suction pumps are rated at 250 psi. Do not exceed this pressure. Install properly sized pressure relief valves in system. Failure to follow these instructions could result in serious personal injury, death or property damage.

WARNING Expansion Hazard

Water expands when heated. Install properly sized thermal expansion tanks and relief valves. Failure to follow these instructions could result in serious personal injury, death or property damage

CALIFORNIA PROPOSITION 65 WARNING:

 **WARNING** This product and related accessories contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

PRODUCT DESCRIPTION

CONFIGURATION:

Pumps are offered with various Mechanical seal types available.

- Type 1
- Type 21
- Type 8B2

Along with above mentioned configurations, pumps are also offered with following options required and mentioned by customer at the time of placing order.

- With or without Impeller wear rings
(Not applicable for pumps below 10x13.5)
- With or without Flush line
- With or without Abrasive separator

PARTS:

Refer to Exploded View, FIG. 32, FIG. 33, FIG. 34 & FIG 35 for listing various parts

INSTALLATION

READ AND UNDERSTAND ALL SAFETY WARNINGS AT THE BEGINNING OF THE MANUAL BEFORE BEGINNING INSTALLATION OR ANY REPAIR WORK.

PUMP LOCATION:

The pump should be located as close to the liquid source as possible so that the suction line can be short and direct. Location should require a minimum of elbows and fittings in the discharge line to minimize friction losses. The pump must be protected against flooding and located in a clean, open area, where it is easily accessible for inspection, disassembly and repair.

To minimize friction losses pump should be located such that the use of elbows and fittings in the discharge line is reduced. Pumps installed in dark, dirty areas or in cramped locations are often neglected, which can result in premature failure of both the pump and the driver. Open area would also be helpful in better air flow into the motor and/or motor fan.

The 382 SC pump must be installed vertically. Install isolating valves on each side of pump so that pump maintenance can be performed without draining the system. Special mounting requirements may be required.

if the pump is to be mounted near a noise or vibration sensitive area. The installation must be evaluated to ensure that the net positive suction head available (NPSHA) meets or exceeds the net positive suction head required (NPSHR), as stated by the pump performance curve.

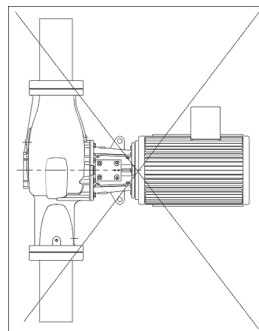


FIG. 1

STORAGE & PROTECTION:

All pumps are shop serviced and delivered in a ready to operate condition. If the pump after being delivered is not put into immediate operation then proper care should be taken so that it operates without failure when put into service. The pump should be kept in a clean and dry area in a vertical position. Ensure that the following precautions are taken for pumps being stored for more than six months.

- Pump surfaces which are machined and unpainted (e.g. flange ends, feet mounting etc.) and are easily subjected to corrosion must be protected by corrosion resistant coating.
- The pump shaft should be rotated once in a month to avoid locking of rotating assembly. This would also be helpful in uniform distribution of lubrication on bearings.
- Bearings must be lubricated with fresh lubricants when pump is being put into service after a long time.

UNCRATING AND LIFTING:

Before shipment pump is fastened securely to the crate. The pump should be removed from the crate carefully by using proper tools and equipments. After removing from crate make sure that all the components are in good condition and have been received as mentioned in the packing list. Report immediately to the concerned person/department if any component is missing or received in a damaged condition. Extreme care must be taken while handling the pump set. Slings and hooks should be used in such a manner, so that while lifting the pump is not exposed to stresses.

METHODOLOGY TO ORIENT PUMPS VERTICALLY WHILE UNPACKING THE UNIT.

Since the pumps are shipped horizontally laid on crate (shown in FIG.2). It is necessary to orient pumps vertically before shifting to their installation location. Once the unit is uncovered, lift the unit by placing straps around the motor while making a pivot point of casing. Human effort will also be required to orient the unit to vertical position. Now let the unit to rest on crate and follow the procedure mentioned below to place the unit to its desired location.

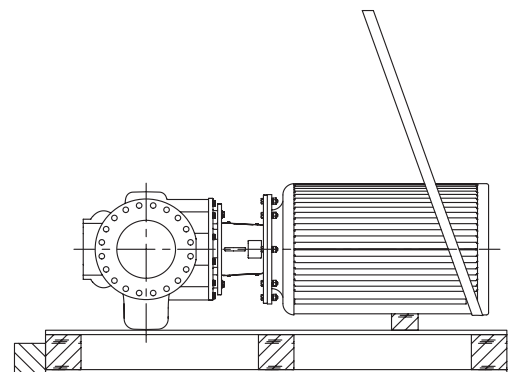


FIG. 2

NOTE:

For typical installation, suitable overhead lifting equipment of adequate capacity to lift the driver, the entire pump (without driver), or the heaviest sub assembly of the pump should be available at the jobsite when installing or removing the pump.

Use following procedure for lifting the pump set.

- i. Remove the coupling guard
- ii. Size 8x8x13.5 & 10x10x13.5: Use eye bolt or lifting lugs on motor bracket for lifting the entire unit as shown in the FIG.3A.

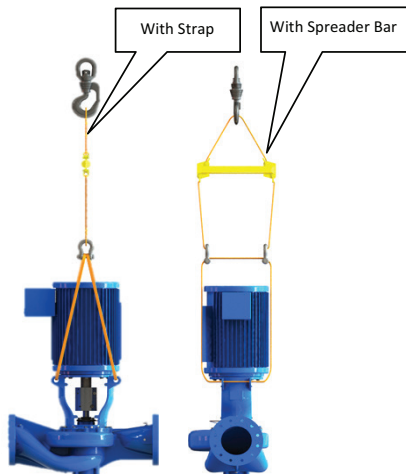


FIG. 3A

- iii. For Other Sizes: Place lifting straps/slings on each side of coupling through the motor bracket as shown in the FIG.3B.
- iv. Use spreader bar in between the slings if necessary. This would be helpful for protecting the motor fan cover while lifting.
- v. DO NOT use eye bolt or lifting lugs on motor and/or motor bracket for lifting the entire unit.
- vi. DO NOT place cable slings around the motor shaft.

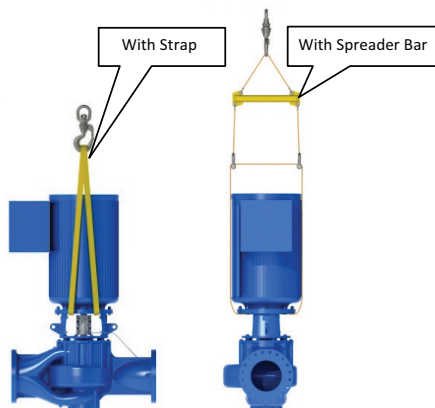


FIG.3B

COMMISSIONING

MOUNTING:

The pump has been designed to be installed in various configurations as shown in the images below.

1. HANGER SUPPORTED PIPE MOUNTED:

(Models 8x8x13.5, 10x10x13.5, 10x10x19, 10x10x14, 12x12x14, 12x12x18, 14x14x15 and 14x14x18 Only)

Where floor space is a restriction, 382 SC Vertical Inline pumps can be installed in the system piping without any additional support from base, as illustrated in FIG.4. For such an installation, care must be taken to ensure that pipe hangers are designed to bear additional weight of pump set.

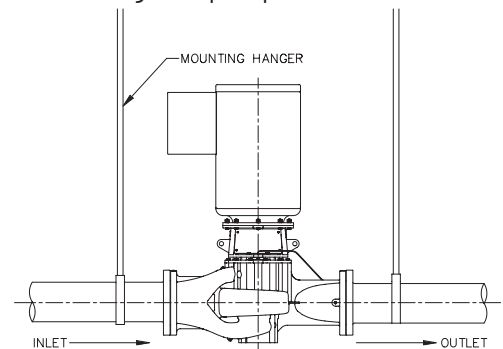


FIG. 4

2. PIPE MOUNTED SUPPORTED AT CEILING:

(Models 8x8x13.5, 10x10x13.5, 10x10x19, 10x10x14, 12x12x14, 12x12x18, 14x14x15 and 14x14x18 Only)

In tight rooms pump can be installed directly into the system piping with no base support and piping can be supported close to ceiling. With this arrangement the pump may be installed with a multi-purpose valve on the discharge side and suction diffuser on the suction side of the pump, as illustrated in FIG.5.

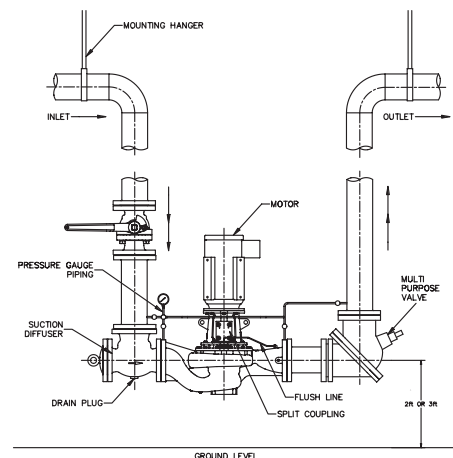


FIG 5.

3. FLOOR SADDLE SUPPORT:

(Models 8x8x13.5, 10x10x13.5, 10x10x19, 10x10x14, 12x12x14, 12x12x18, 14x14x15 and 14x14x18 Only)

In many of the installation locations where support to pump from above is not possible, floor mounted saddle support can be provided beneath suction and discharge piping. The pump case may be mounted on a base in such an installation but is not necessary. The installation is illustrated in FIG.6.

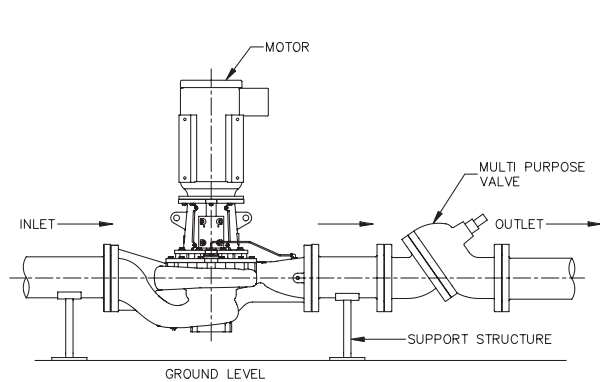


FIG.6

4. PIPE SUPPORTS:

(Models 8x8x13.5, 10x10x13.5, 10x10x19, 10x10x14, 12x12x14, 12x12x18, 14x14x15 and 14x14x18 Only)

For ease of installation and increasing rigidity of the unit, a Structural support may be provided at the pump suction and discharge ports with Isolation pads beneath the support, as illustrated in FIG.7. It is to be ensured that pipe hangers are so adjusted that pump flanges do not support the piping.

