



INSTRUCTIONAL MANUAL

Series T6D and T12D

WARNING

**READ THIS INSTRUCTION MANUAL AND CIA-1 BEFORE
INSTALLATION, OPERATION, OR MAINTENANCE**

This manual now is
identified as part no.
SRM00067

Instructions T6D/T12D (R-5)

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FOREWORD

This instruction manual covers Series T6D and T12D, rotor sizes 218 thru 312, Imo pumps. Because of the large number of operating conditions, it is necessary to have a variety of construction and material combinations to meet job requirements. The model of each pump is identified on the pump nameplate. Specific models discussed in this manual are identified in Table 1 below. Model designators are identified in Figure 1.

**TABLE 1
SERIES T6D AND T12D**

Pump Type	Rotor Size	Seal Fig. No.	Assembly Fig. No.
TA6DBF	218 thru 312	2	5
TA12DBF	218 thru 312	2	6

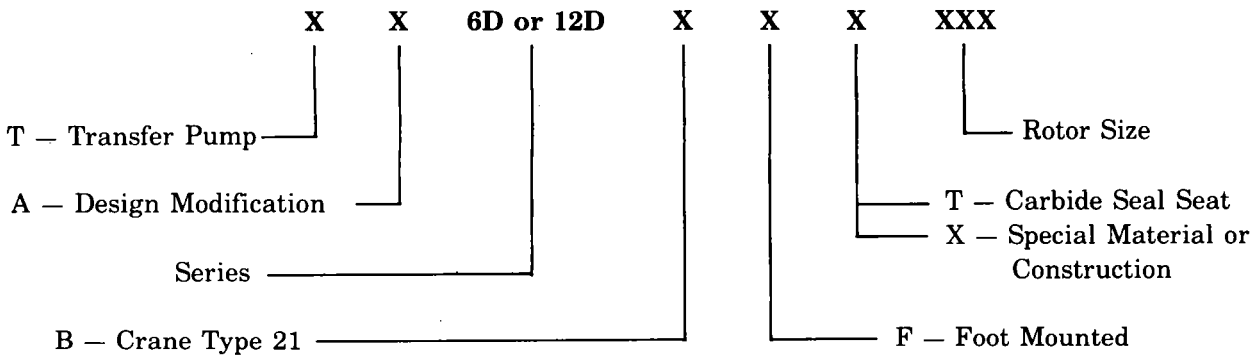


FIGURE 1. Definitions of Model Designators

STRUCTURAL LIMITS

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 data manuals* (available from local Imo Pump offices and representatives listed in Manual CA-1).

Series T6D and T12D pumps should never be utilized for any application other than the application for which the pump was originally designed without factory approval.

MAXIMUM SPEED:

	RPM
Rotor Size	Crude Oil
218 - 312	1800 All Sizes

DISCHARGE PRESSURE:

<u>TA6D</u>	<u>TA12D</u>
1000	1500

VISCOSITY: 60 SSU Minimum
 3000 SSU Maximum — Type B Mechanical Seal

TEMPERATURE: Type B: 0 - 160 Degrees F,
 Consult factory for minimum required inlet pressure

DRIVE: Direct Only

FILTRATION: Light fluids — 60 Mesh
 Heavy fluids — 1/8 to 3/16-inch

NOTE: Series T6D and T12D pumps, rotor sizes 218 thru 312, are equipped with bronze housings. Having a higher coefficient for heat expansion, bronze housings are more susceptible to heat changes than the surrounding iron case or steel alloy rotors. Rapid temperature changes can cause distortion of the bronze housings, resulting in breakdown conditions. Therefore, care must be taken to prevent thermal shock to the pump. Pumps must be heated or cooled slowly as conditions dictate.

ORDERING INSTRUCTIONS

All correspondence pertaining to renewal parts for Series T6D and T12D pumps must refer to this instruction manual number and should be addressed to the nearest Imo Pump representative listed in Manual CA-1.

The following directions should be followed for renewal part orders:

- (1) Give the number of this instruction book.
- (2) Give the pump type and serial number of the pump for which part(s) is ordered.
- (3) Give the Figure number(s) on which pump type and sealing design part(s) are shown.
- (4) Give the part number(s) for necessary part(s).

MECHANICAL SEALS

Mechanical seals installed in Series T6D and T12D pumps are Crane Type 21 (Figure 2). Disassembly and assembly procedures for mechanical seal is as follows:

DISASSEMBLY PROCEDURES

Stationary Assembly

(Figure 2) Slide stationary Assembly, seat (1) and gasket (2) off power rotor shaft.

