

**ENDURA®**

MAG-DRIVE CENTRIFUGAL PUMPS



**Group II - MC**

**Table of Contents**

Forward . . . . .	2
Section 1: General Information . . . . .	3-6
Section 2: Safety Precautions . . . . .	7
Section 3: Start-Up. . . . .	8
Section 4: Maintenance & Repair . . . . .	9-18
Appendix . . . . .	18-33



## Forward:

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This manual provides instructions for the installation, operation and maintenance of the Endura® Series centrifugal pump, group two, mag-drive. 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.

These pumps are not warranted for service other than those specified on the order by Liquiflo applications engineering. If it is desirable to use this product for alternative services, please call Liquiflo applications engineering or your local Liquiflo distributor.

Thank you for purchasing a Liquiflo product.

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

## Section 1: General Information

This manual covers the Endura® Series Mag-Drive Centrifugal Pump, all four sizes of Group II.

### 1.1 Model and Serial Number

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

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 pump is based on a 10-position *Model Coding* system that is described in **Section 1.4**.

This manual covers the "new" style which took effect in July 2011. For instructions on assembly of "Legacy" style pumps, please contact factory. More information about this change is described in Appendix 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.

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:

<b>Model Number:</b>
<b>Serial Number:</b>
<b>Date Received:</b>
<b>Pump Location:</b>
<b>Pump Service:</b>

### 1.3 Pump Specifications

**Table 1: Dimensional Specifications**

Parameter	Specification	Unit
Pump Sizes	3x2x8, 3x2x10, 4x3x8, 4x3x10	in
Impeller Type	Closed	—
Port Type	Flanged (ANSI 150# RF)	—
Mounting Bracket	Close-Coupled, Motor Supported <sup>1</sup>	—
Motor Frame (C-Face)	NEMA 182C thru 365TC, IEC 132 thru 200 <sup>1</sup>	—

<sup>1</sup> - Power Frame option is available for long-coupling pump mounting bracket to other motor frames.

**Table 2: Absolute Temperature & Pressure Ratings**

Parameter	Specification	Unit
Minimum Operating Temperature	70	°F
Maximum Operating Temperature	350	°F
Maximum Operating Pressure	275 <sup>2</sup>	PSI
Maximum Operating Speed	3600 <sup>3</sup>	RPM

<sup>2</sup> - Above 100°F contact factory for de-rating.

<sup>3</sup> - 4x3x10 maximum speed is 1750

**Table 3: Material Data**

Component(s)	Material(s)
Pump Body & Impeller	316 Stainless Steel or Alloy-C
Bearings	Silicon Carbide
O-rings/Gaskets	Teflon, Viton, Kalrez or Graphoil
Mounting Bracket	Epoxy-painted Cast Iron
Mounting Hardware	18-8 Stainless Steel
Power Frame	Frame: Cast Iron/Epoxy; Shaft: Carbon Steel

### 1.4 Model Coding

Model Coding Example:

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
MC	N	2	S	2	T	S	2	0	C

Mag Coupled  
Normal Temp  
3x2x10  
316 SS  
150# Flanges  
Teflon O-Rings  
Stainless Containment Shell  
Close Coupled  
182/184 TC Motor

**Table 4: Model Coding for Endura® Group II - MC**

Position	Description	Code	Selection
1	Pump Model	MC	Magnetically Coupled
2	Temperature	N	Normal Temperature (70-350 °F)
3	Size	1	3x2x8
		2	4x3x8
		4	3x2x10
		5	4x3x10
4	Wet End, Material of Construction	S	316 Stainless
		H	Alloy-C
5	Casing Flanges	2	ANSI RF 150#
		3	ANSI RF 300#
6	Elastomers	T	Teflon
		K	Kalrez
7	Containment Can	S	Stainless Steel
		H	Alloy-C
		Z	Transformation Toughened Zirconia (TTZ)
8	Magnet	1	NdFeB 2" - Metal Can
		2	NdFeB 3" - Metal Can
		3	SmCo 2" - Metal Can
		4	SmCo 3" - Metal Can
		5	NdFeB 2" - Ceramic Can
		6	NdFeB 3" - Ceramic Can
		7	SmCo 2" - Ceramic Can
		8	SmCo 3" - Ceramic Can
9	Coupling Option	0	Close Coupled
		1	Power Frame
10	Motor Frame Size	C	182/184 TC NEMA
		D	213/215 TC NEMA
		E	254/256 TC NEMA
		F	284/286 TC NEMA
		G	324/326 TC NEMA
		H	364/365 TC NEMA
		J	284/286 TSC NEMA
		K	324/326 TSC NEMA
		L	364/365 TSC NEMA
		U	132 IEC
		V	160 IEC
		W	180 IEC
X	200 IEC		

See Appendix 3 for Bill of Materials.

**1.5 Returned Goods Authorization (RGA)**

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 Goods Authorization Number (**RGA #**) and provide the distributor with the required information (see RGA Record below).
- 2) Clean and neutralize pump.
- 3) Package the pump carefully and include the **RGA #** in a visible location on the outside surface of the box.
- 4) Ship pump to factory, freight prepaid.

Returned Goods Authorization (RGA) Record		
<b>1</b>	<b>RGA #</b>	<b>(Supplied by Distributor)</b>
<b>2</b>	<b>Distributor Name</b>	
<b>3</b>	<b>Order Date</b>	
<b>4</b>	<b>Customer PO#</b>	
<b>5</b>	<b>Return Date</b>	
<b>6</b>	<b>Item(s) Returned</b>	
<b>7</b>	<b>Serial Number(s)</b>	
<b>8</b>	<b>Reason for Return</b>	
<b>9</b>	<b>Fluid(s) Pumped</b>	
<b>10</b>	<b>Notes</b>	

**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 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
- When performing maintenance, pay special attention to all cautionary statements given in this manual. **Failure to observe safety precautions can result in personal injury, equipment damage or malfunction.**



**Caution!**

*This pump cannot be run dry. Ensure the pump is primed before starting.*

## Section 3: Start-Up

### 3.1 Inspection of System

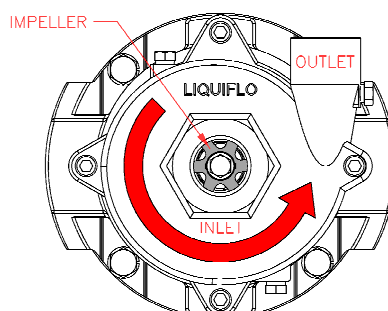
Before operating pump, inspect the pumping system and verify the following:

- 1) **Pump Construction:** The materials of construction of the pump must be compatible with the fluid to be pumped.
- 2) **Pump Mounting:** The pump must be securely fastened to the base and ground using the basic installation procedures as outlined by the Hydraulic Institute.
- 3) **Alignment:** Pumps that are close-coupled to a motor do not require manual alignment. Those that are long-coupled to a motor, using the power frame option, will require alignment of the motor and power frame shafts.
- 4) **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.
- 5) **Valves:** All suction and discharge valves must be open during start-up and operation or damage or malfunction may result.
- 6) **Motor Enclosure:** The motor enclosure must be suitable for the conditions of service.
- 7) **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.
- 8) **Safety:** Never operate pump without all safety devices installed.
- 9) **Priming & Direction of Rotation:** Prime the pump and fill the containment can and then briefly jog the motor to assure proper motor direction. Motor shaft direction must be counter-clockwise, as seen from the pump end.



**Caution!**

*Never run this pump dry, serious damage can result*





## Section 4: Maintenance & Repair

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The most common maintenance items for the pump are bearings. If a leak develops, a decrease in head is observed or an increase in power is required, repair is necessary. When rebuilding the pump, O-rings and gaskets should be replaced, never re-used. Whenever possible, use of anti-seize on stainless bolts is highly recommended.

### 4.1 Work Safety

Use common sense and basic workshop safety when rebuilding the pump.

Pump may have been used for hazardous or toxic fluids. Be sure to flush pump prior to removal.

Components of this pump are heavy, use proper lifting techniques.

