

CRE, CRIE, CRNE, SPKE, MTRE, MTHE, CME

Installation and operating instructions



**CRE, CRIE, CRNE, SPKE, MTRE,
CME**

Installation and operating instructions

Other languages

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CRE, CRIE, CRNE, SPKE, MTRE, MTHE, CME

English (GB)

Installation and operating instructions 4

English (GB) Installation and operating instructions

Original installation and operating instructions

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1. General information



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

1.1 Hazard statements

The symbols and hazard statements below may appear in 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.

1.3 Abbreviations and definitions

AI	Analog input
AL	Alarm, out of range at lower limit
AO	Analog output
AU	Alarm, out of range at upper limit
CIM	Communication interface module
Current sinking	The ability to draw current into the terminal and guide it towards GND in the internal circuitry
Current sourcing	The ability to push current out of the terminal and into an external load which must return it to GND
DI	Digital input
DO	Digital output
ELCB	Earth leakage circuit breaker
FM	Functional module
GDS	Grundfos Digital Sensor: Factory-fitted sensor in some Grundfos pumps
GENIbus	Proprietary Grundfos fieldbus standard
GFCI	Ground fault circuit interrupter (USA and Canada)
GND	Ground
Grundfos Eye	Status indicator light
LIVE	Low voltage with the risk of electric shock if the terminals are touched
OC	Open collector: Configurable open-collector output
PE	Protective earth
PELV	Protective extra-low voltage: A voltage that cannot exceed ELV under normal conditions and under single-fault conditions, except earth faults in other circuits
RCD	Residual-current device
SELV	Safety extra-low voltage: A voltage that cannot exceed ELV under normal conditions and under single-fault conditions, including earth faults in other circuits

2. Product introduction

These installation and operating instructions are a supplement to the installation and operating instructions for the corresponding standard pumps CR, CRI, CRN, SPK, MTR and CM. For instructions not mentioned specifically in this manual, see the installation and operating instructions for the standard pump.

Grundfos E-pumps are fitted with frequency-controlled permanent-magnet motors for single-phase or three-phase mains connection.

You can fit the motors with a Grundfos add-on communication interface module (CIM). The module enables data transmission between the motor and an external system. The module communicates via fieldbus protocols.

2.1 Pumps without a factory-fitted sensor

The pumps have a built-in PI controller and can be set for an external sensor enabling the control of the following parameters:

- constant pressure
- constant differential pressure
- constant temperature
- constant differential temperature
- constant flow rate
- constant level
- constant curve
- constant other value.

The pumps are factory-set to constant-curve control mode. You can change the control mode with the Grundfos GO, HMI 300, HMI 301 or via the Grundfos GO Link.

2.2 Pumps with a factory-fitted pressure sensor

The pumps have a built-in PI controller and are set for a pressure sensor enabling the control of the outlet pressure.

The pumps are factory-set to constant-pressure control mode. The pumps are typically used for keeping a constant pressure in variable-demand systems.

2.3 Radio communication

This product incorporates a radio module for remote control which is a class 1 device and that can be used anywhere in the EU without restrictions.

For use in the USA and Canada, see the appendix on installation in the USA and Canada.

This product can communicate with the Grundfos GO and other products of the same type via the built-in radio module.

In some cases, an external antenna may be required. Only Grundfos-approved external antennas may be connected to this product, and only by a Grundfos-approved installer.

2.4 Battery

A Li-ion battery is fitted in the CRE, CRIE, CRNE, SPKE, MTHE and MTRE pumps. The Li-ion battery complies with the Battery Directive (2006/66/EC). The battery does not contain mercury, lead or cadmium.

3. Receiving the product

3.1 Lifting the product

WARNING

Falling objects

Death or serious personal injury

- Do not use the motor eyebolts to lift the entire pump if the pump is fitted with a motor of another make than Grundfos MG and MGE.
- Follow the lifting instructions.
- Use lifting equipment that is approved for the weight of the product.
- Persons must keep a safe distance from the product during lifting operations.
- Wear personal protective equipment.



For lifting instructions, see the related installation and operating instructions for the pump.

3.2 Inspecting the product

Before installing the product, do the following:

1. Check if the product is as ordered.
2. Check if no visible parts are damaged.
3. If parts are damaged or missing, contact your local Grundfos sales company.

3.3 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. Mechanical installation

4.1 Mounting

CAUTION

Crushing of feet

Minor or moderate personal injury

- Fasten the pump securely to a solid and even foundation according to the specifications in the installation and operating instructions for the pump.



The product must be installed in a location with access control to prevent unauthorized access to the product.



The product must only be connected to protected network subnets with strict access control.

4.2 Cable entries

See the size of the cable entries in the section on other technical data.

Related information

[9.4 Other technical data](#)

4.3 Cable glands

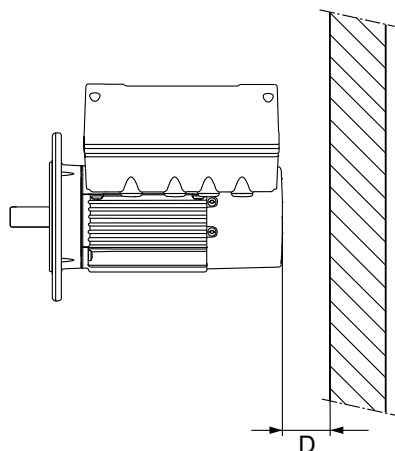
The number and size of cable glands delivered with the pump depend on the motor size. See the section on other technical data.

Related information

[9.4 Other technical data](#)

4.4 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.



TM071139

- 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.

4.5 Installing the product outdoors or in areas with high humidity

If you install the product outdoors or in areas with high humidity, take the following action to avoid condensation on the electronic components.

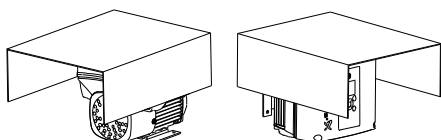


To maintain the UL mark, additional requirements apply to the equipment. See the appendix concerning installation in the USA and Canada.

- Provide the product with a suitable cover. The cover must be large enough to ensure that the product is not exposed to direct sunlight, rain or snow. Grundfos does not supply covers.



When fitting a cover to the product, observe the instructions for adequate cooling.



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- Open the drain holes in the product.

- Connect the product permanently to the mains supply and activate the built-in standstill heating function.

Related information

[4.6 Drain holes](#)

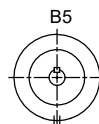
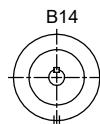
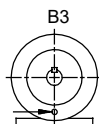
[7.25 Standstill heating](#)

4.6 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 is lower than standard.



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5. Electrical connection

ANGER

Electric shock

Death or serious personal injury



- Switch off the power supply to the motor and to 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.

ANGER

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 operations must be carried out by a qualified electrician.

5.1 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.

5.1.1 Protection against mains voltage transients

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

5.1.2 Motor protection

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

Model H, I: The product includes load- and speed-sensitive motor-overload protection.

Model J: The product includes load- and speed-sensitive motor-overload protection.

Model K: The product includes load- and speed-sensitive motor-overload protection with thermal memory retention.

5.2 Cable requirements

5.2.1 Cable cross-section



DANGER Electric shock

Death or serious personal injury

- Always comply with local regulations regarding cable cross-sections.

1 × 200-230 V

Power [kW]	Conductor type	Cross section	
		[mm ²]	[AWG]
0.25 - 1.5	Solid	1.5 - 2.5	16-12
	Stranded	1.5 - 2.5	16-12

3 × 380-500 V

Power [kW]	Conductor type	Cross section	
		[mm ²]	[AWG]
0.25 - 2.2	Solid	1.5 - 10	16-8
	Stranded	1.5 - 10	16-8
3.0 - 11	Solid	2.5 - 10	14-8
	Stranded	2.5 - 10	14-8

3 × 200-240 V

Power [kW]	Conductor type	Cross section	
		[mm ²]	[AWG]
1.1 - 1.5	Solid	1.5 - 10	16-8
	Stranded	1.5 - 10	16-8
2.2 - 5.5	Solid	2.5 - 10	14-8
	Stranded	2.5 - 10	14-8

5.2.2 Conductors

Type

The conductors are stranded or solid copper.

Temperature rating

Temperature rating for conductor insulation: 60 °C (140 °F).

Temperature rating for outer cable sheath: 75 °C (167 °F).

5.3 Power supply



DANGER Electric shock

Death or serious personal injury

- Use the recommended fuse size.

Related information

[9.2.1.1 Supply voltage](#)

5.3.1 Single-phase supply voltage

1 × 200-240 V-10 % / +10 %, 50/60 Hz, PE

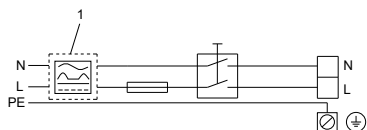
Make sure the supply voltage and frequency correspond to the values stated on the nameplate.



If you want to supply the motor through an IT network, make sure you have a suitable motor variant. If you are in doubt, contact Grundfos.

The wires in the motor terminal box must be as short as possible. Excepted from this is the separated earth conductor which 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.

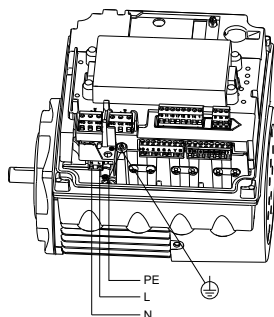
For maximum backup fuse, see the section on supply voltage.



TM078919

Example of a mains-connected motor with a main switch, backup fuse and additional protection

Pos.	Description
1	RCD, type B



TM053494

Mains connection, single-phase motors

Related information

9.2.1.1 Supply voltage

5.3.2 Three-phase supply voltage

Three-phase motors are available for the following voltages:

- 3 × 440-480 V -10 % / +10 %, 60 Hz, PE
- 3 × 200-240 V -10 % / +10 %, 60 Hz, PE.

Make sure the supply voltage and frequency correspond to the values stated on the nameplate.

The wires in the motor terminal box must be as short as possible. Excepted from this is the separated earth conductor which 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, make sure you have pressed home the terminal block for L1, L2 and L3 in its socket when you connect the power cable.

For maximum backup fuse, see the section on supply voltage.



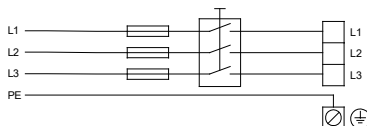
If you want to supply the motor through an IT network, make sure you have a suitable motor variant. If you are in doubt, contact Grundfos.

Only the following motors can be supplied through an IT network:

- Motors with a speed of 2900-4000 rpm or 4000-5900 rpm and up to 3 hp (2.2 kW).

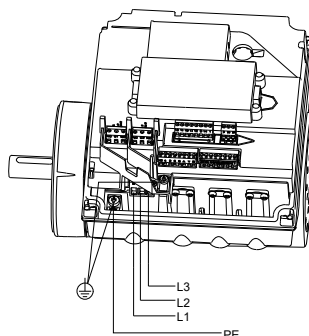


Corner earthing is not allowed for supply voltages above 3 × 240 V and 3 × 480 V, 60 Hz.



TM078920

Example of a power supply-connected motor with a power switch, backup fuses



TM053495

Power supply connection, three-phase motors

Related information

9.2.2.1 Supply voltage

5.4 Additional protection

DANGER

Electric shock

Death or serious personal injury



- Only use residual-current circuit breakers (ELCB, GFCI, RCD) of type B.

The residual-current circuit breaker must be marked with the following symbol:



The total leakage current of all the electrical equipment in the installation must be taken into account. You find the leakage current of the motor in the sections on leakage current and leakage current (AC).

This product can cause a direct current in the protective earth conductor.

Overvoltage and undervoltage protection

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



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

Overload protection

If the upper load limit is exceeded, the motor automatically compensates for it by reducing the speed and stops if the overload condition persists. The motor remains stopped for a set period. After this period, the motor automatically attempts to restart. The overload protection prevents damage to the motor. Consequently, no additional motor protection is required.

Overtemperature protection

The electronic unit has a built-in temperature sensor as an additional protection. When the temperature rises above a certain level, the motor automatically compensates for it by reducing the speed and stops if the temperature keeps rising. The motor remains stopped for a set period. After this period, the motor automatically attempts to restart.

Protection against phase unbalance

Three-phase motors must be connected to a power supply with a quality corresponding to IEC 60146-1-1, class C, to ensure correct motor operation at phase unbalance. This also ensures long life of the components.

Related information

[9.2.1.2 Leakage current](#)

[9.2.2.2 Leakage current \(AC\)](#)

5.5 Connection terminals

The descriptions and terminal overviews in this section apply to both single- and three-phase motors. For maximum torques, see the section on other technical data.

Related information

[9.4 Other technical data](#)

5.5.1 Connection terminals, CRE, CRIE, CRNE, SPKE and MTRE pumps

The CRE, CRIE, CRNE, SPKE and MTRE pumps have a number of inputs and outputs enabling the pumps to be used in advanced applications where many inputs and outputs are required.

The pumps have the following 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
- two Pt100/1000 inputs
- two LiqTec sensor inputs
- two signal relay outputs
- GENibus connection.

See the figure below.



Digital input 1 is factory-set to be start-stop input where open circuit results in stop. A jumper is factory-fitted between terminals 2 and 6. Remove the jumper if digital input 1 is to be used as external start-stop or any other external function.

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.

- Inputs and outputs

All 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), thus ensuring protection against electric shock.

