

SE1 50, 80, 100-SEV 65, 80, 100

1.1 to 11 kW

Service instructions



SE1 50,80,100, SEV 65,80,100
Installation and operating instructions
Other languages
<http://net.grundfos.com/qr/i/96046675>



SE1, SEV without sensor
SE1, SEV without sensor Service video,
YouTube



SE1, SEV with sensor
SE1, SEV with sensor Service video,
YouTube

chapter[en-GB]..... 4

English (GB) Service instructions

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.



This appliance shall not be used by children.

Children shall not play with the appliance.

Cleaning and user maintenance shall not be carried out by children.

Appliances can be used by persons with reduced physical, sensory, or mental capabilities, as well as persons with a lack of experience and knowledge. This requires that they are given supervision or instruction concerning the use of the appliance in a safe way and that they understand the hazards involved.

1.1 Hazard statements

The symbols and hazard statements below may appear in Grundfos 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.

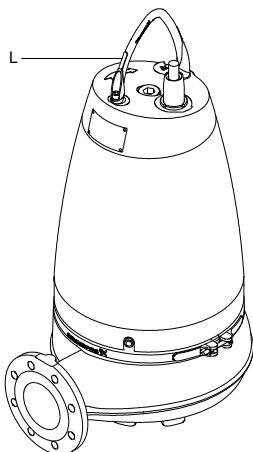
WARNING

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

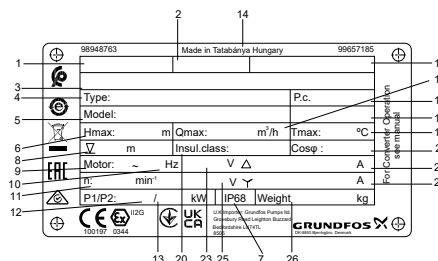
Pos.	Description
L	Lifting bracket

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

Fix the extra nameplate supplied with the pump at the installation site or keep it in the cover of this booklet.



Nameplate

Pos.	Description
1	Approved body and explosion protection classification
2	EU Explosion protection certificate number
3	Explosion protection mark
4	Type designation
5	Product number
6	Maximum head [m]
7	Enclosure class
8	Maximum installation depth [m]
9	Number of phases
10	Frequency [Hz]
11	Speed [min ⁻¹]
12	Motor input power P1 [kW]
13	Motor output power P2 [kW]
14	Country of production
15	UK Explosion protection certificate number
16	Standard for wastewater lifting stations for buildings and installation sites
17	Maximum flow rate [m ³ /h]
18	Production code (year/week)
19	Maximum liquid temperature [°C]
20	Insulation class
21	Power factor
22	Rated current [A], delta connection
23	Rated voltage [V], delta connection
24	Rated current [A], star connection
25	Rated voltage [V], star connection
26	Net weight [kg]

TM085587

TM085558

4.2 Type key

Example: **SE1.80.80.40.A.Ex.4.51D.B**

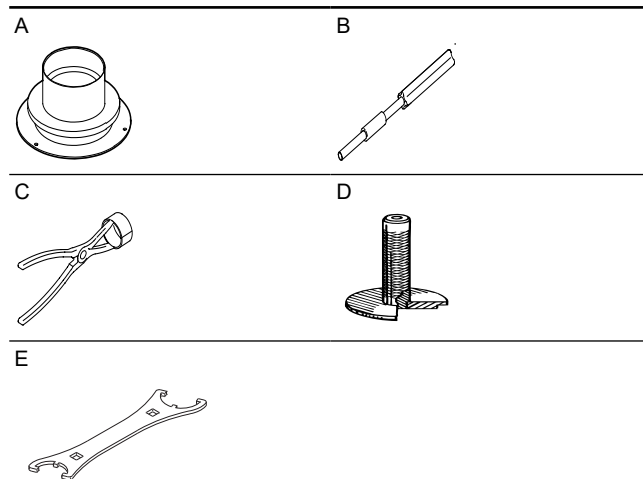
Code	Explanation	Designation
SE	Sewage and wastewater pump	Pump type
1	S-tube® impeller	Impeller type
V	SuperVortex impeller	
80	Maximum solids size [mm]	Pump passage
80	Nominal diameter [mm]	Pump outlet
40	Output power P2/10	Power [kW]
[]	Standard (without sensor)	Sensor version
A	Sensor version	
[]	Non-explosion-proof pump (standard)	Pump version
Ex	Explosion-proof pump	
2	2-pole	Number of poles
4	4-pole	
50	50 Hz	Frequency [Hz] ¹⁾
60	60 Hz	
0B	400-415 V, DOL	Voltage and starting method
0D	380-415 V, DOL	
1D	380-415 V, Y/D	
0E	220-240 V, DOL	
1E	220-240 V, Y/D	
0F	220-277 V, DOL	
0G	380-480 V, DOL	
1F	220-277 V, D / 380-480 V, Y Y/D	
[]	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	Customisation

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.

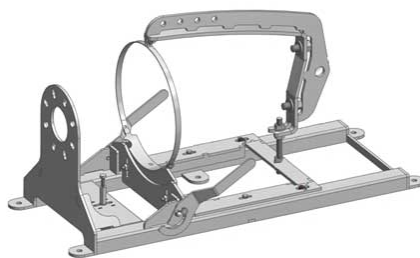
5. Service tools

5.1 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

5.2 Service sledge



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Pump to be installed					Service sledge	
Pump/Impeller type	Pump passage [mm]	Pump outlet	Power [kW]	Poles	Service sledge type key	Product number
SE sledge: B.SE1.50.2.2-3.2.50 DIN						
SE1	50	65	22	2	SE sledge: SE1.50.65.2.2.2.50 DIN	98827089
SE1	50	65	30	2	SE sledge: SE1.50.65.3.2.50 DIN	
SE1	50	80	22	2	SE sledge: SE1.50.80.2.2.2.50 DIN	
SE1	50	80	30	2	SE sledge: SE1.50.80.3.2.50 DIN	
SE sledge: B.SEV.65.2/SE1.80.4.50 DIN						
SEV	65	65	22	2	SE sledge: SEV.65.65.2.2.2.50 DIN	98902585
SEV	65	65	30	2	SE sledge: SEV.65.65.3.2.50 DIN	
SEV	65	80	22	2	SE sledge: SEV.65.80.2.2.2.50 DIN	
SEV	65	80	30	2	SE sledge: SEV.65.80.3.2.50 DIN	
SE1	80	80	15	4	SE sledge: SE1.80.80.1.5.4.50 DIN	
SE1	80	80	22	4	SE sledge: SE1.80.80.2.2.4.50 DIN	
SE1	80	100	15	4	SE sledge: SE1.80.100.1.5.4.50 DIN	
SE1	80	100	22	4	SE sledge: SE1.80.100.2.2.4.50 DIN	
SE sledge: B.SEV.80.80.4.50 DIN						
SEV	80	80	11	4	SE sledge: SEV.80.80.1.1.4.50 DIN	98902589
SEV	80	80	13	4	SE sledge: SEV.80.80.1.3.4.50 DIN	
SEV	80	80	15	4	SE sledge: SEV.80.80.1.5.4.50 DIN	
SEV	80	80	22	4	SE sledge: SEV.80.80.2.2.4.50 DIN	
SEV	80	100	11	4	SE sledge: SEV.80.100.1.1.4.50 DIN	
SEV	80	100	13	4	SE sledge: SEV.80.100.1.3.4.50 DIN	
SEV	80	100	15	4	SE sledge: SEV.80.100.1.5.4.50 DIN	
SEV	80	100	22	4	SE sledge: SEV.80.100.2.2.4.50 DIN	
SE sledge: C.SE1.50.4.2.50 DIN						
SE1	50	65	40	2	SE sledge: SE1.50.65.4.2.50 DIN	98827090
SE1	50	65	40	2	SE sledge: SE1.50.65.4.2.50 DIN	
SE sledge: C.SEV.65.4.2.50 DIN						
SEV	65	65	40	2	SE sledge: SEV.65.65.4.2.50 DIN	98902602
SEV	65	80	40	2	SE sledge: SEV.65.80.4.2.50 DIN	

Pump to be installed					Service sledge	
Pump/Impeller type	Pump passage [mm]	Pump outlet	Power [kW]	Poles	Service sledge type key	Product number
SE sledge: C.SEV.80.SE1.80.50 DIN						
SEV	80	80	40	4	SE sledge: SEV.80.80.4.4.50 DIN	98902603
SEV	80	80	40	2	SE sledge: SEV.80.80.4.2.50 DIN	
SEV	80	80	60	2	SE sledge: SEV.80.80.6.2.50 DIN	
SEV	80	80	75	2	SE sledge: SEV.80.80.7.5.2.50 DIN	
SEV	80	100	40	4	SE sledge: SEV.80.100.4.4.50 DIN	
SEV	80	100	40	2	SE sledge: SEV.80.100.4.2.50 DIN	
SEV	80	100	60	2	SE sledge: SEV.80.100.6.2.50 DIN	
SEV	80	100	75	2	SE sledge: SEV.80.100.7.5.2.50 DIN	
SE1	80	80	30	4	SE sledge: SE1.80.80.3.4.50 DIN	
SE1	80	80	40	4	SE sledge: SE1.80.80.4.4.50 DIN	
SE1	80	80	55	4	SE sledge: SE1.80.80.5.5.4.50 DIN	
SE1	80	100	30	4	SE sledge: SE1.80.100.3.4.50 DIN	
SE1	80	100	40	4	SE sledge: SE1.80.100.4.4.50 DIN	
SE1	80	100	55	4	SE sledge: SE1.80.100.5.5.4.50 DIN	
SE sledge: C.SEV.100.100.50 DIN						
SEV	100	100	40	4	SE sledge: SEV.100.100.4.4.50 DIN	98902606
SEV	100	100	40	4	SE sledge: SEV.100.100.4.4.50 DIN	
SEV	100	100	60	4	SE sledge: SEV.100.100.6.4.50 DIN	
SE sledge: C.SE1.100.100.4.50 DIN						
SE1	100	100	40	4	SE sledge: SE1.100.100.4.4.50 DIN	98902607
SE1	100	100	55	4	SE sledge: SE1.100.100.5.5.4.50 DIN	
SE1	100	150	40	4	SE sledge: SE1.100.150.4.4.50 DIN	
SE1	100	150	55	4	SE sledge: SE1.100.150.5.5.4.50 DIN	
SE sledge: D.SEV.80.SE1.80.50 DIN						
SEV	80	80	92	2	SE sledge: SEV.80.80.9.2.2.50 DIN	98827091
SEV	80	80	110	2	SE sledge: SEV.80.80.11.2.50 DIN	
SEV	80	100	110	2	SE sledge: SEV.80.100.11.2.50 DIN	
SEV	80	100	110	2	SE sledge: SEV.80.100.11.2.50 DIN	
SE1	80	80	75	4	SE sledge: SE1.80.80.7.5.4.50 DIN	
SE1	80	100	75	4	SE sledge: SE1.80.100.7.5.4.50 DIN	
SE sledge: D.SEV.100.75.4.50 DIN						
SEV	100	100	75	4	SE sledge: SEV.100.100.7.5.4.50 DIN	98902608
SE sledge: D.SE1.100.75.4.50 DIN						
SE1	100	100	75	4	SE sledge: SE1.100.100.7.5.4.50 DIN	98902609
SE1	100	150	75	4	SE sledge: SE1.100.150.7.5.4.50 DIN	

