Liquiflo™
Chemical Processing Pumps

INSTALLATION, OPERATION & MAINTENANCE MANUAL

CENTRY® SERIES

MAGNETIC-DRIVE, CLOSE-COUPLED CENTRIFUGAL PUMPS

Models 621 & 622 – Mag-Drive

Table of Contents

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Introduction

This manual provides instructions for the installation, operation and maintenance of the Centry® Series Centrifugal Pumps, Mag-Drive Models 621 & 622. It is critical for any user to read and understand the information in this manual along with any documents this manual refers to prior to installation and start-up.

Liquiflo pumps shall not be liable for damage or delays caused by a failure to follow the instructions for installation, operation and maintenance as outlined in this manual.

Thank you for purchasing a Liquiflo product.

LIQUIFLO STANDARD TERMS AND CONDITIONS APPLY UNLESS SPECIFIED IN WRITING BY LIQUIFLO.

Detailed Table of Contents

Section 1: General Information

This manual covers the Centry® Series Mag-Drive, Close-Coupled Centrifugal Pumps – Models 621 & 622.

1.1 Pump Description

The Centry Series Mag-Drive pumps are end-suction centrifugal pumps with the following features:

- Sealless design (no mechanical seal to replace)
- Close-coupled design to eliminate manual alignment of pump and motor
- Sturdy Cast Iron mounting bracket that supports pump and motor
- Standard reduced impeller sizes to simplify pump selection
- Closed impellers that do not require manual adjustment
- Choice of threaded or ANSI flanged ports

The pump *Model Number* and *Serial Number* are stamped on the *Stainless Steel Tag* that is attached to the pump's housing. The Serial Number is also permanently stamped on the pump's volute.

The Model Number completely describes the pump's construction and is required when ordering either a new pump or replacement parts for an existing pump. The Model Number for the mag-drive pump is based on a 10-position *Model Coding* system that is described in **Section 1.4** (see Page 5).

1.2 General Instructions

The materials of construction of the pump are selected based upon the chemical compatibility of the fluid being pumped. The user must verify that the materials are suitable for the surrounding atmosphere.

If the fluid is non-conductive, methods are available to mechanically ground the isolated shaft. This is only necessary if the surrounding atmosphere is extremely explosive or stray static charges are present.

Upon receipt of your Liquiflo pump:

1) Inspect pump and verify that it was not damaged during transit.

2) Inspect tag and verify that the Model Number of the pump matches the Model Number of the pump that was ordered.

3) Record the following information for future reference:

Model Number:
Serial Number:
Date Received:
Pump Location:
Pump Service:

1.3 Pump Specifications

Table 1: Dimensional Specifications

Specification		Model 621	Model 622	Unit
Ports	Type	Threaded (NPT) or Flanged (ANSI 150# RF)		–
	Suction Size	1 ¼	2	in
	Discharge Size	1	1 ½	in
Impeller	Diameter	5.0	5.0	in
	Standard Trims	4.5, 4.0, 3.5, 3.0	4.5, 4.0, 3.5, 3.0	in
	Axial Length	1.08	1.55	in
	Type	Closed	Closed	–
Mounting Bracket		Close-Coupled, Pedestal [1]		–
Motor Frames (C-Face)		NEMA 56C,143/145TC & 182/184TC; IEC 71, 80 & 90 (B5 Flange) [1]		–

1 S-Adapter is available for long-coupling pump mounting bracket to other motor frames.

Table 2: Performance & Torque Specifications

Specification		Model 621	Model 622	Unit
Maximum Speed		3600	3600	RPM
Maximum Flow Rate		90	160	GPM
Maximum Differential Head		105	95	ft
Magnetic Coupling Maximum Torque @ 20°C	MCF	120		in-lbs
	MCW	200		in-lbs

Table 3: Absolute Temperature & Pressure Ratings

Specification	Models 621 & 622	Unit
Minimum Operating Temperature	-40	°F
Maximum Operating Temperature	500	°F
Maximum Operating Pressure	300 [2]	PSIG

2 For flanged pumps, max rating is 285 PSIG @ -20 to 100°F; above 100°F, derate by 0.3 PSIG/°F.

Table 4: Weight Data

Item	Model 621	Model 622	Unit
Pump with Threaded Ports [3]	42	48	lbs
Pump with Flanged Ports [3]	48	56	lbs

3 Weight includes Pump Cartridge, Pedestal and Outer Magnet, and excludes motor.

Table 5: Material Data

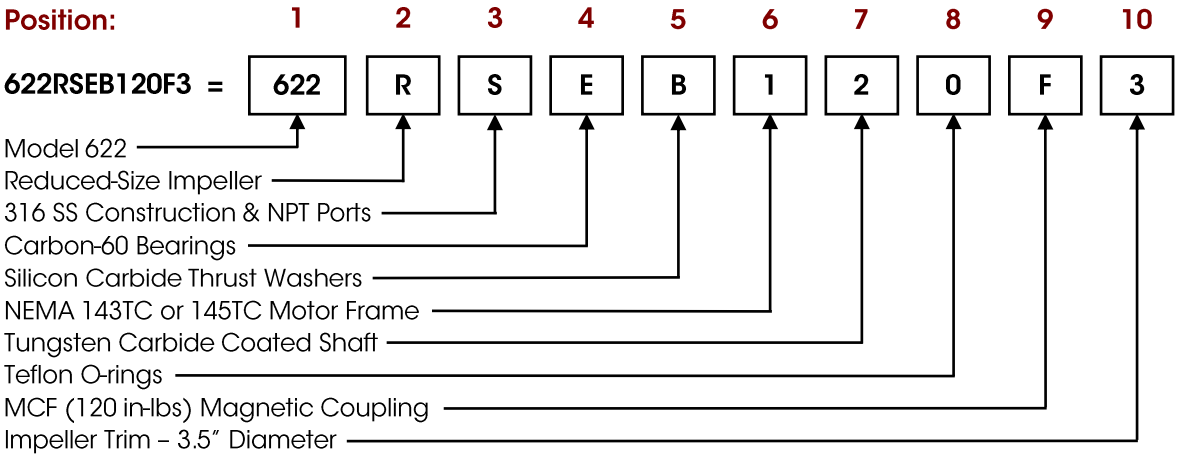
Components		Materials
Pump Body, Impeller & Shaft		316 Stainless Steel
Shaft Coating		Ceramic Chrome Oxide or Tungsten Carbide
Bearings		Carbon-60 or Silicon Carbide (Self-sintered SiC)
Thrust Washers		Silicon Carbide (Self-sintered SiC)
O-rings & Gaskets		Teflon, Viton or Graphoil
Magnetic Coupling	Magnets	MCF & MCW: Samarium Cobalt (SmCo)
	Inner Magnet Casing	316 Stainless Steel
	Outer Magnet Casing	Carbon Steel/Epoxy
Mounting Bracket (Pedestal)		Cast Iron/Epoxy
Mounting Hardware		18-8 Stainless Steel

1.4 Model Coding

Table 6: Model Coding for Centry® MAG-DRIVE Models 621 & 622

Position	Description	Code	Selection	
1	**Pump Model**	**621**	Model 621	
		622	Model 622	
2	**Impeller Size**	**F**	Full-Size – 5.0″ Diameter	**Pos. 10 = 0**
		R	Reduced-Size	**Pos. 10 = 1, 2, 3 or 4**
3	**Basic Material of Construction & Port Type**	**S**	316 SS Construction & NPT Ports	
		L	316 SS Construction & Flanged Ports	
4	**Bearings**	**E**	Carbon 60	
		B	Silicon Carbide (SiC)	
5	**Thrust Washers**	**B**	Silicon Carbide (SiC)	
6	**Motor Frame (Outer Magnet Bore)**	**0**	NEMA 56C (5/8 in.)	
		1	NEMA 143TC or 145TC (7/8 in.)	
		2	IEC 71 (14 mm)	
		3	IEC 80 (19 mm)	
		4	IEC 90 (24 mm)	
		5	NEMA 182TC or 184TC (1-1/8 in.)	
7	**Shaft Coating**	**1**	Chrome Oxide	
		2	Tungsten Carbide	
8	**O-rings/Gaskets**	**0**	Teflon O-rings	
		V	Viton O-rings	
		G	Graphoil Gaskets	
9	**Magnetic Coupling**	**F**	MCF (120 in-lbs)	
		W	MCW (200 in-lbs)	
10	**Impeller Diameter (Trim)**	**0**	No Trim	**Pos. 2 = F**
		1	4.5″ Diameter	**Pos. 2 = R**
		2	4.0″ Diameter	
		3	3.5″ Diameter	
		4	3.0″ Diameter	

Model Coding Example:



1.5 Pump Installation

During installation of the pump and supporting equipment, follow the guidelines given in **Section 3**. Pay special attention to all cautionary notes in this section.

1.6 Start-Up

Before operating the pump, inspect the system as outlined in **Section 4**. Do not start the pump until the inspection is satisfactory and all safety precautions have been taken.

1.7 Operation & Troubleshooting

The successful and safe operation of a pump is not only dependent on the pump but also on each of the system components. It is therefore important to monitor the entire pumping system during operation and to perform the necessary maintenance to keep the system running smoothly.

A normally operating magnetic-drive centrifugal pump will deliver a steady and pulse-less flow with no leakage, be relatively quiet and have a predictable flow rate and power requirement based on the impeller size, operating speed, differential head and fluid specific gravity. Performance curves for centrifugal pumps are normally based on pumping water at room temperature. A performance correction is required when pumping viscous liquids (see the Liquiflo Product Catalog or website: www.liquiflo.com).