- Signal relay outputs

- Signal relay 1:

- LIVE:

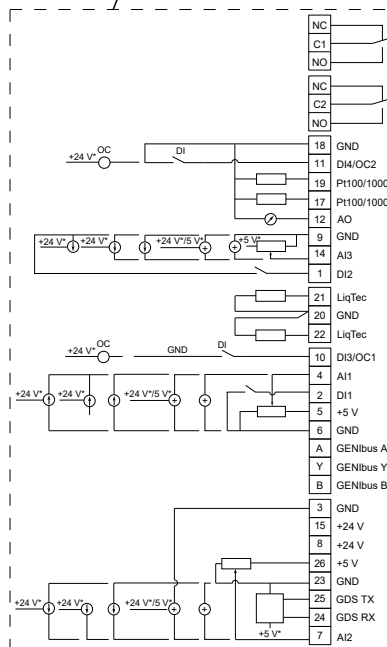
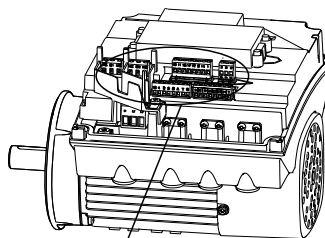
You can connect supply voltages up to 250 VAC. PELV: The output is galvanically separated from other circuits. Therefore, you can connect the supply voltage or protective extra-low voltage to the output as desired.

- 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.

- Mains supply (terminals N, PE, L or L1, L2, L3, PE).



TM07892.1

Connection terminals, CRE, CRIE, CRNE, SPKE and MTRE pumps

*If you use an external supply source, there must be a connection to GND.

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	Ground
11	DI4/OC2	Digital input/output, configurable Open collector: Max. 24 V resistive or inductive
19	Pt100/1000 input 2	Pt100/1000 sensor input
17	Pt100/1000 input 1	Pt100/1000 sensor input
12	AO	Analog output: 0-20 mA / 4-20 mA 0-10 V
9	GND	Ground
14	AI3	Analog input: 0-20 mA / 4-20 mA 0-10 V
1	DI2	Digital input, configurable
21	LiqTec sensor input 1	LiqTec sensor input (white conductor)
20	GND	Ground (brown and black conductors)
22	LiqTec sensor input 2	LiqTec sensor input (blue conductor)
10	DI3/OC1	Digital input/output, configurable. Open collector: Max. 24 V resistive or inductive.
4	AI1	Analog input: 0-20 mA / 4-20 mA 0.5 - 3.5 V / 0-5 V / 0-10 V
2	DI1	Digital input, configurable

Terminal	Type	Function
5	+5 V	Supply to potentiometer and sensor
6	GND	Ground
A	GENIbus, A	GENIbus, A (+)
Y	GENIbus, Y	GENIbus, GND
B	GENIbus, B	GENIbus, B (-)
3	GND	Ground
15	+24 V	Supply
8	+24 V	Supply
26	+5 V	Supply to potentiometer and sensor
23	GND	Ground
25	GDS TX	Grundfos Digital Sensor output
24	GDS RX	Grundfos Digital Sensor input
7	AI2	Analog input: 0-20 mA / 4-20 mA 0.5 - 3.5 V / 0-5 V / 0-10 V

Terminal	Type	Function
2	DI1	Digital input, configurable
5	+5 V	Supply to potentiometer and sensor
6	GND	Ground
A	GENIbus, A	GENIbus, A (+)
Y	GENIbus, Y	GENIbus, GND
B	GENIbus, B	GENIbus, B (-)
3	GND	Ground
15	+24 V	Supply
8	+24 V	Supply
26	+5 V	Supply to potentiometer and sensor
23	GND	Ground
25	GDS TX	Grundfos Digital Sensor output
24	GDS RX	Grundfos Digital Sensor input
7	AI2	Analog input: 0-20 mA / 4-20 mA 0.5 - 3.5 V / 0-5 V / 0-10 V

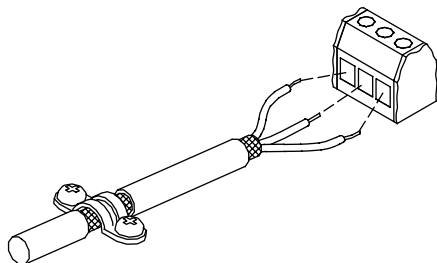
5.6 Signal cables

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.

5.6.1 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.



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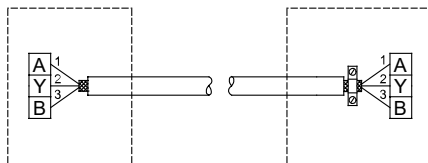
2. Connect the signal cables to the terminals.
3. Tighten the terminal screws.

5.7 Bus connection cable

5.7.1 Connecting a 3-core bus cable, GENIbus

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 .

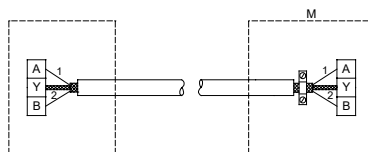
- If the motor is connected to a unit with a cable clamp identical to the one on the product, connect the screen to the cable clamp.
- If the unit has no cable clamp, leave the screen unconnected at this end.



TM070223

5.7.2 Replacing a motor

If a 2-core cable is used in the installation, connect it as shown in the figure below.



TM079070

Connection with screened 2-core cable

Pos.	Description
M	Motor

If a screened 3-core cable is used in the installation, follow the instructions in the section on connecting a 3-core bus cable.

Related information

[5.7.1 Connecting a 3-core bus cable, GENIbus](#)

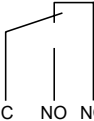

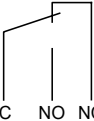

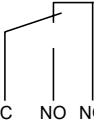
5.8 Signal relays

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 are shown in the table below.





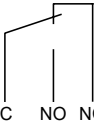
Grundfos Eye is off

The power is off.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					-
C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	



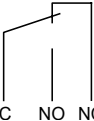

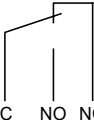
Grundfos Eye is rotating green

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

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					Normal Min. or Max.
C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	

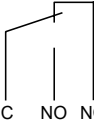

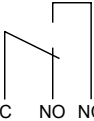

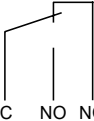
Grundfos Eye is rotating green

The pump runs in **Manual** mode.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					Manual
C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	






Grundfos Eye is permanently green

The pump is ready for operation but is not running.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					Stop
C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	

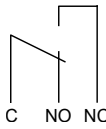
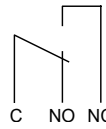



Grundfos Eye is rotating yellow

There is a warning, but the pump is running.

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


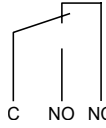

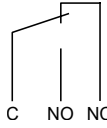

Grundfos Eye is rotating yellow

There is a warning, but the pump is running.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					Manual

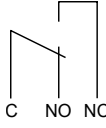
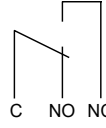



Grundfos Eye is permanently yellow

There is a warning, and the pump is stopped via a **Stop** command.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					Stop

Grundfos Eye is rotating red

There is an alarm, but the pump is running.

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

Grundfos Eye is rotating red

There is an alarm, but the pump is running.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					Manual

Grundfos Eye is flashing red

The pump is stopped due to an alarm.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					Stop

6. Control functions

6.1 User interfaces

WARNING
Hot surface
Death or serious personal injury

- Only touch the buttons on the display as the product may be very hot.

DANGER
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 pump settings by the following user interfaces:

Operating panels

- Standard operating panel.
- Advanced operating panel.

Remote controls

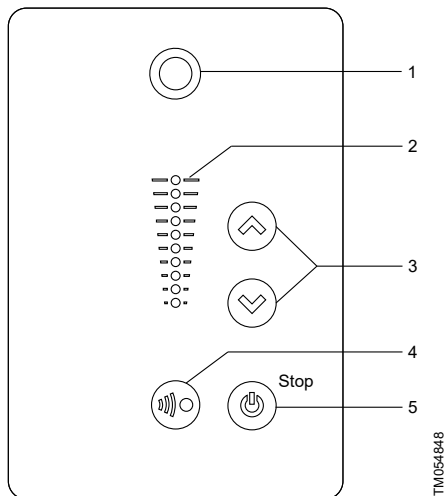
- Grundfos GO
- Grundfos R100 remote control. See the section on description of functions starting with the section on setpoint.

If the power supply to the pump is switched off, the settings are stored.

Related information

- [6.2 Standard operating panel](#)
- [6.3 Advanced operating panel](#)
- [6.4 Grundfos GO](#)
- [7.2 Setpoint](#)

6.2 Standard operating panel



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 the Grundfos GO and other products of the same type.
5		<p>Start/Stop: Press the button to make the product ready for operation or to start and stop the product.</p> <p>Start: If you press the button when the product is stopped, the product starts if no other functions with higher priority have been enabled.</p> <p>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.</p>

6.2.1 Setting the setpoint in constant parameter mode

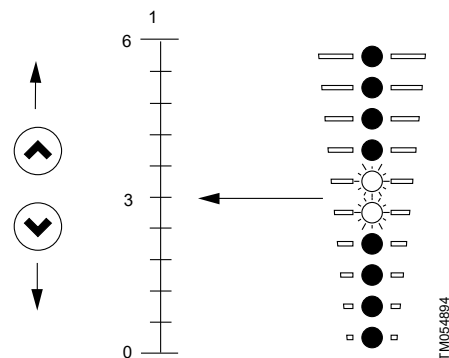
The following applies for motors set to operate in **Const. other val.**

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.



Related information

[7.8 Analog inputs](#)

6.2.2 Setting the setpoint in constant curve mode

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

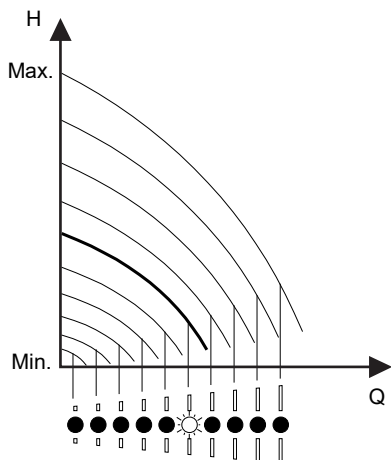
The green light fields on the operating panel indicate the setpoint set.

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

Related information

[6.5 Grundfos Eye](#)

[7.1 Priority of settings](#)

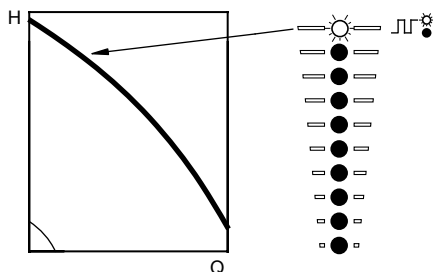


TM054895

6.2.3 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.

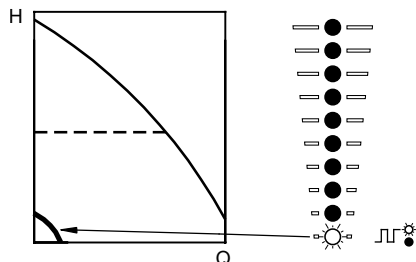


TM054896

6.2.4 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.



TM054897

6.2.5 Starting the pump

How you start the pump depends on how it was stopped.

Start the pump in one of the following ways:

- If the pump was stopped by pressing the **Start/Stop** button, start the pump by pressing the **Start/Stop** button.
- If the pump was stopped by pressing and holding the **Down** button, start the pump by pressing and holding the **Up** button.

6.2.6 Stopping the pump

Stop the pump in one of the following ways:

- Press the **Start/Stop** button.
- Press and hold the **Down** button until all light fields are off.
- Use the Grundfos GO.
- Use a digital input set to **External stop**.

Related information

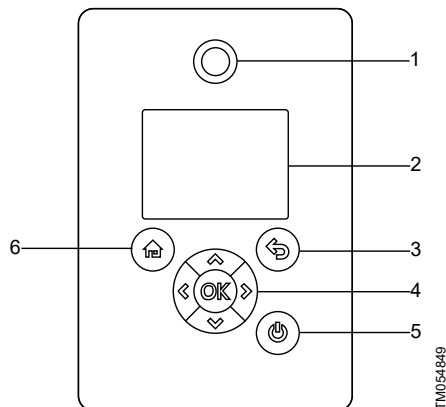
7.1 Priority of settings

6.2.7 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 the Grundfos GO.
- Use the digital input if you have set it to **Alarm resetting**.

6.3 Advanced operating panel



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.

Pos.	Symbol	Description
		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.
4		OK: Press the button to do the following: <ul style="list-style-type: none"> • save changed values, reset alarms and expand the value field • enable radio communication with the Grundfos GO and other products of the same type. <p>OK When you try to establish radio communication between the product and the Grundfos GO or another product, the green indicator light in the 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 the Grundfos GO and other products of the same type.</p>
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.

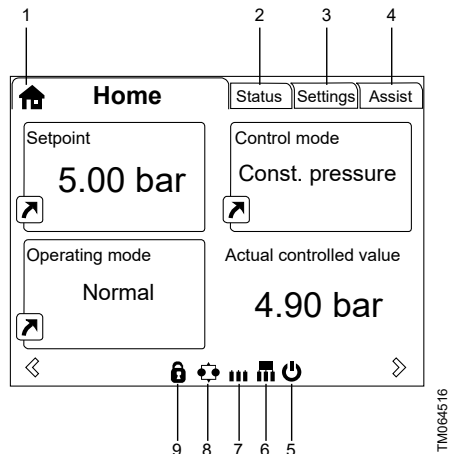
Related information

[6.5 Grundfos Eye](#)

[7.1 Priority of settings](#)




[7.34 Enable/disable settings](#)

6.3.1 Home display



Example of **Home** display

Pos.	Symbol	Description
Home		
1		This menu shows up to four user-defined parameters. You can select parameters shown as shortcut icon , and when pressing α you go directly to the Settings display for the selected parameter.
Status		
2	-	This menu shows the status of the pump and system, as well as warnings and alarms.
Settings		
3	-	This menu gives access to all setting parameters. You can make detailed settings of the pump in this menu. See the section on the setpoint.
Assist		
4	-	This menu enables assisted pump setup, provides a short description of the control modes and offers fault advice. See the section on assist.
5		It indicates that the pump has been stopped via the button.
6		It indicates that the pump is functioning as master pump in a multipump system.

Pos.	Symbol	Description
7		It indicates that the pump is functioning as a slave pump in a multipump system.
8		It indicates that the pump is operating in a multipump system. See the section on Multipump setup (Setup of multipump system).
9		It indicates that the possibility to change settings has been disabled for protective reasons. See the section on Buttons on product (Enable/disable settings).

