



G6DBCX-312/378

PRODUCT SERVICE MANUAL

Imo Part Number / BOM # 3220/378



WARNING

This Instruction Manual and General Instructions Manual, SRM00046, should be read thoroughly prior to pump installation, operation or maintenance.





Manual No. SRM00107

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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. Protection should be provided by user to prevent accidental contact.		
	CAUTION	ATTENTION
Failure to observe precautions noted in this box can cause damage or failure of equipment.		
Non compliance of safety instructions identified by the 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 you keep 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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A. GENERAL INSTRUCTIONS

The instructions found herein cover the disassembly, assembly and parts identification of G6DBCX-312/378 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, CA-1, provided with your order. For further detailed information and technical assistance please refer to Imo Pump, Technical/Customer Service Department, at (704) 289-6511.

This manual cannot possibly cover every situation connected with installation, operation, inspection, and maintenance of equipment supplied. Every effort was made to prepare text of manual so that engineering and design data is transformed into most easily understood wording. Imo Pump must assume personnel assigned to operate and maintain 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.

In applications where equipment furnished by Imo Pump is to become part of processing machinery, these instructions should be thoroughly reviewed to ensure proper fit of said equipment into overall plant operational procedures.



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.

B. INTRODUCTION

This instruction manual covers the **G6DBCX-312/378** Imo pump. This pump has been designed for use in hydraulic, lubricating, seal, distillate, residual, fuel, and crude oil applications. The model and design construction of each pump can be identified by the designator code on the pump nameplate. Definitions of model designators are identified in figure 1.

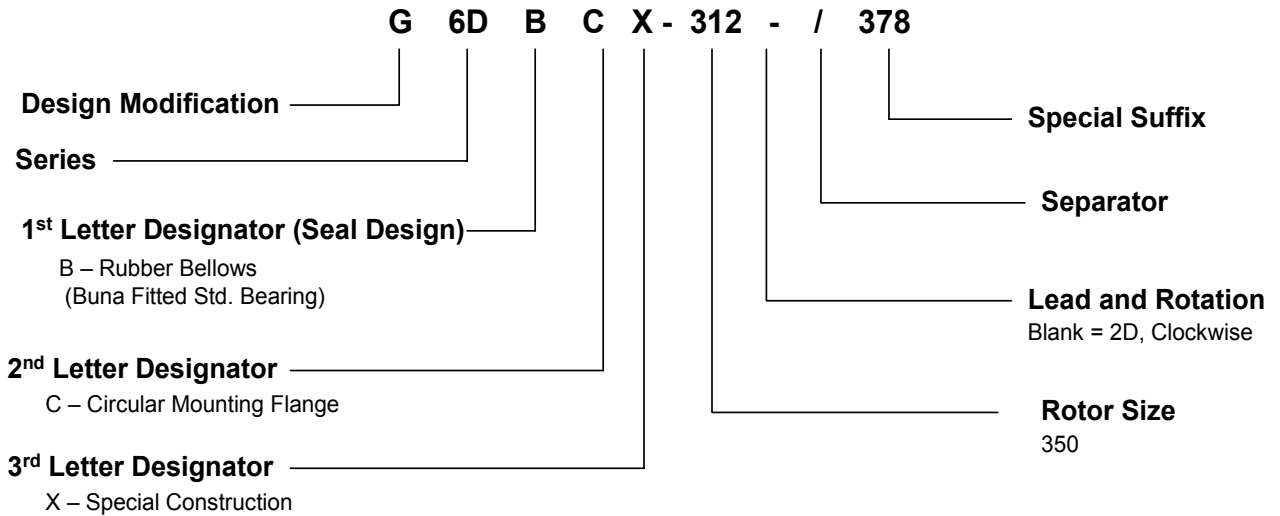
C. DESCRIPTION OF EQUIPMENT

The **G6DBCX-312/378** pump is are positive displacement, rotary screw pump consisting of precision bored housings which enclose a driven screw (power rotor) and intermeshing following screws (idler rotors). These screws when rotating form a succession of closures or cavities. As they rotate, fluid is moved axially from inlet port to outlet port in a continuous, uniform flow with minimum fluid pulsation and pump noise.

