

SUBMERSIBLE

# 4" MOTOPUMP Manual

INSTALLATION / OPERATION / MAINTENANCE



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## Instruction and Safety Information

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This manual uses instructions and safety information for preventing injury and damage to property. To uniquely identify these for personnel, the instructions and safety information are differentiated as follow.

### Safety Information

Information that refers to personal injury is printed in black and is always accompanied by a “WARNING” and “CAUTION” symbols.



“WARNING” SYMBOL



“CAUTION” SYMBOL

## Preparation for Installation

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Before the installation, motopump should be checked if it has been damaged during the shipment or not. Check if there is any fracture or cut on the pump, motor and power cables and do not start the installation until damaged area is repaired.

## Delivery and Unpacking

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Pumps, that are ready to be delivered, accessories are attached on them after they are tested. Unless pump length is too long, pump and motor are delivered as coupled or else they are delivered separately.



Coupling and installation of the pump and motor must be done by people who have been certificated. Controls of the pump and motor should be done in order to detect there is any damage on them happened during the delivery and handling and if so, it must be reported.



If there are any fracture on the pump or any damage on the motor, installation has to be stopped and you should get in touch with our distributor. Otherwise, failures that might be caused because of starting in these conditions are out of WARRANTY.

It should be checked on the pump and motor name plates if the product satisfies the pump specifications in its order or else the installation must not be started.

## The Operating Area

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The operating area must be clean, free of coarse solids, dry, frost-free and if necessary, decontaminated. It must also be suitable for the respective product. The water supply must be sufficient for the maximum flow rate on the unit so that dry running and/or air entry is prevented.

When installed in wells or bore holes, ensure that the unit does not come into contact with the walls. Therefore, ensure that the outer diameter of the submersible motor pump is always smaller than the inner diameter of the well or bore hole.

When working in containers, wells or bore holes, a second person must always be present for safety reasons. If there is danger of poisonous or asphyxiating gases forming, the necessary countermeasures must be taken!

It must be ensured that hoisting gear can be fitted without any trouble, since this is required for assembly and removal of the product. It must be possible to reach the product safely in its operating and storage locations using the hoisting gear. The machine must be positioned on a firm foundation. For transporting the product, the load-carrying equipment must be secured to the appropriate fastening points.

Electric power cables must be laid out in such a way that safe operation and trouble-free assembly/dismantling are possible at all times. The product must never be carried or dragged by the power supply cable. When using switching devices, the corresponding protection class must

be observed. Switching devices must always be mounted in such a way that they are protected from flooding.

Use guide and deflector plates for the pumped liquid intake. If the water jet reaches the surface of the water, air will be introduced into the pumped liquid. This will lead to unfavorable current and pumping conditions for the unit. As a result of cavitation, the product does not run smoothly and is subjected to increased wear.

## Pump Construction

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Hydraulic pump unit is multistage that consist of semi axial impeller and diffuser is radial type. Pump body and shaft is made of stainless steel. Diffuser is made of 20% glass fiber reinforced polycarbonate. Discharge is threaded connection and with built-in check valve.

Minimum submergence depth must be always ensured for Vansan 4" submersible pumps.

## Motor Construction

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Vansan 4" single and three phase submersible motors filled with oil are used for direct start-up. The motor housing is made of stainless steel. The motors have a 4" Nema connector.

The motor is cooled by the pumped medium. The motor must therefore always be submerged when operated. The thresholds for max. liquid temperature and minimum flow speed may not be exceeded.

The connection cable is longitudinally water-proof and fixedly connected to the motor.

Single-phase motors must be operated with capacitor.



## Motor Liquid

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Vansan 4" submersible motors are filled already with oil.



The motors designed to be non-refillable outside. If the motor is to be stored for longer than 1 year we recommend checking the liquid.

## Installation

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All personnel who work on or with the product must be qualified for such work; electrical work, for example may only be carried out by a qualified electrician.

Products of this type must always be submerged during operation to attain the necessary cooling. Always make sure that the minimum water coverage is guaranteed.



Never let the product run dry. We recommend that dry-run protection be installed. If fluid levels deviate dramatically, a dry-run protection must be installed.



## Vertical Installation

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With this type of installation, the product is installed directly on the rising pipe. The installation depth is determined according to the length of the rising pipe.



Do not place the product on the bottom of the pit, as this can lead to tension and mud accumulation in the motor. If the motor becomes blocked with mud, the heat discharge can no longer be ensured and the motor may overheat. Additionally, the product should not be installed level with the filter pipe. Sand and other solids may be pumped through the suction flow, meaning the motor cooling can no longer be guaranteed. This would lead to increased wear on the hydraulics. To prevent this, a water guide shroud should be used when necessary, or the product should be installed next to blind pipes.

## Horizontal Installation

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This installation type is only permitted when used together with a cooling jacket. The unit is installed directly in the water tank/reservoir/container and flanged onto the discharge pipe. The cooling jacket supports must be mounted at the distances specified to prevent the unit from distorting. The connected pipeline must be self-supporting, i.e. it may not be supported by the product. When installed horizontally, the pipe and unit are mounted separately. Make sure that the discharge port of the unit and the pipeline are level.

**On this type of installation, the product must be installed with a cooling jacket.**

## General Information of Installation

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**Pipe:** Suitable pipe should be selected according to the depth of installation.

**Well Depth:** Minimum submergence of the submersible pump must be learnt from the supplier and pump should be installed with 1 mt clearance from the bottom of the sump (well). Advised submergence depth is 3 mt.

**Check Valve:** Submersible pumps have built-in checkvalve. There is no necessity to add additional checkvalve up to 80 m installation depth.

**Three-phase Connection:**The three-phase current version is supplied with free cable ends. The connection to the mains is made at the switch box terminals.

**Start-up:** Pumps should be never operated at the fully open valve position. It is advised to do the start up of the system while valve position is throttled down. After the start up, valve should be opened slowly to the requested position. Any fast action would cause the pump to suck sand or other particules. Such kind of pump failures are out of warranty conditions.

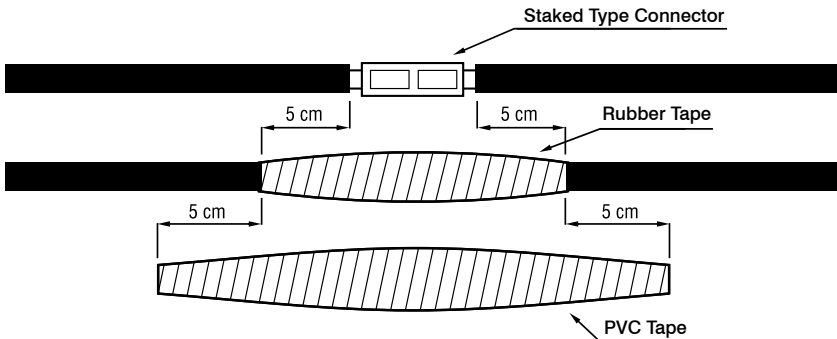
## Connection of Power Cables

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Connection of the power cable that will be used along the well and until the control panel with the power cable on the motor must be done very carefully and by the professionals only. Unless the insulation after the connection is well done, short circuit might happen when the connection area is in the water.

Insulation of each cable should be stripped only as far as necessary to provide room for a stake type connector. Each individual joint should be taped with rubber electrical tape, using two layers by wrapping tightly for eliminating airspaces as much as possible.



Total thickness of tape should be no less than the thickness of the cable insulation in order to prevent the smashing of the cables when the pump is lowered in the well.

## Connection of the Pump to the Control Panel

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After the installation of the submersible pump in the well, power cables that are coming out of the pump should be connected to the electrical control panel. This process should be done by only a professional electrician.



Electrical control panel should be protected from the water and moisture. The most important thing that should be taken into consideration is that the power cables should not be smash or bended.

Connections to the electrical control panel should be done depending on the schematic instructions that are taped inside the electrical control panel's cover. Liquid level electrodes should be also connected depending on the instructions.

Before the connection between electrical control panel and the main system of electricity, it should be checked with a circuit – tester to be sure there is no electricity in the control panel.

Before the connection of the electrical control panel is done, power cable's insulation should be controlled by a Meger Tester.

## Starting the Pump

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Before starting the pump, it must be checked that all controls during the preparation and all warnings are taken into consideration.



Before starting the pump, voltage of the system should be measured. This value shouldn't be less than 5% and higher than 10% of the nominal value for the three phases. If there are more differences at the voltages than the given amounts, it should not be started until the required voltage is provided for the motor.

Thermal relay on the control panel should be set up depending on the ampere value on the nameplate of the motor. Before starting the pump, the valve on the line should be positioned as half open. Manometer should be installed between the pump and the valve to measure the pressure.

Then pump can be started. Pump's discharge pressure can be read from manometer. Manometer gives the information about the direction of rotation because if the pump is rotating in the wrong direction, it cannot reach the real pressure value level. When the gate valve is closed, motor should be started to rotate in the both directions for a few seconds to read the values from the manometer. Right rotation direction is the one that the higher pressure is read from the manometer.

## Maintenance and Storage

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Best way to take care of your submersible pump is to have it controlled periodically.

After start using the pump, a maintenance card should be opened to the pump. Pump's voltage, current, flow rate and pressure values should be saved periodically in every 3 months. By comparing these values between each other and with the nominal values, pump's condition can be understood. As soon as there are sudden deviations or steadily decrease/increase in these values, you should call competent distributor.

There is no problem about making the submersible pumps wait without starting it. However, it must be worked once in a month to prevent possible jamming in the pump.



While storing outside the well, water of the motor should be emptied.

Control panel of submersible pump should be cleaned from dust and moisture by monthly periods. In every 6 months, equipments and cable connections of the control panel should be checked and loosen ones should be tightened.

## Possible Troubles and Corrective Actions

<b>Pumps runs but given no water or runs at reduced capacity</b>	
<b>PROBLEM</b>	<b>SOLUTION</b>
<b>The discharge valve is closed</b>	Open the valve
<b>Wrong direction of rotation ( only at three phase motors )</b>	Power cable's two phase should be replaced.
<b>Too low water level in borehole.</b>	Increase the installation depth of the pump and close the valve to decrease flow rate.
<b>Selected pump is not suitable for this application.</b>	Pull out the pump and install a suitable pump for the application.
<b>Leakage or blockage in the pipework.</b>	Check and repair pipework.
<b>The inlet strainer is choked up.</b>	Pull out the pump, check and clean or replace the pump.
<b>The pump or check valve is blocked partly or completely.</b>	Pull out the pump, check and clean or replace the pump and valve.
<b>Pump runs on at a lower rotational speed.</b>	Check the voltages or if there is anything abnormal with one of the phases.
<b>There is leakage at the installation.</b>	Check the entire installation and repair it if that exists.
<b>Pump shaft or coupling is worn out.</b>	Pull out the pump and check it.

## Possible Troubles and Corrective Actions

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<b>Pump's discharge pressure is not enough</b>	
<b>PROBLEM</b>	<b>SOLUTION</b>
Too low water level in borehole.	Increase the installation depth of the pump and close the valve to decrease flow rate.
Pressure switch is set up wrong or failed.	Check if pressure switch is working properly and set up right.
There is leakage at the installation.	Check the entire installation and repair it if that exists.
Pump is worn out.	Pull out the pump and replace worn out parts and get in touch with the service.
Pump impeller's is choked up.	Pull out the pump and check it.

<b>Thermal protection system is running</b>	
<b>PROBLEM</b>	<b>SOLUTION</b>
Motor absorbs excessive amount of current.	Stop the motor quickly and get in touch with the service.
Pump is jammed.	Pull out the pump and send it to the service
Motor is broken	Pull out the pump and check if motor has any failures and send it to the service.
Settings of thermal relay or selection of relay is wrong.	Check the thermal relay and its settings.
Motor runs on two phases.	Check power phases, fuses and cable connections.



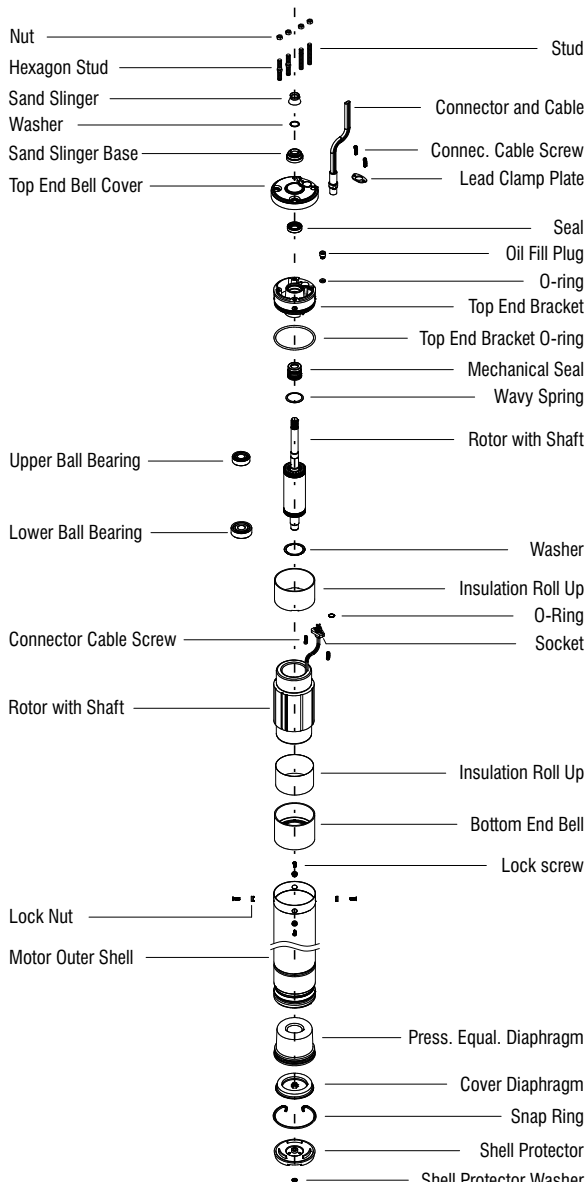
## Possible Troubles and Corrective Actions

<b>Frequent Starts and Stops</b>	
<b>PROBLEM</b>	<b>SOLUTION</b>
Liquid level electrodes are too close to each other.	Distance between two electrodes must be at least 3 meters. Lower electrode should be installed 30 cm up from pump discharge.

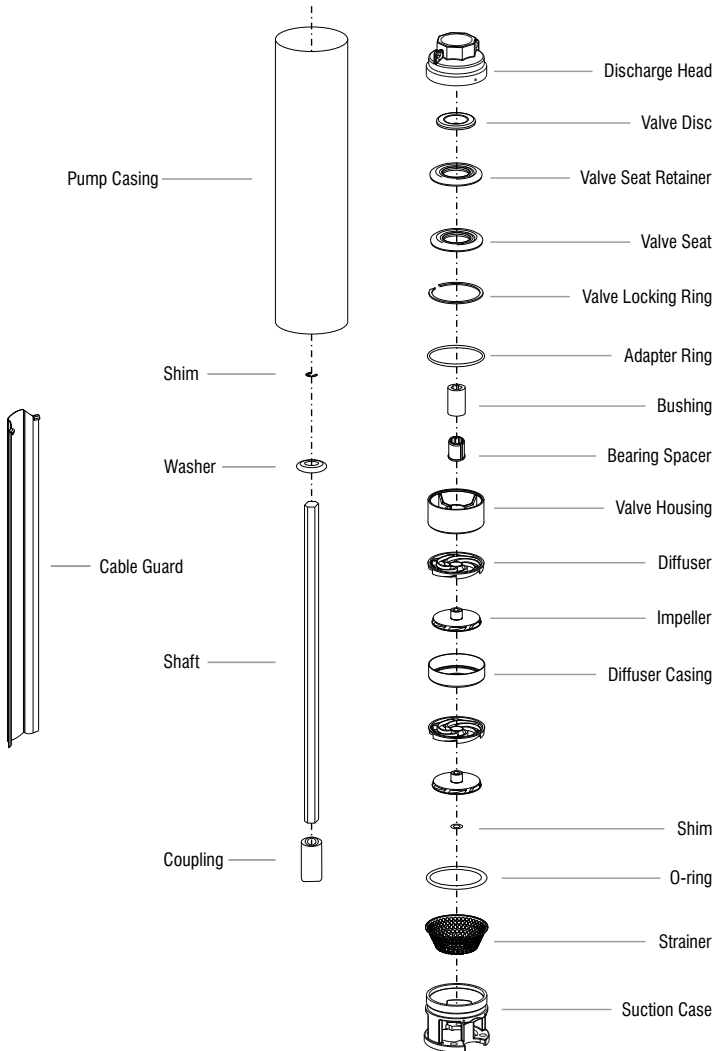
<b>Pumps runs noisy and vibrating</b>	
<b>PROBLEM</b>	<b>SOLUTION</b>
Pump equipments are partly/completely blocked.	Pull out the pump and have it repaired.
There is excessive amount of air or gas in the water of the well.	Fluid must be processed to have air or gas out of it.
Motor's axial thrust bearing is broken.	Pull out the pump and replace the axial thrust bearing of motor.
Selected pump is not suitable for this application.	Pull out the pump and install a suitable pump for the application.
Pump's bearing are worn out.	Replace the pump's bearings.
Fixing of the installation is weak.	Check the installation.
Duty point is out of pump's characteristic curve.	Close the valve to decrease the flow rate to make the pump to work at duty point.

<b>Pump does not run</b>	
<b>PROBLEM</b>	<b>SOLUTION</b>
No electricity supply.	Contact the electricity supply authorities.
The fuses are blown.	Replace the blown fuses with the new ones.
The dry-running protection has cut off the electricity supply to the pump, due to low water level.	Check the water level.

# 4" Submersible Motor Parts(OMOT - Oil Filled)



# 4" Submersible Pump Parts



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