

SE1, SEV 1.5-15 hp

60 Hz ANSI

Service instructions



SE1, SEV 1.5-15 hp

English (US)

Service instructions 4

Original service instructions

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1. General information



Read this document before you install the product. Installation and operation must comply with local regulations and accepted codes of good practice.

1.1 Hazard statements

The symbols and hazard statements below may appear in Peerless installation and operating instructions, safety instructions and service instructions.

**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 hazard statements are structured in the following way:

**SIGNAL WORD****Description of the hazard**

Consequence of ignoring the warning

- Action to avoid the hazard.

1.2 Notes

The symbols and notes below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



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. Transporting the product

The pump may be transported and stored in a vertical or horizontal position.



CAUTION

Crushing hazard

Minor or moderate personal injury

- Make sure the pump cannot roll or fall over.

3. Handling and lifting the product

All lifting equipment must be rated for the purpose and checked for damage before lifting the pump. The lifting equipment rating must under no circumstances be exceeded. The pump weight is stated on the nameplate.

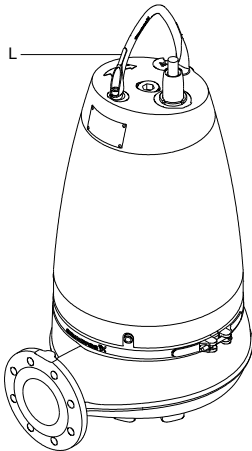


WARNING

Crushing hazard

Death or serious personal injury

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



Lifting bracket

Pos.	Description
L	Lifting bracket

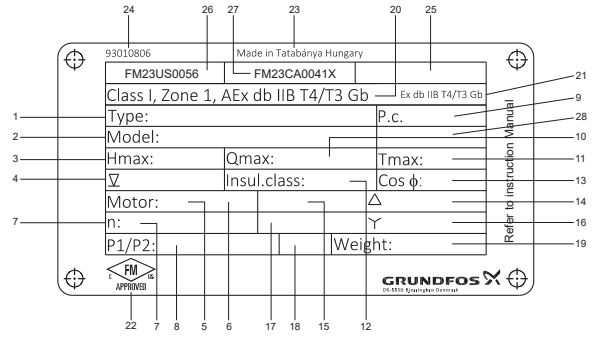
For horizontal, dry-installed pumps, a special lifting bracket can be ordered to ease the lifting of the pump. See the service instruction on www.grundfos.com.

4. Identification

4.1 Nameplate

The nameplate states the operating data and approvals applying to the pump. The nameplate is fitted to the side of the stator housing close to the cable entry.

Fix the extra nameplate supplied with the pump to the cable end in the controller.



TM085707

Nameplate

Pos.	Description
1	Type designation
2	Product number
3	Max. head [ft]
4	Maximum installation depth [ft]
5	Number of phases
6	Frequency [Hz]
7	Rated speed [min ⁻¹]
8	Motor input (P1) / output (P2) power [hp]
9	Production code (year and week)
10	Max. flow rate [GPM]
11	Max. liquid temperature [°F]
12	Insulation class
13	Power factor
14	Rated current [A], delta connection
15	Rated voltage [V], delta connection
16	Rated current [A], star connection
17	Rated voltage [V], star connection
18	Enclosure class
19	Net weight [lb]
20	US marking of explosion protection
21	CA marking of explosion protection
22	Mark of Approved body
23	Country of production
24	Installation and operating instructions
25	Thermal protection
26	US Explosion protection certificate number
27	CA Explosion protection certificate number
28	Ambient temperature

4.2 Type key

The pump can be identified by the type designation stated on the nameplate.

Example: **SE1.30.A40.100.A.EX.4.61R.B**

Code	Explanation	Designation
SE	Sewage and wastewater pump	Pump type
1	S-tube [®] impeller	Impeller type
V	SuperVortex impeller	
30	Maximum solids size [3" (DN80)]	Pump passage
40	Nominal diameter [4" (DN100)]	Pump outlet
100	Output power P2/10	Power [10 hp (7.5 kW)]
[]	Standard (without sensor)	Sensor version
A **	Sensor version	
[]	Non-explosion-proof pump (standard)	Pump version
Ex	Explosion-proof pump	
2	2-pole	Number of poles
4	4-pole	
60	60 Hz	Frequency [Hz] ¹⁾
1R *	3 × 230 V / 460 V, Y direct-on-line starting	Voltage and starting method
0R *	3 × 230 V, direct-on-line starting	
0H	3 × 460 V, direct-on-line starting	
[]	First generation	Generation ²⁾
B	Second generation	
[]	Cast iron impeller, pump housing and top cover	Pump materials
Q	Stainless steel impeller, cast iron pump housing and top cover	
R	Entire pump of stainless steel	
D	Stainless steel	
Z	Custom-built products	

1) Maximum frequency in case of frequency-converter operation.

2) The generation code distinguishes between pumps of different design but with the same power rating.

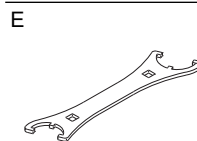
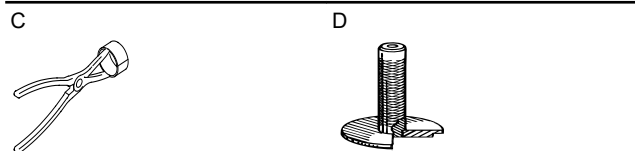
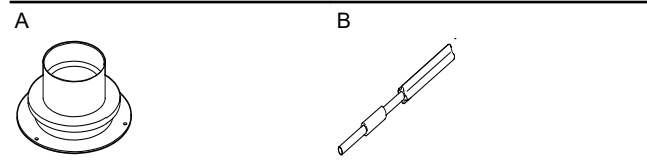
* For 60R and 61R below the nominal level (3x230V) overload not recommended. Service Factor is 1.0

** All Explosion proof SE models are equipped with sensors

5. Service tools

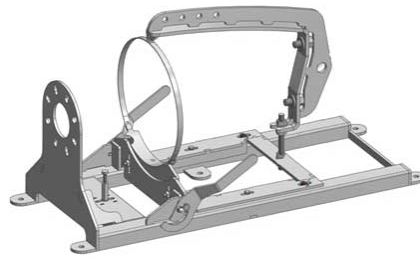
5.1 Special tools

■ 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	3 "	SV0255
			4 "	-
			6 "	-
E	Spanner for cable nut	181	All	95043464
F	Test box		All	96628926

5.2 Service sledge



TM080185

Pump to be installed						
Pump/Impeller type	Pump passage [in]	Pump outlet [in]	Power [Hp]	Poles	Service sledge product number	
SE1	2	3	3	2	98827089	
SE1	2	3	4	2		
SE1	2	3.5	3	2		
SE1	2	3.5	4	2		
SEV	3	3	3	2	98902585	
SEV	3	3	4	2		
SEV	3	3.5	3	2		
SEV	3	3.5	4	2		
SE1	3.5	3.5	2	4		
SE1	3.5	3.5	3	4		
SE1	3.5	4	2	4		
SE1	3.5	4	3	4		
SEV	3.5	3.5	15	4		
SEV	3.5	3.5	13	4		
SEV	3.5	3.5	2	4	98902589	
SEV	3.5	3.5	3	4		
SEV	3.5	4	15	4		
SEV	3.5	4	13	4		
SEV	3.5	4	2	4		
SEV	3.5	4	3	4		
SE1	2	3	5	2		98827090
SE1	2	3	5	2		
SEV	3	3	5	2	9890282	
SEV	3	3.5	5	2		
SEV	3.5	3.5	5	4	9890283	
SEV	3.5	3.5	5	2		
SEV	3.5	3.5	8	2		
SEV	3.5	3.5	10	2		
SEV	3.5	4	5	4		
SEV	3.5	4	5	2		
SEV	3.5	4	8	2		
SEV	3.5	4	10	2		
SE1	3.5	3.5	4	4		
SE1	3.5	3.5	5	4		
SE1	3.5	3.5	7	4		
SE1	3.5	4	4	4		
SE1	3.5	4	5	4		
SE1	3.5	4	7	4		

Pump to be installed					
Pump/Impeller type	Pump passage [in]	Pump outlet [in]	Power [Hp]	Poles	Service sledge product number
SEV	4	4	5	4	
SEV	4	4	5	4	9890286
SEV	4	4	8	4	
SE1	4	4	5	4	
SE1	4	4	7	4	
SE1	4	10	5	4	9890287
SE1	4	10	7	4	
SEV	3.5	3.5	92	2	
SEV	3.5	3.5	15	2	
SEV	3.5	4	15	2	
SEV	3.5	4	15	2	98827091
SE1	3.5	3.5	10	4	
SE1	3.5	4	10	4	
SEV	4	4	10	4	9890288
SE1	4	4	10	4	
SE1	4	10	10	4	9890289

5.3 Horizontal bracket installation



TM080184

Pump to be installed					
Pump/Impeller type	Pump passage [in]	Pump outlet [in]	Power [Hp]	Poles	Horizontal bracket product number
SE1	2	2.5	3	2	98902621
SE1	2	2.5	4	2	
SE1	2	3	3	2	
SE1	2	3	4	2	
SEV	2.5	2.5	3	2	98902622
SEV	2.5	2.5	4	2	
SEV	2.5	3	3	2	
SEV	2.5	3	4	2	
SE1	3	3	2	4	
SE1	3	3	3	4	
SE1	3	4	2	4	
SE1	3	4	3	4	
SEV	3	3	15	4	
SEV	3	3	13	4	
SEV	3	3	2	4	
SEV	3	3	3	4	
SEV	3	4	15	4	
SEV	3	4	13	4	
SEV	3	4	2	4	
SEV	3	4	3	4	
SE1	2	2.5	5	2	98902623
SE1	2	2.5	5	2	

Pump to be installed					
Pump/Impeller type	Pump passage [in]	Pump outlet [in]	Power [Hp]	Poles	Horizontal bracket product number
SEV	2.5	2.5	5	2	
SEV	2.5	3	5	2	
SEV	3	3	5	4	
SEV	3	3	5	2	
SEV	3	3	8	2	
SEV	3	3	10	2	
SEV	3	4	5	4	
SEV	3	4	5	2	
SEV	3	4	8	2	
SEV	3	4	10	2	98902625
SE1	3	3	4	4	
SE1	3	3	5	4	
SE1	3	3	7	4	
SE1	3	4	4	4	
SE1	3	4	5	4	
SE1	3	4	7	4	
SEV	4	4	5	4	
SEV	4	4	5	4	
SEV	4	4	8	4	
SE1	4	4	5	4	
SE1	4	4	7	4	
SE1	4	6	5	4	98902626
SE1	4	6	7	4	
SEV	3	3	92	2	
SEV	3	3	15	2	
SEV	3	4	15	2	
SEV	3	4	15	2	98902628
SE1	3	3	10	4	
SE1	3	4	10	4	
SEV	4	4	10	4	
SE1	4	4	10	4	
SE1	4	6	10	4	98902630

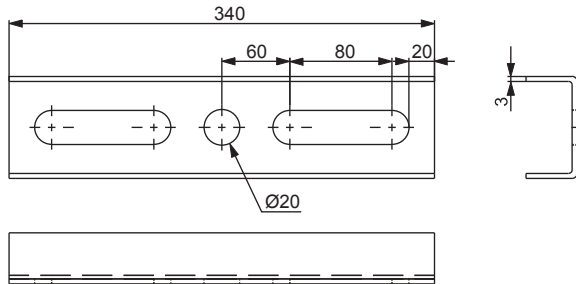
5.4 Lifting tools

G



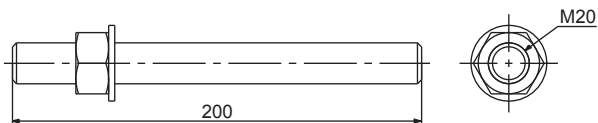
Pos.	Designation	Pump type	Part number
G	Crane for service sledge	All	98902631

5.5 Seal ring mounting tool



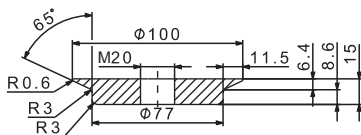
TM064464

Puller beam



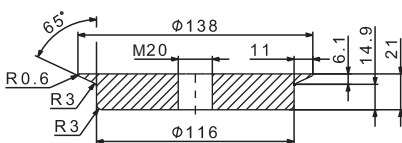
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Threaded rod



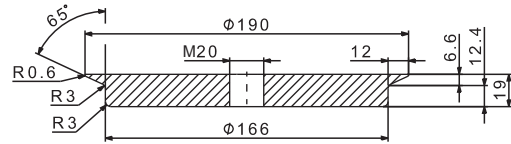
TM064466

Puller tool, DN 50



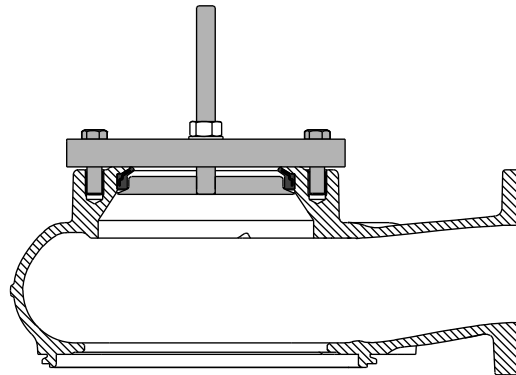
TM064467

Puller tool, DN 80



Puller tool, DN 100

TM064468



Mounting tool for seal ring

TM064479

Related information

[11.9 Fitting the seal ring and wear ring \(SE1\)](#)

6. Tightening torques and lubricants

Pos.	Designation	Quantity	Dim.	Torque [ft-lb (Nm)]
92a	Screw	1		8.85 ± 1.5 (12 ± 2)
118a	Screw	2	M8	14.75 ± 1.5 (20 ± 2)
			M10	22.15 ± 2.2 (30 ± 3)
174	Screw	1		2.95 ± 0.74 (4 ± 1)
181	Union nut	1	7-core cable	36.88 ± 3.7 (50 ± 5)
			10-core cable	55.32 ± 3.7 (75 ± 5)
186	Screw	2		5.2 ± 1.5 (7 ± 2)
182	Screw	4		14.75 ± 1.5 (20 ± 2)
187	Screw	4		14.75 ± 1.5 (20 ± 2)
188	Screw	2	M8	14.75 ± 1.5 (20 ± 2)
			M10	22.13 ± 2.2 (30 ± 3)
188a	Screw	2	M10	36.88 ± 3.7 (50 ± 5)
			M12	55.32 ± 3.7 (75 ± 5)
193	Screw	2		11.8 ± 1.5 (16 ± 2)



Treat the O-rings with Rocol Sapphire Aqua-Sil or with an equivalent lubricant before fitting.

