

# SE1 50, 80, 100 SEV 65, 80, 100

1.1 to 11 kW

Service instructions



SE1, SEV without sensor  
Service video, YouTube



Installation and operating instructions in  
English and other languages for 50 Hz

<http://net.grundfos.com/qr/i/96046675>



SE1, SEV with sensor  
Service video, YouTube



**Original service instructions**

This document contains references to the installation and operating instructions for the SE1 and SEV, 1.1 - 11 kW (96046675). The installation and operating instructions are accessible via the QR code and link on the front of this document.

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**1. Symbols used in this document**



**DANGER**

Indicates a hazardous situation which, if not avoided, will result in death or serious personal injury.



**WARNING**

Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.



**CAUTION**

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

The text accompanying the three hazard symbols DANGER, WARNING and CAUTION is structured in the following way:



**SIGNAL WORD**

**Description of hazard**

Consequence of ignoring the warning.  
- Action to avoid the hazard.



Observe these instructions for explosion-proof products.



A blue or grey circle with a white graphical symbol indicates that an action must be taken.



A red or grey circle with a diagonal bar, possibly with a black graphical symbol, indicates that an action must not be taken or must be stopped.



If these instructions are not observed, it may result in malfunction or damage to the equipment.



Tips and advice that make the work easier.

## 2. Safety



Pump installation in pits must be carried out by specially trained persons.

Work in or near pits must be carried out according to local regulations.

### DANGER

#### Electric shock

Death or serious personal injury

- It must be possible to lock the main switch in position 0. Type and requirements as specified in EN 60204-1, 5.3.2.



Persons must not enter the installation area when the atmosphere is explosive.

For safety reasons, all work in pits must be supervised by a person outside the pump pit.



We recommend that you carry out all maintenance and service work when the pump is placed outside the pit.

Pits for submerged sewage and wastewater pumps contain gasses and wastewater with toxic and/or disease-causing substances. Therefore, all persons involved must wear appropriate personal protective equipment and clothing, and all work on and near the pump must be carried out under strict observance of hygienic regulations in force.

### DANGER

#### Crushing hazard

Death or serious personal injury

- Always lift the pump by its lifting bracket or by means of a forklift truck if the pump is on pallet.
- Never lift the pump by the power cable or the hose or pipe.



## 3. Receiving the product

### 3.1 Transporting the product

You can transport the pump in vertical or horizontal position. Make sure that the pump cannot roll or fall over.

### 3.2 Contaminated products

### CAUTION

#### Biological hazard

Minor or moderate personal injury

- Flush the pump thoroughly with clean water and rinse the pump parts in water after dismantling.



For further information, see the installation and operating instructions for SE1, SEV, 1.1 - 11 kW. The installation and operating instructions are accessible via the QR code and link on the front page of this document.

## 4. Storing and handling the product

### 4.1 Storing the product

During long periods of storage, the pump must be protected against moisture and heat.

For further information, see the installation and operating instructions for SE1, SEV, 1.1 - 11 kW. The installation and operating instructions are accessible via the QR code and link on the front page of this document.

### 4.2 Handling the pump

The SE1, SEV 1.1 - 11 kW pumps weigh between 86 and 216 kg without accessories. It is therefore very important to use the correct lifting equipment. The pump weight is stated on the pump nameplate.



Rate all lifting equipment for the purpose, and check for damage before any attempts are made to lift the pump. Do not under any circumstances exceed the rated data.

### DANGER

#### Crushing hazard

Death or serious personal injury

- Always lift the pump by its lifting bracket or by means of a forklift truck if the pump is on pallet.



### DANGER

#### Electric shock

Death or serious personal injury

- Never lift the pump by the power cable.



#### 4.2.1 Lifting the product

### WARNING

#### Crushing hazard

Death or serious personal injury

- Make sure that the lifting bracket is tightened before attempting to lift the pump. Tighten if necessary.



For horizontal, dry-installed pumps, a special lifting bracket can be ordered to ease the lifting of the pump. See 7.2 *Lifting tools*.

## 5. Identification

You can find an example of a nameplate and the explanation of the type key in the installation and operating instructions for SE1, SEV 1.1 - 11 kW.

The installation and operating instructions are accessible via the QR code and link on the front page of this document.

## 6. Torques and lubricants

This section shows the screws and nuts that must be tightened to a certain torque and the lubricants to be used.

### 6.1 Special torques and lubricants

Pos.	Pump type	Description	Quantity	Size	Torque [Nm]	Lubricant
92a	All	Screw (clamp)	1	M8 x 70	12 ± 2	-
155	All	Intermediate flange	1	-	-	Electrolube HTSP or Corning 340
181	B	Union nut of cable	1	-	50 ± 5	-
	C and D			-	75 ± 5	-
182	All	Screw	4	M8 x 20	18 ± 2	-
183	B	Screw	1	M30 x 50	150 ± 10	-
	C and D			M24 x 40	200 ± 10	-
184	All	Screw	6	M10 x 40	200 ± 10	-
186	All	Screw	2	M6 x 10	7 ± 2/0	-
187	SE1 - originally SC	Screw	4	M8 x 30	20 ± 2	-
	SE1 - S-tube®			M8 x 30 (with low head)	15 ± 2	
	SEV			M8 x 30	20 ± 2	
188a	B	Screw	1	M10 x 25	50 ± 5	-
	C and D			M12 x 35	75 ± 5	-
190	All	Nut, lifting bracket	2	-	50 ± 2	-
193	All	Screw	2	M12 x 20	16 ± 2	-
-	All	O-rings	All	-	-	Rocol 22

Cooling paste: Electrolube HTSP, 99239333 (1 kg)

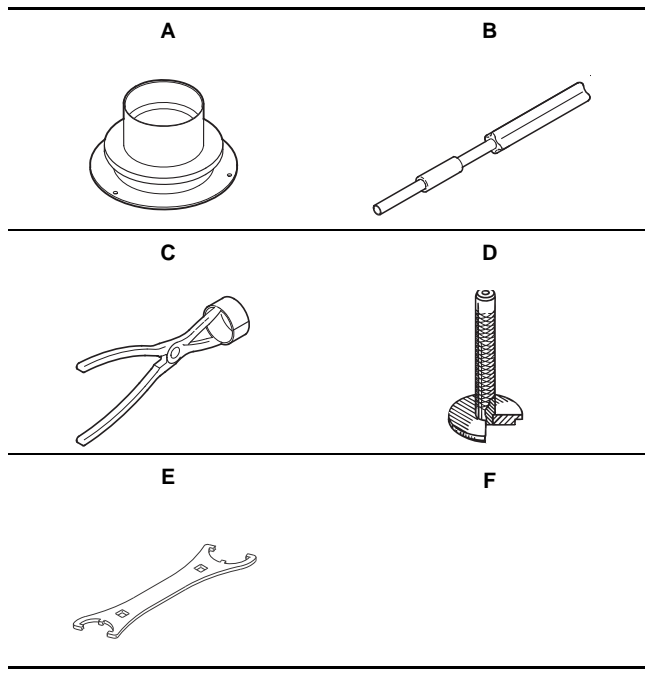
Cooling paste: Corning 340, 00RM2502 (1 kg), as an alternative.

Grease: Rocol 22 (SAPPHIRE AGUA SIL), 96102356 (5 kg).

Soap: KEMA SSP-630 (Industrial spray), 98145099 (-).

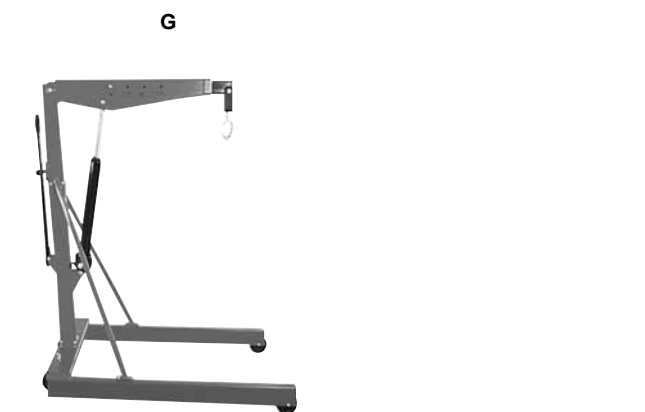
## 7. Service tools

### 7.1 Special tools



Pos.	Designation	For pos.	Pump type	Part number
A	Stator guide	48	B	V7183107
			C	V7181333
			D	V7189087
B	Pin pusher	176	All	SV2117
C	Multiplug pliers	176	7-pole or 10-pole	SV2118
			7-pole or 10-pole	-
D	Punch for wear ring	46	DN 80	SV0255
			DN 100	-
			DN 150	-
E	Spanner for cable nut	181	All	95043464
F	Test box		All	96628926

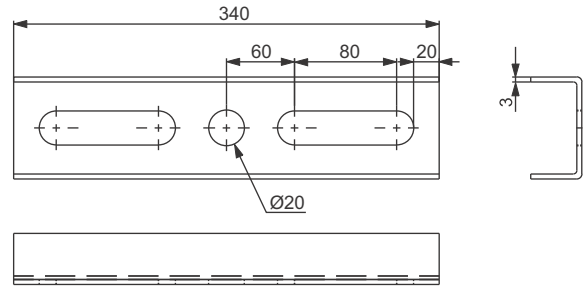
### 7.2 Lifting tools



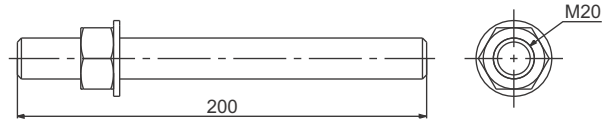
Pos.	Designation	Pump type	Part number
G	Crane for service sledge	All	98902631

### 7.3 Seal ring mounting tool

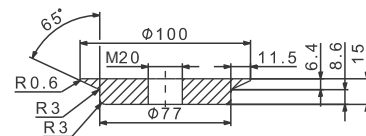
#### Puller beam



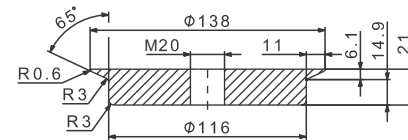
#### Threaded rod



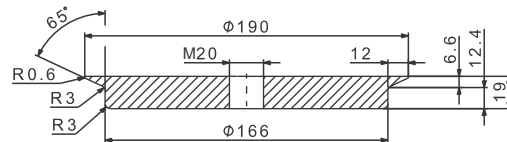
#### Puller tool, DN 50



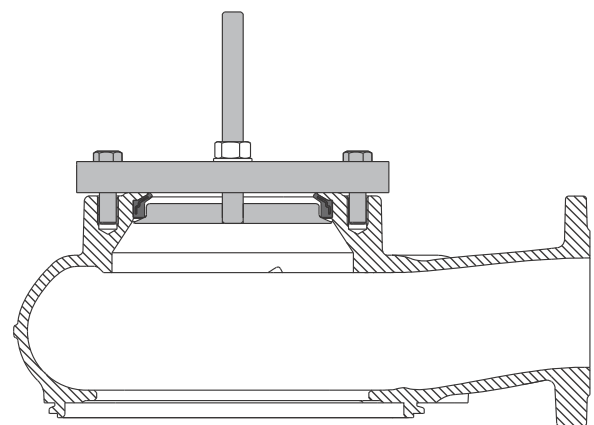
#### Puller tool, DN 80



#### Puller tool, DN 100

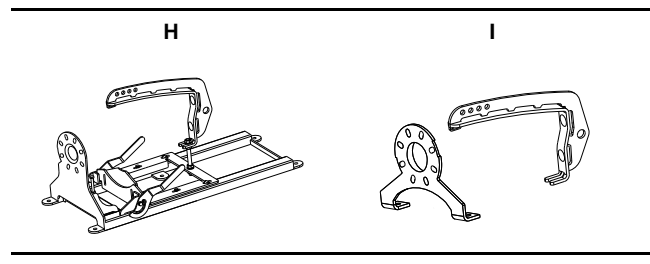


#### Mounting tool for seal ring



TM06 4479 2415 - TM06 4464 2415

## 7.4 Special service tools



Pump type	Service sledge Service bracket*	
	Part number	
	H	I
SE1.50.65.22/30.2	98827089	98902621
SE1.50.65.40.2	98827090	98902623
SE1.80.80.15/22.2	98902585	98902622
SE1.80.80.30/40/55.4	98902603	
SE1.80.80.75.4	98827091	98902625
SE1.80.100.15/22.2	98902585	98902622
SE1.80.100.30/40/55.4	98902603	
SE1.80.100.75.4	98827091	98902625
SE1.100.100.40/55.4	98902607	98902626
SE1.100.100.75.4	98902609	98902630
SE1.100.150.40/55.4	98902607	98902626
SE1.100.150.75.4	98902609	98902630
SEV.65.65.22/30.2	98902585	98902622
SEV.65.65.40.2	98902602	98902625
SEV.65.80.22/30.2	98902585	98902622
SEV.65.80.40.2	98902602	
SEV.80.80.11/13/15/22.4	98902589	98902622
SEV.80.80.40.4		
SEV.80.80.40/60/75.2	98902603	98902625
SEV.80.80.75.4		
SEV.80.80.92/110.2	98827091	98902628
SEV.80.100.11/13/15/22.4	98902589	98902622
SEV.80.100.40.4		
SEV.80.100.40/60/75.2	98902603	98902625
SEV.80.100.75.4		
SEV.80.10.110.2	98827091	98902628
SEV.100.100.40/60.4	98902606	98902625
SEV.100.100.75.4	98902608	98902628

\* Only for pumps for horizontal installation.

## 8. Servicing the product

Service must be carried out by specially trained persons.

Before carrying out service, make sure that the pump has been thoroughly flushed with clean water. Rinse the pump parts in water after dismantling.

### 8.1 Servicing Grundfos pumps with explosion-proof motors

Only Ex-approved service centres are allowed to intervene in the flameproof enclosure pump. Service not affecting the explosion protection of the pump and not violating the Ex regulations may be carried out by service persons who are not Ex-authorized.

Consequently, these persons are allowed to replace the following parts of explosion-proof pumps:

- pump housing
- impeller
- seal ring and wear ring
- shaft seal.

All other service work must be carried out by an authorised Ex-approved service centre. Violation of this requirement will invalidate the Ex classification of the pump.

### 8.2 General information



Position numbers of parts (numbers in brackets) refer to section 12. *Drawings*.

Position numbers of tools (letters in brackets) refer to section 7. *Service tools*.

#### DANGER

##### Electric shock

- Death or serious personal injury
- Before starting work on the pump, make sure that the fuses have been removed or the mains switch has been switched off.
- Make sure that the power supply cannot be accidentally switched on.



#### WARNING

##### Crushing of hands

- Death or serious personal injury
- Make sure that all rotating parts have stopped moving.



#### WARNING

##### Crushing hazard

- Death or serious personal injury
- At all times during service, make sure to secure the pump against rolling over, e.g. by placing a wooden wedge on either side of the pump.



Except for replacement or dismantling of pump housing, shaft seal, impeller, seal ring and wear ring, all other service work must be carried out by Grundfos or an Ex-approved service centre.

### 8.3 Annual maintenance



Explosion-proof pumps must be checked by an authorised Ex workshop after 3000 working hours or at least once a year.



If the pump has not been in operation for some time, vent it to let out any explosive gasses gathered in the pump.

Pumps running normal operation must be inspected every 3000 operating hours or at least once a year. If the pumped liquid is very muddy or sandy, inspect the pump at shorter intervals.

