

INSTRUCTIONS ON

INSTALLATION,

OPERATION AND

MAINTENANCE MANUAL

KIRLOSKAR PUMP

TYPE – IN-IL



KIRLOSKAR BROTHERS LIMITED

REGD. AND HEAD OFFICE: UDYOG BHAVAN, TILAK ROAD, PUNE 411002 (INDIA)

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KIRLOSKAR BROTHERS LIMITED

REGD. AND HEAD OFFICE UDYOG BHAVAN, TILAK ROAD, PUNE-411002

WARRANTY

We warrant that the pump supplied from us is free from defective material and faulty workmanship. This warranty holds good for a period of 12 months from the date of commissioning the equipment or 18 months from the date of dispatch from our factory, whichever is earlier. Our liability in respect of any complaint is limited to replacing part/parts free of charge ex-works or repairs of the defective part/parts only to the extent that such replacement/repairs are attributable or arise solely from faulty workmanship or defective material.

This warranty holds good only for the products manufactured by us.

KIRLOSKAR BROTHERS LIMITED



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1. INTRODUCTION

1.1 Preface:

This manual contains important and useful information for the proper functioning and Maintenance of this pump. It also contains important instructions to prevent possible accidents and serious damage and to ensure the safe and smooth functioning of this pump. Read this manual carefully before commissioning the pump. Familiarize yourself with the operation of the pump and strictly obey the instructions!

The data published here comply with the most recent information at the time of going to press. However, they may be subject to later modifications.

Kirloskar Brothers Limited reserves the right to change the construction and design of the product at any time without being obliged to change earlier deliveries accordingly.

1.2 Safety:

The manual contains instructions for the safe operation of the pump. Operators and maintenance staff shall be familiarized with these instructions.

This manual has been compiled by Kirloskar Brothers Limited with the utmost care. Kirloskar Brothers Limited cannot guarantee the completeness of this information and therefore assumes no liability for possible deficiencies in this manual. The buyer/user shall at all times be responsible for testing the information and for taking possible additional and or deviating safety measures. Kirloskar Brothers Limited reserves the right to change the safety instructions at any time.

Safety Instructions:



1.2.1 General Information:

Before performing any actions detailed within this instruction, the Site Health and Safety instructions shall be read and fully understood. The instructions in this document shall also be read and fully understood.

Whenever the equipment is operated, maintained or used in any way, the procedures detailed within the Health and Safety Dossier (DHS) and any procedures detailed within these instructions shall be followed. The pump supplied by Kirloskar Brothers Limited (KBL) has been designed with safety in mind; where hazards cannot be eliminated, the risk has been minimized by the use of guards and other design features. Some hazards cannot be guarded against and the instructions below MUST BE COMPLIED WITH for safe operation. These instructions cannot cover all circumstances. It is the responsibility of the user of the equipment for maintaining safe working practices at all times. The pumps are supplied with stickers for hazard, caution and safety wherever these are applicable.

1.2.2 Within the manual, safety instructions are marked with safety symbols.



This symbol refers to general mechanical aspects of safety.

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This symbol refers to electrical safety.

This symbol is used to introduce safety instructions whose nonobservance may lead to damage to the machine and its functions.

This symbol refers to magnetic field safety.

This symbol refers to restrict person with having heart pacemaker to avoid contact with magnetic components while pump is in running condition or while carrying out maintenance work of pump.

KBL products are designed for installation in designated areas, which are to be kept clean and free of obstructions that may restrict safe access to the controls and maintenance access points.

Pump nameplate is fitted to each unit and must not be removed. Loss of this plate could make identification impossible. This in turn could affect safety and cause difficulty in obtaining spare parts. Should accidental loss or damage occur, contact KBL immediately.

- 1.2.3 Access to the equipment should be restricted to the personnel responsible for installation, operation and maintenance and they must be trained, adequately qualified and supplied with the appropriate tools for their respective tasks.
- 1.2.4 KBL firmly insists that all personnel responsible for installation, operation and maintenance of the equipment must read the manual before any work is done.
- 1.2.5 Ear defenders should be worn where the specified equipment noise level exceeds locally defined safe levels. Safety glasses or goggles should be worn where working with pressurized systems and hazardous substances. Other personal protection equipment must be worn where local rules apply.
 - Caution
- 1.2.6 *DO NOT* wear loose or frayed clothing or jewellery, which could catch on the controls or becomes trapped in the equipment.
- 1.2.7 Operation of the equipment for the application other than for which it is supplied can increase the risk from hazards. Please consult KBL before making such change in the application of the equipment.
- 1.2.8 Improper installation, operation and maintenance of the product supplied by KBL could result in injury or death.