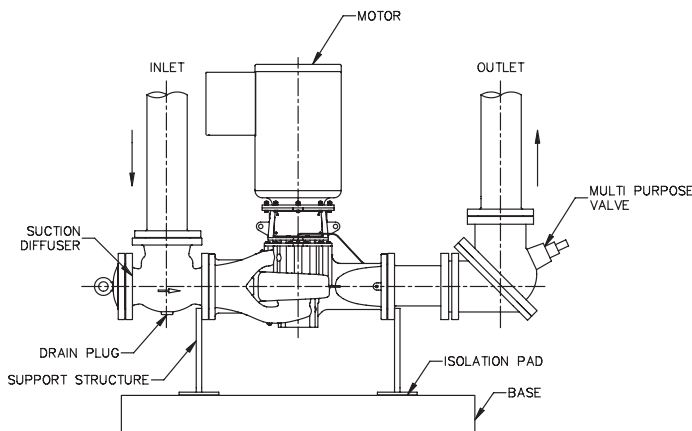


FIG.7

5. FLOOR MOUNTED:

It is recommended that larger double suction vertical in-line pumps be floor mounted. This recommendation is based on the account of weight of pump and motor assembly. A mounting base is to be used for floor mounting which can be fastened to the integral cast in feet on the bottom of casing, as illustrated in FIGS.8A and 8B. Make sure that pump is firmly bolted to the mounting base which in turn is also rigidly secured and mounted on the floor. During floor mounting it is

recommended that flexible connectors are used to eliminate the potential for pipe load to be transferred to the pump. If flexible connectors are not used, it is very important to closely monitor the height of the pump support. If the height of support is more than required then the entire pipe load will be transferred to the pump which will start acting like a pipe support.

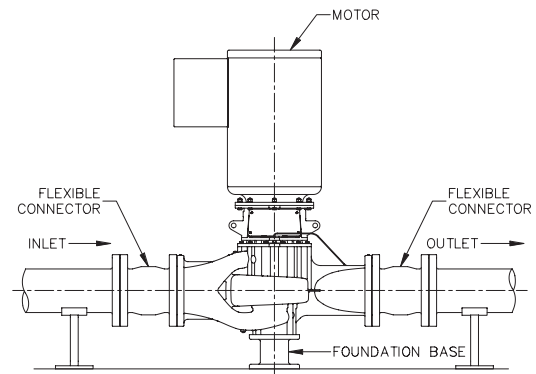


FIG.8A

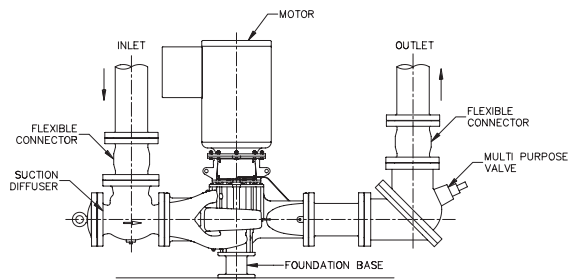


FIG.8B

When the pump is floor mounted, the piping will still need to be supported on both the suction and discharge sides to eliminate pipe stress at the pump. For supporting the pump from the bottom, case feet have been drilled and tapped to use commonly available pipe flanges to create the pump support.

PUMP SIZE	FEET DRILLING AS PER FLANGE
2x2x7, 2x2x9C	2"
2.5x2.5x7, 3x3x7A & B, 4x4x7A & B, 2.5x2.5x9, 3x4x9, 4x5x9	3"
5x5x9, 6x6x9, 4x4x11, 5x5x11, 6x6x11, 8x8x11, 4x4x12, 5x5x12, 6x6x12, 8x8x12	4"
8x8x13.5, 10x10x13.5	6"
10x10x14, 10x10x19	8"
12x12x14, 12x12x18, 14x14x15, 14x14x18	10"

PIPING:

A minimum length of straight pipe is required on the suction side of the pump. Five times the pipe diameter is sufficient to allow a smooth entry of liquid into the pump.

Avoid using short elbows as they tend to give higher friction losses and interruption in streamline flow. Suction and discharge piping must be in line. To avoid undue stresses on pump and pipe flanges, never force align the pipes and provide a rigid support near the pump casing. Pump flanges must be tightened evenly to avoid flange cocking and liquid leakage.

Air leak/trapped in suction piping is one of the major cause of erratic pump performance. To avoid any such kind of trouble, suction piping should be arranged in such a manner that there are no high spots. This is to ensure that air is not trapped in the suction line which will cause faulty pump operation. Wherever suction line is larger than the pump suction nozzle, it is mandatory to use an eccentric reducer. For sumps below center line the straight side of the reducer must be located upwards so that any air cavity if present in the suction line passes through the line to outlet and there is no pressure drop at pump suction due to presence of air pockets.

The check valve must be installed in the discharge line which prevents backward flow of liquid into the pump, thereby protecting the pump from liquid back pressure.

Note: The suction valve should be fully open and should not be used for flow regulation. The discharge valve is to be used for flow regulation.

OPERATION

The following points must be ensured before starting the pump:

- i. The current supply agrees with the voltage and frequency on the motor nameplate.
- ii. The motor is wired for correct voltage.
- iii. The thermal overload relays are correct size and set for operation.
- iv. The pump is fully primed. Flood the casing and seal area with liquid to release the air out of pump through flush line and air vent valve near discharge flange. Priming must be continued till air is completely removed. This would be indicated by continuous flow of liquid through flush line and air vent. If accessible, rotate shaft slowly by hand to evacuate air trapped in the impeller passages and to ensure free turning of the pump.
 - a. Failure to flood the seal area with water may cause seal failure due to lack of lubrication.
- v. Jog the motor to check that the motor rotates clockwise, as indicated by the arrow on the pump casing.
- vi. Coupling guard must be in its appropriate position on account of human safety.

STARTING UP:

NOTE: MAKE SURE SUCTION LINE VALVE IS IN OPEN POSITION AND DISCHARGE LINE VALVE CLOSED

1. Check that the pump is operating smoothly and is not rubbing.
2. Start opening the discharge valve gradually.
(Note: Do not run the pump for extended period with discharge valve closed, so as to avoid overheating and potential damaging loads.)
3. The pump is also provided with a circulation relief valve that prevents overheating when the pump is operating at reduced capacity.
4. Stop the pump immediately if any of the following situations arise:
 - i. No/insufficient liquid.
 - ii. Inadequate discharge pressure.
 - iii. Loss of suction pressure.
 - iv. High power consumption.
 - v. Noisy operation and/or High Vibration.

Check the manual for troubleshooting the cause.

SHUT DOWN:

It is advisable to close the discharge valve before stopping the pump to avoid any water hammer effect. However, this practice is not mandatory and pump may be stopped with discharge valve open in case an emergency.

Preferred shutdown sequence is as follows:

1. Preferably close the discharge valve first.
2. Then turn off the motor.
3. Now, close the suction line valve.
4. Drain the pump liquid completely, if pump to be kept un-operational for longer period or if there is danger of freezing.

MAINTENANCE AND SERVICE

MAINTENANCE AND SERVICE TO THE PUMP

ROUTINE CHECK-UP:

Preventive maintenance and routine check-ups may prevent the pump from major failures. An inspection & maintenance log should be kept & the inspector is to immediately report any problems. Pump should be checked on regular basis for any unusual noise, vibrations and abnormal rise of temperature. Also, check the sight flow indicator from time to time for fluid flow and if no flow is observed, replace the filter or check the separator. A suggested guide for preventive maintenance for normal application is given below:

Items	Action required	Frequency
Vibration	Check for change in vibration	Refer to ANSI/HI 9.6.5 <i>Condition Monitoring</i>
Bolting	Check for loose bolting	Annually
Mechanical Seals	Monitor seal leakage	Refer to ANSI/HI 9.6.5 <i>Condition Monitoring</i>

LUBRICATION:

The pump does not contain any bearings that require lubrication; however motor bearings must be lubricated periodically. Refer motor manufacturer's instructions manual for frequency of lubrication and correct amount of lubricant.

SPLIT COUPLING

Power is transmitted from motor shaft to the pump shaft through a split coupling. The pump shaft does not contain bearings that need lubrication.

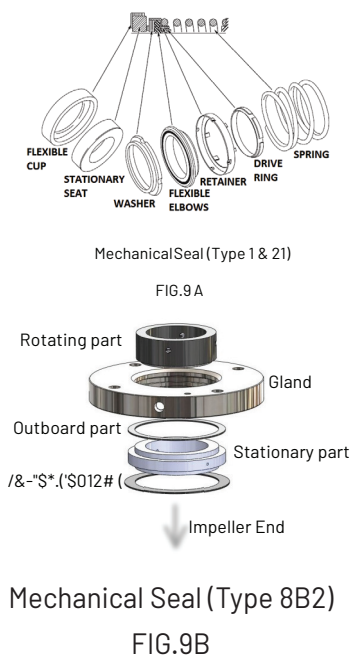
MECHANICAL SEAL

The mechanical seal require flushing which is flushed from discharge of the pump through a flush line. A throttle bush isolates the mechanical seal from the liquid in the pump. Since mechanical seals need a film of liquid between the sealing faces, pump must not be run unless properly filled with liquid for intended operation.

A 'weep' sound may be heard from Mechanical seals at start-up. The pump should be made run for approx. 8-10 hours, which is the break-in period for seal. During this operation the mechanical seal would 'seat' properly.

The 382 SC pumps are supplied with three basic types of seals

1. Seal type 1
2. Seal type 21
3. Seal type 8B2



RECOMMENDED SPARE PARTS LIST:

Although all the components could be procured by the customer at short interval, however to reduce downtime the below mentioned components should be kept handy in case the pump is to be shut down for maintenance. The components are:

- Mechanical seal
- Wear rings
- Gaskets, O-rings, seals

CONSUMABLES:

Following items are of regular use during preventive & accidental maintenance and must be kept in stock by the customer.

- Lubricants
- Cleaning materials
- Touch up coating

REQUIRED TOOLS AND FIXTURES:

Pump assembly and disassembly can be performed by using standard hand tools available in market. For quick reference, tools required for disassembly of various pump components are mentioned below:

FOR PUMPS (8x8x13.5, 10x10x13.5)

Hardware	Location	Wrench size & type (in inches)
Hex Bolt	Motor Bracket - motor mounting flange side	3/4 & 15/16 open end wrench
Heavy Hex Nut, Hex bolt	Motor Bracket - motor Bracket register flange	1-1/8 open end wrench
Hex Bolt	Coupling guard & motor bracket	1/2 open end wrench
Allen Bolt	Coupling	1/2 Allen key
Hex screw / bolt	Gland & gland Jacking, Gland for external mechanical seal	3/4 open end wrench
NPSF plug	Suction & Discharge pressure gauge	7/16 open end wrench
NPSF plug	Air vent & Drain, Recirculation relief	3/4 open end wrench
Set screw	Coupling	1/4 Allen key
Retainer ring	Pump shaft	External retainer ring pliers

FOR PUMPS (10x10x14, 10x10x19, 12x12x14, 12x12x18)

Hardware	Location	Wrench size & type (in inches)
Hex Bolt	Motor Bracket - motor mounting flange side	15/16 open end wrench
Heavy Hex Nut, Hex bolt	Motor Bracket -motor mounting flange side, Motor Bracket register flange	1-1/8 open end wrench
Hex Bolt	Coupling guard & motor bracket	1/2 open end wrench
Allen Bolt	Coupling & Gland Jacking (in 10x10x14 only)	1/2 Allen key
Heavy Hex Nut	Coupling	7/8 open end wrench & 3/8 socket head wrench
Hex screw / bolt	Gland & gland Jacking, Gland for external mechanical seal	3/4 open end wrench
NPSF plug	Suction & Discharge pressure gauge, Air vent & Drain, Recirculation relief	9/16 open end wrench
Set screw	Coupling	1/4 Allen key
Retainer ring	Pump shaft	External retainer ring pliers

FOR PUMPS (14x14x15, 14x14x18)

Hardware	Location	Wrench size & type (in inches)
Hex Bolt	Motor Bracket - motor mounting flange side	1-1/8 open end wrench
Heavy Hex Nut, Hex bolt	Motor Bracket -motor mounting flange side, Motor Bracket register flange	1-1/4 open end wrench
Hex Bolt	Coupling guard & motor bracket	1/2 open end wrench
Allen Bolt	Coupling	1/2 Allen key

Heavy Hex Nut	Coupling	1-1/16 socket head wrench
Hex screw /bolt	Gland & gland Jacking, Gland for external mechanical seal	3/4 open end wrench
NPSF plug	Suction & Discharge pressure gauge, Air vent & Drain, Recirculation relief	9/16 open end wrench
Set screw	Coupling	3/8 Allen key
Retainer ring	Pump shaft	External retainer ring pliers

In addition to the above mentioned tools some additional equipments & fixtures may be required which are mentioned below:

- Lifting devices (crane, hoist, lifting chains or straps)
- Impeller puller (to remove pressed-on impeller from shaft)
- Torch (to heat parts to aid in removal)
- Die grinder (to cut out wear rings or sleeves, if needed)
- Work table or fixture for holding pump
- Measuring equipment (feeler gauges, dial indicator, etc.)

