

SE and SL, Range 56

24-84 Hp, 60 Hz ANSI

Installation and operating instructions



SE/SL 24-84 Hp 60 Hz ANSI
Installation and operating instructions
(all available languages)
<http://net.grundfos.com/qr/i/92876434>

SE and SL, Range 56

English (US)

Installation and operating instructions	4
Limited consumer warranty	60
Limited manufacturer's warranty	62

Original installation and operating instructions

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■ Original installation and operating instructions

These installation and operating instructions describe Grundfos SE/SL 24-84 hp (18-63 kW) pumps.



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

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.



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.

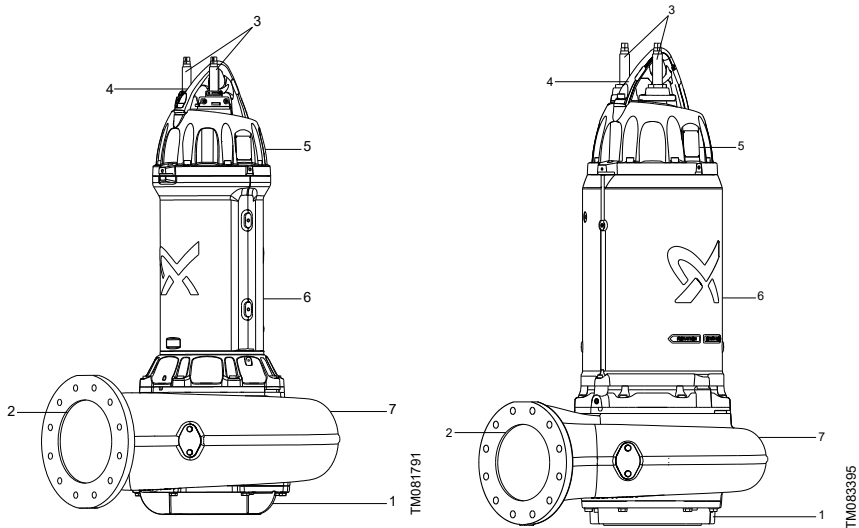
1.3 Target groups

These installation and operating instructions are intended for professional installers.

2. Product introduction

2.1 Product description

The 24-84 hp SE and SL Range 56 pumps are a range of Open **S-tube**[®] impeller pumps specifically designed for pumping sewage and wastewater in a wide range of municipal and industrial applications.



SL Range 56, 24-84 hp pump

SE Range 56, 24-84 hp pump

Pos.	Description
1	Inlet
2	Outlet
3	Power and control cable
4	Lifting bracket
5	Terminal box
6	Submersible motor
7	Pump



2.2 Pumped liquids

The pumps are designed for:

- raw sewage with short and long fibers and particles in municipal and industrial wastewater systems
- surface water
- industrial wastewater with fibrous material
- domestic wastewater with toilet waste
- unscreened sewage in municipal pumping stations or inlet pumping stations in wastewater treatment plants
- raw water.

3. Identification

3.1 Nameplate

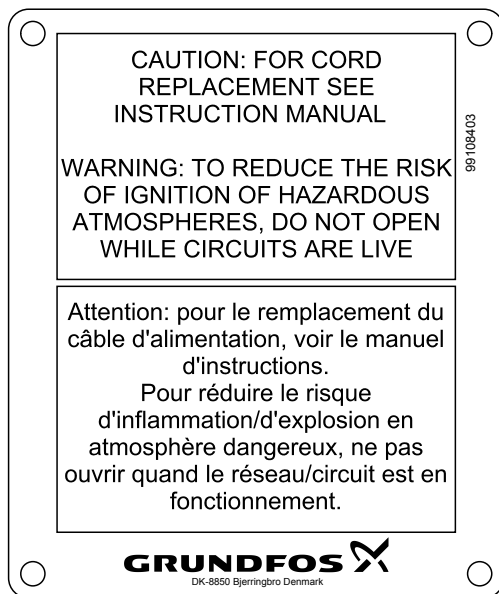
1	Thermally Protected	Ex db IIB T4/T3* Gb		14	
2		CL1, DIV1, GP C, D T4/T3		14	
		CL1, ZONE1, AEx db IIB T4/T3 Gb		15	
		FM24US0026X FM24CA0014X		16	
		Type: SL.56H.560.4.EX.61G.6			
26		6.2.Q.Z			
3		Serial No. 9xxxxxxx00000001			
4		P.c. 2404	IP68	▽ 99 ft	17
5		Amb. Range: Ta= -4°F to +104°F			
6		Hmax: 192 ft	CosΦ: 0.84		18
7		Qmax: 2761 gpm	Motor: 3~		19
8		P1/P2: 61/56 HP	n: 1785 rpm		20
9		380-480V Δ	F.L.Amp: 82-79.5A		21
10		660-690V Y	F.L.Amp: 47,5-46,5A		22
11		Cont. 60 Hz	Insul.class: H		23
13		S.F.:1.15	Weight: 1788 lb		24
12	Made in Székesfehérvár, Hungary			25	
		 <small>DK-8850 Bjerringbro Denmark</small>			

For converter operation see manual 92733670

TM085795

Pos.	Description
1	Explosion-protection classification
2	Explosion-protection classification
3	Serial number
4	Production code, year and week
5	Maximum ambient temperature
6	Maximum head
7	Maximum flow rate
8	Rated power input/output (P1/P2)
9	Rated voltage, delta connection
10	Rated voltage, star connection
11	Continuously operated motor
12	Service factor
13	Frequency
14	Approval marking
15	Explosion protection certification number
16	Type designation (part 1)

Pos.	Description
17	Maximum installation depth
18	Power factor
19	Number of phases
20	Rated speed
21	Rated current, delta connection
22	Rated current, star connection
23	Insulation class
24	Weight without cable
25	Country of production
26	Type designation (part 2)



FM warning plate

3.2 Type key

Example: **SL.56M.380.4.EX.61G.6.1.Z**

Code	Explanation	Designation
SL	Sewage pump without cooling jacket	Pump type
SE	Sewage pump with cooling jacket	
56	Frame 56	Frame size
M	Medium pressure	Pressure range
L	Low pressure	
H	High pressure	
380	Power P2 x 10 [38 hp]	Power [hp]
4	4-pole motor	Number of poles
6	6-pole motor	
EX	Pumps with Ex approval	Pump version
- (blank)	Pumps without Ex approval	
60G	3 x 380-480D (DOL, EMC) 60 Hz	Voltage code for 60 Hz
60F	220-277V D / 380-480V Y	
60L	575-600V D	
61G	3 x 380-480D, 660-690Y (Standard) 60 Hz	
61E	220-240V D / 380-415V Y	
61M	575-600V D	
4		Pump outlet [in]
6		
8	Pump outlet nominal diameter	
10		
12		
- (blank)	Standard sensor version	Sensor versions
1	Sensor version V1	
2	Sensor version V2	
Z	Custom-built products	Customization

3.3 Approvals (cFMus)

The standard pumps are approved by FM Approvals. The explosion-proof versions have the following Certificates of Conformity:

- FM24US0026X
- FM24CA0014X

The letter X in the certificate number indicates that the equipment is subject to specific condition of use. The conditions are described in the certificate and the installation and operating instructions.

Approval standards

The pumps are approved by FM Approvals according to CSA C22.2 No. 60079-0, CSA C22.2 No. 60079-1, CSA C22.2 No. 0.4, CSA C22.2 No. 100, CSA C22.2 No. 145, and CSA C22.2 No. 60529, and FM 3600, FM 3615, FM 3650, and ANSI/IEC 60529, ANSI/UL 60079-0, ANSI/UL 60079-1.

3.3.1 Explanation of FM approval

The pumps have the following explosion-protection classification with an ambient temperature rating of -4 to 104 °F (-20 to +40 °C):

- FM24CA0014X: Class I, Division 1, Groups C and D, T4, T3, IP68, Ex db IIB T4/T3 Gb
- FM24US0026X: Class I, Division 1, Groups C and D, T4, T3, IP68, Class I, Zone 1, AEx db IIB T4/T3 Gb

Standards	Code	Description
	Class I	Explosive atmosphere caused by gas or vapors
FM 3600	Division 1	Area classification
FM 3615	Groups C and D	Classification of gases
FM 3650	T4/T3	Maximum surface temperature is 275 °F (135 °C) and 392 °F (200 °C)
ANSI/IEC 60529	IP68	Enclosure class according to IEC 60529
CSA C22.2 No. 0.4	Zone 1	Typical zone of application: gas atmospheres, "high" level of protection
CSA C22.2 No. 100	AEx / Ex	Marking of explosion protection
CSA C22.2 No. 145	db	Flame-proof enclosure
CSA C22.2 No. 60079-0	IIB	Classification of gases, gas group B includes gas group A.
CSA C22.2 No. 60079-1	Gb	Equipment for explosive gas with "high" level of protection.
CSA C22.2 No. 60529		
ANSI/UL 60079-0		
ANSI/UL 60079-1		

3.3.2 Potentially explosive environments

Use explosion-proof pumps for applications in potentially explosive environments.



The pump must not be used to pump explosive, flammable or combustible liquids.



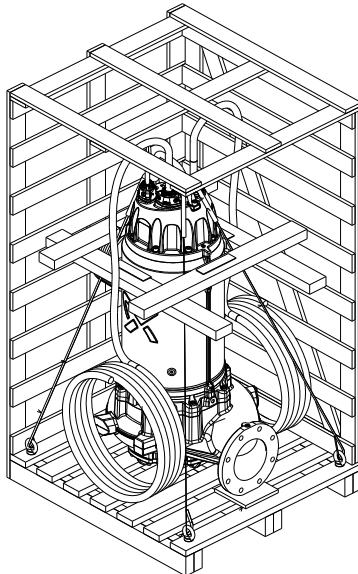
The classification of the installation site must comply with the local regulations.

Specific conditions for safe use of explosion-proof pumps:

1. Make sure the moisture- and thermal switches are connected in two separate circuits and have separate alarm outputs (motor stop) in case of high humidity or high temperature in the motor.
2. Bolts used for replacement must be class A4-80 or A2-80 according to ISO 3506-1.
3. Contact the manufacturer if dimensional information on the flameproof joints is necessary.
4. During operation, the cooling jacket, if fitted, must be filled with cooling liquid.
5. The level of the pumped liquid must be controlled by level switches connected to the motor control circuit. Install an additional level switch to ensure that the pump is stopped in case the stop level switch is not working.
6. Dry running is not allowed.
7. Make sure the cable is mechanically protected, attached to the switchboard and the cable bonding cannot slip out.
8. The sewage pumps have an ambient temperature range of -4 °F to 104 °F (-20 to +40 °C) and a maximum operating temperature of 104 °F (+40 °C).
9. Avoid exposing the ethylene-propylene rubber insulated cables to direct sunlight.
10. Dry-installed pumps often have a higher temperature in the cable entries than submerged pumps. This may reduce the lifetime of the Ex-protection. It is a user responsibility to regularly inspect the condition of the permanently attached cables and cable entries for any visual damage, cracks or embrittlement caused by rubber aging.
11. The thermal protector in the stator windings must have a rated switch temperature of 304 °F (150 °C) and it ensures the disconnection of the power supply. Resetting must be carried out manually.
12. To avoid electrostatic discharge, clean the cables and the painted parts of the pump with a wet fabric.
13. When the pump is operated by a frequency converter, the installation must be rated up to T3 temperature class. When the pump is operated without a frequency converter, the installation must be rated up to T4 temperature class.

**4. Receiving the product**

The pump is supplied from the factory in a proper packaging in which it should remain until installation. Make sure that the pump cannot roll or fall over.



Pump packaging

TM082506

4.1 Inspecting the product

During periods of storage, protect the pump against moisture and heat.



If the pump is not in operation or is being stored for more than a month, turn the impeller once a month.



WARNING

Crushing hazard

Death or serious personal injury

- Do not turn the impeller by hand. Always use an appropriate tool.



On pumps fitted with guide vane, be careful not to damage the guide vane when turning the impeller.

After a period of storage, inspect the pump before putting it into operation. Make sure that the impeller can rotate freely. Pay attention to the condition of the shaft seals, O-rings and the cable entries.

4.2 Transporting the product

All lifting equipment must be rated for the purpose and checked for damage before lifting the pump. The lifting equipment rating must not be exceeded. The pump weight is stated on the nameplate.



WARNING

Crushing hazard

Death or serious personal injury

- Lifting and moving must be done by a trained person.



CAUTION

Sharp element

Minor or moderate personal injury

- Packaging parts may be pointy or sharp. Wear hand protection.



CAUTION

Crushing hazard

Minor or moderate personal injury

- Make sure the pump cannot roll or fall over.



WARNING

Crushing hazard

Death or serious personal injury

- Always lift the pump by its lifting bracket or use a forklift.



DANGER

Electric shock

Death or serious personal injury

- Never lift the pump by the power cable, hose, or pipe.



Leave the cable-end protectors and control cables on the power supply until making the electrical connection. Whether insulated or not, the free cable end must never be exposed to moisture.

5. Mechanical installation

Fit the extra nameplate supplied with the pump at the installation site, where it is easy to access and read.

