



# **PRODUCT SERVICE MANUAL**

## **For**

### **3432/094 (A4PICX-187/094)**



#### **WARNING**

Imo General Installation Operation, Maintenance, and Troubleshooting Manual, (No. SRM00046), along with this manual and all other component manuals supplied with these type units should be read thoroughly prior to pump installation, start-up, operation, maintenance or troubleshooting.

**MANUAL # SRM00124**

**Rev. 01 (21-0001)**

**October, 2021**

## READ THIS ENTIRE PAGE BEFORE PROCEEDING

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

	<b>DANGER</b>	Failure to observe precautions noted in this box can result in severe bodily injury or loss of life.
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	<b>WARNING</b>	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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<b>CAUTION</b>	<b>ATTENTION</b>	Failure to observe precautions noted in this box can cause damage or failure of equipment.
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Non-compliance of safety instructions identified by the following symbol could affect safety for persons:  <div style="text-align: center;"></div>	Safety instructions where electrical safety is involved are identified by:  <div style="text-align: center;"></div>	Safety instructions which shall be considered for reasons of safe operation of pump and/or protection of pump itself are marked by the sign:  <div style="text-align: center;"><b>ATTENTION</b></div>
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<b>ATTENTION</b>
<b><i>If operation of this 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.</i></b>

## A. GENERAL INSTRUCTIONS

Instructions found herein cover disassembly, assembly and parts identification of the A4PICX-187/094 pump.

**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 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 assumes personnel assigned to operate and maintain 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.

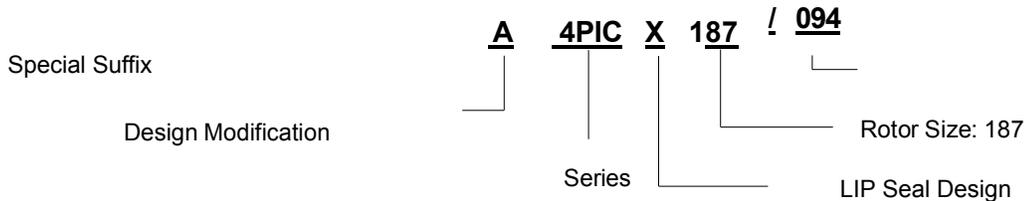


### WARNING

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 A4PICX-187/094 Imo pump. This pump has been designed with a lip seal for use in Solar lube oil systems. Model of each pump is identified on pump nameplate. Definitions of model designators are identified in Figure 1.



**Figure 1 – Definition of Model Designators**

## C. DESCRIPTION OF PUMP

A4PICX-187/094 pump is 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, fluid is moved axially from inlet to outlet port in a continuous, uniform flow with minimum fluid pulsation and pump noise. Pump contains a lip seal.

## D. ORDERING INSTRUCTIONS

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

## E. OPERATION

### E.1 LIQUID LIMITATIONS

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

## E.2 OPERATING LIMITATIONS

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's operating requirements are within pump's capabilities.</p>	

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

**Table 1 – Pump Operating and Structural 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>TEMPERATURE</b> .....	0° to 180° F (-18° to 82° C) Maximum
<b>INLET PRESSURES</b> .....	A4PICX-187/094 pump is submerged in a slightly pressurized reservoir
<b>DRIVE</b> .....	Direct drive only
<b>FILTRATION</b> .....	Always use inlet strainer
<b>MOUNTING</b> .....	Flange mounted only

## F. PARTS LIST AND TORQUE TABLES

**Table 2 – Pump Parts List**

Item	Qty.	Part Description	Item	Qty.	Part Description
1	1	Power Rotor	12	1	Spacer
2	1	Key	15	1	Strainer
3	1	Retaining Ring	17	4	Hex Capscrews
4	1	Retaining Ring	20	1	Adapter Fitting
5	1	Bearing	21	2	Drive Screws
6	1	Inboard Cover	22	1	Name Plate
7	2	Washer	23	1	Seal Retainer
8	1	Rotor Housing	24	4	Socket Head Capscrew
9	4	Lock Washers	25*	1	O-ring
10	2	Socket Head Capscrews	26*	1	Lip Seal
11	2	Idlers			

Items marked with \* are seal kit items

## G. INSPECTION

Intervals for inspection and replacement of worn parts varies with properties of pumped liquid and can only be determined by experience. All parts of A4SICX-187/094 pump 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, e.g.: 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, be sure power to equipment is disconnected and locked-out.

**H.1 GENERAL COMMENTS**

- Part number identifiers (IDPs) contained within parenthesis such as (8) refer to circled numbers shown on Assembly Drawing.
- Close all pump line valves before working on pump.

**H.2 TOOLS REQUIRED**

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 dis-assembly of pump may make floor slippery and cause personal injury.

