



PRODUCT SERVICE MANUAL FOR G12D-187, 218, 250, 275 and 312 PUMPS



WARNING

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

Manual No. SRM00091

Rev. 02 (20-2020)

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.
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	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.
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	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 G12D-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 series G12D-187, 218, 250, 275 and 312 Imo 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.

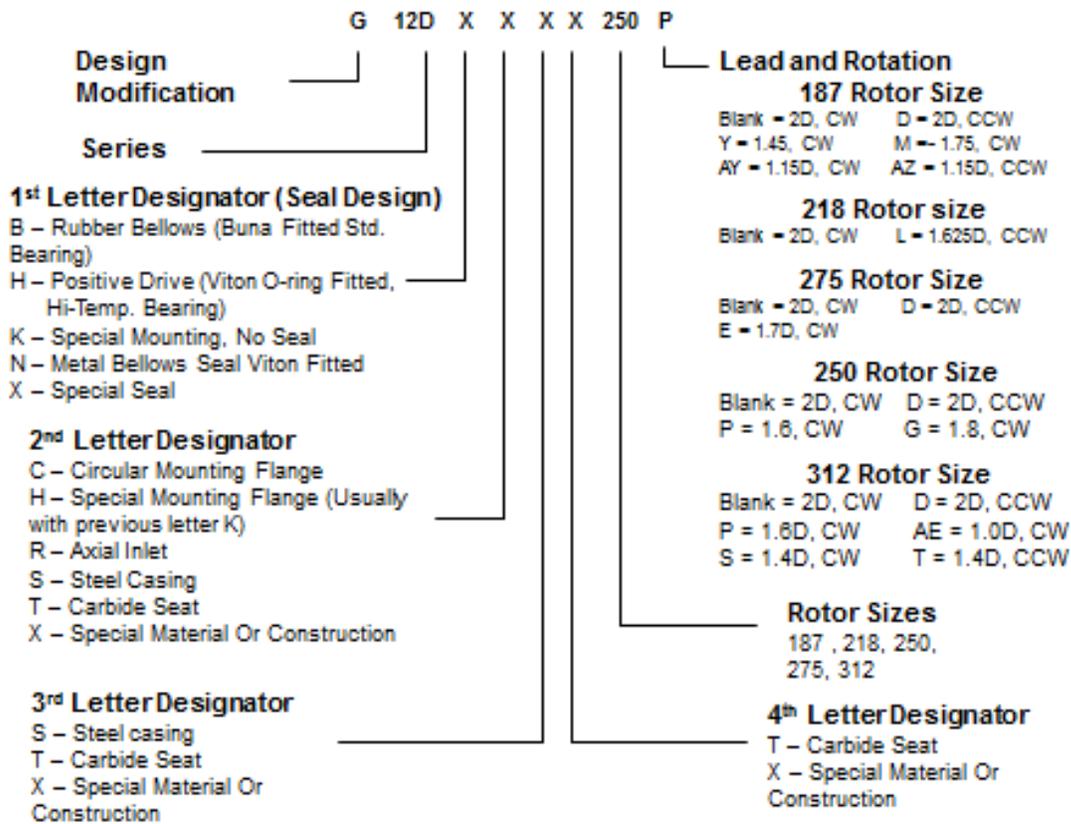
C. DESCRIPTION OF EQUIPMENT

G12D-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 G12D-187, 250 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 G12D-187, 218, 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
<p>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.</p>	

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 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°)
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)	2200 psig (152 barg)
Filtration	Refer to General Instruction Manual, SRM00046
Drive	Direct
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		47	4	Bearing Retainer Hex Bolts	XX
2	1	Inlet Head		48	1	Seal Seat Adapter	
4	16	Cap Screws (Qty 8 on size 187 Foot mount, 218 & 250; Qty. 4 on size 187 C-Face)		49	1	Ball Bearing	X
6	1	Pin Stop (187 size only)	XX	63	1	Power Rotor	XX
7	1	Fastener Seal (187 Size only)	X	67	2	Pipe Plug	
8	2	Housing Snap Rings (Not 187 Size)	XX	68	1	Tube Fitting (Not 312)	
9	2	Inlet Gasket or O-rings	X	69	1	Pipe Nipple (Not 187)	
11	1	Inboard Cover O-ring (Not on 187)	X	70	1	Tubing Fitting	
21	2	Suction Idlers	XX	71	1	Seal Pipe	
22	1	Balance Piston Housing (218 Steel Case Pump Only)	XX	73	3	Inlet Housing (1 on 250 size)	XX
23	2	Cups	XX	74	1	Pipe Fitting (Not 187)	
24	1	Discharge Housing	XX	80	1	Balance Piston Housing Retainer (218 Steel Case Only)	XX
25	1	Mechanical Seal	X	81	1	Balance Piston Housing Snap Ring (218 Steel Case Only)	XX
26	4	Housing Tube (Qty. 3 on 187 and 312 Sizes)		83	1	Seal Gasket or O-Ring	X
27	8	Thrust Tube O-Rings	X	86	1	Balance Piston Bushing (187 and 218 Sizes Only)	XX
28	2	Housing / Cover O-Ring (Qty 1 on 250, 312 and 218 foot mount iron pump)	X	87	2	Discharge Idlers (On 187 and 312 Sizes)	XX
29	1	Thrust Plate	XX	89	1	Housing Spacer (187 Only)	
31	1	Key		93	4	Inboard Cover Bolts (C-Face 187 Only)	
35	4	Idlers (6 for 218, 250 and 275 sizes)	XX	94	1	Tube (312 Only)	
38	1	Seal Spacer (218, 250 and 275 sizes only)		100	1	Oil Balance Tube	
42	2	Bearing Retaining Rings	X	101	2	Thrust Plate Spacer	
43	1	Bearing Retainer		102	2	Thrust Plate Hex Bolt	
46	1	Inboard Cover (Not in 187 Major Kit)		103	8	Hardened Washers (275 and 312 Sizes)	

- 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.

