MTSE

Installation and operating instructions

MTSE
Installation and operating instructions
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GRUNDFOS

MTSE

Original installation and operating instructions

Table of contents

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.

These installation and operating instructions are a supplement to the installation and operating instructions for MTS pumps. For instructions not mentioned specifically in this manual, see the installation and operating instructions for the standard pump.

1.1 Hazard statements

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

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

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

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

The hazard statements are structured in the following way:

SIGNAL WORD
Description of the hazard
Consequence of ignoring the warning
- Action to avoid the hazard.

1.2 Notes

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

Observe these instructions for explosion-proof products.

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

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

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

Tips and advice that make the work easier.

2. Product introduction

2.1 Product description

MTSE pumps are MTS pumps with an E-motor. The pump is fitted with a frequency-controlled permanent-magnet motor for three-phase mains connection. The frequency control enables continuously variable control of motor speed, which makes it possible to set the pump to operate at any duty point. The motors of the MTSE pumps are Grundfos MGE motors designed according to EN standards.

2.2 Intended use

The product is intended for machines with a constant torque characteristic, such as screw-spindle pumps and other positive displacement pumps.

2.3 Radio module

The product incorporates a class 1 radio module for remote control. You can use the module anywhere in the EU without restrictions.

For installation in the USA and Canada, see appendix A. For installation in Brazil, see appendix B.

Some variants of the product and products sold in China and Korea have no radio module.

Via the built-in radio module, the product can communicate with Grundfos GO Remote and other MGE motors.

2.4 Battery

A Li-ion battery is fitted in the advanced functional module, FM 300.

The Li-ion battery complies with the Battery Directive (2006/66/EC). The battery does not contain mercury, lead or cadmium.

Related information

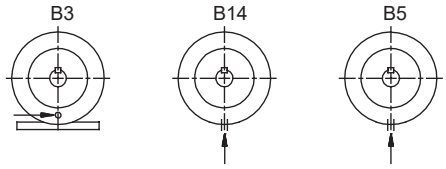
4.2.6.1 Advanced functional module, FM 300

2.5 Drain holes

The motor has a plugged drain hole on the drive side. The drain hole is placed in the flange on the drive side. You can turn the flange 90 ° to both sides or 180 °.

With the drain hole open, the motor becomes self-venting, allowing water and humid air to escape.

When you open the drain hole, the enclosure class of the motor will be lower than standard.



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Related information

4.1.4 Installing the product in moist surroundings

2.6 Identification

2.7 Identification of the functional module

You can identify the fitted module in one of the following ways:

Grundfos GO Remote

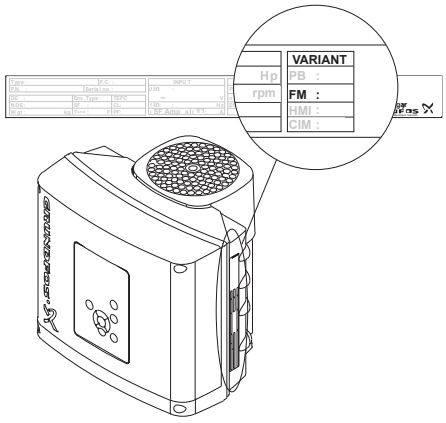
You can identify the functional module in the **Fitted modules** menu under **Status**.

Motor display

For motors fitted with the advanced operating panel, you can identify the functional module in the **Fitted modules** menu under **Status**.

Motor nameplate

You can identify the fitted module by means of the data on the motor nameplate.



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Functional module variants

Variant	Designation
FM 300	Advanced functional module

Related information

6.6 "Analog inputs"

6.7 "Digital inputs"

6.8 "Digital inputs/outputs"

6.10 "Analog output"

6.40 "Assisted pump setup"

6.42 "Setting of date and time"

2.8 Identification of the operating panel

You can identify the operating panel in one of the following ways:

Grundfos GO Remote

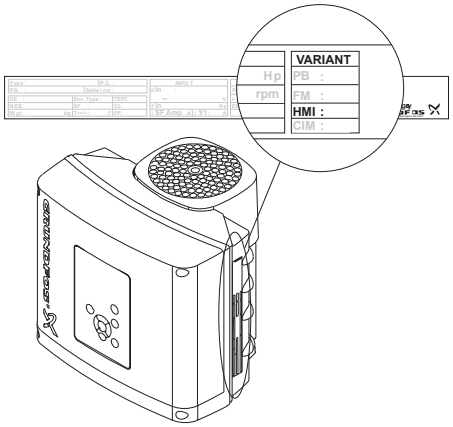
You can identify the operating panel in the **Fitted modules** menu under **Status**.

Motor display

For motors fitted with the advanced operating panel, you can identify the operating panel in the **Fitted modules** menu under **Status**.

Motor nameplate

You can identify the operating panel by means of the data on the motor nameplate.



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Operating panel variants

Variant	Designation
HMI 100	Basic operating panel
HMI 101	Basic operating panel for motors without a radio module
HMI 200	Standard operating panel
HMI 201	Standard operating panel for motors without a radio module
HMI 300	Advanced operating panel
HMI 301	Advanced operating panel for motors without a radio module

3. Receiving the product

3.1 Transporting the product

WARNING
Falling objects
Death or serious personal injury
- Secure the product during transport to prevent it from tilting or falling down.

CAUTION
Crushing of feet
Minor or moderate personal injury
- Wear safety shoes when moving the product.

When you transport the product, pay attention to the following:
- Motors from 2.2 to 5.5 kW: Do not stack more than two motors in their original packaging.
- Motors from 5.5 to 11 kW: Do not stack the motors.

3.2 Inspecting the product

On receipt of the product, do the following:

1. Check that the product is as ordered.
   If the product is not as ordered, contact the supplier.
2. Check that no visible parts have been damaged.
   If any visible parts have been damaged, contact the transport company.

4. Installing the product

4.1 Mechanical installation

WARNING
Flying object
Death or serious personal injury
- If no pump or coupling is attached to the motor, always remove the parallel key from the motor shaft before starting the motor.

CAUTION
Crushing of feet
Minor or moderate personal injury
- Secure the product to a solid foundation by bolts through the holes in the flange or the base plate.

To maintain the UL mark, additional requirements apply to the equipment.

4.1.1 Handling the product

- Observe local regulations concerning limits for manual lifting or handling. The weight of the product is stated on the nameplate.

CAUTION
Back injury
Minor or moderate personal injury
- Use lifting equipment.

CAUTION
Crushing of feet
Minor or moderate personal injury
- Wear safety shoes.
- Attach lifting equipment to the motor eyebolts.

Do not lift the product by the terminal box.

4.1.2 Cable entries

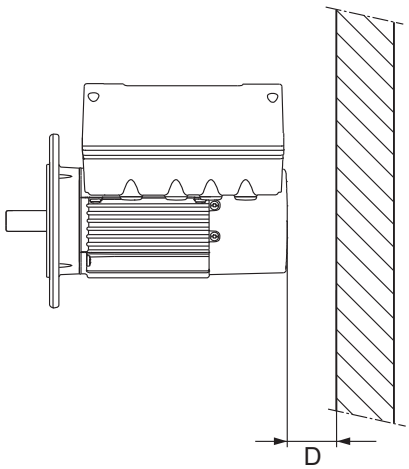
The cable entries are fitted with blanking plugs from the factory. You can order various cable glands from Grundfos as accessory kits.

Related information

8.4.6 Cable entry sizes

4.1.3 Cooling the motor

- Install the motor allowing a distance of minimum 50 mm (D) between the end of the fan cover and the wall or another fixed object.



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- Position the product with sufficient space around.
- Make sure that the temperature of the cooling air does not exceed 50 °C.
- Keep cooling fins and fan blades clean.

4.1.4 Installing the product in moist surroundings

If you install the motor in moist surroundings or areas with high humidity, ensure that the bottom drain hole is open. As a result, the motor becomes self-venting, allowing water and humid air to escape.

Related information

2.5 Drain holes

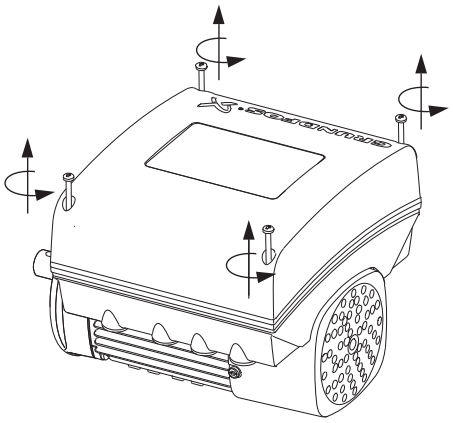
8.5.4 Humidity

4.1.5 Changing the position of the operating panel

DANGER
Electric shock
Death or serious personal injury
- Switch off the power supply to the product including the power supply for the signal relays. Wait at least 5 minutes before you make any connections in the terminal box.

You can turn the operating panel 180 °. Follow the instructions.

1. Loosen the four screws (TX25) of the terminal box cover.



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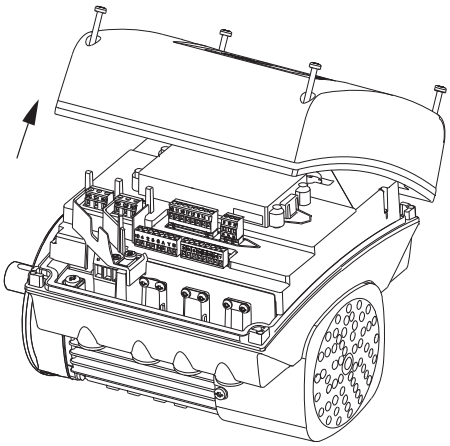
2. Remove the terminal box cover.



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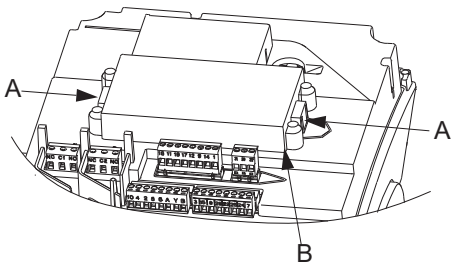
3. Press and hold in the two locking tabs (A) while gently lifting the plastic cover (B).



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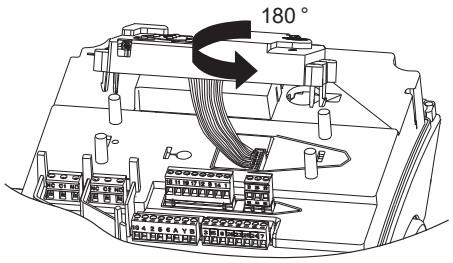
4. Turn the plastic cover 180 °.

Do not twist the cable more than 90 °.



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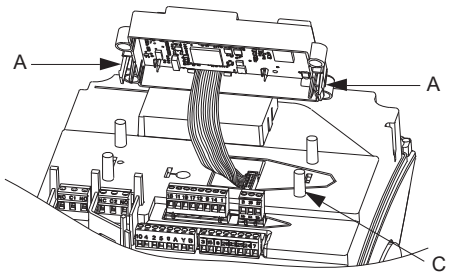
5. Position the plastic cover correctly over the four rubber pins (C). Make sure that the locking tabs (A) are placed correctly.



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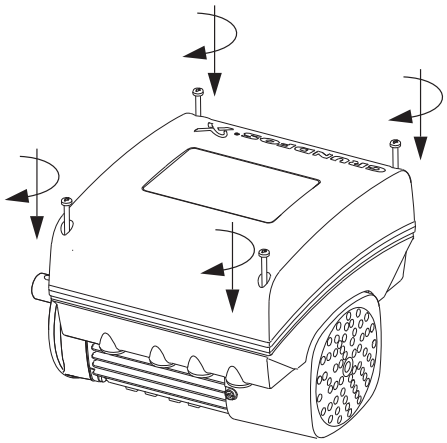
6. Fit the terminal box cover and make sure that it is turned 180 ° so that the buttons on the operating panel are aligned with the buttons on the plastic cover.
7. Tighten the four screws (TX25) with 5 Nm.



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Related information

4.2.10 Installing a communication interface module

4.2 Electrical installation

DANGER
Electric shock
Death or serious personal injury
- Switch off the power supply to the product including the power supply for the signal relays. Wait at least 5 minutes before you make any connections in the terminal box. Make sure that the power supply cannot be switched on accidentally.

DANGER
Electric shock
Death or serious personal injury
- Check that the supply voltage and frequency correspond to the values stated on the nameplate.

If the power cable is damaged, it must be replaced by the manufacturer, the manufacturer's service partner or a similarly qualified person.

The user or the installer is responsible for correct earthing and protection according to local regulations.

All electrical connections must be carried out by qualified persons.

4.2.1 Protection against electric shock, indirect contact

WARNING
Electric shock
Death or serious personal injury

- Connect the product to protective earth and provide protection against indirect contact in accordance with local regulations.

Protective-earth conductors must have a yellow and green (PE) or yellow, green and blue (PEN) colour marking.

4.2.2 Protection against mains voltage transients

The product is protected against mains voltage transients in accordance with EN 61800-3.

4.2.3 Motor protection

The product incorporates thermal protection against slow overloading and blocking. No external motor protection is required.

4.2.4 Cable requirements

DANGER
Electric shock
Death or serious personal injury

- Comply with local regulations as to cable cross-sections.
- Use the recommended fuse size.

Cable cross-section

3 x 380-500 V

Power [kW]	Cross-section	
	[mm²]	[AWG]
1.5 - 2.2	1.5 - 10	16-8
3.0 - 11	2.5 - 10	14-8

3 x 200-240 V

Power [kW]	Cross-section	
	[mm²]	[AWG]
1.1 - 1.5	1.5 - 10	16-8
2.2 - 5.5	2.5 - 10	14-8

Conductor types

Stranded or solid copper conductors.

Conductor temperature ratings

Temperature rating for conductor insulation: 60 °C (140 °F).
Temperature rating for outer cable sheath: 75 °C (167 °F).

Related information

8.1 Technical data, three-phase motors

4.2.4.1 Three-phase connections

The cables in the terminal box must be as short as possible. However, the separated protective earth conductor must be so long that it is the last one to be disconnected in case the cable is inadvertently pulled out of the cable entry.

To avoid loose connections, ensure that the terminal block for L1, L2 and L3 is pressed home in its socket when the power cable has been connected.

