SPXFLOW

INSTRUCTION MANUAL

EcoPure™

HYGIENIC MAGDRIVE CENTRIFUGAL PUMP

FORM NO.: 95-03100 REVISION: 03/04/2016

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.

SPXFLOW

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*Serial numbers can be entered for pumps manufactured after October 2008

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Warranty

LIMITED WARRANTY: Unless otherwise negotiated at the time of sale, SPX FLOW US, LLC (SPX FLOW) goods, auxiliaries and parts thereof are warranted to the original purchaser against defective workmanship and material for a period of twelve (12) months from date of installation or (18) months from date of shipment from factory, whichever expires first. If the goods or services do not conform to the warranty stated above, then as Buyer's sole remedy, SPX FLOW shall, at SPX FLOW's option, either repair or replace the defective goods or re-perform defective services. Third party goods furnished by SPX FLOW will be repaired or replaced as Buyer's sole remedy, but only to the extent provided in and honored by the original manufacturer's warranty. Unless otherwise agreed to in writing, SPX FLOW shall not be liable for breach of warranty or otherwise in any manner whatsoever for: (i) normal wear and tear; (ii) corrosion, abrasion or erosion; (iii) any good or services which, following delivery or performance by SPX FLOW, has been subjected to accident, abuse, misapplication, improper repair, alteration, improper installation or maintenance, neglect, or excessive operating conditions; (iv) defects resulting from Buyer's specifications or designs or those of Buyer's contractors or subcontractors other than SPX FLOW; or (v) defects resulting from the manufacture, distribution, promotion or sale of Buyer's products.

THE WARRANTIES CONTAINED HEREIN ARE THE SOLE AND EXCLUSIVE WARRANTIES AVAILABLE TO BUYER AND SPX FLOW HEREBY DISCLAIMS ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE FOREGOING REPAIR, REPLACEMENT AND RE-PERFORMANCE OBLIGATIONS STATE SPX FLOW'S ENTIRE AND EXCLUSIVE LIABILITY AND BUYER'S EXCLUSIVE REMEDY FOR ANY CLAIM IN CONNECTION WITH THE SALE AND FURNISHING OF SERVICES, GOODS OR PARTS, THEIR DESIGN, SUITABILITY FOR USE, INSTALLATION OR OPERATIONS.

Shipping Damage or Loss

If equipment is damaged or lost in transit, file a claim at once with the delivering carrier. The carrier has a signed Bill of Lading acknowledging that the shipment has been received from SPX FLOW in good condition. SPX FLOW is not responsible for the collection of claims or replacement of materials due to transit shortage or damages.

Warranty Claim

Warranty claims must have a **Returned Material Authorization (RMA)** from the Seller or returns will not be accepted.

Claims for shortages or other errors must be made in writing to Seller within ten (10) days after delivery. This does not include transit shortage or damages. Failure to give such notice shall constitute acceptance and waiver of all such claims by Buyer.

Safety

READ AND UNDERSTAND THIS MANUAL PRIOR TO INSTALLING, OPERATING, OR SERVICING THIS EQUIPMENT

SPX FLOW recommends users of our equipment and designs follow the latest Industrial Safety Standards. At a minimum, these should include the industrial safety requirements established by:

1. Occupational Safety and Health Administration (OSHA), Title 29 of the CFR
   Section 1910.212- General Requirements for all Machines
2. National Fire Protection Association, ANSI/NFPA 79
   ANSI/NFPA 79- Electrical Standards for Industrial Machinery
3. National Electrical Code, ANSI/NFPA 70
   ANSI/NFPA 70- National Electrical Code
   ANSI/NFPA 70E- Electrical Safety Requirement for Employee Workplaces
4. American National Standards Institute, Section B11

Attention: Servicing energized industrial equipment can be hazardous. Severe injury or death can result from electrical shock, burn, or unintended actuation of controlled equipment. Recommended practice is to disconnect and lockout industrial equipment from power sources, and release stored energy, if present. Refer to the National Fire Protection Association Standard No. NFPA70E, Part II and (as applicable) OSHA rules for Control of Hazardous Energy Sources (Lockout-Tagout) and OSHA Electrical Safety Related Work Practices, including procedural requirements for:

- Lockout-tagout
- Personnel qualifications and training requirements
- When it is not feasible to de-energize and lockout-tagout electrical circuits and equipment before working on or near exposed circuit parts

Locking and Interlocking Devices: These devices should be checked for proper working condition and capability of performing their intended functions. Make replacements only with the original equipment manufacturer's OEM renewal parts or kits. Adjust or repair in accordance with the manufacturer's instructions.

Periodic Inspection: Equipment should be inspected periodically. Inspection intervals should be based on environmental and operating conditions and adjusted as indicated by experience. At a minimum, an initial inspection within 3 to 4 months after installation is recommended. Inspection of the electrical control systems should meet the recommendations as specified in the National Electrical Manufacturers Association (NEMA) Standard No. ICS 1.3, Preventative Maintenance of Industrial Control and Systems Equipment, for the general guidelines for setting-up a periodic maintenance program.

Replacement Equipment: Use only replacement parts and devices recommended by the manufacturer to maintain the integrity of the equipment. Make sure the parts are properly matched to the equipment series, model, serial number, and revision level of the equipment.

Warnings and cautions are provided in this manual to help avoid serious injury and/or possible damage to equipment:

DANGER: *marked with a stop sign.*
Immediate hazards which WILL result in severe personal injury or death.

WARNING: *marked with a warning triangle.*
Hazards or unsafe practices which COULD result in severe personal injury or death.

CAUTION: *marked with a warning triangle.*
Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.

Magnetic field

Because of the presence of strong magnetic fields, observe the following:

DANGER: Anyone with a heart pacemaker, implantable cardioverter defibrillator (ICD) or other medical device that could be affected by strong magnets should not handle disassembled magnetic components. *The magnetic field is sufficiently strong to affect the operation of these devices. Stay at least 6 feet (1.8 meters) away from the pump.*

DANGER OF MAGNETIC RADIATION. *Always keep electronic equipment with memory, cards with magnetic strips, and other magnetic media at least 3.5 feet (1 meter) away from the pump.*
Review all magnetic or electrical devices that are stored within 6 feet (1.8 meters) of the magnetic parts for compatibility.

CAUTION: *When the magnetic impeller assembly is separated and handled individually, stray magnetic fields will surround each part. In this condition, other magnetic parts or steel components can be magnetically attracted to them. Precautionary measures must be taken.*

CAUTION: *When the pump is assembled in its operating position, it, is in a "safe" condition with little or no stray fields. However, when the unit is apart, and individual magnetic parts are being handled, the unit is unstable, and can be dangerous. In this condition, strong magnetic fields surround the components. These can be very strong at the surface of the part, but quickly diminish as distance from the part increases. At 1 foot (0.3 meters), the field is weak, and the effect on steel tools is hardly noticeable. At 3 feet (0.9 meters), there is no detectable field.*

CAUTION: *Although there is no documented evidence that handling high strength magnetic parts is a direct health hazard, it is recommended that their handling be minimized, and normal precautions be taken when working in high-energy magnetic fields.*

CAUTION: *Some types of hearing aids may be affected by disassembled magnetic components.*

CAUTION: *Magnetic coupling components must be kept clean if disassembled. Because of the small clearances within the assembly, a buildup of debris cannot be tolerated. As it is difficult to keep the magnets clean, they should be continuously checked and cleaned as the assembly progresses. Running clearances between the impeller bushing and the canister are small, and any magnetic debris buildup on the magnetic components is unacceptable. Magnetic components MUST be free of debris prior to assembly:*

- *Remove larger particles by hand.*
- *Wipe magnet surfaces with the sticky side of masking tape to remove the remaining debris.*

CAUTION: *Magnetic coupling components must be clearly marked and stored in a clearly marked area. Each magnetic component should be individually packed in a foam-filled container to protect it from any possible damage.*

CAUTION: *Both storage area and workplace must be clean and free of any loose iron or steel debris, such as grinding dust and machining chips. Even airborne particles from welding will collect on magnetic surfaces. In addition, any steel tools (hammers, screwdrivers, etc.) being used must be kept away from the magnets. Non-magnetic tools should be used around magnetic coupling components.*

CAUTION: *Assemble magnetic components on a non-magnetic bench.*

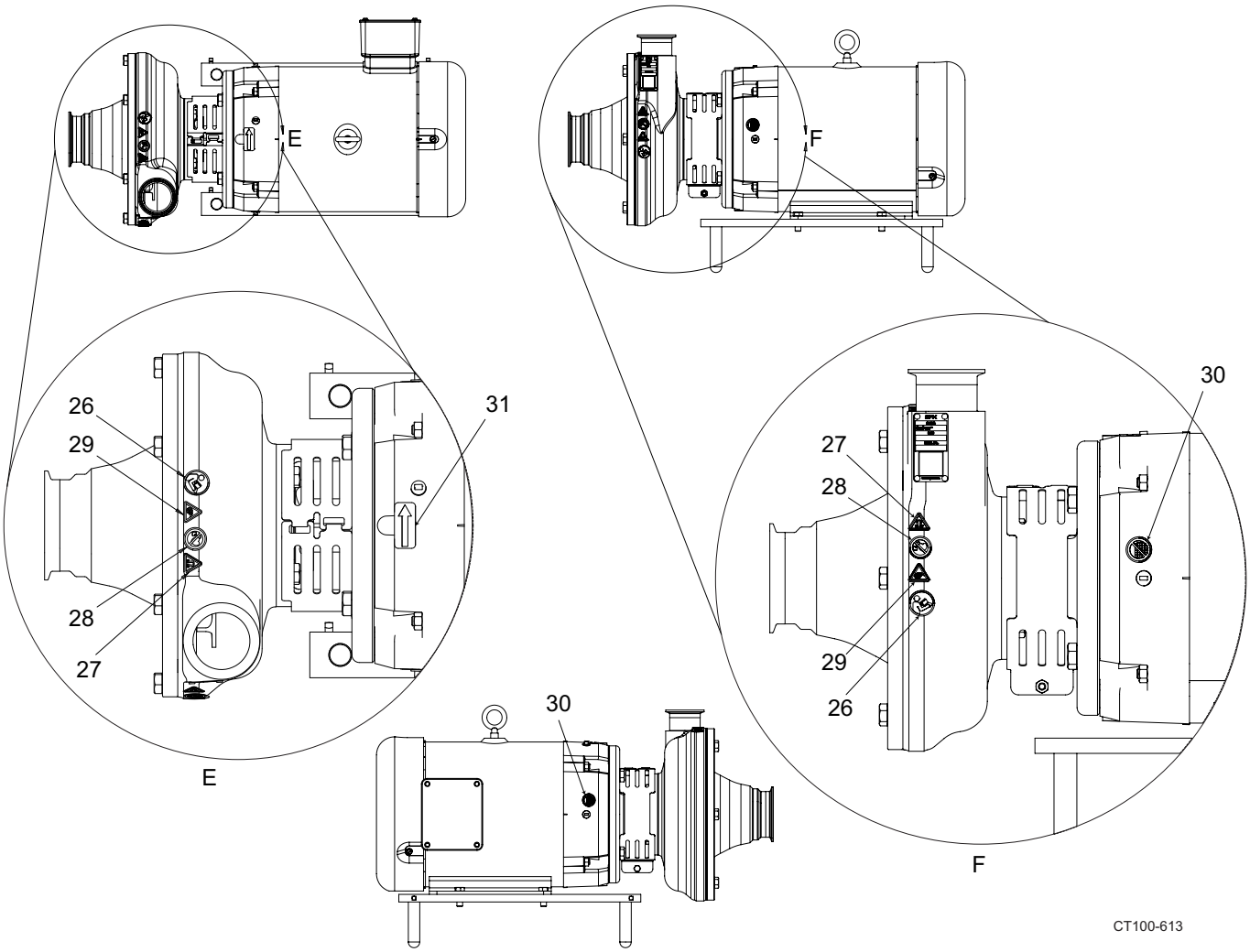
CAUTION: *Keep the areas where magnetic materials are present, well-labeled.*

Replacement Labels

WARNING: *The following labels are installed on your equipment. If these labels are removed or become unreadable, contact SPX FLOW customer service at 1-800-252-5200 or 262-728-1900, or refer to page 39 for replacement part numbers.*

Application Instructions

Apply to a clean, dry surface. Remove the backing from the label, place it in proper position, protect it with a cover sheet and burnish it. (A soft rubber roller also may be used to press the label into place.) Apply all labels to be readable from the front of the pump.