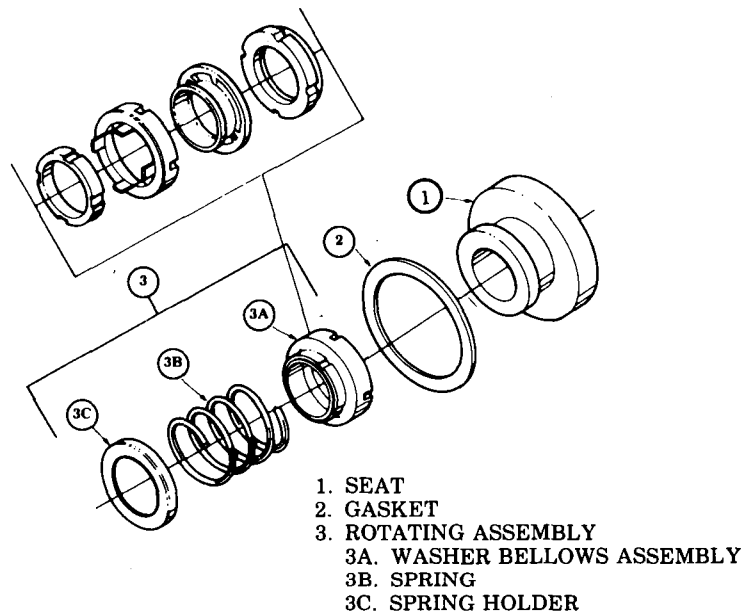


FIGURE 2. Crane Type 21 Mechanical Seal – Clamped Seat

Rotating Assembly-

(Figure 2) Slide rotating assembly (3) off power rotor.

ASSEMBLY PROCEDURES

Rotating Assembly

NOTE: The rotating assembly (3) is normally packaged as an assembly for ease of installation. Coat all parts with oil prior to assembly on power rotor shaft.

(Figure 2) Slide rotating assembly (3) on power rotor shaft next to sleeve (038).

Stationary Assembly

(Figure 2) Slide mechanical seal seat (1) on power rotor shaft next to rotating assembly (3). Gasket (2) is to be installed in seal bore of cover (046).

DISASSEMBLY AND ASSEMBLY PROCEDURES

DISASSEMBLY PROCEDURES

NOTE: Disassembly procedures for Figures 5 and 6 are identical except when specifically noted. Refer to Table 1 and Figure 1 for proper identification of pump type and applicable Assembly Figure Number and Seal Figure Number.

- STEP 1. Close off suction and discharge piping to pump and disconnect piping. Remove fittings and tubing (071). Remove drain plugs and drain unit. Remove pump from driver, coupling and baseplate. Remove coupling hub and key (031) from power rotor (063) shaft.
- STEP 2. Remove bolts (075) with washers (086), nipple (079) with O-ring (089) and gasket (085) from cover (087). Remove O-ring (089) from nipple (079).
- STEP 3. Remove bolts (080), cover (087) and gasket (088) from inlet head (002).
- STEP 4. Remove bolts (004), inlet head (002) and gasket (009) from case (001).
- STEP 5. Remove spiral ring (008) from groove of case (001).
- STEP 6. Remove cage (090) from case (001). Removal of cage (090) includes removal of studs (081), nuts (091), plate (093) and plug (072). If necessary, remove nuts (091) to remove plate (093) from cage (090).
- STEP 7. Remove tube (026) from either cage (090) or housing (073).
- STEP 8. Remove idler balance piston housings (023) from idlers (021). Remove idlers (021) by unscrewing idlers from housing (073). Remove remaining idlers (035) by rotating power rotor (063) in a counter-clockwise direction. DO NOT allow idlers to drop as they emerge from inlet end of pump. NOTE: Quantity of idlers (035) for Series T6D pumps is two (2), Figure 5; for Series T12D pumps is six (6), Figure 6.
- STEP 9. Remove bolts (047) and bearing retainer (043). Remove assembled power rotor (063) will include removal of truarc rings (042), ball bearing (049), spacer (048), mechanical seal (025), sleeve (038), spiral ring (097), sleve (096), O-ring (095) and spring pin (082).
- STEP 10. Remove gasket furnished with mechanical seal (025) from bore of inboard cover (046).
- STEP 11. Disassemble power rotor (063) as follows:
 - a. Remove outer truarc ring (042) from groove of power rotor (063).
 - b. Press ball bearing (049) off power rotor (063) shaft.
 - c. Remove inner truarc ring (042) from groove of power rotor (063). Remove spacer (048) from power rotor (063) shaft.
 - d. Remove mechanical seal seat and rotating assembly. NOTE: Refer to Mechanical Seals, page 2, and Figures 2 for proper disassembly procedures.
 - e. Remove sleeve (038) from power rotor (063) shaft.

