



Product Service Manual and Parts List BM# 3266/005 (M8LKFX-912Y)



WARNING

The Imo General Installation Operation, Maintenance, and Troubleshooting Manual, (No. SRM00046), along with this manual, and the General Start-up Checks & Troubleshooting and Verification Record, should be read thoroughly prior to pump installation, start-up, operation, maintenance or troubleshooting.


Manual No. SRM00112


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READ THIS ENTIRE PAGE BEFORE PROCEEDING

FOR SAFETY OF PERSONNEL AND TO PREVENT DAMAGE TO EQUIPMENT, THE FOLLOWING NOMENCLATURE HAS BEEN USED IN THIS MANUAL:

	DANGER	
Failure to observe precautions noted in this box can result in severe bodily injury or loss of life.		

	WARNING	
Failure to observe precautions noted in this box can cause injury to personnel by accidental contact with equipment or liquids. User should provided protection to prevent accidental contact.		

	CAUTION	ATTENTION
Failure to observe precautions noted in this box can cause damage or failure of the equipment.		

Non compliance of safety instructions identified by following symbol could affect safety for persons:	Safety instructions where electrical safety is involved are identified by:	Safety instructions which shall be considered for reasons of safe operation of pump and/or protection of pump itself are marked by the sign:
		ATTENTION

	ATTENTION
If operation of pump is critical to your business, we strongly recommend keeping a spare pump or major repair kit in stock at all times. As a minimum, a minor repair kit (o-rings, gaskets, shaft seal and bearings) should be kept in stock so pump refurbishment after internal inspection can be accomplished.	

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GENERAL INSTRUCTIONS

Instructions found herein cover disassembly, assembly and parts identification of the M8LKFX-912Y pump.

NOTE: Individual contracts may have specific provisions that vary from this manual. Should any questions arise which may not be answered by these instructions, refer to the General Instructions Manual, SRM00046, provided with your order. For further detailed information and technical assistance please refer to Imo Pump, Technical Service Department at 1-877-853-7867.

This manual cannot possibly cover every situation connected with the installation, operation, inspection and maintenance of the equipment supplied. Every effort was made to prepare the text of the manual so that engineering and design data is transformed into the most easily understood wording. Imo Pump must assume the personnel assigned to operate and maintain the supplied equipment and apply this instruction manual have sufficient technical knowledge and are experienced to apply sound safety and operational practices which may not be otherwise covered by this manual.

INTRODUCTION

This instruction manual covers Imo pump M8LKFX-912Y. Because of the large number of operating conditions, it is necessary to have a variety of construction arrangements and material combinations to meet application requirements. Each pump is identified with a serial number and model designator number on the pump nameplate. Definitions of model designators are given in Figure 1.

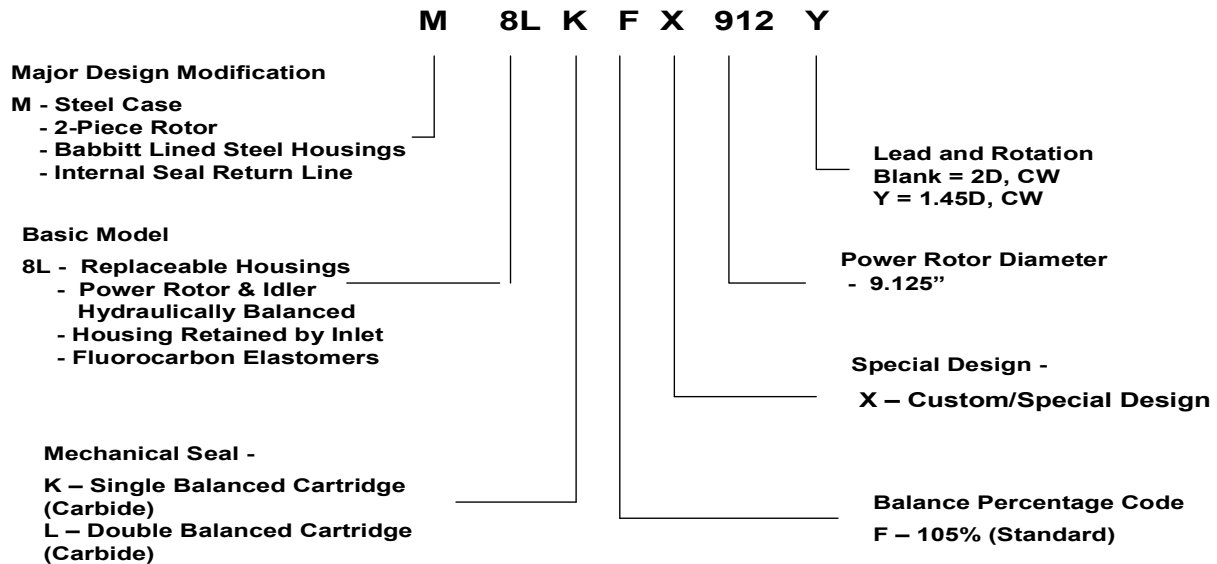



Figure 1. Definitions of Model Designators of M8LKFX- 912Y Pumps

Operating conditions such as speed, fluid viscosity, inlet pressure, temperature, filtration, duty cycle, mounting, drive type, etc. are interrelated. Due to variable conditions, specific application limitations may vary from structural limitations. This equipment must not be operated without verification that operating requirements are within published capabilities as shown in the appropriate pump brochures and rated performance data tables or curves (available from local Imo Pump offices and representatives listed in Manual CA-1).

Under no circumstances are the following structural design limits to be exceeded.

Maximum Discharge Pressure	2200 PSIG Standard Pump
Maximum Inlet Pressure	290 PSIG Standard Pump
<i>(Modification to some basic design pumps allows continuous inlet pressures up to 400 PSIG, consult Imo Pump for higher or intermittent pressures.)</i>	
Maximum Shaft Rotating Speed	1500 RPM
<i>(Consult Imo Pump for Minimum Speed)</i>	
Minimum Viscosity	100 SSU (20.5 cSt)
<i>(Consult Imo Pump for minimum viscosity with relation to specific speed and pressure.)</i>	
Maximum Temperature	225 °F (Standard Pump)
Minimum Temperature	0 °F (Standard Pump)
Rotation.....	Clockwise rotation only, facing pump shaft
Drive.....	Direct only
Mounting	Foot mounted
Weight.....	18,000 Lbs
Displacement	491.2 In ³

	WARNING
<p>The minimum allowable differential pressure for a 8L-912 pumps (regardless of rotor lead) is 300 PSI when pumping liquids having viscosities less than or equal to 450 cSt and shaft speeds of less than or equal to 1200 rpm. Liquids with viscosities exceeding 450 cSt, and/or with shaft speeds higher than 1200 rpm, will require a differential pressure greater than 300 psi. The magnitude of the pressure will depend on both the viscosity and the shaft speed. Contact Imo Pump for additional information.</p>	


DESCRIPTION OF PUMP FEATURES

(Refer to Figure 3, Pump Assembly Drawing.)

Balance

By design, all rotor sets are hydraulically balanced in the radial direction. Idler rotors (19 and 23) are balanced axially by internally transferring high pressure oil from the pump discharge end to the pump inlet end (thrust end). The high pressure oil is transferred to the pump inlet end through bores that have been gun drilled axially through the rotor housings (28 and 83).

In order to provide axial hydraulic balance on the power rotor (11), a balance piston (17) is provided. The size of the balance piston (17) and the balance piston bushing (18) in which it rotates is selected to produce minimum axial thrust loads on the anti-friction ball bearings (7) under the conditions of operation that are "normal" for the application.