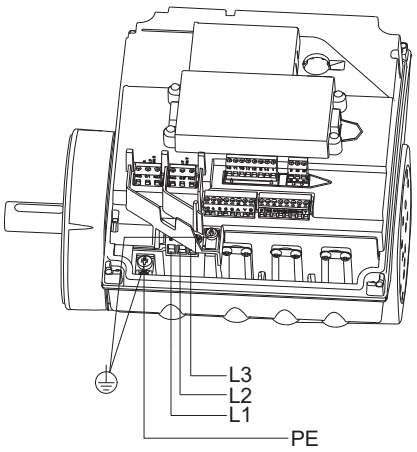
Check that the supply voltage and frequency correspond to the values stated on the nameplate.

If you want to supply the product through an IT network, make sure that you have a suitable product variant. If you are in doubt, contact Grundfos. Only the following motors can be supplied through an IT network:

- Motors with a speed of 1450-2000/2200 rpm and up to 1.5 kW
- Motors with a speed of 2900-4000 rpm or 4000-5900 rpm and up to 2.2 kW.

Corner earthing is not allowed for supply voltages above 3 x 240 V and 3 x 480 V, 50/60 Hz.

Mains connection on a three-phase motor



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Pos.	Description
L1	Phase 1
L2	Phase 2
L3	Phase 3
PE	Protective earth

Related information

8.1 Technical data, three-phase motors

4.2.5 Residual-current circuit breakers

DANGER
Electric shock
Death or serious personal injury

- If national legislation requires a Residual Current Device (RCD) or equivalent in the electrical installation, this must be type B or better, due to the nature of the constant DC leakage current.

The residual-current circuit breaker must be marked.

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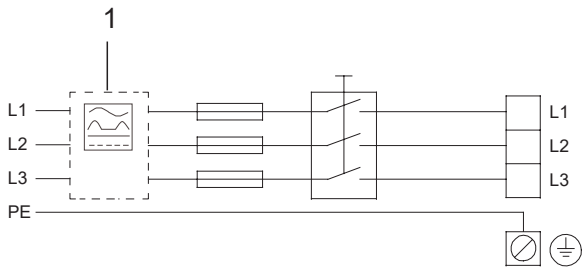
Take into account the total leakage current of all the electrical equipment in the installation.
This product may cause a direct current in the protective-earth conductor.

Connection example for three-phase supply

The drawing shows an example of a mains-connected three-phase motor with a main switch, a backup fuse and a residual-current circuit breaker, type B.



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Pos.	Description
1	Residual-current circuit breaker, type B
L1	Phase 1
L2	Phase 2
L3	Phase 3
PE	Protective earth

4.2.5.1 Overvoltage and undervoltage protection

Overvoltage and undervoltage may occur in case of unstable power supply or a faulty installation. The product stops if the voltage falls outside the permissible voltage range. The product restarts automatically when the voltage is within the permissible voltage range. The product requires no additional protection relay.

The product is protected against transients from the power supply according to EN 61800-3. In areas with high lightning intensity, we recommend external lightning protection.

4.2.5.2 Overload protection

The product reduces the speed automatically if the upper load limit is reached, and it stops completely if the overload condition continues.

The product remains stopped for a set period. After this period, the product automatically attempts to restart. The overload protection ensures that the product is not damaged. The product requires no additional protection.

4.2.5.3 Overtemperature protection

The electronic unit has a built-in temperature sensor as an additional protection. The product reduces the speed automatically if the temperature exceeds a certain level, and it stops completely if the temperature keeps rising. The product remains stopped for a set period. After this period, the product automatically attempts to restart.

4.2.5.4 Protection against phase unbalance

Phase unbalance on the power supply must be minimised. The three-phase motor must be connected to a power supply with a quality corresponding to IEC 60146-1-1, class C. This also ensures long life of the components.

4.2.6 Functional modules

4.2.6.1 Advanced functional module, FM 300

Inputs and outputs

The module has these connections:

- three analog inputs
- one analog output
- two dedicated digital inputs
- two configurable digital inputs or open-collector outputs
- Grundfos Digital Sensor input and output
- LiqTec sensor inputs
- two signal relay outputs
- GENIbus connection.

The inputs and outputs are internally separated from the mains-conducting parts by reinforced insulation and galvanically separated from other circuits. All control terminals are supplied with protective extra-low voltage (PELV), ensuring protection against electric shock.

Signal relay 1

LIVE: You can connect supply voltages up to 250 VAC to the output.

PELV: The output is galvanically separated from other circuits. Therefore, you can connect the supply voltage or protective extra-low voltage to the output as desired.

Signal relay 2

PELV: The output is galvanically separated from other circuits. Therefore, you can connect the supply voltage or protective extra-low voltage to the output as desired.

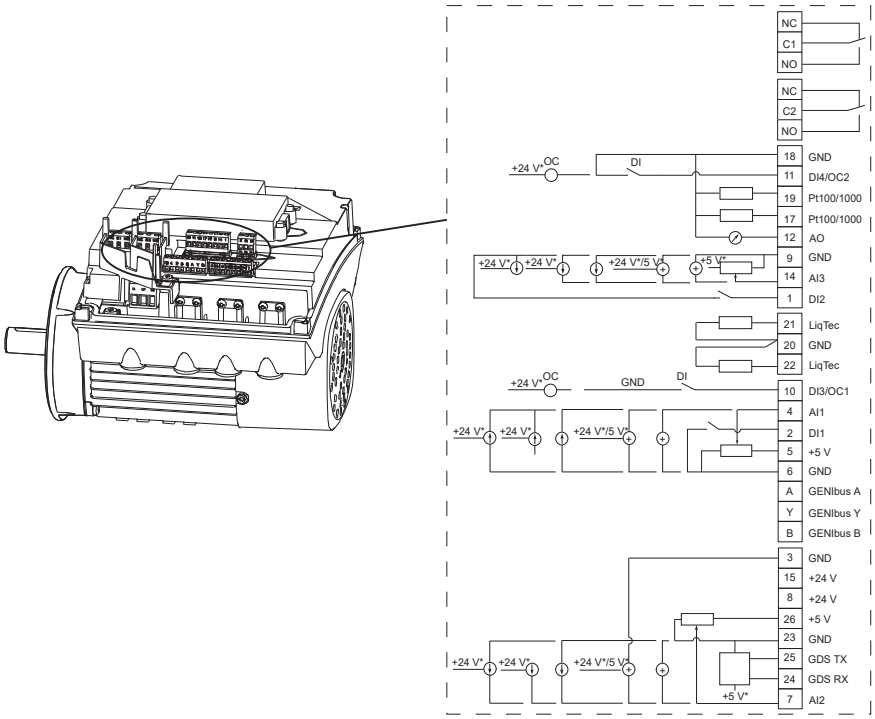
Connection terminals for the mains supply

Phases	Terminals
Single-phase	N, PE, L
Three-phase	L1, L2, L3, PE

Connection terminals for inputs and outputs

DANGER
Electric shock
Death or serious personal injury

- Make sure that the wires to be connected to the connection groups below are separated from each other by reinforced insulation in their entire lengths.



Terminal	Type	Function
NC	Normally closed contact	Signal relay 1. LIVE or PELV.
C1	Common	
NO	Normally open contact	
NC	Normally closed contact	Signal relay 2. PELV only.
C2	Common	
NO	Normally open contact	
18	GND	Protective earth.
11	DI4/OC2	Digital input/output, configurable. Open collector: Maximum 24 V resistive or inductive.
19	Not in use	-
17	Not in use	-
12	AO	Analog output: 0-20 mA or 4-20 mA 0-10 V.
9	GND	Protective earth.
14	AI3	Analog input: 0-20 mA or 4-20 mA. 0.5 - 3.5 V, 0-5 V or 0-10 V.
1	DI2	Digital input, configurable.
21	LiqTec sensor input 1	LiqTec sensor input. White conductor.
20	GND	Protective earth. Brown and black conductors.
22	LiqTec sensor input 2	LiqTec sensor input. Blue conductor.
10	DI3/OC1	Digital input/output, configurable. Open collector: Maximum 24 V resistive or inductive.
4	AI1	Analog input: 0-20 mA or 4-20 mA. 0.5 - 3.5 V, 0-5 V or 0-10 V.

Terminal	Type	Function
2	DI1	Digital input, configurable. Digital input 1 is factory-set to be start or stop input where an open circuit results in stop. A jumper has been factory-fitted between terminals 2 and 6. Remove the jumper if digital input 1 is to be used as external start or stop or any other external function.
5	+5 V	Power supply to a potentiometer or sensor.
6	GND	Protective earth.
A	GENIbus, A	GENIbus, A (+).
Y	GENIbus, Y	GENIbus, Y (GND).
B	GENIbus, B	GENIbus, B (-).
3	GND	Protective earth.
15	+24 V	Power supply.
8	+24 V	Power supply.
26	+5 V	Power supply to a potentiometer or sensor.
23	GND	Protective earth.
25	GDS TX	Grundfos Digital Sensor output.
24	GDS RX	Grundfos Digital Sensor input.
7	AI2	Analog input: 0-20 mA or 4-20 mA. 0.5 - 3.5 V, 0-5 V or 0-10 V.

Related information

2.4 Battery

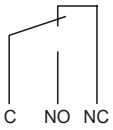
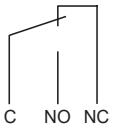
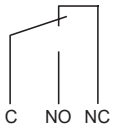
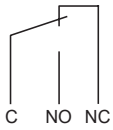
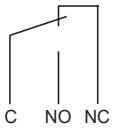
4.2.7 Signal relays

The motor has two outputs for potential-free signals via two internal relays. You can set the signal outputs to **Operation**, **Pump running**, **Ready**, **Alarm** and **Warning**.

The functions of the two signal relays appear from the table below:

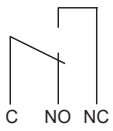
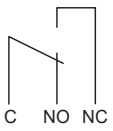
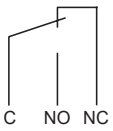
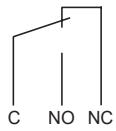
Grundfos Eye is off

The power is off.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					-

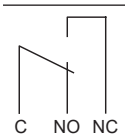
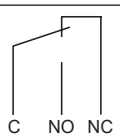
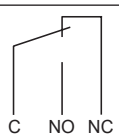
Grundfos Eye is rotating green

The pump or motor runs in **Normal** mode in open or closed loop.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					**Normal** **Min.** or **Max.**

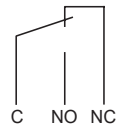
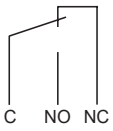
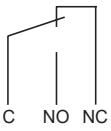
Grundfos Eye is rotating green

The pump or motor runs in **Manual** mode.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					**Manual**

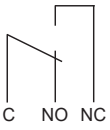
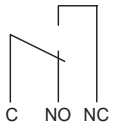
Grundfos Eye is permanently green

The pump or motor is ready for operation but is not running.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					**Stop**

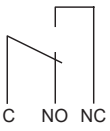
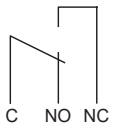
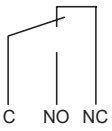
Grundfos Eye is rotating yellow

Warning, but the pump or motor is running.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					**Normal** **Min.** or **Max.**

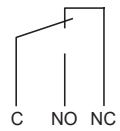
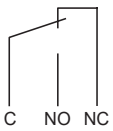
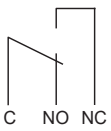
Grundfos Eye is rotating yellow

Warning, but the pump or motor is running.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					**Manual**

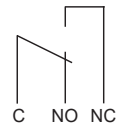
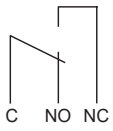
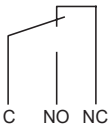
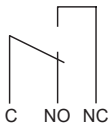
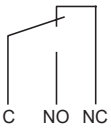
Grundfos Eye is permanently yellow

Warning, but the pump or motor was stopped via a **Stop** command.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					**Stop**

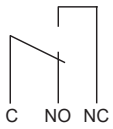
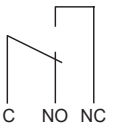
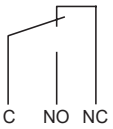
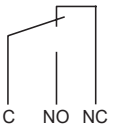
Grundfos Eye is rotating red

Alarm, but the pump or motor is running.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					**Normal** **Min.** or **Max.**

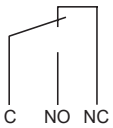
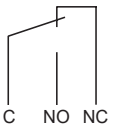
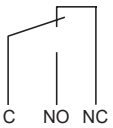
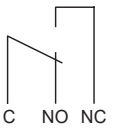
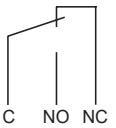
Grundfos Eye is rotating red

Alarm, but the pump or motor is running.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					**Manual**

Grundfos Eye is flashing red

The pump or motor has been stopped due to an alarm.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					**Stop**

Related information

5.3 Grundfos Eye

6.9 "Signal relay" ("Relay outputs")

4.2.8 Signal cables

Use screened cables with a cross-sectional area of minimum 0.5 mm^2 and maximum 1.5 mm^2 for the external on/off switch, digital inputs, setpoint and sensor signals.

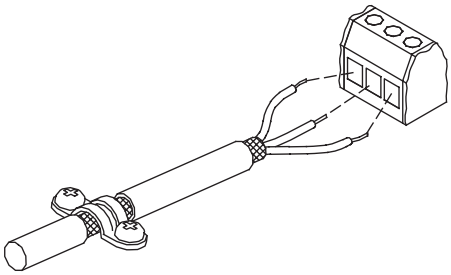
The wires in the motor terminal box must be as short as possible.

Related information

4.2.8.1 Connecting signal cables

4.2.8.1 Connecting signal cables

1. Connect the screens of the cables to the frame at both ends with good connection. The screens must be as close as possible to the terminals.



TM021325

2. Connect the signal cables to the terminals.
3. Tighten the terminal screws.

Related information

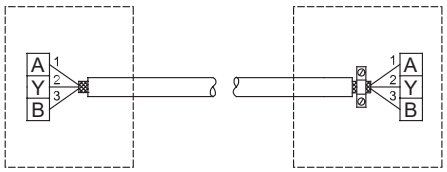
4.2.8 Signal cables

4.2.9 Bus connection cable

4.2.9.1 Connecting a 3-core bus cable

For the bus connection, use a screened 3-core cable with a cross-sectional area of minimum 0.5 mm^2 and maximum 1.5 mm^2.

- If the motor is connected to a unit with a cable clamp which is identical to the one on the product, connect the screen to the cable clamp.
- If the unit has no cable clamp, leave the screen unconnected at this end.