If a significant problem is observed during operation, the pump should be stopped so that corrective action can be taken. The observed problem could have several possible causes, and multiple remedies for each cause. For help with problem solving, refer to the Troubleshooting Guide given in **Appendix 6**.

1.8 Maintenance & Repair

The magnetically-coupled sealless pump has internal bearings, thrust washers and a shaft which require replacement over time due to wear. O-rings and gaskets should always be replaced when rebuilding the pump.

The main factors affecting the physical wear of the pump are operating speed, differential head, fluid viscosity, duty cycle, starting and stopping frequency, abrasives in the fluid and the wear properties of the materials. These factors can cause pump lifetimes to vary significantly from one application to another, making it difficult to predict when the pump will require maintenance. Therefore, the maintenance schedule for the pump is typically based on the maintenance history of the specific application. The main indicators that a pump may require maintenance are the following: (1) decreased flow rate or head, (2) fluid leakage, (3) unusual noise or vibrations and (4) increased power consumption.

Before performing maintenance, review the safety precautions given in **Section 2**. A maintenance tool list is given in **Appendix 2**. Removal of the pump from the piping system is covered in **Section 5.2**. To disassemble the pump, follow the procedure in **Section 5.3**. To replace parts and rebuild the pump, follow the assembly procedure in **Section 5.4**. When performing maintenance, pay special attention to all cautionary notes given in these sections.

1.9 Replacement Parts

Replacement parts for the pumps can be purchased from your local Liquiflo distributor. Refer to **Appendices 3** thru **5** for individual parts information.

1.10 Returned Merchandise Authorization (RMA)

If it is necessary to return the pump to the factory for service,

1) Contact your local Liquiflo distributor to discuss the return, obtain a Returned Merchandise Authorization Number (**RMA #**) and provide the distributor with the required information (see RMA Record below).
2) Clean and neutralize pump.
3) Package the pump carefully and include the **RMA #** in a visible location on the outside surface of the box.
4) Ship pump to factory, freight prepaid.

Returned Merchandise Authorization (RMA) Record		
1	**RMA #**	**(Supplied by Distributor)**
2	**Distributor Name**	
3	**Order Date**	
4	**Customer PO #**	
5	**Return Date**	
6	**Item(s) Returned**	
7	**Serial Number(s)**	
8	**Reason for Return**	
9	**Fluid(s) Pumped**	
10	**Notes**	

NOTE: Pump must be cleaned and neutralized prior to shipment to the factory.

Section 2: Safety Precautions

2.1 General Precautions

- **Always** lock out the power to the pump driver when performing maintenance on the pump
- **Always** lock out the suction and discharge valves when performing maintenance on the pump
- **Never** operate the pump without safety devices installed
- **Never** operate the pump with suction and/or discharge valves closed
- **Never** operate the pump out of its design specifications
- **Never** start the pump without making sure that the pump is primed
- **Never** use heat to disassemble the pump
- Inspect the entire system before start-up
- Monitor the system during operation and perform maintenance periodically or as required by the application
- Decontaminate pump using procedures in accordance with federal, state, local and company environmental regulations
- Before performing maintenance on the pump, check with appropriate personnel to determine if skin, eye or lung protection is required and how best to flush the pump
- Pay special attention to all cautionary statements given in this manual.

Caution!
Failure to observe safety precautions can result in personal injury, equipment damage or malfunction.

2.2 Precautions for Magnetic-Drive Pumps

Magnetic-drive pumps contain strong magnets, which pose health risks. Based on this the following must be observed:

Caution!

- *Individuals with cardiac pacemakers should avoid repairs on these units*
- *Individuals with internal wound clips, metallic wiring, or other metallic prosthetic devices should avoid repairs on these units*
- *Strong magnetic fields can cause tools and parts to slam together, injuring hands and fingers*

Strong magnets will attract iron, cast iron, carbon steel and some types of stainless steel. Keep magnets away from credit cards, computers, computer discs and watches.

Section 3: Pump & Motor Installation

3.1 Installation of Pump, Motor & Base

Refer to the Hydraulic Institute Standards for proper installation procedures of the base, pump and motor. Observe the following guidelines:

1) The foundation area must be firm and level for maintaining pump alignment.

2) The pump and motor assembly must be securely fastened to the base, and the base must be securely attached to the foundation.

3) The pump inlet should be as close to the liquid source as practical and preferably below it.

4) The pump and motor should be accessible for servicing and inspection.

5) The pump and motor should be cleaned periodically to prevent the build-up of dust.

NOTE: The pump models covered in this manual are close-coupled and no alignment procedure between the pump and motor is required.

3.2 General Piping Requirements

Guidelines for piping are given in the Hydraulic Institute Standards and should be reviewed prior to pump installation.

1) All piping must be supported independently and must line up naturally with pump ports.

2) DO NOT make final connection of piping to pump until the grout has hardened and the pump and motor hold-down bolts have been tightened.

3) Piping runs should be designed to minimize friction losses.

4) Suction and discharge piping should be the same size or larger than the inlet and outlet ports.

5) Piping that handles both hot and cold liquids require proper installation of expansion loops and joints so that thermal expansion of the piping will not cause misalignment.

6) The piping should be arranged to allow the pump to be flushed and drained prior to the removal of the pump for servicing. Valves and unions should be installed to allow the pump to be isolated during maintenance.

7) The piping system should be thoroughly cleaned prior to installation of the pump.

8) Gasket installation and materials must be suitable for the service.

3.2.1 Suction Piping

Properly installed suction piping is a necessity for trouble free pump operation. The suction piping should be flushed BEFORE connecting it to the pump.

1) Use of elbows close to the pump suction port should be avoided. There should be a minimum of five pipe diameters of straight pipe between the elbow and the suction inlet. Any elbows used should be long radius.

2) The suction pipe should be one or two sizes larger than the pump suction size, with a reducer at the suction port. The diameter of the suction piping must never be smaller than the pump suction port diameter.

3) Reducers, if used, should be eccentric at the pump suction port.

4) Suction strainers, when used, must have a net "free area" of at least three times the suction pipe area.

5) Separate suction lines are recommended when more than one pump is operated from the same supply.

3.2.2 Discharge Piping

1) Isolation valves should be installed in the discharge line. An isolation valve is required for priming and regulating flow, and for isolating the pump for inspection and maintenance.

2) If quick closing valves are installed in the system, cushioning devices should be used to protect the pump from surges and water hammer.

3.2.3 Suction Head (Flooded Suction) Conditions

1) An isolation valve should be installed in the suction line to permit closing of the line for pump inspection and maintenance.

2) Piping should be level or slope gradually downward from the source of the supply.

3) The suction pipe must be submerged sufficiently below the liquid surface to prevent vortices and air entrapment at the supply.

3.2.4 Suction Lift Conditions

1) The suction pipe must slope continuously upward towards pump suction to eliminate air pockets.

2) All joints must be air tight.

3) A means of priming the pump must be provided.

3.3 General Motor Requirements

1) The motor must be compatible with the pump and conditions of the application.

2) The motor supply voltage must match the nameplate voltage of the motor.

3) The motor should never be operated outside of its design specifications.

4) The motor should be inspected periodically and serviced or replaced, as required.

> ***Caution!***
> *Lock out power to the motor before servicing or replacing.*

3.3.1 Motor Selection

1) The motor frame must be compatible with the pump mounting bracket (pedestal). Valid choices are NEMA 56C, 143TC, 145TC, 182TC & 184TC, and IEC 71, 80 & 90 (with B5 Flange). NEMA 182TC and 184TC motor frames will require an adapter plate to mount the motor to the bracket (see Page 22).

2) The motor must have an enclosure that is compatible with the application conditions. If an explosion-proof motor is required, the *temperature code* of the motor must be acceptable for the fluid that will be pumped.

3) The speed and power output rating of the motor must be sufficient for the conditions of service. The *power output rating* of the motor should exceed the maximum power that will be required by the pump over its operating range.

3.3.2 Motor Hook-up

1) Electrical wiring of the motor should be performed by a certified electrician.

2) Follow the recommendations of the motor manufacturer and observe all electrical wiring safety standards.

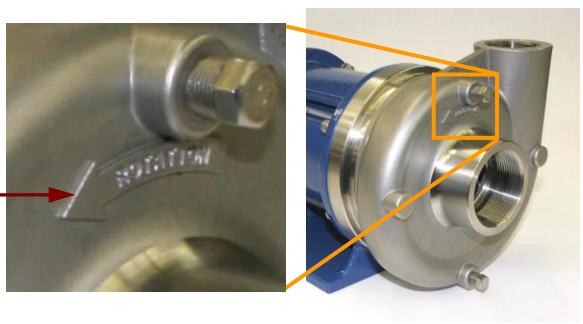
3) The motor supply voltage must match the motor nameplate voltage or serious motor damage or fire can result.

> ***Caution!***
> *Lock out power to the motor before connecting to power line.*

3.3.3 Motor Direction

The motor shaft must turn in the direction required by the centrifugal pump. Looking directly at the front of the motor shaft, the shaft must rotate counterclockwise.

NOTE: A **counterclockwise rotational arrow** is cast on the volute of the pump, below the vent plug and above the suction inlet.



Section 4: Start-Up & Operation

4.1 Inspection of System

Before operating the pump, inspect the system and verify the following:

1) **Pump Construction:** The materials of construction of the pump must be compatible with the fluid that will be pumped.