Observe all safety regulations at the installation site. Make sure there is adequate fresh air supply in the pit.

DANGER



Electric shock

Death or serious personal injury

- Before starting any work on the product, make sure that the power supply is switched off and it cannot be switched on unintentionally.

DANGER



Crushing hazard

Death or serious personal injury

- During installation, always support the pump by lifting chains or place it in horizontal position to secure stability.

CAUTION



Crushing hazard

Minor or moderate 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 main switch has been locked in position 0.
- Make sure that the power supply cannot be switched on unintentionally.

WARNING



Biological hazard

Death or serious personal injury

- Media spraying from the pump can cause injury. Wear eye protection.



The free end of the cable must not be submerged as water may penetrate into the motor.



Make sure that the pipes are installed without the use of undue force. No loads from the weight of the pipes must be carried by the pump. Use loose flanges to ease the installation and to avoid pipe tension at the flanges.

5.1 Installation types

Installation type	Description	Installation and accessories
Vertical	Sewage pump without cooling jacket for vertical, submerged installation	Permanent installation on auto coupling
Dry vertical	Sewage pump with cooling jacket for vertical installation	Permanent installation on concrete foundation
Dry horizontal	Sewage pump with cooling jacket for horizontal installation	Installation on horizontal stand

5.2 Vertical installation on auto-coupling

Pumps for permanent, vertical installation in a pit can be installed on a stationary auto-coupling unit and operated completely or partially submerged in the pumped liquid.



Do not use elastic elements or bellows to connect the pipes.



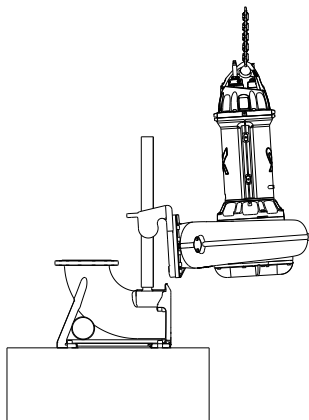
In some installations, a plinth is required beneath the auto coupling to ensure correct installation of the pump. Consider this during the design of the installation.



The guide rails must not have any axial play as this may cause noise during operation.

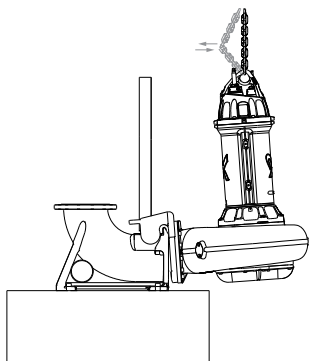
Proceed as follows:

1. Drill mounting holes for the guide-rail bracket on the inside of the pit and fasten it provisionally with two screws.
2. Place the auto-coupling base unit on the bottom of the pit. If the bottom is uneven, the auto-coupling base unit must be supported. Use a plumb line to establish the correct positioning. Fasten the auto coupling with anchor bolts.
3. Connect the outlet pipe in accordance with the generally accepted procedures. Avoid exposing the pipe to distortion or tension.
4. Place the guide rails on the auto-coupling base unit and adjust the length of the rails to the guide-rail bracket at the top of the pit. If the length of the guide rail exceeds 4 m, install an intermediate guide-rail holder to ensure stability.
5. Unscrew the guide-rail bracket. Insert the expansion dowels into the holes. Fasten the guide-rail bracket on the inside of the pit. Tighten the bolts in the expansion dowels.
6. Clean out debris before lowering the pump into the pit.
7. Fit the guide shoe to the pump.
8. Slide the guide shoe along the guide rails and lower the pump into the pit by a chain secured to the lifting bracket.
9. Hang up the end of the chain on a suitable hook at the top of the pit. Make sure that the chain is straight but not strained.
10. Adjust the length of the power cable by coiling it up on a relief fitting to ensure that the cable is not damaged during operation. Fasten the relief fitting to a suitable hook at the top of the pit. Make sure that the cables are not sharply bent or pinched.
11. Connect the power- and the control cables, if any.
12. Check direction of rotation.



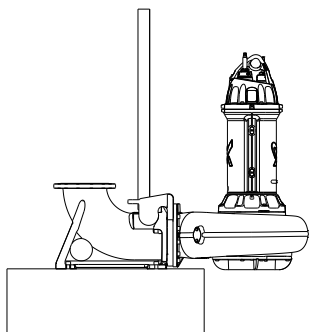
Lowering the pump along the guide rails

TM081913



Connecting the pump to auto coupling

TM081914



Submerged installation on auto coupling

TM081912

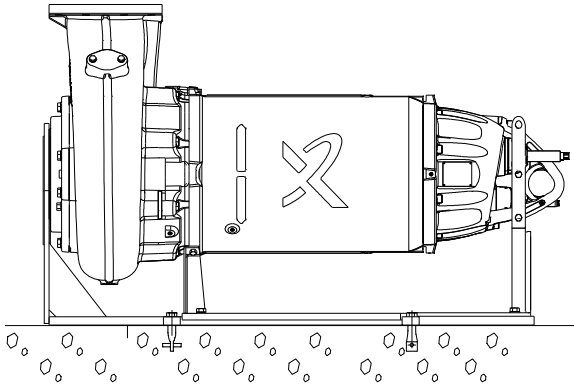


The free end of the cable must not be submerged as water may penetrate into the motor.

5.3 Permanent, vertical or horizontal, dry installation



Use isolating valves on either side of the pump to facilitate service on it.



Dry, horizontal installation on horizontal base stand

Pumps in dry installation are installed permanently in a pump room.

The pump motor is enclosed and watertight.

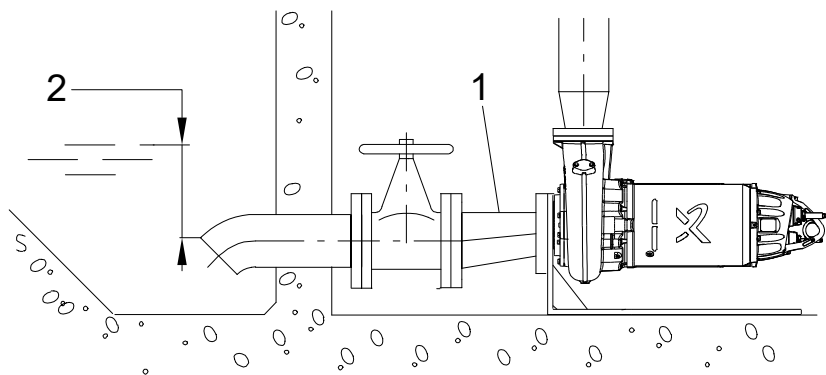
Proceed as follows:

1. Mark and drill mounting holes in the concrete floor or foundation.
2. Fit the bracket or base stand to the pump.
3. Fasten the pump with expansion bolts.
4. Check that the pump is vertical or horizontal.
5. Fit the inlet and outlet pipes and isolating valves, if used, and ensure that the pump is not stressed by the pipes.
6. Adjust the length of the power cable by coiling it up on a relief fitting to ensure that the cable is not damaged during operation. Fasten the relief fitting to a suitable hook. Make sure that the cables are not sharply bent or pinched.
7. Connect the power- and the control cables, if any.

Fasten the pump to the inlet and outlet pipes with flange connections.



In horizontal installations, use a reducer between the inlet pipe and the pump. The reducer must be eccentric and has to be installed the way its straight edge is pointing upwards. Therefore the accumulation of air in the inlet pipe, and the risk of operation disturbance are eliminated.



TM084883

Eccentric reducer in horizontal installation

Pos.	Description
1	Eccentric reducer
2	Minimum level: 0.2 m (2/5 ft)

5.4 Pullout strengths for anchor bolts

Auto-coupling base unit (in)	Bolts [mm (in)]	Pull-out strength for a single bolt [kN (Pound-force)]
DN 100 (4 in)	M16 (5/16 in)	10 (2248.09 lbs)
DN 150 (6 in)	M16 (5/16 in)	10 (2248.09 lbs)
DN 200 (8 in)	M24 (1 in)	10 (2248.09 lbs)
DN 250 (10 in)	M24 (1 in)	10 (2248.09 lbs)
DN 300 (12 in)	M24 (1 in)	12 (2697.71 lbs)



The pull-out strengths stated are without safety factor. The required safety factor may depend on the materials and method used for anchoring.

5.5 Minimum liquid level

Do not let the pump run dry.



Install an additional level switch to ensure that the pump is stopped in case the stop level switch is not working.

The level of the pumped liquid must be controlled by level switches connected to the motor control circuit.



Explosion-proof, submersible SL pumps without cooling jacket must always be completely submerged in the pumped liquid to the top of the motor.

The pump housing of explosion-proof, submersible SE pumps with cooling jacket must always be completely covered by the pumped liquid, in case of wet installation.



For a short period, the pump may be used to pump down the liquid level to remove the float layer. For explosion-proof pumps, do not let it go below the stop levels shown in fig.

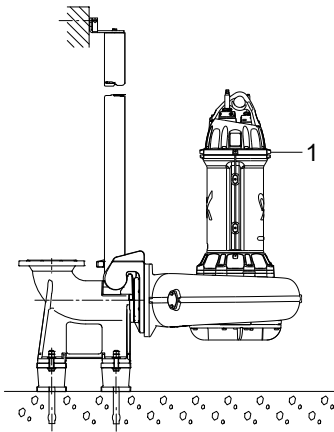


The pump must not run dry.

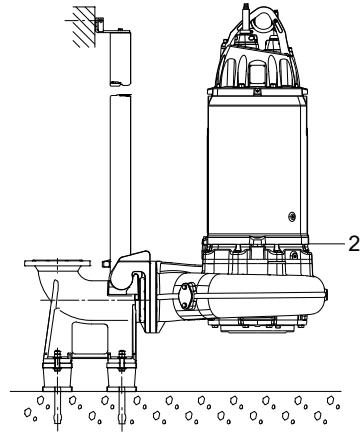
To ensure adequate motor cooling, the following minimum requirements must be met:

• **Vertical installation on auto-coupling:**

- SL pump: the pump must be completely submerged in the pumped liquid to the top of the motor. See **level 1** on the figure below.
- SE pump: the pump must be submerged in the pumped liquid until the bottom of the motor. See **level 2** on the figure below.



Liquid level, SL



Liquid levels, SE

6. Electrical connection



EMC shielding of power and control cables must be connected and fixed by the operator.



Connect pumps installed in hazardous locations to a control box with a motor protection relay with an IEC trip class 10.

1. Do not install pump controllers, Ex barriers or the free end of the power cable in potentially explosive environments.
2. The classification of the installation site must comply with the local rules.
3. On explosion-proof pumps, make sure that an external ground conductor is connected to the external ground terminal on the pump by a secure cable clamp. Clean the surface of the external ground connection and mount the cable clamp.
4. The ground conductor must be minimum AWG 12 type RHH, RHW, RHW-2 or similar, rated for 600 V and minimum 90 °C (194 °F), yellow and green.
5. Make sure that the ground conductor is protected from corrosion.
6. Make sure that all protective equipment has been connected correctly.
7. Float switches used in potentially explosive environments must be approved for this application. They must be connected to the Grundfos Dedicated Controls, DC, DCD or the SLC, DLC controllers, by an intrinsically safe barrier to ensure a safe circuit.





DANGER

Electric shock

Death or serious personal injury

- Unauthorized people must not have any access to this product.



DANGER

Electric shock

Death or serious personal injury

- Before starting any work on the product, make sure that the power supply is switched off and that it cannot be switched on unintentionally.



WARNING

Electric shock

Death or serious personal injury

- Before installation and startup, check the power cable for damage.



DANGER

Electric shock

Death or serious personal injury

- The pump must be grounded. Before connecting the pump to the voltage supply, make sure the connection to ground complies with the local regulations.

Connect the pump to an external main switch ensuring all-pole disconnection with a contact separation. It must be possible to lock the main switch in position 0.



The supply voltage and frequency are marked on the nameplate. Make sure that the motor is suitable for the power supply at the installation site.

The electrical connection must comply with the local regulations.



Connect the pumps to a controller with a motor protection relay with IEC trip class 10 or 15 or NEMA-equivalent.



The power supply for the motor protection circuit must be low voltage, class 2.



If the power cable is damaged, it must be replaced by the manufacturer or his service agent.

Connect the pump to a motor-protective circuit breaker.



Set the motor-protective circuit breaker to the rated current of the pump, +15 % service factor for 60 Hz motors. The rated current is stated on the nameplate.

The supply voltage and frequency are marked on the nameplate.

The voltage tolerance at the motor terminals must be within $\pm 10\%$ of the rated voltage.

The motor is effectively grounded with the power cable and pipes. The motor top cover is equipped with connections for external grounding or an equipotential bonding conductor.



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



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

The most commonly used startup methods are the following:

- Direct-on-line starting (DOL).
- Star-delta starting (Y/D).
- Soft start.

