

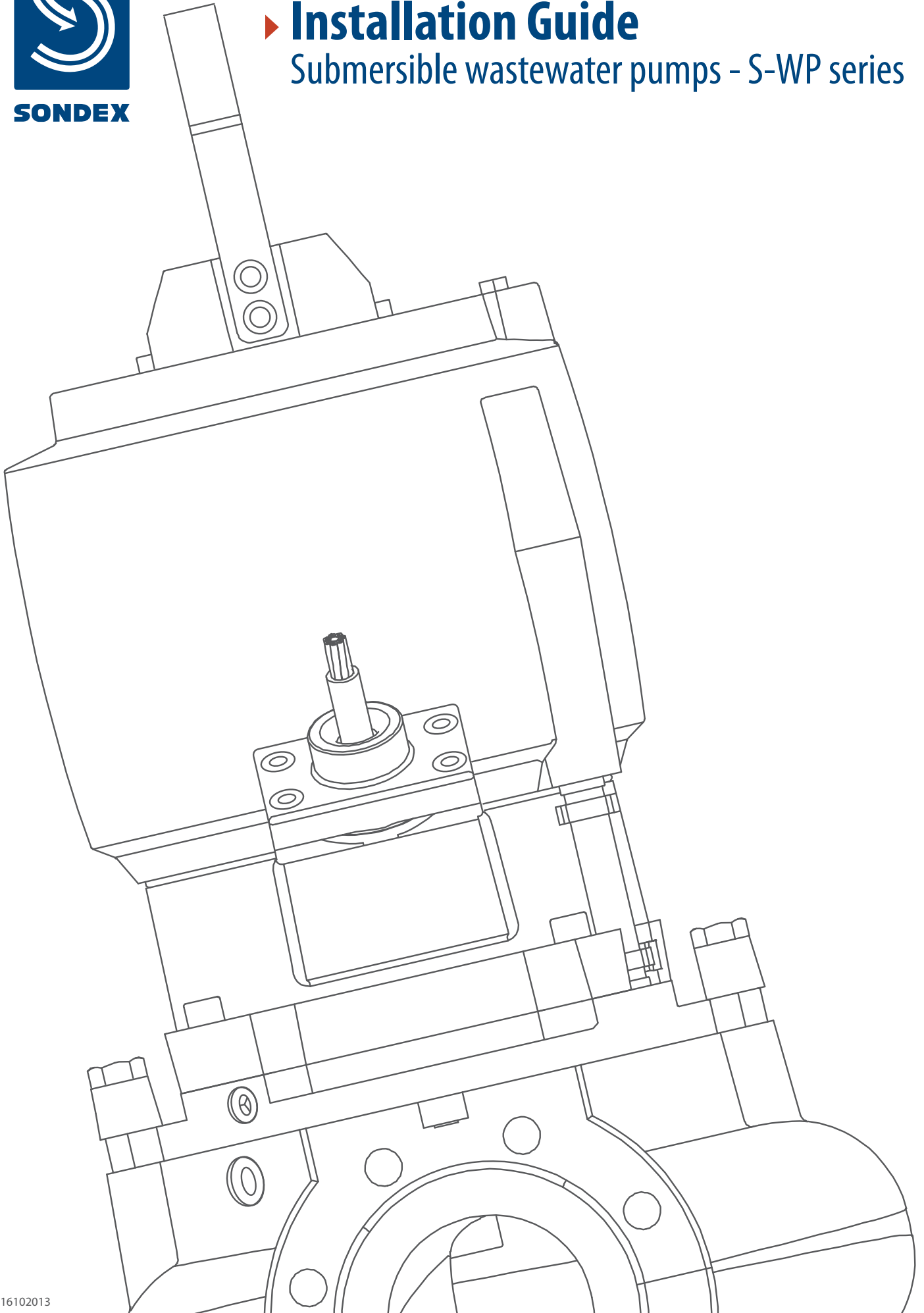


SONDEX

Sondex Pumps

► **Installation Guide**

Submersible wastewater pumps - S-WP series



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2. Identification plate

Standard nameplate:

Sondex Pumps A/S Jernet 9 DK-6000 Kolding			
Type			
No.			
Q		H	
1/min		P2	
V	PH	A	Hz
Kg	Class H	IP 68	▽ 20m
<small> - THERMALLY PROTECTED - SEE MANUAL FOR CORD REPLACEMENT - WARNING - DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE MAY BE PRESENT </small>			

3. Applications

This installation, operation and service manual is applicable to the pump types S-WP1-4. They are submersible pumps in degree of protection IP68. They are all designed for pumping water, wastewater with contaminants, as well as low-viscosity types of sludge. The pumps can also be used as drainage pumps where sand and gravel occurs.



WARNING

The machines must never be used in flammable or explosive media. If there are local restrictions concerning fire risks they must be obeyed.

The pumps meet EU's machine directive, see declaration of conformity at the back of this manual. Sondex Pumps guarantees that the pumps' airborne noise level does not exceed 70 dbA at normal operation in submerged installation. At dry installation the noise level is 74 dbA (at normal operation).



WARNING

If people can get physical contact with the pump or the fluid that is being pumped at e.g. open excavations, building sites or the like, a fault circuit-breaker (HFI) must be mounted in the electrical installation. If the pump is used in oceans, lakes etc. there must be a minimum safety distance of 20 meters between the pump and any persons in the water. NOTE that in pools there are special safety restrictions.

4. Product specification

A code system determines the type of pump model as stated here:

Example: S-WP3-150 VX6-300

S-WP3	=	Pump type and module family
150	=	Standard outlet discharge in mm
V	=	Vortex impeller or C = Channel impeller
X	=	Version of impeller, more than one X indicates other types
6	=	Number of poles (rpm) e.g.
6	=	960 rpm (1150 rpm. 60 Hz)
300	=	Diameter of impeller in mm

Motor

Shorted asynchronous motor in 3-phased version for 50 or 60 Hz
Degree of protection IP68
Insulation class H

Motor protection

All stators are equipped with 3 built-in thermal switches connected in series. The thermal switches open at 135°C and close again at 90°C.