FASTENER TORQUES AND SEQUENCE

Proper tightening of bolting is very important. Torque values will vary depending on the size and grade of bolting used. Torque values for coupling bolts and grub screws and sequence of their tightening are mentioned in the following section for replacement procedure of mechanical seals.

REPAIRS**READ AND UNDERSTAND ALL SAFETY WARNINGS AT THE BEGINNING OF THE MANUAL BEFORE BEGINNING INSTALLATION OR ANY REPAIR WORK**

This repairs section is broken into two parts. The first part covers the replacement of the mechanical seal. The second part covers complete pump disassembly. Refer to the exploded pump diagram (FIG.32, 33, 34 & 35) for Item numbers.

MECHANICAL SEAL REPLACEMENT

- SEAL REPLACEMENT MODELS

(Models 1.5x1.5x9B, 2.5x2.5x7, 2.5x2.5x9, 2x2x12, 2x2x7, 2x2x9A/B/C, 3x3x12, 3x3x7A/B, 3x3x9A/B, 3x4x9, 4x4x11, 4x4x12, 4x4x7A/B, 4x4x9A/B, 4x5x9, 5x5x11, 5x5x12, 5x5x9, 6x6x11, 6x6x12, 6x6x9, 8x8x11, 8x8x12, 8x8x15 and 10x10x15)

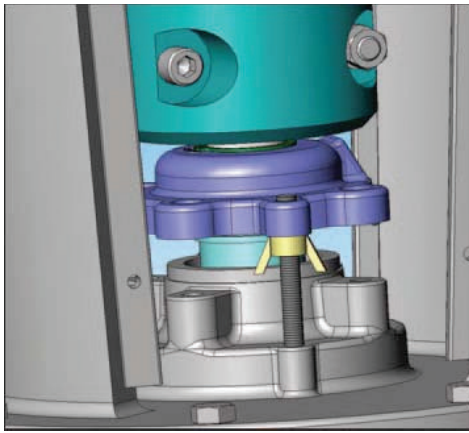


FIG.10

1. Insure the electrical power is locked out, the system pressure has been lowered and temperature of the unit is at a safe level.
2. Isolate the pump from the system by closing the valves that should be located on the suction and discharge side of the pump. Loosen one of the pipe plugs (#4) and drain the pump.
3. Remove the coupling guards (#17) by removing the four (per side) retaining bolts (#18). Loosen the feral nuts on the tubing connectors (#1) and remove the gland flushing tubing (#3).
4. Remove the four gland bolts (#55) and utilizing the two wing nuts (#52) jack the seal gland (#44) upward until the top surface of the seal gland is in firm contact with the bottom of the retaining ring (#41A). With the wing nuts finger tight against the gland the weight of the shaft (#40) and impeller (#11) can now be supported by the snap ring (#41A).
5. Remove the six socket head coupling bolts (#48) along with the nuts (#50) and lock washer (#49). The two coupling halves (#45) can now be pulled away from the shaft.
6. Remove the two annular (round) keys (#46 & #47) as well as the two linear (square) keys (#53 & #54).
7. Carefully lower the shaft impeller assembly by backing off on the two gland supporting wing nuts until the face of the impeller rests inside the casing.
8. Remove the snap ring (#41A) from the shaft.
9. The gland (with the stationary seat of the mechanical seal pressed internally) can now be removed through the gap present between the pump shaft and the motor shaft.
10. Pry the old mechanical seal rotating head (#27) up and off the pump shaft. Remove the stationary seat of the mechanical seal from the gland. Remove the O-Ring gasket (#43) from the groove on the bottom of the gland. Clean all surfaces, checking for nicks and sharp edges that may damage the elastomers on the mechanical seal or the gland.

If the pump is to be fully disassembled stop at this point and proceed to Step 1 under the section titled "COMPLETE PUMP DISASSEMBLY" otherwise continue for installation of the Mechanical Seal.

11. To replace the mechanical seal, lubricate the stationary seat bore in the gland with soapy water mixture and press in the seat insuring it is flat in the bore. Replace the gland O-ring, holding in the groove with a small amount of non-hardening silicon or grease.
12. Lubricate the pump shaft with a soapy water and first place the spring retainer over the shaft, followed by the spring and finally the rotating head of the seal.
13. Place the gland down on the shaft and insure the two jacking holes on the side of the gland are engaged with threaded rod and wing nuts. Replace the external retaining ring making sure it is in the grove of the shaft.
14. Using 1/2 of the split coupling as a guide, (the thin groove cut into the top of the coupling identifies the motor side of the coupling), utilize the wing nuts to raise the shaft (with impeller) upward to align the annular grooves on the coupling with the grooves on the shaft. Place one half of the motor annular key in the motor shaft groove. Place the linear motor key in the motor shaft. Place the linear pump key in the pump shaft and align the two linear keys so the coupling half fits both motor and pump shaft. Slide in the pump shaft annular key half (additional adjustment of the wing nuts maybe necessary as the key to groove fit is close). Place the second halves of pump and motor shaft annular keys in their respective grooves and rotate the keys 90 degrees so they stay in place. Place the other half of the split coupling onto the shafts. Replace the 6 socket head cap screws (3 sockets facing in on one side and 3 facing out on the other side requiring rotating the shaft 180 degrees to tighten the cap screws) and add lock washers and nuts. Adjust the socket head cap screws so the gap between the coupling halves is even. Tighten the socket head cap screws in a crosswise pattern to the torque listed in the table below.

SPLIT COUPLING BOLT TIGHTENING TORQUE

Bolt Size	Hex Socket Size	Torque (ft-lbs)
3/8 inch	5/16	35
1/2 inch	3/8	90

15. Lower the gland by utilizing the wing nuts, replace the four gland bolts and tighten the gland down evenly. After the gland is tightened down, tighten the two wing nuts to the underside of the gland (holding them stationary and preventing them from vibrating).
16. Reinstall the flush tubing. Insure the coupling rotates freely with no dragging or binding. Replace the coupling guards and refer to the beginning of the manual for startup instructions.

- SEAL REPLACEMENT MODELS

(Models 10x10x19, 10x10x14, 12x12x14, 12x12x18, 14x14x15 and 14x14x18 only)



FIG. 11

Refer the Tools mentioned in the required tools and fixtures for pump disassembly

REPLACING THE MECHANICAL SEAL

1. Ensure the electrical power is locked out, the system pressure has been lowered and temperature of the unit is at a safe level.
2. Isolate the pump from the system by closing the valves that should be located on the suction and discharge side of the pump. Loosen one of the pipe plugs (#4) and drain the pump.

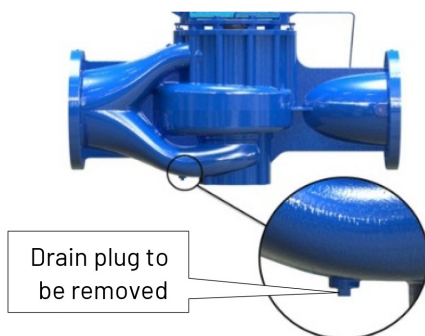


FIG. 12

3. Remove the coupling guards (#17) by removing the four (per side) cap screws (#18). Loosen the ferrule nuts on the tubing connectors (#1) and remove the gland flushing tubing (#3).

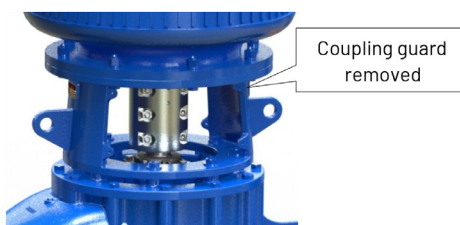


FIG. 13

If 8b2 Mechanical seal has to be replaced stop at this point and proceed to step 28

FOR TYPE 21 MECHANICAL SEAL

4. Size 10x10x14 - Loosen the four gland bolts (#55) so that there is at least 1/2" gap between their head and the gland. Tighten the two set screws (#20) pre-installed in to the gland keeping all the loosened gland bolts engaged in case of 10x10x14 pump, they will keep the gland from rotating as it is lifted.

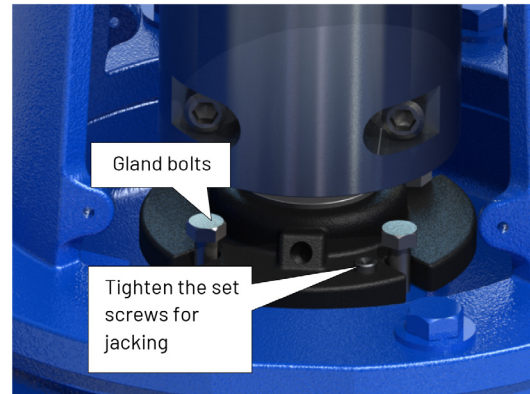


FIG. 14A

All Other Sizes - Loosen the four gland bolts (#55). Two should be loosened so that there is at least 1/2" gap between their head and the gland, and other two removed and transferred to the provided jacking holes. The other two bolts need to be kept engaged in case of 10x10x14 pump) with the gland to keep the gland from rotating as it is lifted.

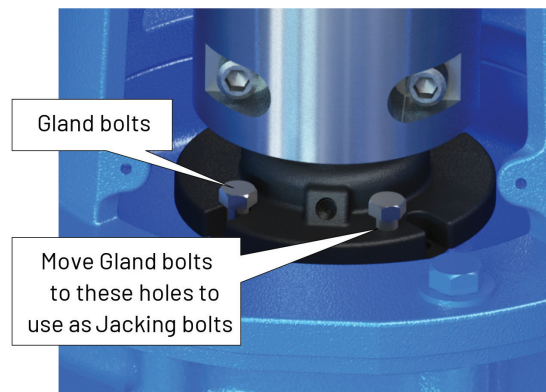


FIG. 14B

5. Start tightening the bolts/set screws to jack the seal gland (#44) upward until the top surface of the seal gland makes a firm contact with the bottom of the retaining ring (#41A). Make sure to alternate tightening of the bolts so the gland is raised evenly.
6. With the bolts (#55) tightened against the gland, the weight of the shaft (#40) and impeller (#11) can now be supported by the gland and the split coupling (#45) can be removed without the shaft dropping.