Pumps with sensor offer the possibility of constant monitoring of key components in the pump, such as shaft seal condition, bearing temperature, winding temperature, insulation resistance and moisture in the motor.

Check the following points:

- **Power consumption**  
See the pump nameplate.
- **Oil level and oil condition**  
See section 8.4 *Checking and changing the oil*.
- **Cable entry**  
Make sure that the cable entry is watertight (visual inspection) and that the cable is not sharply bent and/or pinched.  
See section 9.1 *Checking and replacing the cable*.



The cable must be replaced by Grundfos or a service workshop authorised by Grundfos.

- **Pump parts**  
Check the impeller, the pump housing, etc. for possible wear. Replace defective parts.  
See section 8.5 *Cleaning and inspecting the pump*.
- **Ball bearings**  
Check the shaft for noisy or heavy operation (turn the shaft by hand). Replace defective bearings.  
A general overhaul of the pump is usually required in case of defective ball bearings or poor motor function. This work must be carried out by Grundfos or a service workshop authorised by Grundfos.



Defective bearings may reduce the Ex safety.

- **O-rings and similar parts**  
During service or replacement, make sure that the grooves for the O-rings as well as the seal faces have been cleaned before the new parts are fitted.



Do not reuse used rubber parts.

- **Sensors**  
See sections 12. *Drawings* and 7. *Service tools*.

### 8.4 Checking and changing the oil

Change the oil in the oil chamber in these cases as described:

- After 3000 operating hours or once a year.
- If the shaft seal has been replaced.



Use Shell Ondina X420 oil or similar type.

	Power [kW]	Oil quantity [l]
2-pole	2.2	0.30
	3.0	
	4.0	
	6.0	
	7.5	
4-pole	9.2	0.55
	11.0	
	1.0	
	1.3	
	1.5	
4-pole	2.2	0.30
	3.0	
	4.0	
	5.5	
	7.5	

#### Draining the oil

Proceed as follows:

1. Place the pump on a plane surface with one oil screw pointing downwards.
2. Place a suitable container (approximately 1 litre), for instance made of transparent plastic material, under the oil screw.

#### CAUTION

##### Pressurised system



Minor or moderate personal injury

- As pressure may have built up in the oil chamber, loosen the screws slowly, and do not remove the screws until the pressure has been fully relieved.

3. Loosen and remove the lower oil screw.
4. Remove the upper oil screw.  
If the pump has been in operation for a long period of time, if the oil is drained off shortly after the pump has been stopped, and if the oil is greyish white like milk, it contains water. If the oil contains more than 20 % water, it is an indication that the shaft seal is defective and must be replaced. If the shaft seal is not replaced, the motor will be damaged.  
If the quantity of oil is smaller than the quantity stated, the shaft seal is defective.
5. Clean the faces for the gaskets for oil screws.

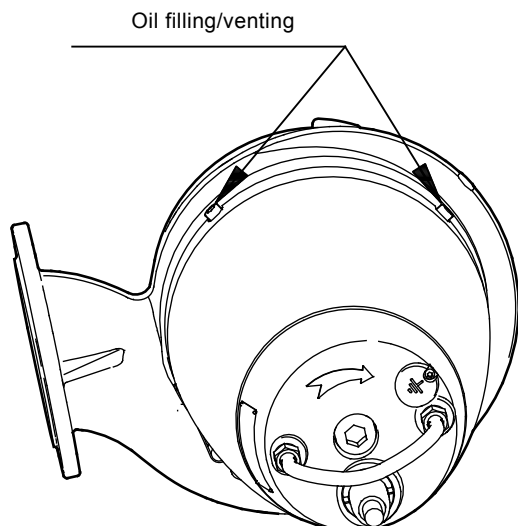


Dispose of used oil in accordance with local regulations.



### Filling with oil

1. Turn the pump so that the oil filling holes are placed opposite each other, pointing upwards.



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Fig. 1 Oil filling holes

2. Pour oil into the oil chamber.
3. Fit the oil screws with new gaskets.

### 8.5 Cleaning and inspecting the pump

Clean the pump on site at regular intervals by following this procedure:

- Lift the pump out of the pit.
- Hose down the pump externally, using a high-pressure cleaner at maximum 100 bar.
- Remove caked dirt from the motor to ensure good heat conductivity. Use a mild detergent approved for disposal into the sewage system.
- If necessary, scrub the pump, using a soft brush.

Visual inspection of the pump must include the following points:

- Search for cracks or other external damage.
- Check the lifting bracket and lifting chain for wear and corrosion.
- Inspect the power cable for cracks or lacerations in the sheath, for kinks or for other damage.
- Inspect visible parts of the cable entry for cracks.
- Check that the cable is firmly connected to the top cover.
- Check all visible screws for self-loosening and tighten, if necessary.

The pump is fitted with a vent valve at the bottom of the cooling jacket. Remove and clean the valve, if necessary. Clean the vent hole before refitting the valve after cleaning.

### 8.6 Checking the sensors



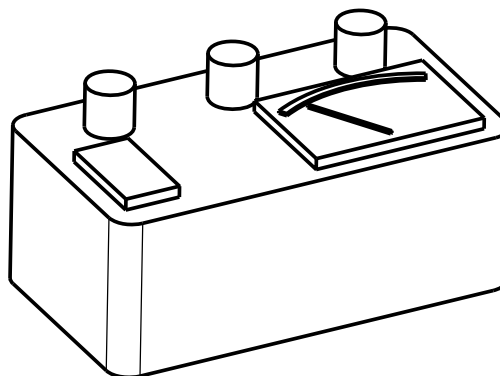
Sensor check measurements must be made by Grundfos or persons authorised by Grundfos.

Make the measurements from the free end of the cable (10 m), the other end of the cable is connected to the pump. In case the pump cable is longer than 10 m, contact Grundfos for correct values.

A Grundfos sensor test box can be used for check measuring the sensors. The sensor test box gives the response values by means of LEDs, to indicate if the sensor is ok. See section 8.6.1 *Checking by means of a test box*.

It is also possible to measure the sensors by means of a standard instrument measuring Amperes and Ohms. See section 8.6.2 *Checking by means of a standard instrument*.

#### 8.6.1 Checking by means of a test box

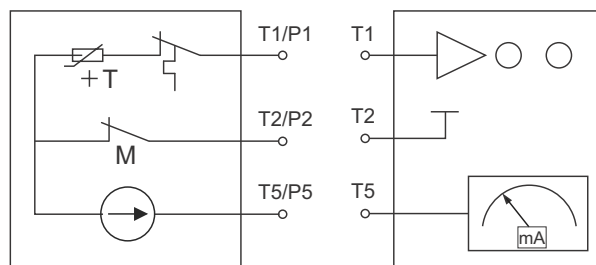


TM04 8000 2610

Fig. 2 Text box

Proceed as follows:

1. Connect the text box and sensors according the wiring diagram. See fig 3.



TM04 8022 2410

Fig. 3 Wiring diagram for test box and sensors

2. Observe led lights on the test box and compare to the table below.

Fault	LED	Output [mA]
None	Green	4-20
Moisture	Red	0
No pump	Red	0
Temperature	Red	4-20
WIO	Green	0
WIO - air (WIA)	Green	3.5
WIO - water	Green	22

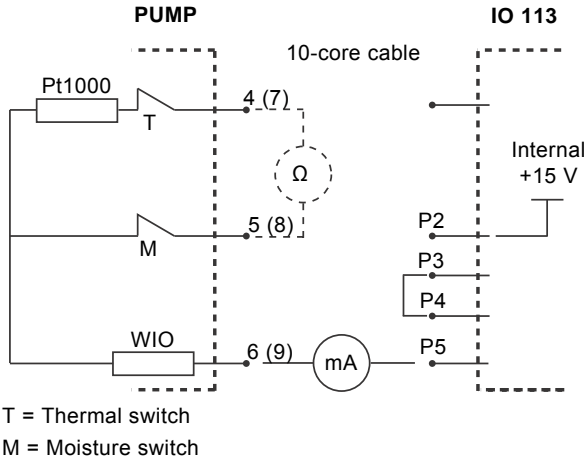
8.6.2 Checking by means of a standard instrument



Do not use a megohmmeter for checking the sensor as this will damage the control circuit.

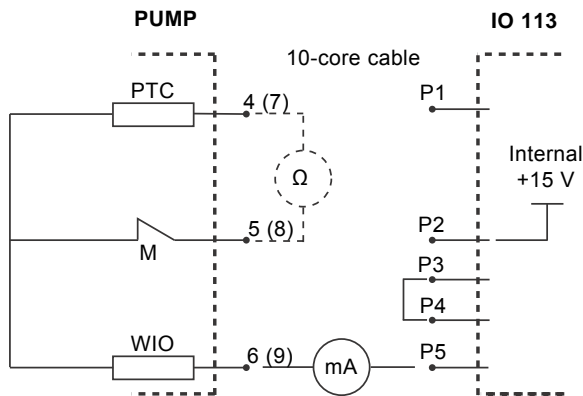
If the measured value is  $\Omega$ , disconnect the conductors from IO 113.

If the measured value is mA, disconnect conductor 6 (9) from P5 and connect the standard instrument to 6 (9) and P5.



T = Thermal switch  
M = Moisture switch

Fig. 4 Pump with Pt1000 sensor



T = Thermal switch  
M = Moisture switch

Fig. 5 Pump with PTC sensor

The figures in the following tables refer to figs 4 and 5.

Pt1000 and thermistor

4 (7)	5 (8)	6 (9)	P5 IO 113	Value	Response
•	•	-	-	400 $\Omega$	OK
•	•	-	-	> 3000 $\Omega$	Alarm

PTC sensor

4 (7)	5 (8)	6 (9)	P5 IO 113	Value	Response
•	•	-	-	400 $\Omega$	OK
•	•	-	-	> 3000 $\Omega$	Alarm
•	•	-	-	0 $\Omega$	Alarm

WIO sensor

4 (7)	5 (8)	6 (9)	P5 IO 113	Value	Response
-	-	•	•	4 mA (new oil)	OK
-	-	•	•	3.5 mA (air)	Alarm
-	-	•	•	22 mA (water)	Warning
-	-	•	•	0 mA	Warning

Moisture switch

4 (7)	5 (8)	6 (9)	P5 IO 113	Value	Response
•	•	-	-	0 $\Omega$	Alarm
-	-	•	•	0 mA	Warning

9. Dismantling and assembling the product



Service videos are available as guidance in Grundfos Product Center or YouTube.

9.1 Checking and replacing the cable

Make sure that the cable is not sharply bent or pinched and that the cable sheath has no visual defects.

9.1.1 Removing the cable

1. Loosen and remove the union nut from the cable plug (181), using a spanner (E).



When removing the union nut, make sure that the cable plug cannot rotate. Otherwise, it can detach the wires from the pin housing.

2. Loosen the cable plug (181) carefully, using two screw drivers. See fig. 6.

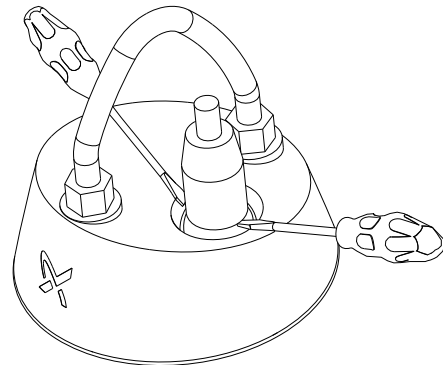


Fig. 6 Loosening the cable plug

3. Remove the cable plug (181). Be careful not to damage the pins inside the cable plug and in the pin housing.

9.1.2 Fitting the cable

1. Fit the O-ring (198).
2. Fit the outer plug part (181).
3. Fit the union nut of the plug and tighten it with the spanner (E) for cable plug (181).



When tightening the union nut, make sure that the cable plug cannot rotate. Otherwise, it can detach the wires from the pin housing.

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TM04 7040 1410

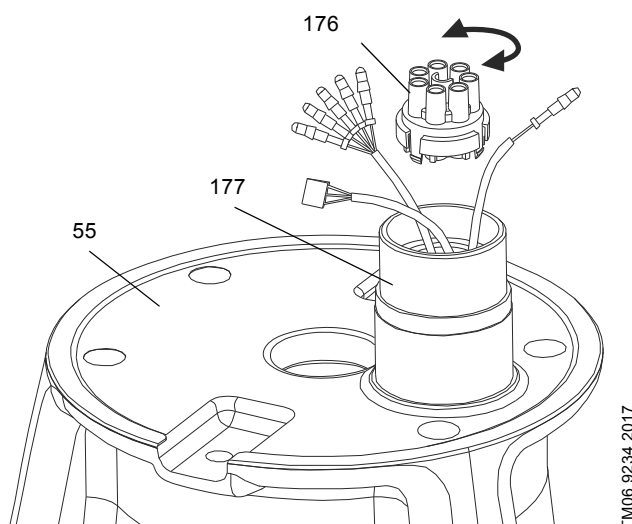
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## 9.2 Replacing the pin housing

### 9.2.1 Removing the pin housing

1. See section 9.1.1 *Removing the cable*.
2. See section 9.4.7 *Removing the motor top*.
3. Remove the earthing screw (173) including the washer (173a).
4. Disconnect the wire pins from the pin housing (176).
5. Remove the plug protector (177), including the pin housing (176).
6. Remove the pin housing (176) by pressing it up with the pin pusher (D) below the pin housing.

### 9.2.2 Fitting the pin housing



TM06 9234 2017

**Fig. 7** Fitting the pin housing

1. Pull the wires (coming from the stator) gently through the plug protector (177).
2. Fit the plug housing (177) to the stator housing (55).
3. Connect the wires (coming from the stator) to the pin housing (176). See section 12.5.2 *Wiring diagrams*.
4. Fit the new pin housing (176) in the plug protector (177).
5. Connect the earthing screw (173) and washer (173a).
6. Assemble the pump according to the instructions in section 9.5 *Assembling*.

## 9.3 Replacing the protection sensors

For sensor positions, see section 12.4 *Sensor positions*.



The protection sensors must be replaced by Grundfos or an Ex-approved service centre.

All SE1 and SEV pumps have thermal protection incorporated in the stator windings.

### Pumps without sensor

Pumps without sensor have a thermal switch. Via the pump controller safety circuit, the thermal switch will stop the pump by breaking the circuit in case of high overtemperature (approximately 150 °C). The thermal switch will reclose the circuit after cooling.

The maximum operating current of the thermal switch is 0.5 A at 500 VAC and  $\cos \phi$  0.6. The switch must be able to break a coil in the supply circuit.

In the case of standard pumps, when closing the circuit after cooling, the thermal switch can (restart the pump automatically via the controller.

### Pumps with sensor

Pumps with sensor have either a thermal switch and a Pt1000 sensor or a thermistor (PTC) in the windings, depending on the installation site.

To find out whether the pump is fitted with a thermal switch or a PTC thermistor, measure the motor winding resistance. See the table below.

	Without cable	With 10 m cable	With 15 m cable
<b>Thermal switch</b>	< 50 mΩ	< 320 mΩ	< 390 mΩ
<b>PTC thermistor</b>	> 100 mΩ	> 370 mΩ	> 440 mΩ

Via the pump controller safety circuit, the thermal switch or the thermistor stops the pump by breaking the circuit in case of high temperature, approximately 150 °C. The thermal switch or the thermistor recloses the circuit after cooling.

The maximum operating current for both the Pt1000 and the thermistor is 1 mA at 24 VDC.