D. PUMP MODEL IDENTIFICATION

This instruction manual covers **G6DBCX-312/378** pumps. The model of each pump is identified on pump nameplate. Refer to figure 1 and table 2 for instructional keys when using this manual.

Figure 1 – Model Designator Definitions



E. ORDERING INSTRUCTIONS

When corresponding with Imo Pump regarding the **G6DBCX-312/378** pump, refer to pump nameplate, this instruction manual, and assembly drawing as instructed below:

1. From pump nameplate, record pump model number, serial number, and manufactured date.
2. Record instruction manual number, revision, and date.
3. From instruction manual, record figure numbers that apply to replacement part(s).
4. From assembly drawing or parts list (see table 2) provide IDP number(s) and names for replacement part(s).
5. Give above information to your Imo service representative.

Imo sales and service representatives are listed herein and in General Instruction Manual, SRM00046.

F. OPERATION

F.1 LIQUID LIMITATIONS

	CAUTION		ATTENTION
Never operate with thin liquids such as solvents or water. Pump is designed for liquids having general characteristics of oil			

F.2 OPERATING LIMITS

	CAUTION		ATTENTION
Operating conditions, such as speed, fluid viscosity, temperature, inlet pressure, discharge pressure, filtration, duty cycle, drive type, mounting, etc., are interrelated. Due to these variable conditions, specific application limits may be different from operational limitations. Equipment must not be operated without verifying system operating requirements are within pump’s capabilities.			

Under no circumstances are following operating limits (specified in table 1) to be exceeded without specific approval from Imo Pump.

Table 1 – Normal Pump Operating and Structural Limits
(Refer to Section F.2 Operating Limits, in this Manual)


Condition	Limit
Maximum Speed	2500 rpm
Minimum Viscosity	32 SSU
Maximum Viscosity	2500 SSU
Minimum Liquid Temperature	0°F
Maximum Liquid Temperature (figure 1)	180°F
Maximum Inlet Pressure	50 psig
Maximum Discharge Pressure (Continuous)	1500 psig
Filtration	Refer to General Instruction Manual, SRM00046
Drive	Direct Drive Only
Mounting	Vertical “C” - Face

G. PARTS LIST – Table 2

Parts List IDP	QTY	DESCRIPTION	KIT	IDP	QTY	DESCRIPTION	KIT
1	1	Case		42	2	Bearing Snap Rings	X
2	1	Inlet Head		43	1	Bearing Retainer	
4	16	Hex Bolts		46	1	Inboard Cover	
8	2	Housing Snap Rings	XX	47	4	Brg. Retainer Hex Bolts	
9	1	Inlet O-Rings	X	48	1	Seal Seat Adapter	
11	1	Inboard Cover O-ring	X	49	1	Ball Bearing	X
21	2	Suction Idlers	XX	63	4	Power Rotor	XX
23	2	Cups	XX	70	1	Tubing Fitting`	
24	1	Discharge Housing	XX	71	1	Seal Pipe	
25	1	Mechanical Seal	X	73	1	Inlet Housing	XX
26	2	Housing Tube		83	1	Seal Gasket	X
27	4	Thrust Tube O-Rings	X	86	1	Balance Piston Bushing	XX
28	1	Housing O-Ring	X	100	1	Oil Balance Tube	
29	1	Thrust Plate	XX	101	2	Thrust Plate Spacer	
31	1	Key		102	2	Thrust Plate Hex Bolt	
35	2	Discharge Idlers	XX	103	1	Inlet Strainer	
38	1	Sleeve		104	8	Cap Screws	

X - Minor Repair Kit Items.
XX - Major Repair Kit Items. (Items marked (X) are included in Major Repair Kit.)

H. PUMP MAINTENANCE

	WARNING
Failure to observe precautions while installing, inspection, and maintaining pump can cause injury to personnel from accidental handling of liquids that may harm skin or clothing, or fire hazard risks from flammable liquids, or injury from high pressure fluid jets.	

**DANGER**

BEFORE working on equipment, make sure all power to equipment is disconnected and locked-out.

H.1 GENERAL COMMENTS

NOTE: Part number identifiers (IDP) contained within parenthesis, such as (9), refer to circled numbers shown on assembly drawing.

De-energize driver before starting with any maintenance action.

