



**INSTRUCTION MANUAL  
AND  
PARTS LIST  
FOR  
3SIC AND 4SIC SERIES PUMPS**



**WARNING**

This manual, and General Instructions Manual, CA-1 should be read thoroughly prior to pump installation, operation or maintenance.

.....  
: This manual now is  
: identified as part no.  
: SRM00024  
: .....


Manual No. 3-4SIC


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## READ THIS ENTIRE PAGE BEFORE PROCEEDING

FOR THE SAFETY OF PERSONNEL AND TO PREVENT DAMAGE TO THE EQUIPMENT, THE FOLLOWING NOMENCLATURE HAS BEEN USED IN THIS MANUAL:

	<b>DANGER</b>
Failure to observe the precautions noted in this box can result in severe bodily injury or loss of life.	

	<b>WARNING</b>
Failure to observe the precautions noted in this box can cause injury to personnel by accidental contact with the equipment or liquids. Protection should be provided by the user to prevent accidental contact.	

<b>CAUTION</b>	<b>ATTENTION</b>
Failure to observe the precautions noted in this box can cause damage or failure of the 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 the pump and/or protection of the pump itself are marked by the sign:
		<b>ATTENTION</b>

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## A. GENERAL INSTRUCTIONS

The instructions found herein cover the disassembly, assembly and parts identification of 3SIC and 4SIC Series pumps.

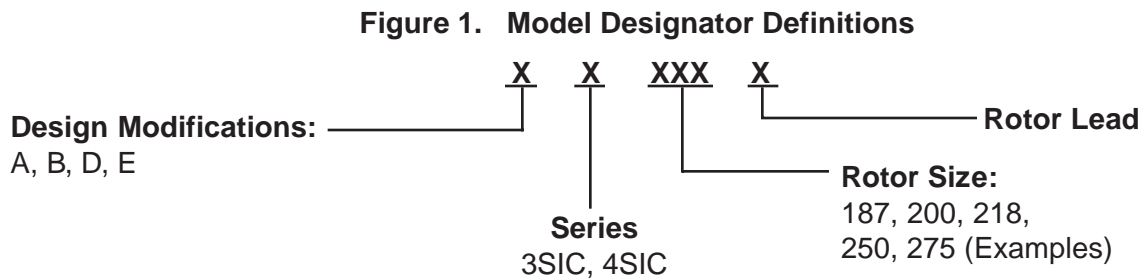
**NOTE:** Individual contracts may have specific provisions that vary from this manual. For further detailed information and technical assistance to questions not answered by these manuals, please refer to Imo Pump, Technical/Customer Service Department, at (704) 289-6511.

This manual cannot possibly cover every situation connected with the installation, operation, inspection, and maintenance of the equipment supplied. Every effort was made to prepare the text of the manual so that engineering and design data is transformed into the most easily understood wording. Imo Pump must assume the personnel assigned to operate and maintain the supplied equipment and apply this instruction manual have sufficient technical knowledge and experience to apply sound safety and operational practices which may not be otherwise covered by this manual.

	<b>WARNING</b>
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 3SIC and 4SIC Imo pumps. This series of pumps has been designed for use in hydraulic elevator submerged applications. The model, construction and material of each pump is identified on the pump nameplate. Definitions of model designators are identified in Figure 1.



## C. DESCRIPTION OF PUMP

The 3SIC and 4SIC series pumps are positive displacement, rotary screw pumps consisting of a precision bored housing that encloses a driven screw (power rotor) and two intermeshing following screws (idler rotors). These screws when rotating form a succession of closures or cavities. As they rotate, the fluid is moved axially from the inlet to the outlet port in a continuous, uniform flow with minimum fluid pulsation and pump noise.

## D. ORDERING INSTRUCTIONS

To order a replacement pump, contact Imo service representative with the pump model number, serial number and manufactured date. This information can be found on the pump's nameplate.

## E. OPERATION

### E.1 LIQUID LIMITATIONS

Never operate with thin liquids such as solvents or water. The pump is designed for liquids having the general characteristics of oil.

## E.2 OPERATING LIMITATIONS

### 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, the specific application limits may be different from that of the operational limitations. This equipment must not be operated without verifying the system's operating requirements are within the pump's capabilities.