2) **Pump Mounting & Alignment:** The pump must be securely fastened to the base and ground using the basic installation procedures as outlined by the Hydraulic Institute. The Centry pumps are close-coupled and no alignment procedure between the pump and motor is needed.

3) **Piping Layout:** Process piping procedures are extremely important and must be performed in accordance with the Hydraulic Institute. As a minimum, inlet piping must be equal to or larger in diameter than the pump inlet size. Twists and bends of pump inlet piping should be kept to an absolute minimum. Ensure that adequate NPSH is available for the pump to operate properly.

4) **Valves:** All suction and discharge valves must be open during start-up and operation or damage or malfunction may result.

5) **Motor Enclosure:** The motor enclosure must be suitable for the conditions of service.

6) **Electrical Hook-up:** The electrical connections to the motor should be performed by a certified electrician. It is critical that the supply voltage match the motor nameplate voltage or serious motor damage or fire can result.

7) **Priming & Direction of Rotation:** Prime the pump and then briefly jog the motor to assure proper motor direction. Motor shaft direction must be counterclockwise as seen from the suction side of the pump (see Page 11).

> ***Caution!***
> *Always prime the pump before operating. Do not run the pump dry for more than 30 seconds or damage to internal parts can result.*

8) **Safety:** Never operate the pump without all safety devices installed.

4.2 Pump Operation

A normally operating magnetic-drive centrifugal pump will deliver a steady, pulse-less flow with no leakage, be relatively quiet and have a predictable flow rate based on the impeller size, operating speed and differential head across the pump. Refer to the performance curves for Centry Model 621 or 622. If the fluid viscosity is significantly higher than that of water, a performance correction is required. (See the Liquiflo Product Catalog or website: www.liquiflo.com.)

During pump operation, inspect for: (1) Unusual noise, (2) Product leakage, (3) Expected suction and discharge pressures and (4) Expected flow rate based on impeller size, pump speed and differential head. If any problems occur, stop the pump and take corrective action. For help with problem solving, refer to the Troubleshooting Guide given in **Appendix 6**.

Section 5: Maintenance & Repair

The magnetically-coupled pump has internal bearings, thrust washers and a shaft that require replacement over time due to wear. O-rings and gaskets should always be replaced when rebuilding the pump.

5.1 Work Safety

Before performing maintenance, review the safety precautions given in **Section 2** (see Page 8).

> ***Caution!***
> *The magnetic couplings used in these pumps contain strong magnets. Observe the safety precautions given in Section 2.2.*

5.2 Removal from System

Before servicing, prepare the pump as follows:

> ***Caution!***
> *If the pump was used to move hazardous or toxic fluids, it must be flushed and decontaminated prior to removal from the system piping. Refer to the Material Safety Data Sheet (MSDS) for the liquid and follow all prescribed safety precautions and disposal procedures.*

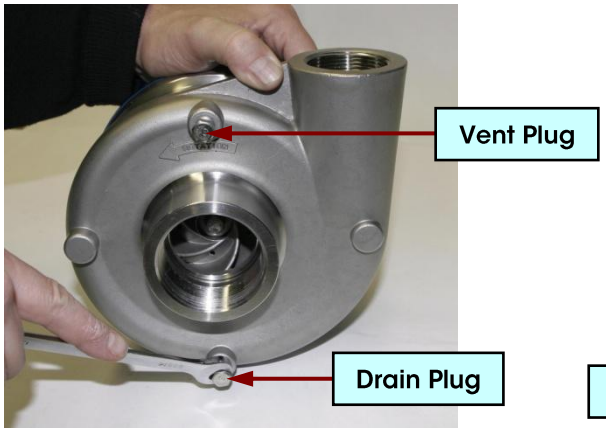
1. Flush the pump.
2. Stop the motor and lock out the electrical panel.

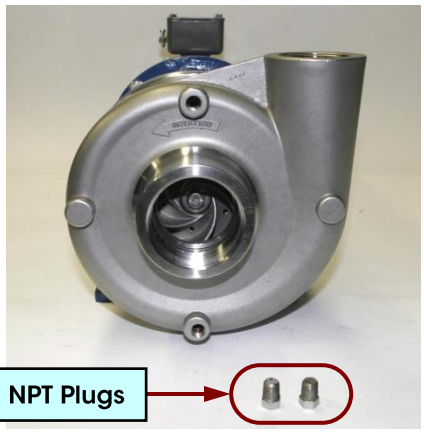
> ***Caution!***
> *Be certain that the power to the motor is turned OFF and locked out.*

3. Close the suction and discharge isolation valves.
4. Drain the fluid from the pump by removing the vent and drain plugs (see photos below.)
5. Disconnect the pump from the system and move it to a clean work area.

Location & Removal of Vent & Drain Plugs

The pump has two **1/8" NPT plugs** located on the suction side of the volute, as shown.



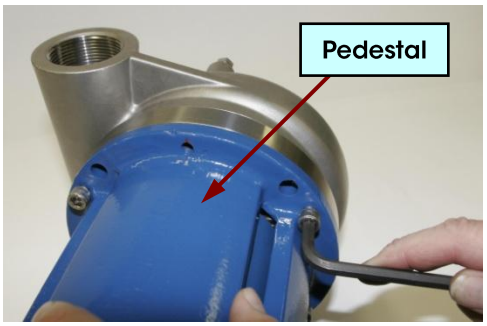


5.3 PUMP DISASSEMBLY

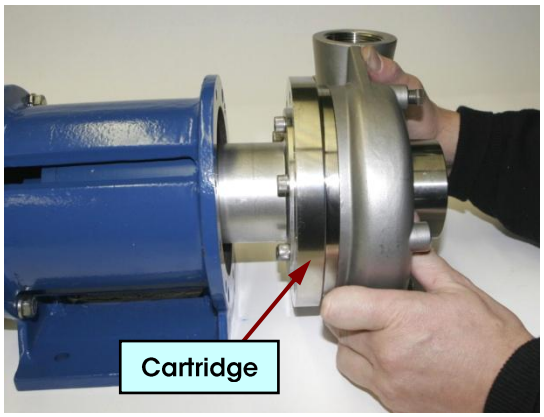
Follow the procedure below and refer to the exploded view drawing on Page 29. Drawing reference numbers are given in parentheses in the following procedure.

Cartridge Removal:

1 Remove four mounting bolts (21) and separate the **pump cartridge** from the pedestal (20).



NOTE: Force is required to overcome the magnetic attraction between the outer and inner magnets.

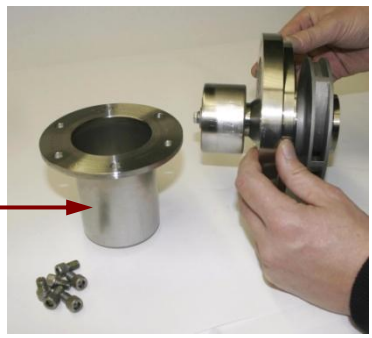


Caution!
Do not place hands or fingers between the Pedestal and Cartridge.

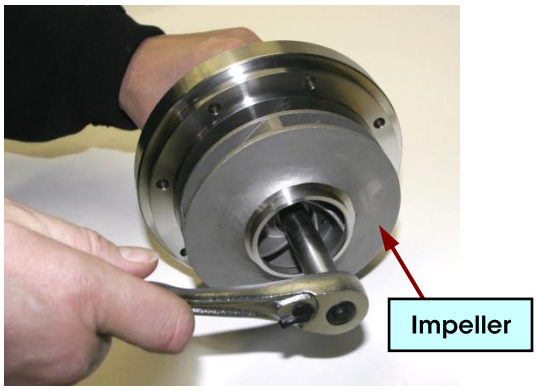
Cartridge Disassembly:

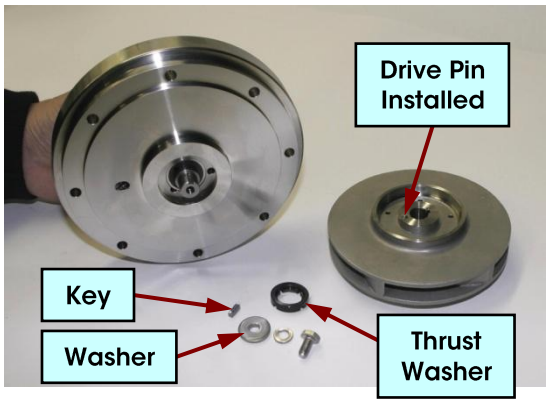
2 Remove eight bolts (6) and separate the volute (2). Discard volute O-ring (5).

3 Remove six screws (17) and separate the containment can (15). Discard O-ring (16).

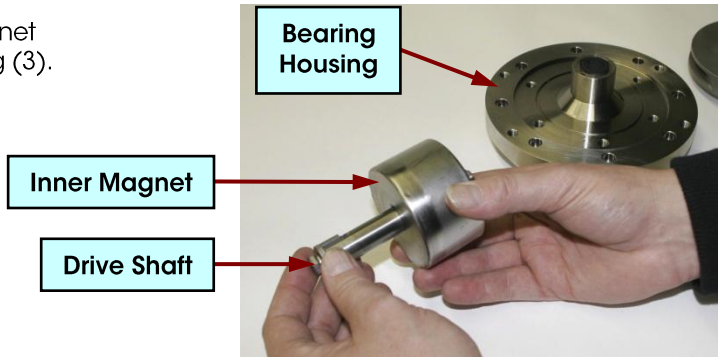


4 Remove impeller screw (8) and separate the impeller (1) from the drive shaft (4). Remove the thrust washer (13), key (10), drive pin (18), lockwasher (9) and washer (7).