1.3 Service and support:

This manual is intended for technicians and maintenance staff and for those who are in charge of ordering spare parts.

1.3.1 Ordering spare parts:

This manual contains the spare - and replacement parts as recommended by Kirloskar Brothers Limited.

1.3.2 Pump serial number:

The pump serial number is stated on the pump nameplate. Please refer to this serial number and the other data mentioned on the nameplate when corresponding for ordering spare parts with Kirloskar Brothers Limited.

1.3.3 Contact Information:

KIRLOSKAR BROTHERS LIMITED								
REGD. OFF: UDYOG BHAVAN, TILAK ROAD, PUNE-411002 (INDIA)	CORPORATE OFFICE: "YAMUNA", SURVEY NO-98/3-7, PUNE-MUMBAI HIGHWAY, BANER, PUNE-411 045 (INDIA)	WORKS: KIRLOSKARWADI, 416308, DIST.: SANGLI (INDIA)						
TEL: 091 020- 2440 0770	TEL: 091 020- 2721 4444	TEL: 091 02346- 221 055						
FAX: 091 020- 2427 0156	FAX: 091 020- 2427 0879	FAX: 091 02346- 222 311						

Note: The information in this document may sometimes be of generic nature and applicable to various company products irrespective of its specific application and use. Additional instructions if any shall be specified on individual project drawings and documents furnished to the buyer against specific order.

Where a conflict exists between the contents herein and the actual equipment supplied, the user must make an engineering judgment, else contact KBL.

Kirloskar Brothers Ltd reserves the right to change the construction and design of the products at any time without being obliged to change products already supplied earlier.

1.4 Inspection of delivered items:

- Check the consignment immediately on arrival for conformity with the packing note.
- Check for damage and/or missing parts if any.
- In case of damage and/or missing parts, have a report drawn up by the carrier/receiver at once and inform to the concerned people immediately.



1.5 Lifting:

If a pump or a complete pump unit should be lifted, the slings should be fixed as shown in Figure 1.



Figure 1. Lifting instruction

NOTE: Proper care should be taken to protect pump and/or prime mover and/or paint at contact area of sling or rope at the time of lifting.



1.6 Storage:

In case the pump is not immediately being used, the pump shaft must be rotated manually once in a month to prevent pitting on bearing surfaces.

1.6.1 Temporary Storage for up to six weeks:

If the pump unit is not to be used immediately it should be stored carefully in a horizontal/vertical position, in a sheltered, dry location.

Caution

Additional rust preventive should be applied to all unpainted carbon steel or cast-iron parts and should not be removed until final installation.

1.6.2 Long Term Storage:

If the pump is not to be installed and operated soon after arrival, store it in a clean, dry place, having slow, moderate changes in ambient temperature. Step should be taken to protect the pump from moisture, dust, dirt, and foreign bodies. It is recommended that the following precautions to be taken:

- a) Ensure that the bearings are packed with the recommended grease, to prevent moisture from entering around the shaft.
- b) Ensure that suction and discharge branches of the pump and all other openings are covered with cardboard, wood or masking tape to prevent foreign objects entering the pump.
- c) If the pump is to be stored where there is no protective covering, it is advisable to cover the unit with a tarpaulin or other suitable covering.

d) The pump shaft should be manually rotated periodically (once in 2 weeks) to prevent pitting of the bearing surfaces due to moisture.



DO NOT place fingers or hands, etc., into the suction or discharge pipe outlets and do NOT touch the impeller, if rotated this may cause severe injury. To prevent ingress of any objects, retain the protection covers or packaging in place until removal is necessary for installation. If the packaging or suction and discharge covers are removed for inspection purposes, replace afterwards to protect the pump and maintain the safety.

Fill the bearing housing with recommended oil to ensure that the shaft and bearings remain rust free.