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

**Table 1. Pump Operating Limits**

<b>MAXIMUM SPEED</b> .....	3600 RPM
<b>VISCOSITY</b> .....	60 SSU (10.3 cSt) Minimum, if over 5000 SSU (1079 cSt) contact Imo Pump
<b>NOTE:</b>	Consult factory for allowable operating viscosity at specific speeds and pressures. <b>DO NOT</b> alter design viscosity without prior consultation with Imo Pump
<b>TEMPERATURE</b> .....	0° to 180° F (-18° to 82° C) Maximum
<b>INLET PRESSURES</b> .....	3SIC and 4SIC Pump types must be submerged to a depth of at least 6 in. (15.24 cm) from top of pump to top of fluid
<b>DISCHARGE PRESSURE*</b> .....	See Elevator Pump Data Book
<b>DRIVE</b> .....	Direct drive only
<b>FILTRATION</b> .....	Always use inlet strainer supplied with pump
<b>MOUNTING</b> .....	Flange mounted

## F. PARTS LIST AND TORQUE TABLES

**Table 2. Pump Parts List**

IDP	QTY	DESCRIPTION	IDP	QTY	DESCRIPTION
1	1	Power Rotor	10	4	Hex Bolt(s)
2	1	Key	11	2	Idler Rotor(s)
3	1	Truarc Ring(s)	12	2	Spacer(s)
4	1	Truarc Ring(s)	13	1	Thrust Plate
5	1	Bearing	14	2	Hex Bolt(s)
6	1	Inboard Cover	15	1	Strainer
8	1	Rotor Housing	16	1	Strainer Clamp
9	2	Lockwasher(s)	17	4	Hex Bolt(s)

**Table 3. Fastener Descriptions and Torque Tightening Values**

PUMP	IDP	DESCRIPTION	TORQUE (English)	TORQUE (Metric)
SIC 187/200	17	HEX BOLT	100 ± 5 lb. in.	12 ± 3 Nm
	10	CAP SCREW	18 ± 2 lb. ft.	25 ± 3 Nm
	14	CAP SCREW	18 ± 2 lb. ft.	25 ± 3 Nm
SIC 218	17	HEX BOLT	100 ± 5 lb. in.	12 ± 3 Nm
	10	HEX BOLT	50 ± 2 lb. ft.	68 ± 3 Nm
	14	HEX BOLT	18 ± 2 lb. ft.	25 ± 3 Nm
SIC 250	17	HEX BOLT	100 ± 5 lb. in.	12 ± 3 Nm
	10	HEX BOLT	50 ± 2 lb. ft.	68 ± 3 Nm
	14	HEX BOLT	18 ± 2 lb. ft.	25 ± 3 Nm
SIC 275	17	HEX BOLT	100 ± 5 lb. in.	12 ± 3 Nm
	10	HEX BOLT	75 ± 5 lb. ft.	102 ± 7 Nm
	14	HEX BOLT	18 ± 2 lb. ft.	25 ± 3 Nm

## G. INSPECTION

The interval for inspection and replacement of worn parts varies with the properties of the pumped liquid and can only be determined by experience. All parts of the 3SIC and 4SIC series pumps are lubricated by the pumped fluids. Pumping liquid which contains abrasive materials or liquid that is corrosive, will significantly reduce service life and call for shorter service intervals. A worn pump will be noticeable by excessive vibration, noise, reduction in flow or reduction in pressure.

## H. PUMP MAINTENANCE



### WARNING

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



### DANGER

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

### H.1 GENERAL COMMENTS

- Part number identifiers (IDPs) contained within parenthesis such as (8) refer to the circled numbers shown on Assembly Drawings, Figures 2 and 3.
- Close all pump line valves.

### H.2 TOOLS REQUIRED

The procedures described in this manual require common mechanics hand tools, a torque wrench and a suitable lifting device (such as) slings, straps, etc.

### H.3 PUMP DISASSEMBLY

#### CAUTION

#### ATTENTION

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

**NOTE:** The 3SIC and 4SIC pumps incorporate highly finished precision parts that must be handled carefully to avoid damage to critical machined surfaces. The parts removed should be tagged for identification and their exact positions in the pump carefully noted so that new parts, or the removed parts, are properly replaced.

STEP 1. Remove Pump from Driver.

Remove bolts (17) and washers (18).

Slide pump out and away from driver. Place pump on workbench.

If replacing bearing, remove key (2) from power rotor (1) shaft keyway.

