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SHAKTI

PUMPING LIFE

INSTALLATION & OPERATING INSTRUCTIONS

4SS (SERIES)
SUBMERSIBLE PUMP

SHAKTI
PUMPING LIFE

CONTENTS PAGE NO.

SYMBOLS USED IN THIS DOCUMENT

⚠ WARNING

Before installation read this installation and operating manual carefully. This manual explains right method of installation.

Caution If these safety instructions are not followed, it may result in malfunctioning or damage of the equipment.

Note Notes or instructions that make the job easier and ensure safe operation.

⚠ ***WARNING***

Before to installation, should be read this installation and operating manual carefully. This manual explains right method of installation. This is applicable to Shakti submersible 4SS pump-sets only. These instructions apply to Shakti submersible motors, types 4".

1. GENERAL DATA

1.1 APPLICATION

• Shakti submersible 4SS pump set are used for Drinking Water, Irrigation and other Industrial application. Wherever there is a need to install pump set under water.

• Pump set are used at Boring, Ponds, River, Canal, and Wall Etc.

• Pump set could be used in Horizontal and Vertical, position.

1.2 PUMPED LIQUIDS

• The fluid used in pump set should be Clean, thin, non-explosive liquids without solid particles or fibers.

• The maximum sand content of the water must not exceed 50g/m^3.

• A larger sand content will reduce the life of the pump and increase the risk of blocking.

1.3 DISPOSAL

Disposal of this product or parts of it must be carried out according to the following guidelines:

1. Dispose of the product and the packaging material in a proper, environmentally sound manner.
2. Use the local public or private waste collection service.
3. In case such waste collection service does not exist or cannot handle the materials used in the product, please deliver the product or any hazardous materials from it to your nearest Shakti Service Workshop.

2. DELIVERY AND STORAGE

Shakti submersible 4SS pump sets are supplied from the factory in proper packing in which they should remain until they are to be installed. During unpacking and prior to installation, care to be taken when handling the pump to ensure that misalignment does not occur due to bending. The pump should not be exposed to unnecessary impact and shocks. When the pump part and motor are supplied as separate units (long pumps), fit the motor to the pump as described in section 4 fitting the motor to the pump.

STORAGE AND HANDLING : Storage temperature
For Pump – 20 °C to +40 °C For Motor – 15 °C to +60 °C

The pump and motor must be stored in a dry and closed placed. Make sure that the pump cannot roll or fall over. During storage, the pump should be supported.
If the pump has been unpacked, it should be stored horizontally, sufficiently supported, or vertically to prevent misalignment of the pump.
(as shown in Fig. 1)

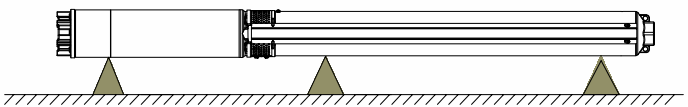


Fig. 1

It can be lifted by hand or other means by hold the pump from end as well as pump ends. Take care of the balance as per the length of the pump (as shown in Fig. 2).

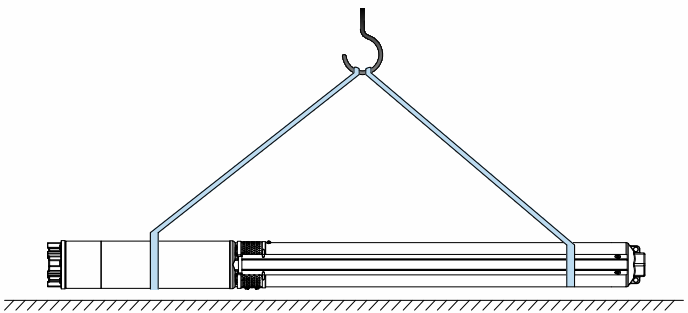


Fig. 2

3. PRE-OPERATION CHECKS

3.1 CHECK THE MOTOR PRIOR TO INSTALLATION:-

If a leak is visible or if the motor is more than one year old (e.g. in the event of re-use or after long storage):

- Check the fluid level in the motor prior to installing it (See 3.3 to 3.4).
- Check insulation resistance and continuity prior to installation

3.2 TOOLS

You need the following tools for assembly and inspection work:
Insulation measuring unit: As Per testing Filling Kit

