CASING- Visually inspect for signs of wear, corrosion, or pitting. The casing should be replaced if wear exceeds *Ys*" deep. Check gasket surface for signs of corrosion or irregularities.

IMPELLER- Visually inspect impeller vanes for wear, erosion, or corrosion damage. If vanes are worn more than *Ys*"deep, or if they are bent, the impeller should be replaced.

FRAME ADAPTER- Visually inspect for cracks, warpage or corrosion damage. Replace if any of these signs appear.

BEARING HOUSING- Visually inspect for signs of wear or corrosion. Check for cracks and/orpits. Check tolerances as noted below. Replace if worn or out of tolerance.

SEAL CHAMBER/BOX COVER- Visually inspect for cracks, pitting, erosion, or corrosion. Check face of cover for wear, scoring or grooves. Replace if worn more than 1/8" deep.

BEARING FITS INCHES (MM) BEARING FITS INCHES (MM)

	STP	MTP	LTP	XLTP
Frame Inboard I.D.	2.8346	3.9370	4.7244	5.5118
	(72.000)	(100.000)	(120.000)	(140.000)
	2,8353	3.9379	4.7253	5.5128
	(72.019)	(100.022)	(120.022)	(140.025)
Bearing Inboard O.D.	2.8346	3.9370	4.7244	5.5118
	(72.000)	(100.000)	(120.000)	(140.000)
	2.8341	3.9364	4.7238	5.5111
	(71.987)	(99.985)	(119.985)	(139.982)
Shaft Inboard O.D.	1.3875	1.7722	2.1660	2.5597
	(35.013)	(45.013)	(55.015)	(65.015)
	1.3871	1.7718	2.1655	2.5592
	(35.002)	(45.002)	(55.002)	(65.002)
Bearing Inboard I.D.	1.3780	1.7717	2.1654	2.5591
	(35.000)	(45.000)	(55.000)	(65.000)
	1.3775	1.7712	2.1648	2.5585
	(34.988)	(44.988)	(54.985)	(64.985)
Shaft Outboard O.D.	1.1815	1.7722	1.9690	2.5597
	(30.011)	(45.013)	(50.013)	(65.015)
	1.1812	1.7718	1.9686	2.5592
	(30.002)	(45:002)	(50.002)	(65.002)
Bearing Outboard I.D.	1.1811	1.7717	1.9685	2.5591
	(30.000)	(45.000)	(50.000)	(65.000)
	1.1807	1.7712	1.9680	2.5585
	(29.990)	(44.988)	(49.988)	(64.985)
Bearing Housing I.D.	2.8346	3.9370	4.3307	5.5118
Outboard	(72.000)	(100.000)	(110.000)	(140.000)
	2.8353	3.9379	4.3316	5.5128
	(72.019)	(100.022)	(110.022)	(140.025)
Bearing O.D. Outboard	2.8346	3.9370	4.3307	5.5118
	(72.000)	(100.000)	(110.000)	(140.000)
	2.8341	3.9364	4.8301	5.5111
	(71.987)	(99.985)	(109.985)	(139.982)

SHAFT RUNOUT (WITH SLEEVE) IN INCHES

	STP	MTP	LTP	XLTP
At Sleeve Journal	0.002	0.002	0.002	0.002
At Coupling Journal	0.002	0.002	0.002	0.002

ASSEMBLY (See Isometric View, Pages 53 & 54)

ROTATING ELEMENT AND BEARING FRAME, STP AND MTP FRAMES

BEARING FRAME - INSPECT TAPPED CONNECTIONS FOR DIRT, CLEAN AND CHASE THREADS AS NECESSARY. USE THREAD SEALANT ON ALL THREADS AND FITTINGS.

- (a) Install oil fill plug (113A), oil sight glass (143), oil mist/grease plugs (408H), oil cooler inlet and outlet plugs (408L) and (408M).
- (b) Attach bearing frame foot (241) with bolts (370F).

POWER END ASSEMBLY

- (a) Install outboard bearing (112) on shaft. If bearings are grease lubricated install single shielded bearing with shield toward the impeller. Bearings can be pressed on the shaft with an arbor press, or if available, an induction heater can be used. Follow all instructions and recommendations of the heater manufacturer. When using a press, make sure that force is applied to the inner bearing race only.
- (b) Install bearing lock washer (382) on shaft. Place tang of lock washer in shaft keyway under bearing.
- (c) Thread locknut (136) onto shaft. Tighten nut until snug, with a spanner wrench, and bend any tang of lock washer over flat on nut. Slide bearing retaining snap ring (361A) over shaft, flat side toward the bearing.
- (d) Install inboard bearing (168A). If using a press, make sure force is applied on inner bearing race only. NOTE: If bearing is grease lubricated, it has a single shield. The bearing is installed with the shield away from the impeller.
- (e) Install new 0-ring (496) on bearing housing (134). Apply thin coating of oil on outside of bearing and inside of bearing housing. Lightly lubricate shaft to assist with installation of labyrinth seal 0-rings.
- (f) Slide coupling end of pump shaft through bearing housing. Press housing evenly, DO NOT FORCE, until bearing seats against shoulder in bearing housing. Support outer face of bearing isolator to prevent accidental separation of rotor from stator.
- (g) Install bearing snap ring (361A) in groove in bearing housingbore.

NOTE

Locate ends of retaining ring so that they do not obstruct the flow of oil through the return groove. Rotate shaft to make sure that it turns freely.