H. PUMP MAINTENANCE



WARNING

Failure to observe precautions while installing, inspecting 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 10).

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 21 through 24.

Determine pump model identification on pump nameplate to select applicable pump assembly shown in Figures 3 thru 10. 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.
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 groove in power rotor (63).

- 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. Remove stationary seat with O-ring from seal seat adapter (48). Discard O-ring.
- d. If seal is multi-spring type, loosen 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 (83) from inboard end cover (46).
6. Remove inboard cover (46) by removing bolts (4). Remove O-ring (28 or 11) from front cover (46).
7. If pump is steel cased 218 size (figure 7) remove retaining ring (81), retainer (80) and balance piston housing (22). Remove O-ring (28) from balance piston housing (22).
8. Remove tube (26 or 94) from housing (24), balance piston housing (22) or inboard cover (46) where applicable.
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) from idlers (21) and idlers (21, 35, 87) from housings (73, 50, 24).

CAUTION	ATTENTION
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Do not permit idlers (21, 35 and 87) to drop as they emerge from housings (73, 24 and 50).

13. If pump is 187 size, remove spacer (89) from case (Figures 3 and 4).
14. Remove snap ring (8) from case (1) except on 187 size.
15. If pump is a size 187 or steel cased 218 (Figures 3, 4 and 7), remove pin stop (6) with fastener seal (7) from case (1).
16. Remove housings (73, 24 and 50) 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 tubes (26).

CAUTION**ATTENTION**

Do not permit housings (73, 24 & 50) to drop as they are removed from pump.

H4. Pump Reassembly Procedure:

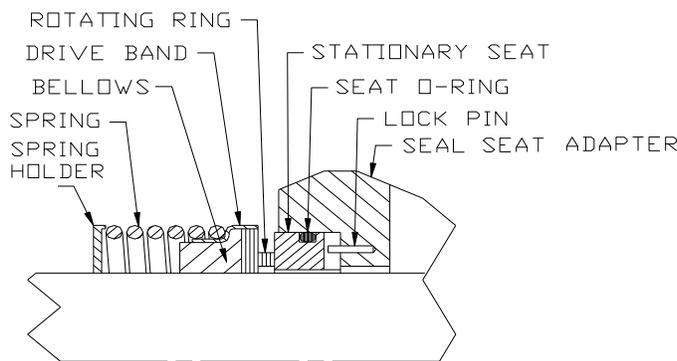
Note: Prior to reassembly, all parts should be cleaned and inspected for nicks and burrs. Replace all worn and damaged parts. Imo pump recommends replacement of ball bearing (49), mechanical seal (25), gaskets (9, 83) and O-rings (9, 28, 11) when these parts are disturbed from their original installed position. Parts should be coated with light lubricating oil to assist in assembly.

1. If pump is 187 size or 218 steel case pump (figures 3,4 and 7), proceed to step 2 below. If pump is any other 218, 250, 275 or 312 sizes skip to step 14.
2. Install O-ring (28) in groove in discharge housing (24). On the 218 steel case pump (Figure 7) install tube (26) in discharge housing (24) on same side as installed O-ring.
3. Install discharge 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 O-rings (27) on all remaining tubes (26) and then install tube (26) with installed O-rings (27) in first inlet housing (73). Install inlet 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 (73) mates to hole in housing (24).
5. Install the tubes (26) with installed O-rings (27) into next two housings (73) and then housings (73) in case (1). Be sure that tubes (26) in housing (73) mates to holes in other housings (73).
6. If pump is 218 steel case type (See fig. 7), proceed to next steps. If pump is 187 size, skip to step 10.
7. Install snap rings (8) into case (1).
8. Install O-ring (28) in balance piston housing (22). Then install balance piston housing (22) in case (1) being sure that pin (26) in discharge housing (24) mates with pin hole in balance piston housing (22).
9. Install segmented ring (80) into pump case (1) and retaining ring (81) into segmented ring (80). Skip to step 12 below.
10. Install spacer (89) in case (1).
11. 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.
12. Install O-ring (28) or (11) on inboard cover. Install inboard cover (46) in case (1) using bolts (4). Ensure seal vent (70) is facing up. Torque bolts (4) to value on torque table for appropriate pump size.
13. Skip to step 22.

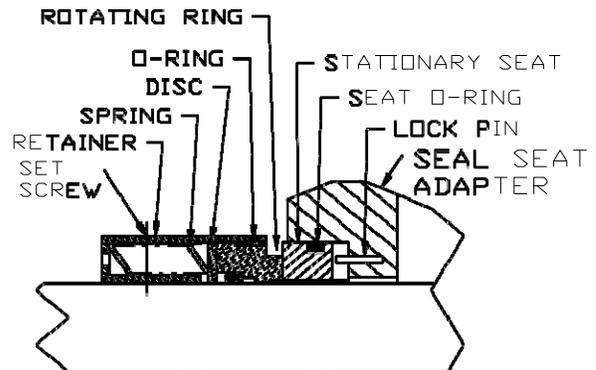
14. Install tube (26 or 94) in inboard cover (46).
15. Install O-ring (11) on inboard cover (46).
16. Install inboard cover (46) into discharge port side of case (1) using bolts (4). Ensure seal vent (70) is facing up. Torque bolts (4) to values in torque table for appropriate pump size.
17. Install O-rings (27) in grooves in all remaining tubes (26 and 100) and install (1) tube (26) with installed O-rings in discharge housing (24) on opposite side that O-ring groove is in its OD (28)
18. Install O-ring (28) in groove in discharge housing (24).
19. Install discharge 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).
20. Install the tubes (26) with installed O-rings (27) into next two housings (73) and then housings (73) in case (1). Be sure that tubes (26) in housing (73) mates to holes in other housings (73).
21. Install snap rings (8) in case (1) behind housing (73).
22. Assemble power rotor (63) and mechanical seal (25) as follows (See Figure 2 for seal drawings):
 - a. Assemble spacer (38) onto shaft (63).
 - b. 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.
 - c. 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.
 - d. 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.
 - e. Install inner snap ring (42) in groove of power rotor (63).
 - f. 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).
 - g. Install outer snap ring (42) in groove of power rotor (63)
23. Install gasket (83) in seal bore of inboard cover (46).
24. 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).
25. Install bearing retainer (43) on inboard cover (46) using bolts (47). Torque bolts (47) to value on torque table for appropriate pump size.