1.6.3 Exposed or Extreme Conditions Storage:

For exposed storage or extreme variants in atmospheric or environmental conditions, please refer to KBL for special storage instructions to suit the conditions acceptable.



2. General

2.1 Pump Description:

Kirloskar IN-IL pump is of vertical execution, back pullout design which enables to remove the rotating unit of pump for inspection and repair without disturbing the pipe connections and motor.

Pumps when properly installed and given due care in operation and maintenance should satisfactorily perform for long period of time.

Following are the pump models available:

- 1. IN 40/160 IL
- 2. IN 50/160 IL
- 3. IN 65/160 IL
- 4. IN 65/200 IL
- 5. IN 65/320 IL
- 6. IN 80/260 IL
- 7. IN 100/160 IL
- 8. IN 100/260 IL
- 9. IN 125/260 IL
- 10. IN 150/320 IL
- 11. IN 200/320 IL

2.2 Explanation of Designations:

Example : IN 40/160 IL

Pump family: IN - INDIAN NAVY / IL - INLINE

Pump size : 40/160 (diameter of discharge connection [mm]/nominal impeller diameter [mm]



Material construction

Part Description ↓		01	02	03	04
Pump Casing		NiAlBr	GM	GM	Cast Iron
Impeller		NiAlBr	GM	Al. Br	Cast Iron
Pump Shaft		SS 431	SS 431	SS 431	SS 316
Casing Ring		NiAlBr	GM	GM	Cast Iron
Impeller Ring		NiAlBr	GM	GM	Cast Iron
Casing Cover		NiAlBr	GM	GM	Cast Iron
Liquid Deflector		SS 316	SS 316	SS 316	SS 316
Bearing Housing	l	GM	GM	GM	Cast Iron
Impeller Nut		NiAlBr	GM	GM	SS 316
Stuffing Box		NiAlBr	GM	GM	MS
Motor Stool		MS	MS	MS	MS

2.3 Applications:

2.3.1 Application guidelines:

Please do not use the pump for the applications other than those for which it is designed without consulting with the manufacturer/supplier.

Using a pump in a system or under system conditions (liquid, working pressure, temperature, etc.) for which it has not been designed may be hazard to the user!

Application Area:

The application area globally looks as follows:

Suction/Delivery Size	:	up to 200 mm
Capacity	:	up to 500 m ³ /hr (500 TPH)
Head	:	up to 150 meter
Speed	:	1450 and 2900 rpm (50 Hz)
		1750 and 3500 rpm (60 Hz)



2.3.2 Field of application:

- ✓ Ballast and Bilge.
- ✓ Air conditioning chilled water.
- ✓ Main fire-fighting.
- ✓ Bilge transfer.
- ✓ Waste water recycling.
- ✓ Portable water supply.
- ✓ Distilling plant feed systems.
- ✓ Main and auxiliary engine cooling.
- ✓ Main boiler feed and condensate.

2.4 Construction:

2.4.1 Pump casing:

The casing is of single volute design with suction and discharge connections situated "inline".

The In-line design offers advantages, viz:

- a low resistance (NPSHR).
- increases efficiency.
- The velocity of the liquid is uniform when entering the impeller eye; baffles prevent vortex formation at the impeller eye.

2.4.2 Impeller:

Impeller of INIL pumps are of enclosed type. The hydraulic axial thrust in enclosed impellers is either balanced by back vanes or by drilling balancing holes depending upon magnitude of axial thrust.

Dynamic balancing of impeller is done at reduced speed to Grade 6.3 of ISO 1940. Impeller is positively locked on the pump shaft by means of an impeller nut.

A radial running clearance has been set up on the suction side between impeller and casing.

2.4.3 Stuffing Box Cover:

Stuffing Box Cover - Efficient cooling of the packing/mechanical seal is achieved by formation of a cooling chamber in the stuffing box portion ensuring thereby long life of packing/mechanical seal. Mechanical seal is supplied in "cartridge" construction exclusively and is to be fitted from impeller end.

The flushing of the mechanical seal will be by the pumped liquid, for most pumps by an internal channel.



2.4.4 Bearing Assembly:

Inline pump is available with Bearings of SKF or Equivalent make. Smaller models of these pumps are provided with a specially designed journal bearing at NDE side to make it ideally suitable for pumping sea water while large models are provided with high capacity antifriction ball bearings on DE and NDE side.