7. Remove the four coupling set screws (#20) followed by six/four socket head coupling bolts (#48) along with the nuts (#50) and spring washers (#49). The two coupling halves (#45) can now be pulled away from the shaft.

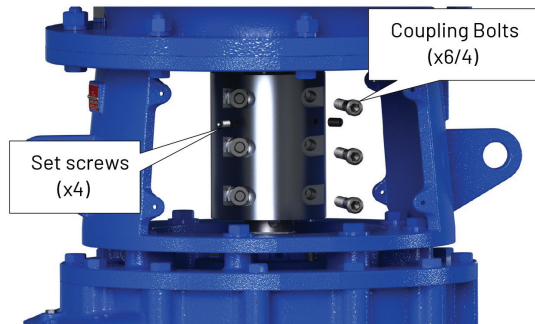


FIG. 15

8. Remove the two linear (square) keys (#53, #54).

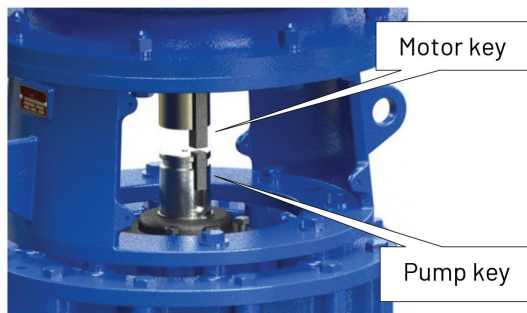


FIG. 16

9. Carefully lower the shaft impeller assembly by backing off on the two gland supporting bolts (the two set screws in case of 10x10x14) until the face of the impeller rests inside the casing.
10. Remove the retaining ring (#41A) from the shaft.
11. Remove two remaining gland bolts (#55) which are engaged with seal plate (#35A).
12. The gland (#44) (with the stationary seat of the mechanical seal pressed internally) can now be removed through the gap present between the pump shaft and the motor shaft.

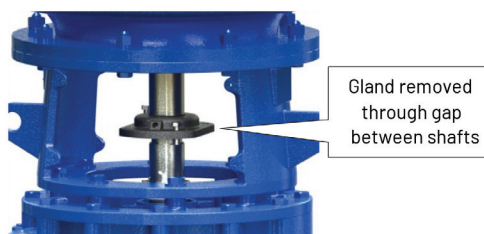


FIG. 17

13. Pry the old mechanical seal (#27) rotating head, spring & spring retainer up and off the pump shaft.
14. Remove the stationary part of the mechanical seal from the gland. Remove the O-Ring gasket (#43) from the groove on the bottom of the gland.

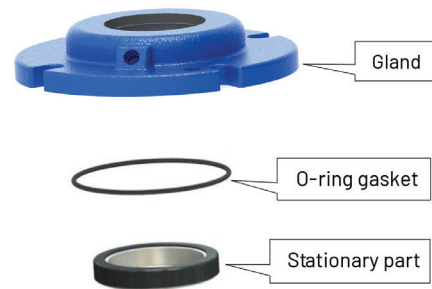


FIG. 18

If the pump is to be fully disassembled stop at this point and proceed to Step 1 under the section titled "COMPLETE PUMP DISASSEMBLY" otherwise continue for installation of the Mechanical Seal.

15. Clean all surfaces of the gland, checking for nicks and sharp edges that may damage the elastomers on the mechanical seal or the gland.
16. To replace the mechanical seal, lubricate the stationary seat bore in the gland with soapy water mixture and press in the seat ensuring it is flat in the bore.
17. Replace the gland O-ring, holding in the groove with a small amount of non-hardening silicon or grease.
18. Lubricate the pump shaft with soapy water. Place the spring retainer over the shaft, followed by the spring and finally the rotating head of the seal until it rests over lower retaining ring.

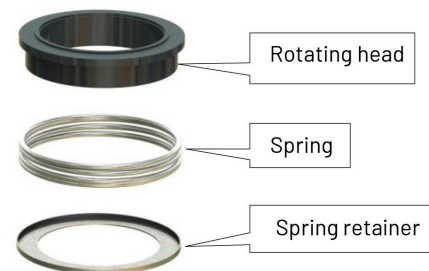


FIG. 19

19. Place the gland down on the seal plate and ensure the two jacking bolts/set screws are engaged.
20. Engage the remaining two gland bolts loosely with the gland and seal plate (all the four bolts in case of 10x10x14 pump) to restrict the motion of the gland about shaft axis.
21. Replace the external retaining ring making sure it is in the groove of the shaft.
22. Using half of the split coupling as a guide, (the tapping for setscrews identifies the motor side of the coupling) utilize the jacking bolts to raise the shaft (with impeller) upward until the step inside the coupling touches motor shaft end face so that pre specified distance between pump shaft & motor shaft is maintained.

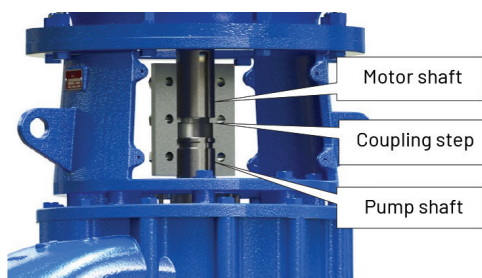


FIG. 20

23. Place the linear motor key in the motor shaft. Place the linear pump key in the pump shaft and align the two linear keys so that the other coupling half fits over both motor and pump shaft.
24. Place the other half of the split coupling onto the shafts. Replace the six/four socket head cap screws (three/two sockets facing in on one side and three/two facing out on the other side requiring rotating the shaft 180 degrees to tighten the cap screws) and add spring washers and nuts. Adjust the socket head cap screws to maintain even gap between coupling halves. Tighten the socket head cap screws in a crosswise pattern. The minimum tightening torque to be maintained is 120 lbf-ft but should not exceed 130lbf-ft. Make sure that all the bolts are tightened to same torque.

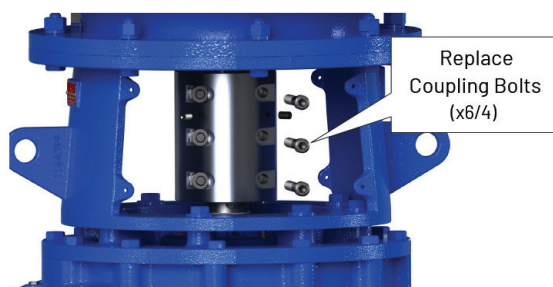


FIG. 21

- Tighten to the required torque in three steps as follows:
 - a) First time – Tighten to 50% of the specified torque
 - b) Second time – Tighten to 75% of the specified torque
 - c) Third time – Tighten to 100% of the specified torque
- 25. Tighten grub screws to fix the axial location of coupling (in a crossing pattern). The minimum tightening torque to be maintained is 30 lbf-ft but should not exceed 65lbf-ft. Make sure that all the bolts are tightened to same torque.
- Tighten to the required torque in three steps as follows
 - a) First time – Tighten to 50% of the specified torque
 - b) Second time – Tighten to 75% of the specified torque

c) Third time – Tighten to 100% of the specified torque

26. Lower the gland by disengaging the jacking bolts/set screws and tighten the gland to the seal plate using the four gland bolts.
27. Reinstall the flush tubing. Ensure that impeller and motor rotate freely with no dragging or binding. Replace the coupling guards and refer to the beginning of the manual for startup instructions.

FOR TYPE 8B2 MECHANICAL SEAL IN ALL MODELS

28. Loosen the four gland bolts (#55). Keeping the two bolts engaged with the gland to restrict the motion of the gland about shaft axis, engage the other two bolts into the threaded holes in Jacking Plate (#10). Place the Jacking plate sub-assembly beneath the retaining ring, aligning the bolts with two clear blind holes in the gland (#44). Tighten the engaged bolts simultaneously such that the jacking plate makes a firm contact with the bottom of the retaining ring (41A).

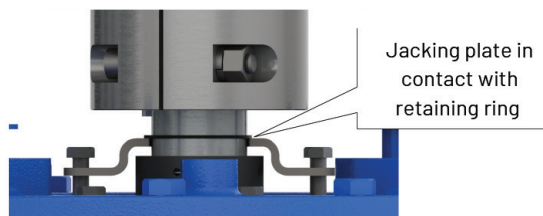


FIG. 22

29. Remove set screws (#21) from rotating part of the seal and move the rotating part slightly upwards so that it does not hinder shaft (#40) axial movement when the jacking plate (#10) is backed off. Failure to do so could cause damage to the stationary seat when the impeller (#11) is lowered.

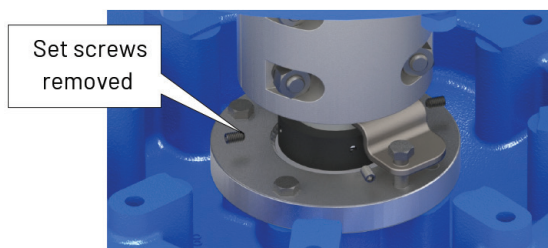


FIG. 23

30. With the Jacking bolts tight against the jacking plate, the weight of the shaft (#40) and impeller(#11) can now be supported by the gland (#44) and the split coupling (#45) can be removed without the shaft dropping.
31. Remove the four coupling set screws (#20) followed by six/four socket head coupling bolts (#48) along with the nuts (#50) and spring washer (#49). The two coupling halves (#45) can now be pulled away from the shaft.

32. Remove the two linear (square) keys (#53, #54).
33. Carefully lower the shaft impeller assembly by backing off the two gland plate supporting bolts until the face of the impeller rests inside the casing.
34. Remove the retaining ring (#41A) from the shaft.
35. Pry the old mechanical seal (#27) rotating part off the pump shaft.
36. Remove the jacking plate (#10) and bolts sub-assembly.
37. Inspect the surface of the stationary seat. If damaged, remove gland bolts (#55), and remove gland (#44) through the gap present between the pump shaft and the motor shaft.

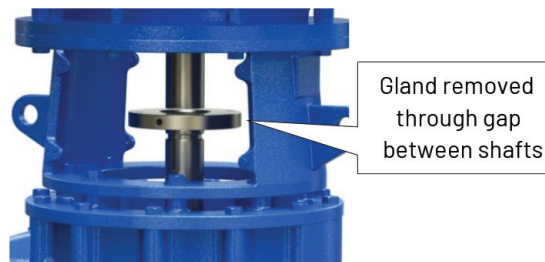


FIG. 24

38. Remove the stationary part along with the inboard and outboard stationary gasket off the pump shaft.

If the pump is to be fully disassembled proceed to Step 1 under the section titles "COMPLETE PUMP DISASSEMBLY", otherwise continue for installation of the 8B2 Seal.

39. Clean all surfaces of the gland, checking for nicks and sharp edges that may damage the elastomers on the mechanical seal or the gland.
40. Remove the mechanical seal from its packaging, inspect for any damage, and keep seal faces clean and free from contaminants during installation. **DO NOT GREASE OR LUBRICATE SEAL FACES**
41. Use soap, petro gel, glycerin, etc. for lubrication for ease of assembly.
42. If removed, install the inboard stationary gasket and the stationary part of seal on to the shaft. Then place the outboard stationary gasket over the stationary part.
43. Next place the seal gland over the stationary part and gaskets, making sure that all the gaskets have been installed properly before securing the gland bolts.
44. Now install the rotating part of the seal over the shaft. Do not tighten seal set screws at this time.