26. Install idlers (87, 35 and then 21) into housings (24, 73 and 50) by meshing threads with power rotor thread
 27. Install cups (23) on idlers (21).
 28. Install tube (100) with O-rings (27) installed into inlet housing (73).
 29. Install bolts (102) in thrust plate (29) and spacers (101) on bolts (102).
 30. 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 value on torque table for appropriate pump size.
 31. 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 value on appropriate assembly drawing.
 32. Install seal pipe (71) and drain plug (67)
- NOTE:** Inlet head (2) can be rotated and repositioned in 90 degree increments to suit suction piping. To change inlet position remove bolts (4) and rotate inlet head to desired position. Torque bolts (4) to value on torque table for appropriate pump size.
33. Install coupling hub key (16). Install and align pump and driver as specified in General Instruction Manual, SRM00046.

I. Seal Drawing - Figure 2



SINGLE SPRING RUBBER
BELLOWS SEAL



MULTI-SPRING SEAL

Torque Table

Pump Rotor Size	Bolt Description (IDP #)	Torque
187	Inlet Bolt (4)	110 ± 10 Lb-Ft (150 ± 14 N-m)
	Thrust Plate Bolt (102)	144 ± 10 Lb-in (16 ± 1 N-m)
	Inboard Cover Bolt (4 or 93)	110 ± 10 Lb-Ft (150 ± 14 N-m)
	Bearing Retainer Bolt (47)	110 ± 10 Lb-in (13 ± 1 N-m)
218	Inlet Bolt (4)	150 ± 10 Lb-FT (203 ± 14 N-m)
	Thrust Plate Bolt (102)	35 ± 2 Lb-Ft (48 ± 3 N-m)
	Inboard Cover Bolt (4)	150 ± 10 Lb-FT (203 ± 14 N-m)
	Bearing Retainer Bolt (47)	25 ± 2 LB-Ft (34 ± 3 N-m)
250	Inlet Bolt (4)	150 ± 10 Lb-FT (203 ± 14 N-m)
	Thrust Plate Bolt (102)	30 ± 2 Lb-Ft (40 ± 3 N-m)
	Inboard Cover Bolt (4)	205 ± 15 Lb-Ft (278 ± 20 N-m)
	Bearing Retainer Bolt (47)	22 ± 2 Lb- Ft (30 ± 3 N-m)
275	Inlet Bolt (4)	55 ± 5 Lb-Ft (75 ± 7 N-m)
	Thrust Plate Bolt (102)	30 ± 2 Lb-Ft (40 ± 3 N-m)
	Inboard Cover Bolt (4)	130 ± 10 Lb-in (176 ± 14 N-m)
	Bearing Retainer Bolt (47)	35 ± 2 Lb-Ft (48 ± 3 N-m)
312	Inlet Bolt (4)	100 ± 10 Lb-Ft (137 ± 14 N-m)
	Thrust Plate Bolt (102)	60 ± 5 Lb-Ft (81 ± 7 N-m)
	Inboard Cover Bolt (4 or 93)	130 ± 10 Lb-in (176 ± 14 N-m)
	Bearing Retainer Bolt (47)	44 ± 2 Lb-Ft (60 ± 3 N-m)

I. TROUBLESHOOTING

For assistance with troubleshooting see General Instruction Manual, SRM00046.

