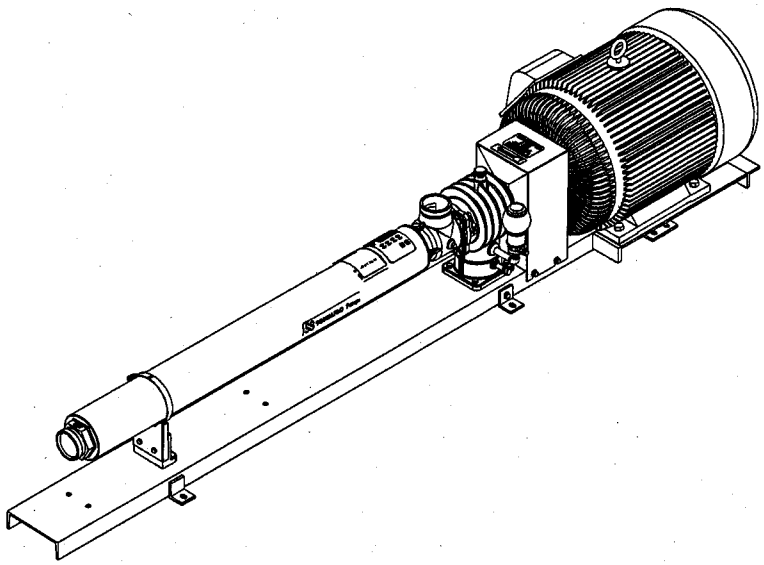
# OSMONICS
# TONKAFLO® PUMPS
# SS SERIES

## INSTALLATION, OPERATION, AND MAINTENANCE MANUAL



For SS5500, SS8500, SS12500, SS23000, and SS24000 Series High-Pressure Tonkaflo Centrifugal Pumps with E-Bearing Frames

**GE Infrastructure**
**Water & Process Technologies**

**INSTALLATION, OPERATION,**
**AND MAINTENANCE MANUAL**

**FOR SS5500, SS8500, SS12500, AND**
**SS24000 HIGH-PRESSURE TONKAFLO**
**CENTRIFUGAL PUMPS WITH**
**TYPE E-BEARING FRAME**

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## 1.0 INTRODUCTION

This manual contains information important to the installation, operation, and maintenance of your Tonkaflo® high-pressure multi-stage centrifugal pump. The Tonkaflo pump has been designed for reliable service in many types of pumping applications. Proper installation and normal maintenance will help insure extended pump life and prevent costly downtime.

Before installing and operating your Tonkaflo pump, read these instructions carefully and keep the manual handy for future reference. This manual is intended for general maintenance only.

Further information may be obtained by contacting your local Tonkaflo pump distributor or Osmonics. Contact Osmonics at:

GE Infrastructure
Water & Process Technologies
5951 Clearwater Drive
Minnetonka, MN
55343-8995
USA

Phone: 952 - 933 - 2277
Fax: 952 - 933 - 0141
Toll Free: (800) 848 - 1750

This manual is not intended for repair or overhaul of the Tonkaflo pump liquid end.

Only the factory or those who have successfully completed the Factory Service School and have been certified are authorized to repair, service, or overhaul Tonkaflo pump liquid ends.

Your new Tonkaflo multi-stage centrifugal pump is designed for quiet, smooth running, and highly efficient operation. The seven series of Tonkaflo pumps range in capacities from 2 - 300 gpm (0.45 - 68.1 $m^3/h$) with single unit pressures up to 650 psig (44.8 barg). The materials of construction make Tonkaflo pumps suitable for many chemical and pure water applications.

The Tonkaflo pump's unique modular design allows the user to choose the number of stages that most closely match the desired performance, and thereby achieve the highest pumping efficiency. Unlike many other pump manufacturers, GE will produce pumps to fit your particular applications should a standard model pump not suit your requirements.

**NOTE:** This manual, along with all other manuals, is available at www.gewater.com.

## 2.0 TONKAFLO SPECIFICATIONS

The Tonkaflo pumps covered in this instruction manual are the higher capacity SS5500, SS8500, SS12500, SS23000, and SS24000 Series pumps. These five series of pumps cover a flow range of 20 - 300 gpm (4.5 - 68 $m^3$/h) with single-unit pressures up to 650 psig (44.8 barg). The capacity and discharge pressure can be increased by operating pumps in parallel or series, respectively. There is no maximum limit on capacity when operating Tonkaflo pumps in parallel. When operating pumps in series, a maximum discharge pressure of 1000 psig (69 barg) may be achieved with optional high pressure construction on the downstream pump. With inlet pressures greater than 200 psig (13.8 barg) and less than 400 psig (27.6 barg), optional high-pressure mechanical seals should be used.

### 2.1 Capacities

**Table 2.1**
**Tonkaflo Pump**
**Capacities**

| SS Series | 3500 rpm - 60 Hz Minimum - Maximum gpm ($m^3$/h) | Maximum Number of Stages 60 Hz | 2900 rpm - 50 Hz Minimum - Maximum gpm ($m^3$/h) | Maximum Number of Stages 50 Hz | Maximum Efficiency |
|---|---|---|---|---|---|
| **5500** | 20 - 75 (4.5 - 17.0) | 24 | 15 - 65 (3.4 - 14.8) | 33 | 60% |
| **8500** | 30 - 100 (6.8 - 522.7) | 27 | 20 - 90 (4.5 - 20.4) | 33 | 64% |
| **12500** | 40 - 190 (9.1 - 43.1) | 22 | 35 - 160 (7.9 - 36.3) | 27 | 62% |
| **23000** | 80 - 300 (18.2 - 68.1) | 11 | 65 - 25 (14.8 - 56.8) | 16 | 61% |
| **24000** | 80 - 300 (18.2 - 68.1) | 16 | 65 - 250 (14.8 - 56.8) | 18 | 61% |

**NOTE:** There must be adequate flow through the pump to prevent excessive heat build-up at all times.

2.2 Maximum Developed Boost Pressure for Standard Model Pumps (3500 rpm)

**Table 2.2**
**Tonkaflo Standard Model**
**Pump Boost Pressure**

| SS Series | Centrifugal Stages | Standard |
|---|---|---|
| **5500** | 24 | Up to 650 psig (44.8 barg) |
| **8500** | 27 | Up to 640 psig (44.1 barg) |
| **12500** | 22 | Up to 640 psig (44.1 barg) |
| **23000** | 11 | Up to 380 psig (26.2 barg) |
| **24000** | 16 | Up to 530 psig (36.5 barg) |

2.3 Maximum Recommended Operating Temperature:

The maximum recommended operating temperature range is 125°F (52°C). The maximum operating temperature is dependent upon the operating pressure. For high temperature applications, consult your local Tonkaflo distributor or the factory for available materials of construction.

Pumps have the maximum recommended temperature stated on the label on the pump case. The temperature stated is for the design flow and pressure.

2.4 Standard Materials of Construction:

SS: Wetted castings and pump shaft are 316 Stainless Steel (SS). The pump casing is 316SS. Impellers and diffusers are Noryl except SS23000 and SS24000-Series diffusers which are 316SS. The mechanical seal has a carbon rotating face and a ceramic stationary face. The secondary sealing element of the mechanical seal is Buna-N. The standard O-rings and diffuser bearings are Buna-N.

2.5 Special Materials of Construction

Optional ethylene propylene (EPDM), Viton*, and Teflon* elastomers are available, contact the factory.

2.6 Pump Nomenclature

| **Model SS5518E** | | | **Model SS5527E-50Hz** | | |
|---|---|---|---|---|---|
| SS | = | Materials of Construction | SS | = | Materials of Construction |
| 55 | = | Series 5500 | 55 | = | Series 5500 |
| 18 | = | Number of Stages | 27 | = | Number of Stages |
| E | = | Bearing Frame | E | = | Bearing Frame |
| | | | 50Hz | = | 50 Hertz Operation |

2.7 Special Liquids

For liquids other than water, aqueous solutions at elevated temperatures, or corrosive solutes, consult the factory for compatibility.

* Viton and Teflon are trademarks of E.I. Dupont de Nemours and Company, Inc.

## 3.0 PUMP INSTALLATION

### 3.1 Check Upon Arrival

Your pump was inspected at the factory prior to shipment to assure meeting the requirements of your order. It is suggested the pump be checked upon receipt for possible damage due to shipping. Any damage should be reported immediately to the carrier.

### 3.2 Location

Install the pump as close as possible to the source of the liquid to be pumped. High-pressure process pumps may need to be located several feet (meters) away or remote from the liquid source in which case a transfer pump would be used near the liquid source to transfer liquid to the high-pressure pump. It is ideal for the pump to be fed from a reservoir above the pump or from a supply line under positive pressure.

### 3.3 Foundation

The foundation for the bedplate, motor and pump must be sufficiently rigid and substantial to prevent any significant vibration of the pump or deflection of the motor and pump shafts when operating the pump.

The recommended foundation is of reinforced concrete or a heavy steel skid. When using concrete, it should support the bedplate at all points. When using a steel skid, the motor and coupling must be re-aligned after any movement whatsoever of the skid.

The pump mounting is to be horizontal and the pump leveled within 1/16 - inch/foot (1.59 mm/meter), so the oil level at both bearing frame bearings is the same. The pump case is the best reference for leveling.

3.4 Bedplate Installation

**NOTE:** The bedplate must be level and securely mounted for proper pump operation.

**THIS BEDPLATE MUST BE LEVEL AND SECURELY MOUNTED FOR PROPER PUMP OPERATION.**

**1. SECURE (4) FIXED FEET; SHIM ONE FOOT AS REQUIRED TO PREVENT TWISTING BEDPLATE (Figure 1a).**

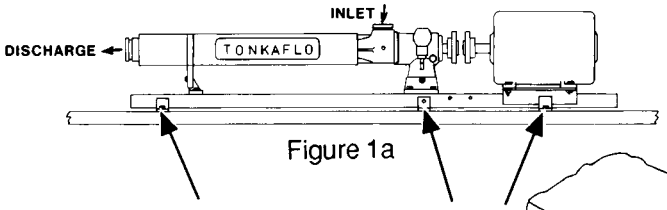



Figure 1a

**2. LOOSEN 3/8" BOLTS (2) ON ADJUSTABLE FEET (Figure 1b).**

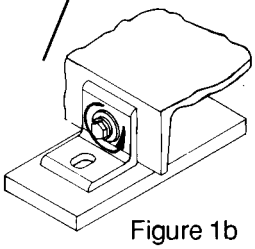
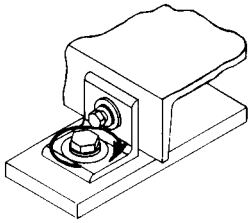


Figure 1b

**3. INSTALL AND TIGHTEN 1/2 " BOLTS (2) (Figure 1c).**



**4. TIGHTEN 3/8" BOLTS (2) (Figure 1d).**

Figure 1c

**5. ALIGN COUPLING FLANGES.**

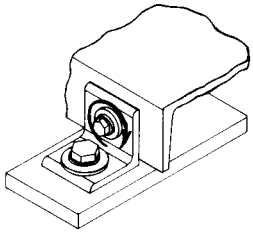


Figure 1d

**Figure 3.1**
**Bedplate**
**Installation**

## 3.5 Motor, Pump, and Coupling Alignment (Applicable for Direct Drive)

Accurate alignment of the motor, pump and coupling is a "MUST."