(h) Apply thin film of lubricant to outside of bearing housing (134).

- (i) Apply thin film of lubricant to frame bore I.D. Install shaft assembly into bearing frame (228). Rotate shaft to make sure that it turns freely.
- (j) Install cap screws (370C), into bearing frame (228).
- (k) Install jack bolts (370D) and lock nuts (423). Hand tighten evenly.
- (1) On MTP frames, install new 0-ring gasket in frame face (360D).

ASSEMBLY (See Isometric View, Pages 55 & 56)

ROTATING ELEMENT AND FRAME ASSEMBLY, LTP AND XLTP

BEARING FRAME - INSPECT TAPPED CONNECTIONS FOR DIRT, CLEAN AND CHASE THREADS AS NECESSARY. USE THREAD SEALANT ON ALL THREADS AND FITTINGS.

- (a) Install oil fill plug (113A), oil sight glass (143), oil mist/grease plugs (408H), oil cooler inlet and outlet plugs (408L) and (408M).
- (b) Attach bearing frame foot (241) with bolts (370F).

ROTATING ELEMENT-LTP FRAME

- (a) If removed, install oil ring (248A) on shaft. OIL RING IS A PRESS FIT ONTO SHAFT. USE, PROPER SIZE DRIVE TOOL TO PREVENT DAMAGE.
- (b) Install bearing cover (109C) on shaft.
- (c) Install outboard bearings (112). NOTE, LTP FRAMES USE DUPLEX ANGULAR CONTACT BEAR-INGS. MAKE SURE BEARINGS ARE MOUNTED IN THE CORRECT ORDER, BACK TO BACK.
- (d) Install inboard bearing (168A). If using a press, make sure force is applied on inner bearing race only NOTE: If bearing is grease lubricated, it has a single shield. The bearing is installed with the shield away from the impeller.
- (e) Lightly lubricate bearings with oil and coat the outside of outboard bearing (112) and bearing housing bore (134). Slide bearing housing (134) onto shaft and over outboard bearing. DO NOT FORCE.
- (f) Install bearing cover bolts (370G), check shaft so that it turns freely. Tighten bolts to 55 IN-LBS for Lubricated threads or 83 inch-lbs. for dry threads.
- (g) Install new 0-ring forbearing housing (496).
- (h) Lightly lubricate outside surface of bearing housing (134) and inside diameter of frame bearing bore (228).
- (i) Install shaft and bearing assembly into bearing housing (228). Rotate shaft to see that it turns freely.
- (j) Install bearing cover bolts (370C), hand tighten only. Install jack bolts (370D) with lock nuts (423). and tighten only.

ROTATING ELEMENT-XLTP FRAME

- (a) Install outboard bearing (112)on shaft.
- (b) Install bearing lock washer (382) on shaft. Place tang of lock washer in shaft keyway. Thread locknut (136) onto shaft. Tighten nut until snug and bend tang of lock washer (382) over flat on nut. If it is necessary to adjust the position of the locknut so that the tang will lineup with the flat, always tighten the nut, never loosen it.
- (c) Lightly lubricate bearings with oil and coat the outside of outboard bearing (112) and bearing housing bore (134). Slide bearing housing (134) onto shaft and over outboard bearing. DO NOT FORCE.
- (d) Install gasket (360C), bearing cover (109C) and bolts. Check to see that shaft turns freely. Refer to Appendix, page 42, for bolt torque values.
- (e) Install inboard bearing (168A). If bearing is greaseable type, install with shield away from impeller. Lightly lubricate bearing with oil or grease as required.
- (f) Install new 0-ring for bearing housing (496). Lubricate outside of bearing housing and inside diameter of frame bearing bore (228) with oil.
- (g) In.stall shaft and bearing assembly into frame (228). Rotate shaft to see that if it turns freely.
- (h) Install bearing cover bolts (370C), hand tighten only. Install jack bolts (370D) with lock nuts (423), hand tighten only.
- (i) Install bearing frame foot (241), hand tighten bolts (370F).

POWER FRAME CHECKS AND LIQUID END ASSEMBLY-ALL MODELS

- (a) Place power frame in the horizontal position, support frame assembly so that it does not tip over. Check shaft end play by moving shaft forward and backward by hand. Dial indicator movement should be within tolerances listed in Appendix. If values are greater, disassemble power end for inspection. See troubleshooting, page 33.
- (b) Install shaft sleeve (126). Install impeller, (101) on shaft (122). Rotate shaft one full revolution, and check for shaft/sleeve run out. See tolerances listed in Appendix. Maximum allowable indicator runout is 0.002 inch. If values are greater, disassemble power end for inspection. See troubleshooting, page 33.
- (c) Attach dial indictor to shaft, place indicator against face of frame. Rotate shaft by hand so that indicator sweeps the entire fit for 360 degrees. Maximum indicator runout should be no more than 0.005 inch. If greater, disassemble and determine cause.
- (d) Lightly lubricate adapter 0-ring (360D) and install in frame face. Install frame adapter (108) with bearing isolator seal (333A, MTP frame only) onto the power end assembly, align bolt holes and dowel pin holes. Install dowel pins (469B) and frame to adapter bolts (370B). See Appendix for bolt torques. Tighten evenly in a crisscross manner.
- (e) Attach dial indicator to shaft, place indicator against mating face of adapter. Rotate shaft 360 degrees. Total indicator runout should not exceed 0.005. With dial indicator still attached to shaft, position indicator on inside diameter of mating face. Rotate shaft again a full 360 degrees. Total indicator runout should not exceed 0.005 inch. If greater values are measured, disassemble and determine cause be- fore proceeding with assembly.