Be sure power is disconnected and valves are locked out before starting maintenance.

### 4.2.1 Pump Disassembly

Refer to assembly section for pictures of components or Appendix 4 for reference drawings. Drawing numbers are given for reference in parenthesis.

**Step 1.** Be sure the motor power is disconnected, all valves are closed, and the pump is empty of fluid by using the drain plug located on the bottom of the casing.

**Step 2.** Remove the four bolts which attach the Bracket (**46**) to the motor.

**Step 3.** Remove the four bolts which attach the Casing (**1**) to the pump.

**Step 4.** Remove the eight bolts which attach the Containment Can (**35**) to the pump. Be careful, fluid may remain inside the Containment can.

**Step 5.** Remove the one bolt which holds on the Impeller (**2**). A bar may be used to prevent the impeller from rotating. Set aside Key and Washers for use during re-assembly. **3x2x8 Only** – Remove Ring, adapter (**6**) and Bolts (**7**) and set aside for re-use.

**Step 6.** Carefully pull the shaft assembly from the bearing housing.

**Step 7.** Remove Bolt (**9**) and Washer, inner magnet (**12**), then pull Inner magnet (**36**) from shaft.

#### 4.2.2 Removal of Bearings

##### **Caution – Safety glasses required for these steps**

**Step 1.** Bearings, rotating (18) are pressed onto the shaft and held in place with Tolerance rings (20). The best way to remove these one-time-use bearings from the shaft is to break them. Wrap a rag around the bearing and gently crack the bearing apart with a hammer. **Caution –** Sharp fragments may remain on the rag.

An arbor press may also be used. However, the tolerance ring may mar the shaft during pressing. If using this method, be sure to loosen the Set Screw (22) in the Spacer (23).

**Step 2.** Bearings, stationary (17) are pressed into the Casing Cover (2) with an O-ring (19). Gently tap around the inside lip of the bearing to push the bearing out of the casing cover. **Caution –** Bearings may fracture during this step.

**Step 3.** Carefully dispose of the fragments of the old bearings as well as the tolerance rings and O-rings.

**Step 4.** Examine pump components for signs of wear, replace if needed.

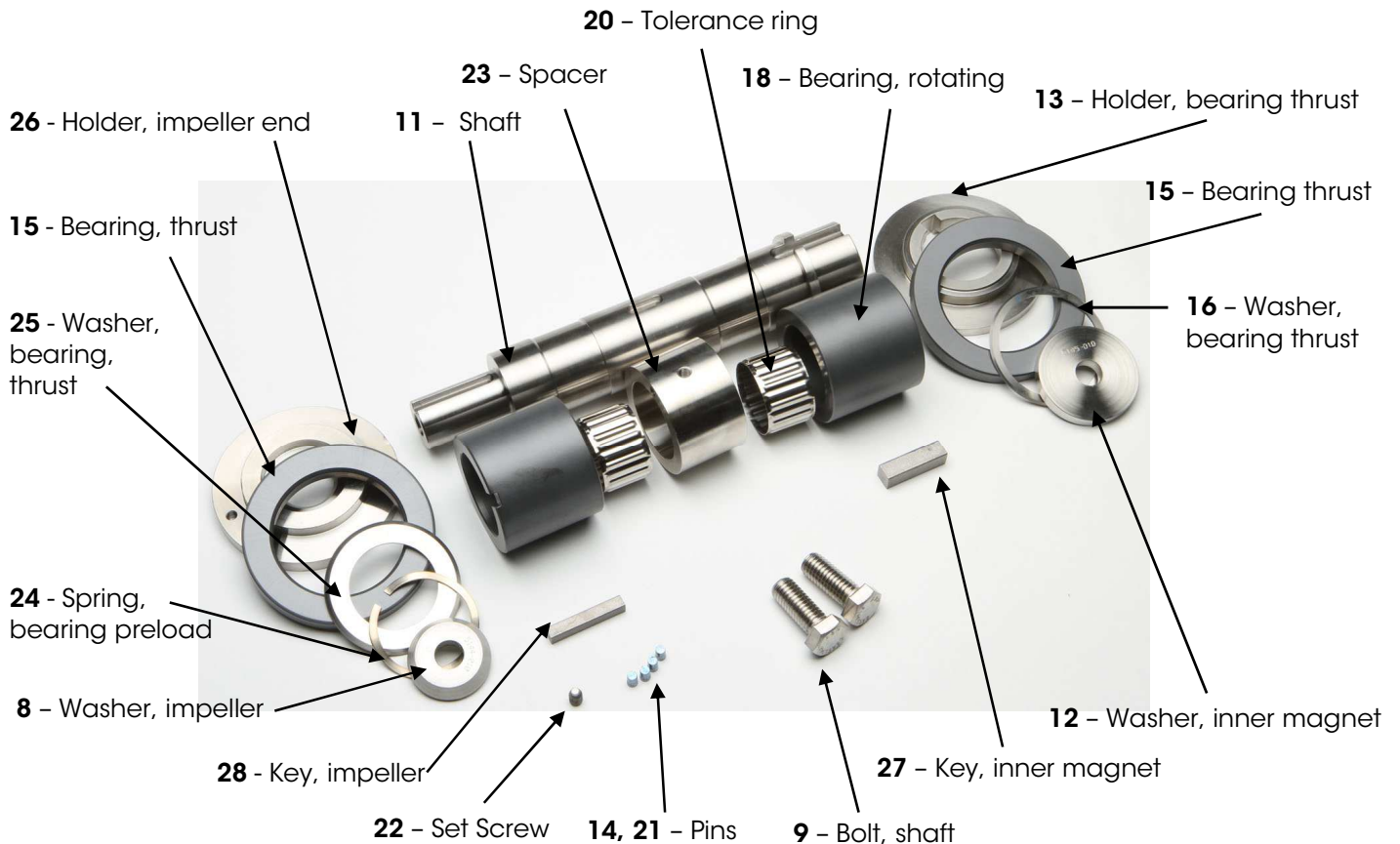
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**END OF DISASSEMBLY PROCEDURE**

### 4.3 PUMP ASSEMBLY

Follow the procedure below and refer to the Sectional and Exploded View drawings in **Appendix 4**. Drawing item numbers are given in parentheses in the following procedure.

#### 4.3.1 Shaft Assembly

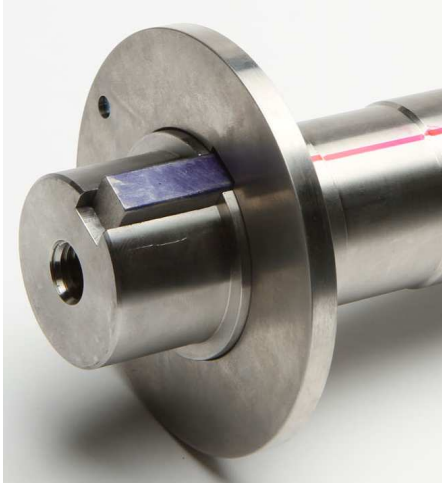


**Step 1.** Using a marker and assembly tool **5150-070** or a straight edge, mark a line down the length of Shaft (**11**), centered on the keyways.

**Step 2.** Using a hammer or press, insert Pin (**14**) into Holder, bearing thrust (**13**) such that the head of the pin is flush with the holder.



**Step 3.** Install Key, inner magnet (27) to Shaft (11)



**Step 4.** Install Holder, bearing thrust (13) onto shaft, aligned with key. Followed by Bearing, thrust (15) onto Holder (13), aligning the groove in the bearing to the pin in the holder.

**Step 5.** Install Washer, bearing thrust (16) with the beveled side facing the thrust bearing.

**Step 6.** Install one Tolerance Ring (20) onto the shaft, into the groove as shown.



**Step 7.** Slide one rotating Bearing (18) onto shaft and align single groove with line previously marked on shaft as shown.

**Step 8.** Using an arbor press, and assembly tool (5149-070), apply slow and even pressure to press the Bearing (18) over the Tolerance ring (20) and seat it flush with the thrust Bearing (15). Do NOT use a hammer for this step, the bearing may crack.