The final alignment of the motor, pump and coupling is to be done after the bedplate is rigidly mounted (Section 3.3, Foundation), with the unit in its final operating position. Shipment, as well as handling in the field, may have changed the alignment, and it is essential that the alignment be checked before operating the pump. To check alignment:

Shims are placed under the motor mounting pads to facilitate adjustment. Use a straight edge, feeler gauges, and a 1/2- to 1-inch taper gauge (or telescope gauge and micrometer) to perform the steps shown in Figure 3.2 [Coupling Alignment (2a, 2b, 2c, and 2d)].

If the pump has been supplied complete with motor, pump, coupling and coupling guard, remove the coupling guard. Loosen the coupling flange on the motor shaft and remove the coupling sleeve.

If the pump is not supplied as a complete unit, slide one coupling flange onto the pump shaft with a snug-fitting key. With the flange and key flush with the shaft end, tighten the set screws.

Slide the coupling flange onto the motor shaft with shaft key and position the motor on the bedplate.

Measure horizontal and vertical alignment (Figure 3.2, 2a & 2b) using a straight edge and feeler gauges. Align the coupling to the accuracy noted in Figure 3.2 (2a & 2b) using the shims provided and placing them under the motor mounting feet as needed. Measure angular alignment of the flanges using a 1/2- to 1-inch (1.27 - 2.54 cm) taper gauge or telescope gauge and micrometer. Taper gauge as shown on Figure 3.2 (2c & 2d). Align the coupling to the accuracy noted in Figure 3.2 (2c & 2d).

For best coupling life, keep the misalignment values as near to zero as possible.

Insert the wire ring and two-piece coupling sleeve between the two coupling flanges. Slide the wire ring into the groove on the sleeve halves and slide the flange along the motor shaft to fully seat the sleeve between the two flanges. Adjust the gap between the flanges to the values shown in Figure 3.2 within ±1.6 - 1.0 - inch (±1.5- 0 mm).

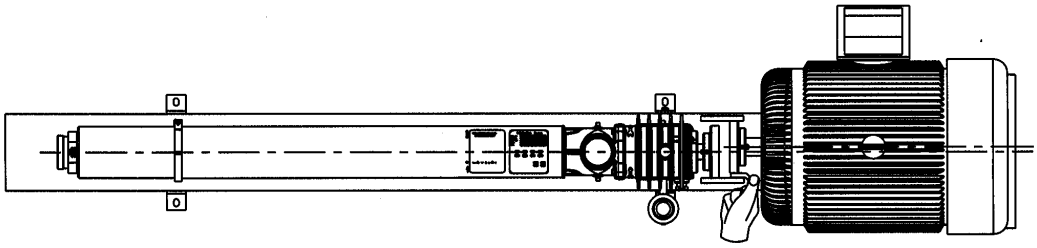


Figure 2a - Measure horizontal parallel alignment. Coupling must be aligned within 0.010 in. (0.25 mm).

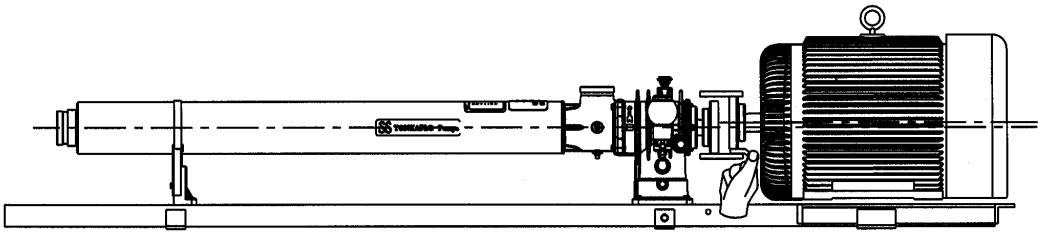


Figure 2b - Measure vertical parallel alignment. Coupling must be aligned within 0.010 in. (0.25 mm).

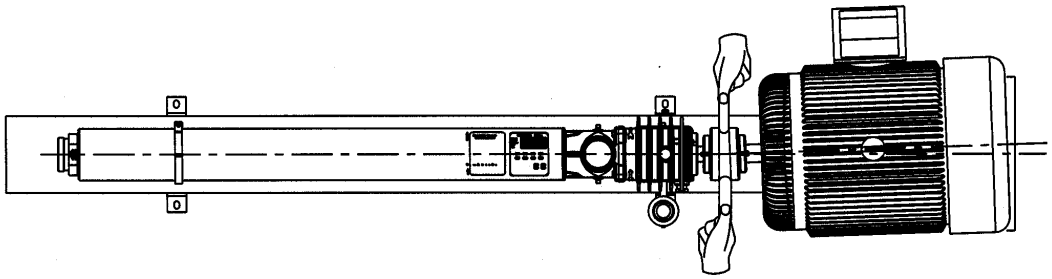


Figure 2c - Measure horizontal angular alignment. Coupling must be parallel within 0.020 in. (0.5 mm).

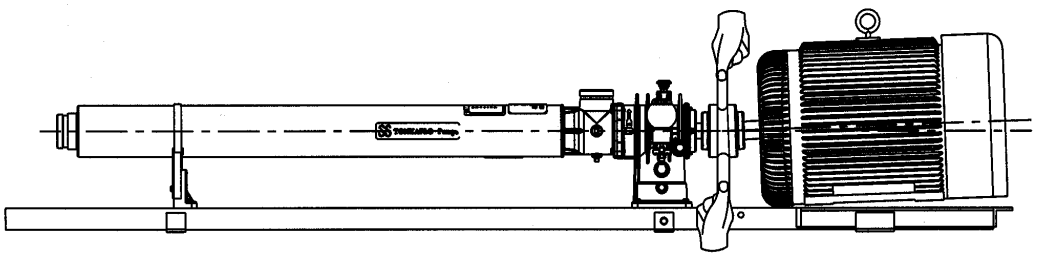
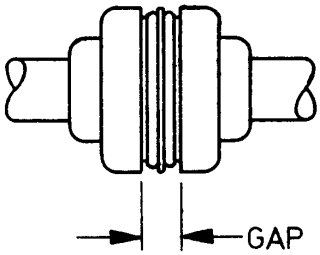


Figure 2c - Measure vertical angular alignment. Coupling must be parallel within 0.020 in. (0.5 mm).

**Figure 3.2**
**Coupling Alignment**

3.6 Coupling Guard

Coupling guards are available for all Tonkaflo pumps. GE recommends a coupling guard. Check your plant safety requirements.




| Coupling Size | Gap inch | Gap mm |
|---|---|---|
| 6 | 7/8 | 22.2 |
| 7 | 1 | 25.4 |
| 8 | 1-1/8 | 28.6 |
| 9 | 1-7/16 | 36.5 |

**Figure 3.3**
**Gap Between Flanges**

3.7 Piping

The pump inlet housing has been designed for either upright or left or right horizontal positioning. For left or right position, remove the 4 bolts holding the suction (inlet) housing to the bearing frame. Rotate the suction housing 90° and replace the 4 bolts. For left or right position, a pipe plug can be removed to vent off any air in the top of the pump inlet housing should "venting" be required for pump priming and start-up for your installation.

Suction (pump inlet) piping should be of ample size, installed in direct runs, and have a minimum of bends to minimize pressure loss and to help ensure sufficient suction pressure. When possible, keep the suction pipe short.

The suction (inlet) pipe size immediately ahead of the pump inlet should be sufficiently sized so that the pressure available at the pump suction (inlet) exceeds the Net Positive Suction Head (NPSH) required by the pump. Generally, the suction (inlet) piping should be 4-inches (10.2 cm) for flows greater than 170 gpm (38.6 $m^3$/h), 3-inches (7.6 cm) for 100 gpm - 170 gpm (22.7 - 38.6 $m^3$/h), 2-1/2 inches (6.4 cm) for 60 gpm - 100 gpm (13.6 - 22.7 $m^3$/h), and 2-inches (5.1 cm) or greater for 60 gpm (13.6 $m^3$/h) or less (see frictional loss and pressure loss discussion below).

The recommended pipe size for most applications should result in frictional line loss of 3 psig per 100 feet (0.21 barg per 30.5 m) or less for suction lines and 10 psig per 100 feet (0.69 bar per 30.5 m) or less for discharge lines. A larger pipe size will reduce the frictional line loss.

The pump inlet piping should be designed to avoid areas where air may be trapped and accumulated. Keep the suction pipe free of high points and thus air pockets, which tend to disrupt pump priming and start-up. Suction pipe size changes just ahead of the pump should be tapered. Reducers should be eccentric to avoid air pockets.

The discharge piping should be sized to properly handle the maximum flow and pressure developed by the pump.

When the pump operates with a suction lift, the suction pipe should slope upward to the pump from the source of supply (Figure 3.4, Suction Lift Piping). Provision must be made for priming the pump. To maintain pump prime, a foot valve can be used with an opening at least as large as the inlet piping. An alternate method would be to use a shutoff valve on the discharge line and a vacuum pump to draw air out of the pump and suction line.