STEP 2. Remove Strainer (suction side).

Remove strainer clamp (16) and strainer (15).

STEP 3. Remove Thrust Plate.

Remove bolts (14) lockwashers (9) thrust plate (13) and spacers (12).

STEP 4. Remove Idler Rotors.

Remove idler rotors (11) from the bore of the housing (8) by pulling and rotating rotors in a clockwise direction.

STEP 5. Remove Power Rotor (discharge side)

1. Using snap-ring pliers remove the Truarc rings (4) from the groove of inboard cover (6).

2. Holding shaft of power rotor (1) pull rotor from inboard cover (6) and rotor housing (8).

- STEP 6. Remove Inboard Cover.  
Remove bolts (10) and inboard cover (6).
- STEP 7. Remove Bearing from Power Rotor – (Optional step for bearing removal).  
1. Using a screwdriver, remove the outer Truarc ring halves (3).  
2. Using a bearing puller or press, remove ball bearing (5) from power rotor (1).
- NOTE:** Imo Pump strongly recommends replacement of the ball bearing (5) every time the bearing is pressed-off the power rotor.

#### H.4 PUMP ASSEMBLY

- NOTE:** Prior to pump assembly, all parts should be cleaned and inspected for nicks, burrs or gouges.  
When ready for assembly, wipe all parts, including bolts, with SAE 30 lubricating oil.
- STEP 1. Install Inboard Cover (discharge side)  
Install rotor housing (8) on inboard cover (6) using bolts (10).  
Torque bolts as follows:  
1. Using Figure 2, torque bolts (10) to  $18 \pm 2$  lb. ft.  
2. Using Figure 3, torque bolts (10) to  $50 \pm 2$  lb. ft.  
3. For all SIC-275 series pumps, torque bolts (10) to  $75 \pm 5$  lb. ft.
- STEP 2. Install Bearing (If previously removed).  
Using an arbor press, install ball bearing (5) onto power rotor (1) shaft by pushing on bearing inner race ring only.

#### CAUTION

Bearing service life could be significantly reduced if the bearing is pushed on by its outer race ring.

- NOTE:** Take care to press on the bearing inner race only. Press bearing down until the inner race of ball bearing (5) is positioned against power rotor (1) shoulder. Install Truarc rings (3) in groove of power rotor(1).
- STEP 3: Install Power Rotor.  
Install the power rotor (1) into inboard cover (6) and rotor housing (8).
- STEP 4: Install Truarc Rings.  
Install Truarc rings set (4) next to ball bearing (5) in groove of inboard cover (6).
- STEP 5: Install Idler Rotors.  
Install idler rotors (11) into rotor housing (8) idler bores, by meshing threads and pushing and turning idlers (11) while inserting.
- STEP 6: Install Thrust Plate.  
Install spacers (12) and thrust plate (13) on rotor housing (8) using bolts (14) and lockwashers (9). Torque bolts to a value of  $18 \pm 2$  lb. ft.
- STEP 7: Install Strainer.  
Install strainer (15) and strainer clamp (16).
- STEP 8: Reinstall Pump to Driver.  
Install key (2) in power rotor (1) keyway.  
Slide pump shaft into driver shaft.
- STEP 9: Mount Pump and Driver.  
Install bolts (17) into inboard cover (6) and torque to  $100 \pm 5$  lb. ft.