Related information

[11.10 Fitting the impeller](#)

[11.11 Fitting the pump housing](#)

6.1 Torques for inlet and outlet flanges

Grade 4.6 (5) galvanized steel screws and nuts

Diameter (in.)	DC	Screws	Torque (rounded off ± 5) [ft.lbs (Nm)]	
			Slightly oiled	Well lubricated
			2.5	145
3	160	8 × M16	50 (70)	45 (60)
4	10	8 × M16	50 (70)	45 (60)
6	240	8 × M20	100 (140)	90 (120)

Grade A2.50 (AISI 304) steel screws and nuts

Diameter (in.)	DC	Screws	Torque (rounded off ± 5) [ft.lbs (Nm)]	
			Slightly oiled	Well lubricated
			2.5	145
3	160	8 × M16	-	45(60)
4	180	8 × M16	-	45 (60)
6	240	8 × M20	-	90 (120)



The gasket must be a full face, reinforced paper gasket, such as Klingersil C4300. If softer gasket material is used, torques must be reconsidered.

7. Electrical connection

DANGER

Electric shock

Death or serious personal injury

- Connect the pump to an external mains switch which ensures all-pole disconnection with a contact separation according to National Electrical Code and all local codes.



- It must be possible to lock the mains switch in position 0. Type and requirements as specified in National Electrical Code and all local codes.

- The electrical connection must be carried out in accordance with local regulations.



The pumps must be connected to a controller with a motor protection relay with IEC trip class 10 or 15 or NEMA equivalent.



Power supply for motor-protection circuit must be low voltage, Class 2.

7.1 Protection and control functions

7.1.1 Level controllers

Suitable level controllers:

- LC 231: compact solution with certified motor protection for single- and dual-pump versions.
- LC 241: cabinet solution offering modularity and customization for single- and dual-pump versions.
- Dedicated Controls (DC): high-end cabinet solution for multi-pump versions up to 6 pumps.

In the following description, "level switches" can be air bells, float switches, or electrodes depending on the selected pump controller.

Depending on the security and the number of pumps, level switches can be used in the following setups:

- Dry run (optional)
- Stop
- Start pump 1 (single-pump version)
- Start pump 2 (dual-pump version)
- High level (optional).

An analog level transmitter can be used and all levels can be customized. Level switches can be used with a level transmitter (one for dry and one for high level).

When installing the level switches, observe the following:

- To prevent air intake and vibrations, install the stop level switch, so the pump is stopped before the liquid level is lowered to the middle of the motor housing.
- Install the start level switch, so the pump is started at the required level. The pump must always be started before the liquid level reaches the bottom of the inlet pipe.
- Always install the high-level alarm switch about 3.93 inches (10 cm) above the start level switch. However, the alarm must always be given before the liquid level reaches the inlet pipe.

For further settings, see the installation and operating instructions for the selected pump controller.

The pump must not run dry.



Install an additional level switch to ensure that the pump is stopped in case the stop level switch is not operating. The pump must be stopped when the liquid level reaches the upper edge of the clamp.

Float switches used in potentially explosive environments must be approved for this application. They must be connected to the Grundfos LC 231 or LC 241 level controller by an intrinsically safe barrier to ensure a safe circuit.



In potentially explosive environments, the anti-seizing function must be disabled on the pump controllers.

7.1.2 Switches and sensors

Every explosion-proof pump is assembled with a WIO sensor.



Pumps for hazardous locations must be connected to a control box with a motor protection relay with IEC trip class 10.

Do not install Grundfos pump controllers, Ex barriers, and the free end of the power cable in potentially explosive environments.

The classification of the installation site must be approved by the local fire-fighting authorities.

On explosion-proof pumps, make sure that an external earth lead is connected to the external earth terminal on the pump using a secure cable clamp. Clean the surface of the external earth connection and mount the cable clamp.



The cross-section of the earth conductor must be at least 0.0062 in² (4 mm²), such as type H07 V2-K (PVT 90°) yellow and green.

Make sure that the earth connection is protected from corrosion.

Make sure that all protective equipment is connected correctly.

Float switches used in potentially explosive environments must be approved for this application. They must be connected to the Grundfos LC 231 or LC 241 pump controller through the intrinsically safe barrier to ensure a safe circuit.

DANGER

Electric shock

Death or serious personal injury



- If the supply cable is damaged, it must be replaced by the manufacturer, its service agent, or similarly qualified persons.



Set the motor-protective circuit breaker to the rated current of the pump. The rated current is stated on the nameplate.



If the pump has an FM mark on the nameplate, make sure that the pump is connected in accordance with the instructions given in this manual.

The main supply voltage and frequency are marked on the pump nameplate. The voltage tolerance must be within $\pm 10\%$ of the rated voltage. Make sure that the motor is suitable for the power supply available at the installation site.

All pumps are supplied with 49 ft (15 m) cable and a free cable end.

Pumps with sensor must be connected to a Grundfos IO 113 and one of the following controller type is recommended:

- a control box with a motor-protective circuit breaker, such as a Grundfos CU 100
- a Grundfos LC 231 or LC 241 pump controller
- a Grundfos DC, DCD pump controller.



Before installation and the first startup of the pump, check the condition of the cable to avoid short circuits.

7.1.3 Pumps with WIO sensor

CAUTION

Electric shock

Minor or moderate personal injury



- For safe installation and operation of pumps equipped with a WIO sensor, an RC filter is recommended. If an RC filter is installed to avoid any kind of transient, the RC filter must be installed between the power connector and the pump.

The following may cause problems in case of transients in the power supply system:

- Motor power:
 - The bigger the motor, the higher the transients.
- Length of the motor cable:
 - Where power and signal conductors are running in parallel close to each other, the risk of transients causing interference between power and signal conductors increases with the length of the cable.
- Switchboard layout:
 - Power and signal conductors must be physically separated as much as possible. Close installation can cause interference in case of transients.
- Supply network "stiffness":
 - If a transformer station is located close to the installation, the supply network may be "stiff" and transient levels can be higher.

If combinations of the above aspects are present, it may be necessary to install RC filters for pumps with WIO sensors to protect against transients.

Transients can be completely eliminated if soft starters are used.

Note: Soft starters and variable speed drives have other Electro-Magnetic Compatibility (EMC)-related issues that must be taken into consideration.

Related information

[9.5 Removing the WIO sensor](#)

[11.6 Fitting the WIO sensor](#)

7.2 Pump controllers

SE1 and SEV pumps can be connected to the following Grundfos pump controllers for level control:

- LC 231 or LC 241
- Grundfos DC and DCD.

For further information on controllers, see the installation and operation instructions for the selected controller or go to www.us.grundfos.com.

7.3 Thermal switch, Pt1000 and thermistor

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

7.3.1 Pumps with WIO sensor

Pumps with a WIO sensor have either a thermal switch and a Pt1000 sensor or a PTC thermistor in the windings, depending on the installation site. Through the pump controller safety circuit, the thermal switch or the thermistor stops the pump by breaking the circuit in case of overtemperature (approximately 302 °F [150 °C]). The thermal switch or the thermistor closes the circuit after cooling.

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

7.3.2 Explosion-proof pumps

The thermal protection of explosion-proof pumps must not restart the pump automatically. This ensures protection against overtemperature in potentially explosive environments. In pumps with a sensor, this is done by removing the short circuit between terminals R1 and R2 in the IO 113.



See Electrical data in the installation and operating instructions for IO 113

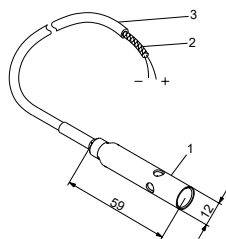
<http://net.grundfos.com/qr/i/98097396>

The separate motor-protective circuit breaker or controller must not be installed in potentially explosive environments.

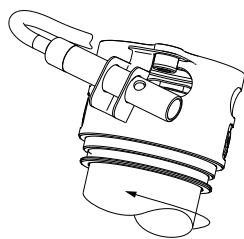
7.4 Water-in-oil sensor

The water-in-oil (WIO) sensor measures the water content in the oil and converts the value into an analog current signal. The two sensor leads are for power supply and for carrying the signal to the IO 113. 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). The sensor is fitted in a stainless steel tube for mechanical protection.

WIO sensor



TM031164



TM045238

Related information

[9.5 Removing the WIO sensor](#)

[11.6 Fitting the WIO sensor](#)

7.4.1 Technical data

Input voltage:	12-24 VDC
Output current:	3.4 - 22 mA
Power input:	0.6 W
Ambient temperature:	32-158 °F (0-70 °C)

See also the installation and operating instructions for IO 113 on www.grundfos.us.

7.5 Moisture switch

All pumps are fitted with a moisture switch as standard, with the moisture switch being connected through the supply cable, and connected to a separate circuit breaker.

The moisture switch is positioned in the bottom of the motor. If there is moisture in the motor, the switch breaks the circuit and sends a signal to the IO 113.

The moisture switch is non-reversing and must be replaced after use.

The moisture switch is connected to the control cable and must be connected to the safety circuit of the separate pump controller.

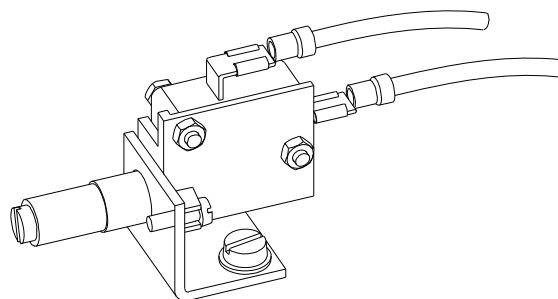
CAUTION

Electric shock

Minor or moderate personal injury



- The motor-protective circuit breaker of the pump controller must include a circuit that automatically disconnects the power supply in case the protective circuit for the pump is opened.



Moisture switch

Related information

[9.6 Removing the moisture switch](#)

[11.7 Fitting the moisture switch](#)

7.6 IO 113

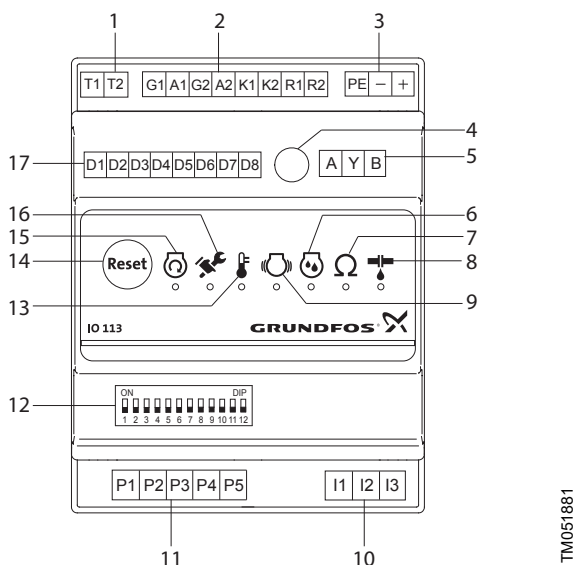
IO 113 provides an interface between a Grundfos wastewater pump equipped with sensors and the pump controller(s). The most important sensor status information is indicated on the front panel. One pump can be connected to one IO 113 module.