See page 39 for replacement part numbers.

Care of Stainless Steel

NOTE: *SPX FLOW recommends the use of an FDA-approved anti-seize compound on all threaded connections.*

Stainless Steel Corrosion

Corrosion resistance is greatest when a layer of oxide film is formed on the surface of stainless steel. If film is disturbed or destroyed, stainless steel becomes much less resistant to corrosion and may rust, pit or crack.

Corrosion pitting, rusting and stress cracks may occur due to chemical attack. Use only cleaning chemicals specified by a reputable chemical manufacturer for use with 300 series stainless steel. Do not use excessive concentrations, temperatures or exposure times. Avoid contact with highly corrosive acids such as hydrofluoric, hydrochloric or sulfuric. Also avoid prolonged contact with chloride-containing chemicals, especially in presence of acid. If chlorine-based sanitizers are used, such as sodium hypochlorite (bleach), do not exceed concentrations of 150 ppm available chlorine, do not exceed contact time of 20 minutes, and do not exceed temperatures of 104°F (40°C).

Corrosion discoloration, deposits or pitting may occur under product deposits or under gaskets. Keep surfaces clean, including those under gaskets or in grooves or tight corners. Clean immediately after use. Do not allow equipment to set idle, exposed to air with accumulated foreign material on the surface.

Corrosion pitting may occur when stray electrical currents come in contact with moist stainless steel. Ensure all electrical devices connected to the equipment are correctly grounded.

Elastomer Seal Replacement Following Passivation

Passivation chemicals can damage product contact areas of this equipment. Elastomers (rubber components) are most likely to be affected. Always inspect all elastomer seals after passivation is completed. Replace any seals showing signs of chemical attack. Indications may include swelling, cracks, loss of elasticity or any other noticeable changes when compared with new components.

Introduction

Pump Characteristics

The SPX FLOW EcoPure™ Magnetic Drive Centrifugal Pump is 3-A and EHEDG compliant.

Standard Construction

- Cover: 316L Stainless Steel Forging
- Port Connections: S-Line
- Casing: 316L Stainless Steel Forging
- Impeller: 316L Stainless Steel Bar Stock
- Nose: 316L Stainless Steel
- Elastomers: FDA approved FKM and EPDM
- Finish: All product contact surfaces are provided with a 32RA finish.
- Motor Adapter: 304SS
- Mounting: Direct-coupled

Construction Options

Ports

S-line
DIN 11851 SC

Elastomers

EPDM (FDA approved)
FKM (FDA approved)

Leg Kit

See “Motor Mounts” on page 41.

Motors

NEMA C-Face (standard) for close-coupled pumps

1750 or 3500 RPM single phase 115/230 volt and 3 phase 230/460 volt

Optional Enclosures

Washdown
Explosion proof
Severe Duty/Chemical Duty

Operating Parameters

Viscosity

Up to 500 CPS

Temperature

Operation: up to 200°F (93°C)
Cleaning (non-running): 300°F (149°C)

Nominal Speeds

1450 or 2900 RPM - 50HZ
1750 or 3500 RPM - 60HZ

Dimensions

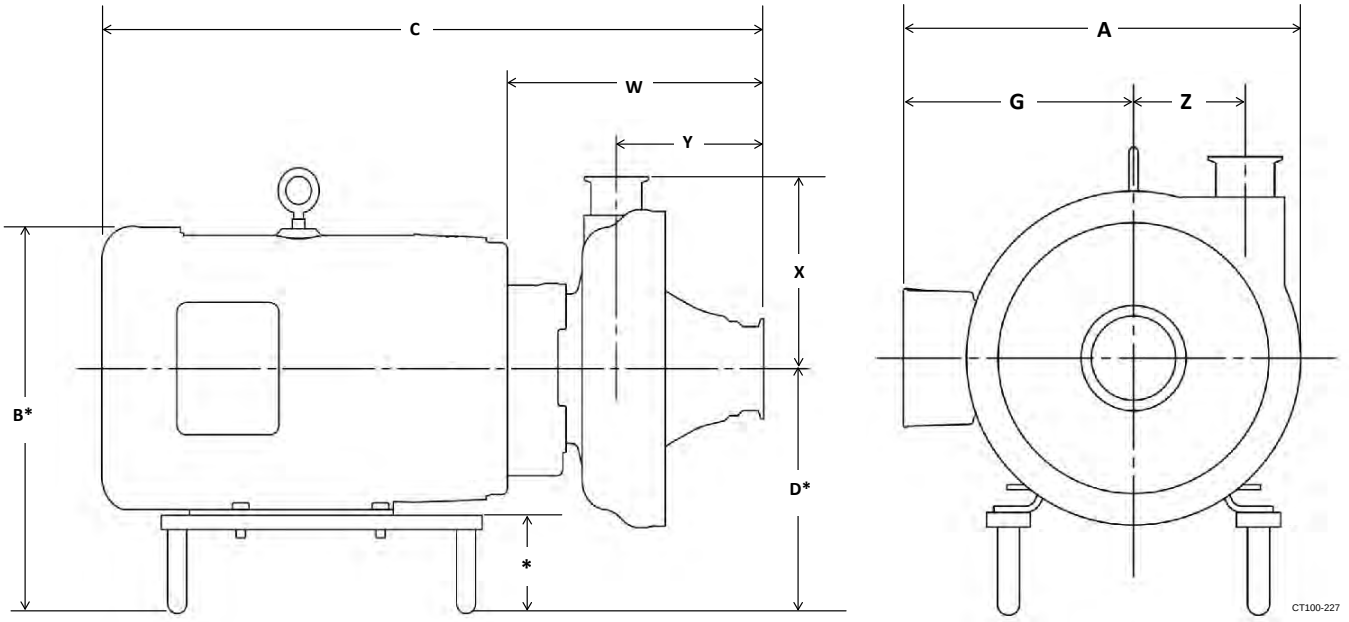


Figure 1 - Footprint Dimensions

Dimensions given at max. leg height (dimension) of 3.5 in (88.9 mm). Leg height is adjustable from 1-3.5 in. (25.4-88.9 mm)

SIZE	MOTOR FRAME	INLET in (mm)	OUTLET in (mm)	A in (mm)	B* in (mm)	D* in (mm)	F in (mm)	G in (mm)	Z in (mm)
P1	140TC	2.0 (51)	1.5 (38)	8.56 (217)	10.13 (257)	7.00 (178)	0.75 (19)	5.25 (133)	2.87 (73)
	180TC	2.0 (51)	1.5 (38)	9.81 (249)	12.19 (310)	8.00 (203)	0.75 (19)	5.88 (149)	2.87 (73)
	210TC	2.0 (51)	1.5 (38)	12.16 (309)	13.75 (349)	8.75 (222)	1.00 (25)	7.38 (187)	2.87 (73)
P2	180TC	3.0 (76)	2.0 (51)	9.81 (249)	12.19 (310)	8.00 (203)	0.75 (19)	5.88 (149)	3.80 (96)
	210TC	3.0 (76)	2.0 (51)	12.16 (309)	13.75 (349)	8.75 (222)	1.00 (25)	7.38 (187)	3.80 (96)
	250TC	3.0 (76)	2.0 (51)	16.09 (409)	16.38 (416)	9.75 (248)	1.00 (25)	9.63 (244)	3.80 (96)
	280TSC	3.0 (76)	2.0 (51)	20.44 (519)	18.13 (460)	10.50 (267)	1.50 (38)	13.13 (333)	3.80 (96)

CT100-228

NOTE: *The dimensions chart is continuted on the next page.*

Dimensions, continued

		S-LINE			
SIZE	MOTOR FRAME	W in (mm)	X in (mm)	Y in (mm)	C in (mm)
P1	140TC	8.03 (204)	5.70 (145)	4.89 (124)	20.08 (510)
	180TC	9.00 (228)	5.70 (145)	4.89 (124)	24.42 (620)
	210TC	9.00 (228)	5.70 (145)	4.89 (124)	26.88 (683)
P2	180TC	10.81 (275)	6.85 (174)	5.80 (147)	26.24 (666)
	210TC	10.81 (275)	6.85 (174)	5.80 (147)	28.70 (729)
	250TC	10.81 (275)	6.85 (174)	5.80 (147)	30.59 (777)
	280TSC	10.81 (275)	6.85 (174)	5.80 (147)	33.95 (862)

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		DIN 11851 SC			
SIZE	MOTOR FRAME	W in (mm)	X in (mm)	Y in (mm)	C in (mm)
P1	140TC	8.44 (214)	6.07 (154)	5.29 (134)	20.48 (520)
	180TC	9.40 (239)	6.07 (154)	5.29 (134)	24.83 (631)
	210TC	9.40 (239)	6.07 (154)	5.29 (134)	27.29 (693)
P2	180TC	11.50 (292)	7.26 (184)	6.49 (165)	26.92 (684)
	210TC	11.50 (292)	7.26 (184)	6.49 (165)	29.38 (746)
	250TC	11.50 (292)	7.26 (184)	6.49 (165)	31.28 (794)
	280TSC	11.50 (292)	7.26 (184)	6.49 (165)	34.64 (880)

Dimensions given at max. leg height (dimension) of 3.5 in (88.9 mm). Leg height adjustable from 1-3.5 in.

Installation

Pump Location

Consider the following when determining a location for the installation of your pump:

- Locate the pump as near as is practical to the liquid supply.
- Keep the supply piping short and straight to keep the pump supplied with liquid and prevent damaging cavitation.
- Make sure the pump is accessible for service and inspection during operation.
- Protect the motor from flooding.

Pump Leveling

Level the pump by loosening the set screws (Figure 2, item A) to adjust the length of the legs.

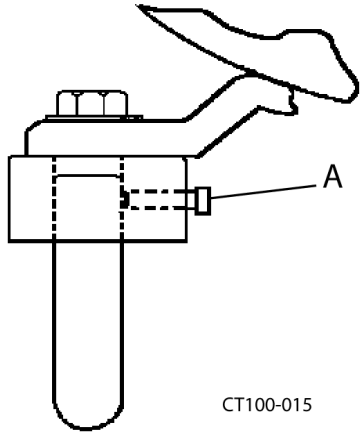


Figure 2 - Leveling Leg Set Screw Location

Supply and Discharge Piping/Valves

Consider the following when determining supply/discharge piping and valve installation of your pump:

- Use a line size equal to or larger than the connection size on the pump, especially the inlet supply line.
- Keep the supply line as short and straight as possible and use as few elbows, valves, or other types of restriction as possible. Avoid up and down rises which will trap air.
- Be certain all joints in the suction line are well-sealed to prevent air leaks.
- Maintain a straight length of pipe (Figure 3, item A) at least 8 diameters long at the pump inlet.

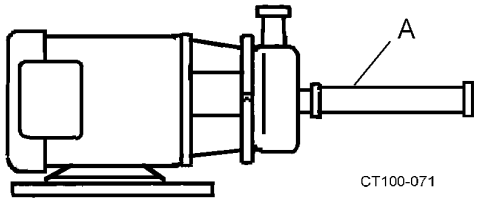


Figure 3 - Straight Pipe Length

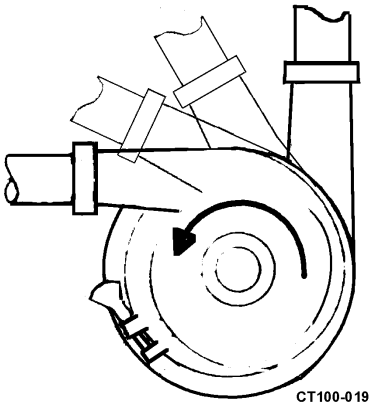


Figure 4 - Recommended Discharge Positions

- The pump casing may be rotated with the discharge connection pointing in any direction. The best pump performance will be with the outlet up, to the left, or positions in between; these positions ensure a flooded casing and prevent problems caused by air in the system (Figure 4).
- All joints in the suction line must be well-sealed to prevent air from being sucked into the system.