**Step 9.** Using an arbor press or a hammer, press in two Pins (21) into each side of Spacer (23) such that the step of the pin is flush with the spacer as shown. Install Set Screw (22) into spacer but do not tighten.



**Step 10.** Install Spacer (23) onto shaft, aligning Pin (21) into groove in Bearing (18). Do not tighten Set Screw (22) yet. Install second Tolerance ring (20) into tolerance ring groove on shaft.

**Step 11.** Install second Bearing (18) onto shaft. Align the single groove in the bearing facing down and aligned with the Pin (21) in Spacer (23) as shown.

**Step 12.** Similar to Step 9, press Bearing (18) onto shaft. Then tighten Set Screw (22).



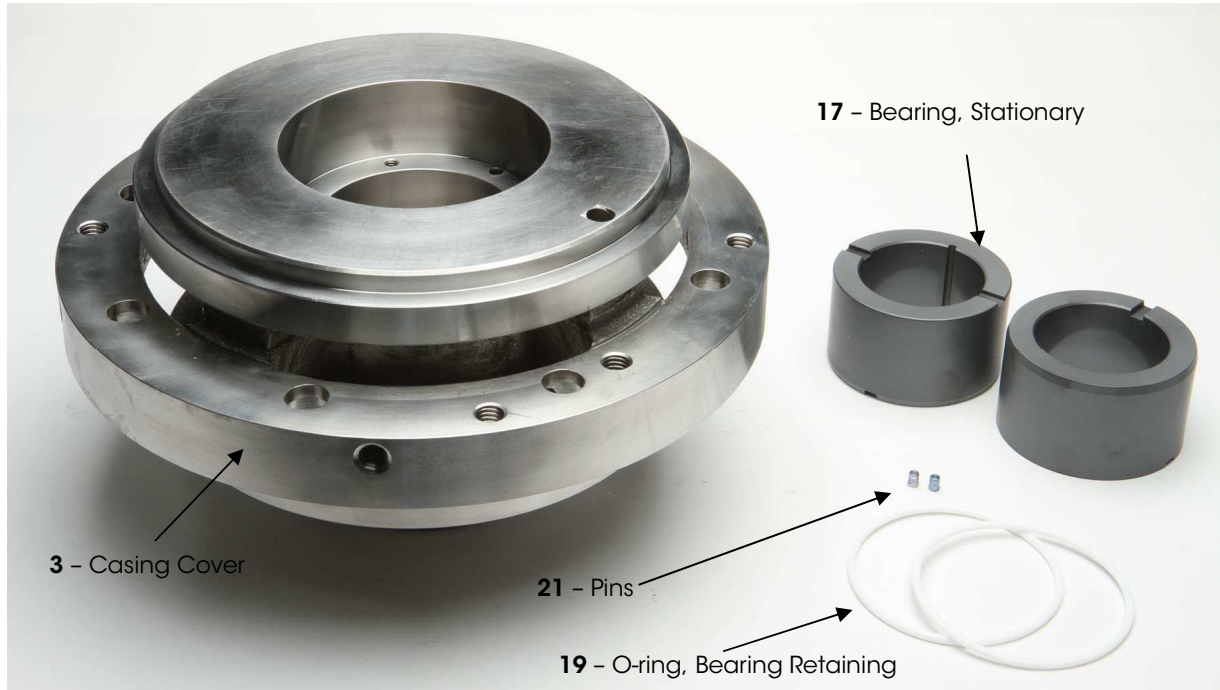
#### 4.3.2 Inner Magnet Assembly

**Step 1.** Place the Inner magnet (36) onto the large end of the shaft (or the shaft into the inner magnet), oriented as show and aligned to the key.



**Step 2.** Assemble the Washer, inner magnet (12) and Bolt (9) to secure the Inner magnet to the shaft. Tighten with wrench.

### 4.3.3 Bearing Housing Assembly



**Step 1.** Place Casing cover (3) on a bench with the large diameter (pump side) facing up, as shown above. Assembly **MUST** begin from this side to prevent damage to bearings.

**Step 2.** Using a punch and hammer, install Pin (21) into Casing cover (3) such that the step of the pin is flush with the casing cover.



**Step 3.** Install O-ring, bearing retaining (19) into O-ring groove in casing cover. Do not re-use O-rings

**Step 4.** Install Bearing, stationary (17) into casing cover. The beveled side of the bearing faces down and the single groove aligns to the Pin (21) as shown.

**Step 5.** Using Assembly tool (5148-070) and an arbor press, press the bearing through the O-ring. The bottom of the bearing must seat against the casing cover.

**Step 6.** Repeat Step 1 to Step 5 for the other side of the Casing cover. Note: The bottom of the bearing should seat flush against the casing cover, but the top of the second bearing will stick up approximately 1/8 in above the casing cover.



#### 4.3.4 Impeller Assembly



**Step 1.** Insert the shaft assembly into the Casing cover assembly in the direction shown. Assure the shaft assembly rotates freely in the bearings of the Casing cover.



**Step 2.** Install Spring, bearing preload (**24**) over shaft.

**Step 3.** Install Washer, bearing thrust (**25**) bevel side up, as shown.

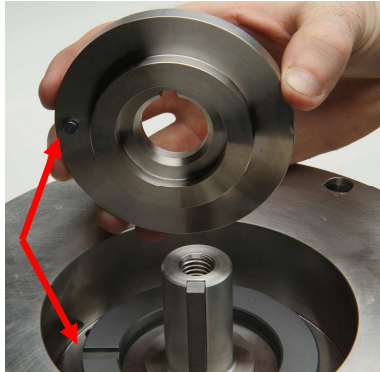


**Step 4.** Install Bearing, thrust (**15**), single groove facing up.

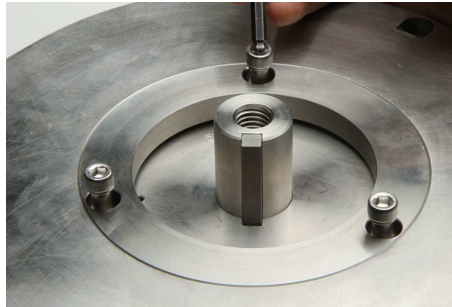
**Step 5.** Install Pin (**21**) into Holder, impeller end (**26**), same as Step 2 in Shaft Assembly.

**Step 6.** Install Key, Impeller (28) into shaft

**Step 7.** Install Holder, impeller end (26) over shaft, aligned with Key (28). The Pin should align with the groove in the Thrust bearing.



**Step 8. 3x2x8 Only** – Install Ring, Adapter (6) and secure with three Socket Head Cap Screws (7)



**Step 9.** Install Impeller (2) onto shaft.

**Step 10.** Install Washer, impeller (8) and Bolt, shaft (9). Use wrench to tighten.



#### 4.3.5 Containment Can Assembly

**Step 1.** Carefully turn over the assembly to gain access to the inner magnet side.

**Step 2.** Using a clean rag, wipe any dirt or small magnetic particles from the inner magnet.

**Step 3.** Install O-ring, containment can (55) into groove. Do not re-use O-rings

**Step 4. Ceramic Can Only** – Install O-ring, bumper (33) into Flange (34) and install flange over Containment Can, Ceramic (35)

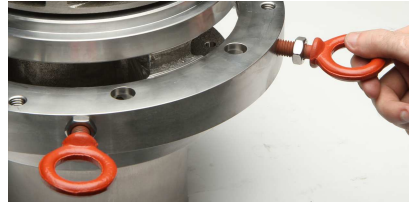


**Step 5.** Install Containment can (35) onto Casing cover. Apply anti-seize to eight Bolts (38) and tighten. Use caution when tightening; inner magnet will attract metal tools.



### 4.3.6 Final Assembly

**Step 1.** Wrap with Teflon tape and install Plug (60) into the side of the Casing cover.



**Step 2.** Assemble Nut (51) onto Eyebolt (50) and thread into two holes in Casing cover rim. Secure with jam Nut (51). Ensure these eyebolts are well engaged, as they are for lifting the pump.