Related information

[7.34 Enable/disable settings](#)

[7.49 Setup of multipump system](#)

6.3.2 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 is completed, the main menus appear on the display.

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

Related information

[7.42 Run start-up guide](#)

6.3.3 Menu overview for the advanced operating panel

6.3.3.1 Home

Home	CRE, CRIE, CRNE, SPKE, MTRE	MTHE, CME	Multipump system
	•	•	•

6.3.3.2 Status

Status	CRE, CRIE, CRNE, SPKE, MTRE	MTHE, CME	Multipump system
Operating status	•	•	•
Operating mode, from	•	•	•
Control mode	•	•	•
Pump performance	•	•	•
Actual control. value	•	•	•
Resulting setpoint	•	•	•
Speed	•	•	•
Acc. flow and specific energy	•	•	•
Power and energy consumption	•	•	•
Measured values	•	•	•
Analog input 1	•	•	•
Analog input 2	•	•	•
Analog input 3	•	• ¹⁾	• ¹⁾
Pt100/1000 input 1	•	• ¹⁾	• ¹⁾
Pt100/1000 input 2	•	• ¹⁾	• ¹⁾
Analog output	•	• ¹⁾	• ¹⁾
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	•	•	•
Multi-pump system			•

Status	CRE, CRIE, CRNE, SPKE, MTRE	MTHE, CME	Multipump system
System operating status			•
System performance			•
System input power and energy			•
Pump 1, multi-pump system			•
Pump 2, multi-pump system			•
Pump 3, multi-pump system			•
Pump 4, multi-pump system			•

1) It is only available if an advanced functional module, type FM 300, is fitted.

6.3.3.3 Settings

Settings	CRE, CRIE, CRNE, SPKE, MTRE	MTHE, CME	Multipump system
Setpoint	•	•	•
Operating mode	•	•	•
Set manual speed	•	•	•
Set user-defined speed	•	•	•
Control mode	•	•	•
Setting the proportional pressure	•	•	•
Analog inputs	•	•	•
Analog input 1, setup	•	•	•
Analog input 2, setup	•	•	•
Analog input 3, setup	•	• ²⁾	• ²⁾
Pt100/1000 inputs	•	• ²⁾	• ²⁾
Pt100/1000 input 1, setup	•	• ²⁾	• ²⁾
Pt100/1000 input 2, setup	•	• ²⁾	• ²⁾
Digital inputs	•	•	•
Digital input 1, setup	•	•	•
Digital input 2, setup	•	• ²⁾	• ²⁾
Digital inputs/outputs	•	•	•
Digital input/output 3, setup	•	•	•
Digital input/output 4, setup	•	• ²⁾	• ²⁾
"Signal relays" 1 and 2 (Relay outputs)	•	•	•
Relay output 1	•	•	•
Relay output 2	•	•	•
Analog output	•	• ²⁾	• ²⁾

Settings	CRE, CRIE, CRNE, SPKE, MTRE	MTHE, CME	Multipump system
Output signal	•	• ²⁾	• ²⁾
Function of analog output	•	• ²⁾	• ²⁾
Controller settings	•	•	•
Operating range	•	•	•
Setpoint influence	•	•	•
External setpoint function	•	•	•
Predefined setpoints	•	• ²⁾	• ²⁾
Monitoring functions	•	•	•
Motor bearing monitoring	•	•	•
Motor bearing maintenance	•	•	•
Limit-exceeded function	•	•	•
LiqTec function	•	•	•
Alarm handling	•	•	•
Special functions	•	•	•
Stop function (Low-flow stop function)	•	•	•
Stop at min. speed	•	•	•
Pipe filling function	•	•	•
Pulse flowmeter setup	•	•	•
Ramps	•	•	•
Standstill heating	•	•	•
Communication	•	•	•
Pump number	•	•	•
Enable/disable radio communication	•	•	•
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	•	•	•

²⁾ It is only available if an advanced functional module, type FM 300, is fitted.

6.3.3.4 Assist

Assist	CRE, CRIE, CRNE, SPKE, MTRE	MTHE, CME	Multipump system
Assisted pump setup	•	•	•
Setup, analog input	•	•	•
Setting of date and time	•	•	•
Setup of multipump system	•	•	•
Description of control mode	•	•	•
Assisted fault advice	•	•	•

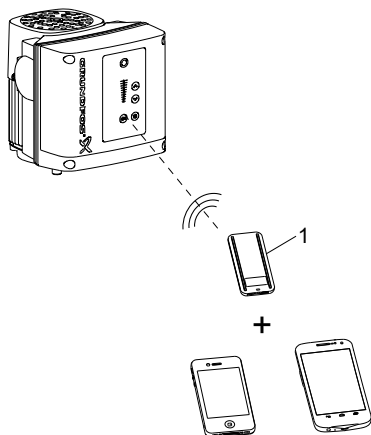
6.4 Grundfos GO

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

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

Use the Grundfos GO together with the following mobile interface:

Grundfos MI 301.



TM066256

Pos. Description

- | | |
|---|---|
| 1 | Grundfos MI 301:
It is a separate module enabling radio or infrared communication. Use the module together with an Android or iOS-based smart device via a Bluetooth connection. |
|---|---|

6.4.1 Communication

When the Grundfos GO initiates communication with the product, the indicator light in the centre of the 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 the Grundfos GO, or press the **Home** button to reject connection.

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

You can choose between the following communication types:

- radio communication
- infrared communication.

Related information

6.5 Grundfos Eye

6.4.1.1 Radio communication

Radio communication can take place at distances up to 30 metres. The first time the Grundfos GO 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 the Grundfos GO, and you can select the product from the **List** menu.

6.4.1.2 Infrared communication

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

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

6.4.2 Menu overview for the Grundfos GO

Dashboard	CRE, CRIE, CRNE, SPKE, MTRE	CME	Multipump system
	•	•	•

Status	CRE, CRIE, CRNE, SPKE, MTRE	CME	Multipump system
System mode			● ³⁾
Resulting setpoint	•	•	
Resulting system setpoint			● ³⁾
Actual controlled value	•	•	● ³⁾
Motor speed	•	•	
Power consumption	•	•	
Power cons., system			● ³⁾
Energy consumption	•	•	
Energy cons., system			● ³⁾
Acc. flow, specific energy	•	•	● ³⁾
Operating hours	•	•	
Operating hours, system			● ³⁾
Pt100/1000 input 1	•	● ⁴⁾	
Pt100/1000 input 2	•	● ⁴⁾	
Analog output	•	● ⁴⁾	
Analog input 1	•	•	
Analog input 2	•	•	
Analog input 3	•	● ⁴⁾	
Digital input 1	•	•	
Digital input 2	•	● ⁴⁾	
Digital in/output 3	•	•	
Digital in/output 4	•	● ⁴⁾	
Fitted modules	•	•	
Pump 1			● ³⁾

Status	CRE, CRIE, CRNE, SPKE, MTRE	CME	Multipump system
Pump 2			● ³⁾
Pump 3			● ³⁾
Pump 4			● ³⁾

3) It is only available if the Grundfos GO is connected to a multipump system.

4) It is only available if an advanced functional module, type FM 300, is fitted.

Settings	CRE, CRIE, CRNE, SPKE, MTRE	CME	Multipump system
Setpoint	●	●	●
Operating mode	●	●	●
Set user-defined speed	●	●	●
Control mode	●	●	●
Setting the proportional pressure	●	●	●
Pipe filling function	●	●	●
Enable/disable settings	●	●	
LiqTec function	●	● ⁴⁾	
"Stop function" (Lowflow stop function)	●	●	●
Stop at min. speed	●	●	●
Controller settings	●	●	●
Operating range	●	●	●
Ramps	●	●	
Pump number	●	●	
Enable/disable radio comm.	●	●	
Analog input 1	●	●	
Analog input 2	●	●	
Analog input 3	●	● ⁴⁾	
Pt100/1000 input 1	●	● ⁴⁾	
Pt100/1000 input 2	●	● ⁴⁾	
Digital input 1	●	●	
Digital input 2	●	● ⁴⁾	
Digital in/output 3	●	●	
Digital in/output 4	●	● ⁴⁾	
Pulse flowmeter setup	●	●	
Predefined setpoints	●	●	●
Analog output	●	● ⁴⁾	
External setpoint function	●	●	
Signal relay 1	●	●	

Settings	CRE, CRIE, CRNE, SPKE, MTRE	CME	Multipump system
Signal relay 2	•	•	
Limit 1 exceeded	•	•	•
Limit 2 exceeded	•	•	•
Alternating operation, time			• ³⁾
Sensor to be used			• ³⁾
Time for pump changeover			• ³⁾ ⁴⁾
Standstill heating	•	•	
Alarm handling	•	•	•
Motor bearing monitoring	•	•	
Service	•	•	
Set date and time	•	• ⁴⁾	
Store actual settings	•	•	
Recall stored settings	•	•	
Undo	•	•	•
Pump name	•	•	•
Connection code	•	•	•
Units	•	•	

³⁾ It is only available if the Grundfos GO is connected to a multipump system.

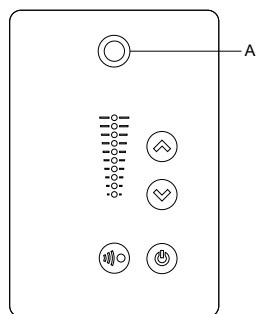
⁴⁾ It is only available if an advanced functional module, type FM 300, is fitted.

Alarms and warnings	CRE, CRIE, CRNE, SPKE, MTRE	CME	Multipump system
Alarm log	•	•	•
Warning log	•	•	•
"Reset alarm" button	•	•	•

Assist	CRE, CRIE, CRNE, SPKE, MTRE	CME	Multipump system
Assisted pump setup	•	•	
Assisted fault advice	•	•	•
Setup of multipump system	•	•	•






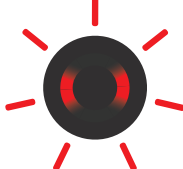
6.5 Grundfos Eye

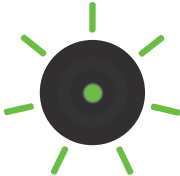
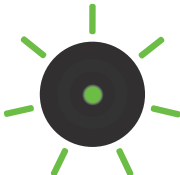
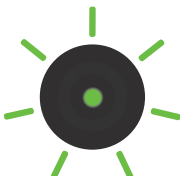

The operating condition of the pump is indicated by the Grundfos Eye on the operating panel.



TM055993

Grundfos Eye indicator light (A)

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.	The Grundfos Eye flashes four times when you press the Grundfos Eye symbol next to the motor name in the Grundfos GO.
	The green indicator light in the middle is flashing continuously.	You have selected the motor in the Grundfos GO, 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 the Grundfos GO or exchanging data with the Grundfos GO.
	The green indicator light in the middle is permanently on.	The motor is connected to the Grundfos GO.

6.6 Bus signal

The pump supports serial communication via an RS-485 input. The communication is carried out according to the Grundfos GENlbus protocol and enables connection to other pumps as well as a building management system or another external control system.

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

Contact Grundfos for further information.



If you use a bus signal, the number of settings available via the R100 or the Grundfos GO are reduced.

6.7 Installing a communication interface module

DANGER

Electric shock

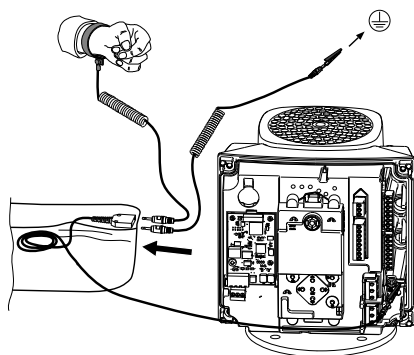
Death or serious personal injury



- 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.

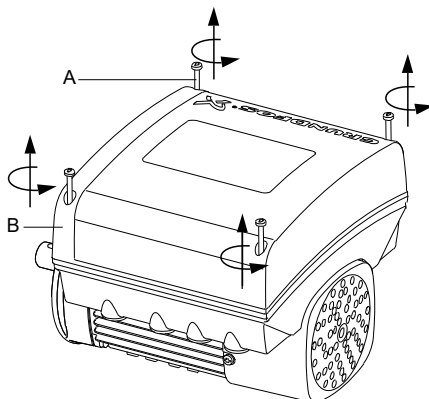


Use an antistatic service kit when handling electronic components. This prevents static electricity from damaging the components.



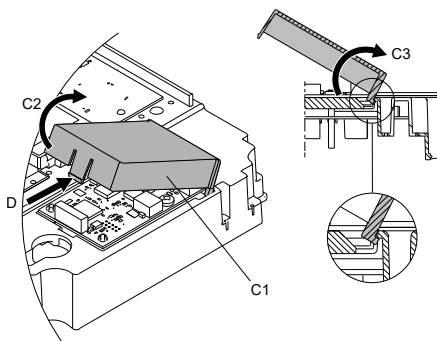
TM064462

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



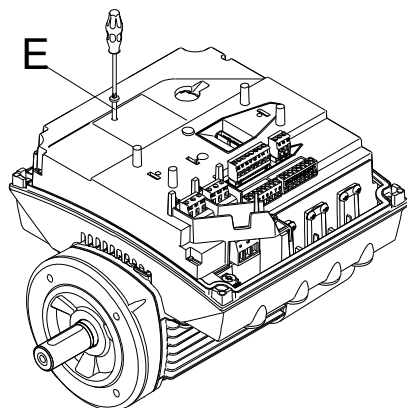
TM064081

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).