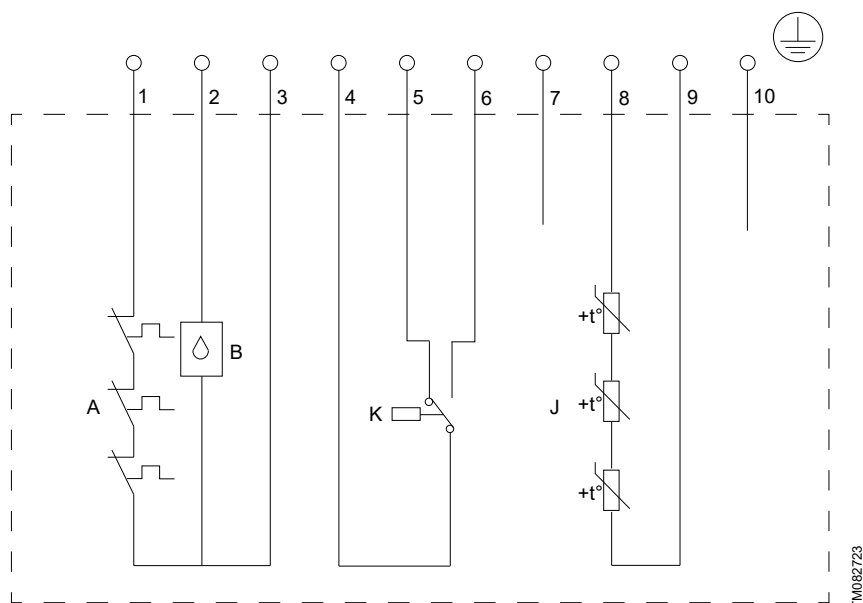
The suitable starting method depends on several considerations on usage and mains supply conditions.



When using star-delta start, it is important to keep switching transient time to a minimum to avoid high transient torques. Use a time relay with a switching time of maximum 50 milliseconds, or according to the manufacturer's specifications.

The pump can be operated with a frequency converter according to the specifications of the manufacturer.

6.1 Sensor wiring diagrams



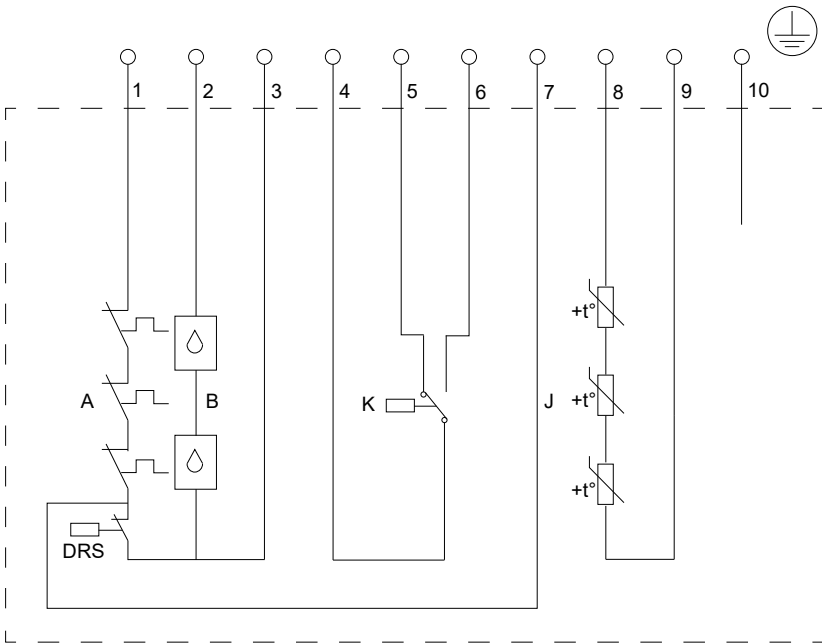
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Sensor connection, standard version

Pos.	Description
A	3 x PTO
B	Moisture switch (motor top)
K	Leakage switch
J	3 x PTC

Cable screening must be connected to the ground. To connect the leakage switch to SM113 module, use resistor kit 92726268. The resistor converts the digital signal from the leakage switch (Terminal 4, 5 and 6) must be converted to analog 4-20 mA signal. The resistor kit must be connected as follows:

1. Connect Sensor wire "4" (common point of leakage switch) to SM113 Terminal "3".
2. Connect Sensor wire "5" (leakage switch lower position: 4-6 mA = "OK" signal) to "R1" of the resistor kit.
3. Connect Sensor wire "6" (leakage switch upper position: 16-18 mA = "Alarm" signal) to "R2" of the resistor kit.
4. Connect the common end of the resistor kit to Terminal "4" of the SM113 module.



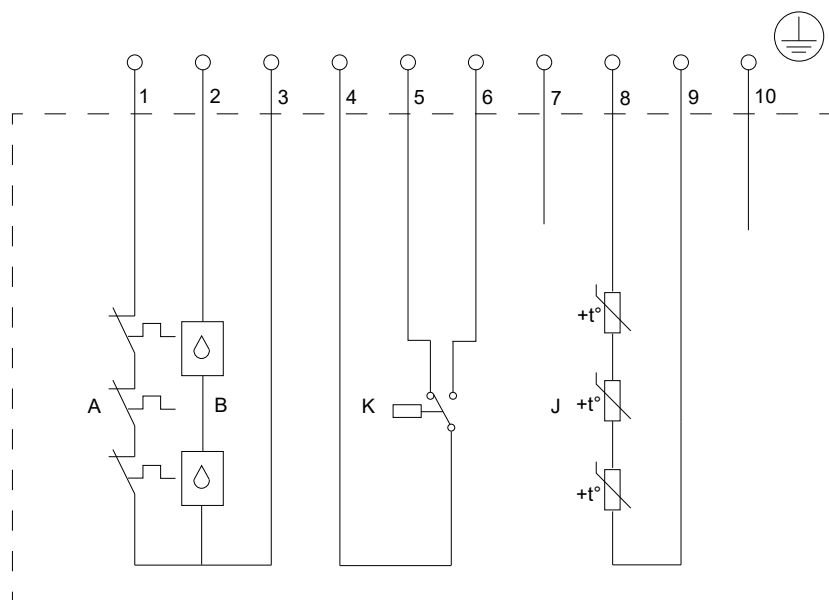
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Sensor connection, standard Ex version

Pos.	Description
A	3 x PTO
B	2 x Moisture switch (motor top)
K	Leakage switch
J	3 x PTC
DRS	Dry running switch

Cable screening must be connected to the ground. Sensor wire 7 is the control wire for service. If not used, then the wire end must be insulated. To connect the leakage switch to SM113 module, use resistor kit 92726268. The resistor converts the digital signal from the leakage switch (Terminal 4, 5 and 6) must be converted to analog 4-20 mA signal. The resistor kit must be connected as follows:

1. Connect Sensor wire "4" (common point of leakage switch) to SM113 Terminal "3".
2. Connect Sensor wire "5" (leakage switch lower position: 4-6 mA = "OK" signal) to "R1" of the resistor kit.
3. Connect Sensor wire "6" (leakage switch upper position: 16-18 mA = "Alarm" signal) to "R2" of the resistor kit.
4. Connect the common end of the resistor kit to Terminal "4" of the SM113 module.



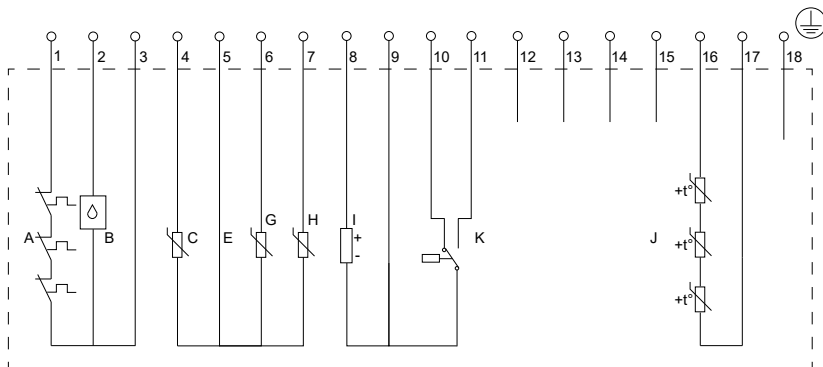
TM085736

Sensor connection, standard Ex version without Dry Running Switch

Pos.	Description
A	3 x PTO
B	2 x Moisture switch (motor top)
K	Leakage switch
J	3 x PTC

Cable screening must be connected to the ground. Sensor wire 7 is the control wire for service. If not used, then the wire end must be insulated. To connect the leakage switch to SM113 module, use resistor kit 92726268. The resistor converts the digital signal from the leakage switch (Terminal 4, 5 and 6) must be converted to analog 4-20 mA signal. The resistor kit must be connected as follows:

1. Connect Sensor wire "4" (common point of leakage switch) to SM113 Terminal "3".
2. Connect Sensor wire "5" (leakage switch lower position: 4-6 mA = "OK" signal) to "R1" of the resistor kit.
3. Connect Sensor wire "6" (leakage switch upper position: 16-18 mA = "Alarm" signal) to "R2" of the resistor kit.
4. Connect the common end of the resistor kit to Terminal "4" of the SM113 module.



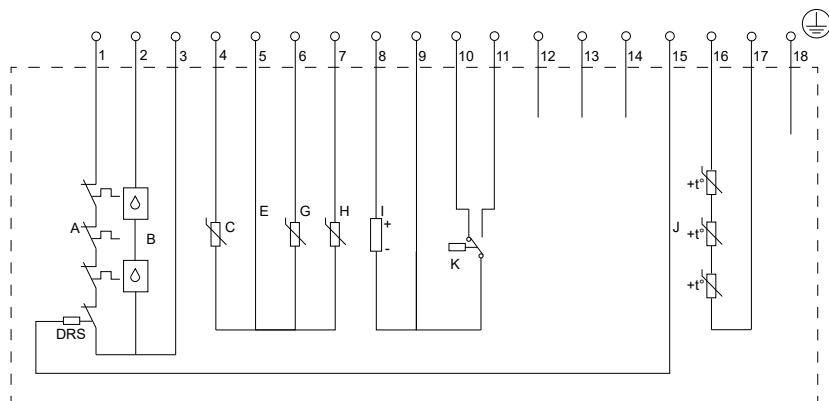
TM084630

Sensor connection, version V1

A	3 x PTO
B	Moisture switch (motor top)
C	Pt100 (lower bearing)
E	Common grounding for sensors
G	Pt100 (upper bearing)
H	Pt100 (stator winding)
I	Vibration sensor
K	Leakage switch
J	3 x PTC

Cable screening must be connected to the ground. To connect the leakage switch to SM113 module, use resistor kit 92726268. The resistor converts the digital signal from the leakage switch (Terminal 9, 10 and 11) must be converted to analog 4-20 mA signal. The resistor kit must be connected as follows:

1. Connect Sensor wire "9" (common point of leakage switch) to SM113 Terminal "3".
2. Connect Sensor wire "10" (leakage switch lower position: 4-6 mA = "OK" signal) to "R1" of the resistor kit.
3. Connect Sensor wire "11" (leakage switch upper position: 16-18 mA = "Alarm" signal) to "R2" of the resistor kit.
4. Connect the common end of the resistor kit to Terminal "4" of the SM113 module.



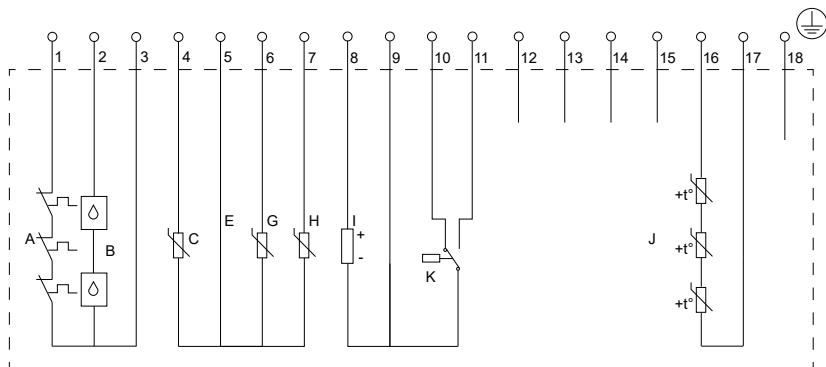
TM085739

Sensor connection, version V1 Ex

A	3 x PTO
B	2 x Moisture switch (motor top)
C	Pt100 (lower bearing)
E	Common grounding for sensors
G	Pt100 (upper bearing)
H	Pt100 (stator winding)
I	Vibration sensor
K	Leakage switch
J	3 x PTC
DRS	Dry running switch

Cable screening must be connected to the ground. Sensor wire 15 is the control wire for service. If not used, then the wire end must be insulated. To connect the leakage switch to SM113 module, use resistor kit 92726268. The resistor converts the digital signal from the leakage switch (Terminal 9, 10 and 11) must be converted to analog 4-20 mA signal. The resistor kit must be connected as follows:

1. Connect Sensor wire "9" (common point of leakage switch) to SM113 Terminal "3".
2. Connect Sensor wire "10" (leakage switch lower position: 4-6 mA = "OK" signal) to "R1" of the resistor kit.
3. Connect Sensor wire "11" (leakage switch upper position: 16-18 mA = "Alarm" signal) to "R2" of the resistor kit.
4. Connect the common end of the resistor kit to Terminal "4" of the SM113 module.



