



IMO®

PRODUCT SERVICE MANUAL
For
G6D-187, 218, 250, 275 and 312 PUMPS



WARNING

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

Manual No. SRM00090

Rev. 02 (20-0051)

March, 2020

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.			

CONTENTS

Safety and Table of Contents.....	A
A. General Instructions	1
B. Introduction.....	1
C. Description of Equipment	1
D. Pump Model Identification	2
E. Ordering Instructions	2
F. Operating Limits	3
G. Parts List	4
H. Pump Maintenance	5
I. Mechanical Seal Drawing.....	9
I. Torque Table.....	10
J. Troubleshooting and Field and Factory Service and Parts	11
K. Assembly Drawings.....	12 - 22

A. GENERAL INSTRUCTIONS

The instructions found herein cover the disassembly, assembly and parts identification of G6D-187, 218, 250, 275 and 312 series pumps

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 the 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 the 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 G6D-187, 218, 250, 275 and 312 Imo series pumps. This series of pumps 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.

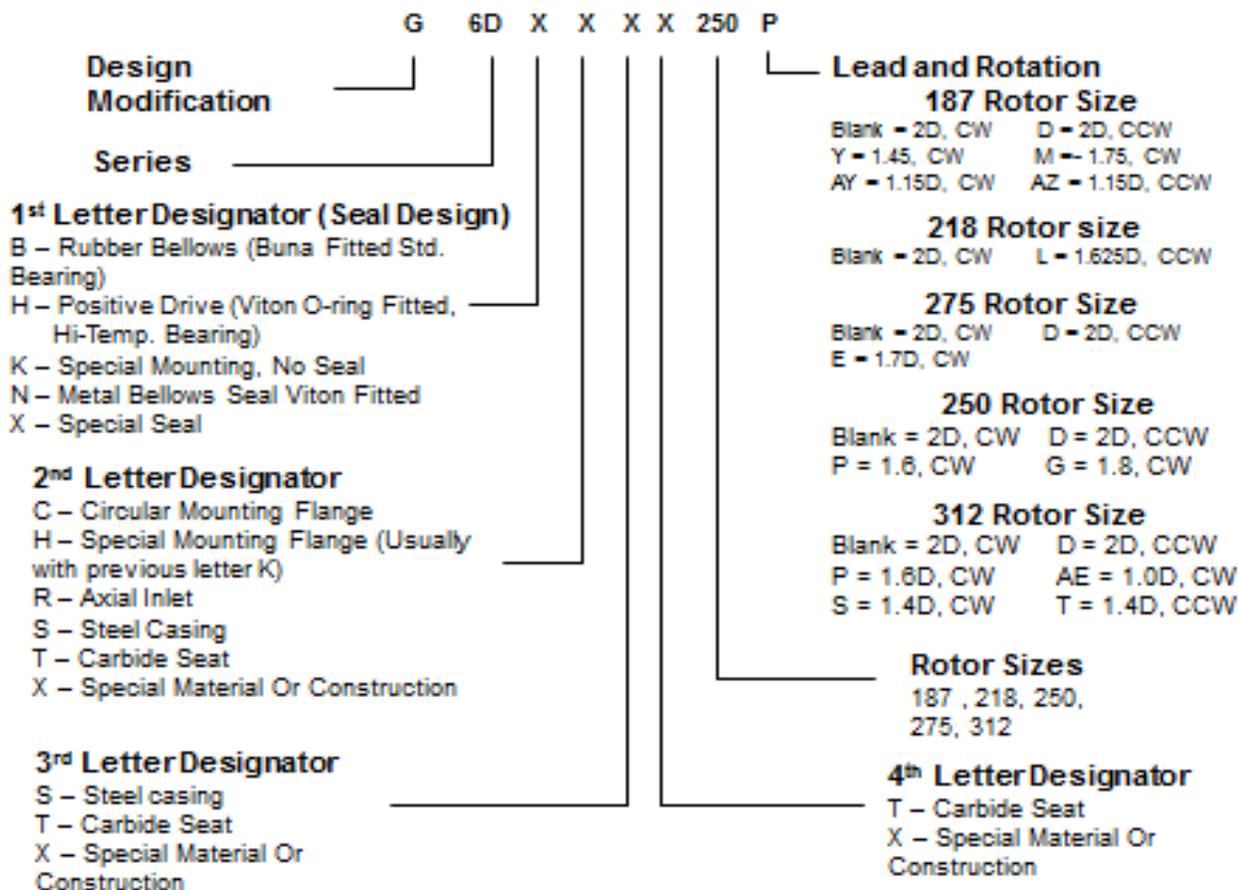
C. DESCRIPTION OF EQUIPMENT

G6D-187, 218, 250, 275 and 312 Series pumps are positive displacement, rotary screw pumps 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 Imo Series G6D-187, 218, 250, 275 and 312 pumps. The model of each pump is identified on pump nameplate. Refer to figure 1 and table 1 for instructional keys when using this manual.

Figure 1 – Model Designator Definitions



E. ORDERING INSTRUCTIONS

When corresponding with Imo Pump regarding Series G6D-187, 217, 250, 275 and 312 series pumps, 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

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 the following operating limits (specified in table 1) to be exceeded without specific approval from Imo Pump.

Table 1 – Normal Pump Operating and Structural Limits

Condition	Limit
Maximum Speed	4400 Rpm for the 187 3600 Rpm for the 218, 250 and 275E 3000 Rpm for the 275 2500 Rpm for the 312
Minimum Viscosity	32 SSU (1.81 Cst)
Maximum Viscosity (figure 1)	
1 st Letter Designator B	2500 SSU (540 Cst)
1 st Letter Designator H	20000 SSU (4310 Cst)
Minimum Liquid Temperature	0°F (-18°C)
Maximum Liquid Temperature (figure 1)	
1 st Letter Designator B	180°F (82°C)
1 st Letter Designator H	220°F(104°C)
Maximum Inlet Pressure	75 psig (5.2 Barg.) for the 187, 218 and 250 50 psig (3.5 Barg) for the 275 and 312
Maximum Discharge Pressure (Continuous Duty)	1500 psig (103 Barg)
Filtration	Refer to General Instruction Manual, SRM00046
Drive	Direct Only
Mounting	Foot mounted in any attitude