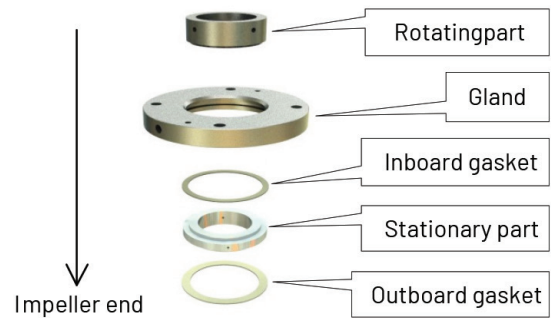


FIG. 25

45. Replace the external retaining ring making sure it is in the groove of the shaft.
46. Engage the jacking plate and bolt sub-assembly so that it touches the lower face of the retaining ring.
47. Using half of the split coupling as a guide, (the tapping for setscrews identifies the motor side of the coupling), utilize the Jacking plate and bolts sub-assembly to raise the shaft (with impeller) upward until the step inside the coupling touches motor shaft end face so that pre specified distance between pump shaft & motor shaft is maintained.

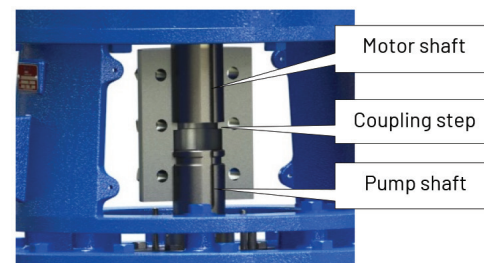


FIG. 26

48. Place the linear motor key in the motor shaft. Place the linear pump key in the pump shaft and align the two linear keys so that the other coupling half fits over motor and pump shaft.
49. Place the other half of the split coupling onto the shafts. Replace the six/four socket head cap screws (three/two sockets facing in on one side and three/two facing out on the other side requiring rotating the shaft 180 degrees to tighten the cap screws) and add spring washers and nuts. Adjust the socket head cap screws to maintain even gap between the coupling halves.

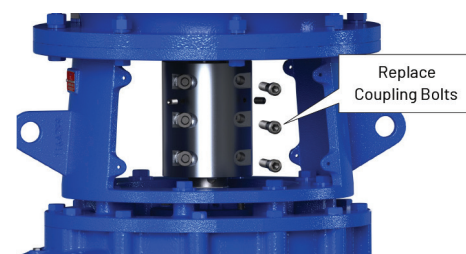


FIG. 27

50. Tighten the socket head cap screws in a crosswise pattern. The minimum tightening torque to be maintained is 120lbf-ft but should not exceed 130lbf-ft. Make sure that all the bolts are tightened to same torque.

- Tighten to the required torque in three steps as follows:

- a) First time – Tighten to 50% of the specified torque
- b) Second time – Tighten to 75% of the specified torque
- c) Third time – Tighten to 100% of the specified torque

51. Tighten set screws to fix the location of coupling (in a crossing pattern). The minimum tightening torque to be maintained is 30 lbf-ft but should not exceed 65lbf-ft. Make sure that all the bolts are tightened to same torque.

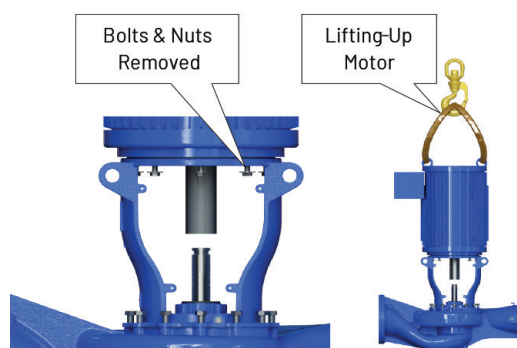
- Tighten to the required torque in three steps as follows:

- a) First time – Tighten to 50% of the specified torque
- b) Second time – Tighten to 75% of the specified torque
- c) Third time – Tighten to 100% of the specified torque

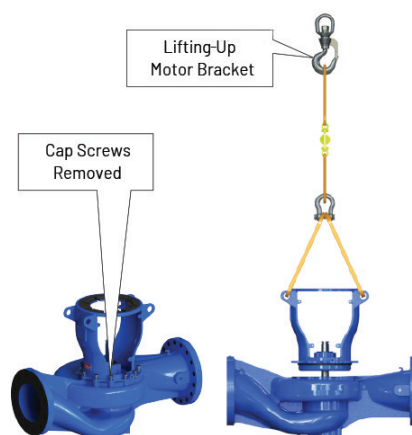
52. Fasten the set screws of rotating part of the seal. After maintaining the compression recommended by the seal manufacturer, tighten the set screws to a torque as recommended by the seal manufacturer.

53. Lower the jacking plate by utilizing bolts wing nuts, replace the four gland bolts and tighten the gland to the seal plate.

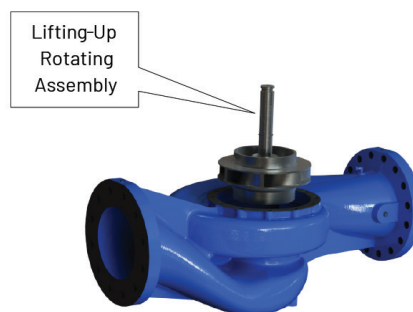
54. Reinstall the flush tubing. Ensure that the coupling rotates freely with no dragging or binding. Replace the coupling guards and refer to the beginning of the manual for startup instructions.



2. Remove the snap ring (#41B) from the shaft (#40).
3. Remove the cap screws (#5) holding the bracket (#35) to the casing (#6). Utilizing suitable lifting equipment lift the bracket straight up and off the casing and over the shaft. Take care when lifting to insure a straight lift, the carbon bushing (#42) may be damaged by uneven lifting.



4. Remove the casing gasket (#8) from the casing and bracket.
5. Lift the rotating assembly from the casing.



6. Unscrew impeller screw (#9) and remove impeller seal (#9C).
7. Slide impeller (#11) and impeller key (#12) from shaft.
8. Now remove the impeller washer (#9A).

COMPLETE PUMP DISASSEMBLY

• PUMP DISASSEMBLY MODELS

(1.5x1.5x9B, 2.5x2.5x7, 2.5x2.5x9, 2x2x12, 2x2x7, 2x2x9A/B/C, 3x3x12, 3x3x7A/B, 3x3x9A/B, 3x4x9, 4x4x11, 4x4x12, 4x4x7A/B, 4x4x9A/B, 4x5x9, 5x5x11, 5x5x12, 5x5x9, 6x6x11, 6x6x12, 6x6x9, 8x8x11, 8x8x12, 8x8x13.5, 10x10x13.5)

1. With the coupling, gland and mechanical seal removed, remove the bolts (#32) and nuts (#31) holding the motor to the bracket (#35). Pull the motor up and away utilizing suitable lifting equipment.

9. Remove wear rings (#7, #16) from the casing and bracket.
10. Press out the carbon bushing (#42) from the bore inside the bracket (at the base of the packing box). During reassembly the new bushing must be pressed in evenly or it can crack.

11. Pump reassembly is performed in the reverse order.

• PUMP DISASSEMBLY MODELS

(Models 10x10x19, 10x10x14, 12x12x14, 12x12x18, 14x14x15 and 14x14x18 only)

1. With the coupling (#45), gland (#44) and mechanical seal (#27) removed, remove the bolts (#32), nuts (#31) and washers (#32A) holding the motor to the bracket.
2. Pull the motor up and away utilizing suitable lifting equipment.
3. Remove the lower snap ring (#41B) from the pump shaft.
4. Remove the cap screws (#5) and washers (#5A) holding the bracket (#35) to the seal plate (#35A). Utilizing suitable lifting equipment lift the bracket straight up.
5. Remove the cap screws (#5) holding the seal plate to the casing (#6) and by utilizing two bolts jack the seal plate upwards. Utilizing suitable lifting equipment lift the seal plate straight up. Take care when lifting to ensure a straight lift.

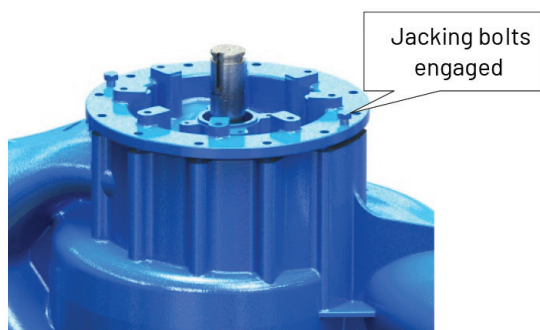


FIG. 28

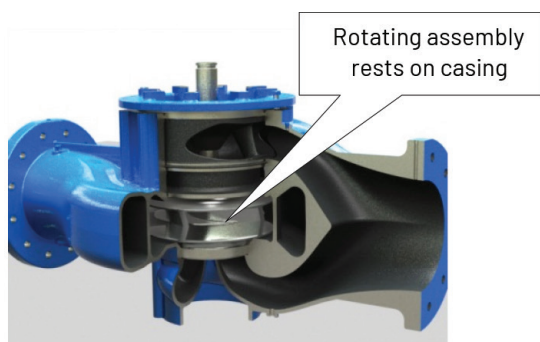


FIG. 29

6. Remove carbon bushing (#42) from the bore inside the seal plate. During reassembly the new bushing must be pressed in evenly or it can crack.
7. Remove O-rings/gaskets (#8 and #8A) from the seal plate

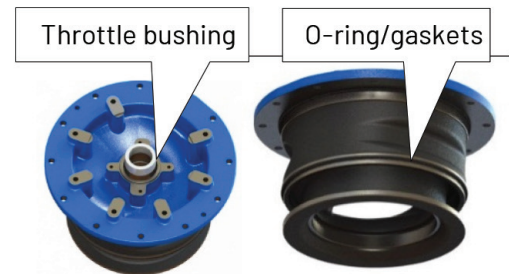


FIG. 30

8. Unscrew impeller screw (#9), remove impeller washer (#9A) and impeller seal (#9C).
9. Slide impeller (#11) and impeller key (#12) from shaft.
10. Remove spire bush (#13) from the impeller bore using a small puller. During reassembly the new bushing must be pressed evenly or it can crack.
11. Remove wear rings (#7) & (#16) from the casing and seal plate with the help of puller.



FIG. 31

12. Remove sleeve (#25A) from casing spire with the help of a puller.
13. Remove nameplate (#34) and screws (#33) only if replacement is needed.

INSPECTION

Once the pumping unit is disassembled, component parts should be inspected to determine their condition. Worn parts should be reconditioned to like-new condition or replaced.

ASSEMBLY

Pump reassembly is performed in the reverse order. During the assembly procedure, take care not to damage any of the component parts and avoid contamination (dirt, debris, moisture, etc.) to the unit.