The wires for the switches are marked "F0" & "F1" and method of installation can be found in the installation diagram for the pump.



TO MAINTAIN WARRANTY ON THE PUMP, THE THERMAL SENSORS MUST BE CONNECTED PROPERLY

Moisture indicator

The pump is mounted with a moisture sensor as standard. It detects moisture in the stator compartment as well as the oil compartment simultaneously.

The sensor is connected with the wire marked "D" coming out of the pump. This conductor shall be connected to a moisture relay, which is built into the electric board. The relay will cut off or signal (depending on connection) that the pump has moisture or water penetration. The normal alarm level is 100 kΩ for submersed and for dry installation, both at a voltage of 24V DC.



TO MAINTAIN WARRANTY ON THE PUMP, THE THERMAL SENSORS MUST BE CONNECTED PROPERLY

Motor cable

All standard pumps are delivered with 10 metre cable of the type H07RN-F. For installation of a longer cable please contact your local Sondex Pumps dealer, who can advise you about volt drop and dimensions. Also note that cable type and number of cables can vary depending on voltage, start method and country.

Technical specifications

Please see the technical data supplied with the pump for weight, amount of oil and coolant, rpm, nominal power etc.

Cooling system

The pumps can optionally be equipped with an internal cooling system for cooling the motor and critical parts. The cooling system is a closed circuit system, which means the system will not be clogged or lose its function due to polluted water. Amount of cooling fluid and type is stated in the technical specifications supplied with the pump.

5. Handling

The pump must be packaged properly during transport to avoid damage to the pump or surroundings. It can be transported and/or stored in vertical or horizontal position. Check that the cables are packaged securely. The cable ends are sensitive towards moisture and water, which could seep into the coupling room and the motor.



Always place the pump on a stable surface, so it cannot tip over during service, transport, testing and installation. Never lift the pump in the cables, always use its original lifting handles, which are designed in accordance with the machine's weight. Furthermore, check before lifting that the screws, which hold the lifting handles, are securely fastened.

For storage for long periods of time the pump must be serviced and checked again before use. Before electrical connection the impeller shall be turned by hand to ensure the correct friction of the mechanical seal. Also check the cable for breaks and assess whether the cable is flexible and smooth enough.

6. Installation

The immersion depth for pumps covered by this manual is max 20 meters. The temperature of the pumped media must not continuously exceed 45°C.

Accidents in relation to installation can be minimised by taking special care. Be especially careful with the pump's weight and the risk of electrical accidents.

When lifting with hoisting equipment, these must always be of the correct dimensions with regard to the lifted weight. Never walk under hanging loads.

Installation with submerged pump on coupling foot

Cables for the pump have to be installed in such a way that they avoid any sharp bends or getting squeezed. Never let the cables hang in a way that they might get sucked into the pump. Mount the coupling foot at the bottom of the well with expanding bolts or glue-anchors of a size as stated on the dimension drawing. When mounting the upper guide brackets, the guide tubes must be vertical and parallel. Connect the discharge pipe to the coupling foot's flange and attach a possible automatic non-return valve followed by a check valve in the mentioned order. The hoisting device must be installed directly above the pump's centre of gravity. The pump will then automatically connect at bottom position and loosen again when lifted. Now connect the cables to the electrical board and the pump is ready for operation.



Check that the pipe dimensions are correct according to the required capacity. Contact your local Sondex Pumps dealer, who can advise you.

Dry pit installation

The pump unit is delivered with support legs. If the legs are adjustable, the height is regulated by loosening the two bolts on each leg, and tightens them again at the desired height. Then mount the inlet and discharge pipes.

To make mounting and demounting of the motor part during service easier, we recommend mounting a valve on the suction side. This will also ease the adjustment or changing of the wear ring.



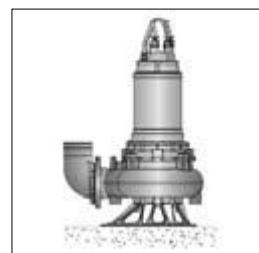
The discharge side can also be equipped with a pressure gauge to easily check the pumps performance.

Check that the pipe dimensions are correct according to the required capacity. Contact your local Sondex Pumps dealer, who can advise you.

Portable installation

When mounting this installation type, it is very important that the cables are installed in such a way so they do not bend, get damaged by vehicles etc. It is also important that there is no pulling in the cables or the hose.

The pump must be mounted on a solid surface and in a vertical position so it does not tip over or "dig" into the sand, sludge etc.





The pump can also be mounted lying down, but note that the pump's inlet is exposed whereby all physical contact must be avoided. Keep a minimum safety distance of 5 metres from a pump in operation. The pump is able to give a very powerful suction under water. Never underestimate this and also mount a plate that can be screwed onto the pump's frame to avoid large objects being sucked into the pump.



NOTE that the loss of pressure in a hose is much greater than in a pipe. Contact your local Sondex Pumps dealer for determining hose loss and dimensions.

7. Electrical installation

The pumps electrical equipment are made according to EN60204-1.



An authorised electrician must perform all electrical connections.

The pump must be mounted with a motor guard and a fault circuit breaker.

The pump should be grounded according to local regulations. The grounding wire are marked with a grounding symbol

Check that the pump's identification plate is in accordance with network voltage, frequency, fuse size and start form.

The network voltage must not fluctuate more than $\pm 5\%$ of the pump voltage marking. If more, the motor's life will be reduced and the motor itself could short-circuit.

Motor connection

Connection of the stator wires has to be done according to the connection diagram supplied with the pump. The proper connection of the motor depends on knowing the number of conductors as well as sensor cables.

The electric board must be equipped with a motor guard that fits the motor size. This relay must be set as follows:

Direct start

The motor guard is set to the current (measured in ampere) that is stated on the identification plate. When the thermal surveillance is connected, the motor guard's setting is increased by 10 percent.

Star-delta start

The motor guard is set to the current (measured in ampere) that is stated on the identification plate multiplied by 0.58. When the thermal overload switches are connected add 8 percent to the calculated value.

The grid must be secured with ordinary safety cutouts.

Thermal protection:

All pumps, are equipped with thermal overload switches built into the stator. These are marked F0 & F1. The thermal protection conductors must be connected in series with the motor guard in the electric board according to the connection diagram supplied with the pump. If this protection is not connected the guarantee will be void in case of damage.

Moisture sensor:

The conductor marked "D" is connected to a moisture sensor, which is placed between the oil housing and the motor housing. This sensor must be connected to a relay in the electric board. The relay must be connected

to the safety circuit and sound the alarm and at the same time stop the pump when moisture is registered in oil or stator housing. For further information on connection, see the connection diagram supplied with the pump. Your local Sondex Pumps dealer can supply you with the correct relay as an accessory.

Changing the Cable

Note that a damaged cable always has to be replaced. Connecting the pump with a defective cable can be life endangering. Never try to lengthen the cable, only use cables in complete length, as water would be able to get into the motor and damage it.

Check the following to avoid water getting into the pump when changing the cable:

- a) Cable packing of rubber as well as cable washers must fit the cable dimension perfectly.
- b) The cable's outer diameter must not be deformed. Always cut off a piece so it will seal in a new place in case of a reused cable.
- c) Use grease before connecting.



NOTE that the grounding conductor must be longer in the pump, and in a connector at the opposite end. If the motor cable is torn accidentally, the ground wire will therefore be the last to be torn.

EMC – Electromagnetic compatibility

The pump does not give out electromagnetic radiation.

The pump does not have elements that generate electromagnetic radiation or that are sensitive to electromagnetic radiation. The pumps are seen to live up to directive 89/336/EEC – concerning electromagnetic compatibility with later amendments.

Electromagnetic radiation can occur during frequency control of the pump. Hence, the pump can be ordered with a shielded cable.

8. Operation



Never start up a pump with incompletely connected cables or non-operational overload switches and leakage sensor

Before the pump is started, the rotation direction must be checked. At start the motors starting torque will cause the pump to jerk. The start reaction will be counter clockwise, seen from the top of the motor.



The starting torque can be very powerful even with small pumps. Never hold on to the pump and do not start the pump when hanging in free air. Place the pump solid so it cannot rotate or tip over before starting.

Never start the pump without impeller, the pump must be fully assembled and ready for operation. At wrong start reaction two phases must be switched. See the connection diagram.



NOTE that the pump at dry running or wrong rotation can get very hot and make a loud noise.



Before any inspection, service or repair of the pump, it has to be physically disconnected from the power supply. Remove connectors or dismount the wires in the electric board. An emergency stop can be released or be defective and start the pump by mistake. Observe this before the motor part is removed from the motor housing and before any contact with the impeller.

9. Service & maintenance

The pump is disconnected from the power supply before the work is started (as described in "Operation"). All pumps require regular control and preventive maintenance to operate economically and reliably. The pump should be checked every 6 months and during possible extreme operating conditions more often. Your local Sondex Pumps dealer can advise you about preventive maintenance. For complete overhaul of the pump contact an authorised Sondex Pumps workshop or your local Sondex Pumps dealer.

For service on and around the pump a high hygiene must be practiced. Use gloves. Clean the pump carefully before dismantling it. Follow local and national safety instructions.



WARNING

Before any inspection and service is carried out, make sure that the electrical power supply is disconnected from any power source. Use a skilled electrician to disconnect the power.

Service Instructions for S-WP1-70, S-WP1-80, S-WP2-80, S-WP2-100, S-WP2-150

Type W - Wet Pit Installation

Installed on a guide rail system with a quick-release discharge connection bracket (DCB). The DCB is bolted to the floor of the sump. The volute is equipped with an adapter to guide the pump via two 2" guide rails in order to secure connection on the DCB.

Type D - Dry Pit Installation

Installed in a dry well. The pump has a factory mounted adjustable stand. The height of the stand makes it possible to install a standard suction elbow. The pump volute is drilled for standard DN flange.

Type P - Portable Pit or fixed installation

A version of pump, which is suitable for temporary or permanent installations. The pump is equipped with a steel stand and either a threaded (BSP) or plain hose connection.

The Volute

The volutes are equipped with adjustable wear rings as standard. The volute has 2 fast lock latches for easy release between motor unit and volute.

Removal from the wet well

Lift the pump from the sump and clean thoroughly.

Removal of the volute

The motor unit is connected to the volute with two fast lock latches. Loosen the latches and lift the motor unit out from the volute.

Changing the oil

Remove the inlet and outlet plugs. Tilt the pump against the outlet and discharge used oil according to the local regulations.

Fasten the outlet plug and fill with new oil and fasten the inlet plug.

Type of oil: Hydraulic DTE 24 or similar.

Qty: S-WP1 0.32 l

Qty: S-WP2 0.45 l

Changing the cooling liquid

Remove the cooling liquid plug on the cooling flange (water out). Remove the plug on top of the cooling jacket (water inlet) for fast emptying. Re-plug the water outlet. Slowly fill the new cooling liquid into the water inlet on top of the cooling jacket.



Note! Do not forget to tighten the plugs after filling.

Cooling liquid, quantity (l): S-WP1: 3.00 l
S-WP2: 6.00 l

(20% Propylene glycol DOWCAL ® 20: 80% water)

Removal of the impeller

The impeller is fixed to the shaft with a washer and a screw. Secure the impeller and remove the impeller bolt with a wrench.

Removal of the seal cartridge

Disassemble volute and impeller as above, and empty the motor of cooling liquid and oil. Lay the rotating element on its side. Remove the four screws that hold the seal cartridge. The cartridge can be removed from the oil chamber by inserting the set screws into the "jacking holes" in the cartridge, which will force the cartridge from the lower bearing housing.

Changing the cable seal

After disassembling or if there is water in the stator housing, the cable seal has to be replaced. Measure the cable diameter with a slide gauge and compare with the holes in the cable gland seal and the spacers so that the dimensions are alike. Pull the seal onto the cable with one spacer underneath. Pull the cable as far through the cover so that a new part of the cable gets jammed when tightening the cable gland. Tighten the four screws of the cable gland.

Removal of the cooling jacket

Drain out cooling water. Disassemble by removing the four screws that fix the jacket and lift it off. The cooling tubes can be "clicked" out without any tools and can be reinstalled. Remember to inspect the o-rings on the cooling tubes.

Check the stator unit

If the motor protection trips repeatedly, the stator must be inspected. Remove the stator housing and disconnect the wires. (Make sure that the wires are marked so that you are able to reconnect). Check the insulation resistance with an insulation tester (min. 500 V). Test between U1, V1 and W1 and GND.

Test between U1, V1 and W1. The insulation resistance must exceed 1 mega ohm. If the insulation resistance is below 1 mega ohm, clean the stator and dry it in an oven for 2-3 hours at 100 degr. C.

Check the circuit of the three built-in thermal overload switches using a buzzer or other measuring device.

Before reconnecting:

Check that the motor cable has no broken wires. Check the motor cable insulation with a 500V insulation tester, between the wires.

Make sure you have connectors in order to secure good wire connections.

Removal of the stator housing

Mark the stator housing position on the bearing house to be able to reinstall correctly. Remove the four screws fixing the stator casing. Lift the stator casing approx. 5 cm from the shaft and rotor - use a hoist. Disconnect the wire from the moisture sensor. Continue lifting off the stator housing.

Disassembling the rotor and bearings

When the stator housing has been removed the shaft with rotor and bearings have to be lifted out. (Lower bearing might stay in the lower bearing house). Do not reuse worn bearings or bearings which have been in contact with water.

Assembling

Clean all O-ring grooves and all other contact surfaces carefully. Use a wire brush when necessary. Change all O-rings. Lubricate all O-rings with oil or grease to prevent the O-rings from getting stuck or damaged when remounted. Also lubricate the threads on all the screws to facilitate disassembling when servicing next time.

Mounting the bearings

Check that the shaft is straight and that the key way is not damaged. Polish possible scratches and burrs off. Push the upper bearing into its position. If pressure is needed, then put pressure only on the inner ring of the bearing, using a piece of pipe and a soft hammer. Mount the lower bearing by using only your hands. Do not forget to fill the bearings with grease.

Mounting the rotor in the oil housing

Push the lower bearing into the bearing seat by pushing lightly with your hand at the end of the shaft.

Mounting the seal cartridge

Put down the driving unit. Lubricate the shaft and all four O-rings on the seal unit (three external on the seal housing and one internal in the seal cap). Carefully push the seal unit onto the shaft, and place into position by aligning the screw holes. Do not use hard striking tools. Tighten the seal unit by fastening the four screws. All 4 screws have to follow each other to make sure that the seal unit does not tilt.



NOTE! Never run the motor without having the impeller mounted, if the seal is mounted. This will cause damage to O-rings in the seal.

Mounting the impeller

Turn the shaft so that the key way is upward. Put the key in its groove and push the impeller onto the shaft. Lock the impeller from rotating with a pipe or similar and fasten the impeller washer and screw.

Mounting the stator

Erect the oil housing and clean all contact surfaces between the oil housing and the stator unit with a wire brush. Lubricate and mount a new o-ring on the oil housing. The stator is now ready to be mounted on the oil housing. Lift the stator unit with a lifting device and lower it carefully over the rotor. Make sure that the rotor does not damage the windings or the stator stick. Remember to connect the wire from the moisture sensor. Fasten the stator with its four screws. Make sure that the external markings are in line.

Mounting the cooling jacket

Put the gasket on top of the stator house. Fit the 2 external cooling tubes. Make sure that the o-rings are changed. Lower the cooling mantle over the stator casing and make sure that the external markings are in line and that the cooling pipes are in their right positions. Fasten the cooling jacket with four screws.

Mounting the motor unit in the volute

Turn the latch bolts so that the driving unit is free down to the upper edge of the volute. Turn the latch bolts in and fasten the screws alternately. Make sure that the external markings are in line. Tighten completely by hand using a 24 mm wrench. Once hand tightened, use a sledge hammer and tighten by another ¼ to ½ turn to assure a tight connection.

Adjusting the wear ring

Lay the pump down on its side and check the clearance between impeller and wear ring. The clearance should be max. 0.4 mm. The wear ring is placed on the bottom side of the volute and is fastened by three screws placed horizontally. Loosen these screws and adjust with the three vertically placed screws. When necessary, strike carefully with a hammer or plastic club. When the distance is adjusted the horizontally placed screws can be tightened.



Note! This only applies if using channel impeller. If using vortex impeller do not adjust the wear ring!

Testing

Connect the cables to the electric mains and start the pump. This should only be done by a qualified electrician. Check the direction of rotation - it has to be clockwise, when viewed from the top of the motor. The starting reaction will be in the opposite direction. Make sure you have a firm grasp on the pump.

Tightening torque screws

Size (Nm)

M6 : 7

M8 : 17

M10 : 33

M12 : 57

M14 : 91

M16 : 140

Tightening factor

Cable gland: A specific estimation of the tightening factor cannot be given for the cable gland. Tighten it until the rubber offers good resistance, and thereafter one more full rotation for each screw.

Size (Nm)

Impeller bolt

(M12 Bumax) 115

Latch bolt

(M16) 95

Service Instructions for S-WP3-80, S-WP3-100, S-WP3-150

Type W - Wet Pit Installation

Installed on a guide rail system with a quick-release discharge connection bracket (DCB). The DCB is bolted to the floor of the sump. The volute is equipped with an adapter to guide the pump via two 2" guide rails in order to secure connection on the DCB.

Type D - Dry Pit Installation

Installed in a dry well. The pump has a factory mounted adjustable stand. The height of the stand makes it possible to install a standard suction elbow. The pump volute is drilled for standard DN flange.

Type P - Portable Pit or fixed installation

A version of pump, which is suitable for temporary or permanent installations. The pump is equipped with a steel stand and either a threaded (BSP) or plain hose connection.

The Volute

The volutes are equipped with adjustable wear rings as standard. The volute on the S-WP3-80 is only available in the Vortex impeller design and has no wear ring. The volute has 4 fast lock latches for easy release between motor unit and volute.

Removal from the wet well

Lift the pump from the sump and clean thoroughly.

Removal of the volute

The motor unit is connected to the volute with four latch bolts. Loosen the locking screws and turn the latch bolts 90°. Lift the motor unit out from the volute.

Changing the oil

Remove the plug marked "oil out" and let the used oil pour out through the groove under the plug. Discard used oil in accordance with local regulations.

Fasten the plug so that the lower but not the top O-ring gasket seals.

Oil: white oil (Hydraulic oil DTE24, or similar).

Oil amount: 0.15 l.

Inspect the motor housing by removing the screw marked "motor". Tilt the pump slightly. If water, oil or other debris is present in the motor housing, a full dismantling is required.

Changing the cooling liquid

Remove the cooling liquid plug on the cooling flange (water out). Remove the plug on top of the cooling jacket (water inlet) for fast emptying. Re-plug the water outlet. Slowly fill the new cooling liquid into the water inlet on top of the cooling jacket.



Note! Do not forget to tighten plugs after filling.

Cooling liquid, quantity (l): 10,50
(20% Propylene glycol DOWCAL ® 20; 80% water)

Removal of the impeller

The impeller is fixed to the shaft with a washer and a screw. Secure the impeller and remove the impeller bolt with a wrench.

Removal of the seal cartridge

Disassemble volute and impeller as above, and empty the motor of cooling liquid and oil. Lay the rotating element on its side. Remove the four screws that hold the seal cartridge. The cartridge can be removed from the oil chamber by inserting the set screws into the "jacking holes" in the cartridge, which will force the cartridge from the lower bearing housing.

Disassembling the connection cover

Remove the four screws fixing the cover. Gently lift the cover to gain access to the terminal board area. Be careful not to damage the cable and motor connections. If disconnecting wires make sure that you are able to reinstall them correctly.

Removal of the cooling jacket

Drain out cooling water. Disassemble by removing the four screws that fix the jacket and lift it off. It is possible to lift it off without removing the cable cover. The cooling tubes can be "clicked" out without any tools and can be reinstalled. Remember to inspect o-rings on cooling tubes.

Check the stator unit

If the motor protection trips repeatedly, the stator must be inspected. Disassemble the cable cover with the motor cable. Disconnect the stator wires. Check the insulation resistance with min. 500V insulation tester. Test between U1, V1 and W1 and GND.

Test between U1, V1 and W1. The insulation resistance must exceed 1 mega ohm. If the insulation resistance is below 1 mega ohm, clean the stator and dry it in an oven for 2-3 hours at 100 degr. C.

Check the circuit of the three built-in thermal overload switches using a buzzer or other measuring device.

Before reconnecting:

Check that the motor cable has no broken wires. Check the motor cable insulation with a 500V insulation tester, between the wires.

Removal of the stator housing

Mark the stator housing position on the bearing house to be able to reinstall correctly. Remove the six screws fixing the stator casing. Lift the stator casing approx. 5 cm from the shaft and rotor - use a hoist. Disconnect the wire from the moisture sensor. Continue lifting off the stator housing.

Disassembling the rotor and bearings

When the stator housing has been removed the bearing cover is removed (4 screws). Lift out the shaft with rotor and bearings. (Lower bearing might stay in the lower bearing house). Do not reuse worn bearings or bearings which have been in contact with water.

Assembling

Clean all O-ring grooves and all other contact surfaces carefully. Use a wire brush when necessary. Change all O-rings. Lubricate all O-rings with oil or grease to prevent the O-rings from getting stuck or damaged when remounted. Also lubricate the threads on all the screws to facilitate disassembling when servicing next time.

Mounting the bearings

Check that the shaft is straight and that the key way is not damaged. Polish possible scratches and burrs off. Push the upper bearing into its position. If pressure is needed, then put pressure only on the inner ring of the bearing, using a piece of pipe and a soft hammer. Place the bearing cover on the shaft and mount the lower bearing by using only your hands. Do not forget to fill the bearings with grease.

Mounting the rotor in the oil housing

Push the lower bearing into the bearing seat by pushing lightly with your hand at the end of the shaft. Lock the rotor by fastening the four screws of the bearing house.

Mounting the seal cartridge

Put down the driving unit. Lubricate the shaft and all four O-rings on the seal unit (three external on the seal housing and one internal in the seal cap). Push the seal unit onto the shaft, and place into position by aligning the screw holes. Do not use hard striking tools. Tighten the seal unit by fastening the four screws. All 4 screws have to follow each other to make sure that the seal unit does not tilt.



NOTE! Never run the motor without having the impeller mounted, if the seal is mounted. This will cause damage to O-rings in the seal.

Mounting the impeller

Turn the shaft so that the key way is upward. Put the key in its groove and push the impeller onto the shaft. Lock the impeller from rotating with a pipe or similar and fasten the impeller washer and screw.

Mounting the cable seal

If water has penetrated the cable seal and reached the terminal board, the cable seals have to be replaced. The cable seal should be replaced after every disassembly of the cable gland. Measure the cable diameter with a slide gauge and compare it to the holes in the cable seal and the spacers, so that the dimensions are correct. Pull the seal onto the cable with one washer on each side. Pull the cable through the cover so that the cable with its cover extends through the cable gland and into the terminal area when tightening the cable lead-in. After tightening, the strain relief clamp is fastened. Turn the clip's long pin down to prevent the cable lead-in from unthreading.

Mounting the stator

Erect the oil housing and clean all contact surfaces between the oil housing and the stator unit with a wire brush. Lubricate and mount a new o-ring on the oil housing. The stator is now ready to be mounted on the oil housing. Lift the stator unit with a lifting device and lower it carefully over the rotor. Make sure that the rotor does not damage the windings or the stator stick. Remember to connect the wire from the moisture sensor. Fasten the stator with its six screws. Make sure that the external markings are in line.

Mounting the coupling cover

Keep the cover near the terminal board to avoid too long cables. Connect the cables according the wiring diagram in the CE manual following the pump. Remember that the ground cable should be longer than the other cables for safety reasons. Before the cover is fastened, it should be turned one half turn to avoid having the cables pinched under the cap.

Mounting the cooling jacket

Fit the internal cooling pipe so that it is in the right position and fix with the 2 external cooling tubes. Make sure that the o-rings are changed. Lower the cooling mantle over the stator casing and make sure that the external markings are in line, and that the cooling tubes are in their right positions. Fasten the cooling jacket with four screws.

Mounting the motor unit to the volute

Turn the latch bolts so that the driving unit is free down to the upper edge of the volute. Turn the latch bolts in and fasten the screws alternately. Make sure that the external markings are in line. Tighten completely by hand using a 24 mm wrench. Once hand tightened, use a sledge hammer and tighten by another $\frac{1}{4}$ to $\frac{1}{2}$ turn to assure a tight connection.

Adjusting the wear ring

Lay the pump down on its side and check the clearance between impeller and wear ring. The clearance should be max. 0.4 mm. The wear ring is placed on the bottom side of the volute and is fastened by three screws placed horizontally. Loosen these screws and adjust with the three vertically placed screws. When necessary, strike carefully with a hammer or plastic club. When the distance is adjusted the horizontally placed screws can be tightened.



Note! This only applies if using channel impeller. If using vortex impeller do not adjust the wear ring!

Testing

Connect the cables to the electric mains and start the pump. This should only be done by a qualified electrician. The arrow on the cover indicates the direction of rotation - clockwise, when viewed from the top of the motor. The starting reaction will be in the opposite direction. Make sure you have a firm grasp on the motor.

Tightening torque screws

Size (Nm)

M6 : 7

M8 : 17

M10 : 33

M12 : 57

M14 : 91

M16 : 140

Tightening factor

Cable gland: A specific estimation of the tightening factor cannot be given for the cable gland. Tighten it until the rubber offers resistance, and thereafter one more full rotation.

Size (Nm)

Impeller bolt

(M12 Bumax) 115

Latch bolt

(M16) 95

Service Instructions for S-WP4-100, S-WP4-150, S-WP4-200, S-WP4-250, S-WP4-300

Type W - Wet Pit Installation

Installed on a guide rail system with a quick-release discharge connection bracket (DCB). The DCB is bolted to the floor of the sump. The volute is equipped with an adapter to guide the pump via two 2" guide rails in order to secure connection on the DCB. In the S-WP4-250 and S-WP4-300 version the size of the guide rails is 3".

Type D - Dry Pit Installation

Installed in a dry well. The pump has a factory mounted adjustable stand. The height of the stand makes it possible to install a standard suction elbow. The pump volute is drilled for standard DN flange.

Type P - Portable Pit or fixed installation

A version of pump, which is suitable for temporary or permanent installations. The pump is equipped with a steel stand and either a threaded (BSP) or plain hose connection.

The Volute

The volutes are equipped with adjustable wear rings as standard.

Removal from the wet well

Lift the pump from the sump and clean thoroughly.

Removal of the volute

Before disassembly the pump has to be disconnected from the electrical source. The motor unit is connected to the volute with six latch bolts. Loosen the locking screws and turn the latch bolts 90°. Lift the motor unit out from the volute.

Changing the oil

Remove the plug marked "oil out" and let the used oil pour out through the groove under the plug. Discard used oil in accordance with local regulations.

Fasten the plug so that the lower but not the top O-ring gasket seals.

Oil: white oil (Hydraulic oil DTE24, or similar).

Oil amount: 0.4 l.

If there is any problem filling in oil, tilt the pump slightly so that air can escape.

Inspect the motor housing by removing the screw marked "motor". Tilt the pump slightly. If water, oil or other debris is present in the motor housing, a full dismantling is required.

Changing the cooling liquid

Remove the cooling liquid plug on the cooling flange (water out). Remove the plug on top of the cooling jacket (water inlet) for fast emptying. Re-plug the water outlet. Slowly fill the new cooling liquid into the water inlet on top of the cooling jacket.



Note! Do not forget to tighten plugs after filling.

Cooling liquid, quantity (l): 44,0
(20% Propylene glycol DOWCAL ® 20: 80% water)

Removal of the impeller

The impeller is fixed to the shaft with a washer and a screw. Secure the impeller and remove the impeller bolt with a wrench.

Removal of the seal cartridge

Disassemble volute and impeller as above, and empty the motor of cooling liquid and oil. Lay the rotating element on its side. Remove the four screws that hold the seal cartridge. The cartridge can be removed from the oil chamber by inserting the set screws into the "jacking holes" in the cartridge, which will force the cartridge from the lower bearing housing.

Disassembling the connection cover

Remove the six screws fixing the cover. Gently lift the cover to gain access to the terminal board area. Be careful not to damage the cable and motor connections. If disconnecting wires make sure that you are able to reinstall them correctly.

Removal of the terminal housing

Disconnect all wires from the terminal board. The terminals are spring operated and can be opened by a screwdriver. Open the cable glands for wiring to the stator. Remove the 6 screws and lift the terminal housing carefully. Do not damage the wires to the stator.

Removal of the cooling jacket

Drain out cooling water. Disassemble by lifting off the jacket. Inspect where the o-rings are located.

Check the stator unit

If the motor protection trips repeatedly, the stator must be inspected. Open the terminal housing cover. Disconnect the stator wires (spring terminals). Check the insulation resistance with min. 500V insulation tester. Test between U1, V1 and W1 and GND.

Test between U1, V1 and W1. The insulation resistance must exceed 1 mega ohm. If the insulation resistance is below 1 mega ohm, clean the stator and dry it in an oven for 2-3 hours at 100 degr. C.

Check the circuit of the three built-in thermal overload switches using a buzzer or other measuring device.

Before reconnecting:

Check that the motor cable has no broken wires. Check the motor cable insulation with a 500V insulation tester, between the wires.

Removal of the stator housing

Mark the stator housing position on the bearing house to be able to reinstall correctly. Remove the six screws fixing the stator casing. Lift the stator casing approx. 5 cm from the shaft and rotor - use a hoist. Disconnect the wire from the moisture sensor. Continue lifting off the stator housing.

Disassembling the rotor and bearings

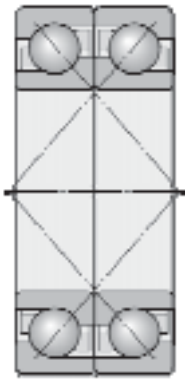
When the stator housing has been removed, the shaft with rotor and bearing has to be lifted out. (Lower bearing will stay in the lower bearing house). Do not reuse worn bearings or bearings which have been in contact with water.

Assembling

Clean all O-ring grooves and all other contact surfaces carefully. Use a wire brush when necessary. Change all O-rings. Lubricate all O-rings with oil or grease to prevent the O-rings from getting stuck or damaged when remounted. Also lubricate the threads on all the screws to facilitate disassembling when servicing next time.

Mounting the bearings

Check that the shaft is straight and that the key way is not damaged. Polish possible scratches and burrs off. Push the upper bearing into its position. If pressure is needed, then put pressure only on the inner ring of the bearing, using a piece of pipe and a soft hammer. Put the shaft through the shaft hole in the bearing house. Mount the lower bearing from the bottom side of the bearing house. You may need a piece of pipe and a soft hammer to install the bearings. The lower bearing is a double bearing. Make sure that the bearings are placed face to face.



Do not forget to fill the bearings with grease.

Mounting the seal cartridge

Put down the motor unit. Lubricate the shaft and all four O-rings on the seal unit (three external on the seal housing and one internal in the seal cap). Carefully push the seal unit onto the shaft, and place into position by aligning the screw holes. Do not use hard striking tools. Tighten the seal unit by fastening the four screws. All 4 screws have to follow each other to make sure that the seal unit does not tilt.



NOTE! Never run the motor without having the impeller mounted, if the seal is mounted. This will cause damage to the O-rings in the seal.

Mounting the impeller

Turn the shaft so that the key way is upward. Put the key in its groove and push the impeller onto the shaft. Lock the impeller from rotating with a pipe or similar and fasten the impeller washer and screw.

Mounting the cable seal

If water has penetrated the cable seal and reached the terminal board, the cable seals have to be replaced. The cable seal should be replaced after every disassembly of the cable gland. Measure the cable diameter with a slide gauge and compare it to the holes in the cable seal and the spacers, so that the dimensions are correct. Pull the seal onto the cable with one washer on each side. Pull the cable through the cable gland so that the cable with its cover extends through the cable gland and into the terminal area when tightening the cable lead-in. After tightening, the strain relief clamp is fastened. Turn the clip's long pin down to prevent the cable lead-in from unthreading.

Mounting the stator

Erect the oil housing and clean all contact surfaces between the oil housing and the stator unit with a wire brush. Lubricate and mount a new o-ring on the oil housing. The stator is now ready to be mounted on the oil housing. Lift the stator unit with a lifting device and lower it carefully over the rotor. Make sure that the rotor does not damage the windings or the stator stick. Remember to connect the wire from the moisture sensor. Fasten the stator with its six screws.

Make sure that the external markings are in line.

Mounting the cooling jacket

Make sure that the o-rings are changed. Lower the cooling mantle over the stator casing and make sure that the external markings are in line.

Mounting the terminal housing

Make sure that all cables go through the holes in the cable gland. Be careful not to damage the wires from the stator. Tighten the 6 screws fixing the terminal housing and cooling jacket. Reconnect the wires and cables according to the marking made before dismantling. Close the terminal housing with the cover and make sure that the o-ring is changed.

Mounting the motor unit to the volute

Turn the latch bolts so that the driving unit is free down to the upper edge of the volute. Turn the latch bolts in and fasten the screws alternately. Make sure that the external markings are in line. Tighten completely by hand using a 24 mm wrench. Once hand tightened, use a sledge hammer and tighten by another ¼ to ½ turn to assure a tight connection.

Adjusting the wear ring

Lay the pump down on its side and check the clearance between impeller and wear ring. The clearance should be max. 0.4 mm. The wear ring is placed on the bottom side of the volute and is fastened by six screws placed horizontally. Loosen these screws and adjust the wear ring. When necessary, strike carefully with a hammer or plastic club. When the distance is adjusted the horizontally placed screws can be tightened.



Note! This only applies if using channel impeller. If using vortex impeller do not adjust the wear ring!

Testing

Connect the cables to the electric mains and start the pump. This should only be done by a qualified electrician. The arrow on the cover indicates the direction of rotation - clockwise, when viewed from the top of the motor. The starting reaction will be in the opposite direction. Make sure you have a firm grasp on the motor.

Tightening torque screws

Size (Nm)

M6 : 7

M8 : 17 M10 : 33 M12 : 57 M14 : 91 M16 : 140 [tightening factor](#)

Cable gland: A specific estimation of the tightening factor cannot be given for the cable gland.

Tighten it

until the rubber offers resistance, and thereafter one more full rotation.

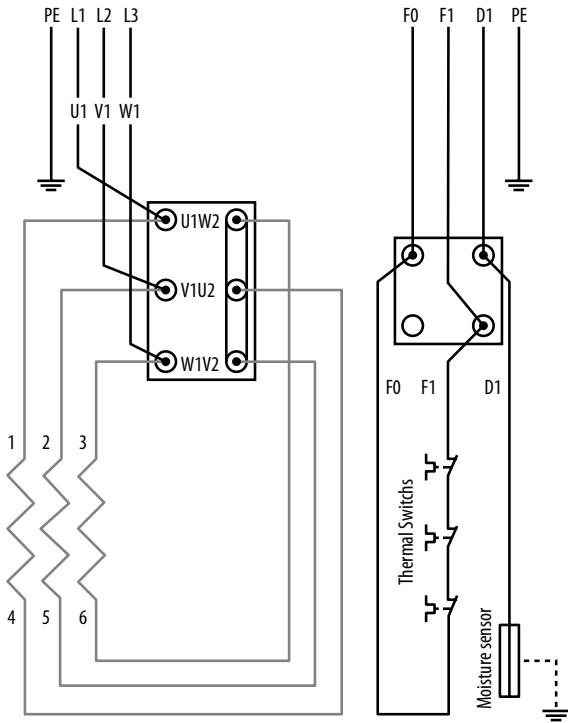
Size (Nm)

impeller bolt (M12 Bumax) 115 Latch bolt

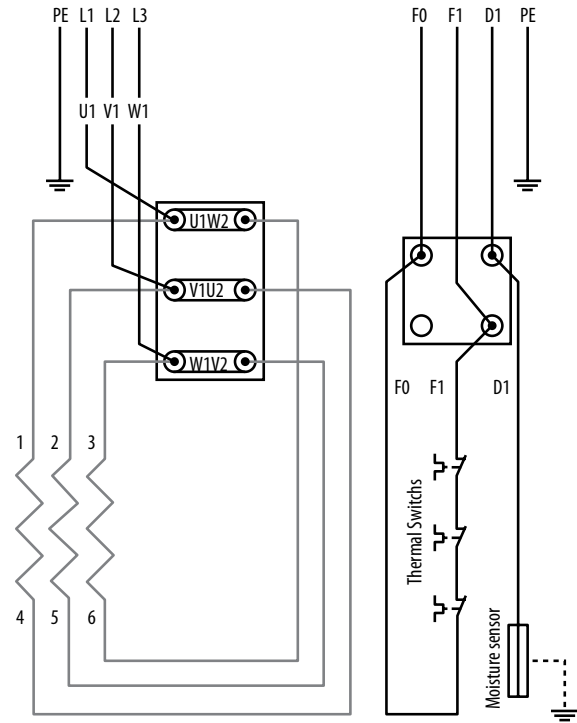
(M16) 95

12. Electrical diagram - 50/60Hz

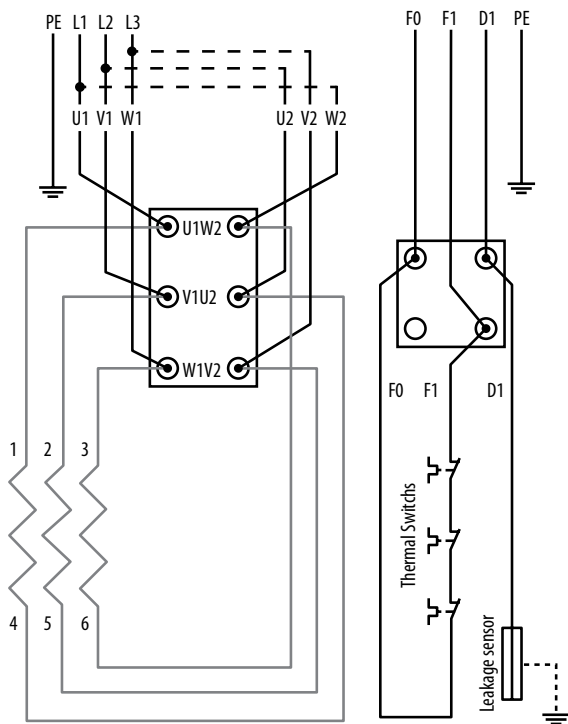
1 Direct on-line starting



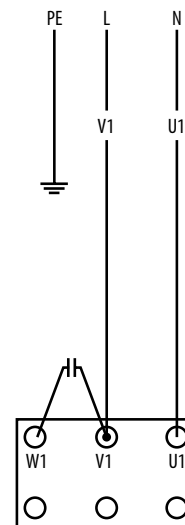
2 Direct on-line starting



3 Star-Delta start



6 Single phase with condensatore





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