G. PARTS LIST

Table 2 – Pump Parts List

IDP	QTY	DESCRIPTION	KIT	IDP	QTY	DESCRIPTION	KIT
1	1	Case		46	1	Inboard Cover	XX***
2	1	Inlet Head		47	2	Bearing Retainer Hex Bolts	
4	16	Cap Screws (Qty 8 on size 187 foot mount and Qty 4 on size 187 C-face)		48	1	Seal Seat Adapter or Spacer on DKH Pumps	
6	1	Pin Stop (187 size only)		49	1	Ball Bearing	X
7	1	Fastener Seal (187 Size only)	X	63	1	Power Rotor	XX
8	2	Housing Snap Rings (Not 187 Size)	XX	67	2	Pipe Plug	
9	2	Cover Gasket or O-rings	X	68	1	Tube Fitting	
11	1	Inboard Cover O-ring (Not on 187)	X	69	1	Pipe Nipple (Not 187)	
21	2	Suction Idlers	XX	70	1	Tubing Fitting	
23	2	Cups	XX	71	1	Seal Pipe	
24	1	Discharge Housing	XX	73	1	Inlet Housing	XX
25	1	Mechanical Seal **	X	74	1	Pipe Fitting (Not 187)	
26	2	Housing Tube		83	1	Seal Gasket *	X
27	6	Thrust Tube O-Rings (4) On 218 Size	X	86	1	Balance Piston Bushing (C-Face units Only and 187 size)	XX
28	2	Housing / Cover O-Ring	X	89	1	Housing Spacer (187 Only)	
29	1	Thrust Plate	XX	93	4	Hex Bolts (187 size C-face only)	
31	1	Key		94	1	Tube Spacer (312 Foot Mount Only)	
35	2	Discharge Idlers	XX	100	1	Oil Balance Tube	
38	2	Seal Spacer (Not on 187 or foot mount 312)		101	2	Thrust Plate Spacer	
42	2	Bearing Snap Ring	X	102	2	Thrust Plate Hex Bolt	
43	2	Bearing Retainer					

- X - Minor Repair Kit Items.
- XX - Major Repair Kit Items. (Items marked (X) are included in Major Repair Kit.)
- * - This is an O-ring or a gasket depending on pump seal configuration. Gasket supplied with seal.
- ** - Not used in “DKH” pumps.
- *** - This cover is in major kits of foot mount units on 218, 250, 275 and 312 sizes.

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 drawings (Figures 3 through 12).

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 18 through 21.

Determine pump model identification on pump nameplate to select applicable pump assembly shown in Figures 3 thru 12. Refer to appropriate assembly for the following instructions.

1. Close suction and discharge valves. Drain pump by removing drain plugs (67). Remove seal tubing (71). Remove pump from driver, coupling and base plate. Remove coupling hub and key (31).
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) where applicable. If pump is DKH type, there will be a spacer (48) instead of a seal seat adapter and no seal (25).
4. Disassemble power rotor (63) as follows (See Figure 2 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
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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 or spacer (48) if DKH design. Remove stationary seat with O-ring from seal seat adapter (48). Discard O-ring.
 - d. If seal is multi-spring type, disengage set screws and remove rotating seal seat. If seal is a single spring rubber bellows type, remove it from shaft with a rotating motion.
 - e. Remove spacer (38) from shaft (63) where applicable.
5. Remove gasket or O-ring (83) from inboard end cover (46).
 6. Remove inboard cover (46) by removing bolts (4) or (93) if pump is a C-face 187 version.) Remove O-ring (28 or 11) from inboard cover (46).
 7. If pump is 218, 250, 275 or 312 size, remove tube (26 or 94) with O-rings (27) from either housing (24) or inboard cover (46). Remove and discard O-rings (27). 218, 275 and 312 sizes do not have O-rings (27) on their tubes (26 & 94).
 8. If pump is a 187 or a C-face design of any other size, remove balance piston bushing (86) from inboard cover (46) by heating this area to dissolve loctite between balance piston bushing (86) and cover (46).
 9. Remove inlet head (2) from case (1) by removing bolts (4). Remove and discard gasket or 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
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Do not permit idlers (21, 35) to drop as they emerge from housings (73, 24).

13. Remove spacer (89) from case if pump is a 187 size or snap rings (8) from case (1) for all other sizes.
14. If pump is a size 187, remove pin stop (6) with fastener seal (7) from case (1).

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

CAUTION	ATTENTION
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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), gaskets (9, 83) 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. If pump is 187 sizes, proceed to step 2 below. If pump is 218, 250, 275 or 312 size skip to step 9
2. Install O-ring (28) in groove in housing (24). Install O-rings (27) in grooves in tube (26) and install tube (26) in housing (24) on opposite side as O-ring (28).
3. Install housing (24), O-ring end first, in pump case (1) from suction end until stop pin (6) slot is properly aligned. Install stop pin (6) with fastener seal (7) in case (1).
4. Install housing (73) in pump case (1) with end that has two drilled and tapped holes facing inlet end of pump. Be sure that tube (26) in housing (24) mates to hole in housing (73). Install spacer (89) in case (1).
5. If DKH design, skip to step 7, otherwise clean and dry inboard cover (46) and balance piston bushing (86) mating surfaces with solvent. Wipe Loctite "T747" Primer or equivalent onto 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.
6. Install O-ring (28) on inboard cover. Install inboard cover (46) in case (1) using bolts (4 or 93 if C-face pump). Ensure seal vent (70) is facing up. Torque bolts (4) to correct value in torque table 3.
7. Skip to step 18.
8. Install O-rings (27) on tube (26) and tube (26) or (94) for foot mount size 312, in inboard cover (46). (Tube (94 and 26) on Size 218, 275 and 312 pumps do not take O-rings (27)
9. If pump is C-face version (Figure 3), proceed to next step, otherwise skip to step 12.
10. 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.
11. Install O-ring (11) (or (28) on 275 size) on inboard cover (46).

12. Install inboard cover (46) into discharge port side of case (1) using bolts (4). Ensure seal vent (70) is facing up on 218, 250 and 275 sizes and at 1 o'clock on 312 size facing shaft. Torque bolts (4) correct to values in torque table 3
13. Install O-ring (28) in groove in housing (24). Install O-rings (27) in groove in tube (26) and install tube (26) in ends of housing (24) opposite O-ring groove (28).
14. Install housing (24), O-ring end first, in pump case (1) from suction end being sure that hole in O-ring end of housing (24) lines up with tube (26 or 94) in inboard cover (46).
15. Install housing (73) in pump case (1) with the end that has the two drilled and tapped holes facing the inlet end of the pump. Be sure that tube (26) in housing (24) mates to hole in housing (73). Install snap rings (8) in case (1) behind housing (73)
16. Assemble power rotor (63) and mechanical seal (25) as follows (See seal drawings – Figure 2):
17. If pump is DKH type, there is no seal (25). In this case, first install inner snap ring on power rotor (42) and then 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). Next install outer snap ring (42) on power rotor (63) and then spacer (48) into inboard cover (46). Skip to step 28
18. If pump is anything other than a DKH type, assemble spacer (38) onto power rotor (63) where applicable.
19. If 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 the shoulder of seal spacer (38). Wipe seal face with isopropyl alcohol and a lint free rag.
20. If seal is a multi-spring seal, coat O-ring inside of rotating seat with system fluid and slide mechanical seal rotating assembly on power rotor (63) until it seats against the shoulder of seal spacer (38). Tighten rotating seat set screws. Wipe seal face with isopropyl alcohol and a lint free rag.
21. 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.
22. Install inner snap ring (42) in groove of power rotor (63).
23. 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.		