Together with the sensors, the IO 113 provides a galvanic isolation between the motor voltage in the pump and the connected controller(s).

As standard, IO 113 is capable of the following:

- Protect the pump against overheating.
- Monitor the status of the following items:
 - motor winding temperature
 - leakage (WIO)
 - moisture in the pump.
- Measure the stator insulation resistance.
- Stop the pump in case of alarm.
- Remotely monitor the pump through RS-485 communication (Modbus or GENibus).


- Control the pump by frequency converter.



IO 113 module

Pos.	Description
1	Terminals for alarm relay
2	Terminals for analog and digital inputs and outputs
3	Terminals for supply voltage
4	Potentiometer for setting the warning limit of stator insulation resistance
5	Terminals for RS-485 for GENIbus or Modbus
6	Indicator light for moisture measurement
7	Indicator light for stator insulation resistance
8	Indicator light for leakage (WIO)
9	Indicator light for vibration in the pump
10	Terminals for measurement of stator insulation resistance
11	Terminals for connection of pump sensors
12	DIP switch for configuration
13	Indicator light for motor temperature
14	Button for resetting alarms
15	Indicator light for motor running
16	Indicator light for service
17	Terminals for digital outputs

7.7 Frequency converter operation

 If the motor is operated by a frequency converter, the temperature class of the explosion-proof pumps must be T3.

All SE1/SEV pump types are designed for frequency converter operation to keep power consumption at a minimum. To avoid sedimentation in the pipes, operate the speed-controlled pump at a flow rate above 3.28 ft/s (1 m/s). In this product range, only a negligible amount of bearing currents occur during frequency converter operation.

For frequency converter operation, observe the following:

- Before installing a frequency converter, calculate the lowest allowable frequency in the installation to avoid zero flow.
- Do not reduce the motor speed to less than 50 % of the rated speed.
- Keep the flow velocity above 3.2 ft/s (1 m/s).

- Let the pump run at rated speed at least once a day to prevent sedimentation in the piping system.
- Do not exceed the frequency indicated on the nameplate to avoid motor overload.
- Keep the power cable as short as possible. The peak voltage increases with the length of the power cable. See the data sheet for the frequency converter used.
- Use input and output filters on the frequency converter. See the data sheet for the frequency converter used.
- Use screened power cable if there is a risk that electrical noise can disturb other electrical equipment. See the data sheet for the frequency converter used.
- The thermal protection of the motor must be connected.
- The minimum switching frequency is 2.5 kHz.
- Variable switching frequency is accepted.
- Peak voltage and dU/dt must be in accordance with the table below. The values stated are maximum values supplied to the motor terminals. The cable influence is not taken into account. See the frequency converter data sheet regarding the actual values and the cable influence on the peak voltage and dU/dt.

Maximum repetitive peak voltage [V]	Maximum dU/dt U _N 400 V [V/μ sec.]
850	2000

- If the pump is an Ex-approved pump, check if the Ex certificate of the specific pump allows the use of a frequency converter.
- Set the frequency converter U/f ratio according to the motor data.
- Local regulations and standards must be complied with.

When operating the pump with a frequency converter, consider the following:

- Set the frequency converter for constant torque operation. Pulse width modulation should be used.
- The locked-rotor torque may be lower, depending on the frequency converter type. See the installation and operating instructions for the selected frequency converter.
- Frequency converter use can increase the wear on the shaft seal and bearings.
- The noise level may increase. See the installation and operating instructions for the frequency converter used.
- The working condition of bearings and shaft seal may be affected.



For further information on pumps operated with a frequency converter, visit the Grundfos Product Center at <https://productselection.grundfos.com>.

For further information about the frequency converter operation, see the data sheet and the installation and operating instructions of the selected frequency converter.

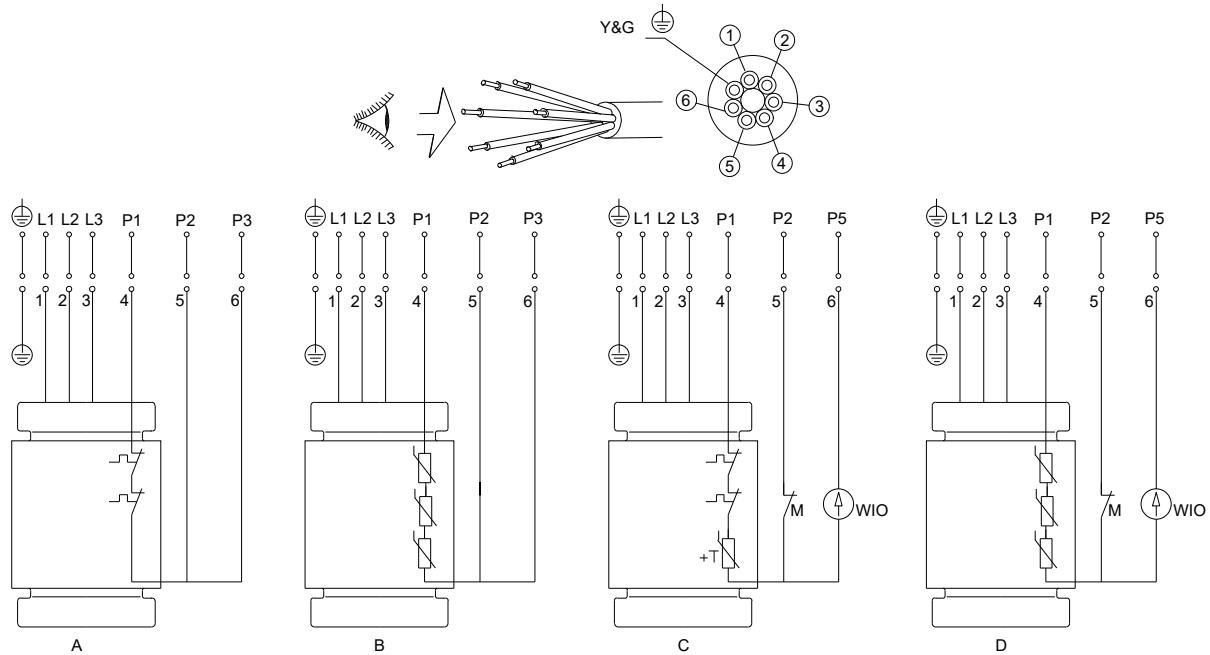
7.8 Wiring diagrams

WARNING**Electric shock**

Death or serious personal injury

- Make sure the earth and phase conductors are not mixed up. Make sure the earth conductor is connected first. Make sure that the product is earthed properly.

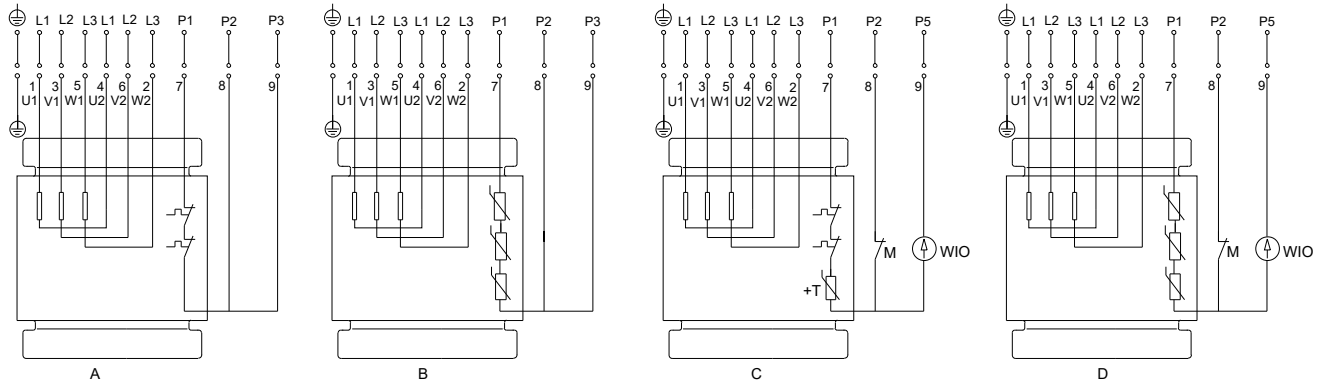
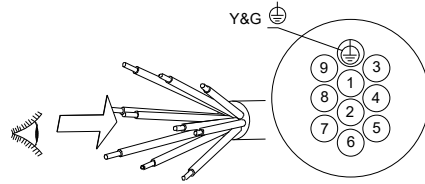
The pumps are supplied with either a 7- or a 10-core cable. See the wiring diagrams below.



TM046884

Wiring diagram, 7-wire cable, Direct-On-Line (DOL) connected

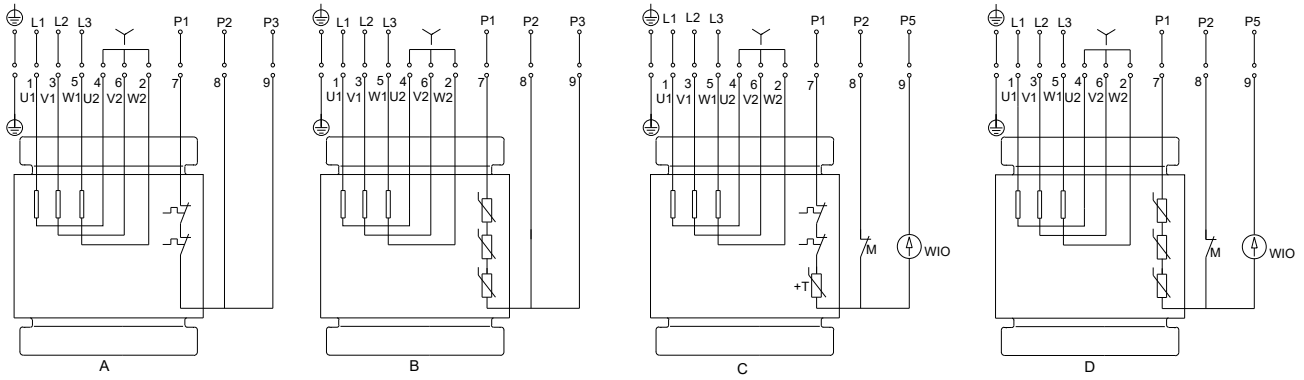
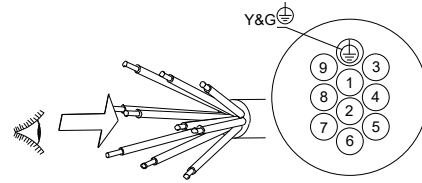
Position	Description
Y&G	Yellow and green
A	Standard version with thermal switches
B	Standard version with PTC thermistors
C	Sensor version with thermal switches, Pt1000, moisture switch and WIO sensor
D	Sensor version with PTC thermistors, moisture switch and WIO sensor



Wiring diagram, 10-wire cable, Star/Delta (Y/D) connected

Position	Description
Y&G	Yellow and green
A	Standard version with thermal switches
B	Sensor version with PTC thermistors
C	Sensor version with thermal switches, Pt1000, moisture switch and WIO sensor
D	Sensor version with PTC thermistors, moisture switch and WIO sensor

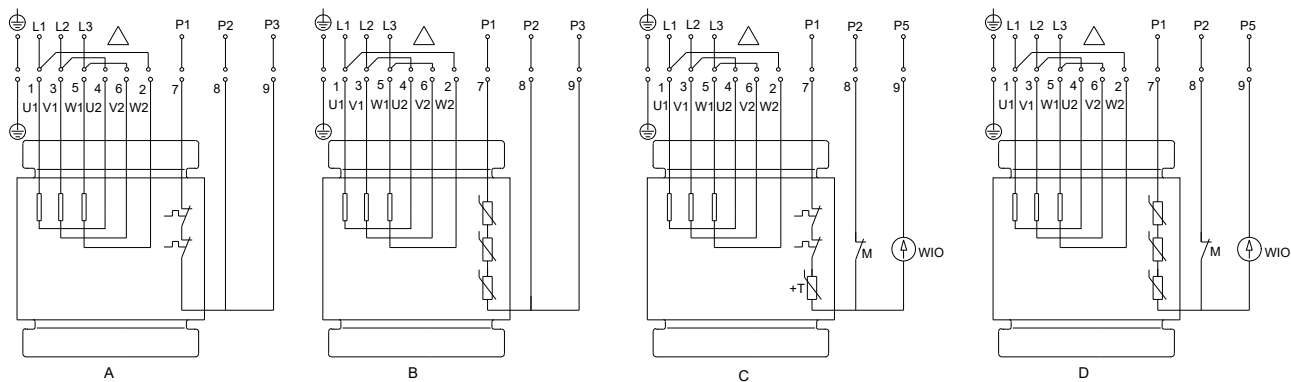
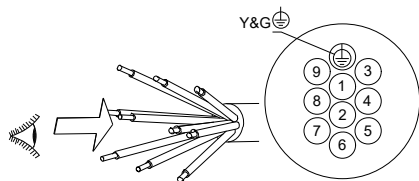
TM046885



TM046886

Wiring diagram, 10-wire cable, Star-connected (Y)

Position	Description
Y&G	Yellow and green
A	Standard version with thermal switches
B	Standard version with PTC thermistors
C	Sensor version with thermal switch, Pt1000, moisture switch and WIO sensor
D	Sensor version with PTC thermistors, moisture switch and WIO sensor



TM046887

Wiring diagram, 10-wire cable, Delta-connected (D)

Position	Description
Y&G	Yellow and green
A	Standard version with thermal switches
B	Standard version with PTC thermistors
C	Sensor version with thermal switch, Pt1000, moisture switch and WIO sensor
D	Sensor version with PTC thermistors, moisture switch and WIO sensor

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.