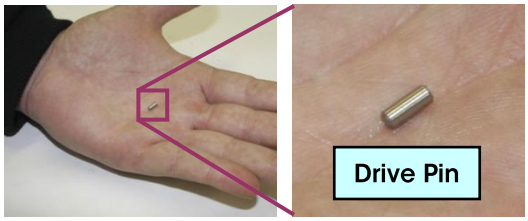


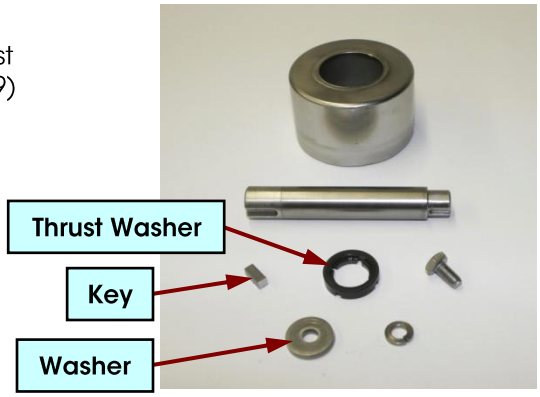


5 Separate the drive shaft-inner magnet assembly from the bearing housing (3).

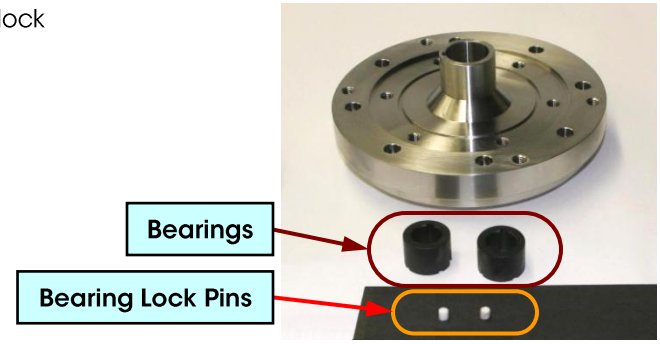


6 Remove the screw (8) from the drive shaft (4) and separate the inner magnet (14). Remove the thrust washer (13), key (11), drive pin (18), lockwasher (9) and washer (7).





7 Remove the bearings (12) and bearing lock pins (25) from the bearing housing (3).



Removal of Outer Magnet:

NOTE: The following step is required only if it is necessary to remove the motor from the pedestal or the outer magnet from the motor shaft. If only a **cartridge** replacement is needed, skip **Step 8**. The assembly and installation of the pump cartridge is covered in **Section 5.4**, **Parts A** & **D**.

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8 **a.** Detach the motor (with outer magnet) from the pedestal (25) by removing four bolts (29).

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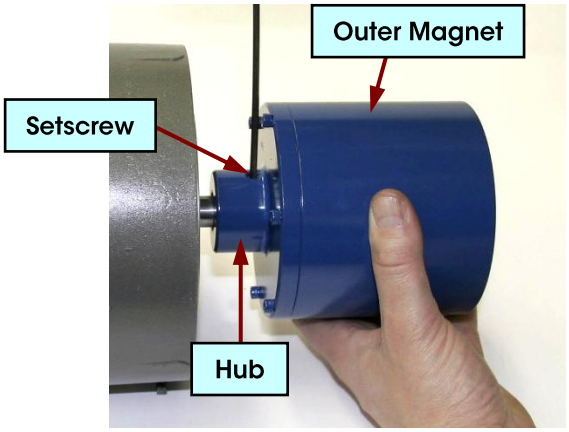
b. Loosen the two setscrews (17) on the hub (23) of the outer magnet (24).



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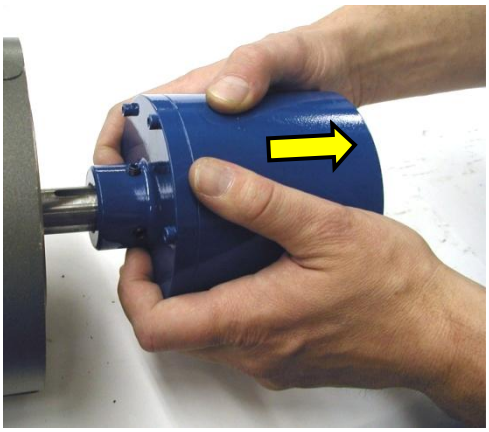
c. Remove the outer magnet from the motor shaft.

NOTE: Move the outer magnet to a safe location, away from the inner magnet, tools and other metal objects.



END OF DISASSEMBLY PROCEDURE

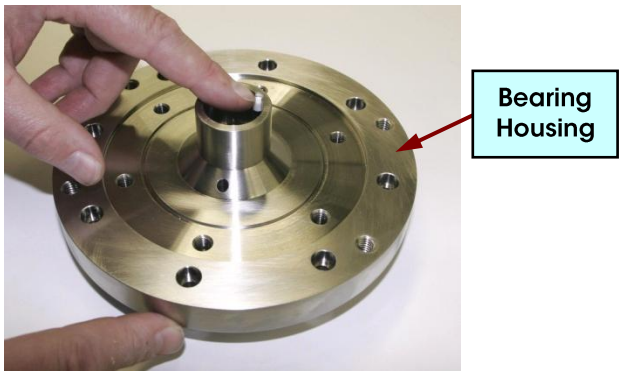
5.4 PUMP ASSEMBLY

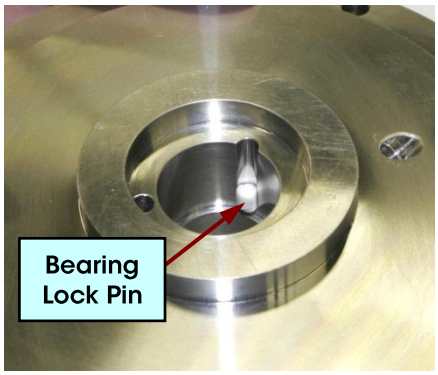
Follow the procedure below and refer to the exploded view drawing on Page 29. Drawing reference numbers are given in parentheses in the following procedure.

Part A: Cartridge Assembly

Installation of Bearings:

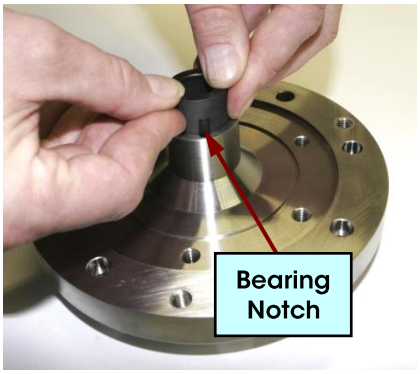
1 Install the bearing lock pins (25) into both sides of the bearing housing (3).





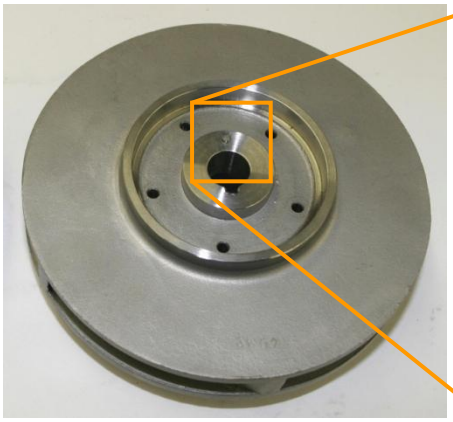
2 Install the bearings (12) into both sides of the bearing housing (3).

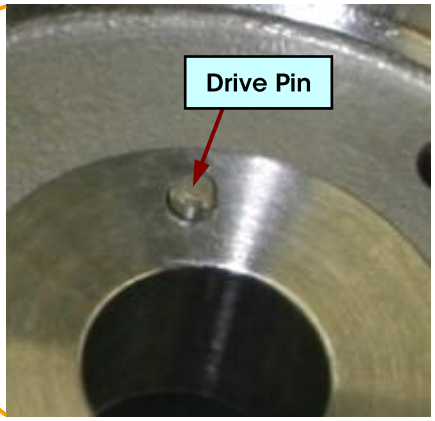
NOTE: The Bearing notch must face down, towards the bearing lock pin.



3 Insert drive pin (18) into the impeller (1).

NOTE: Make certain pin is pushed in fully. Pin should stick out .060 to .080 in.

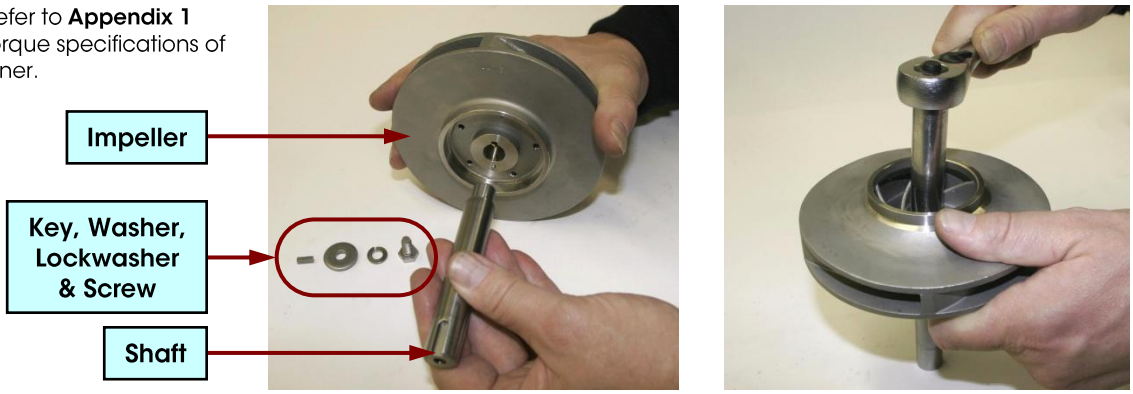




Shaft-Impeller Assembly:

4 Assemble the shaft (4) and impeller (1) with key (10), washer (7), lockwasher (9) and screw (8).

NOTE: Refer to **Appendix 1** for the torque specifications of the fastener.