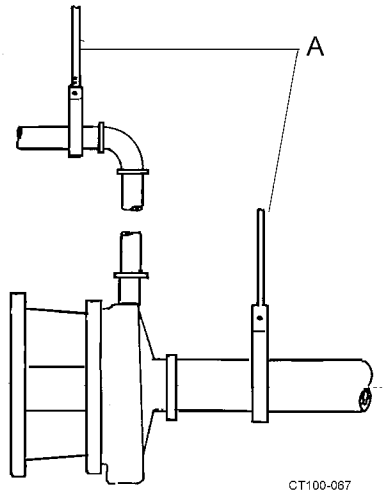


Figure 5 - Pipe Supports

- Support the supply and discharge piping near the pump so that no strain is put on the pump casing.
- If an expansion joint is used, install a pipe anchor between the joint and the pump.
- If a reducer is connected to an inlet, use an eccentric-type reducer to prevent problems caused by trapped air (Figure 6).

CAUTION: *The pump and piping may contain sharp edges. Wear gloves while installing and servicing the pump to help avoid injuries from these hazards.*

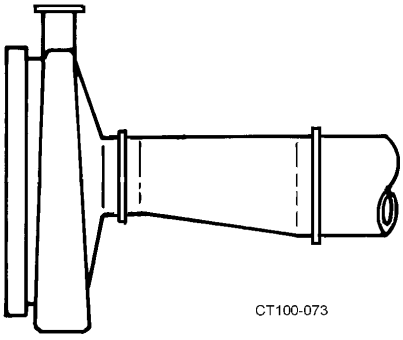


Figure 6 - Correct Eccentric Installation

- The line slope will depend on application requirements; the best pump operation is with the supply line sloped slightly upward toward the pump to prevent trapping air. If the system must drain into the pump casing, keep the downward slope to a minimum or priming problems may occur.
- Install shutoff valves to isolate the pump from the supply and discharge lines. This will allow the pump to be serviced without draining the system.

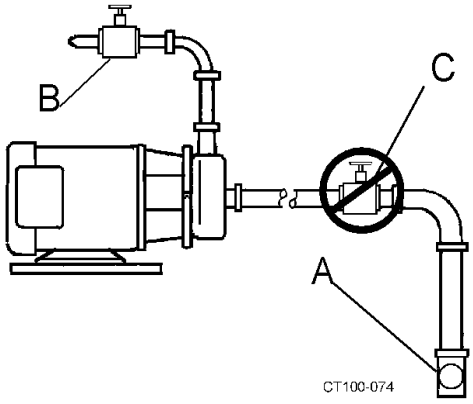


Figure 7 - Valve Piping Installation

Installations That May Cause Operation Problems

- This pump is not self priming. If the pump is installed above the supply liquid level, install a foot valve or other system check valve to keep the system flooded for priming (Figure 7, item A)
- A throttling valve may be required to control the pump flow rate to prevent motor overload. Always install the throttling valve (Figure 7, item B) in the discharge piping, at least 10 pipe diameters from the pump outlet.
- **Never** install a throttling valve in the supply piping (Figure 7, item C).
- Any system throttling valves or similar devices to control the flow rate must be installed in the discharge line. **Do not** install any system throttling valves or similar devices to control the flow rate in the supply line. Restriction in the supply line may cause cavitation and pump damage.
- “Water hammer” in the system can damage the pump and other system components. Water hammer often occurs when valves in the system are suddenly closed, causing lines to move violently and with a loud noise. When this condition is present, find and eliminate the source of the water hammer. One way to eliminate water hammer is to slow down the actuation speed of the valve.
- Do not expose the pump to freezing temperatures with liquid in the casing. Frozen liquid in the casing will damage the pump. Drain the casing before exposing it to freezing temperatures.

Electrical Connections

WARNING: *To avoid electrocution, ALL electrical installation should be done by a registered Electrician, following Industry Safety Standards. All power must be OFF and LOCKED OUT during installation.*

- Read the motor manufacturer's instructions before starting the installation. Follow the manufacturer's lubrication schedules.
- Check the motor nameplate to be sure the motor is compatible with the electrical supply and all wiring, switches, and starters. Make sure all overload protections are correctly sized.
- Check the pump rotation following the electrical installation. The correct rotation is counterclockwise when facing the pump inlet connection (Figure 4).
- Make sure to use a motor soft start. See “Motor Soft Start Required” on page 17.

Before First Startup

Clean Pump and Piping

Disassemble the pump and clean all product contact parts and seal parts prior to the first operation. Follow the instructions in the “Cleaning Safety Procedures,” below and “Routine Maintenance” on page 18. Thoroughly clean the pump of any materials which could have accumulated during installation.

Cleaning Safety Procedures

WARNING: *To prevent an accidental start-up, lock out the power source with lock and key.*

Manual Cleaning

Address the following recommendations when manually cleaning your pump:

- Do not use toxic and/or flammable solvents.
- Lock out electrical power and shut off all air prior to cleaning the equipment.
- Keep electrical panel covers closed and power off when washing the equipment.
- Clean up spills as soon as possible.
- Never attempt to clean the equipment while it is operating.
- Wear proper protective clothing.

Cleaning-In-Place (CIP)

When performing CIP:

1. Make certain that all connections in the cleaning circuit are properly applied and tight to avoid contact with hot water or cleaning solutions.
2. When the cleaning cycle is controlled from a remote or automated cleaning center, establish safe procedures to avoid automatic start-up while servicing equipment in the circuit.

NOTE: *Always replace the elastomers when reassembling the pump. If the area behind these seals becomes soiled, contact SPX FLOW Application Engineering for a specific cleaning and sanitizing procedure validated to remove bacteria. See Figure 68 on page 33.*

Preliminary Test Run

Test the system using a preliminary run with the materials that will be pumped. **DO NOT** run the pump at this time to produce final product. You must use a soft starter.

WARNING: *You **must** use a soft starter or VFD with a recommended ramp up time of 3-5 seconds (depending on manufacturer) to protect the pump and motor.*

See “Starting the Pump” on page 17.

Check For Possible Motor Overload Conditions

WARNING: *Keep the motor within the torque restriction of the magnets. Contact factory for specification.*

Certain combinations will overload the motor when operated with open unrestricted discharge, resulting in an unacceptably high flow rate.

Additional discharge restriction may be required to lower the flow rate and lower the horsepower requirement. **DO NOT** add a restriction to the supply line. If the pump was incorrectly selected, a smaller impeller or a higher motor horsepower may be required.

If you are uncertain about pump selection and application, temporarily install an ammeter in the electrical service.

WARNING: *To avoid electrocution and equipment damage, only a qualified electrician should install the ammeter.*

Ammeter Test

Operate the pump under process conditions and check the motor amp draw versus the nameplate full load rating. If the amp draw exceeds the motor rating, a system change or pump change is required.

If the process conditions and/or liquid changes (higher viscosity, higher specific gravity), recheck the motor amp draw.

Operation

Before proceeding, make sure your pump has been correctly installed as described in “Installation” on page 12.

Priming the Pump

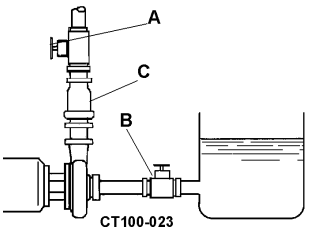


Figure 8 - Pump Below Supply (Feed Source Above Pump Level)

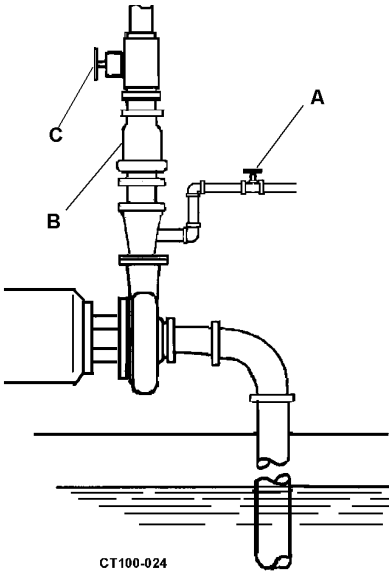


Figure 9 - Pump Above Supply (Feed Source Below Pump Level)

Priming the Pump With the Feed Source Above Pump Level

1. Fill the supply tank with liquid; open the supply line (suction) valve (Figure 8, item B).
2. Vent any air trapped in the supply line or casing by opening the discharge valve (Figure 8, item A).

Priming the Pump With the Feed Source Below Pump Level

The pump will not self-prime if the liquid supply is below the pump level. When the liquid supply is below the pump level, an outside source must be provided for priming.

1. Close the discharge valve (Figure 9, item C) and open the air vents.
2. Open the valve installed in the outside supply line (Figure 9, item A) until liquid flows from vent valves.
3. Close the vent valves.
4. Close the outside supply line.

NOTE: *Use a check valve system (Figure 9, item B) to keep the supply line and pump casing flooded with liquid; otherwise the pump must be primed before each operation.*

Starting the Pump

***NOTE: Before** starting the pump, prime the pump by flooding the pump casing with liquid, to avoid damage to pump parts. See "Priming the Pump" above.*

***WARNING:** Keep the motor within the torque restriction of the magnets. Contact factory for specification.*

Motor Soft Start Required

***WARNING:** You **must** use a soft starter or VFD with a recommended ramp up time of 3-5 seconds* to protect the pump and motor.*
** The recommended ramp-up time may vary by manufacturer.*

1. Start the pump motor.
2. Check the pump to see that liquid is flowing. Inspect the pump and piping for leaks.
3. Make sure that the pump is not operating against a closed discharge. Continued operation against a closed discharge will heat the liquid in the casing to boiling and lead to pump damage.
4. Slowly open the discharge valve until the desired flow is obtained. Observe the pressure gauges and if pressure is not attained quickly, stop the pump and prime it again.

Stopping the Pump

1. To stop the pump, shut off power to the pump motor.

***NOTE:** Liquid in the system can flow freely through the pump—the pump does not act as a shutoff valve.*

2. Shut off supply and discharge lines.

Maintenance

Scheduled Maintenance

A routine maintenance program can extend the life of your pump. Make sure to keep maintenance records. These records will help pinpoint potential problems and causes.

Routine Maintenance

Your scheduled routine maintenance should include the following items:

- Check for unusual noise, vibration, and bearing temperatures
- Inspect the pump and piping for leaks
- Check elastomers for wear/damage
- Bearing lubrication (See motor manufacturer for correct specifications)
- Vibration analysis
- Check the discharge pressure
- Temperature monitoring

Pump Disassembly

Remove the cover

1. Shut off the product flow to the pump and relieve any product pressure. Remove any product from the pump.
2. Remove the cover bolts.
3. On the P2, install the cover guide rods to assist with removal, then remove the cover.