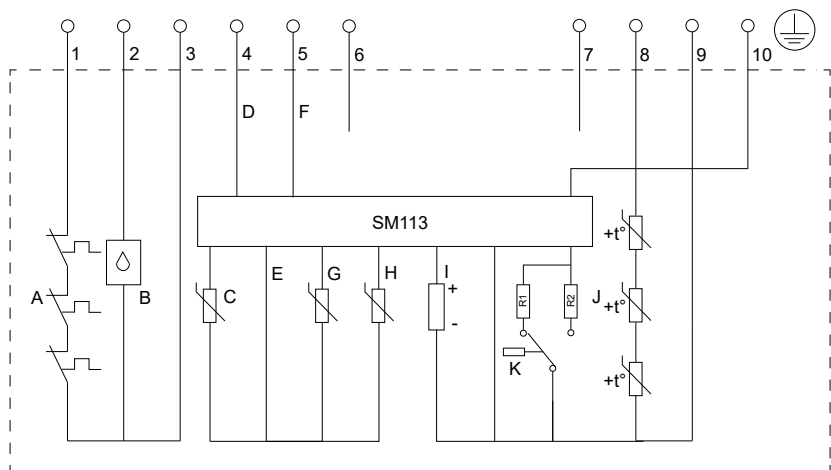
TM085737

Sensor connection, version V1 Ex without Dry Running Switch

A	3 x PTO
B	2 x Moisture switch (motor top)
C	Pt100 (lower bearing)
E	Common grounding for sensors
G	Pt100 (upper bearing)
H	Pt100 (stator winding)
I	Vibration sensor
K	Leakage switch
J	3 x PTC

Cable screening must be connected to the ground. Sensor wire 15 is the control wire for service. If not used, then the wire end must be insulated. To connect the leakage switch to SM113 module, use resistor kit 92726268. The resistor converts the digital signal from the leakage switch (Terminal 9, 10 and 11) must be converted to analog 4-20 mA signal. The resistor kit must be connected as follows:

1. Connect Sensor wire "9" (common point of leakage switch) to SM113 Terminal "3".
2. Connect Sensor wire "10" (leakage switch lower position: 4-6 mA = "OK" signal) to "R1" of the resistor kit.
3. Connect Sensor wire "11" (leakage switch upper position: 16-18 mA = "Alarm" signal) to "R2" of the resistor kit.
4. Connect the common end of the resistor kit to Terminal "4" of the SM113 module.

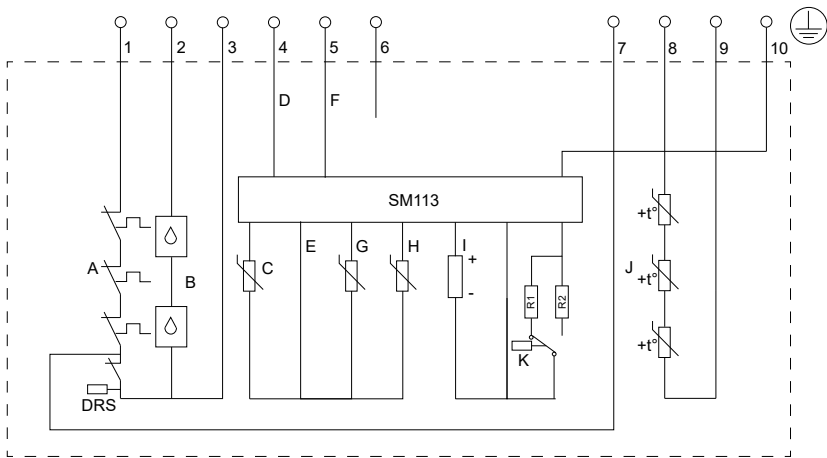


TM084631

Sensor connection, version V2

A	3 x PTO
B	Moisture switch (motor top)
C	Pt100 (lower bearing)
D	Supply input for sensor board from IO113
E	Common grounding for sensors
F	Communication signal for IO113
G	Pt100 (upper bearing)
H	Pt100 (stator winding)
I	Vibration sensor
K	Leakage switch
J	3 x PTC

Cable screening must be connected to the ground.

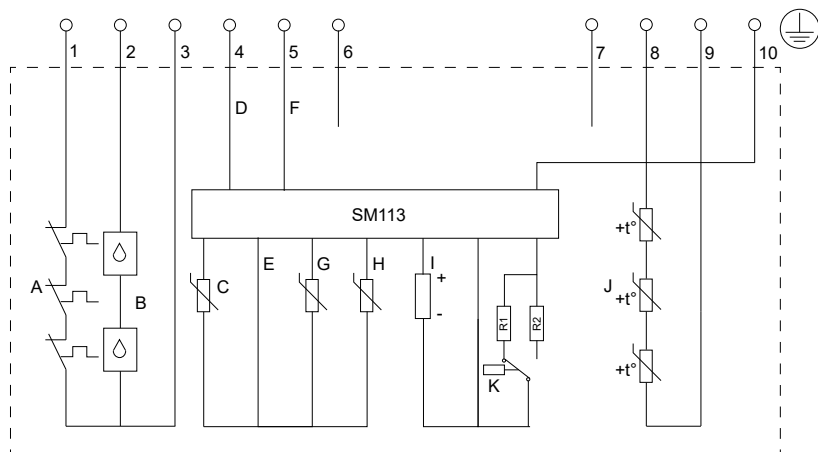


TM085738

Sensor connection, version V2 Ex

A	3 x PTO
B	2 x Moisture switch (motor top)
C	Pt100 (lower bearing)
D	Supply input for sensor board from IO113
E	Common grounding for sensors
F	Communication signal for IO113
G	Pt100 (upper bearing)
H	Pt100 (stator winding)
I	Vibration sensor
K	Leakage switch
J	3 x PTC
DRS	Dry running switch

Cable screening must be connected to the ground. Sensor wire 7 is the control wire for service. If not used, then the wire end must be insulated.



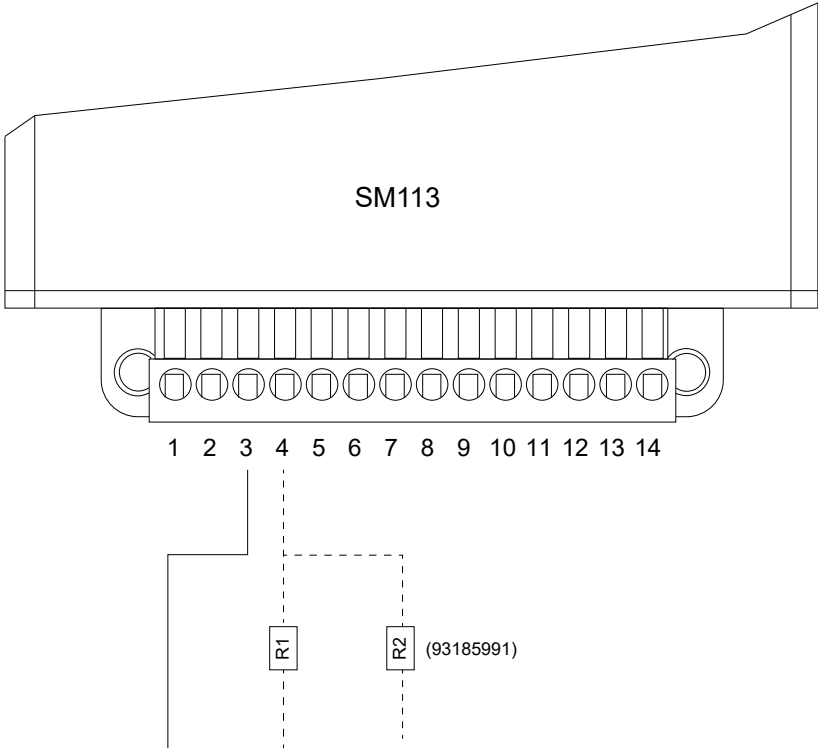
TM085740

Sensor connection, version V2 Ex without Dry Running Switch

A	3 x PTO
B	2 x Moisture switch (motor top)
C	Pt100 (lower bearing)
D	Supply input for sensor board from IO113
E	Common grounding for sensors
F	Communication signal for IO113
G	Pt100 (upper bearing)
H	Pt100 (stator winding)
I	Vibration sensor
K	Leakage switch
J	3 x PTC

Cable screening must be connected to the ground. Sensor wire 7 is the control wire for service. If not used, then the wire end must be insulated.

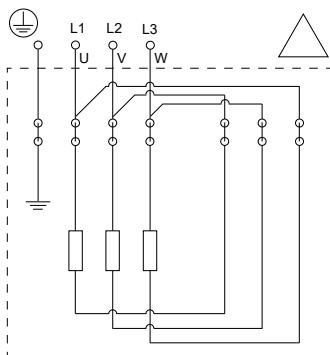
6.2 SM113 connection diagram



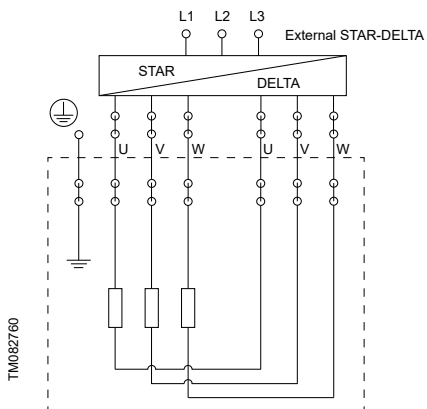
Standard version	Sensor wire 4 - 5 - 6
Sensor version V1	Sensor wire 9 - 10 - 11
Sensor version V2	Built into the motor top
93185991	Resistor kit

TM085735

6.3 Motor wiring diagrams



Delta connection



Star-delta connection

6.4 Frequency converter operation



CAUTION

Electric shock

Minor or moderate personal injury

- Be aware of possible residual voltage being present.



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

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 may cause the motor to be more noisy due to eddy currents caused by voltage peaks.

Large motors driven with a frequency converter may be 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 .
- The minimum switching frequency is 2 kHz. The switching frequency can be variable.
- 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.
- Before installing a frequency converter, calculate the lowest frequency allowed in the installation to avoid zero flow.
- Do not reduce the motor speed to less than 50 %.
- 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 pipe network.
- 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 the frequency converter for constant-torque operation. Use pulse width modulation.

When operating the pump with 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.]
2.200	9.000



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

6.4.1 General conditions for frequency converter operation

All motors used with frequency converter must be protected against voltage peaks and dU/dT according to IEC60034-25 Figure 40 – Curve A.

Grundfos recommends using insulated bearing systems in installations where common mode currents can be a problem. It is generally recommended to use insulated bearings from the following performance ranges:

- 60 Hp / 2-pole
- 40 Hp / 4-pole
- 30 Hp / 6-pole.

Use screened cables for frequency converter operation.

- Screened **power cables** to comply with EMC regulations.
- Screened **sensor cables** to protect the signals against electromagnetic interference.

6.4.2 Mains-dependent conditions for frequency converter operation

200-240 V

No output filters are required for frequency converter operated pumps with up to 240 V mains voltages.

380-500 V

For frequency converter operated pumps with less than 25 m (82 ft) power cable length and mains supply up to 460 V, no additional motor protection is required against voltage peaks.

If the power cable length is longer than 25 m (82 ft), or the mains supply is higher than 460 V, sine-wave filters are required.

500 V and above

Always use sine-wave filters for pumps marked for 500 V or higher voltages.

6.5 Power cable data

	Cable type	Outer cable diameter	Minimum bending radius
	[AWG]	[inch]	[inch]
Screened EMC power cable	3 × 6 + 3 × 12	1.10 ± 0.020	5
	3 × 4 + 3 × 6	1.35 ± 0.020	6
	3 × 2 + 3 × 6	1.45 ± 0.020	6
	3 × 1/0 + 3 × 6	1.70 ± 0.020	7
Screened EMC sensor cable	10 × 16	0.70 ± 0.010	3
	18 × 16	0.81 ± 0.010	4



The minimum size of the ground conductor must be equal to or bigger than the phase conductor.



The top cover of the explosion-proof pumps is provided with an external ground terminal to ensure the connection to the ground. The electrical installation must include an external connection from this terminal to the ground. The ground conductor must comply with all electrical safety regulations in force.



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

6.6 Sensors

The pumps can be equipped with various switches and sensors for protection. The specification table below indicates which switch and sensor types can be used.

Switch and sensor specification

Ex sensor versions come with 2 moisture switches and 1 optional dry running switch.

Sensor version	Standard and Standard Ex	V1 and V1 Ex	V2 and V2 Ex
Thermal switches / PTC	•	•	•
Moisture switch	•	•	•
Float switch in leakage chamber	•	•	•
Pt100 in motor winding		•	•
Pt100 in upper bearing		•	•
Pt100 in lower bearing		•	•
PVS3 vibration sensor		•	•
SM113 (integrated in the motor top)			•
IO113 (not integrated in the motor top)			•

Voltage tolerances

Component	Voltage	Tolerance
Motor	See the pump nameplate	± 10 %
Thermal switches	Maximum 24 V DC	± 10 %
Thermistors	2.5 - 7.5 V	-
Moisture switches	12-24 V DC	-
Other sensors (optional)	Maximum 14 V DC	± 1 V
SM 113 (optional)	Maximum 14 V DC	± 1 V

6.7 Thermal switches

Three bimetallic thermal switches are built into the stator windings. A contact opens in case of overtemperature (150 °C [302 °F]). The motor insulation is class H (180 °C [356 °F]).