24. Install outer snap ring (42) in groove of power rotor (63).
25. Install gasket or O-ring (83) in seal bore of inboard cover (46).

26. 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).
27. Install bearing retainer (43) on inboard cover (46) using bolts (47). Torque bolts (47) to correct value in torque table 3.
28. Install idlers (35 and then 21) into housings (24, 73) by meshing threads with power rotor thread
29. Install cups (23) on idlers (21).
30. Install tube o-rings (27) on tube (100), and install tube (100) in housing (73).
31. Install bolts (102) in thrust plate (29) and spacers (101) on bolts (102).
32. 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 correct value in torque table 3.
33. Install O-ring or gasket (9) on inlet head (2) and install inlet head (2) on case (1) using hex bolts (4). Torque bolts (4) to correct value in torque table 3.
34. Install seal pipe (71) and drain plug (67).

NOTE: Inlet head (2) can be rotated and repositioned in 90° increments to suit suction piping. To change inlet position, remove bolts (4) and rotate inlet head to desired position. Torque bolts (4) to correct value in torque table 3.

1. Install coupling hub key (16). Install and align pump and driver as specified in General Instruction Manual, SRM00046.

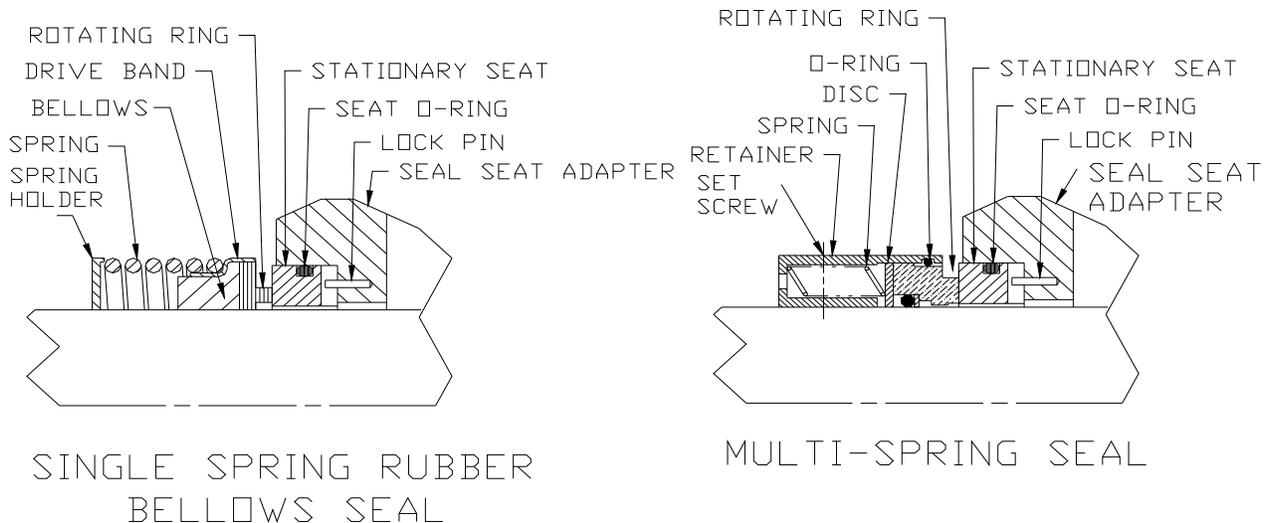


FIGURE 2 - Seal Drawing

Torque Values - Table 3

Pump Size	Bolt Description (IDP #)	Torque
187	Inlet Bolt (4)	110 ± 10 Lb-Ft (150 ± 14 N-m)
	Thrust Plate Bolt (102)	200 ± 15 LB-In (23 ± 2 N-m)
	Inboard Cover Bolt (4)	100 ± 5 Lb-Ft (136 ± 7 N-m)
	Bearing Retainer Bolt (47)	110 ± 10 Lb-In (12 ± 1 N-m)
218	Inlet Bolt (4)	150 ± 10 Lb-Ft (203 ± 14 N-m)
	Thrust Plate Bolt (102)	35 ± 2 Lb-Ft (48 ± 2.7 N-m)
	Inboard Cover Bolt (4)	150 ± 10 Lb-Ft (203 ± 14 N-m)
	Bearing Retainer Bolt (47)	25 ± 2 Lb-Ft (34 ± 2.7 N-m)
250	Inlet Bolt (4)	150 ± 10 Lb-Ft (203 ± 14 N-m)
	Thrust Plate Bolt (102)	30 ± 2 Lb-Ft (41 ± 2.7 N-m)
	Inboard Cover Bolt (4)	200 ± 10 Lb-Ft (271 ± 14 N-m)
	Bearing Retainer Bolt (47)	22 ± 2 Lb-Ft (30 ± 2.7 N-m)
275	Inlet Bolt (4)	55 ± 5 Lb-Ft (75 ± 7 N-m)
	Thrust Plate Bolt (102)	32 ± 2 Lb-Ft (43 ± 2.7 N-m)
	Inboard Cover Bolt (4)	100 ± 5 Lb-Ft (136 ± 7 N-m)
	Bearing Retainer Bolt (47)	35 ± 2 Lb-Ft (48 ± 2.7 N-m)
312	Inlet Bolt (4)	100 ± 5 Lb-Ft (136 ± 7 N-m)
	Thrust Plate Bolt (102)	60 ± 5 Lb-Ft (81 ± 7 N-m)
	Inboard Cover Bolt (4)	100 ± 5 Lb-Ft (136 ± 7 N-m)
	Bearing Retainer Bolt (47)	44 ± 2 Lb-Ft (60 ± 2.7 N-m)

I. TROUBLESHOOTING

For assistance with troubleshooting see General Instruction Manual, SRM00046.

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 in the 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.