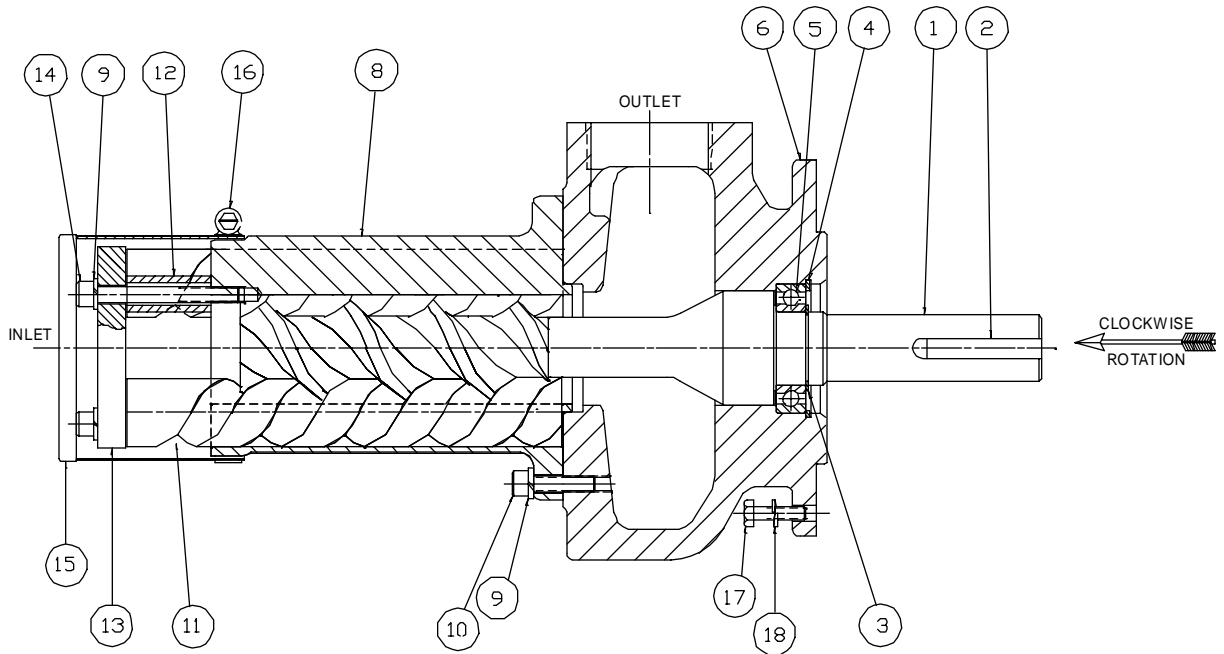


Figure 2. Assembly Drawing for 3SIC-187, -200 and 4SIC-187, -200 Series Pumps

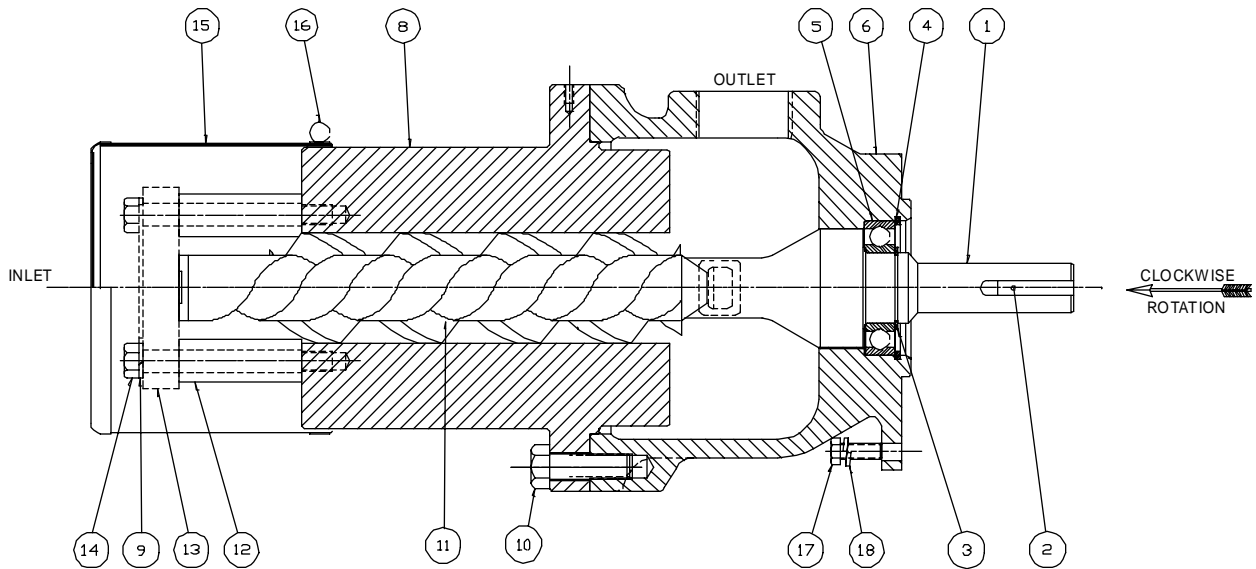


Figure 3. Assembly Drawing for 3SIC-218, -250 and 4SIC-218, -250, -275 Series Pumps

**NOTE:** Actual pump may differ slightly from figure.