**Step 3.** Apply Teflon tape to threads and install Drain plug (4) into Casing (1)

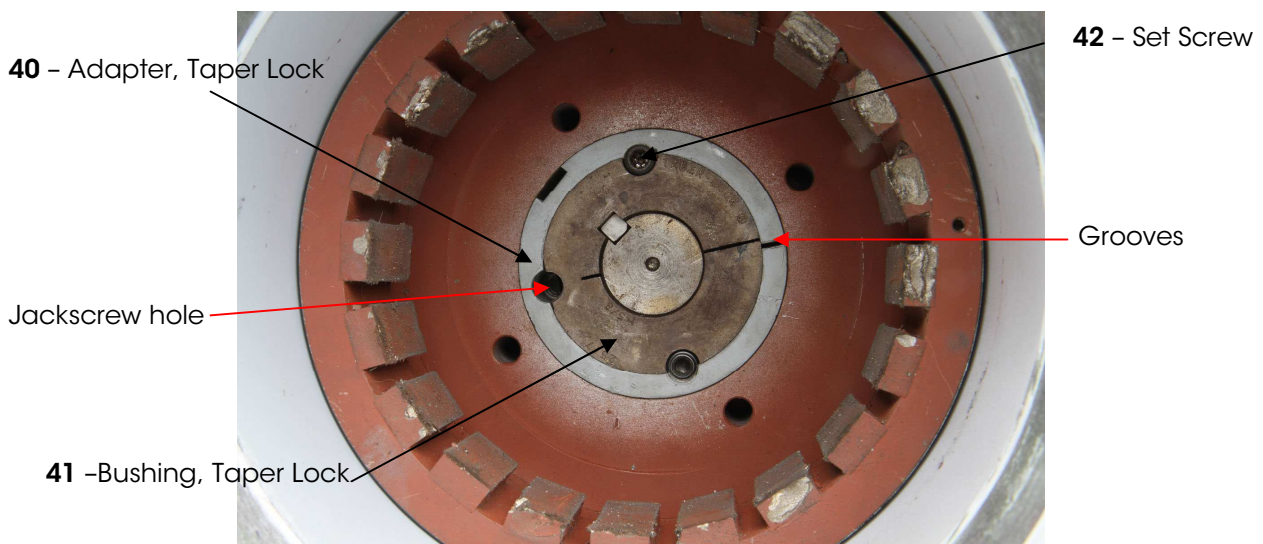
**Step 4.** Install Gasket, casing (56) onto Casing cover (2) and carefully place Casing (1) onto Casing cover. Apply anti-seize and secure with Bolt (5). Do not re-use gasket.

**Step 5.** Install Bracket (45) onto Casing cover with Bolt (48).

### 4.3.7 Outer Magnet Assembly

**Step 1.** Install Adapter, taper lock (40) into Outer Magnet (37). Install Bushing, taper lock (41) into Adapter (40), align grooves and hold in place with two Set Screws (42).

If this assembly is already inside the outer magnet, it may be necessary to remove the two set screws, and use the jackscrew hole to open the Bushing (41) such that it will fit over the motor shaft.



**Step 2.** Install motor key (provided with motor) and slide Outer magnet assembly onto shaft. Tighten two Set Screws (42) to secure assembly onto motor shaft.

**Step 3.** Install Adapter, motor (45) onto motor with Bolt (49).

**Step 4.** Carefully install Bracket (45) onto Adapter (46) with Bolt (48). **Caution** – Magnets will attract each other.

**Step 5.** Double check all bolts and seals are tight. Prime pump with liquid; be sure to allow a few minutes to fill containment can.

**Step 6.** Monitor pump for 15 minutes to ensure proper operation. If excessive noise is heard or performance is not as expected, refer to Appendix 6 for troubleshooting.

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**END OF ASSEMBLY PROCEDURE**

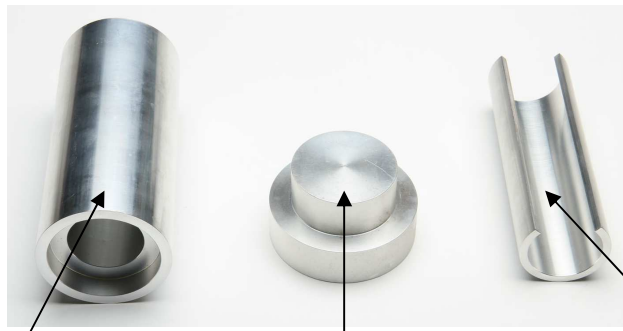
**Appendix 1: Fastener Torque Specifications**

**Maximum Torque Values for 18-8 Stainless Steel Bolts**

Bolt Size	Max Torque Specifications	
	(in-lbs)	(N-m)
1/4-20	79	9
3/8-24	236	27
1/2-13	517	58
5/8-11	1110	125

**Appendix 2: Maintenance Tool List**

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



**5149-070** – Shaft Bearing Tool

**5148-070** – Casing Cover Bearing Tool

**5150-070** – Shaft Tool

Allen Wrench Set, Inch
5/8" Socket & Ratchet
Punch
Hammer
Arbor Press

Appendix 3: Bill of Materials

Endura®				Bill of Materials – Group II, MC				
				Position 3 - Pump Size				
				3x2x8	4x3x8G	3x2x10	4x3x10H	
				1	2	4	5	
Code	Part Description	Ref #	Material	Part #				Qty
<b>Position 1 - Pump Type</b>								
<b>MC</b>	<b>Magnetically Coupled</b>							
	Eyebolt	50	CS/Epoxy	2620-050				2
	Nut, Eyebolt	51	18-8SS	2621-060				2
	Bolt, Bracket/Casing Cover (1/2-13 x 1-1/2 SHCS)	47	18-8SS	2847-060				4
	Bolt, Case Cover / Casing (5/8-11 x 1-1/4 SHCS)	5	18-8SS	5173-060	5173-060	X	X	8
	Bolt, Case Cover / Casing (5/8-11 x 1-1/4 SHCS)	5	18-8SS	X	X	3104-060	3104-060	12
	Bolt, Motor Adapter/Bracket (1/2-13 x 1-1/4 SHCS)	48	18-8SS	3153-060				4
	Set Screw, Spacer/Shaft (1/4-28 x 3/8 SHSS-HD)	22	18-8SS	5089-060				1
	Tolerance Ring, Shaft	20	Alloy-C	5098-020				2
	Adapter, Taper Lock	40	CS	5172-050				1
	Bearing, Thrust	15	SiC	5102-110				2
	Bearing, Radial (Stationary)	17	SiC	5101-110				2
	Bearing, Sleeve (Rotating)	18	SiC	5100-110				2
	Name Plate	-	316SS	2723-010				1
<b>Position 2 -Temperature Range</b>								
<b>N</b>	<b>Normal Temperature (+70 to +350°F)</b>							
<b>Position 3 - Size (See Columns)</b>								
—	See Columns 1,2,4,5							