H.2 TOOLS REQUIRED

Procedures described in this manual require common mechanics hand tools, a torque wrench, dial indicators for alignment and a suitable lifting device such as slings, straps, etc.

H.3 Pump Disassembly Procedure

**CAUTION**

Fluid leakage from disassembly of pump may make floor slippery and cause personal injury

Note: To service mechanical seal and ball bearing only, perform H.3, steps 1 thru 5 and H.4, Steps 9 through 12.

Refer to assembly drawing for following instructions.

1. Close discharge valve. Remove pump and driver unit from tank. Loosen set screws on coupling and then remove motor from bracket. Remove coupling hub and key (31) from pump. Remove seal pipe (71).
2. Remove bearing retainer (43) from inboard cover (46) by removing bolts (47).
3. Remove assembled power rotor (63) from inboard cover (46). Removal of power rotor (63) includes removal of snap rings (42), ball bearing (49), seal (25), seal seat adapter (48) and spacer (38).
4. Disassemble power rotor (63) as follows (See Figure 1 for seal drawings) :
 - a. Using a flat nosed tool, such as a screw driver, remove snap rings (42) from grooves in power rotor (63) on both sides of bearing (49).
 - b. Sealed ball bearing (49) is assembled to power rotor (63) with light press fit. Ball bearing (49) may be removed by using bearing puller or vertical arbor press. When using press, place two pieces of key stock through openings of mechanical seal seat adapter (48) underneath ball bearing (49) on both sides of power rotor shaft. Key stock should be long enough to support power rotor (63) as it is placed in press. Position press ram against power rotor (63) coupling end face. Gently press power rotor (63) through ball bearing (49).

CAUTION**ATTENTION**

Ensure power rotor (63) does not fall to floor once ball bearing (49) is off of its diameter

- c. Remove seal seat adapter (48) with stationary seal seat. Remove stationary seat with O-ring from seal seat adapter (48). Discard O-ring.

- d. Remove single spring rubber bellows type seal (25) from the power rotor shaft (63) with a rotating motion.
 - e. Remove spacer (38) from shaft (63).
5. Remove gasket (83) from inboard end cover (46).
 6. Remove inboard cover (46) by removing bolts (4). Remove O-ring (11) from inboard cover (46).
 7. Remove tube 26 from either housing (24) or inboard cover (46). Tube (26) in front cover (46) does not have o-rings installed.
 8. Remove balance piston bushing (86) from inboard cover (46) by heating area of inboard cover (46) around bushing (86) to loosen loctite and then pulling out balance piston bushing (86).
 9. Remove inlet strainer (103) from inlet head (2) by removing bolts (104). Remove inlet head (2) from case (1) by removing bolts (4). Remove and discard O-ring (9) from inlet head (2).
 10. Remove thrust plate (29) and spacers (101) by removing bolts (102).
 11. Remove seal return tube (100) with O-rings (27). Remove and discard O-rings (27).
 12. Remove cups (23) and idlers (21 and 35) from housings (73 and 24).

	CAUTION	ATTENTION
Do not permit idlers (21, 35) to drop as they emerge from housings (73, 24).		

13. Remove snap rings (8) from case.
14. Remove housings (73, 24) by pushing them out through discharge end of the case (1). Remove and discard housing O-ring (28). Remove tubes (26) and O-rings (27) from housings (24 or 73).

	CAUTION	ATTENTION
Do not permit housings (73, 24) to drop as they are removed from pump.		

H4. Pump Reassembly Procedure:

Note: Prior to reassembly, all parts should be cleaned and inspected for nicks and burrs. Replace all worn and damaged parts. Imo pump recommends replacement of ball bearing (49), mechanical seal (25), and O-rings (9, 28, 11) when these parts are disturbed from their original installed position. All parts should be coated with light lubricating oil to assist in assembly.

1. Install O-rings (27) on tube (26). Tube (26) that is installed in housing (24) and inboard cover (46) does not require O-rings.
2. Clean and dry inboard cover (46) and balance piston bushing (86) mating surfaces with solvent. Wipe Loctite "T747" Primer or equivalent onto the mating surfaces of bushing (86) and inboard cover (46). Allow 1 to 5 minutes until primer is visibly dry. Apply Loctite 609 or equivalent to bushing (86) and inboard cover (46) mating surfaces. Assemble bushing (86) into inboard cover (46). Allow 10 minutes to dry before proceeding with assembly.