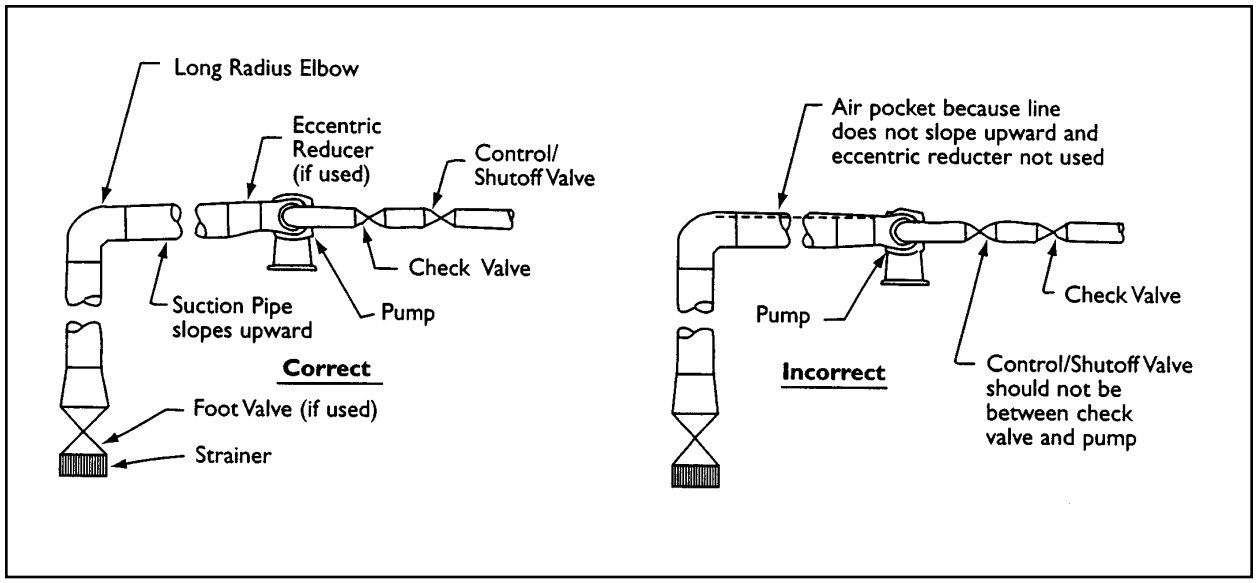



**Figure 3.4**
**Suction Lift Piping**

When pumping liquid from a tank, the suction line must be submerged enough so air is not drawn into the suction line from a vortex. Increasing the size of the inlet pipe to reduce the velocity will help to prevent the vortex from forming.

Hot liquids within the temperature range of the pump must have sufficient positive head to prevent vaporization at the impeller inlet. Consult the factory for NPSH requirements of the pump for your application.

The pump must never be throttled on the suction side.

After installation, test the suction line with water at 30 psig (2.1 barg) pressure to detect leaks.

## 3.8 Bypass Piping for Multi-Stage Pumps

Sufficient flow must be maintained through a multi-stage pump so the pump does not overheat. Low flow rates result in excessive energy accumulation and heat build-up in the pump. Minimum recommended flows are shown in Section 2.0 (Tonkaflo Specifications).

A bypass pipe, (a pipe from the discharge piping back to the source of liquid supply or suction line), may be needed for your installation to ensure that the pump operation is within the specified flow range. It is recommended that the connection of a bypass pipe to the suction line be at least 24-inches (61 cm) away from the pump inlet.

3.9 Suction Screen (Strainer)

This is a precision multi-stage centrifugal pump with close tolerances to provide maximum efficiency.

It is good practice to install a 30 mesh or finer screen (available as an accessory) or a cartridge filter in the suction line to collect any foreign objects or large particles.

The pump must not be operated with restricted suction line (inlet) flow.

Positive gauge pressure must be maintained at the pump inlet (downstream from the filter or screen). A clogged screen or filter will result in a greater pressure drop. A low pressure alarm or shutoff switch located between the screen or filter and the pump should always be used in conjunction with a suction line screen or filter.

3.10 Discharge Screen (Strainer)

A 30 mesh screen (available as an accessory) located in the discharge piping will protect your process fluid should the pump be damaged due to improper operation or other causes. The installation of the discharge screen is shown in Figure 3.5 (Installation of Discharge Screen).

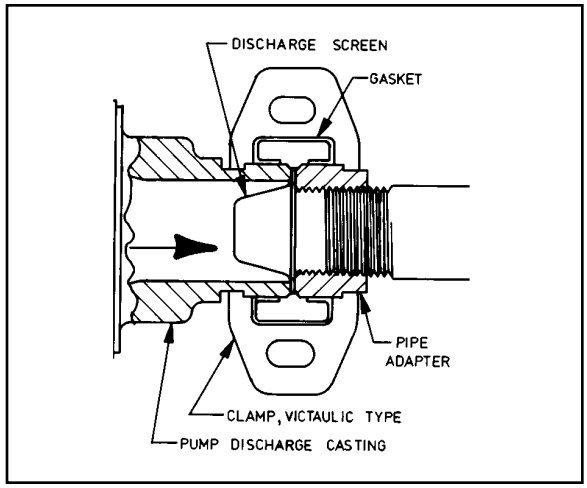



**Figure 3.5**
**Installation of Discharge Screen**

3.11 Pump Piping Connections

The standard model Tonkaflo SS5500, SS8500, SS12500, SS23000 and SS24000 Series Pumps have grooved ends as shown in Figure 3.5 (Installation of Discharge Screen) to accept Victaulic-type couplings. The couplings with 1000 psi (69 bar) working pressure rating are available as an accessory and include a Buna-N gasket (standard). Other gasket materials such as Viton or ethylene propylene are available. Consult the factory.

The coupling gasket should be thoroughly lubricated before installation. Silicone grease is recommended. Petroleum grease is suitable for most gasket materials, but is not suitable with ethylene propylene (EPDM).

3.12 Lubrication of Pump Bearings

The pump bearings are not lubricated at the factory.

The bearings are lubricated by maintaining a static oil level within the bearing frame.

One quart (0.95 L) of oil is provided with each new Tonkaflo oil lubricated pump. Additional oil can be purchased from GE (Section 10.2, Standard Model Parts List).

A heavy-duty premium hydraulic and lubricating oil (anti-wear, non-detergent, rust, oxidation, and foam inhibited) should be used, such as those listed in Table 3.3 (Typical Heavy-Duty Hydraulic and Lubricating Oil Types).

**Table 3.3**
**Typical Heavy-Duty Hydraulic and Lubricating Oil Types**

| Manufacturer or Supplier | Description |
|---|---|
| Tonkaflo Pumps | Anti-wear Hydraulic Oil<br>1 Quart (P/N 1120693)<br>1 Case [12 Qt, (P/N 1120682)] |
| Shell or other brands | Heavy-duty premium Hydraulic Oil which meets ISO-VG Grade 100 Specifications* |
| * ISO-Vg Grade 100 has a viscosity of 465 SSU at 100°F (38°C). | |

A #5 TRICO OILER is provided (not installed when shipped) and is used to maintain the static oil level. The removable crossbar bottle support for the oiler was adjusted at the factory to maintain proper oil level. If adjustment is lost, reset according to Figure 3.6 (Installation of Oiler). The crossbar support must be used. Do not discard.

An oil sight gauge is provided on the bearing frame so the oil level may be viewed before start-up as a check on proper installation of the oiler.

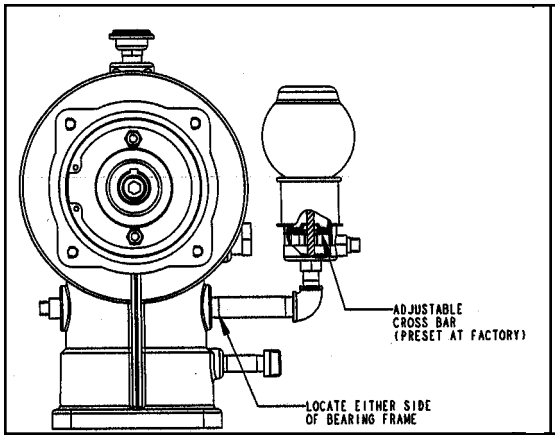



**Figure 3.6**
**Installation of Oiler**

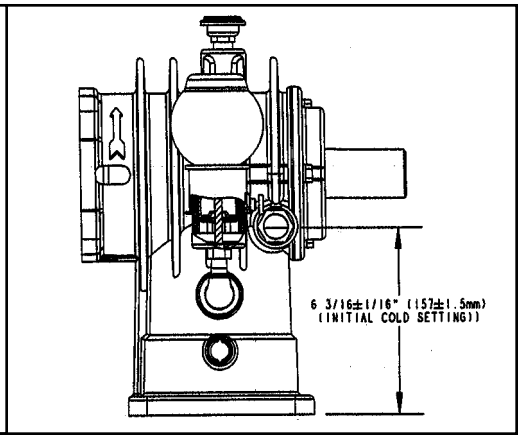



**Figure 3.7**
**Initial Cold Setting for Constant Level Oiler**

To install the oiler, remove the 1/4-inch pipe plug in either side of the bearing frame. Using a pipe sealing compound compatible with oil, install the nipple and elbow assembly as shown in Figure.3.6 (Installation of Oiler). Install the lower reservoir using the thread sealing compound.

The bearing frame oil reservoir capacity is approximately one quart (one liter). Fill the oiler bottle and place onto the lower reservoir. Several fillings should be required. DO NOT try to fill the bearing frame reservoir by pouring directly into the lower reservoir. On the final bottle fill, allow 15 minutes or more to elapse before measuring the oil level. On the final fill, the bottle should be approximately 2/3 to 3/4 full, and not completely full, for best operation of the Trico Oiler.

Check the oil level according to Figure 3.7 (Initial Cold Setting for Constant Level Oiler). Adjust as necessary, draining excess oil.

Replenish oil in bottle only when oil is no longer visible in the globe.

ON PUMP START-UP, VIEW THE SIGHT GAUGE TO SEE THAT OIL DROPLETS FORM ON THE SIGHT GAUGE, indicating sufficient oil level. The oil level will rise gradually in the sight gauge in a few minutes to the center of the eye, or just above the center.

The bearings are lubricated by a mist. Setting the initial cold oil level higher than specified will result in higher oil operating temperatures and reduced oil life.

## 4.0 TONKAFLO PUMP START-UP

### 4.1 Pump Priming

THE INLET PIPING AND PUMP MUST BE FILLED WITH LIQUID (i.e., PRIMED) BEFORE START-UP. If the pump is below the liquid source or connected to a positive pressure source, the pump may be primed from that source.

If the pump is above the liquid source, fill the pump and supply line with liquid from an external source.

The pump should be shut off immediately if prime is lost to avoid overheating and possible damage to the internals of the liquid end.

The pump should not run with a closed discharge for more than one (1) minute as the liquid can heat up very quickly and exceed the maximum operating temperatures causing irreversible damage to the wetted internal parts of the liquid end.

**WARNING: NEVER RUN PUMP DRY.**

In order to adequately protect the Tonkaflo pump from running dry, it is suggested that controls to protect the pump be used. These controls include: pressure switches, flow switches, and temperature switches.

### 4.2 Pump Rotation

When initially connecting to the power source, be certain that the motor wiring and available line voltage are the same. Connect the wires as shown on the motor wiring diagram located on the inside of the motor junction box cover or on the nameplate label.

**CAUTION:** If a three-phase motor is wired incorrectly, it will cause the pump shaft to rotate in the wrong direction. This will result in low pressure (about 1/4 to 1/2 of normal) and flow (about 1/2 of normal).