The bearing arrangements mentioned above are suitable for suction pressure less than 5 kg/cm². For applications involving suction pressure above 5 kg/cm² please refer to Marketing Division or Engineering Department.

C3 clearance bearings are used.

Axial running clearance shall be less than 0.45 mm for all above bearing arrangements. Maximum allowable temperature of bearing shall be 80 degrees Celsius. Bearings are grease lubricated.

2.4.5 Hydraulic performance:

The performance curve shows the hydraulic performance for each pump type at several impeller diameters and standard speeds.

A) Performance as per curves shall be applicable for the liquids satisfying following conditions.

- a. Viscosity not greater than 2 centistokes.
- b. Consistency of liquid not greater than 2%.
- c. Specific gravity equal to 1.
- d. Total solid contents not greater than 3000 PPM.
- B) Performance testing can be offered as per any of the following standards.
 - a. IS 5120, 1520 and 9137.
 - b. ISO 3555 Class B.
 - c. ISO 9906 Gr. 2B.
 - d. As per approved type test procedure.
- C) Pumps can be offered for type tests and NPSH tests at extra cost.
- D) Performance curves (IM) indicate NPSH requirements of pumps on the basis of a 3% drop in total head.

2.5 Re-use:

The pump may only be used for other applications after prior consultation with Kirloskar Brothers Ltd or your supplier. Since the lastly pumped medium is not always known, the following instructions should be observed:

- \checkmark Flush the pump properly.
- ✓ Make sure the flushing liquid is discharged safely (environment).
- ✓ Take adequate precautions and use the appropriate personal protection means (rubber gloves, spectacles).

2.6 Scrapping:

If it has been decided to scrap a pump, the same procedure as for Re-use (2.5) should be followed.



3. Installation

3.1 Safety:

These instructions should be read carefully before installing the pump.

- This pump is designed for circulation of sea water or other suitable HVAC media. It is not suitable for hazardous, corrosive or flammable liquids.
- Pump must not be started until all electrical connections are in place.
- Pump must not be operated without installing the safety guards.
- The piping should be adequately supported to reduce thermal and mechanical stresses.
- Refer to motor installation instructions to determine proper terminal connections to obtain correct pump rotation.
- Good installation practice recommends the system must be cleaned and flushed off all foreign materials and sediments prior to pump installation.

3.2 Environment:

- A too high ambient temperature and air humidity, as well as a dusty environment may have a negative effect on the functioning of the electric motor.
- Ensure adequate space is left above and around the pump for operation, maintenance, service and inspection of parts.
- In open system locate the pump as possible as close to the liquid being pumped so that suction line is short and direct.
- Head room must be provided to use hoist or tackle as necessary.

3.3 Mounting:

3.3.1 Installation of set:

- Pump set is delivered as a complete set with pump and motor on center mounting assembled together.
- The alignment is done at KOV works.
- Ensure the direction of the suction and discharge pipeline before placing the pump on the foundation.
- For permanent arrangement, place the complete set on the foundation. Check the level with the help of level bottle and if required put the shims under AVM of the pump. Tighten all the bolts carefully. Recheck the pump and motor alignment.
- While dismantling and reassembling, the cross-sectional assembly drawing and specification list should be referred.

3.3.2 Dismantling procedure:

- Isolate the power supply to motor.
- Shut off the valves controlling flow to and from the pump.
- Drain the liquid from the pump by removing the drain plug (60100).
- Remove safety guard (38800). Remove flushing pipe from mechanical seal cover.
- Remove screws of the coupling cover.
- Remove motor from motor stool (29000) if standard coupling is used.