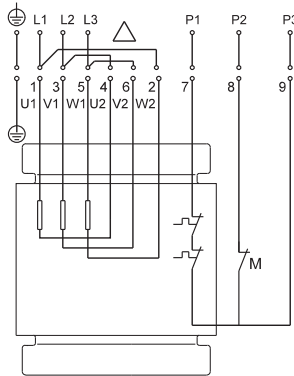
Related information

[11.7 Fitting the moisture switch](#)

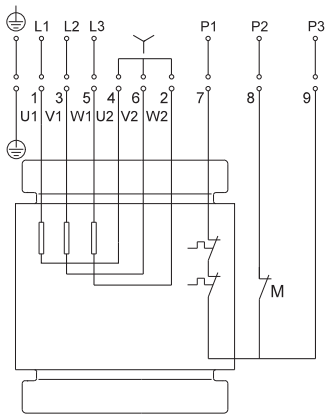
7.8.1 SE dual voltage concept

To standardize the SE product portfolio, a 61R voltage variant is available. It is a dual-voltage (230 V / 460 V), three phase, 60 Hz Direct-On-Line (DOL) connected motor.

- Connect 230 V pumps using the low-voltage (delta) connection.
- Connect 460 V pumps using the high-voltage (star) connection.



61R 230 V DOL wired in low-voltage (delta) connection



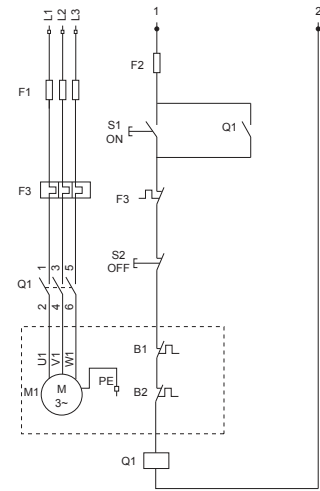
61R, 460 V DOL wired in high-voltage (star) connection

The 61R voltage variant provides a large voltage range for supply power.

Stated voltage [V]	Percentage variation	Voltage range [V]
230	± 10 %	207-253
460	± 10 %	414-506

TM057155

TM057156



Motor-protection wiring diagram

Position	Description
S1	On switch
S2	Off switch
F1 + F2	Fuse
F3	Motor-protection switch
Q1	Contactor
B1 + B2	Thermal switch in motor
M1	Motor

TM060523

8. Maintenance



Explosion-proof pumps must be checked by an authorized Ex workshop after 3000 working hours or at least once a year. When the pump is new or after the replacement of the shaft seal, check the oil level and water content after one week of operation.



After a short period of storage, vent the pump to let any explosive gasses escape.

Pumps running normal operation must be inspected every 3000 operating hours or at least once a year. If the pumped liquid is 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:

- **Power consumption:** See on the nameplate.
- **Oil level and condition:** When the pump is new or its shaft seal has been replaced, check the oil level and water content after one week of operation. If there is more than 20 % extra liquid (water) in the oil chamber, the shaft seal is defective. The oil must be changed after 3000 operating hours or once a year.
- **Cable entry:** Make sure that the cable entry is watertight and the cable is not sharply bent or pinched.
- **Pump parts:** Check the pump parts for possible wear. Replace the defective ones.
- **Ball bearings:** Check the shaft for noisy or heavy operation (turn the shaft by hand). Replace the 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 an authorized service workshop. Bearings are lubricated for a lifetime.



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 and the seal faces have been cleaned before the new parts are fitted. Grease O-rings and recesses before assembly.



Do not reuse rubber parts.

- **Sensors.**

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.

The following parts can be replaced by non-Ex authorized personnel:

- 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.

Related information

- [9.8 Removing the rotor](#)
- [9.9 Removing the bearings](#)
- [9.10 Removing the motor top](#)
- [9.12 Removing the sleeve](#)
- [9.13 Removing the stator housing](#)
- [9.14 Removing the stator](#)
- [11.1 Fitting the stator](#)
- [11.2 Fitting the stator housing](#)
- [11.3 Fitting the sleeve](#)
- [11.4 Fitting the shaft](#)
- [11.5 Fitting the lower bearing](#)
- [11.8 Fitting the shaft seal](#)
- [11.14 Fitting the motor top](#)

8.2 Oil check and change



Inspect the oil level and condition every 3000 operating hours or at least once a year. When the pump is new or after the replacement of the shaft seal, check the oil level and water content after one week of operation.

Check and change the oil in the oil chamber as described below.



Use Shell Ondina X420 oil or equivalent type.

Related information

[11.8 Fitting the shaft seal](#)

8.2.1 Oil quantities

The table indicates the quantity of oil in the oil chamber. Oil type: Shell Ondina X420.

	Power [hp (kW)]	Oil quantity [oz (l)]
2-pole	3.0 (2.2)	10.1 (0.30)
	4.0 (3.0)	
	5.5 (4.0)	
	8.0 (6.0)	
	10.0 (7.5)	
	12.5 (9.2)	
4-pole	15.0 (11)	23.6 (0.70)
	1.3 (1.0)	
	1.8 (1.3)	10.1 (0.30)
	2.0 (1.5)	
	3.0 (2.2)	
	4.0 (3.0)	
	5.5 (4.0)	
	7.5 (5.5)	
	10.0 (7.5)	23.6 (0.70)



Used oil must be disposed of in accordance with local regulations.

8.2.2 Draining of oil

Proceed as follows:

1. Place the pump on a plain surface with one oil screw pointing downwards.
2. Place at least 34 oz (1 l) capacity transparent container under the oil screw.



Warning

The oil chamber may be under pressure. Loosen the screws carefully and do not remove them until the pressure is completely relieved.

3. Loosen and remove the lower oil screw.
4. Remove the upper oil screw and let the oil drain into the container.

Check that the quantity of oil corresponds to the quantity stated in the table above. If the quantity is smaller than stated, the shaft seal is defective and must be replaced.

Check the water content in the oil. If the color is greyish-white, it contains water. If the oil contains more than 20 % water, the shaft seal is defective and must be replaced. If the shaft seal is not replaced, it may cause damage to the motor.

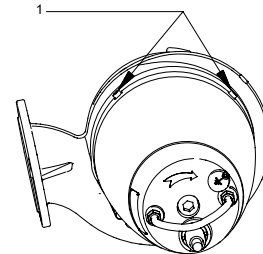
5. Clean the faces for the gaskets for oil screws.



Used oil must be disposed of in accordance with local regulations.

8.2.3 Filling with oil

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



Oil filling holes

Pos.	Description
1	Oil filling/venting

2. Pour oil into the oil chamber through one filling hole until it starts coming out of the other hole.
3. Fit the oil screws with new gaskets.

TM066005

8.3 Cleaning and inspecting the pump

Clean the pump on site at regular intervals in the following way:

- Lift the pump out of the tank.
- Hose down the pump externally by using a high-pressure cleaner at a maximum of 100 bar.
- Remove caked dirt from the motor to ensure appropriate heat conductivity. A mild detergent, which is approved for disposal into the sewage system, may be used.
- If necessary, scrub the pump with a soft brush.

Visual inspection of the pump must include the following:

- Search for cracks or other external damage.
- Check the lifting bracket and lifting chain for wear and corrosion.
- Inspect the power cable for cracks, lacerations, kinks, or other damage in the sheath.
- Inspect the 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 them, if necessary.

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

8.4 Checking the sensors

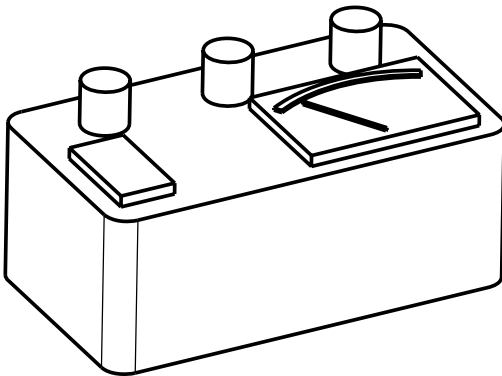


Sensor check measurements must be made by Grundfos or persons authorised by Grundfos.

Make the measurements from the free end of the cable (10 m) while 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.

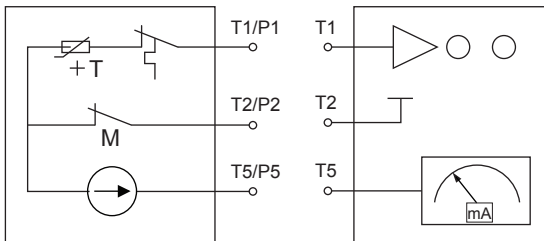
Sensors can be checked by using the Grundfos Test Box or a multimeter.

8.4.1 Checking with Test Box



Text box

1. Connect the text box and sensors according the wiring diagram.



Wiring diagram for test box and sensors

2. Check the following table:

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

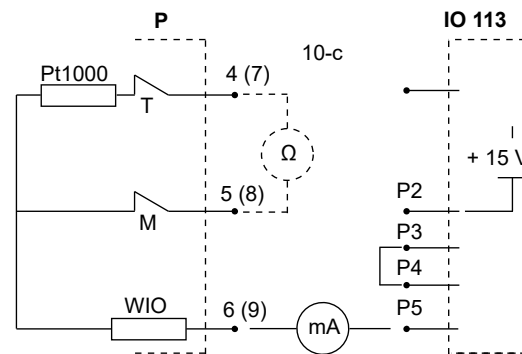
8.4.2 Checking with a Multimeter



Do not use a megaohmmeter for checking the sensor as it will damage the control circuit.

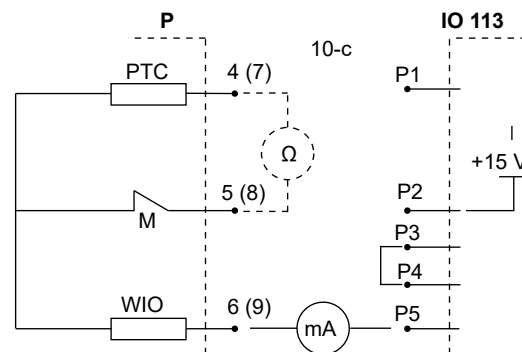
If the measured value is Ω , disconnect the conductors from IO 113.

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



Pump with Pt1000 sensor

Pos.	Description
P	Pump
I	Internal +15 V
10-c	10-core cable
T	Thermal switch
M	Moisture switch



Pump with PTC sensor

TM047039

TM048000

TM048022_2710

TM047040

Pos.	Description
P	Pump
I	Internal +15 V
10-c	10-core cable
T	Thermal switch
M	Moisture switch

Pt1000 and thermistor

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

PTC sensor

4 (7)	5 (8)	6 (9)	P5 IO 113	Value	Response
•	•	-	-	400 Ω	OK
•	•	-	-	> 3000 Ω	Alarm
•	•	-	-	0 Ω	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 Ω	Alarm
-	-	•	•	0 mA	Warning

9. Disassembly

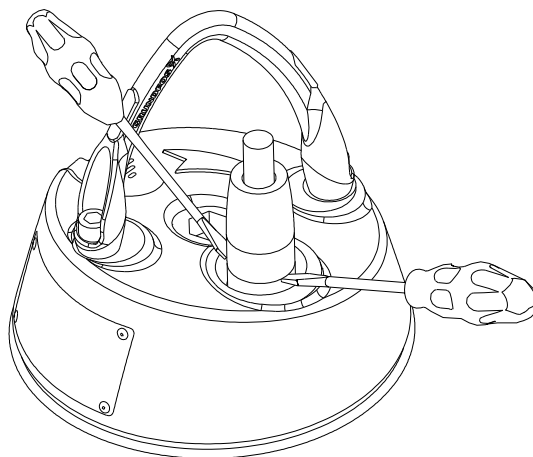
9.1 Removing the cable

- Loosen and remove the union nut from the cable plug (181) with a spanner.



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

- Loosen the cable plug (181) carefully, using two screw drivers.



