
**ISTRUZIONI PER L'INSTALLAZIONE E LA MANUTENZIONE
INSTRUCTIONS DE MISE EN SERVICE ET D'ENTRETIEN
INSTRUCTIONS FOR INSTALLATION AND MAINTENANCE
INSTALLATIONSANWEISUNG UND WARTUNG
INSTRUCTIES VOOR INGEBRUIKNAME EN ONDERHOUD
INSTRUCCIONES PARA LA INSTALACION Y EL MANTENIMIENTO
INSTALLATIONS - OCH UNDERHÅLLSANVISNING
ΟΔΗΓΙΕΣ ΓΙΑ ΤΗΝ ΕΓΚΑΤΑΣΤΑΣΗ ΚΑΙ ΤΗ ΣΥΝΤΗΡΗΣΗ
KULLANIM VE BAKIM TALİMATLARI
ИНСТРУКЦИИ ПО МОНТАЖУ И ТЕХНИЧЕСКОМУ ОБСЛУЖИВАНИЮ
INSTRUCȚUNI PENTRU INSTALARE ȘI ÎNTREȚINERE
INSTRUÇÕES PARA A INSTALAÇÃO E A MANUTENÇÃO
INSTRUKCJE OBSŁUGI I KONSERWACJI
INSTALLÁCIÓS ÉS KARBANTARTÁSI UTASÍTÁS
إرشادات خاصة بعملية التركيب والصيانة**

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The appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.



Ensure that the product has not suffered any damage during transport or storage.

Check that the outer casing is unbroken and in excellent conditions.

1.1 Safety

Use is allowed only if the electric system is in possession of safety precautions in accordance with the regulations in force in the country where the product is installed (for Italy CEI 64/2).

1.2 Responsibility

The Manufacturer does not vouch for correct operation of the machine or for any damage that it may cause if it has been tampered with, modified and/or run outside the recommended work range or in contrast with other indications given in this manual.

2. PUMPED FLUIDS

The machine has been designed and built for pumping water, free from explosive substances and solid particles or fibres, with a density of 1000 kg/m³ and a kinematic viscosity of 1 mm²/s, and chemically non-aggressive liquids.

Small sand impurities of 50 gr./m³ - Ø 1 mm are accepted.

3. TECHNICAL DATA

3.1 Pump and motor group

The electric pump is a centrifugal multistage pump with submersible motor and built-in non return valve, designed to minimize friction losses.

The impellers are dinamically balanced and the shafts are driven by co-axial bush bearings. The electric pump is manufactured in two versions, radial flow and mixed flow.

The radial version features compact axial stages made of stage casing, impeller and diffuser, allowing the assembling of a large number of stages to reach higher delivery heads.

The mixed flow stages features instead stage casings with built-in diffusers and semi-axial impellers. This kind of pump is employed in place of radial versions when higher capacities are required with the same well diameter.

1. GENERAL



Read this documentation carefully before installation.

Installation, electrical connection and commissioning must be carried out by skilled personnel in compliance with the general and local safety regulations in force in the country of installation of the product. Failure to comply with these instructions not only causes risk to personal safety and damage to the equipment, but invalidates every right to assistance under guarantee.

3.2 Construction features

Pump nameplate reports the following informations:

- Manufacturer
- Pump type
- Serial number
- Capacity (m³/h)
- Head (meters)
- Month/ year of construction
- Break Power (kW)
- Shaft speed (min-l)

3.3 Applications

Submersed electric pumps are mainly employed in the following applications:

- Industrial and civil applications
- Irrigation systems
- Water supply systems
- Mining
- Offshore
- Nuclear and steam power stations
- Fire-fighting equipments

Motors are guaranteed for plant operation up to 20 bar. Maximum allowable water temperature in standard constructions is 25°C. For higher temperatures, please consult our Technical Department.

The pumps should be used only for the applications specified in par. 3.3.

In case of applications not specified on this manual, please contact DAB PUMPS to check for pump suitability, installation safety and pump life.