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- For spacer coupling no need to remove the motor stool. only remove the spacer coupling.
- Remove the hex. nut from casing studs holding the bearing housing (24000) to pump casing (11800).
- Slightly pull out the driving unit till impeller (15100) clears the pump casing (11800).
- Take out this assembly through the window provided in motor stool (29000).
- Place this rotating unit on a table or clear place for further dismantling.
- Remove gasket (51100) from pump casing.
- Unscrew the impeller nut (33000). Remove the gasket (68200) between impeller and impeller nut.
- Take out the impeller (15100) from pump shaft (18000). Remove the gasket between impeller and shaft sleeve (51500). Remove key for impeller (32000).
- Remove Casing cover (22000) along with Cartridge mechanical seal assembly by slightly tapping.
- Removal of stuffing box bush (35000) from mechanical seal (23000).
- For pumps with mechanical seal arrangement, lock mechanical seal assembly by tightening two Allen screws of the cartridge mechanical seal. Unscrew the nuts of mechanical seal cover studs (4 nos.) and remove cartridge mechanical seal assembly along with shaft sleeve from casing cover (22000).
- Remove pump half coupling (39700) after unscrewing grub screw.
- Take out coupling key (32100).
- Loosen the hex. socket screw holding driving end bearing cover (27000). Remove carefully bearing cover along with oil seal (50000) or Felt ring (50200).
- Force shaft (18000) carefully in the direction of the driving end. Shaft will come out along with the bearings.
- Unlock the lock washer (41500) and remove lock nut (33600).
- Take out driving end bearing (26200) with the help of puller.
- Radial roller bearing (26400) fitted in casing cover (22000) should be removed only if it is worn out. Or Thordon bush (for IN 50/160 IL and IN 100/160 IL pumps only).
- Take out Radial roller bearing at non-driving end (26400) with the help of suitable sleeve.
- Casing ring suction side (19000) to be removed only if it is worn out and need replacement.

CAUTION:

Coupling half should be removed with the help of suitable extraction device. To avoid damage to the bearings, the coupling half should not be knocked off the shaft.

3.3.3 After dismantling:

- 1. All parts must be carefully cleaned and checked for wear. Recondition or replace the parts wherever necessary.
- 2. Wear rings clearances should be checked and wear rings are replaced if excessive wear has taken place.

3.3.4 Reassembly:

- This procedure covers reassembly of pump after complete dismantling of the pump. Before reassembly, all the parts should be thoroughly cleaned in Kerosene, Petrol or Benzene to remove the dust, rust, etc. After cleaning the necessary parts should be replaced.
- Following clearances are to be checked before reassembly of pump.
 - a. Clearance between wear rings: max 0.50 mm diametrically.
 - b. Clearance between Radial bearing and shaft sleeve: 0.05 mm.



- Mount the pair of angular contact ball bearings. Please refer to any bearing catalogue for back to back arrangement.
 - **Caution:** Use arbor press while fitting the bearings. However, it is recommended that bearings should be heated in oil bath at temperature 70-80° C and then fitted. Slide inboard ball bearing on shaft by hand and make sure that it is square with shaft. Press the inner race of the bearing until bearing is seated firmly against the shaft shoulder.
- Tighten the bearing lock nut (33600) after inserting lock washer for bearing in proper position. Fold one lip of lock washer in slot of bearing lock nut to lock it.
- Insert shaft along with bearings (26300) (i.e. angular contact ball bearings at driving end) in to the bearing housing from driving end.
- Tighten bearing cover DE (27000) with the help of hexagonal headed screws.
- Push Radial roller bearing (26400) at non-driving end into casing cover (22000) if it is removed.
- Fit mechanical seal cover along with cartridge seal assembly and tighten the nuts on studs of casing cover evenly.
- Slide pump shaft fitted in bearing housing in to casing cover assembly.
- Fit clamping plate by tightening 4 nos. cap screws.
- Fit impeller key (32000). Fit gasket (51500) on impeller. Fit impeller (15100) on shaft.
- Fit gasket (68200) in to impeller nut. Tighten impeller nut (33000).
- Fit pump half coupling (39700).
- Rotate shaft by hand and ensure free rotation.
- Fit gasket (51100) of the pump casing.
- Fit entire assembled unit along with the impeller into pump casing (11800).
- Tighten screws of pump casing (11800) and bearing housing (24000) evenly.
- Fit motor along with the motor half coupling. Align the coupling halves.
- Fit screws of the coupling guard (38800).
- Loosen the two screws of seal cover by allen key and unlock the cartridge mechanical seal (23000).
- Fit the drain plug (60100) of the pump casing.

4. Commissioning

Purpose of Commissioning:

- 1. Minimize the life-cycle maintenance costs of the pumps.
- 2. Demonstrate that the provided equipment is fit for purpose and fully covered under manufacturer's warranty.
- 3. Set the pump to the requested flow rate.
- 4. Reduce the risk of noise and vibration problems with the pumps.
- 5. Reduce the risk of pump damage, particularly mechanical seals failing during flushing.