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

1. If lip seal only is to be replaced, remove key (2) from shaft (1), remove seal retainer (23) by removing socket head capscrews (24) and then remove lip seal (26) and O-ring (25) from seal retainer and discard. See steps 7 and 8 on page 4 of assembly instructions for reinstallation of lip seal (26).
2. If rest of pump is to be disassembled, proceed below.
3. Remove pump from driver by removing bolts (17) and washers (9). Place pump on workbench.
4. Remove strainer retaining ring (4) and strainer (15).
5. Place pump on end (suction side down) on a solid flat surface and remove capscrews (10)
6. Remove front cover and rotor set as a sub-assembly from housing (8) by lifting front cover (6) with power rotor (1), idler rotors (11), ball bearing (5), supporting washer (12) and retaining ring (3) from housing (8)

**CAUTION****ATTENTION**

During removal of front cover assembly, to prevent idlers (11) damage, hold idler rotors (11) against power rotor (1) until sub-assembly is placed on work bench. At that time, Idler rotor (11) can be disengaged from power rotor (1).

7. Disassembly front cover assembly by remove Retaining ring (3) and spacer (12) from front cover (6). Then slide front cover off power rotor (1).
8. Remove ball bearing (5) from power rotor (1).

**NOTE:** Ball bearing (5) should be replaced if it is pressed off power rotor.

#### H.4 PUMP REASSEMBLY

**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.

1. Install bearing (5) onto power rotor (1) either with a press or by heating.

<b>CAUTION</b>	<b>ATTENTION</b>
To prevent damage to bearing, press only on bearing inner race when installing bearing. If bearing is being heated for installation, heat to 180°F - 200°F, for installation.	

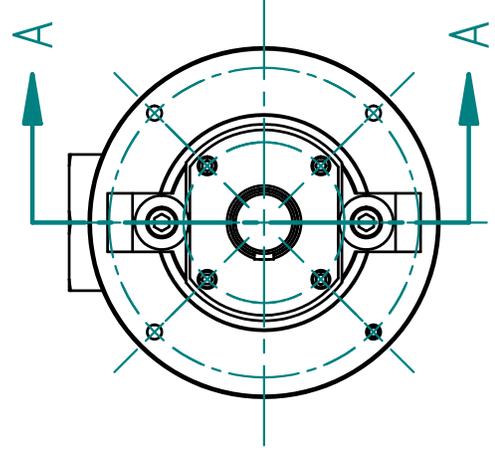
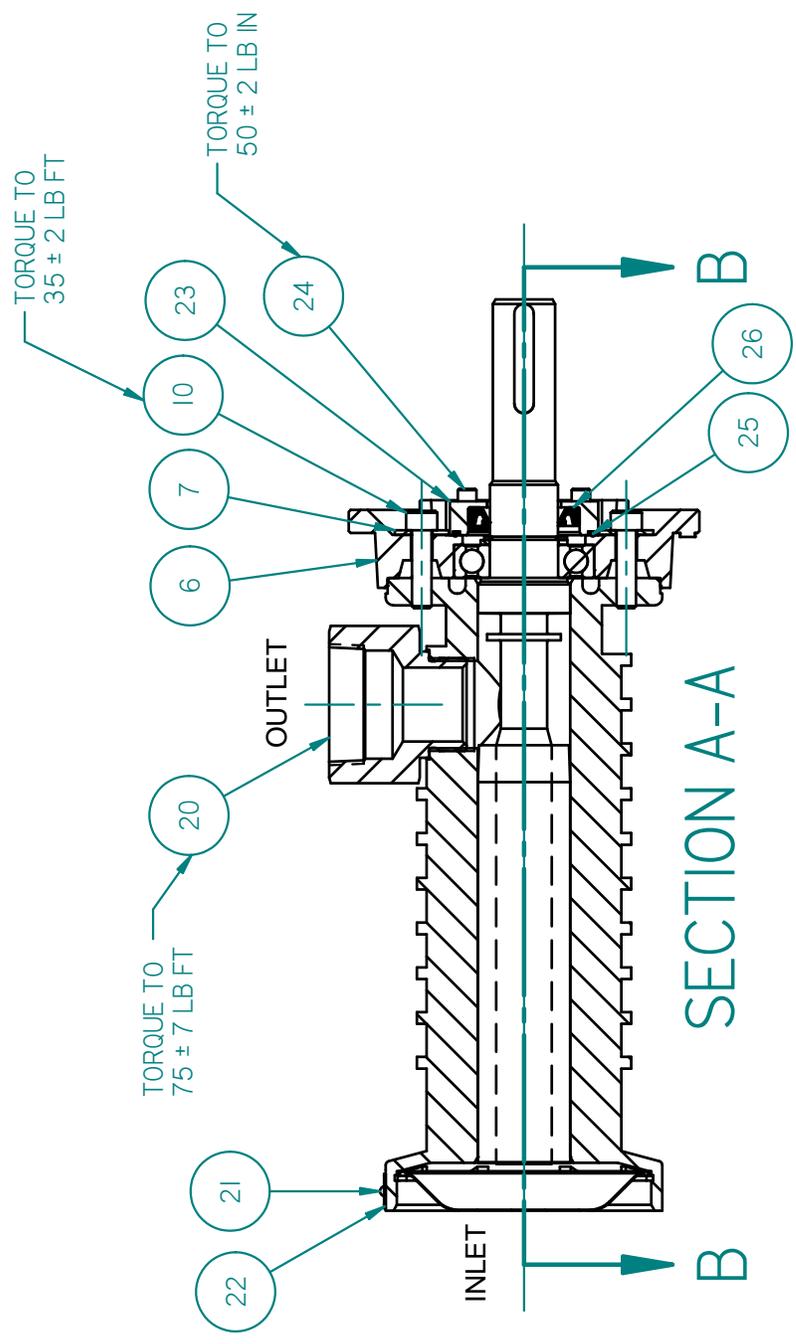
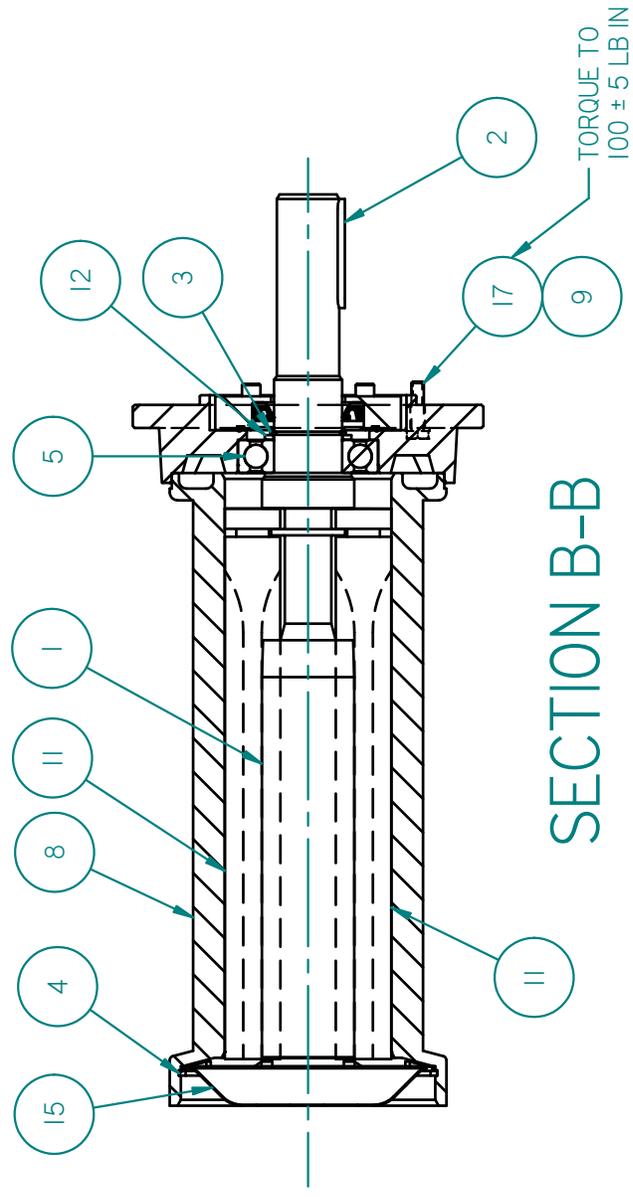
2. Install spacer (12) onto power rotor against inner race of bearing (5) and then install retaining ring (3) into groove on power rotor (1).
3. Slide front cover (6) onto power rotor (1), until bearing (5) is seated in bearing bore of cover (6).
4. Place pump on end (suction side down) on a solid flat surface for next step.