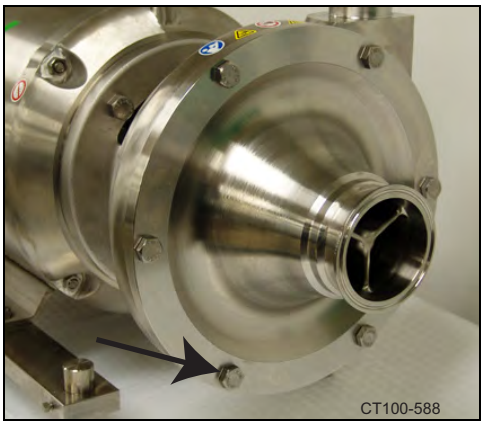


Figure 10 - Remove cover bolts

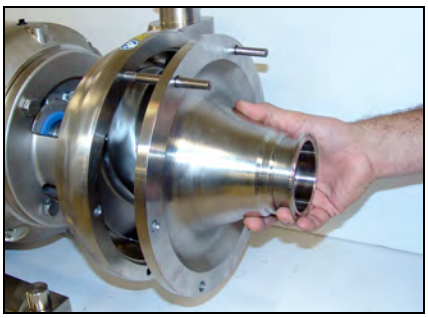


Figure 11 - Install guide rods and remove cover

NOTE: *Cover guide rods are recommended on the P2.*

4. Pull the cover away from the pump casing.

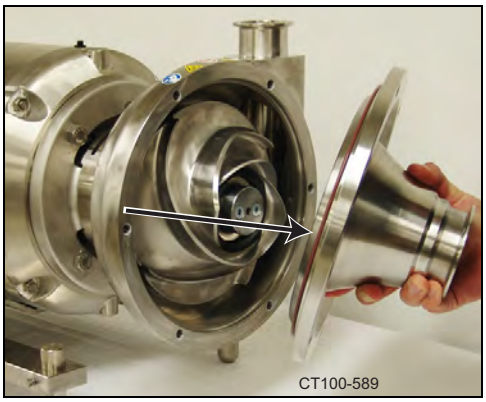


Figure 12 - Pull cover from casing

Remove the inner magnet assembly

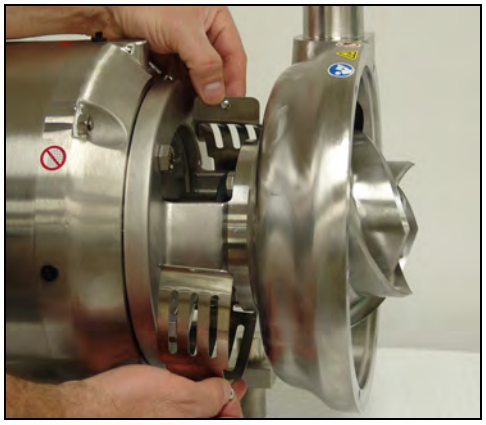


Figure 13 - Remove shaft guard

1. Unscrew the shaft guard bolt and remove the shaft guard.

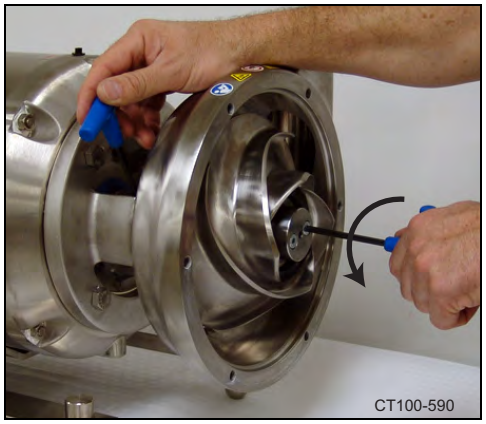


Figure 14 - Remove mounting bolts

2. Place an Allen wrench into one of the motor shaft collar bolt heads to keep the shaft from rotating.
   Remove the inner magnet assembly mounting bolts from the shaft.

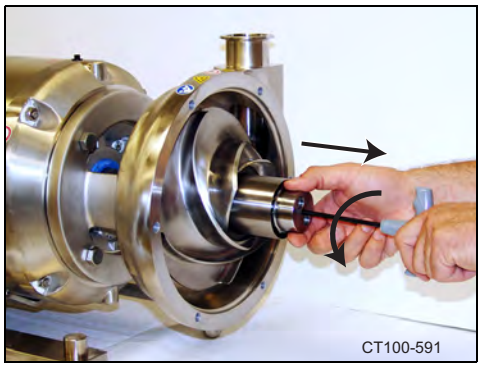


Figure 15 - Unscrew inner magnet assembly jack screw

3. Grasp the inner magnet assembly and, using an Allen wrench, unscrew the inner magnet assembly jack screw. Gently pull the inner magnet assembly toward you as you unscrew the jack screw.

CAUTION: *Strong magnetic pull. Keep fingers clear.*

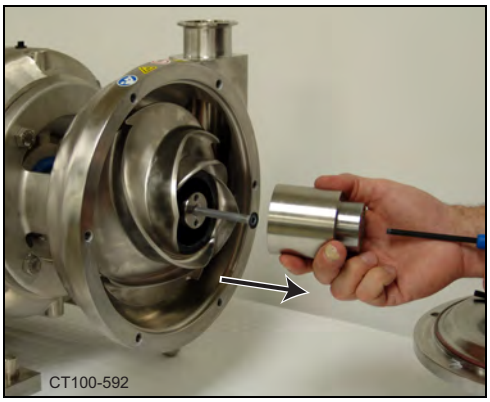


Figure 16 - Pull inner magnet assembly free from shaft

4. When the inner magnet assembly jack screw is almost fully retracted, pull the inner magnet assembly free from the shaft.

Remove the impeller, shaft, and canister from the pump

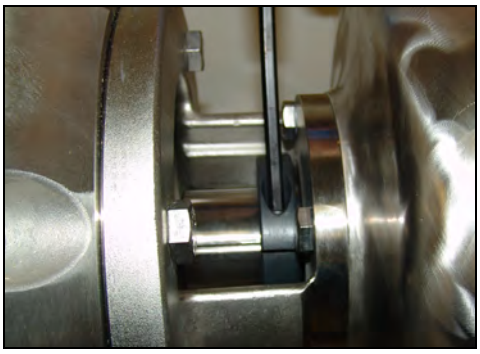


Figure 17 - Loosen motor shaft collar bolts

1. Loosen the motor shaft collar bolts.

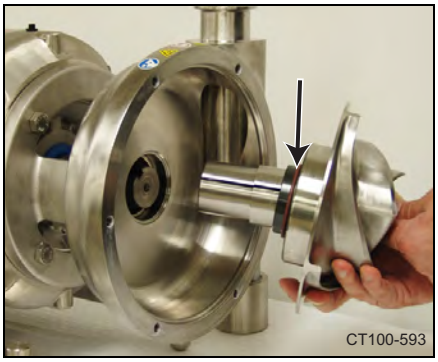


Figure 18 - Pull impeller, shaft, canister from casing

2. Pull the impeller, shaft, and canister out of the casing as an assembly. See Figure 18. The arrow indicates the canister-to-casing o-ring location.

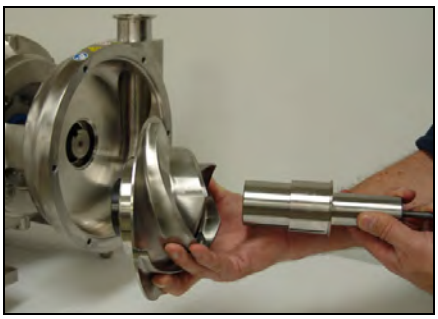


Figure 19 - Remove shaft from impeller assembly

3. Remove the shaft from the impeller assembly.

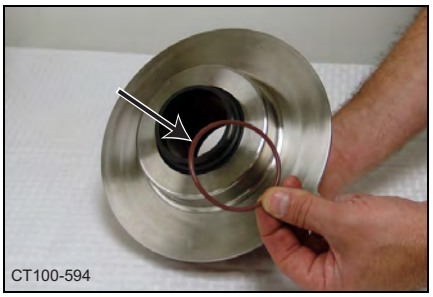


Figure 20 - Remove canister-to-casing o-ring

4. Remove the canister-to-casing o-ring from the canister.

Figure 21 - Remove canister from impeller

5. Remove the canister from the impeller.

Remove the impeller bushing

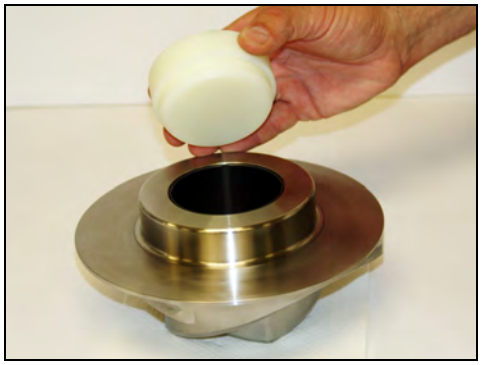


Figure 22 - Place tool on bushing

1. Place the impeller on a shock-absorbing surface. Place the the impeller bushing installation/removal tool on the bushing. See page 40 for tool part numbers.

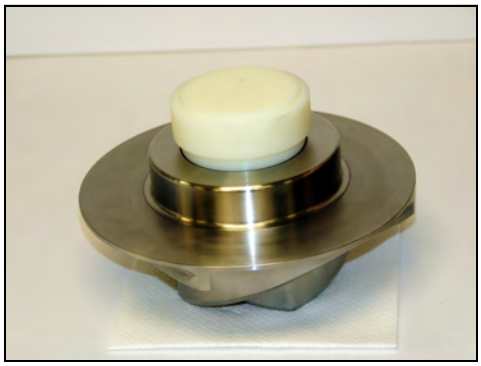


Figure 23 - Center tool on bushing

2. Center the tool on the bushing.

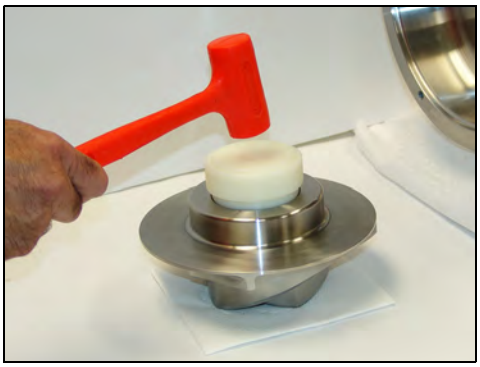


Figure 24 - Tap the tool with a mallet

3. With a mallet, tap the tool until it is flush with the face of the impeller.

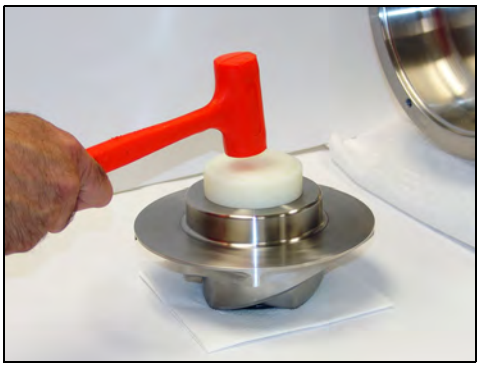


Figure 25 - Tool flush with impeller face

4. When the tool is flush with the impeller face, the bushing should be released from the impeller.

Figure 26 - Remove bushing from impeller

5. Remove the bushing from the impeller.

Figure 27 - Remove rear impeller o-ring

6. Remove the rear impeller o-ring.

Figure 28 - Remove front impeller o-ring

7. Remove the front impeller o-ring.

Remove the o-rings and nose from the cover

1. Remove the cover o-ring from the cover.

Figure 29 - Cover o-ring location

2. Remove the nose-to-canister o-ring from the nose.

Figure 30 - Remove nose-to-canister o-ring from nose

3. Using an Allen wrench, unscrew the nose bolt.

Figure 31 - Unscrew nose bolt

Figure 32 - Remove nose bolt

4. Remove the nose bolt.

Figure 33 - Remove nose from cover

5. Remove the nose from the cover.

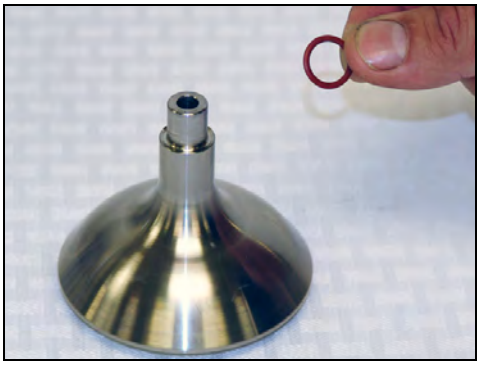


Figure 34 - Nose-to-cover o-ring

6. Remove the nose-to-cover o-ring.

Pump Assembly

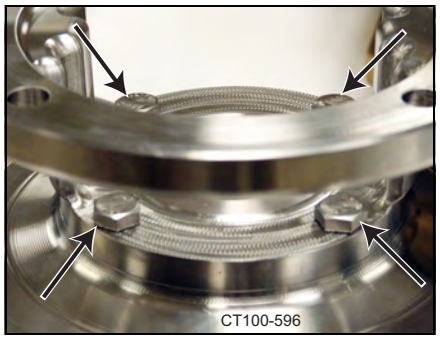


Figure 35 - Motor adapter bolts

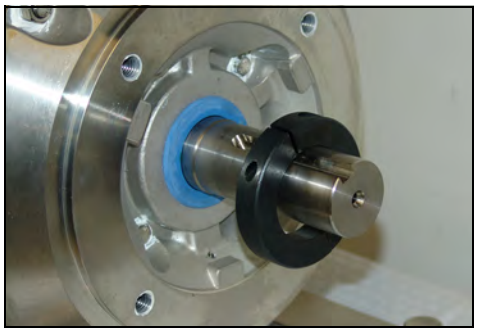


Figure 37 - Motor shaft collar on shaft

Figure 38 - Orient the pump outlet

Install the motor adapter, casing, motor shaft collar

1. Attach the motor adapter to the casing using 4 bolts and torque to the value specified in Table 1 on page 35.

NOTE: *SPX FLOW recommends the use of an FDA-approved anti-seize compound on all threaded connections.*