### Moisture switch and WIO sensor

The moisture switch is an NC switch (normally closed). In case of moisture, the circuit is broken, and the current supply to the pump is interrupted. If the moisture switch has been activated, it must be replaced.

The WIO sensor measures the water content in the oil and converts the value into an analog current signal. The two sensor conductors are for power supply as well as for carrying the signal to the IO 113 module. The sensor measures the water content from 0 to 20 %. It also sends a signal if the water content is outside the normal range (warning), or if there is air in the oil chamber (alarm).

Fault indication	Reaction
Water in oil	Warning. The pump keeps running.
Sensor not covered by oil	Alarm. The pump stops.

### 9.3.1 Replacing the thermal switch, Pt1000 or thermistor (PTC)

In case the thermal switch, Pt1000 or thermistor (PTC) is not operating, even if the pump has cooled down, the stator has been damaged by too high temperature.

The thermal switch, Pt1000 or thermistor (PTC) is built into the stator windings and cannot be changed without replacing the stator. See section 9.4 *Dismantling*.

### 9.3.2 Replacing the water-in-oil sensor (WIO)



We recommend that you change the motor oil in case the WIO sensor is changed.

#### Removing the WIO sensor

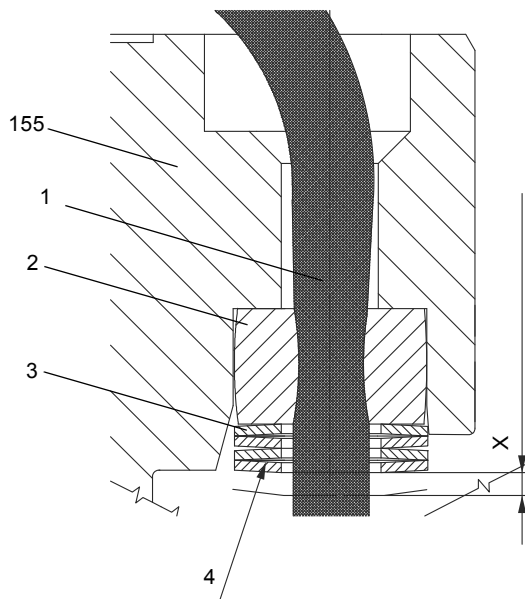
1. Dismantle the pump according to the instructions in section 9.4 *Dismantling*.
2. Cut off the cable shoe of the WIO sensor (521).
3. Remove the cable sleeve from the wire, and pull the sensor cable out of the intermediate flange (155).
4. Remove the rubber bush and the disk springs from the wire.

#### Fitting a new WIO sensor

1. Fit the four spring washers and the rubber seal on the sensor cable. For correct positioning, see fig. 8.



The spring washers and rubber seal must always be replaced if removed.

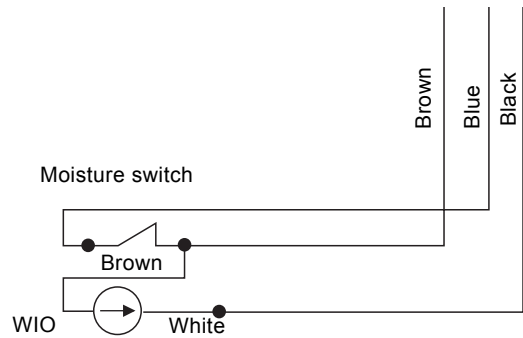


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Fig. 8 Position of spring washers

Pos.	Description
1	Sensor cable
2	Rubber seal
3	Spring washer
4	Spring washer stack
155	Intermediate flange
X	Minimum compression is 1.4 mm

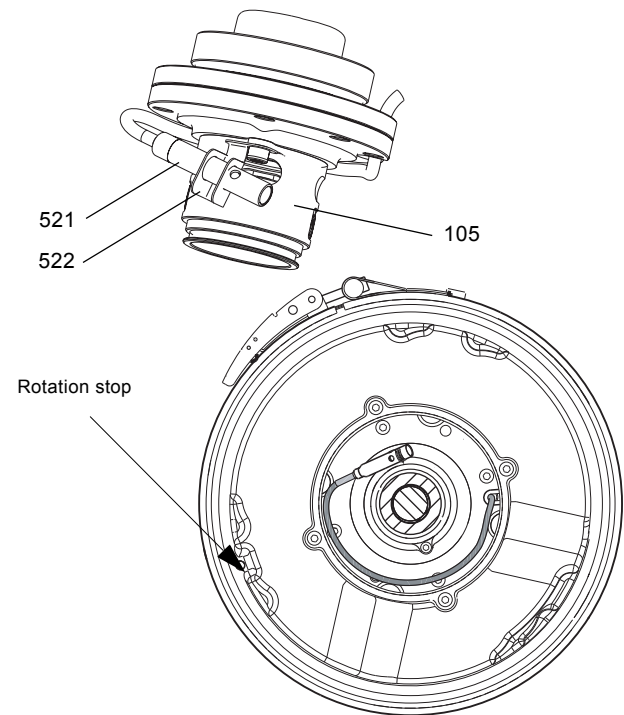
2. Pull the sensor cable up through the intermediate flange (155).
3. Push the protection sleeve on the sensor cable.
4. Cut the cable to a suitable length and connect the wires according to the wiring diagram. See section 12.5 *Electrical data*.



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Fig. 9 Wiring diagram for WIO sensor

5. Fit the sensor (521) in the bracket (522).
6. Fit the sensor with screw (186) so that the sensor is positioned in the direction of rotation and approximately 55° clockwise after the rotation stop (6a). See fig. 10.



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Fig. 10 Fitting the water-in-oil sensor

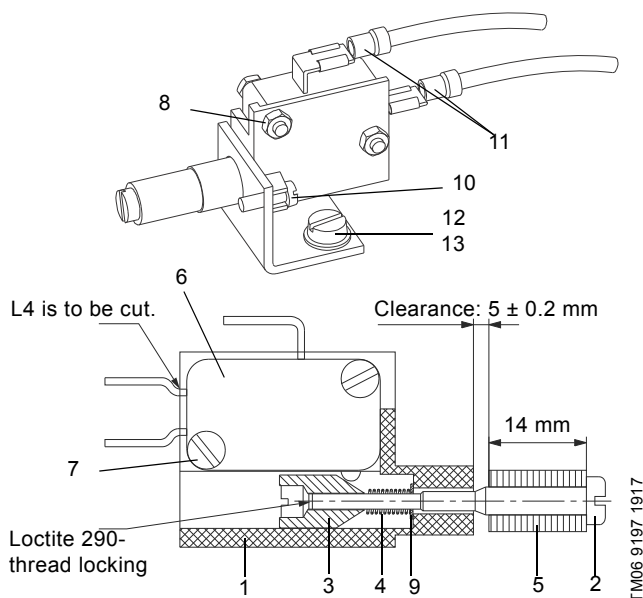
7. Assemble the pump. See section 9.5 *Assembling*.

### 9.3.3 Replacing the moisture switch



Do not touch the head of the moisture switch with wet or oily hands. Moisture in the sensor head before installation causes false measuring values.

The moisture switch must be stored in air-tight packaging to protect the expansion part against moisture. The relay is factory-set to 5 mm and requires no further setting.



**Fig. 11** Moisture switch

Pos.	Description
1	Mounting bracket
2	Shaft
3	Adjustment nut
4	Spring
5	Expanding washer
6	Micro switch
7	Screw
8	Nut
9	Washer
10	Screw
11	Spade connectors
12 (186)	Mounting screw
13	Lock washer

#### Checking the micro switch

1. Connect the switch to a simple bell circuit or similar test circuit.
2. Pull the expander (5) two to three times to make sure that the bell stops ringing when the expander is pulled outwards, which breaks the electric circuit, and starts ringing when the expander is free.  
If the bell does not ring, turn the adjusting nut (3) outwards until the bell rings.

#### Adjusting the clearance of the moisture switch

1. Connect the moisture switch in the test bell.
2. Place the feeler gauge between the mounting bracket (1) and the expander (5).
3. Pull the expander (5) outwards.  
If the bell rings turn the adjusting nut (3) clockwise until the bell stops ringing.
4. Check the adjustment by removing the feeler gauge, reinstall it and repeat step 2.  
The test bell should connect on and off by gently moving the feeler gauge.
5. Lock the adjusted moisture switch with Loctite 290 thread locking compound by adding a drop of it in the cavity of the adjusting nut (3).

#### Replacing the moisture switch

1. Dismantle the pump, leaving only the stator housing. See section 9.4 *Dismantling*.
2. Remove the sensor protector (plastic cover).
3. Remove the mounting screw (12) and lock washer (13) from the mounting bracket (1).
4. Pull out the sensor from the stator housing (55).
5. Disconnect the spade connectors (11) from the switch.
6. Remove the screw (10).
7. Remove the switch from the mounting bracket (1).

#### Fitting a new moisture switch

1. Fit the moisture switch to the mounting bracket (1).
2. Fit the screw (10) to attach the switch to the mounting bracket (1).
3. Fit the mounting bracket (1), including the switch on the stator housing (55), with the mounting screw (12) and the lock washer (13).
4. Connect the spade connectors (11).
5. Connect the wires according to the wiring diagram. See section 12.5 *Electrical data*.
6. Fit the sensor protector (plastic cover).
7. Assemble the pump according to the instructions in section 9.5 *Assembling*.

## 9.4 Dismantling

For position numbers, see section 12. *Drawings*.



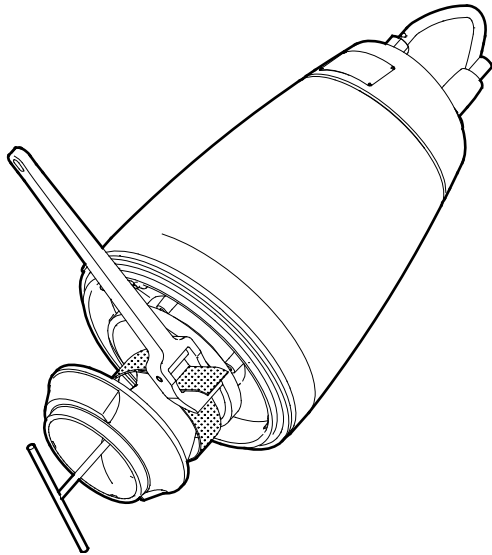
Except for replacement or dismantling of pump housing, shaft seal, impeller, seal ring and wear ring, all other service work must be carried out by Grundfos or an Ex-approved service centre.

### 9.4.1 Removing the pump housing

1. Loosen the clamp (92).
2. Remove the screw (92a).
3. Lift the pump approximately 5 cm.
4. Remove the pump housing (50) by lifting the pump by the lifting bracket (190) using a crane and knocking on the pump housing (50).
5. Check that the pin (6a) is attached to the intermediate ring (155).

### 9.4.2 Removing the impeller

1. See section 9.4.1 *Removing the pump housing*.
2. Place the pump in horizontal position.
3. Secure the impeller (49) by means of a strap wrench. See fig. 12.



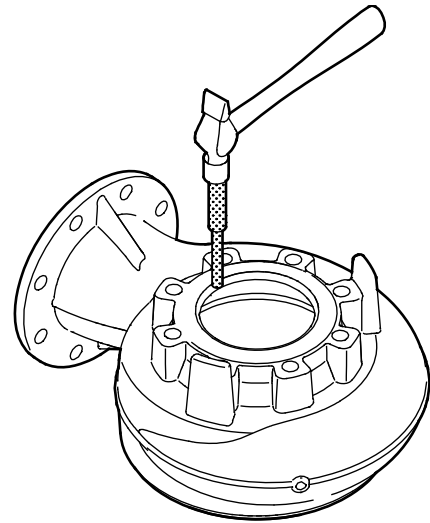
**Fig. 12** Removing the impeller

4. Remove the screw (188a) and washer (66).
5. Loosen the impeller (49) with a light blow on the edge.
6. Remove the impeller (49).
7. Remove the key (9a) and the corrugated spring (157).

### 9.4.3 Removing the seal ring and wear ring

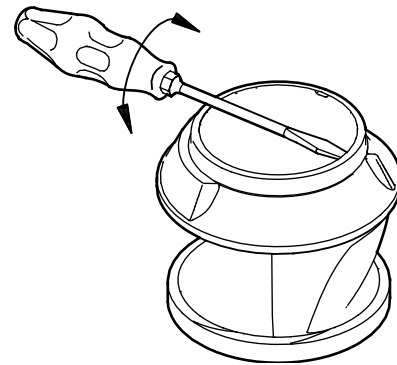
This section applies only to SE1 pumps.

1. See section 9.4.2 *Removing the impeller*.
2. Turn the pump housing upside down.
3. Knock the seal ring (46) out of the pump housing, using a punch. See fig. 13.



**Fig. 13** Removing the seal ring

4. Clean the pump housing where the seal ring was fitted.
5. Remove the wear ring (49c), using a screwdriver. See fig. 14.



**Fig. 14** Removing the wear ring

6. Clean the impeller (49) where the wear ring was fitted.

### 9.4.4 Removing the shaft seal

Step 1 is only valid for SE1 pumps.

1. See section 9.4.3 *Removing the seal ring and wear ring*.
2. Drain the oil. See section 8.4 *Checking and changing the oil*.
3. Remove the screws (187).
4. Remove the cover for oil chamber (58), using a puller.
5. Remove the O-ring (107).
6. Remove the screws (186).  
In case of sensor version, the WIO sensor including the bracket is detached together with the screw (186). See section 9.3.2 *Replacing the water-in-oil sensor (WIO)*.
7. Fit the screw (188a) in the end of the shaft and remove the shaft seal (105), using the puller.
8. Remove the O-ring (153b).
9. Remove the O-ring (37) from the intermediate flange (155).
10. Remove the screw (188a) from the shaft end.

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### 9.4.5 Removing the rotor



This work must be carried out by Grundfos or an Ex-approved service centre.

1. See section 9.4.4 *Removing the shaft seal*.
2. Remove the screws (182).
3. Remove the lower bearing cover (59).
4. Fit two screws (182) in the upper bearing cover (60), and tighten them until the rotor (172) is free.
5. Carefully pull out the rotor.



The upper bearing (154) is removed together with the rotor.

6. Remove the corrugated spring (158) from the stator housing (55).
7. In case of a WIO sensor, remove the sensor (521) from the bracket (522). Place the sensor inside the stator (48).
8. Remove the O-rings (109 and 108).

### 9.4.6 Removing the bearings



This work must be carried out by Grundfos or an Ex-approved service centre.

1. See section 9.4.5 *Removing the rotor*.
2. Pull out the lower bearing retainer (60) including the lower bearing (153).
3. Remove the O-ring (102).
4. Gently tap the inner ring of the lower bearing (153) to remove it from the lower bearing cover (60).
5. Remove the O-ring (108).
6. Remove the upper bearing (154), using a bearing puller.

### 9.4.7 Removing the motor top



This work must be carried out by Grundfos or an Ex-approved service centre.

1. See section 9.4.4 *Removing the shaft seal*.
2. Remove the cable plug. See section 9.1 *Checking and replacing the cable*.
3. Place the motor housing in vertical position on wooden bars.



Be careful not to damage the plug housing (177).

4. Remove the screw (183) and washer (183a).
5. Remove the motor top (151) by lifting the pump slowly by the lifting bracket (190) using a crane.
6. Remove the O-ring (37b).

### 9.4.8 Removing the sleeve



This work must be carried out by Grundfos or an Ex-approved service centre.

1. See section 9.4.7 *Removing the motor top*.
2. Pull the sleeve (150) free of the stator housing (55), using two crowbars. See fig. 15.