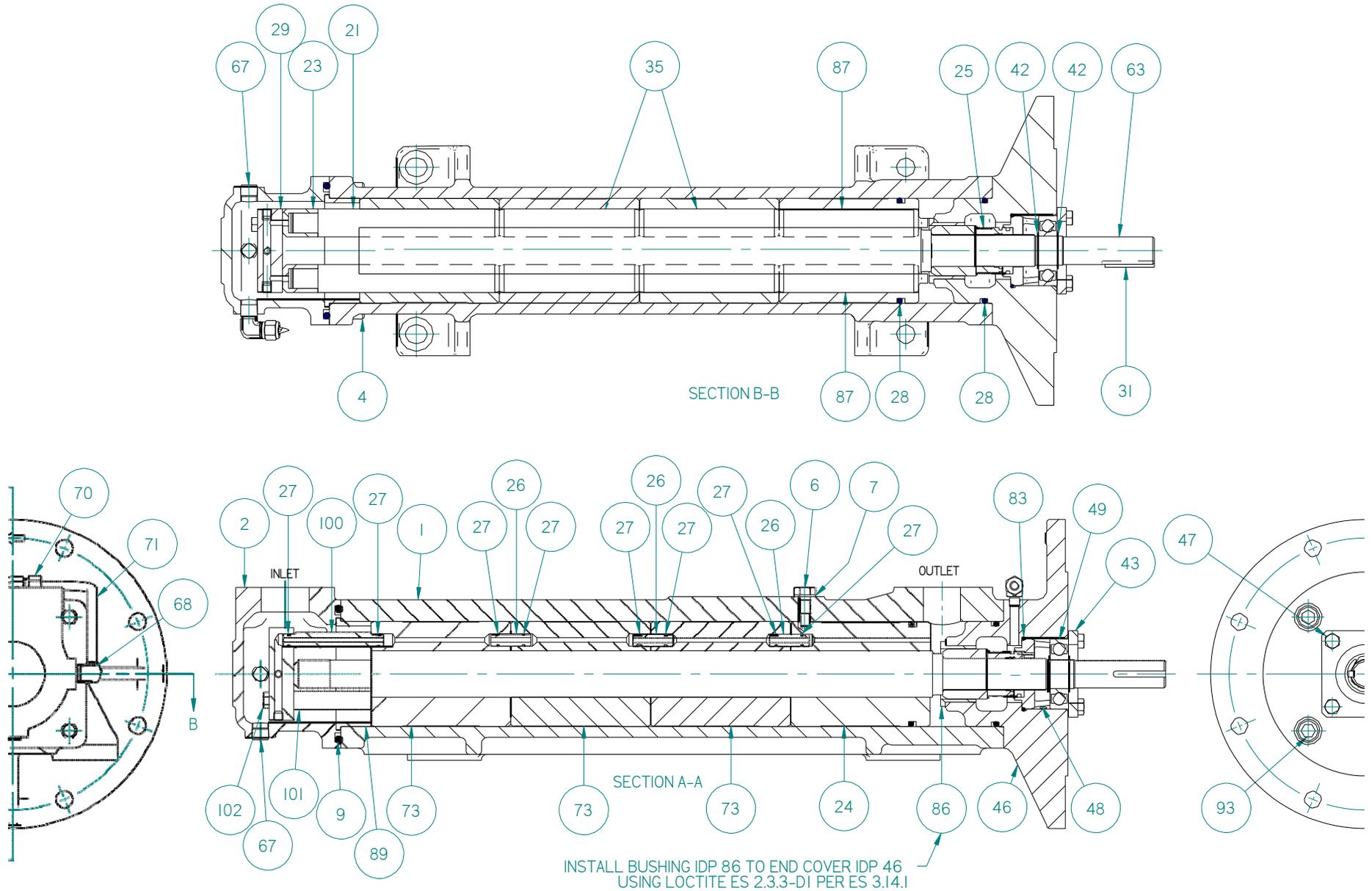
J. FIELD AND FACTORY SERVICE AND PARTS

Imo Pump maintains a staff of trained service personnel to 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.

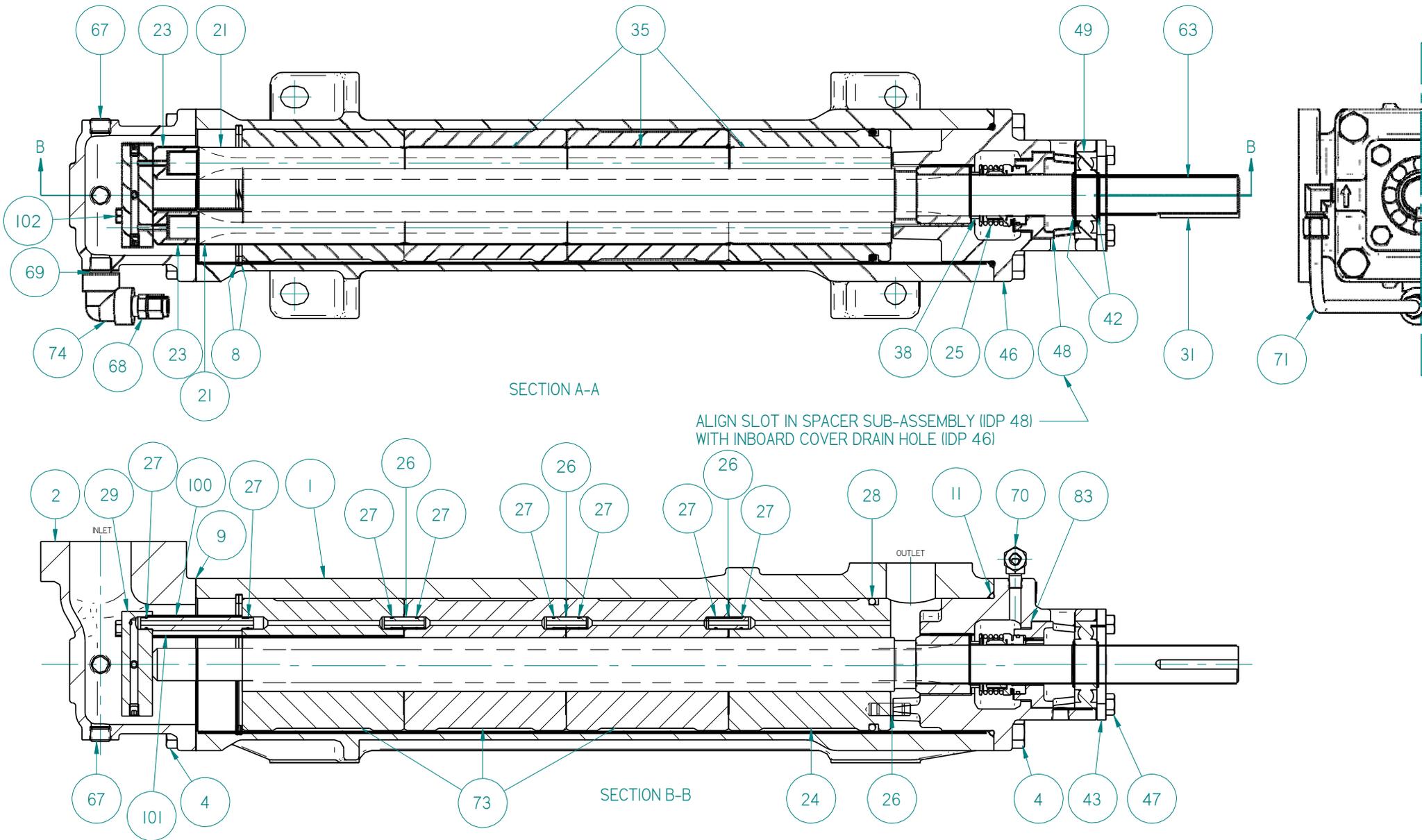
Most pumps have repair kits available. Minor Repair Kits are used to repair leaking seals, bad bearings and/or for re-assembly after pump tear-down. They include (as applicable) pump shaft seals, packing, all gaskets/O-rings and bearings. Major Repair Kits are sufficient to rebuild completely worn-out 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.