2. Assemble the motor shaft collar together using 2 bolts.

NOTE: *Do not tighten the bolts at this time.*

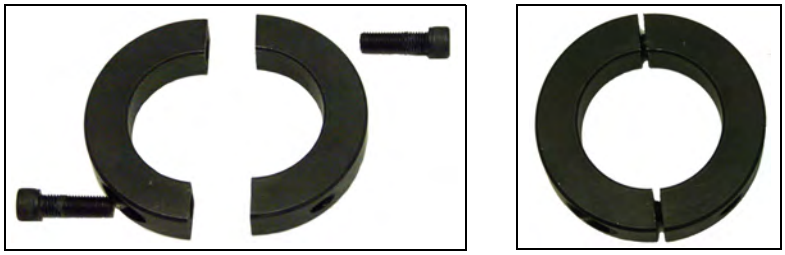


Figure 36 - Assemble motor shaft collar

3. Place the motor shaft collar onto the motor shaft.

4. Orient the pump outlet horizontally or vertically as required. (Vertical outlet port shown in Figure 38.)

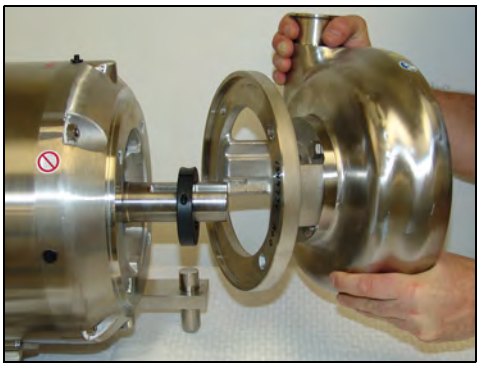


Figure 39 - Install motor adapter to motor

5. Install the pump casing and motor adapter to the motor. Orient the discharge port as required.

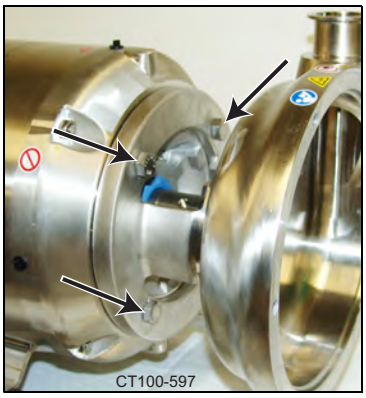


Figure 40 - Torque bolts

6. Install the bolts to attach the motor adapter to the motor and tighten down.

NOTE: *SPX FLOW recommends the use of an FDA-approved anti-seize compound on all threaded connections.*

Assemble the impeller bushing

Figure 41 - Insert rear impeller o-ring

1. Lubricate the rear impeller o-ring and install it into the impeller bushing.

NOTE: *Always replace elastomers when re-assembling the pump.*

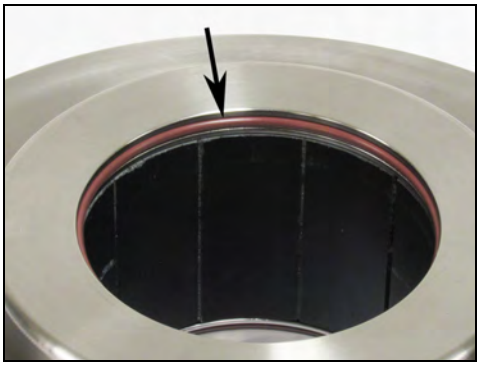


Figure 42 - Rear impeller o-ring installed

Figure 43 - Install front impeller o-ring

2. Lubricate the front impeller o-ring and install it into the impeller bushing.

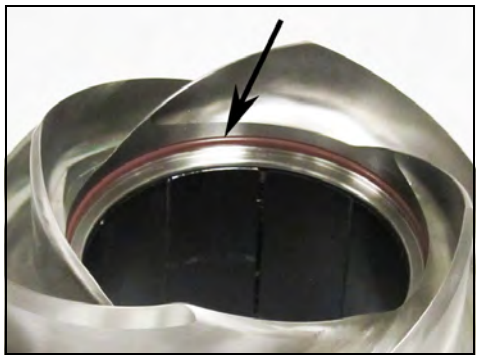


Figure 44 - Front impeller o-ring installed

Figure 45 - Place impeller on the tool

3. Install the bushing into the impeller.

Figure 46 - Place impeller on the tool

4. Place the impeller on the impeller bushing installation/removal tool. See page 40 for tool part numbers.

Figure 47 - Press down

5. Press down to seat the impeller bushing in the impeller.

CAUTION: *Take care not to pinch the o-ring. See Figure 48.*

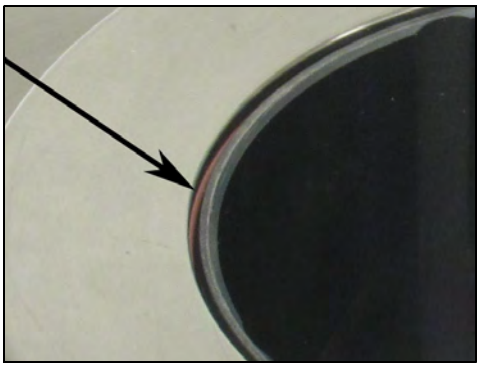


Figure 48 - Check rear impeller o-ring

6. After installing the impeller bushing, check to confirm that the rear impeller o-ring is installed correctly (not pinched).

Install the impeller, canister, and shaft

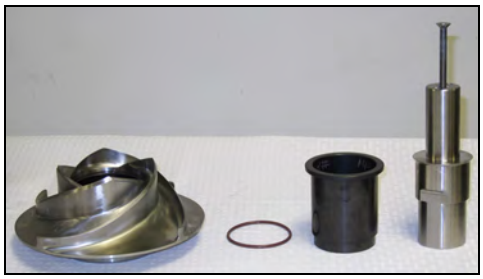


Figure 49 - Gather parts shown

1. Gather the parts shown in Figure 49. From left to right: Impeller, Canister-to-casing o-ring, Canister, Shaft with magnet jack screw.

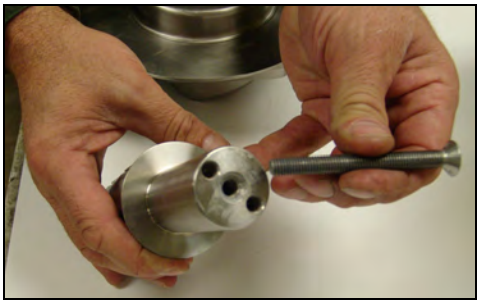


Figure 50 - Thread magnet jack screw

2. Thread the magnet jack screw into the shaft approximately 5 full rotations.

NOTE: *SPX FLOW recommends the use of an FDA-approved anti-seize compound on all threaded connections.*

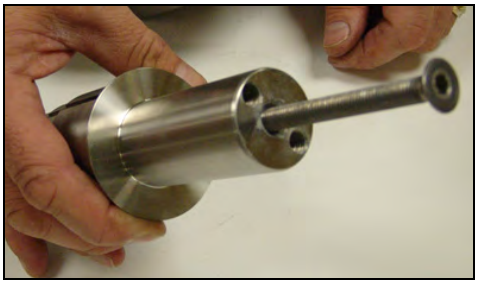


Figure 51 - Leave screw protruding from shaft

3. Leave the magnet jack screw protruding from the shaft as shown in Figure 51. Set the shaft aside.

Figure 52 - Install canister into impeller

4. Install the canister into the impeller

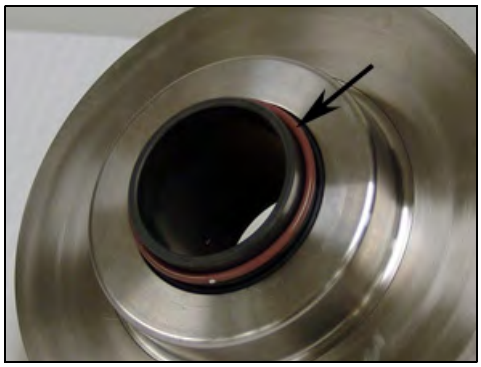


Figure 53 - Install o-ring onto canister

5. Install the canister-to-casing o-ring onto the canister.

NOTE: *Always replace the elastomers when re-assembling the pump.*

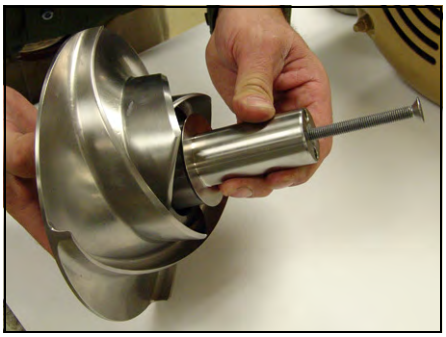


Figure 54 - Insert shaft in canister

6. Insert the shaft into the canister.

NOTE: *Handle the shaft with care to prevent it from hitting the canister.*

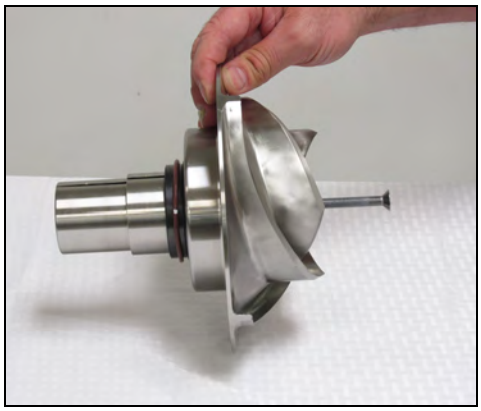


Figure 55 - Hold shaft in place

NOTE: *This will be a loose fit, so hold the shaft in place.*

Figure 56 - Install impeller shaft

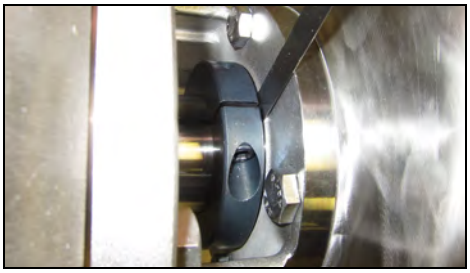


Figure 57 - Position motor shaft

Figure 58 - Align motor shaft collar

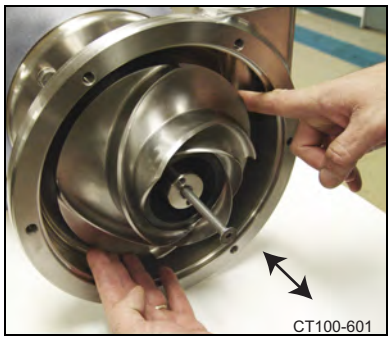


Figure 59 - Leave impeller in forward position

Install the impeller shaft assembly onto the motor shaft

1. Align the motor shaft keyway 90° from the machined groove on the shaft. Slide the shaft collar onto the pump shaft up to the step on the shaft. Make sure you push the pump shaft fully onto the motor shaft. See Figure 56.