TM069213

Loosening the cable plug

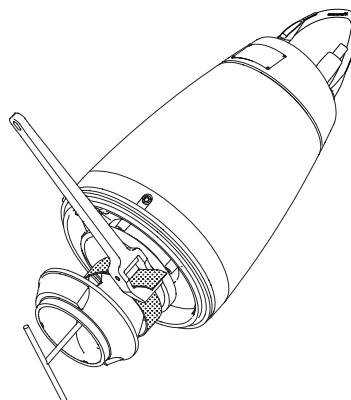
- Remove the cable plug (181). Be careful not to damage the pins inside the cable plug and in the pin housing.

9.2 Removing the pump housing

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

9.3 Removing the impeller

- Remove the screw (188a). Hold the impeller (49) with a strap wrench.



TM028407

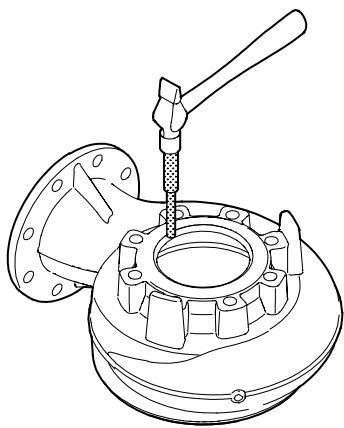
Removing the impeller

- Loosen the impeller (49) with a light blow on the edge. Pull it off.
- Remove the key (9a) and the corrugated spring (157).

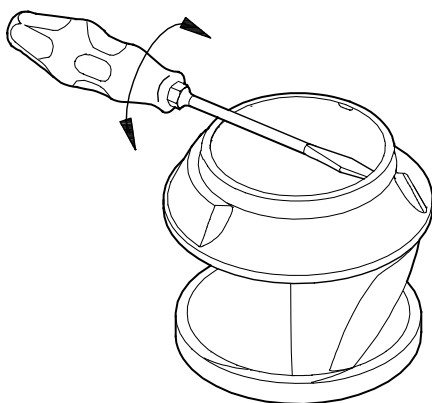
9.4 Removing the seal ring and wear ring

- Turn the pump housing (50) upside-down.
- Knock the seal ring (46) out of the pump housing using a punch.
- Clean the pump housing (50) where the seal ring (46) was fitted.
- Remove the wear ring (49c) using a screwdriver.

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



Removing the seal ring



Removing the wear ring

9.5 Removing the WIO sensor



In case of a WIO sensor change, change the motor oil.

1. Cut the cable shoe (521) of the WIO sensor off.
2. Remove the cable sleeve from the wire, and pull the sensor cable out of the intermediate flange (155).
3. Remove the rubber bush (524) and the disk springs (524a) from the wire.

Related information

- [7.1.3 Pumps with WIO sensor](#)
- [7.4 Water-in-oil sensor](#)

9.6 Removing the moisture switch

1. Remove the sensor protector (plastic cover).
2. Remove the mounting screw and lock washer from the mounting bracket.
3. Pull out the sensor from the stator housing (55).
4. Disconnect the spade connectors from the switch.
5. Remove the screw.
6. Remove the switch from the mounting bracket.

Related information

- [7.5 Moisture switch](#)

9.7 Removing the shaft seal

1. Remove the screws (187).
2. Remove the cover for the oil chamber (58) with a puller.
3. Remove the screws (186).
4. Remove the sensor (521) and the bracket (522), if fitted, from the shaft seal.
5. Remove the shaft seal (105) with the puller.
6. Remove the O-ring (153b).

9.8 Removing the rotor

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



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

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

Related information

- [8.1 Servicing Grundfos pumps with explosion-proof motors](#)

9.9 Removing the bearings

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

Related information

- [8.1 Servicing Grundfos pumps with explosion-proof motors](#)

9.10 Removing the motor top

1. Place the motor housing in vertical position on wooden bars.



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

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

Related information

- [8.1 Servicing Grundfos pumps with explosion-proof motors](#)

9.11 Removing the pin housing

1. Remove the earthing screw (173) including the washer (173a).
2. Disconnect the wire pins from the pin housing (176).
3. Remove the plug protector (177), including the pin housing (176).

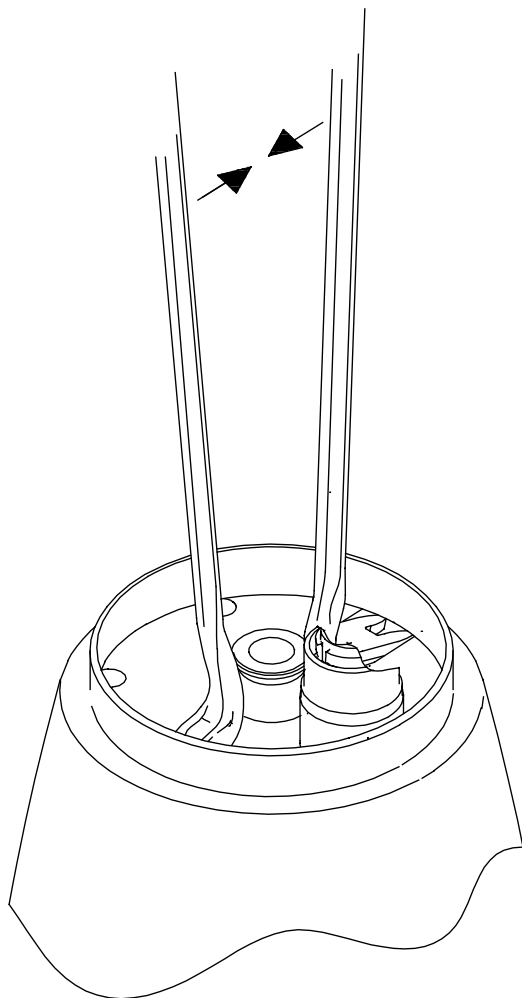
TM028420

TM028422

- Remove the pin housing (176) by pressing it up with the pin pusher below the pin housing.

9.12 Removing the sleeve

- Pull the sleeve (150) free of the stator housing (55) with two crowbars.



Removing the sleeve

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

Related information

[8.1 Servicing Grundfos pumps with explosion-proof motors](#)

9.13 Removing the stator housing

- Remove the screws (184) and washers (184a).
- Fit the motor top (151) with screw (183).
- Turn the pump in horizontal position and support with wooden blocks or similar support.
- Fit one of the screws (184) into the screw hole to loosen the intermediate flange (155).
- In case of sensor version: Pull the WIO sensor out of the stator housing.
- 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.

- Remove the WIO sensor (521) and moisture switch (520).

Related information

[8.1 Servicing Grundfos pumps with explosion-proof motors](#)

9.14 Removing the stator

- Remove the pin housing (176), using the pin pusher (B).
- Remove the plug protector (177), using the multipug pliers (C).
- Remove the screw (173) and the washer (173a).
- Remove the upper bearing cover (61) from the stator housing (55).
- Block up the stator housing (55) so that it stands on the flange at a height where the stator can come out underneath.
- 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.

Related information

[8.1 Servicing Grundfos pumps with explosion-proof motors](#)

10. Contaminated pumps

CAUTION

Biological hazard

Minor or moderate personal injury



- Wear appropriate personal protective equipment and clothing.
- Observe the local hygiene regulations in force.

WARNING

Biological hazard

Death or serious personal injury



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

The product is classified as contaminated if it is used for contagious or toxic liquid.

Contact Grundfos with details about the pumped liquid before returning the product for service. Otherwise, Grundfos can refuse to accept the product.

Any application for service must include details about the pumped liquid.

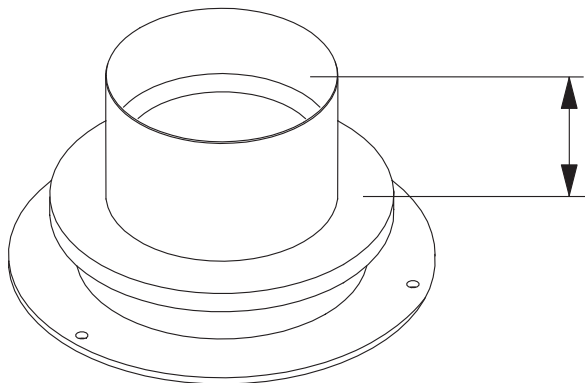
Clean the product in the best possible way before returning it.

TMD031673

11. Assembly

11.1 Fitting the stator

1. Place the stator (48) on the stator guide (A) with the wire end upwards.

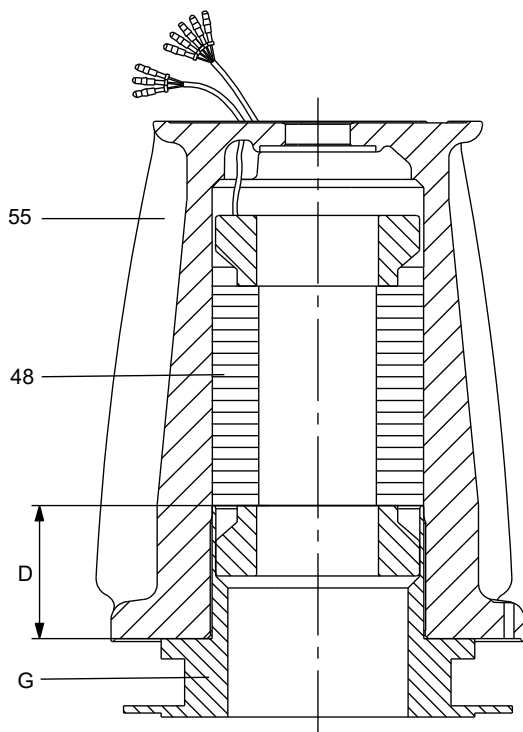


TM069216

Stator guide

Installation dimensions: B: 84.8 ± 0.75 mm C: 97.0 ± 0.75 mm D: 103.0 ± 0.75 mm
--

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.

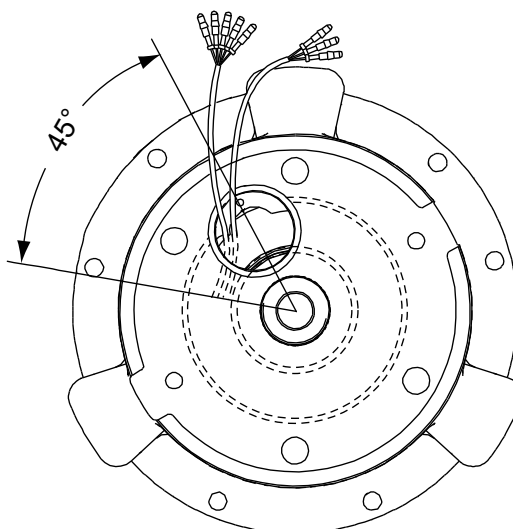


TM069226

Installing the stator housing

Pos.	Description
D	Installation dimensions
G	Stator guide

5. Make sure the plug hole and the hole for the wires in the stator are in a 45° angle.



TM033622

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 evenly so it won't deform. 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 above.
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).

Related information

[8.1 Servicing Grundfos pumps with explosion-proof motors](#)

11.2 Fitting the stator housing

1. Place the motor in horizontal position on wooden bars.
2. Fit the moisture switch in the stator housing (55), if any.
3. Apply cooling paste (192) on the bottom flange of the stator housing (55), and distribute it evenly.
4. Fit the intermediate flange (155). In case of sensor version, pull the wire of the WIO sensor (521) through the hole in the intermediate flange. Take care not to damage the WIO sensor.



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.
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 30 Nm.
10. Remove the screw (183) and the washer (183a).

Related information

[8.1 Servicing Grundfos pumps with explosion-proof motors](#)

11.3 Fitting the sleeve

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. Fit the sleeve (150) and knock with a hammer and a wooden block if needed.

Related information

[8.1 Servicing Grundfos pumps with explosion-proof motors](#)

11.4 Fitting the shaft

1. Place the motor housing horizontally with a crane.
2. Fit the corrugated spring (158) into the stator housing (55). It may need to be kept in position with a small amount of grease.
3. Lubricate the outside of the upper bearing (154) with O-ring grease.
4. Fit and lubricate the O-ring (108) to the upper bearing cover (60).
5. Fit the cover on the shaft (172).
6. 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.
7. Align the groove in the bearing housing (60) to the cable entry of the intermediate flange (155).
8. Fit the upper bearing (154) to the shaft (172).



Bearings are factory-greased.

Related information

[8.1 Servicing Grundfos pumps with explosion-proof motors](#)

11.5 Fitting the lower bearing

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

Related information

[8.1 Servicing Grundfos pumps with explosion-proof motors](#)

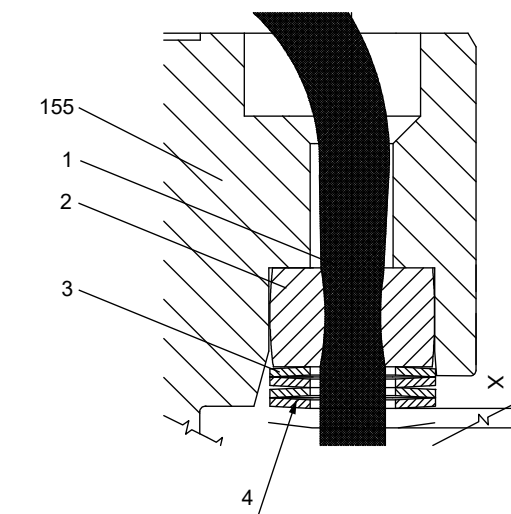
11.6 Fitting the WIO sensor



Fit the sensor next to one of the shaft seal openings. The sensor must be tilted into the motor's direction of rotation to ensure that oil is led into the sensor. Make sure that the sensor is submerged in the oil.