Code	Part Description	Ref	Material	3x2x8	4x3x8G	3x2x10	4x3x10H	Qty
<b>Position 4 - Wet End, Material of Construction</b>								
<b>S</b>	<b>316 Stainless Steel</b>							
	Impeller, Closed	2	316SS	5070-010	5376-010	5066-010	5078-010	1
	Cover, Casing	3	316SS	5260-010		5263-010		1
	Plug, Casing Cover (1/4" NPT Socket Head)	60	316SS	5085-010				1
	Adapter, Ring (3 in. Inlet)	6	316SS	5262-010	X	X	X	1
	Bolt, Adpt. Ring/Case Cover (1/4-20 x 1-3/4 SHCS)	7	18-8SS	5265-060	X	X	X	3
	Shaft	11	316SS	5140-010				1
	Bolt, Shaft (1/2-13 x 1-1/4 HHCS)	9	316SS	2836-010				2
	Key, Impeller	28	316SS	5163-010				1
	Key, Inner Magnet	27	316SS	5162-010				1
	Drain Plug, 1/2" NPT	4	316SS	2730-010				1
	Pin, Sleeve Bearing	21	316SS	5237-010				4
	Pin, Thrust Bearing	14	316SS	5237-010				2
	Spacer (Sleeve Bearings)	23	316SS	5105-010				1
	Spring, Bearing Preload	24	316SS	5305-010				1
	Washer, Thrust Bearing (Impeller End)	25	316SS	5306-010				1
	Washer, Impeller	8	316SS	5144-010				1
	Holder, Thrust Bearing (Impeller End)	26	316SS	5141-010				1
	Holder, Thrust Bearing (Magnet End)	13	316SS	5142-010				1
	Washer, Inner Magnet	12	316SS	5145-010				1
	Washer, Thrust Bearing (Magnet End)	16	316SS	5302-010				1
<b>Position 5 - Casing Flanges</b>								
<b>2</b>	<b>Casing, 150# RF ANSI</b>	1	316SS	5069-010	5454-010	5244-010	5459-010	1
<b>3</b>	<b>Casing, 300# RF ANSI</b>	1	316SS	5294-010	5496-010	5450-010	5493-010	1
<b>Position 6 - O-Rings/Gaskets</b>								
<b>T</b>	<b>Teflon</b>							
	Gasket, Casing	56	Teflon	5169-210		5048-210		1
	O-ring, Containment Can (2-165)	51	Teflon	5087-210				1
	O-ring, Bearing Retaining (2-237)	19	Teflon	5264-210				2
<b>K</b>	<b>Kalrez 4079</b>							
	Gasket, Casing	56	Kalrez 4079	5169-240		5048-240		1
	O-ring, Containment Can (2-165)	51	Kalrez 4079	5087-240				1
	O-ring, Bearing Retaining (2-237)	19	Kalrez 4079	5264-240				2

Code	Part Description	Ref	Material	3x2x8	4x3x8G	3x2x10	4x3x10H	Qty
<b>Position 7 - Containment Can, Material of Construction</b>								
<b>S</b>	<b>316 Stainless Steel</b>							
	Containment Can	35	316SS			5106-010		1
	Bolt, Metallic Can (3/8-24 x 1-1/4 SHCS)	38	18-8SS			3230-060		8
<b>H</b>	<b>Hastelloy C</b>							
	Containment Can	35	Alloy-C/316SS			5106-100		1
	Bolt, Metallic Can (3/8-24 x 1-1/4 SHCS)	38	18-8SS			3230-060		8
<b>Z</b>	<b>Zirconia (TZ)</b>							
	Containment Can	35	Zirconia (TZ)			5014-140		1
	Flange, Ceramic Containment Can	34	304SS			5015-013		1
	O-ring, Flange Bumper, Ceramic Can	33	Teflon			2883-210		1
	Bolt, Ceramic Can (3/8-24 x 1-1/2 SHCS)	38	18-8SS			5090-060		8
<b>Position 8 - Magnetic Coupling</b>								
<b>1</b>	<b>NdFeB 2" - Metal Can Only</b>							
	Inner Magnet, 2"	36	316SS/NdFeB			5230-370		1
	Outer Magnet, Metal Can, 2"	37	CS/NdFeB			5111-410		1
<b>2</b>	<b>NdFeB 3" - Metal Can Only</b>							
	Inner Magnet, 3"	36	316SS/NdFeB			5110-370		1
	Outer Magnet, Metal Can, 3"	37	CS/NdFeB			5113-410		1
<b>3</b>	<b>SmCo 2" - Metal Can Only</b>							
	Inner Magnet, 2"	36	316SS/SmCo			5230-380		1
	Outer Magnet, Metal Can, 2"	37	CS/SmCo			5111-420		1
<b>4</b>	<b>SmCo 3" - Metal Can Only</b>							
	Inner Magnet, 3"	36	316SS/SmCo			5110-380		1
	Outer Magnet, Metal Can, 3"	37	CS/SmCo			5113-420		1
<b>5</b>	<b>NdFeB 2" - Ceramic Can Only</b>							
	Inner Magnet, 2"	36	316SS/NdFeB			5230-370		1
	Outer Magnet, Ceramic Can, 2"	37	CS/NdFeB			5112-410		1
<b>6</b>	<b>NdFeB 3" - Ceramic Can Only</b>							
	Inner Magnet, 3"	36	316SS/NdFeB			5110-370		1
	Outer Magnet, Ceramic Can, 3"	37	CS/NdFeB			5114-410		1
<b>7</b>	<b>SmCo 2" - Ceramic Can Only</b>							
	Inner Magnet, 2"	36	316SS/SmCo			5230-380		1
	Outer Magnet, Ceramic Can, 2"	37	CS/SmCo			5112-420		1
<b>8</b>	<b>SmCo 3" - Ceramic Can Only</b>							
	Inner Magnet, 3"	7	316SS/SmCo			5110-380		1
	Outer Magnet, Ceramic Can, 3"	16	CS/SmCo			5114-420		1