3. Install O-ring (11) on inboard cover (46).
4. Install O-ring (28) in groove in housing (24). Install tube (26) in end of housing (24) opposite O-ring groove (28).
5. Install housing (24), end of housing opposite of O-ring first, in pump case (1) from discharge end of the pump.
6. Install housing (73) into the suction end of the pump case (1) with the end that has the two drilled and tapped holes facing the inlet of the pump. Be sure that the tube (26) in housing (24) mates to hole in housing (73).
7. Install tube (26) in inboard cover (46). Install inboard cover (46) into discharge port side of case (1) ensure tube (26) lines up with hole in discharge housing (24). Seal vent (70) must be positioned at 9 o'clock facing shaft with outlet port facing up. Install bolts (4) and torque bolts (4) to 100 ± 5 LB-FT.
8. Install snap rings (8) in groove in case (1) behind housing (73).
9. Assemble power rotor (63) and mechanical seal (25) as follows (See Page 9 for seal drawings):
 - a. Assemble spacer (38) onto shaft (63).
 - b. Seal is a single spring rubber bellows type, apply light coat of system fluid to inside diameter of bellows and slide mechanical seal rotating assembly on power rotor (63) until it seats against of seal spacer (38). Wipe seal face with isopropyl alcohol and a lint free rag.
 - c. Install O-ring in groove of mechanical seal stationary seat. Install seat including O-ring in seal seat adapter (48) ensuring that groove in back of stationary seat mates to spring pin in seal seat adapter (48). Clean seal face with isopropyl alcohol and lint free rag. Put small amount of clean system fluid or light oil on seal running face. Install stationary seat running face against rotating seat face.
 - d. Install inner snap ring (42) in groove of power rotor (63).
 - e. Press bearing (49) on power rotor (63), pressing only on inner race of bearing (49) using an installation sleeve until it is located next to inner snap ring (42).

	CAUTION		ATTENTION
Ball Bearing (49) will be damaged if installed by pressing on inner race.			

- f. Install outer snap ring (42) in groove of power rotor (63).
10. Install gasket (83) in seal bore of inboard cover (46).
11. Install assembled power rotor (63) in pump, centering all parts as they enter inboard cover (46). Align one of openings in spacer (48) over drain in inboard cover (46).
12. Install bearing retainer (43) on inboard cover (46) using bolts (47). Torque bolts (47) to 44 ± 2 LB-FT.
13. Install idlers (35 and then 21) into housings (24, 73) by meshing threads with power rotor thread

14. Install cups (23) on idlers (21).
 15. Install tube o-rings (27) on tube (100), and install tube (100) in housing (73)
 16. Install bolts (102) in thrust plate (29) and spacers (101) on bolts (102).
 17. Install thrust plate assembly including thrust plate (29), bolts (102) and spacers (101) on housing (73). Be sure idler balance hole in thrust plate (29) mates with tube (100). Torque bolts (102) to 60 ± 5 LB-FT.
 18. Install O-ring (9) on inlet head (2), and install inlet head (2) on case (1) using hex bolts (4). Be sure seal return fitting (70) in inlet head lines up with fitting in inboard cover (46). It should be at 9 o'clock facing shaft with outlet port facing up. Torque bolts (4) to 100 ± 5 LB-FT.
 19. Install inlet strainer (103) on inlet head (2) using bolts (104). Torque bolts to 40 ± 2 LBFT.
 20. Install seal pipe (71) using fittings (70).
1. Install coupling hub key (16). Install and align pump and driver as specified in General Instruction Manual, SRM00046.