	WARNING
<p>When a unit is purchased, if no inlet conditions are specified, the power rotor will be provided with standard balance. If a unit with standard balance is installed on an operation with high inlet pressure, the ball bearings (7) and the mechanical seal (51) may be overloaded. If the unit has been fitted to operate with high inlet pressure, operation on low inlet pressure can overload the ball bearings. Do not change inlet pressure radically without approval from Imo Pump.</p>	

Ball Bearing

The M8LKFX-912Y pump is equipped with angular duplex ball bearings that are lubricated with Mobil SHC 32 or equivalent grease. The initial regreasing cycle is 6 tubes of grease (12.5 oz.) after the first 4500 hours of operation at temperatures up to 180 °F (4 tubes of grease each time thereafter-4500 hour intervals). For every 15 °F rise in temperature, the regreasing cycle should be cut in half. To grease ball bearings, remove pipe plug (76) from grease vented reducer bushing (75), insert grease tube onto grease fitting (39). Pump approximately 6 – 12.5 oz. tubes grease (4 tubes each time thereafter) into fitting until new grease emerges from fitting (75) or lip seal (8). Run pump at normal operating conditions for at least 30 minutes to allow any excess grease to purge from vented reducer bushing (75) or lip seal (8). Replace pipe plug (76) to vented reducer bushing (75). During purging process, bearing temperature may increase.

CAUTION

Any questions regarding regreasing cycles should be directed to Imo Pump.

Mechanical Seals

The M8LKFX-912Y pump is equipped with positive drive API 682 cartridge mechanical seals. This is a balanced cartridge-type mechanical seal with a Tungsten Carbide face rotating on a Tungsten Carbide stationary face. Refer to mechanical seal drawing shown in Figure 2. When ordering new mechanical seals, it is important that the complete pump model, pump bill of material number, and/or serial number be given. When this information cannot be ascertained, the basic pump model and operating conditions should be listed so that proper mechanical seal can be supplied.

Instrumentation (Optional)

The M8LKFX-912Y pump is provided with instrumentation connections for monitoring temperatures of inboard and outboard areas of the pump and vibration at the ball bearing.

Ball Bearing RTD – A ½ inch-14 NPT threaded connection with a $\frac{5}{16}$ inch diameter drill through for a temperature sensor (RTD) probe is provided on the inboard cover (40). This RTD (when installed) monitors the temperature of the ball bearing (7). The temperature will vary, depending on the temperature of the fluid pumped, the speed at which the pump is running and the suction pressure. Typically the ball bearing temperature will run 40 °F to 70°F above the fluid temperature. The maximum temperature allowed is 250°F.

Thrust Loss RTD's – Two ½ inch-14 NPT threaded connection ports with ¼ inch OD X 9 inch deep blind hole for the RTD probe are provided on the outboard cover (66) for connection to two optional RTD's. The RTD's (when installed) are used to read the temperature in the (2) idler rotor thrust plate areas individual to each idler. These temperatures should be relatively close to each other in normal operation. If a serious idler rotor thrust loss occurs, the temperature between the (2) idler rotor thrust areas will be detected. It is recommended the operating system should immediately be shut down if the delta temperature between these two RTD's should exceed 25°F to 30°F.

Vibration – A ¼ inch-18 NPT, ¾ inch deep hole is located on the inboard cover (40) is provided for installation of an optional vibration transmitter.

Seal Leak, Catastrophic – A pressure switch, set to a minimum of approximately 5-7 psi, is used to detect catastrophic seal leakage.

Seal Leak, Detection – An “on-off” float switch is used for detection of normal seal leakage.

Mounting – The M8LKFX-912Y pump is designed for horizontal foot mounting. Refer to Figure 3, Pump Assembly Drawing. The pump case (32) has four feet. The two inboard feet are drilled to receive two tie-down or mounting bolts and the rear or outboard feet are drilled to receive one bolt each. The double bolting on the inboard end is designed to provide rigid location of the front end of the pump. The length of the pump and the normal variations in temperature require that allowance be made for thermal growth. The rigidity of the pump case (32) is usually several times that of the bedplate. If relative movement cannot take place between the outboard feet and the base, thermal movement can distort the bedplate and produce misalignment between pump and driver.

Variable Frequency Drives (VFD) - When utilizing VFD's with positive displacement pumps, consideration must be given to the minimum and maximum speed range intended for the pumping application. Maximum speed must consider the inlet pressure available for the fluid viscosity range. The minimum operating speed is dependent on the minimum operating viscosity and associated discharge pressure.


When starting positive displacement pumps with VFD's, there will be a delay from the initial start until the motor reaches the selected minimum operating speed. In some applications, such as crude oil pipeline transfer, the pump needs to be operated in full fluid bypass mode through a control valve loop during the VFD speed ramp-up time. Once the minimum operating speed is attained, the control valve should completely close and the system operated as intended. The time delay should be relatively short, approximately 30 seconds to two minutes. For system shut down, it is recommended this procedure be followed in reverse order.


If a pump is to be driven by a VFD, this detail should be addressed during the pump selection process. Contact Imo Pump if there are any questions concerning VFD operation with positive displacement pumps.

Inlet Position - The inlet head may be rotated in 22.5 degree increments. Refer to Maintenance, Changing Inlet Position below.

MAINTENANCE

(Refer to Figure 3, Pump Assembly Drawing.)

	WARNING
On critical or dangerous equipment, provide safety and emergency systems to protect personnel and property from injury due to pump malfunction. If pumped liquids are flammable, toxic, corrosive, explosive or otherwise hazardous, provide for safety in the event of leakage or malfunction. BEFORE working on equipment, make sure all power to equipment is disconnected and locked out.	

	WARNING
Due to size and weight of individual parts of the pump, a crane and/or block and tackle capable of handling weights in excess of 16,000 pounds must be available. Fatal injury or damage to the equipment may result if the weight is not properly controlled.	

Changing Inlet Position - The inlet head (27) may be positioned to permit fluid to enter the pump from the top or either side. The inlet head may be rotated in 22.5 degree increments – NOTE: SmartSense technology may be affected. Please refer to SmartSense Operating and Maintenance Manual.



WARNING

If installation, operation, and maintenance instructions are not correctly and strictly followed and observed, injury to personnel or serious damage to pump could result. Imo Pump cannot accept responsibility for unsatisfactory performance or damage resulting from failure to comply with instructions.



WARNING

Exercise caution when moving cover (66) as it weighs approximately 200 pounds.



WARNING

Use caution not to damage smart sense technology if installed on pump.

1. To change position of inlet head (27), if applicable, first refer to SmartSense Operating and Maintenance Manual. Remove thermo-wells (94). Install a ½ - 13 inch eyebolt in tapped bore in cover (66) to aid in support of cover during removal. Remove bolts (96), washers (97), and cover (66) using caution to avoid damage to O-ring (98).



WARNING

Exercise caution when moving inlet head (27) as it weighs approximately 1,700 pounds.

2. Place a sling or lifting hooks on inlet head (27). Remove ferry capscrews (50) and washers (62). Separate inlet head (27) from case (32).
3. Rotate inlet head (27) so that inlet flange is in desired position, using care to avoid damage to o-ring (30). Install ferry capscrews (50) and washers (62). Tighten capscrews to a torque value per assembly drawing.
4. Install cover (66), ensuring that o-ring (98) is properly seated and not damaged. Install capscrews (96) and washers (97). Do NOT torque until you verify alignment of thermo wells.
5. The possibility exists that cover (66) will not align in a way that permits the thermo wells to properly engage the bores in the thrust plate (65). The end cover (66) and/or inlet (27) may have to be loosened and readjusted until proper alignment is obtained.
6. Tighten capscrews (96) to a torque value per assembly drawing.