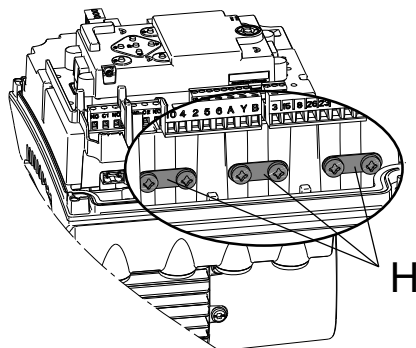
TM069905

3. Remove the screw (E).



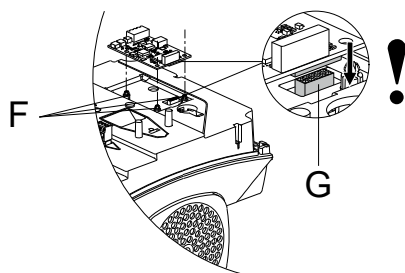
TM069906

7. Connect the cable screens of the bus cables to protective earth via one of the earth clamps (H).



TM069908

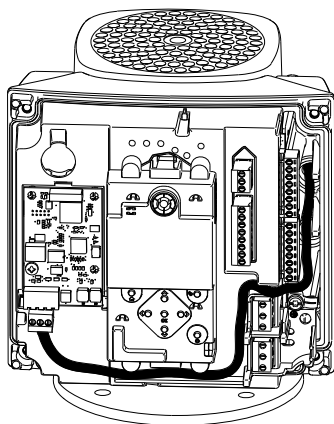
4. Fit the module by aligning it with the three plastic holders (F) and the connection plug (G). Press the module home, using your fingers.



TM069907

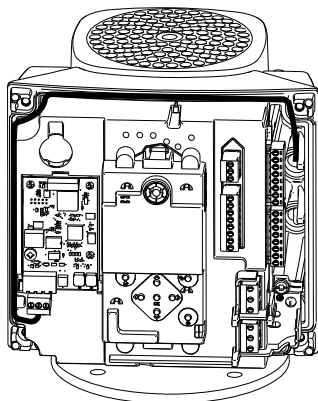
5. Fit and tighten the screw (E) to 1.3 Nm.
6. Make the electrical connections to the module as described in the instructions supplied with the module.

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



TM064085

MGE 71, 80, 90

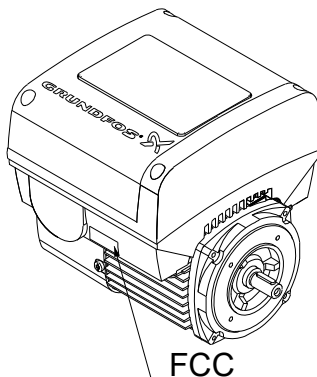


TM070190

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

[6.10 Changing the position of the operating panel](#)

6.8 Identification of the functional module

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

Grundfos GO

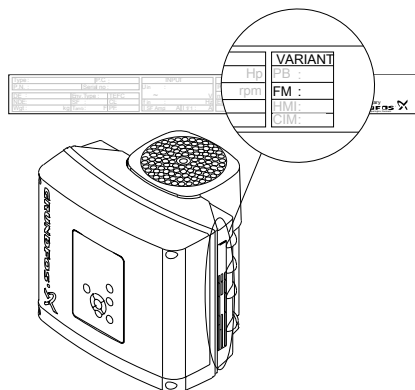
You can identify the functional module in the **Fitted modules** menu under **Status**.

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 the data on the motor nameplate.



TM061889

Functional module variants

Variant	Designation
FM 100	Basic functional module
FM 200	Standard functional module
FM 300	Advanced functional module

6.9 Identification of the operating panel

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

Grundfos GO

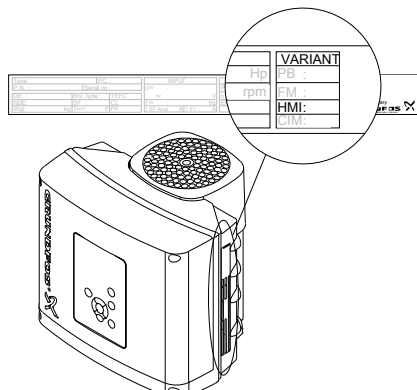
You can identify the operating panel in the **Fitted modules** menu under **Status**.

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 the data on the motor nameplate.



TM064013

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

6.10 Changing the position of the operating panel

DANGER

Electric shock

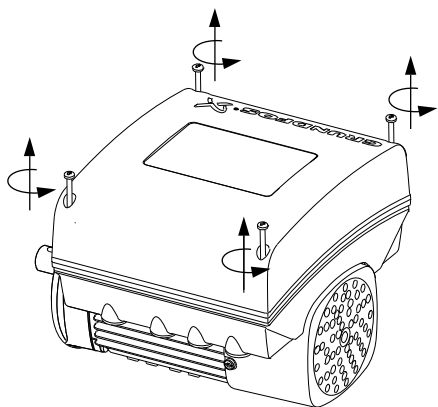
Death or serious personal injury



- 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.

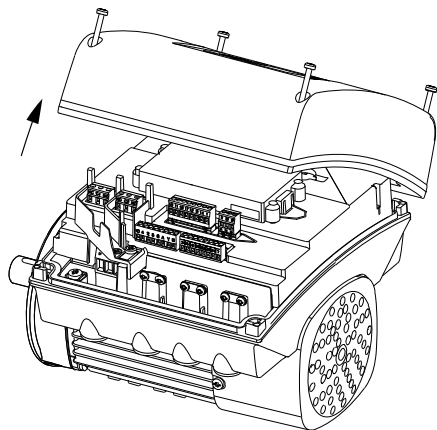
You can turn the operating panel 180°. Follow the instructions.

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



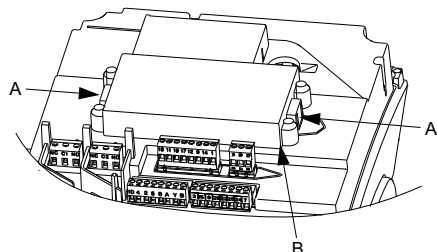
TM064915

2. Remove the terminal box cover.



TM064926

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

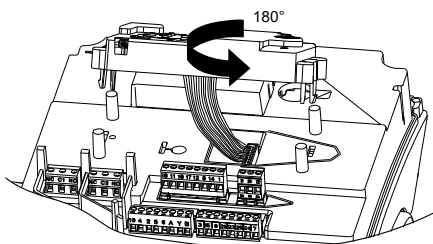


TM055353

4. Turn the plastic cover 180°.

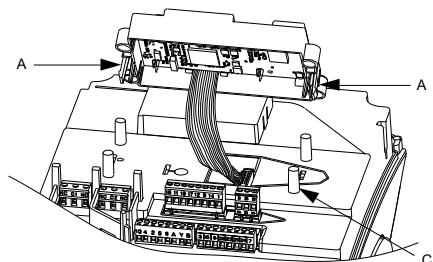


Do not twist the cable more than 90°.



TM055354

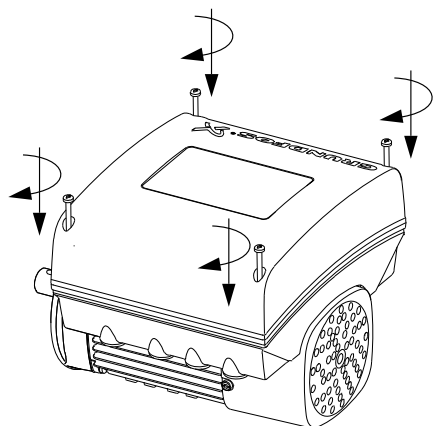
5. Position the plastic cover correctly over the four rubber pins (C). Make sure that the locking tabs (A) are placed correctly.



TM055355

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.



TM064929

7. Setting the product

The description of settings applies both to pumps without factory-fitted sensor and to pumps with a factory-fitted pressure sensor.

Setpoint

You can set the desired setpoint in three ways:

- on the pump operating panel
- via an input for the external setpoint signal
- with the Grundfos wireless R100 remote control or the Grundfos GO.

Other settings

Make all other settings with the R100 or the Grundfos GO.

You can read important parameters, such as the actual value of the control parameter and power consumption, via the R100 or the Grundfos GO.

If special or customised settings are required, use the Grundfos PC Tool. Contact your local Grundfos company for more information.

7.1 Priority of settings

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

The priority of the settings is shown in the table below.

Priority	Start/stop button	Grundfos GO or operating panel	Digital input	Bus communication
1	Stop			
2		Stop ⁵⁾		
3		Manual		
4		Maximum speed ⁵⁾ / 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		

⁵⁾ **Stop** and **Maximum speed** settings made with the Grundfos GO or the 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**, selected with the Grundfos GO or the operating panel.

7.2 Setpoint

You can set the setpoint for all control modes once you select the desired control mode.

Related information

[7.6 Control mode](#)

[7.52 Factory settings](#)

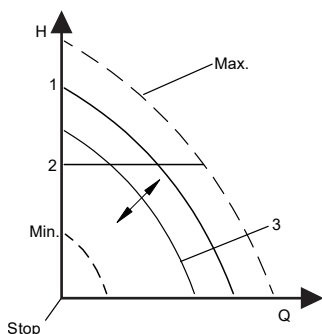
7.3 Operating mode

Possible operating modes:

- **Normal**: The pump runs according to the selected control mode.
- **Stop**: The pump stops.

- **Min.:** You can use the minimum curve mode in periods in which a minimum flow is required. When operating according to the minimum curve, the pump operates like an uncontrolled pump.
- **Max.:** You can use the maximum curve mode in periods in which a maximum flow is required. When operating according to the maximum curve, the pump operates like an uncontrolled pump.
- **Manual:** The pump operates at a manually set speed. In **Manual** the setpoint via bus is overruled.
- **User-defined speed:** The motor operates at a speed set by the user.

All operating modes are illustrated in the figure below.



TM064024

Operating modes

Pos.	Description
1	Normal
2	Normal
3	Manual

Related information

- [7.4 Set manual speed](#)
- [7.5 Set user-defined speed](#)
- [7.52 Factory settings](#)

7.4 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 set the operating mode to **Manual**, the product starts running at the set speed.

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

Related information

- [7.52 Factory settings](#)

7.5 Set user-defined speed

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

7.6 Control mode

The possible control modes are the following:

- Proportional pressure
- Constant pressure (**Const. pressure**)
- Constant temperature (**Const. temp.**)
- Constant differential pressure (**Con. diff. press.**)
- Constant differential temperature (**Con. diff. temp.**)
- Constant flow rate (**Const. flow rate**)
- Constant level (**Const. level**)
- Constant other value (**Const. other val.**)
- Constant curve (**Const. curve.**):

Requires a measured differential pressure and pump data entered into the controller.

Related information

- [7.7.5 Pump data](#)
- [7.52 Factory settings](#)

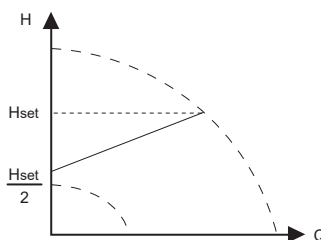
7.6.1 Proportional pressure

The head of the pump is reduced at decreasing water demand, and increased at rising water demand. See the figure below.

This control mode is especially suitable in systems with relatively large pressure losses in the distribution pipes. The head of the pump increases proportionally to the flow in the system to compensate for the large pressure losses in the distribution pipes.

The setpoint can be set with an accuracy of 0.1 m. The head against a closed valve is half the setpoint. The setting range is between 25 % and 90 % of the maximum head.

For more information about settings, see the section on proportional-pressure setup.

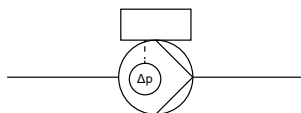


TM057909

Proportional pressure

Example:

Factory-fitted differential-pressure sensor



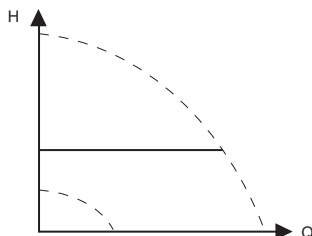
Proportional pressure

Related information

[7.7.1 Control curve function](#)

7.6.2 Constant pressure

We recommend this control mode if the pump is to deliver a constant pressure, independently of the flow rate in the system.



Constant pressure

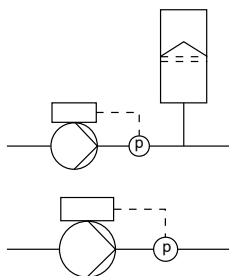
This control mode requires an external pressure sensor as shown in the examples below.

You can set the pressure sensor in the **Assist** menu. See the section on assisted pump setup.

The setting range is between 12.5 % and 100 % of the maximum head.

Example:

One external pressure sensor



Related information

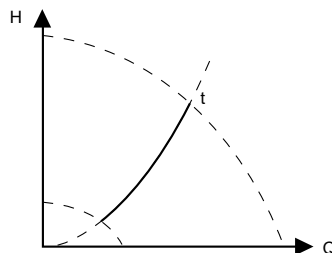
[7.14 Controller settings](#)

[7.46 Assisted pump setup](#)

[7.52 Factory settings](#)

7.6.3 Constant temperature

This control mode ensures a constant temperature. It is a comfort control mode that can be used in domestic hot-water systems to control the flow rate to maintain a constant temperature in the system.

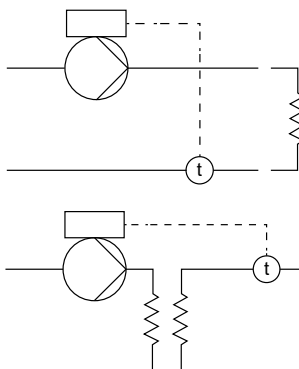


Constant temperature

This control mode requires either an internal or external temperature sensor as shown in the examples below.

Example:

One external temperature sensor



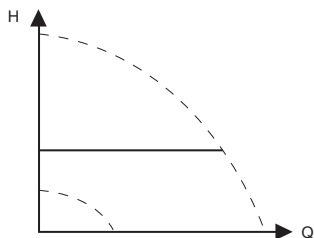
Related information

[7.14 Controller settings](#)

[7.52 Factory settings](#)

7.6.4 Constant differential pressure

The pump maintains a constant differential pressure, independently of the flow rate in the system. This control mode is primarily suitable for systems with relatively small pressure losses.