The supply voltage to the thermal switches must be 12-24 V DC.

The thermal switches are connected to the control cable and must be connected to the safety circuit of the separate pump controller.

Use a multimeter to check that the circuit resistance does not exceed the maximum of 1.5 Ω (including 3 x PTO and control cable) at 20°C (68 °F).



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



In case the thermal switches or the moisture switches are not working, install an automatic circuit breaker.

6.8 Moisture switches and leakage switches

One moisture switch and one leakage switch are installed in the pump. The moisture switch is placed in the top cover and the leakage switch is in the chamber above the shaft seal.

Ex version:

Two moisture switches and a level switch are mounted in an Ex pump. The moisture switches are placed in the top cover and the level switch is in the leakage chamber.

All switches in both non-Ex and Ex versions are hardwired from the pump to IO 113. If moisture or a leakage is detected, they break the electric circuit. This generates both a hardware and a software alarm in IO 113, and the alarm relay opens.

Moisture- and level switches are motor protection devices protecting the motor from moisture or leakage. The moisture switch is non-reversing, and it must be replaced after being released. The level switch does not have to be replaced after being released.

The moisture- and level switches are connected in a separate circuit and to the control cable.

6.9 Thermistors

The standard pump range has bimetallic thermal switches connected, however, a pump with PTC thermistors connected are available as a Factory Product Variant (FPV).

The thermistors can be used as motor protection devices to monitor stator temperature instead of thermal switches and must be connected to the thermistor relay in the control cabinet.

The operating voltage of PTC thermistors is 2.5 - 7.5 V.

After the electrical connection, use a multimeter to:

1. check that the overall circuit resistance is between 250-750 Ω.
2. check that the insulation between the circuit and the stator housing is outside the range.
3. carry out similar measurements at the end of the power cable.

6.9.1 Pt100 temperature sensor

The Pt100 temperature sensor is available as an accessory or an FPV.

The Pt100 sensor is primarily used for the monitoring of bearing temperature, but it can also be used in the stator.

In case of overheating, the Pt100 sensor sends an alarm signal.



The bearing temperature monitoring system is only available as an option (based on sensor version).

The sensor resistance values are the following:

- 100 Ω at 0 °C (32 °F)
- 138.5 Ω at 100 °C (212 °F)
- approximately 107.8 Ω at room temperature.

The temperature limits are the following:

- 90 °C (194 °F): warning for bearing temperature

- 130 °C (266 °F): optional warning for high stator temperature, in case of PTC sensor used for monitoring
- 150 °C (302 °F): pump stop caused by high stator temperature (stop by thermistor / thermal switch).



In Ex-approved pumps, the maximum acceptable alarm temperature in the bearing sensors is 100 °C (212 °F) for the lower bearing (shaft end) and 120 °C (248 °F) for the upper bearing.



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.

6.10 IO 113 module

The IO 113 module is the interface between a pump with analog and digital sensors and the pump controller. The most important sensor data are indicated on the front panel.

One pump can be connected to one IO 113.

With the sensors, IO 113 provides a galvanic separation between the motor voltage in the pump and the connected controller.

The IO 113 enables the following functions:

- overtemperature protection
- monitoring the sensors for analog measurement of:
 - motor temperature (with Pt100 installed in the windings)
 - pump vibrations (with PVS3 vibration sensor)
 - stator insulation resistance
 - bearing temperature (with Pt100 installed at the bearings)
 - moisture in motor
- stopping the pump in case of alarm
- monitoring the pump through RS485 communication (Modbus or GENIbus).

Insulation resistance measurement

IO 113 measures the insulation resistance between a stator winding and ground:

- resistance above 10 MΩ = OK
- resistance between 10 MΩ and 1 MΩ = warning
- resistance below 1 MΩ = alarm.

6.11 SM 113 module

The SM 113 module is used for collecting and transferring sensor data. SM 113 works with IO 113 through power line communication using the Grundfos GENIbus protocol.

SM 113 collects data from the following devices:

- 2 current sensors, 4-20 mA
 - Vibration sensor
 - Water-in-oil (WIO) sensor
- Maximum 3 Pt100 thermal sensors
- Maximum 4 Pt1000 thermal sensors
- 1 PTC thermal sensor
- 1 digital input.



SM 113 is fitted with a 2.7 kΩ resistor to avoid false sensor alarms in the IO 113.

6.12 Pump vibration sensor (PVS 3)

The PVS 3 sensor monitors the vibration level to protect the pump and the pipe network against damage. A change in the vibration level indicates an abnormal situation. Make sure that a service inspection is carried out before the pump or the pipe network is damaged.



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

7. Startup



Pumps in dry installation must be vented.



Before the first startup and after a long standstill period, make sure that the pump is filled with the pumped liquid.



Make sure that the pump is filled with the pumped liquid.
Dry-running is not allowed.



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



Make sure the pump is connected to an overcurrent protective device.



No automatic disconnection device is applied in the product.



DANGER

Electric shock
Death or serious personal injury

- Make sure the pump is grounded.



WARNING

Electric shock
Death or serious personal injury

- Make sure the connections are correct.



CAUTION

Hearing impairment
Minor or moderate personal injury

- Use hearing protection when working nearby an environment with a sound pressure level above 70 dB(A).



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

1. Remove the fuses or switch off the main switch.
2. Check the motor liquid level in the cooling chamber.
3. Check if the impeller can rotate freely.
4. Check if the switches are closed, replace if necessary.
5. Check whether the monitoring units, if used, are operating properly.
6. For pumps in a submerged installation, make sure that the pump is submerged in the liquid.
7. Open the isolating valves, if fitted.
8. Check if the system is filled with liquid and vented.
9. Check the settings of the level switches.

10. Start the pump and check the operation for abnormal noise or vibrations.
11. After startup, the actual pump duty point must be established. Make sure the operating conditions are met.



The pump may only be started for a short period without being submerged for checking the direction of rotation. The correct direction is highlighted on the pump.

Always operate the pump in accordance with established routines and perform scheduled checks of pump monitoring equipment and accessories. Make sure that the pump and equipment settings cannot be changed by unauthorized persons.

8. Storage

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

After a period of storage, inspect the pump before putting it into operation. Make sure that the impeller can rotate freely. Pay attention to the condition of the shaft seals, O-rings and the cable entries.



Do not store the product in direct sunlight.



Storage temperature is -20 °C to +55 °C (-4 °F to 131 °F). A maximum of 70 °C (158 °F) is allowed for short periods, not exceeding 24 hours.



Do not remove the cable-end protectors until the cables are installed to protect them against moisture.



If the pump is being stored for more than a month, turn the impeller at least every month to prevent the seal faces of the lower mechanical shaft seal from seizing up.

Avoiding this may cause damage to the shaft seal and motor bearings when the pump is started.

If the impeller cannot be turned, contact an authorized service workshop.



WARNING

Crushing hazard

Death or serious personal injury

- Do not turn the impeller by hand. Always use an appropriate tool.



On pumps fitted with guide vane, be careful not to damage the guide vane when turning the impeller.

9. Maintenance and service



The maintenance and service work on explosion-proof pumps must be carried out by Grundfos or an authorized service workshop.



Do not open the pump if the ambient atmosphere is explosive.

DANGER



Electric shock

Death or serious personal injury

- Before starting any work on the product, make sure that the power supply is switched off and it cannot be switched on unintentionally.

CAUTION



Crushing hazard

Minor or moderate personal injury

- Make sure the pump cannot roll or fall over.

DANGER



Electric shock

Death or serious personal injury

- Make sure the pump is grounded.

CAUTION



Sharp element

Minor or moderate personal injury

- Be careful of sharp edges. Wear protective gloves.



Maintenance and service must be carried out by qualified persons.

Before carrying out maintenance and service, make sure that the pump is thoroughly flushed with clean water. Rinse the pump parts after dismantling.



Change the motor liquid after 12.000 operating hours or 3 years, whichever comes first.



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



When the pump is new or after replacement of the shaft seals, check the motor liquid level and its water content after one week of operation. If the motor liquid level has dropped, the shaft seal may be defective.

Pumps running normal operation must be inspected every 12.000 operating hours or once in 3 years.

Check the following during inspection:

- **Power consumption**
- **Motor liquid (SML3 glycol) level.**



Disposal of the motor liquid must comply with local regulations.

- **Cable entries:** Make sure that the cable entries are waterproof and the cables are not sharply bent or pinched.
- **Impeller clearance:** Check the impeller clearance.
- **Pump parts:** Check the pump housing and other parts for possible wear. Replace defective parts.
- **Ball bearings:** Check the shaft for noisy or heavy operation; turn the shaft manually. Replace defective bearings. A general overhaul of the pump is usually required in case of defective bearings or poor motor function. This work must be carried out by an authorized service workshop. Bearings are lubricated for lifetime.
- **Vibration:** If the pump is vibrating at an abnormal level, do not restart the pump until the cause of the fault is identified and eliminated.
- **General maintenance:** It is usually required in case of defective ball bearings or poor motor function. This work must be carried out by an authorized service workshop.
- **Dry-running switch:** Test the dry-running switch during inspection to make sure it functions properly. If the switch does not function properly, it must be replaced.



Replace the ball bearings at least every 25.000 operating hours.

9.1 Dry-running switch check

Test the dry-running switch during pump inspections. During the test, the dry-running switch must stay in place. If the sensor does not work correctly, it must be replaced. To test the sensor, measure the resistance between the wire ends and compare the values to the table below.

Value	Sensor version	Measurement points	Measurement evaluation
closed circuit (0.5-2 Ω depending on cable length)	Standard Ex version	Sensor wire "3" and "7"	The switch is at the upper position because of the cooling liquid. Correct function.
	Sensor V1 Ex version	Sensor wire "3" and "15"	
	Sensor V2 Ex version	Sensor wire "3" and "7"	
open circuit (no resistance can be measured)	Standard Ex version	Sensor wire "3" and "7"	Incorrect function. Change the switch.
	Sensor V1 Ex version	Sensor wire "3" and "15"	
	Sensor V2 Ex version	Sensor wire "3" and "7"	

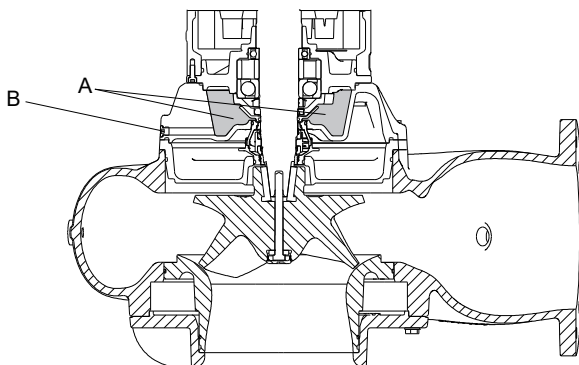
9.2 Drain leakage chamber on SL pumps



Drain the leakage chamber after 12.000 operating hours or three years, whichever comes first.



Normal leakage rate for the shaft seal is 2.000 ml / 12.000 operating hours. If more than 5.000 ml fluid can be drained from the leakage chamber, the shaft seal must be replaced.



TM083732

Leakage chamber on SL pumps

A	Leakage chamber
B	Leakage chamber plug

1. Place a plastic container under the leakage chamber plug.
2. Remove the leakage chamber plug (B).
3. Drain the fluid from the leakage chamber. Tilt the pump if necessary.

9.3 Pump overhaul

Pumps running in normal operation require major overhaul after 24.000 operating hours or 6 years, whichever comes first. The overhaul includes the replacement of the following:

- shaft seal
- bearings
- impeller + suction cover
- moisture switch
- gaskets
- O-rings
- motor liquid.

9.4 Motor liquid check and change



Clean the outside of the pump regularly to retain the heat conductivity.



Change the motor liquid once a year or after 12.000 operating hours to prevent oxidation.



Lack of motor liquid may cause overheating and damage to the mechanical seals.



Use SML3 coolant for motor cooling.

The ingress level of the pumped liquid into the motor liquid can be checked. Use a refractometer (product no. 98676968) which shows the refractive index in percentage. Always use the propylene glycol scale.

Measured freezing point	Liquid ingress (%)
-20 °C (-4 °F)	0
-18 °C (0.4 °F)	5
-17 °C (1.4 °F)	10
-15 °C (5 °F)	15
-14 °C (6.8 °F)	20

If the refractive index is higher than 20 %, change the motor liquid.

Pump type	Liquid amount
SL	13 l (3.4 US gal)
SE	31 l (8.19 US gal)

Do not exceed this level of refractive index to ensure the appropriate condition of the shaft seal and the bearings for reliable operation.



Drain the leakage chamber of the pump after 12.000 operating hours.



Normal leakage rate for the shaft seal is 2.000 ml / 12.000 operating hours. If more than 5.000 ml fluid can be drained from the leakage chamber, the shaft seal must be replaced.