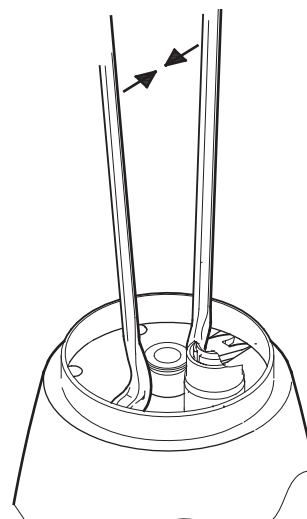


Fig. 15 Removing the sleeve

3. Remove the O-rings (37a).
4. Remove the O-ring (159).

### 9.4.9 Removing the stator housing



This work must be carried out by Grundfos or an Ex-approved service centre.

1. See section 9.4.8 *Removing the sleeve*.
2. Remove the screws (184) and washers (184a).
3. Fit the motor top (151) with screw (183).
4. Turn the pump in horizontal position and support with wooden blocks or similar support.
5. Fit one of the screws (184) into the screw hole to loosen the intermediate flange (155).
6. In case of sensor version: Pull the WIO sensor out of the stator housing.
7. Carefully pull the intermediate flange (55) free and, at the same time, push the wire of the WIO sensor (521) through the flange.



Do not use force when pulling the sensor wire.  
Do not pinch the sensor under the intermediate flange.

8. Remove the WIO sensor and moisture switch. See section 9.3 *Replacing the protection sensors*.

### 9.4.10 Removing the stator



This work must be carried out by Grundfos or an Ex-approved service centre.

1. See section 9.4.9 *Removing the stator housing*.
2. Remove the pin housing (176), using the pin pusher (B).
3. Remove the plug protector (177), using the multiplug pliers (C).
4. Remove the screw (173) and the washer (173a).
5. Remove the upper bearing cover (61) from the stator housing (55).
6. Block up the stator housing (55) so that it stands on the flange at a height where the stator can come out underneath.
7. Heat the stator housing (55) until the stator (48) drops out. Heat the stator housing uniformly so that it is not deformed. When using a gas burner, heat up to approximately 200 °C. When using a pre-heated oven, heat up to approximately 300 °C.

### 9.5 Assembling

For position numbers, see section 12. *Drawings*.



Except for replacement or dismantling of pump housing, shaft seal, impeller, seal ring and wear ring, all other service work must be carried out by Grundfos or an Ex-approved service centre.

#### 9.5.1 Fitting the stator



This work must be carried out by Grundfos or an Ex-approved service centre.

1. Place the stator (48) on the stator guide (A) with the wire end upwards. See fig. 16 and fig. 17.

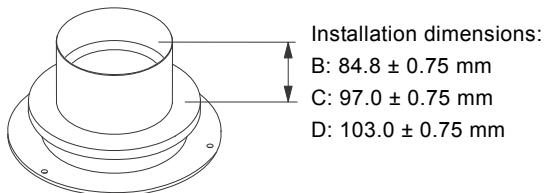


Fig. 16 Stator guide

2. Tie together the wires with a steel wire.
3. Fit the upper bearing cover (61) to the stator housing (55) with a screw (183) and washer (183a).
4. Place the stator housing (55) on the stator (48), and run the wires through the stator housing. See fig. 17.

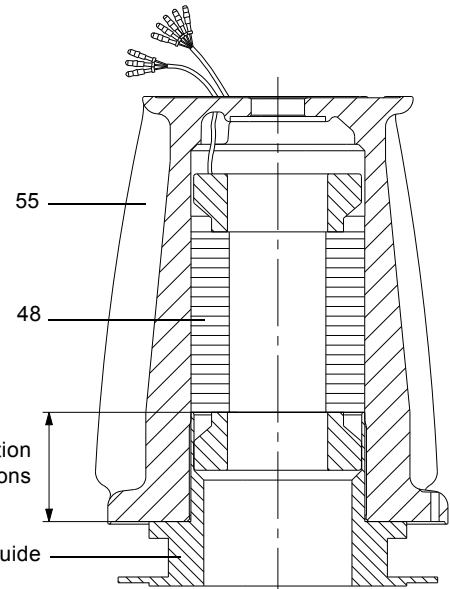


Fig. 17 Installing the stator housing

5. Make sure that the stator housing is placed so that the bore for plug is turned 45 ° in relation to the point where the wires leave the stator. See fig. 18.

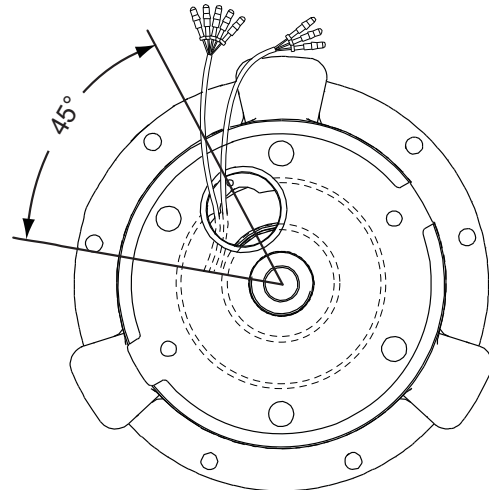


Fig. 18 Position of stator in relation to the stator housing

6. Heat the stator housing (55) to 200 °C (maximum 240 °C) until the stator housing slides down on the stator. Heat the stator housing uniformly so that it is not deformed. Make sure that the wires are not pinched, and that the bottom flange of the stator housing touches the stator guide (A).
7. Check the installation dimensions. See fig. 16.
8. Let the stator housing (55) cool down.
9. Fit the protective conductor (green and yellow) with the screw (173) and washer (173a).
10. Fit the pin housing (176) and the plug protector (177). See section 12.5 *Electrical data*.



### 9.5.2 Fitting the stator housing



This work must be carried out by Grundfos or an Ex-approved service centre.

1. Place the motor in horizontal position on wooden bars.
2. Fit the moisture switch in the stator housing (55), if any. See section 9.3.3 *Replacing the moisture switch*.
3. Apply cooling paste (192) on the bottom flange of the stator housing (55), and distribute an even layer on the entire flange, using a fine-toothed putty knife.
4. Fit the intermediate flange (155).  
In case of sensor version, pull the wire of the WIO sensor continuously through the hole in the intermediate flange. Take care not to damage the WIO sensor (521).



Pay attention to the correct pin (6a) position.

5. Fit the screws (184) and washers (184a), but do not tighten the screws:
  - Frame sizes B and C: The threaded holes for the screws (184) are placed asymmetrically.
6. In case of sensor version, fit the wires of the WIO sensor. See section 9.3.2 *Replacing the water-in-oil sensor (WIO)*.
7. Fit the pin (6a), if any.
8. Turn the pump in vertical position on wooden bars.
9. Tighten the screws (184), including washer (184a), to a torque of 30 Nm.
10. Remove the screw (183) and the washer (183a).

### 9.5.3 Fitting the sleeve



This work must be carried out by Grundfos or an Ex-approved service centre.

1. Place the motor in horizontal position on wooden bars.
2. Fit and lubricate the O-rings (37a).
3. Fit the oil plug (193) and the washers (194).
4. Lubricate the lower inner part of the sleeve (150) with O-ring grease.
5. Lower the sleeve (150) down on the stator housing (55).
6. Press the sleeve home. It may be necessary to knock it with a hammer and a wooden block.

### 9.5.4 Fitting the motor top



This work must be carried out by Grundfos or an Ex-approved service centre.

1. Fit the lifting bracket (190), including washer (190a), to the motor top (151), if needed.
2. Fit and lubricate the O-ring (37b).
3. Fit and lubricate the O-ring (159).
4. Fit the motor top (151) to the stator housing (55).
5. Fit the washer (183a) and screw (183).

### 9.5.5 Fitting the upper bearing



This work must be carried out by Grundfos or an Ex-approved service centre.



Bearings are factory-greased for life.

1. Fit the upper bearing (154) to the shaft (172) and press home.

### 9.5.6 Fitting the shaft



This work must be carried out by Grundfos or an Ex-approved service centre.

1. Place the motor housing horizontally by means of a crane.
2. Fit the corrugated spring (158) into the stator housing (55). It may be necessary to keep it in position with a small amount of grease.
3. Lubricate the outside of the upper bearing (154) with O-ring grease.
  1. Fit and lubricate the O-ring (108) to the upper bearing cover (60).
  2. Fit the cover on the shaft (172).
  3. Insert the rotor and shaft (172) into the stator housing (55) so that the upper bearing (154) goes first. Take care not to damage or pinch the WIO sensor (521), if any.
4. Align the groove in the bearing housing (60) to the cable entry of the intermediate flange (155).

### 9.5.7 Fitting the lower bearing

5. Fit the lower bearing (153) on the upper bearing cover (60). Fill the bearing with grease.
6. Fit the corrugated spring (157).
7. Fit and lubricate the O-ring (109) to the lower bearing cover (59).
8. Fit the lower bearing cover (59) to the shaft (172).
9. Fit the screws (182) and tighten them diagonally.

### 9.5.8 Fitting the shaft seal



This work must be carried out by Grundfos or an Ex-approved service centre.

10. Fit and lubricate the O-rings (153b)
11. Lubricate and fit the O-rings (106, 2 pcs) to the shaft seal (105).
12. Carefully push the shaft seal (105) onto the shaft (172).
13. Lubricate the O-ring (107), and fit it into the cover for oil chamber (58).
14. Fit the cover for oil chamber (58).
15. Fit and tighten the screws (186) diagonally.  
In case of sensor version, fit the WIO sensor. See section 9.3.2 *Replacing the water-in-oil sensor (WIO)*.
16. Fill in oil. See section 8.4 *Checking and changing the oil*.

### 9.5.9 Fitting the seal ring and wear ring

This section applies only to SE1 pumps.

1. Moisten the seal ring (46) with oil.
2. Place the seal ring in the pump housing (50).
3. Knock the seal ring (46) home in the pump housing (50), using a punch or wooden block. See fig. 19.



Check on the outside that the seal ring is completely home in the pump housing or use a seal ring mounting tool.

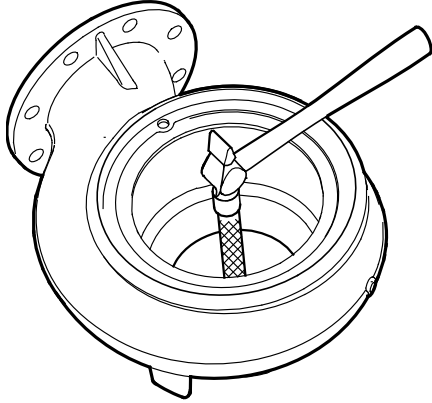


Fig. 19 Fitting the seal ring

4. Place the wear ring (49c) on the impeller (49).
5. Knock the wear ring (49c) home, using a hammer and a wooden block. See fig. 20.

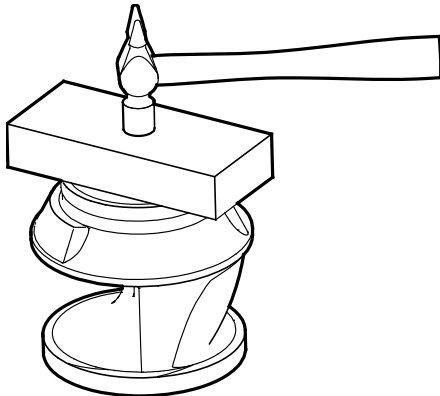


Fig. 20 Fitting the wear ring

### 9.5.10 Fitting the impeller

1. Fit the spring (157) and key (9a).



Keep the key in position while the impeller is fitted.

2. Fit the impeller (49).
3. Fit the washer (66) and the screw (188a).
4. Tighten the screw (188a). See section 6. *Torques and lubricants*. Hold the impeller with the strap wrench.

### 9.5.11 Fitting the pump housing

1. Mark the position of the pin (6a) on the pump housing (50).
2. Mark the position of the pin hole on the oil chamber (58).
3. Fit and lubricate the O-ring (37).
4. Lower the motor down over the pump housing (50), using a crane.
5. Mark the sleeve (150) and pump housing (50) to place the motor correctly. Lower the motor down on the pump housing (50).
6. Fit the clamp (92).
7. Tighten the screw (92a). See section 6. *Torques and lubricants*.
8. Check that the impeller (49) rotates freely and without drag.

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## 10. Start-up



The pump must not run dry.



Do not start the pump if the atmosphere in the pit is potentially explosive.

### CAUTION

#### Sharp element

Minor or moderate personal injury

- Wear protective gloves to avoid being cut by the sharp edges of the impeller.



The pumps are fitted with impellers of S-tube® design. S-tube® impellers are wet balanced which will reduce the vibration during operation. If the pumps are started with the pump housing full of air, the vibration level will be higher compared to normal operation.



Local balancing of S-tube® impellers will damage the wet balancing and lead to higher vibration level during operation.



If the pump has not been in operation for some time, vent it to let out any explosive gasses gathered in the pump.

See step 12 below.

### 10.1 Starting up the SE1 pump

1. Remove the fuses and check that the impeller can rotate freely. Turn the impeller by hand.
2. Check the condition of the oil in the oil chamber. See also section 8.4 *Checking and changing the oil*.
3. Check that the system, bolts, gaskets, pipes and valves, etc. are in correct condition.
4. Check the direction of rotation.  
See section 10.3 *Checking the direction of rotation*.
5. Mount the pump in the system.
6. Switch on the power supply.
7. Check whether the monitoring units, if used, are operating satisfactorily.
8. For pumps with sensor: Switch on IO 113 and check that there are no alarms or warnings. See section 8.6 *Checking the sensors*.
9. Check the setting of the air bells, float switches or electrodes.
10. Open the isolating valves, if fitted.
11. Check that the liquid level is above the upper edge of the clamp on the pump. If the level is below the clamp, add liquid to the pit until the minimum level is obtained.
12. Remove trapped air from the pump housing by tilting the pump, using the lifting chain.
13. Start the pump and let the pump run briefly. Check whether the liquid level is falling. A correctly vented pump quickly lowers the liquid level.



In case of abnormal noise or vibrations from the pump, other pump failure, power supply failure or water supply failure, stop the pump immediately.

Do not attempt to restart the pump until the cause of the fault has been found and the fault corrected.

After one week of operation or after replacement of the shaft seal, check the condition of the oil in the chamber. For pumps without sensor, check the condition of the oil by taking a sample of the oil. See section 8.4 *Checking and changing the oil* for procedure.

### 10.2 Starting up the SEV pump

1. Remove the pump from the system.
2. Check that the impeller can rotate freely. Turn the impeller by hand.
3. Check the condition of the oil in the oil chamber. See also section 8.4 *Checking and changing the oil*.
4. Check whether the monitoring units, if used, are operating satisfactorily.
5. Check the setting of the air bells, float switches or electrodes.
6. Check the direction of rotation. See section 10.3 *Checking the direction of rotation*.
7. **Submerged pumps**
  - Start the pump above water level and lower the pump into the pit to avoid that air is trapped in the pump housing.
8. **Dry-installed pumps with positive inlet pressure**  
The pump is installed in a pump room next to the pit.



Check that there is positive inlet pressure before starting up the pump.