5.3 Horizontal bracket installation



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Pump to be installed					Horizontal bracket installation	
Pump/Impeller type	Pump passage [mm]	Pump outlet	Power [KW]	Poles	Frequency [Hz]	Product number
Horizontal bracket installation B.65.50 DIN						
SE1	50	65	22	2	50	98902621
SE1	50	65	30	2	50	
SE1	50	80	22	2	50	
SE1	50	80	30	2	50	
Horizontal bracket installation B.80/100.50 DIN						
SEV	65	65	22	2	50	98902622
SEV	65	65	30	2	50	
SEV	65	80	22	2	50	
SEV	65	80	30	2	50	
SE1	80	80	15	4	50	
SE1	80	80	22	4	50	
SE1	80	100	15	4	50	
SE1	80	100	22	4	50	
SEV	80	80	11	4	50	
SEV	80	80	13	4	50	
SEV	80	80	15	4	50	
SEV	80	80	22	4	50	
SEV	80	100	11	4	50	
SEV	80	100	13	4	50	
SEV	80	100	15	4	50	
SEV	80	100	22	4	50	
Horizontal bracket installation C.65.50 DIN						
SE1	50	65	40	2	50	98902623
SE1	50	65	40	2	50	

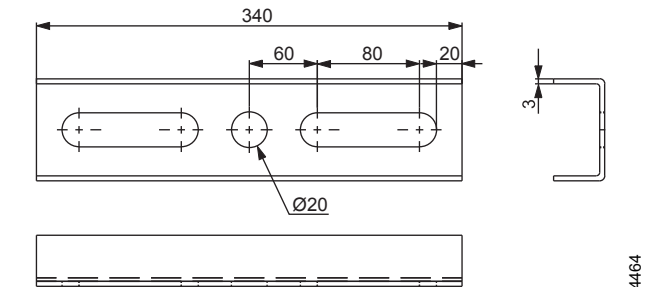
Pump to be installed					Horizontal bracket installation	
Pump/Impeller type	Pump passage [mm]	Pump outlet	Power [KW]	Poles	Frequency [Hz]	Product number
Horizontal bracket installation C.80/100.50 DIN						
SEV	65	65	40	2	50	98902625
SEV	65	80	40	2	50	
SEV	80	80	40	4	50	
SEV	80	80	40	2	50	
SEV	80	80	60	2	50	
SEV	80	80	75	2	50	
SEV	80	100	40	4	50	
SEV	80	100	40	2	50	
SEV	80	100	60	2	50	
SEV	80	100	75	2	50	
SE1	80	80	30	4	50	
SE1	80	80	40	4	50	
SE1	80	80	55	4	50	
SE1	80	100	30	4	50	
SE1	80	100	40	4	50	
SE1	80	100	55	4	50	
SEV	100	100	40	4	50	
SEV	100	100	40	4	50	
SEV	100	100	60	4	50	
Horizontal bracket installation C.150.50 DIN						
SE1	100	100	40	4	50	98902626
SE1	100	100	55	4	50	
SE1	100	150	40	4	50	
SE1	100	150	55	4	50	
Horizontal bracket installation C.80/100.50 DIN						
SEV	80	80	92	2	50	98902628
SEV	80	80	110	2	50	
SEV	80	100	110	2	50	
SEV	80	100	110	2	50	
SE1	80	80	75	4	50	
SE1	80	100	75	4	50	
SEV	100	100	75	4	50	
Horizontal bracket installation D.150.50 DIN						
SE1	100	100	75	4	50	98902630
SE1	100	150	75	4	50	

5.4 Lifting tools

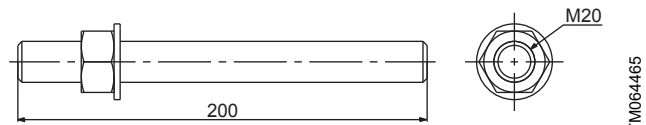


Pos.	Designation	Pump type	Part number
G	Crane for service sledge	All	98902631

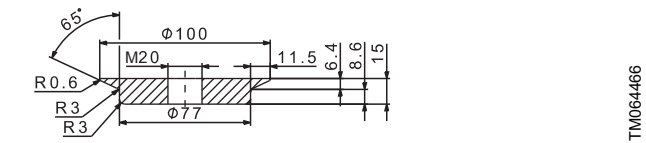
5.5 Seal ring mounting tool



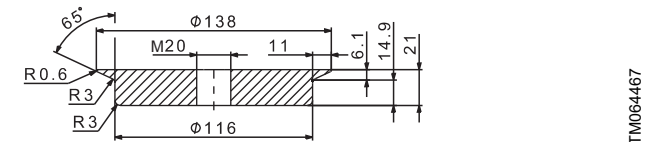
Puller beam



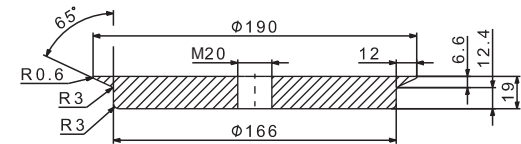
Threaded rod



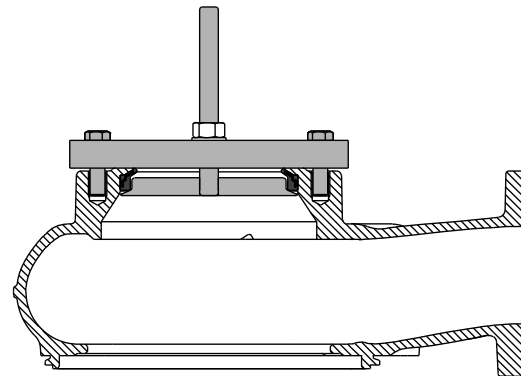
Puller tool, DN 50



Puller tool, DN 80



Puller tool, DN 100



Mounting tool for seal ring

TM064468

TM064479

6. Torques and lubricants

This section indicates 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. Electrical connection

WARNING Electric shock

Death or serious personal injury



- Before starting any work on the product, make sure that the fuses have been removed or the main switch has been switched off and locked in position 0. Make sure that the power supply cannot be switched on unintentionally.

WARNING Electric shock

Death or serious personal injury



- Make sure the earth and phase conductors are not mixed up, follow the description in the wiring diagram.
- Make sure the earth conductor is connected first.

Connect the pump to an external main switch which ensures all-pole disconnection with a contact separation according to EN 60204-1.

Make sure that the main switch is locked in position 0. Type and requirements as specified in EN 60204-1.



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

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



In hazardous locations and in case of household applications, connect the pumps to a control box with a motor protection relay with IEC trip class 10.

Check the following:

- Do not install Grundfos control boxes, pump controllers, Ex barriers, or leave the free end of the power cable in potentially explosive environments.
- The classification of the installation site must be defined by the owner of the site.
- On explosion-proof pumps, make sure that an external earth conductor is connected to the external earth terminal on the pump by 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 4 mm², such as H07 V2-K (PVT 90 °) yellow and green.
- Make sure that the earth connection is protected from corrosion.
- Make sure that all protective equipment has been 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 or DC, DCD pump controller by the intrinsically safe barrier to ensure a safe circuit.



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



A damaged power cable must be replaced by the manufacturer, its service agent or similarly qualified persons.

The supply voltage and frequency are marked on the nameplate. The voltage tolerance must be within - 10 % / + 6 % 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 10 m power cable and a free cable end, except for pumps for Australia, which have 15 m cable.

Pumps without sensor must be connected to one of the following controllers:

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

Pumps with sensor must be connected to a Grundfos IO 113 and one of the following controllers:

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



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

WIO sensor

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

For safe installation and operation of pumps equipped with a WIO sensor, install an RC filter between the power supply and the pump.



If an RC filter should be installed to avoid any kind of transients in the installation, install it between the power supply 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 power cable:
 - Where power and signal cables are running in parallel close to each other, the risk of transients causing interference between power and signal cables increases with the length of the cables.
- Switchboard layout:
 - Power and signal cables must be 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. Be aware that soft starters and variable-speed drives have other EMC-related issues that must be taken into consideration.

For further information, see the installation and operating instructions for the selected control box or pump controller.

7.1 Pump controllers

The pumps can be controlled by the Grundfos LC 231, LC 241, DC and DCD controllers.

Pumps with a sensor are supplied with an IO 113, which can receive signals from the following transmitters:

- water-in-oil (WIO) sensor in the pump
- moisture sensor in the motor
- temperature sensor in the stator windings
- winding resistance sensor in the motor.

For further information, see installation and operating instructions for the specific sensor.



LC 231 and LC 241 level controllers are for industrial use.

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 customisation 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 the 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 analogue level transmitter can be used and all levels can be customised. Level switches can be used with 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 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 DC, DCD

The Dedicated Controls (DC) system consists of a CU 362 control unit connected to one or two IO 351 modules. An optional IO 113 sensor can be connected to each pump.

CU 362 must be incorporated in all installations. The units in the system can be combined in different ways based on user requirements.

DC controls the pumps by power contactors and IO 351 modules. Power contactors, cable and other high-voltage components must be positioned as far as possible from the control system and the signal cables.

DC is operated through a user-friendly control panel on the CU 362 or a PC. Wireless remote control is available. DC can be integrated into an existing SCADA system.

7.1.3 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 cover.

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

As standard, IO 113 is capable for the following:

- protect the pump against overheating
- monitor the status of:
 - motor winding temperature
 - leakage (WIO or WIA)
 - moisture in the pump.
- measure the stator insulation resistance
- stop the pump in case of alarm
- remotely monitor the pump by RS-485 communication (Modbus or GENIbus)
- control the pump by a frequency converter.

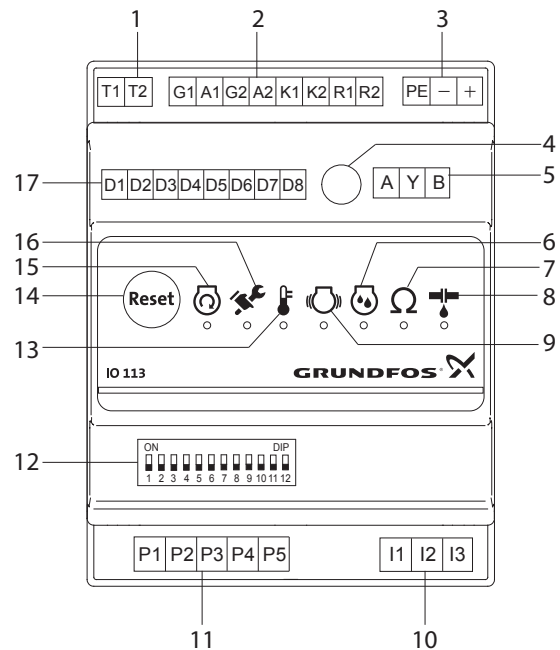
Note: not all pumps with sensors have IO 113 as standard. The IO 113 module needs to be ordered separately, as an accessory.



Do not use IO 113 for other purposes than those mentioned in the installation and operating instructions for IO 113.



Do not connect pumps with sensors to LC 231 as it may cause damage to the level controller.



IO 113

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 or WIA)
9	Indicator light for vibrations in the pump

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Pos.	Description
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

General installation data

Supply voltage	24 VAC $\pm$ 10 %
	50 or 60 Hz
	24 VDC $\pm$ 10 %
Supply current	Min. 2.4 A; max. 8 A
Power consumption	Max. 5 W
Ambient temperature	-25 to +65 °C
Enclosure class	IP20

7.2 Switches and sensors

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

7.2.1 Thermal switch, PT1000 and thermistor (PTC)

Pumps without sensor

Pumps without sensor have a thermal switch or a PTC thermistor. Through the pump controller safety circuit, the thermal switch stops the pump by breaking the circuit in case of overtemperature (approximately 150 °C). The thermal switch recloses the circuit after cooling. For pumps equipped with a PTC thermistor, connect the thermistor to either the PTC relay or the IO module to break the circuit at 150 °C.