PACKED TYPE PUMPS

- (a) Install stuffing box cover (184) with studs and nuts (370H, 423B)
- (b) Mount dial indicator on end of shaft and check seal chamber cover run out. Rotate shaft a full 360 degrees. Maximum dial indicator reading should not exceed 0.005 on any of the following readings:
 - (1) Outside diameter of the pilot fit.
 - (2) Face of gasket surface.
 - (3) Box cover face.
- (c) Apply a light coating of anti-seize compound to area of shaft under the sleeve. Install shaft sleeve (126). Be sure sleeve is seated against shoulder of shaft and that the anti-rotation pin is located in notch on sleeve shoulder.
- (d) Install impeller with 0-ring. Thread impeller on shaft until it seats against shaft sleeve face. Slide impeller wrench over shaft and coupling key. Tighten impeller, by raising wrench counterclockwise (viewed from impeller end) and slamming it down (clockwise) against the work bench. Repeat two or three times.
- (e) Attach dial indicator to flange of frame adapter. Position indicator on tip of impeller vane. Rotate shaft 360 degrees. Check impeller run out from vane tip to vane tip. Total indicator runout should be less than 0.005 inch.
- (f) Install packing in stuffing box. Stagger each ring joint 90 degrees. Two rings should be inserted into the bottom of the box, followed by the lantern ring (105) and then three more rings of packing. Make sure lantern ring is located at the flushing connection, otherwise no flushing will occur. Install packing gland haves (107), hand tighten evenly.

MECHANICAL SEAL PUMPS

- (a) Install seal chamber (184) with studs and nuts (370H, 423B).
- (b) Mount dial indicator on end of shaft and check seal chamber cover run out. Rotate shaft a full 360 degrees. Maximum dial indicator reading should not exceed .005 on any of the following:
 - (1) Outside diameter of the pilot fit.
 - (2) Face of gasket surface.
 - (3) Seal chamber cover face.
- (c) Install shaft sleeve. Apply a light coating of anti-seize compound to area of shaft under the sleeve. Install shaft sleeve (126). Be sure sleeve is seated against shoulder of shaft and that the anti-rotation pin is located in notch on sleeve shoulder.
- (d) Install impeller less 0-ring. Thread impeller on shaft until it seats against shaft sleeve face. Slide impeller wrench over shaft and coupling key. Tighten impeller, by raising wrench counterclockwise (viewed from impeller end) and slamming it down (clockwise) against the work bench. Repeat two or three times.
- (e) Attach dial indicator to flange of frame adapter. Position indicator on tip of impeller. Rotate shaft 360 degrees. Check impeller run out from vane tip to vane tip. Total indicator runout should be less than 0.005 inch.
- (f) Apply bluing solution to the shaft sleeve. Scribe a mark on the shaft sleeve at the face of the seal chamber/stuffing box cover. This will locate a reference point for the installation of the mechanical seal.
- (g) Remove impeller and shaft sleeve. Remove seal chamber cover.

- (h) Install mechanical seal stationary into mechanical seal gland, (250). Follow seal manufacturer's instructions.Slideseal gland with stationary seal seat overshaft and position gland back towards the adapter face.
- (i) Reinstall shaft sleeve. Follow the manufacturer's instructions and install the rotating seal assembly on the shaft sleeve/shaft.
- (j) Install seal chamber (184) with studs and nuts (370H,423B).
- (k) Install impeller with 0-ring. Thread impeller on shaft until it seats against shaft sleeve face. Slide impeller wrench over shaft and coupling key. Tighten impeller, by raising wrench counterclockwise (viewed from impeller end) and slamming it down (clockwise) against the work bench. Repeat two or three times.
- (1) Install mechanical seal gland (250) with nuts, (353A). Tighten nuts evenly. Check shaft to see if it can be rotated by hand. If binding or rubbing occurs, determine cause and correct before proceeding. See chart below for possible causes.

Symptom	Cause
Excessive Shaft/Sleeve Runout	Sleeve Worn-Replace Shaft Bent/Twisted-Replace
Excessive Bearing Frame Flange Runout	Shaft Bent/Twisted—Replace Frame Flange Warped—Replace
Excessive Shaft End Play	Bearing Internal Clearance Too Great—Replace Bearings Snap Ring Loose Or Broken—Replace Or Reseat
Excessive Frame Adapter Runout	Adapter Eroded/Warped—Replace
Excessive Impeller Vane Tip Runout	Vane(S) Broken or Worn-Replace
Excessive Seal Chamber	Seal Chamber Not Seated
Runout	Seal Chamber Worn/Warped
	Seal Chamber Corroded–Eroded–Replace Cover

POWER FRAME Troubleshooting

WARNING

Proper methods to handle the back pull out assembly must always be used to avoid physical injury or damage.

- (a) Inspect casing. Clean casing fit and install gasket (351) onto seal chamber/stuffing cover.
- (b) Loosen cap screws (390C) and jacking bolts (370D). Install back pull out assembly in casing.
- (c) Apply anti seize compound to casing bolts (370). Install casing bolts hand tight. Torque casing bolts to values shown in Appendix.
- (d) Check lateral movement of impeller in casing. Acceptable range is between .030 inch and .065 inch. Clearance beyond these limits indicates defective parts, improper installation or excessive pipe strain. Determine cause and correct before proceeding.
- (e) Set impeller clearance as detailed in Appendix.
- (f) Install any auxiliary piping or flush plans.
- (g) Check shaft to see if it can be rotated by hand. If binding or rubbing occurs, determine cause and correct before proceeding.