- Open the isolating valve on the inlet side.
  - Loosen the vent screw until water comes out of the vent hole, then tighten the vent screw again.
  - Open the isolating valve on the outlet side and start the pump.
9. **Dry-installed pumps with inlet pipe and foot valve**
    - Open the isolating valve on the outlet side to allow the water above the valve to run backwards to prime the inlet pipe.
    - Loosen the vent screw until water comes out of the vent hole, then tighten the vent screw again.
    - Start the pump.
  10. **Dry-installed pumps with inlet pipe and foot valve, without or with short outlet pipe**  
We recommend that you use a vacuum system.
    - Keep the isolating valve on the outlet side closed.
    - Start the vacuum system until liquid has been sucked in and the pump has been vented.
    - Open the isolating valve on the outlet side and start the pump.

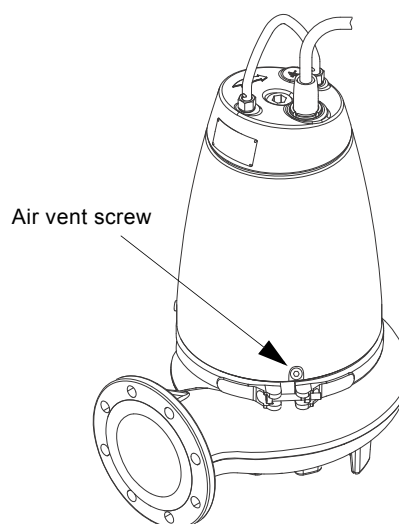


Fig. 21 Position of the air vent screw

### 10.3 Checking the direction of rotation



Only start and run an unsubmerged pump for a few seconds to check the direction of rotation.

An arrow on the top cover indicates the correct direction of rotation. Correct direction of rotation is clockwise when viewed from above.

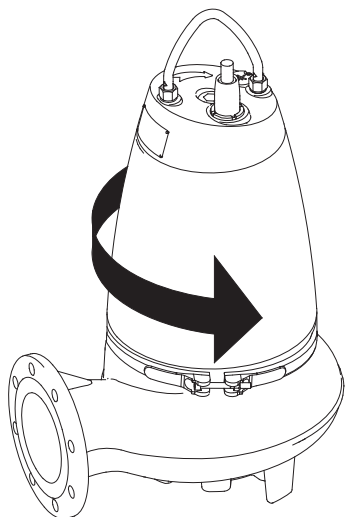
When started, the pump will jerk in the opposite direction of the direction of rotation. See fig. 22.

#### Procedure

The direction of rotation must be checked in the following way every time the pump is connected to a new installation.

Proceed as follows:

1. Let the pump hang from a lifting device, for example the hoist used for lowering the pump into the pit.
2. Start and stop the pump while observing the movement or jerk of the pump. If connected correctly, the pump will rotate clockwise, and it will jerk counterclockwise. See fig. 22.
3. If the direction of rotation is wrong, interchange any two of the phases in the power supply cable. See section 12.5 *Electrical data*.



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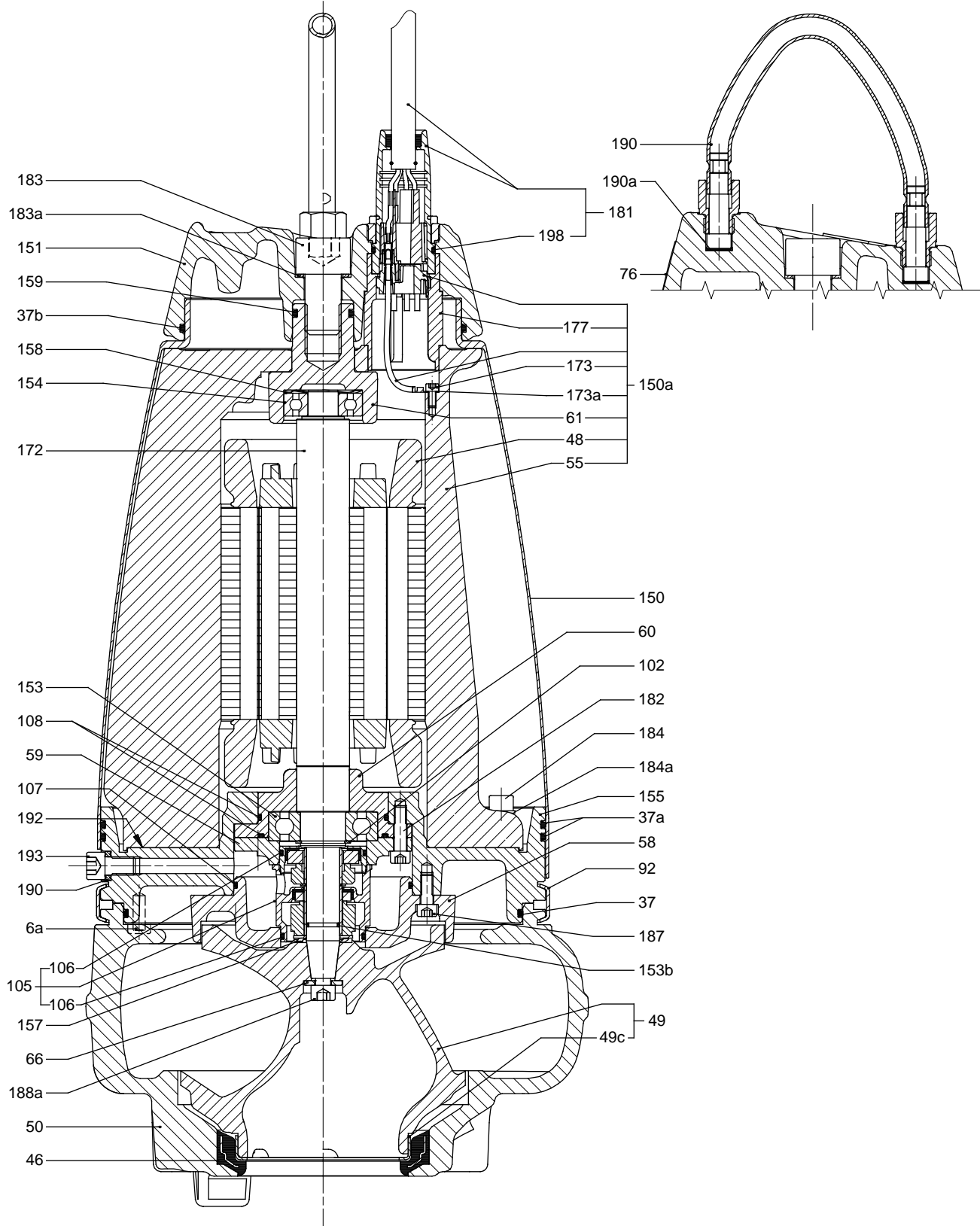
**Fig. 22** Jerk direction

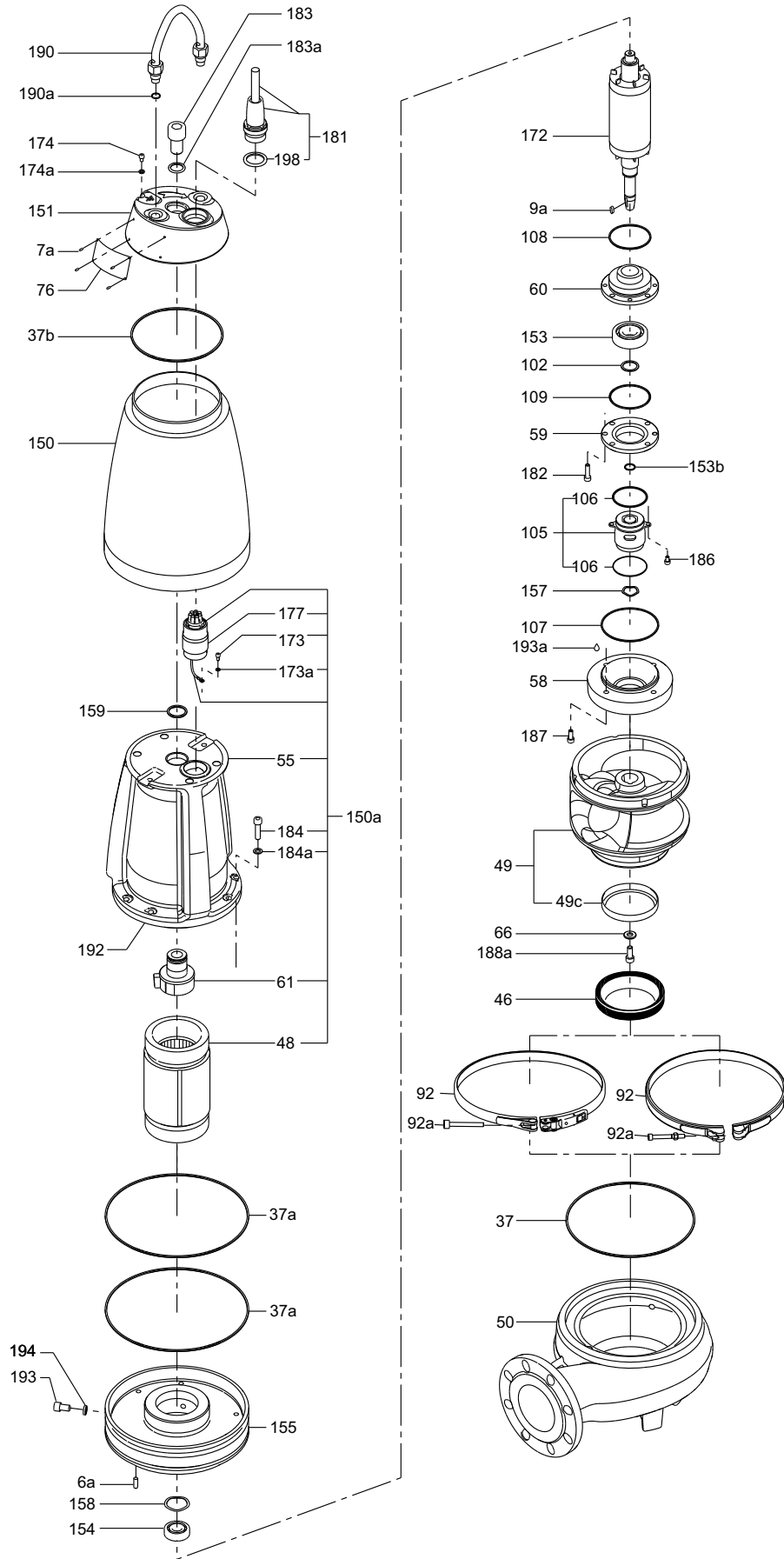
## 11. Fault finding

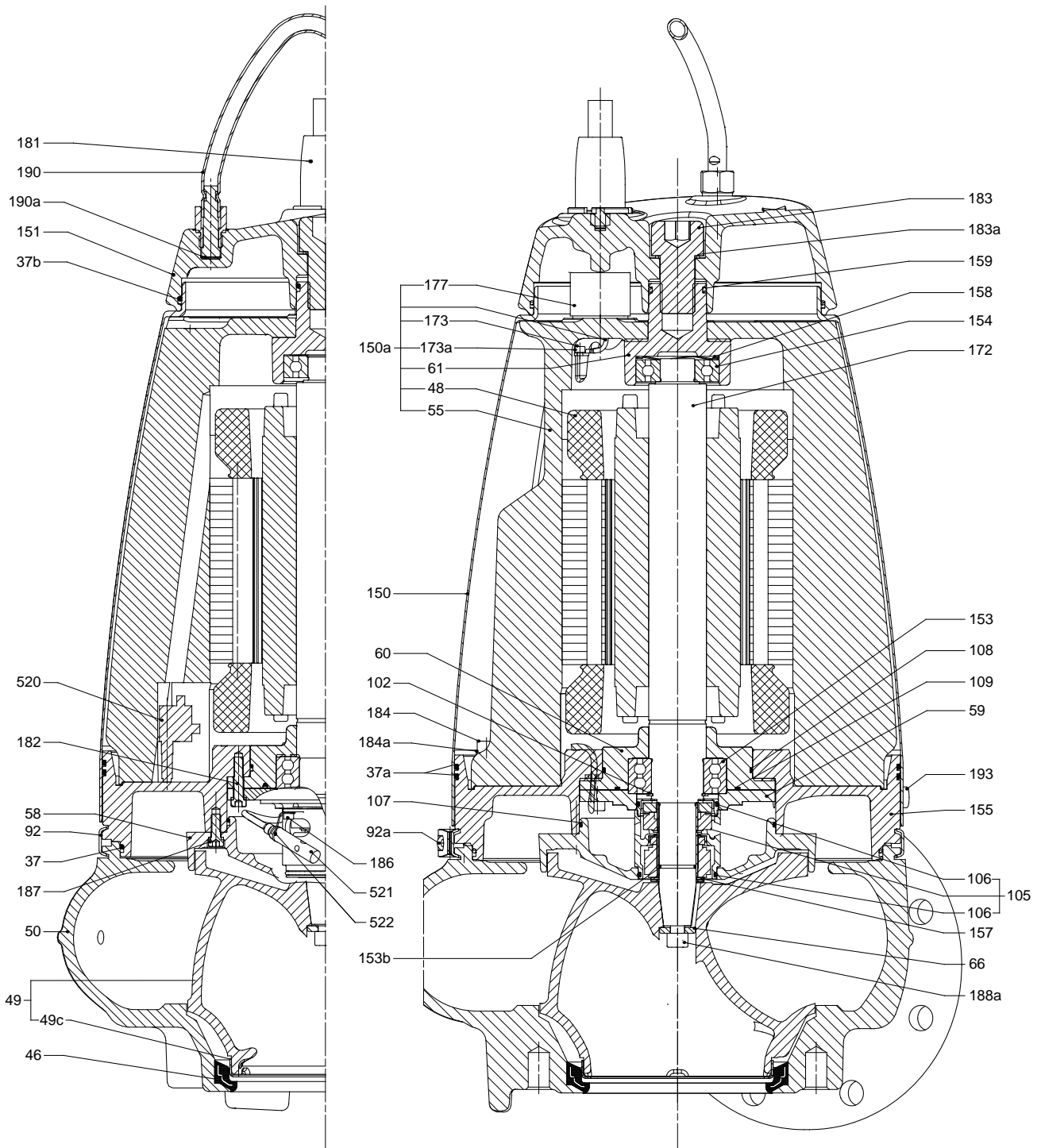
For further information, see the installation and operating instructions for SE1, SEV 1.1 - 11 kW. The installation and operating instructions are accessible via the QR code and link on the front page of this document.