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

Pumps with sensor

Pumps with 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 150 °C). The thermal switch or the thermistor recloses the circuit after cooling.

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

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

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

Non-explosion-proof pumps

When closing the circuit after cooling, the thermal protection restarts the pump automatically through the controller. Pumps with 4 kW and larger motors sold in Australia or New Zealand are fitted with a PTC thermistor.

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 sensor, this can be done by removing the short circuit between terminals R1 and R2 in the IO 113.

See electrical data in the IO 113 installation and operating instructions.



Do not install the separate motor-protective circuit breaker or control box in potentially explosive environments.

7.2.2 WIO sensor

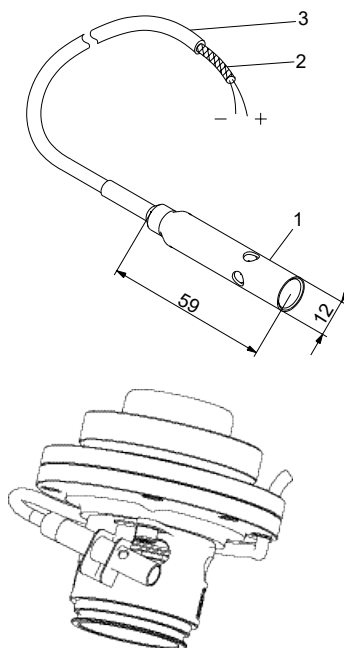
The WIO sensor measures the water content in the oil and converts the value into an analog current signal. The two sensor conductors are for power supply as well as for carrying the signal to the IO 113. The sensor measures the water content from 0 to 20 %. It also sends a signal if the water content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



The IO 113 module must be configured to stop explosion-proof pumps in case the WIO sensor sends an alarm signal.

The pump must not restart automatically.

The sensor is fitted in a stainless steel tube for mechanical protection.



WIO sensor

Fitting the WIO sensor

Fit the sensor next to one of the shaft seal openings. See fig. Figure 1. The sensor must be tilted into the direction of rotation to ensure that oil is led into the sensor. Make sure that the sensor is submerged in the oil.

Technical data

Input voltage	12-24 VDC
Output current	3.5 - 22 mA
Power input	0.6 W
Ambient temperature	0 to 70 °C

7.2.3 Moisture switch

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 IO 113.

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

The moisture switch is connected in series with the thermal switch and connected to the control cable, and it must be connected to the safety circuit of the separate pump controller.



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

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7.3 Frequency converter operation

In principle, all three-phase motors can be connected to a frequency converter.

However, frequency converter operation often exposes the motor insulation system to a heavier load and causes the motor to be more noisy due to eddy currents caused by voltage peaks.

In addition, large motors operated with a frequency converter are loaded by bearing currents.

For frequency converter operation, observe the following:

- The thermal protection of the motor must be connected.
- 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 .
- Minimum switching frequency is 2.5 kHz. Variable switching frequency is accepted.
- If the pump is Ex-approved, 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 or standards must be complied with.

Before installing a frequency converter, calculate the lowest permissible frequency in the installation to avoid zero flow.

- Do not reduce the motor speed to less than 30 %.
- Keep the flow rate above 1 m/sec.
- 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 as this may cause motor overload.
- Keep the power cable as short as possible. The peak voltage increases with the length of the power cable.
- Use input and output filters on the frequency converter.
- Use a screened power cable, if there is a risk that electrical noise may disturb other electrical equipment.
- Set frequency converter for constant-torque operation. Pulse width modulation should be used.

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

- The locked rotor torque can be lower depending on the type of the frequency converter.
- The noise level may increase. See the installation and operating instructions for the selected frequency converter.

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



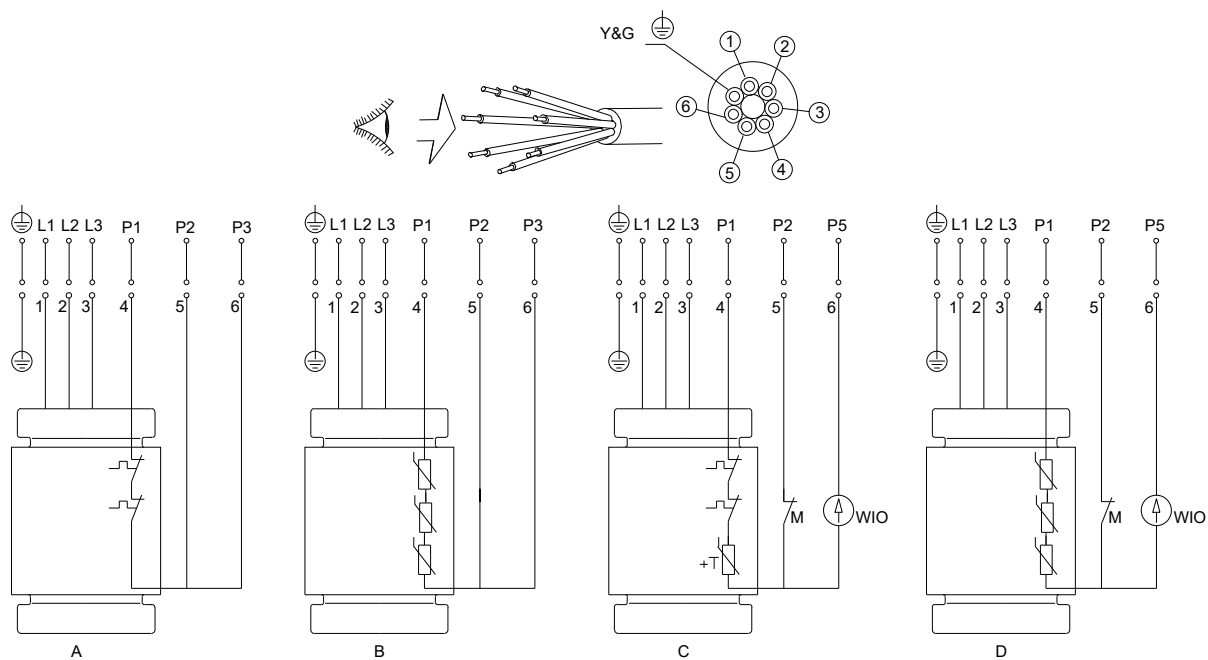
Frequency converter use may reduce the lifespan of the bearings and the shaft seal, depending on operating mode and other circumstances.

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

7.4 Wiring diagrams

7-core cable

The figure below shows the wiring diagrams for SE1, SEV pumps with 7-core cable in three versions, one without sensors and two with WIO sensor and moisture switch.



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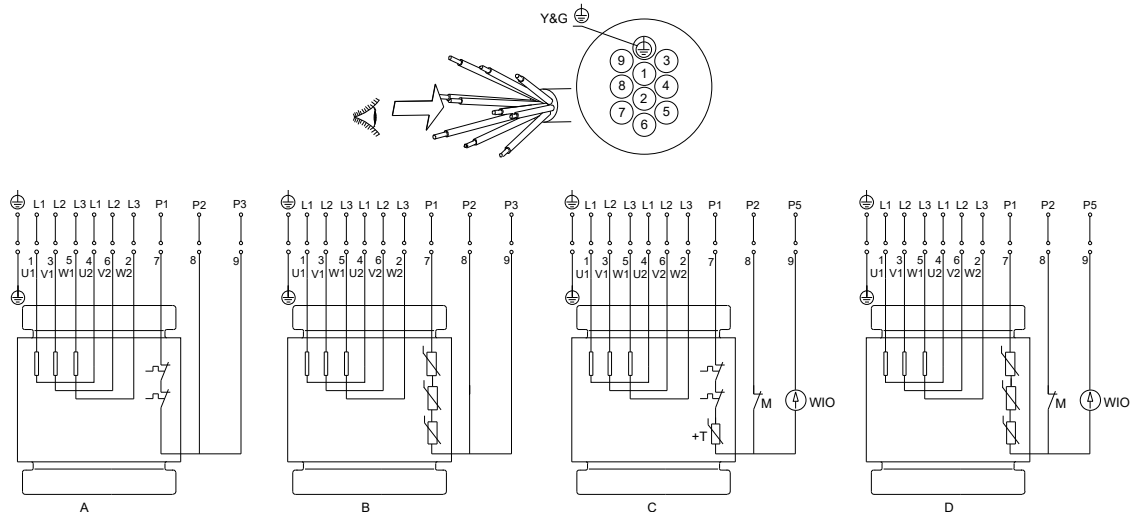
Wiring diagram, 7-core cable, DOL

Pos.	Description
Y&G	Yellow and green
A	Standard version with thermal switches
B	Standard version with PTC thermistors ³⁾
C	Sensor version with thermal switches, Pt1000, moisture switch and WIO sensor
D	Sensor version with PTC thermistors, moisture switch and WIO sensor ³⁾

³⁾ Pumps with 4 kW and larger motors sold in Australia or New Zealand are fitted with a PTC thermistor.

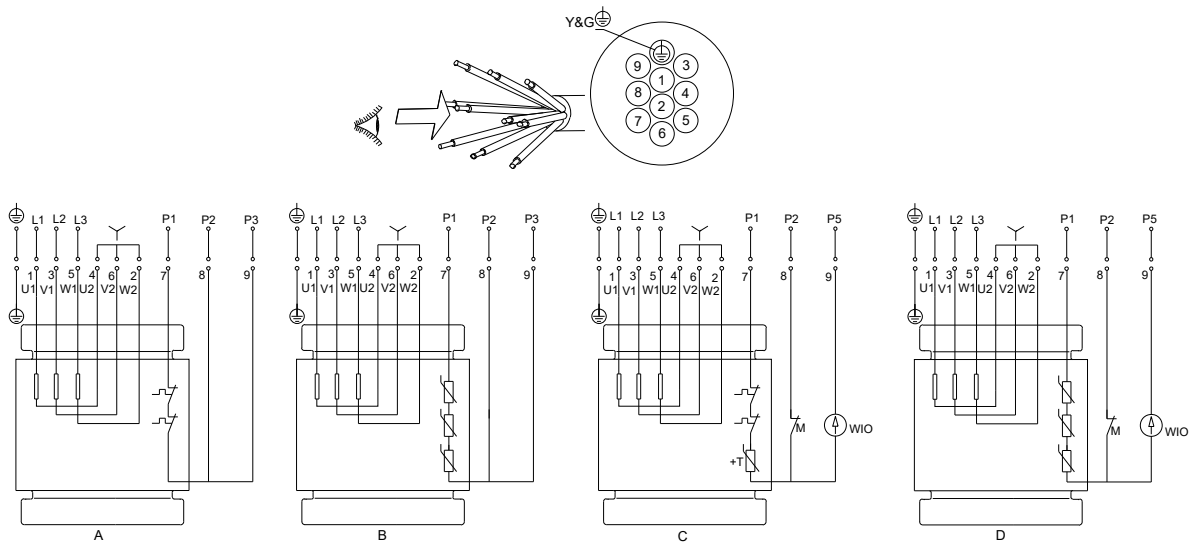
10-core cable

The figures below show the wiring diagrams for SE1, SEV pumps with 10-core cable in three versions, one without sensors and two with WIO sensor and moisture switch.