NOTE: *Lightly tighten the motor collar screws to secure the shaft collar onto the shaft.*

2. Use a 1 mm (.040") shim between the shaft collar and the motor adapter to position the step on the motor 1 mm away from the motor adapter.

3. Align one open end of the motor shaft collar so that it is 90° from the split on the shaft. Tighten both motor shaft collar screws to the specified torque. See Table 1 on page 35. There should be an equal gap between the top and bottom of the motor shaft collar.

4. The impeller will be loosely mounted to the motor shaft. The impeller should move forward and backward no more than 1/4 inch (6.4 mm). If the impeller moves more than 1/4 inch (6.4 mm), repeat the process on page 29, step 6. Leave the impeller in the forward position.

CAUTION: *Make sure the motor shaft collar is secured to the motor shaft before proceeding.*

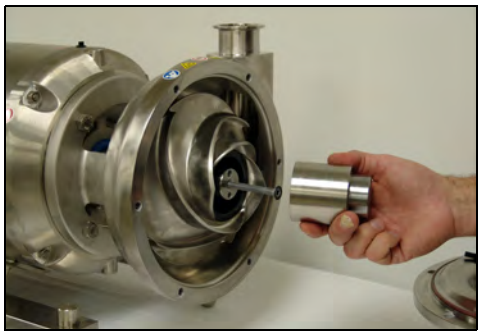


Figure 60 - Install inner magnet assembly

5. Install the inner magnet assembly onto the magnet jack screw, centering it within the canister.

CAUTION: *Strong magnetic pull. Keep fingers clear.*

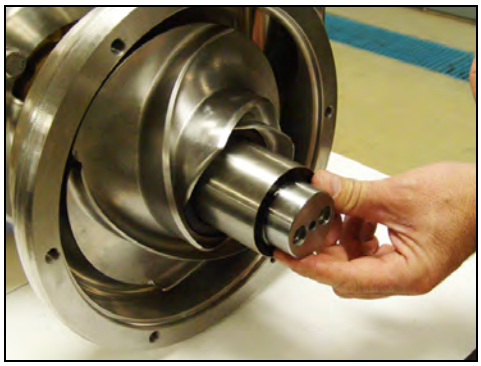


Figure 61 - Center the magnet assembly

6. Install the inner magnet assembly.

NOTE: *Make sure the inner magnet assembly is centered within the canister.*

CAUTION: *Strong magnetic pull. Keep fingers clear.*

Figure 62 - Screw in magnet jack screw

7. Slowly screw in the magnet jack screw until it seats against the shaft. The inner magnet assembly should track in with the magnet jack screw. If not, unscrew the magnet jack screw and re-center the inner magnet assembly into the canister.

CAUTION: *Equipment damage may occur if the jack screw is not centered on the inner magnet assembly.*

NOTE: *SPX FLOW recommends the use of an FDA-approved anti-seize compound on all threaded connections.*

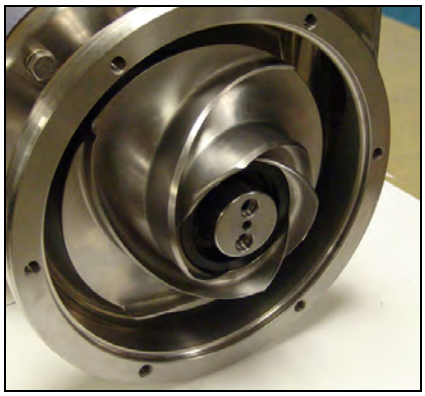


Figure 63 - Magnet assembly installed

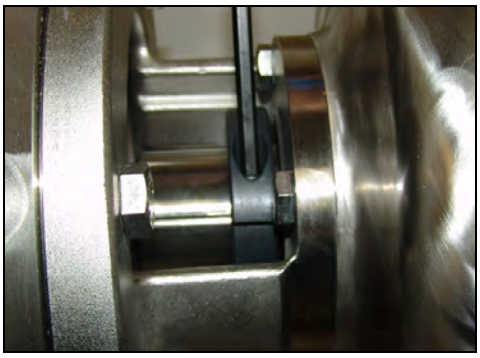


Figure 64 - Place Allen wrench in bolt head to keep shaft from rotating

8. Place an Allen wrench into one of the motor shaft collar bolt heads to keep the shaft from rotating.

Figure 65 - Rotate inner magnet assembly

9. Rotate the inner magnet assembly by hand until the holes in the magnet assembly line up with the holes in the shaft.

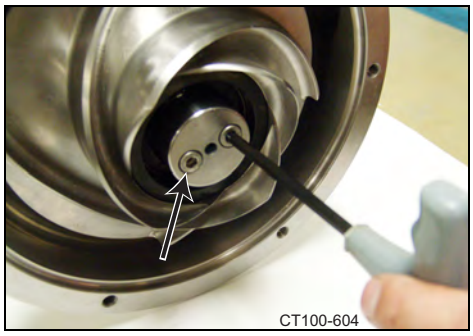


Figure 66 - Tighten inner magnet assembly screws

10. Install the inner magnet assembly screws into the shaft. Tighten both inner magnet assembly screws to the specified torque. See Table 1 on page 35.

11. Once the screws are torqued, remove the Allen wrench* from the motor shaft collar bolt head.
    *This is the Allen wrench that was placed there in step 8.

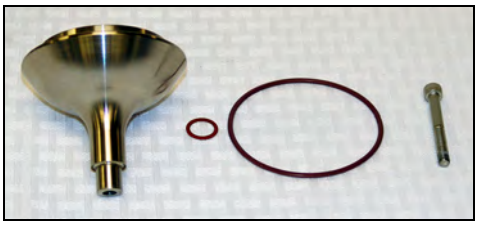


Figure 67 - Nose, nose-to-cover o-ring, nose-to-canister o-ring, nose bolt

Assemble nose to cover and install static o-rings

NOTE: *Always replace elastomers when re-assembling the pump.*

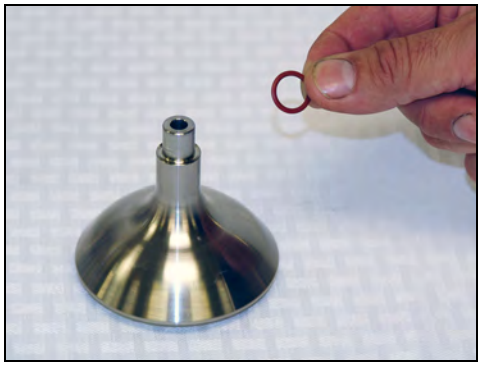


Figure 68 - Install nose-to-cover o-ring

1. Install the nose-to-cover o-ring onto the nose. (See Figure 68 and Figure 69.).

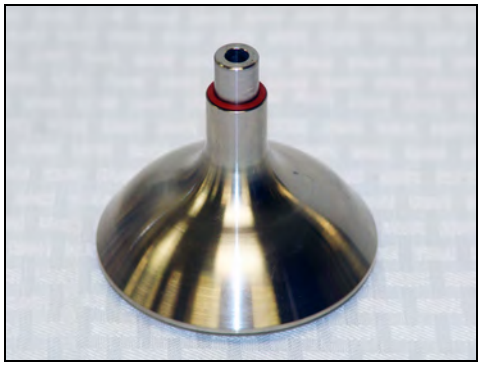


Figure 69 - Nose-to-cover o-ring installed

Figure 70 - Install nose onto cover

2. Install the nose onto the cover.

Figure 71 - Install nose bolt

3. Install the nose bolt.

NOTE: *SPX FLOW recommends the use of an FDA-approved anti-seize compound on all threaded connections.*

Figure 72 - Torque nose bolt

4. Torque the nose bolt to the specified torque. See Table 1 on page 35.

Figure 73 - O-rings installed on nose and cover

5. Install the nose-to-canister o-ring (item 11) onto the nose, and install the cover o-ring (13) onto the cover.

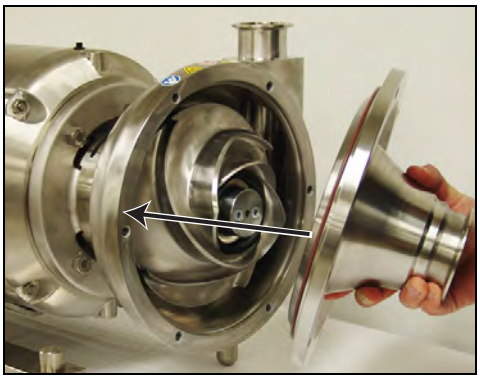


Figure 74 - Install the cover

6. Install the cover onto the pump casing. Line up the threaded holes on the casing with the holes in the cover.

7. On the P2, install the cover guide rods to assist with installation, then install the cover.

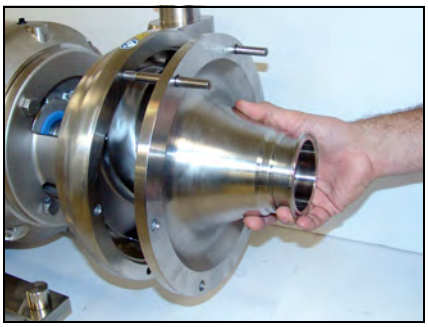


Figure 75 - Install guide rods and remove cover

NOTE: *Cover guide rods are recommended on the P2.*

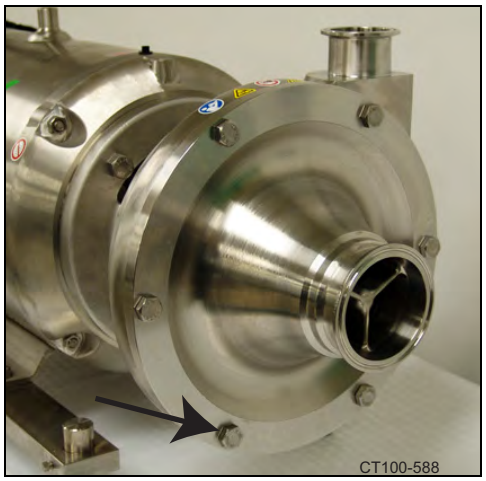


Figure 76 - Install the cover mounting bolts

8. Install the cover mounting bolts and torque the cover bolts to the specified torque. See Table 1, “Bolt Torques and Tools Required” below.

NOTE: *SPX FLOW recommends the use of an FDA-approved anti-seize compound on all threaded connections.*