Before working on the pump, make sure the electric components of the concerned installation are disconnected from main power supply.

4. MANAGEMENT

4.1 Storage

During storage, please observe the following precautions:

- Store the pump in a closed, dry and airy environment.
- All motors are filled with a water/ antifreeze mixture to prevent internal freezing up to -30°C.
- Motors should not be stored or installed with lower temperatures or for periods longer than 12 months; however, if this is unavoidable, turn the shaft by hand once a month.
- If the motor has been stored for more than 12 months, disassemble it and check rotating parts and thrust bearing. Just before installation, drain completely the motor from the water/ antifreeze mixture and fill it with clear water, following the instructions reported on this manual.
- Protect cable ends against humidity.

- To avoid any damage to the electric cables, never bend them with a curving radius than lower 6 times their diameter.
- Protect against direct sunlight the pump/ motor group, the electric cables and, in case the pump will be stored partially dismantled, the rubber parts and the thrust bearings.

4.2 Transport

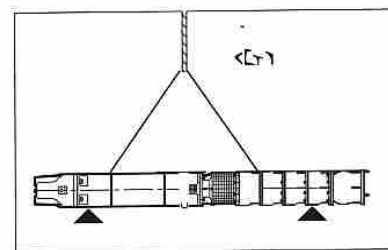
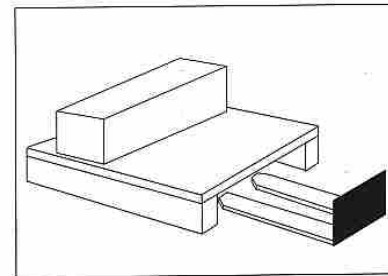
Before transportation, please perform the following checks:

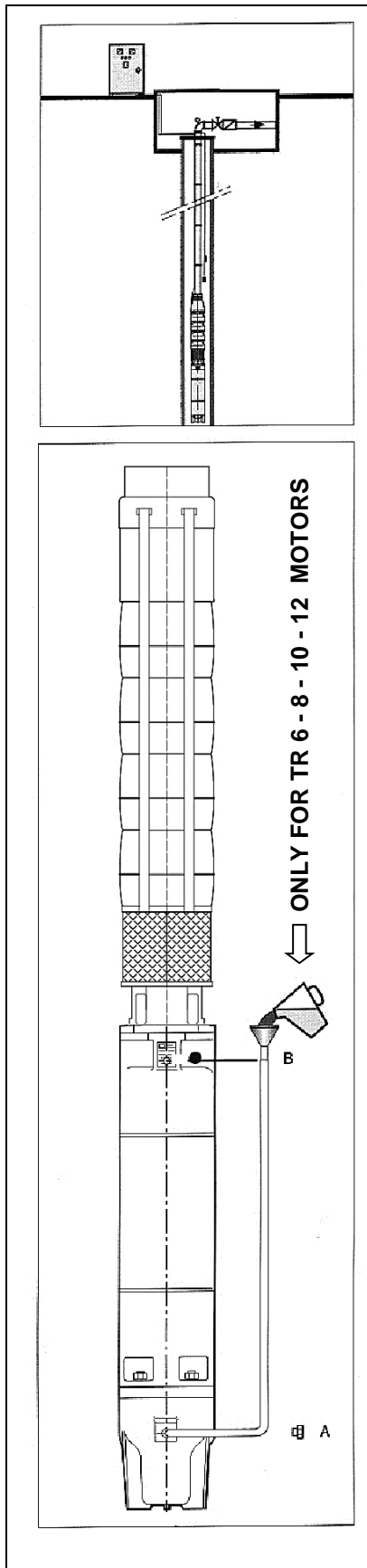
- Weight of pump/ motor group.
- Overall dimensions of pump/ motor group.
- Suitability of lifting points.

Pumping units and their accessories are packed in crates suited for transportation to avoid any damage on the way.

However, we recommend to inspect carefully the group at delivery.