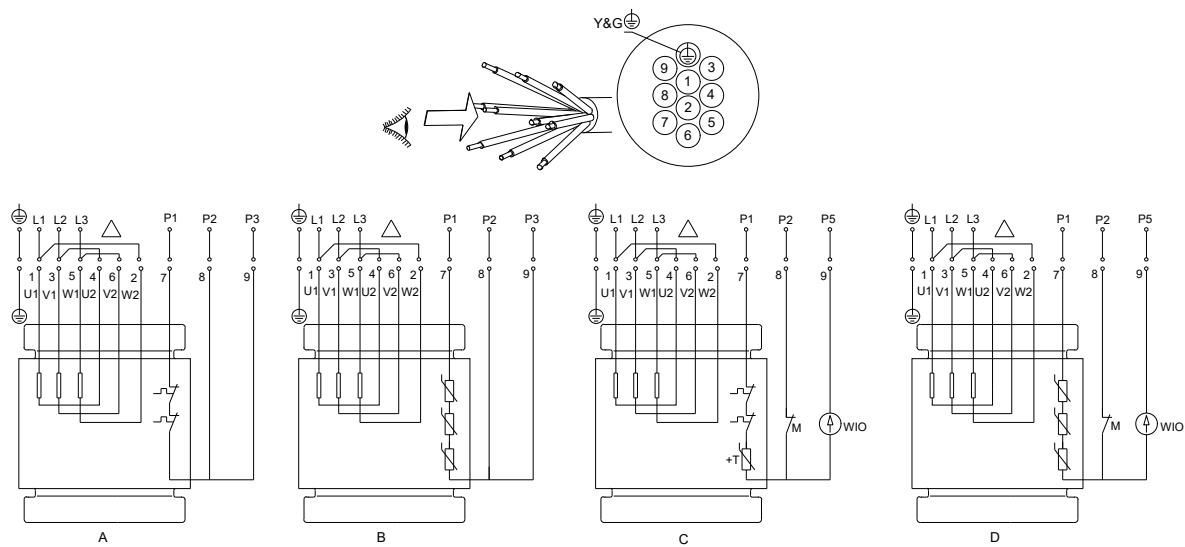
Wiring diagram, 10-core cable, star/delta (Y/D)

Pos.	Description
Y&G	Yellow and green
A	Standard version with thermal switches
B	Standard version with PTC thermistors ³⁾
C	Sensor version with thermal switches, Pt1000, moisture switch and WIO sensor
D	Sensor version with PTC thermistors, moisture switch and WIO sensor ³⁾



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

Pos.	Description
Y&G	Yellow and green
A	Standard version with thermal switches
B	Standard version with PTC thermistors ³⁾
C	Sensor version with thermal switch, Pt1000, moisture switch and WIO sensor
D	Sensor version with PTC thermistors, moisture switch and WIO sensor ³⁾



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

Pos.	Description
Y&G	Yellow and green
A	Standard version with thermal switches
B	Standard version with PTC thermistors ³⁾
C	Sensor version with thermal switch, Pt1000, moisture switch and WIO sensor
D	Sensor version with PTC thermistors, moisture switch and WIO sensor ³⁾

8. Storing the product

A product that is not indicated to be protected against freezing shall not be left outside in freezing weather conditions.

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



If the product is stored for more than one year, turn the impeller by hand at least once a month.

Leave the polyurethane-embedded plug mounted in the pump to prevent moisture from penetrating into the motor.

If the pump has been in use, the oil needs to be changed before storage.

After a long period of storage, the pump must be inspected before it is put into operation. Make sure that the impeller can rotate freely. Pay attention to the condition of the shaft seal, O-rings, oil and the cable entry.

9. Servicing the product



WARNING **Crushing hazard**

Death or serious personal injury

- Do not stand near or under the pump when it is lifted.



WARNING **Electric shock**

Death or serious personal injury

- Make sure the earth and phase conductors are not mixed up, follow the description in the wiring diagram.
- Make sure the earth conductor is connected first.



WARNING **Electric shock**

Death or serious personal injury

- Before starting any work on the product, make sure that the fuses have been removed or the main switch has been switched off and locked in position 0. Make sure that the power supply cannot be switched on unintentionally.



WARNING **Crushing of hands**

Death or serious personal injury

- Make sure that all rotating parts have stopped moving.



CAUTION **Sharp element**

Minor or moderate personal injury

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



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.



Maintenance work on explosion-proof pumps must be carried out by Grundfos or an authorised service workshop.

However, this does not apply to the hydraulic components, such as pump housing and impeller.



Observe all regulations applying to pumps installed in potentially explosive environments.

Make sure that no work is carried out in potentially explosive environment.

Before carrying out maintenance and service, flush the pump thoroughly with clean water and rinse the pump parts after dismantling.

9.1 Maintenance schedule



Explosion-proof pumps must be checked by an authorised 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 pump nameplate.
- **Oil level and oil condition**
- **Cable entry** Make sure that the cable entry is watertight and the cable is not sharply bent or pinched.



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

- **Pump parts** Check the impeller, the pump housing, seal and wear ring for possible wear. Replace defective parts.
- **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 authorised service workshop.



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.



Do not reuse used rubber parts.

- **Sensors**

9.2 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.

9.3 Checking and changing the oil



Check 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.

- Change the oil after 3000 operating hours or once a year.
- Change the oil if the shaft seal has been replaced.

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



Use Shell Ondina X420 oil or equivalent type.

	Power [kW]	Oil quantity [l]
2-pole	2.2	0.30
	3.0	
	4.0	
	6.0	0.55
	7.5	
	9.2	
4-pole	11.0	0.70
	1.0	
	1.3	0.30
	1.5	
	2.2	
	3.0	0.55
	4.0	
	5.5	
	7.5	0.70

Draining of oil

Proceed as follows:

1. Place the pump on a plain surface with one oil screw pointing downwards.
2. Place a transparent container (approximately 1 litre) under the oil screw.

WARNING

Pressurised system

Death or serious personal injury



- The oil chamber may be under pressure. Loosen the screws carefully and do not remove them until the pressure has been fully relieved.

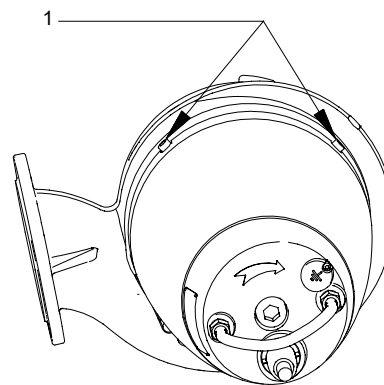
3. Loosen and remove the lower oil screw.
4. Remove the upper oil screw and allow the oil to drain into the container.
 - Check that the quantity of oil corresponds to the quantity stated in table above. If the quantity is smaller than stated, the shaft seal is defective and must be replaced.
 - Check the water content in the oil by letting the oil and water separate. If the quantity of water exceeds 20 %, the shaft seal is defective and must be replaced. Not replacing the shaft seal may cause damage to the motor.
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.



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.

9.4 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.

9.5 Checking the sensors



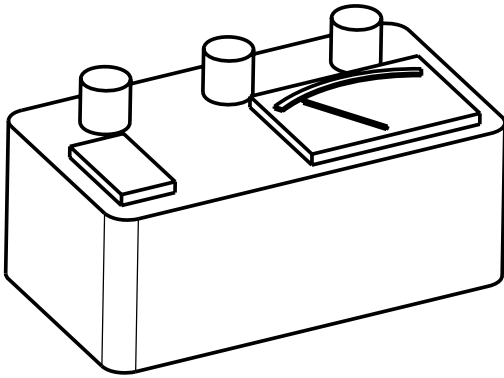
Sensor check measurements must be made by Grundfos or persons authorised by Grundfos.

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.

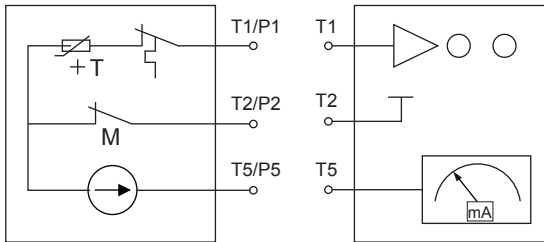
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9.5.1 Checking with Test Box



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

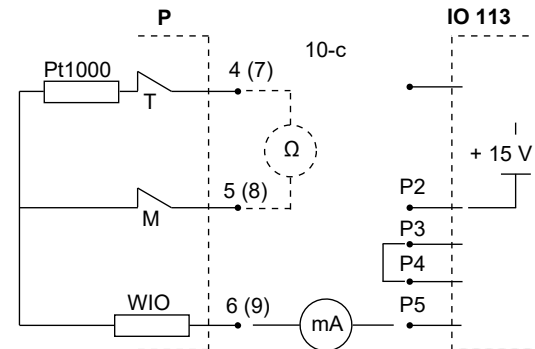
9.5.2 Checking with a multimeter



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

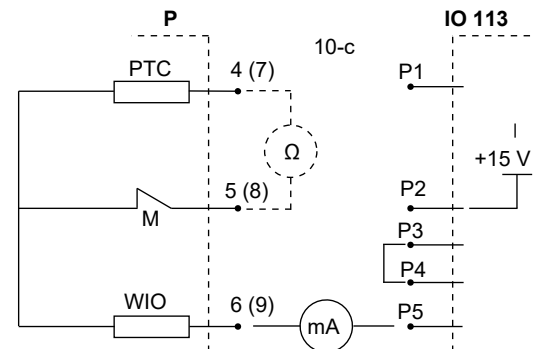
If the measured value is Ω , disconnect the conductors from IO 113.

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

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

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

WIO sensor

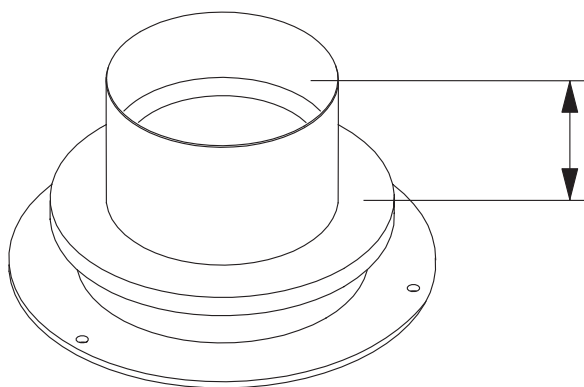
4 (7)	5 (8)	6 (9)	P5 IO 113	Value	Response
-	-	•	•	4 mA (new oil)	OK
-	-	•	•	3.5 mA (air)	Alarm
-	-	•	•	22 mA (water)	Warning
-	-	•	•	0 mA	Warning

Moisture switch

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

10. Assembly**10.1 Fitting the stator**

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

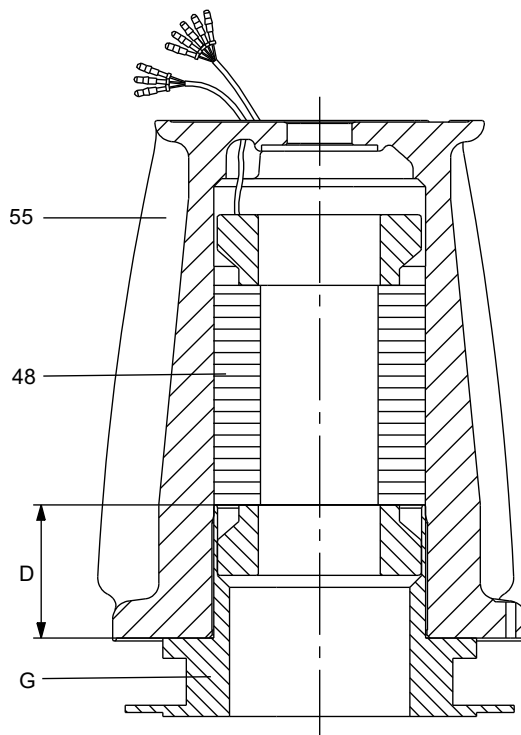


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Stator guide

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

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

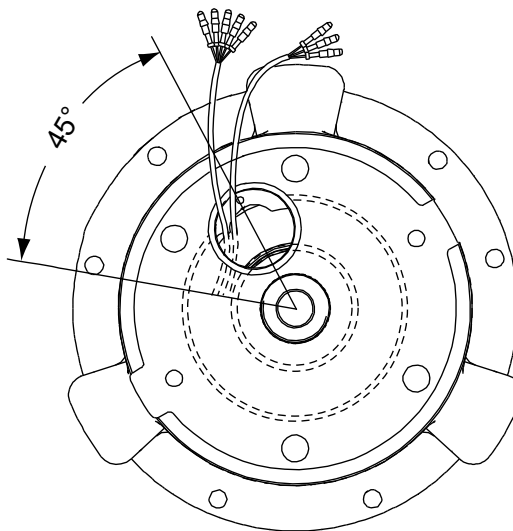


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Installing the stator housing

Pos.	Description
D	Installation dimensions
G	Stator guide

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



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Position of stator in relation to the stator housing

- 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).
- Check the installation dimensions above.
- Let the stator housing (55) cool down.
- Fit the protective conductor (green and yellow) with the screw (173) and washer (173a).
- Fit the pin housing (176) and the plug protector (177).