MINOR KIT INSTALLATION

Disassembly for Minor Kit Installation

1. Close inlet and outlet valves. Vent pressure from pump and drain pump. Remove bottom most plug (59) from inlet to drain pump fluid from suction end. Fluid in the outlet end of pump can be pumped to inlet chamber by rotating pump power rotor counterclockwise with a spanner wrench.
2. Disassemble the drive coupling:
 - a. Remove the coupling body.
 - b. Remove key (10), set-screw (45) and lock nut (44) from power rotor (11).
 - c. Remove pump coupling hub from power rotor shaft (11).

3. Remove seal chamber leakage container tube (hereafter referred to as Can) (152) – NOTE: SmartSense technology may be affected. Please refer to SmartSense Operating and Maintenance Manual.
 - a. Thoroughly clean coupling end of power rotor (11) prior to removal of Can assembly.
 - b. If applicable, disconnect Can sensor connections from inboard cover (40).
 - c. Connect lifting equipment to Can (152) and take up slack.
 - d. Remove bolts (161) and washers (164) from Can retainer tabs (153).



WARNING

Exercise caution when moving Can (152) as it weighs approximately 300 pounds.

CAUTION

During removal of Can (152), evenly torque jack screws per assembly drawing to prevent cocking Can. Cocked Can will result in binding and damage to bearings (7) and/or power rotor (11).

- e. Evenly torque the four jackscrews (166), until the Can assembly is separated from the inboard cover (40).
 - f. Using lifting equipment, support and remove the Can (152) along with hex bolts (160), Can retainer tabs (153), jackscrews (166), and pipe plugs (165).
4. Remove o-rings (155) and (154) from inboard cover (40).



WARNING


Step 5, seal preparation, must be performed before further disassembly to avoid damage to cartridge seal.

5. Prepare seal (51) for removal: (Refer to Figure 2 for seal part drawing numbers.)
 - a. Thoroughly clean and lubricate exposed power rotor (11) surfaces.
 - b. Loosen 4 retaining clip bolts [Figure 2, item number 40].
 - c. Slide 4 seal retaining clips [Figure, 2, Item Number 103] into groove in seal sleeve [Figure 2, item number 1] and retighten 4 retaining clip bolts securely in place [Figure 2, item number 40].
 - d. Loosen and remove all radial set screws [Figure 2, item number 57.1] holding seal sleeve [Figure 2, item number 1] on power rotor shaft (11) to ensure seal sleeve and/or power rotor shaft (11) is not damaged during seal removal. NOTE: Locking collar [Figure 2, item number 58] will be loose and could separate from seal cartridge (51). This is not a problem.
 - e. Remove nuts (167) and washers (168) from studs holding cartridge seal (51) in place.
6. Remove bearing retainer plate (48) and bolts (9).
7. Break free socket head cap screws (162) and washers (164). Cap screws are torqued to 250 ft-lbs. Breaking the torque allows for easy removal of the bearing housing (151) after the assembly is removed from the power rotor. DO NOT remove cap screws at this point. The bearing housing alignment is essential to prevent the potential of cocking the bearing during disassembly.

8. Remove Supernut (47) and Supernut washer located behind check nut per instructions in Figure 4.
9. Remove nuts (163) and washers (164) from bearing plate (150).
10. Install front end disassembly plate (found in tool kit 3266/1000TK) using ¾"-10 bolt (found in tool kit 3266/1000TK) installed in end of power rotor shaft (11).
11. Insert 4 ea ¾" allthread (found in tool kit 3266/1000TK) through front end disassembly tool (found in tool kit 3266/1000TK) and into jacking bolt holes in bearing plate (150).

	CAUTION	
Power rotor will slide outboard when performing step 16. Ensure mechanical seal is completely disengaged.		

12. Using washers and 4 ea ¾" nuts jack bearing plate (150), bearing housings (151), fitting (75), pipe plug (76), bushing (39), gasket (156), gasket (157), 2 ea bearings (7), lip seals (6,8), lip seal retainer (169), 2 ea spacer (13), spacer (49) until assembly breaks free on shaft.
13. Remove front end disassembly tool and allthread.

	WARNING	
Exercise caution when moving assembly as it weighs approximately 300 pounds.		

14. Install ¾"-10 eyebolt (found in tool kit 3266/1000TK) into top of bearing plate (150) and, using adequate lifting device, gently slide assembly off of power rotor shaft (11) and place on suitable work table to be disassembled.

**Complete steps 15-23, as necessary to remove bearings/lip seals from bearing cover/spacers
Using Jacking method:**

15. Remove the 4 plugs (171) located on the outboard side of the bearing plate.
16. Install (qty 4) 3/4-10-4.0" hex bolts, located in the tool kit, and evenly jack the bearings (7), spacers (13), lip seals (6,8), and spacer (49) from the bearing plate (150)/bearing housing (151) assembly.
17. Reinstall 3/8" pipe plugs (171) into bearing plate (150).
18. Remove bolts (162) and washers (164) from bearing housing (151).
19. Proceed to step 24.

Using Brass Rod method:

20. Install ½-13 eyebolt, supplied in the tool kit 3266/1000TK, into the bearing housing (151) and support the weight.
21. Remove bolts (162) and washers (164) from bearing housing (151).

(Optional) Use a bearing press to complete steps 22-23

22. Support the bearing on blocks to allow for the spacer (49) and bearings to fall out during disassembly.

23. Use a brass rod (found in kit 3266/1000TK) and hammer, tap around outer ring of face of outboard bearing (7) until outboard or both bearings (7) slide completely out of bearing housing (151). Spacer (49) should also be removed in this step.
24. Using 2 brass rods (found in tool kit 3266/1000TK) punch lip seal (8) out of spacer (49).
25. Remove lip seal (6) from outboard spacer (13).

CAUTION

Support weight of power rotor (11) with sling to avoid damage to power rotor (11) housings (28 and 83) and other components.

CAUTION

Do not lift power rotor (11) too high. Power rotor should not be raised beyond horizontally level position.

26. Cartridge seal assembly removal:

CAUTION

Mechanical seal weights approximately 150 lbs.

CAUTION

Pull mechanical seal by hand (if/when possible). Using a tool to pry the mechanical seal from the inboard cover may cause damage to the mechanical seal faces. Ensure that the retaining clips do not bend while removing the mechanical seal. If flushing port plugs are installed, remove once they become accessible. They will not pass through the inboard cover during mechanical seal removal process.

- a. Insert 2ea $\frac{3}{4}$ "-10 allthread (found in tool kit 3266/1000TK) through front end disassembly tool into face of seal gland [Figure 2, item number 11].
- b. Put jam nuts on seal gland to prevent allthread from going through seal and into and damaging inboard cover.
- c. Evenly torque $\frac{3}{4}$ " heavy nut (found in tool kit 3266/1000TK) to separate seal assembly (51) from inboard cover (40). CAUTION: Take care not to push power rotor into pump.
- d. Pull allthread by hand, slowly, and carefully until possible to install 2ea $\frac{3}{4}$ "-10 eyebolt in cartridge seal.
- e. Remove allthread from cartridge seal assembly (51).
- f. Remove cartridge seal (51) from the pump.
- g. Remove but DO NOT discard oil balance tube (158) from inboard cover (40).
- h. Remove o-rings (159) from oil balance tube (158) from inboard cover (40).

CAUTION

Maximum length of travel of the power should be when the shaft check nut bolts (95) are flush with the inboard cover/ mechanical seal gland mating surface. This check nut holds the balance piston in position. Failure to follow this guideline may result damage to the suction housing bore.

27. Rotate power rotor (11) counter clockwise and pull 3" to 4" from current position.

Reassembly for Minor Kit Installation

Prior to reassembly of pump, all parts should be cleaned and inspected for nicks and burrs. Replace all worn or damaged parts. Imo Pump recommends replacement of all o-rings, gaskets, mechanical seal and ball bearings when these parts are disturbed from their previously installed positions. Coat all parts with light lubricating oil to assist in assembly.