A motor starter is required for all three-phase motors.

BEFORE STARTING THREE-PHASE MOTOR

STEPS

1. Prime pump before applying power to avoid damage to pump.

2. Apply power for ONE SECOND to check direction of motor shaft rotation. The motor shaft should turn in a clockwise direction as viewed from the motor end. The direction of rotation for three-phase motors may be reversed by interchanging any two leads.

## 4.3 Initial Operation

With the oiler installed and filled, oil level set, pump primed, and pump rotation checked, your pump is ready to operate.

Upon start-up, check to see that the correct boost pressure level is obtained at design flow and that oil droplets form in the oil eye (Section 3.12, Lubrication of Pump Bearings).

If prime was not achieved, reprime as necessary.

## 5.0 GENERAL TROUBLESHOOTING FOR TONKAFLO PUMPS

### 5.1 Troubleshooting Chart

| LOW FLOW | MOTOR RUNS HOT OR STOPS |
|---|---|
| 1. Restrictions in inlet or discharge<br>2. Foot valve operating improperly<br>3. Air leak in inlet piping<br>4. Air leak in mechanical seal<br>5. Wrong installation of belt drive<br>6. Suction lift too high<br>7. Reverse rotation of pump shaft<br>8. Pump not primed adequately<br>9. Inlet strainer/filter plugged. | 1. Motor wired improperly<br>2. Bad connection<br>3. Motor exceeded rated amp draw<br>4. Excessive ambient temperature<br>5. Heater size to small in motor heater<br>6. Binding rotation in the pump shaft<br>7. Bearings not adequately lubricated<br>8. Specific gravity or viscosity of liquid higher than design conditions |
| **MOTOR DOES NOT RUN** | **LOW PRESSURE** |
| 1. Blown fuse or tripped circuit breaker or overload heater<br>2. Motor to hot - allow to cool<br>3. Motor voltage connection and line voltage different<br>4. Bad connection<br>5. Motor wired improperly<br>6. Wrong ratio for belt drive | 1. Pump not adequately primed<br>2. Air leak in inlet piping<br>3. Excessive flow<br>4. Clogged suction line filter or screen<br>5. Reverse rotation of pump shaft<br>6. Foot valve operating improperly |
| **PUMP VIBRATION** | **PUMP LEAKING** |
| 1. Misalignment of flexible coupling<br>2. Bent pump shaft<br>3. Improper mounting<br>4. Starved suction<br>5. Worn bearings<br>6. Motor out of balance | 1. Mechanical seal needs replacing<br>2. O-rings in pump casing damaged<br>3. Oil seals need replacing<br>4. Piping not sealed properly |

### 5.2 Bearing Frame Temperature

The operating temperature of the oil lubricated E-Bearing frame utilized on high pressure Tonkaflo pumps will vary depending on the boost pressure of the pump. As a general rule, type E-Bearing frames will operate within a temperature range of 130°-203°F (54° - 95°C). During operation, the bearing frame will feel hot to the touch.

## 6.0 TONKAFLO FIELD MAINTENANCE

### 6.1 Mechanical Seal Leakage

If liquid is leaking from the hole on the bottom or the holes on either side of the bearing frame near the inlet, the mechanical seal may need to be replaced. With new pumps, pumps with new mechanical seals, or pumps which have been dormant for long periods, the seal faces may not be completely seated and a slight leakage will occur. If this leakage continues for more than 60 seconds, remove discharge piping and tap pump shaft using a wooden dowel to seat the seal. Be careful not to damage the pump shaft.

**WARNING: POWER MUST BE DISCONNECTED BEFORE MAINTENANCE.**

### 6.2 Removal and Installation of Liquid End Assembly

#### 6.2.1 Removal of Liquid End Assembly

Removal of the liquid end assembly is required for replacement of the mechanical seal or for maintenance work on the pump bearing frame as described in Sections 6.3 - 6.6. The liquid end may be removed from the bearing frame without removing the bearing frame from the bedplate or other mounting.

STEPS

1. Remove the four 3/8-inch bolts and lock washers connecting the liquid end assembly to the bearing frame as shown in Figure 6.8 (Separation of Liquid End from Bearing Frame).

2. Insert a 3/16-inch Allen (hex) wrench in one of the access holes on either side of the bearing frame toward the liquid end. Refer to Figure 6.8 for more detail. Rotate the pump shaft until the Allen wrench slips into the set screw. Rotate the shaft by rotating the flexible coupling.

3. Loosen the clamp on the discharge end of the pump case.

4. Remove the liquid end assembly (i.e., liquid end and pump shaft) by pulling the liquid end away from the bearing frame. Be sure the discharge end of the liquid end assembly is supported so that the pump shaft is not bent upon removal.

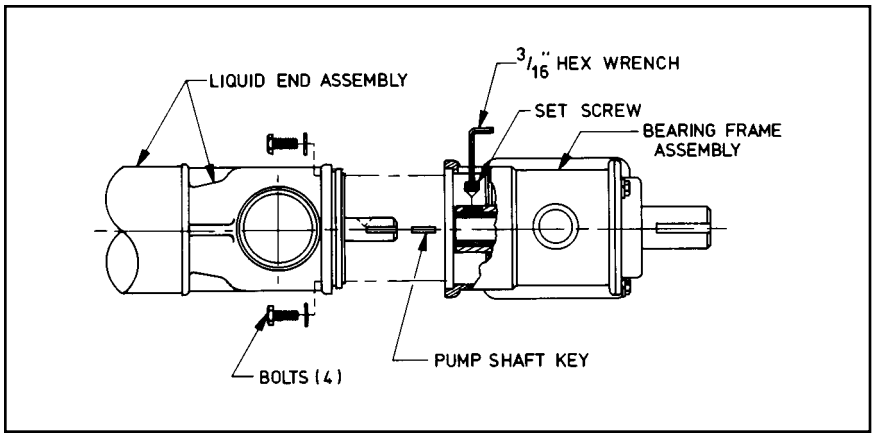



**Figure 6.8**
**Separation of Liquid End**
**from Bearing Frame**

6.2.2 Installation of Liquid End Assembly

STEPS

1. Place the shaft key in the pump shaft key way and be sure it is fully seated.

2. Check to see that anti-seize compound is on the exposed pump shaft where it engages with the bearing frame shaft. If not, coat the pump shaft with a small amount of an anti-seize compound (i.e., Never-Seez or Anti-Seize). The anti-seize compound is used to prevent corrosion, galvanic pitting, rust, and seizure. These compounds are available from the factory or local industrial supply house.

3. Align the keyed pump shaft with the bore of the bearing frame shaft and insert the pump shaft such that the key on the pump shaft fits into the key way on the bearing frame shaft. Then push until castings come together.

4. Fasten together the inlet casting, mechanical seal holder, and bearing frame assembly with the four (4) 3/8-inch bolts and lock washers. Reference Figure 6.8 (Separation of Liquid End from Bearing Frame) and Figure 6.9 (Removal of Mechanical Seal) for correct placement of parts.

5. After fastening the inlet casting to the bearing frame assembly, line up the set screw hole in the bearing frame shaft with the access hole in the bearing frame by rotating the flexible coupling. Place the set screw in the bearing frame shaft. Through the opening in the discharge casting, push on the end of the pump shaft with a wooden dowel to seat the shaft in the bearing frame and then tighten the set screw.

6.3 Mechanical Seal Replacement - SS5500, SS8500, SS12500, SS23000, and SS24000 Series Pumps

STEPS

1. Remove the liquid end assembly (Section 6.2, Removal and Installation of Liquid End Assembly).

2. Remove the pump shaft key and slide the mechanical seal holder off the pump shaft (Figure 6.9, Removal of Mechanical Seal).

3. Remove the rotary portion (spring, washer, and face assembly) of the seal assembly from the pump shaft by rotating and pulling the rotary portion until it slides off the pump shaft. If prying is required, do not damage the pump shaft or inlet housing where the seal holder seals (Figure 6.9, Removal of Mechanical Seal).

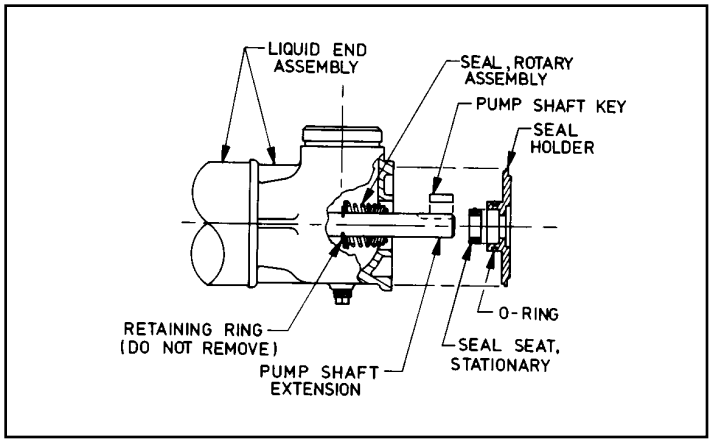



**Figure 6.9**
**Removal of Mechanical Seal**

4. When installing a new mechanical seal, do not cut the rubber bellows when sliding the seal over the shaft key way. One method is to wrap thin plastic tape over the shaft key way to protect the rubber bellows from damage. Wrap 1-1/4 turns to cover the end of the key way opposite the shaft end. With some overlap, wrap a second 1-1/4 turns, etc., until complete key way is covered.

5. Lubricate the round surface of the pump shaft with oil, petroleum grease or silicone grease. After lubrication, install the rotary portion of the new seal by placing it onto the pump shaft and carefully rotating and pushing the rotary portion down the pump shaft until it is lightly seated against the spring. Remove the tape.

6. Remove the stationary portion of the old mechanical seal from the cavity in the seal holder (Figure 6.9).

7. Lubricate the O-ring on the outside of the new stationary seat. Lubricate with petroleum or silicone grease. Install the stationary portion into the seal holder cavity. Make sure the stationary portion is fully seated. Lightly lubricate the ground surface of the stationary seat with grease or oil.

8. Examine the rubber O-ring on the mechanical seal holder and, if the O-ring is damaged, replace it with a new one. A new O-ring is included with the factory-supplied mechanical seal replacement kit. Lubricate with grease before installing.

9. Place the mechanical seal holder containing the new stationary seat onto the pump shaft and slide it down the shaft until fully engaged with the inlet casting.

**CAUTION:** Care must be taken not to damage the new stationary seat when sliding the assembly over the pump shaft.

10. Install the liquid end assembly onto the bearing frame (Section 6.2.2).

## 6.4 High-Pressure Mechanical Seal Replacement

High-pressure mechanical seals have the same basic design as standard mechanical seals. Replace them using the same procedure as denoted in Section 6.3 (Mechanical Seal Replacement).