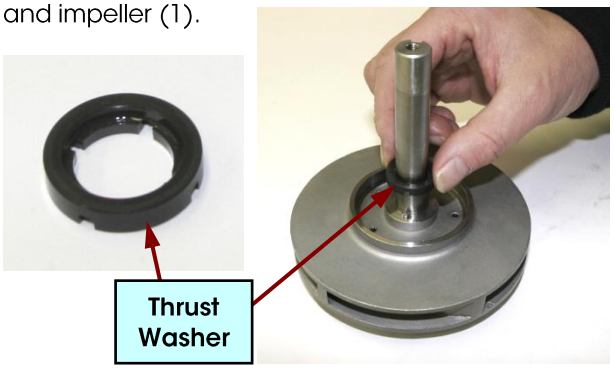


Installation of Thrust Washers:

5 Install thrust washer (13) onto drive shaft (4) and impeller (1).

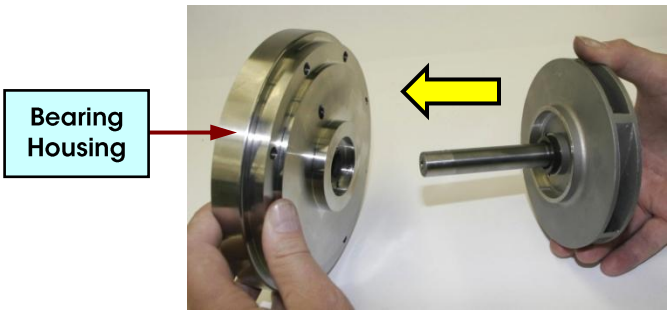
> ***Caution!***
> *There must be clearance between top of pin and bottom of drive notch or breakage of thrust washer may result.*

NOTE: Apply a small amount of lubricant to the thrust washer, such as mineral oil or grease that is compatible with the fluid to be pumped. This will allow the thrust washer to stay in place during assembly. Be certain thrust washer seats properly over the drive pin.



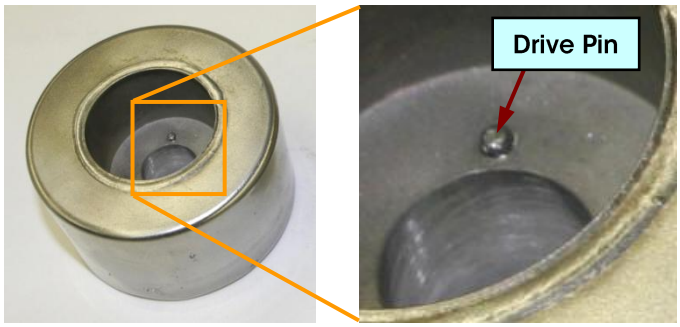
6 Slide shaft-impeller assembly into the bearing housing (3); then place the assembly on the bench top with the impeller facing down.

NOTE: The thrust washer should seat firmly against the bearing.



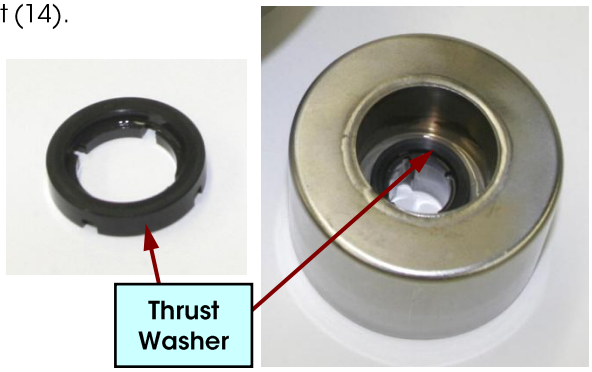
7 Insert drive pin (18) into the inner magnet (14).

NOTE: Make certain pin is pushed in fully. Pin should stick out .060 to .080 in.



8 Install thrust washer (13) into the inner magnet (14).

> ***Caution!***
> *There must be clearance between top of pin and bottom of drive notch or breakage of thrust washer may result.*



NOTE: Apply a small amount of lubricant to the thrust washer, such as mineral oil or grease that is compatible with the fluid to be pumped. This will allow the thrust washer to stay in place during assembly. Be certain thrust washer seats properly over the drive pin.

Installation of Inner Magnet:

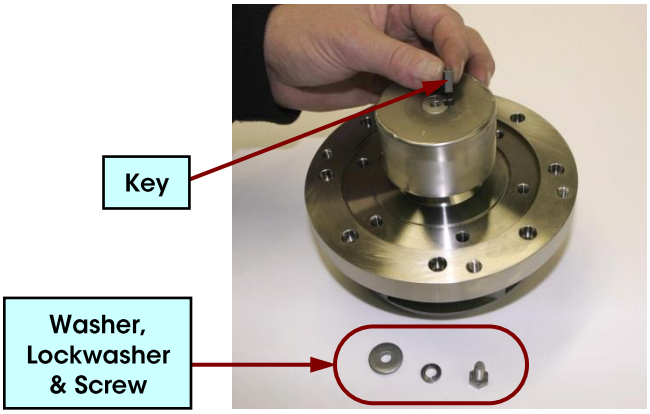
9 Slide inner magnet (14) onto shaft (4).

NOTE: Align keyways of the inner magnet and shaft. Be certain thrust washer seats firmly against bearing and remains properly seated over the drive pin.

---

10 Insert the key (11).

NOTE: The top of the shaft should be flush with or slightly above the top surface of the inner magnet.



---

11 Install washer (7), lockwasher (9) and screw (8); then tighten the screw.

NOTE: Refer to **Appendix 1** for the torque specifications of the fastener.

Installation of Containment Can:

12 Install containment can O-ring (16) into the circular groove.

> ***Caution!***
> *Do not reuse O-rings.*

---

13 Install containment can (15) with six screws (17).

NOTE: Apply anti-seize compound to the screws. Refer to **Appendix 1** for the torque specifications of the fasteners. When tightening the containment can screws, use a star-pattern torque sequence to ensure even compression on the O-ring's surface. With Teflon (PTFE) O-rings, repeat this process several times, waiting between retightening. This is necessary because Teflon will cold flow and require some time to properly seat. Continue the process until the screws no longer require retightening.

Installation of Volute:

14 Install volute O-ring (5).

> ***Caution!***
> *Do not reuse O-rings.*

NOTE: Be careful not to bend or twist O-ring during installation. The O-ring should seat naturally into position.

---

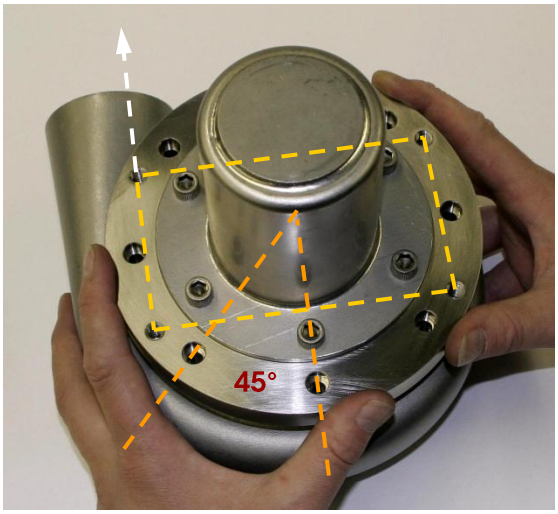
15 Place volute (2) onto the bearing housing (3).

NOTE: If not previously done, Install the vent and drain plugs into the volute. Use Teflon tape or pipe lubricant to prevent leakage and galling. (See Page 13 for description of the plugs.)

---

16 Carefully turn the assembly over and align the bearing housing (3) with the volute (2), as shown.

NOTE: For vertical discharge, orient the four drilled and tapped holes as shown. The bearing housing can be rotated in 45° steps relative to the volute to obtain seven other discharge angles.

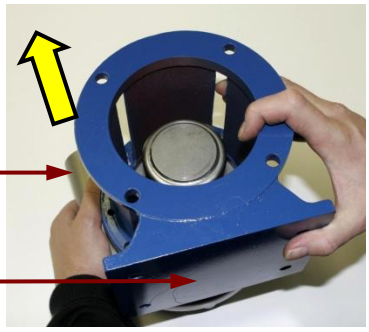


17 Bolt the volute (2) to the bearing housing (3) using eight screws (6). This completes the **pump cartridge** assembly.

NOTE: Apply anti-seize compound to the screws. Refer to **Appendix 1** for the torque specifications of the fasteners. When tightening the housing screws, use a star-pattern torque sequence to ensure even compression on the O-ring's surface. With Teflon (PTFE) O-rings, repeat this process several times, waiting between retightening. This is necessary because Teflon will cold flow and require some time to properly seat. Continue the process until the screws no longer require retightening.