Torque fasteners per assembly drawing.

1. Grease and install two o-rings (159) on oil balance tube (158).
2. Install oil balance tube (158) with o-rings (159) in inboard cover (40).
3. Remove tape from o-ring(s) on mechanical seal (51) and apply grease to o-rings [Figure 2, item numbers 18 & 19].
4. Ensure seal set screws [Figure 2, item number 57.1] are loose.
5. Using 2ea $\frac{3}{4}$ " eyebolts (found in tool kit (3266/1000TK), install cartridge seal (51) onto power rotor (11) with set screws [Figure 2, item number 57.1] facing motor.
6. O-ring [Figure 2, item number 19] may have tendency to snag on step in power rotor (11). Use caution to avoid damage to o-ring [Figure 2, item number 19].
7. Install heavy nuts (167) and washers (168) on seal. Do not torque nuts (167) at this point.

NOTE

Ensure the cartridge seal face is installed passed the balance tube o-ring. This will minimize the potential of pinching the o-ring.

8. Install lip seal (6), seal retainer (169) and hex bolts (170) on bearing plate (150).
9. Using Mobile SH32 grease or equivalent, completely fill the inner lip seal cavity 360°. Ensure the remainder of the bearing cavity is filled 1/3 full.
10. Install pipe plug (171) in bearing plate (150).
11. Torque hex bolts (170) per assembly drawing.
12. If seal does not make use of quench and drain ports, plug with accompanying 2 ea $\frac{3}{8}$ " pipe plugs in 12 o'clock and 6 o'clock positions on OD of mechanical seal.
13. Install gasket (156) on inboard cover (40).



WARNING

Exercise caution when moving bearing plate (150) as it weighs approximately 100 pounds.

14. Using $\frac{1}{2}$ "-13 eyebolt, install bearing plate (150) with pipe plug (171), lip seal (6), seal retainer (169), and hex bolts (170) onto inboard cover (40).
15. Install washers (164) and install and torque cap screws (163) per assembly drawing.
16. Install inner most bearing spacer (13) against step on power rotor shaft (11).

17. Using Mobile SHC32 grease or equivalent, hand pack bearings (7) and fill bearing cavity approximately 1/3 full.
18. Heat bearings at 200 F for 2 hours.
19. Apply a thin film of anti-seize to power rotor (11) shaft's bearing OD. This will aid in the bearing removal process when a repair is conducted.
20. Install bearings (7) with shorter outer race lips facing each other against spacer (13).
21. Install outer most spacer (13) and tighten the Supernut (47) hand tight onto the shaft.
22. Allow bearings (7) to cool so that they will fit under bearing plate (150).
23. Install Supernut (47) per instructions on Figure 4 Supernut installation and removal instructions.



WARNING

When installing bearing plate (150) please ensure the lip seal (6) does not fold on the outboard spacer (13). If the lip seal has the tendency to fold, use a small tool (scribe) to hold it in the correct position.

24. Now that bearings (7) are seated at the correct position on power rotor (11) push power rotor into pump until bearings (7) seat on shoulder of bearing plate (150).



WARNING

Exercise caution when moving bearing housing (151) as it weighs approximately 100 pounds.

25. Install gasket (157) onto bearing plate (150).
26. Install bearing housing (151) and bushing/grease fitting (75)/pipe plug (76) using 31" all thread (found in tool kit 3266/1000TK). Bearing housing (151) should contain fitting (39).
27. Install washers (164) and cap screws (162) into bearing housing (151). Torque capscrews (162) per assembly drawing.
28. Install lip seal (8), spacer (49), and o-ring (12) on power rotor (11). Ensure the bearing cavity is 1/3 full of Mobile SHC32 grease or equivalent.
29. Install bearing retainer plate (48).
30. Install and torque hex bolts (9) per assembly drawing.
31. Torque hex nuts (167) on mechanical seal (51) per assembly drawing.
32. Tighten set screws [Figure 2, item number 57.1] on mechanical seal (51).
33. Loosen tab screws [Figure 2, item number 40] on mechanical seal (51).
34. Slide tabs [Figure 2, item number 103] out of way – do not remove tabs.
35. Tighten tab screws [Figure 2, item number 40].
36. Grease and install o-rings (154) and (155) on inboard cover (40).

**WARNING**

Exercise caution when moving Can (152) as it weighs approximately 300 pounds.

37. Install Can (152).

If necessary, complete steps 38-41. Otherwise, proceed to step 42.

38. Install appropriate pipe plugs and/or smart sense as follows:

- a. If no smart sense is to be used, install 2ea $\frac{3}{4}$ " pipe plugs (165) on both sides of Can (152) in 3 o'clock and 9 o'clock positions. In this arrangement, if a seal leak occurs, the leakage will drain through the bottom of the Can since no plug is present. We recommend, at a minimum to install a seal leak collection pot below the six o'clock $\frac{3}{4}$ "-14 NPT drill thru.
- b. If catastrophic leak detector sensor (found in smart senses kit, 3266/004SSEP) is installed, it will be installed in the 9 o'clock position. The 3 o'clock position will be plugged with $\frac{3}{4}$ " pipe plugs (165) and the 6 o'clock position will be either left open as a weep hole or piped to a seal leak collection pot.

39. Install retaining clips (153) and hex bolt (161) with washers (164). Torque hex bolts (161) per assembly drawing.

40. Install 8 ea hex bolts (160). Torque per assembly drawing.

41. Install 4 ea jacking bolt (166).

42. Install coupling hub.

43. Install lock nut (44) on power rotor (11).

44. Install and tighten setscrews (45) in lock nut (44).

NOTE: SmartSense technology may be affected. Please refer to SmartSense Operating and Maintenance Manual.

MAJOR KIT INSTALLATION

Disassembly for Major Kit Installation

NOTE: SmartSense technology may be affected. Please refer to SmartSense Operating and Maintenance Manual.

1. Refer to steps 1-28 of **Disassembly for Minor Kit Installation**, above.

2. Remove o-ring (155) and o-ring (154).


**WARNING**

Exercise caution when moving cover (66) as it weighs approximately 200 pounds.


**WARNING**


Use caution not to damage smart sense technology if installed on pump.

3. If applicable, disconnect and remove all smart sense components. Please refer to SmartSense Operating and Maintenance Manual.
4. Remove thermo-wells (94) and/or pipe plugs (77).
5. Install a ½"-13 eyebolt (found in tool kit 3266/1000TK) into ½"-13 tapped bore in cover (66) to aid in support of cover during removal.
6. Remove bolts (96), washers (97), and cover (66) using caution to avoid damage to o-ring (98).
7. Remove o-ring (98).


	WARNING
Exercise caution when moving thrust plate (65) as it weighs approximately 300 pounds.	

8. Remove heavy nuts (61) and washers (62).
9. Using 1-8 eyebolt (found in 3266/1000TK) remove thrust plate (65).
10. Remove spacers (26).
11. Remove but DO NOT discard oil balance tube (81).
12. Remove O-rings (82).
13. Remove idler balance piston bushing assemblies (72).

	WARNING
Exercise caution when moving idler rotors (19 and 23) as they weigh up to 150 pounds each.	

	WARNING
Exercise caution when moving idler rotors (19 and 23) as sharp edges may cut skin.	

14. Using support board under idler bores to prevent dropping and ease process, rotate and remove idlers (23).
15. Using ½"-13 x 36" threaded rod and handle (supplied in tool kit 3266/1000TK) pull idler rotors (19) until able to safely remove.
16. Remove idler rotors (19).

	WARNING
Exercise caution when moving power rotor (11). Power rotor (11) weighs approximately 1,000 pounds.	