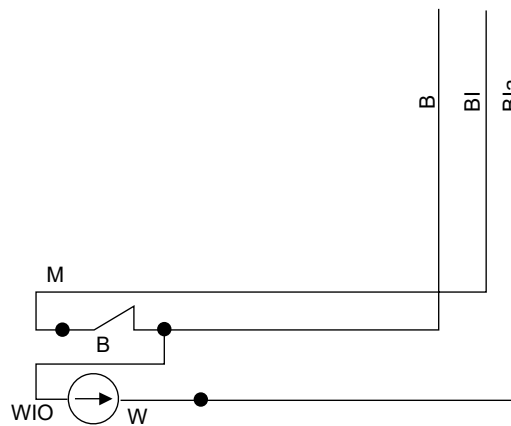


Upon removal of disc springs and the rubber bush, they must always be replaced.



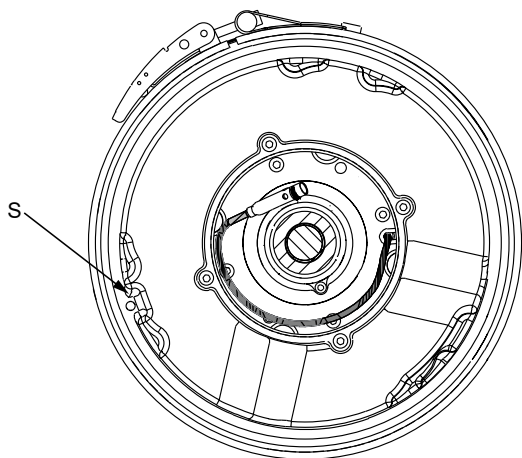
Position of disc springs and the rubber bush

Pos.	Description
1	Sensor cable
2	Rubber bush
3	Disc spring
4	Disc spring stack
155	Intermediate flange
X	Minimum compression is 0.05 " (1.4 mm)



Wiring diagram for WIO sensor

Pos.	Description
M	Moisture switch
Br	Brown
W	White
Bl	Blue
Bla	Black



Fitting the WIO sensor

Pos.	Description
S	Rotation stop

1. Fit the spring discs and the rubber bush on the sensor cable.
2. Pull the sensor cable through the intermediate flange (155).
3. Fit 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 wiring diagram for WIO sensor above.
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 fitting the WIO sensor figure above.

Related information

[7.1.3 Pumps with WIO sensor](#)

[7.4 Water-in-oil sensor](#)

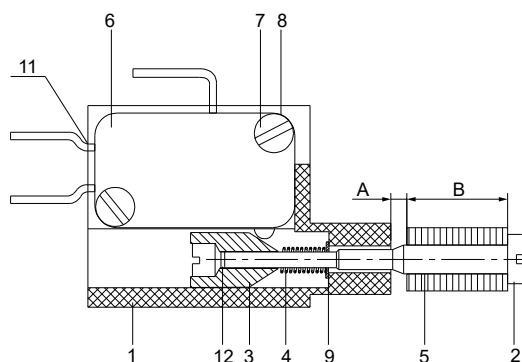
11.7 Fitting the moisture switch

1. Fit the moisture switch to the mounting bracket.
2. Fit the screw to attach the switch to the mounting bracket.
3. Fit the mounting bracket, including the switch on the stator housing (55), with the mounting screw and the lock washer.
4. Connect the spade connectors.
5. Connect the wires according to the wiring diagrams.
6. Fit the sensor protector (plastic cover).

Related information

[7.5 Moisture switch](#)

[7.8 Wiring diagrams](#)

11.7.1 Adjusting clearance of the moisture switch

Moisture switch parts

Pos.	Description
1	Plastic frame
2	Shaft
3	Adjustment
4	Spring
5	Expanding washer
6	Micro switch
7	Nut
8	Washer
9	Washer
A	Clearance gouge: 0.19 ± 0.007 " (5 ± 0.2 mm)
11	L4 is to be cut
12	Loctite 290 - thread locking compound
B	0.55 " (14 mm)

1. Connect the moisture switch in the test bell.
2. Place the feeler gauge between the mounting bracket and the expander.
3. Pull the expander outwards. If the bell rings turn the adjusting nut 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 switch 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.

11.8 Fitting the shaft seal

1. Fit and lubricate the O-rings (153b)
2. Lubricate and fit the O-rings (106, 2 pcs) to the shaft seal (105).
3. Carefully push the shaft seal (105) onto the shaft (172).
4. Lubricate the O-ring (107), and fit it into the cover for oil chamber (58).
5. Fit the cover for oil chamber (58).
6. Fit and tighten the screws (186) diagonally. In case of sensor version, fit the WIO sensor.
7. Fill in oil.

Related information

[8.1 Servicing Grundfos pumps with explosion-proof motors](#)

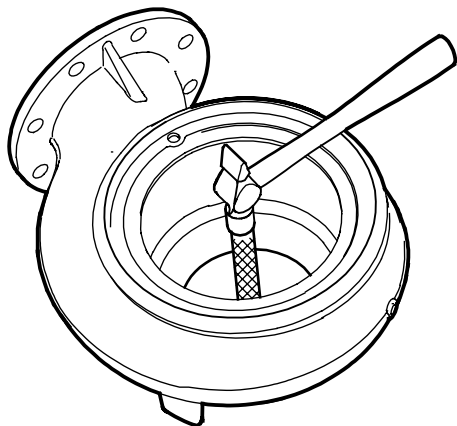
[8.2 Oil check and change](#)

11.9 Fitting the seal ring and wear ring (SE1)

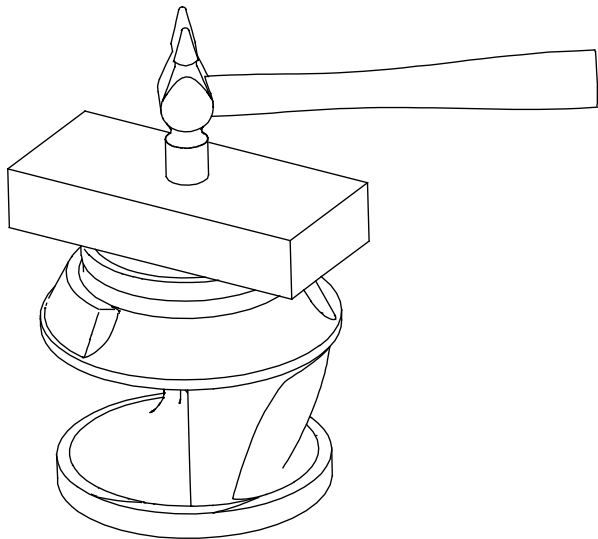
1. Lubricate the seal ring (46) with oil.
2. Place the seal ring in the pump housing (50).
3. Fit the seal ring (46) in the pump housing (50).



Make sure the seal ring is properly fit, otherwise use the seal ring mounting tool.

*Fitting the seal ring*

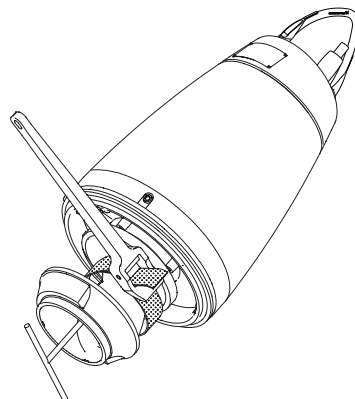
4. Place the wear ring (49c) on the impeller (49).
5. Fit the wear ring (49c) with a hammer and a wooden block.

*Fitting the wear ring***Related information**

[5.5 Seal ring mounting tool](#)

11.10 Fitting the impeller

1. Fit the corrugated spring (157) and the key (9a). Keep the key (9a) in position while fitting the impeller (49).
2. Fit the impeller (49).
3. Fit the washer (66), nord-lock washer (66b), and the screw (188a).
4. Tighten the screw (188a) to a torque of 75 Nm. Hold the impeller (49) with the strap wrench.

*Removing the impeller*

5. Mark the position of the pin (6a) on the pump housing (50).
6. Mark the position of the pin hole on the oil chamber.
7. Fit and lubricate the O-ring (37) with oil.

Related information

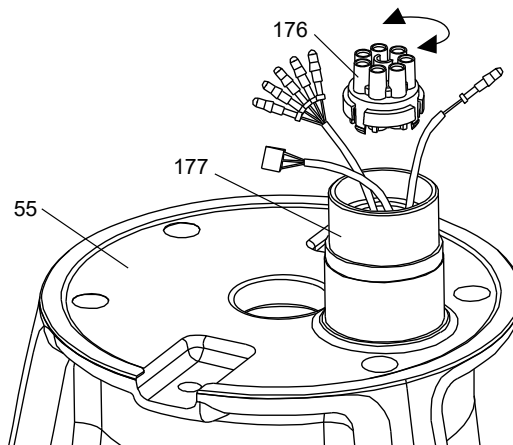
[6. Tightening torques and lubricants](#)

11.11 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 into the pump housing (50) with a crane.
5. Mark the sleeve (150) and pump housing (50) to place the motor correctly. Lower the motor into the pump housing (50).
6. Fit the clamp (92).
7. Tighten the screw (92a).
8. Check if the impeller (49) rotates freely and without drag.

Related information

[6. Tightening torques and lubricants](#)

11.12 Fitting the pin housing*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).

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TM028421


TM028423

TM069234

3. Connect the wires (coming from the stator) to the pin housing (176).
4. Fit the new pin housing (176) in the plug protector (177).
5. Connect the earthing screw (173) and washer (173a).

11.13 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 the cable plug cannot rotate. Otherwise, it can detach the wires from the pin housing.

11.14 Fitting the motor top

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).

Related information

[8.1 Servicing Grundfos pumps with explosion-proof motors](#)

12. Startup




The pump must not run dry.



Dry running can cause ignition hazard.



Do not open the clamp during operation.

 The pumps are fitted with S-tube[®] impellers. S-tube[®] impellers are wet balanced, which reduces the vibration during operation. If the pumps are started with the pump housing containing air, the vibration level can be higher than normal operation.

Local balancing of the S-tube[®] impellers may damage the wet balancing and lead to higher vibration levels during operation.



The pumps are designed for continuous operation, both for submerged- and dry installations.

WARNING

Crushing of hands

Death or serious personal injury



- Do not put your hands or any tool into the pump inlet or outlet after the pump has been connected to the power supply, unless the pump has been switched off by removing the fuses or switching off the main switch.
- Make sure that the power supply cannot be switched on unintentionally.



Before starting the product, make sure the following:

- The fuses have been removed.
- All protective equipment has been connected correctly.

WARNING

Biological hazard

Death or serious personal injury



- Make sure to seal the pump outlet properly when fitting the outlet pipe, otherwise water may spray out.

WARNING

Crushing of hands

Death or serious personal injury



- When lifting the pump, make sure your hand cannot be caught between the lifting bracket and the hook.

WARNING

Crushing hazard

Death or serious personal injury



- Make sure that the hook is fixed properly to the lifting bracket.
- Always lift the pump by its lifting bracket or by a forklift truck, if the pump is fixed on a pallet.
- Never lift the pump by the power cable, hose, or pipe.
- Make sure that the lifting bracket is tightened before lifting the pump.

WARNING

Electric shock

Death or serious personal injury



- Before starting up the product for the first time, check the power cable for visible defects to avoid short circuits.
- If the power cable is damaged, it must be replaced by the manufacturer, his service agent or a similarly qualified person.
- Make sure that the product is earthed properly.
- Switch off the power supply and lock the main switch in position 0.
- Switch off any external voltage connected to the product before working on it.

CAUTION

Biological hazard

Minor or moderate personal injury



- Flush the pump thoroughly with clean water and rinse the pump parts after dismantling. Tanks for submersible drainage and effluent pumps may contain drainage or effluent with toxic and/or contagious substances.
- Wear appropriate personal protective equipment and clothing.
- Observe the local hygiene regulations in force.

CAUTION

Hot surface

Minor or moderate personal injury



- Do not touch the surface of the pump while it is running.

12.1 General startup procedure



The pump must not run dry.



If the environment is potentially explosive, use pumps with Ex approval.



In case of abnormal noise or vibration, stop the pump immediately. Do not restart the pump until the cause of the fault is identified and eliminated.