FIGURE 3



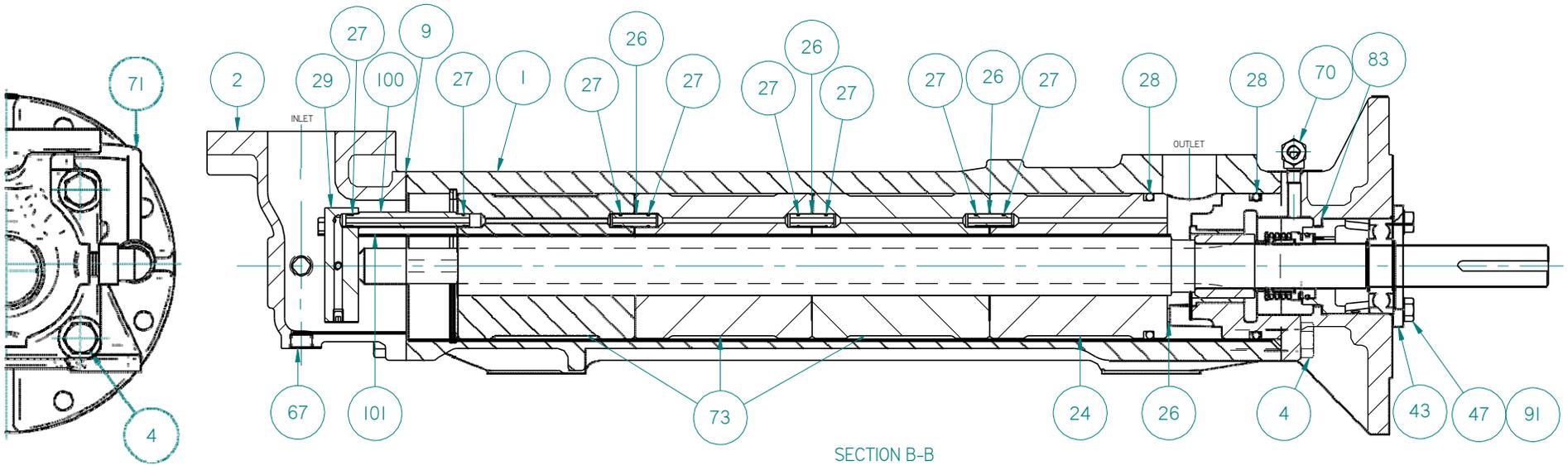
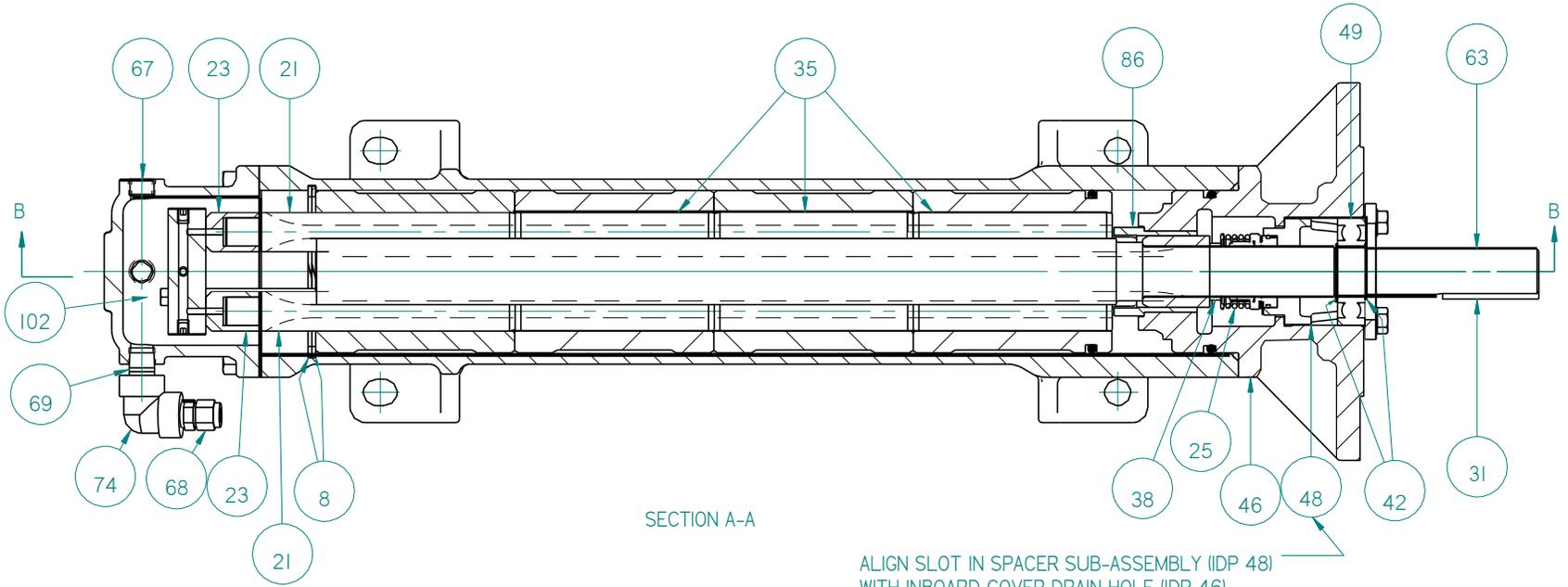
GI2D_C-187 ASSEMBLY