17. Install lifting strap on power rotor discharge end Install plastic bullet (found in tool kit 3266/1000TK) with ¾"-2" allen screw (also found in tool kit 3266/1000TK) on suction end of power rotor. The plug is used to guide the power rotor from the pump housing to prevent damaging the housing bore.
18. Take weight off of power rotor discharge end with hoist, using caution not to over lift, and pull power rotor (11) out of rotor housings (83 and 28) readjusting hoist strap position to as close to balance point as possible.

**WARNING**

Early models may have a 1/2" eyebolt on the inboard cover (40). If inboard cover (40) has 1/2" tapped bore, please use lifting strap instead as deflection may exceed rating of 1/2" eyebolt.

19. Install 3/4" – 10 eyebolt (found in tool kit 3266/1000TK) into tapped bore in inboard cover (40). Attach lifting equipment and take up slack.
20. Remove capscrews (50) and washers (62) from inboard cover (40).

**WARNING**

Exercise caution when moving inboard cover (40) as it weighs approximately 1,500 pounds.

21. Jack jackscrews (74) into inboard cover to separate inboard cover from pump assembly.
22. Using 3/4"–10 eyebolts, remove inboard cover (40) along with jackscrews (74). Set inboard cover (40) vertically with idler stops up (34).
23. Remove capscrews (52) and stop sub-assembly (34).
24. Remove balance piston bushing (18).
25. Remove O-ring (3).
26. Remove oil balance tube (80). Remove 2 ea o-rings (35) from oil balance tube.

**WARNING**

Exercise caution when moving pump assembly as it weighs approximately 12,000 pounds.

CAUTION

To avoid damage to discharge end of pump case (32), position discharge end of pump assembly onto wooden block supports.

27. Using two hoists, discharge end shackles (found in tool kit (3266/1000TK) and 1 1/4" hoist rings (found in tool kit 3266/1000TK) in inlet (27) surface that end cover (66) mates with, turn the pump assembly upward and rest discharge end of pump case (32) on wooden block supports positioning the assembly in the vertical position.
28. Once hoist is removed from discharge end shackles, and pump assembly is stable, take up slack in hoist connected to inlet (27).
29. Remove capscrews (50) and washer (62) from inlet head (27).

**WARNING**

Exercise caution when moving inlet head (27) as it weighs approximately 1,700 pounds.

30. Remove inlet head (27) along with, if applicable, plug (165) any pipe plugs (59) installed on inlet head (27). – NOTE: SmartSense technology may be affected. Please refer to SmartSense Operating and Maintenance Manual.
31. Remove o-ring (30), plug (22), and o-ring (21).

32. Insert a 3/4-10 UNC threaded bolt into stop pin (20). Pull bolt to remove stop pin from pump case (32).



WARNING

Exercise caution when moving housings (83 and 28) as together they weigh approximately 3,300 pounds.

CAUTION

To avoid damage to strainer (92), exercise caution when lowering housings (83 and 28) onto wooden block supports.

33. Remove 2 ea 1 1/4"-7 hoist rings (found in tool kit 3266/1000TK) from inlet (27) and install into tapped bore in housing (83).



WARNING

Exercise extreme caution when removing housings (83 & 28) to ensure pump case remains vertical and does not fall.

34. Using adequate lifting equipment, remove housings (83 and 28). Housing (83) and housing (28) should remain assembled together.

Reassembly for Major Kit Installation

Prior to reassembly of pump, all parts should be cleaned and inspected for nicks and burrs. Replace all worn or damaged parts. Imo Pump recommends replacement of all o-rings, gaskets, mechanical seal and ball bearings when these parts are disturbed from their previously installed positions. Coat all parts with light lubricating oil to assist in assembly.

Torque fasteners per assembly drawing.



WARNING

Exercise caution when moving pump case (32) as it weighs approximately 7,000 pounds.

1. If necessary, install strainer sub-assembly (92) on housing (28).
2. Install two o-rings (3) on housing (28). – NOTE: SmartSense technology may be affected. Please refer to SmartSense Operating and Maintenance Manual.



WARNING

Exercise caution when moving housings (83 and 28) as together, they weigh approximately 3,000 pounds.

3. Install 2ea 1/4" hoist rings (supplied with tool kit, 3266/1000TK) 180 degrees apart into the suction end of housing (83). The filter should be on the discharge (opposite) end. Attach lifting equipment to eyebolts and take up slack.



WARNING

When lowering rotor housings into pump case, look through cavitation detector sensor hole in case. O-ring around housing may catch the lip of this hole. If you watch carefully, and lower housings into case slowly, you can assist o-ring over this lip with screw driver if needed.

**WARNING**

Wear sensor wires should be below flush of outer edge of housing. If not, press them gently into position so they are not cut/damaged by the housing engaging the case.

**WARNING**

Exercise caution when moving pump assembly as it weighs approximately 11,000 pounds.

4. Ensure case (32) is in vertical position and resting on wood block supports (See step 27 in **Disassembly for Major Kit Installation**). Use lifting equipment to lower the assembled housings (83 and 28) and strainer sub-assembly (92) into the case until the hole for the rotor housing stop pin (20) is aligned with the appropriate slot in housing (83). The housings should be oriented with the filter in the discharge, the oil balance tube in the 12 o'clock position, and the 1 3/8" alignment slot in line with alignment pin.
5. Install rotor housing stop pin (20), o-ring (21), and hex plug (22).

**WARNING**

Exercise caution when moving housings (83 and 28) as together, they weigh approximately 3,000 pounds. Do not let housings fall out of pump case. Use hoist control in below step to control housing movement.

**WARNING**

Exercise caution when moving pump assembly as it weighs approximately 11,000 pounds.

6. Housings will continue to drop into case. They will be too deep at this point. Pump case will need to be lowered back to horizontal position and then the other end raised – not completely vertical, just enough to move housings. Housings should slide forward slowly (use control of hoist to control movement rate of housings) until the sensor wires are in line with the sensor wire ports in case. Once correct housing position is obtained, place pump assembly in horizontal position.
7. If necessary, install 4ea studs (63) in housing (83) and use two nuts back to back to tighten to a length of 20 5/8". Use Loctite 86 Grade AVV (64) on threads before installing into housing.
8. Assemble inboard cover:
 - a. Install balance piston bushing (18) in inboard cover (40).
 - b. Install Idler Stop Plate (180) on to Idler Stop Sub-assembly using Cap Screw (181). Torque the cap screw per assembly drawing.
 - c. Install stop sub-assembly (34) so that it is aligned with pin located in balance piston bushing (18) and so that idler stops will be at 3 o'clock and 9 o'clock positions when inboard cover is mounted on pump case. Housing stops will be oriented at 2 o'clock and 8 o'clock positions.
 - d. After applying light oil on capscrews (52), install capscrews (52) in stop sub-assembly (40). Measure running torque on each of these capscrews and add that value to the torque value on assembly drawing for total required torque.
 - e. Grease and install o-ring (3) on inboard cover (40).
 - f. Grease and install 2 o-rings (35) on oil balance tube (80). Install oil balance tube (80) and 2 o-rings (35).

**WARNING**

Exercise caution when moving inboard cover assembly as it weighs approximately 1,500 pounds.

9. Using ½"-13 eyebolt (found in tool kit, (3266/1000TK), install inboard cover assembly (40), along with o-ring (3), stop sub-assembly (34), capscrews (52), oil balance tube (18), and 2ea o-rings (35) on case (32).
10. Using caution, install and tighten washers (62) and capscrews (50) enough to secure inboard cover (40) to case.
11. Grease two o-rings (159) and install on oil balance tube (158). Install oil balance tube (158) and two o-rings (159) into inboard cover (40).
12. Assemble power rotor:
 - a. Grease and install 2 ea o-rings (36) on power rotor (11).
 - b. Install balance piston (17) on power rotor (11). The power rotor must be lifted vertical from the suction end and the balance piston placed in a position were the power rotor can be lowered on to the balance piston and forced into position on the power rotor. This is required in order that the weight of the power rotor can be used to force the balance piston in to the correct location.
 - c. Apply graphite jacking bolt lubricant between super bolt washer and super bolt (95) and install super bolt washer and super bolt. Use super bolt installation and removal instructions (Figure 4).