Part B: Cartridge-Pedestal Assembly

18 Place pedestal (20) on pump cartridge as shown; then align mounting holes.



19 Attach bearing housing (3) to pedestal (20) using four bolts (21).

NOTE: Refer to **Appendix 1** for the torque specifications of the fasteners.

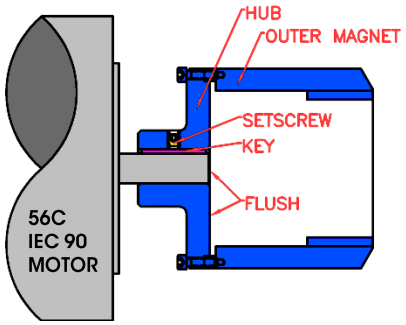
Part C: Outer Magnet-Motor Assembly

Outer Magnet Installation

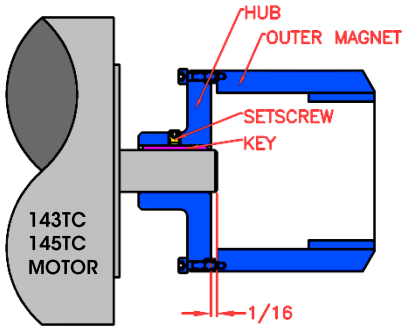
The procedure for installing the outer magnet on the motor shaft is dependent on which motor frame is used with the pump. The four standard cases are described below:

I. **NEMA 56C & IEC 90 Frames:** The end of the motor shaft must be flush with the inner surface of the outer magnet's hub. (See diagram at right.)

NOTE: The IEC motor must have a B5 Flange to be compatible with the pump mounting bracket.

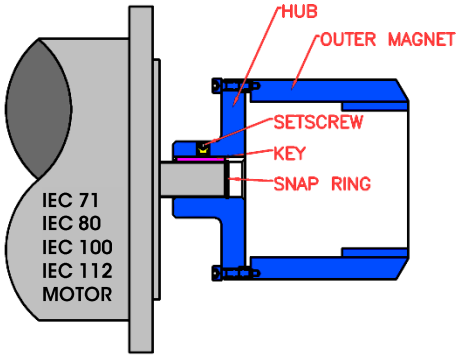


II. **NEMA 143TC & 145TC Frames:** The motor shaft must protrude past the inner surface of the outer magnet's hub by 1/16 in. (1.6 mm). (See diagram at right.)



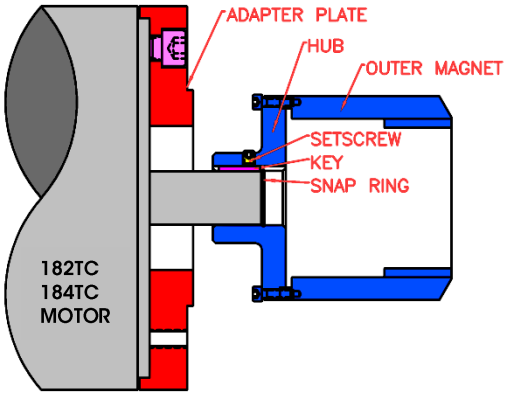
III. **IEC 71, 80, 100 & 112 Frames:** The outer magnet's hub is positioned by a snap ring installed in the hub. The end of the motor shaft must contact the snap ring. (See diagram at right.)

NOTE: The IEC motor must have a B5 Flange, as shown, to be compatible with the pump mounting bracket.



IV. **NEMA 182TC & 184TC Frames:** An **adapter plate** is required to mount the motor to the pedestal. The outer magnet's hub is positioned by a snap ring installed in the hub. The end of the motor shaft must contact the snap ring. (See diagram at right.)

NOTE: Complete pumps ordered for use with NEMA 182/184TC motor frames will be supplied with the *adapter plate* (P/N SP0046) and *adapter mounting bolts* (P/N 641105).



20 Install the outer magnet as follows:

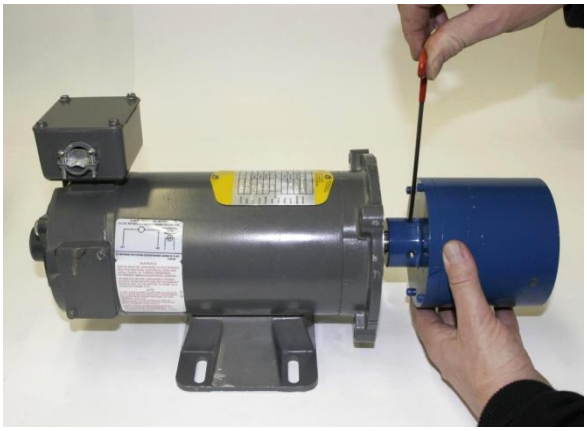
a. Insert motor key into the keyway on the motor shaft.

b. Apply a small amount of anti-seize compound to the motor shaft.

c. Align keyway of the outer magnet's hub with the key on the motor shaft.

d. Slide the outer magnet onto the shaft and position the hub as shown on Page 22.

e. Tighten the two setscrews on the hub.



Part D: Motor-Pedestal Assembly

21

Caution!
Do not place hands or fingers between the Pedestal and Motor C-Faces. The Outer and Inner Magnets will suddenly pull together with significant force.

Install the motor-outer magnet assembly to the pedestal-cartridge assembly using four sets of bolts (22) and lockwashers (23).

NOTE: The pedestal base should be securely fastened to the base plate before installing the motor to the pedestal. Keep hands and fingers away from the space between the C-faces of the motor and pedestal. The C-faces should mate freely and mount flush. Refer to **Appendix 1** for the torque specifications of the fasteners.

END OF ASSEMBLY PROCEDURE

Appendix 1: Fastener Torque Specifications

Maximum Torque Values for 18-8 Stainless Steel Bolts

Function	Bolt Size	Bolt Type	Quantity (per Pump)	Torque Specifications	
				(in-lbs)	(N-m)
Volute - Bearing Housing Assembly	1/4-28 UNF x 1	SHCS	8	94.0	10.6
Impeller - Shaft Assembly	1/4-28 UNF x 5/8	HHCS	1	94.0	10.6
Inner Magnet - Shaft Assembly	1/4-28 UNF x 5/8	HHCS	1	94.0	10.6
Containment Can - Bearing Housing Assembly	5/16-24 UNF x 1/2	SHCS	6	142	16.0
Cartridge - Pedestal Assembly	5/16-18 UNC x 1	SHCS	4	132	14.9
BOLTS for MOTOR-PEDESTAL ASSEMBLY:					
Motor[1] - Pedestal Assembly	3/8-16 UNC x 1	HHCS	4	236	26.7
Motor[2] - Adapter Assembly	1/2-13 UNC x 1	SHCS	4	517	58.4
Adapter[2] - Pedestal Assembly	3/8-16 UNC x 1	HHCS	4	236	26.7
Motor[3] - Pedestal Assembly	3/8-16 UNC x 1-1/2	SHCS	4	236	26.7
Motor[4] - Pedestal Assembly	M10 x 40 mm	SHCS	4	327	37.0

1 - NEMA 56C, 143TC & 145TC motor frames
2 - NEMA 182TC & 184TC motor frames
3 - IEC 71 (B5) motor frame
4 - IEC 80 & 90 (B5) motor frames

HHCS = Hex Head Cap Screw
SHCS = Socket Head Cap Screw

Appendix 2: Maintenance Tool List

The following tools (or equivalents) are required when performing maintenance on the pumps:

Tool #	Tool	Function	Photo
1	**Allen Wrench, 3/16" Hex**	For volute screws.	
2	**Ratchet Wrench with 7/16" Hex Socket**	For impeller screw.	
3	**Wrench, 7/16"**	For inner magnet screw and 1/8" NPT plugs.	
4	**Allen Wrench, 1/4" Hex**	For containment can screws and cartridge mounting bolts.	
5	**Wrench, 9/16"**	For NEMA 56C-184TC motor mounting bolts.	
6	**Allen Wrench, 5/16" Hex**	For IEC 71 motor mounting bolts.	
7	**Allen Wrench, 8 mm Hex**	For IEC 80 & 90 motor mounting bolts.	
8	**Allen Wrench, 3/8" Hex**	For adapter mounting bolts (NEMA 182/184TC motor frames only).	

Appendix 3: Pump Parts List

Parts (and quantities) for Centry® Mag-Drive Models 621 & 622:

1 Impeller (1)
2 Volute (1)
3 Bearing Housing (1)
4 Shaft (1)
5 O-ring for volute (1)
6 Bolts for volute assembly (8)
7 Washers for shaft (2)
8 Screws for shaft (2)
9 Lockwashers for shaft (2)
10 Key for impeller (1)
11 Key for inner magnet (1)
12 Bearings (2)
13 Thrust Washers (2)
14 Inner Magnet (1)
15 Containment Can (1)
16 O-ring for containment can (1)
17 Screws for containment can (6)
18 Drive Pins for thrust washers (2)
19 Outer Magnet (1)
20 Pedestal (1)
21 Bolts for cartridge mounting (4)
22 Bolts for motor mounting (4)
23 Lockwashers for motor mounting (4)
24 Plugs for volute (2)
25 Lock Pins for bearings (2)

NOTE: For Liquiflo Part Numbers, see BOM on Pages 27-28.