Table 1: Bolt Torques and Tools Required

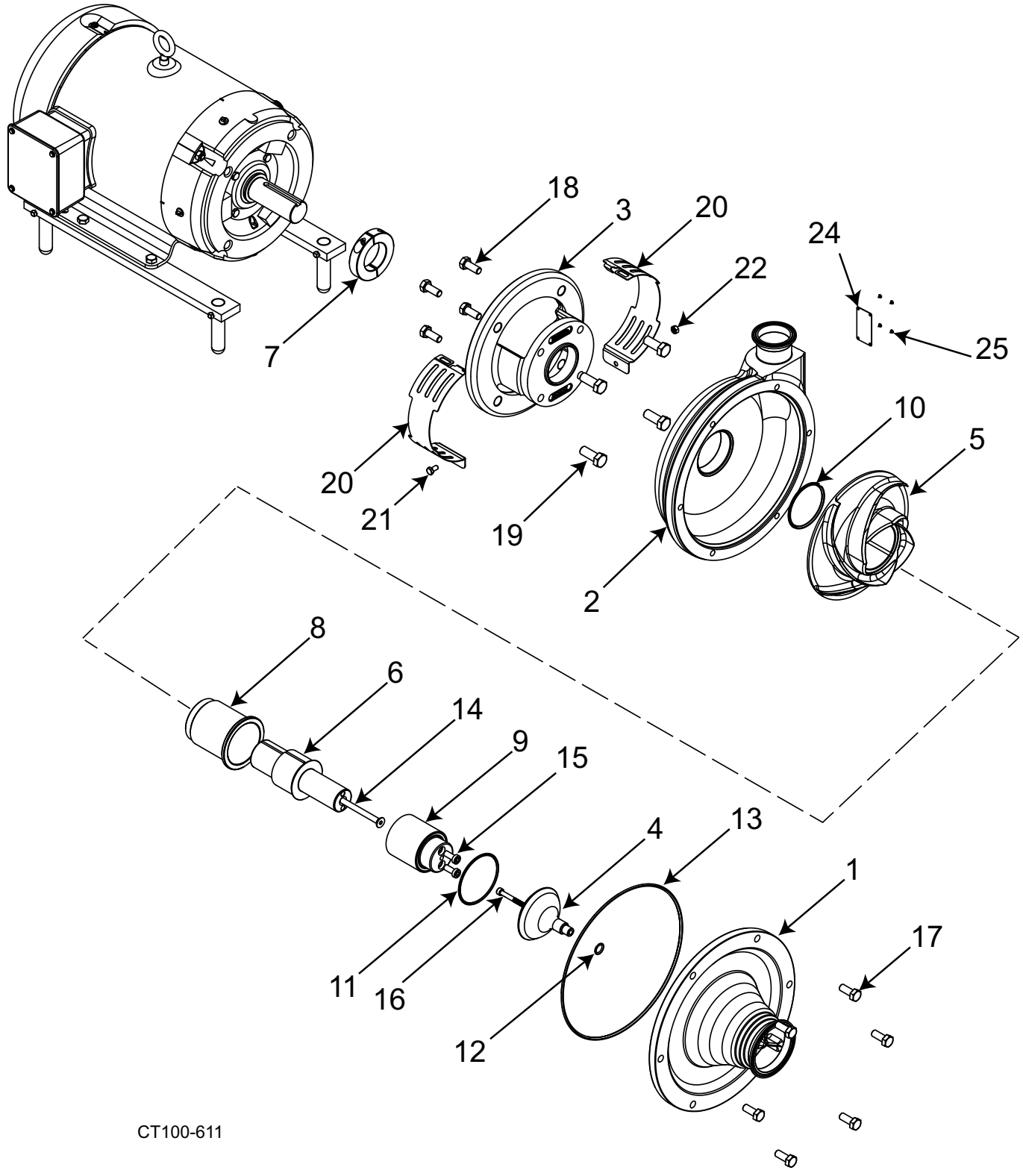
Description	**Pump Model**			
	P1		**P2**	
	Torque	**Tool size**	**Torque**	**Tool size**
Motor Shaft Collar Bolt, 140TC	19 ft-lb	3/16" Allen	N/A	
Motor Shaft Collar Bolt, 180TC	19 ft-lb	3/16" Allen	38 ft-lb	3/16" Allen
Motor Shaft Collar Bolt, 210TC	19 ft-lb	3/16" Allen	38 ft-lb	1/4" Allen
Motor Shaft Collar Bolt, 250TC	N/A		38 ft-lb	1/4" Allen
Motor Shaft Collar Bolt, 280TSC	N/A		38 ft-lb	1/4" Allen
Motor Shaft Collar Bolt, 320TSC	N/A		N/A	
Motor Shaft Collar Bolt, 360TSC	N/A		N/A	
Cover Mounting Bolts	17 ft-lb	13 mm S/W	40 ft-lb	17 mm S/W
Nose Bolt	6 ft-lb	5 mm Allen	6 ft-lb	5 mm Allen
Motor Adapter to Casing Bolts	17 ft-lb	13 mm S/W	40 ft-lb	17 mm S/W
Inner Magnet Assembly Screws	6 ft-lb	4 mm Allen	6 ft-lb	5 mm Allen
Magnet jack screw	N/A	4 mm Allen	N/A	5 mm Allen
Guard nut and screw	N/A	10 mm S/W	N/A	10 mm S/W
Shim	N/A	1 mm	N/A	1 mm
Description	**Qty**	**Part No.**	**Qty**	**Part No.**
Impeller Bushing Installation / Removal Tool	1	136397+	1	136398+
Guide Rod, Cover, M10 (recommended on P2)	N/A	N/A	2	137408+
O-Ring Removal Tool	1	AD0096001	1	AD0096001

CT100-620

Allen = Allen wrench; S/W = Socket/Wrench

Parts Lists

EcoPure™ Pump Parts



NOTE: *For Item 5, Impeller Assembly, see page 40.*

EcoPure™ Pump Parts

ITEM	DESCRIPTION	QTY	PART NUMBER BY MODEL		NOTES
			P1	P2	
1	COVER	1	Contact Factory		
2	CASING	1	Contact Factory		
3	ADAPTER 140TC	1	135534+	N/A	
	ADAPTER 180TC		135533+	134977+	
	ADAPTER 210TC		135533+	134977+	
	ADAPTER 250TC		N/A	134977+	
	ADAPTER 280TSC		N/A	134980+	
4	NOSE	1	136933+	136934+	
5	IMPELLER ASSEMBLY	1	see Impeller Parts		
6	SHAFT 140TC	1	135540+	N/A	
	SHAFT 180TC		135541+	135025+	
	SHAFT 210TC		135542+	135026+	
	SHAFT 250TC		N/A	135027+	
	SHAFT 280TSC		N/A	135027+	
7	SHAFT COLLAR 140TC	1	135577+	N/A	
	SHAFT COLLAR 180TC		135580+	135580+	
	SHAFT COLLAR 210TC		135580+	135698+	
	SHAFT COLLAR 250TC		N/A	135700+	
	SHAFT COLLAR 280TSC		N/A	135700+	
8	CANISTER	1	135556+	135018+	
9	INNER MAGNET ASSEMBLY	1	135531+	135206+	
10	O-RING - CANISTER TO CASING - FKM	1	V70225	V70230	
	O-RING - CANISTER TO CASING - EPDM		E70225	E70230	
11	O-RING - NOSE TO CANISTER - FKM	1	V70138	V70150	
	O-RING - NOSE TO CANISTER - EPDM		E70138	E70150	
12	O-RING - NOSE TO COVER - FKM	1	V70012	V70014	
	O-RING - NOSE TO COVER - EPDM		E70012	E70014	
13	O-RING - COVER - FKM	1	V70262	V70271	
	O-RING - COVER - EPDM		E70262	E70271	
14	MAGNET JACK SCREW	1	135798+	135800+	
15	INNER MAGNET ASSSEMBLY SCREW	2	136118+	136119+	
16	NOSE BOLT	1	30-657	137052+	
17	HHCS - COVER	6	137602+	135796+	
18	HHCS - ADAPTER TO CASING	4	137602+	135796+	

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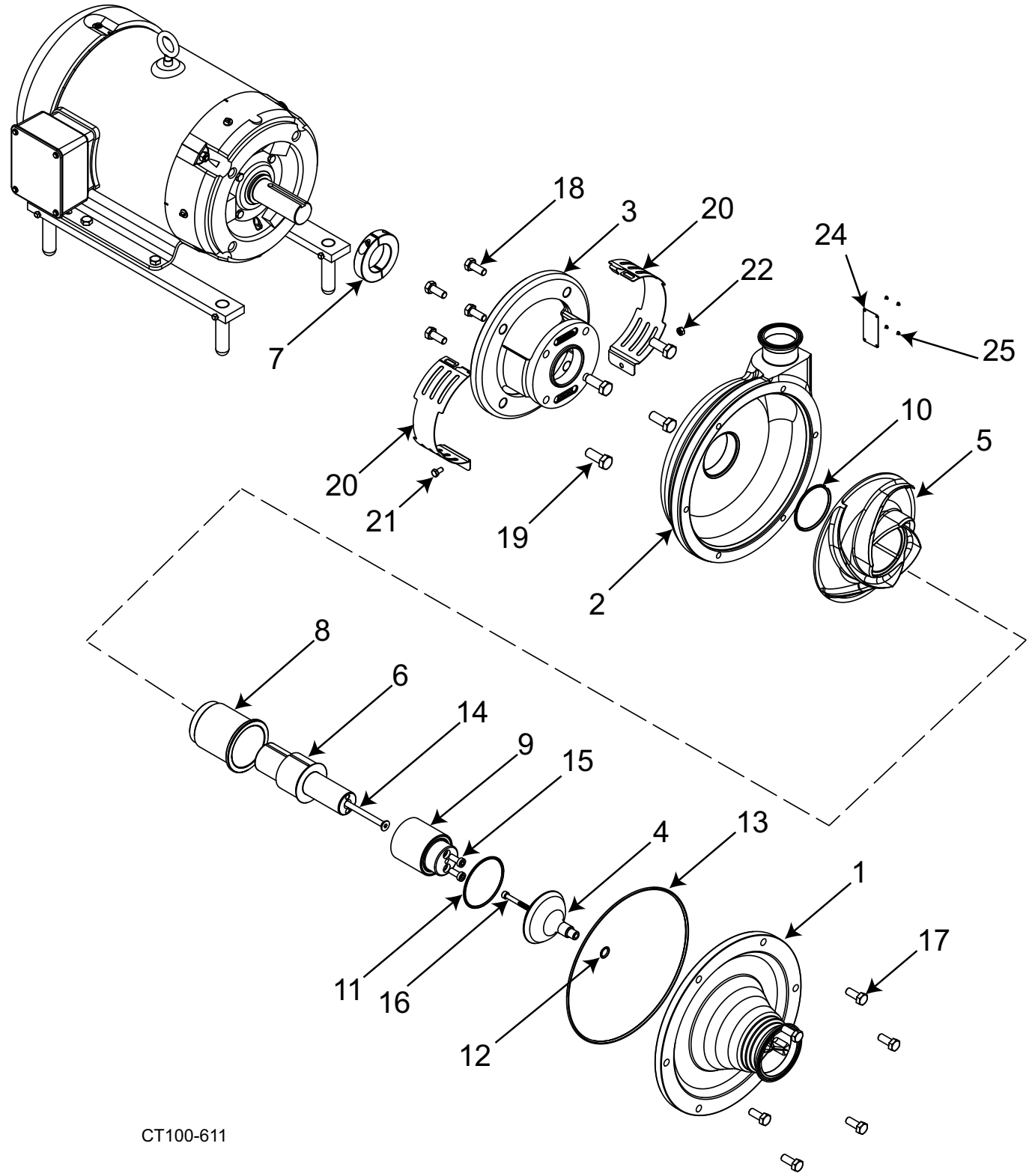
EcoPure™ Pump Parts, continued