10.2 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).

10.3 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.

10.4 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.

10.5 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.

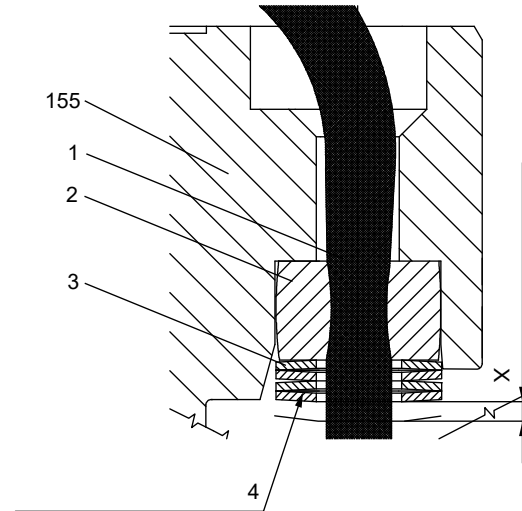
10.6 Fitting the WIO sensor



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.

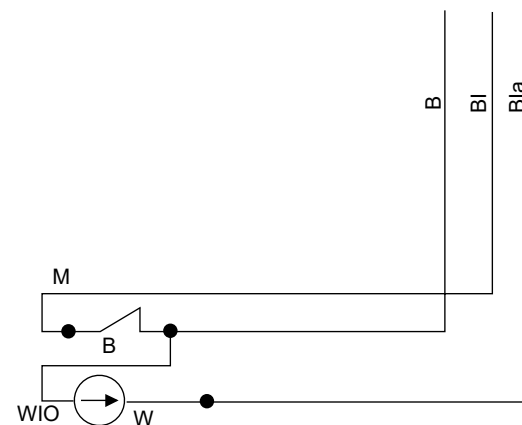


Upon removal of disc springs and the rubber bush, they must always be replaced.



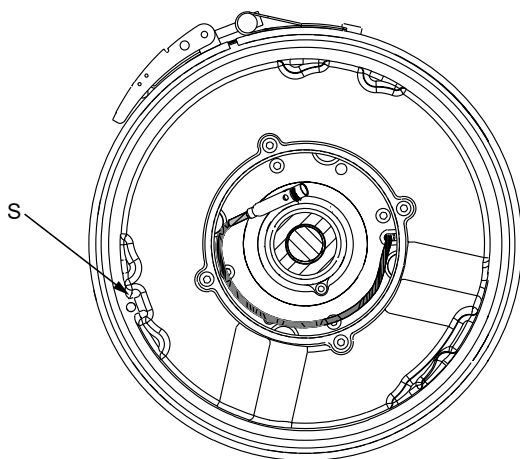
Position of disc springs and the rubber bush

Pos.	Description
1	Sensor cable
2	Rubber bush
3	Disc spring
4	Disc spring stack
155	Intermediate flange
X	Minimum compression is 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

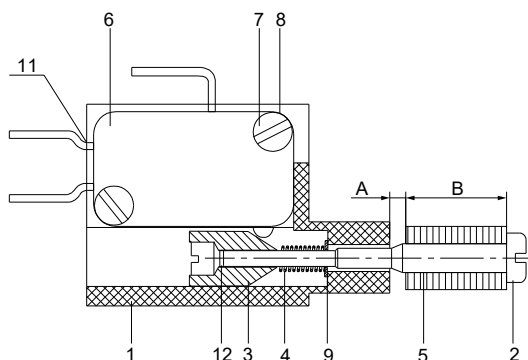
Pos.	Description
S	Rotation stop

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.

10.7 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).

10.7.1 Adjusting clearance of the moisture switch



Moisture switch parts

Pos.	Description
1	Plastic frame
2	Shaft
3	Adjustment
4	Spring
5	Expanding washer

Pos.	Description
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.

10.8 Fitting the shaft seal

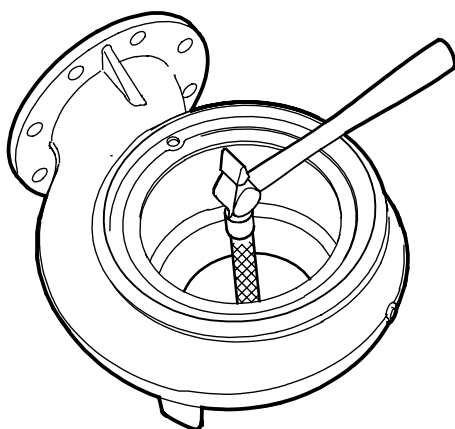
1. Fit and lubricate the O-rings (153b)
2. Lubricate and fit the O-rings (106, 2 pcs) to the shaft seal (105).
3. Carefully push the shaft seal (105) onto the shaft (172).
4. Lubricate the O-ring (107), and fit it into the cover for oil chamber (58).
5. Fit the cover for oil chamber (58).
6. Fit and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

10.9 Fitting the seal ring and wear ring

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).



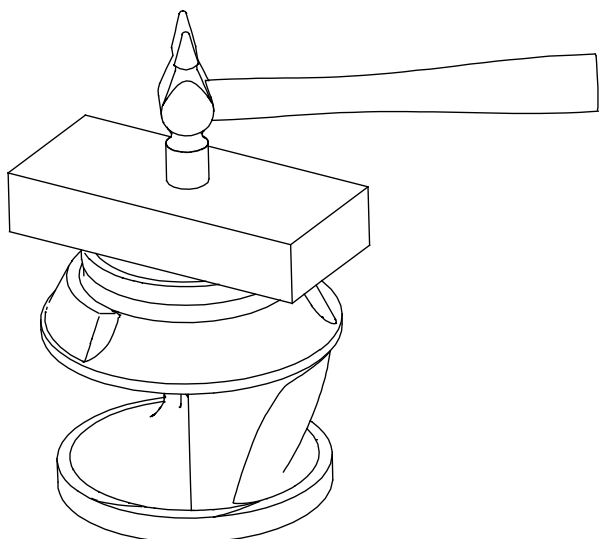
Make sure the seal ring is properly fit, otherwise use the seal ring mounting tool.



TM028421

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.

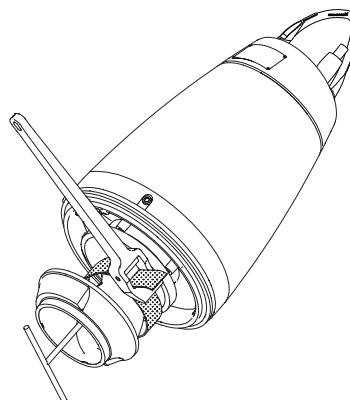


Fitting the wear ring

TM028423

10.10 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.



TM028407

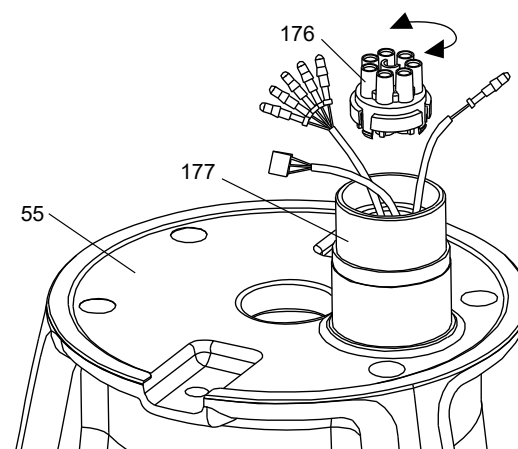
Removing the impeller

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.

10.11 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.

10.12 Fitting the pin housing



TM068234

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).

4. Fit the new pin housing (176) in the plug protector (177).
5. Connect the earthing screw (173) and washer (173a).

10.13 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.

10.14 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).

11. Contaminated pumps

WARNING

Infection caused by wastewater

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.

Before returning the product for service, contact Grundfos with details about the pumped liquid. Otherwise, Grundfos can deny to service the product.

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

Clean the product in the best possible way before you return it.

Costs of returning the product are to be paid by the customer.

12. Disassembly

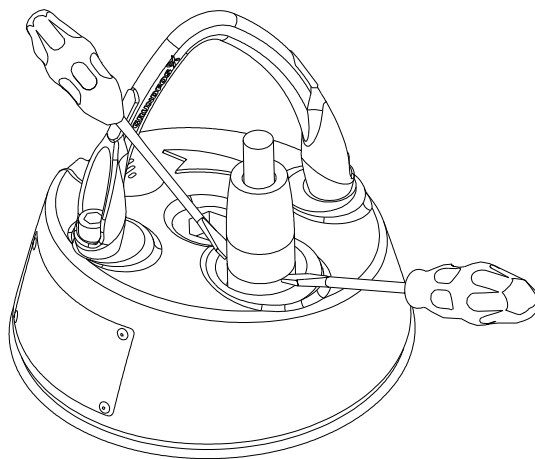
12.1 Removing the cable

1. 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.

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



TM069213

Loosening the cable plug

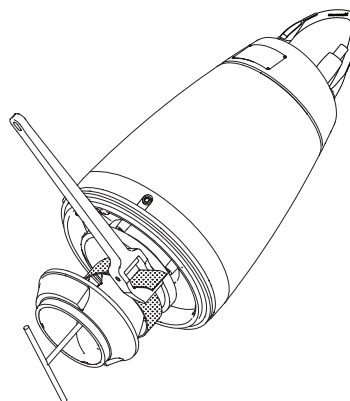
3. Remove the cable plug (181). Be careful not to damage the pins inside the cable plug and in the pin housing.

12.2 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).

12.3 Removing the impeller

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



TM028407

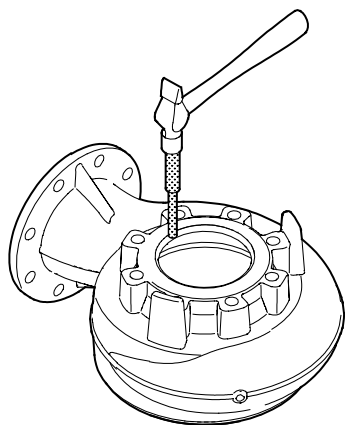
Removing the impeller

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

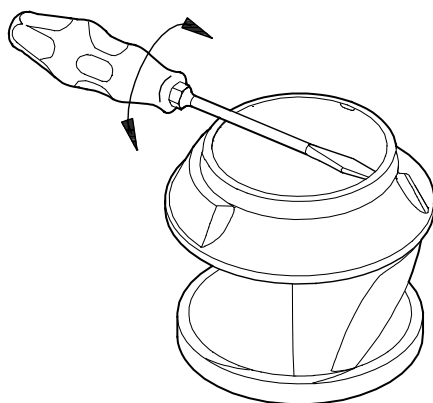
12.4 Removing the seal ring and wear ring

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

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



Removing the seal ring



Removing the wear ring

12.5 Removing the WIO sensor



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

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

12.6 Removing the moisture switch

- Remove the sensor protector (plastic cover).
- Remove the mounting screw and lock washer from the mounting bracket.
- Pull out the sensor from the stator housing (55).
- Disconnect the spade connectors from the switch.
- Remove the screw.
- Remove the switch from the mounting bracket.