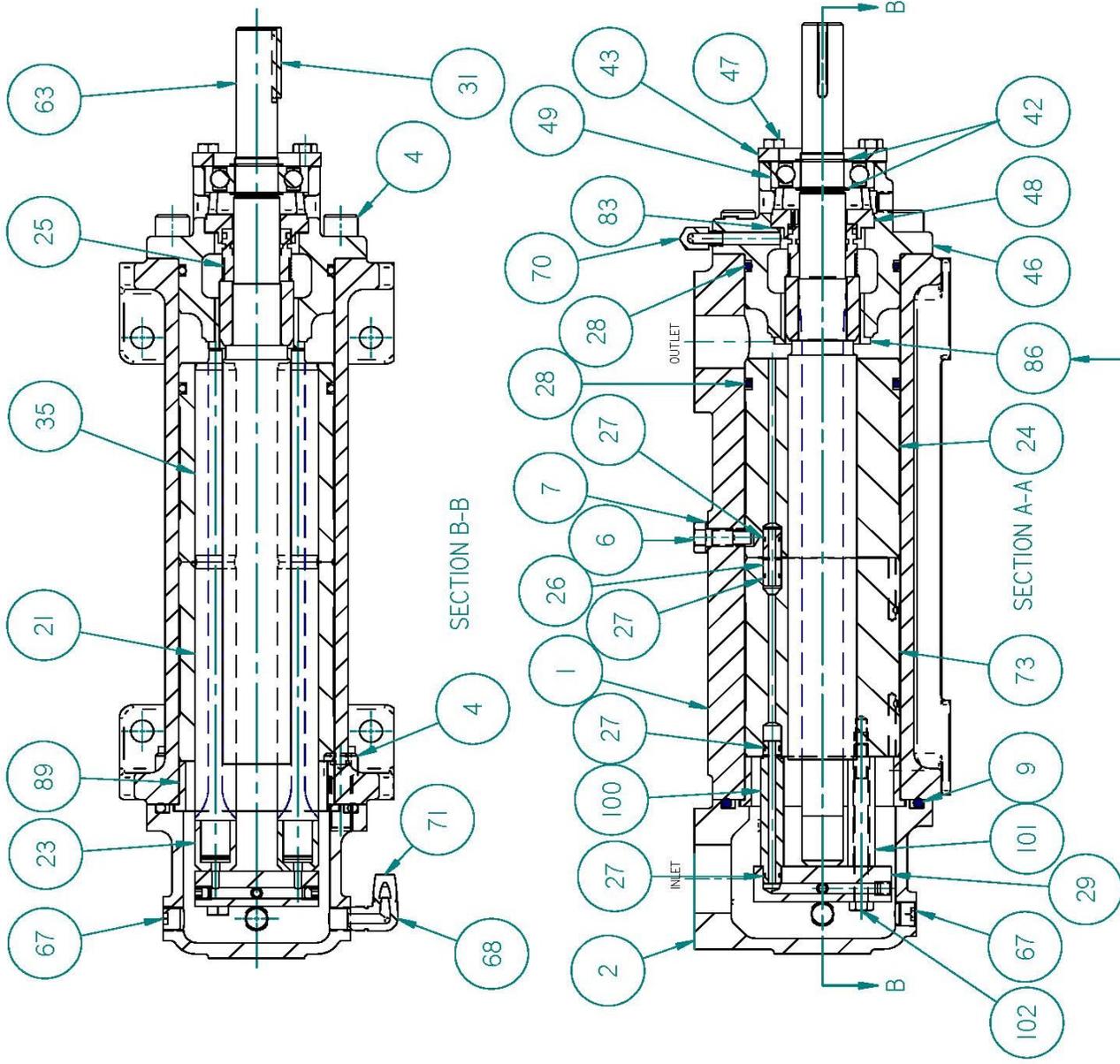


FIG. 3 - G6D-187 FOOT MOUNT ASSEMBLY

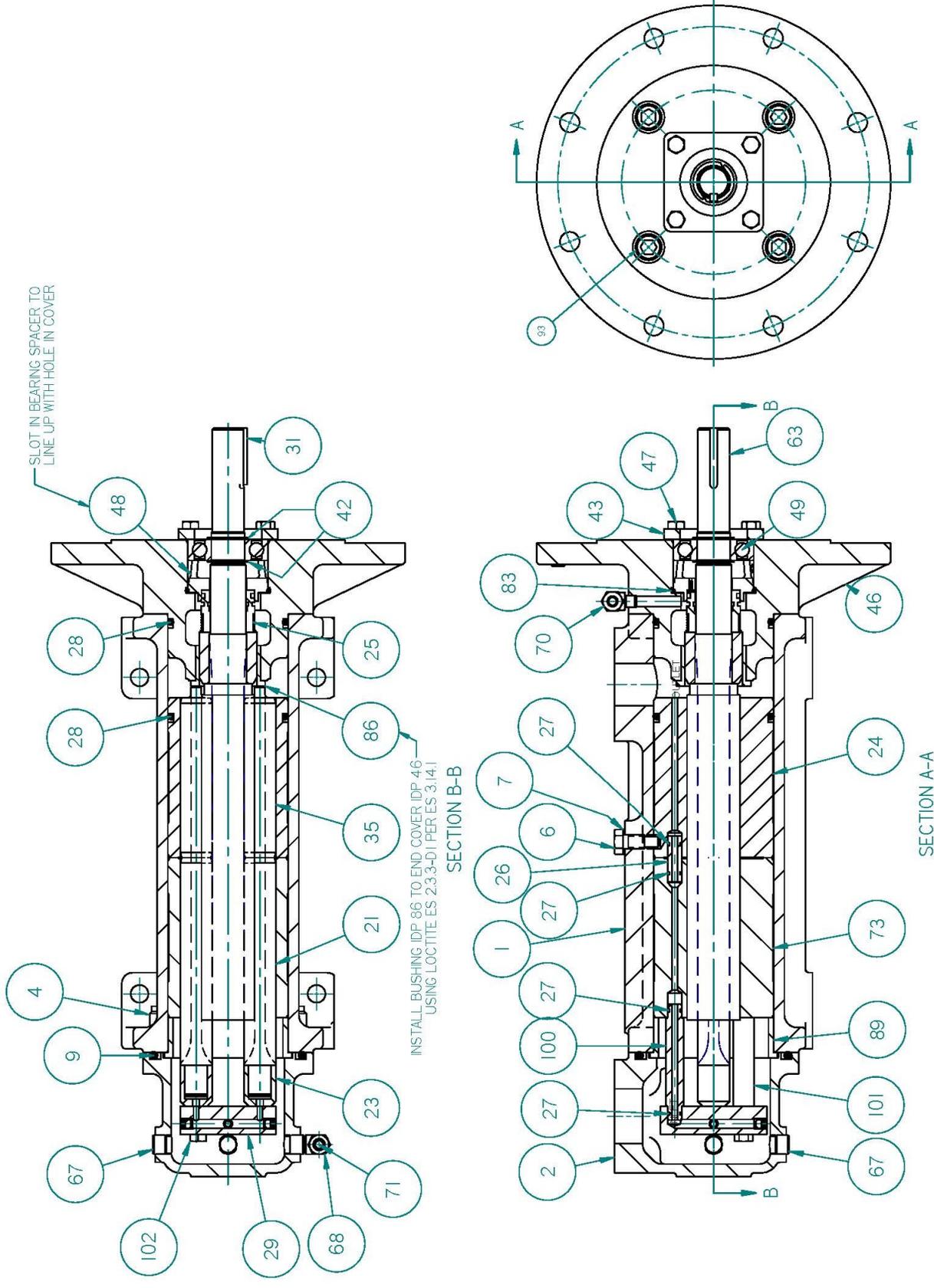


FIG 4 - G6D-187 C-FACE ASSEMBLY DRAWING

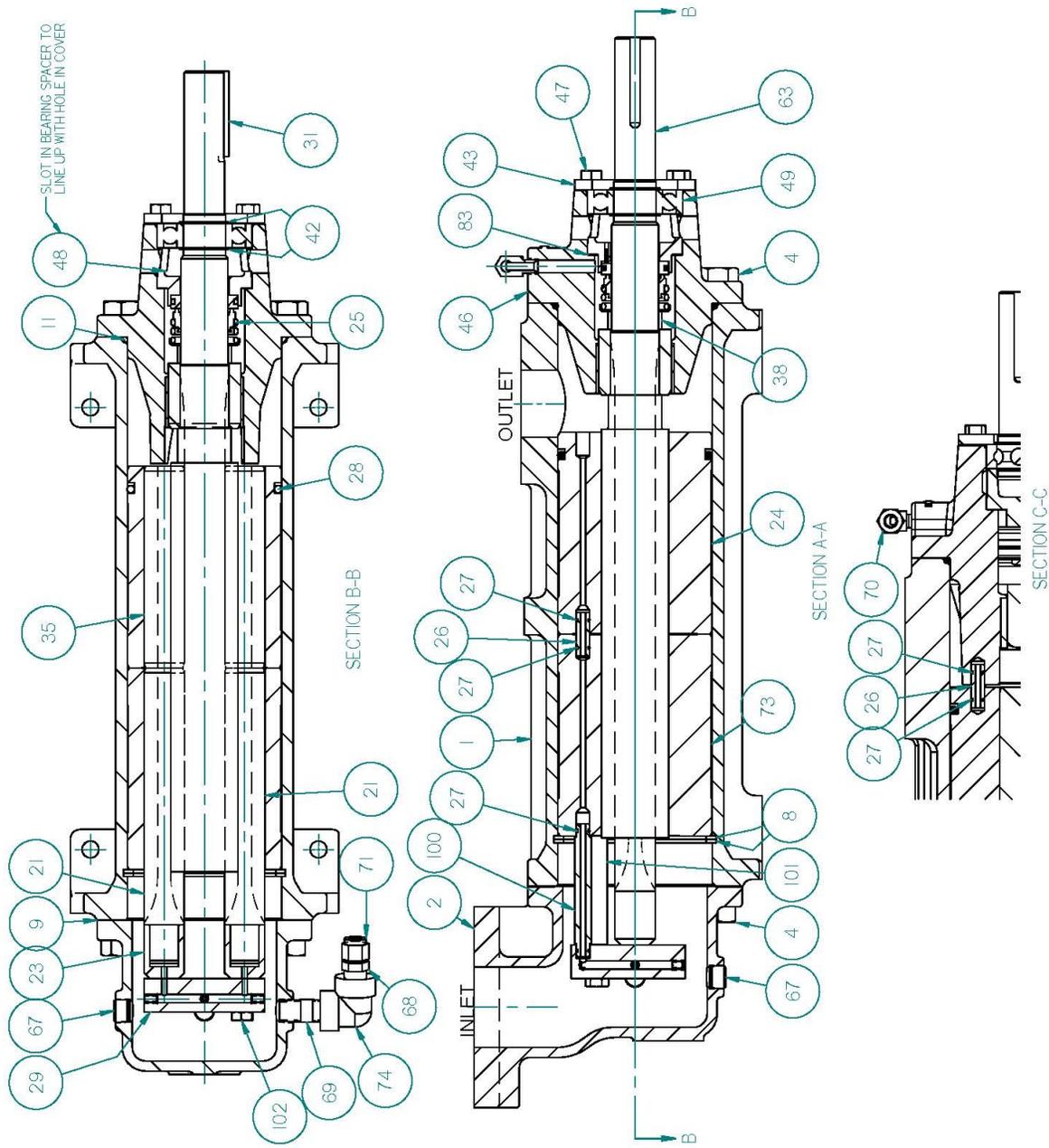