NOTE: *For Item 5, Impeller Assembly, see page 40.*

EcoPure™ Pump Parts, continued

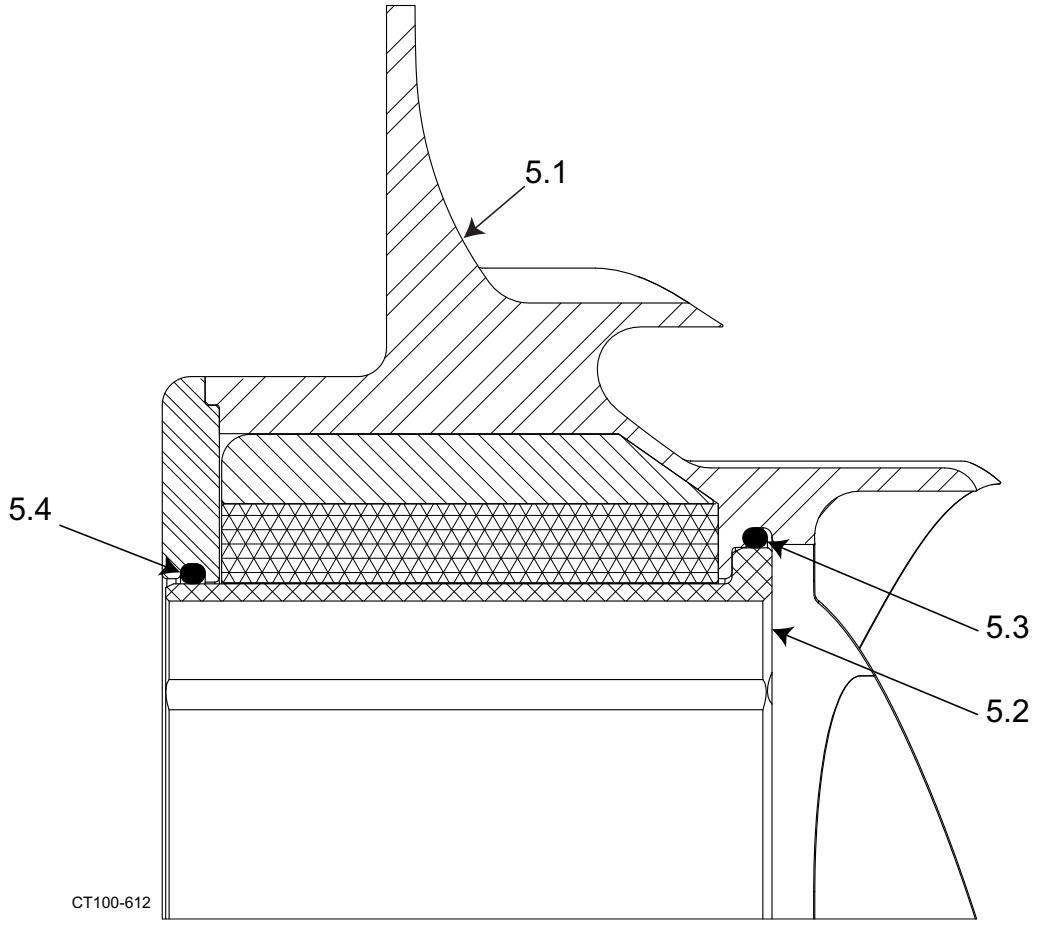
ITEM	DESCRIPTION	QTY	PART NUMBER BY MODEL		NOTES
			P1	P2	
19	HHCS - ADAPTER TO MOTOR 140TC	4	30-60	N/A	
	HHCS - ADAPTER TO MOTOR 180TC		30-36X	30-36X	
	HHCS - ADAPTER TO MOTOR 210TC		30-36X	30-36X	
	HHCS - ADAPTER TO MOTOR 250TC		N/A	30-36X	
	HHCS - ADAPTER TO MOTOR 280TSC		N/A	30-36X	
20	SHAFT GUARD - P1 140 TC	1	135574+	N/A	1
	SHAFT GUARD - P1 180TC - 210TC	1	135854+	N/A	1
	SHAFT GUARD - P2 ALL MOTOR SIZES	2	N/A	135575+	2
21	BOLT - SHAFT GUARD	1	132472+	132472+	
22	NUT - SHAFT GUARD	1	36-112	36-112	
23	MOTOR	1	-	-	3
24	NAMEPLATE	1	136077+	136077+	
25	RIVET	4	30-355	30-355	
26	LABEL ISO - READ MANUAL	2	CNG127385	CNG127385	5
27	LABEL - ISO STRONG MAGNETIC FIELD	2	136122+	136122+	5
28	LABEL - ISO NO PACEMAKERS	2	136125+	136125+	5
29	LABEL - ISO WARNING CUTTING OF FINGERS OR HAND	2	136121+	136121+	5
30	LABEL - ISO GUARD	2	CNG127388	CNG127388	5
31	LABEL - FLOW ARROW	1	33-34	33-34	5
32	LEG KIT	1	-	-	4

PL5035-CH3

Notes

1. Kit contains hook and slot guards
2. Hook and slot on same part (2 required)
3. Configuration-specific
4. See “Motor Mounts” on page 41
5. Shown below; for location, see “Replacement Labels” on page 7.

EcoPure™ Impeller Parts

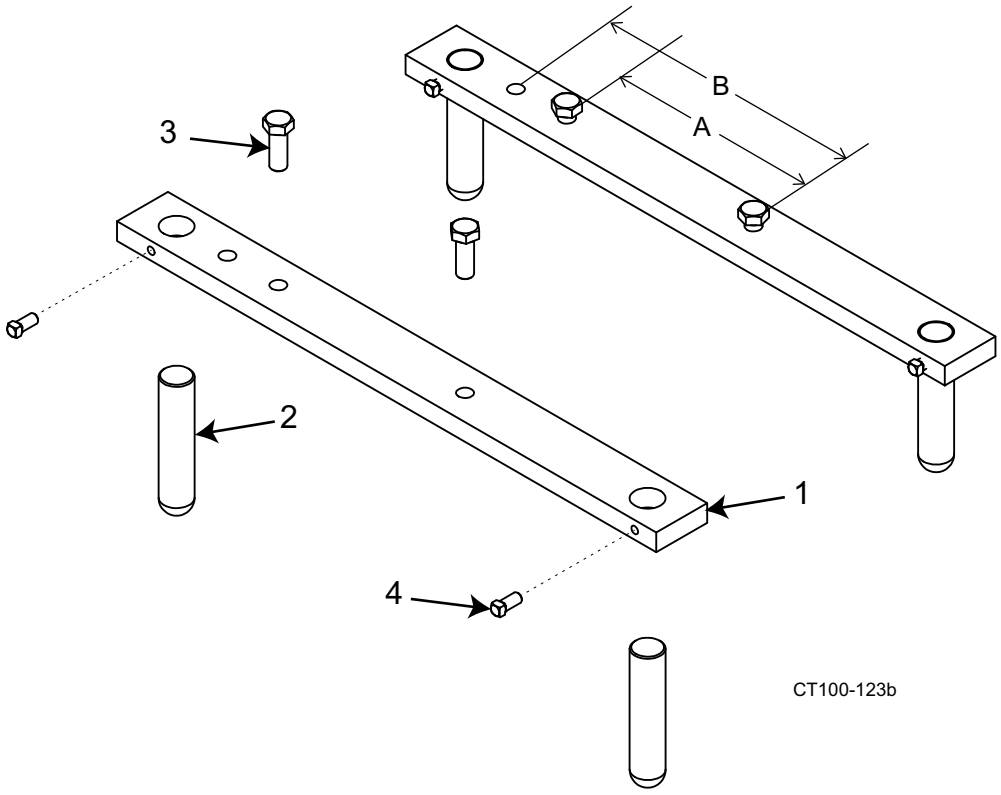


ITEM	DESCRIPTION	QTY	PART NUMBER BY MODEL		NOTES
			P1	P2	
5.1	IMPELLER SUB-ASSEMBLY	1	Contact factory		1
5.2	BUSHING - CARBON GRAPHITE	1	135552+	135016+	
5.3	O-RING FRONT - FKM	1	V70143	V70152	
	O-RING FRONT - EPDM		E70143	E70152	
5.4	O-RING REAR - FKM	1	V70139	V70150	
	O-RING REAR - EPDM		E70139	E70150	

PL5035-CH4

1. Impeller Sub-Assembly includes impeller, outer ring, impeller cap, and magnets. Contact factory for part number.

Motor Mounts



Pump Model	Motor Frame Sizes	Complete Mounting Kit	Item 1 (Bar) Part No.	Item 2 (Leg) Part No.	Item 3 (HHCS) Part No.	Item 4 (SHCS) Part No.	"A" Dim. in. (cm)	"B" Dim. in. (cm)
P1	140TC	110256+	110262+	110264+	30-623	30-625	4.0 (10.16)	5.0 (12.7)
P1, P2	180TC	110255+	110261+	110264+	30-30	30-625	4.5 (11.43)	5.5 (13.97)
P1, P2	210TC	110254+	110260+	110264+	30-30	30-625	5.5 (13.97)	7.0 (17.78)
P2	250TC	110253+	110259+	110263+	30-36X	30-626	8.25 (20.96)	10.0 (25.4)
P2	280TSC	110252+	110258+	110263+	30-36X	30-626	9.5 (24.13)	11.0 (27.94)

PL5035-CH1

Troubleshooting

Problem	possible cause	suggested action
Not Enough Liquid Delivered	Pump not primed	Prime pump. Install a priming system if possible.
	Impeller magnetically decoupled	Stop pump and re-start pump.
	Suction or discharge plugged or closed	Open suction. If plugged, shut down pump and remove blockage.
	Air leak in supply or at seal area	Check system for air leaks and repair as necessary. Replace seals if required.
	Wrong direction of rotation	Adjust motor electrical wiring to correct rotation.
	Discharge head too high	Lower discharge head until pump can move material without turning to freely, causing overload.
	Suction lift too high	Lower pump in system until the pump is easily supplied with material.
	Speed too slow (low voltage, wrong frequency, wrong motor)	Adjust voltage and frequency. Change motor if necessary.
	Excessive air in material	Adjust system to remove excess air from material before it reaches the pump.
	Insufficient NPSH (Net Positive Suction Head) available	Adjust system to provide correct NPSH.
	Impeller diameter too small for duty	Contact your SPX FLOW customer service representative for sizing information. SPX FLOW Customer Service: 1-800-252-5200 or 262-728-1900
Not Enough Pressure	Air leak in supply	Check system for air leaks and repair as necessary. Replace elastomers if required.
	Wrong direction of rotation	Adjust motor electrical wiring to correct rotation.
	Speed too slow (low voltage, wrong frequency, wrong motor)	Adjust voltage and frequency. Change motor if necessary.
	Excessive air in material	Adjust system to remove excess air from material before it reaches the pump.
	Impeller diameter too small for duty	Contact your SPX FLOW customer service representative for sizing information. SPX FLOW Customer Service: 1-800-252-5200 or 262-728-1900
Motor Overload	Faulty electrical connections	Check wiring and repair/replace as necessary.
	Unrestricted discharge resulting in too high a flow rate	Add discharge restriction to lower flow rate.

Problem	possible cause	suggested action
Motor Overload	Impeller interference	Disassemble pump and inspect for damage. Remove interference if still present. Replace worn/damaged parts.
	Discharge head too low allowing pump to deliver too much liquid	Raise discharge head until pump achieves proper resistance to flow.
	Liquid heavier or more viscous than rating	Contact your SPX FLOW customer service representative for sizing information. SPX FLOW Customer Service: 1-800-252-5200 or 262-728-1900
	Overload heaters too small for motor	Inspect and replace as necessary.
	Electrical supply, voltage, frequency, incorrect	Adjust voltage and frequency. Change motor if necessary.
	Impeller diameter too large for duty	Contact your SPX FLOW customer service representative for sizing information. SPX FLOW Customer Service: 1-800-252-5200 or 262-728-1900
	Defective motor	Replace motor.
Vibration/Noise	Pump not level	Make sure all legs are touching the floor. Level pump.
	Piping not supported	Support all piping as described in the installation section.
	Impeller magnetically decoupled	Stop pump and re-start pump.
	Starved suction/Supply line blocked	**Shut down pump** and remove blockage.
	Foreign material in pump	Disassemble pump, remove all foreign material and inspect for damage. Replace worn/damaged parts.
	Starved suction/Insufficient NPSH (Net Positive Suction Head) available	Adjust system to provide correct NPSH.
	Impeller hub/impeller shaft worn	Disassemble pump and inspect for damage. Replace worn parts.
	Impeller shaft loose or bent	Disassemble pump and inspect for damage.
	Impeller out of balance	Disassemble pump and inspect for damage. Replace impeller.
	Motor bearings worn	Disassemble motor and inspect for damage. Replace worn parts.
	Starved suction/supply line too long	Shorten system supply line.
	Starved suction/supply line too small	Install larger supply lines.
	Excessive air in material	Adjust system to remove excess air from material before it reaches the pump.

Problem	possible cause	suggested action
Bushing/Canister Wear	Water hammer	Adjust system to reduce air in system and sudden starts or stops in flow.
	Impeller shaft loose or bent	Disassemble pump and inspect for damage. Replace worn/damaged parts.
	Abrasive product	Contact your SPX FLOW customer service representative for sizing information. SPX FLOW Customer Service: 1-800-252-5200 or 262-728-1900
	Prolonged “dry” running	Adjust process to insure pump has a continual fresh supply of product during operation.
Pump Leaks	Elastomers damaged or worn	Disassemble pump and inspect for damage.
	Elastomers not installed correctly	Disassemble pump and inspect elastomers for damage (replace if necessary). Install elastomers correctly and assemble pump.
	Canister or bushing worn or damaged	Disassemble pump and inspect canister and bushing for damage (replace if necessary).
	Inlet/Outlet connection loose or no gasket	Inspect Inlet/outlet connection for gasket and tighten connection.

EcoPure™

HYGIENIC MAGDRIVE CENTRIFUGAL PUMP

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