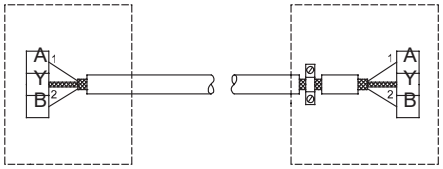
TM070223

Related information

4.2.9.2 Replacing a 2-core bus cable

4.2.9.2 Replacing a 2-core bus cable

- Connect a screened 2-core bus cable as follows:



TM070221

Related information

4.2.9.1 Connecting a 3-core bus cable

4.2.9.3 Bus signal

The product enables serial communication via an RS-485 input. The communication is carried out according to the Grundfos GENIbus protocol and enables connection to a building management system or another external control system.

Via a bus signal, you can remote-set operating parameters, such as setpoint and operating mode. At the same time, the product can provide status information about important parameters, such as the actual value of the control parameter, input power and fault indications, via the bus.

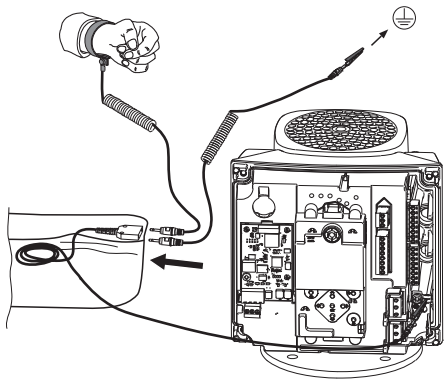
Contact Grundfos for further information.

If you use a bus signal, the local settings made via Grundfos GO Remote or the advanced operating panel will be overruled.In case the bus signal fails, the product will run with the local settings made via Grundfos GO Remote or the advanced operating panel.

4.2.10 Installing a communication interface module

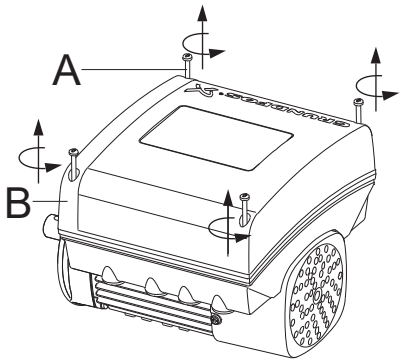
DANGER
Electric shock
Death or serious personal injury
- Switch off the power supply to the product including the power supply for the signal relays. Wait at least 5 minutes before you make any connections in the terminal box. Make sure that the power supply cannot be switched on accidentally.

Use an antistatic service kit when handling electronic components. This prevents static electricity from damaging the components.



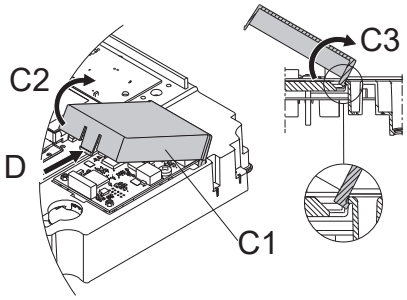
TM064462

1. Loosen the four screws (A) and remove the terminal box cover (B).



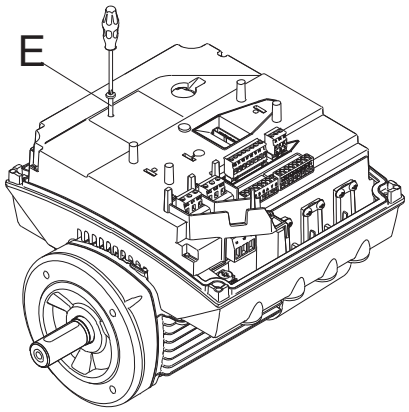
TM064081

2. Remove the CIM (Communication Interface Module) cover (C1) by pressing the locking tab (D) and lifting the end of the cover (C2). Then lift the cover off the hooks (C3).



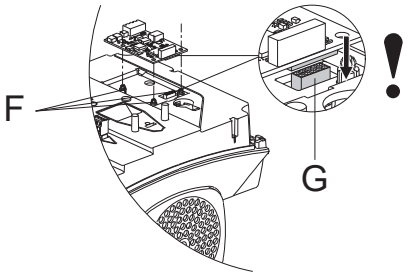
TM069905

3. Remove the screw (E).



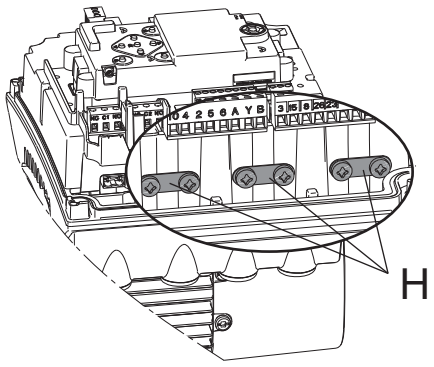
TM069906

4. Fit the module by aligning it with the three plastic holders (F) and the connection plug (G). Press the module home, using your fingers.



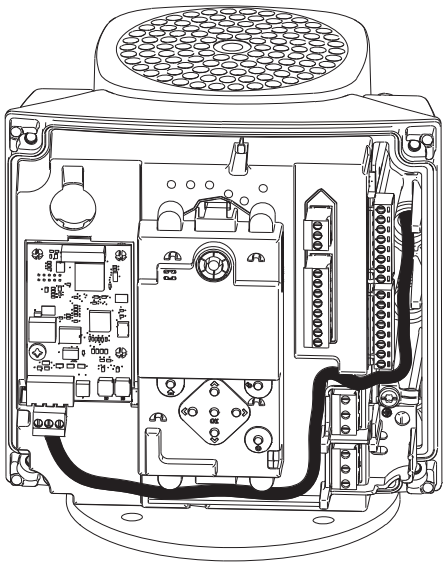
TM069907

5. Fit and tighten the screw (E) to 1.3 Nm.
6. Make the electrical connections to the module as described in the instructions supplied with the module.
7. Connect the cable screens of the bus cables to protective earth via one of the earth clamps (H).



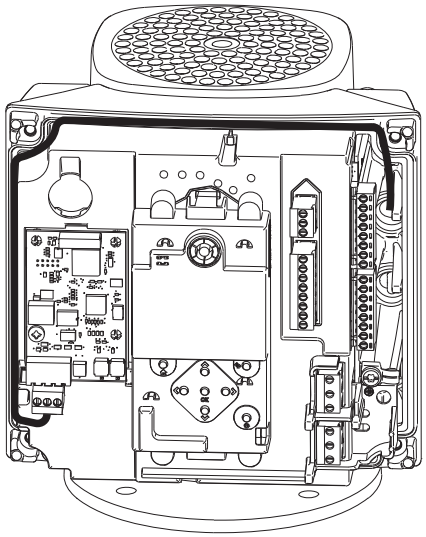
TM069908

8. Route the wires for the module through one of the cable glands.



TM064085

MGE 71, 80, 90

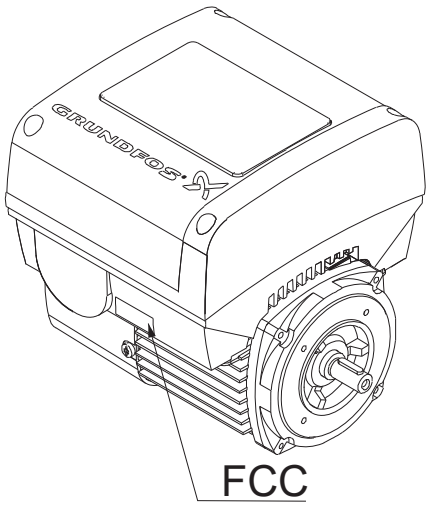


TM070190

MGE 100, 112, 132, 160

9. Fit the CIM cover.

10. If the module is supplied with an FCC label, fix the label on the terminal box.



TM069909

11. Fit the terminal cover and cross-tighten the four mounting screws to 6 Nm.

Make sure that the terminal box cover is aligned with the orientation of the operating panel.

Related information

4.1.5 Changing the position of the operating panel

5. Control functions

5.1 User interfaces

WARNING
Hot surface
Death or serious personal injury
- Touch only the buttons on the operating panel. The product may be very hot.

WARNING
Electric shock
Death or serious personal injury
- If the operating panel is cracked or perforated, replace it immediately. Contact the nearest Grundfos sales company.

You can change the settings by means of the user interfaces listed below.

Variant	Designation
HMI 200	Standard operating panel
HMI 300	Advanced operating panel
-	Grundfos GO Remote

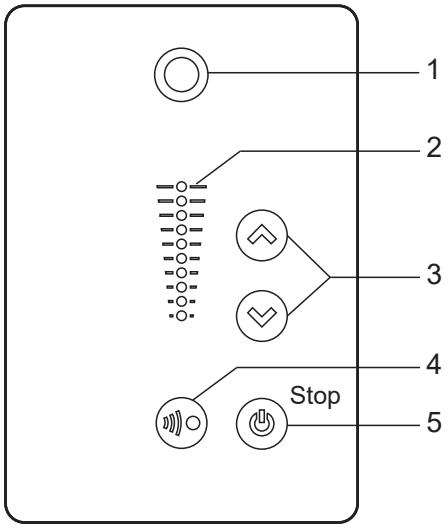
All settings are saved if the power supply is switched off.

Related information

5.1.1 Standard operating panel

5.1.2 Advanced operating panel

5.1.1 Standard operating panel



TM054848

Pos.	Symbol	Description
1		**Grundfos Eye:** The indicator light shows the operating status of the product.
2	-	Light fields for indication of the setpoint.
3		**Up**/**Down**: The buttons change the setpoint.
4		**Radio communication**: The button enables radio communication with Grundfos GO Remote and other products of the same type.
5		**Start/Stop**: Press the button to make the product ready for operation or to start and stop the product.**Start**: If you press the button when the product is stopped, the product starts if no other functions with higher priority have been enabled.**Stop**: If you press the button when the product is running, the product always stops. When you press the button, the stop icon appears at the bottom of the display.

Related information

5.1 User interfaces

6.28 "Buttons on product" ("Enable/disable settings")

6.45 Priority of settings

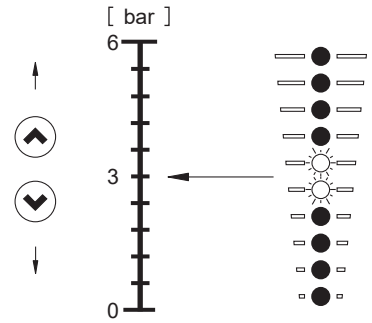
5.1.1.1 Setting the setpoint in constant parameter mode

The following applies for motors set to operate in **Const. other val.**

- Set the desired setpoint by pressing the **Up** or **Down** buttons.

The green light fields on the operating panel indicate the setpoint set.

The following example applies to a pump or motor in an application where a pressure sensor gives a feedback to the pump or motor. The sensor has been set manually, and the pump or motor does not automatically register a connected sensor.
Light fields 5 and 6 are activated, indicating a desired setpoint of 3 bar with a sensor measuring range from 0 to 6 bar. The setting range is equal to the sensor measuring range.



TM054894

Related information

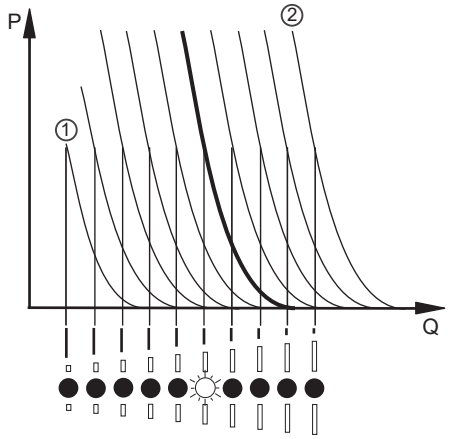
6.5 "Control mode"

5.1.1.2 Setting the setpoint in constant curve mode

- Set the desired setpoint by pressing the **Up** or **Down** buttons.

The green light fields on the operating panel indicate the setpoint set.

Example: In **Constant curve** mode, the motor output is between minimum and maximum speed defined by **Operating range**.



TM075097

Pos.	Description
p	Pressure
Q	Flow rate
1	Minimum
2	Maximum

Related information

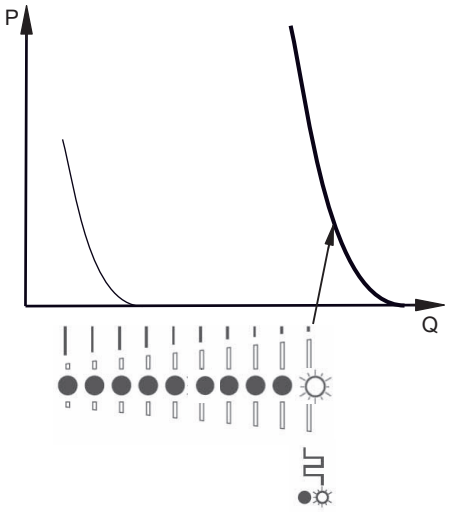
6.5 "Control mode"

6.12 "Operating range"

5.1.1.3 Setting to maximum speed

The motor must not be in operating mode **Stop**.

- Press and hold the **Up** button until the top light field is on and starts flashing.

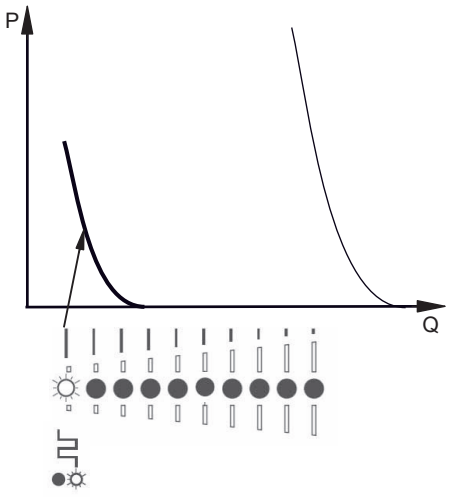


TM074811

5.1.1.4 Setting to minimum speed

The motor must not be in operating mode **Stop**.

- Press and hold the **Down** button until the bottom light field is on and starts flashing.



TM074812

5.1.1.5 Starting the motor

The way how you start the motor depends on how it was stopped.

- Start the motor in one of the following ways:
  - If the motor was stopped by pressing the **Start/Stop** button: Start the motor by pressing the **Start/Stop** button.
  - If the motor was stopped by pressing and holding the **Down** button: Start the motor by pressing and holding the **Up** button.

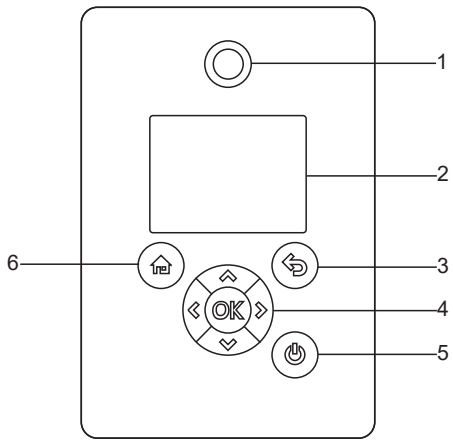
5.1.1.6 Stopping the motor

- Stop the motor in one of the following ways:
  - Press the **Start/Stop** button.
  - Press and hold the **Down** button until all light fields are off.
  - Use Grundfos GO Remote.
  - Use a digital input set to **External stop**.

5.1.1.7 Resetting alarms and warnings in products with a standard operating panel

- You can reset a fault indication in one of the following ways:
  - Briefly press the **Up** or **Down** button.
    This is not possible if the buttons have been locked.
    This does not change the setting of the motor.
  - Switch off the power supply until the indicator lights are off.
  - Switch the external start and stop input off, and then on again.
  - Use Grundfos GO Remote.
  - Use the digital input if you have set it to **Alarm resetting**.

5.1.2 Advanced operating panel



TM054849

Pos.	Symbol	Description
1		**Grundfos Eye:** The indicator light shows the operating status of the product.
2	-	Graphical colour display.
3		**Back**: Press the button to go one step back.
4		**Left/Right**: Press the buttons to navigate between main menus, displays and digits. When you change the menu, the display shows the top display of the new menu.
		Up/Down: Press the buttons to navigate between submenus or change the value settings. If you have disabled the possibility to make settings with the **Enable/disable settings** function, you can enable it again temporarily by pressing these buttons simultaneously for at least 5 seconds.
	OK	**OK**: Press the button to do as follows: • save changed values, reset alarms and expand the value field • enable radio communication with Grundfos GO Remote and other products of the same type. When you try to establish radio communication between the product and Grundfos GO Remote or another product, the green indicator light in Grundfos Eye flashes. In the controller display, a note states that a wireless device wants to connect to the product. Press **OK** on the product operating panel to allow radio communication with Grundfos GO Remote and other products of the same type.
5		**Start/Stop**: Press the button to make the product ready for operation or to start and stop the product.**Start**: If you press the button when the product is stopped, the product starts if no other functions with higher priority have been enabled. **Stop**: If you press the button when the product is running, the product always stops. When you press the button, the stop icon appears at the bottom of the display.
6		**Home**: Press the button to go to the **Home** menu.

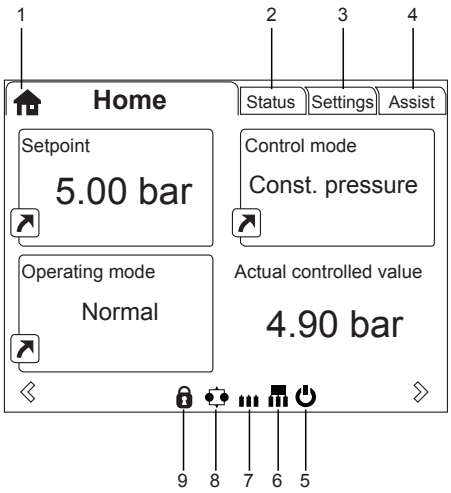
Related information

5.1 User interfaces

6.28 "Buttons on product" ("Enable/disable settings")

6.45 Priority of settings

5.1.2.1 Home display



TM064516

Pos.	Symbol	Description
1		**Home**: This menu shows up to four user-defined parameters. You can access each parameter directly from this menu.
2	-	**Status**: This menu shows the status of the product and system, warnings and alarms.
3	-	**Settings**: This menu gives access to all setting parameters. The menu also allows you to make detailed settings.
4	-	**Assist**: This menu enables assisted setup, provides a short description of the control modes and offers fault-finding advice.
5		**Start/Stop**: The icon indicates that the product was stopped with the **Start/Stop** button.
6		**Master:** The icon indicates that the product is functioning as the master in a system with products of the same type and size.
7		**Slave:** The icon indicates that the product is functioning as a slave in a system with products of the same type and size.
8		**Multioperation:** The icon indicates that the product is operating in a system with products of the same type and size.
9		**Lock:** The icon indicates that the possibility to make settings has been disabled for protective reasons.

5.1.2.2 Startup guide

The function is only available in the advanced operating panel.

The startup guide starts at the first startup and guides you through the settings needed for the product to operate in the given application. When the startup guide has been completed, the main menus appear in the display.

You can always run the startup guide at a later time.

Related information

6.36 "Run start-up guide"

5.1.2.3 Menu overview for the advanced operating panel

Home	MTSE
	•

Status		MTSE
Operating status		•
	Operating mode, from	•
	Control mode	•
Pump performance		•
	Actual controlled value	•
	Resulting setpoint	•
	Speed	•
	Acc. flow and specific energy	•
Power and energy consumption		•
Measured values		•
	Analog input 1	•
	Analog input 2	•
	Analog input 3	•
Analog output		•
Warning and alarm		•
	Actual warning or alarm	•
	Warning log	•
	Alarm log	•
Operating log		•
	Operating hours	•
Fitted modules		•
Date and time		•
Product identification		•
Motor bearing monitoring		•

* Only available if an advanced functional module, type FM 300, is fitted.

Settings		MTSE
Setpoint		•
Operating mode		•
Set manual speed		•
Set user defined speed		•
Control mode		•
Analog inputs		•
	Analog input 1, setup	•
	Analog input 2, setup	•
	Analog input 3, setup	•
Digital inputs		•
	Digital input 1, setup	•
	Digital input 2, setup	•
Digital inputs/outputs		•
	Digital input/output 3, setup	•
	Digital input/output 4, setup	•
Relay outputs		•
	Relay output 1	•
	Relay output 2	•
Analog output		•

Settings		MTSE
	Output signal	•
	Function of analog output	•
Controller settings		•
Operating range		•
Setpoint influence		•
	Ext. setpoint infl.	•
	Predefined setpoints	•
Monitoring functions		•
	Motor bearing monitoring	•
	Alarm handling	•
	Motor bearing maintenance	•
	Limit-exceeded function	•
Special functions		•
	Stop at min. speed	•
	Ramps	•
	Standstill heating	•
Communication		•
	Pump number	•
	Enable/disable radio comm.	•
General settings		•
	Language	•
	Set date and time	•
	Units	•
	Enable/disable settings	•
	Delete history	•
	Define Home display	•
	Display settings	•
	Store actual settings	•
	Recall stored settings	•
	Run start-up guide	•

* Only available if an advanced functional module, type FM 300, is fitted.

Assist	MTSE
Assisted pump setup	•
Setup, analog input	•
Setting of date and time	•
Description of control mode	•
Assisted fault advice	•

Related information

6. Setting the product

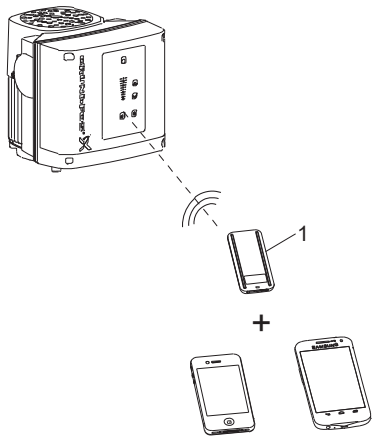
5.2 Grundfos GO Remote

The product is designed for wireless radio or infrared communication with Grundfos GO Remote.

Grundfos GO Remote enables you to set functions and gives you access to status overviews, technical product information and current operating parameters.

Use Grundfos GO Remote together with this mobile interface:

- Grundfos MI 301.



TM066256

Pos.	Description
	Grundfos MI 301:
1	Separate module enabling radio or infrared communication. Use the module together with an Android or iOS-based smart device via a Bluetooth connection.

Related information

5.2.1 Communication

5.2.1.1 Radio communication

5.2.1.2 Infrared communication

5.2.1 Communication

When Grundfos GO Remote initiates communication with the product, the indicator light in the centre of Grundfos Eye flashes green.

On products fitted with an advanced operating panel, the display indicates that a wireless device is trying to connect to the product. Press **OK** on the operating panel to connect the product with Grundfos GO Remote, or press the **Home** button to reject connection.

Symbol	Description
OK	Press **OK** on the operating panel to connect the product with Grundfos GO Remote.
	Press the **Home** button to reject connection.

You can choose between these communication types:

- radio communication
- infrared communication.

Related information

5.2 Grundfos GO Remote

5.2.1.2 Infrared communication

5.3 Grundfos Eye

5.2.1.1 Radio communication

Radio communication can take place at distances up to 30 metres. The first time Grundfos GO Remote communicates with the product, you enable communication by pressing the **Radio communication** button or **OK** on the operating panel.

Later when communication takes place, the product is recognised by Grundfos GO Remote, and you can select the product from the **List** menu.

Related information

5.2 Grundfos GO Remote

5.2.1.2 Infrared communication

Infrared communication can take place at distances up to 2 m.

When communicating via infrared light, Grundfos GO Remote must be pointed at the operating panel of the product.

Related information

5.2 Grundfos GO Remote

5.2.1 Communication

5.2.2 Menu overview for Grundfos GO Remote

Dashboard	MTSE
	•

Status	MTSE
Resulting setpoint	•
Actual controlled value	•
Motor speed	•
Power consumption	•
Energy consumption	•
Acc. flow, specific energy	•
Operating hours	•
Motor current	•
Number of starts	•
Analog, Output	•
Analog input 1	•
Analog input 2	•
Analog input 3	•
Digital input 1	•
Digital input 2	•
Digital input/output 3	•
Digital input/output 4	•
Fitted modules	•

Settings	MTSE
Setpoint	•
Operating mode	•
Set user defined speed	•
Control mode	•
Buttons on product	•
Stop at min. speed	•
Controller	•
Operating range	•
Ramps	•
Number	•
Radio communication	•
Analog input 1	•
Analog input 2	•
Analog input 3	•
Digital input 1	•
Digital input 2	•
Digital input/output 3	•
Digital input/output 4	•
Predefined setpoint	•
Analog output	•
External setpoint funct.	•
Signal relay 1	•
Signal relay 2	•
Limit 1 exceeded	•
Limit 2 exceeded	•
Standstill heating	•
Alarm handling	•
Motor bearing monitoring	•

Settings	MTSE
Service	•
Date and time	•
Store settings	•
Recall settings	•
Undo	•
Pump name	•
Connection code	•
Unit configuration	•

* Only available if an advanced functional module, type FM 300, is fitted.

Alarms and warnings	MTSE
Alarm log	•
Warning log	•

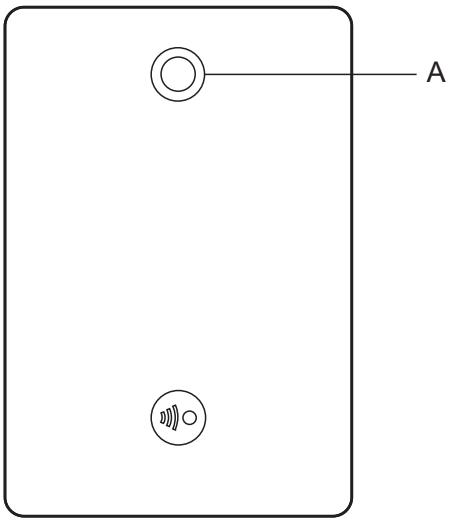
Assist	MTSE
Assisted pump setup	•
Assisted fault advice	•
Multi-pump setup	•

Related information

6. Setting the product

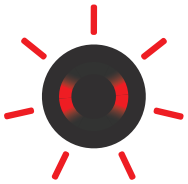
5.3 Grundfos Eye

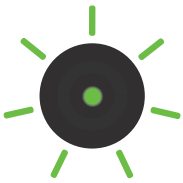
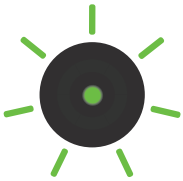
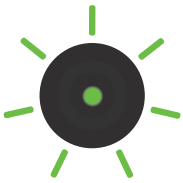
The operating condition of the motor is indicated by Grundfos Eye on the motor operating panel.



TM054846

Grundfos Eye indicator light

Indicator light	Indication	Description
	No lights are on.	**Power off** The motor is not running.
	Two opposite green indicator lights are rotating.	**Power on** The motor is running. The indicator lights are rotating in the direction of rotation of the motor when seen from the non-drive end.
	Two opposite green indicator lights are permanently on.	**Power on** The motor is not running.
	One yellow indicator light is rotating.	**Warning** The motor is running. The indicator light is rotating in the direction of rotation of the motor when seen from the non-drive end.
	One yellow indicator light is permanently on.	**Warning** The motor has stopped.
	Two opposite red indicator lights are flashing simultaneously.	**Alarm** The motor has stopped.

Indicator light	Indication	Description
	The green indicator light in the middle flashes quickly four times.	Grundfos Eye flashes four times when you press the Grundfos Eye symbol next to the motor name in Grundfos GO Remote.
	The green indicator light in the middle is flashing continuously.	You have selected the motor in Grundfos GO Remote, and the motor is ready to be connected.
	The green indicator light in the middle flashes quickly for a few seconds.	The motor is controlled by Grundfos GO Remote or exchanging data with Grundfos GO Remote.
	The green indicator light in the middle is permanently on.	The motor is connected to Grundfos GO Remote.

Related information

4.2.7 Signal relays

5.2.1 Communication

6. Setting the product

You can set control functions via Grundfos GO Remote or the advanced operating panel.

- If only one function name is mentioned, it refers to both Grundfos GO Remote and the operating panel.
- If a function name is mentioned in a parenthesis, it refers to a function on the advanced operating panel.

Related information

5.1.2.3 Menu overview for the advanced operating panel

5.2.2 Menu overview for Grundfos GO Remote

6.1 "Setpoint"

When you have selected the desired control mode, set the setpoint.

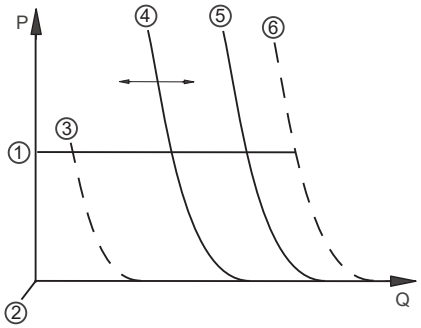
Related information

6.41 "Setup, analog inputs"

6.2 "Operating mode"

Possible operating modes

Normal	The product runs according to the selected control mode.
Stop	The product stops.
Min.	The product runs at minimum speed.
Max.	The product runs at maximum speed.
Manual	The product is operating at a manually set speed, and the setpoint via bus and setpoint influence function are overruled.
User-defined speed	The product is operating at a speed set by the user.



TM075098

Pos.	Description
p	Pressure
Q	Flow rate
1	Normal
2	Stop
3	Minimum
4	Manual
5	Normal
6	Maximum

6.3 "Set manual speed"

The function is only available in the advanced operating panel.

Use this function to set the speed in percentage of the maximum speed. When you have set the operating mode to **Manual**, the product starts running at the set speed.

With Grundfos GO Remote, you can set the speed via the **Setpoint** menu.

6.4 "Set user-defined speed"

Use this function to set the motor speed in percentage of the maximum speed. When you have set the operating mode to **"User-defined speed"**, the motor starts running at the set speed.

6.5 "Control mode"

You can choose between the following control modes:

- **Constant pressure**
- **Const. other val.** (constant other value)
- **Const. curve** (constant curve)

Related information

5.1.1.1 Setting the setpoint in constant parameter mode

5.1.1.2 Setting the setpoint in constant curve mode

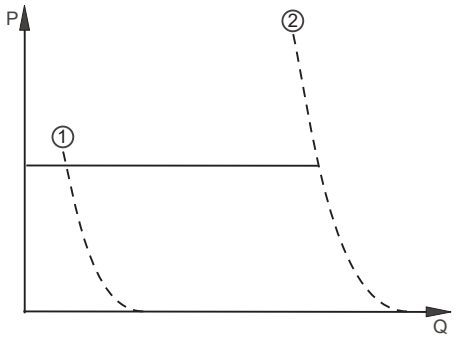
6.41 "Setup, analog inputs"

6.43 "Description of control mode"

6.5.1 "Constant pressure"

Use this control mode if you want the pump to deliver a constant pressure. The control mode uses the factory-fitted pressure sensor, if any, which measures the outlet pressure of the pump.

For pumps without a factory-fitted sensor, you must connect a pressure sensor to one of the analog inputs of the pump. You can set the pressure sensor in the **Assist** menu.



TM075099

Pos.	Description
P	Pressure
Q	Flow rate
1	Minimum
2	Maximum

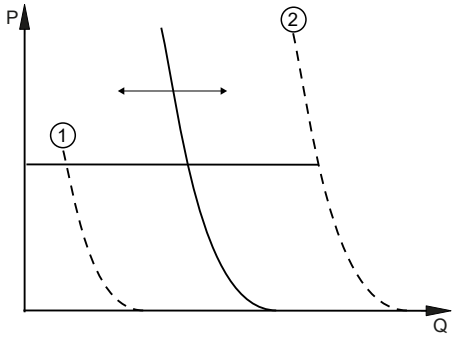
6.5.2 "Constant other value"

Use this control mode to control a value which is not available in the **Control mode** menu. To measure the controlled value, connect a sensor to one of the analog inputs. The controlled value is shown in percentage of the sensor range.

6.5.3 "Constant curve"

Use this control mode to control the motor speed.

You can set the desired speed in percentage of the maximum speed in the range from user-set minimum speed to user-set maximum speed.



TM075206

Pos.	Description
P	Pressure
Q	Flow rate
1	Minimum
2	Maximum

Related information

6.12 "Operating range"

6.6 "Analog inputs"

The inputs and outputs available depend on the functional module fitted in the motor.

Functional module	Analog input 1 (Terminal 4)	Analog input 2 (Terminal 7)	Analog input 3 (Terminal 14)
FM 300 (advanced)	•	•	•

To set the input, make the settings below:

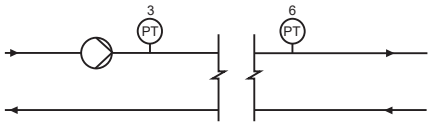
Function

You can set the inputs to these functions:

- **Not active**
- **Feedback sensor**
  The sensor is used for the selected control mode.
- **Setpoint influence**
  The input signal is used for influencing the setpoint.
- **Other function**
  The sensor input is used for measurement or monitoring.

Measured parameter

Select one of the below parameters to be measured in the system by the sensor connected to the input.



TM075207

Sensor function/measured parameter	Pos.
Discharge press.	3
Press. 1, external	6

Unit

Parameter	Available units
Pressure	bar, m, kPa, psi, ft
Level	m, ft, in
Pump flow	m^3/h, l/s, yd^3/h, gpm
Liquid temperature	°C, °F
Other parameter	%

Electrical signal

Available signal types:

- 0.5 - 3.5 V
- 0-5 V
- 0-10 V
- 0-20 mA
- 4-20 mA.

Sensor range, minimum value

Set the minimum value of the connected sensor.

Sensor range, maximum value

Set the maximum value of the connected sensor.

Related information

2.7 Identification of the functional module

6.13 "External setpoint function"

6.41 "Setup, analog inputs"

6.7 "Digital inputs"

The inputs and outputs available depend on the functional module fitted in the motor.

Functional module	Digital input 1 (Terminals 2, GND)	Digital input 2 (Terminals 1, GND)
FM 300 (advanced)	•	•

To set the input, make the settings below:

Function

You can set the inputs to these functions:

- **Not active**
  When set to **Not active**, the input has no function.
- **Ext. stop**

When the input is deactivated, open circuit, the motor stops.

- **Min.** (minimum speed)
  When the input is activated, the motor runs at the set minimum speed.
- **Max.** (maximum speed)
  When the input is activated, the motor runs at the set maximum speed.
- **User defined speed**
  When the input is activated, the motor runs at a speed set by the user.
- **External fault**
  When the input is activated, a timer is started. If the input is activated for more than 5 seconds, the motor stops and a fault is indicated. The function depends on input from external equipment.
- **Alarm resetting**
  When the input is activated, a fault indication, if any, is reset.
- **Dry running**
  When this function is selected, lack of inlet pressure or water shortage (dry running) can be detected. When this happens, the pump stops. The pump cannot restart as long as the input is activated. This requires the use of an accessory such as these:
  - a pressure switch installed on the inlet side of the pump
  - a float switch installed on the inlet side of the pump.
- **Accumulated flow**
  When this function is selected, the accumulated flow can be registered. This requires the use of a flowmeter which can give a feedback signal as a pulse per defined volume of water.
- **Predefined setpoint 1**
  The function applies only to digital input 2.
  When you set digital inputs to a predefined setpoint, the pump operates according to a setpoint based on a combination of the activated digital inputs.
- **Activate output**
  When this function is selected, the related digital output is activated. This is done without any changes to pump operation.

The priority of the selected functions are interdependent.
A stop command always has the highest priority.

Related information

2.7 Identification of the functional module
6.8 "Digital inputs/outputs"
6.14 "Predefined setpoints"

6.7.1 Timer function for a digital input

Activation delay

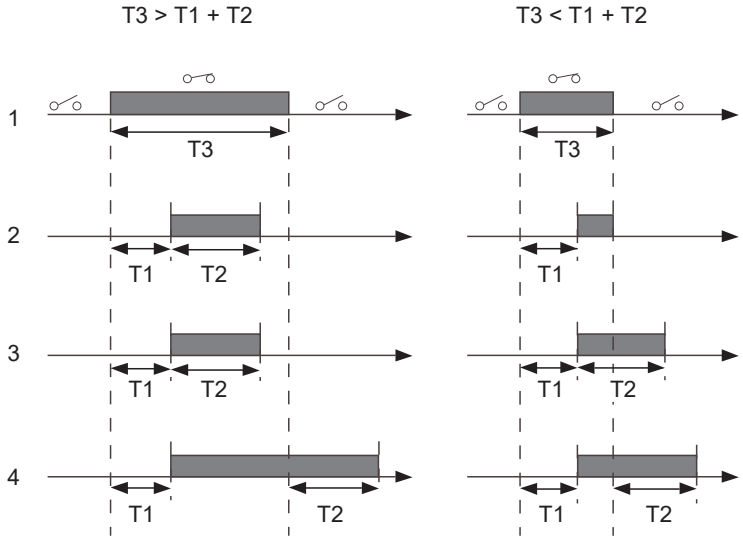
The activation delay (T1) is the time between the digital signal and the activation of the selected function.
Range: 0-6000 seconds.

Duration time

Available modes:

- **Not active**
- **Active with interrupt**
- **Active without interrupt**
- **Active with after-run**.

The duration time (T2) is the time which, together with the mode, determines how long the selected function is active.
Range: 0-15,000 seconds.



TM070000

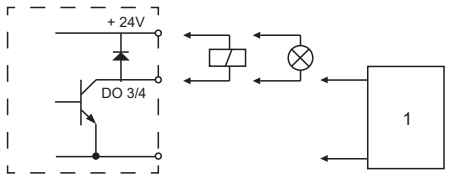
Pos.	Description
1	**Digital input**.
2	**Active with interrupt**.
3	**Active without interrupt**.
4	**Active with after-run**.
T1	Activation delay.
T2	**Duration time**.
T3	The period of time when the digital input is activated.

6.8 "Digital inputs/outputs"

The inputs and outputs available depend on the functional module fitted in the motor.

Functional module	Digital input/output 3 (Terminals 10, GND)	Digital input/output 4 (Terminals 11, GND)
FM 300 (advanced)	•	•

You can select whether the interface is to be used as input or output. The output is an open collector. You can connect the open collector to, for example, an external relay or a controller such as a PLC.



TM070001

Pos.	Description
1	External relay or controller

Mode

You can set the digital input or output 3 and 4 to act as a digital input or digital output.

Functions if the digital input or output is set to input:

- **Not active**
- **Ext. stop**
- **Min.**
- **Max.**
- **User defined speed**
- **External fault**
- **Alarm resetting**
- **Dry running**
- **Accumulated flow**
- **Predefined setpoint 2** (digital input/output 3)
- **Predefined setpoint 3** (digital input/output 4)
- **Local motor stop**
- **Activate output**

Functions if the digital input or output is set to output:

- **Not active**
- **Ready**
- **Alarm**
- **Operation**
- **Pump running**
- **Warning**
- **Limit 1 exceeded**
- **Limit 2 exceeded**
- **Digital input 1,state**
- **Digital input 2,state**
- **Digital input 3,state**
- **Digital input 4,state**

Related information

2.7 Identification of the functional module

6.7 "Digital inputs"

6.9 "Signal relay" ("Relay outputs")

The motor has two outputs for potential-free signals via two internal relays.

Functional module	Signal relay (Terminals 12, GND)
FM 300 (advanced)	•

Functions

You can configure the signal relays to be activated when the product changes to one of the following states:

- **Not active**
  The relay has been deactivated.
- **Ready**
  The motor may be running or is ready to run, and no alarms are active.
- **Alarm**
  There is an active alarm, and the motor is stopped.
- **Operating** (**Operation**)
  Operating equals **Running**, but the motor is still in operation when it is stopped, for example, by the **Stop function** or **"Limit exceeded"**.
- **Running** (**Pump running**)
  The motor shaft is rotating.
- **Warning**
  There is an active warning.
- **Limit 1 exceeded**
  When you have set this function and the limit is exceeded, the signal relay is activated.
- **Limit 2 exceeded**
  When you have set this function and the limit is exceeded, the signal relay is activated.
- **External fan control** (**Control of external fan**).
  When you select this function, the relay is activated if the internal temperature of the motor electronics reaches a preset limit value. In this way the relay activates external cooling to add additional cooling to the motor.
- **Digital input 1,state**
  Follow digital input 1. If digital input 1 is triggered, digital output is also triggered.
- **Digital input 2,state**
  Follow digital input 2. If digital input 2 is triggered, digital output is also triggered.
- **Digital input 3,state**
  Follow digital input 3. If digital input 3 is triggered, digital output is also triggered.
- **Digital input 4,state**
  Follow digital input 4. If digital input 4 is triggered, digital output is also triggered.

Related information

4.2.7 Signal relays

6.15 "Limit-exceeded function"

6.10 "Analog output"

The inputs and outputs available depend on the functional module fitted in the motor.

Functional module	Analog output (Terminals 12, GND)
FM 300 (advanced)	•

The analog output enables external control systems to read specific operating data.
To set the analog output, make these settings.

Output signal

Possible signal types:

- 0-10 V
- 0-20 mA
- 4-20 mA.

Function of analog output

Actual speed		
0 %	**100 %**	**200 %**
0 V	5 V	10 V
0 mA	10 mA	20 mA
4 mA	12 mA	20 mA

Sensor value	
Minimum	**Maximum**
0 V	10 V
0 mA	20 mA
4 mA	20 mA

Resulting setpoint	
0 %	**100 %**
0 V	10 V
0 mA	20 mA
4 mA	20 mA

Motor load	
0 %	**100 %**
0 V	10 V
0 mA	20 mA
4 mA	20 mA

Motor current		
0 %	**100 %**	**200 %**
0 V	5 V	10 V
0 mA	10 mA	20 mA
4 mA	12 mA	20 mA

Limit-exceeded function	
Output not active	**Output active**
0 V	10 V
0 mA	20 mA
4 mA	20 mA

Flow rate		
0 %	**100 %**	**200 %**
0 V	5 V	10 V
0 mA	10 mA	20 mA
4 mA	12 mA	20 mA

Related information

2.7 Identification of the functional module

6.11 "Controller" ("Controller settings")

The gain (Kp) and integral time (Ti) are preset from the factory. However, if the factory setting is not the optimum setting, you can change the gain and integral time:

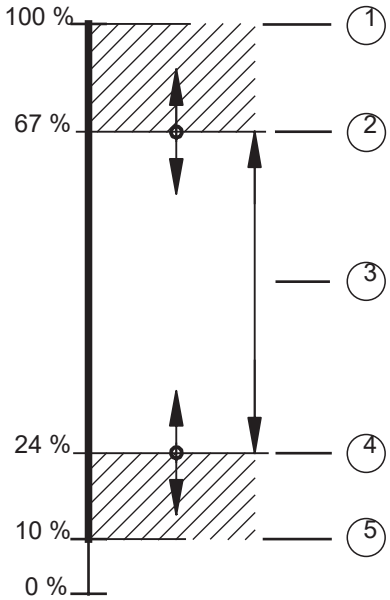
1. Set the gain (Kp) within the range from 0.1 to 20.
2. Set the integral time (Ti) within the range from 0 to 3600 seconds.
   If you select 0 seconds, the controller functions as a P-controller.

You can set the controller to inverse control. This means that if you increase the setpoint, the speed is reduced. In the case of inverse control, set the gain (Kp) within the range from -0.1 to -20.

6.12 "Operating range"

Set the operating range as follows:

1. Set the minimum speed within the range from fixed minimum speed (5) to user-set maximum speed (2).
2. Set the maximum speed within the range from user-set minimum speed (4) to fixed maximum speed (1).
   The range between the user-set minimum and maximum speed is the operating range (3).



TM069817

Pos.	Description
1	Fixed maximum speed
2	User-set maximum speed
3	Operating range
4	User-set minimum speed
5	Fixed minimum speed

Related information

5.1.1.2 Setting the setpoint in constant curve mode

6.5.3 "Constant curve"

6.13 "External setpoint function"

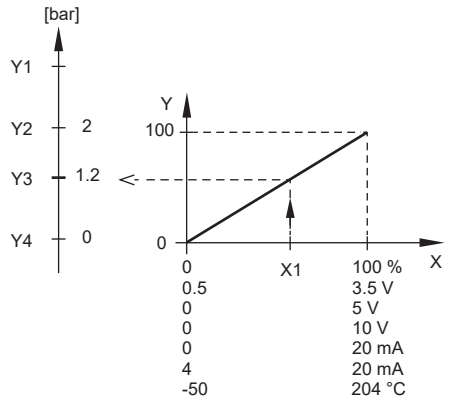
Use this function to influence the setpoint by an external signal via one of the analog inputs.

To enable the function, set one of the analog inputs to **Setpoint influence** with Grundfos GO Remote or to **Ext. setpoint infl.** with the advanced operating panel.

Example of setpoint influence in control mode Const. pressure

Actual setpoint: actual input signal x setpoint.

At a setpoint of 2 bar and an external setpoint of 60 %, the actual setpoint is 0.60 x 2 = 1.2 bar.



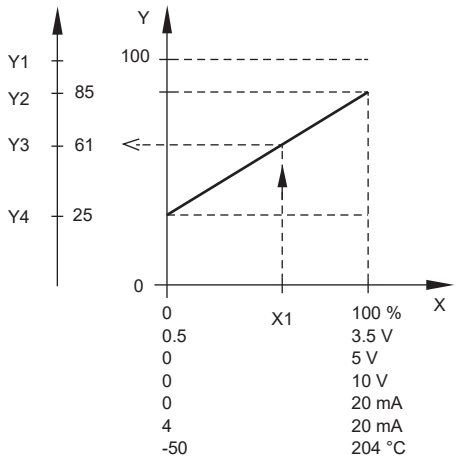
TM070252

Pos.	Description
X:	External input signal from 0 to 100 %
Y:	Setpoint influence from 0 to 100 %
X1:	Actual input signal, 60 %
Y1:	Sensor maximum [bar]
Y2:	Setpoint [bar]
Y3:	Actual setpoint [bar]
Y4:	Sensor minimum [bar]

Example of a constant curve with linear influence function

Actual setpoint: actual input signal x (setpoint - user-set minimum speed) + user-set minimum speed.

At a user-set minimum speed of 25 %, a setpoint of 85 % and an external setpoint of 60 %, the actual setpoint is 0.60 x (85 - 25) + 25 = 61 %.



TM070253

Pos.	Description
X:	External input signal from 0 to 100 %
Y:	Setpoint influence from 0 to 100 %
X1:	Actual input signal, 60 %
Y1:	Y1: Fixed maximum speed in percentage
Y2:	Y2: Setpoint speed in percentage
Y3:	Y3: Actual setpoint speed in percentage
Y4:	Y4: User-set minimum speed in percentage

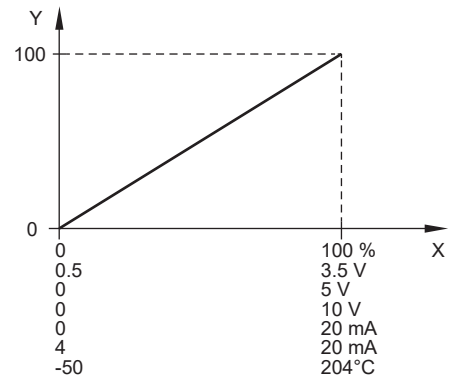
Related information

6.6 "Analog inputs"

6.13.1 “Setpoint influence” functions

6.13.1.1 "Linear function"

The setpoint is influenced linearly from 0 to 100 %.

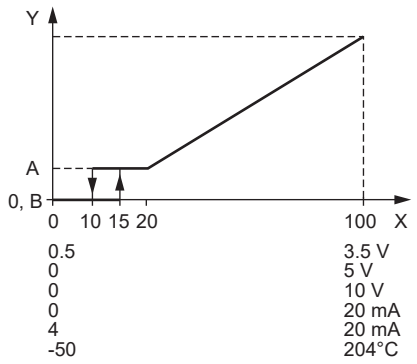


TM070255

Pos.	Description
X:	External input signal from 0 to 100 %
Y:	Setpoint influence from 0 to 100 %

6.13.1.2 "Linear with stop"

In the input signal range from 20 to 100 %, the setpoint is influenced linearly. If the input signal is below 10 %, the motor changes to the **Stop** operating mode. If the input signal increases more than 15 %, the operating mode changes back to **Normal**.

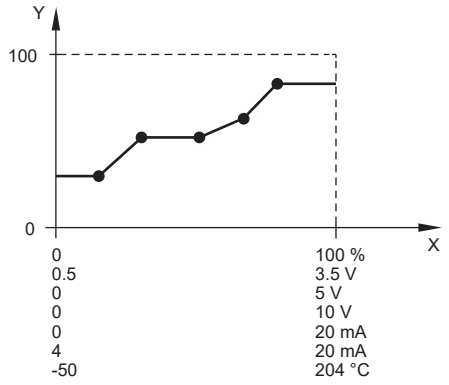


TM070542

Pos.	Description
X:	External input signal from 0 to 100 %
Y:	Setpoint influence from 0 to 100 %
A:	**Normal**
B:	**Stop**

6.13.1.3 "Influence table"

The setpoint is influenced by a curve made of two to eight points. There is a straight line between the points and a horizontal line before the first point and after the last point.



TM070254

Pos.	Description
X:	External input signal from 0 to 100 %
Y:	Setpoint influence from 0 to 100 %

6.14 "Predefined setpoints"

You can set and activate seven predefined setpoints by combining the input signals to digital inputs 2, 3 and 4 as shown in the table below. Set the digital inputs 2, 3 and 4 to **Predefined setpoints** if all seven predefined setpoints are to be used. You can also set one or two of the digital inputs to **Predefined setpoints** which, however, limits the number of predefined setpoints available.

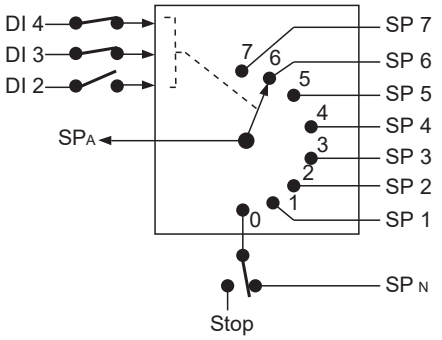
Digital inputs			Setpoint
2	**3**	**4**	
0	0	0	Normal setpoint or **Stop**
1	0	0	**Predefined setpoint 1**
0	1	0	**Predefined setpoint 2**
1	1	0	**Predefined setpoint 3**
0	0	1	**Predefined setpoint 4**
1	0	1	**Predefined setpoint 5**
0	1	1	**Predefined setpoint 6**
1	1	1	**Predefined setpoint 7**

0: Open contact

1: Closed contact

Example

The figure shows how you can use the digital inputs to set seven predefined setpoints. Digital input 2 is open, and digital inputs 3 and 4 are closed. If you compare with the table above, you can see that **Predefined setpoint 6** is activated.



TM070083

Pos.	Description
DI	**Digital input**
SP	**Setpoint**
SP_A	**Actual setpoint**
SP_N	Normal setpoint
Stop	**Stop**

If all digital inputs are open, the motor stops or runs at the normal setpoint. Set the desired action with Grundfos GO Remote or with the advanced operating panel.

Related information

6.7 "Digital inputs"

6.15 "Limit-exceeded function"

Use this function to monitor a measured parameter or one of the internal values such as speed, motor load or motor current. If a set limit is reached, a selected action can take place. You can set two limit-exceeded functions, meaning that you can monitor two parameters or two limits of the same parameter simultaneously.

The function requires setting of the following parameters:

Measured

Set the measured parameter to be monitored.

Limit

Set the limit which activates the function.

Hysteresis band

Set the hysteresis band for when the function must be deactivated again.

Limit exceeded when

Set the function to be activated when the selected parameter exceeds or drops below the set limit.

- **above limit**
  The function is activated if the measured parameter exceeds the set limit.
- **below limit**
  The function is activated if the measured parameter drops below the set limit.

Action

If the value exceeds a limit, you can set an action. The following actions are available:

- **Not active**
  The pump remains in its current state. Use this setting if you only want to activate a signal relay output when the limit is reached.
- **Stop**
  The pump stops.
- **Min.**
  The pump reduces the speed to minimum speed.
- **Max.**
  The pump increases the speed to maximum speed.
- **User defined speed**
  The pump runs at a speed set by the user.
- **Alarm and Stop**
  An alarm is given and the pump stops.
- **Alarm And Min**
  An alarm is given and the pump decreases the speed to a minimum.
- **Alarm And Max**

An alarm is given and the pump increases the speed to maximum.

- **Alarm and Userdefined speed**
  An alarm is given and the pump runs at the speed set by the user.

Detection delay

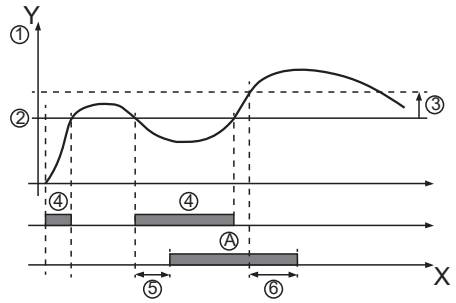
Setting the detection delay ensures that the monitored parameter stays above or below a set limit in a set time before the function is activated.

Resetting delay

The resetting delay is the time from when the measured parameter differs from the set limit, including the set hysteresis band, and until the function is reset.

Example

The function is to monitor the outlet pressure from a CRE pump. If the pressure is below 5 bar for more than 5 seconds, a warning is indicated. If the pressure is above 7 bar for more than 8 seconds, reset the limit-exceeded warning.



TM070085

X: Time in seconds

Y: Pressure in bar

Pos.	Parameter	Setting
1	**Measured**	**Discharge pressure**
2	**Limit**	5 bar
3	**Hysteresis band**	2 bar
4	**Limit exceeded when**	**below limit**
5	**Detection delay**	5 seconds
6	**Resetting delay**	8 seconds
A	**Limit-exceeded function** active	-
-	**Action**	**Warning**

Related information

6.9 "Signal relay" ("Relay outputs")

6.16 "Stop at min. speed"

This stop function can be utilised in for example constant level applications where a boost of pressure is not needed. It is a different type of stop function than low flow stop but the purpose is the same. The pump stops if there is no or low consumption.

This function monitors the speed of the pump. When the PI-controller has forced the speed of the pump to minimum according to the feedback value, the pump stops after a set period of time. It remains stopped until the feedback value starts to drop and the PI-controller starts the pump again.

- **Enable Stop at min. speed**
  Enables the **Stop at min. speed** function.
- **Delay**
  The delay time the pump must be running at minimum speed before it stops.
- **Restart speed**
  Speed in percentage when the pump must start again, hysteresis. It must be set higher than the **Minimum speed** of the pump.

6.17 "Ramps"

The ramps determine how quickly the product can accelerate and decelerate during start and stop or setpoint changes.

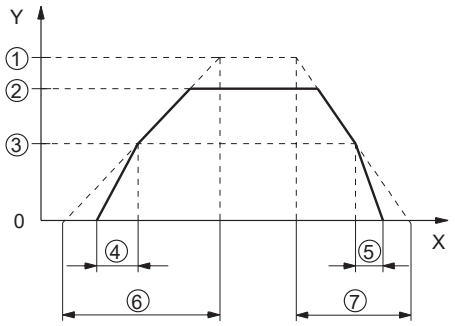
You can make the following settings:

- acceleration time, 0.1 to 300 s
- deceleration time, 0.1 to 300 s.

The times apply to the acceleration from 0 rpm to a fixed maximum speed and the deceleration from a fixed maximum speed to 0 rpm, respectively.

At short deceleration times, the deceleration of the product may depend on load and inertia as there is no possibility of actively braking the product.

If the power supply is switched off, the deceleration of the product only depends on the load and inertia.



TM069798

Pos.	Description
Y	Speed
X	Time
1	Fixed maximum
2	User-set maximum
3	User-set minimum
4	Fixed initial ramp
5	Fixed final ramp
6	Ramp time up
7	Ramp time down

6.18 "Skip band"

Use this function to select a skip band within the range from user-set minimum speed to user-set maximum speed, if continuous operation is not required. The upper and lower speeds are stated in percentage of rated speed.

The purpose of the skip band is to avoid certain speeds which may cause noise or vibrations. If no skip band is required, select "**-**".

6.19 "Standstill heating"

Use this function to avoid condensation in humid environments.

When you set the function to **Active** and the product is in operating mode **Stop**, a low AC voltage is applied to the motor windings. The voltage is not high enough to make the motor rotate, but ensures that sufficient heat is generated to avoid condensation in the product, including the electronic parts in the drive.

Remember to remove the drain plugs and fit a cover over the product.

6.20 "Alarm handling"

This setting determines how the pump must react in case of a sensor failure.

Alarm or warning types:

- **Warning**
  A warning. There is no change in the operating mode.
- **Stop**
  The pump stops.
- **Min.**
  The pump reduces the speed to minimum.
- **Max.**
  The pump increases the speed to maximum.
- **User defined speed**
  The pump runs at the speed set by the user.

Affected inputs:

- **Analog input 1**
- **Analog input 2**
- **Analog input 3**
- **Built-in Grundfos sensor**
- **Liqtec input**

6.21 "Motor bearing monitoring"

Use this function to select whether or not you want to monitor the motor bearings.

You can make the following settings:

- **Active**
- **Not active**

When the function is set to **Active**, a counter in the controller starts counting the running hours of the bearings. The running hours are calculated on the basis of the motor speed. When a predefined limit is reached, a warning indicates that the bearings must be replaced or relubricated.

If you change the function to **Not active**, the counter continues to count. However, no warning is given when it is time to replace the bearings. If you change the function to **Active** again, the accumulated running hours are used to recalculate the replacement time.

6.22 "Service"

6.22.1 "Time to next service" ("Motor bearing service")

This display shows when to replace the motor bearings. The controller monitors the operating pattern of the motor and calculates the period between bearing replacements.

Displayable values:

- **in 2 years**
- **in 1 year**
- **in 6 months**
- **in 3 months**
- **in 1 month**
- **in 1 week**
- **Now!**.

6.22.2 "Bearing replacements"

The display shows the number of bearing replacements made during the lifetime of the motor.

6.22.3 "Bearings replaced" ("Motor bearing maintenance")

When the bearing monitoring function is active, a warning is given when the motor bearings must be replaced.

1. When you have replaced the motor bearings, press **Bearings replaced**.

6.23 "Number" ("Pump number")

Use this function to allocate a unique number to the motor. This makes it possible to distinguish between motors in connection with GENIbus communication.

6.24 "Radio communication" ("Enable/disable radio comm.")

Use this function to set the radio communication to **Enabled** or **Disabled**. Select **Disabled** in areas where radio communication is not allowed.

IR communication remains active.

6.25 "Language"

The function is only available in the advanced operating panel.

Use this function to select the desired language from the list.

6.26 "Date and time" ("Set date and time")

The function is only available in the advanced operating panel.

Use this function to set the date and time as well as how you want them to be viewed in the display.

- **Select date format**
  - **YYYY-MM-DD**
  - **DD-MM-YYYY**
  - **MM-DD-YYYY**
- **Select time format**
  - **HH:MM 24-hour clock**
  - **HH:MM am/pm 12-hour clock**
- **Set date**
- **Set time**.

Related information

6.42 "Setting of date and time"

6.27 "Unit configuration" ("Units")

The function is only available in the advanced operating panel.

Use this function to select SI or US units. You can make the setting for all parameters or customise for each individual parameter.

6.28 "Buttons on product" ("Enable/disable settings")

Use this function to disable the option to make settings for protective reasons.

- If you use Grundfos GO Remote and set the buttons to **Not active**, the buttons on the standard operating panel are disabled, except the **Radio communication** button.

- If you disable the buttons on pumps fitted with an advanced operating panel via **Enable/disable settings**, you can still use the buttons to navigate through the menus but you cannot make changes directly on the advanced operating panel. A lock symbol appears in the display. However, you can unlock the motor temporarily and allow settings by pressing the **Up** and **Down** buttons simultaneously for at least 5 seconds.

Related information

5.1.1 Standard operating panel

5.1.2 Advanced operating panel

6.29 "Delete history"

The function is only available in the advanced operating panel.

Use this function to delete the following historical data:

- **Delete operating log**
- **Delete energy consumption**

6.30 "Define Home display"

The function is only available in the advanced operating panel.

Set the **Home** display to show up to four user-defined parameters.

6.31 "Display settings"

The function is only available in the advanced operating panel.

Use this function to adjust the display brightness. You can also set whether or not the display is to switch off if no buttons have been activated for a period of time.

6.32 "Store settings" ("Store actual settings")

Use this function to store the current settings to enable the user to go back to a previous set of settings.

6.33 "Recall settings" ("Recall stored settings")

Use this function to return to previously stored settings.

With Grundfos GO Remote, you can return to previously stored settings.

With the advanced operating panel, you can only recall the last stored settings.

6.33.1 "Undo"

The function is only available in Grundfos GO Remote.

Use this function to undo all settings made with Grundfos GO Remote in the current communication session. Once you have recalled settings, you cannot undo.

6.34 "Pump name" ("Motor name")

The function is only available in Grundfos GO Remote.

Use this function to give the motor a name. The selected name then appears in Grundfos GO Remote.

6.35 "Connection code"

Use the connection code to enable automatic connection between Grundfos GO Remote and the product. Thus, you do not need to press **OK** or the **Radio communication** button each time.

You can also use the connection code to restrict remote access to the product.

You can only set the connection code with Grundfos GO Remote.

6.35.1 Setting a connection code in the product by using Grundfos GO Remote

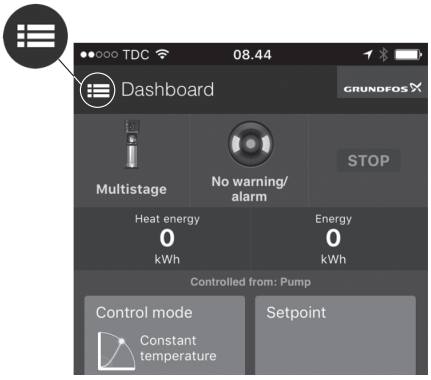
1. Connect Grundfos GO Remote to the product.
2. Go to **Settings** > **Connection code**.
3. Enter a connection code and press **OK**.
   You can change the code in the **Connection code** menu at any time. The old code is not required.

6.35.2 Setting a preset connection code in Grundfos GO Remote

You can set and store a preset connection code in Grundfos GO Remote so that it automatically connects to products with an identical code.

1. Open Grundfos GO Remote.

2. Press the **Menu** icon in the upper left corner of Grundfos GO Remote.



TM070084

3. Go to **General** > **Settings** > **Remote**.
4. Enter the preset connection code in the **Preset connection code** field and press **OK**.
   To change the preset connection code, press **Delete** and enter a new one.

To activate the connection code, restart the product.

If Grundfos GO Remote fails to connect and asks you to press **OK** or the**Radio communication** button on the product, the product has no connection code or has a different connection code. In this case, press **OK** or the **Radio communication** button to establish connection.

6.36 "Run start-up guide"

The function is only available in the advanced operating panel.

The startup guide automatically starts when you start the product for the first time. You can always run the startup guide later. The startup guide guides you through the general settings of the product.

To run the startup guide, go to **Settings** > **General settings** > **Run start-up guide**.

Related information

5.1.2.2 Startup guide

6.37 "Alarm log"

This function contains a list of logged alarms from the product. The log shows the alarm code, name of the alarm, when the alarm occurred and when the alarm was reset.

6.38 "Warning log"

This function contains a list of logged warnings from the product. The log shows the warning code, name of the warning, when the warning occurred and when the warning was reset.

6.39 "Assist"

This menu consists of a number of different assist functions.

Assist functions are small guides that take you through the steps needed to set the product.

6.40 "Assisted pump setup"

This function guides you through the following:

Setting the motor

- Selection of control mode
- Configuration of feedback sensors
- Adjustment of the setpoint
- Controller settings
- Summary of settings.

With Grundfos GO Remote, access the **Assisted pump setup** menu.

With the advanced operating panel, access the **Assisted pump setup** menu.

Related information

2.7 Identification of the functional module

6.41 "Setup, analog inputs"

The function is only available in the advanced operating panel.

- **Analog inputs**, follow on-screen instructions.

Related information

6.1 "Setpoint"

6.5 "Control mode"

6.6 "Analog inputs"

6.42 "Setting of date and time"

The function is only available in the advanced operating panel.
The inputs and outputs available depend on the functional module fitted in the motor.

Functional module	Setting of date and time
FM 300 (advanced)	•

The function guides you through the following settings:

- **Select date format**
- **Set date**
- **Select time format**
- **Set time**.

Related information

2.7 Identification of the functional module

6.26 "Date and time" ("Set date and time")

6.43 "Description of control mode"

The function is only available in the advanced operating panel.
The function describes each of the control modes available for the product.

Related information

6.5 "Control mode"

6.44 "Assisted fault advice"

This function provides guidance and corrective actions in the event of product failure.

6.45 Priority of settings

With Grundfos GO Remote, you can set the motor to operate at maximum speed or to stop.

If two or more functions are enabled at the same time, the motor operates according to the function with the highest priority.

If you have set the motor to maximum speed via the digital input, the motor operating panel or Grundfos GO Remote can only set the motor to **Manual** or **Stop**.

The priority of the settings appears from the table below:

Priority	Start/stop button	Grundfos GO Remote or operating panel on motor	Digital input	Bus communication
1	**Stop**			
2		**Stop** *		
3		**Manual**		
4		**Maximum speed** / **User defined speed** *		
5			**Stop**	
6			**User defined speed**	
7				**Stop**
8				**Maximum speed** / **User defined speed**
9				**Minimum speed**
10				**Start**
11			**Maximum speed**	
12		**Minimum speed**		
13			**Minimum speed**	
14			**Start**	
15		**Start**		

* **Stop** and **Maximum speed** settings made with Grundfos GO Remote or on the motor operating panel can be overruled by another operating-mode command sent from a bus, for example **Start**. If the bus communication is interrupted, the motor resumes its previous operating mode, for example **Stop**, that was selected with Grundfos GO Remote or the motor operating panel.

Related information

5.1.1 Standard operating panel

5.1.2 Advanced operating panel

6.46 Factory settings for Grundfos GO Remote

Settings	MTSE
Setpoint	75 % of speed range
Operating mode	**Normal**
Set user defined speed	67 %
Control mode	**Constant curve**
Buttons on product	**Active**
Controller	**Kp**: 0.5 **Ti**: 0.5
Operating range	20-100 %
Ramps	**Ramp-up time**: 0.5 s **Ramp-down time**: 3 s
Number	-
Radio communication	**Active**
Analog input 1	**Not active**
Analog input 2	**Not active**
Analog input 3	**Not active**
Digital input 1	**Ext. stop**
Digital input 2	**Not active**
Digital input/output 3	**Not active**
Digital input/output 4	**Not active**
Predefined setpoint	0 %
Analog output	**Speed**
External setpoint function	**Not active**
Signal relay 1	**Alarm**
Signal relay 2	**Running**
Limit 1 exceeded	**Not active**
Limit 2 exceeded	**Not active**
Standstill heating	**Not active**
Motor bearing monitoring	**Active**
Pump name	-
Connection code	-
Unit configuration	**SI Units**

7. Service

DANGER
Electric shock
Death or serious personal injury
- Switch off the power supply to the product including the power supply for the signal relays. Wait at least 5 minutes before you make any connections in the terminal box. Make sure that the power supply cannot be switched on accidentally.

DANGER
Magnetic field
Death or serious personal injury
- Do not handle the motor or rotor if you have a pacemaker.

If service of the product is required, contact Grundfos.

7.1 Servicing the motor

1. Contact Grundfos if the motor is in need of service.

7.2 Servicing the pump

Service documentation is available in Grundfos Product Center.

1. Go to http://product-selection.grundfos.com. Contact Grundfos if you have any questions.

7.3 Insulation resistance test

Do not use a megger or similar high voltage instrument, as the built-in electronics may be damaged.

7.4 Cleaning the product

WARNING
Electric shock
Death or serious personal injury
- Switch off the power supply to the product and to the signal relays. Check that the terminal box cover is intact before spraying water on the product.

To clean the motor, follow the procedure below:

1. Let the motor cool down first to avoid condensation.
2. Spray it with cold water.

8. Technical data

8.1 Technical data, three-phase motors

DANGER
Electric shock
Death or serious personal injury
- Use the recommended fuse size.

Supply voltage

- 3 x 380-500 V - 10 %/+ 10 %, 50/60 Hz, PE
- 3 x 200-240 V - 10 %/+ 10 %, 50/60 Hz, PE.

Check that the supply voltage and frequency correspond to the values stated on the nameplate.

Recommended size of fuse or circuit breaker

You can use standard as well as quick-blow or slow-blow fuses.

3 x 380-500 V - 10 %/+ 10 %, 50/60 Hz, PE

Motor size [kW]	Minimum [A]	Maximum [A]
1.5	6	10
2.2	6	16
3	10	16
4	13	16
5.5	16	32
7.5	20	32
11	32	32

3 x 200-240 V - 10 %/+ 10 %, 50/60 Hz, PE

Motor size [kW]	Minimum [A]	Maximum [A]
1.5	10	20
2.2	13	35
3	16	35
4	25	35
5.5	32	35

Related information

4.2.4 Cable requirements

4.2.4.1 Three-phase connections

8.5.3 Installation altitude

8.1.1 Leakage current (AC)

The leakage currents are measured without any load on the shaft and in accordance with EN 61800-5-1:2007.

- 3 x 380-500 V - 10 %/+ 10 %, 50/60 Hz, PE
- 3 x 200-240 V - 10 %/+ 10 %, 50/60 Hz, PE.

Speed [min $^{-1}$]	Power [kW]	Mains voltage [V]	Leakage current [mA]
2900-4000	1.5 - 2.2	≤ 400	< 3.5
		> 400	< 5
	3 - 5.5	≤ 400	< 3.5
		> 400	< 3.5
	7.5 - 11	≤ 400	< 3.5
		> 400	< 5

8.2 Inputs and outputs

Earth reference

All voltages refer to earth. All currents return to earth.

Absolute maximum voltage and current limits

Exceeding the following electrical limits may result in severely reduced operating reliability and motor life.
Relay 1:

- Maximum contact load: 250 VAC, 2 A or 30 VDC, 2 A.

Relay 2:

- Maximum contact load: 30 VDC, 2 A.

GENI terminals: -5.5 to +9.0 VDC or less than 25 mADC.
Other input and output terminals: -0.5 to +26 VDC or less than 15 mADC.

Digital inputs

Internal pull-up current greater than 10 mA at Vi equal to 0 VDC.
Internal pull-up to 5 VDC. Currentless for Vi greater than 5 VDC.
Certain low logic level: Vi less than 1.5 VDC.
Certain high logic level: Vi greater than 3.0 VDC.
Hysteresis: No.
Screened cable: 0.5 - 1.5 mm^2 / 28-16 AWG.
Maximum cable length: 500 m.

Open-collector digital outputs (OC)

Current sinking capability: 75 mADC, no current sourcing.
Load types: Resistive and/or inductive.
Low-state output voltage at 75 mADC: Maximum 1.2 VDC.
Low-state output voltage at 10 mADC: Maximum 0.6 VDC.
Overcurrent protection: Yes.
Screened cable: 0.5 - 1.5 mm^2 / 28-16 AWG.
Maximum cable length: 500 m.

Analog inputs (AI)

Voltage signal ranges:

- 0.5 - 3.5 VDC, AL AU.
- 0-5 VDC, AU.
- 0-10 VDC, AU.

Voltage signal:

- Ri greater than 100 kΩ at 25 °C.

Leak currents may occur at high operating temperatures. Keep the source impedance low.
Current signal ranges:

- 0-20 mADC, AU.
- 4-20 mADC, AL AU.

Current signal: Ri is equal to 292 Ω.
Current overload protection: Yes. Change to voltage signal.
Measurement tolerance: 0-3 % of full scale, maximum-point coverage.
Screened cable: 0.5 - 1.5 mm^2 / 28-16 AWG.
Maximum cable length: 500 m, excluding potentiometer.
Potentiometer connected to +5 V, GND, any AI: Use maximum 10 kΩ.
Maximum cable length: 100 m.

Analog output (AO)

Current sourcing capability only.
Voltage signal:

- Range: 0-10 VDC.
- Minimum load between AO and GND: 1 kΩ.
- Short-circuit protection: Yes.

Current signal:

- Ranges: 0-20 and 4-20 mADC.
- Maximum load between AO and GND: 500 Ω.
- Open-circuit protection: Yes.

Tolerance: 0-4 % of full scale, maximum-point coverage.
Screened cable: 0.5 - 1.5 mm^2 / 28-16 AWG.
Maximum cable length: 500 m.

Grundfos Digital Sensor input and output (GDS)

Use Grundfos Digital Sensor only.

Power supplies, +5 V, +24 V

+5 V

- Output voltage: 5 VDC - 5 % to + 5 %.
- Maximum current: 50 mADC, sourcing only.
- Overload protection: Yes.

+24 V

- Output voltage: 24 VDC - 5 % to + 5 %.
- Maximum current: 60 mADC, sourcing only.
- Overload protection: Yes.

Digital outputs, relays

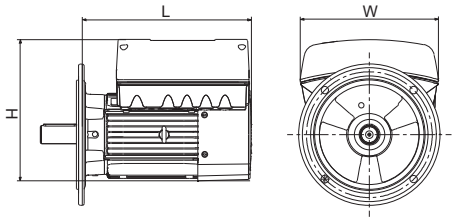
Potential-free changeover contacts.
Minimum contact load when in use: 5 VDC, 10 mA.
Screened cable: 0.5 - 2.5 mm^2 / 28-12 AWG.
Maximum cable length: 500 m.

Bus input

Grundfos GENIbus protocol, RS-485.
Screened 3-core cable: 0.5 - 1.5 mm^2 / 28-16 AWG.
Maximum cable length: 500 m.

8.3 Dimensions and weights

Motor with free-hole flange (FF), B5



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2900-4000

Supply voltage	Power [kW]	L [mm]	W [mm]	H [mm]	Weight [kg]
3 x 380-500 V	1.5	274	268	219	14.9
	2.2	274	268	219	16.3
	3.0	334	291	296.7	27
	4.0	334	291	296.7	29.7
	5.5	365	291	296.7	39
	7.5	389	346	364.5	49
	11.0	406	346	364.5	65.6
3 x 200-240 V	1.5	274	268	219	15
	2.2	334	291	296.7	21.9
	3.0	334	291	296.7	22
	4.0	334	291	296.7	25
	5.5	389	246	364.5	41.7

8.4 Other technical data

8.4.1 Ecodesign Directive

This product is out of scope of Directive 2009/125/EC and Commission Regulation (EU) 2019/1781 due to Article 2 (3a), as the variable speed drive (VSD) is integrated into a product and its energy performance cannot be tested independently from the product.

8.4.2 EMC (electromagnetic compatibility)

Standard used: EN 61800-3.
The table below shows the emission category of the motor.
C1 fulfils the requirements for residential areas.

Note: When connected to a public network, 11 kW motors do not comply with the partial weighted harmonics (PWH) requirements of EN 61000-3-12. If required by the distribution network operator, compliance can be obtained in the following way:

The impedance of the mains cables between the motor and the point of common coupling (PCC) must be equivalent to the impedance of a 50 m cable with a cross-section of 0.5 mm.

C3 fulfils the requirements for industrial areas.

Note: When the motors are installed in residential areas, supplementary measures may be required to prevent the motors from causing radio interference.

Motor [kW]	Emission category
	2900-4000 min^{-1}
1.5	C1
2.2	C1
3	C1
4	C1
5.5	C1
7.5	C3/C1*EMC (electromagnetic compatibility)*
11	C3/C1*EMC (electromagnetic compatibility)*

Immunity: The motor fulfils the requirements for industrial areas.

Contact Grundfos for further information.

8.4.3 Enclosure class

Standard: IP55 (IEC 34-5).

Optional: IP66 (IEC 34-5).

8.4.4 Insulation class

F (IEC 85).

8.4.5 Standby power consumption

5-10 W.

8.4.6 Cable entry sizes

Number and size of cable entries

Motor [kW]	2900-4000 min^{-1}
1.5	4 x M20
2.2	4 x M20
3.0 - 4.0	1 x M25 + 4 x M20
5.5	1 x M25 + 5 x M20
7.5 - 11	1 x M32 + 5 x M20

Related information

4.1.2 Cable entries

8.4.7 Cable gland sizes

Number and size of cable glands

Motor [kW]	Quantity	Thread size	Cable diameter [mm]
1.5 - 2.2	2	M20 x 1.5	5
	1		7-14
3 - 5.5	4	M20 x 1.5	5
	1	M25 x 1.5	9-18
7.5 - 11	4	M20 x 1.5	5
	1	M32 x 1.5	14-25

8.4.8 Torques for terminals

Terminal	Thread size	Maximum torque [Nm]
L1, L2, L3, L, N	M4	1.8
NC, C1, C2, NO	M2.5	0.5
1-26, A, Y, B	M2	0.5

8.4.9 Sound pressure level

Motor [kW]	Rated maximum speed [min^{-1}]	Speed [min^{-1}]	Sound pressure level ISO 3743 [dB(A)]
			3-phase motor
1.5	4000	3000	57
		4000	64
2.2	4000	3000	57
		4000	64
3	4000	3000	60
		4000	69
4	4000	3000	61
		4000	69
5.5	4000	3000	61
		4000	69
7.5	4000	3000	66
		4000	73
11	4000	3000	66
		4000	73

8.5 Operating conditions

8.5.1 Maximum number of starts and stops

The number of starts and stops via the power supply must not exceed four times per hour.

When switched on via the power supply, the product starts after approximately 5 seconds.

If a higher number of start and stops are required, use a digital input for external start and stop when starting and stopping the product.

When started via an external on and off switch, the product starts immediately.

8.5.2 Ambient temperature

8.5.2.1 Ambient temperature during storage and transportation

Description	Temperature
Minimum	-30 °C
Maximum	60 °C

8.5.2.2 Ambient temperature during operation

Description	3 x 200-240 V	3 x 380-500 V*
Minimum	-20 °C	-20 °C
Maximum	40 °C	40 °C

* The motor can operate with the rated power output (P2) at 50 °C. Continuous operation at higher temperatures reduces the expected product life. If the motor operates at ambient temperatures between 50 and 60 °C, select an oversized motor. Contact Grundfos for further information.

8.5.3 Installation altitude

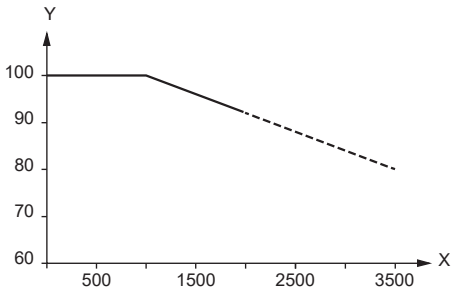
The installation altitude is the height above sea level of the installation site.

Products installed up to 1000 m above sea level can be loaded 100 %.

The motors can be installed up to 3500 m above sea level.

Products installed more than 1000 m above sea level must not be fully loaded due to the low density and consequent low cooling effect of the air.

The motor output power (P2) in relation to the altitude above sea level is shown in the graph.



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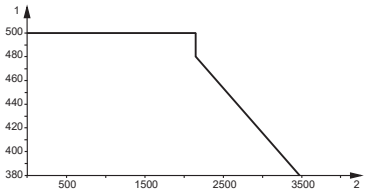
Pos.	Description
Y	P2 [%]
X	Altitude [m]

To maintain the galvanic isolation and ensure correct clearance according to EN60664-1:2007, adapt the supply voltage to the altitude.
The supply voltage for a three-phase motor in relation to the altitude is shown in the graph.



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Pos.	Description
Y	Supply voltage
X	Altitude [m]

Related information

8.1 Technical data, three-phase motors

8.5.4 Humidity

Description	Percentage
Maximum humidity	95 %

If the humidity is constantly high and above 85 %, open the drain holes in the drive-end flange to vent the motor.

Related information

4.1.4 Installing the product in moist surroundings

8.5.5 Turbine operation

To increase the life of the product, do not operate the product at a higher speed than the maximum speed stated on the nameplate.

9. Disposing of the product

WARNING
Magnetic field
Death or serious personal injury
- Persons with pacemakers dismantling this product must exercise caution when handling the magnetic materials embedded in the rotor.

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.
3. Dispose of the waste battery through the national collective schemes. If in doubt, contact your local Grundfos company.

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

A.1. Installation in the USA and Canada

To maintain the cURus approval, the additional information in this section must be followed.
The UL approval is according to UL 1004-1.

Outdoor installation

According to UL 778/C22.2 No 108-14, pumps intended for outdoor use must be marked enclosure type 3 and the product must be tested at a surface temperature down to -35 °C. The MLE enclosure is approved for type 3 or 4 and is rated at a surface temperature down to 0 °C, thus it is only for indoor use in UL 778/C22.2 No 108-14 pump applications.

For more information about ambient temperature during operation, see *8.5.2.2 Ambient temperature during operation*.

Canadian Interference-Causing Equipment Standard

This product complies with the Canadian ICES-003 Class B specifications. This Class B device meets all the requirements of the Canadian interference-causing equipment regulations.

Cet appareil numérique de la Classe B est conforme à la norme NMB-003 du Canada. Cet appareil numérique de la Classe B respecte toutes les exigences du règlement sur le matériel brouilleur du Canada.

A.1.1. Electrical codes

For the USA

This product complies with the Canadian Electrical Code and the US National Electrical Code.

This product has been tested according to the national standards for Electronically Protected Motors:

CSA 22.2 100-14:2014 (applies to Canada only).

UL 1004-1:2015 (applies to USA only).

Pour le Canada

Codes de l'électricité:

Ce produit est conforme au code canadien de l'électricité et au code national de l'électricité américain.

Ce produit a été testé selon les normes nationales s'appliquant aux moteurs protégés électroniquement:

CSA 22.2 100.04: 2009 (s'applique au Canada uniquement).

UL 1004-1: Juin 2011 (s'applique aux États-Unis uniquement).

A.1.2. Radio communication

For the USA

This device complies with Part 15 of the FCC rules and RSS210 of the IC rules. Operation is subject to the following two conditions:

- This device may not cause interference.
- This device must accept any interference, including interference that may cause undesired operation of the device.

Users are cautioned that changes or modifications not expressly approved by Grundfos could void the user's authority to operate the equipment.

Pour le Canada

Ce dispositif est conforme à la partie 15 des règles de la FCC et aux normes RSS210 de l'IC. Son fonctionnement est soumis aux deux conditions suivantes:

- Ce dispositif ne doit pas provoquer de brouillage préjudiciable.
- Il doit accepter tout brouillage reçu, y compris le brouillage pouvant entraîner un mauvais fonctionnement.

A.1.3. Identification numbers

For the USA

Grundfos Holding A/S

Contains FCC ID: OG3-RADIOM01-2G4.

For Canada

Grundfos Holding A/S

Model: RADIOMODULE 2G4

Contains IC: 10447A-RA2G4M01.

Pour le Canada

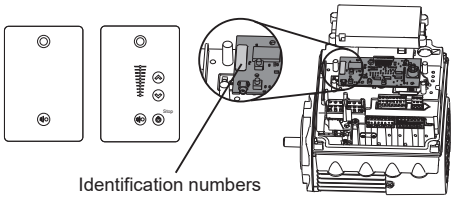
Numéros d'identification:

Grundfos Holding A/S

Modèle: RADIOMODULE 2G4

Contient IC: 10447A-RA2G4M01.

Location of identification numbers



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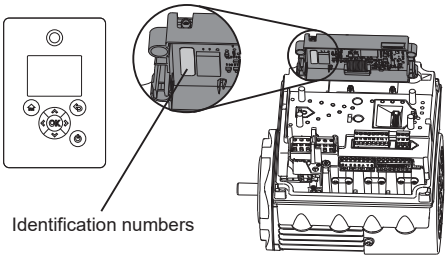

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A.1.4. Electrical connection

Conductors

See *4.2.4 Cable requirements*.

Torques

See *8.4.8 Torques for terminals*.

Line reactors

The maximum line reactor size in front of the drive must not exceed the following values:

P2 [kW]	Maximum line reactor [mH]	
	1450-2000 rpm 1450-2200 rpm	2900-4000 rpm 4000-5900 rpm
0.25 - 3	1.5	1.5
4	0.7	0.7
5.5	0.9	0.3
7.5	0.6	0.6
11	0.3	0.3

Exceeding these values creates resonance between the reactor and the drive, which reduces the life of the product.

Short-circuit current

If a short circuit occurs, the pump can be used on a mains supply delivering not more than 5000 RMS symmetrical amperes, 600 V maximum.

Fuses

Fuses used for motor protection must be rated for minimum 500 V. Motors up to and including 10 hp require class K5 UL-listed fuses. Any UL-listed fuse can be used for motors of 15 hp.

Branch-circuit protection

When the pump is protected by a circuit breaker, the circuit breaker must be rated for a maximum voltage of 480 V. The circuit breaker must be of the "inverse time" type.

Overload protection

Degree of overload protection provided internally by the drive, in percent of full-load current: 102 %.

B.1. Instalação no Brasil

B.1.1. Comunicação via rádio

Este equipamento está em conformidade com a Parte 15 das normas da FCC, IC – RSS-210 e da Anatel com número de registro 01507-14-7763. A operação é de acordo com as duas condições:

- Este equipamento não pode causar interferência.
- Este equipamento deve aceitar qualquer interferência, incluindo interferência que pode causar operação indesejada do equipamento.

Os usuários são alertados de que qualquer alteração ou mudança não expressamente aprovada pela Grundfos pode anular o direito da operação do equipamento pelo usuário.

Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.

B.1.2. Números de Identificação

Grundfos Holding A/S

Contém FCC ID: OG3-RADIOM01-2G4.

Contém IC: 10447A-RA2G4M01.

Modelo: RADIOMODULE 2G4.

Contém Anatel: 01507-14-7763.

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Revision Info
Last revised on 09-09-2020

99688961 **06.2021**

ECM 1317431

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