REFILL POWER FRAME WITH OIL, OR GREASE BEARINGS AS DESCRIBED IN THE PRELIMINARY START UP CHECK LIST. FOLLOW ALL INSTRUCTIONS IN START UP CHECK LIST AND PROCEED WITH PUMP START-UP.

OILLUBRICATED BEARINGS

NOTE

PUMPS ARE NOT SHIPPED FROM THE FACTORY WITH OIL. RESPONSIBILITY FOR FILL-ING THE BEARING FRAME WITH THE PROPER TYPE AND AMOUNT OF OIL IS THE RESPONSIBILITY OF THE USER.

Remove item (113A) oil fill plug and fill frame with oil to the center of the sight glass. If a Trico oiler is used, follow instructions below in Figure A.



- Remove adjustment assembly from oiler.
- Adjust bars to dimension "A".
- Lock Into position.
- Replace adjustment assembly in oiler.

Pump Group	Oiler Size	A	В
STP, MTP, LTP	#3 (4 Ounce)	13/16"	1⁄2"
XLTP	#5 (8 Ounce)	13/16	1⁄2"

Figure A. Oil lubricated bearings, Trico oiler only

A high-quality turbine oil with rust and oxidation inhibitors should be used. Under normal operating conditions, an oil of 300 SSU viscosity at 100° F should be used where pumping temperatures do not exceed 350° F (177°C). Fill frame with oil to the center of the sight glass through oil fill plug (113A). Fill oiler bottle and replace in oiler housing. We recommend a breather to be installed in the location of the oil fill plug.

Change oil after 200 hours of operation for new bearings, then every 2000 hours or three months whichever occurs first.

Frame	Pints	Milliliters	
STP	1.0	473	
MTP	2.6	1250	
LTP	3.0	1420	
XLTP	7.4	3500	

BEARING FRAME OIL CAPACITY

RECOMMENDED OIL MANUFACTURERS

Atlantic Richfield	DURO 68	
Chevron	CHEVRON TURBINE OIL GST 68	
Exxon	TERESSTIC 68	
Texaco Inc.	Regal R&O 68	
Mobil	DTE Heavy-Medium	
Amoco Oil	Amoco Industrial Oil #68	

GREASE LUBRICATED BEARINGS

NOTE

Grease lubricated ball bearings are optional on the ANSI series. These units can be identified by grease fittings located on the bearing frame (see figure b). Pumps ordered with greaseable bearing from the factory will contain some grease, but not a sufficient amount for placing the pump into continuous service. It is necessary to completely grease the bearings as described below before placing the pump on line. Failure to do this may result in repairs not covered by the product warranty.

(a) Clean any dirt or foreign matter from the grease fittings. Remove grease relief plugs from bottom of frame. Pump grease through the fittings and into each bearing cavity until fresh grease comes out of the relief ports. REGREASE BEARINGS EVERY 2000 HOURS OF OPERATION OR 3 MONTHS, WHICHEVER OCCURS FIRST. For pumping temperatures, less than 350° F, use a lithium based mineral oil grease of NLGI consistency equal to NO. 2. NEVER MIX GREASES OF DIFFERENT CONSISTENCIES OR OF DIFFERENT TYPES. WHEN CHANGING FROM ONE TYPE GREASE OR CONSISTENCY TO ANOTHER, ALWAYS REMOVE THE BEARINGS AND CLEAN OUT ALL THE OLD GREASE.

NGLI GRADE 2	(350 Degrees F. MAX.)
Mobil	Mobilux EP2
Exxon	Unirex N2
Sunoco	Multipurpose EP
SKF	LGMT 2
NGLI GRADE 3	(500 Degrees F. MAX.)
Exxon	Unirex 3
SKE	I CMT 9

ACCEPTABLE GREASE MANUFACTURERS

FIELD CONVERSION FROM FLOOD OIL TO OIL MIST BEARINGS

There are several types of oil mist configurations available from various manufacturers. The following instructions are for conversion of flood oil lubrication to a continuous purge oil mist system.

- (a) Install oil mist inlet connections (14) inch at top inboard and outboard tapped connections on bearing frame. SEE FIGUREC.
- (b) Remove oil drain plug (408A) at bottom center of frame% inch NPT plug. Install drain connection for oil mist system.
- (c) Refer to oil mist manufacturer's system instructions for operation and adjustment.



Figure C. Oil Mist system connection (MTP Frame Illustrated)

BEARING IDENTIFICATION MRC - SKF OR EQUAL

	Inboard (RadialBearing)			
Frame	Oil	Grease		
STP	207S	207SF		
MTP	309S	309SF		
LTP	3118			
XLTP	313S	313SF		
Outbo	ard (Thrust Bearing	g/Double Row)		
Frame	Oil	Grease		
STP	5306	5360F		
MTP	5309	5309F		
LTP	7310 DUPLEX			
XLTP	5313	5313F		

IMPELLER CLEARANCE ADJUSTMENT

If a gradual loss in head and/or capacity occurs, performance may be restored by adjusting the impeller. If performance cannot be restored by adjustment, the pump should be disassembled and impeller and casing inspected for wear. Impeller clearance is the measurement between the edge of the impeller vanes and the surface of the casing. The following table should be used as a guide for setting the impeller clearance under various operating temperatures.