4.1 Electrical open and closed-loop control elements:

- Observe voltage and current values.



4.2 Direction of rotation of drive/driven shafts:

- ✓ Observe directional arrow.
- ✓ Testing of a unit filled with hydraulic fluid:
- ✓ Switching the unit briefly on and off prevents damage in the case of the wrong direction of rotation.
- ✓ If the direction of rotation is not correct, change connecting wire of motor to match with the rotation of pump.

4.3 Filling:

✓ For Pump types self-priming, the pump casing need not to be filled. For all other pumps, verify whether the pump casing must be filled.

4.4 Start-up:

- ✓ Observe specific component instructions.
- ✓ Set all valves, especially on the suction and supply side, to the free-flow position.
- ✓ Switch the motor briefly on and off several times in order to facilitate bleeding. Only operate the pump under full load when it operates properly and smoothly.
- ✓ During initial start-up, bleed the pressure line to allow complete filling of the pump. Exceptions to this are pumps with automatic bleed valve.
- ✓ The pump should never run dry.
- ✓ When the system starts up, the fluid level in the tank must not fall below the minimum suction level.
- ✓ As soon as the pump develops the pressure, slowly open the delivery valve until the working pressure is attained.
- ✓ Make sure that when the pump is running, rotating parts are always properly guarded by the safety guard/cover.

4.5 Pressure limitation / pressure control:

- ✓ Always select the lowest settings for commissioning.
- ✓ Carefully increase the pressure to the required values, but do not set to unnecessarily high values.
- ✓ If required, secure settings against unwanted adjustment.

4.6 Preparation for lubrication:

The bearings of pump are provided with grease lubricated bearings. They are filled with grease at the time of delivery from factory.



5. Maintenance

5.1 Routine Inspections:

Routine inspections should be made on a regular basis. Inspections made while pump is running should reveal potential failures.

A) Inspect motor bearings for any sign of temperature rise. Temperature should not exceed 160°F. Temperature rise may indicate the early stages of bearing problems.

B) Listen for any unusual noise.

- a. Air trapped in pump.
- b. Hydraulic noise.
- c. Mechanical noise in motor and/or pump.

C) Check suction gauge reading and confirm that it is normal.

D) Check discharge gauge reading and confirm that it is normal. If gauge readings are abnormal find out why.

Note: Suction and discharge gauges should read the same with pump stopped.

5.2 Mechanical Seal:

A mechanical seal generally not require any maintenance. However, it should never be allowed to run dry. If there is no problem, it is not advisable to dismantle the mechanical seal. As the sealing faces are running on one another, dismantling always means damage and/or replacement of partial or complete mechanical seal. When the shaft sealing area is found leaking, part or complete mechanical seal needs to be replaced based on results of investigation.

5.3 Noise:

If after some time, the pumps start making noise this may indicate that something is wrong with the pump unit. For instance, a crackling noise can indicate cavitation or an excessively noise motor can indicate deterioration of the bearings.



6. Cause of failures

A. Failure: - No Discharge

Causes: -

- Air leakage in suction line.
- Suction lift higher than pump is designed.
- Suction pipe block.
- Pump not primed.
- NPSH available too low.
- Incorrect direction of rotation.
- Wrong pump selection.
- Obstructions in impeller and in pump casing
- Damaged impeller.
- Speed too low.

B. Failure: - Insufficient discharge flow

Causes: -

- Air leak in suction line.
- Speed too low.
- System head higher than anticipated.
- Insufficient NPSH. Suction lift too high. Check gauges.
- Also check for clogged suction line.
- Impeller partially plugged.
- Mechanical defects.
 - Worn out wear rings.
 - Impeller damaged.
 - Incorrect direction of rotation.

C. Failure: - Insufficient discharge pressure

Causes: -

- Speed too low.
- System head less than anticipated.
- Air in system.
- Mechanical defects.
 - Worn out wear rings.
 - Impeller damaged.
 - Impeller diameter too small.
 - Incorrect direction of rotation.
- Gas or air coming from the liquid.