MODEL 382B SC VERTICAL IN-LINE PUMP

TC-Motor

(Models 10x10x14, 12x12x14, 12x12x18, 14x14x15 and 14x14x18)

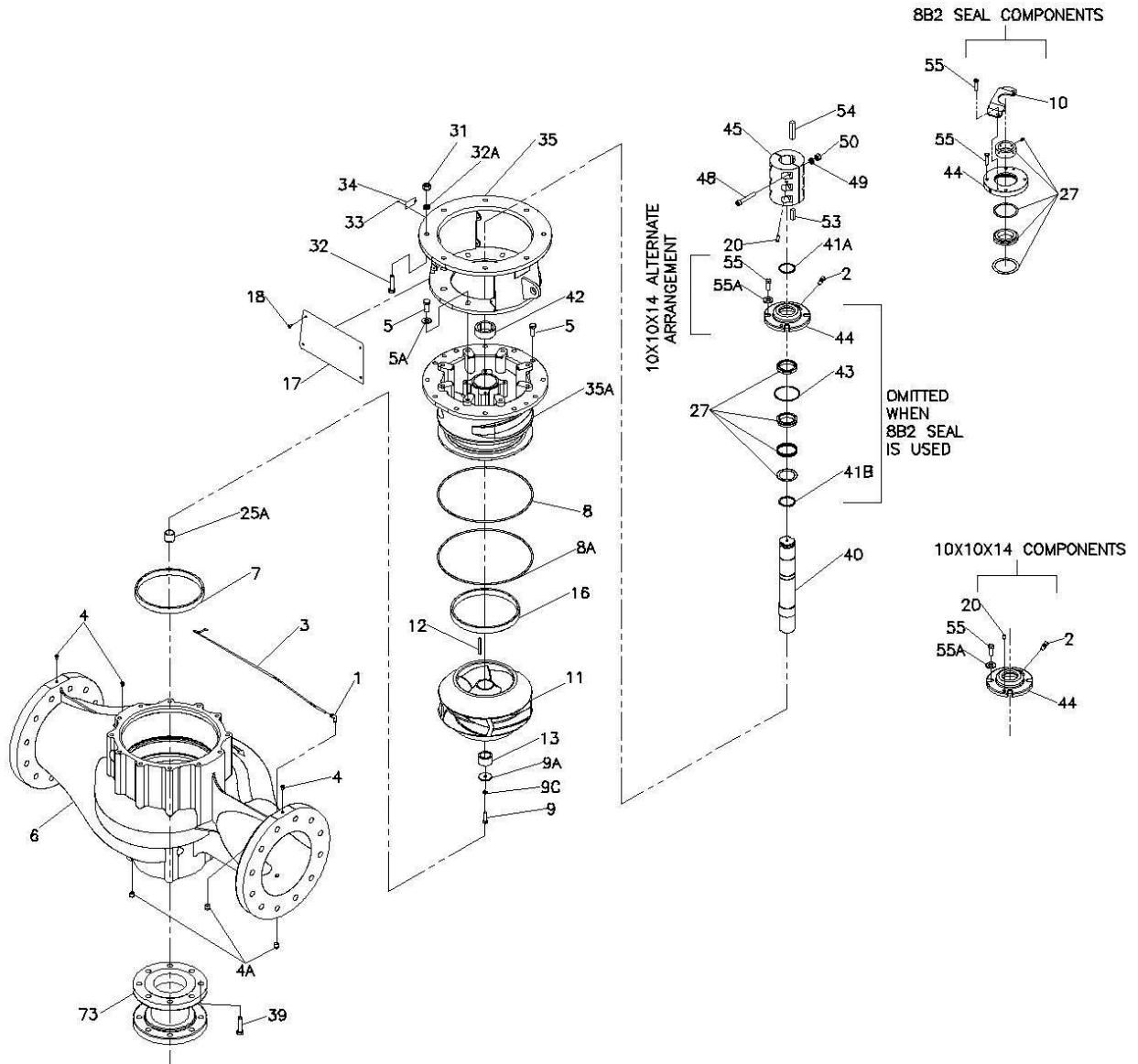
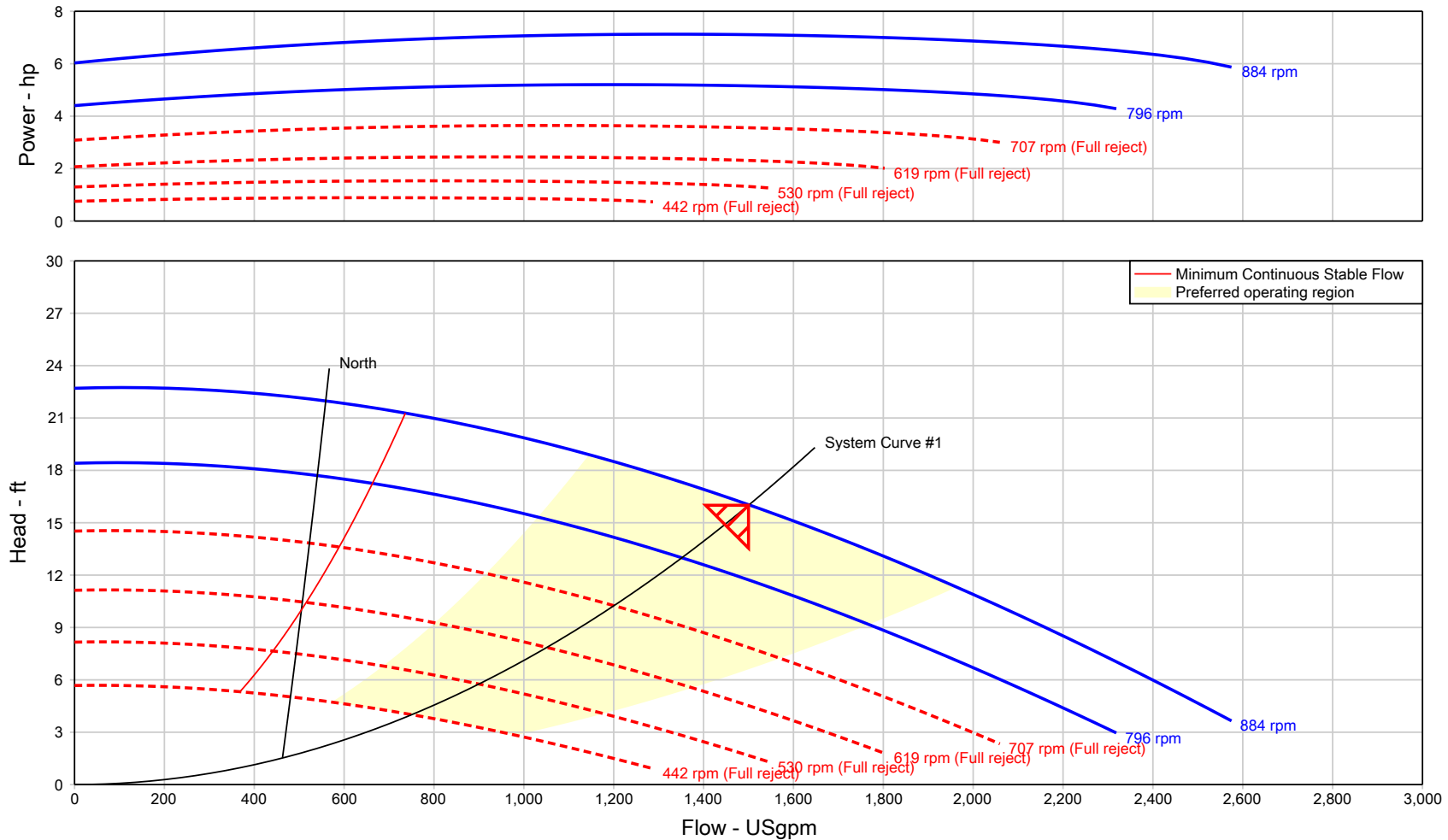


FIG. 34

PART LIST FOR 382 SC VERTICAL INLINE PUMPS

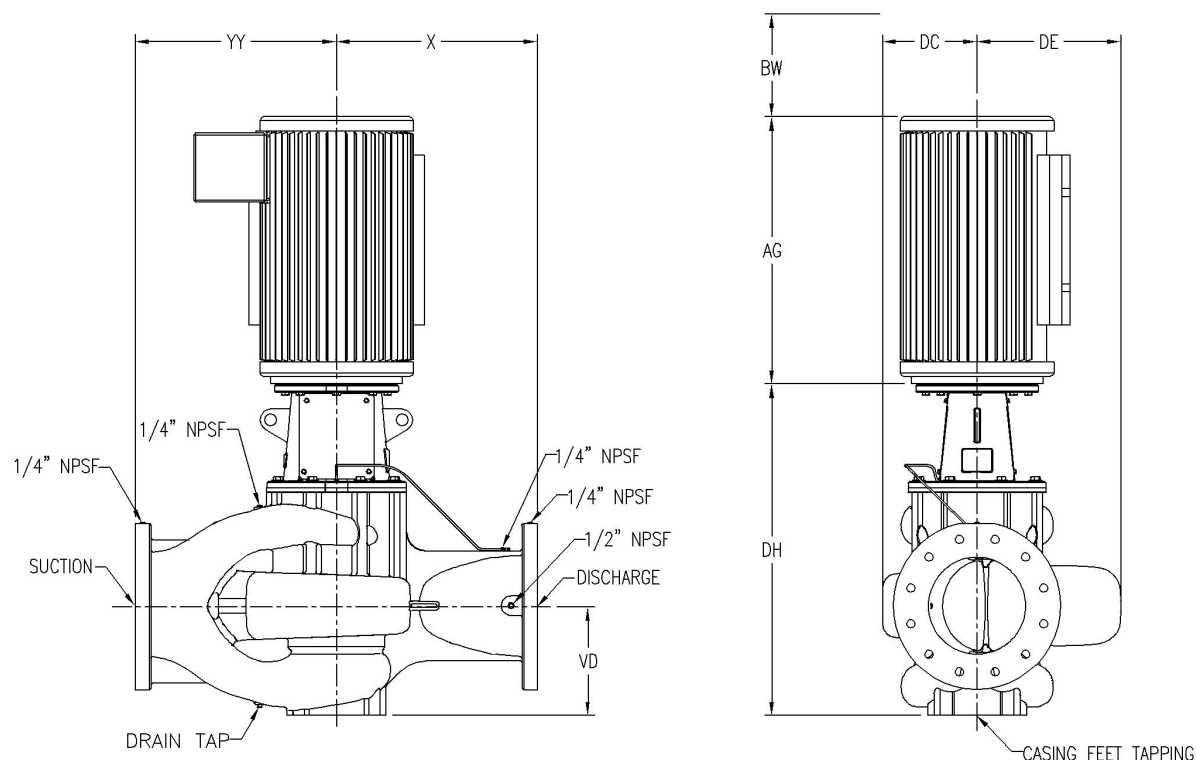
Reference: FIG. 32, 33, 34, 35 (Exploded Views)