Caution

Submersible Motor damage due to being insufficiently filled

- Fill the motor with sufficient motor fluid
- Wear safety goggles and gloves when filling and draining the motor.
- Top up using original motor fluid from Shakti Pumps container or clean drinking water.
- Never use distilled water
- Filling volumes
  3 Inch: approx. – 100 ml
  For 4 inch motor refer below table.

kW	VOLUMES
0.75 - 1.5	180 ml
2.2 - 3.7	200 ml
4.0 - 7.5	220 ml

3.3 VENTING THE MOTOR

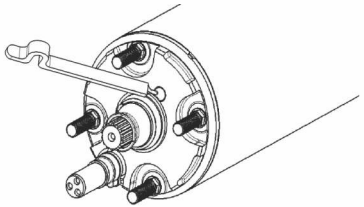


Fig. 3.3

- Place the motor horizontally so that the filling valve is located at the highest position.
- Remove the PRV Cap from the filling valve
- Carefully push the test pin into the filling valve until air and some fluid escape from it.

3.4 CHECKING THE MOTOR

- Feed the test pin (A) through the opening in the diaphragm housing (B)
- Measure the actual diaphragm distance to the side of the opening in the diaphragm cover If the measured result is not identical to the target value: 12 mm±2 mm (4 Inch Submersible motor)

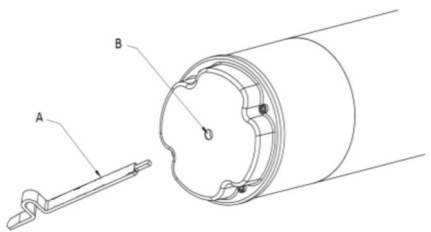


Fig. 3.4 Checking the motor fluid

3.5 TOPPING UP THE MOTOR:-

- Apply the filling syringe (C) to the filling valve (D). See Figure (3.5)
- Top up the motor filling fluid until the value of the diaphragm position is lower than the target value.

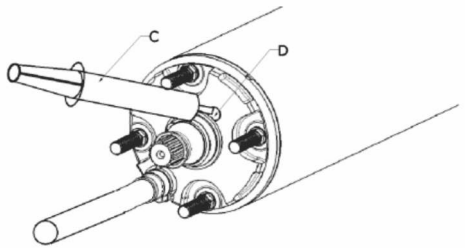


Fig. 3.5 Topping up the motor fluid

3.6 ADJUSTING THE MOTOR:-

- Adjust the diaphragm position by draining (see Venting) or topping up fluid until the target value is reached.
- Fit the PRV Cap again.

4 ADJUSTING THE MOTOR –

ASSEMBLING THE MOTOR & PUMP

Note

These assembly & operating instructions only describe action steps related to the motor. You should also observe the pump unit manufacturer's instructions in all events.

How to Couple Motor with Pump

Step A

Remove The Shaft Protector, Nut & Washer (Ref FIG.–A) Surface of Parts To Be Connected Are Free From Dust & Dirt.

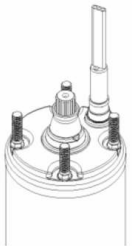


Fig. A

Step B

Pump Fitted on motor by taped hole (Ref. FIG - B) apply water resistance non-toxic grease to the inner part of Coupling

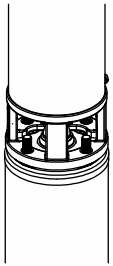


Fig. B

Step C

Put spring washer & nut tight crosswise as per table torque stated in table - 1 (Ref FIG.- C)

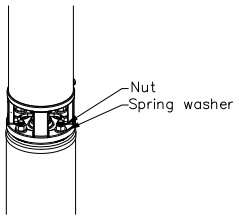


Fig. C

Note

Only use fixing screws of the relevant grade & dimensions approved by the pump unit manufacturer When Assembling the motor and pump, the nuts must be tightened diagonally to the torques stated in the following

PUMP/MOTOR STAY BOLT SIZE	TORQUE [NM]
M8	18
M12	100
M16	150
M20	300

Caution

Make sure that the pump chambers are aligned when assembly has been completed.