Temperature	Impeller Clearance
up to 200°F (93°C)	.015 in. (0.38mm)
201°F to 250°F (121°C)	.017 in. (0.43mm)
251°F to 300°F (149°C)	.019 in. (0.48mm)
301°F to 399°F (177°C)	.021 in. (0.53mm)
400°F to 450°F (218°C)	.023 in. (0.58mm)
451°F to 500°F (246°C)	.025 in. (0.64mm)

FEELER GAUGE ADJUSTMENT OF IMPELLER CLEARANCE

(a) LOCK OUT POWER SUPPLY TO MOTOR.

(b) Remove coupling guard. Loosen jack bolts (370D) and jam nuts (423). Tighten bearing housing bolts (370C) evenly, while slowly rotating the shaft until the impeller just starts to rub on the casing. Using a feeler gauge; set the gap between the three housing bolts (370C) and the bearing housing. Set the gap according to the table as required. SEE FIGURE D.



Figure D.

- (c) Tighten jacking bolts (370D) evenly, until bearing housing backs out and contacts the bearing housing bolts (370C). Tighten jam nuts (423) evenly. Rotate shaft to make sure that it turns freely.
- (d) Reinstall coupling guard.

DIAL INDICATOR ADJUSTMENT OF IMPELLER CLEARANCE

(a) LOCK OUT POWER SUPPLY TO MOTOR.

- (b) Remove coupling guard and coupling.
- (c) Place a dial indicator with a magnetic mounting base on the surface of the pump baseplate. Position indicator against face of pump shaft. SEE FIGURE E.



Figure E.

- (d) Loosen jacking bolts (370D) and jam nuts (423).
- (e) Tighten bearing housing bolts (370C) evenly, while slowly rotating the shaft until the impeller just starts to rub on the casing. Set dial indicator to zero.
- (f) Tighten the jacking bolts (370D) evenly, until they contact the bearing frame. Continue to tighten the jacking bolts evenly, about one flat at a time, drawing the bearing housing away from the frame until the dial indicator shows the proper clearance, from .015 inch to .025 inch.
- (g) Tighten bearing housing bolts (370C) evenly, then tighten jacking bolts (370D) evenly. Make sure dial indicator reading does not move from the proper setting. Rotate shaft to make sure that it turns freely.
- (h) Reinstall coupling and coupling guard.

Frame	Double Row	
STP	.0011 IN. (.028MM)	
	.0019 IN. (.047MM)	
MTP	.0013 IN. (.033MM)	
	.0021 IN. (.054MM)	
LTP	.0010 IN. (.026MM) DUPLEX	
	.0015 IN. (.038MM) DUPLEX	
XLTP	.0014 IN. (.036MM)	
	.0023 IN. (.058MM)	

ASSEMBLY CHECKS SHAFT END PLAY

BOLT TORQUE VALUES

Туре	Frame Size	Threads Dry	Threads Lubricated
Casing Bolts	STP 6 inch	45 Ft Lbs (60nm)	30 Ft Lbs (40nm)
	STP 8 inch	30 Ft Lbs (40nm)	20 Ft Lbs (27nm)
Frame To			
Adapter Bolts	STP	Not Applicable	
Bearing Cover			
Bolts	CONTRACTOR OF A DO		2020 Contraction of the second statement of the second second second second second second second second second s
ACCOUNT OF STREET			
Deemin a End			