D. Failure: - Loss of Suction

Causes: -

- Leak in suction line.
- Suction lift too high.
- Insufficient NPSH.
- Air in system.

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• Casing gasket defective.

E. Failure: - Excessive power consumption

Causes: -

- Speed too high.
- System head lower than rating.
- Specific gravity of liquid too high.
- Mechanical defects.
 - Shaft bent.
 - Rotating part running out of concentricity.
 - Worn out wear ring.

F. Failure: - Minimum Power consumption

Causes: -

- Speed too low.
- Wrong direction of rotation.
- Pump doesn't work at the right duty point.
- Liquid density differs from the calculated liquid density.
- Liquid viscosity differs from the calculated liquid viscosity.
- Pump works when the liquid flow is too low.
- G. Failure: Vibration / Noise

Causes: -

- Air in system.
- Foundation not rigid.
- Rotating part running out of concentricity.
- Obstruction in impeller or Pump casing
- Imbalance in rotating parts e.g. impeller, pump shaft, coupling.
- Mechanical defects.
 - Damaged impeller.
 - Motor bearings worn out.
 - Rotor out of balance.
 - Shaft bent.

H. Failure: - Motor runs hot

Causes: -

- Speed too high.
- Specific gravity of liquid too high.
- Mechanical defects.
 - Shaft bent.
 - Rotating elements bent.
 - Defective motor.
 - Voltage lower than rating.



7. Technical data

7.1 Recommended greases:

Following grades of grease available in the market are suitable.

NAME

GREASE -SPECIFICATION

INDIAN OIL CALTEX HINDUSTAN PETROLEUM INTERNATIONAL GRADE SERVOGEM-2 OR EQUI. STARFAX-2 OR EQUI. NATRA-2 or LITHON-2 OR EQUI. NLGI-2 OR EQUI.

7.2 Tightening moments:

Tightening moments for bolts and nuts

										Bearing C	Cover-2	7000,
Dump	Casing-51800		Casing Cover-22000		Bearing Housing-24000		27100					
Model	No. of			No. of			No. of			No. of		
WIGGET			Torque			Torque			Torque			Torque
	Bolts/Nuts	Size	Nm	Bolts/Nut	Size	Nm	Bolts/Nuts	Size	Nm	Bolts/Nuts	Size	Nm
IN40/160IL	8	M12	55	8	M12	55	NA	-	-	4	M8	18
IN50/160IL	8	M12	55	8	M12	55	NA	-	-	4	M8	18
IN65/160IL	8	M12	55	8	M12	55	NA	-	-	4	M12	55
IN65/200IL	8	M12	55	8	M12	55	NA	-	-	4	M12	55
IN65/320IL	12	M12	55	12	M12	55	12	M12	55	4	M10	35
IN80/260IL	12	M12	55	10	M12	55	8	M10	35	4	M10	35
IN100/160IL	8	M12	55	8	M12	55	NA	-	-	4	M8	18
IN100/260IL	8	M16	70	12	M12	55	8	M10	35	4	M10	35
IN125/260IL	8	M16	70	12	M12	55	8	M10	35	4	M10	35
IN150/320IL	12	M12	55	12	M12	55	12	M12	55	4	M12	55
IN200/320IL	12	M16	70	12	M12	55	12	M12	55	4	M12	55

7.3 Tools:

Assembly and disassembly of pump unit requires no special tools. However, to make maintenance job easier, a tool kit consisting of following tools is provided with each pump unit.

Contact your concerned reporting authorities for the same.

Sr. No.	Description	Size	Qty (Nos.)
01	Fixed Spanners	32x30	01
		27x24	01
		23x21	01

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		22x20	01
		19x18	01
		17x16	01
		15x14	01
		13x12	01
		11x10	01
		9x8	01
		7x6	01
00	Bing Channers	32x30	01
02	ning spanners	27x24	01
		23x21	01
		22x20	01
		19x18	01
		17x16	01
		15x14	01
		13x12	01
		11x10	01
		9x8	01
		7x6	01
0.2		8 mm	01
03	Allen key	6 mm	01
		5 mm	01
		4 mm	01
		3 mm	01
04	Box spanner cap 30 mm		01
05	Box spanner cap 24 mm		01
06	Handle for box spanner		01
07	Internal Circlip Plier (size	200 mm)	01
08	External Circlip Plier (size	e 200 mm)	01
09	Screw Driver (heavy dut	y 10" long)	01
10	Nylon hammer (900 gm)		01