4.1 CONNECTING THE DROP CABLE CAUTION

Caution

- Motor damage due to damaged motor cable
- Make sure that the motor cable is not in contact with any sharp edges
- The unit manufacturer's instructions regarding the cable connection have been observed
- Only extension cable and insulating material used with are suitable for the specific use (specifically drinking water) and with are approved for the temperatures occurring in the relevant medium
- Cable cross-sections: The table in the appendix only save as recommended suggestions. The fitter is responsible for the correct selection & dimensioning of the cable
- Lay the cable along the pump
- Connect the ground conductor correctly (motors or integrated ground conductors are prepared for external grounding)
- Protect the cable connection location against water penetration (shrink hoses, compounds or ready cable sets)
- Make sure that the short motor cable is always fully surrounded by transport medium for proper cooling during operation

4.2 ELECTRICAL CONNECTION

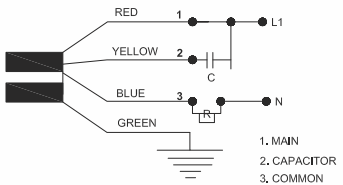
Testing the pump for direction Helical rotor pumps will produce water flow only if they are rotating in the right direction. If you place it in a water tank or a bucket, you will observe flow if the rotation is correct. (Submerge at least 75% to observe full flow).

⚠ ***WARNING*** - Before starting the pump, make sure that the electricity supply has been switched off that it cannot be accidentally switched on.
General- The electrical connection should be carried out by an authorized electrician in accordance with local regulation.

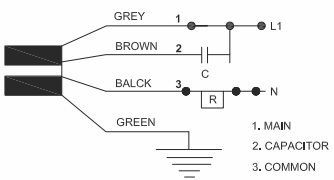
4.3 CONNECTION OF SINGLE-PHASE MOTORS

The SHAKTI motors are connected to the mains via an operating capacitor which should be sized for continuous operation.

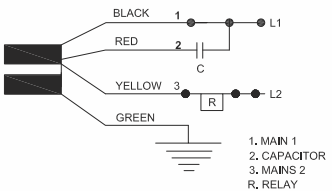
WIRING DIAGRAM FOR INDIA



WIRING DIAGRAM FOR EUROPE



WIRING DIAGRAM FOR USA/KOREA



4.4 CONNECTION OF THREE-PHASE MOTORS

Three-phase submersible motors must be protected. When a conventional motor starter is being used, the electrical connection should be carried out as described below.

4.4.1 Checking Of Direction Of Rotation

When the pump has been connected to the electricity supply, determine the correct direction of rotation as follows:

1. Start the pump and check the quantity of water and head developed.
2. In case of head not developed, stop the pump and interchange two of the phase connections. In the case of motors wound for star-delta starting, exchange lead wire.
3. Again start the pump and check the quantity of water and head developed.

4. Stop the pump.

Compare the results taken under points 1. and 3. The connection which gives the larger quantity of water and the higher head is the correct connection.

4.4.2 Shakti Motors, Direct-on-line Starting

The connection of Shakti submersible motors wound for direction line starting appears from the table and fig. 4.4.2.

LEAD	CABLE/CONNECTION
	SHAKTI 6" MOTORS
L1	U (Brown)
L2	W (Black)
L3	V (Grey)
PE	PE (Yellow/Green)

Check the direction of rotation as described in section 4.4.1

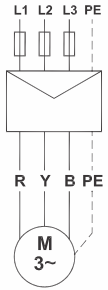


Fig. 4.4.2

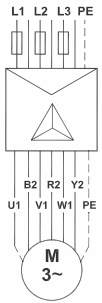


Fig.4.4.3

4.4.3 Shakti Motors, Star-delta Starting

The connection of Shakti submersible motors wound for star delta starting appears from the table below and fig. 4.4.3

Check the direction of rotation as described in section 4.4.1 Checking of direction of rotation.

4.4.4 Connection In Case Of Unidentified Cable Marking/connection

If it is unknown where the individual leads are to be connected to the mains in order to ensure the correct direction of rotation, proceed as follows:

Motors wound for direct-on-line starting: Connect the pump to the mains as is expected to be right. Then check the direction of rotation as described in section 4.4.1 Checking of direction of rotation.

Motors wound for star-delta starting: The windings of the motor are determined by means of an ohmmeter, and the lead sets for the individual windings are named accordingly. See fig. 4.4.4.

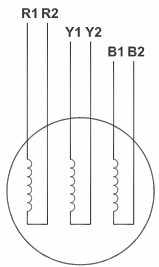


Fig. 4.4.4

If star-delta starting is required, the leads should be connected as shown in fig. 4.4.4

If direct-on-line starting is required, the leads should be connected as shown in fig.4.4.3.

Then check the direction of rotation as described in section 4.4.4

4.4.5 SOFT STARTER

Shakti only recommends the use of soft starters which control the voltage on all three phases and which are provided with a bypass switch.

R_{amp} times: Maximum 3 seconds.

For further details, please contact your soft starter supplier or Shakti.

⚠ *WARNING* If the pump wires are in the wrong order, the motor will run in reverse and the pump will not function. Damage may result. Check the direction BEFORE installing the pump. The proper direction is COUNTERCLOCKWISE when viewed from above.
WARNING When testing for direction, do not run the pump dry for more than 15 seconds.

4.5 CABLE FITTING:-

Cable clips must be fitted every 3 meters to fix the submersible drop cable and the straining wire, if fitted, to the riser pipe of the pump.

Shakti supplies cable clip sets on request. The set consists of a 1.5 mm thick rubber band and 16 buttons.

- Cable fitting: Cut off the rubber band so that the piece with no slit becomes as long as possible.
- Insert a button in the first slit.
- Position the wire alongside the submersible drop cable, Fig.4.6
- Bind the band once around the wire and the cable.
- Then bind it tightly at least twice around the pipe, wire and the cable.
- Push the slit over the button and then cut off the band.
- Where large cable cross-sections are used, it will be necessary to bind the band several times.
- Where plastic pipes are used, some slackness must be left between each cable clip as plastic pipes expand when loaded.
- When flanged pipes are used, the cable clips should be fitted above and below each joint.

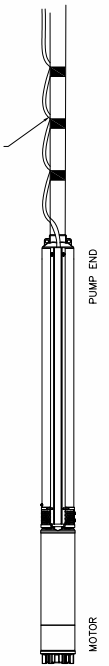


Fig.4.5

4.6 Deep Well Setting—How Deep?

SHAKTI Pumps may be submersed as deep as necessary to ensure reliable water supply. The lift load on the pump is determined by the vertical head of water starting at the SURFACE of the water in the source. Increasing the submergence of the pump (placing it lower in the well) will NOT cause it to work harder or to pump less water, nor will it increase the stress or wear on the pump. There are reasons NOT to set the pump near the bottom of the well, if it isn't necessary:

1. A deep setting will increase the size requirements, costs and weight of pipe and cable.
2. A deep setting may increase the chance of sand or sediment being drawn into the pump.
   To make an informed decision, it is helpful to have accurate data for your water source. In most places, drillers are required to report the details and the performance of wells that they drill. If you do not have the driller's well record, you may be able to obtain a copy from your regional government office that oversees ground water resources and issues drilling permits.

Dirty Water Conditions

SHAKTI Pumps have good resistance to quantities of sand and fine sediment that can normally occur in a well. However, any amount of abrasive material will reduce the life of this pump, like any other pump. Extreme sediment can cause the pump to stick. Sediment can also settle inside the drop pipe each time the pump stops, and block the flow. For water sources that contain high amounts of sand, clay, or other solids, consider the following suggestions.

To avoid pumping dirty water :

1. Have your well purged, developed, or otherwise improved by a water well contractor before installing the pump.
2. Temporarily install a more powerful pump to draw at a high flow rate until the water looks clean.
3. Set the pump as high as possible in the well. If the pump can be placed higher than the perforations in the well casing, it will probably avoid all but the finest suspended silt.

4. After lowering the pump in a well, wait at least 15 minutes for sediment or debris to settle down.
5. If the water source is at the surface, dig a shallow well next to the water source to obtain clean water.
   If dirty water cannot be avoided
1. Monitor the situation regularly by observing the volume of water pumped and/or the current draw of the pump (AC amps). As a pump wears, its flow rate (and current draw) will decrease gradually. Replace the pump end when reduced performance is observed, or before your season of greatest water demand. Increased current draw may indicate debris stuck in the pump and/or pipe.

Filtration at the pump intake

SHAKTI Pumps will tolerate small amounts of sand, strainer is provided in suction case to block large size particles, but you may need to filter out larger debris that is normally found in a pond or stream.

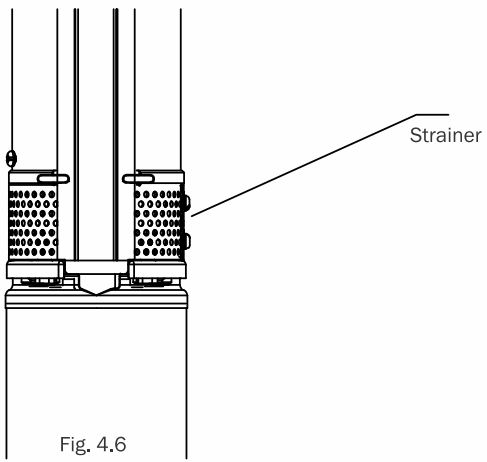


Fig. 4.6

4.7 LOWERING THE PUMP:-

It is recommended to check the borehole by means of an inside calliper before lowering the pump to ensure unobstructed passage.

Lower the pump carefully into the borehole, taking care not to damage the motor cable and the submersible drop cable.

Note

Do not lower or lift the pump by means of the motor cable.

4.8 INSTALLATION DEPTH:-

The dynamic water level should always be above the suction inter connector of the pump. The minimum safety margin should be 1-metre head.

It is recommended to install the pump so that the motor part is above the well screen in order to ensure optimum cooling. When the pump has been installed to the required depth, the installation should be finished by means of a borehole seal.

Slacken the straining wire so that it becomes unloaded and lock it to the borehole seal by means of wire locks.

Note

For pumps fitted with plastic pipes, the expansion of the pipes when loaded should be taken into consideration, when deciding on the installation depth of the pump.

Note

The SHAKTI Submersible 4SS pump set system must be installed vertically.

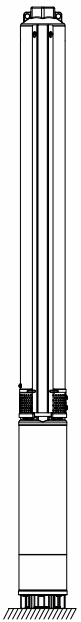


Fig. 4.8

4.9 START-UP AND OPERATION:-
START-UP

When the pump has been connected correctly and it is submerged in the liquid to be pumped, it should be started with the discharge valve closed off to approx. 1/3 of its maximum volume of water. Check the direction of rotation.
If there are impurities in the water, the valve should be opened gradually as the water becomes clearer. The pump should not be stopped until the water is completely clean, as otherwise, the pump parts and the non-return valve may choke up. As the valve is being opened, the drawdown of the water level should be checked to ensure that the pump always remains submerged. The dynamic water level should always be above the suction inter connector of the pump.

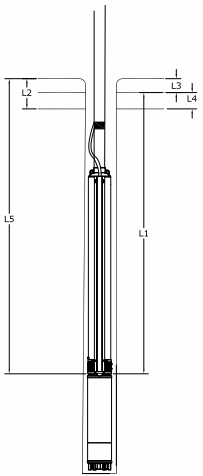


Fig. 4.9

L1: Minimum installation depth below dynamic water level.
Minimum 1 meter is recommended.
L2: Depth to dynamic water level.
L3: Depth to static water level.
L4:- Drawdown. This is the difference between the dynamic and the static water levels.
L5:- Installation depth.

Caution

Long time operation with water containing air may damage the pump and cause insufficient cooling of the motor.

5. TROUBLE SHOOTING

S. No.	FAULT	CAUSE	REMEDY
1	The pump does not run.	a) The fuses are blown.	Replace the blown fuses. If the new ones blow too, the electric installation and the submersible drop cable should be checked.
		b) The ELCB or the voltage-operated ELCB has tripped out.	Cut in the circuit breaker.
		c) No electricity supply.	Contact the electricity supply authorities.
		d) The motor starter overload has tripped out.	Reset the motor starter overload (automatically or possibly manually). If it trips out again, check the voltage, Is the voltage OK, see items e) - h).
		e) Motor starter/contactor is defective.	Replace the motor starter/contactor.
		f) Starter device is defective.	Repair/replace the starter device.
		g) The control circuit has been interrupted or is defective.	Check the electric installation.
		h) The dry-running protection has cut off the electricity supply to the pump, due to low water level.	Check the water level. If it is OK, check the water level electrodes/level switch.
		I) The pump/submersible drop cable is defective.	Repair/replace the pump/cable.

S. NO.	FAULT	CAUSE	REMEDY
2	The pump runs but gives no water.	a) The discharge valve is closed.	Open the valve.
		b) No water or too low water level in borehole.	See item 3 a).
		c) The non-return valve is stuck in its shut position.	Pull out the pump and clean or replace the valve.
		d) The inlet strainer is choked up.	Pull out the pump and clean the strainer.
		e) The pump is defective.	Repair/replace the pump.
3	The pump runs at reduced capacity.	a) The drawdown is larger than anticipated.	Increase the installation depth of the pump, throttle the pump or replace it by a smaller model to obtain a smaller capacity.
		b) Wrong direction of rotation.	See section 5.7.1 Checking of direction of rotation.
		c) The valves in the discharge pipe are partly closed/blocked.	Check and clean/replace the valves, if necessary.
		d) The discharge pipe is partly choked by impurities (ochre).	Clean/replace the discharge pipe.
		e) The non-return valve of the pump is partly blocked.	Pull out the pump and check/replace the valve.
		f) The pump and the riser pipe are partly choked by impurities (ochre).	Pull out the pump. Check and clean or replace the pump, if necessary. Clean the pipes.
		g) The pump is defective.	Repair/replace the pump.
		h) Leakage in the pipe work.	Check and repair the pipe work.
		I) The riser pipe is defective.	Replace the riser pipe.
4	The pump runs at reduced capacity.	a) The differential of the pressure switch between the start and stop pressures is too small.	Increase the differential. However, the stop pressure must not exceed the operating pressure of the pressure tank, and the start pressure should be high enough to ensure sufficient water supply.

S. NO.	FAULT	CAUSE	REMEDY
		b) The water level electrodes or level switches in the reservoir have not been installed correctly.	Adjust the intervals of the electrodes/level switches to ensure suitable time between the cutting-in and cutting-out of the pump. See installation and operating instructions for the automatic devices used. If the intervals between stop/start cannot be changed via the automatics, the pump capacity may be reduced by throttling the discharge valve.
		c) The non-return valve is leaking or stuck half-open.	Pull out the pump and clean/replace the non-return valve.
		d) The volume of air in the Pressure/diaphragm tank is too small.	Adjust the volume of air in the pressure/diaphragm tank in accordance with its installation and operating instructions.
		e) The pressure/diaphragm tank is too small.	Increase the capacity of the pressure/diaphragm tank by replacing or supplementing with another tank.

Considering continuous product development the information/performance/specifications and illustrations disseminated in this catalogue are subject to change without notice.

WARRANTY CERTIFICATE

Dear Customer,
Congratulation, for purchasing our product.

Pump and Motor are warranted against defects in workmanship and material under normal use, service & specified duty conditions. We provide one time warranty service for twelve months from the date of purchase by the first user.
Shakti Pumps (India) Limited warrants this product to be free from damage/ defects in material and workmanship under normal use and service for Twelve Months from the date of purchase by the first user. The user shall produce valid and original copy of invoice for availing warranty. The user shall carry defective pump set to nearest authorized service center
This warranty does not cover any loss or damage/ defect of any nature resulting from wrong product selection/ improper installation or installation by unauthorized/ untrained person/ sandy condition/ dry running and improper use of the pump sets.
The warranty also does not cover consequential losses/ damages arising due to failure of pump/ motor.
Our obligation is limited to recycling or repairing or replacing product/ parts ex-factory. Equipment for repairs should be returned free of cost to us.
The forgoing is subject to the provision that the user does not open the unit and make any change or repair without prior approval of authorized service center during the warranty period.
This warranty excludes every condition whether statutory or otherwise, whatsoever not herein expressly set out.

Customer name: .....Customer's phone:.....

Customer Address: .....

Invoice number: .....Invoice date:.....

Model Name: .....Model Serial Number:.....

Dealer's Name: .....Dealer's phone:.....

Dealer's Address:.....

APPROVED BY: DATE OF ISSUE

SHAKTI PUMPING LIFE

INSTALLATION REPORT

Customer's Name: - _____

Customer's Address: - _____

Customer's Ph. No.: _____

Dealer's Name: - _____

Dealer's Address: _____

Dealer's Ph. No. _____

Pump Model:- _____ S.L.No: _____

Project/Application: _____

Pressure In Kg:- _____ Flow in m^3/hr: _____

Liquid:- _____ Temp.: _____

Voltage:- _____ Current: _____

Packing Condition:- _____

Remarks: _____

_____

_____

Date:- _____ _____

Customer's Signature

BOOK-POST

SHAKTI PUMPS (INDIA) LIMITED

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Stamp