FIGURE 5



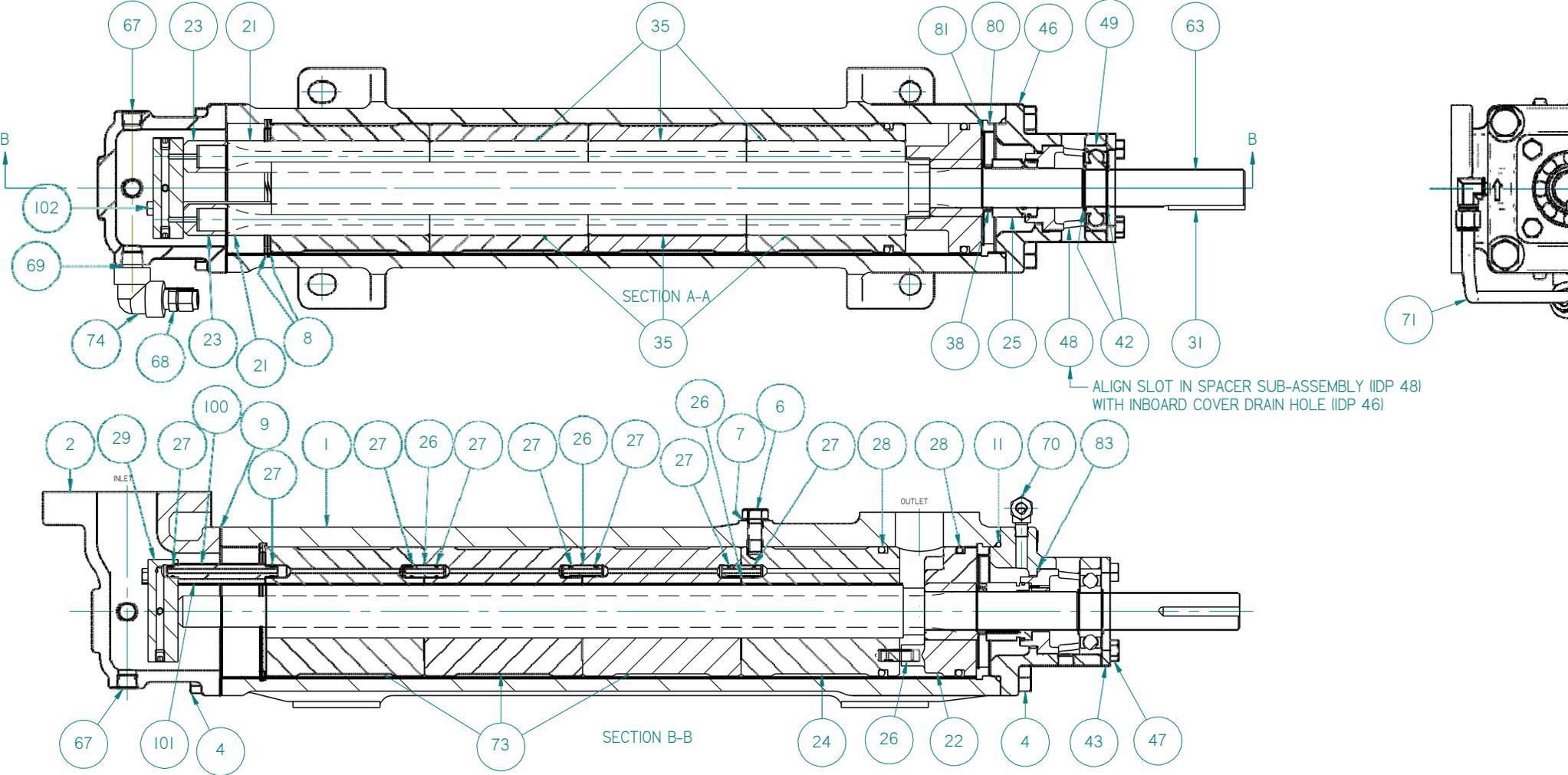
GI2D-218 ASSEMBLY

FIGURE 6



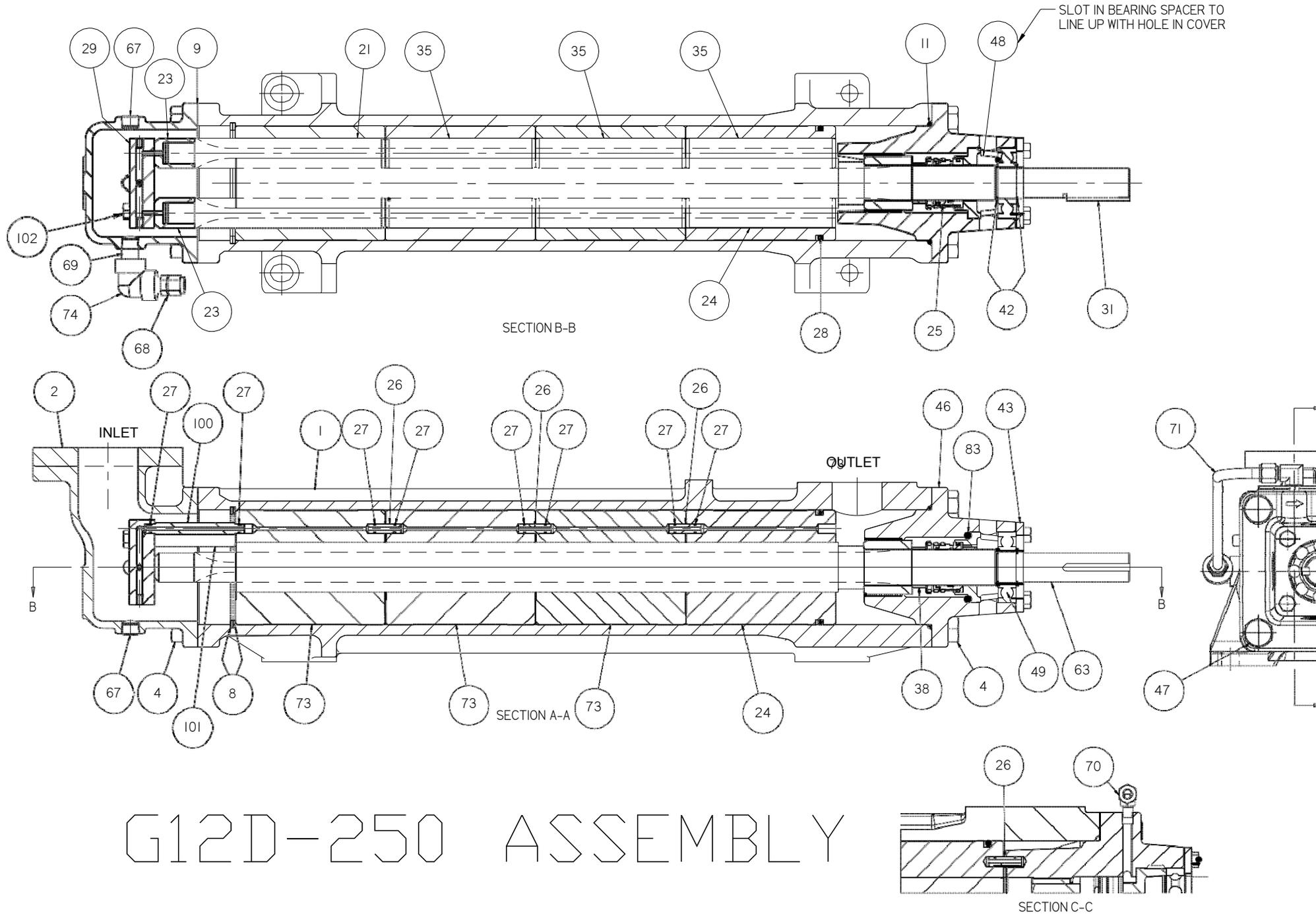
GI2D_C-218 ASSEMBLY

Figure 7



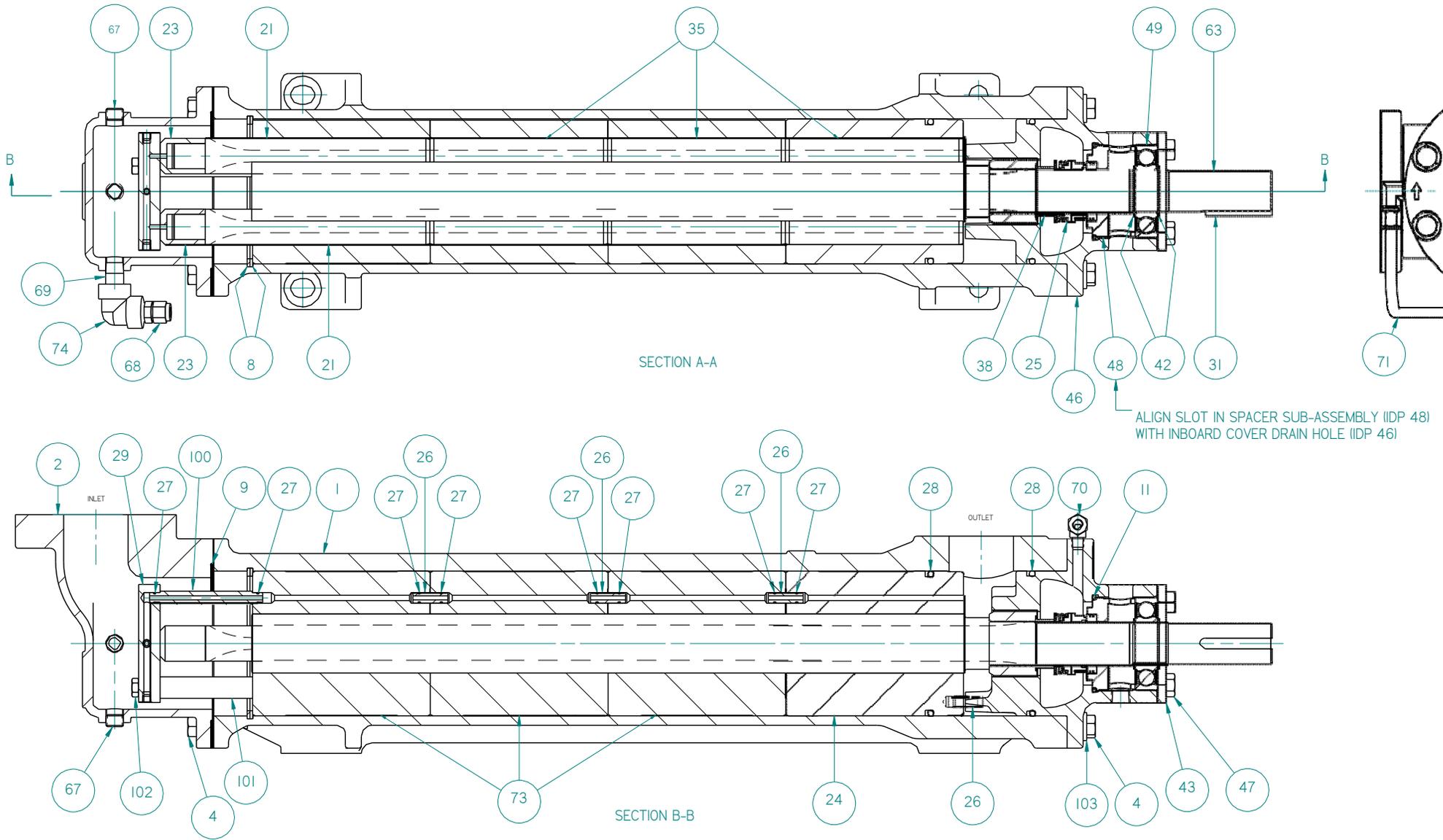