Appendix 4: Pump Bill of Materials (BOM)

BOM for Centry® Mag-Drive Models 621 & 622

Drwg. Ref. #	Part Description		Material	Model 621 Part Number	Model 622 Part Number	Qty.
1	Impeller	5.0" Dia. (Full Size)	316 SS	622700	622701	1
		4.5" Dia. (Reduced Size)	316 SS	622702	622706	
		4.0" Dia. (Reduced Size)	316 SS	622703	622707	
		3.5" Dia. (Reduced Size)	316 SS	622704	622708	
		3.0" Dia. (Reduced Size)	316 SS	622705	622709	
2	Volute	Threaded (NPT)	316 SS	622100	622101	1
		Flanged (ANSI 150# RF)	316 SS	622110	622111	
3	Bearing Housing		316 SS	622800	622800	1
4	**Shaft ***		316 SS/CO	S622302-CO	S622302-CO	1
			316 SS/TC	S622302-TC	S622302-TC	
5	**O-ring/Gasket, * Volute**	O-ring (2-049)	Teflon	3121103	3121103	1
		O-ring (2-049)	Viton	3121119	3121119	
		Gasket	Graphoil	622603	622603	
6	Bolt, Volute (1/4-28 x 1 SHCS)		18-8 SS	S622005	S622005	8
7	Washer, Shaft		316 SS	622500	622500	2
8	Screw, Shaft (1/4-28 x 5/8 HHCS)		316 SS/Teflon	S620034	S620034	2
9	Lockwasher, Shaft		18-8 SS	863701	863701	2
10	Key, Impeller		316 SS	621900	621900	1
11	Key, Inner Magnet		316 SS	S622901	S622901	1
12	**Bearing ***		SiC	622901	622901	2
			Carbon-60	622902	622902	
13	**Thrust Washer ***		SiC	622905	622905	2
14	Inner Magnet	MCF (120 in-lbs)	316 SS/SmCo	SIMCE-05	SIMCE-05	1
		MCW (200 in-lbs)	316 SS/SmCo	SIMCW-05	SIMCW-05	
15	Containment Can		316 SS	740913	740913	1
16	**O-ring/Gasket, * Containment Can**	O-ring (2-042)	Teflon	S4000	S4000	1
		O-ring (2-042)	Viton	S4002	S4002	
		Gasket	Graphoil	S4005	S4005	
17	Screw, Containment Can (5/16-24 x 1/2 SHCS)		18-8 SS	864007	864007	6
18	Pin, Thrust Washer		316 SS	622750	622750	2
19	Outer Magnet – MCF (120 in-lbs)	NEMA 56C	Cast Iron/Epoxy	SOMCB-5	SOMCB-5	1
		NEMA 143/145TC	Cast Iron/Epoxy	SOMCB-7	SOMCB-7	
		IEC 71 – B5	Cast Iron/Epoxy	SOMCB-71	SOMCB-71	
		IEC 80 – B5	Cast Iron/Epoxy	SOMCB-80	SOMCB-80	
		IEC 90 – B5	Cast Iron/Epoxy	SOMCB-90	SOMCB-90	
		NEMA 182/184TC	Cast Iron/Epoxy	SOMCB-9	SOMCB-9	
	Outer Magnet – MCW (200 in-lbs)	NEMA 56C	Cast Iron/Epoxy	SOMCV-5	SOMCV-5	
		NEMA 143/145TC	Cast Iron/Epoxy	SOMCV-7	SOMCV-7	
		IEC 71 – B5	Cast Iron/Epoxy	SOMCV-71	SOMCV-71	
		IEC 80 – B5	Cast Iron/Epoxy	SOMCV-80	SOMCV-80	
		IEC 90 – B5	Cast Iron/Epoxy	SOMCV-90	SOMCV-90	
		NEMA 182/184TC	Cast Iron/Epoxy	SOMCV-9	SOMCV-9	

* Primary repair components.

Appendix 4: Pump Bill of Materials (Continued)

BOM for Centry® Mag-Drive Models 621 & 622

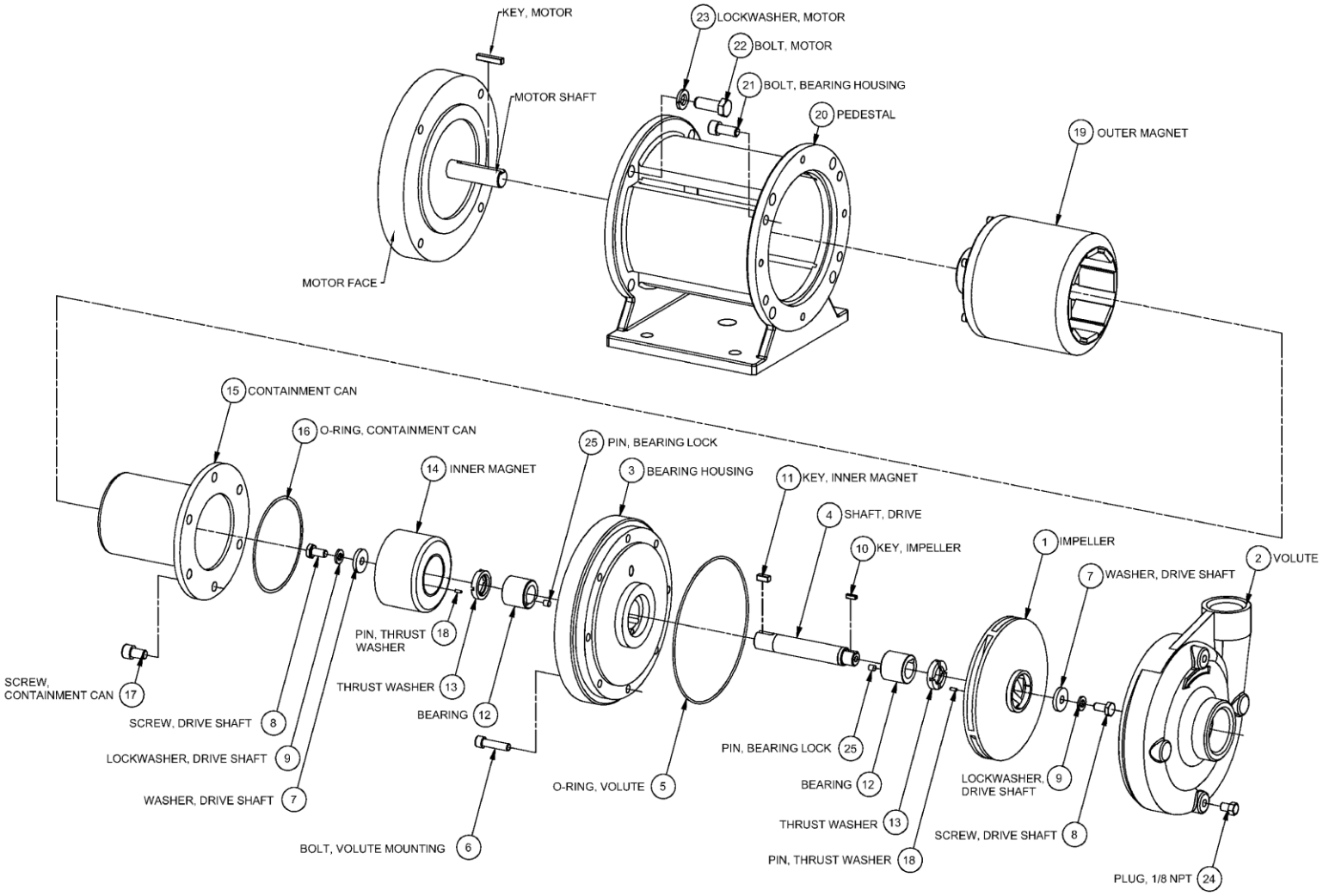
Drwg. Ref. #	Part Description		Material	Model 621 Part Number	Model 622 Part Number	Qty.
20	Pedestal	NEMA Frames [1]	Cast Iron/Epoxy	SP003	SP003	1
		IEC 71 – B5 Flange	Cast Iron/Epoxy	SP004	SP004	
		IEC 80 & 90 – B5 Flange	Cast Iron/Epoxy	SP005	SP005	
21	Bolt, Cartridge-Pedestal (5/16-18 x 1 SHCS)		18-8 SS	621105	621105	4
22	Bolt, Motor [2]	NEMA Frames [1]	18-8 SS	620825	620825	4
		IEC 71 – B5	18-8 SS	781117	781117	
		IEC 80 & 90 – B5	18-8 SS	S1011	S1011	
23	Lockwasher, Motor	NEMA Frames [1] (3/8)	18-8 SS	S1004	S1004	4
		IEC 71 - B5 (3/8)	18-8 SS	S1004	S1004	
		IEC 80 & 90 - B5 (M10)	18-8 SS	S1012	S1012	
24	Plug, 1/8" NPT (Volute)		316 SS	362304	362304	2
25	Pin, Bearing Lock		Teflon	361801	361801	2
26	Adapter – NEMA 182/184TC [Not Shown]		CS/Epoxy	SP0046	SP0046	1
27	Bolt, Adapter – NEMA 182/184TC [Not Shown]		18-8 SS	641105	641105	4
28	Nut, Motor [Not Shown]	3/8-16 (IEC 71 – B5)	18-8 SS	S1003	S1003	4
		M10 (IEC 80 & 90 – B5)	18-8 SS	S1013	S1013	

1 NEMA 56C, 143TC, 145TC, 182TC & 184TC.
2 See Page 24 for Motor Bolt information.

NOTE: Drawing Reference Numbers above correspond to Exploded View Reference Drawing on following page.

