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SHAKTI
PUMPING LIFE

INSTALLATION & OPERATING INSTRUCTIONS

VERTICAL MULTISTAGE CENTRIFUGAL PUMPS

SMTR SERIES

CE

EC DECLARATION OF CONFORMITY
IN ACCORDANCE WITH LV & EC MACHINERY DIRECTIVES UNDER SELF DECLARATION

Product Designation : Immersible Vertical Multistage Pressure Booster Pump set
Model Reference : SMTR 1- 15 (Max. - 5.0 Hp)
Intended End Use : for Vertical Pressure Booster Pump set to be used for pumping of Cooling lubricants for machine tools, condensate transfers & similar application

Conforming to the requirement of following European Directives:
a) Low Voltage Directive : 2006/95/EC
b) EC Machinery Directive : 2006/42/EC

Applicable Harmonized Standards:
EN ISO 12100-2010, EN 809: 1998+A1:2009, EN 60335-1, EN 60335-2-41

We hereby declare that Immersible Vertical Multistage Pressure Booster Pump set is indented to be incorporated into or assembled with other machinery to constitute relevant machinery to comply with the essential Health and Safety requirement of the mentioned directives.

This machinery, its components and sub assemblies shall not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provision of the applicable directives.

The criteria for selection, safety requirement of other associated equipment and installation guide lines are detailed in the instruction manual.

- Date of Manufacturer & First CE marking : 16.09.2016
- Place of Manufacturer : Shakti Pumps India Ltd. ,Pithampur

Issued at: SHAKTI PUMPS (I) LTD. , Pithampur
Marking:
The above pump set must not put into service /usage for other than specified in the instruction Manual Date: 16.09.2016

CE

Sanjay Bhatnagar
Deputy General Manager -QA

INSTALLATION AND OPERATING INSTRUCTIONS

SHAKTI PUMPING LIFE

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Before beginning installation procedures, these installation and operating instructions should be studied carefully. The installation and operation should also be in accordance with local regulations and accepted codes of good practice.

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

1.GENERAL

SMTR pumps are vertical multistage centrifugal pumps designed for pumping of cooling lubricants for machine tools, condensate transfer and similar applications. The pumps are designed to be mounted on top of tanks with the chamber stack immersed in the pumped liquid. Available in various pump sizes and have various numbers of stages to provide the flow, the pressure and the installation length required. The pumps consist of two main components: The motor and the pump unit. The motor is a Shakti standard SMG motor designed to EN standards. The pump unit consists of optimised hydraulics, various types of connections, a motor stool, a given number of chambers and various other parts.

2.SHIPMENT INSPECTION

Examine the components carefully to make sure no damage has occurred to the pump during shipment. Care should be taken to ensure the pump is NOT dropped or mishandled.

2.1.ENSURE YOU HAVE THE RIGHT PUMP :

SMTR (A - version) : Centrifugal pump with standard cast iron and 304 stainless steel construction.

SMTR (I - version) : Centrifugal pump with all wetted part are 304 stainless steel construction.

SMTR (N - version) : Centrifugal pump with all wetted part are 316 stainless steel construction.

Read the nameplate to ensure it is the one you ordered & Compare the pump's nameplate data or its performance curve (for head, Discharge, etc.) with the application in which you plan to install it.

2.2.CHECK THE CONDITION OF THE PUMP :

The shipping carton is specially designed to prevent damage during transportation. As a precaution, it should remain in the carton until you are ready to install it. Examine any other parts of the shipment as well (electrical control boxes, etc) for any visible damage. If you find any, contact the transportation company in writing and ask to have it inspected.

2.3.VERIFYING ELECTRICAL REQUIREMENTS :

Verification of the electrical supply should be made to be certain the voltage, phase and frequency match that the pump motor. The proper operating voltage and other electrical information can be found on the motor nameplate. These motors are designed to run on ±6 % of the nameplate - rated voltage. For dual voltage motors, the motors should be internally connected to operate on the voltage closest to the 10 % rating. i.e. a 208 voltage motor wired per the 208 volt connection diagram. The wiring connection diagram can be found on terminal box cover. If voltage variations are larger than ± 6 % do not operate the pump.

3.CONFIRMING PROPER APPLICATION

The pump must not be used for the transfer of inflammable liquids such as diesel oil and petrol.

TYPE	DESIGNED TO PUMP
SMTR	Machine tool applications : • Boring • Milling/Turning • Wire cutting • Filtration • Part washing • Condensate systems

4. CHECKING OPERATING CONDITIONS :

4.1. AMBIENT TEMPERATURE

If the ambient temperature exceeds above maximum values or if the motor is located 1000 metres (3280 ft) above sea level, the motor output (P2) must be reduced due to the low density and consequently low cooling effect of the air. In such cases, it may be necessary to use a motor with a higher output.

Motor Power [kW]	Motor Make	Maximum ambient temperature at full load °F [°C]	Maximum altitude above sea level [ft][m]
0.37 - 0.75	SMG	+104°F [+40°C]	3280 ft [1000]
1.1 - 11	SMG	+140°F [+60°C]	11480 ft [3500]
15 -30	SMG	+130°F [+55°C]	15580 ft [4750]

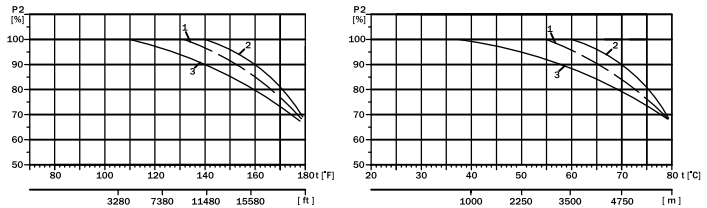

FIG 1. Relationship between motor output (P2) and ambient temperature/altitude

4.2. Maximum permissible operating pressure and liquid temperature for the shaft seal

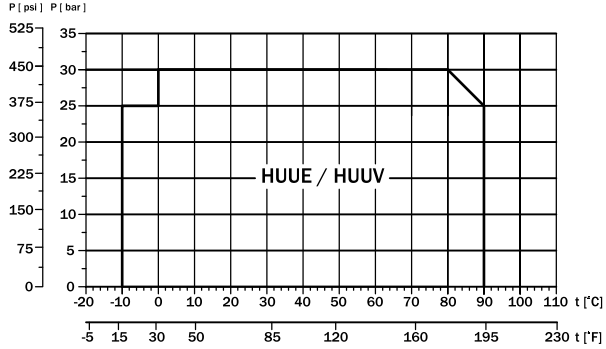

FIG 2. Maximum permissible operating pressure and liquid temperature for the shaft seal for SMTR 1s to 64

4.3. MINIMUM FLOW RATE

Due to the risk of overheating, the pump should not be used at flows below the minimum flow rate. The curve below shows the minimum flow rate as a percentage of the nominal flow rate in relation to the liquid temperature.

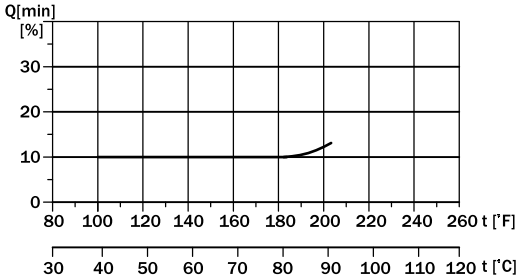

FIG 3. Minimum flow rates

Note: The pump must never operate against a closed discharge valve.

4.4. ELECTRICAL DATA

See motor nameplate.

4.5 MAXIMUM NUMBER OF STARTS

Pump	Motor	Recommended maximum number of starts per hour
SMTR	0.06 - 0.18	100
	0.25 - 2.2	250
	3.0 - 4.0	100
	5.5 - 11.0	50
	15.0 - 22.0	40
	30.0 - 45.0	8

5. HANDLING

⚠ SMTR 1s to 64 pumps are supplied with lifting eyes which must not be used for lifting the entire pump. When the entire pump is to be lifted, observe the following: SMTR 1s to 64 pumps fitted with Shakti SMG motors should be lifted in the pump head by means of straps or the like.

SHAKTI PUMPING LIFE

6. INSTALLING THE PUMP

⚠ Do not energize pump until properly installed.

⚠ The pump must be installed so that persons cannot accidentally come into contact with the hot surface of the motor

6.1. PUMP LOCATION

The pump is designed for tank mounting in vertical position. The pump is positioned in a hole cut into the cover of the tank (upper side) and is secured to the tank by four hexagon head screws through the holes in the mounting flange. It is recommended to fit a sealing gasket between the pump flange and tank. If the pump is to be installed horizontally, the drain hole of the motor stool must be fitted with a plug and four closed nuts with O-rings must be fitted to the straps.

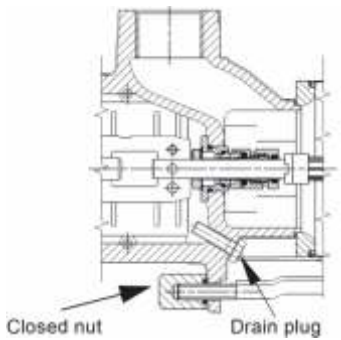

FIG.4 Horizontal installation

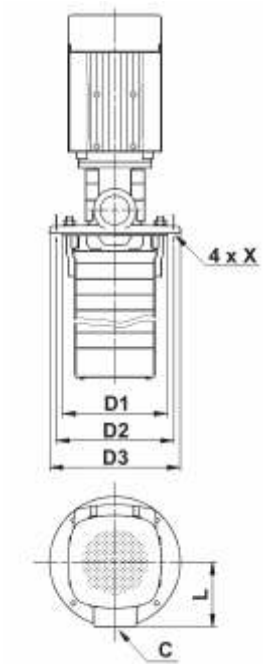

FIG 5. Vertical installation

Note : SMTR 32, 45 and 64 pumps can only be installed in vertical position.

Pump Mounting Flange Dimensions					
Pump Type	D1	D2	D3	C	X
SMTR 1s, 1, 3 , 5	140 (5.5")	160 (6.3")	180 (7.1")	1-1/4" BSP	Ø 9 (0.35")
SMTR 10, 15, 20	200 (7.9")	225 (8.9")	250 (9.9")	2"BSP	Ø 9 (0.35")
SMTR 32	190 (7.5")	220 (8.7")	250 (9.9")	DN 65	Ø 12 (0.47")
SMTR 45, 64	240 (9.5")	265 (10.5")	290 (11.4")	DN 80	Ø 12 (0.47")

6.2. SUCTION CONDITION

The bottom of the pump strainer must be at least 25 mm(0.98") above the bottom of the tank.

The pumps are designed to provide full performance down to a level of A mm above the bottom of the strainer.

At a liquid level between A and B mm above the bottom of the strainer, the built-in priming screw will protect the pump against dry running.

Note : SMTR 32, 45 and 64
pumps have no priming screw.

PUMP TYPE	A mm (inch)	B mm (inch)
SMTR 1s, 1, 3 & 5	41(1.61")	28 (1.10")
SMTR 10, 15 & 20	50 (1.96")	25 (0.98")
SMTR 32, 45 & 64	70 (2.75")	-

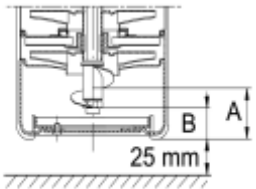

FIG 6. SMTR 1s, 1, 3 AND 5

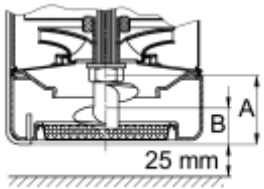

FIG 7. SMTR 10, 15 AND 20

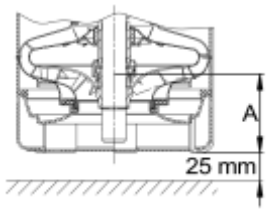

FIG 8. SMTR 32, 45 AND 64

6.3. SEPARATION OF PARTICLES

Out of consideration for the pump, the distribution system, the cutting tools and the treated materials, cooling/cutting fluids should, wherever possible, be free of particles before entering the pump unit. The system's requirements as to the purity of the pumped fluid depend on the machining methods, the treated materials and other criteria. Filtration methods should be matched to these requirements. Larger particles are unable to enter the pump with the pumped fluid due to the effect of the built-in inlet strainer particles 2 mm or smaller are allowed to enter the SMTR pump.

7. ELECTRICAL CONNECTION

The electrical connection should be carried out by an authorized electrician in accordance with local regulations

⚠ Before removing the terminal box cover and before any removal/dismantling of the pump, make sure that the electricity supply has been switched off. The pump must be connected to an external mains switch with a minimum contact gap of 3 mm in all poles.

The operating voltage and frequency are marked on the pump nameplate. Please make sure that the motor is suitable for the electricity supply on which it will be used.

Single-phase Shakti motors incorporate a thermal protection and require no additional motor protection.
Three-phase motors must be connected to a motor starter.

The terminal box can be turned to four positions, in 90° steps. see Fig. 9

1. If necessary, remove the coupling guards. Do not remove the coupling.
2. Remove the bolts securing the motor to the pump.
3. Turn the motor to the required position.
4. Replace and tighten the bolts.
5. Replace the coupling guards.

   The electrical connection should be carried out as shown in the diagram inside the terminal box cover.

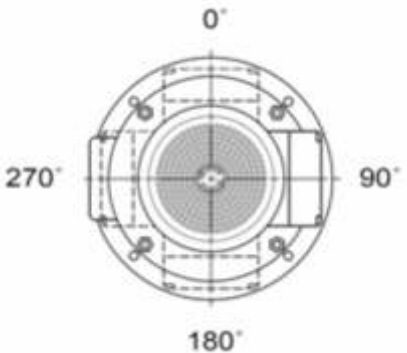

fig 9 Terminal box position

7.1 FREQUENCY CONVERTER OPERATION

All three phase motors supplied with shakti can be connected to a frequency converter. Dependent on the frequency converter type, this may cause increased acoustic noise from the motor. Furthermore, it may cause the motor to be exposed to detrimental voltage peaks.

8. STARTING THE PUMP FIRST TIME

8.1. AIR ELIMINATION

As long as the pump body is partially submerged in fluid, the pump may be started against an open or a closed discharge line. If the discharge line is open, the air will quickly escape through the discharge pipe. If the discharge line is closed, the air will be pressed down through the pump body and out into the tank so that the discharge pressure will quickly reach its maximum (shutoff) level.

If the pump is fitted with a vent valve, this valve must be opened while running the pump against a closed valve. Once a steady stream of liquid is running out of this vent valve it can be closed.

8.2. PROCEDURE FOR REMOVAL OF FLOAT GAUGE

8.2.1. Switch the Power Off.

8.2.2. Every pump set is supplied with float gauge in assembled condition. Please ensure the pump float with available float gauge, also check at regular interval.

8.2.3. Remove the float gauge (As indicated by arrow), Don't run the pump with float gauge.

8.2.4. Please put the coupling guard before running the pump.

fig 10 Procedure of float gauge removal

8.3. CHECK THE DIRECTION OF ROTATION

A. Switch the POWER OFF.

B. Make sure the pump has been filled and vented.

C. Remove the coupling guard and rotate the pump shaft to be certain it turns freely. Replace the coupling guard.

D. Verify that the electrical connections are in accordance with the wiring diagram on the motor.

E. Switch the power on and observe the direction of rotation. When viewed from the top, the pump should rotate counter-clockwise.

F. To reverse the direction of rotation, first switch OFF the supply power.

G. On three-phase motors, switch any two power leads at the load side of the starter. On single-phase motors, refer to the connection diagram on the nameplate. Change wiring as required.

H. Switch the power ON and check for proper motor rotation.

Note: The pump is not allowed to run against a closed discharge valve for more than approx. 5 minutes as this will cause an increase in temperature/ formation of steam in the pump which may cause damage to the pump.

8.4. STARTING AND ADJUSTING

Before starting the pump, make sure that:

A. The pump body is partially submerged in the fluid.

B. The direction of rotation is counter-clockwise when viewed from the top.

C. All piping connections are tight and the pipes are adequately supported.

D. The pump inlet screen is clean and unblocked.

E. Depending on the application, it may be necessary to start the pump against a closed discharge valve in order to prevent system damage due to water hammer. If so, this valve should be opened in a gradual manner after the pump is started. Unless used as a flow throttling device, make sure this valve is completely opened.

F. Check and record the voltage and amperage of the motor. Adjust the motor overloads if required.

G. Check and record operating pressures if pressure gauges have been installed.

H. Check all controls for proper operation. If pump is controlled by a pressure switch, check and adjust the cut in and cut-out pressures. If low-water-level controls are used, be sure the low-level switch is properly adjusted so the pump cannot run if the pump should break suction.

No Flow

Under no circumstances should the pump be operated for any prolonged periods of time without flow through the pump. This can result in motor and pump damage due to overheating. A properly sized relief valve should be installed to allow sufficient water to circulate through the pump to provide adequate cooling and lubrication of the pump bearings and seals.

9. MAINTENANCE

⚠ Pumps installed in accordance with these instructions require very little maintenance.

Before starting work on the pump, make sure that all power supplies to the pump have been switched off and that they cannot be accidentally switched on.

9.1 LUBRICATION

The mechanical shaft seal is self-adjusting and has wear-resistant seal rings which are lubricated and cooled by the pumped liquid. The pump bearings are also lubricated by the pumped liquid. The motor ball bearings are grease packed and sealed for life. No further lubrication is necessary. Pumps from 4 kW (5.5 HP) and up have angular contact bearings. If the pump is to be drained for a long period of inactivity, remove one of the coupling guards to inject a few drops of silicone oil on the shaft between the pump head and the coupling. This will prevent the shaft seal faces from sticking.

9.1.1. MOTOR BEARINGS :

Motors which are not fitted with grease nipples are maintenance-free. Motors fitted with grease nipples should be lubricated with a high-temperature lithium-based grease.

9.2. FILTERS

Chip trays, filters, etc. should be cleaned at regular intervals to ensure a correct flow of liquid.

9.3. PERIODIC CHECKS

At regular intervals, depending on the conditions and time of operation, the following checks should be made:

- Check the quantity of liquid and operating pressure.
- Check that there are no leaks.
- Check that the motor is not overheating.
- Check the tripping of the motor starter.
- Check that all controls are operating satisfactorily.
- If the above checks do not reveal any abnormal operating details, no further checks are necessary

10. REPLACING THE MOTOR

If the motor is damaged due to bearing failure, burning or electrical failure, the following instructions detail how to remove the motor for replacement. It must be emphasized that motors used on SMTR pumps are specially selected to our rigid specifications. Replacement motors must be of the same frame size.

Removing the Old Motor

A. Remove the coupling guard screens.
B. Using the proper metric allen wrench, loosen the four cap screws in the coupling.
C. With the correct size wrench, loosen and remove the four bolts which hold the motor to the discharge section of the pump end.
D. Lift the motor straight up until the shaft is free from the coupling.

Installing the New Motor

A. Thoroughly clean the surfaces of the motor and pump end mounting flanges. Set the motor on the pump end.
B. Place the terminal box in the desired position by rotating the motor.
C. Insert the mounting bolts, then tighten diagonally and evenly.
D. Using a larger screwdriver, raise the pump shaft by placing the tip of the screwdriver under the coupling and carefully elevating the coupling to its highest point. Note: The shaft can only be raised approximately 0.20 inches (5 mm).
E. Be sure to tighten the top and bottom screws on one side of the coupling and then the other. Torque the coupling screws to the following specifications.
F. Check to see that the gaps between the coupling halves are equal. Loosen and re-adjust if necessary.
G. Be certain the pump shaft can be rotated by hand. If the shaft cannot be rotated or it binds, disassemble and check for misalignment.
H. Replace the two coupling guard screens.

Coupling Bolt Size	Minimum Torque Specifications
M6	10 ft-lbs/13.5 Nm
M8	23 ft-lbs/31 Nm
M10	46 ft-lbs/62 Nm

11.SOUND PRESSURE LEVEL

SOUND PRESSURE LEVEL			
Pump	P_2 [Hp / (Kw)]	50Hz	60Hz
		LpA [dB(A)]	LpA [dB(A)]
SMTR	0.08 (0.06)	41	41
	0.12 (0.16)	41	41
	0.18 (0.24)	41	41
	0.25 (0.33)	56	62
	0.5 (0.37)	53	58
	0.75 (0.55)	53	56
	1.0 (0.75)	53	57
	1.5 (1.1)	60	65
	2.0 (1.5)	59	65
	3.0 (2.2)	61	66
	4.0 (3.0)	59	64
	5.5 (4.0)	65	69
	7.5 (5.5)	63	68
	10.0 (7.5)	60	65
	15.0 (11.0)	60	65
	20.0 (15.0)	60	65
	25.0 (18.5)	60	65
	30.0 (22.0)	64	69
	40.0 (30.0)	70	84
	50.0 (37.0)	71	75
	60.0 (45.0)	71	75

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12. FAULT FINDING CHART

Fault	Cause	Remedy
1. Motor does not run'when started	a) Supply failure.	Connect the electricity supply.
	b) Fuses are blown.	Replace fuses.
	c) Motor starter overload has tripped out.	Reactivate the motor protection.
	d) Thermal protection has tripped out.	Reactivate the thermal protection.
	e) Main contacts in motor starter are not making contact or the coil is faulty.	Replace contacts or magnetic coil.
	f) Control circuit is defective.	Repair the control circuit.
	g) Motor is defective.	Replace the motor.
2. Motor starter overload trips out immediately when supply is switched on	a) One fuse/automatic circuit breaker is blown.	Cut in the fuse.
	b) Contacts in motor starter overload are faulty.	Replace motor starter contacts.
	c) Cable connection is loose or faulty.	Fasten or replace the cable connection.
	d) Motor winding is defective.	Replace the motor.
	e) Pump mechanically blocked.	Remove the mechanical blocking of the pump.
	f) Overload setting is too low.	Set the motor starter correctly.
3. Motor starter overload trips out occasionally.	a) Overload setting is too low.	Set the motor starter correctly.
	b) Low voltage at peak times.	Check the electricity supply.
4. Motor starter has not tripped out but the pump does not run.	a) Supply failure.	Connect the electricity supply.
	b) Fuses are blown.	Replace fuses.
	c) Thermal protection has tripped out.	Reactivate the thermal protection.
	d) Main contacts in motor starter are not making contact or the coil is faulty.	Replace contacts or magnetic coil.
5. Pump runs but gives no liquid or pump capacity is not constant.	a) Pump strainer partly blocked by impurities.	Clean the strainer.
	b) Liquid level in tank too low.	Increase the liquid level.
	c) Pump draws in air.	Check the suction conditions.
6. Leakage in shaft seal.	a) Shaft seal is defective.	Replace the shaft seal.
7. Noise.	a) Cavitation occurs in the pump.	Check the suction conditions.
	b) Pump does not rotate freely (frictional resistance) because of incorrect pump shaft position.	Adjust the pump shaft

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 (I) Ltd 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.
No warranty will be provided on mechanical seal, rubber parts, fasteners, cables in pump, motor / pump sets. our obligation is limited t 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

17 - 05 - 2016

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

Stamp

To,
Shakti Pumps (I) Ltd.
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