FIG 5 - G6D-218, 250 FOOT MOUNT PUMP ASSEMBLY

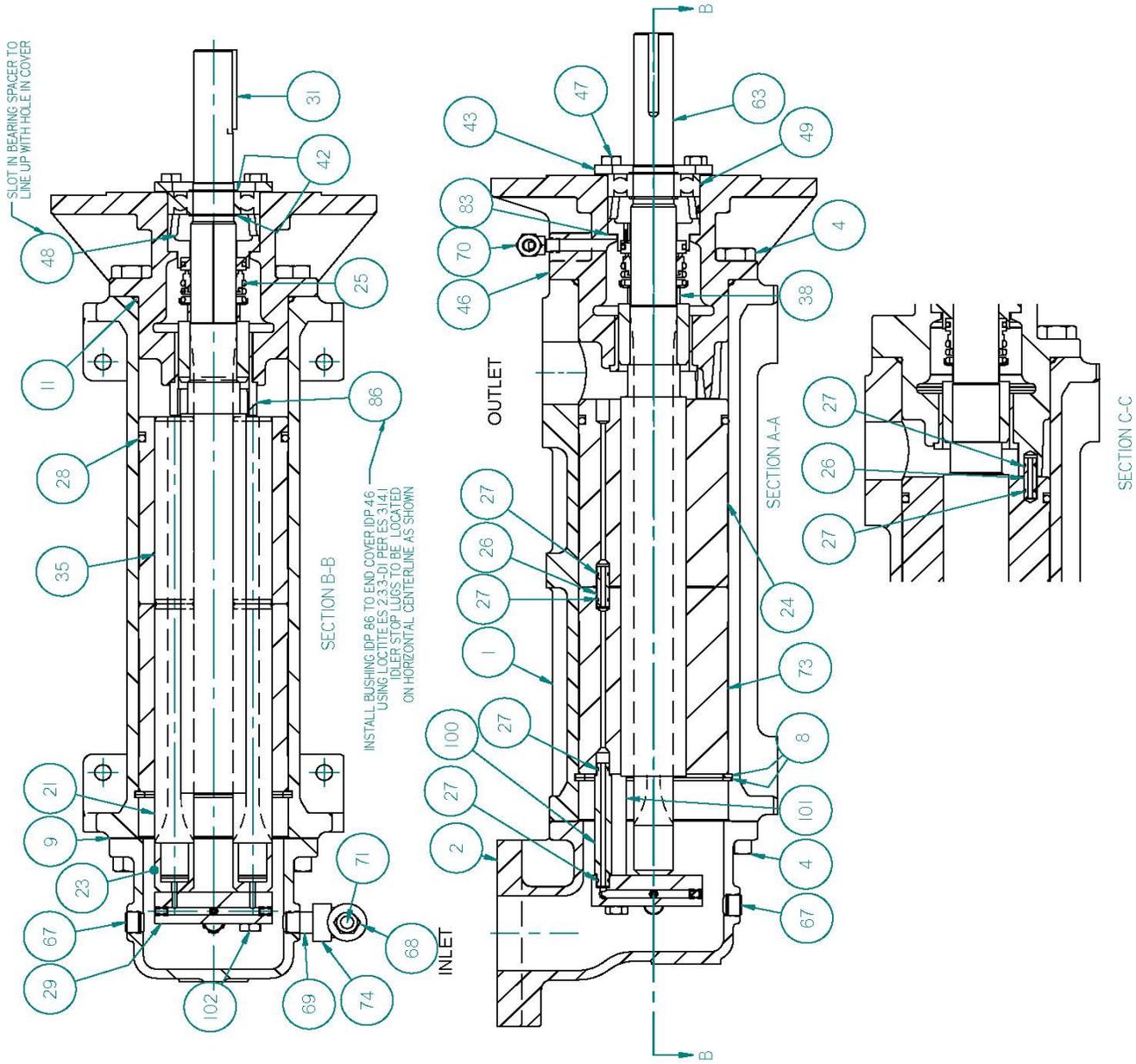


FIG. 6 - G6D-218, 250 C-FACE PUMP ASSEMBLY

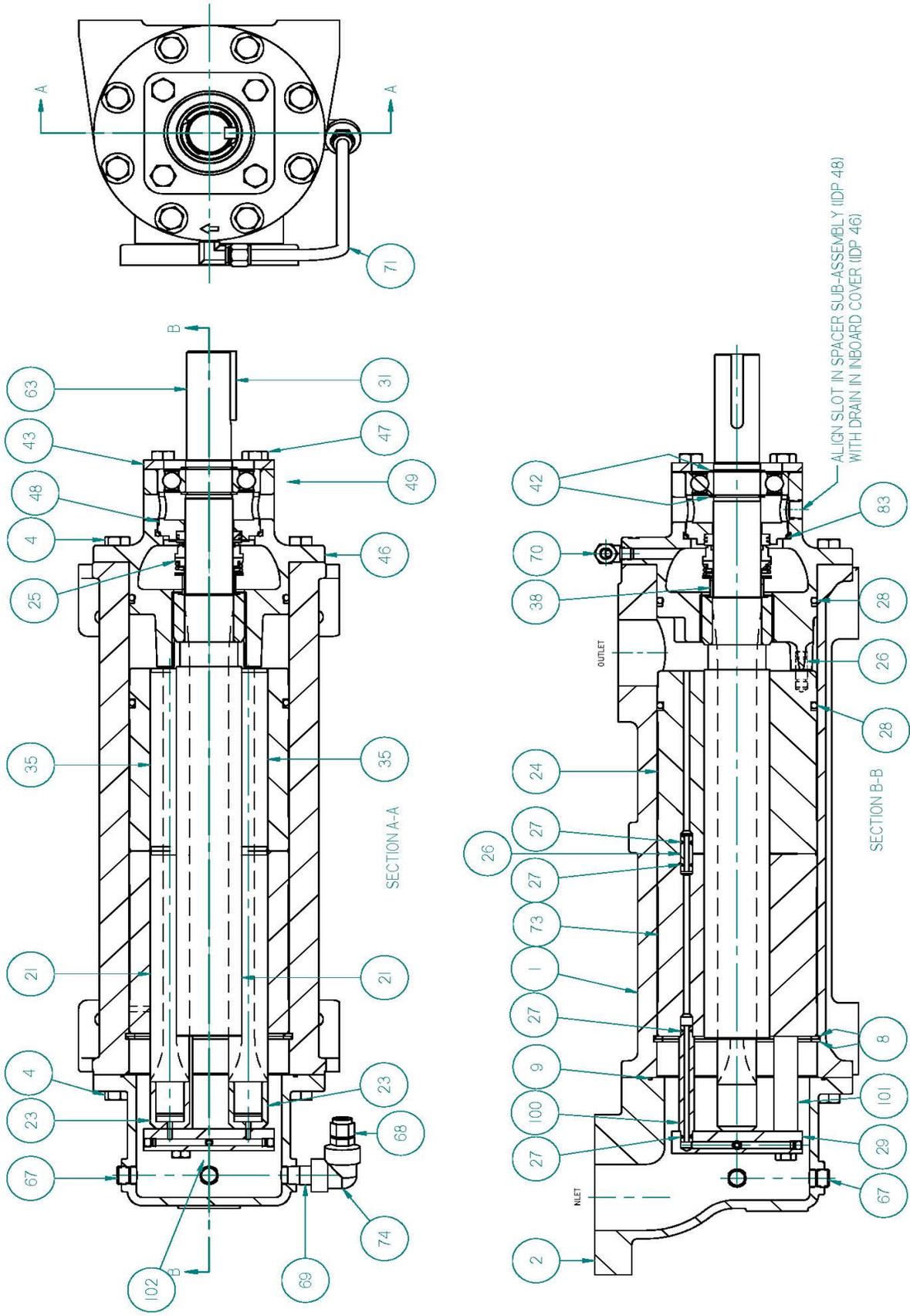