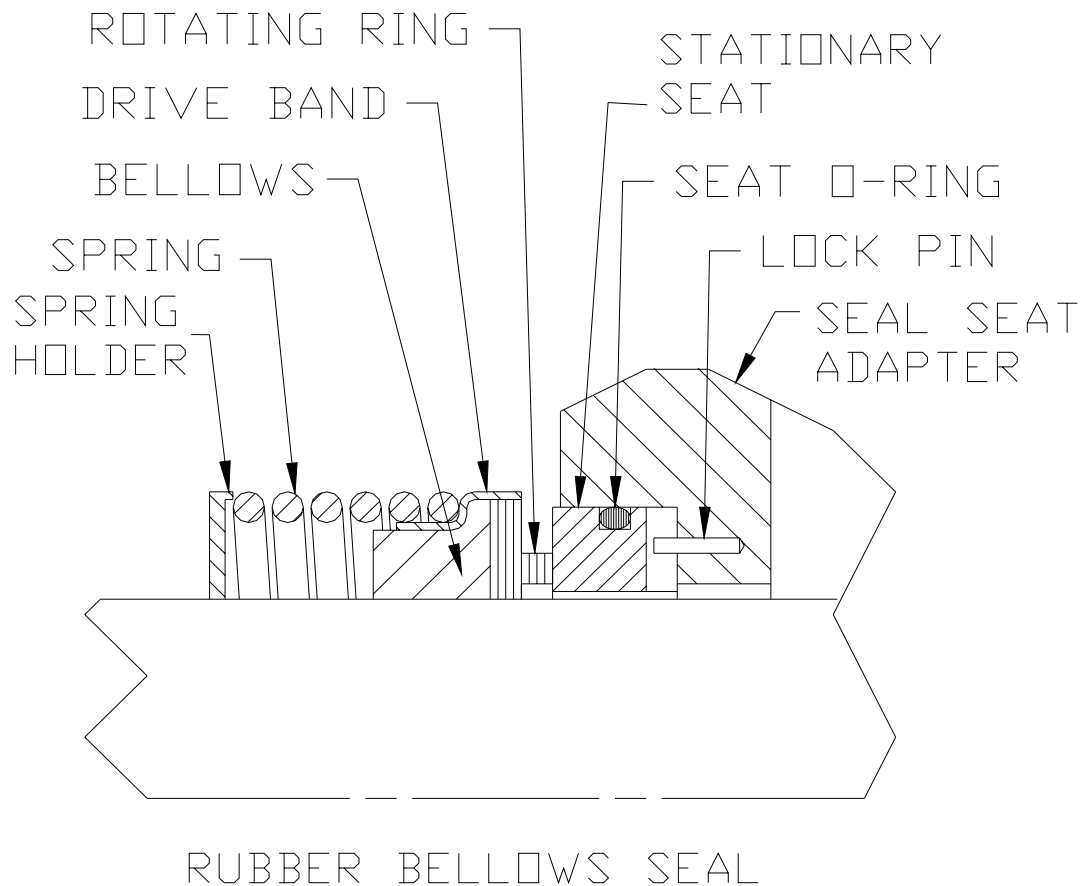
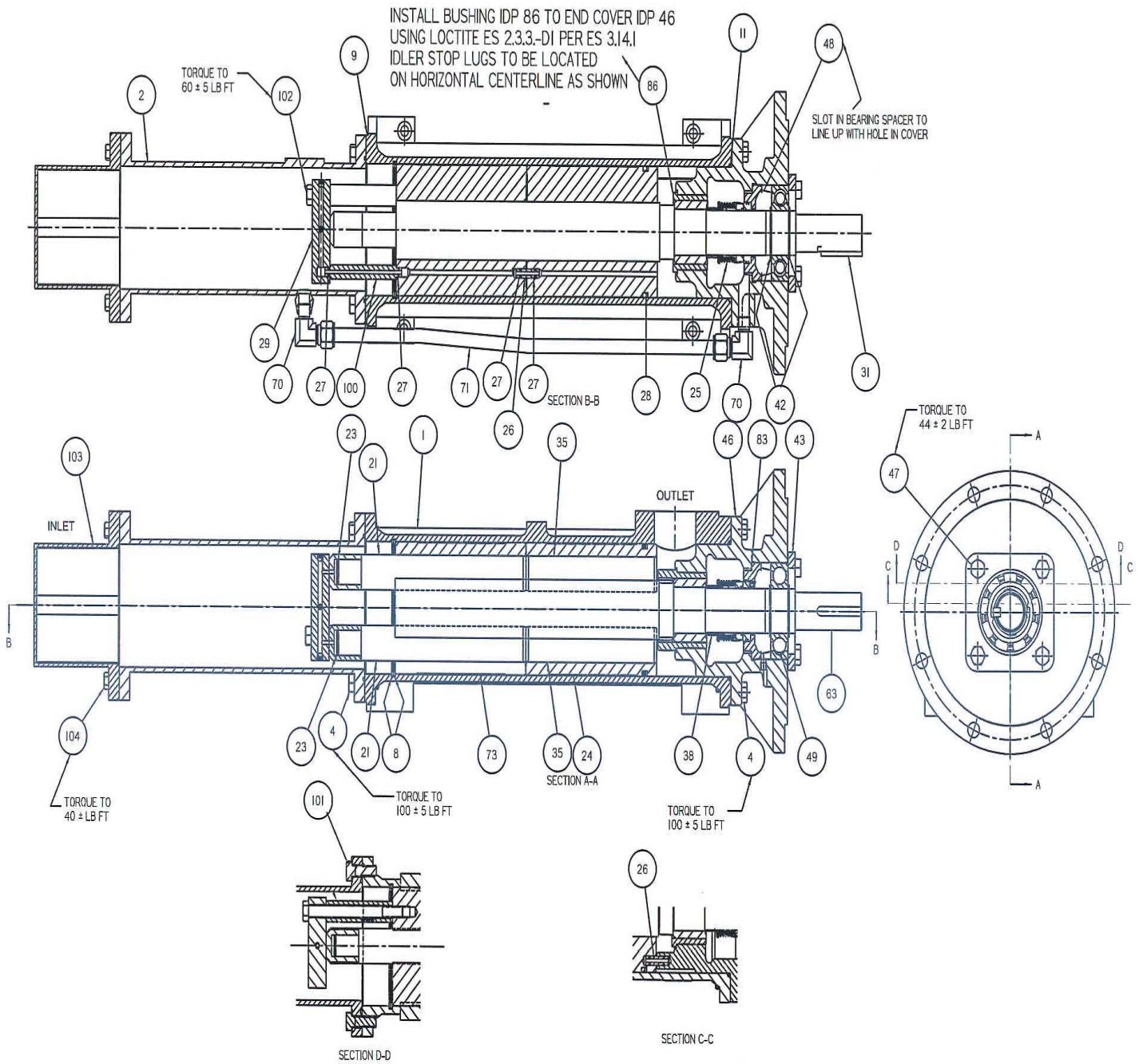