12.7 Removing the shaft seal

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

12.8 Removing the rotor

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



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

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

12.9 Removing the bearings

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

12.10 Removing the motor top

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



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

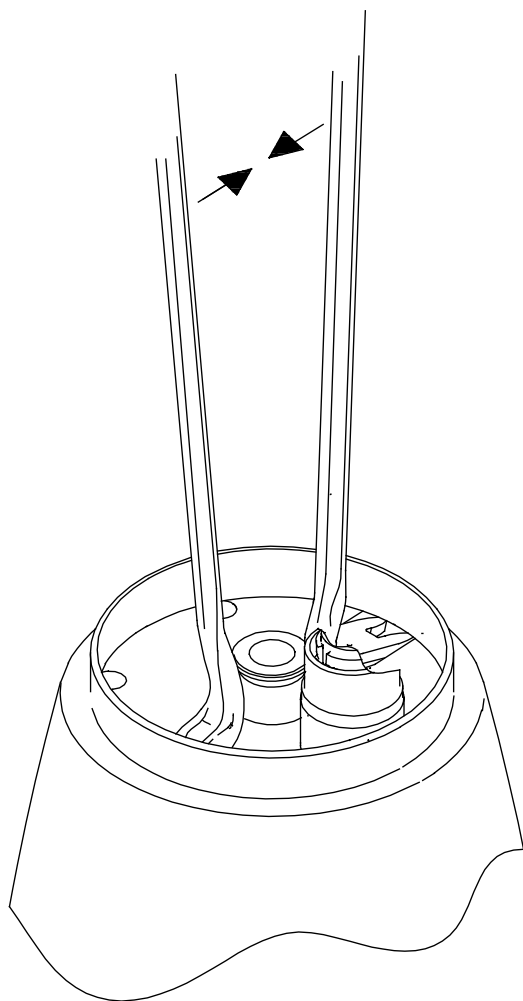
- Remove the screw (183) and washer (183a).
- Remove the motor top (151) by lifting the pump slowly by the lifting bracket (190) using a crane.
- Remove the O-ring (37b).

12.11 Removing the pin housing

- Remove the earthing screw (173) including the washer (173a).
- Disconnect the wire pins from the pin housing (176).
- Remove the plug protector (177), including the pin housing (176).
- Remove the pin housing (176) by pressing it up with the pin pusher below the pin housing.

12.12 Removing the sleeve

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



TM031673

Removing the sleeve

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

12.13 Removing the stator housing

1. Remove the screws (184) and washers (184a).
2. Fit the motor top (151) with screw (183).
3. Turn the pump in horizontal position and support with wooden blocks or similar support.
4. Fit one of the screws (184) into the screw hole to loosen the intermediate flange (155).
5. In case of sensor version: Pull the WIO sensor out of the stator housing.
6. 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.

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

12.14 Removing the stator

1. Remove the pin housing (176), using the pin pusher (B).
2. Remove the plug protector (177), using the multiplug pliers (C).
3. Remove the screw (173) and the washer (173a).
4. Remove the upper bearing cover (61) from the stator housing (55).
5. Block up the stator housing (55) so that it stands on the flange at a height where the stator can come out underneath.
6. 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.

13. Start-up



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.

13.1 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.

13.2 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.
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.

13.3 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.
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.

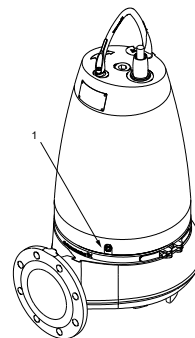


Check that there is positive inlet pressure before starting up the pump.

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

14. Fault finding

For further information, see the installation and operating instructions for SE1, SEV 1.1 - 11 kW.

Installation and Operating Instructions



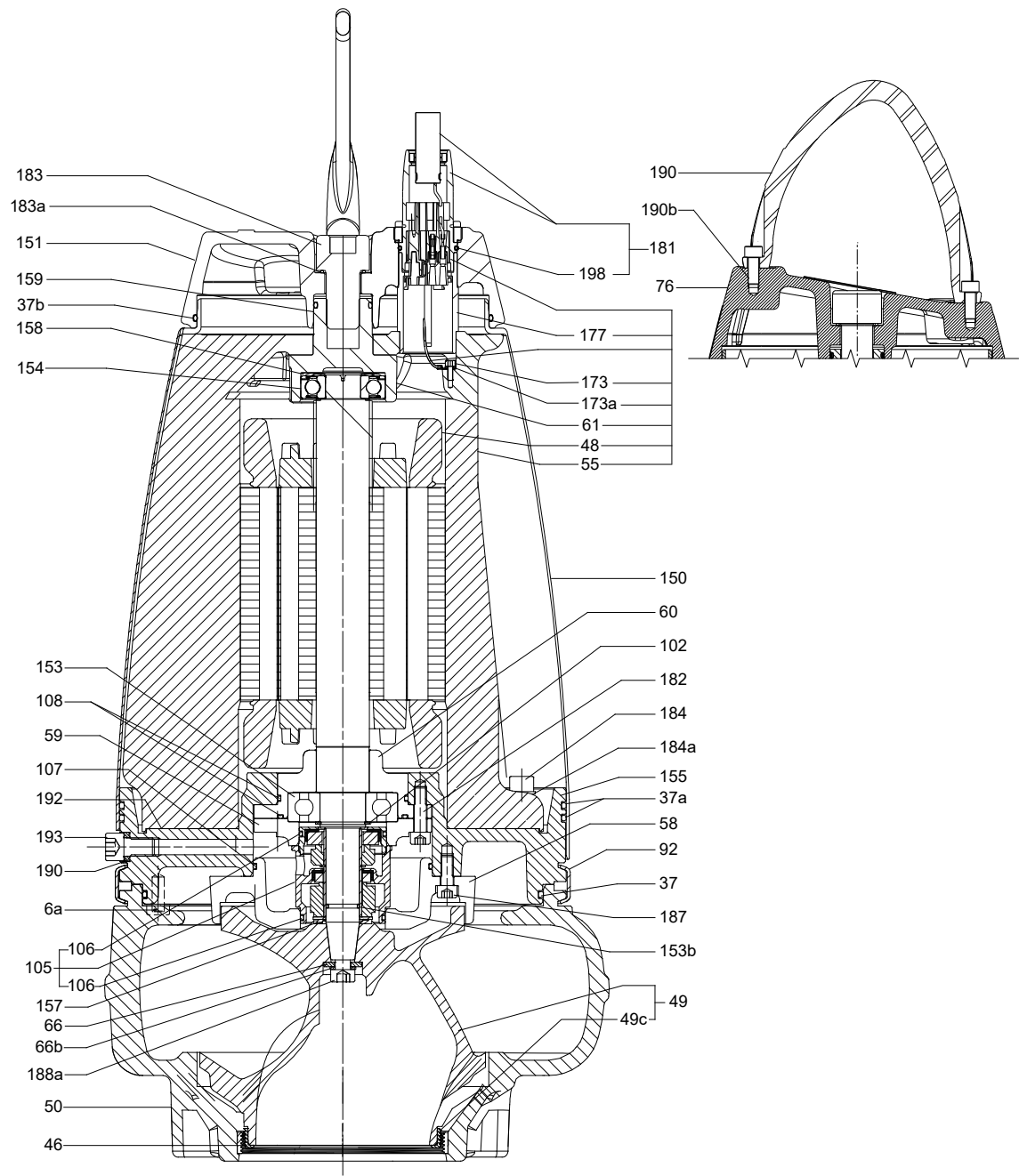
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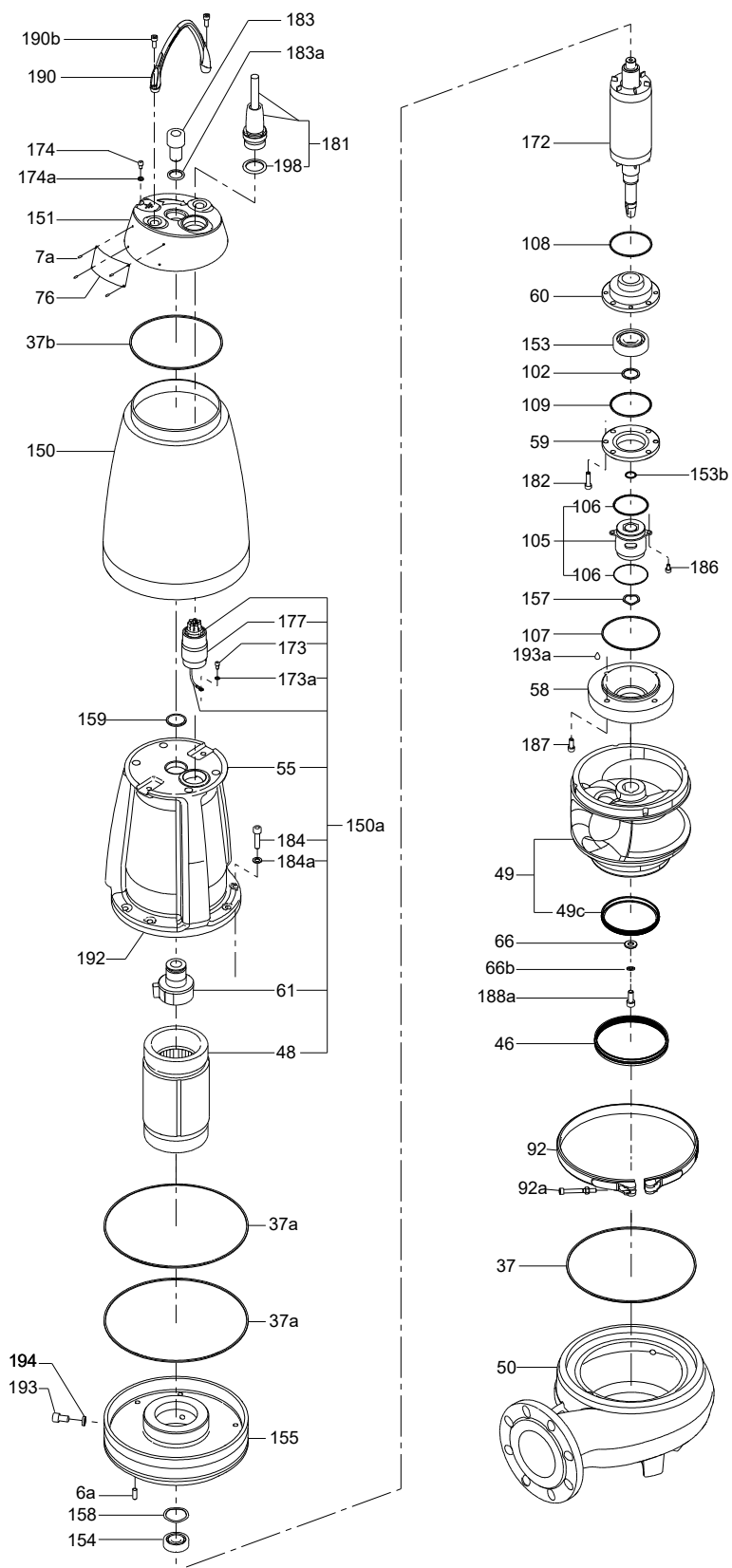
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15. Drawings