- f. Remove spiral ring (097) from groove of piston (020). Remove sleeve (096). Remove O-ring (095) from groove of piston (020). NOTE: Piston (020) furnished as part of power rotor (063) and is not serviced separately.

STEP 12. Remove bolts (004), inboard cover (046) and gasket (009) from case (001).

STEP 13. Remove retainer (100) and retaining ring (101) from pump case (001).

STEP 14. Remove balance piston housing (022) with O-ring (028), balance piston bushing (098) and idler stop (099). Remove idler stop (099) from balance piston housing (022) by removing capscrews (078). Remove balance piston bushing (098) from balance piston housing (022). Remove O-ring (028) from groove of balance piston housing (022).

STEP 15. Remove tube (026) from either idler stop (099) or housing (024).

STEP 16. Remove stop pin (006) with Dyna seal (007) from case (001).

STEP 17. Remove housings (073 and/or 050 and 024) with tube(s) (026) from inlet end of pump case (001). NOTE: Series T6D pumps are equipped with two (2) housings, Figure 5; Series T12D pumps are equipped with four (4) housings, Figure 6.

CAUTION

Do not permit housings to fall as they are removed from pump.

STEP 18. Remove tube(s) (026) from housings (073, 050 or 024).

ASSEMBLY PROCEDURES

NOTE: Prior to assembly of pump, all parts should be cleaned and inspected for nicks and burrs. Replace all worn or damaged parts. The IMO Pump Division recommends automatic replacement of O-rings (028, 089 and 095), gaskets (009, 085 and 088), Dyna seal (007), mechanical seal (025) and ball bearing (049) when these parts are disturbed from their previously installed position. Refer to pump assembly drawings, Figures 5 and 6; mechanical seal drawings, Figure 2; and List of Material, Table 3, during assembly. Coat all parts with light lubricating oil to assist in assembly. Assembly procedures for Figures 5 and 6 are identical.

STEP 1. Install O-ring (028) in groove of housing (024). Install tubes (026) in housing (024). Install housing (024) in pump case (001), ensuring that housing is properly aligned with bore for stop pin (006) in case (001). Install stop pin (006) with Dyna seal (007) in case (001).

STEP 2. Install tube(s) (026) in housing(s) (073 or 050) and install housing(s) (073 or 050) in case (001), ensuring that tubes (026) engage bores of adjoining housing(s). NOTE: Series T6D pumps are equipped with two (2) housings (024 and 073, Figure 5) and three tubes (026, Figure 5); Series T12D pumps are equipped with four (4) housings (024 and 073 or 050, Figure 6) and five tubes (026, Figure 6).

STEP 3. Install balance piston bushing (098) on balance piston housing (022). Install idler stop (099) on balance piston housing (022) using capscrews (078). Torque capscrews (078) to proper value listed in Table 2. Install O-ring (028) in groove of balance piston housing (022).

STEP 4. Install assembled balance piston housing (022) in pump case (001), ensuring that bore of idler stop (099) engages tube (026) installed in housing (024).

- STEP 5. Install retainer (100) and retaining ring (101) in groove of pump case (001).
- STEP 6. Install gasket (009) and inboard cover (046) on flange of pump case (001) using bolts (004). Torque bolts (004) to proper value listed in Table 2.
- STEP 7. Assemble power rotor (063) as follows:

NOTE: Piston (020) furnished as part of power rotor (063) and is not serviced separately.

- a. Install O-ring (095) in groove of piston (020). Install sleeve (096) on piston (020), ensuring that spring pin (082) in piston (020) engages slot in sleeve (096). Install spiral ring (097) in groove of piston (020).
- b. Install sleeve (038) on power rotor (063) shaft next to piston (020).
- c. Install mechanical seal (025) rotating assembly (3, Figure 2) on power rotor (063) shaft in accordance with procedures outlined in Mechanical Seals, page 2, Refer to Table 1 and Figure 2.
- d. Install mechanical seal stationary seat (1, Figure 2) on power rotor (063) shaft.
- e. Install spacer (048) on power rotor (063) shaft. Install inner truarc ring (042) in groove of power rotor (063).
- f. Press ball bearing (049) on power rotor (063) shaft, pressing only on inner race of bearing, until bearing (049) is next to installed truarc ring (042).
- g. Install outer truarc ring (042) in groove of power rotor (063) shaft to retain bearing.