## 12. Drawings

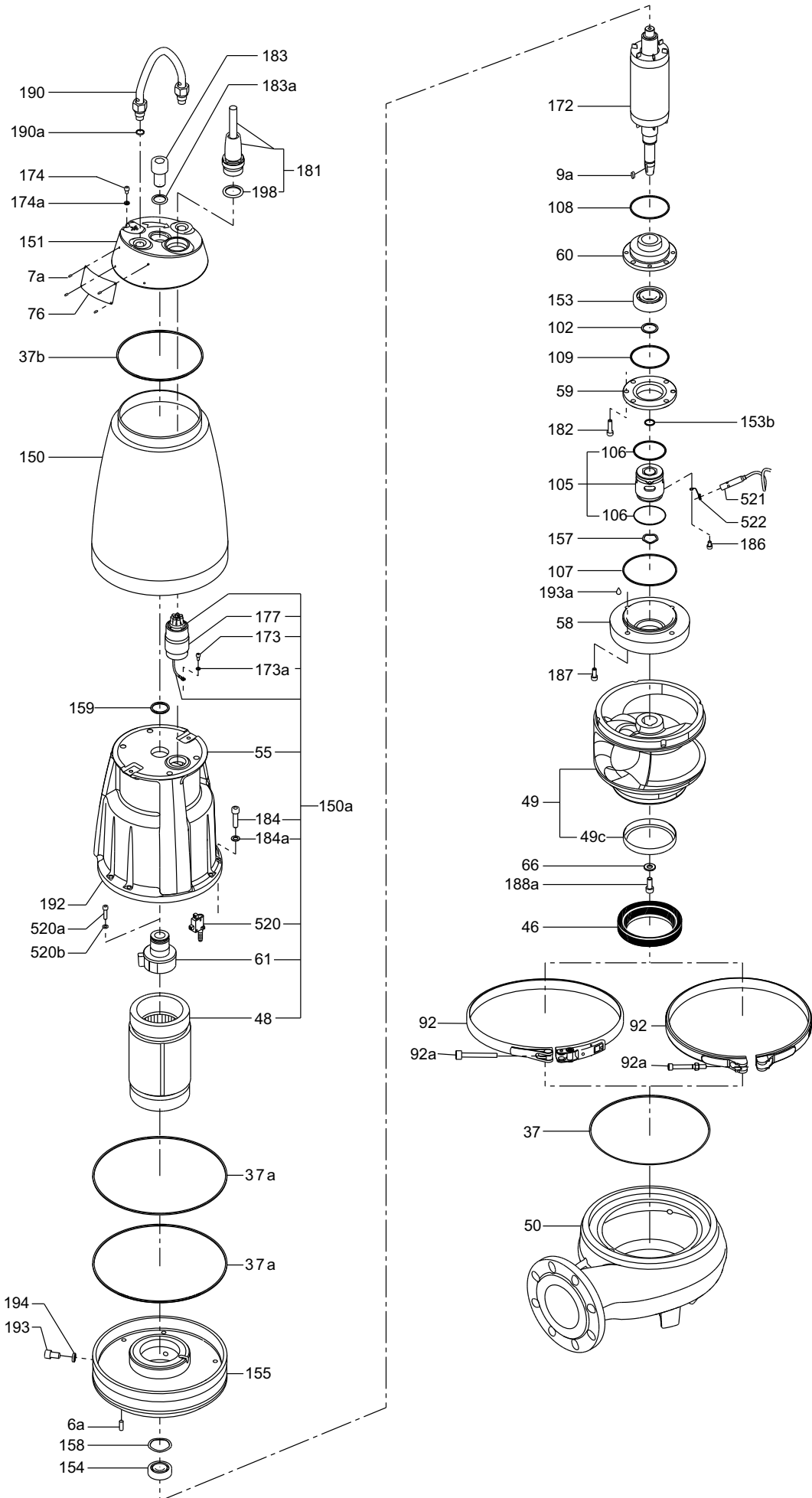
### 12.1 SE1



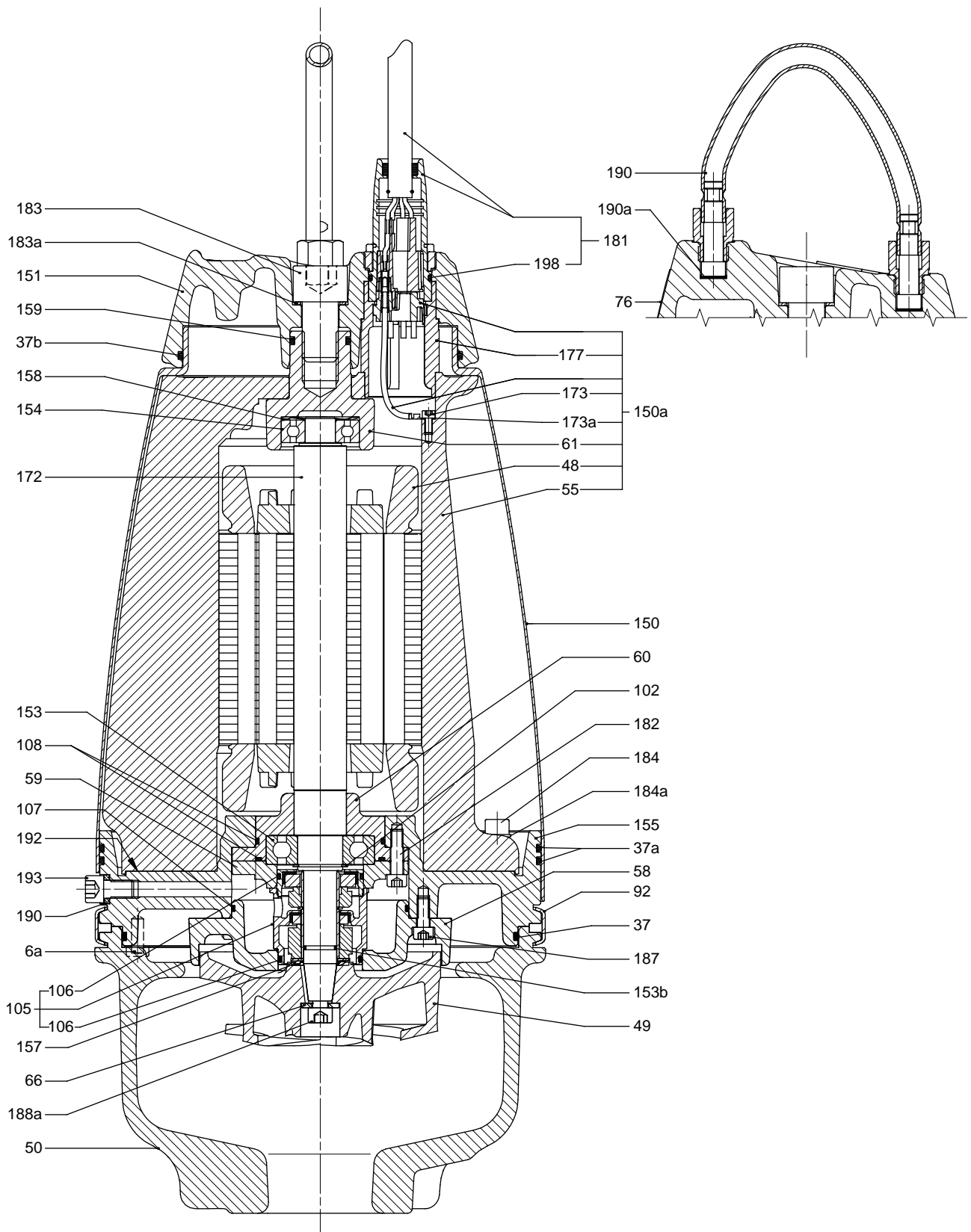


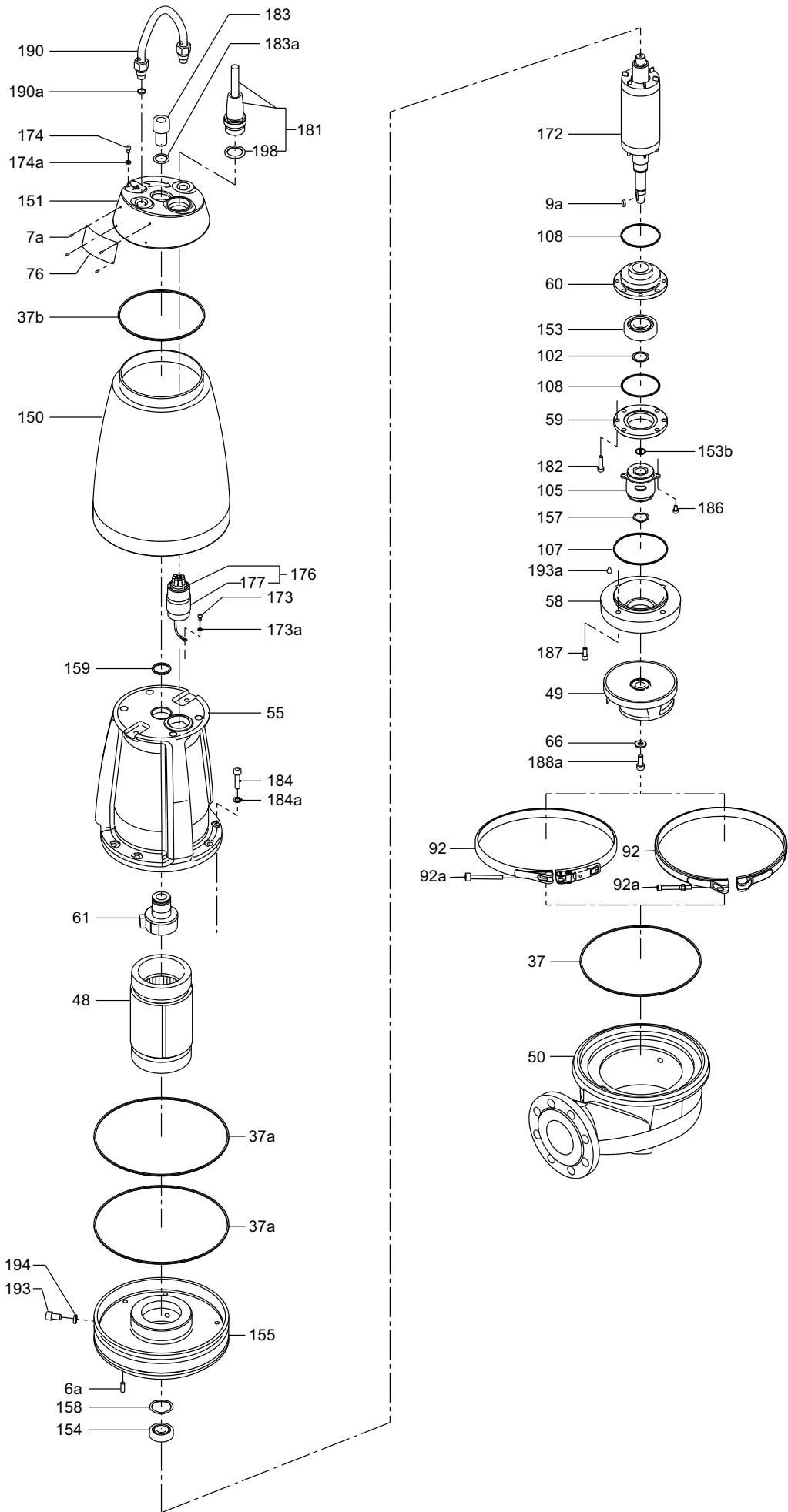


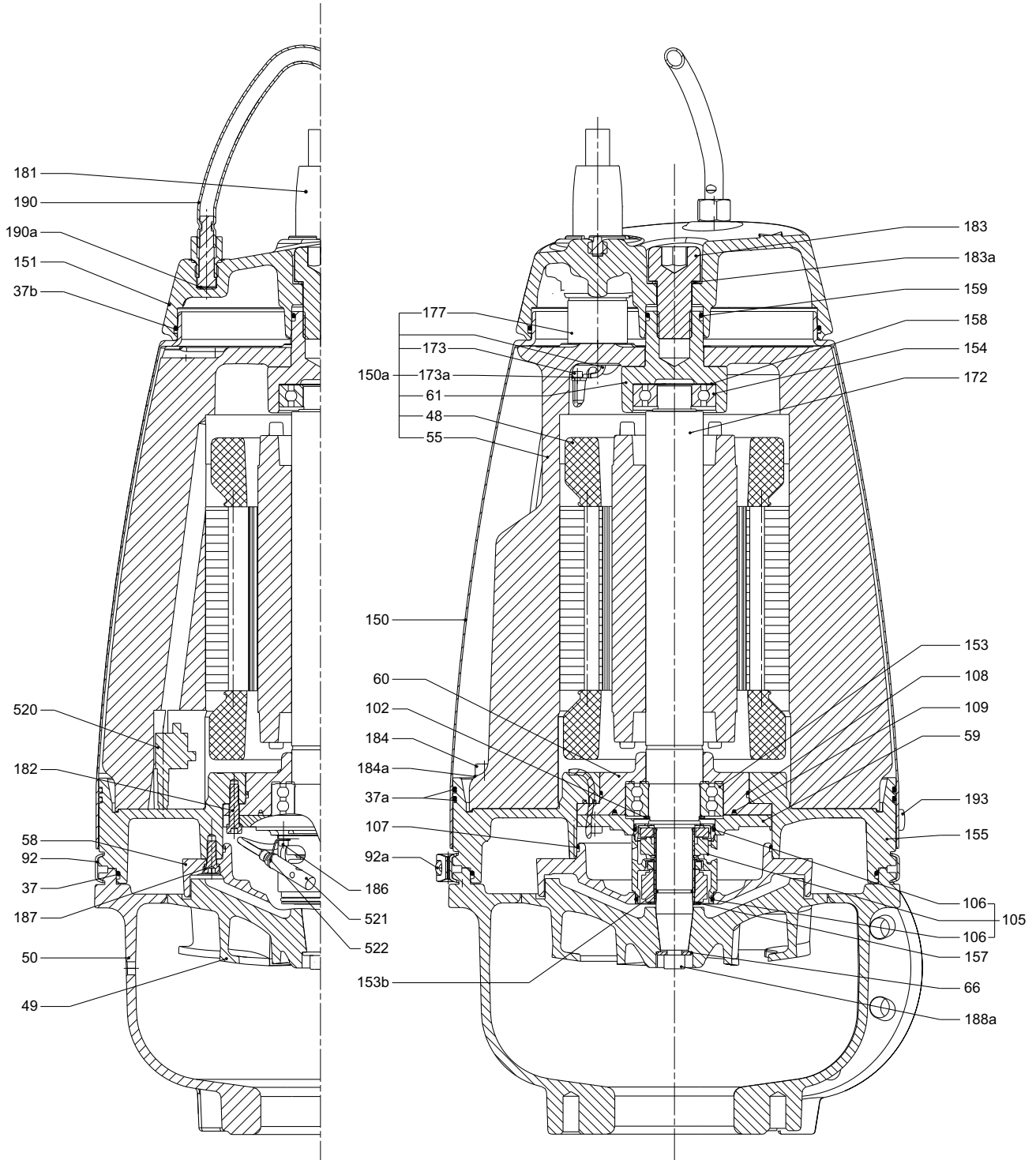
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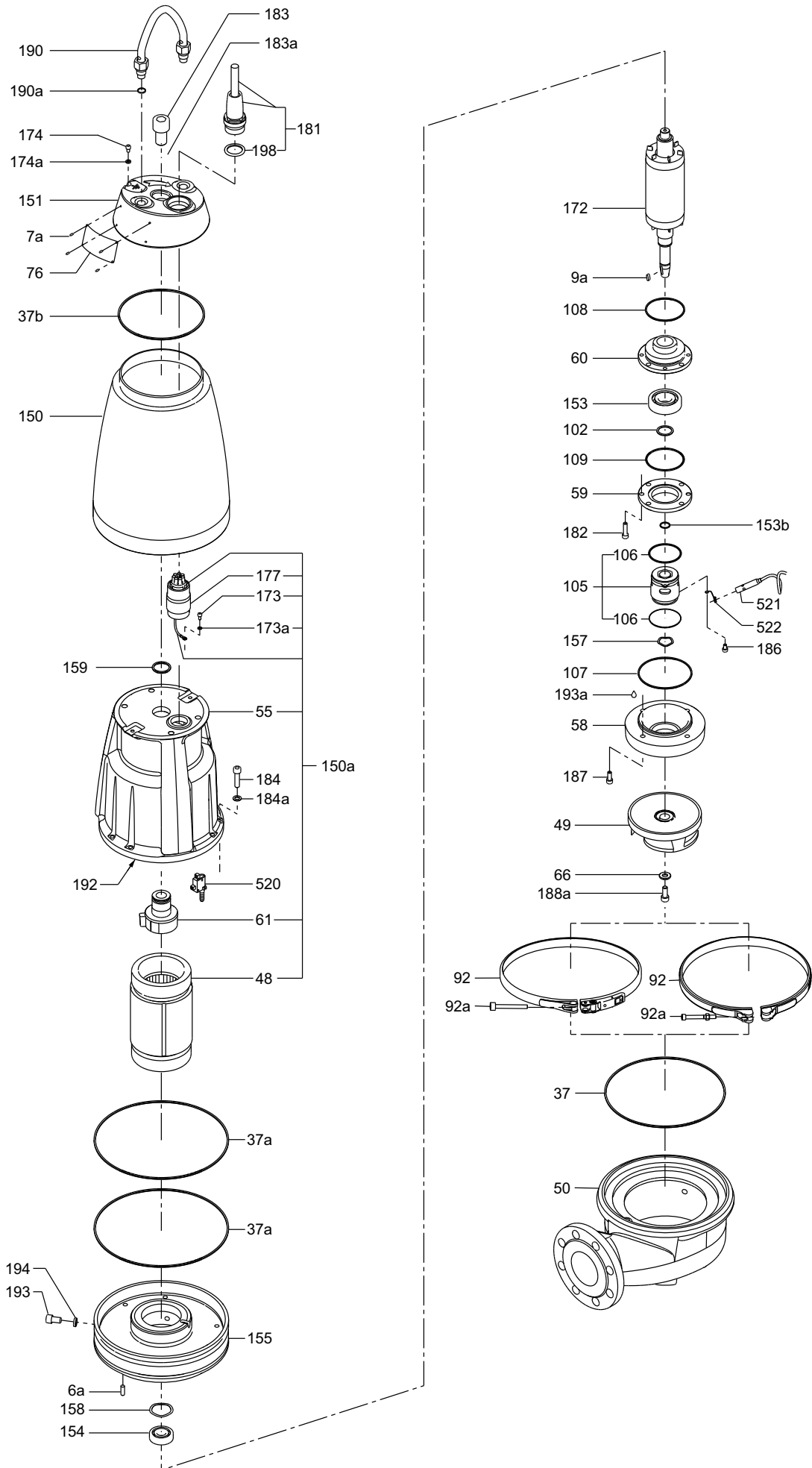