**WARNING**

Exercise caution when moving power rotor assembly as it weighs approximately 1,000 pounds.

13. Install plastic bullet (found in tool kit 3266/1000TK) with ¾"-2" allen screw (also found in tool kit 3266/1000TK) on suction end of power rotor.
14. Using hoist strap placed on balance point of power rotor (11), raise power rotor into air. A magnetic level can be placed on power rotor to assist in keeping perfectly balanced.
15. Apply thin layer of oil lubricant in power rotor bore in housing.
16. Partially install power rotor (11) into power rotor housing bore. You want to leave power rotor out enough so that you can completely seat bearing. You should push the power rotor in until the first major step up on the power rotor shaft (when looking from coupling end) is one inch away (towards motor) from end of inboard cover (40).
17. Refer to steps 1-42 in **Reassembly for Minor Kit Installation** instructions.

**WARNING**

Exercise caution when moving idler rotors (19 and 23) as they weigh up to 150 pounds each.

18. NOTE: Placing support board under idlers bores will assist in installation and reduce possibility of dropping idlers (19 and 23). Using lifting equipment, install 2 discharge idler rotors (19). Use 1/2"-13 x 36" threaded rod and handle to push idlers (19) into housing until they reach idler stop.

19. Using lifting equipment, install 2 suction idler rotors (23). Using large spanner wrench, rotate power rotor (11) to assist in installation.
20. Install balance piston assemblies (72) on idler rotors (23).
21. Install spacers (26) on studs (63).
22. Grease and install two o-rings (82) on oil balance tube (81).
23. Install oil balance tube (81) with o-rings (82) into housing (83).



WARNING

Exercise caution when moving thrust plate (65) as it weighs approximately 300 pounds.

24. Using 1"-8 eyebolt (found in tool kit 3266/1000TK), install thrust plate (65) on studs (63) and oil balance tube (81).
25. Install washers (62) and nuts (61) on studs (63). Torque nuts per assembly drawing. A torque multiplier will greatly reduce effort required to obtain torque.
26. Grease and install o-ring (30) on inlet (27).



WARNING

Exercise caution when moving inlet head (27) as it weighs approximately 1,700 pounds.

27. Using lifting strap install inlet (27). Reference SmartSense Operating and Maintenance Manual for instructions regarding SmartSense installation.
28. Install washers (62) and torque cap screws (50) in inlet (27).
29. Using torque multiplier, torque cap screws (50) per assembly drawing.
30. Install o-ring (98) on end cover (66).



WARNING

Exercise caution when moving end cover (66) as it weighs approximately 200 pounds.

31. Using lifting equipment, support and install end cover (66).
32. Install washers (97) and capscrews (96). Do not torque until you try to align and install RTD's. RTD's may not align. End cover (66) and inlet (27) may need to be rotated until alignment can be achieved.
33. Using torque multiplier, torque capscrews (96) per assembly drawing.
34. Install thermowell (94) and plug (77).
35. Install drain plug (59) and gasket (58) washer (59) nuts (55) and hex crews (57). Torque hex screws per assembly drawing.
36. Install coupling hub.

37. Install lock nut (44) on power rotor (11).
38. Install and tighten set-screws (45) in lock nut (44). Install coupling hub.
39. Install lock nut (44) on power rotor (11).
40. Install and tighten setscrews (45) in lock nut (44).