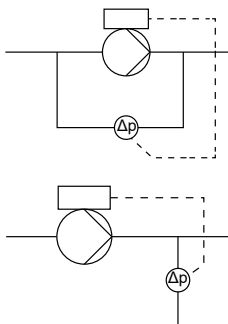
TM057901

Constant differential pressure

The setting range is between 12.5 % and 100 % of the maximum head. This control mode requires either an internal or external differential-pressure sensor, or two external pressure sensors as shown in the examples below.

Examples:

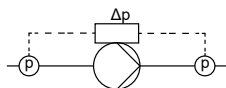
- One external differential-pressure sensor:
The pump uses the input from the sensor to control the differential pressure.
You can set the sensor manually or via the **Assist** menu. See the section on assisted pump setup.



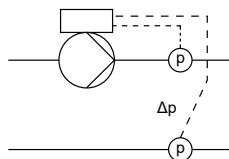
TM057886

TM057887

- Two external pressure sensors:
Constant differential-pressure control is achievable with two individual pressure sensors. The pump uses the inputs from the two sensors and calculates the differential pressure.
The sensors must have the same unit and must be set as feedback sensors. You can set the sensors manually, sensor by sensor, or via the **Assist** menu. See the section on assisted pump setup.



TM057888



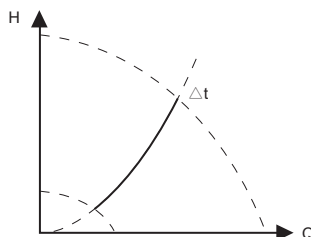
TM057889

Related information

- [7.14 Controller settings](#)
- [7.46 Assisted pump setup](#)
- [7.52 Factory settings](#)

7.6.5 Constant differential temperature

The pump maintains a constant differential temperature in the system, and the pump performance is controlled according to this.



TM057954

Constant differential temperature

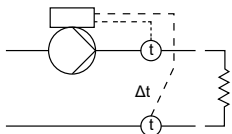
This control mode requires either two temperature sensors or one external differential-temperature sensor. See the examples below.

The temperature sensors can either be analog sensors connected to two of the analog inputs, or two Pt100/1000 sensors connected to the Pt100/1000 inputs if these are available on the specific pump.

Set the sensor in the **Assist** menu under **Assisted pump setup**. See the section on assisted pump setup.

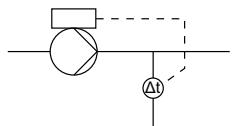
Examples:

- Two external temperature sensors:
Constant differential-temperature control is achievable with two temperature sensors. The pump uses the inputs from the two sensors and calculates the differential temperature.
The sensors must have the same unit and must be set as feedback sensors. You can set the sensors manually, sensor by sensor, or via the **Assist** menu. See the section on assisted pump setup.



TM057894

- One external differential-temperature sensor:
The pump uses the input from the sensor to control the differential temperature.
You can set the sensor manually or via the **Assist** menu. See the section on assisted pump setup.



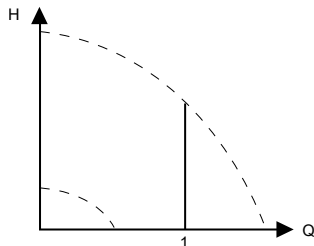
TM057931

Related information

- [7.14 Controller settings](#)
- [7.46 Assisted pump setup](#)
- [7.52 Factory settings](#)

7.6.6 Constant flow rate

The pump maintains a constant flow rate in the system independently of the head.



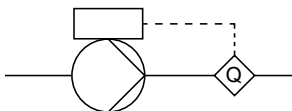
TM057955

Constant flow rate

This control mode requires an external flow sensor. See the example below.

Example:

One external flow sensor



TM057895

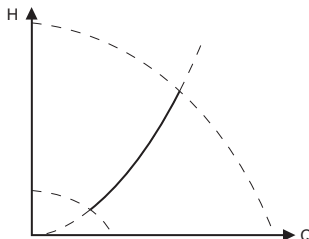
Constant flow rate

Related information

- [7.14 Controller settings](#)
- [7.52 Factory settings](#)

7.6.7 Constant level

The pump maintains a constant level independently of the flow rate.



TM057941

Constant level

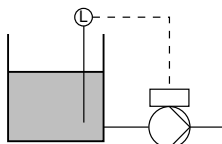
This control mode requires an external level sensor. The pump can control the level in a tank in two ways (see the figure above):

- as an emptying function where the pump draws the liquid from the tank.
- as a filling function where the pump pumps the liquid into the tank.

The type of level control function depends on the setting of the built-in controller.

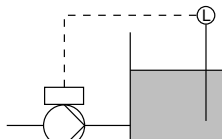
Examples:

- One external level sensor with emptying function



TM057896

- One external level sensor with filling function



TM057965

Related information

- [7.14 Controller settings](#)
- [7.52 Factory settings](#)

7.6.8 Constant other value

Use this control mode to control a value 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.

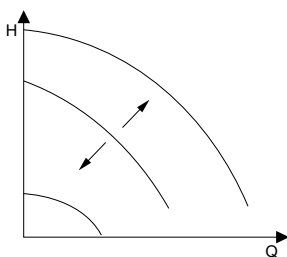
Related information

[7.52 Factory settings](#)

7.6.9 Constant curve

You can set the pump to operate according to a constant curve, like an uncontrolled pump.

The desired speed can be set in percentage of the maximum speed in the range from 13 to 100 %.



TM057957

Constant curve

Related information

[7.14 Controller settings](#)

[7.52 Factory settings](#)

7.7 Setting the proportional pressure

7.7.1 Control curve function

You can set the proportional curve either to quadratic or linear to match the system curve.

7.7.2 Zero flow head

You can set this value in percentage of the setpoint, and define how much the setpoint must be reduced at a closed valve. With a setting of 100 %, the control mode is equal to the constant differential pressure.

7.7.3 Fixed inlet pressure

This menu enables the use of a fixed inlet pressure.

7.7.4 Inlet pressure

Enter the fixed inlet pressure that is to be supplied to the pump.

7.7.5 Pump data

To enable the pump to operate in proportional pressure, the controller needs to process the pump curve. Enter the maximum head, rated head and rated flow rate from the pump nameplate.

7.8 Analog inputs

The available inputs depend on the functional module fitted in the pump:

Function (terminal)	FM 200 ⁶⁾ (standard)	FM 300 ⁶⁾ (advanced)
Analog input 1, setup (4)	•	•
Analog input 2, setup (7)	•	•
Analog input 3, setup (14)	-	•

⁶⁾ See the section on identification of the functional module.

If you want to set the analog input for a feedback sensor, we recommend that you do this via the **Assisted pump setup** menu. See the section on assisted pump setup.

If you want to set an analog input for other purposes, you can do this manually.

You can set the analog inputs via the **Setup, analog input** menu. See the section on setup, analog input.

If you make the manual setting via the Grundfos GO, you need to enter the menu for the analog input under the **Settings** menu.

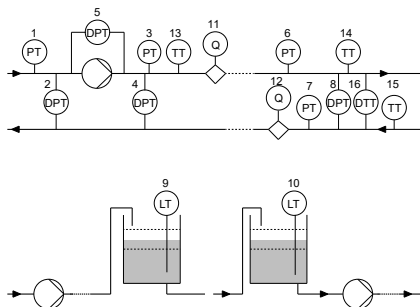
Function

The analog inputs can be set to the following functions:

- **Not active**
- **Feedback sensor:** The sensor is used for the selected control mode.
- **Ext. setpoint infl.:** See the section on the external setpoint function.
- **Other function.**

Measured parameter

Select one of the parameters listed to be measured in the system by the sensor connected to the actual analog input.



Overview of sensor locations

Sensor function/measured parameter	Pos.
Inlet pressure	1
Diff. press., inlet	2
Discharge press.	3
Diff. press.,outlet	4
Diff. press.,pump	5
Press. 1, external	6
Press. 2, external	7
Diff. press., ext.	8
Storage tank level	9
Feed tank level	10
Pump flow	11
Flow, external	12
Liquid temp.	13
Temperature 1	14
Temperature 2	15
Diff. temp., ext.	16
Ambient temp.	Not shown
Other parameter	Not shown

Unit

Parameter	Possible units
Pressure	bar, m, kPa, psi, ft
Level	m, ft, in
Pump flow	m³/h, l/s, yd³/h, gpm
Liquid temperature	°C, °F
Other parameter	%

Electrical signal

Select signal type:

- 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

[6.8 Identification of the functional module](#)

[7.16 External setpoint function](#)

[7.46 Assisted pump setup](#)

[7.47 Setup, analog input](#)

[7.52 Factory settings](#)

7.8.1 Setting two sensors for differential measurement

To measure the difference of a parameter between two points, set the corresponding sensors as follows:

Parameter	Analog input for sensor 1	Analog input for sensor 2
Pressure, option 1	Differential pressure, inlet	Differential pressure, outlet
Pressure, option 2	Pressure 1, external	Pressure 2, external
Flow	Pump flow	Flow, external
Temperature	Temperature 1	Temperature 2



If you want to use the control mode Constant differential pressure, you must choose the function **Feedback sensor** for the analog input of both sensors.

7.9 Pt100/1000 inputs

Available inputs depend on the functional module fitted in the pump:

Function (terminal)	FM 200 ⁷⁾ (standard)	FM 300 ⁷⁾ (advanced)
Pt100/1000 input 1, setup (17 and 18)	-	•
Pt100/1000 input 2, setup (18 and 19)	-	•

⁷⁾ See the section on the identification of the functional module.

If you want to set the Pt100/1000 input for a feedback sensor, we recommend that you do this via the **Assisted pump setup** menu. See the section on assisted pump setup.

If you want to set a Pt100/1000 input for other purposes, you can do this manually.

You can set the analog inputs via the **Setup, analog input** menu. See the section on setup, analog input.

If you make the manual setting via the Grundfos GO, you need to enter the menu for the Pt100/1000 input under the **Settings** menu.

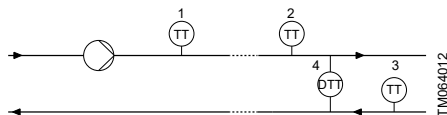
Function

The Pt100/1000 inputs can be set to the following functions:

- **Not active**
- **Feedback sensor:** The sensor is used for the selected control mode.
- **Ext. setpoint infl.:** See the section on the external setpoint function.
- **Other function.**

Measured parameter

Select one of the parameters listed to be measured in the system by the PT100/1000 sensor connected to the actual PT100/1000 input.



Overview of PT100/1000 sensor locations

Parameter	Pos.
Liquid temp.	1
Temperature 1	2
Temperature 2	3
Ambient temp.	Not shown

Measuring range

-50 to 204 °C.

Related information

[6.8 Identification of the functional module](#)

[7.16 External setpoint function](#)

[7.46 Assisted pump setup](#)

[7.47 Setup, analog input](#)

[7.52 Factory settings](#)

7.10 Digital inputs

Available inputs depend on the functional module fitted in the pump:

Function (terminal)	FM 200 ⁸⁾ (standard)	FM 300 ⁸⁾ (advanced)
Digital input 1, setup (2 and 6)	•	•
Digital input 2, setup (1 and 9)	-	•

⁸⁾ See the section on the identification of the functional module.

To set a digital input, make the settings below.

Function

Select one of the following functions:

- **Not active:** When set to **Not active**, the input has no function.
- **External stop:** When the input is deactivated (open circuit), the pump stops.
- **Min.** (minimum speed): When the input is activated, the pump runs at the set minimum speed.
- **Max.** (maximum speed): When the input is activated, the pump 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 pump stops and a fault is indicated. This function depends on input from external equipment.
- **Alarm resetting:** When the input is activated, a possible fault indication is reset.
- **Dry running:** When this function is selected, lack of inlet pressure or water shortage (dry running) can be detected, and if that occurs, the pump stops. The pump cannot restart as long as the input is activated. This requires the use of an accessory, such as the following:
 - 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 that can give a feedback signal as a pulse per defined volume of water. See the section on pulse flowmeter setup.
- **Predefined setpoint digit 1** (applies only to digital input 2): When digital inputs are set to predefined setpoint, the pump operates according to a setpoint based on the combination of the activated digital inputs. See the section on predefined setpoints.

- **Active output:** When the input is activated, the related digital output is activated. See the section on digital inputs/outputs. This is done without any changes to pump operation.
- **Local motor stop:** When the input is activated, the given pump in a multipump system stops without affecting the performance of the other pumps in the system.

The priority of the selected functions in relation to each other is listed in the section on priority of settings.

A stop command always has the highest priority.

Activation delay

Select the activation delay (T1).

It is the time between the digital signal and the activation of the selected function.

Range: 0-6000 seconds.

Duration timer mode

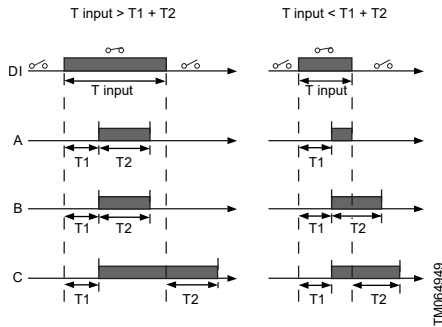
Select the mode. See the figure below.

- **Not active**
- active with interrupt (mode A)
- active without interrupt (mode B)
- active with after-run (mode C).

Select the duration time (T2).

It is the time that, together with the mode, determines how long the selected function is active.

Range: 0 to 15,000 seconds.



Duration timer function of digital inputs

Pos.	Description
DI	Digital input
A	Mode A
B	Mode B
C	Mode C

Related information

[6.8 Identification of the functional module](#)

[7.1 Priority of settings](#)

[7.11 Digital inputs/outputs](#)

[7.17.1 Predefined setpoints](#)

[7.23 Pulse flowmeter setup](#)

[7.52 Factory settings](#)

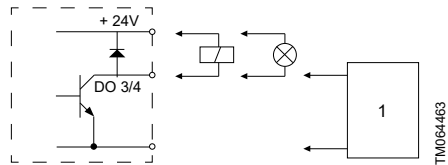
7.11 Digital inputs/outputs

Available inputs/outputs depend on the functional module fitted in the pump:

Function (terminal)	FM 200 ⁹⁾ (standard)	FM 300 ⁹⁾ (advanced)
Digital input/output 3, setup (6 and 10)	•	•
Digital input/output 4, setup (11 and 18)	-	•

⁹⁾ See the section on the identification of the functional module.