WARNING

Pressurized system

Death or serious personal injury



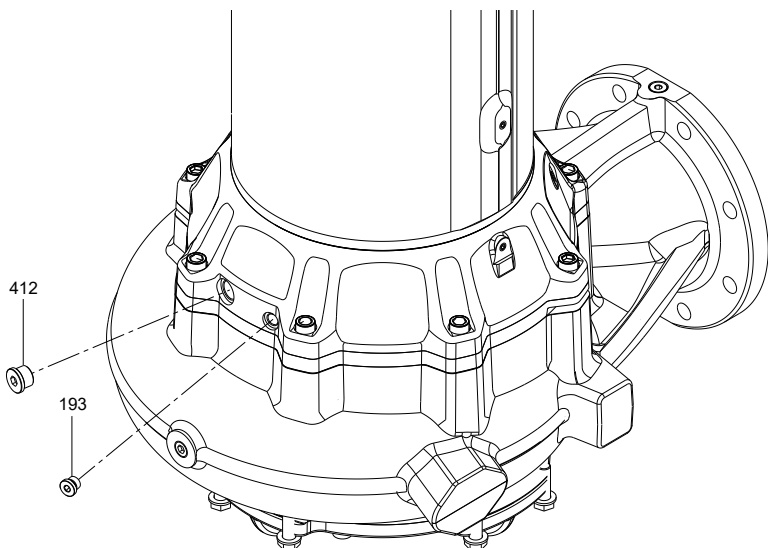
- The seal chamber may be under pressure. Loosen the screws carefully and do not remove them until the pressure is completely relieved.



There must be minimum 10 % air in the seal housing due to thermal expansion of the motor liquid during operation.

9.4.1 Drain motor liquid on SL pumps

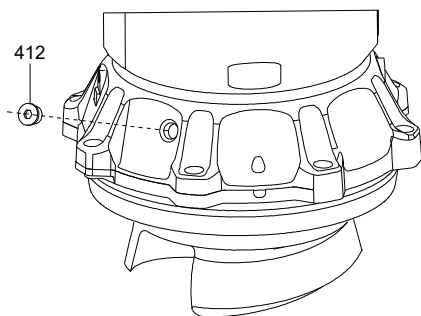
1. Place the pump in horizontal position, so the filling plug (412) is pointing downwards.



2. Place a container under the filling hole (above 13 liter (3.4 US gal) capacity).
3. Remove the filling plug and drain the motor liquid from the seal housing.

9.4.2 Fill motor liquid on SL pumps

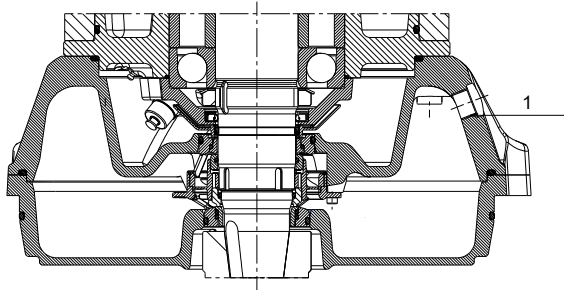
1. Place the pump in vertical position.
2. Remove the filling plug (412) from the seal housing.



TM085629

TM083647

3. Fill the seal housing through the filling hole with the required motor liquid. The seal housing is full when the liquid level reaches the edge of the filling hole (1). Approximately 13 liters (3.4 US gal) of motor liquid required for full fill-up.

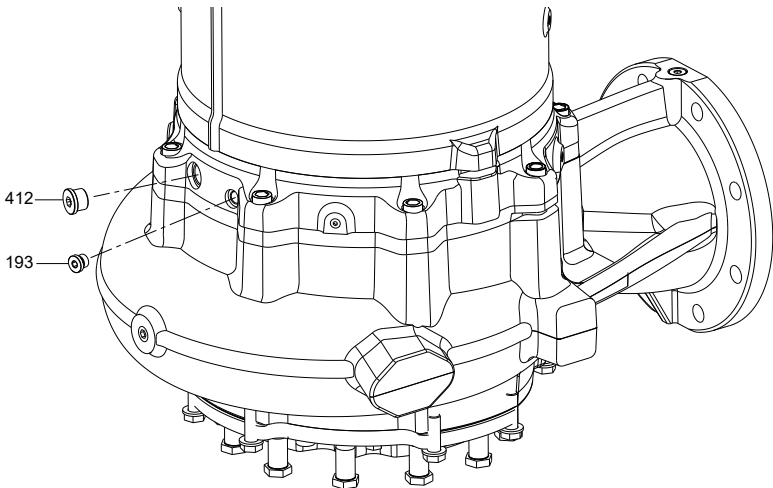


TM083648

4. After the seal housing is filled up, insert the plug back into the filling hole and tighten with $30 \pm 3 \text{ Nm}$ ($22 \pm 2 \text{ ft-lbs}$) torque.

9.4.3 Drain motor liquid on SE pumps

1. Place the pump in horizontal position, so the filling plug (412) is pointing downwards.



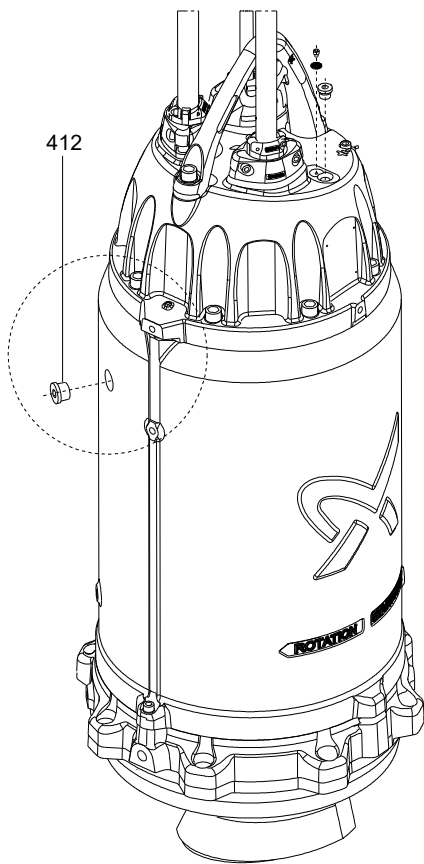
TM085626

2. Place a container under the filling hole (above 31 liter [8.19 US gal] capacity).
3. Remove the filling plug and drain the motor liquid from the cooling jacket.

9.4.4 Fill motor liquid on SE pumps

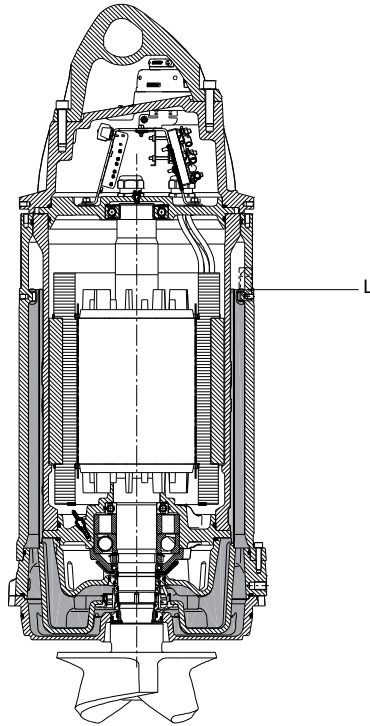
1. Place the pump in vertical position.

2. Remove the filling plug (412) from the cooling jacket.



TM084959

- Fill the cooling jacket through the filling hole with the required motor liquid. The cooling jacket is full when the liquid level reaches the edge of the filling hole (L). Approximately 31 liters (8.19 US gal) of motor liquid required for full fill-up.



- After the cooling jacket is filled up, insert the plug back into the filling hole and tighten with 30 ± 3 Nm (22 ± 2 ft-lbs) torque.

9.5 Impeller clearance inspection

For pumps fitted with open **S-tube**®, the impeller clearance is the distance between the bottom of the impeller and the suction cover.

The correct impeller clearance is required to maintain the hydraulic performance of the pump and to prevent clogging.



CAUTION

Hot surface
Minor or moderate personal injury

- Check the impeller clearance every time service is carried out to prevent hot surfaces in the hydraulic parts.

Clearance sizes for open S-tube® impellers

Pressure range	Impeller clearance [mm]
All	0.5 ± 0.1

TM084958



DANGER

Electric shock

Death or serious personal injury

- Before starting any work on the product, make sure that the power supply is switched off and that it cannot be switched on unintentionally.

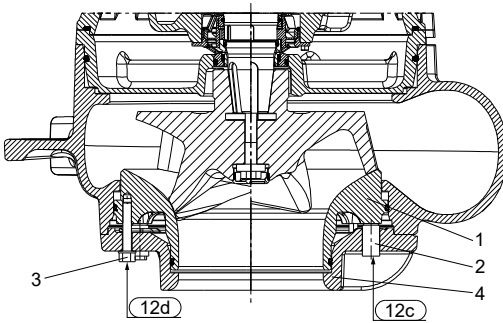


The impeller clearance of vertical, submerged installation types is inspected directly through the pump inlet.

9.6 Impeller clearance adjustment parts



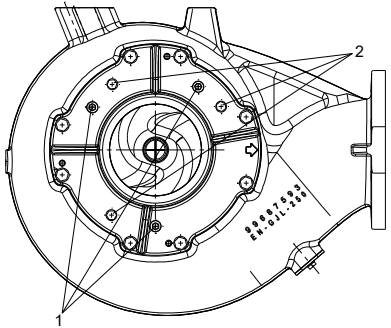
Tighten the set screws carefully to avoid damage to the bearings.



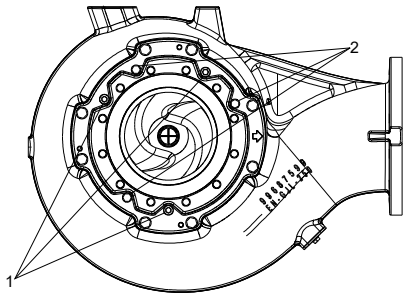
TM1040240

Tip gap adjustment parts

Pos.	Description
1	Suction cover
2	Set screw
3	Fastening screw
4	Suction flange



TM11040241



TM083369

SL impeller clearance screws

SE impeller clearance screws

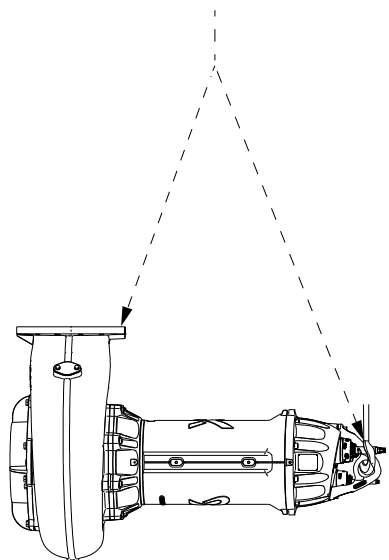
Pos.	Description
1	Set screws
2	Fastening screws

9.6.1 Impeller clearance adjustment - in case of major maintenance when the pump is removed from application



Tighten the set screws carefully to avoid bearing damage.

The following method is suitable for pumps in horizontal position.



TM083487



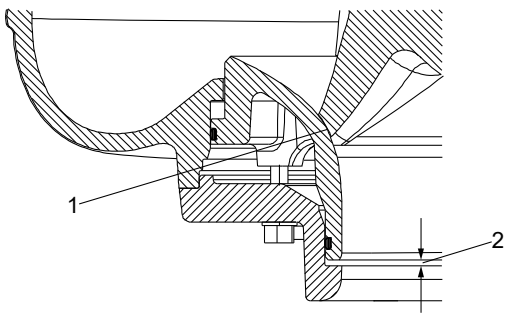
SL pumps are not intended for horizontal installation. Only move them horizontally for maintenance purposes.

Horizontal lifting points for SL pumps

Proceed as follows:

1. Loosen all fastening screws.
2. Slowly tighten all three set screws to a stop. Follow a circular pattern when tightening, use the same torque on each screw (torque wrench not necessary). In this case, the suction cover touches the impeller, and the impeller cannot be turned, the gap is set to 0. To make sure that the Suction Cover is not slanted in any direction, check the „Indirect Gap“ around. The gap must be even all around.
3. Loosen all set screws one by one, by turning them 120° counterclockwise.
4. Tighten all fastening screws to stop. Follow a circular pattern when tightening, use the same torque on each screw (torque wrench not necessary).
5. Now the impeller clearance (gap between suction cover and impeller) should be 0.5 ± 0.1 mm. Check the gap in 60° steps around by rotating the impeller and using a gap gauge.

- 6. Tighten the fastening screws, required torque is 50 ± 5 Nm. Impeller clearance (1) is set. Check clearance size with the gap gauge again, to ensure the setting did not alter during the tightening of screws.