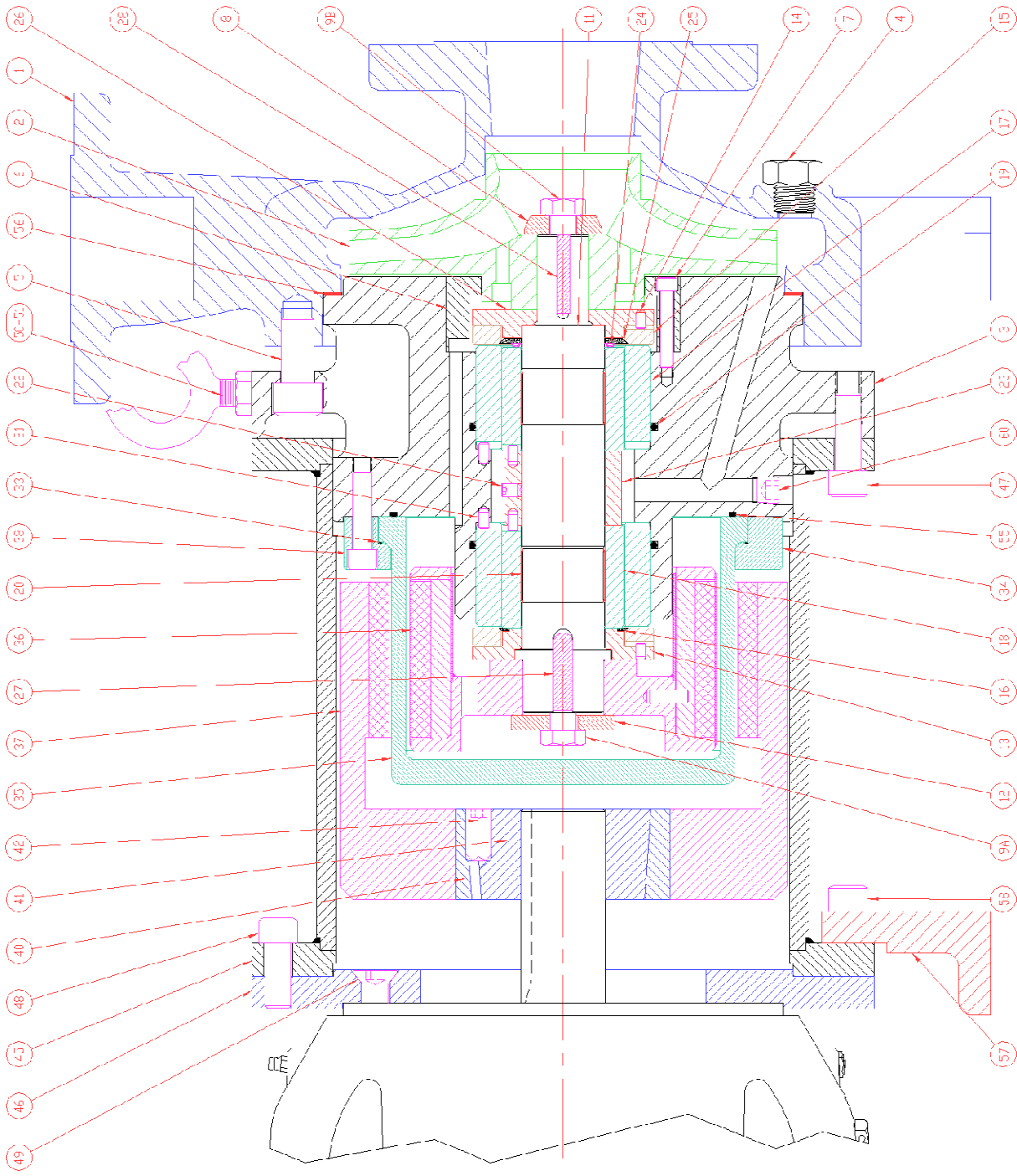
Code	Part Description	Ref	Material	3x2x8	4x3x8G	3x2x10	4x3x10H	Qty
<b>Position 9 - Mounting</b>								
<b>0</b>	<b>Close Coupled</b> (Select Motor Code in Position 10)							
<b>1</b>	<b>Power Frame</b> (Leave Position 10 blank)							
	Power Frame Assembly - Group 2	46	DI/Epoxy/Misc		5194-190			1
	Bracket	45	CS/Epoxy		5035-050			1
	Bushing, Taper Lock 1-5/8	41	Carbon Steel		5171-050			1
<b>Position 10 - Motor Frame Size (If Close Coupled Mounted)</b>								
<b>C</b>	<b>182/184 TC Motor</b>							
	Bracket	45	CS/Epoxy		5035-050			1
	Motor Adapter, 182-256TC	46	CS/Epoxy		5195-050			1
	Bushing, Taper Lock, 1-1/8 Shaft	41	Carbon Steel		5246-050			1
	Bolt, Adapter to Motor (1/2-13 x 1-1/2 FH-SHCS)	49	Carbon Steel		3415-050			4
<b>D</b>	<b>213/215TC Motor</b>							
	Bracket	45	CS/Epoxy		5196-050			1
	Motor Adapter, 182-256TC	46	CS/Epoxy		5195-050			1
	Bushing, Taper Lock, 1-3/8 Shaft	41	Carbon Steel		5210-050			1
	Bolt, Adapter to Motor (1/2-13 x 1-1/2 FH-SHCS)	49	Carbon Steel		3415-050			4
<b>E</b>	<b>254/256 TC Motor</b>							
	Bracket	45	CS/Epoxy		5197-050			1
	Motor Adapter, 182-256TC	46	CS/Epoxy		5195-050			1
	Bushing, Taper Lock, 1-5/8 Shaft	41	Carbon Steel		5171-050			1
	Bolt, Adapter to Motor (1/2-13 x 1-1/2 FH-SHCS)	49	Carbon Steel		3415-050			4
<b>F</b>	<b>284/286TC Motor</b>							
	Bracket	45	CS/Epoxy		5198-050			1
	Motor Adapter, NEMA 284/286 TC/TSC	46	CS/Epoxy		5203-050			1
	Bushing 1-7/8 Shaft	41	Carbon Steel		5228-050			1
	Bolt, Adapter to Motor (1/2-13 x 1-1/4 SHCS)	49	18-8SS		3153-060			4
<b>G</b>	<b>324/326TC Motor</b>							
	Bracket	45	CS/Epoxy		5199-050			1
	Motor Adapter, NEMA 324/326 TC	46	CS/Epoxy		5234-050			1
	Bushing - 2-1/8 Shaft	41	Carbon Steel		5467-050			1
	Bolt, Adapter to Motor (5/8-11 x 2 SHCS)	49	18-8SS		5337-060			4

Code	Part Description	Ref Item #	Material	3x2x8	4x3x8G	3x2x10	4x3x10H	Qty
<b>Position 10 Continued - Motor Frame Size (If Close Coupled Mounted)</b>								
<b>H</b>	<b>364/365TC Motor</b>							
	Bracket	45	CS/Epoxy			5200-050		1
	Motor Adapter, NEMA 324/326 TC	46	CS/Epoxy			5234-050		1
	Bushing - 2-3/8 Shaft	41	Carbon Steel			CF		1
	Bolt, Adapter to Motor (5/8-11 x 2 SHCS)	49	18-8SS			5337-060		4
<b>J</b>	<b>284/286TSC Motor</b>							
	Bracket	45	CS/Epoxy			5035-050		1
	Motor Adapter, NEMA 284/286 TC/TSC	46	CS/Epoxy			5203-050		1
	Bushing - 1-5/8 Shaft	41	Carbon Steel			5171-050		1
	Bolt, Adapter to Motor (5/8-11 x 2 SHCS)	49	18-8SS			5337-060		4
<b>K</b>	<b>324/326TSC Motor</b>							
	Bracket	45	CS/Epoxy			5199-050		1
	Motor Adapter, NEMA 324/364 TSC	46	CS/Epoxy			5235-050		1
	Bushing - 1-7/8 Shaft	41	Carbon Steel			5228-050		1
	Bolt, Adapter to Motor (5/8-11 x 2 SHCS)	49	18-8SS			5337-060		4
<b>L</b>	<b>364/365TSC Motor</b>							
	Bracket	45	CS/Epoxy			5199-050		1
	Motor Adapter, NEMA 324/364 TSC	46	CS/Epoxy			5235-050		1
	Bushing - 1-7/8 Shaft	41	Carbon Steel			5228-050		1
	Bolt, Adapter to Motor (5/8-11 x 2 SHCS)	49	18-8SS			5337-060		4
<b>U</b>	<b>132 IEC Motor</b>							
	Bracket	45	CS/Epoxy			5035-050		1
	Motor Adapter, 132 IEC	46	CS/Epoxy			5536-050		1
	Bushing, 38mm Shaft	41	Carbon Steel			5526-050		1
	Bolt, Adapter to Motor (1/2-13 x 2-1/4 SHCS)	49	Carbon Steel			2969-050		4
	Nut, Adapter to Motor (1/2-13 Hex)	-	18-8SS			2621-060		4
	Lock Washer, Adapter to Motor (1/2)	-	18-8SS			641107		4