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



Example of configurable digital inputs/outputs

Pos.	Description
1	External controller

To set a digital input/output, make the settings below.

Mode

You can set the digital input/output 3 and 4 to act as digital input or digital output:

- **Digital input**
- **Digital output.**

Function

You can set the digital input/output 3 and 4 to the functions stated in the table below:

Possible functions, digital input/output 3

Function if input (See details in the section on digital inputs)	Function if output (See details in the section on Signal relays 1 and 2 (Relay outputs))
Not active	Not active
External stop	Ready
Min.	Alarm
Max.	Operation
User-defined speed	Pump running
External fault	Warning
Alarm resetting	Limit 1 exceeded
Dry running	Limit 2 exceeded
Accumulated flow	Digital input 1, state
Predefined setpoint digit 2	Digital input 2, state
Active output	Digital input 3, state
Local motor stop	Digital input 4, state

Possible functions, digital input/output 4

Function if input (See details in the section on digital inputs)	Function if output (See details in the section on Signal relays 1 and 2 (Relay outputs))
Not active	Not active
External stop	Ready
Min.	Alarm
Max.	Operation
User-defined speed	Pump running
External fault	Warning
Alarm resetting	Limit 1 exceeded
Dry running	Limit 2 exceeded
Accumulated flow	Digital input 1, state
Predefined setpoint digit 3	Digital input 2, state
Active output	Digital input 3, state
Local motor stop	Digital input 4, state

Duration timer mode (only for input)

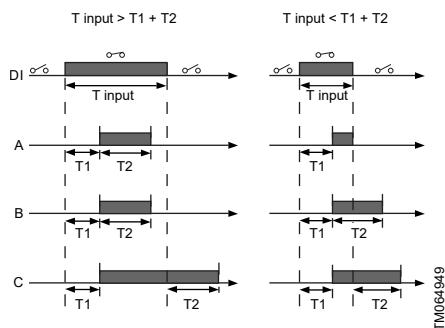
Select the duration timer mode:

- **Not active**
- active with interrupt (mode A)
- active without interrupt (mode B)
- active with after-run (mode C).

Select the duration time (T2).

It is the time that, together with the mode, determines how long the selected function is active.

Range: 0 to 15,000 seconds.



Duration timer function of digital inputs

Pos.	Description
DI	Digital input
A	Mode A
B	Mode B
C	Mode C

Related information

- [6.8 Identification of the functional module](#)
- [7.10 Digital inputs](#)
- [7.12 "Signal relays" 1 and 2 \(Relay outputs\)](#)
- [7.52 Factory settings](#)

7.12 "Signal relays" 1 and 2 (Relay outputs)

The pump incorporates two signal relays for potential-free signalling. For further information, see the section on megging.

Function

You can configure the signal relays to be activated by one of the following incidents:

- **Not active**
- **Ready:** The pump can be running or is ready to run and no alarms are present.
- **Alarm:** There is an active alarm and the pump is stopped.
- **Operating (Operation):** Operating equals Running but the pump is still in operation when the pump is stopped due to low flow. See the section on low-flow detection.
- **Running (Pump running):** The pump is running.
- **Warning:** There is an active warning.
- **Digital input 1:** If digital input 1 is activated, the output is also activated.
- **Digital input 2:** If digital input 2 is activated, the output is also activated.
- **Digital input 3:** If digital input 3 is activated, the output is also activated.

- Digital input 4: If digital input 4 is activated, the output is also activated.
- **Limit 1 exceeded:** When this function is activated, the signal relay is activated. See the section on the limit-exceeded function.
- **Limit 2 exceeded:** When this function is activated, the signal relay is activated. See the section on the limit-exceeded function.
- **External fan control (Control of external fan):** When you select External fan control, the relay is activated if the internal temperature of the motor electronics reaches a preset limit value.

Related information

[7.18 Limit-exceeded function](#)

[7.20 Stop function \(Low-flow stop function\)](#)

[7.52 Factory settings](#)

[9.3 Megging](#)

7.13 Analog output

Whether the analog output is available or not depends on the functional module fitted in the pump.

Function (terminal)	FM 200 ¹⁰⁾ (standard)	FM 300 ¹⁰⁾ (advanced)
Analog output	-	•

¹⁰⁾ See the section on the identification of the functional module.

The analog output enables the reading of certain operating data to external control systems.

To set the analog output, make the settings below.

Output signal:

- **0-10 V**
- **0-20 mA**
- **4-20 mA**

Function of analog output:

- **Actual speed**

Signal range [V, mA]	Actual speed [%]		
	0	100	200
0-10 V	0 V	5 V	10 V
0-20 mA	0 mA	10 mA	20 mA
4-20 mA	4 mA	12 mA	20 mA

The reading is a percentage of the rated speed.

- **Actual value**

Signal range [V, mA]	Actual value	
	Sensor _{min}	Sensor _{max}
0-10 V	0 V	10 V
0-20 mA	0 mA	20 mA
4-20 mA	4 mA	20 mA

The reading is a percentage of the range between the minimum and maximum value.

- **Resulting setpoint**

Signal range [V, mA]	Resulting setpoint [%]	
	0	100
0-10 V	0 V	10 V
0-20 mA	0 mA	20 mA
4-20 mA	4 mA	20 mA

The reading is a percentage of the external setpoint range.

- **Motor load**

Signal range [V, mA]	Motor load [%]	
	0	100
0-10 V	0 V	10 V
0-20 mA	0 mA	20 mA
4-20 mA	4 mA	20 mA

The reading is a percentage of the range between 0 and 200 % of the maximum permissible load at the actual speed.

- **Motor current**

Signal range [V, mA]	Motor current [%]		
	0	100	200
0-10 V	0 V	5 V	10 V
0-20 mA	0 mA	10 mA	20 mA
4-20 mA	4 mA	12 mA	20 mA

The reading is a percentage of the range between 0 % and 200 % of the rated current.

- **Limit 1 exceeded** and **Limit 2 exceeded**

Signal range [V, mA]	Limit-exceeded function	
	Output not active	Output active
0-10 V	0 V	10 V
0-20 mA	0 mA	20 mA
4-20 mA	4 mA	20 mA

This function is typically used for monitoring secondary parameters in the system. If the limit is exceeded, an output, a warning or an alarm is activated.

- **Flow rate**

Signal range [V, mA]	Flow rate [%]		
	0	100	200
0-10 V	0 V	5 V	10 V
0-20 mA	0 mA	10 mA	20 mA
4-20 mA	4 mA	12 mA	20 mA

The reading is a percentage of the range between 0 and 200 % of the nominal flow.

Related information

[6.8 Identification of the functional module](#)

[7.52 Factory settings](#)

7.14 Controller settings

The pumps have a factory default setting of gain (K_p) and integral time (T_i).

However, if the factory setting is not the optimum setting, you can change the gain and the integral time:

- Set the gain within the range from 0.1 to 20.
- Set the integral-action time within the range from 0.1 to 3600 seconds. If you select 3600 seconds, the controller functions as a PI controller.

Furthermore, you can set the controller to inverse control.

This means that if you increase the setpoint, the speed is reduced. In case of inverse control, you must set the gain within the range from -0.1 to -20.

Guidelines for setting of PI controller

The tables below show the recommended controller settings:

Constant differential pressure	K_p		T_i
	Heating system ¹¹⁾	Cooling system ¹²⁾	
	0.5	0.5	
	0.5	0.5	L1 < 5 m: 0.5 L1 > 5 m: 3 L1 > 10 m: 5

L1: Distance in metres between the pump and the sensor.

Constant temperature	K_p		T_i
	Heating system ¹¹⁾	Cooling system ¹²⁾	
	0.5	-0.5	10 + 5L2
	0.5	-0.5	30 + 5L2

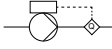
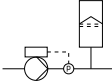
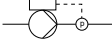
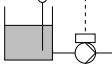
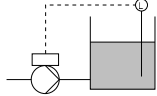
¹¹⁾ In heating systems, an increase in pump performance results in a rise in temperature at the sensor.

¹²⁾ In cooling systems, an increase in pump performance results in a drop in temperature at the sensor.

L2: Distance in metres between the heat exchanger and the sensor.

Constant differential temperature	K_p		T_i
	Heating system ¹¹⁾	Cooling system ¹²⁾	
	-0.5	10 + 5L2	
	-0.5	10 + 5L2	

L2: Distance in metres between the heat exchanger and the sensor.

Constant flow rate	K_p	T_i
	0.5	0.5
Constant pressure	K_p	T_i
	0.5	0.5
	0.5	0.5
Constant level	K_p	T_i
	-10	0
	10	0

General rules of thumb:

If the controller is too slow-reacting, increase the gain.

If the controller is hunting or unstable, dampen the system by reducing the gain or increasing the integral time.

Related information

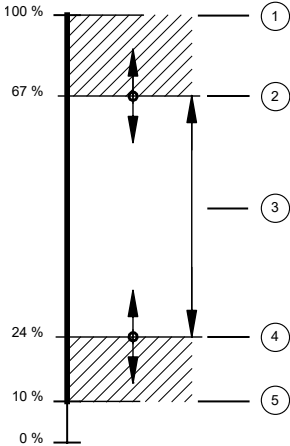
[7.52 Factory settings](#)

7.15 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).



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

[7.52 Factory settings](#)

TM069817

7.16 External setpoint function

You can influence the setpoint by an external signal, either via one of the analog inputs or, if an advanced functional module (FM 300) is fitted, via one of the Pt100/1000 inputs.



Before you can enable the function, you must set one of the analog inputs or Pt100/1000 inputs to **External setpoint function**.

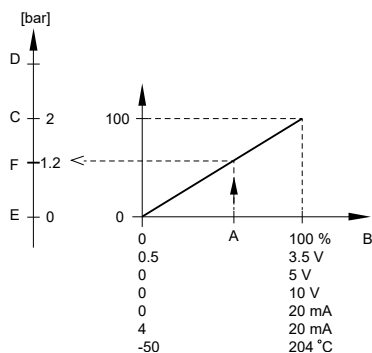
See the sections on analog inputs and Pt100/1000 inputs.

Example with constant pressure with linear influence

Actual setpoint: actual input signal × (setpoint - sensor min.) + sensor min.

At a sensor minimum of 0 bar, a setpoint of 2 bar and an external setpoint of 60 %, the actual setpoint is the following:

$$0.60 \times (2 - 0) + 0 = 1.2 \text{ bar}$$



TM064165

Example of setpoint influence with sensor feedback

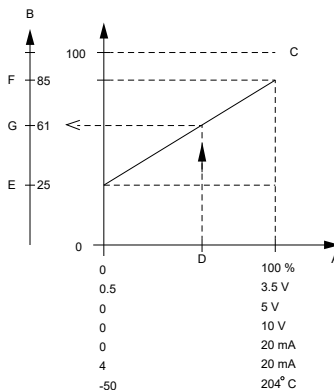
Pos.	Description
A	Actual input signal (60 %)
B	External setpoint signal
C	Setpoint
D	Sensor max.
E	Sensor min.
F	Actual setpoint

Example with constant curve with linear influence

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

At a user-set minimum speed of 25 %, and a setpoint of 85 % and an external setpoint of 60 %, the actual setpoint is the following:

$$0.60 \times (85 - 25) + 25 = 61 \%$$



TM064525

Example of setpoint influence with constant curve

Pos.	Description
A	External setpoint signal
B	Speed [%]
C	Fixed maximum speed
D	Actual input signal (60 %)
E	User-set min. speed
F	Setpoint
G	Actual setpoint

Related information

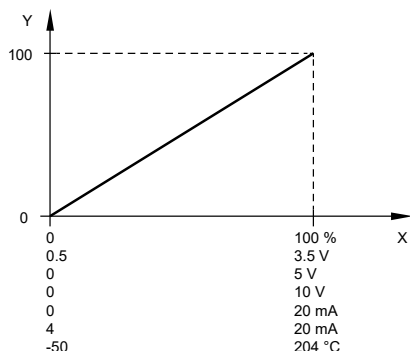
[7.8 Analog inputs](#)

[7.9 Pt100/1000 inputs](#)

7.16.1 Setpoint influence functions

7.16.1.1 Linear function

The setpoint is influenced linearly from 0 to 100 %.

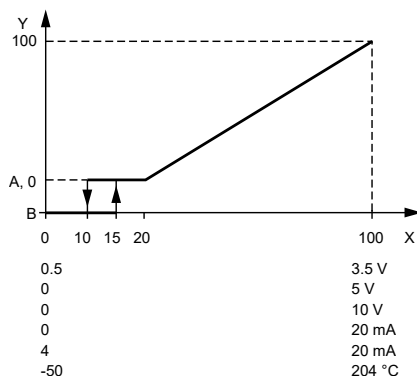


TM070255

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

7.16.1.2 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 over 15 %, the operating mode changes back to **Normal**.

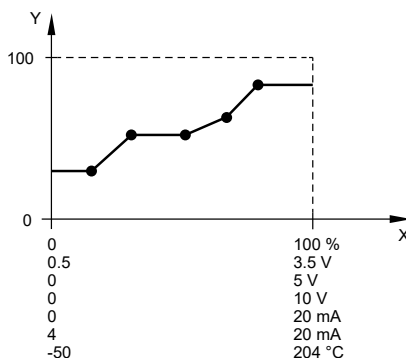


TM070542

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

7.16.1.3 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 %

Related information

[7.52 Factory settings](#)

7.17 Availability of predefined setpoints

Pump variant	Predefined setpoints
CME	-
CRE, CRIE, CRNE, SPKE, MTRE, BMS hp	•

7.17.1 Predefined setpoints

You can set and activate seven predefined setpoints by combining the input signals with 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**. However, this 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

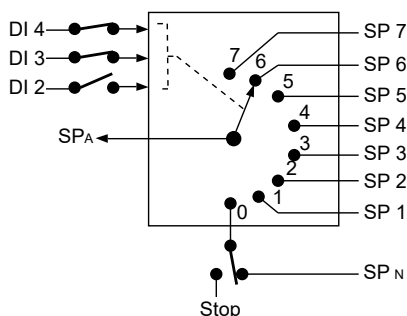
Digital inputs			Setpoint
2	3	4	
1	1	0	Predefined setpoint 3
0	0	1	Predefined setpoint 4
1	0	1	Predefined setpoint 5
0	1	1	Predefined setpoint 6
1	1	1	Predefined setpoint 7

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.