Bearing End

Cover Bolts

PARTS LIST WITH MATERIALS OF CONSTRUCTION

			MATERIAL	
ITEM #	ΟΤΥ	DESCRIPTION	DI ALL CD4MCu ALLOY 31785 MONEL NICKEL HAST HAST C	
100	1	Casing	D.I. 316SS CD4 ALLOY 20 317SS MONEL NICKEL HAST B HAST C	
370		Bolt, Casing	STEEL STAINLESS STEEL	
NA	1	Foot, Casing	CASTIRON	
358A	1	Plug, Casing Drain	STEEL SS ALLOY 20 ALLOY 20 31755 MONEL NICKEL HAST B HAST C	
101	1.	Impeller	316SS 316SS CD4 ALLOY 20 317SS MONEL NICKEL HAST B HAST C	
122	1	Shaft	4140 STEEL 316SS 316SS	
184	1	Cover, Stuffing Box	316SS 316SS CD4 ALLOY 20 317SS MONEL NICKEL HAST B HAST C	
370H	2	Box Cover/Adapter Stud	STAINLESS STEEL	
423B	2	Nut, Box Cover/Adapter Stud	STAINLESS STEEL	
106	5	Packing	ARAMID - PTFE SYNTHETIC	
126	1.	Siseve, Shaft	316SS ALLOY 20 ALLOY 20 317SS MONEL NICKEL HAST B HAST C	
NA	1	Pin, Sleeve	STAINLESS STEEL 420	
168A	1	Bearing, Inboard	STEEL - SINGLE ROW BALL	
250	1	Gland, Mechanical Seal	VARIES	
107	1	Gland, Packing	316SS ALLOY 20 317SS MONEL NICKEL HAST B HAST C	
353	4*	Stud, Gland	STAINLESS STEEL	
353A	4*	Nut, Gland Stud	STAINLESS STEEL	
112	1	Bearing, Outboard	STEEL - DOUBLE ROW BALL	
228	1	Frame	STP - DUCTH F IRON - MTP TP XI TP - CAST IRON	
241	1	Foot, Frame	CAST IDON	
408H	4	Pfup, Frame Lubrication Port	Steel	
408L	1	Plus, Oil Cooler Inlet	STEEL	
408A	1	Pluo. Frame Drain	STEEL STEEL	
3705		Bolt Frame Fool to Frame	STEEL CTEEL	
529		Washer Frame Foot	OTEL.	
408M		Pite Oil Conlar Ordial (Not Shown)	STEEL	
1404		Plug, Of Could Could (Not Shown)	STEEL	
1134		Plug, Ori Hill	TEFLON	
136		Locknut, Bearing	SIEEL	
105		Ring, Lantern	TEFLON	
134		Housing: Bearing, Outboard	CASTIHON	
3700	3	Bolt, Bearing Housing	STEEL	
370D	3	Jack Bolt, Bearing Housing	STEEL	
423	3	Jamnut, Bearing Housing Jack Bolt	STEEL	
408H	2	Plug, Bearing Housing Lubrication - XI,TP Only	STEEL	
361A	1	Snap Ring, Bearing	STEEL	
109C	<u> </u>	Cover, Bearing, Outboard	CAST IRON	
370G	6	Bolt, Bearing Cover	STEEL	
360C	1	Gasket - XLTP Only	VEGETABLE FIBER	
496A	1	Gasket, Shaft Sleeve	TEFLON	
400	1	Key, Coupling	STEEL	
248A	1	Ring, Oil - LTP Frame Only	STEEL	
365	1	Seal, Mechanical Stationary Element	VARIES	
382	1	Lock Washer, Bearing	STEEL	
108	1	Adapter	DUCTILE IRON	
370B	4	Bolt, Frame/Adapter	. STEEL	
469B	2	Dowel Pin, Frame/Adapter	STEEL.	
351	1	Gasket, Case	ARAMID FIBER WITH EPDM BINDER	
360Q	1	Gasket; Gland, Mechanical Seal	VARIES	
360D	1	Frame/Adapter - O-ring	BUNA N	
496	1	Bearing Housing/Frame - O-ring	BUNA N	
383	1	Seal, Mechanical Rotating Element	VARIES	
333A	1	Labyrinth, Inboard Frame	BRONZE / VITON	
332A	1	Labyrinth, Outboard Frame	BRONZE / VITON	
-	1	O-ring	VITON	
_	1	O-ring	VITON	
-	1	O-ring	VITÓN	
-	1	O-ring	VITON	
143	1	Gauge: Sight, Oil	STEEL / GLASS	
	d have such	O Physics 2 Martine 114 and VI TO Frances	Minimum 0 CTD (Manimum 04 V) TD	

MATERIALS OF CONSTRUCTION			
MATERIAL	CODE	SPECIFICATION	
316 STAINLESS STEEL	086	CAST, ASTM A743, GRADE CF-BM	
317 STAINLESS STEEL	653	CAST, ASTM A743, GRADE CG-BM	
ALLOY20	654	CAST, ASTM A743, GRADE CN-7M	
CAST IRON	040	ASTM A48, CLASS 30	
CAST IRON	650	ASTM A48, CLASS 25	
CD4MCu	507	ASTM A743, GRADE CD4MCu	
DUCTILE IRON	596	ASTM A395, GRADE 60-40-18	
DUCTILE IRON	680	ASTM A536, GRADE 65-45-12	
HASTELLOYB	101	ASTM A494, GRADEN - 12MV, CLASS 1	
HASTELLOYC	102	ASTM A494, GRADE CW-2M	
MONEL	651	CAST, ASTM A494 M-35	
NICKEL	485	ASTM A494, GRADE C2100	
STEEL	075	4140 STEEL, ASTM A331-64	
TITANIUM	652	CAST, ASTM 8367, GRADE C-3	

STP FRAME Cross Sectional Drawing



ITEM#	ΟΤΥ	DESCRIPTION
100	1	Casing
370	8	Bolt. Casing
358A	1	Plug, Casing Drain
101	1	Impeller
122	1	Shaft
184	1	Cover, Stuffing Box
370H	2	Box Cover/Adapter Stud
4230	2	Nut, Box Cover/Adapter Stud
106	5	Packing
126	1	Sleeve, Shaft
NA	1	Pin, Sleeve
168A	1	Bearing, Inboard
250	1	Gland, Mechanical Seal
107	1	Gland, Packing
353	4•	Stud, Gland
353A	4•	Nut, Gland Stud
112	1	Bearing, Outboard
228	1	Frame
406H	4	Plug, Frame Lubrication Port
406L	1	Plug, Oil Cooler Inlet
406A	1	Plug, Frame Drain
408M	1	Plug, Oil Cooler Outlet (Not Shown)
113A	1	Plua, Oil Fill

