



INSTRUCTIONS and PARTS LIST

SERIES FC4LZET-400 & 400P

WARNING

**READ THIS INSTRUCTION BOOK AND CA-1 BEFORE
INSTALLATION, OPERATION OR MAINTENANCE**

Instructions FC4L-(R-1)

This manual now is
identified as part no.
SRM00057

**Imo Delaval Inc.
IMO Pump Division
P.O. Box 5020
Airport Road
M nro , NC 28110-0527
USA**

May, 1987

ORDERING INSTRUCTIONS

All correspondence pertaining to renewal parts for the equipment must refer to the instruction book number and should be addressed to the nearest IMO Pump Division sales office. See addresses of sales offices listed above.

The handling of renewal orders will be greatly facilitated if the following directions are carefully observed.

1. Give the number of the instruction book.
2. Give the serial number of the machine for which part is desired. This number appears on the nameplate.
3. Designate the desired part by the number and name as listed in this instruction book.
4. Give the drawing number or figure number in which the part is shown. (In the event the part is called out on an unnumbered sketch — the page number on which the sketch appears should be used in lieu of the drawing number as the reference.)

For Example:

Instruction Book No. A3D-6
Serial Number 505629
Part Number and Name 063, Power Rotor
Drawing Number (see item 4 above) SF-5377

FOREWORD

These instructions cover

FC-4LZET-400

FC-4LZET-400P

These units are equipped with Borg Warner Type QB mechanical seals. The ball bearing is a standard deep groove Conrad type bearing with Buna seals.

INSTALLATION

MOUNTING — These units are designed for horizontal foot mounting. For other mounting attitudes, approval must be obtained from IMO Pump Division.

INLET — These units are designed to handle high positive inlet pressures. The seal on the inlet end of the pump and the seal on the drive end of the pump operate under inlet pressure conditions. Both seals are of balanced design. These units should not be operated with an inlet pressure that is below atmospheric. Low inlet pressures may cause the seals to leak air into the inlet of the pump causing cavitation and loss of prime.

The inlet and outlet nozzles are integral with the pump case (001) and their position, relative to each other cannot be changed.

PIPING CONNECTIONS — Inlet and outlet piping should be flexible with adequate provision for expansion and contraction due to hydraulic loads and temperature change. All piping should be independently supported. Unnecessary piping stresses should not be imposed on the pump. Piping stresses can produce pump misalignment, and/or case distortion which can result in pump malfunction or failure.

PRIMING AND VENTING — Always provide priming and vent connections to purge air from the system and prevent pump from starting dry.

RELIEF VALVE — A relief valve should be installed in the discharge line as close to the pump as practical. The discharge from the relief valve should be returned to tank or to a remote location in the inlet line.

WARNING — Before connecting the pump into the system, all of the piping must be thoroughly cleaned and flushed to remove debris generated during fabrication.

ALIGNMENT AND ROTATION – Align pump shaft to driver shaft to within .005 inches F.I.R., in both parallel and angular position. Before connecting the coupling, check driver rotation and make sure driver rotates in the proper direction. Connect coupling and rotate unit by hand. If unit is properly aligned, unit should rotate smoothly without tight spots.

OPERATION

INITIAL START-UP – When the unit does not have boost pressure available, prime the pump and as much of the suction line as possible. Open the vent connection on the discharge side of the pump. Make sure all inlet and outlet valves are fully open before starting unit.

When boost pressure is available, open inlet and discharge valves. Open vent valve to fully fill unit before starting.

Close vent valves when solid stream of oil is obtained.

MAINTENANCE

The pump should operate satisfactorily with very little attention other than periodic checks of the bearing and seals.

DISASSEMBLY OF PUMP – Close off the inlet and discharge valving. Vent pressure from this pump. Open the drain connection and drain as much of the oil as practical from the pump and piping between the isolation valving. The unit may be rotated in a counter-clockwise direction by hand to release the fluid trapped in the rotors and discharge chamber. Break inlet and discharge piping connections.

Disconnect coupling. Remove pump from its baseplate to a convenient location for disassembly.

DISASSEMBLY INSTRUCTIONS

Step 1 – Remove Tubing (034) by loosening nuts on Tube Fittings (032).

Step 2 – Remove Cover (Outboard) (030) including Tube Fitting (032), "O" Rings (003) and (033), Seat Adapter Sub-Assembly (014), "O" Ring (017), Retainer (031) and Bolts (020) by removing Bolts (006).

Step 3 – Loosen Setscrews in Seal (018) and pull seal off Power Rotor (007).

Step 4 – Remove Sleeve (010), Shim (029) and Retaining Ring (028) from Power Rotor (007).