Pos. Description

- 1 Tip gap between impeller and suction cover, must be 0.5 ± 0.1 mm.
- 2 Indirect gap for control measurement

TM11040239

Clearance gaps

9.6.2 Impeller clearance adjustment - in case of minor maintenance when the pump remains in application

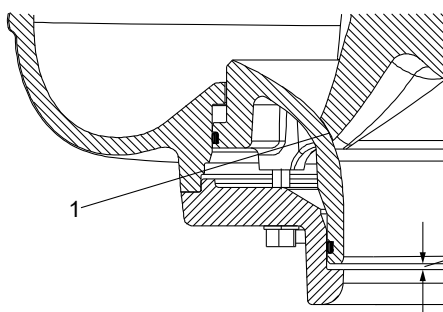


Tighten the set screws carefully to avoid bearing damage.

The following method is suitable for pumps in horizontal position.

Proceed as follows:

1. Loosen all fastening screws.
2. Slowly tighten all three set screws to a stop. Follow a circular pattern when tightening, use the same torque on each screw (torque wrench not necessary). In this case, the suction cover touches the impeller, and the impeller cannot be turned, the gap is set to 0. To make sure that the Suction cover is not slanted in any direction, check the „Indirect Gap“ around. The gap must be even all around.
3. Loosen all set screws one by one, by turning them 120° counterclockwise.
4. Tighten the fastening screws, required torque is 50 ± 5 Nm (38 ± 4 ft-lbs). Impeller clearance (1) is set.



Pos. Description

1 Tip gap between impeller and suction cover, must be 0.5 ± 0.1 mm.

2 Indirect gap for control measurement

TM1040239

Clearance gaps

5. Start the pump and listen if there is any noise from the impeller touching the suction cover.
 - a. If there is no noise, no further action is necessary.
 - b. If there is noise, stop the pump immediately, loosen all fastening screws, then loosen the set screws by rotating them 10° further, then finally tighten the Fixing Screws according to Step 4. If this does not solve the noise issue, start over from Step 1.

9.7 Contaminated pumps

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



CAUTION

Biological hazard

Minor or moderate personal injury

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

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 returning it.

10. Troubleshooting



Observe all regulations applying to pumps installed in potentially explosive environments. Make sure that no work is carried out in potentially explosive atmospheres.



DANGER

Electric shock

Death or serious personal injury

- Before starting any work on the product, make sure that the power supply is switched off and it cannot be switched on unintentionally.



DANGER

Electric shock

Death or serious personal injury

- The pump must be grounded.



Before diagnosing any fault, make sure that all rotating parts have stopped moving.

Fault	Cause	Remedy
The pump does not start or stops without visible cause.	No power supply.	Re-establish the power supply. Start the pump manually.
	Missing phase.	Re-establish all phases.
	The pump is overloaded.	If the fault does not disappear automatically, find the cause and remedy the fault.
	The impeller is clogged by impurities.	Clean the impeller.
	The motor-protective circuit breaker is set incorrectly.	Set the motor-protective circuit breaker according to the rated current.
	The thermal switches are tripped. Insufficient motor cooling.	Re-establish the motor cooling.
	The moisture switch in the motor is tripped.	Contact an authorized service workshop.
The pump does not start or stops. The control panel indicates that the motor-protective circuit breaker or protection equipment is tripped.	The power cable is defective.	Contact an authorized service workshop.
	The voltage is fluctuating.	Re-establish the correct voltage supply. Permissible deviation is $\pm 10\%$.

Fault	Cause	Remedy
The pump runs, but does not deliver the rated flow.	The direction of rotation is wrong.	Interchange two phases to the motor.
	The impeller is loose or worn.	Tighten or replace the impeller.
	The pump or the pipes are blocked by impurities.	Clean the pump or the pipes.
	The pump head is too high.	Measure the differential pressure and compare the value with the pump curve. Check that all valves are open or remove any blockage in the outlet pipe.
	The valves are closed or blocked. The non-return valve is not operating.	Clean or replace the valves.
	There is air in the pump or the inlet pipe.	Vent the pump and the inlet pipe. Increase the stop level in the pit.
	The pumped liquid is too dense.	Dilute the pumped liquid.
	The pump is improperly connected to the auto coupling.	Pump down the liquid level in the pit. Lift out the pump and place it on the auto coupling again.
	There is leakage in the pipes.	Repair the pipes.
The pump starts, but stops immediately.	The pit flushing system is inadvertently activated.	Check the function of the pit flushing system and repair it, if required.
	The pump is clogged, which causes the motor-protective circuit breaker to trip.	Clean the pump.
	The motor is overheated, which causes the thermal switches to trip.	Allow the pump to cool. Clean the pump.
	The level switch is out of adjustment or defective, or the cooling liquid is leaking.	Check the level of the cooling liquid, then contact an authorized service.

Fault	Cause	Remedy
The pump is vibrating or emitting excessive noise.	The pump is partly clogged by impurities.	Clean the pump.
	The direction of rotation is wrong.	Interchange two phases to the motor.
	The pump is operating outside the specified operating range.	Re-establish proper operating conditions.
	The pump is defective.	Repair the pump or contact an authorized workshop, if necessary.
	The pump is not properly connected to the auto coupling.	Pump down the liquid level in the pit. Lift out the pump and place the pump on the auto coupling.
	The pump is cavitating.	Clean the inlet pipe.
	The impeller is not in balance.	Contact an authorized service workshop.
	The base stand, the auto coupling, the ring stand or the guide rails are installed incorrectly.	Install the components correctly.
Low motor liquid level.	The upper mechanical shaft seal is leaking.	Contact an authorized service workshop.

11. Technical data

pH value

Pumps in permanent installations can cope with the following pH values:

Material variant	Installation	pH value
Standard ¹⁾	All types	6-14 ¹⁾

¹⁾ Cast iron impeller, pump housing and motor top.

Density and viscosity of the pumped liquid

Density: 8.3 lbs / US gal (1000 kg/m³).

Kinematic viscosity: 1 cSt (1 mm²/s).



When pumping liquids with a density and/or a kinematic viscosity higher than the values stated above, use motors with correspondingly higher outputs.

Flow rate

Keep a minimum flow rate to avoid sedimentation in the pipe network. Recommended minimum flow rates:

- in vertical pipes: 2.5 ft/s (0.7 m/s).
- in horizontal pipes: 3.5 ft/s (1.0 m/s).

Ambient temperature

The maximum ambient temperature for Ex-proof pumps is 104 °F (40 °C). Non-Ex pumps may handle up to a maximum of 140 °F (60 °C) for a short period (maximum 3 minutes).

Altitude

The product operates correctly up to 3280 ft (1000 m) altitude above sea level.

Liquid temperature

32 °F to 104 °F (0 to +40 °C).

For non-Ex pumps only, the maximum liquid temperature may be up to 60 °C (140 °F) for a short period (maximum 3 minutes).

Operating mode

The pumps are designed for continuous operation.

Installation depth

Maximum 65 ft (20 m) below liquid level. Custom variants may be installed at maximum 98 ft (30 meters) depth, but not explosion-proof pumps. Power cable length must always be more than installation depth.



Do not use extended power cables. Only use a single-piece power cable that is longer than the depth of installation.

Enclosure class

IP68.

Sound Pressure



Use hearing protection when working nearby by an installation in operation with a sound pressure level above 70 dB(A).

Motor liquid

The motor is factory-filled with Grundfos SML3 motor liquid which is frost-resistant until -4 °F (-20 °C). The motor liquid helps to transfer the heat generated by the motor to the cooling chamber and to the pumped liquid to pass on the outside of the pump.

Electrical data

The supply voltage and frequency are marked on the nameplate.

The voltage tolerance at the motor terminals must be within $\pm 10\%$ of the rated voltage.

Maximum number of starts per hour

30.

12. Disposing of the product

This product or parts of it must be disposed of in an environmentally sound way.

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.



The crossed-out wheellie bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities. The separate collection and recycling of such products will help protect the environment and human health.

See also end-of-life information at www.grundfos.com/product-recycling.

Limited consumer warranty

1. Limited consumer warranty

This Limited Warranty is provided for Consumer Products sold in the United States only and applies to Consumer Transactions as defined in and applicable under the Magnusson-Moss Warranty Act and any other applicable Federal and/or State laws. In case of non-Consumer Products, please refer to Grundfos' warranty terms defined in clause 10 of Grundfos US Terms and Conditions of Sale of Product and Services available at <https://www.grundfos.com/legal/grundfos-customer-terms/usa-grundfos-general-terms-for-sales-of-products-and-services>

This Limited Warranty gives you specific legal rights, and you may also have other rights which vary from State to State.

New products manufactured by Grundfos are warranted to the original purchaser only and are to be free from defects in design, material and workmanship under normal use and service for no greater than a period of thirty (30) months from the date of manufacture which is set forth on the product's nameplate and on the product's packaging or the minimum period required by the applicable State law. For New Jersey, the applicable period is one year from the date of purchase.

The warranty period for replacement products, parts and components expires thirty (30) months from the original date of manufacture of the product originally purchased, unless a longer period is required under the applicable State law. For New Jersey, the warranty period for replacement products, parts and components expires one year from the original date of purchase of the product, not the date of replacement.

Products sold by Grundfos that are manufactured by others are not covered by this warranty.

Note that when purchasing a Grundfos product online, it is important to check the date of manufacture and the duration of the warranty with the seller as the product might no longer be covered under this Limited Warranty.

When a product is subject to this Limited Warranty a purchaser should contact the seller from which it purchased the product to make a claim.

If the seller of a product is no longer in business, the purchaser should contact a Grundfos Authorized Service Partner, which can be found at www.grundfos.com/us under > Support > Contact Service.

As part of making a claim, a purchaser shall return a defective product at the purchaser's cost, to the extent allowed by applicable law, along with proof of purchase and an explanation of the defect, date the defect occurred and circumstances surrounding the defect. For New Jersey there is no prohibition on returning a defective product at a purchaser's cost. If Grundfos is required by applicable State law to pay for the cost of shipment under applicable State law, then a purchaser should contact a Grundfos Authorized Service Partner to arrange for shipment. A purchaser also needs to promptly respond to Grundfos as to any inquiries regarding a warranty claim.

Grundfos' liability under this Limited Warranty to purchaser is limited to the repair or replacement of a product (at Grundfos' decision) that is the sole and exclusive remedy for purchaser to the extent permissible by applicable law. For New Jersey this limitation is permissible.

This warranty does not cover the following: ordinary wear and tear; use of a product for applications for which it is not intended; use of a product in an unsuitable environment; modifications, alterations or repair undertaken by anyone not acting with Grundfos' written authorization; failure to follow Grundfos' instructions, operations manuals, any other guidelines or good industry practice; use of faulty or inadequate ancillary equipment in combination with a product; application of spare or replacement parts not provided or authorized by Grundfos; accidental or intentional damage or misuse of a product.

The time period for making a claim under the implied warranty of merchantability and implied warranty of fitness are limited to the same time period as provided by this warranty to the extent permissible by applicable law. For residents of New Jersey, this limitation is permissible, but note that some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Grundfos shall not be liable for any incidental and consequential damages in connection with a product to the extent permissible by applicable law. For residents of New Jersey, this limitation is permissible, but note that some states do not allow limitations of incidental or consequential damages, so the above limitation may not apply to you.

2. Garantía limitada del consumidor

Esta garantía limitada se proporciona únicamente para los productos de consumo vendidos en los Estados Unidos y es aplicable a las transacciones de consumo tal y como se define en y resulta aplicable en virtud de la ley de Garantías Magnusson-Moss y cualquier otra legislación federal y/o estatal aplicable. Para el caso de productos que no sean de consumo, consulte los términos de la garantía de Grundfos definidos en la cláusula 10 de los términos y condiciones de venta de productos y servicios de Grundfos para los EE. UU., disponibles en <https://www.grundfos.com/legal/grundfos-customer-terms/usa-grundfos-general-terms-for-sales-of-products-and-services>.

Esta garantía limitada le confiere derechos legales específicos. Puede que también tenga otros derechos en virtud de su jurisdicción estatal.

Se garantiza únicamente al comprador original que los productos fabricados por Grundfos estarán libres de defectos de diseño, materiales y mano de obra en condiciones normales de uso y servicio durante un periodo no mayor a treinta (30) meses a partir de la fecha de fabricación que figura en la placa de datos del producto y en el empaque del mismo o el periodo mínimo exigido por la legislación estatal aplicable. Para Nueva Jersey, el periodo aplicable es de un año a partir de la fecha de compra.

El periodo de garantía para los productos, partes y componentes de repuesto vence a los treinta (30) meses contados a partir de la fecha de fabricación original del producto adquirido en primer lugar, a menos que la legislación estatal aplicable exija un periodo más largo. Para Nueva Jersey, el periodo de garantía de los productos, partes y componentes de repuesto vence un año contado a partir de la fecha original de compra del producto, no de la fecha de sustitución.

Los productos vendidos por Grundfos que sean producidos por otros fabricantes no están cubiertos por esta garantía.

Tenga en cuenta que, al comprar un producto Grundfos en línea, es importante revisar la fecha de fabricación y la duración de la garantía con el vendedor, ya que es posible que el producto ya no esté cubierto por esta garantía limitada.

Cuando un producto esté sujeto a esta garantía limitada, el comprador deberá ponerse en contacto con el vendedor al que haya comprado el producto para presentar una reclamación.

Si el vendedor de un producto ya no está en el negocio, el comprador debe ponerse en contacto con socio de servicio autorizado por Grundfos, que puede encontrar en la dirección www.grundfos.com/us, en la sección "Support" > "Contact Service".