ITEM#	QTY	DESCRIPTION
136	1	Locknut, Bearing
105	1	Ring, Lantern
134	1	Housing; Bearing, Outboard
370C	3	Bolt, Bearing Housing
370D	3	Jack Bolt, Bearing Housing
423	3	Jam nut, Bearing Housing Jack Bolt
361A	1	Retaining Ring, Bearing
496A	1	Gasket, Shaft Sleeve
400	1	Key, Coupling
365	1	Seal, Mechanical Stationary Element
362	1	Lock Washer, Bearing
108	1	Adapter 8 • Pumps Only
370B	4	Bolt Frame/Adapter
351	1	Gasket, Case
350Q	1	Gasket; Gland, Mechanical Seal
496	1	Gasket, Bearing Housing/Frame
363	1	Seal, Mechanical Rotating Element
333A	1	Labyrinth, Inboard Frame
332A	1	Labyrinth Outboard Frame
-	1	0-ring
-	1	0-ring
-	1	0-rlng
143	1	Gauge; Sight, Oil

*Packing Gland has only 2 Studs & Nuts

MTP FRAME Cross Sectional Drawing



ITEM#	QTY	DESCRIPTION		
100	1	Casing		
370	3	Bolt, Casing		
NA	1	Foot, Casing		
358A	1	Plug, Casing Drain		
NA	2	Bolt Casing Foot		
101	1	Impeller		
122	1	Shaft		
184	1	Cover, Stuffing, Box		
370H	2	Box Cover/Adapter Stud		
4238	2	Nut, Box Cover/Adapter Stud		
106	5	Packing		
126	1	Sleeve, Shaft		
NA	1	Pin, Sleeve		
168A	1	Bearing, Inboard		
250	1	Gland, Mechanical Seal		
107	1	Gland, Packing		
353	4•	Stud, Gland		
353A	4•	Nut, Gland Stud		
112	1	Bearing, Outboard		
228	1	Frame		
241	1	Foot, Frame		
406H	4	Plug, Frame Lubrication Port		
406L	1	Plug; Oil Cooler Inlet		
408A	1	Plug, Frame Drain (Not Shown)		
529	2	Bolt, Frame Foot to Frame		
370F	1	Washer, Frame Foot		

*Packing Gland has only 2 Studs & Nuts

IIEM#	QIY	DESCRIPTION		
406M	1	Plug, Oil Cooler Outlet (Not Shown)		
113A	1	Plug, Oil Fill		
136	1	Locknut, Bearing		
105	1	Ring, Lantern		
134	1	Housing- Bearing, Outboard		
370C	3	Bolt Bearing Housing		
370D	3	Jack Bolt. Bearing Housing		
423	3	Jam Nut, Bearing Housing Jack Bolt		
361A	1	Retaining Ring, Bearing		
496A	1	Gasket, Shaft Sleeve		
400	1	Key, Coupling		
365	1	Seal, Mechanical Stationary Element		
362	1	Lock Washer, Bearing		
108	1	Adapter		
370B	4	Bolt, Frame/Adapter		
469B	2	Dowel Pin, Frame/Adapter		
351	1	Gasket, Casing		
360Q	1	Gasket; Gland, Mechanical Seat		
360D	1	Gasket, Frame/Adapter		
496	1	Gasket, Bearing Housing/Frame		
383	1	Seal, Mechanical Rotating Element		
333A	1	Labyrinth, Inboard Frame		
332A	1	Labyrinth, Outboard Frame		
-	1	0-ring		
-	1	0-ring		
-	1	0-ring		
-	1	0-ring		
143	1	Gauge; Sight, Oil		

LTPFRAME Cross Sectional Drawing



Packing Gland has only 2 Studs & Nuts

XLTP FRAME Cross Sectional Drawing



ITEM#	QTY	DESCRIPTION	
100	1	Casing	
370	4	Bolt, Casing	
358A	1	Plug, Casing Drain	
101	1	Impeller	
122	1	Shaft	
184	1	Cover, Stuffing Box	
370H	2	Box, Cover/Adapter Stud	
4238	2	Nut, Box Cover/Adapter Stud	
106	5	Packing	
126	1	Sleeve, Shaft	
NA	1	Pin, Sleeve	
168A	1	Bearing, Inboard	
250	1	Gland, Mechanical Seal	
107	1	Gland, Packing	
353	4•	Stud, Gland	
353A	4•	Nut, Gland Stud	
112	1	Bearing, Outboard	
228	1	Frame	
241	1	Foot, Frame	
406H	4	Plug, Frame Lubrication Port	
408L	1	Plug, Oil Cooter Inlet	
408A	1	Plug, Frame Drain	
370F	2	Bolt, Frame Foot to Frame	
529	1	Washer, Frame Foot	
408M	1	Plug, Oil Cooler Outlet (Not Shown)	
113A	1	Plug, Oil Fill	
136	1	Locknut, Bearing	

ITEM#	QTY	DESCRIPTION	
105	1	Ring, Lantern	
134	1	Housing; Bearing, Outboard	
370C	3	Bolt, Bearing Housing	
370D	3	Jack Bolt, Bearing Housing	
423	3	Jam Nut, Bearing Housing Jack Bolt	
408H	2	Plug, Bearing Housing Lubrication	
109C	1	Cover; Bearing, Outboard	
370G	6	Bolt, Bearing Cover	
360C	1	Gasket	
496A	1	Gasket, Shaft Sleeve	
400	1	Key, Coupling	
365	1	Seal, Mechanical Stationary, Element	
382	1	Lock Washer, Bearing	
108	1	Adapter	
370B	4	Bolt, Frame/Adapter	
469B	2	Dowel Pin, Frame/Adapter	
351	1	Gasket, Case	
360Q	1	Gasket; Gland, Mechanical Seal	
360D	1	Gasket, Frame/Adapter	
496	1	Gasket, Bearing Housing/Frame	
383	1	Seal, Mechanical Rotating Element	
333A	1	Labyrinth, Inboard Frame	
332A	1	Labyrinth, Outboard Frame	
-	1	0-ring	
143	1	Gauge; Sight, Oil	

*Packing Gland has only 2 Studs & Nuts

ANSI PROCESS PUMPS ENGINEERING DATA



PRESSURE/TEMPERATURERATINGS

CONTACT FACTORY FOR SUCTION PRESSURES OVER 160 PSIG.