FIGURE 7 - G6D-275 FOOT MOUNT PUMP ASSEMBLY

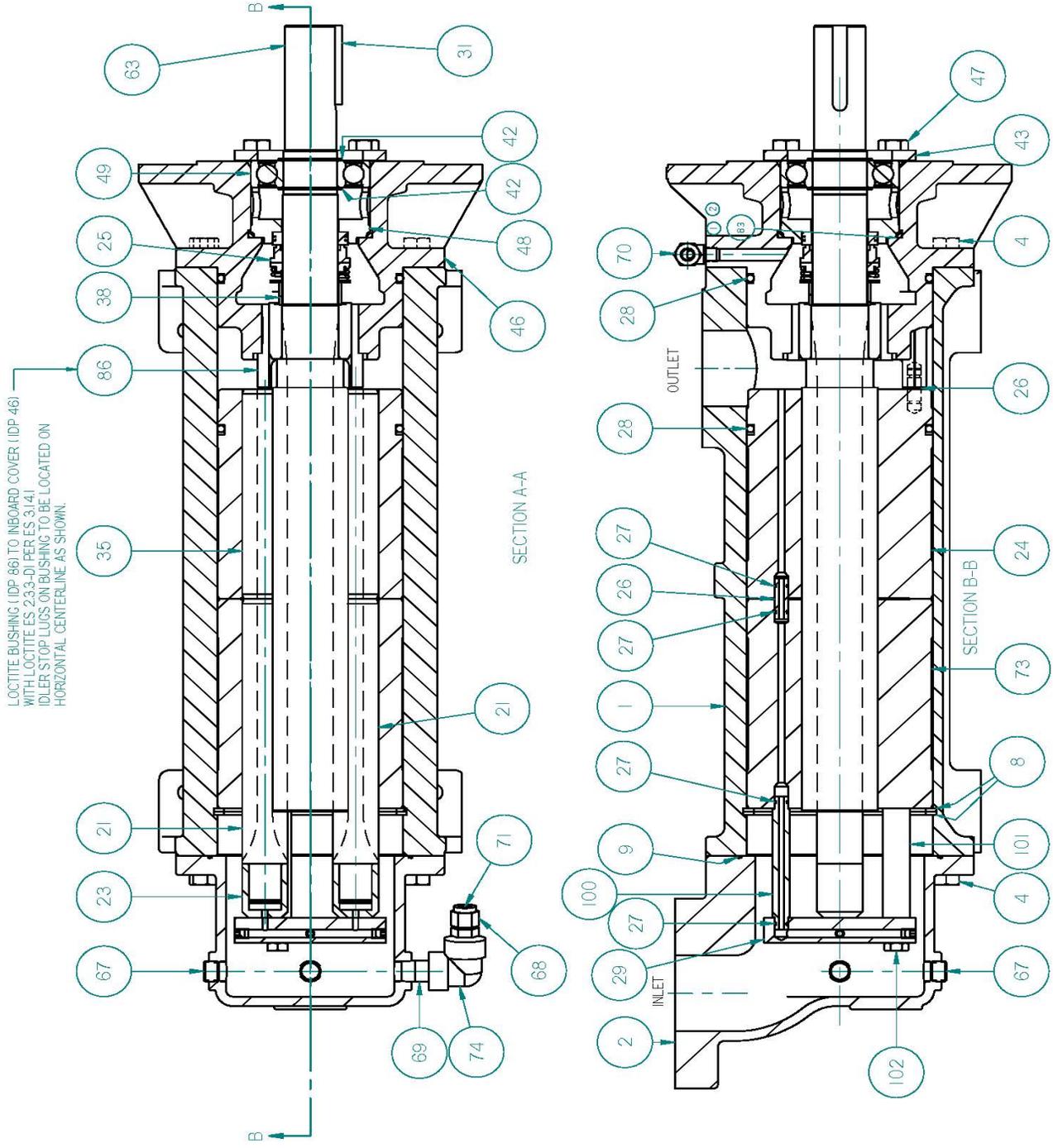


FIG 8 - G6D-275 C-FACE PUMP ASSEMBLY

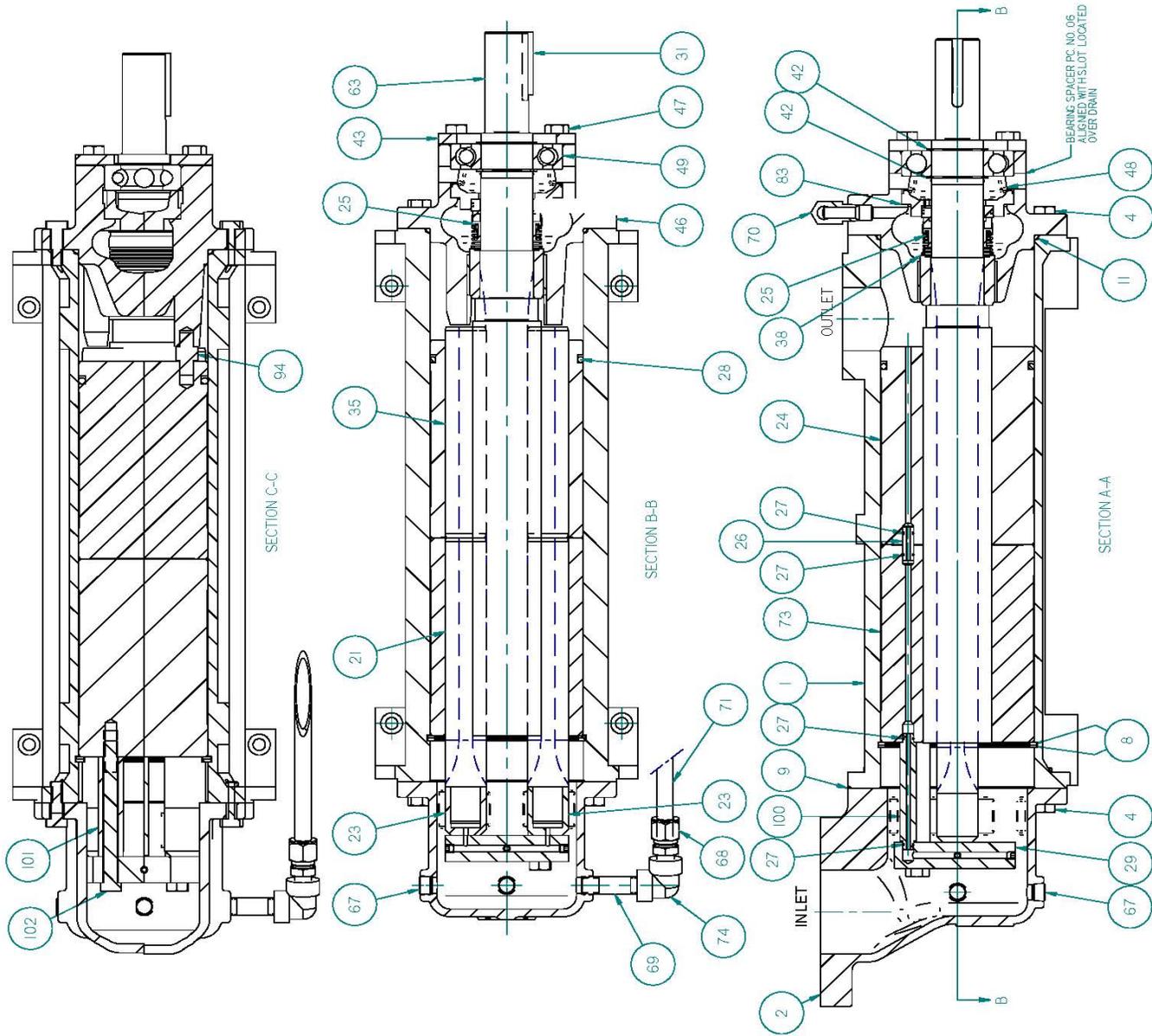