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 the Grundfos GO or with the HMI 300 or HMI 301 operating panel.

Related information

[7.52 Factory settings](#)

7.18 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 up to four limit-exceeded functions, meaning that you can monitor four different parameters or two to four limits of the same parameter simultaneously.

Note that when using **Limit 1-3 exceeded** in a multipump system, the selected action has an impact on the system, for example, if Action is set to Stop, then the system stops.

Limit 4 exceeded in a multipump system is a local function. The selected action only has an impact on the single pump, for example, if Action is set to Stop, then only the single pump stops.



For **Limit 4 exceeded** in a multipump system, the action always leads to a pump stop, alarm and stop or a warning.

The function requires setting the following parameters:

Measured

Set the measured parameter to be monitored.

Limit

Set the limit that 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 User-defined speed:**
An alarm is given, and the pump runs at the speed set by the user.

Alarm and Warning text

The **Limit-exceeded** function automatically defines a relevant alarm or warning text based on the **Measured parameter** and **Limit exceeded when** functions.

The auto defined text can be overwritten by selecting the alarm or warning text option **Limit X exceeded**.

The following list shows the auto-defined texts:

- Limit X exceeded
- Low inlet pressure
- High discharge pressure
- High pressure
- Low pressure
- High temperature
- Low temperature
- High flow
- Low flow
- High level
- Low level
- High diff. pressure
- Low diff. pressure
- High conductivity.

Detection in Stop

Enable this function to prevent the pump from monitoring the limit while the pump is in the **Stop** state.



Use the **Detection delay** function to allow the pump to start up and bring the value above the limit before detecting.

Detection delay

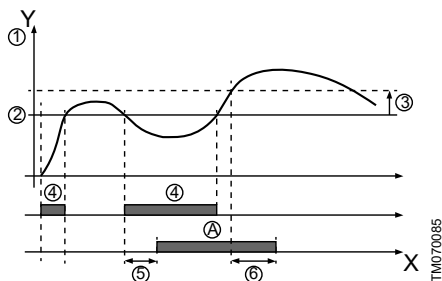
Setting the detection delay ensures that the monitored parameter stays above or below a set limit in a set time before the function is activated.

Resetting delay

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

Example

The function is to monitor the outlet pressure from the 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.



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

[7.12 "Signal relays" 1 and 2 \(Relay outputs\)](#)

[7.52 Factory settings](#)

7.19 LiqTec function

Pump variant	LiqTec function
MTHE, CME	-
CRE, CRIE, CRNE, SPKE, MTR	•

You can enable the function of the LiqTec sensors in this display. A LiqTec sensor protects the pump against dry running.

The function requires that a LiqTec sensor is fitted and connected to the pump.

When you enable the LiqTec function, it stops the pump if dry running occurs. Restart the pump manually if it stops due to dry running.

Dry running detection delay

You can set a detection delay to make sure the pump is given a chance to start up before the LiqTec function stops it due to dry running.

Range: 0-254 seconds.

Related information

7.52 Factory settings

7.20 Stop function (Low-flow stop function)

You can set **Low-flow stop function** to the following values:

- **Not active**
- **Energy-optimal mode**
- **High-comfort mode**
- **User-defined mode (Customised operating mode)**.

When the low-flow stop function is active, the flow is monitored. If the flow becomes lower than the set minimum flow (Q_{\min}), the pump changes from continuous operation at constant pressure to start-stop operation and stops if the flow reaches zero.

The advantages of enabling **Low-flow stop function** are the following:

- There is no unnecessary heating from the pumped liquid.
- The wear of the shaft seals is reduced.
- There is reduced noise from operation.

The disadvantages of enabling **Low-flow stop function** may be the following:

- The delivered pressure is not completely constant as it fluctuates between the start and stop pressures.
- The frequent starts and stops of the pump may in some applications cause acoustic noise.

The impact of the above disadvantages very much depends on the setting selected for the stop function.

The **High-comfort mode** setting minimises pressure fluctuations and acoustic noise.

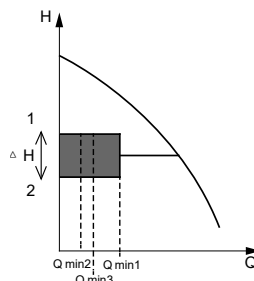
Select **Energy-optimal mode** if the main priority is to reduce the energy consumption as much as possible.

Possible settings of the stop function:

- **Energy-optimal mode:** The pump automatically adjusts the parameters for the stop function so that the energy consumption during the start-stop operation period is minimised. In this case, the stop function uses the factory-set values of the minimum flow ($Q_{\min 1}$) and other internal parameters. See the figure below.
- **High-comfort mode:** The pump automatically adjusts the parameters for the stop function so that the disturbances during the start-stop

operation period are minimised. In this case, the stop function uses the factory-set values of the minimum flow ($Q_{\min 2}$) and other internal parameters. See the figure below.

- **User-defined mode (Customised operating mode):** The pump uses the parameters set for ΔH and minimum flow ($Q_{\min 3}$) respectively for the stop function. See the figure below.



Difference between start and stop pressures (ΔH) and minimum flow rate

Pos.	Description
1	Stop pressure
2	Start pressure

In start-stop operation, the pressure varies between the start and stop pressures. See the figure above.

In **User-defined mode (Customised operating mode)**, ΔH is factory-set to 10 % of the actual setpoint. ΔH can be set within the range from 5 to 30 % of the actual setpoint.

The pump changes to start-stop operation if the flow becomes lower than the minimum flow rate.

The minimum flow rate is set in percentages of the nominal flow rate of the pump. See the pump nameplate.

In **User-defined mode (Customised operating mode)**, the minimum flow rate is factory-set to 10 % of the nominal flow rate.

Low-flow stop function

A low flow can be detected in two ways:

1. One possibility is a built-in low-flow detection function that is active if none of the digital inputs are set for flow switch.
 - **Low-flow detection function:** The pump checks the flow regularly by reducing the speed for a short time. If there is no or only a small change in pressure, this means that there is low flow. The speed is increased until the stop pressure (actual setpoint + $0.5 \times \Delta H$) is reached and

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the pump stops. When the pressure falls to the start pressure (actual setpoint - $0.5 \times \Delta H$), the pump restarts.

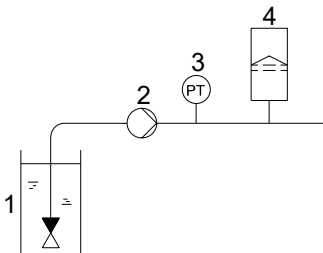
- If the flow rate is higher than the set minimum flow rate, the pump returns to continuous operation at constant pressure.
 - If the flow rate is still lower than the set minimum flow rate (Q_{min}), the pump continues in start-stop operation until the flow rate is higher than the set minimum flow rate (Q_{min}). When the flow rate is higher than the set minimum flow rate (Q_{min}), the pump returns to continuous operation.
2. The other possibility is a flow switch connected to one of the digital inputs.
- Flow switch: When the digital input is activated for more than 5 seconds due to low flow, the speed is increased until the stop pressure (actual setpoint + $0.5 \times \Delta H$) is reached, and the pump stops. When the pressure falls to start pressure, the pump restarts. If there is still no flow, the pump quickly reaches the stop pressure and stops. If there is flow, the pump continues operating according to the setpoint.

Operating conditions for the low-flow stop function

You can only use the stop function if the system incorporates a pressure sensor, a non-return valve and a diaphragm tank.

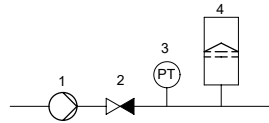


Always install the non-return valve before the pressure sensor and diaphragm tank.



Position of the non-return valve and pressure sensor in system with suction lift operation

Pos.	Description
1	Non-return valve
2	Pump
3	Pressure sensor
4	Diaphragm tank



Position of the non-return valve and pressure sensor in a system with a positive inlet pressure

Pos.	Description
1	Pump
2	Non-return valve
3	Pressure sensor
4	Diaphragm tank

Set minimum flow

Set the minimum flow rate (Q_{min}) in this display.

This setting determines at which flow rate the system is to change from continuous operation at constant pressure to start-stop operation. The setting range is 5 to 30 % of the rated flow rate.

Related information

[7.52 Factory settings](#)

7.21 Stop at min. speed

This stop function can be utilised in, for example, constant level applications where a boost of pressure is not needed. This stop function differs from the 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 function **Stop at min. speed**.

- **Delay**

The delay time during which the pump must be running at minimum speed before it stops.

- **Restart speed**

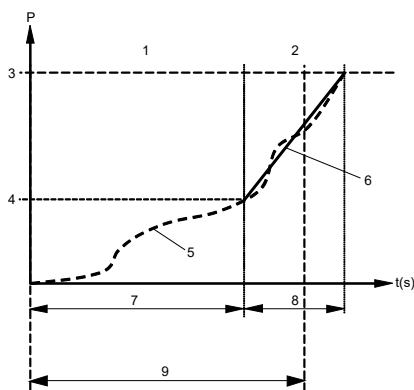
It is the speed in percentage when the pump must start again, hysteresis. It must be set higher than the minimum speed of the pump.

7.22 Pipe filling function

This function is typically used in pressure-boosting applications and ensures smooth startup of systems with, for instance, empty pipes.

Startup takes place in two phases:

1. **Filling phase:** The pipes are slowly filled with water. When the pressure sensor of the system detects that the pipes are filled, phase two begins.
2. **Pressure build-up phase:** The system pressure is increased until the setpoint is reached. The pressure build-up takes place over a pressure build-up time. If the setpoint is not reached within a given time, a warning or an alarm can be given, and the pumps can be stopped at the same time.



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Filling and pressure build-up phases

Pos.	Description
1	Filling phase (constant-curve operation)
2	Pressure build-up phase (constant-pressure operation)
3	Setpoint
4	Filling pressure
5	Actual value
6	Setpoint ramp-up
7	Filling time
8	Pressure build-up time
9	Maximum filling time
P	Pressure
t(s)	Time (sec)

Setting range

- **Filling speed:** fixed speed of the pump during the filling phase.
- **Filling pressure:** the pressure that the pump must reach before the maximum filling time.
- **Max. filling time:** the time in which the pump must reach the filling pressure.

- **Max. time reaction:** reaction of the pump if the maximum filling time is exceeded:
 - warning
 - alarm (pump stops).
- **Pressure build-up time:** ramp time from when the filling pressure is reached until the setpoint must be reached.



When you activate this function, the function always starts when the pump has been in operating mode **Stop** and is changed to **Normal**.

Related information

[7.52 Factory settings](#)

7.23 Pulse flowmeter setup

You can connect an external pulse flowmeter to one of the digital inputs to register the actual and accumulated flows. Based on this, you can also calculate the specific energy.

To enable a pulse flowmeter, set one of the digital-input functions to **Accumulated flow** and set the pumped volume per pulse.

Related information

[7.10 Digital inputs](#)

[7.52 Factory settings](#)

7.24 Ramps

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

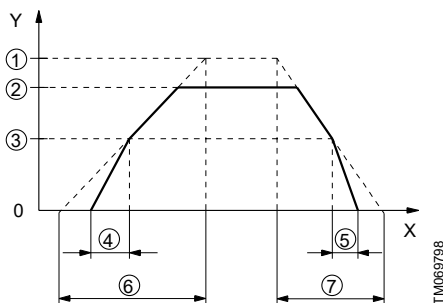
You can make the following settings:

- 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.



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

Related information

[7.52 Factory settings](#)

7.25 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.

Related information

[7.52 Factory settings](#)

7.26 Alarm handling

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

The alarm or warning types are the following:

- **Warning:**
It is a warning, but 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.

The affected inputs are the following:

- **Analog input 1**
- **Analog input 2**
- **Analog input 3**
- **Grundfos Direct Sensor**
- **Pt100/1000 input 1**
- **Pt100/1000 input 2**
- **Liqtec input.**

7.27 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 based on 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.

7.28 Service

7.28.1 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!

7.28.2 Bearing replacements

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

7.28.3 Motor bearing maintenance

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

1. Replace the motor bearings.
2. Press **Bearings replaced**.

7.29 Pump number

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

Related information

[7.52 Factory settings](#)

7.30 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.

Related information

[7.52 Factory settings](#)

7.31 Language

The function is only available in the HMI 300 and HMI 301 operating panels.

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

Related information

[7.52 Factory settings](#)

7.32 Set date and time

The function is only available in the HMI 300 and HMI 301 operating panels.

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

[6.8 Identification of the functional module](#)

[7.52 Factory settings](#)

7.33 Units

This function is only available in the HMI 300 and HMI 301 operating panels.

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

Related information

[7.52 Factory settings](#)

7.34 Enable/disable settings

Use this function to disable the adjusting of settings for protective reasons.

- If you use Grundfos GO and set the buttons to **Not active**, the buttons on the HMI 200 or HMI 201 operating panel are disabled, except the **Radio communication** button.
- If you disable the buttons on pumps fitted with the HMI 300 or HMI 301 operating panel via **Enable/disable settings**, you can still use the buttons to navigate through the menus but you cannot make changes directly on these operating panels. A lock symbol appears on 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

[7.52 Factory settings](#)

7.35 Delete history

This function is only available in the HMI 300 and HMI 301 operating panels.

Use this function to delete the following historical data:

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

7.36 Define Home display

This function is only available in the HMI 300 and HMI 301 operating panels.

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

Related information

[7.52 Factory settings](#)

7.37 Display settings

This function is only available in the HMI 300 or HMI 301 operating panels.