Figure 2 - Seal Drawing

PUMP ASSEMBLY DRAWING



ASSEMBLY G6DBCX-312/378

3220/378 SF6603 471 LBS

I. TROUBLESHOOTING

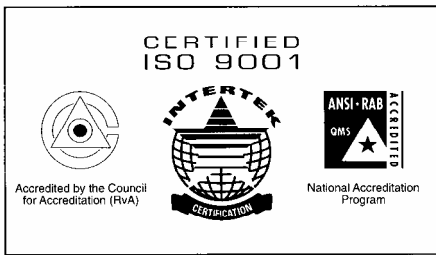
For assistance with troubleshooting see General Instruction Manual, CA-1.

J. FIELD AND FACTORY SERVICE AND PARTS

Imo Pump maintains a staff of trained service personnel that can provide pump installation, pump start-up, maintenance/overhaul and troubleshooting supervision as well as installation and maintenance training.

Our factories provide maintenance as well as overhaul and test facilities the in event user prefers to return pumps for inspection or overhaul. Factory-overhauled pumps are normally tested and warranted “as-new” for a period of one year from date of shipment. For either field service or factory overhaul assistance, contact your local Imo Sales Office or representative at Technical/ Customer Service Department in Monroe, NC, USA.

Most pumps have repair kits available. Minor Repair Kits are used to repair leaking seals, bad bearings and/or for re-assembly after pump tear-down. They include (as applicable) pump shaft seals, packing, all gaskets/O-rings and bearings. Major Repair Kits are sufficient to rebuild completely worn-out pumps to “as-new” condition. They include all parts found in Minor Repair Kits plus all major internal parts subject to wear. Since kits have all necessary parts, kit purchase is preferred rather than selecting individual parts. When parts are individually selected from Parts List, some needed components are often overlooked. In addition, mixing worn or used parts with new parts risks rapid wear and shortened service life from new parts.



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