Step 5 – Remove Cover (Inboard) (004) including Power Rotor (007), Idlers (022), Retainer (019), Bolts (020), Retaining Rings (011), Bearing (012), Spacer (013), Seal Adapter Sub-Assembly (014), "O" Rings (017), Seal (018), Sleeve (010), Bushing (005), Tube Fitting (032), "O" Rings (003) and (033) and Key (021) by removing Bolts (006). NOTE: Care to be taken not to drop the Idlers (022) from assembly.

Step 6 – Remove Retainer (019) at Inboard End by removing Bolts (020).

Step 7 – Remove Power Rotor Assembly (007) which consists of Retaining Rings (011), Bearing (012), Spacer (013), Seal Adapter Sub-Assembly (014), "O" Ring (017), Seal (018), Sleeve (010) and Key (021).

Step 8 – Push Housing and Plate Assembly from Case (001). The Assembly consists of Housing (002), "O" Ring (003), Spacer (026), Plate (023) and Capscrews (027).

Step 9

Disassembly of Cover (Outboard) (Step 2)

- (a) Remove Seat Adapter Sub-Assy (014) including 'O' Ring (017) by removing Bolts (020) and Retainer (031).
- (b) Remove 'O' Ring (003) from Cover and 'O' Ring (017) from Seat Adapter Sub-Assy.
- (c) Remove Tube Fitting (032) from Cover and 'O' Ring (033) from Tube Fitting.

Step 10

Disassembly of Power Rotor Assembly (Step 5)

- (a) Remove Key (021) and Retaining Ring (011) nearest Keyway.
- (b) Remove Bearing (012) and Retaining Ring (011).
- (c) Remove Spacer (013) and Seat Adapter Sub-Assy (014) including 'O' Ring (017).
- (d) Loosen Setscrews in Seal (018) and pull seal off Power Rotor (007).
- (e) Remove Sleeve (010) from Power Rotor (007) and 'O' Ring (017) from Seat Adapter Sub-Assy (014).

Step 11

Disassembly of Cover (Inboard) (Step 5)

- (a) Remove Bushing (005) and "O" Ring (003).
- (b) Remove Tube Fitting (032) from Cover and O' Ring (033) from Tube Fitting.

Step 12

Disassembly of Housing and Plate Assembly (Step 8)

- (a) Remove 'O' Ring (003).
- (b) Remove Plate (023) and Spacers (026) by removing Capscrews (027).

ASSEMBLY INSTRUCTIONS

Step 1

Power Rotor Assembly

- (a) Install Sleeve (010) and Seal (018) on inboard end of Power Rotor (007). Tighten Setscrews in seal to shaft.
- (b) Install "O" Ring (017) in groove of Seat Adapter Sub-Assembly (014) which includes Seat Adapter (015) and Pin (016). Seal seat with "O" Ring should be installed in Seat Adapter Sub-Assembly with Pin engaged before installing on shaft.
- (c) Install Seat Adapter Sub-Assembly (014) on shaft insuring that Pin (016) registers with slot in the seal seat. Seal seat with "O" Ring should be installed in Seat Adapter Sub-Assembly with Pin engaged before installing on shaft.
- (d) Install Retaining Ring (011) in groove on shaft closest to Seal (018) then install Spacer (013) and Bearing (012) on shaft.
- (e) Install Retaining Ring (011) to retain Bearing (012) on shaft and remove holding clips from Seal (018). NOTE: Bearing should be pressed on at the inner race.

Step 2

Inboard Cover Assembly

- (a) Install "O" Ring (003) in groove in Cover (004).
- (b) Install "O" Ring (033) in groove of Tube Fitting (032) and assemble to Cover (004).

Step 3

Housing and Plate Assembly

- (a) Install Spacers (026) and Plate (023) at end of Housing (002) using Capscrews (027), torque Capscrews finger tight only (see Step 4a).
- (b) Install "O" Ring (003) in groove in Housing (002).

Step 4

Housing Assembly (Step 3) Installation

- (a) Slide Housing Assembly (002), "O" Ring end first into Case (001) from inlet end. Be sure that idler bores are perpendicular to inlet of Case.

NOTE: Finger tight Capscrews (027) in Step 3a permit plate to be adjusted to suit case bore and insure entry with a minimum of force.

Step 5

Assembly of Power Rotor Assembly (Step 1) to Inboard Cover Assembly (Step 2)

- (a) Install Cover Assembly (Step 2) on Power Rotor Assembly (Step 1).
- (b) Install Bushing (005) on shaft and into Cover.
- (c) Install Retainer (019) using Bolts (020) and torque to 100 ± 5 lbs. in.