<b>CAUTION</b>	<b>ATTENTION</b>
To prevent idlers from disengaging from power rotor during next step, it is important to hold idler rotors against power rotor until entire sub-assembly is positioned with a minimum of rotor set length into housing.	

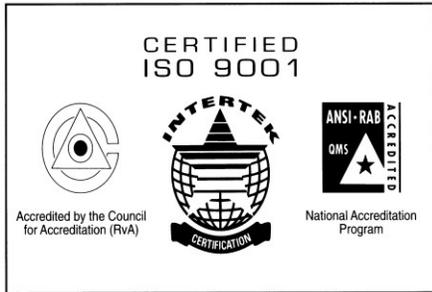
5. Carefully mesh idler rotors (11) in proper position axially onto power rotor (5) and while holding idlers in that position carefully lift rotor set and front cover sub-assembly and install into housing (8). When rotor set is approximately 50% of its length into housing (8), you can release idler rotors (11) and continue installation until front cover (6) is firmly seated on locating diameter of housing (8).
6. Install cap screws (10) and torque per value on assembly drawing.
7. Install lip seal (26) and O-ring (25) in seal cover (23). Be sure open side of lip seal (26) is facing O-ring (25) side of seal cover (23).
8. Grease lip seal (23) and O-ring (25) and install seal cover (23) with lip seal (23) and O-ring (25) onto shaft (1). Be careful not to turn lip of lip seal (23) inside out during installation.
9. Install inlet strainer (15) and retaining ring (4) into housing (8).
10. If adapter (20) was removed, screw into place on housing (8) and torque to required value on assembly drawing.

**NOTE:** Pump should rotate free and smooth 360° of rotation.

11. Install pump onto bracket with lock washers (4) and bolts (17) and torque bolts (17) to value on assembly drawing.



# A4PICX-187 WITH LIP SEAL



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