The pump should be handled with equipment suited to its weight and to the shape of its crate (see side pictures). Lifting by hand is allowed only for weights lower than 20 kilograms.





5. INSTALLATION

For what concerns pump handling at the installation site, please refer to section.4.2.

Clean the well from sand or grit by applying the normal cleaning procedures.

Place the pumping unit at the top of the well, fasten it to the hoist hook and fill the motor as follows:

- Place the motor in vertical position.
- Remove filling plug (A) and replace it with the nipple equipped with pipe and funnel delivered with the motor.
- Remove vent plug (B) to bleed the air possibly trapped in the motor.
- Holding the funnel higher than the vent valve, pour clear water in the motor until the mixture already in starts dropping from the vent valve.
- Stop pouring water in the motor, screw valve (B) plug back in place, remove the nipple and screw valve (A) plug back in place.

The group should never run without being filled, since pump bearings are lubricated by the pumped fluid.

Dry running should be absolutely avoided even for a very short period, since it might heavily damage the pump.

Also, the pump should not rest on the well bottom as the motor would run in a high sand-concentration environment with a dangerous reduction of its cooling capacity and probable windings burn-out.

Check cable connection to the control panel terminals. Check also the calibration of thermal protection relays, which should be set according to rated break power.

Disconnect the group from main electric supply before lowering it in the well.

Fasten accurately the cable far end as the cable might fall in the well. Lower then the electric pump into the well with the help of two supporting brackets placed alternately on the pump column pipe.

Proceed in the following way:

- Connect the first column section to the pump delivery nozzle after having placed a splitted supporting bracket at the opposite end of the pipe. In case of threaded column pipes, place by the upper end the suited threaded sleeve to avoid possible sliding between pipe and bracket.
- Move the assembly with a hoist and lower it till the bracket will rest on the well opening.
- Fasten every 2 or 3 meters the electric supply cables to the pump column by means of suited bands. We recomend a firm fastening, since slacken cables will tend to slide down along the pipe due to their own weight, creating loose, bending sections which could violently rub against the well internal walls at pump startup and stopping.
- Connect the second column pipe, that too coupled to a supporting bracket at its top.
- Keep the assembly lifted and remove the first supporting bracket, then lower the unit as described at point (b).
- Repeat this operation till reaching the desired depth. The unit should be submersed for at least f or 2 meters below the water dynamic level, such however to fulfil its NPSH requirements. The water level, for seasonal drop or for an excessive pump delivery compared to well feeding, should never be lower than the pump suction chamber, as that could cause driving bushes seizing and motor overheating. Check the length of the column pipe while lowering the unit, to make sure the unit is installed at the right depth. Definitive fastening is performed by welding and bolting the last pipe flange to the well opening. In case of threaded pipes, these have to be completely tightened and possibly locked since the group reaction torque at startup could make them loose.



Flanges should be provided with suited slots to accommodate the wires.
 During the assembling use a suspension ring fastened to the column pipe, to avoid dropping the pump in the well in case of hoist failure or chain breaking.

6. ELECTRICAL INSTALLATION



**ATTENTION!
 ALWAYS RESPECT THE SAFETY
 REGULATIONS!!**

Electrical installation must be carried out by an expert, authorised electrician, who takes on all responsibility.

Attenersi scrupolosamente alle istruzioni del costruttore del motore e delle apparecchiature elettriche.



**THE SYSTEM MUST BE
 CORRECTLY AND SAFELY
 EARTHED!!**

Always switch off the mains power supply before working on the electrical or mechanical part of the system and make sure it cannot be switched on again accidentally.

- We recommend to install upstream the motor a safety switch to protect the motor against voltage drop or overload.
- Refer to voltage data on motor nameplate for its correct sizing.
- Leave 2 or 3 meters of cable more in case the terminal connection should be changed.

6.1 Power supply cable connection

The supply cable should be selected according to the Ampere flow, showed on motor nameplate.
 If the cable is not supplied with the motor, it should suit the following requirement:

- a) Its section should correspond to the one recommended by the motor manufacturer according to carried power, installation depth and motor starting system.
- b) Warranty required: up to 600V in water.
- c) Motor connection should be performed with extreme care.
- d) The cable should show no cuts, cracks, scratches or other damages.

If two cables have to be joined in parallel, pay extreme attention when connecting cables of the same color.

6.2 Electric system

The motor is connected by the supply cable to the control panel which contains the necessary control and protection devices. Since every difficulty, either mechanical or electric, will damage almost automatically the motor windings, it is necessary for the control and protection equipment to be adequate and reliable. Economy may, in this case, produce unpleasant results. We recommend besides an efficient grounding of the control panel.

6.3 Electric protections

In all case of:

- DOL starting,
- Star/ Delta starting,
- Stator starting,
- Autotrasformer,

Are necessary:

- An overload protection.
- A short circuit protection.

such protections should trip on all three phases.

We suggest besides protections against:

- Phase drop.
- Voltage drop.
- Water level drop.

6.4 Rotation direction

Check motor rotation direction before coupling the motor to the pump, so to avoid any damage to motor thrust bearing.



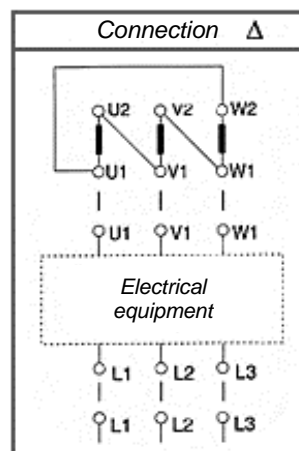
Find and mark by means of cyclic phase indicator, whose pointer is turning clockwise, mains terminals L1, L2 and L3 and connect them to control panel terminals L1, L2 and L3.



Electropumps turning in a counter-clockwise direction viewed from the delivery mouth



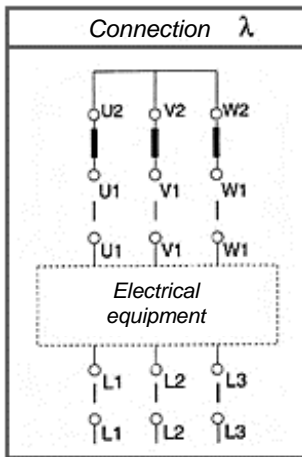
Electropumps turning in a clockwise direction viewed from the delivery



Star/delta starting

Motor cables are marked with letters U1-V1-W1 and U2-V2-W2. They have to be connected to control panel terminals, respectively: U1-V1- W1 and U2-V2-W2 for clockwise rotation (seen from motor/pump coupling).

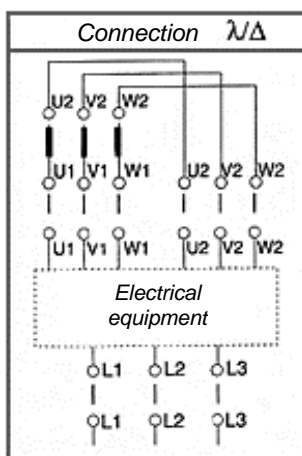
In case of counterclockwise rotation, reverse terminals U1-V1 and U2- W2.



DOL , stator and autotransformer starting

Motor cables are marked with letters U1, V1, W1 and have to be connected to control panel terminals, respectively: U1, V1, W1 for clockwise rotation (seen from motor/pump coupling). For counterclockwise rotation, reverse two of the cables.

6.5 Further instructions for six-cables motors terminals connection



Six cables motors can be started with a Star/Delta starter only if main voltage is at least equivalent to the motor minimum rated voltage.



To obtain the correct rotation direction, find main terminals L1, L2 and L3 as previously described.

7. COMMISSIONING AND STARTUP

7.1 Startup

- Start the pump with gate valve half opened to check rotation direction. When the water starts flowing, close further the gate valve: pressure rating should be higher than rated pressure value. If this is not the case, the rotation direction is wrong. Reverse two motor phases to restore the correct rotation direction.
 - The pump should not run in the wrong sense for more than 3 minutes. Close then the gate valve to about the half of its full opening and leave the pump running for a minute. Stop then the pump for five minutes to allow the dissolution of air bubbles which, if present, might endanger shaft lubrication.
 - Start the pump and gradually open the delivery gate valve till the water shows free of sand, or till the suspended sand has dropped to a sufficiently low percentage (40 g/m³).
 - Before definitively commissioning the pump, remove starter fuses and check the electric circuit integrity with an ohm-meter to make sure there have been no damages when lowering the pump in the well.
- If the results are negative, lift the group again and check it thoroughly.

- For three-phases units, the electric resistance value should be nearly the same for each phase.
- Check insulation resistance to the ground (i.e. between cable end and discharge pipe) using a megahoms-meter. Minimum value to the ground for a new pump is 10 megahoms with cold motor.
- However, if some malfunctioning is detected during startup, stop immediately the pump and investigate the problem.
- Check also that the pump runs within its operating limits and that voltage rates reported on control panel do not exceed motor nameplate rated values.
- If necessary, partially close gate valve or adjust the intervention of pressure switches.

The system should be fully completed before starting the pump, especially for what concerns electrical, mechanical and hydraulical components.



All safety systems must be correctly operating.

The pump cannot run for more than 3 minutes with the gate valve closed to avoid overheating of the unit.

7.2 Operation

The max. number of possible startups / hour depends from motor power and starter type.

- Up to 100 Hp = 10 startups / hour
- 100/200 Hp = 8 startups / hour
- above 200 Hp = 5 startups / hour

If the pump does not start, avoid insisting without having before investigated the reason.

All motors can afford ÷ 5% voltage deviation from rated voltage values.

7.3 Running tests

In case of pump malfunctioning, perform the following tests to find out the probable reasons:

FIRST TEST

- Close fully the gate valve.
- Note at startup the AMPS absorbed.
- Note during operation.
- Note pressure as reported by the pressure gauge on delivery.
- Note vertical distance between water level and the gauge dial center.

The following cases are possible:

Same pressure, same AMPS absorbed:

- If the gauge readings do not differ substantially from previous readings, the impellers are not worn and motor rotation is correct.
- If the AMPS absorber did not change from the original readings, the pump and motor internal rubbing did not increase and the percentage of water suspended sand is not representing a problem for the pump.

Lower pressure:

- Lower pressure means worn impellers, or too low main voltage.

Higher AMPS absorbed:

- This usually indicates a strong rubbing by the bearing journals due to suspended solids.

SECOND TEST

- Open completely the gate valve.
- Note the AMPS absorbed.
- Note pressure as reported by the pressure gauge.
- Note pump delivery as reported by the flow meter.

The following case is possible:

- Pump delivery lower than rated delivery. This can depend from scaling, from a clogged upstream valve or from leaks along the pipe line.

8. MAINTENANCE

- Periodical maintenance is strictly related to the percentage of water suspended sand.
- No maintenance is necessary as long as the pump keeps running efficiently, i.e. pump delivery keeps above 50% of rated delivery or the AMPS absorbed do not exceeds the 5% allowance.
- In some cases it will be necessary to replace worn parts such as impellers, sealing rings or bearings.
- In case of an high sand percentage, we suggest a first inspection after a 1000 running hours.
- During long idle periods in the well, the pump / motor groups should be shortly started every 2 or 3 months.
- Making sure the group is still fully submersed.

9. REPAIRING THE PUMP

9.1 Disassembling the pump / motor group

Because of its construction features, the pump and motor group easily disassembled and re-assembled with normal metric size shop tools.

- If the pump adopts a non return valve, consider the additional weight of the water-filled column besides the group weight and use therefore a suited hoist.
- We suggest to employ specialized personnel for assembling and disassembling.

9.2 Assembling the pump / motor group

- Check the free rotation of pump and motor rotating parts, paying attention not to damage them.
- The axial joint between pump shaft and motor shaft should be installed without forcing. Absolutely avoid kicking the shaft, as that could damage the thrust bearing.
- The pump-motor coupling should be done perfectly, a wrong alignment will unavoidably cause motor bearing failure and vibrations.
- The pump joints are provided with screws to lock the rotating part axially. The coupling screw for 10" - 12" - 14" motors should be strongly locked on the motor key.
- When coupling 6" - 8" motors, the coupling screw shall be aligned to the hole located on the motor shaft; after locking, the screw must be unscrewed half turn and locked in this position by a sealing product (loctite or similar) or in a mechanical position positive way (calking), paying attention not to damage the screw thread. **The locking of the screw on the shaft could cause an eccentric rotation of the rotating part and consequently damage the bearings.**

10. DECOMMISSIONING AND DISMANTLEMENT

When the pump will be permanently stopped and dismantled, the various materials composing it should be properly disposed of. It is important to make sure that no residual polluting liquids are trapped within the pump.

The materials used in pump construction are:

- Steel and cast iron.
- Aluminum.
- Rubber and plastic.
- Copper.

The disposal of polluting liquids and materials should follow current environmental regulations.

11. TROUBLESHOOTING

Error conditions		
FAULTS	CHECKS (possible causes)	REMEDIES
1. The pumps gives no water.	A. Water level in the well lower than pump suction nozzle. B. Blocked valve. C. Leaks in the delivery pipe. D. Voltage lower than the rated value and absorption higher than normal. E. Absorbed current lower than normal due to air in the pump. F. Clogged grid because of suspended solids. G. Unexpected friction losses	A. Increase the pump depth. B. Kick the pipe line with a hammer trying to unblock the valve. C. Check delivery pipe by the flanges. D. Increase voltage. Change the supply cable with a larger one. E. Start and stop the pump at intervals of about a minute. F. Clean the pump. G. Check calculations and use larger pipes if necessary.
2. The pump is not starting but fuses don't blow up and starter relays do not trip.	A. No voltage in the line. B. The circuits is cut off by the cable on in motor windin. C. Open circuit in the starter.	A. Check voltage ratings on main and on starter terminals. B. Remove starter fuses and connect one Ohmmeter conductor to delivery pipe; Check then motor cables terminals one by one with the other conductor. The reading of each terminal shloud be at least 10 Megahoms. C. Check circuit integrity referring to electric diagrams.
3. The starter trips or the fuses blow-out when the pump is running.	A. Too low voltage. B. Overload due to sand clogging; bearings tend to saize. C. Single phase: a voltage 1.5/2 times higher than normal runs through motor windings, so the starter trips stopping the unit. D. The starter is installed in a too warm place. E. The starter in not correctly calibrated. F. Electropump blocked in a crooked sinkhole with consequent abnormal value of the absorbed current. G. Cut-off conductors in the starter. H. Grounded, short-circuited or cut-off cable joint or motor windings.	A. Increase supply cable diameter. B. Pull on the pump and clean it. C. Check voltage on all three phases. Check the conditions of starter fuses and contact. D. Set starter overload relays on the highest value. E. If the amperometer shows normal voltage and the starter trips also after different calibrations, replace the overload relay. F. Move the unit so to straighten it and it again. G. See point 2.C H. See point 2.B
4. The pump runs with a low capacity or head.	A. Wrong motor rotation. B. The delivery pipe leaks; flange or coupling not well fastened. C. Voltage lower than normal, absorbed current higher than normal. D. Clogged grid. E. Worm impellers and diffusers. F. The manometric head has been wrongly calculated.	A. Lift the pump out of the well and check the delivery pipe. B. Move the unit so to straighten it and start it again. C. Lift the pump out of the well and check the delivery pipe. D. Clean the pump. E. Replace worm parts. F. Calculate again the manometric head; replace the unit with a more suited one.