Step 6

- (a) Position Idlers (022) onto Power Rotor in Power Rotor and Cover Assembly (Step 5) and slide rotors into Housing bores until face of Cover (004) contacts face of Case (001).
- (b) Install Bolts (006) in Case. Torque to 60 ± 5 lbs. ft.

Step 7

Torque Plate retaining Capscrews (027) to 100 ± 5 lbs. in.

Step 8

Outboard Seal and Cover Assembly

- (a) Install Retaining Ring (028).
- (b) Install Shim (029) per Fig. 1.
- (c) Install Sleeve (010) and Seal (018) on outboard end of Power Rotor (007). Tighten Setscrews in seal on shaft and remove holding clips from seal.
- (d) Install "O" Ring (003) in groove of Cover (030) and "O" Ring (033) in groove of Tube Fitting (032) and assemble to Cover (030).
- (e) Install Cover (030) to Case (001) using Bolts (006) and torque to 60 ± 5 lbs. ft.
- (f) Install "O" Ring (017) in groove of Seat Adapter Sub-Assembly (014) which includes Seat Adapter (015) and Pin (016).
- (g) Install Seat Adapter Sub-Assembly (014) in Cover (030) insuring that Pin (016) registers with slot in seal seat. Seal seat with "O" Ring should be installed in Seat Adapter Sub-Assembly with Pin engaged before installing on shaft.
- (h) Install Retainer (031) using Bolts (020). Torque to 100 ± 5 lbs. in.

Step 9

Install Tubing (034) between Tube Fittings (032 in Covers (004) and (030).