Como parte de la presentación de una reclamación, el comprador deberá devolver el producto descompuesto a su costa, en la medida en la que lo permita la legislación aplicable, junto con el comprobante de compra y una explicación del defecto, la fecha en que este se haya producido y las circunstancias en torno al defecto. En Nueva Jersey no existe ninguna prohibición de devolver un producto descompuesto a costa del comprador. Si la legislación estatal aplicable obliga a Grundfos a hacerse cargo de los gastos de envío, el comprador deberá ponerse en contacto con un servicio técnico autorizado por Grundfos para organizar el envío. El comprador también debe responder con prontitud a Grundfos cualquier consulta relacionada con una reclamación de garantía.

La responsabilidad de Grundfos hacia el comprador en virtud de esta garantía limitada se limita a la reparación o sustitución de un producto (a decisión de Grundfos), que es el único y exclusivo remedio para el comprador en la medida permitida por la legislación aplicable. Para Nueva Jersey, esta limitación resulta permisible.

Esta garantía no cubre lo siguiente: el desgaste ordinario; el uso de un producto para aplicaciones para las que no está diseñado; el uso de un producto en un entorno inadecuado; las modificaciones, alteraciones o reparaciones realizadas por cualquier persona que no actúe con la autorización por escrito de Grundfos; el incumplimiento de las instrucciones, manuales de operación, cualquier otro lineamiento o las buenas prácticas industriales de Grundfos; el uso de equipos auxiliares descompuestos o inadecuados en combinación con un producto; el uso de repuestos o partes de sustitución no proporcionados ni autorizados por Grundfos; el daño accidental o deliberado o el uso indebido de un producto.

El periodo para presentar una reclamación en virtud de la garantía implícita de comerciabilidad y la garantía implícita de idoneidad se limita al mismo periodo previsto por esta garantía en la medida permitida por la legislación aplicable. Para los residentes de Nueva Jersey, esta limitación resulta permisible, si bien se debe tener en cuenta que algunos estados no permiten limitaciones en cuanto a la duración de una garantía implícita, por lo que la limitación anterior puede no resultar aplicable en su caso.

Grundfos no será responsable de ningún daño indirecto o consecuente en relación con un producto en la medida en la que lo permita la legislación aplicable. Para los residentes de Nueva Jersey, esta limitación resulta permisible, si bien debe tenerse en cuenta que algunos estados no permiten limitaciones en cuanto a daños indirectos o consecuentes, por lo que la limitación anterior puede no resultar aplicable en su caso.

Limited manufacturer's warranty

1. Limited manufacturer's warranty

This Limited Manufacturer's Warranty outlines applicable coverage and claims procedures for the pumps manufactured by Grundfos (the "Product").

This Limited Manufacturer's Warranty is provided for consumer products sold and used in Canada only and applies to consumer transactions as defined in the applicable provincial and territorial laws. In case of non-consumer products, please refer to Grundfos' warranty terms defined in clause 10 of Grundfos Canada Terms and Conditions of Sale of Product and Services available at: <https://www.grundfos.com/ca/legal/general-terms-and-conditions-of-sales-and-delivery>

This Limited Manufacturer's Warranty provides specific rights and limitations. Some of the limitations may not apply to you, and you may also have other rights that vary from province to province.

Scope of the Limited Manufacturer's Warranty

Subject to the following warranty terms and conditions, Grundfos Canada Inc. of 2941 Brighton Rd, Oakville, ON L6H 6C9, Canada ("Grundfos"), warrants to the original consumer (the "Purchaser") that the new Product manufactured by Grundfos is free from defects in design, material and workmanship under normal use and service for a period of twenty-four (24) months from the date of retail purchase but no greater than a period of thirty (30) months from the date of manufacture which is set forth on the Product's nameplate and on the Product's packaging (the "Warranty Period").

Note that when purchasing a Grundfos Product online, it is important to check the date of manufacture and the duration of the warranty with the seller as the Product might no longer be covered under this Limited Manufacturer's Warranty.

This Limited Manufacturer's Warranty applies exclusively to a new Grundfos Product sold and used in Canada. This Limited Manufacturer's Warranty does not apply to any Product sold "as is" or "sales final". This Limited Manufacturer's Warranty is not transferrable by the original Purchaser. Products sold by Grundfos that are manufactured by others are not covered by this warranty.

The sole and exclusive remedy under this Limited Manufacturer's Warranty is the repair or, at the discretion of Grundfos, the replacement of the Product, as set out below. Defects or damages are not covered by the Limited Manufacturer's Warranty if they are due to:

- ordinary wear and tear;
- use of the Product for an application for which it is not intended;
- installation of the Product in an environment not suitable for the Product;
- any modification, alteration or repair of the Product undertaken by the Purchaser or a third party (not acting on Grundfos' behalf);
- failure to follow Grundfos' instructions, including in the installation manual, operation manual, maintenance manual or service manual;
- installation, commissioning, operation (including the use of the Product or any Grundfos product outside its specifications) or maintenance of the Product other than in accordance with Grundfos installation manual, operation manual, maintenance manual or service manual or with good industry practice;
- use of faulty or inadequate ancillary equipment in combination with the Product;
- the application of spare parts of poor quality (excluding the application of any Grundfos original spare parts);
- accidental or intentional damage or misuse of the Products or services by the Purchaser or a third party (not acting on Grundfos' behalf); or
- the non-compliance of the Purchaser or of the Purchaser's own products with applicable law and regulation.

How to get service under the Limited Manufacturer's Warranty:

When a Product is subject to this Limited Manufacturer's Warranty, the Purchaser should contact the seller from which it purchased the Product to make a claim within 24 months from the date of retail purchase but no later than thirty (30) months from the date of manufacture which is set forth on the Product's nameplate and on the Product's packaging (the "Warranty Notification Period").

If the seller of a Product is no longer in business, the Purchaser should contact Grundfos Service at www.grundfos.com/us under **Support > Contact Service**.

To exercise the rights under this Limited Manufacturer's Warranty, the Purchaser shall return a defective Product at the Purchaser's cost, to the extent allowed by applicable law, along with proof of purchase and an explanation of the defect, date the defect occurred and circumstances surrounding the defect.

The Purchaser is responsible for any expenses for dismounting and mounting the Product and for any and costs related to removal, reinstallation, transportation, and insurance. If Grundfos is required by applicable provincial or territorial law to pay for the cost of transportation, then the Purchaser should contact Grundfos Service Partner to arrange for shipment. The Purchaser also needs to promptly respond to Grundfos as to any inquiries regarding a warranty claim.

Unless requested by Grundfos, the Product may not be disassembled prior to remedy. Any failure to comply herewith will render this Limited Manufacturer's Warranty void.

Grundfos will either arrange the repair of the defective Product under this Limited Manufacturer's Warranty or, at Grundfos' option, provide the Purchaser with a replacement of the defective Product. The replacement unit can be new or remanufactured.

To the extent permissible by applicable law, Grundfos shall not be liable for any incidental and consequential damages or losses of any kind whatsoever arising under, relating to or in connection with the Product, use of the Product or the inability to use the Product.

2. Garantie limitée du fabricant

Cette garantie limitée du fabricant décrit la couverture applicable et les procédures de réclamation pour les pompes fabriquées par Grundfos (ci-après le « Produit »).

Cette garantie limitée du fabricant est fournie pour les produits de consommation vendus et utilisés au Canada uniquement et s'applique aux transactions de consommateurs telles que définies dans les lois provinciales et territoriales applicables. Dans le cas de produits non destinés aux consommateurs, se référer aux conditions de garantie de Grundfos définies à l'article 10 des Conditions générales de vente des produits et services de Grundfos Canada, qui sont disponibles à l'adresse suivante : <https://www.grundfos.com/ca/fr/legal/general-terms-and-conditions-of-sales-and-delivery>

Cette garantie limitée du fabricant prévoit des droits et des limitations spécifiques. Certaines des limitations peuvent ne pas s'appliquer à vous, et vous pouvez également bénéficier d'autres droits qui varient d'une province à l'autre.

Champ d'application de la garantie limitée du fabricant

Sous réserve des conditions générales de garantie suivantes, Grundfos Canada Inc., dont le siège social est situé au 2941, Brighton Rd, Oakville, ON L6H 6C9, Canada (ci-après « Grundfos »), garantit au consommateur initial (ci-après « l'Acheteur ») que le nouveau Produit fabriqué par Grundfos est exempt de défauts de conception, de matériaux et de fabrication dans des conditions normales d'utilisation et d'entretien pendant une période de vingt-quatre (24) mois à compter de la date d'achat au détail, mais pas plus de trente (30) mois à compter de la date de fabrication indiquée sur la plaque signalétique et sur l'emballage du Produit (« Période de garantie »).

Lors de l'achat d'un Produit Grundfos en ligne, il est important de vérifier la date de fabrication et la durée de la garantie auprès du vendeur, car le Produit pourrait ne plus être couvert par cette garantie limitée du fabricant.

Cette garantie limitée du fabricant s'applique exclusivement à un Produit Grundfos neuf vendu et utilisé au Canada. Cette garantie limitée du fabricant ne s'applique pas aux Produits vendus « en l'état » ou « vente finale ». La présente garantie limitée du fabricant n'est pas transférable par l'Acheteur initial. Les produits vendus par Grundfos qui sont fabriqués par des tiers ne sont pas couverts par cette garantie. Le seul et unique recours dans le cadre de cette garantie limitée du fabricant est la réparation ou, à la discrétion de Grundfos, le remplacement du Produit, comme indiqué ci-dessous. Les défauts ou dommages ne sont pas couverts par la garantie limitée du fabricant s'ils sont dus à :

- l'usure normale ;
- l'utilisation du Produit pour une application pour laquelle il n'est pas prévu ;
- l'installation du Produit dans un environnement non adapté au Produit ;
- toute modification, altération ou réparation du Produit entreprise par l'Acheteur ou un tiers (n'agissant pas pour le compte de Grundfos) ;
- la non-observation des instructions de Grundfos, y compris dans les notices d'installation, d'utilisation, de maintenance ou d'entretien ;
- l'installation, la mise en service, l'utilisation (y compris l'utilisation du Produit ou de tout produit Grundfos en dehors de ses spécifications) ou l'entretien du Produit autrement que conformément aux notices d'installation, d'utilisation, de maintenance ou d'entretien Grundfos ou aux bonnes pratiques de l'industrie ;
- l'utilisation d'un équipement auxiliaire défectueux ou inadéquat en combinaison avec le Produit ;
- l'utilisation de pièces de rechange de mauvaise qualité (à l'exclusion de l'utilisation de pièces de rechange d'origine Grundfos) ;
- tout dommage accidentel ou intentionnel ou toute mauvaise utilisation des Produits ou des services par l'Acheteur ou un tiers (n'agissant pas pour le compte de Grundfos) ; ou
- la non-conformité de l'Acheteur ou de ses propres produits aux lois et règlements applicables.

Procédure à suivre pour bénéficier d'un service dans le cadre de la garantie limitée du fabricant :

Lorsqu'un Produit est soumis à la présente garantie limitée du fabricant, l'Acheteur doit contacter le vendeur auprès duquel il a acheté le produit pour faire une réclamation dans les 24 mois suivant la date d'achat au détail, mais au plus tard trente (30) mois à compter de la date de fabrication indiquée sur la plaque signalétique du Produit et sur l'emballage du Produit (« Période de notification de garantie »).

Si le vendeur d'un Produit n'est plus en activité, l'Acheteur doit contacter le service Grundfos à l'adresse www.grundfos.com/us sous **Support > Contact Service**.

Pour exercer les droits prévus par la présente garantie limitée du fabricant, l'Acheteur doit renvoyer le Produit défectueux à ses frais, dans la mesure où la loi applicable le permet, accompagné de la preuve d'achat et d'une explication du défaut, de la date à laquelle le défaut s'est produit et des circonstances entourant le défaut.

L'Acheteur est responsable de tous les frais de démontage et de montage du Produit et de tous les frais liés à l'enlèvement, à la réinstallation, au transport et à l'assurance. Si Grundfos est tenu par la loi provinciale ou territoriale applicable de payer les frais de transport, l'Acheteur doit contacter le partenaire de service Grundfos pour organiser l'expédition. L'Acheteur doit également répondre rapidement à Grundfos pour toute demande concernant une réclamation au titre de la garantie.

Sauf demande de Grundfos, le Produit ne doit pas être démonté avant d'être remis en état. Tout manquement à ces dispositions entraînera l'annulation de la présente garantie limitée du fabricant.

Grundfos procédera à la réparation du Produit défectueux dans le cadre de cette garantie limitée du fabricant ou, à la convenance de Grundfos, fournira à l'Acheteur un produit de remplacement du Produit défectueux. L'unité de remplacement peut être neuve ou refabriquée.

Dans la mesure autorisée par la loi applicable, Grundfos ne sera pas responsable des dommages accessoires et indirects ou des pertes de quelque nature que ce soit découlant de, liés à ou en rapport avec le Produit, l'utilisation du Produit ou l'incapacité d'utiliser le Produit.

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