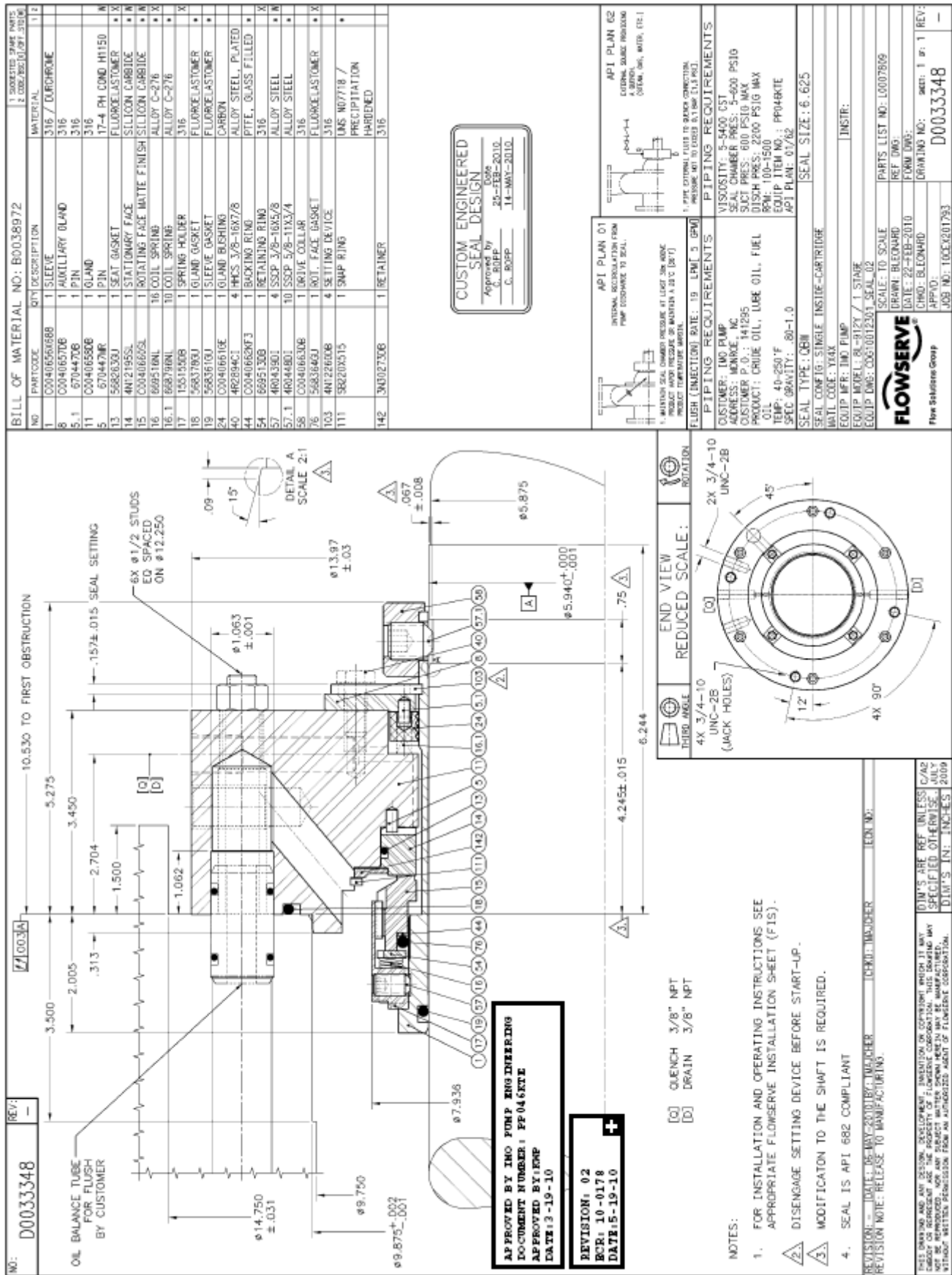


Figure 2. Mechanical Seal Drawing, PP046KTE

PARTS LIST

IDP	Part Description	Qty	Kit	IDP	Part Description	Qty	Kit
0002	Locknut	12	XX	0068	Grease	3	X
0003	O-ring	3	X	0072	Balance Piston Assembly	2	XX
0006	Lip Seal	1	X	0074	Jackscrew	7	
0007	Bearing	2	X	0075	Vented Reducer Bushing	1	
0008	Lip Seal	1	X	0076	Plug	1	
0009	Hex Bolt	8		0077	Plug	2	
0010	Key	1		0080	Oil Balance Tube	2	XX
0011	Power Rotor Sub-assembly	1		0081	Oil Balance Tube	1	
0012	O-ring	1	X	0082	O-ring	2	X
0013	Spacer	2	X	0083	Housing	1	XX
0017	Balance Piston	1	XX	0092	Strainer Sub-assembly	1	XX
0018	Balance Piston Bushing	1	XX	0094	Thermowell	2	
0019	Discharge Idler Rotor	2	XX	0095	Check Nut	1	XX
0020	Rotor Housing Stop Pin	1	XX	0096	Capscrew	16	XX
0021	O-ring	1	X	0097	Washer	16	
0022	Plug	1		0098	O-ring	1	X
0023	Inlet Idler Rotor	2	XX	0100	Hex Nut	8	
0026	Spacer	4		0101	Hardened Washer	16	
0027	Inlet Head	1		0102	Heavy Hex Screw	8	
0028	Housing Sub-assembly	1	XX	0103	Spiral Wound Gasket	1	X
0030	O-ring	1	X	0104	Blind Flange	1	
0031	Dowel Pin	2	XX	0105	Hex Cap Screw	3	
0032	Pump Case	1		0106	Hex Bolt	1	
0034	Stop Sub-assembly	1		0150	Bearing Plate	1	
0035	O-ring	4	X	0151	Bearing Housing	1	
0036	O-ring	2	X	0152	Leakage Container Tube (Can)	1	
0039	Valve	1		0153	Retainer Leakage Container Tube	4	
0040	Inboard Cover Sub Assembly	1		0154	O-ring	1	X
0044	Check Nut	1		0155	O-ring	1	X
0045	Set Screw	1		0156	Gasket	1	X
0047	Check Nut	1	X	0157	Gasket	1	X
0048	Bearing Retainer Plate	1		0158	Oil Balance Tube	1	
0049	Spacer	1		0159	O-ring	2	X
0050	Ferry Capscrew	32		0160	Bolt	8	
0051	Seal	1		0161	Bolt	4	
0052	Capscrew	4	XX	0162	Capscrew	8	
0055	Hex Nut	4		0163	Nut	8	
0056	Hardened Washer	8		0164	Washer	20	
0057	Heavy Hex Screw	4		0165	Plug	10	
0058	Spiral Wound Gasket	1		0166	Jackscrew	4	
0059	Plug	1		0167	Nut	6	
0061	Nut	4		0168	Washer	6	
0062	Washer	36	XX	0169	Seal Retainer	1	
0063	Stud	4	XX	0170	Hex Bolt	4	
0064	Loctite AVV	4		0171	Pipe Plug	4	
0065	Thrust Plate	1	XX	0180	Idler Stop Plate	2	
0066	Cover	1		0181	Cap Screw	4	

X Denotes Minor Repair Kit Items XX Denotes Major Repair Kit Items **Note:** Minor Kit Items are included in Major Repair Kit

Figure 4 Superbolt Instructions



Installation and Removal Instructions

(excludes piston end, crosshead, mill motor & bearing lock nuts)

Air Impact Tool Selection 90 psi air pressure *(Call Superbolt for additional help with air tool selection)*

NOTE: The jackbolt torque actually achieved by an air impact wrench is usually only 30 - 50% of its rated output. For minimum hand work, use an air impact with an output of 110% - 120% target torque. For maximum power, use the largest air line fitting.

Up to 70 ft-lbs: For 15 - 35 ft-lbs use a right angle ratchet or light duty 3/8" impact. For 35 - 70 ft-lbs use a heavy duty 3/8" impact.

70 - 100 ft-lbs: Use a light duty 1/2" impact at a reduced pressure or setting. (Be careful not to overtighten! Calibrate the impact before starting.)

100 - 170 ft-lbs: For 100 - 130 ft-lbs use a light duty 1/2" impact. For 130 - 170 ft-lbs use a heavy duty 1/2" impact.

170 - 200 ft-lbs: Use a light duty 3/4" impact on low setting. Some heavy duty 1/2" impacts will also reach this range.

Over 200 ft-lbs: For 200 - 300 ft-lbs, use a light to medium duty 3/4" impact. Over 300 ft-lbs, use a heavy duty 3/4" impact.

Calibrating an air impact wrench: Tighten one jackbolt until the socket rotation stops and check the jackbolt with a torque wrench. The torque required to move the jackbolt further is the output of the impact as measured on Superbolt tensioners.

Helpful Tips

Prior to Tightening:

1) Check threads of main stud: If possible, verify that the tensioners spin on prior to the installation date. If a tensioner is tight or will not thread on, try using lapping compound on the main thread and work the tensioner in a back and forth motion making small advances when the thread loosens up. If necessary, chase the studs with a die.

2) Use of spacers: Tensioners should be positioned at the ends of the studs to minimize exposed threads and facilitate easy access to the jackbolts. A spacer (or stacked washers) can be used beneath the special hardened washer to accomplish this. A spacer will also "step over" a damaged area on a stud where years of bolting have deformed the first few threads.

3) Back the tensioner off before tightening to provide 1/16" to 1/8" gap: The additional jackbolt extension provides easy access for oiling the jackbolt tips prior to removal. This is especially beneficial for oiling when the tensioners are inverted. Note: There may be insufficient jackbolt stroke to allow this step when tensioning exceptionally long bolts or tie rods, or when closing a gap between flanges.

4) For spinning the tensioner on and off the stud: Custom "sockets" which grip the tensioner are available. Also, two deep well sockets inserted over two jackbolt hex's at 180° apart can serve as "handles" for spinning the tensioners on and off the studs.

For Tightening:

5) To improve efficiency when using impacts: Don't wait for the socket to stall completely on a specific jackbolt before advancing to the next jackbolt. It is faster, overall, to move quickly between jackbolts.

6) Overshooting the target torque: You may want to use 110 - 120% of the target torque for Step 3, Step 4, and for 1-2 rounds of Step 5. This may eliminate a tightening round. Be careful not to stabilize all of the jackbolts at this torque however. For long bolts or tie rods, you may want to experiment using even higher torque values. Call Superbolt before using more than 120% target torque.

7) For gasketed joints: During gasket compression, the load is transferred to the jackbolts (i.e. stud) being tightened. Don't be concerned if some jackbolts (or tensioners) become loose during the procedure. Continue following the procedure. Don't spin down tensioners that become loose during gasket compression.

For Removal:

9) 1/4 turn or less!: Removing the jackbolts more than a 1/4 turn will increase the removal torque of the remaining jackbolts and you may get stuck. If this happens, you will have to retighten and start again.

10) Stuck jackbolt removal: If a jackbolt will not turn, remove, re-lube, and retighten a neighboring jackbolt and then try to turn it.

Installation Preparation:



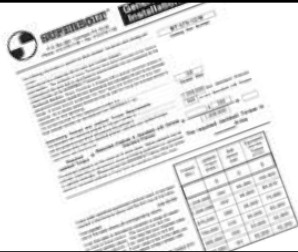
Superbolt® Product: Confirm jackbolts are lubricated with correct Superbolt® lubricant (JL-G or JL-M). New product is lubricated at the factory. Make sure the jackbolt tips are flush (or recessed) with the bottom of the nut body.



Torque Wrenches: Select appropriate hand tools, depending on your target torque.