FIG. 9 - G6D-3I2 FOOT MOUNT PUMP ASSEMBLY

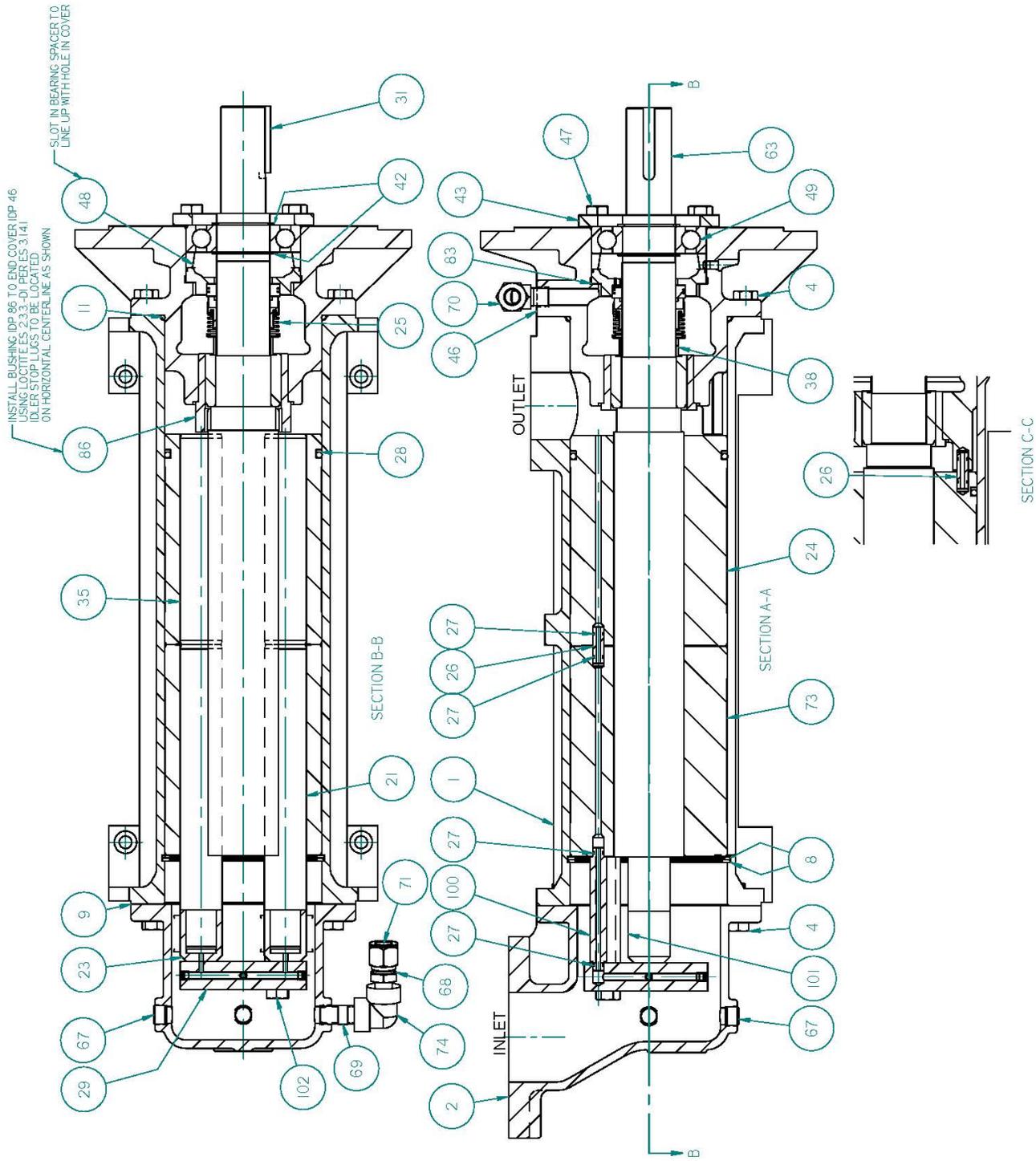


FIG. 10 - G6D-312 C-FACE PUMP ASSEMBLY

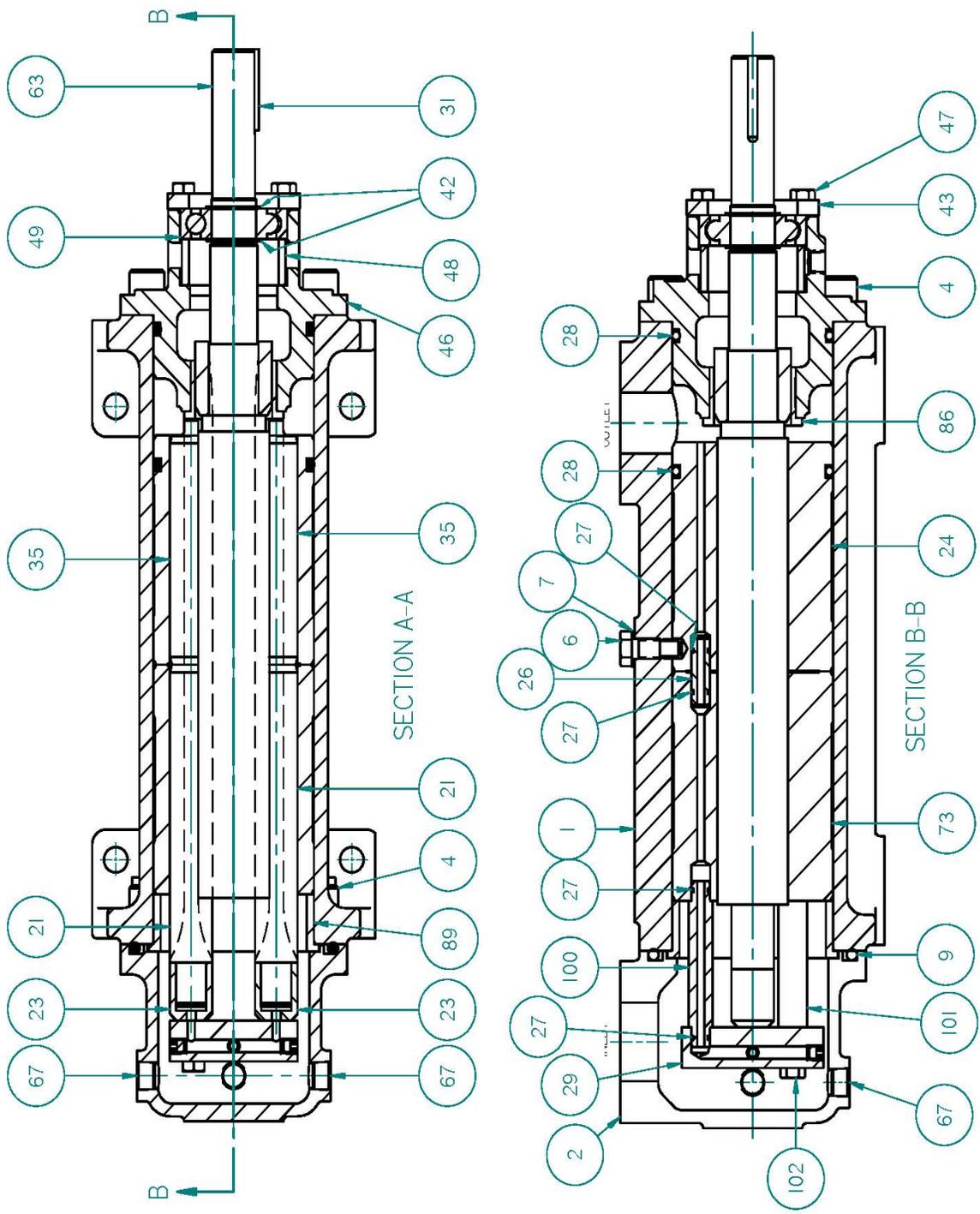
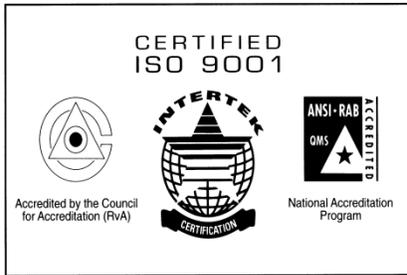


FIG. 11 - 6DKH-187 ASSEMBLY



CIRCOR

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Monroe, NC USA
28111.5020

Tel: +1.877.853.7867

Email: cc@circor.com

Web: www.circorpt.com