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### 12.3 Position numbers and material specification

Pos.	Designation	Material	DIN W.-Nr./ EN standard
6a	Pin	Stainless steel	1.4301
7a	Rivet	Stainless steel	1.4301
9a	Key	Stainless steel	
37	O-ring	NBR rubber	
37a	O-ring	NBR rubber	
37b	O-ring	NBR rubber	
46	Seal ring	Stainless steel	1.4301
48	Stator		
49	SuperVortex impeller	Cast iron/ stainless steel	EN-GJL-200/ EN-GJL-250
	S-tube® impeller	Cast iron	EN-GJL-250
49c	Wear ring	Stainless steel	1.4301
50	Pump housing	Cast iron	EN-GJL-200/ EN-JL1030
55	Stator housing	Aluminium	EN AB-AISI 10 mg
58	Oil chamber cover	Cast iron	EN-GJL-200/ EN-JL1030
59	Bearing cover, lower	Cast iron	EN-GJL-250/ EN-JL1040
60	Bearing cover, upper	Cast iron	EN-GJL-250/ EN-JL1040
61	Bearing retainer	Cast iron	EN-GJS-450-10/ EN-JS1040
66	Washer	Stainless steel	1.4305
76	Nameplate	Stainless steel	1.4401
92	Clamp	Stainless steel	1.4401
92a	Screw	Stainless steel	
102	O-ring	NBR rubber	
105	Shaft seal complete	Primary seal: Stainless steel, SiC/SiC	
		Secondary seal: Carbon/ ceramics	
106	O-ring	NBR rubber	
107	O-ring	NBR rubber	
108	O-ring	NBR rubber	
109	Retaining ring		
150	Sleeve	Stainless steel	1.4301/ (optional 1.4401)
150a	Stator housing complete		
151	Motor top	Cast iron	EN-GJL-250/ EN-JL1040
153	Ball bearing, lower	6306	
153b	Retaining ring		
154	Ball bearing, upper	6304	
155	Intermediate flange	Cast iron	EN-GJL-250/ EN-JL1040
157	Corrugated spring	Stainless steel	
158	Corrugated spring	Carbon steel	1.1248
159	O-ring	NBR rubber	
172	Shaft with rotor	Carbon steel/ stainless steel	1.0432/ 1.4401
173	Earth screw	Stainless steel	
173a	Lock washer	Stainless steel	
174	Earth screw, external	Stainless steel	
174a	Washer	Stainless steel	
176	Pin housing		
177	Plug protector	Stainless steel	1.4408
181	Cable/outer plug part	H07RN-F / -	
182	Screw	Stainless steel	

Pos.	Designation	Material	DIN W.-Nr./ EN standard
183	Screw	Stainless steel	
183a	Washer	Stainless steel	
184	Screw	Stainless steel	
184a	Washer	Stainless steel	
186	Screw	Stainless steel	
187	Screw	Stainless steel	
188a	Screw	Stainless steel	
190	Lifting bracket	Stainless steel	1.4301
190a	Rubber sleeve	NBR rubber	
192	Cooling paste		
193	Screw	Stainless steel	
193a	Oil	Shell Ondina X420	
194	Gasket	Nylon	
198	O-ring	NBR rubber	
520	Moisture switch		
521	Water-in-oil sensor (WIO)		
522	Bracket for WIO sensor		

#### Material declaration:

- Grey cast iron is manufactured according to EN 1561:2012.
- Cast stainless steel is manufactured according to EN 10283:2010.
- Conversion to other standards such as AISI/ASTM is normative, and products are not manufactured according to these.



Q and R variants with SuperVortex impeller are available on request, including O-rings of FKM and intermediate flange of stainless steel.

### 12.4 Sensor positions

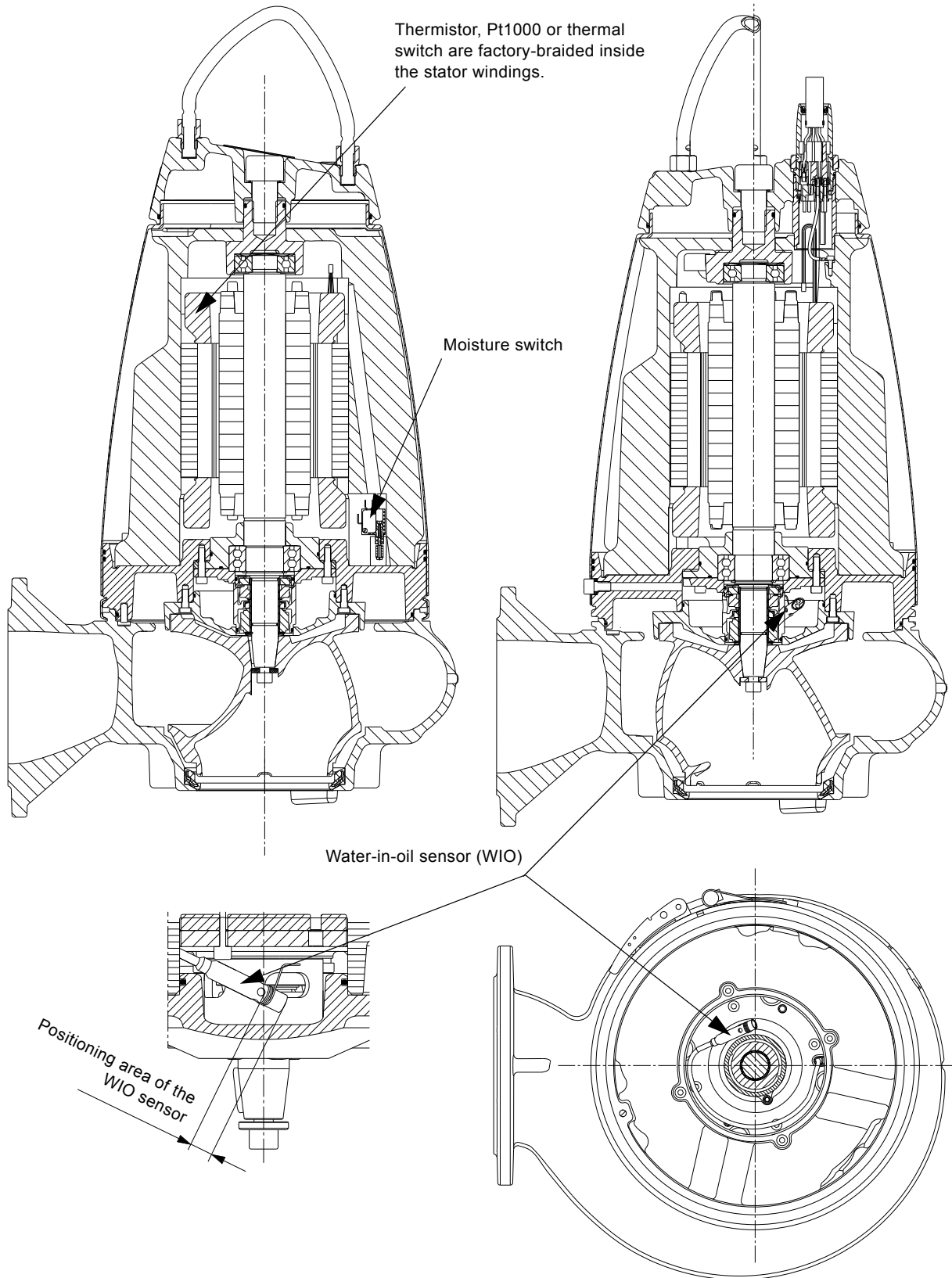


Fig. 23 Sensor positions

## 12.5 Electrical data

### 12.5.1 Overview

2-pole motor				Cable connection	
Power, P2	Power, P1	Voltage	Thermal protection	Cable cross-section	Conductors/ plug pins
[kW]	[kW]	[V]		[mm <sup>2</sup> ]	
2.2	2.8	3 x 220-240	Thermal switch	1.5	7/7
2.2	2.8	3 x 380-415	Thermal switch	1.5	7/7
2.2	2.8	3 x 400-415	Thermal switch	1.5	7/7
3	3.8	3 x 220-240	Thermal switch	1.5	7/7
3	3.8	3 x 380-415	Thermal switch	1.5	7/7
3	3.8	3 x 400-415	Thermal switch	1.5	7/7
4	4.8	3 x 220-240	Thermal switch	2.5	10/10
4	4.8	3 x 380-415	Thermal switch	2.5	10/10
4	4.8	3 x 380-415	Thermistor	2.5	10/10
4	4.8	3 x 400-415	Thermal switch	2.5	7/10
4	4.8	3 x 400-415	Thermistor	2.5	7/10
6.0	7.1	3 x 220-240	Thermal switch	2.5	10/10
6.0	7.1	3 x 380-415	Thermal switch	2.5	10/10
6.0	7.1	3 x 380-415	Thermistor	2.5	10/10
6.0	7.1	3 x 400-415	Thermal switch	2.5	7/10
6.0	7.1	3 x 400-415	Thermistor	2.5	7/10
7.5	8.9	3 x 220-240	Thermal switch	2.5	10/10
7.5	8.9	3 x 380-415	Thermal switch	2.5	10/10
7.5	8.9	3 x 380-415	Thermistor	2.5	10/10
7.5	8.9	3 x 400-415	Thermal switch	2.5	7/10
7.5	8.9	3 x 400-415	Thermistor	2.5	7/10
9.2	10.5	3 x 220-240	Thermal switch	2.5	10/10
9.2	10.5	3 x 380-415	Thermal switch	2.5	10/10
9.2	10.5	3 x 380-415	Thermistor	2.5	10/10
9.2	10.5	3 x 400-415	Thermal switch	2.5	7/10
9.2	10.5	3 x 400-415	Thermistor	2.5	7/10
11	12.6	3 x 220-240	Thermal switch	2.5	10/10
11	12.6	3 x 380-415	Thermal switch	2.5	10/10
11	12.6	3 x 380-415	Thermistor	2.5	10/10
11	12.6	3 x 400-415	Thermal switch	2.5	7/10
11	12.6	3 x 400-415	Thermistor	2.5	7/10

The power cable resistance depends on the cable diameter.

Resistance per running metre of cable: 1.5 mm<sup>2</sup> = 0.012 W.

Resistance per running metre of cable: 2.5 mm<sup>2</sup> = 0.007 W.

4-pole motor			Cable connection		
Power, P2	Power, P1	Voltage	Thermal protection	Cable cross-section	Conductors/ plug pins
[kW]	[kW]	[V]		[mm <sup>2</sup> ]	
1.1	1.5	3 x 220-240	Thermal switch	1.5	7/7
1.1	1.5	4 x 380-415	Thermal switch	1.5	7/7
1.1	1.5	4 x 400-415	Thermal switch	1.5	7/7
1.3	1.8	3 x 220-240	Thermal switch	1.5	7/7
1.3	1.8	4 x 380-415	Thermal switch	1.5	7/7
1.3	1.8	4 x 400-415	Thermal switch	1.5	7/7
1.5	2.1	3 x 220-240	Thermal switch	1.5	7/7
1.5	2.1	3 x 380-415	Thermal switch	1.5	7/7
1.5	2.1	4 x 400-415	Thermal switch	1.5	7/7
2.2	2.9	3 x 220-240	Thermal switch	1.5	7/7
2.2	2.9	3 x 380-415	Thermal switch	1.5	7/7
2.2	2.9	4 x 400-415	Thermal switch	1.5	7/7
3	3.7	3 x 220-240	Thermal switch	1.5	7/10
3	3.7	3 x 380-415	Thermal switch	1.5	7/10
3	3.7	3 x 380-415	Thermal switch	2.5	7/10
3	3.7	3 x 400-415	Thermal switch	2.5	7/10
3	3.7	3 x 660-720	Thermal switch	2.5	7/10
4	4.9	3 x 220-240	Thermal switch	2.5	10/10
4	4.9	3 x 380-415	Thermal switch	2.5	10/10
4	4.9	3 x 380-415	Thermistor	2.5	10/10
4	4.9	3 x 400-415	Thermal switch	2.5	7/10
4	4.9	3 x 400-415	Thermistor	2.5	7/10
5.5	6.5	3 x 220-240	Thermal switch	2.5	10/10
5.5	6.5	3 x 380-415	Thermal switch	2.5	10/10
5.5	6.5	3 x 380-415	Thermistor	2.5	10/10
5.5	6.5	3 x 400-415	Thermal switch	2.5	7/10
5.5	6.5	3 x 400-415	Thermistor	2.5	7/10
7.5	9.0	3 x 220-240	Thermal switch	2.5	10/10
7.5	9.0	3 x 380-415	Thermal switch	2.5	10/10
7.5	9.0	3 x 380-415	Thermistor	2.5	10/10
7.5	9.0	3 x 400-415	Thermal switch	2.5	7/10
7.5	9.0	3 x 400-415	Thermistor	2.5	7/10

The power cable resistance depends on the cable diameter.