ITEM NO.	DESCRIPTION
1	COMP. ELBOW
2	COMP. CONNECTOR
3	TUBING
4	PIPE PLUG
4A	PIPE PLUG
5	CAP SCREW
5A	WASHER
6	CASING
7	WEAR RING
8	GASKET
9	IMPELLER SCREW
9A	WASHER
9C	CAP SCREW SEAL
10	JACKING PLATE
11	IMPELLER
12	IMPELLER KEY
13	IMPELLER BUSH
16	WEAR RING
17	COUPLING GUARD
18	GUARD MOUNTING SCREW
20	SET SCREW
23A	WEAR RING
23B	WEAR RING
25A	SPIRE SLEEVE
27	SEAL
31	HEX NUT (MOTOR SIDE)
32	CAP SCREW
32A	LOCK WASHER (MOTOR SIDE)
33	SCREW
34	NAME PLATE
35	BRACKET
35A	SEAL PLATE
39	CAP SCREW
40	SHAFT
41 (A, B)	RETAINING RING
42	THROTTLE BUSHING
43	GLAND O-RING
44	GLAND
45	SPLIT COUPLING
48	CAP SCREW
49	LOCK WASHER
50	HEX NUT
51	STUD
52	WING NUT
53	PUMP COUPLING KEY
54	MOTOR COUPLING KEY
55	GLAND CAP SCREW
55A	GLAND WASHER
73	SPOOL BASE



Item number	: 002	Size	: 382B - 10x10x14	Flow, rated	: 1,500.0 USgpm
Service	: Backwash Supply Pumps	Stages	: 1	Differential head / pressure, rated	: 16.00 ft
Quantity	: 3	Efficiency	: 85.41 %	Speed, rated	: 884 rpm
Quote number	: 07282017	Power, rated	: 7.11 hp	Impeller diameter, rated	: 10.13 in
Based on curve number	: 83-10x10x14-1185-SC	NPSH required	: 7.30 ft	Fluid density, rated / max	: 1.000 / 1.000 SG
Date last saved	: 26 Oct 2018 3:08 PM	Frequency	: 60 Hz	Viscosity	: 1.00 cP
		Nominal speed	: 884 rpm	Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00

General Arrangement Drawing



X	DC	DE	DH	YY	VD	AG	BW	Drain Tap Size
25.00	10.60	14.80	32.24	25.00	10.61	23.00	15.00	0.50

NOTES:

All dimensions are in inches.

Dimensions may vary $\pm 1/4"$ (6mm) due to normal manufacturing tolerances.

Conduit box is shown in approximate position. Dimensions are not specified as they vary with each motor manufacturer.

Dimension BW is clearance required for servicing.

Pump Data

Series	380	Discharge Size	10.00 in
Model	382B-SC	Suction Size	10.00 in
Size	10x10x14	Impeller Diameter	10.13 in
Flow	1,500.0 USgpm	Pressure Rating	20.68 psi
Head	16.00 ft	Temperature Rating	68.00 deg F
RPM	884 RPM	Connection Suc/Dis	Flanged 125#/125#
Rotation	Right	Base Type	No Base
Pump Paint	Standard blue paint	Coupling Type	-

Motor Data

Power	7.50 hp	-	-
Phase	0	Efficiency (%)	Not available
Frequency	60 Hz	Efficiency Rating	-
Volts	-	Enclosure	-
RPM	884	Manufacturer	-
Frame	324TC		

Pump Materials of Construction

Pump Material	Stainless fitted	Motor Bracket	Cast iron ASTM A48
Casing	Ductile Iron ASTM A536	Seal Type	Type 21
Impeller	Stainless Steel Type 316	Seal Material	Carbon Ceramic
Shaft	Stainless Steel 416	Impeller Wear Ring	-
Shaft Sleeve	-		

Estimated Weights

Pump	3,312.0 lb
Driver	0.00 lb
Total	3,312.0 lb

Additional Options

-
-
-

Quote Information

Customer	ADVANCED PUMP & EQUIPMENT INC		
Customer Quote #	686093		
Job Name	Glasgow WTP		
Market	Municipal		



Quote Item #	002
Quote Date	26 Oct 2018



Motors

NIDEC MOTOR CORPORATION

8050 WEST FLORISSANT AVE.
ST. LOUIS, MO 63136



DATE: 12/5/2018

P.O. NO.: DATA
Order/Line NO.: 1334081 IN 100

TO: Aurora Pump
Pentair Water Aurora Pump
1101 Myers Parkway
Ashland, OH, 44805

ATTN: GERARDO VALERIO

Model Number: NA
Catalog Number: D15V4CCR-P
Horiz. ODP VFD Duty Config.
CONF,MOTOR,HORIZ. ODP VFD DUTY

REVISIONS:

**ALL DOCUMENTS HEREIN ARE CONSIDERED TYPICAL BY NIDEC MOTOR CORPORATION.
THANK YOU FOR YOUR INQUIRY AND THE OPPORTUNITY TO SERVE YOU.**

Features:

Temporary - DO NOT COPY
Horsepower 00015.00 ~ KW: 11.19
Enclosure ODP
Poles 08 ~ RPM: 900
Frame Size 324~TC
Phase/Frequency/Voltage.. 3~060~460
Winding Type Random Wound
Service Factor 1.15
Insulation Class Class "F" ~ Insulife 2000
Altitude In Feet (Max) .. 3300 Ft.(1000 M)
Ambient In Degree C (Max) +40 C
Assembly Position Footless, Shaft Down
Efficiency Class Premium Efficient
Application Centrifugal Pump
Inverter Duty NEMA MG1 Part 31
Customer Part Number
Inverter Duty Rating Details:
Load Type (Base Hz & Below) .. Variable Torque
Speed Range (Base Hz & Below). 10:1
"AK" Dimension (Inches).. 12.500
Temperature Rise (Sine Wave): "F" Rise @ SF (Resist)
Starting Method Direct-On-Line Start
Duty Cycle Continuous Duty
Efficiency Value 90.2 % ~ Typical
Load Inertia: NEMA ~ Standard Inertia: 400 LB-FT²
Number Of Starts Per Hour: NEMA
Motor Type Code DFI
Rotor Inertia (LB-FT²) 10.6 LB-FT²
Qty. of Bearings PE (Shaft) 1
Qty. of Bearings SE (OPP) 1
Bearing Number PE (Shaft) 6311-2Z-J/C3
Bearing Number SE (OPP) 6211-2Z-J/C3

Nidec trademarks followed by the ® symbol are registered with the U.S. Patent and Trademark Office.

NIDEC MOTOR CORPORATION

8050 WEST FLORISSANT AVE.
ST. LOUIS, MO 63136



DATE: 12/5/2018

P.O. NO.: DATA
Order/Line NO.: 1334081 IN 100

TO: Aurora Pump
Pentair Water Aurora Pump
1101 Myers Parkway
Ashland, OH, 44805

ATTN: GERARDO VALERIO

Model Number: NA
Catalog Number: D15V4CCR-P
Horiz. ODP VFD Duty Config.
CONF,MOTOR,HORIZ. ODP VFD DUTY

REVISIONS:

**ALL DOCUMENTS HEREIN ARE CONSIDERED TYPICAL BY NIDEC MOTOR CORPORATION.
THANK YOU FOR YOUR INQUIRY AND THE OPPORTUNITY TO SERVE YOU.**

Accessories:

Drip Cover (Canopy Cap)
Footless (Round Frame)
AEGIS Grounding Ring (SGR)
Vertical Lifting Lugs
Special Balance
Thermostats - Normally Closed
Test Requirements:
Short Commer. Test - Unwit

USE THE DATA PROVIDED BELOW TO SELECT THE APPROPRIATE DIMENSION PRINT

Horsepower	15
Pole(s)	08
Voltage(s)	460
Frame Size	324TC
Shaft U Diameter	2.125
Outlet Box AF	3.25
Outlet Box AA	2.00

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EFFECTIVE:
30-NOV-11

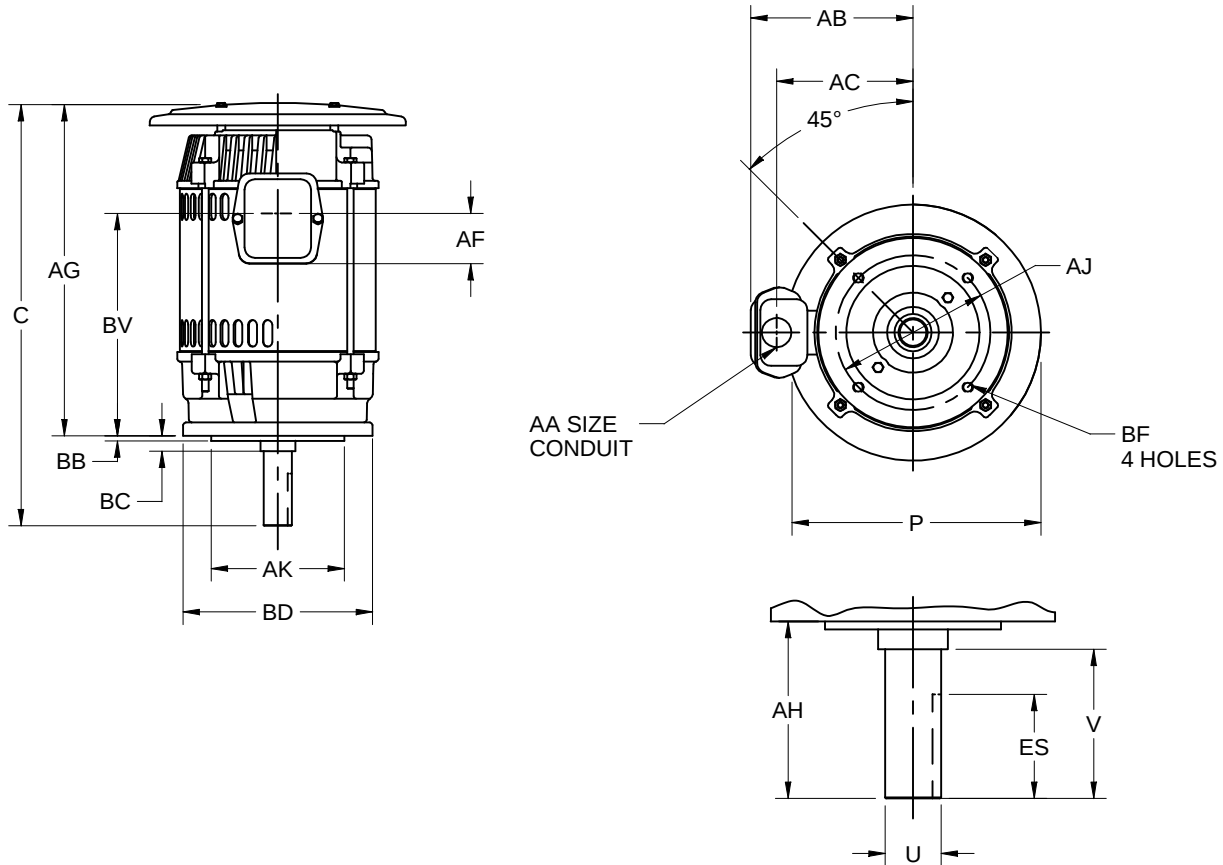
SUPERSEDES:
16-MAY-94

HORIZONTAL MOTORS

W / CANOPY CAP
FRAME: 320TC, TSC
BASIC TYPE: DF, DFI, DEF

PRINT:
1005-1-77

SHEET:
1 OF 1



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	⁵ P	AA	AB	AC	AF	AG	AJ	AK +.003	BB MIN	BC ⁷	BD MAX
IN	14.125	2.00	12.687	9.312	3.25	27.843	11.00	12.500	.25	-.25	13.00
MM	358.77		322.26	236.53	82.5	707.21	279.4	317.50	6.3	-6.3	330.2

UNITS	BF ⁶	BV	SQ KEY
IN	.625-11 x 1.47	17.00	.500
MM		431.8	12.7

FRAME	UNITS	C	U -.0005	V MIN	AH ± .006	ES MIN
320TC	IN	32.843	2.125	5	5.00	3.906
	MM	834.21	53.97	127	127	99.21
320TSC	IN	31.343	1.875	3.20	3.50	3.031
	MM	796.11	47.62	81.2	88.9	76.98

TOLERANCES	4.500-10.500 AK	12.500 AK
FACE RUNOUT	.004 T.I.R.	.007 T.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.004 T.I.R.	.007 T.I.R.
PERMISSIBLE SHAFT RUNOUT	.002 T.I.R.	.003 T.I.R.

- ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- SHAFT EXTENSION DIAMETER TOLERANCE: +.0000/ -.0005 UP TO 1.25 INCLUSIVE.
LARGER DIAMETERS: +.000/ -.001.
- ALL TAPPED HOLES ARE UNIFIED NATIONAL COARSE, RIGHT HAND THREAD.
- CONDUIT BOX MAY BE LOCATED ON EITHER SIDE. CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
- LARGEST MOTOR WIDTH
- TAP SIZE AND BOLT PENETRATION ALLOWANCE.
- SHAFT SHOULDER IS BEHIND MOUNTING FACE AS INDICATED BY (-) MINUS SIGN.

Nidec Motor Corporation
St. Louis, Missouri

INFORMATION DISCLOSED ON THIS DOCUMENT
IS CONSIDERED PROPRIETARY AND SHALL NOT BE
REPRODUCED OR DISCLOSED WITHOUT WRITTEN
CONSENT OF NIDEC MOTOR CORPORATION



ISSUED BY
M. FLORES
APPROVED BY
E. LIZANA

NAMEPLATE DATA

CATALOG NUMBER:		D15V4CCR-P		NAMEPLATE PART #:		422699-007	
MODEL		FR	324TC	TYPE	DFI	ENCL	ODP
SHAFT END BRG		6311-2Z-J/C3 - QTY 1		OPP END BRG		6211-2Z-J/C3 - QTY 1	
PH	3	MAX AMB	40 C	ID#	(ref: Order#: 1334081, Type: IN, Line#: 100)		
INSUL CLASS	F	Asm. Pos.		DUTY	CONT		
HP	15	RPM	885	HP		RPM	
VOLTS	460			VOLTS			
FL AMPS	20.5			FL AMPS			
SF AMPS	23.4			SF AMPS			
SF	1.15	DESIGN	B	CODE	F		
NEMA NOM EFFICIENCY	90.2	NOM PF	75.8	KiloWatt	11.19		
GUARANTEED EFFICIENCY	88.5	MAX KVAR		HZ	60		

HAZARDOUS LOCATION DATA (IF APPLICABLE):

DIVISION		CLASS I		GROUP I	
TEMP CODE		CLASS II		GROUP II	

VFD DATA (IF APPLICABLE):

VOLTS	460		
AMPS	21.5		
TORQUE 1	88.8LB-FT		
VFD LOAD TYPE 1	VT/PWM		
VFD HERTZ RANGE 1	6-60		
VFD SPEED RANGE 1	90-900		
TORQUE 2			
VFD LOAD TYPE 2			
VFD HERTZ RANGE 2			
VFD SPEED RANGE 2			
SERVICE FACTOR	1.00		
FL SLIP			
NO. POLES			
MAGNETIZING AMPS			
VECTOR MAX RPM			
Encoder PPR			
Radians / Seconds			
Encoder Volts			

TEAO DATA (IF APPLICABLE):

HP (AIR OVER)		HP (AIR OVER M/S)		RPM (AIR OVER)		RPM (AIR OVER M/S)	
FPM AIR VELOCITY		FPM AIR VELOCITY M/S		FPM AIR VELOCITY SEC			

ADDITIONAL NAMEPLATE DATA:

Decal / Plate	WD=912113	Customer PN	
Notes		Non Rev Ratchet	
Max Temp Rise		OPP/Upper Oil Cap	GREASE
Thermal (WDG)	OVER TEMP PROT 2	SHAFT/Lower Oil Cap	GREASE
Altitude		Usable At	
Regulatory Notes		Regulatory Compliance	CC 030A
COS		Marine Duty	
Balance	0.06 IN/SEC	Arctic Duty	
3/4 Load Eff.	91.8	Inrush Limit	
Motor Weight (LBS)	385	Direction of Rotation	
Sound Level		Special Note 1	
Vertical Thrust (LBS)		Special Note 2	
Thrust Percentage		Special Note 3	
Bearing Life		Special Note 4	
Starting Method		Special Note 5	
Number of Starts		Special Note 6	
200/208V 60Hz Max Amps		SH Max. Temp.	
190V 50 hz Max Amps		SH Voltage	
380V 50 Hz Max Amps		SH Watts	
NEMA Inertia		Load Inertia	
Sumpheater Voltage		Sumpheater Wattage	
Special Accessory Note 1		Special Accessory Note 16	
Special Accessory Note 2		Special Accessory Note 17	
Special Accessory Note 3		Special Accessory Note 18	
Special Accessory Note 4		Special Accessory Note 19	
Special Accessory Note 5		Special Accessory Note 20	
Special Accessory Note 6		Special Accessory Note 21	
Special Accessory Note 7		Special Accessory Note 22	
Special Accessory Note 8		Special Accessory Note 23	
Special Accessory Note 9		Special Accessory Note 24	
Special Accessory Note 10		Special Accessory Note 25	
Special Accessory Note 11		Special Accessory Note 26	
Special Accessory Note 12		Special Accessory Note 27	
Special Accessory Note 13		Special Accessory Note 28	
Special Accessory Note 14		Special Accessory Note 29	
Special Accessory Note 15		Special Accessory Note 30	
Heater in C/B Voltage		Heater in C/B Watts	
Zone 2 Group		Division 2 Service Factor	
Note 1		Note 2	
Note 3			

NIDEC MOTOR CORPORATION
ST. LOUIS, MO



TYPICAL NAMEPLATE DATA
ACTUAL MOTOR NAMEPLATE LAYOUT MAY VARY
SOME FIELDS MAY BE OMITTED

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MOTOR PERFORMANCE

MODEL NO.	CATALOG NO.	PHASE	TYPE	FRAME
NA	D15V4CCR-P	3	DFI	324TC
ORDER NO.		1334081	LINE NO.	
			100	
MPI:				257494
HP:				15
POLES:				8
VOLTS:				460
HZ:				60
SERVICE FACTOR:				1.15
EFFICIENCY (%):				
S.F.				89.9
FULL				90.2
3/4				91.8
1/2				91.6
1/4				88.1
POWER FACTOR (%):				
S.F.				76.9
FULL				75.8
3/4				71.1
1/2				61.1
1/4				40.4
NO LOAD				4.2
LOCKED ROTOR				38.6
AMPS:				
S.F.				23.4
FULL				20.5
3/4				16.1
1/2				12.5
1/4				9.9
NO LOAD				9.1
LOCKED ROTOR				103.7
NEMA CODE LETTER				F
NEMA DESIGN LETTER				B
FULL LOAD RPM				885
NEMA NOMINAL / EFFICIENCY (%)				90.2
GUARANTEED EFFICIENCY (%)				88.5
MAX KVAR				6.2
AMBIENT (°C)				40
ALTITUDE (FASL)				3300
SAFE STALL TIME-HOT (SEC)				30
SOUND PRESSURE (DBA @ 1M)				58
TORQUES:				
BREAKDOWN{% F.L.}				206
LOCKED ROTOR{% F.L.}				139
FULL LOAD{LB-FT}				88.8

NEMA Nominal and Guaranteed Efficiencies are up to 3,300 feet above sea level and 25 ° C ambient

The Above Data Is Typical, Sinewave Power Unless Noted Otherwise

NIDEC MOTOR CORPORATION
ST. LOUIS, MO

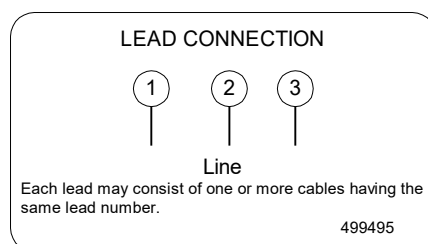
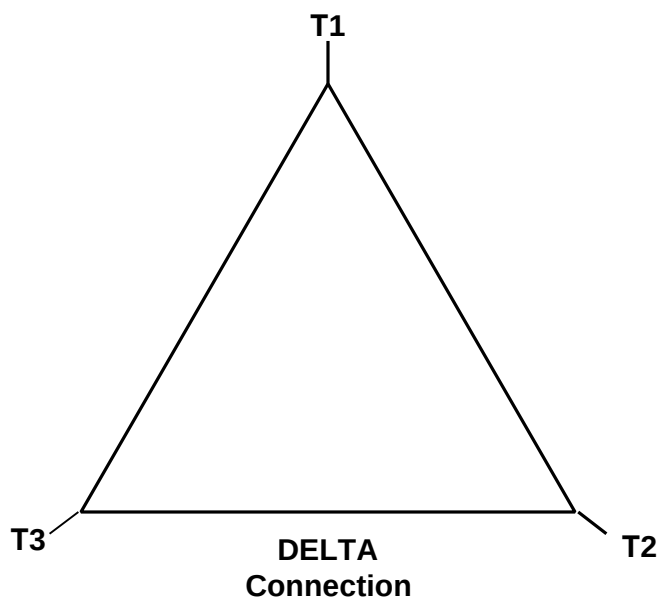


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499495

Motor Wiring Diagram

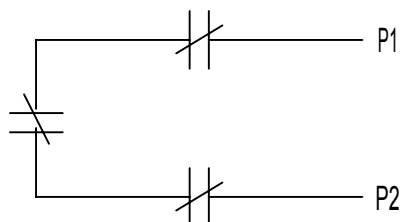


To reverse direction of rotation interchange connections L1 and L2.
Each lead may be comprised of one or more cables.
Each cable will be marked with the appropriate lead number.

THERMOSTATS

1. MOTOR IS EQUIPPED WITH QTY-3 (1 PER PHASE) NORMALLY CLOSED THERMOSTATS.
THERMOSTATS ARE SET TO OPEN AT HIGH TEMPERATURE.
2. CONTACT RATINGS FOR THERMOSTATS: 120-600 VAC, 720 VA

N. C. THERMOSTATS



NOTE: THERMOSTATS LEADS MAY BE LOCATED IN EITHER THE MAIN OUTLET BOX OR IF SO EQUIPPED, AN AUXILIARY BOX.

ACCESSORY LISTING

QTY-3 N.C. THERMOSTATS

REVISION DESCRIPTION FOR: MISC		SCALE	UNITS	TITLE		NIDEC MOTOR CORPORATION		
STL0211 - UPDATED FORMAT .		NONE	IN					
		TOLERANCES ON DIMENSIONS (UNLESS OTHERWISE SPECIFIED)		CUSTOMER CONNECTION DIAGRAM				
		INCHES	mm					
MATERIAL:				ISSUED BY	APPROVED BY	REVISION DATE		
---				R. KING	C. CADE	24-FEB-11		
				CODE	DWG NO.	REV	SHEET NUMBER	DWG SIZE
		ANGLES $X^{\circ} = \pm 1^{\circ}$			0834066	G	1 OF 1	A