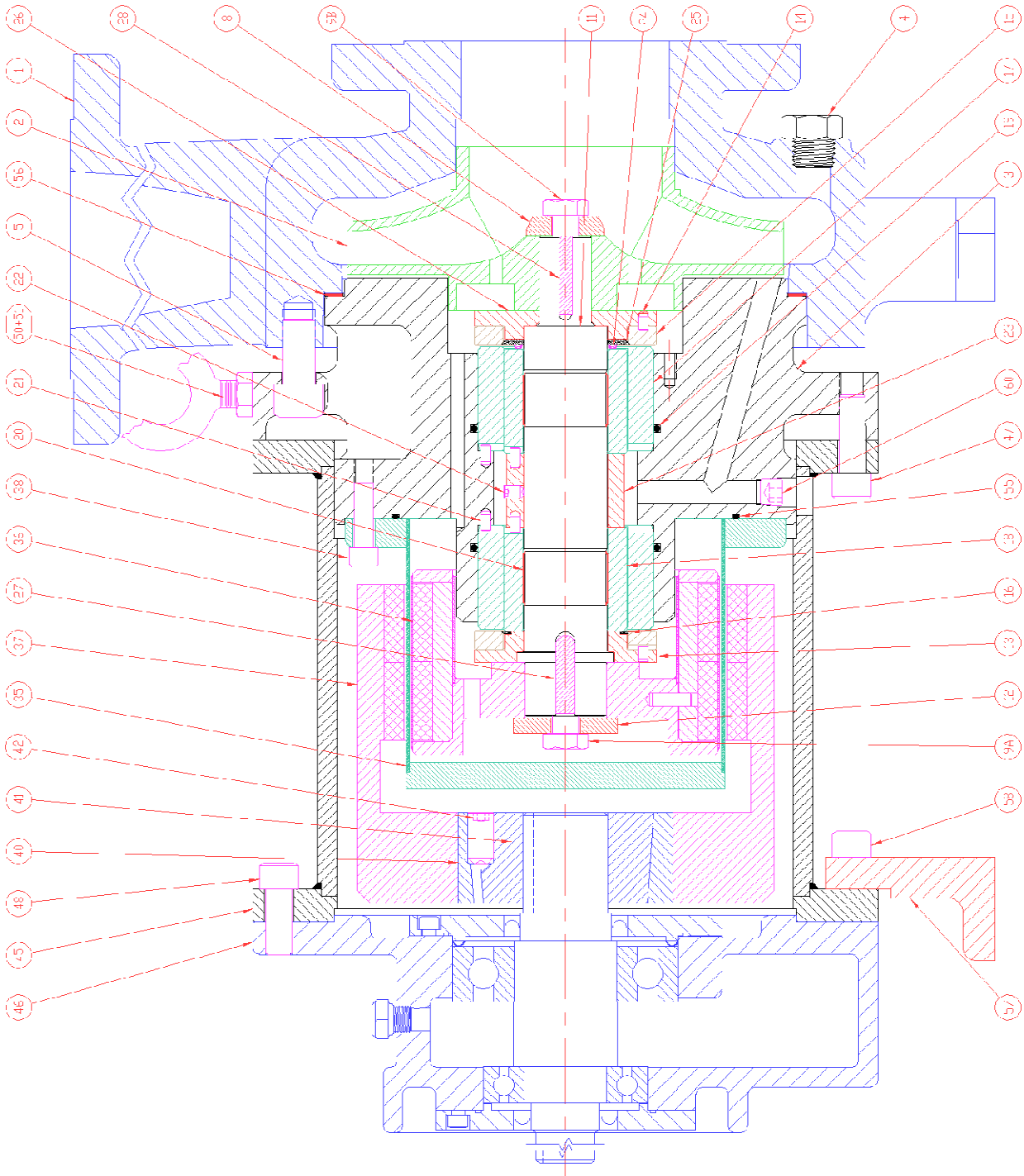


Code	Part Description	Ref Item #	Material	3x2x8	4x3x8G	3x2x10	4x3x10H	Qty
<b>Position 10 Continued - Motor Frame Size (If Close Coupled Mounted)</b>								
<b>V</b>	<b>160 IEC Motor</b>							
	Bracket	45	CS/Epoxy		5197-050			1
	Motor Adapter, 160 IEC	46	CS/Epoxy		5533-050			1
	Bushing, 42mm Shaft	41	Carbon Steel		5359-050			1
	Bolt, Adapter to Motor (5/8-11 x 2-1/2 SHCS)	49	18-8SS		CF			4
	Nut, Adapter to Motor (5/8-11 Hex)	-	18-8SS		CF			4
	Lock Washer, Adapter to Motor (5/8)	-	18-8SS		CF			4
<b>W</b>	<b>180 IEC Motor</b>							
	Bracket	45	CS/Epoxy		5197-050			1
	Motor Adapter, 180 IEC	46	CS/Epoxy		5533-050			1
	Bushing, 48mm Shaft	41	Carbon Steel		5532-050			1
	Bolt, Adapter to Motor (5/8-11 x 2-1/2 SHCS)	49	18-8SS		CF			4
	Nut, Adapter to Motor (5/8-11 Hex)	-	18-8SS		CF			4
	Lock Washer, Adapter to Motor (5/8)	-	18-8SS		CF			4
<b>X</b>	<b>200 IEC Motor</b>							
	Bracket	45	CS/Epoxy		5197-050			1
	Motor Adapter, 200 IEC	46	CS/Epoxy		5537-050			1
	Bushing, 55mm Shaft	41	Carbon Steel		5570-050			1
	Bolt, Adapter to Motor (5/8-11 x 2-3/4 SHCS)	49	18-8SS		CF			4
	Nut, Adapter to Motor (5/8-11 Hex)	-	18-8SS		CF			4
	Lock Washer, Adapter to Motor (5/8)	-	18-8SS		CF			4
<b>Add-Ons</b>								
-	Guard, Coupling (Motor/Power Frame)	-	316SS		5345-010			1
-	Guard, Mounting Bracket	-	304SS		5386-013			1
-	Base Plate #254E (54" x 18" x 4" Channel)	-	CS/Epoxy		3527-050			1
-	Base Plate #264 (64" x 18" x 4" Channel)	-	CS/Epoxy		3528-050			1
-	Motor Riser	-	CS/Epoxy		CF			1
-	Pump Riser	-	CS/Epoxy		CF			1
-	Power Frame Riser	-	CS/Epoxy		CF			1
-	EARS Power Sensor	-	Misc		3239-000			1

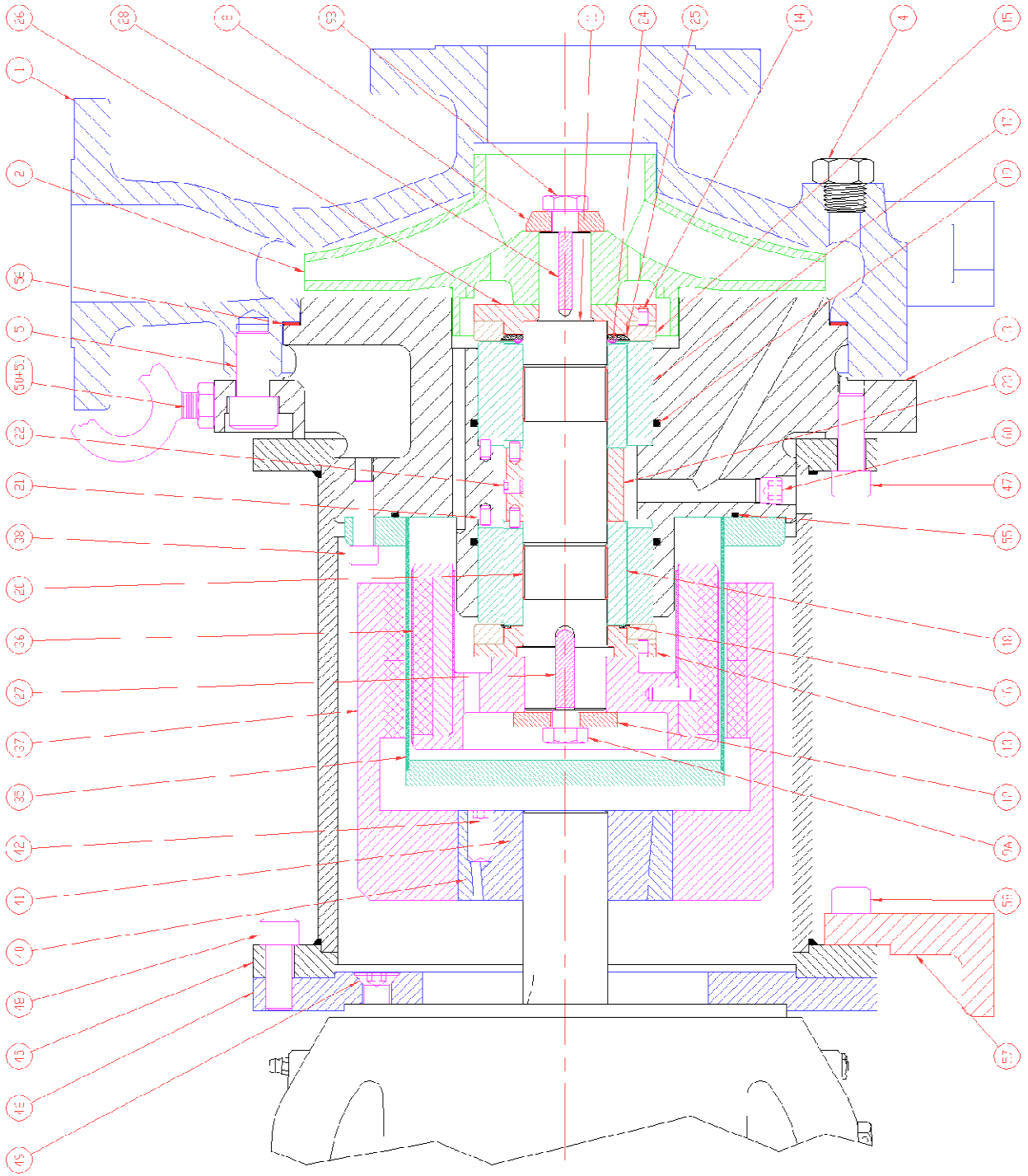
Appendix 4: Reference Drawings  
3x2x8 w/ Ceramic Containment Can