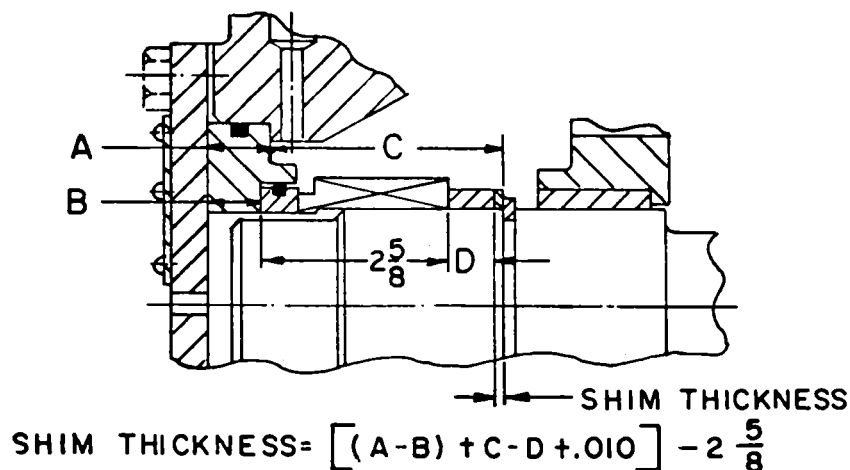


Fig. No. 1

PARTS LIST

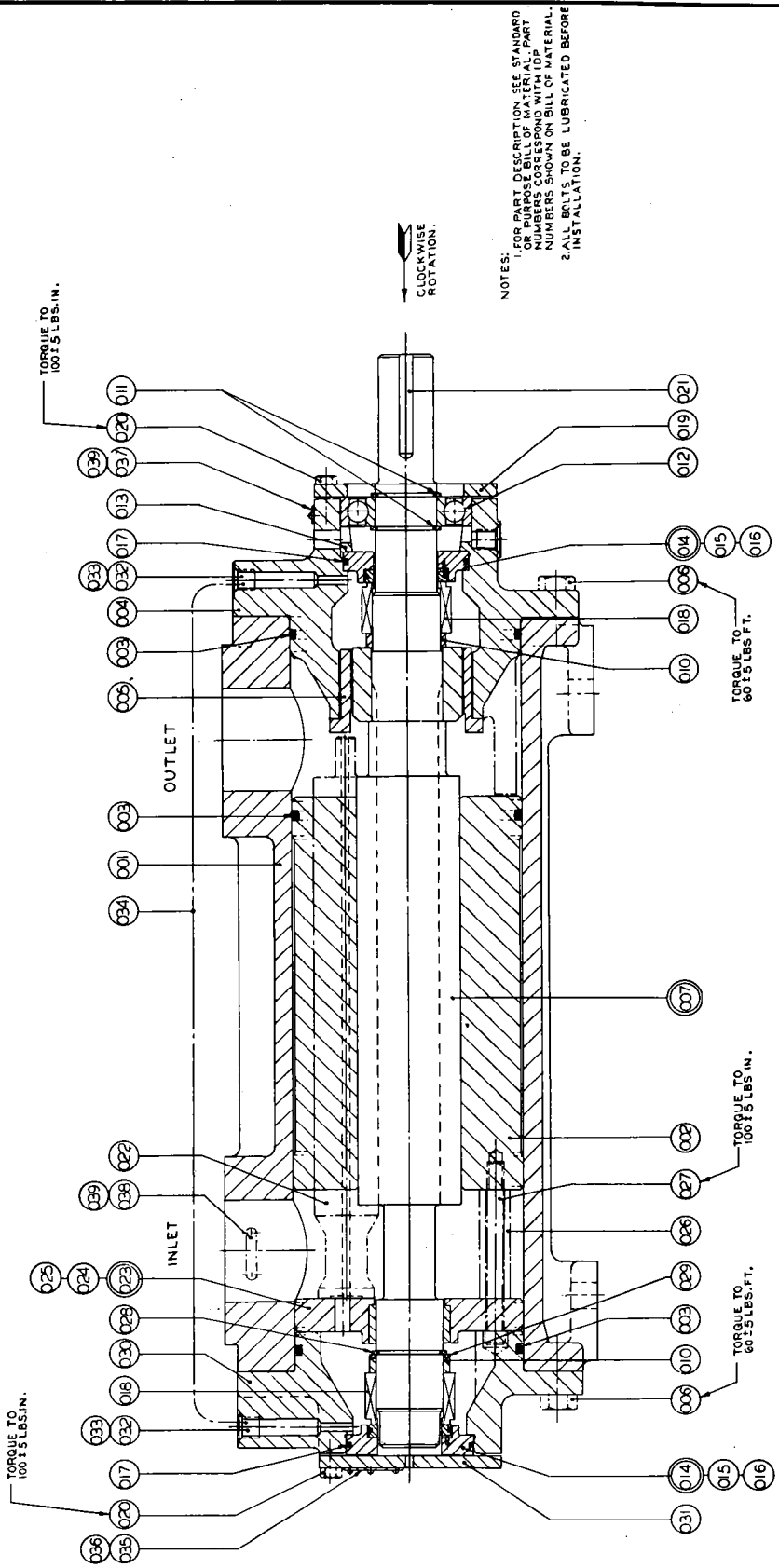
DRAWING SD-5499

| <u>No.</u> | <u>Name</u> | <u>No.</u> | <u>Name</u> |
|------------|-----------------------------|------------|-------------------|
| 001 | Case | 022 | Idler Rotor XX |
| 002 | Housing XX | 023 | Plate Ass'y XX |
| 003 | O-Ring X | 024 | Plate (2) |
| 004 | Cover, Inboard | 025 | Bushing (2) |
| 005 | Bushing XX | 026 | Spacer (3) |
| 006 | Hex Hd. Bolt | 027 | Soc. Hd. Cap Scr. |
| 007 | Power Rotor Ass'y XX | 028 | Retaining Ring X |
| 010 | Sleeve | 029 | Shim X |
| 011 | Retaining Ring X | 030 | Cover, Outboard |
| 012 | Ball Bearing X | 031 | Retainer |
| 013 | Spacer | 032 | 90°El. |
| 014 | Seal Seat Adapter Ass'y (1) | 033 | O-Ring X |
| 015 | Seal Seat Adapter (1) | 034 | Tubing |
| 016 | Spring Pin (1) | 035 | Name Plate |
| 017 | O-Ring X | 036 | Drive Scr. |
| 018 | Mechanical Seal X | 037 | Name Plate |
| 019 | Retainer | 038 | Name Plate |
| 020 | Hex Hd. Bolt | 039 | Drive Scr. |
| 021 | Key | | |

All parts marked X are a minor repair kit
 All parts marked X, & XX are a major repair kit.

1. Parts 015 and 016 make up assembly 014
2. Parts 024 and 025 make up assembly 023
3. Spacers 026 serviced in sets of two (2) match ground for length

| | | | |
|-----|------|----|------|
| REV | DATE | BY | CHKD |
| | | | |
| | | | |
| | | | |



The instructions given herein cover generally the operation and maintenance of subject equipment. Should any questions arise which may not be answered specifically by these instructions, they should be referred to the IMO Pump Division for further detailed information and technical assistance.

This manual cannot possibly cover every situation connected with the operation, adjustment, inspection, test, overhaul and maintenance of the equipment furnished. Every effort is made to prepare the text of the manual so that engineering and design data is transformed into the most easily understood wording. The IMO Pump Division, in furnishing this equipment and this manual, must presume that the operating and maintenance personnel assigned thereto have sufficient technical knowledge and experience to apply sound safety and operational practices which may not be otherwise covered herein.

In applications where IMO Pump Division-furnished equipment is to be integrated with a process or other machinery, these instructions should be thoroughly reviewed to determine the proper integration of the equipment into the overall plant operational procedures.