CAUTION



Sharp element

Minor or moderate personal injury

- Do not touch the sharp edges of the impeller without wearing protective gloves.



After a short period of storage, vent the pump to let any explosive gasses escape.

12.1.1 SE1 pumps

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.
3. Check that the system, bolts, gaskets, pipes, and valves are in correct condition.
4. Check 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.
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. If the level is below the clamp, add liquid to the tank until the minimum level is obtained.
12. Remove trapped air from the pump housing by tilting the pump by the lifting chain.
13. Start the pump and let it run briefly. Check if the liquid level is falling. A correctly vented pump quickly lowers the liquid level.

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, this can be done by taking a sample of the oil.

12.1.2 SEV pumps

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.
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.
7. **Submerged pumps:**
 - Start the pump above the water level and lower it into the tank to avoid air being trapped in the pump housing.

8. **Dry-installed pumps with positive inlet pressure** (the pump is installed in a pump room next to the tank):

- 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.



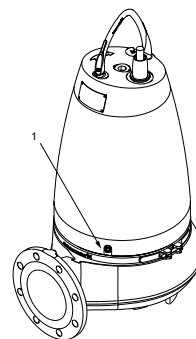
Check that there is positive inlet pressure before starting up the pump.

9. **Dry-installed pumps with inlet pipe and foot valve:**

- Open the isolating valve on the outlet side to let the water above the valve 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, with or without short outlet pipe** (use a vacuum system):

- Keep the isolating valve on the outlet side closed.
- Start the vacuum system until liquid is sucked in and the pump is vented.
- Open the isolating valve on the outlet side and start the pump.



Position of the air vent screw

Pos.	Description
1	Air vent screw

13. Fault finding

For further information, see the installation and operating instructions for SE1, SEV 1.5 - 15 hp.

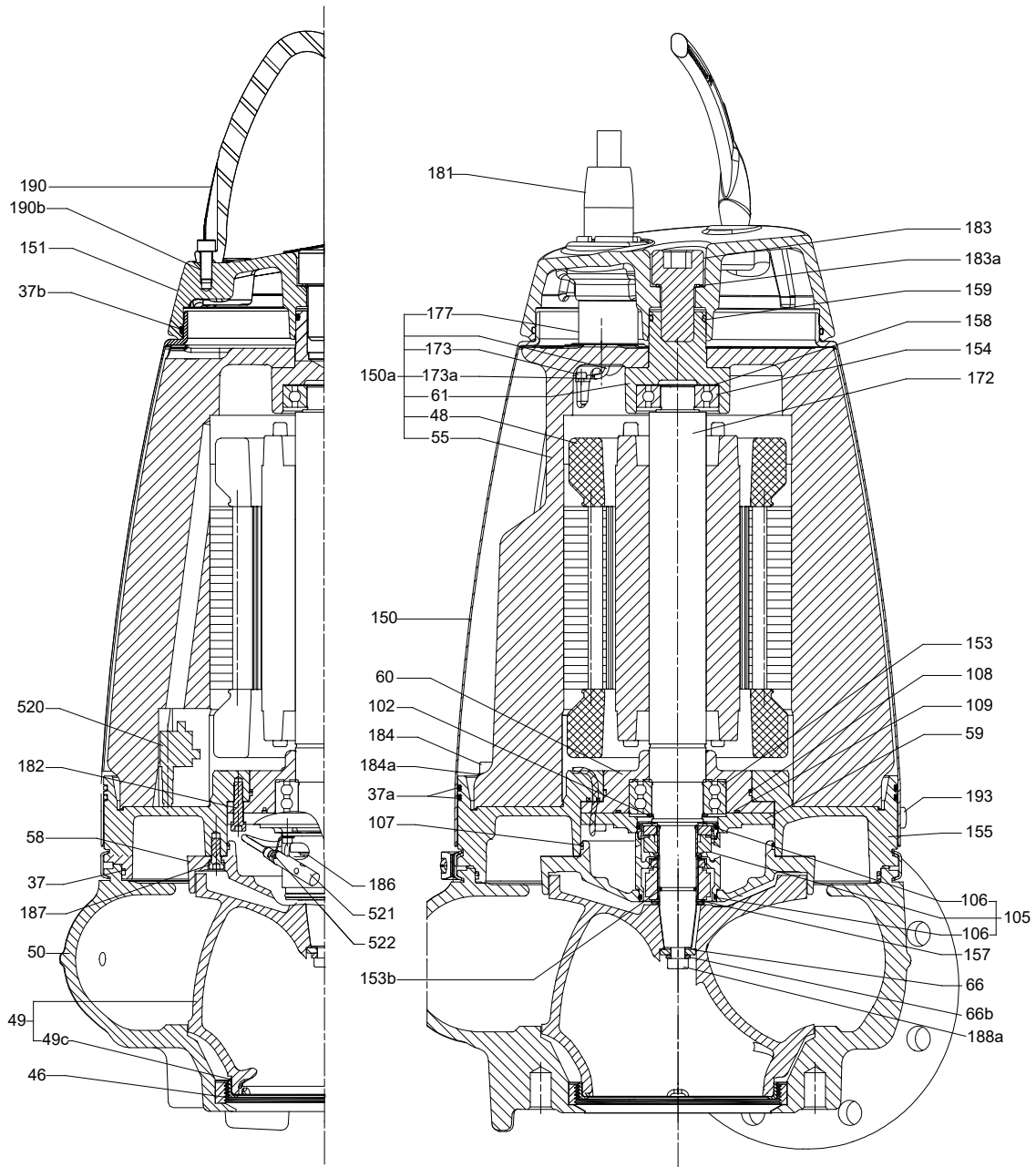
Installation and Operating Instructions



<http://net.grundfos.com/qr/i/93010806>

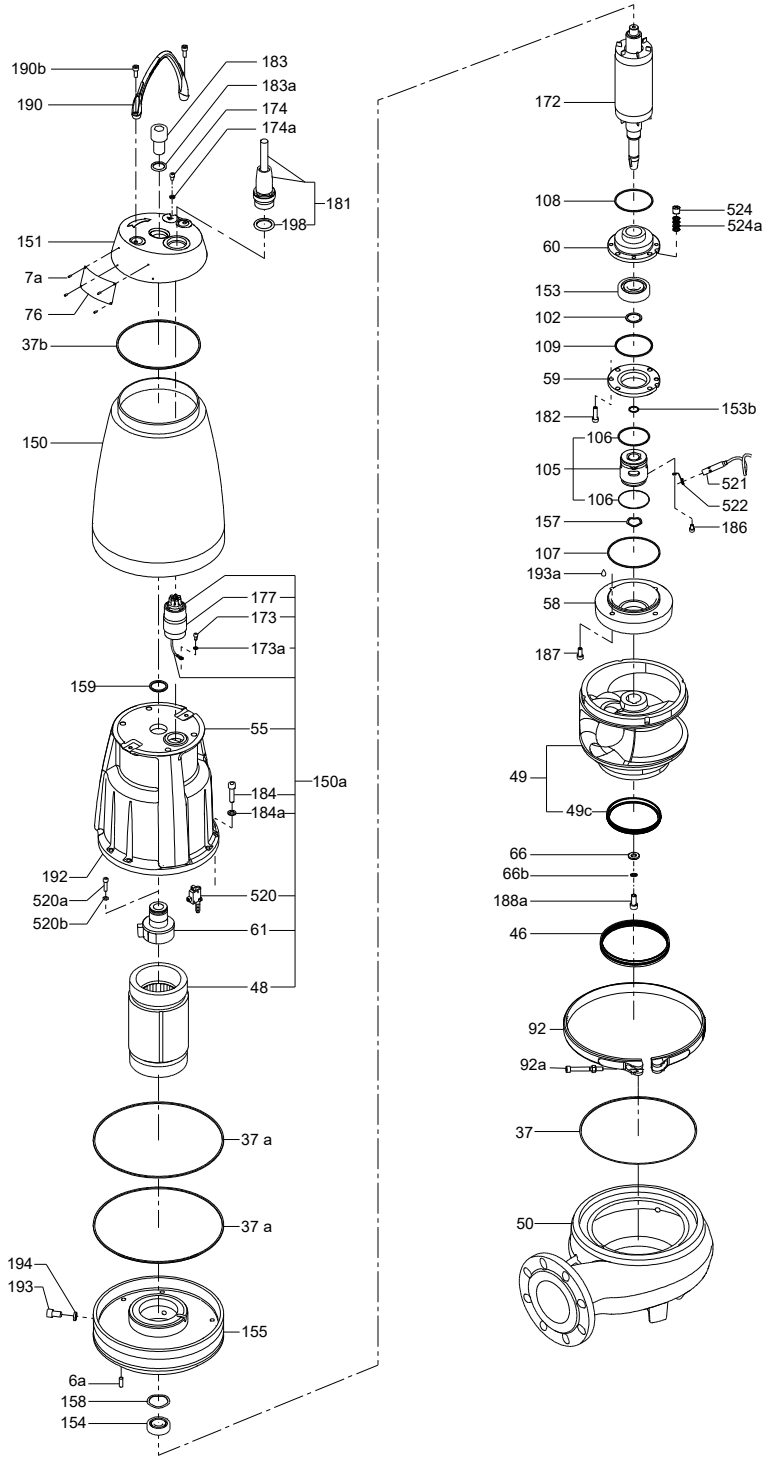
14. Drawings

14.1 SE1



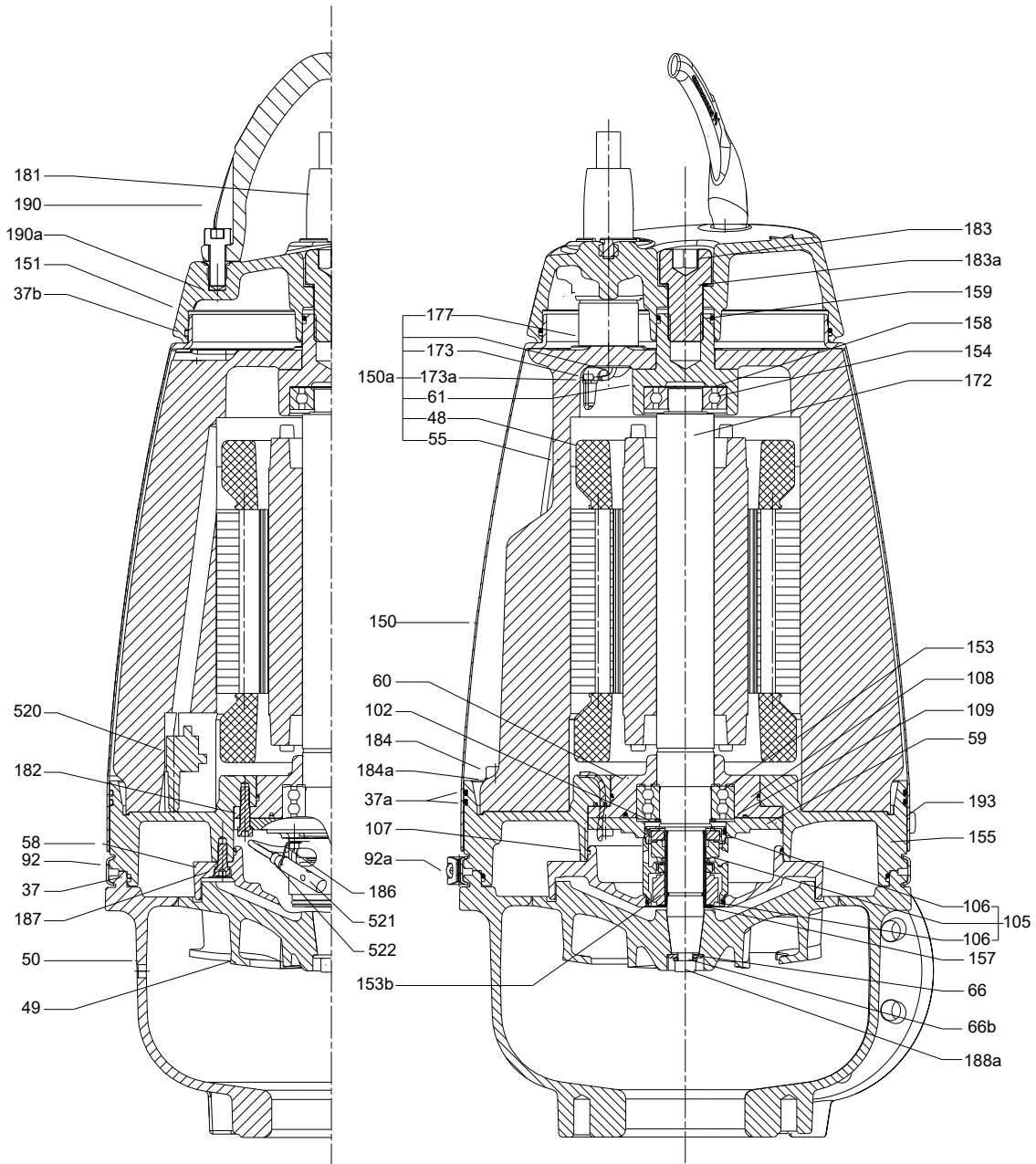
Sectional drawing, SE1 pump with S-tube® impeller, sensor version