Appendix 4: Reference Drawings (Continued)  
4x3x8 w/ Metal Containment Can

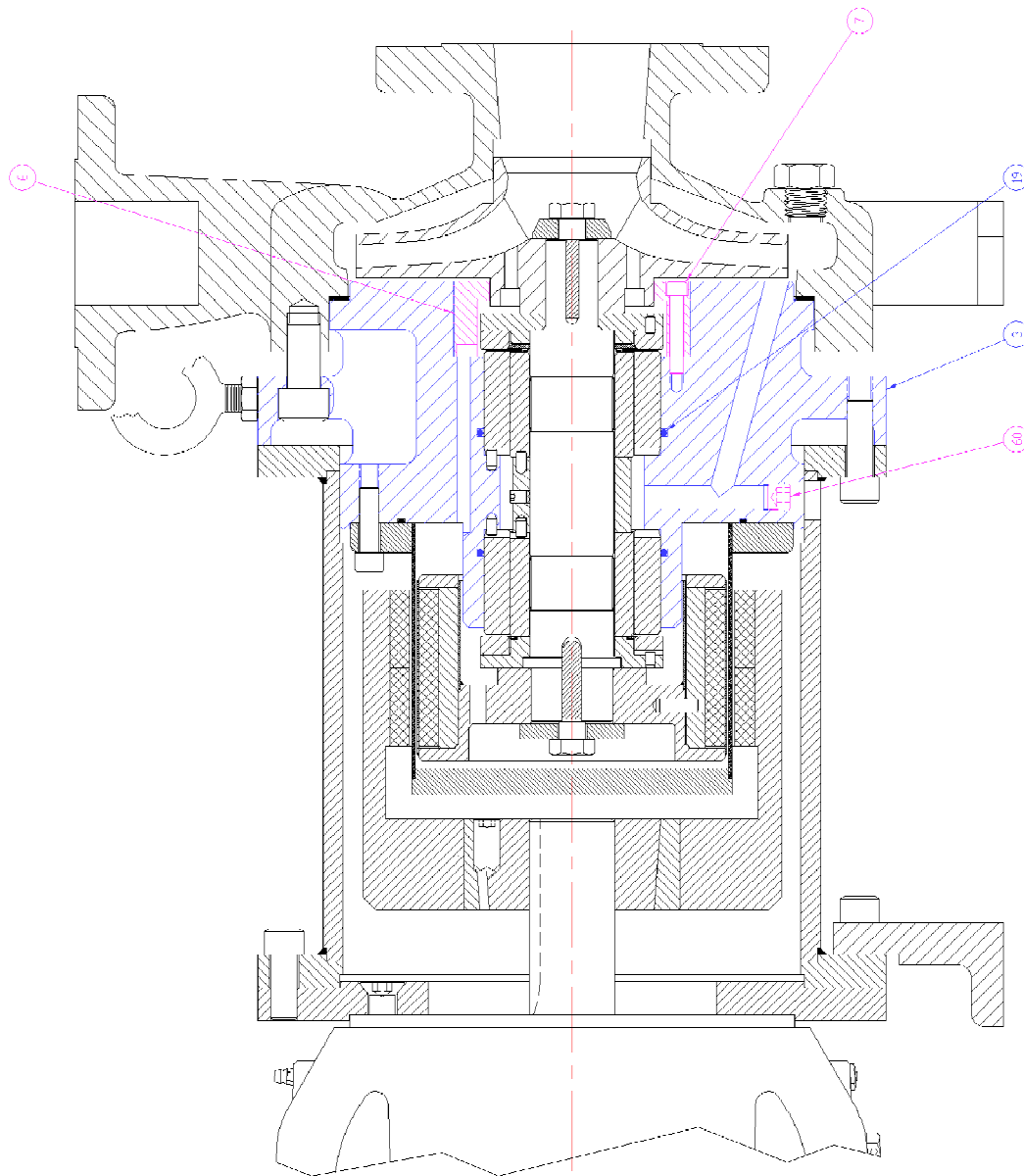


Appendix 4: Reference Drawings (Continued)  
3x2x10 or 4x3x10 w/ Metal Containment Can



Appendix 5: Comparison Drawings – New Style

NOTIFIED OR REPLACED PARTS LIST (BLUE)	
JTBH 800C	PART NUMBER DESCRIPTION
3	SECC- 201AS 0041-3 x 6 x 8 A17 4 x 3 x 8
19	SECC- 201AS 0041-3 x 6 x 8 A17 4 x 3 x 10
2	SECC- 201AS 1030P-2E1000-02527
NEW - 248 3 LIS - (69-EN17)	
JTBH 800C	PART NUMBER DESCRIPTION
3	SECC- 201AS 0041-3 x 6 x 8 A17 4 x 3 x 8
19	SECC- 201AS 0041-3 x 6 x 8 A17 4 x 3 x 10
2	SECC- 201AS 1030P-2E1000-02527
* FOR 2 x 2 x 8 PWT	





**Appendix 5: Comparison of Part Numbers  
New vs Legacy Design**

Endura®	Group II MC Comparison								
	Pump Size				Pump Size				
	3x2x8	4x3x8G	3x2x10	4x3x10H	3x2x8	4x3x8G	3x2x10	4x3x10H	
	1	2	4	5	1	2	3	4	
Part Description	Part # - New				Part # - Legacy				Qty - Both
Tolerance Ring, Bearing Housing	Legacy Only				5245-020				2
Bolt, Lock Nut, Bearing Housing (5/16-24 x 1 SHCS)	Legacy Only				2714-060				1
Cover, Casing	5260-010	5263-010			5138-010	5139-010	5137-010	5206-010	1
Bearing Housing, Standard	Legacy Only				5207-010				1
Pin, Bearing Housing	Legacy Only				5216-010				1
Pin, Sleeve Bearing	5237-010				2615-010				4
Lock Nut, Bearing Housing	Legacy Only				5034-010				1
Plug, Casing Cover (1/4" NPT Socket Head)	5085-010				New Only				1
Adapter, Ring (3 in. Inlet)	5262-010	X	X	X	New Only				1
Bolt, Adpt. Ring/Case Cover (1/4-20 x 1-3/4 SHCS)	5264-060	X	X	X	New Only				3
Tubing, 3/8 Dia. (Bearing Flush)	Legacy Only				5535-010				1
Nipple 1/4 NPT x 3" (Bearing Flush)	Legacy Only				5317-010				1
Straight Fitting, Female (Bearing Flush)	Legacy Only				5310-010				1
Male Elbow (Bearing Flush)	Legacy Only				5311-010				1
O-ring, Bearing Retaining (2-237)	5264-210				New Only				2

**OVERVIEW**

In July 2011, a design change was made to simplify the number of components and assembly of the Endura MC style pumps.

**Group II Changes**

The bearing housing tolerance rings (5245-020) were replaced by O-rings (5264-210). Similar to tolerance rings, the O-rings should be replaced when performing maintenance and changing bearings.

The most prominent change is to the Group II design, where the two-piece bearing housing was replaced with a single -piece construction.

The external bearing flush piping was replaced by an internal flush built into the housing.

Finally, to accommodate the different impellers, an adapter ring is used with the new casing for the 3x2x8 inch size only.

**Parts, Rebuilds & New Pumps**

For both Group I and Group II, when rebuilding an existing pump, ordered before July 2011, the most common wear part is the bearing housing tolerance rings. This component is still available as a repair part. If other parts are required, contact the factory.

When rebuilding an existing pump ordered after July 2011, order parts based on the current bill of materials. When buying a new pump, a new module or replacing the casing cover, the new casing cover design and related parts will be used.

**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.
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**

<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
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 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.
	Mechanical seal worn or damaged	Disassemble and replace mechanical seal. Prime pump and avoid dry running.
	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.