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

Related information

[7.52 Factory settings](#)

7.38 Store actual settings

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

7.39 Recall stored settings

Grundfos GO

In this menu, you can recall stored settings from a number of previously stored settings that the pump then uses.

Advanced operating panel

In this menu, you can recall the last stored settings that the pump then uses.

7.39.1 Undo

This function is only available in the Grundfos GO. Use this function to undo all settings made with the Grundfos GO in the current communication session. Once you recall settings, you cannot undo it.

7.40 Pump name

This function is only available in the Grundfos GO. Use this function to give the motor a name. The selected name then appears in the Grundfos GO.

7.41 Connection code

Use the connection code to enable automatic connection between the Grundfos GO 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 the Grundfos GO.

7.41.1 Setting a connection code in the product by using the Grundfos GO

1. Connect Grundfos GO to the product.
2. Go to **Settings > General > 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.

7.42 Run start-up guide

The function is only available in the HMI 300 and HMI 301 operating panels.

The startup guide automatically starts when you start the product for the first time. You can always run it later. It 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

[6.8 Identification of the functional module](#)

[7.6 Control mode](#)

[7.31 Language](#)

[7.32 Set date and time](#)

[7.46 Assisted pump setup](#)

7.43 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.

7.44 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.

7.45 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.

7.46 Assisted pump setup

This menu guides you through the following:

- selection of control mode
- configuration of feedback sensors
- adjusting the setpoint
- controller settings
- summary of settings.

Example of how to use the **Assisted pump setup** for setting up the pump to constant pressure:

On the Grundfos GO

1. Open the **Assist** menu.
2. Select **Assisted pump setup**.
3. Select the control mode Constant pressure (**Const. pressure**).

4. Read the description for this control mode.
5. Select which analog input to use as sensor input.
6. Select the sensor function according to where the sensor is installed in the system. See the section on analog inputs.
7. Select the electrical input signal according to the sensor specifications.
8. Select the measuring unit according to the sensor specifications.
9. Set the minimum and maximum sensor range values according to the sensor specifications.
10. Set the desired setpoint.
11. Set the gain and integral time of the controller. See the section on the controller.
12. Type the desired pump name.
13. Check the summary of settings and confirm them.

On the advanced operating panel

1. Open the **Assist** menu.
2. Select **Assisted pump setup**.
3. Select the control mode **Const. pressure**.
4. Select which analog input to be used as sensor input.
5. Select the measured parameter which is to be controlled. See the section on analog inputs.
6. Select the measuring unit according to the sensor specifications.
7. Set the minimum and maximum sensor range values according to the sensor specifications.
8. Select electrical input signal according to the sensor specifications.
9. Set the desired setpoint.
10. Set the gain and integral time of the controller. See the section on the controller.
11. Check the summary of settings and confirm them by pressing [OK].

Related information

- [7.2 Setpoint](#)
- [7.6 Control mode](#)
- [7.8 Analog inputs](#)
- [7.14 Controller settings](#)

7.47 Setup, analog input

This menu is only available in the advanced operating panel.

This menu guides you through the following:

Setup, analog input

- Analog inputs 1 to 3.
- Pt100/1000 input 1 and 2.
- Adjusting the setpoint.
- Summary.

Related information

- [7.2 Setpoint](#)
- [7.8 Analog inputs](#)
- [7.9 Pt100/1000 inputs](#)

7.48 Setting of date and time

This function is only available in the HMI 300 and HMI 301 operating panels.

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

Functional module	Setting of date and time
FM110	-
FM310	•
FM311	•

The function guides you through the following settings:

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

Related information

- [6.8 Identification of the functional module](#)
- [7.32 Set date and time](#)

7.49 Setup of multipump system

The function **Setup of multi-pump system** enables the control of two motors connected in parallel without external controllers. The pumps or motors in a system communicate with each other via the wireless GENlair connection or the wired GENI connection.

You can set a multipump system via the master motor which is the first selected motor.

If several pumps or motors in the system have sensors, they can all function as the master and take over the master function if the other fails. This provides additional redundancy in the multimotor system.

You can choose between the following multimotor functions:

Alternating operation

Alternating operation serves as a duty and standby operating mode, and is possible with two pumps or two motors of the same size and type connected in parallel. The main purpose of the function is to ensure an even amount of running hours, and to ensure that the other pump or motor starts if the duty pump or motor stops due to an alarm.

You can choose between two alternating operating modes:

- **Alternating operation, time:**
The change from one pump or motor to the other is based on time.
- **Alternating operation, energy:**
The change from one pump or motor to the other is based on energy consumption.

If the duty pump or motor fails, the other pump or motor starts.

Backup operation

Backup operation is possible with two motors of the same size and type connected in parallel. One motor is operating continuously. The backup motor is operated for a short time each day to prevent seizing up. If the duty motor stops due to a fault, the backup motor starts.

Cascade operation

This function is available with up to 4 motors installed in parallel. The motors must be of the same size and if used with pumps, the pumps must be of the same model.

- The performance is adjusted to the demand through cutting pumps in or out and through parallel control of the pumps in operation.
- The controller maintains a constant process value through continuous adjustment of the speed of the pumps.
- Pump changeover is automatic and depends on load, operating hours and fault detection.
- All pumps in operation run at the same speed.
- The number of pumps in operation also depends on the energy consumption of the pumps. If only one pump is required, two pumps run at a lower speed if this results in a lower energy consumption.
- If several pumps or motors in the system have a sensor, they can all function as the master and take over the master function if the other fails.

7.49.1 Alternating operation, time

The **Alternating operation, time** menu sets the interval of alternation between two pumps.

This setting is only available in alternating mode.

7.49.2 Time for pump changeover

The **Time for pump changeover** menu sets the time of day for pump changeover to take place.

This setting is only available in alternating operation.

7.49.3 Sensor to be used

This function defines the sensor for controlling the pump system.

Select **Master pump sensor** if the sensor is placed in a way where it can measure the output from all the pumps in the system, for example, in the manifold.

Select **Running pump sensor** if the sensor is placed on or across individual pumps, for example, if the sensor is installed behind non-return valves, or if it is not able to measure the output from all pumps.

This setting is only available in alternating operation and cascade operation.

7.49.4 Setting up a multipump system

You can set up a multipump system in the following ways:

- Grundfos GO and wireless motor connection
- Grundfos GO and wired motor connection
- HMI 300 or HMI 301 operating panel and wireless motor connection
- HMI 300 or HMI 301 operating panel and wired motor connection.

Related information

[7.29 Pump number](#)

[7.40 Pump name](#)

[7.46 Assisted pump setup](#)

7.49.4.1 Grundfos GO and wireless motor connection

1. Power on both motors.
2. Establish contact to one of the motors with the Grundfos GO.
3. Set the needed analog and digital inputs via the Grundfos GO, according to the connected equipment and the required functionality.
4. Assign a name to the motor using the Grundfos GO.
5. Disconnect the Grundfos GO from the motor.
6. Establish contact to the other motor.
7. Set the needed analog and digital inputs via the Grundfos GO, according to the connected equipment and the required functionality.
8. Assign a name to the motor using the Grundfos GO.
9. Select the **Assist** menu and **Setup of multipump system**.
10. Select the desired multimotor function.
11. Press the **Right** button to continue.
12. Set the time when the alternation between the two motors is to take place.



This step applies only if you have selected **Alternating operation, time** and if the motors are fitted with the FM310 or FM311.

13. Press the **Right** button to continue.

14. Select **Radio** as the communication method between the two motors.
15. Press the **Right** button to continue.
16. Select pump 2 (motor 2).
17. Select the pump from the list.



Use **OK** or the **Radio communication** button to identify the pump.

18. Press the **Right** button to continue.
19. Confirm the setting by pressing **Send**.
20. When you finish the setup and the dialog box disappears, wait for the green indicator light in the middle of **Grundfos Eye** to light up.

7.49.4.2 Grundfos GO and wired motor connection

1. Connect the two motors with each other with a 3-core screened cable between the GENIbus terminals A, Y, B.
2. Power on both motors.
3. Establish contact to one of the motors with the Grundfos GO.
4. Set the required analog and digital inputs via the Grundfos GO, according to the connected equipment and the required functionality.
5. Assign a name to the motor using the Grundfos GO.
6. Assign motor number 1 to the motor.
7. Disconnect the Grundfos GO from the motor.
8. Establish contact to the other motor.
9. Set the analog and digital inputs according to the connected equipment and the required functionality by the Grundfos GO.
10. Assign a name to the motor using the Grundfos GO.
11. Assign motor number 2 to the motor.
12. Select the **Assist** menu and **Setup of multi-pump system (multimotor setup)**.
13. Select the desired multimotor function.
14. Press the **Right** button to continue.

15. Set the time when the alternation between the two motors is to take place.



This step applies only if you have selected **Alternating operation, time** and if the motors are fitted with the FM310 or FM311.

16. Press the **Right** button to continue.
17. Select **Bus** as the communication method between the two motors.
18. Press the **Right** button to continue.
19. Select pump 2 (motor 2).
20. Select the additional motor from the list.



Use **OK** or the **Radio communication** button to identify the pump.

21. Press the **Right** button to continue.
22. Confirm the setting by pressing **Send**.
23. When you have finish the setup and the dialog box disappears, wait for the green indicator light in the middle of the **Grundfos Eye** to light up.

7.49.4.3 HMI 300 or HMI 301 and wireless motor connection

1. Power on both motors.
2. On both motors, set the analog and digital inputs according to the connected equipment and the required functionality.
3. Select the **Assist** menu on one of the motors and **Setup of multi-pump system**.
4. Press the **Right** button to continue.
5. Select **Wireless** as the communication method between the two motors.
6. Press the **Right** button to continue.
7. Select the desired multimotor function.
8. Press the **Right** button three times to continue.
9. Press **OK** to search for other motors.
The green indicator light in the middle of the **Grundfos Eye** flashes on the other motors.
10. Press **OK** or the **Radio communication** button on the motor that is to be added to the multimotor system.
11. Press the **Right** button to continue.

12. Set the **Time for pump changeover**.

This is the time when the alternation between the two motors is to take place.



This step applies only if you have selected **Alternating operation, time** and if the motors are fitted with the FM310 or FM311.

13. Press the **Right** button to continue.

14. Press **OK** to confirm the setting.

The multipump function icons appear at the bottom of the operating panels.

7.49.4.4 HMI 300 or HMI 301 and wired motor connection

1. Connect the two motors with each other with a 3-core screened cable between the GENIBus terminals A, Y, B.
2. Set the needed analog and digital inputs according to the connected equipment and the required functionality.
3. Assign motor number 1 to the first motor.
4. Assign motor number 2 to the other motor.
5. Select the **Assist** menu on one of the motors and the **Setup of multi-pump system**.
6. Press the **Right** button to continue.
7. Select **Wired GENIBus** as the communication method between the two motors.
8. Press the **Right** button twice to continue.
9. Select the desired multimotor function.
10. Press the **Right** button to continue.
11. Press **OK** to search for other motors.
12. Select the additional motor from the list.
13. Press the **Right** button to continue.
14. Set the **Time for pump changeover**.

This is the time when the alternation between the two motors is to take place.



This step applies only if you have selected **Alternating operation, time** and if the motors are fitted with the FM310 or FM311.

15. Press the **Right** button to continue.

16. Press **OK** to confirm the setting.

The multipump function icons appear at the bottom of the operating panels.

7.49.5 Grundfos GO

1. Go to **Assist**.
2. Select the **Multi-pump setup** and press **Disable**.
3. Press the **Right** button to continue.
4. Confirm the setting by pressing **Send**.
5. Press **Finish**.

7.49.6 HMI 300 or HMI 301

1. Go to **Assist**.
2. Select the **Setup of multi-pump system**.
3. Press the **Right** button to continue.
4. Press **OK** to confirm **Disable**.
5. Press the **Right** button to continue.
6. Press **OK** to confirm.

7.50 Description of control mode

This function is only available in the HMI 300 and HMI 301 operating panels.

The function describes each of the control modes available for the product.

Related information

[7.6 Control mode](#)

7.51 Assisted fault advice

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

7.52 Factory settings

●	Function enabled
○	Function disabled
-	Function not available

Settings	CRE, CRIE, CRNE, SPKE, MTRE		
	With factory-fitted sensor	Without factory-fitted sensor	MTHE, CME
Setpoint	75 % of sensor range	75 % speed	75 % speed
Operating mode	Normal	Normal	Normal
Control mode	Const. pressure	Const. curve	Const. curve
Pipe filling function	Not active	Not active	Not active
Enable/disable settings	Active	Active	Active
Stop function (Low-flow stop function)	Not active	Not active	Not active
Controller settings	●	●	●
Ti	0.5	0.5	0.5
Kp	0.5	0.5	0.5
Operating range	25-100 %	25-100 %	25-100 %
Ramps			
Ramp-up	1 second	1 second	1 second
Ramp-down	3 seconds	3 seconds	3 seconds
Pump number	-	-	-
Enable/disable radio comm.	Active	Active	Active
Analog input 1	4-20 mA	Not active	Not active
Analog input 2	Not active	Not active	Not active
Analog input 3 ¹³⁾	Not active	Not active	_ 13)
Pt100/1000 input 1 ¹³⁾	Not active	Not active	_ 13)
Pt100/1000 input 2 ¹³⁾	Not active	Not active	_ 13)
Digital input 1	External stop	External stop	External stop
Digital input 2 ¹³⁾	Not active	Not active	_ 13)
Digital in/output 3	Not active	Not active	Not active
Digital in/output 4 ¹³⁾	Not active	Not active	_ 13)
Pulse flowmeter setup	○	○	○
Predefined setpoints	0 %	0 %	0 %
Analog output ¹³⁾	Speed	Speed	_ 13)
External setpoint function	Not active	Not active	Not active
Signal relay 1	Alarm	Alarm	Alarm
Signal relay 2	Running	Running	Running

Settings	CRE, CRIE, CRNE, SPKE, MTRÉ		
	With factory-fitted sensor	Without factory-fitted sensor	MTHