RS6 - R8 - P6 - P8 - P10
SUBMERSIBLE PUMPS

Operating Instructions

GB

Contents

K.S.P. - Kostakis Submersible pumps - 3rd km Argous-Korinthou, PC 212 00 Argos - Phone: (+30) 2751069370 - fax: (+30)2751069371 - email: info@kspumps.gr - http://www.kspumps.gr

Thank you for purchasing a quality K.S.P. product. The present instructions will assist you during commissioning and operation of the pump. These operating instructions contain fundamental information and precautionary notes.

These Instructions must always be kept close to the product's operating location or directly with the product.

These instructions should be read prior to installing, operating, using and maintaining the equipment in any region worldwide. The equipment must not be put into service until all the conditions relating to safety, noted in the instructions, have been met.

1.0 General information

1.1 General

This pump has been developed in accordance with state-of-the-art technology; the unit is produced with great care and commitment to continuous quality control, utilising sophisticated quality techniques, and safety requirements. These operating instructions are intended to facilitate familiarisation with the pump and its designated use. The manual contains important information for reliable, proper and efficient operation. Compliance with the operating instructions is of vital importance to ensure reliability and a long service life of the pump and to avoid any risks. The instructions may not take into account local regulations; ensure such regulations are observed by all, including those installing the product. This pump must not be operated beyond the limit values specified in the technical documentation for the medium handled, capacity, speed, density, pressure, temperature and mo tor rating. Make sure that operation is in accordance with the instructions laid down in this manual or in the contract documentation. These instructions describe the procedures to be used for fitting, operation and maintenance of standard submersible pumps.

1.2 Symbols

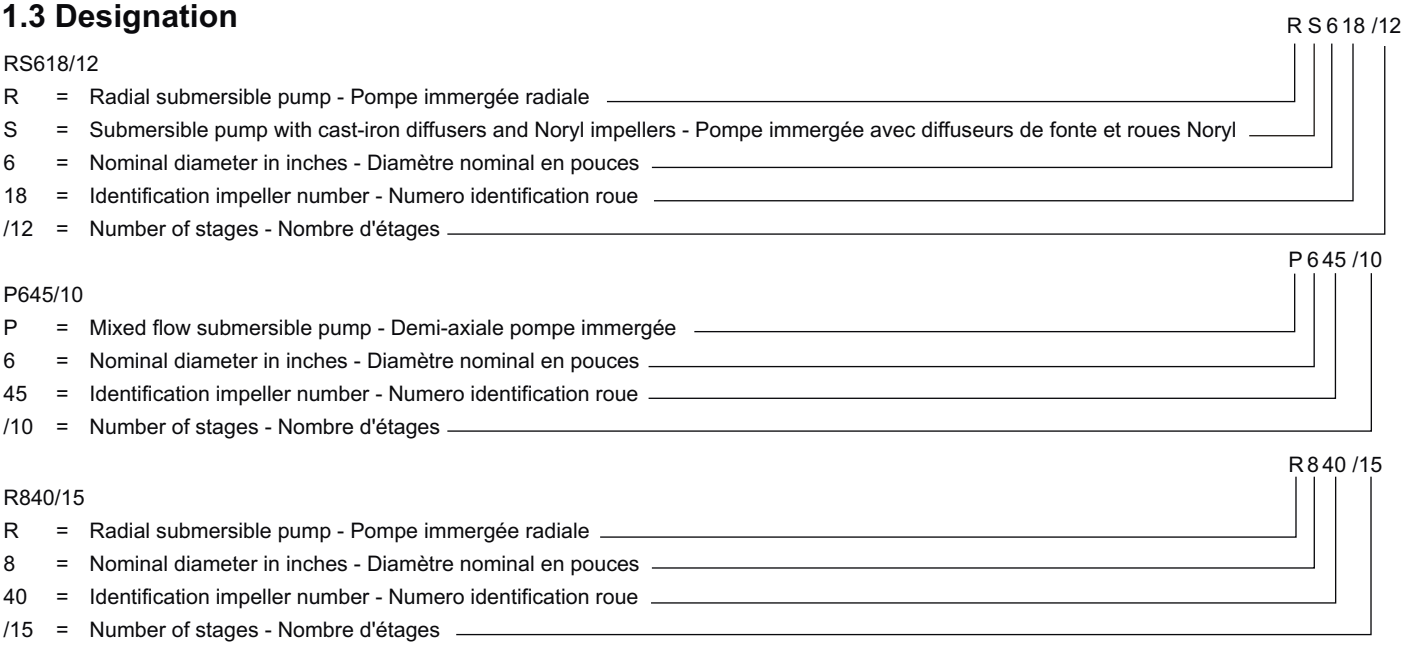
These User Instructions contain specific safety markings where non-observance of an instruction would cause hazards. The specific safety markings are:

This symbol indicates safety instructions where non-compliance would affect personal safety and could result in loss of life.

This symbol indicates electrical safety instructions where non-compliance will involve a high risk to personal safety or the loss of life.

DANGER This symbol indicates safety instructions where non-compliance will involve some risk to safe operation and personal safety and would damage the equipment or property.

1.3 Designation



1.4 Pumped liquids

Standard submersible pumps serve to transport cold clean water under normal operating conditions. Pumped liquids must be: clean, thin, free of solid particles or fibres, compatible with pump components and materials. The maximum sand content of the water must not exceed manufacturer's recommendations. A larger sand content will reduce the life of the pump and increase the risk of blocking. When pumping liquids with a density higher than that of water, motors with correspondingly higher outputs must be used. Other uses or operating purposes must be agreed upon with the manufacturer.

2.0 Safety instructions

These operating instructions contain fundamental information which must be complied with during installation, operation and maintenance. Therefore this operating manual must be read and understood both by the installing personnel and the responsible trained personnel/operators prior to installation and commissioning, and it must always be kept close to the location of operation of the machine/unit for easy access. The operator is responsible for ensuring that all maintenance, inspection and installation work be performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual. If the personnel in question do not already possess the necessary knowledge and skill, appropriate training and instruction must be provided.Work on the machine must be carried out only during standstill. The shutdown procedure described in the manual for taking the machine out of service must be adhered to without fail.

DANGER **The unit may only be operated by trained personnel, only in a completely assembled condition, and with a completely filled and immersed pump unit.**

All work on the electrical system may only be performed by qualified electrician!

- Guards for movable parts (e.g. coupling) must not be removed from the machine while it is in operation.

- Danger from electric energy must be eliminated (for details see e.g. the regulations of the VDE and the local power supply companies).

Before maintenance and repair work, the motor of the pump unit must first be completely separated from the power supply.

Pumped liquids that may be hazardous to health must be decontaminated prior to maintenance.

2.1 Unauthorised modification and manufacture of spare parts

Modifications or alterations of the machine are only permitted after consultation with the manufacturer. Original spare parts and accessories authorised by the manufacturer ensure safety.

2.2 Statement of non-liability

By not heeding this documentation, product liability is rendered void.

3.0 Description of the product

3.1 Technical specification P6 - P8 - P10

KSP submersible pumps are multistage centrifugal types which operate below water level and driven by an electric submersible motor. KSP submersible pumps Series P6 – P8 – P10 represent the strength and consistence towards pumping instances. Lightweight, low operating and maintenance cost are some advantages among others. KSP submersible pumps are well-tested machines, ideal for raising capacities up to 400m^3/h and delivery heads up to 600m. Bowls are provided of sturdy cast-iron with incorporated sleeve bearings for shaft protection. Closed-type impellers made of high quality bronze are fastened with a split, tapered bushing that locks impeller firmly in place. Valve casing of cast-iron incorporates a non-return valve of bronze for preventing the hydraulic system of water hammering. Suction casing is made of high strength cast-iron with a fitted stainless steel strainer which facilitates the smooth approach of fluid to the suction impeller and restricts the entry of foreign objects. KSP submersible pumps can be totally offered of bronze. All mounting dimensions are in accordance with NEMA standards.

3.2 Technical specification RS6 – R8

KSP submersible pumps Series RS6-R8 are characterized by a high number of stages with a short length, able to deal in great depths of installation and high heads. KSP submersible pumps are well-tested machines, ideal for raising capacities up to 70m^3/h and delivery heads up to 580m. Bowls are provided in high strength cast-iron. Series R8 bowls incorporate steel bearing for shaft protection. Closed-type radial impellers are made of bronze for Series R8 and of reinforced Noryl for the Series RS6. Valve casing of both series is made of cast-iron and incorporates a bronze, non-return valve with stainless steel spring preventing from water hammering and friction losses. Series R8 valve casing is integrated steel bearing which prevents from malfunction when the pump shaft begins to whip. Suction casing is made of cast-iron. A steel bearing is fitted, specifically designed to handle loading presenting in a pumping application and prevents shaft misalignment. An external stainless steel strainer reduces the amount of sediment that can enter in the pump. All mounting dimensions are in accordance with NEMA standards.

3.3 Mounting arrangements

Except the pump types RS6, P642 and P8250, the following pump types can be offered either with thread or flange connection: P6 – P8 – P10.

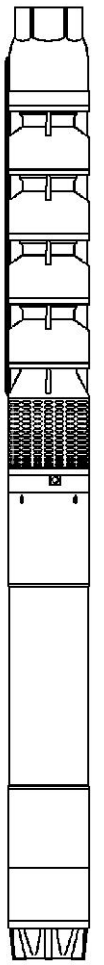


Figure 3-1: Thread connection

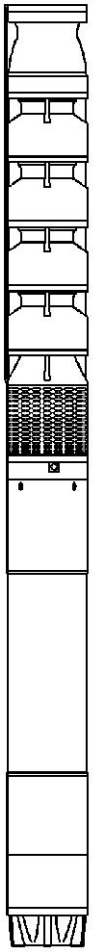


Figure 3-2: Flange connection

4.0 Transport and Intermediate storage

4.1 Delivery

These submersible pumps are supplied from the factory in proper packing. The unit must be taken out of its packaging immediately upon receipt and checked for possible damage, completeness and correctness. If damage has been determined, notify the carrier immediately. During unpacking and prior to installation, care must be taken when handling the pump to ensure that misalignment does not occur due to bending.

4.2 Handling

DANGER **Take special care when handling the pump unit. Avoid hitting the pump against massive objects during handling and transport!**

Examples for correctly transporting pump and motor:

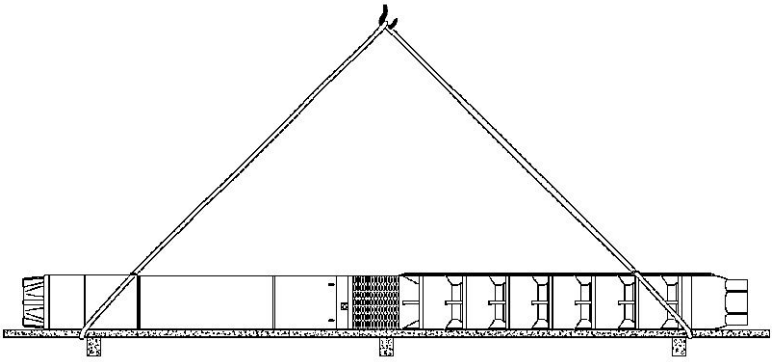


Figure 4-1: Horizontal proper handling

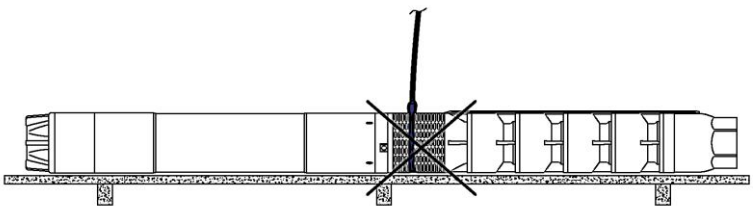


Figure 4-2: Improper handling

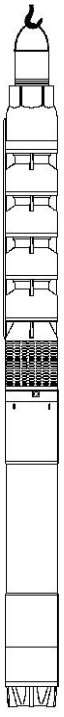


Figure 4-3: Vertical proper handling

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DANGER **Due to the danger of sagging, overlong pump units must be supported by an auxiliary carrier (U or H carrier) when lifted into the vertical position. This carrier may only be removed after the pump unit is hanging vertically from the crane or lifting block. (See Figure 4-4.)**

DANGER **For transport, ensure that the hoist has an adequate carrying capacity.**

DANGER **Under no circumstances must the power cables be used for lifting or moving the motor.**

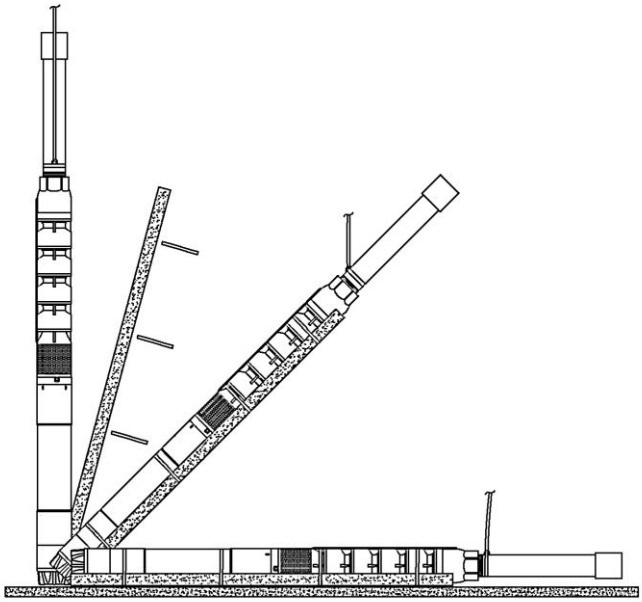

Figure 4-4

4.3 Intermediate storage

- Storage location must be free of dust, dry and protected against heat and frost.
- The pump should not be exposed to direct sunlight. If the pump has been unpacked, it should be stored horizontally, adequately supported or vertically, secured appropriately in this position to prevent tipping over.
- For storage between one and three months, it is recommended that the shaft of the unit be turned at intervals. On pump units where this is not possible, the pump and motor must be separated.
- Long-time storage of more than 3 months: preservation required!
- The leads of the power supply cables must be protected from moisture. Also be careful that the power supply cables are not bent during storage.
- Storage temperatures:
  a) +50 to -25 °C (+122 to -13 °F) for units with unfilled motors.
  b) +50 to 0 °C (+122 to +32 °F) for units with water-filled motors without antifreeze.

5.0 Assembling the motor and pump

5.1 Checking of liquid in motor

The submersible motors are factory-filled with clean water.

The level of the liquid in the motor must be checked and the motor must be refilled, if required. Use clean water.

Refilling of liquid is carried out as described below.

The filling hole for motor liquid is placed in the top of the motor.

Filling procedure:

1. Place the motor vertically with the top of the motor upwards, see fig. 5.1
2. Unscrew the plug 1 and place a funnel in the hole.
3. Pour water into the motor until the motor liquid inside the motor starts running out at plug 2.
4. Remove the funnel and refit the plugs 1 and 2.

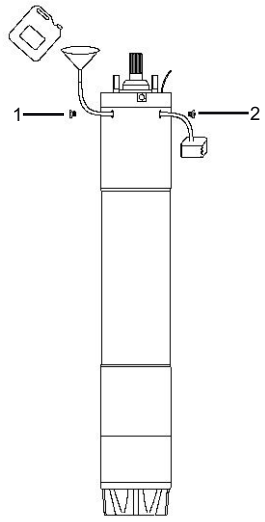

Figure 5-1: Correct way to fill the motor

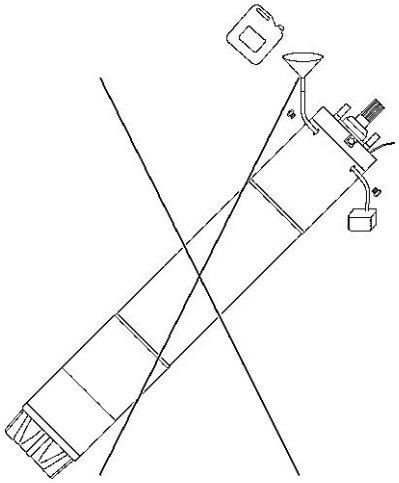

Figure 5-2: Incorrect way to fill the motor

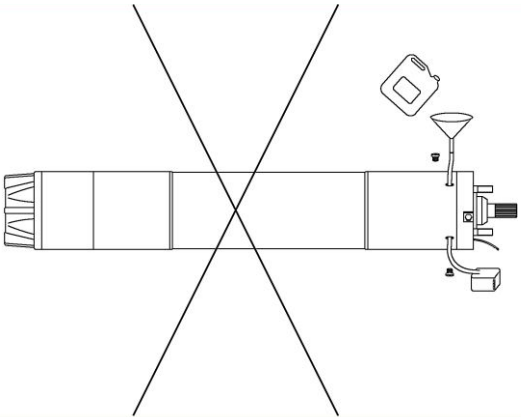

Figure 5-3: Incorrect way to fill the motor

5.2 Shaft rotation test

Check the motor shaft for smooth rotation before assembly with the pump. It runs freely after overcoming static friction.

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5.3 Assembly

1. Remove the motor's shaft guard
2. Remove pump's strainer.
3. Make sure that the mating surfaces of the parts to be connected are free of dust and dirt.
4. Align pump and motor shafts to each other and join pump and motor together.
5. Bolt motor and pump together and tighten the fastening screws crosswise, as specified.
6. Replace pump's strainer.

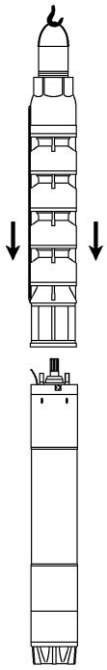


Figure 5-4: Vertical assembly

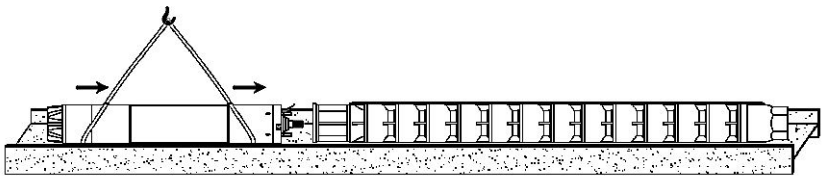
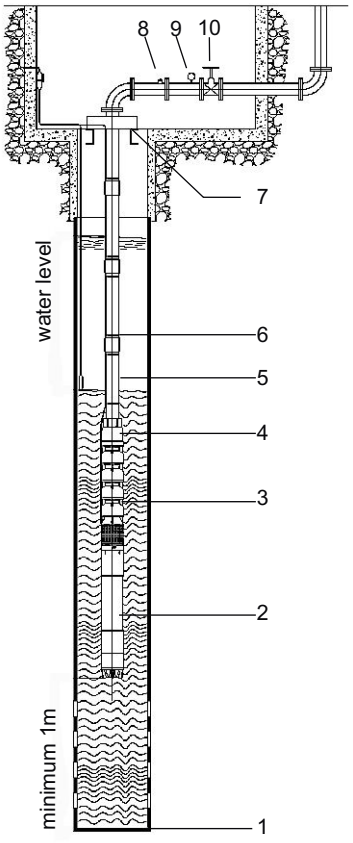


Figure 5-5: Horizontal assembly

6.0 Installation

6.1 Hydraulic installation

A typical design for a water supply system is shown in Figure 6.1. As this shows a basic arrangement, the actual layout must be adapted to local conditions.



1	Clearence area for silt disposit
2	Submersible motor
3	Submersible pump
4	Non-return valve
5	Rising main
6	Cable clip
7	Supporting claml/well head
8	Water meter
9	Manometer
10	Isolating valve

Figure 6-1: Vertical installation, pump without shroud

6.2 Installation site specifications

- Make sure that transporting the pump unit or its components to or from the installation site is possible without any hazard.
- Appropriate lifting gear and attachment devices must be available.

6.3 General advice for installation

6.3.1 Vertical installation

The following criteria must be taken into account to determine the installation position and depth:

- Vertical fitting in a well above the filter line, so that a perfect flow is guaranteed along the external motor surface.
- Sufficient water cover.
- A static water level at least 2m above the pump exit.
- A dynamic water level above the suction housing, taking into account the required NPSH value (see pump characteristic) for the pump.
- Flow rate (see pump characteristic).
- Access to the inlet strainer must be unblocked.
- Make sure that the well is free from mud and sand deposits.

- Ensure that the line voltage (measured between two phases) is equal to the motor voltage according to the rating plate.
- The maximum permissible voltage fluctuation can be seen in motor label. Greater voltage and frequency fluctuations must be given in the order and confirmed by the factory.
- It must be ensured that the well diameter is large enough down to the fitting depth, so that the pump unit can be fitted without difficulties.
- When pump units are installed in narrow wells the steel pipes or hose lines, will need to be centralised to prevent them from touching the wall of the well which could cause damage to any cables fastened to them.

6.3.2 Horizontal installation

- When the pump is installed horizontally, the discharge port should never fall below the horizontal plane, see fig. 6.2.

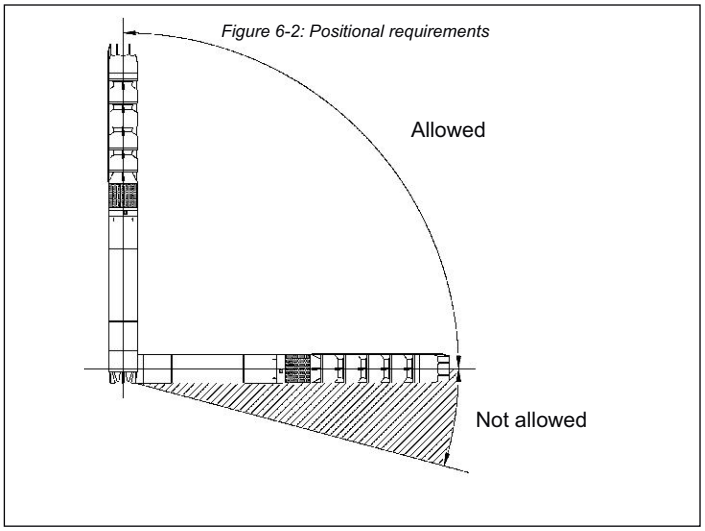


Figure 6-2: Positional requirements

It is recommended fitting a motor cooling jacket if the pump is installed in a horizontal position.

- During operation, the lowest water level must be such that the pump does not draw in any air.
- The pump is not suitable for completely draining the tank.
- It is recommended cleaning the suction strainer and the motor surface if they are heavily soiled.

6.3.3 Pumps with shrouds

Motor cooling/sand protection jacket

Serves to increase the flow velocity on the motor surface to enhance the heat dissipation in the following cases:

- too high liquid temperature.
- too low flow velocity on the motor surface.
- deposits on the motor surface due to the liquid composition.
- water inflow in the well above the motor.
- protects the pump against increased sand catchments.

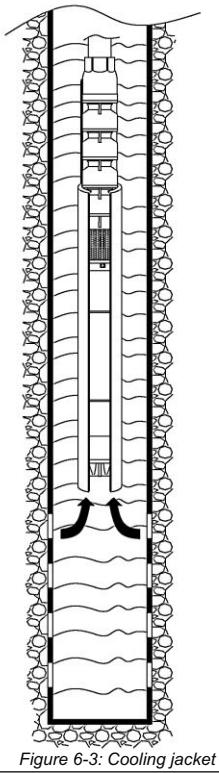


Figure 6-3: Cooling jacket

6.4 Vertical installation of pre-assembled pump unit

Heed the following factors when selecting the hoisting device:

- weight of the unit including the cables
- weight of the rising main
- for removal: additional weight of the water filling in the rising main

To detect cable damages right away, measure the resistance at regular intervals during lowering.

The cable must be carefully rolled up or laid out during installation (and also during removal of the unit) to prevent damages to material and injuries to persons caused by the cable being pulled inevitably if a pump should drop into the well.

DANGER **Make sure that no one steps into the rolled-up cable loop.**

Long pump units must be supported with a reinforcement to avoid sagging during rising. Remove the reinforcement only when the unit is vertically suspended from the crane or tackle.

1. Mount the first length of the ascending pipe, which should not be longer than 0.5 m onto the assembled pump unit.
2. Fasten the power supply cables and, if necessary, the control lines and /or instruments lead with clamps onto the ascending pipe.
3. Attach a “fitting bracket” (3) beneath the ascending pipe flange or sleeve and hang the complete unit from a suitable hoist.

1. Lower the pump unit into the well until the fitting bracket is resting on the well pipe or well head.
2. Attach the next length of the ascending pipeline (4). Secure the power supply cables and, if necessary, the control lines and/or instrument lead approx 0.5 m above the flange with a clamp.
3. Connect a second fitting bracket (6) beneath the upper flange or beneath the sleeve with screwed pipes. Hang the unit onto the hoist with the upper fitting bracket, rise a bit, release the lower fitting bracket and sink the unit slowly into the well.

DANGER **Do not let the pump slip through the bracket!**

When lowering the unit, proceed so that the power supply cable is neither squeezed nor scraped. In order to protect the power supply cables, we recommend lining the well head at the entry point of the power supply cable into the well pipe with a rubber sheet and feed it into the well shaft using a cable roller (see Fig. 6.4). During the lowering, the unit must always hang freely and must not become wedged in the well casing-tube. One control possibility: the pump can be rotated freely. Attach a second cable clamp about 0.5 m beneath the upper flange/sleeve. Lower the unit far enough for the fitting bracket to sit on the well head and then screw on the next piece of the ascending pipeline. If needed, attach a cable clamp every 3 m of pipe length. Install the remaining riser pipes as described from point 2. to 6.

For especially narrow and deep wells, the insulating measurements should be repeated, during installation process, in order to be able to determine possible damage to the power supply cables in time.

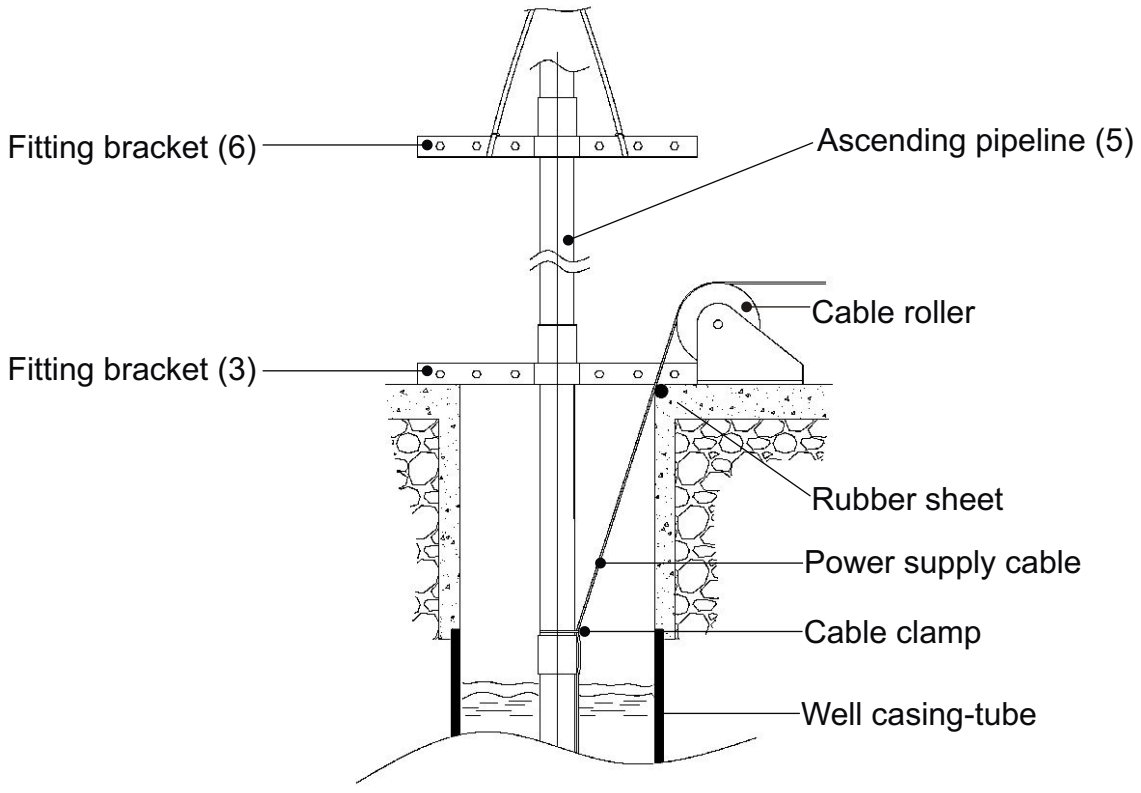


Figure 6-4

6.5 Horizontal installation of pre-assembled pump unit

Pumps may only be installed in a horizontal position if this has been permitted by the manufacturer.

- Using an appropriate hoisting device, lower the pump unit onto the prepared support in the basin after topping up the motor (as for vertical installation).

- Secure the pump unit on the steel supports.

- Support the pump unit in its centre of gravity. Several supports are required for pumps with many
stages.

- Heed the minimum water level. The minimum water level above the pump must be dimensioned in dependence of the capacity and if it is used a motor cooling shroud.

6.6 Electrical Connection

Before starting work on the pump, make sure that the electricity supply has been switched off and that it cannot be accidentally switched on.

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

DANGER **The motor must be earthed and connected to an external mains switch with suitable earth leakage installed by a qualified electrician.**

Detailed information about the connection of motors and, if necessary, of control and monitoring devices can be taken from the appropriate circuit diagrams from the switch cupboard manufacturer. So that a perfect connection with the least possible contact resistance can be established when connecting the power supply lines, the conductor ends should not be tin -plated. Should the conductor ends be tin-plated, the tin -plated ends must be removed. The individual exposed fine-strand wires must be connected to the electrical system by suitable terminal screws or with crimping or soldering cable lugs.
When the pump has been connected to the electricity supply, determine the correct direction of rotation as follows. Prior to installation, manually start the pump unit for no longer than 2 seconds run time, then turn off.

If the pump has been installed, please refer to below steps to determine rotation:

1. Start the pump and check the quantity of water and head developed.
2. Stop the pump and interchange two of the phase connections. In the case of motors wound for star delta starting, exchange U1 by V1 and U2 by V2.
3. Start the pump and check the quantity of water and head developed.

4. Stop the pump.

5. 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.

7.0 Start-Up

Briefly start the pump against the almost closed gate valve (open only so far that the air can escape) and compare the attained delivery head against the manufacturer's specifications. Then open the gate valve until the operating point is reached. When the values for delivery flow and delivery head are significantly lower, an incorrect direction of rotation may be the cause. In such a case, 2 phases of the power cable must be swapped. Normally, the pump reaches its highest pressure with the gate valve closed and while rotating in the correct direction.

The unit must not be driven longer than 3 minutes in the wrong direction.

If there are impurities in the water or if it is a newly drilled well, 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. Opening the slide valve gradually, watch the current consumption of the motor on the ammeter as also check the drawdown of the water level to ensure that the pump always remains submerged. Slowly open the slide valve until the ammeter shows the operational current according to the data sheet. When the operating point has been reached for which the pump unit was designed, current consumption must approximately coincide with that given in the data sheet. If this is not the case, the fitting conditions and electrical connections must once again be checked. If there are no abnormalities during and after the test run, the pressure pipe can be connected if this has not yet been accomplished.

The dynamic water level should always be above the suction motor adaptor of the pump.

If the pump can pump more than yielded by the well, it is recommended to fit a control unit of dry-running protection. If no water level electrodes or level switches are installed, the water level may be drawn down to the suction motor adaptor of the pump and the pump will then draw in air. Long time operation with water containing air may damage the pump and cause insufficient cooling of the motor.

8.0 Maintenance/Servicing

8.1 Pump unit

While K.S.P. submersible pumps do not require regular maintenance, it is a good practice to monitor the conditions and performance of the pump and motor. If a pump unit should stand idle for a longer period of time, perform a 10 minute test run every 2-3 months, so that malfunctions can be recognized in time.

The pump unit must be completely submersed in pumping medium for this test run.

This diagnosis may be carried out by checking the maximum pressure (shut valve for a very short period) generated by the pump, and by checking the amperage draw of the motor at standard duty flow rate. Both these figures should be compared to pressures and current draws recorded when the unit was initially installed. Any reduction in pressure may indicate wear in the pump, while any increase in motor current indicates a possible overload condition. Consult the pump service chart for further diagnosis of possible causes.

8.2 Electrical system

All the work on the electrical system may only be performed by qualified electricians!

8.3 Removal

If the pump unit is equipped with a non-return valve, the unit weight with the ascending pipelines and the water column contained within it must be lifted during removal.

8.4 Notes of disassembly and assembly

Only qualified personnel may disassemble and assemble the pump as shown in the sectional drawings (ref. to section 10.0). The order of the steps can be deriving from the sectional drawings or can be requested from the manufacturer.

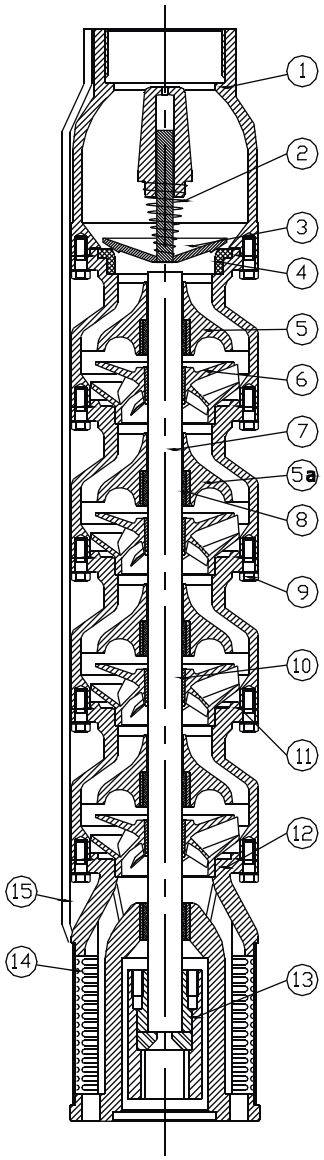
9.0 Operating problems and their elimination

Fault	Probable cause	Probable remedy
1. The pump does not start	a) The fuses are blown	Replace the blown fuses. If the new onew blow too, the electric installation and the submersible drop cable should be checked
	b) Motor protection triggered	Find cause for triggering, rectify and reset motor circuit breaker
	c) No electricity spply	Contact the electricity supply authorities
	d) The motor starter overload has tripped out	Reset the motor starter overload (auto-matically or possibly manually). If it trips out again, chek the voltage. Is the voltage OK, see items e) - h)
	e) Motor starter/contactor is difective	Replace the motor starter/contactor
	f) Starter device is defective	Repair/replace the starter device
	g) The control circuit has been interrupted or is defe-ctive	Check the electric installation
	h) The dry-running prote-ction has cut off the electri-city supply to the pump, due to low water level	Check the water level. It is OK, check the water level electro-des/level switch
	i) The pump submersible drop cable is defective	Repair/replace the pump's cable
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 3a)
	c) The non-return valve is stuck in its shut position	Pull out the pump and clean or replace the valve
	d) Blocked pump	Pull out the pump and clean the strainer
	e) The pump is defective	Repair/replace the pump
3. Flow inadequate	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) Incorrect rotating dire-ction	Change direction of rotation
	c) The valves in the discha-rge pipe are partly closed/ blocked	Check and clean/replace the valves, if necessary
	d) The discharge pipe is partly choked by impurities	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	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) Pressure pipe leak	Check and repair the pipework
	i) The riser pump is defecti-ve	Replace the riser pipe
	k) Rotating speed too low	Check system voltage and frequency
4. Unit runs but does not pump	a) Head too great	Reduce head
	b) Motor runs but pump does not turn	Pull out the pump, check/replace pump's coupling, if neces-sary

9.1 Checking of motor and cable

1. Supply voltage	Measure the voltage between the phases by mean of a voltmeter. Connect the voltmeter to the terminals in the motor starter	The voltage should, when the motor is loaded, be within the specified range. The motor may burn if there are larger variations in voltage. Large variations in voltage indicate poor electricity supply and the pump should be stopped until the defect has been remedied
2. Current consumption	Measure the amps of each phase while the pump is operating at a constant discharge head (if possible, at the capacity where the motor is most heavily loaded).	On three-phase motors, the difference between the current in the phase with the highest consumption and the current in the phase with the lowest consumption should not exceed 5 %. If so, or if the current exceeds the full load current, there are the following possible faults: • The contacts of the motor starter burnt. Replace the contacts or the control box for single-phase operation • Poor connection in leads, possibly in the cable joint. See item 3 • Too high or too low supply voltage. See item 1 • The motor windings are short-circuited or partly disjointed. See item 3 • Damaged pump is causing the motor to be overloaded. Pull out the pump for overhaul • The resistance value of the motor windings deviates too much (three-phase). Move the phases in phase order to a more uniform load. If this does hot help, see item 3
Items 3 and 4: Measurement is not necessary when the supply voltage and the current consumption are normal		
3. Winding resistance	Disconnect the submersible drop cable at the motor starter. Measure the winding resistance between the leads of the drop cable	For three-phase motors, the deviation between the highest and the lowest value should not exceed 5 %. If the deviation is higher, pull out the pump. Measure motor, motor cable and drop cable separately, and repair/replace defective parts
4. Insulation resistance	Disconnect the submersible drop cable at the motor starter. Measure the insulation resistance from each phase to earth (frame). Make sure that the earth connection is made carefully	If the insulation resistance is less than 0,5 MΩ, the pump should be pulled out for motor or cable repair. Local regulations may specify other values for the insulation resistance

10.4 Submersible pump P6 (with thread connection)



Pos.	Code	Designation	Denomination
1	02.95.01	Valve casing Corps du clapet	Cast iron Fonte
2	16.95.03	Spring Ressort	Stainless steel Acier inox
3	07.95.05	Non-return valve Soupape du clapet	Bronze Bronze
4	17.02.09	Wear ring Bague d'usure	Rubber Caoutchouc
5	03.66.01	Diffuser Diffuseur	Cast iron Fonte
5a	03.65.01	Diffuser Diffuseur	Cast iron Fonte
6	04.82.05	Impeller / Roue 645	Bronze / Bronze
	04.83.05	Impeller / Roue 656	
	04.81.05	Impeller / Roue 660	
	04.80.05	Impeller / Roue 670	
7	13.25.10	Shaft Arbre	Chrome steel Acier chrome
8	17.08.03	Bearing Palier corps d'etage	Stainless Steel-Rubber Acier inox-Caoutchouc
9	15.25.03	Screw Vis	Stainless steel Acier inox
10	05.25.05	Bushing Douille conique	Bronze Bronze
11	17.03.09	O.Ring Bague O.R.	Rubber Caoutchouc
12	01.65.01	Suction casing Corps d'aspiration	Cast iron Fonte
13	18.95.03	Coupling Accouplement	Stainless steel Acier inox
14	25.44.03	Strainer Crepine d'aspirant	Stainless steel Acier inox
15	21.00.03	Cable guard Gaine du câble	Stainless steel Acier inox

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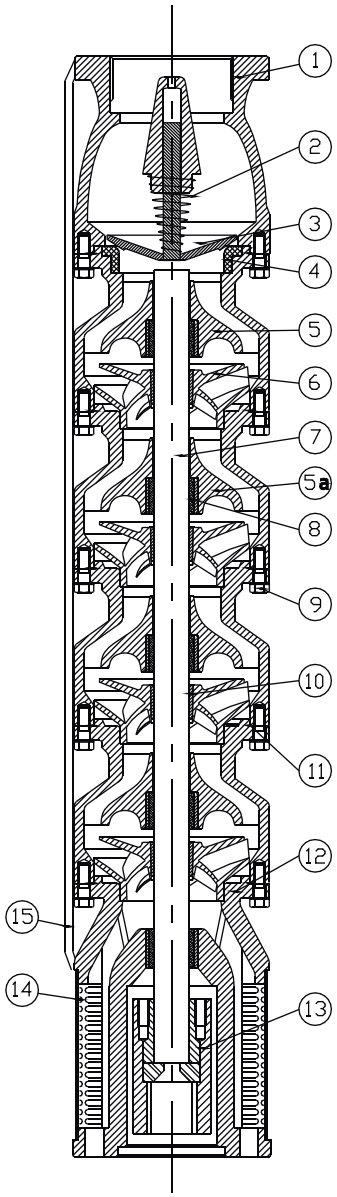
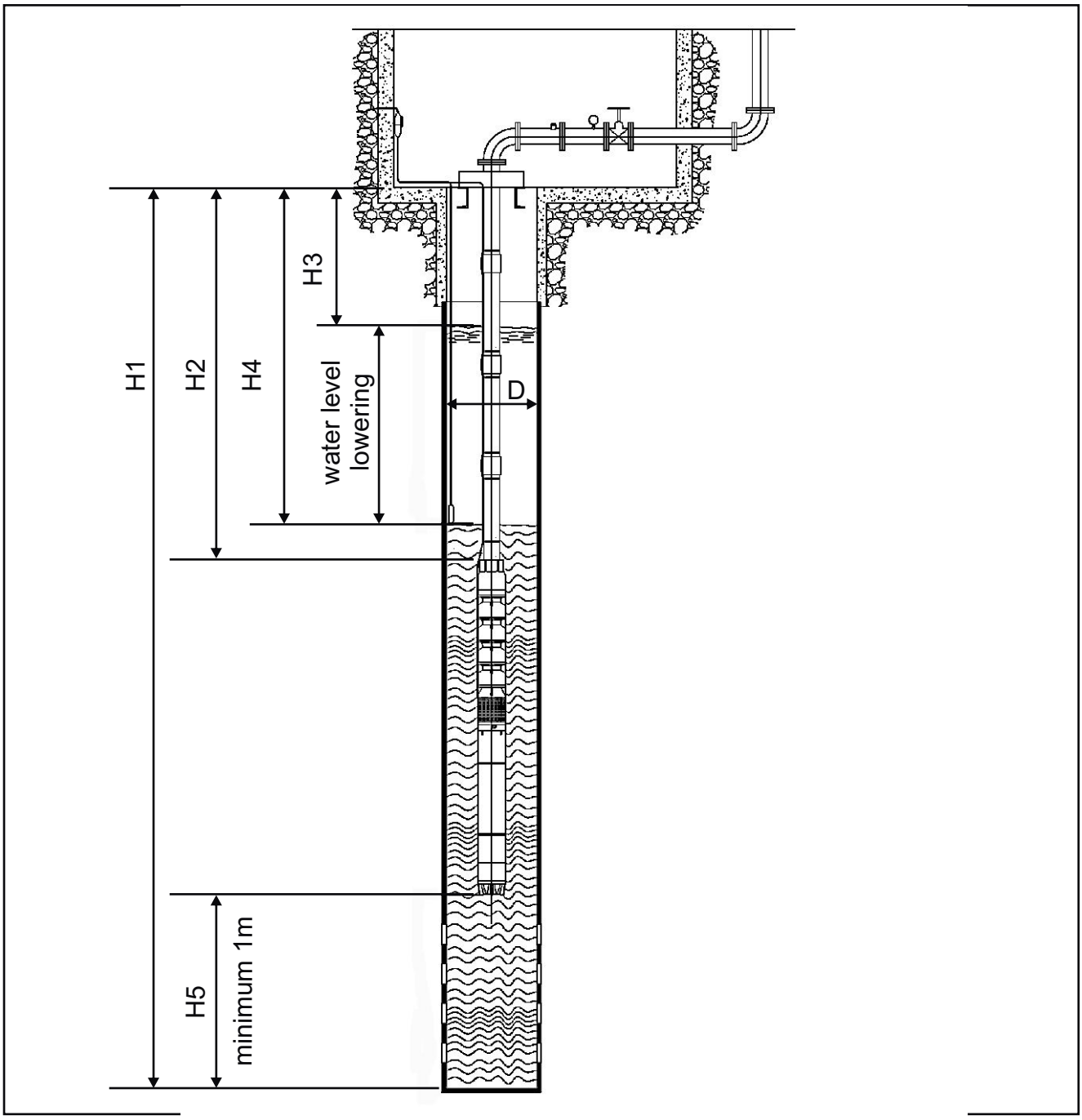
10.5 Submersible pump P6 (with flange connection)



Pos.	*Code*	*Designation*	*Denomination*
1	02.22.01	Valve casing Corps du clapet	Cast iron Fonte
2	16.95.03	Spring Ressort	Stainless steel Acier inox
3	07.95.05	Non-return valve Soupape du clapet	Bronze Bronze
4	17.02.09	Wear ring Bague d'usure	Rubber Caoutchouc
5	03.66.01	Diffuser Diffuseur	Cast iron Fonte
5a	03.65.01	Diffuser Diffuseur	Cast iron Fonte
6	04.82.05	Impeller / Roue 645	Bronze / Bronze
	04.83.05	Impeller / Roue 656	
	04.81.05	Impeller / Roue 660	
	04.80.05	Impeller / Roue 670	
7	13.25.10	Shaft Arbre	Chrome steel Acier chrome
8	17.08.03	Bearing Palier corps d'etage	Stainless Steel-Rubber Acier inox-Caoutchouc
9	15.25.03	Screw Vis	Stainless steel Acier inox
10	05.25.05	Bushing Douille conique	Bronze Bronze
11	17.03.09	O.Ring Bague O.R.	Rubber Caoutchouc
12	01.65.01	Suction casing Corps d'aspiration	Cast iron Fonte
13	18.95.03	Coupling Accouplement	Stainless steel Acier inox
14	25.44.03	Strainer Crepine d'aspirant	Stainless steel Acier inox
15	21.00.03	Cable guard Gaine du câble	Stainless steel Acier inox

11.0 Protocols

11.1 Installation protocol



Serial number of the pump:		
Serial number of the motor:		
H1	Well depth	m
H2	Installation depth	m

H3	Depth of operating water level	m
H4	Depth of minimum water level	m
H5	Distance between lower edge of motor and well bottom	m
D	Well diameter	m

11.2 Commissioning protocol

1. Switch on the pump with the isolating valve opened slightly
2. Check the direction of rotation for the submersible unit and correct if necessary
3. Read the manometer:

Pressure with isolating valve closed:		bar
Pressure with isolating valve completely opened:		bar

4. Determine dimension H3 (see page 27)

Depth of operating water level	m

5. Deternine the delivery head of the pump (=H3 + manometer reading, converted to m)
6. If the measure delivery head is lower than the requested delivery head:

   Close the isolating valve somewhat (throttle)

Manometer reading after throttling:	m

7. Determine the electricl data of the motor, adjust the motor protection according to the motor manual

Current consumption	L1 A	L2 A	L3 A
Voltage			V
Frequency			Hz

8. Start type:

Direct-on-line	Autotransformer	Star-delta

9. Read/determine the operating data:

Capacity	m^3/h
Water temperature	^oC
Sand content in the liquid	yes/no

10. Commisioning performed:

Date	Name	Signature

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