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Engineering Data



TABLE DIMENSIONS: A, D, G AND G' ARE NOT APPLICABLE TO THE TAPERED DESIGN.



Pump Trouble-Shooting

Common Pump Operational Problems

Common Pump Operational Problems

Problem	Probable Cause	Remedy	
	Improper pump/driver alignment	Align shafts.	
	Partly clogged impeller causing imbalance.	Back-flush pump to clean impeller.	
	Broken or bent impeller or shaft.	Replace as required	
Pump is noisy or vibrates.	Foundation net rigid.	Tighten hold down bolts of pump and motor or adjust stills.	
	Worn bearings.	Replace	
	Suction or discharge piping not anchored or property supported.	Anchor per Hydraulic Institute Standards Manual recommendations	
	Pump is cavitating.	System problem.	
	Air leak thru gasket.	Replace gasket.	
	Air leak thru stuffing box.	Replace or readjust packing/mechanical seal.	
Pump not producing	Impeller partly clogged.	Back-flush pump to clean impeller.	
rated flow or head.	Worn suction sideplate or wear rings.	Replace defective part as required.	
	Insufficient suction head.	Ensure that suction line shutoff valve is fully open and line unobstructed.	
	Worn or broken impeller.	Inspect and replace if necessary.	
	Improperly primed pump	Reprime pump.	
Pump starts then stops pumping.	Air or wappr pockels in suction line	Rearrange piping to eliminate air pockets	
	Air leak in suction line.	Repair (plug) leak.	
	Pump not primed.	Reprime pump, check that pump and suction line are full of liquid.	
	Suction line clogged.	Remove obstructions.	
	Impeller clogged with foreign material.	Back-flush pump to clean impeller.	
No liquid delivered.	Wrong direction of rotation.	Change rotation to concur with direction indicated by arrow on bearing housing or pump casing.	
·	Foot valve or suction pipe opening not submerged enough.	Consult factory for proper depth. Use baffle to eliminate vortices.	
	Suction lift too high.	Shorten suction pipe.	
	Packing gland improperly adjusted	Tighten gland nuts.	
Recessive Jack and from	Stuffing box improperly packed.	Check packing and repack box.	
stuffing box,	Worn mechanical seal parts.	Replace worn parts.	
	Overheating mechanical seals.	Check lubrication and cooling lines.	
	Shaft sleeves scored.	Remachine or replace as required.	
	Improper alignment.	Re-align pump and driver.	
Bearings run hot.	Improper lubrication.	Check lubricant for stability and level.	
	Lube cooling.	Check cooling system.	
	Head lower than rating. Pumps - tee much liquid.	Consult factory. Install throttle valve, cut impeller,	
Motor requires excessive	Liquid heavier than expected	Check specific gravity and viscosity	
power.	Stuffing packing too tight.	Readjust packing, Replace if worn.	
	Rotating parts bind	Check internal wearing parts for proper clearances	

ORDERING SPARE PARTS

To insure against possible long and costly downtime periods, especially on critical services, it is advisable to have spare parts on hand.

- 1. For critical services: It is recommended that a "back pull-out assembly" be kept on hand. This is a group of assembled parts which includes all parts except the casing and the coupling.
 - (a). If pump is equipped with mechanical seal, the following parts should be on hand:
 - (1) Stuffing box packing.
 - (2) Stuffing boxgland.
- 2. An alternative, though not as desirable as that stated above, can be used on noncritical services. This involves having on hand parts that are most likely to wear and can be used as needed. See list below for these recommended spares.

Recommended Spare Parts

Shaft	Item 122	Bearing Housing Snap Ring	Item361A
Shaft Sleeve	Item 126	Bearing Lock Washer	ltem382
Outboard Bearing	ltem112	Bearing Lock Nut	Item 136
Inboard Bearing	Item 168 A	Impeller	Item 101
Case Gasket	ltem351	Shaft Sleeve 0-Ring	ltem496A
Frame/Adapter 0-ring	ltem360D	Lantern Ring (packed box)	Item 105
Bearing Housing 0-ring	ltem496	Bearing Cover Gasket (XLTP only)	Item360C

Instructions for Ordering Spare Parts

Repair orders will be handled with a minimum of delay. Contact your local authorized representative and provide the following:

- 1. Give model number, size of pump, and serial number. These can be obtained from the nameplate on the pump.
- 2. Write plainly the name, part number, and material of each part required. These names and numbers should agree with those on the sectional drawing on pages 43, 44, 45 and 46.
- 3. · Give the number (quantity) of parts required.
- 4. Give complete shipping instructions.

NOTICE

Materials of construction, specifications, dimensions, design features and application information, where shown in this bulletin, are subject to change without notice by Peerless Pump Company at their option.



Modular Interchangeability Chart

STP Exploded Isometric View



MTP Exploded Isometric View



LTP Exploded Isometric View



XLTP · Exploded Isometric View