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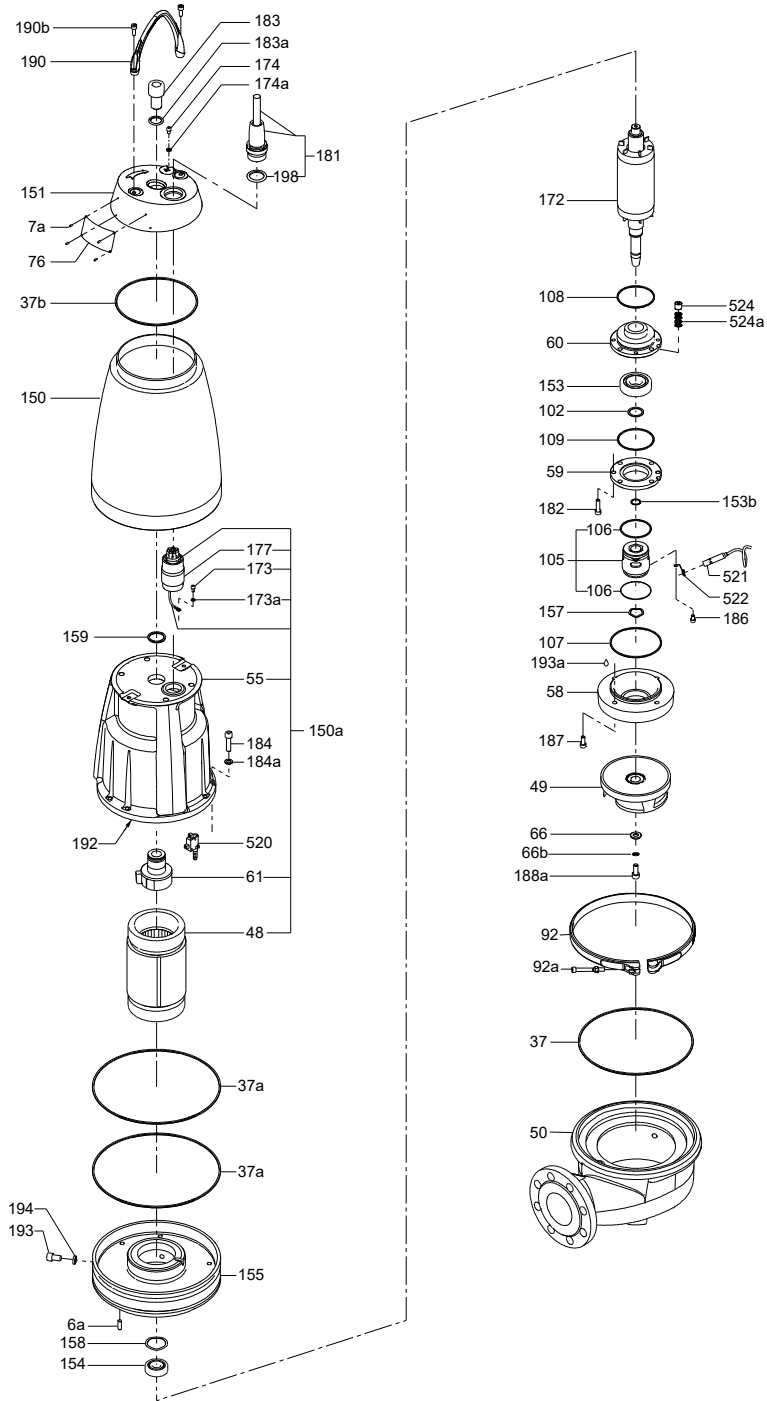
Exploded view, SE1 pump with S-tube[®] impeller, sensor version

TM065986



Sectional drawing, SEV pump with SuperVortex impeller, sensor version

TM031519



Exploded view, SEV pump with SuperVortex impeller, sensor version

14.3 Material specification

Standard variant (cast iron)

Material declaration:

Pos.	Designation	Material	DIN W.-Nr./ EN standard
6a	Tubular pin	Stainless steel	EN 1.4301
7	Lock washer	Stainless steel	EN 1.4401
7a	Blank rivet	Stainless steel	EN 1.4301
37	O-ring	NBR rubber	
37a	O-ring	NBR rubber	
37b	O-ring	NBR rubber	

TM065993

Pos.	Designation	Material	DIN W.-Nr./ EN standard
46	Seal ring, inlet	Stainless steel	EN 1.4301
48	Stator package		
49	SuperVortex impeller	Cast iron	EN-GJL-250/
	S-tube® impeller	Cast iron	EN-GJL-250
49c	Wear ring	Stainless steel	EN 1.4301
50	Pump housing	Cast iron	EN-GJL-250
55	Stator housing	Aluminium	EN AB-AISI 10 Mg
58	Cover for oil chamber	Cast iron	EN-GJL-250
59	Bearing cover	Cast iron	EN-GJL-250
60	Bearing retainer, lower	Cast iron	EN-GJL-250
61	Bearing retainer, upper	Cast iron	EN-GJS-450-10
66	Washer	Stainless steel	EN 1.4305
76	Nameplate	Stainless steel	EN 1.4301
92	Clamp	Stainless steel	EN 1.4401
92a	Screw	Stainless steel	EN 1.4401
102	Retaining ring		DIN 471
105	Shaft seal complete	Primary seal	SiC/SiC
		Housing	Stainless steel
		Secondary seal	Carbon/ceramics
106	O-ring	NBR rubber	
107	O-ring	NBR rubber	
108	O-ring	NBR rubber	
109	O-ring	NBR rubber	
150	Sleeve	Stainless steel	EN 1.4301
150a	Stator housing complete		
151	Motor top	Cast iron	EN-GJL-250
153	Ball bearing, lower	6306.2CS.C4	
153b	O-ring	NBR rubber	
154	Ball bearing, upper	6304.2Z.C3	
155	Intermediate flange	Cast iron	EN-GJL-250
157	Corrugated spring	Carbon steel	Inconel X750
158	Corrugated spring	Stainless steel	EN 1.1248
159	O-ring	NBR rubber	
172	Shaft with rotor	Non-alloy quality steel / Stainless steel	EN 1.0533/EN 1.4462
173	Earth screw	Stainless steel	EN 1.4301
173a	Lock washer	Stainless steel	EN 1.4301
174	Earth screw, external	Stainless steel	EN 1.4301
174a	Washer	Stainless steel	EN 1.4301
177	Plug protector	Stainless steel	EN 1.4408
181	Cable/outer plug part	H07RN-F / -	
182	Screw	Stainless steel	EN 1.4301
183	Screw	Stainless steel	DIN 912
183a	Washer	Copper Hard	
184	Screw	Stainless steel	DIN 912
184a	Washer	Stainless steel	
186	Screw	Stainless steel	DIN 912
188	Screw	Stainless steel	DIN 912
188a	Screw	Stainless steel	EN 1.4301
190	Lifting bracket	Stainless steel	EN 1.4301
190b	Screw		
192	Cooling paste		
193	Screw	Stainless steel	EN 1.4301
193a	Oil	Shell Ondina X420	
194	Gasket	Nylon	
198	O-ring	NBR rubber	
520	Moisture switch		
521	Water-in-oil sensor		

Pos.	Designation	Material	DIN W.-Nr./ EN standard
522	Bracket for WIO sensor		
524	Rubber bush	NBR rubber	
524a	Disc Springs		

Grey cast iron is manufactured according to EN 1561:1997.

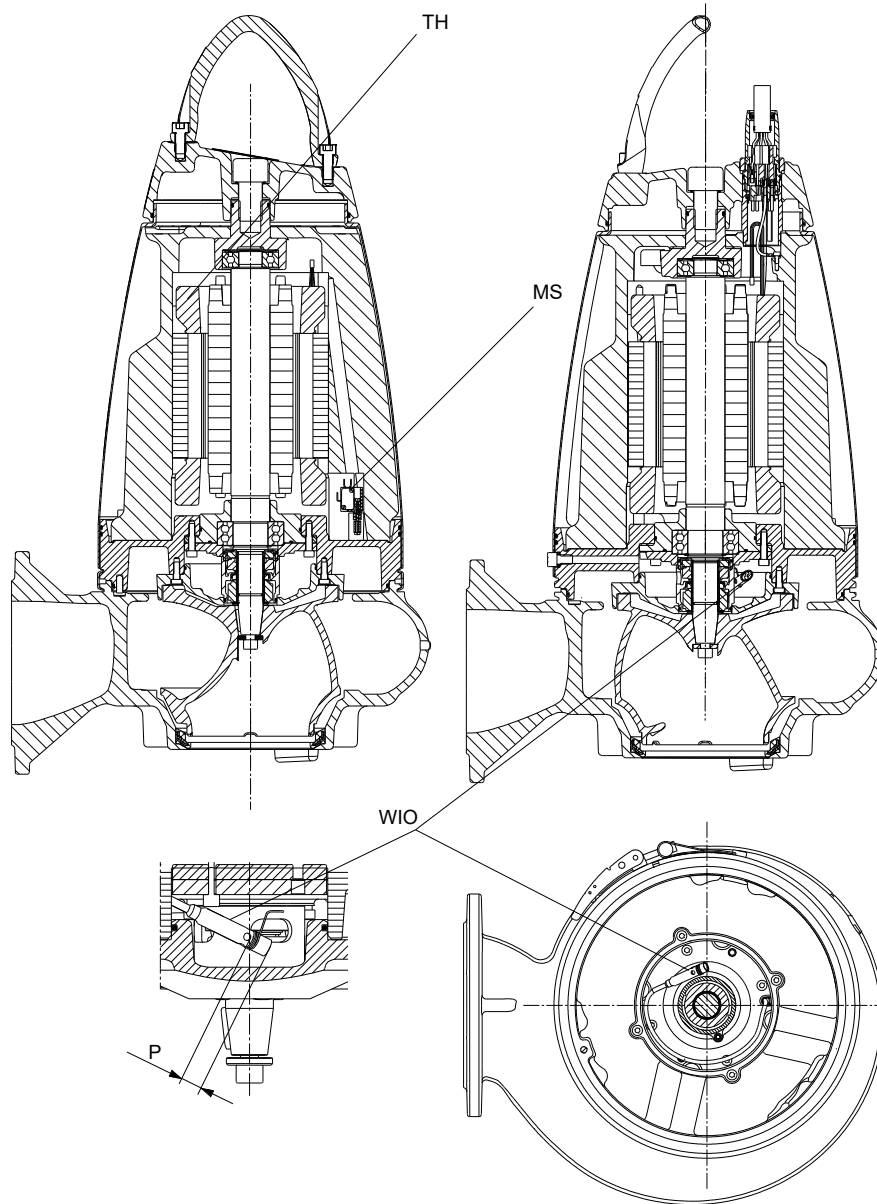
Cast stainless steel is manufactured according to EN 10283:2010.

Conversion to other standards such as AISI/ASTM is normative, and products are not manufactured according to these.

14.3.1 Material variants

Position	Description	Material Variant		
		Q	R	D
	Bolts and washers	A2-70	A4-70	EN 1.4539
	O-Rings	NBR	FKM	FKM
	Polyolefin Cable Protection	No	Yes	Yes
48	Seal Ring	EN1.4301	EN1.4401	EN 1.4539
49	Impeller	EN 1.4408	EN 1.4408	EN 1.4517
49C	Wear Ring	EN 1.4301	EN 1.4401	EN 1.4539
50	Volute	EN-GJL-250	EN 1.4408	EN 1.4517
58	Cover for oil Chamber	EN-GJL-250	EN 1.4408	EN 1.4517
92	Clamp	EN 1.4401 / EN 1.4408	EN 1.4401 / EN 1.4408	EN 1.4539 / EN 1.4517
105	Shaft seal	EN 1.4408 / NBR	EN 1.4408 / FKM	EN 1.4539 / FKM
151	Motor Top	EN-GJL-250	EN 1.4408	EN 1.4517
150	Motor Sleeve	EN 1.4301	EN 1.4301	EN 1.4539
155	Intermediate flange	EN-GJL-250	EN 1.4408	EN 1.4517
157	Corrugated Spring	Inconel X750	Hastelloy C-276	Hastelloy C-276
172	Shaft with rotor	1.0533 / EN 1.4462	1.0533 / EN 1.4462	1.0533 / EN 1.4462
190	Lifting handle	EN 1.4301	EN 1.4408	EN 1.4517

14.4 Sensor positions



Sensor positions

Pos.	Description
WIO	Water-in-oil sensor (WIO)
P	Positioning area of the WIO sensor
MS	Moisture switch
TH	Thermistor, Pt1000 or thermal switch are factory-braided inside the stator windings.

TM069223

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