8. Sectional Drawings and Parts-List

8.1 Cross-Sectional Drawing: Figure 2.



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8.2 PARTS LIST-SECTIONAL DRAWING:

PART NO.	QTY	PART DESCRIPTION
10700	01	PUMP CASING
*15100	01	ENCLOSED IMPELLER
*18000	01	PUMP SHAFT
*19000	01	CASING WEAR RING
22000	01	CASING COVER
*23000	01	CARTRIDGE MECHANICAL SEAL
23600	01	WATER DEFLECTOR
24000	01	BEARING HOUSING
*26300	01	ANGULAR CONTACT BALL BRG.
*26400	01	RADIAL ROLLER BRG.
27000	01	BEARING COVER DE
27100	01	BEARING COVER NDE
29000	01	MOTOR STOOL
*32000	01	KEY FOR IMPELLER
32100	01	KEY FOR COUPLING
*33000	01	IMPELLER NUT
33600	01	BEARING LOCK NUT
35000	01	STUFFING BOX BUSH
39700	01	PUMP COUPLING
39800	01	MOTOR COUPLING
39900	01	COUPLING SPACER
41500	01	LOCK WASHER FOR BEARING NUT
44100	02	GREASE NIPPLE
*47900	01	HELICOIL SCREW LOCK INSERT
48500	02	INTERNAL CIRCLIP
*50800	01	METALLIC MEMBRANE
50200	01	FELT RING DE
50201	01	FELT RING NDE
*51100	01	GASKET FOR PUMP CASING
*51500	01	GASKET FOR SHAFT SLEEVE
*68200	01	GASKET FOR IMPELLER NUT







Figure 3. Exploded view – Pump unit assembly INIL





8.4 Exploded view – Hydraulic parts assembly:

Figure 4. Exploded view – Hydraulic parts assembly INIL



39800 39700 26400 -27000 44100 33600 - 26300 - 32100 24000 18000 27100 -23600 32000

8.5 Exploded view – Drive assembly:

Figure 5. Exploded view – Drive assembly INIL





8.6 Exploded view – Shaft end assembly:

Figure 6. Exploded view – Shaft end assembly INIL





Dimensional GA drawing

Figure 7: General arrangement drawing *Note – This outline drawing is tentative not for foundation/Structure construction



9.1 OUTLINE DIMENSION OF INIL PUMP

оит	LINE DIME	NOISN	0F	INIL PL	JMP																
Sr.	Pump												Dia						dia		Weight in Kg
No	Model	A	8	с	C1	Ŀ	×	Q	R	۶	W1	z	d	D	멅	T	൭	N1	d 1	≤	Bare Pump
01	IN40/160IL	340	110	548	428	500	75	75	100	500	650	9	19.5	8	8	160	180	4	18	110	120
02	IN50/160IL	340	110	560	440	400	75	75	100	500	650	9	18.5	50	50	160	190	4	18	125	160
03	IN65/160IL	416	122	659	549	500	75	75	175	500	650	9	20	65	65	180	200	4	18	145	180
04	IN65/200IL	394	105	525	375	550	75	75	150	450	700	9	14	65	65	200	215	4	18	145	210
50	IN65/320IL	499.5	140	689.5	654.5	625	62.5	62.5	250	650	750	9	19.5	65	65	300	300	4	18	145	310
90	IN80/260IL	500	147	790	611	550	55	50	225	550	650	9	23	80	8	250	275	8	17.5	160	325
70	IN100/160IL	387	150	655	530	009	75	75	225	600	750	9	19.5	100	100	225	269	8	17.5	180	270
80	IN100/260IL	529	200	670	629	540	55	50	225	550	650	9	23	100	100	305	340	80	17.5	180	340
60	IN125/260IL	500	180	820	650	600	75	75	225	600	750	9	21	125	125	305	350	8	18	210	375
10	IN150/320IL	609.5	210	899.5	759.5	700	50	75	250	650	650	9	23	150	150	355	400	8	23	240	495
11	IN200/3201L	609.5	260	929.5	748	750	75	75	300	750	900	6	23	200	200	465	500	12	23	295	515