15.1 SE1

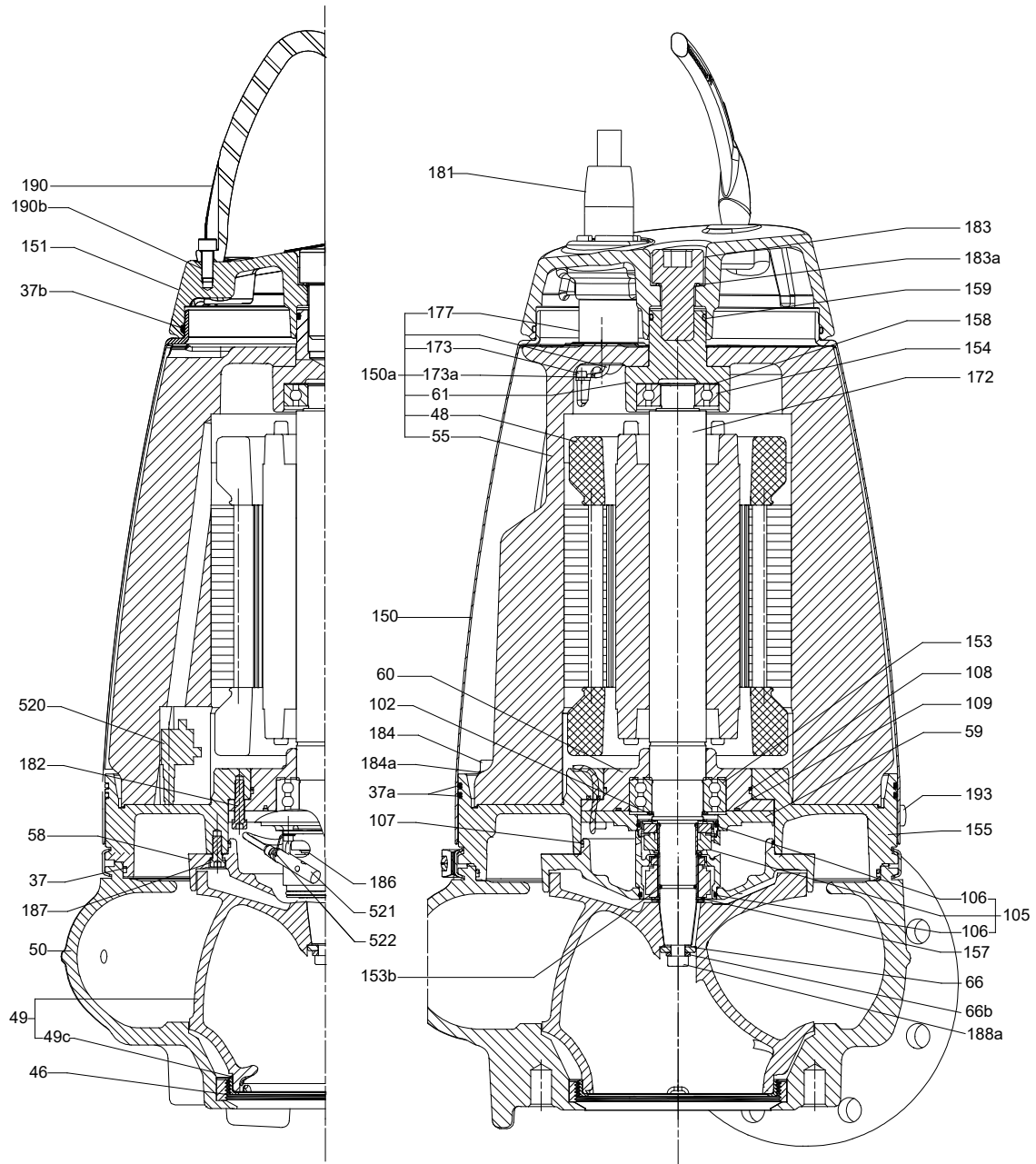


Sectional drawing, SE1 pump with S-tube® impeller

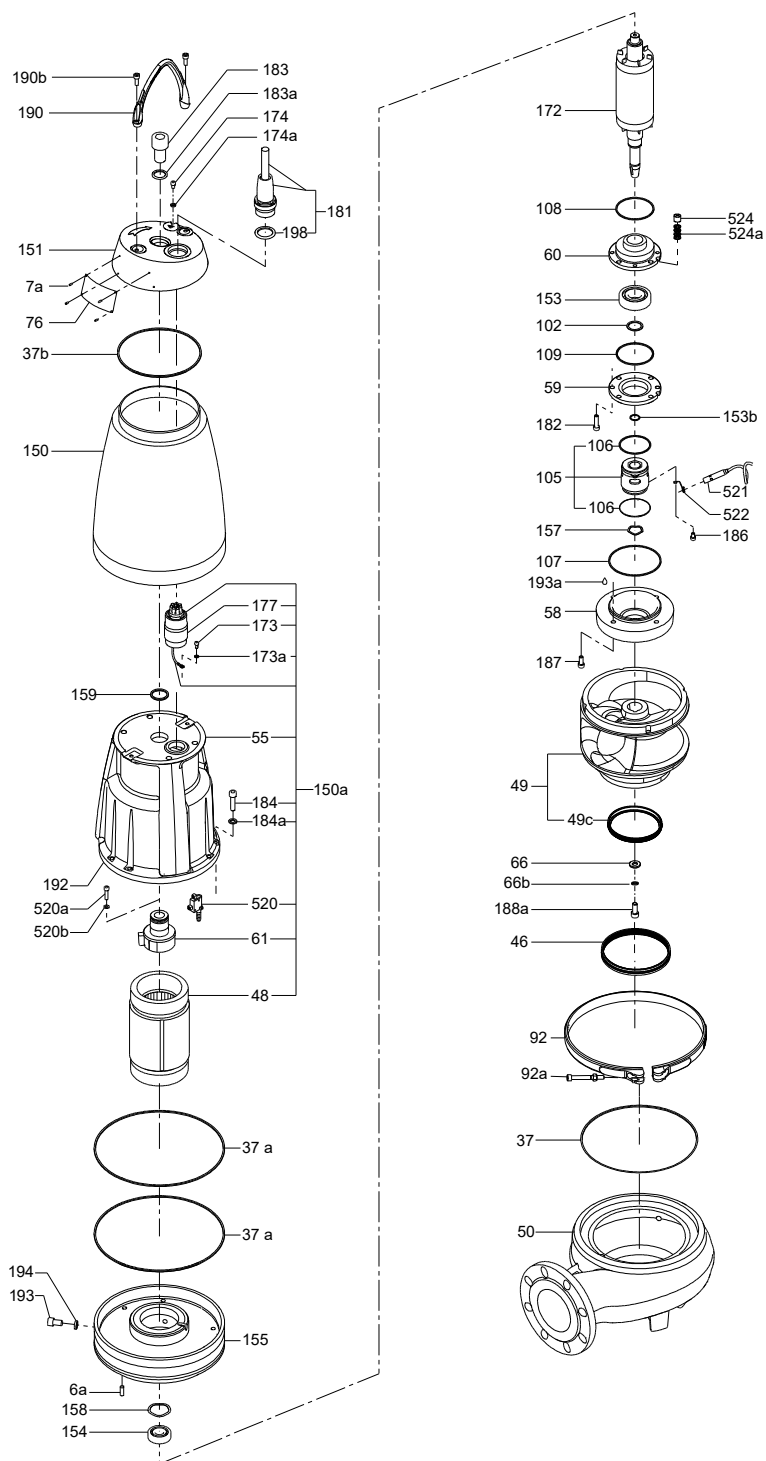


Exploded view, SE1 pump with S-tube® impeller

TM065985



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

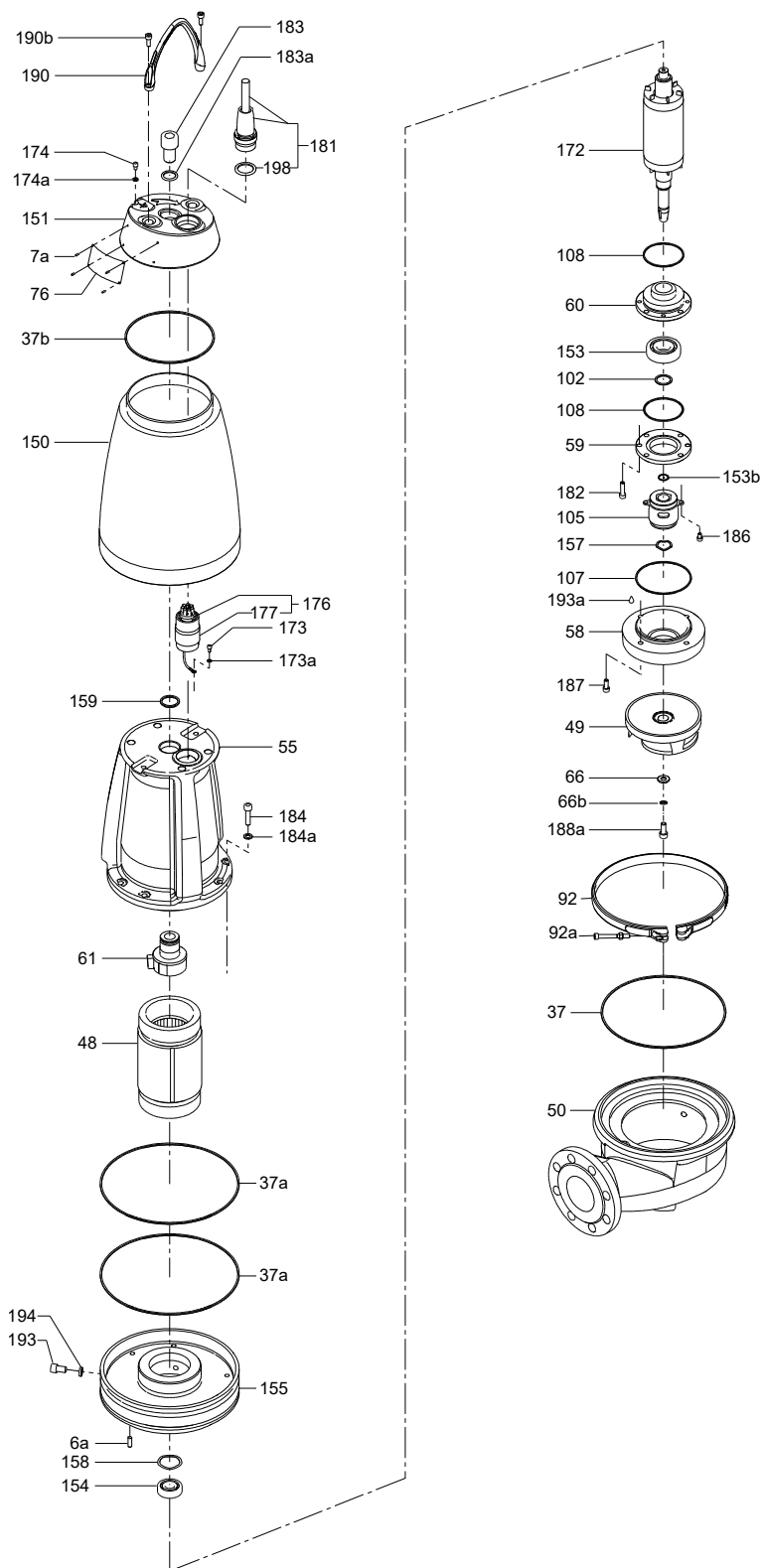


Exploded view, SE1 pump with S-tube® impeller, sensor version

TM065986

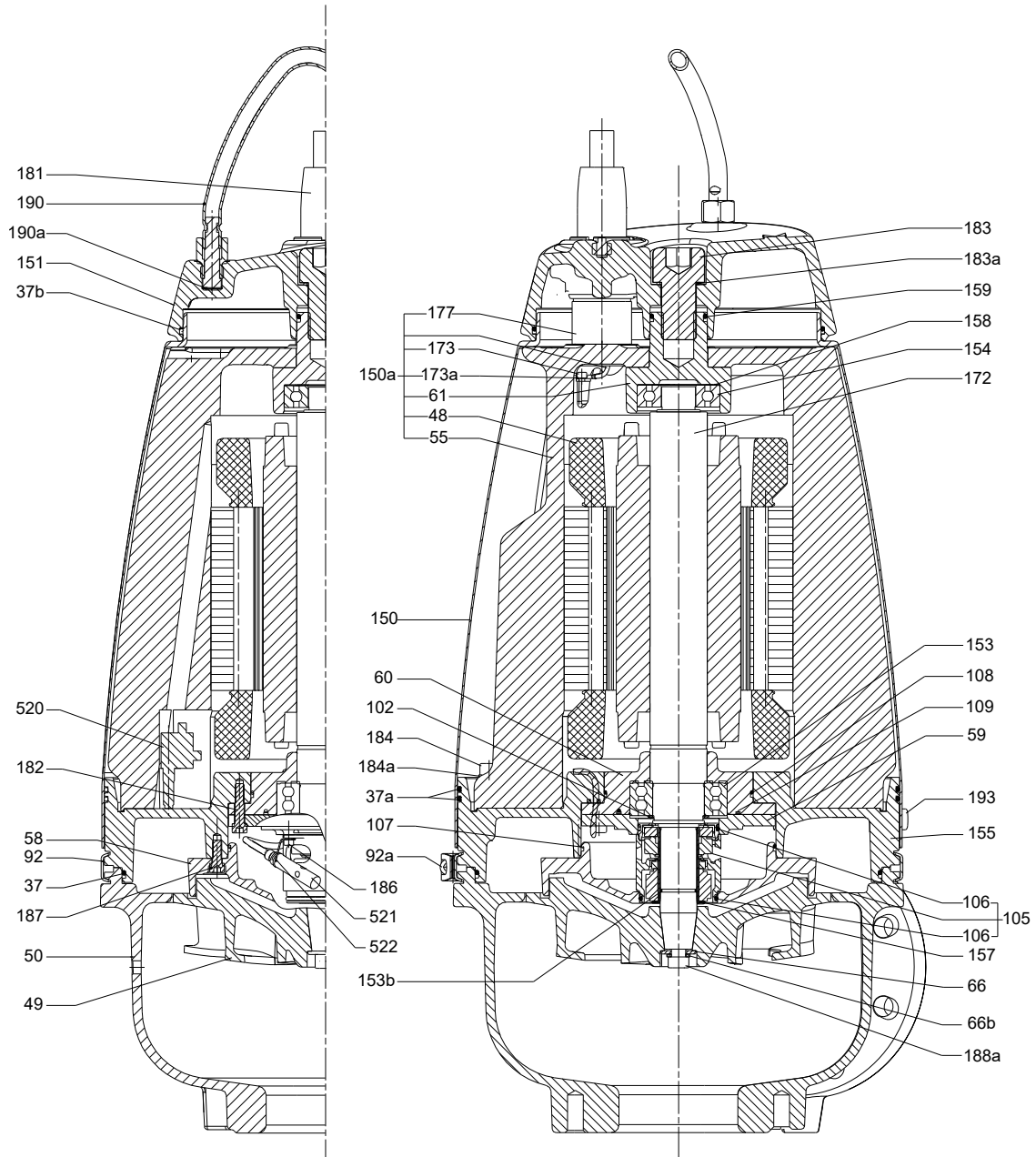


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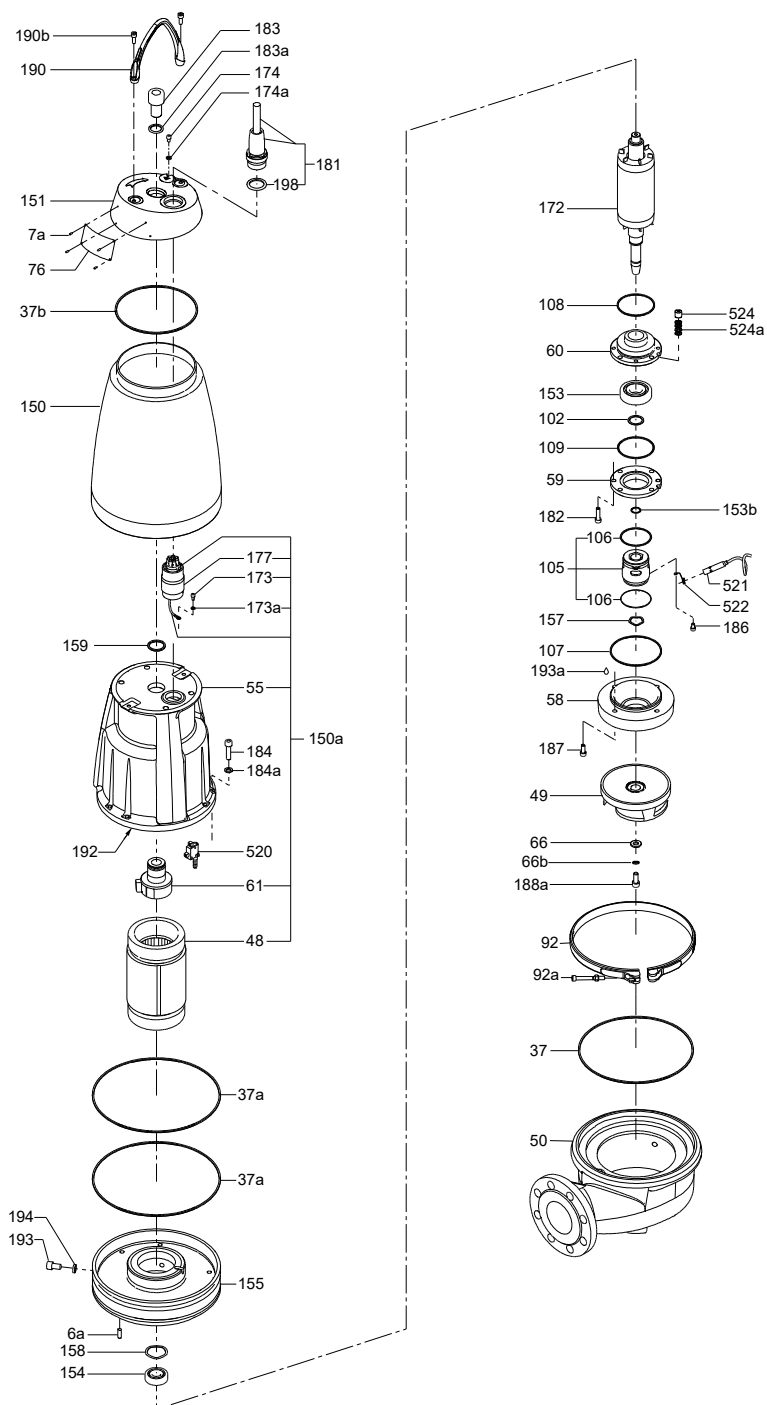
Exploded view, SEV pump with SuperVortex impeller

TM065992



Sectional drawing, SEV pump with SuperVortex impeller, sensor version

TM031519



Exploded view, SEV pump with SuperVortex impeller, sensor version

TM065993

15.3 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	
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	Stainless steel	Inconel X750