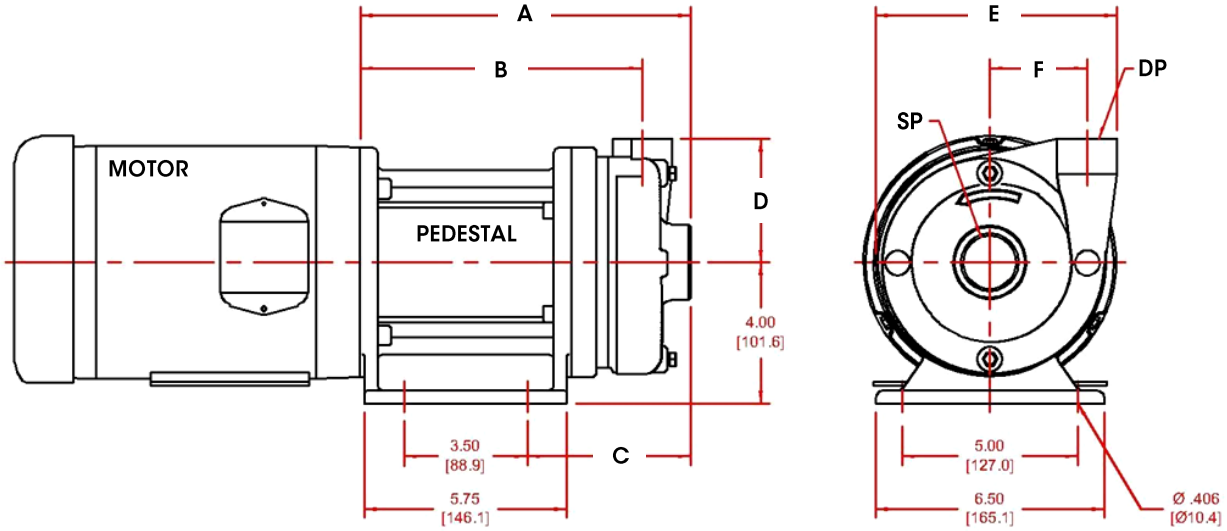
Appendix 5: Reference Drawings

Exploded View Drawing for Centry® Mag-Drive Models 621 & 622



Appendix 5: Reference Drawings (Continued)

Dimensional Drawing #1: Centry® Mag-Drive Models 621 & 622 with Threaded Ports



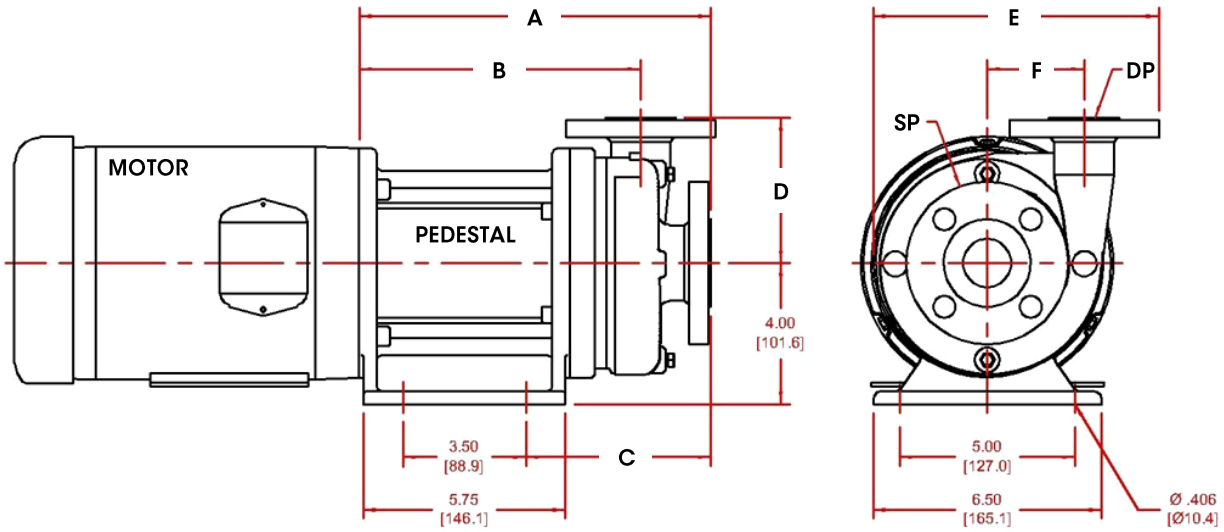
Dimensional Data (inches [mm]) – Models 621 & 622 with Threaded Ports

Pump Models	Port Sizes		Dimensions with Threaded (NPT) Ports					
	SP	DP	A	B	C	D	E	F
621	1-1/4"	1"	9.39 [238]	8.01 [203]	4.64 [118]	3.50 [88.9]	6.85 [174]	2.75 [69.9]
622	2"	1-1/2"	10.20 [259.1]	8.08 [205]	5.45 [138]	3.82 [97.0]	7.91 [201]	3.13 [79.4]

SP = Suction Port **DP** = Discharge Port

Appendix 5: Reference Drawings (Continued)

Dimensional Drawing #2: Centry® Mag-Drive Models 621 & 622 with Flanged Ports



Dimensional Data (inches [mm]) – Models 621 & 622 with Flanged Ports

Pump Models	Port Sizes		Dimensions with Flanged (ANSI 150# RF) Ports					
	SP	DP	A	B	C	D	E	F
621	1-1/4″	1″	10.01 [254.3]	8.01 [203]	5.26 [134]	4.13 [105]	8.13 [206]	2.75 [69.9]
622	2″	1-1/2″	10.96 [278.3]	8.08 [205]	6.21 [158]	4.52 [115]	9.10 [231]	3.13 [79.4]

SP = Suction Port **DP** = Discharge Port

Appendix 6: Troubleshooting Guide

Troubleshooting Guide – Part 1

Problem	Possible Cause	Corrective Action
No discharge	Pump not primed	Verify suction pipe is submerged. Increase suction pressure. Open suction valve.
	Wrong direction of rotation	Reverse motor leads.
	Valves closed	Open all suction and discharge valves.
	Bypass valve open	Close bypass valve.
	Air leak in suction line	Tighten connections. Apply sealant to all threads. Verify suction pipe is submerged.
	Clogged strainer	Clean strainer.
	Clogged impeller	Disassemble and remove blockage.
	Impeller greatly worn or damaged	Disassemble and replace impeller.
	Magnetic coupling has decoupled	Stop driver and check temperature and viscosity of fluid. Stronger magnetic coupling may be needed.
Insufficient discharge	Suction pressure too low	Increase suction pressure. Verify suction piping is not too long. Fully open any suction valves.
	Bypass valve open	Close bypass valve.
	Partly clogged strainer	Clean strainer.
	Partly clogged impeller	Disassemble and remove blockage.
	Speed too low	Increase driver speed, if possible. Use larger size pump, if required.
	Impeller worn or damaged	Disassemble and replace impeller.
Loss of suction after satisfactory operation	Pump not properly primed	Reprime pump.
	Air leaks in suction line	Tighten connections. Apply sealant to all threads. Verify suction pipe is submerged.
	Air or vapor pockets in suction line	Rearrange piping as necessary.
	Increase in fluid viscosity	Heat fluid to reduce viscosity. Reduce pump speed.
Excessive power consumption	Fluid viscosity higher than specified	Heat fluid to reduce viscosity. Reduce pump speed. Increase driver horsepower.
	Liquid specific gravity higher than expected	Reduce pump speed. Increase driver horsepower.
	Total head greater than specified	Increase pipe diameter. Decrease pipe run.
	Total head lower than specified, pumping higher flow than expected	Install throttle valve.
	Total head higher than rating with flow at rating	Install impeller with correct diameter.
	Rotating parts binding or severely worn	Disassemble and replace worn parts.

Appendix 6: Troubleshooting Guide (Continued)

Troubleshooting Guide – Part 2

Problem	Possible Cause	Corrective Action
Rapid pump wear	Abrasives in fluid	Install suction strainer. Limit solids concentration. Reduce pump speed or use larger pump running at lower speed.
	Corrosion wear	Use materials of construction that are acceptable for fluid being pumped.
	Extended dry running	Install power sensor to stop pump.
	Discharge pressure too high	Increase pipe diameter. Decrease pipe run.
Excessive noise and vibration	Partly clogged impeller causing imbalance	Disassemble and remove blockage.
	Damaged impeller and/or shaft	Disassemble and replace damaged parts.
	Suction and/or discharge piping not anchored or properly supported	Anchor per Hydraulic Institute Standards.
	Base not rigid enough	Tighten hold-down bolts on pump and motor or adjust stilts. Inspect grout and regrout if necessary.
	Worn pump bearings	Replace bearings.
	Worn motor bearings	Replace bearings or motor.
	Pump cavitation	Increase NPSH available.
Excessive product leakage	Static seal failure caused by chemical incompatibility or thermal breakdown	Use O-rings or gaskets made of material compatible with fluid and temperature of the application.
	Static seal failure caused by improper installation	Install O-rings or gaskets without twisting or bending. Use star-pattern torque sequence on housing bolts during assembly. Allow Teflon O-rings to cold flow and seat during tightening. Torque bolts to specification.
	Pump port connections not properly sealed	Use Teflon tape or other suitable sealant. Use gaskets compatible with fluid and temperature of the application.
	Crevice corrosion of pump housing material	Only pump chemicals that are compatible with the pump housing material. Decrease temperature to reduce corrosion rate to acceptable value. Flush idle pumps that are used to pump corrosive chemicals. Eliminate contaminants in the fluid that can accelerate corrosion wear.

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