## 6.5 Bearing Frame Maintenance on E-Bearing Frame Tonkaflo Pumps

### 6.5.1 Disassembly of Pumps with Type E-Bearing Frame

STEPS

1. Remove the liquid end assembly (Section 6.2.1, Removal of Liquid End Assembly).

2. Drain the oil from the bearing frame by removing the oil drain plug on the lower portion of the bearing frame and then remove the bearing frame from the bedplate or other mounting.

3. Bearing frame overhaul. Refer to Figure 6.10 (Bearing Frame Overhaul) for the construction of Type E-Bearing frame.

STEPS

1. Remove the three bolts and lock washers that fasten the bearing frame cap to the motor side of the bearing frame. Separate the cap from the bearing frame.

2. Remove retaining ring #1 from the bearing frame as shown on Figure 6.10 (Bearing Frame Overhaul).

3. Remove the lock nut, lock washer and flat washer from the bearing frame shaft.

4. Place the bearing frame in a press. Simultaneously press out the oil seal holder and remove bearing cone #2 from the shaft by pressing on the motor end of the bearing frame shaft. After the oil seal holder is removed, continue pressing to remove the shaft assembly from the bearing frame. Bearing cone #1 will remain on the shaft. Removal of

   bearing cone #1 from the shaft should be done only when replacement is necessary.

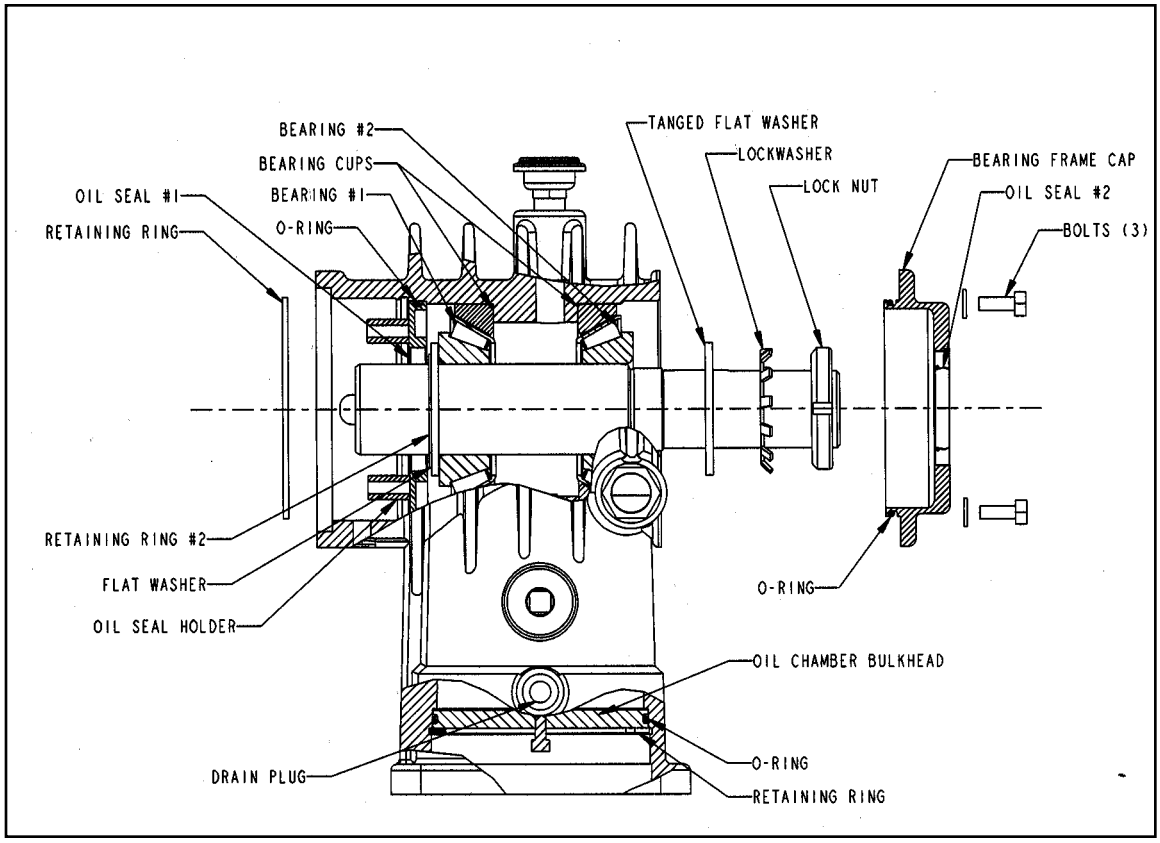



**Figure 6.10**
**Bearing Frame Overhaul**

5. Inspect the bearing cups and cones for any rough surface conditions and replace both cup and cone when necessary. Pitted and galled rollers and/or bearing cap indicate replacement is necessary. Very light marks around each roller may occur during "break-in period" from the bearing cage. This is not a problem and bearing replacement is not necessary.

6. To remove the bearing cup(s) from the bearing frame, use a brass or soft steel rod and hammer to knock them out.

7. Inspect both oil seals and replace if the seals are no longer pliable or if they were leaking (Section 6.5.2, Assembly of Pumps with Type E-Bearing Frame).

6.5.2 Assembly of Type E-Bearing Frame

STEPS

1. If removed, press new bearing cup(s) into the bearing frame, making sure they are fully seated.

2. If removed, press a new bearing cone #1 (Figure 6.10, Setting Bearing Frame Overhaul) onto the shaft, holding the bearing square with the shaft while starting. Make sure the washer behind bearing cone #1 has been replaced. The correct setup may be checked by placing the shaft into the bearing frame and measuring the 2.772 inches ± 0.010 inch (70.41 ± 0.25 mm) recess (Figure 6.11, Setting Bearing Frame Shaft End Play).

3. With the shaft placed in the bearing frame, press on the second bearing cone, holding it square with the shaft while starting. Press until the bearing cone is fully seated against the bearing cup and there is no end play.

4. Reinstall the tanged flat washer, lock washer and nut. Hand tighten the lock nut and lightly set a tang on the lock washer into a slot on the lock nut. If desired, a 3/8-16 NC x 3 bolt may be inserted through a side port in the bearing frame and into the set screw hole in the end of the bearing frame shaft (Figure 6.8, Separation of Liquid End from Bearing Frame) when tightening the lock nut.

5. Using a press, force bearing cone #2 back against the tanged flat washer by pressing on the motor end of the shaft. This sets the bearing so the shaft end play may be checked.

6. Check the end play of the shaft by pulling and pushing on the shaft. The end play should be 0.005-0.008-inch (0.127-0.203 mm) for direct-driven pumps, using a dial indicator (Figure 6.11, Setting Bearing Frame Shaft End Play). End play of 0.0065-inch (0.165 mm) or less is difficult to feel by hand. Readily noticeable play means further adjustment is necessary.

7. If further adjustment is necessary, press bearing cone #2 to reseat it against the bearing cup.

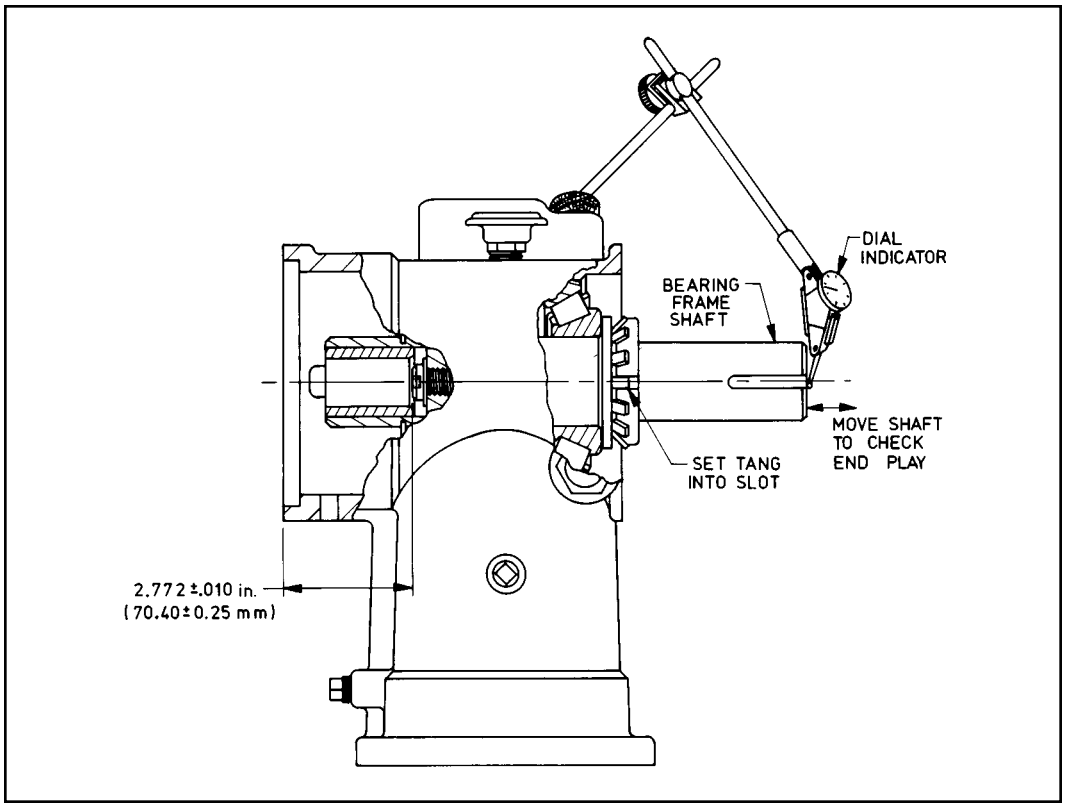



**Figure 6.11**
**Setting Bearing**
**Shaft End Play**

8. Tighten or loosen the lock nut as required. Advancement of the nut until the next lock washer tang is aligned results in 0.0008-inch (0.02 mm) less end play. Advancing the lock nut until the same notch lines up with the next lock washer tang results in 0.003-inch (0.08 mm) less end play.

9. Repeat Steps 5 and 6.

10. When the end play setting is correct, set one tang of the lock washer into a slot in the lock nut.

11. Inspect and replace the O-ring on the oil seal holder and on t h e end cap if damaged. Replace the oil seals.

12. Reinstall the oil seal holder, oil seal, and retaining ring (Figure 6.10, Bearing Frame Overall) making sure the seal and O-ring are lubricated with grease or oil.

13. Install the bearing frame cap and oil seal on the motor end of the bearing frame.

**<u>WARNING</u>: TO PREVENT OIL LEAKAGE, DO NOT TO DAMAGE THE SEAL LIP.**

The oil seal rubber must be lubricated with grease or oil and the shaft key way must be covered to protect the oil seal from damage.

A thin metal sleeve placed over the end of the shaft will suffice. Taper the sleeve on the end so the seal can be easily slipped on the end. As an alternate, thin plastic tape, applied 1-1/4 wrap at a time, can be used to cover the key way.

14. Install the three 5/16-inch bolts and lock washers to secure the bearing frame cap.

6.5.3 Install the Liquid End and Remount The Pump.

<u>STEPS</u>

1. Install the liquid end on the bearing frame (Section 6.2.2, Steps 1-5).

2. Mount the pump on the bedplate or other mounting, and position and tighten the clamp on the discharge support.

3. Align the coupling (Section 3.5, Motor, Pump & Coupling Alignment).

4. Lubricate pump bearings (Section 3.12, Lubrication of Pump Bearings).

## 6.6 <u>Oil Seal Replacement</u>

Oil leaking around the bearing frame shaft means oil seal #2 (Figure 6.10, Bearing Frame Overhaul) is leaking.

Oil leaking from the ports in the bearing frame near the liquid end indicates oil seal #1 (Figure 6.10) is leaking.

### 6.6.1 Replacement of Oil Seal #2

<u>STEPS</u>

1. Remove the flexible coupling guard (Figure 6.10).

2. Either remove the pump or motor from the bedplate or other mounting, or swing the motor shaft away from the bearing frame shaft.

3. Remove the flexible coupling flange and key from the bearing frame shaft.

4. Remove the constant level oiler bottle and drain about 1/2 cup or 120 cubic centimeters (cc) of oil from the bearing frame.

5. Remove the three bolts and lock washers that fasten the bearing frame cap to the bearing frame. Separate the bearing frame cap from the bearing frame.

6. Remove the oil seal from the bearing frame cap. Replace with a new oil seal.

7. Replace the O-ring on the end cap if damaged.

8. To prevent damage to the oil seal from the shaft key way, cover the key way in the shaft as described in Section 6.5.2.1, Step 13. Apply grease or oil to the bearing frame shaft and the O-ring on the end cap.

9. Place the bearing frame cap and new oil seal onto the bearing frame. Care must be taken to not damage the oil seal lip.

10. Reinstall the three bolts and lock washers to fasten the bearing frame cap to the bearing frame.

11. Reinstall the coupling flange so it is flush with the end of the shaft and remount the pump or motor as required.

12. Install and align the flexible coupling (Section 3.5, Installation of Discharge Screen).

13. Install the coupling guard.

14. Replace the oiler bottle, refilling it with oil as needed. Recheck the oil level [Figure 4.7 (Installation of Oiler)].

6.6.2 Replacement of Oil Seal #1

STEPS

1. Remove the liquid end assembly from the bearing frame as described in Section 6.2.1 (Replacement of Oil Seal #2).

2. Remove retaining ring #1 shown (Figure 6.10, Bearing Frame Overhaul).

3. Remove the oil seal holder (Figure 6.10), which can be done as described in Section 6.5.1.3, Step 4, or as described here by making a simple fixture.

STEPS

A. Use two 5/16-18NC bolts and a flat plate (not provided) to bridge across the end of the bearing frame to pull out the seal holder.

B. Drill two holes, 3/8-inch (9.5 mm) diameter, through the flat plate, spacing the holes 3.25 inch (82 mm) apart.

C. Insert two 5/16-18NC bolts through the plate and turn them into the seal holder's two coupling nuts provided. (Select bolt length as needed to engage coupling nuts). Tighten the two bolts uniformly to pull the seal holder out straight.

4. Remove the oil seal from the seal holder and install a new oil seal. The seal should be flush with the exterior side of the seal holder.

5. Reinstall the oil seal holder and retaining ring in the bearing frame. Make sure the O-ring on the outside of the oil seal holder and the oil seal lip are lubricated before installing. Replace the O-ring if damaged.

6. Install the liquid end and remount the pump (Section 6.2.2, Steps 1-4).

6.6.3 Replacement of Oil Chamber O-ring Seal

Should the O-ring seal for the oil chamber bulkhead (Figure 6.10, Bearing Frame Overhaul) need replacement, remove the bulkhead.

STEPS

1. Remove the retaining ring using a retaining ring pliers.

2. Using a pliers or other gripping tool, pull on the bolt in the center of the bulkhead to remove the bulkhead and O-ring.

3. Lubricate the new O-ring with grease.

4. Place the O-ring in the groove in the bulkhead.

5. Insert the bulkhead into the bearing frame with the bolt outward.

6. Reinstall the retaining ring.

7. Install the liquid end and remount the pump (Section 6.2.2, Steps 1-4).

## 6.7 Lubrication

### 6.7.1 Adding Oil

Add oil to the oiler bottle; do not fill directly into the oiler reservoir. After filling, allow at least fifteen minutes to elapse before measuring the oil level (Figure 3.6, Initial Cold Setting for Constant Level Oiler). Fill the oiler bottle approximately 2/3 to 3/4 full, and not completely full, for best operation of the Trico Oiler. The oiler bottle is designed to maintain a constant oil level in the bearing frame. Refer to Section 3.12 (Lubrication of Pump Bearings) for oil type.

### 6.7.2 Oil Change

THE RECOMMENDED OIL CHANGE INTERVAL IS 2000 HOURS OF PUMP OPERATION OR SIX MONTHS, WHICHEVER OCCURS FIRST. Refer to Section 3.12 (Lubrication of Pump Bearings) on oil filling. The crossbar support for the oiler must be installed; do not discard.

Always add oil into the oiler bottle; do not fill directly into the oiler reservoir.

Before starting, check the static oil level on the oil sight gauge (Figure 3.7, Initial Cold Setting for Constant Level Oiler). After starting the pump, check for formation of oil drops on the oil eye. Do not set oil level too high. Lubrication of the bearings is with an oil mist and not immersion.

## 7.0 TONKAFLO SERVICE POLICY - LIQUID END

Section 6.0 (Tonkaflo Field Maintenance) in the Tonkaflo Installation, Operation, and Maintenance Manual was written to assist our customers in performing minor maintenance in the field on Tonkaflo pumps. Proper maintenance will ensure longer pump life and minimize downtime. Tonkaflo pumps are manufactured to make field repairs on the mechanical seal a quick and easy process. Bearing frame overhauls may be done by the customer, a local maintenance shop, or the factory. If repair at the factory is desired, call GE for a Return Goods Authorization (RGA) number (Section 8.0, Tonkaflo Pump Return Authorization Procedure) and send the complete pump, with or without motor, to the factory. For motor problems, such as worn out motor bearings, it is recommended that maintenance be done at a local motor repair shop.

**For Motor Service: Motors must be sent to the nearest authorized motor service center for repair, replacement, and warranty disposition**.

Field service of the liquid end, with the exception of mechanical seal replacement, is not recommended. If a liquid end is damaged by running the pump dry, inadequate flow, excessive deadheading, cavitation, or other reasons, contact a Tonkaflo distributor certified for service or return it with or without motor to the factory for repair.

The pump has a oil lubricated bearing frame attached to the pump liquid end. It is typically characterized by an "E" in the model number (e.g., SS5518E).

To return an oil lubricated bearing frame pump to the factory, GE requires the whole unit (pump liquid end and bearing frame) less the motor, bedplate, and flexible coupling pieces.

The original bearing frame is essential for rebuilding the pump liquid end on 5500, 8500, 12500, 23000, and 24000 Series pumps based on the pump design (shimmed impellers). Also, a bearing frame is required to test the pump. If we attach a new bearing frame to your pump. If we attach a new bearing frame to your pump liquid end in order to test it, it will be shipped with the repaired liquid end of the pump and you will be billed for it.

## 8.0 TONKAFLO PUMP RETURN GOODS AUTHORIZATION (RGA) PROCEDURE

If you wish to return goods for repair, warranty evaluation and/or credit, please have your original sales order or invoice available when you call GE . Call (800) 848-1750 and ask to speak with Customer Service. A GE Customer Service representative will provide instructions and a Return Goods Authorization (RGA) number which needs to be clearly written on the outside of the box used to ship your materials. All equipment must be shipped to GE with the freight prepaid by the customer. Call our Customer Service Center with any questions or issues concerning freight claims and a representative will discuss your situation.

All materials to be returned must be rendered into a non-hazardous condition prior to shipping.

There are two ways to handle a return: (1) send in the pump for repair and return or (2) purchase a new pump and when desired, send the defective pump to the factory for repair and return.

### 8.1 Motor Warranty

Motors must be sent to the nearest authorized motor service center or repair, replacement, and warranty consideration.

### 8.2 In-Warranty Pump Failure

8.2.1 Return the pump on an RGA for repair on an RGA within 15 days from RGA issue date. GE absorbs the cost of repair. The repaired pump will be returned and is under warranty for the remainder of the original warranty period or three months, whichever is longer.

8.2.2 GE will not stock or issue credit against a new, custom-built, pump purchase regardless of the warranty status of the failed pump. The warranty (Section 11.0) is 12 months from installation or 15 months from receipt, whichever occurs first.

### 8.3 Out-of-Warranty Pump Failure

Return the pump on an RGA for repair. The pump will be repaired and repair charges invoiced to the customer. The warranty on repairs is three months.

### 8.4 Shipping Charges

8.4.1 In-Warranty

Customer pays for shipment to GE. GE pays one way surface freight return to customer.

8.4.2 Out-of-Warranty When New Pump Is Purchased

Customer pays all shipping charges.

9.0 DIMENSIONAL DRAWING

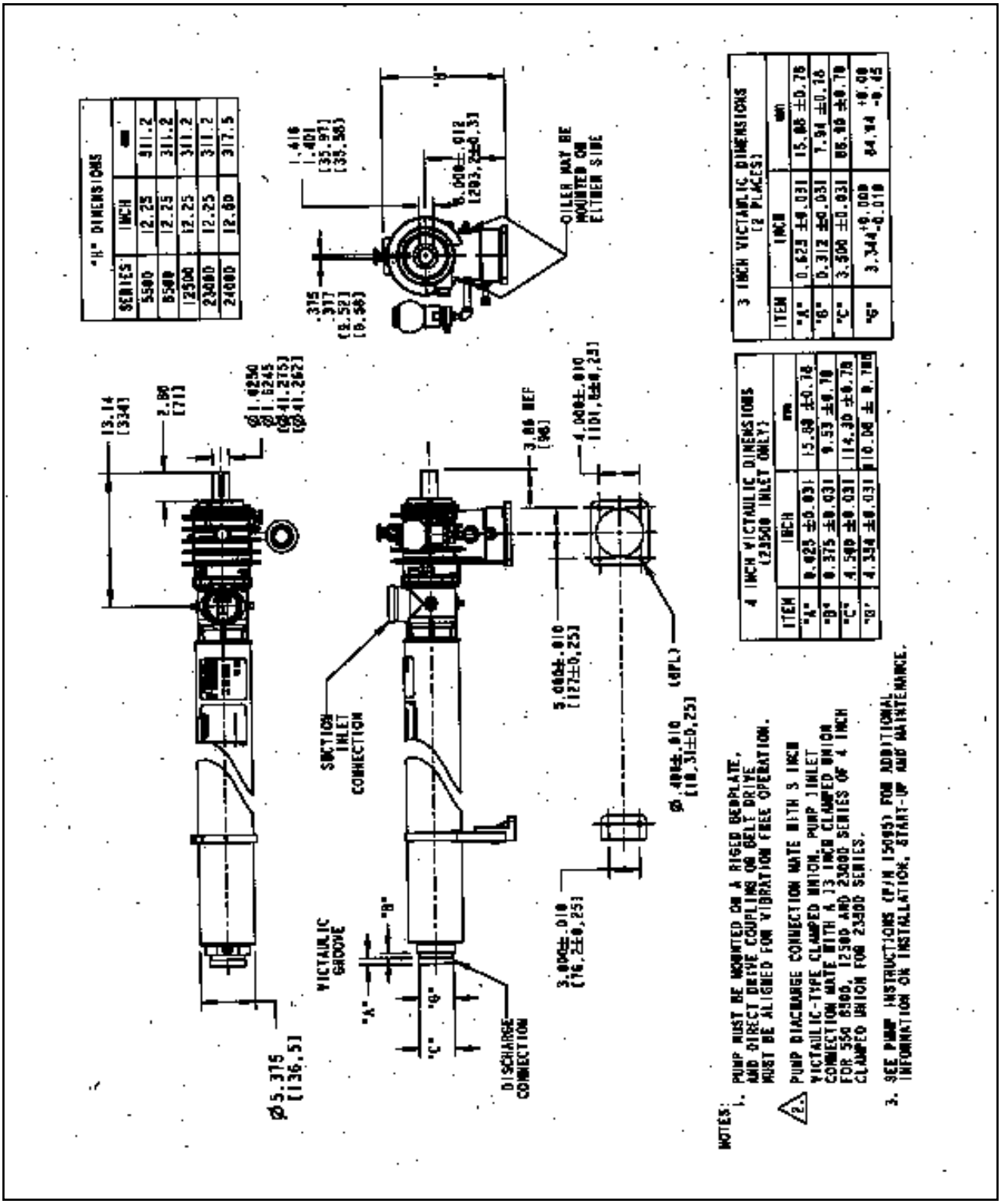



**Figure 9.12**
**Dimensions**
**(Pump Only)**

## 10.0 REPLACEMENT PARTS

### 10.1 Pump Cutaway Drawing

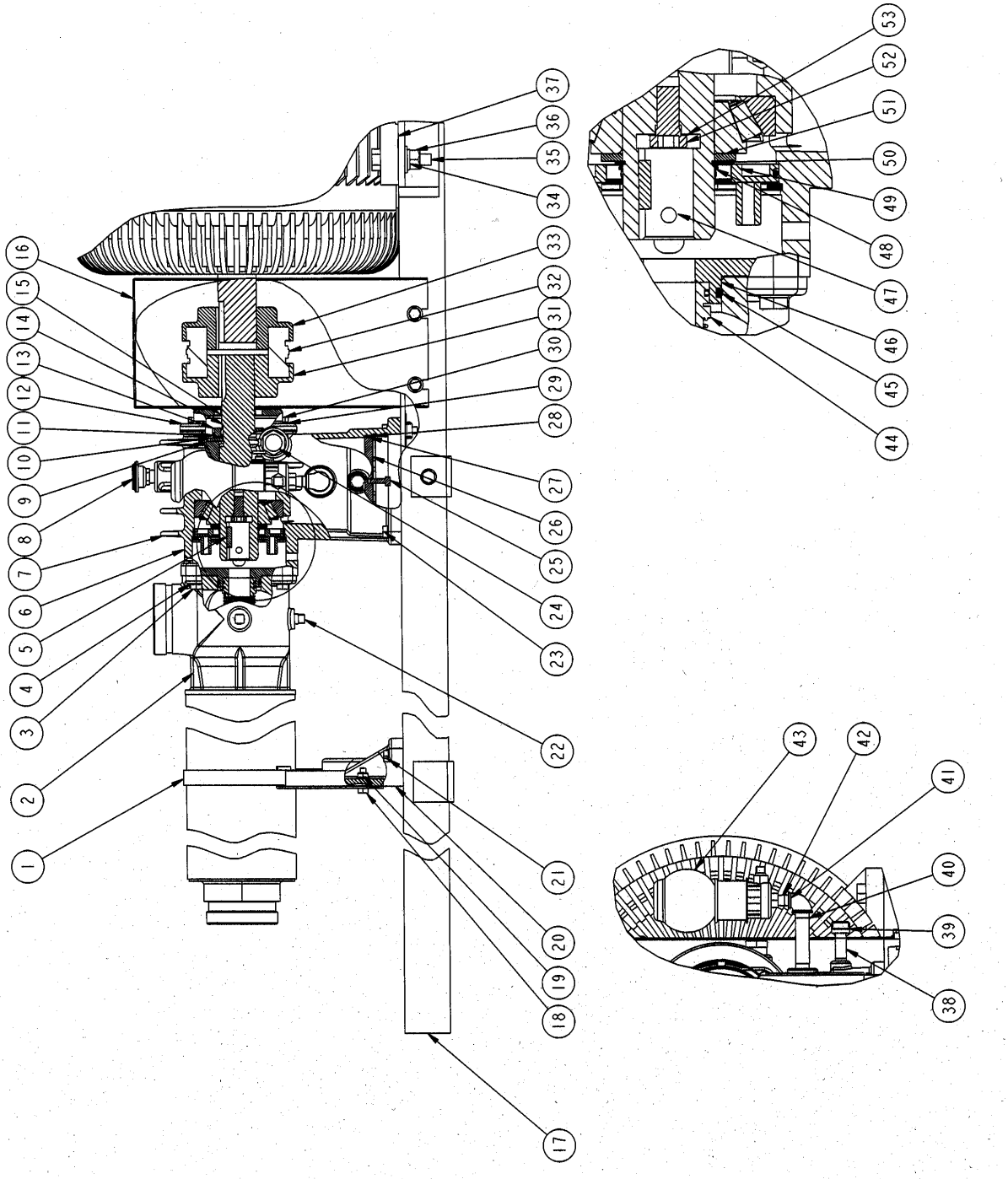



**Figure 10.13**
**Pump Cutaway Drawing**

10.2 Standard Model Parts List

| Item Number | Part Description | Part Number | Item Number | Part Description | Part Number |
|---|---|---|---|---|---|
| 1 | Clamp, HD | 1114375 | 18 | Screw Cap, 5/16-18NC x 1/2-inch | 1110471 |
| 2 | Liquid End Assembly | * | 18 | Nut Lock | 1113768 |
| 3 | Screw, Cap, 3/8-16NPC x 1-1/4-inch | 1110984 | 20 | Discharge Support Assembly (Includes items 10 & 11) | 1120600 |
| 4 | Lock Washer, 3/8-inch | 1110012 | 21 | Screw, Cap, 3/8-16NC x 1.0-inch | 1112048 |
| 5 | Shaft /Key, 1/4- x 1-1/2-inch | 1120445 | 22 | Plug, 1/4 NPT, SS, 316 | 1115055 |
| 6 | Bearing Frame, Painted | 1120604 | 23 | Screw, Cap, 3/8-16NC x 1-1/2inch | 1112250 |
| 7 | Bearing Frame Assembly | 1120412 | 24 | Oil Sight Gauge | 1114455 |
| 8 | Oil Breather | 1114851 | 25 | Screw, Cap, 1/4-28NC x 3/4-inch | 1115091 |
| 9 | Roller Bearing, Cup & Cone | 1120603 | 26 | Oil Chamber Bulkhead | 1120354 |
| 10 | Tanged Washer | 1114283 | 27 | O-ring, 4-1/4-inch ID | 1113998 |
| 11 | Lock Washer | 1114282 | 28 | Retaining Ring, N5000-433 | 1114280 |
| 12 | Oil Seal Cap | 1120356 | 29 | Lock Washer, 5/16-inch | 1112256 |
| 13 | Lock Nut, Left Hand Thread | 1115975 | 30 | Screw Cap, 5/16-18 NC x 3/4-inch | 1110490 |
| 14 | Bearing Frame Shaft | 1120348 | 31 | Coupling Flange | |
| 15 | Oil Seal, CR16085 | 1121049 | | Size 6, 1/5-inch bore | 1114333 |
| 16 | Coupling Guard, 7-inch channel | 1120601 | | Size 7, 1/5-inch bore | 1114334 |
| | Coupling Guard, 8-inch channel | 1120544 | | Size 8, 1/5-inch bore | 1114335 |
| 17 | Bedplate, NEMA frame motors | | | Size 9, 1/5-inch bore | 1115177 |
| | 50 Hertz | | | Size 10, 1/5-inch bore | 1123102 |
| | 254T & 256T, Size D | 1120859 | 32 | Coupling Sleeve | |
| | 284TS &286TS, Size E | 1120858 | | Size 6 | 1114454 |
| | 324TS & 326TS, Size G, 110-inch | 1120857 | | Size 7 | 1114337 |
| | | | | Size 8 | 1114338 |
| | 324TS & 326TS, Size H, 120-inch | 1120758 | | Size 9 | 1115179 |
| | | | | Size 10 | 1118896 |
| | 364TS & 365TS, Size J | 1120856 | 33 | Coupling Flange, Motor | |
| | 160L & 150M, Size N | 1122335 | | Size 6, 1-5/8-inch bore | 1114333 |
| | 180M & 180L, Size K | 1121278 | | Size 7, 1-5/8-inch bore | 1114334 |
| | 200M & 200L, Size L | 1121279 | | Size 8, 1-5/8-inch bore | 1114335 |
| | 225S & 225M, Size M | 1121280 | | Size 9, 1-5/8-inch bore | 1114336 |
| 17 | Bedplate, NEMA frame motors | | | Size 10, 2-1/8-inch bore | 1123103 |
| | 60 Hertz | | | Size 6, 38 mm | 1122316 |
| | 213T & 215T, Size A | 1120599 | | Size 7, 42 mm | 1121349 |
| | 254G & 256T, Size B | 1120380 | | Size 7, 48 mm | 1122328 |
| | 284TS & 286TS, Size D | 1120381 | | Size 8, 18 mm | 1121346 |
| | 324TS & 326TS, Size F | 1120382 | | Size 8, 55 mm | 1122237 |
| | 364TS & 365TS, Size I | 1120383 | | Size 9, 55mm | 1121347 |
| | 404TS/405TS | 1123059 | | | |

* Contact factory for assistance.

| Item Number | Part Description | Part Number | Item Number | Part Description | Part Number |
|---|---|---|---|---|---|
| 34 | Lock Washer | | 44 | Mechanical Seal | |
| | 1/2-inch | 1113104 | | Standard, Type 21, 200 psi | |
| | 5/8-inch | 1111650 | | (13.8 bar), ceramic seat | 1121167 |
| 35 | Screw, Cap | | | High-Pressure, Type 1, 300 psi | |
| | 3/8-16NC x 1-1/2-inch | 1112250 | | (20.7 bar), ceramic seat | 1116127 |
| | 1/2-13NC x 2-inch | 1112986 | | High-Pressure, Type 1, | |
| | 5/8-11NC x 2-inch | 1111648 | | 300 psi (20.7 bar), Ni resist | 1114326 |
| 36 | Nut | | | seat | |
| | 1/2-13-inch | 1113462 | | High-Pressure, Type 1, 400 psi | 1115090 |
| | 5/8-11-inch | 1111649 | 45 | (27.6 bar), tungsten carbide | 1114284 |
| 37 | Shim, 5/8-inch | 1120665 | 46 | seat | 1120341 |
| | Shim, Square | 1122204 | 47 | O-ring, 1-7/8-ID | 1113769 |
| 38 | Nipple, 1/4 NPT x 2-inch | 1111754 | 48 | Seal Holder | 1113996 |
| 39 | Cap, 1/4 NPT | 1121978 | 49 | Set Screw | 1120723 |
| 40 | Oiler, Nipple, 3/8 NPT x | | 50 | Oil Seal, CR18546 | 1113999 |
| | 3-1/2-inch | 1122025 | 51 | Oil Seal Holder Assembly | 1120379 |
| 41 | Oiler, Elbow, 3/8 NPT x 1/4 NPT | 1121976 | 52 | Retaining Ring, 5100-187 | 1114379 |
| 42 | Oiler, Nipple, Close, 1/4 NPT | 1110202 | 53 | Washer, Bearing Frame | 1120361 |
| 43 | Oiler, Cup & Globe | 1114476 | | Screw, Cap, 1/2-13C x 1.0-inch | |
| | | | | Shim, Bearing Frame | |

## 10.3 Accessories

| Part Description | Part Number |
|---|---|
| Retaining ring pliers for mechanical seal retaining ring | 1120717 |
| Set screw pump shaft, D-, E, G- & H-Bearing frame | 1113769 |
| Allen wrench, 3/16-inch, for set screw (P/N 1113679) | 1113770 |
| Pump discharge screen | 1120501 |
| 316SS Trico Oiler | - |
| 2 cap screws, 5/16 x 18NC x 2-1/2-inch long U.S. thread (for oil seal holder removal, pump side) | |
| Standard Trico oiler | 1114476 |
| ISO-Vg, Grade 100, 1 Quart | |
| 1 Quart (0.95 L) | 1120693 |
| 1 Case [12 Quarts (114. L0] | 1120682 |
| Anti-seize thread compound | 1120110 |
| Thrust washers | 1120424 |
| Stage bearing | 1120349 |
| Carbon bearing | 1120386 |
| Center housing tool, E-Bearing frame pump | 1120780 |
| Discharge housing tool, E-Bearing frame pump | 1120781 |
| SS5500 - SS12500 Series stage parts | * |
| Mechanical seal kit | |
| 200 psi (13.8 bar), Type 21 ceramic | 1121177 |
| 300 psi (20.9 bar), Type 1 ceramic | 1120606 |
| 300 psi (20.9 bar), Type 1 Ni-Resist | 1120607 |
| 400 psi (27.6 bar), Type 1 tungsten carbide | 1120608 |
| Allen wrench, 3/16-inch | 1113770 |

* Contact factory for technical assistance.

| Part Description | Part Number |
|---|---|
| Victaulic adapters | |
| 3-inch Victaulic x 3-inch MNPT 304SS | 1120589 |
| 3-inch Victaulic x 3-inch MNPT 316SS | 1120590 |
| 3-inch Victaulic x 2-inch FNPT 304SS | 1120586 |
| 3-inch Victaulic x 2-inch FNPT 316SS | 1120587 |
| 3-inch Victaulic x 1-1/2-inch FNPT 316SS | 1120588 |
| 4-inch Victaulic x 4-inch MNPT 304SS | 1122066 |
| 4-inch Victaulic x 4-inch MNPT 316SS | 1122067 |
| Victaulic coupling, 3-inch, Style 77 Buna-N | 1114373 |
| Victaulic coupling, 4-inch, Style 77 Buna-N | 1115161 |

10.4 Recommended Spare Parts List

| Part Description | Part Number | Quantity |
|---|---|---|
| Operation and Maintenance Manual for SS5500, SS8500, SS12500, SS23000 & SS24000 Series High-Pressure Pumps [up to 1000 psi (69 bar)] with Type-E Bearing Frames | 1115092 | 1 |
| 1-inch, Type 21, BF501C1-316SS Mechanical Seal Kit, Inlet pressure < 200 psig (13.8 barg) | 1121177 | 1 |
| Heavy-duty, anti-wear hydraulic oil ISO-VG 100 [1 Quart (0.95 L)] | 1120693 | 1 |
| Bearing Cup and Cone | 1120603 | 2 |

10.5 Complete Set of Bearing Frame Replacement Parts

| Part Description | Part Number | Quantity |
|---|---|---|
| Bearing frame oil seal, motor side (replaces P/N 1113997) | 1121049 | 1 |
| Bearing frame oil seal, pump side | 1113996 | 1 |
| O-ring for bearing frame | 1113998 | 3 |
| Bearing cup and cone | 1120603 | 2 |
| Retaining ring for bearing frame house | 1114280 | 2 |
| Retaining ring for frame shaft | 1113999 | 1 |
| Lock nut, left hand thread | 1115975 | 1 |
| Lock washer, flat with tang | 1114282 | 1 |
| Multi-tanged washer | 1114283 | 1 |
| Bearing frame shaft, left hand thread | 1120348 | 1 |
| Bearing frame shaft bolt shims | 1120361 | 3 |
| Painted bearing frame housing | 1120604 | 1 |
| Oiler cup and globe | 1114476 | 1 |
| Oiler nipple, 3/8-inch NPT x 3-1/2-inch | 1122025 | 1 |
| Oiler elbow, 3/8-inch NPT x 1/4-inch | 1121976 | 1 |
| Oiler nipple, close, 1/4-inch NPT | 1110202 | 1 |
| Bearing frame shaft washer | 1120379 | 1 |
| Bearing frame shaft bolt | 1114379 | 1 |
| Oil breather | 1114851 | 1 |
| Bearing frame shaft set screw cone point | 1113769 | 1 |
| Oil sight gauge | 1114455 | 1 |
| Oil drain nipple, 1/4-inch NPT x 2-inch | 1111754 | 1 |
| Oil drain cap, 1/4-inch NPT | 1121978 | 1 |
| Oil seal holder assembly | 1120723 | 1 |
| (Without oil seal, PN 1113996) | | 1 |
| Coupling flanges (2) and sleeve(1) [Refer to Section 3.5 (Motor, Cup, & Coupling Alignment)] | * | 1 |
| Coupling key bearing frame | 1120444 | |
| Pump shaft key | 1120445 | 1 |
| Machine bolts, 5/16- x 18NC x2-inch long U.S. thread (for oil seal holder removal | 1116595 | 2 |
| Holder, oil seal cap E | 1120356 | 1 |

10.6 Bearing Frame Overhaul Tools

1. Two 5/16-inch x 18 UNC x 2-1/2-inch-long bolts for removal of grease seal holder (E-Bearing frame pumps).

2. One 3/8-inch bolt for E-Bearing frame pumps to hold bearing frame shaft when removing lock nut.

3. One 3/16-inch Allen (hex) wrench for removal of bearing frame shaft set screw.

4. Bearing press (arbor press).

5. Dial indicator for setting bearing frame shaft end play.

6. Retaining ring pliers for removal of retaining ring from E-Bearing frame shaft (Truarc L1520 or equivalent).

10.7 Mechanical Seal Change-Out Tools

1. One 3/16-inch Allen (hex) wrench for removal of bearing frame shaft set screw
2. 9/16-inch wrench

10.8 Ordering Parts

Order parts through your local distributor or directly from:

GE Infrastructure
Water & Process Technologies
5951 Clearwater Drive
Minnetonka, MN 55343-8995 USA
Telephone: (952) 933-2277
Fax: (952) 933-0141
Toll Free: (800) 848-1750

To order parts, the following information is necessary:

1. Pump model number (see pump label)
2. Pump serial number (see pump label)
3. Other nameplate information such as operating temperature, materials of construction, or material code and type of mechanical seal
4. Motor horsepower, motor frame size, and enclosure specification
5. Part name
6. Part number
7. Quantity desired
8. Specific materials of construction, if any.

## 11.0 WARRANTY

### TONKAFLO PUMP WARRANTY

GE, warrants its pumps to be free from defects in design, material or workmanship for a period of 15 months from receipt or 12 months from installation of the product, whichever occurs first, when said products are operated in accordance with written instructions and are installed properly. If Tonkaflo pumps are altered or repaired without prior approval of GE, all warranties are void. If any defects or malperformance occur during the warranty period, GE's sole obligation shall be limited to alteration, repair, or replacement at GE's expense, F.O.B. factory, of parts or equipment, which upon return to GE and upon GE's examination prove to be defective. Equipment and accessories not manufactured by GE are warranted only to the extent of and by the original manufacturer's warranty. GE shall not be liable for damage or wear to equipment caused by abnormal conditions, excessive temperature, vibration, failure to properly prime or to operate equipment without flow, or caused by corrosives, abrasives or foreign objects. The foregoing warranty is exclusive and in lieu of all other warranties, whether expressed or implied, including any warranty of merchantability or fitness for any particular purpose. In no event shall GE be liable for consequential or incidental damages.

PUMP MODEL NUMBER: _____

PUMP SERIAL NUMBER: _____

For more information call 952-933-2277 or 800-848-1750 in the U.S., or visit **www.gewater.com**.

## GE Infrastructure
## Water & Process Technologies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