GI2D_S-218 ASSEMBLY

FIGURE 8



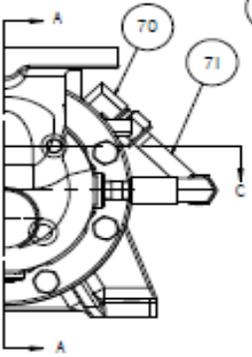
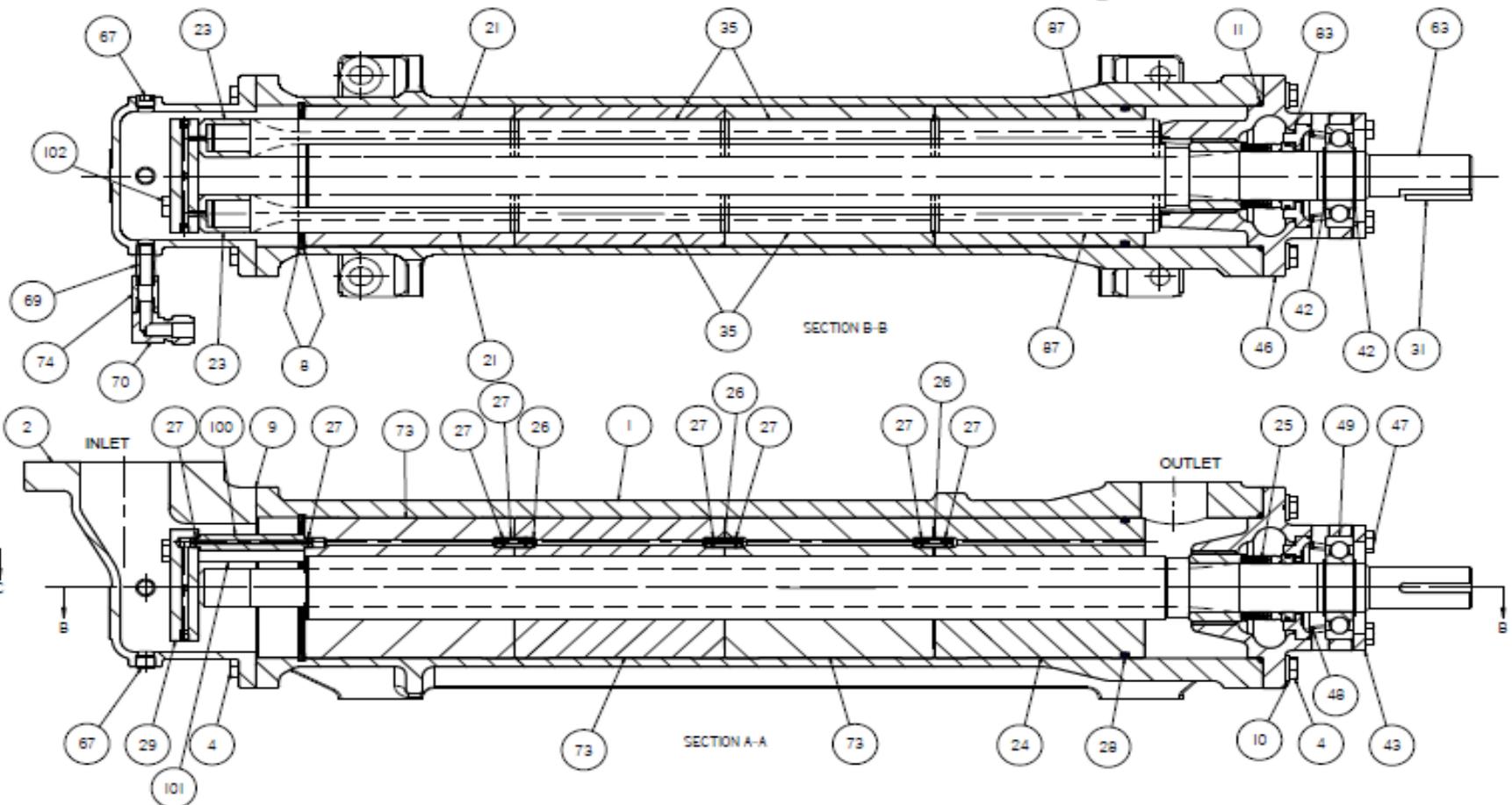
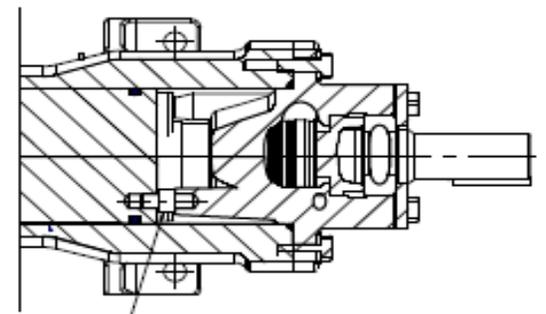
G12D-250 ASSEMBLY

FIGURE 9

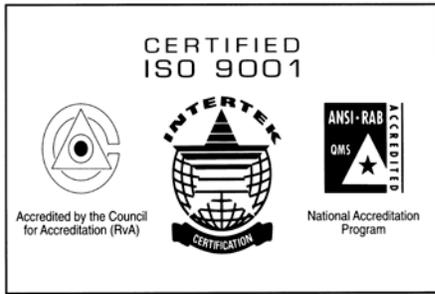


GI2D-275 ASSEMBLY

FIGURE 10



G12D-312 ASSEMBLY



CIRCOR

1710 Airport Road
PO Box 5020
Monroe, NC USA
28111.5020

Tel: +1.877.853.7867

Email: cc@circor.com

Web: www.circorpt.com