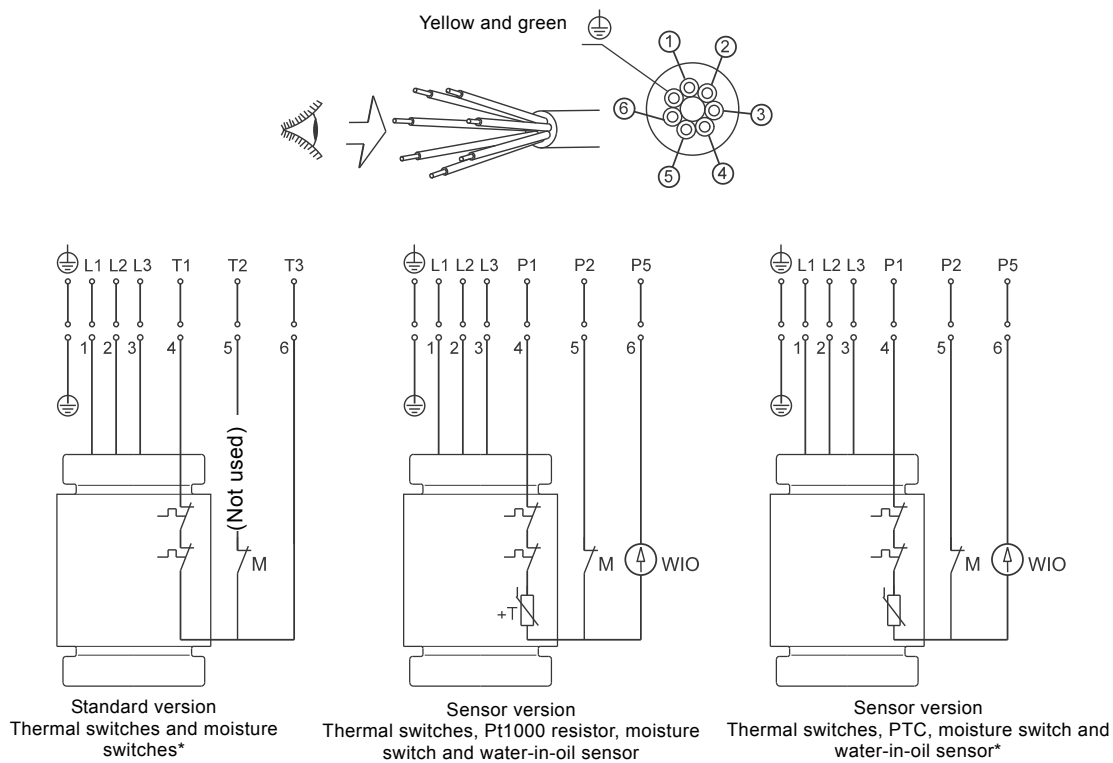
Resistance per running metre of cable: 1.5 mm<sup>2</sup> = 0.012 W.

Resistance per running metre of cable: 2.5 mm<sup>2</sup> = 0.007 W.



12.5.2 Wiring diagrams

7-core cable



\* Pumps from 4 kW and up sold in Australia and New Zealand are fitted with a PTC thermistor.

Fig. 24 Wiring diagram, 7-core cable, DOL

Frame size B

Y-connection

D-connection

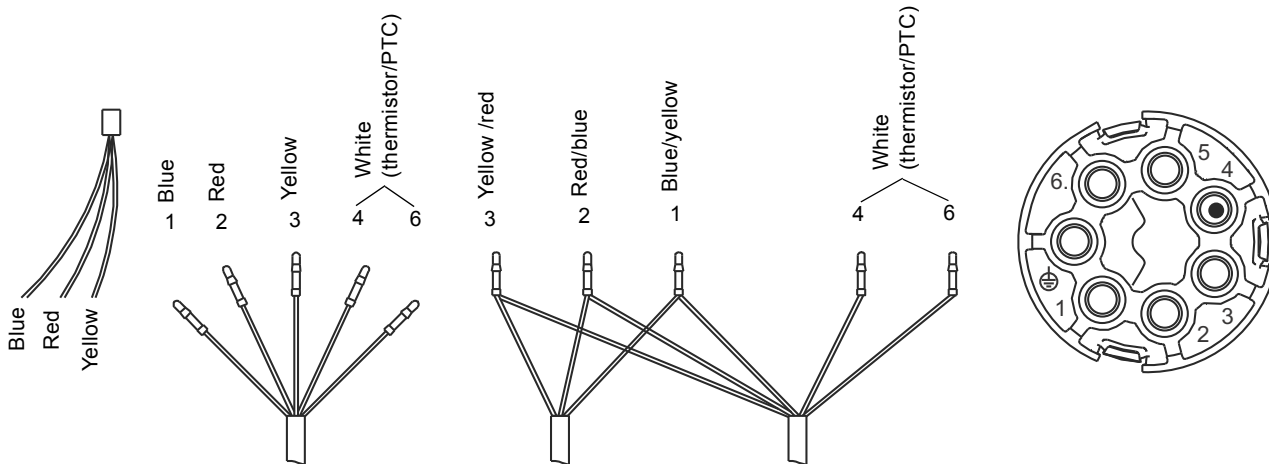
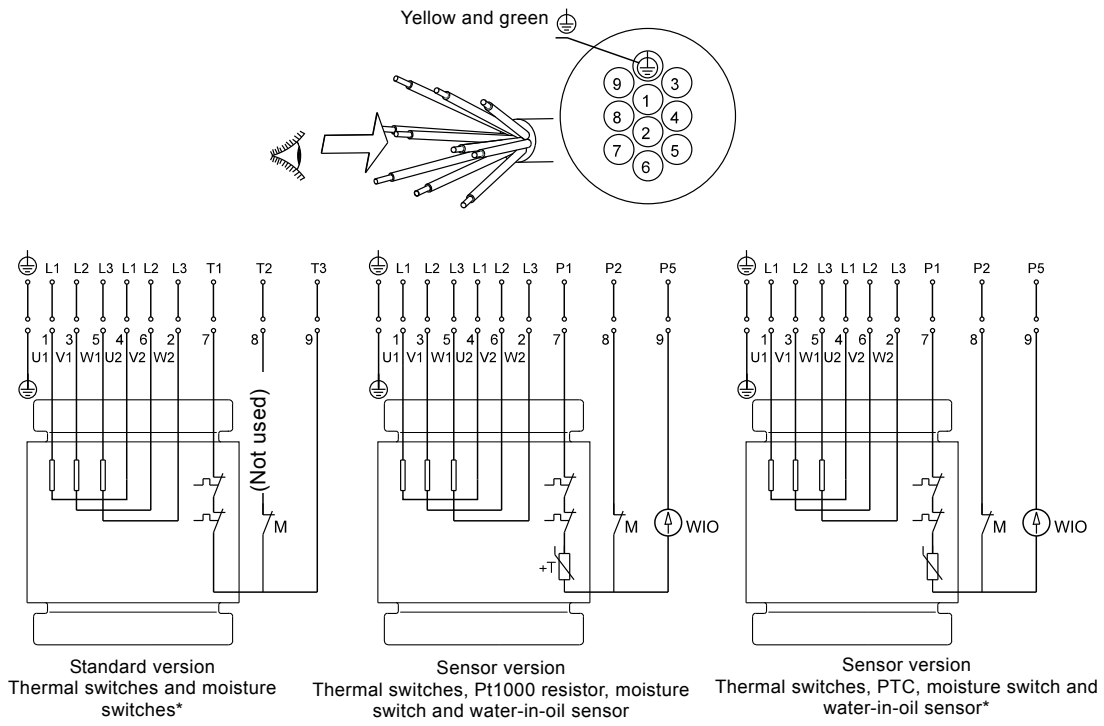


Fig. 25 7-pole connections for pin housing (frame size B)

TM04 6884 1317

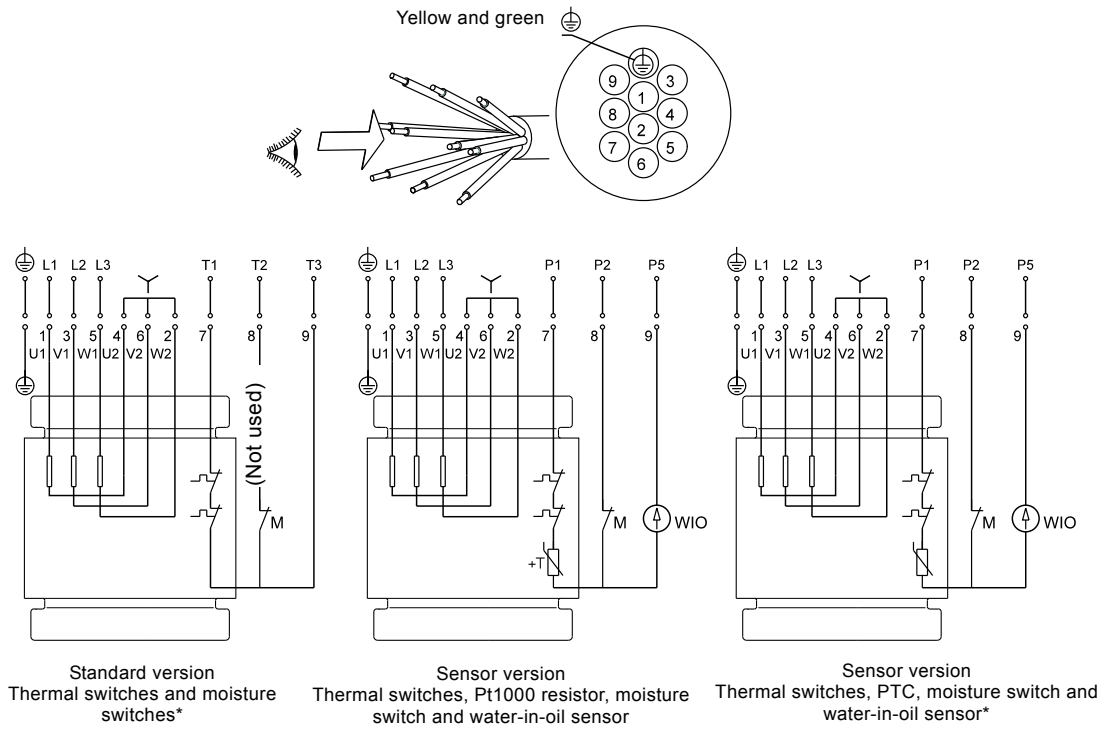
TM06 9232 2017

10-core cable



\* Pumps from 4 kW and up sold in Australia and New Zealand are fitted with a PTC thermistor.

Fig. 26 Wiring diagram, 10-core cable, star/delta (Y/D)

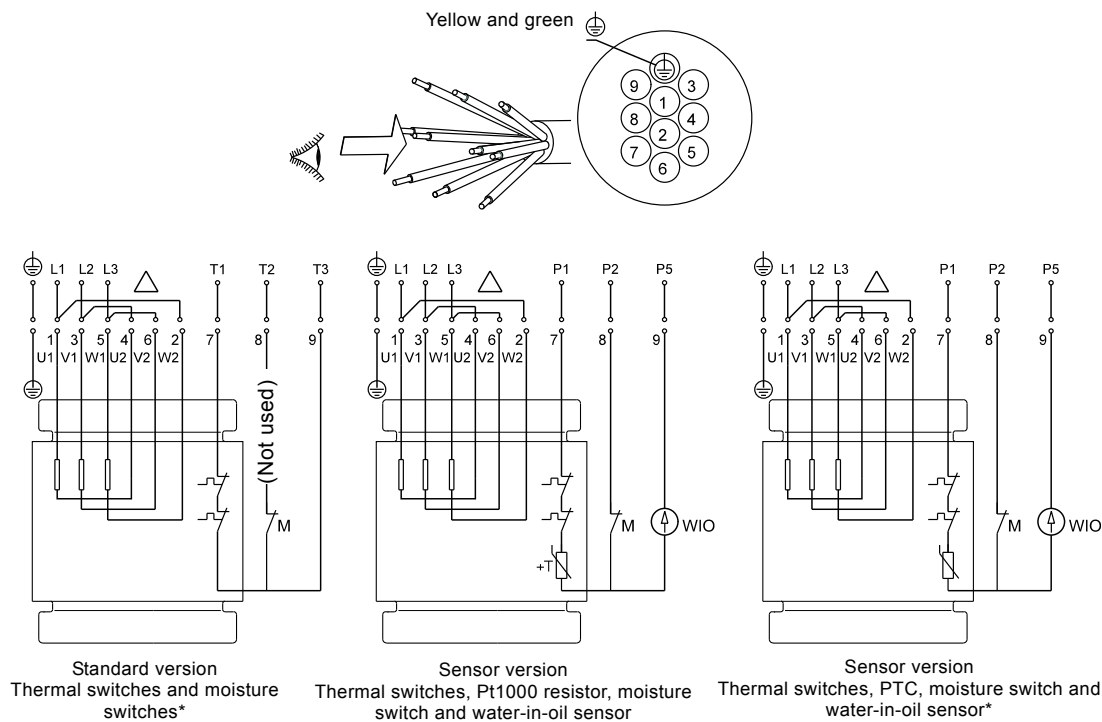


\* Pumps from 4 kW and up sold in Australia and New Zealand are fitted with a PTC thermistor.

Fig. 27 Wiring diagram, 10-core cable, star-connected (Y)

TM04 6885 1317

TM04 6886 1317



\* Pumps from 4 kW and up sold in Australia and New Zealand are fitted with a PTC thermistor.

Fig. 28 Wiring diagram, 10-core cable, delta-connected (D)

Frame size C and D

Connection version 1

Connection version 2

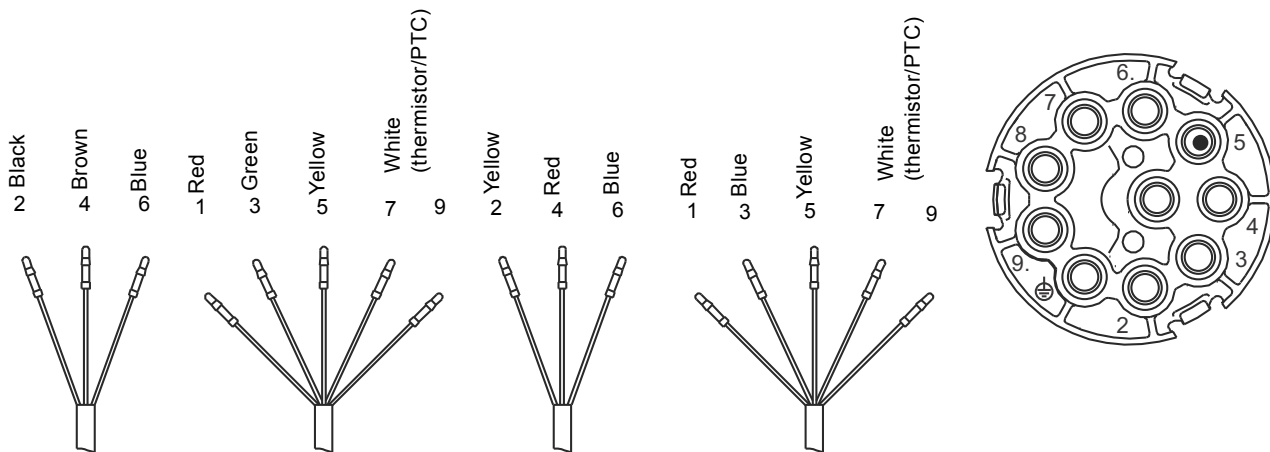


Fig. 29 10-pole connections for pin housing (frame sizes C and D)

TM04 6887 1317

TM06 9233 2017







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