**TABLE 2
TORQUE VALUES**

Part	Rotor Size	Torque Value
004 (1)	218	185 lbs. ft. (± 10 lbs. ft.)
	250	260 lbs. ft. (± 15 lbs. ft.)
	275 and 312	100 lbs ft. (± 5 lbs. ft.)
004 (2)	218	95 lbs. ft. (± 5 lbs. ft.)
	250	160 lbs. ft. (± 5 lbs. ft.)
	275 and 312	65 lbs. ft. (± 5 lbs. ft.)
047	218	15 lbs. ft. (± 2 lbs. ft.)
	250 and 275	20 lbs. ft. (± 2 lbs. ft.)
	312	30 lbs. ft. (± 2 lbs. ft.)
075	218 thru 312	4 lbs. ft. Maximum
078	218 and 250	5 lbs. ft. Maximum
	275 and 312	18 lbs. ft. (± 2 lbs. ft.)
080	218 and 250	65 lbs. ft. (± 5 lbs. ft.)
	275 and 312	100 lbs. ft. (± 5 lbs. ft.)

- STEP 8. Install gasket furnished with mechanical seal flat in seal bore of inboard cover (046).
- STEP 9. Install assembled power rotor (063) in pump, centering each part as it enters inboard cover (046) and case (001).
- STEP 10. Install retainer (043) using bolts (047). Torque bolts (047) to proper value listed in Table 2.
- STEP 11. Install idlers (035) in inlet end of pump by engaging threads of idlers (035) with threads of power rotor (063) and rotating power rotor shaft in a clockwise direction. NOTE: Quantity of idlers (035) for Series T6D pumps (Figure 5) is two (2); for Series T12D (Figure 6) is six (6).
- STEP 12. Install idler balance piston housings (023) on idlers (021). Install idlers (021) as described above.
- STEP 13. If removed during disassembly, install plate (093) on cage (090) using nuts (091). Install assembled cage (090) on housing (073), ensuring that bore of cage (090) engages tube (026) installed in housing (073).
- STEP 14. Install spiral ring (008) in groove of pump case (001) to retain cage assembly (090).
- STEP 15. Install gasket (009) and inlet head (002) on flange of pump case (001) using bolts (004). Torque bolts (004) to proper value listed in Table 2.
- STEP 16. Install gasket (088) and cover (087) on inlet head (002) using bolts (080). Torque bolts (080) to proper value listed in Table 2.
- STEP 17. Install O-ring (089) in groove of nipple (079). Install nipple (079) with gasket (085) into plate (093) and on cover (087) using bolts (075) with washers (086). Torque bolts (075) to proper value listed in Table 2.
- STEP 18. Install coupling hub and key (031).
- STEP 19. Install tubing (071). Install all plugs removed during disassembly.
- STEP 20. Mount pump on baseplate and align with driver as described in CA-1 manual.

TABLE 3
LIST OF MATERIALS (FIGURES 5 AND 6)

Part	Description	Part	Description
001	Case	067	Plug (3)
002	Inlet Head	068	Nipple
004 (3)	Bolt	069	Coupling
006 (2)	Stop Pin	070	No-Flare Elbow
007 (1)	Dyna Seal	071	Tubing
008 (2)	Spiral Ring (2)	072	Plug (2)
009 (1)	Gasket (2)	073 (2) (6)	Housing
020	Piston	074	No-Flare Elbow (3)
021 (2)	Idler (2)	075	Bolt (8)
022 (2)	Balance Piston Housing	078	Capscrew (2)
023 (2)	Idler Balance Piston Housing (2)	079	Nipple
024 (2)	Housing	080	Bolt (8)
025 (1)	Seal	081	Stud (2)
026 (2) (4)	Tube	082	Spring Pin
028 (1)	O-ring (2)	085 (1)	Gasket
031	Key	086	Washer (8)
033	Nameplate	087	Cover
034	Drive Screw	088 (1)	Gasket
035 (2) (5)	Idler	089 (1)	O-ring
038	Sleeve	090	Cage
042 (1)	Truarc Ring (2)	091	Nut (2)
043	Retainer	093 (2)	Plate
046	Inboard Cover	095 (1)	O-ring
047	Bolt (4)	096 (2)	Sleeve
048 (2)	Spacer	097 (2)	Spiral Ring
049 (1)	Ball Bearing	098 (2)	Balance Piston Busing
050	Housing	099 (2)	Stop
051	Spring Pin	100 (2)	Retainer
063 (2)	Power Rotor	101 (2)	Retaining Ring

Quantities are on (1) except when noted in parentheses after part description or in notes below.

- (1) Minor Repair Kit items.
- (2) Major Repair Kit items. Items marked (1) also included in Major Repair Kit.
- (3) Quantity eight (8) for rotor sizes 218 and 250; sixteen (16) for rotor sizes 275 and 312.
- (4) Quantity three (3) for Figure 5; five (5) for Figure 6.
- (5) Quantity two (2) for Figure 5; six (6) for Figure 6.
- (6) Quantity one (1) for Figure 5; three (3) for Figure 6.

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 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. Imo Pump, 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 the Imo Pump 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.