158	Corrugated spring	Carbon steel	EN 1.1248
159	O-ring	NBR rubber	
172	Shaft with rotor	Carbon 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		

Pos.	Designation	Material	DIN W.-Nr./ EN standard
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		
522	Bracket for WIO sensor		

Grey cast iron is manufactured according to EN 1561:2012.

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

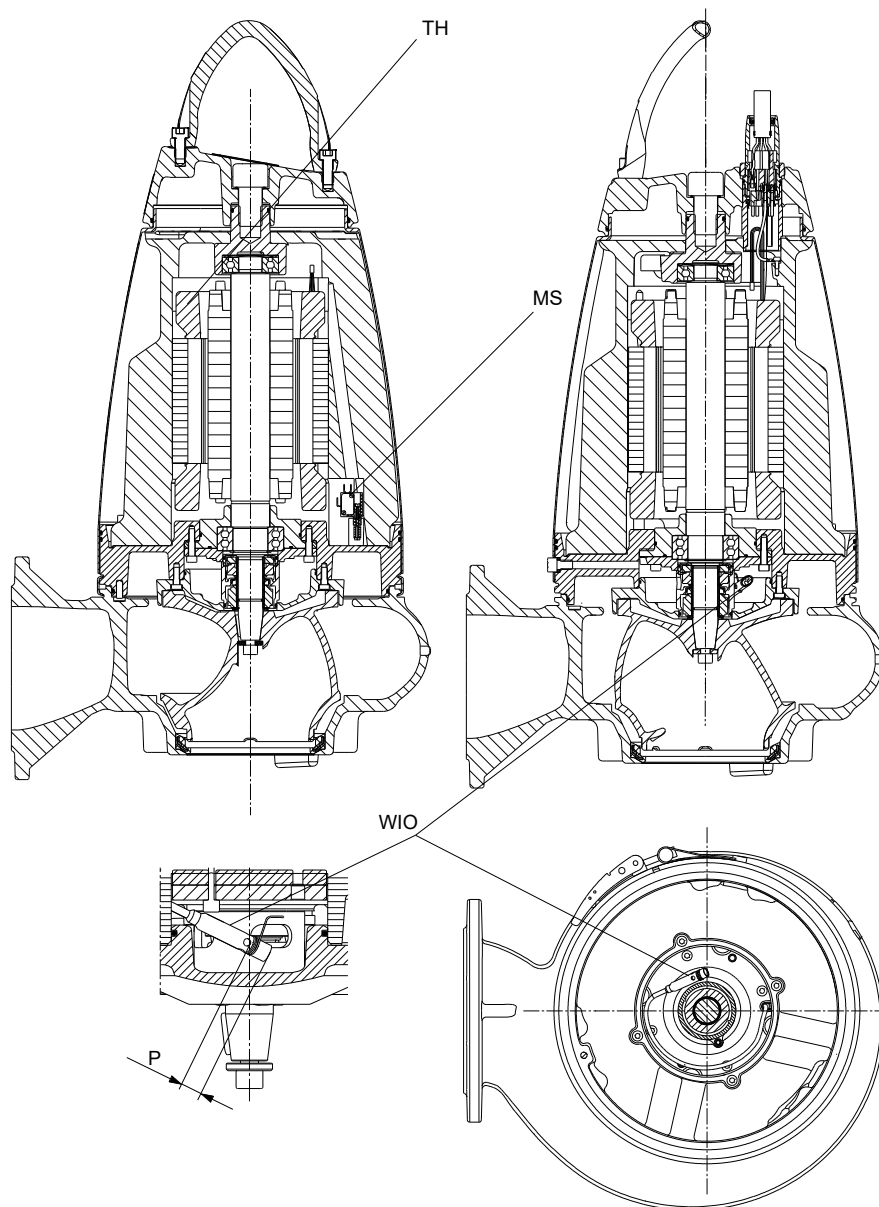
Conversion to other standards, such as AISI/ASTM, is normative, and products are not manufactured according to these.

15.3.1 Material variants

Position	Description	Material Variant		
		Q	R	D ⁴⁾
	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

4) Available only on request. For more information, contact Grundfos.

15.4 Sensor positions



TM069223

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.

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