Sockets: High hex stresses require the use of quality six-point impact sockets. Have several spares handy for each job and replace them at the first sign of wear. Special Superbolt® sockets may be required when using a 3/4" impact or torque wrench and jackbolt spacing is close.



Installation Sheet (*shipped with product*). Determine the target jackbolt torque. NOTE: The jackbolt torque stamped on the tensioner is a standard value for that part and may not be correct for your application. If you are unsure, contact Superbolt®.



Air Impacts: If using air impacts, select a tool with an output of about 100% - 110% of the target torque. See "Air Impact Tool Selection" on page 4.



Lubricants: Jackbolts are pre-lubricated from the factory with either JL-G or JL-M lubricant. For the main stud any standard anti-seize lubricant can be used. For reuse after temperature service, remove, clean, and re-lubricate the jackbolts with the correct Superbolt® lubricant.



Washers: Apply the correct Superbolt® lubricant to the washer face or to the jackbolt tips.

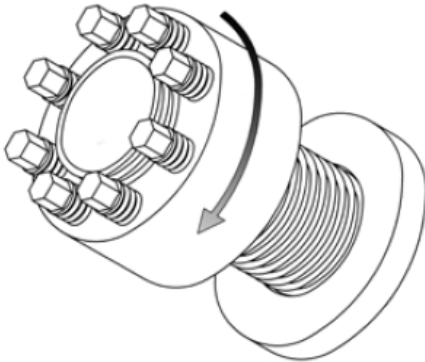
Further Preparation Steps:

1) Lubricate the thread of the main stud. 2) Slide the hardened washer onto the stud. 3) Lubricate the washer face or jackbolt tips with the correct Superbolt lubricant (JL-G or JL-M).

For flanges: To speed up installation, use two workers at 180° apart, following OEM pattern for tightening.

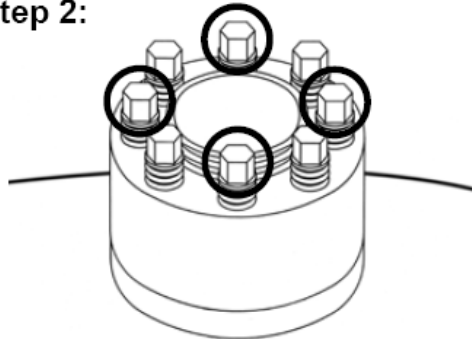
Installation

Step 1:



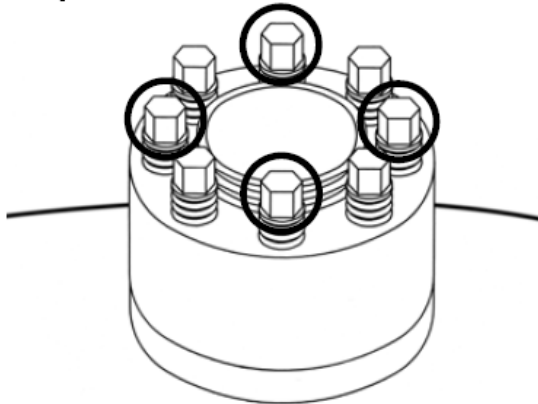
Spin the tensioner onto the main thread until it seats against the washer. You may want to back off the tensioner slightly as mentioned in Helpful Tip #3 on page 4.

Step 2:



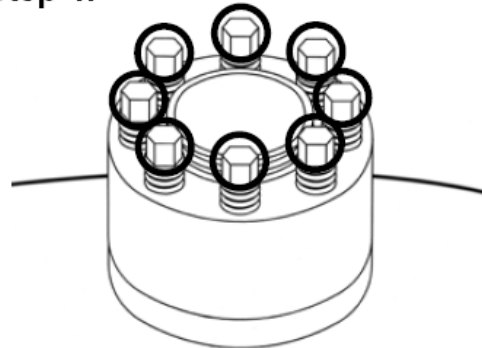
Tighten (4) jackbolts at 90° apart (12:00, 6:00, 9:00, and 3:00) on all studs with a partial torque (30-70%). This serves to seat the flange. If using an air impact, use a reduced setting or lightly pulse the trigger at the full setting.

Step 3:



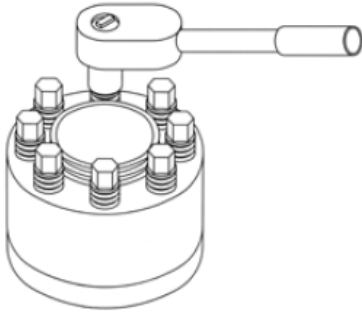
At 100% target torque, tighten the same (4) jackbolts on all studs.

Step 4:



At 100% target torque, tighten all jackbolts in a circular pattern. Do this for all studs (1 round only). See Helpful Tip #7 about using up to 120% torque.

Step 5:



Repeat "STEP 4" until all jackbolts are stabilized (less than 10° rotation). This usually requires 2-4 additional passes. If using air tools, switch to a torque wrench when socket rotation is small. Use the torque wrench to stabilize at the target torque.

NOTE: Product with 4 or 6 jackbolts - use a star pattern for all steps.

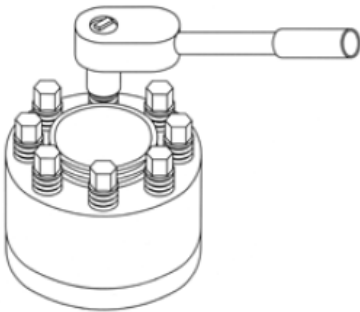
Removal

CAUTION! Jackbolts must be unloaded gradually. If some jackbolts are fully unloaded prematurely, the remaining jackbolts will carry the entire load and may be hard to turn. With extreme abuse, a jackbolt tip can deform, making removal difficult.

Service Under 250°F

Preparation: Spray jackbolts with penetrating oil or hydraulic oil prior to start (especially if product is in corrosive environment).

Step 1:



Loosen each jackbolt 1/8 turn following a circular pattern around the tensioner (1 round only). As you move around and get back to the first jackbolt, it will be tight again. Do this for all studs on the joint prior to the next step.

Step 2: Repeat a 2nd round as above for all studs, now loosening each jackbolt 1/4 turn in a circular pattern.

Step 3: Continue loosening 1/4 turn for 3rd and successive rounds until all jackbolts are loose. **NOTE:** Usually after the 3rd or 4th round, an impact can be used to completely extract the jackbolts, one by one. For long bolts or tie rods, additional rounds may be required before removing the jackbolts with an impact tool.

Step 4: Remove, clean and relubricate the jackbolts prior to next use with correct Superbolt lubricant (JL-G or JL-M).

Service Over 250°F

Preparation: Above 300°F the petroleum base of the lubricant burns off. Oil per "STEP 1" below to reduce the removal torque.

Step 1:

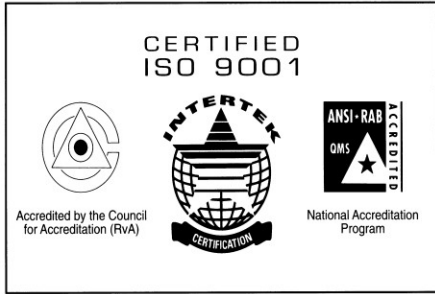


As the equipment is cooling down (around 300°F), apply hydraulic oil to the jackbolts and washer and let sit for several hours. Thoroughly “wet-down” all components and re-apply during equipment cool down period. If the tensioner is inverted, squirt oil in the gap between the nut body and the washer. Synthetic oil can be used for oiling above 300°F.

Step 2: Wait for tensioners to cool below 200°F. Using a circular pattern, “crack” each jackbolt only enough to ensure movement. Do not turn beyond the break loose point. Do this for all studs.

Step 3: Now begin with “STEP 1” of the procedure for service under 250°F.

NOTE: Heating Rods can be used to reduce the removal torque required.



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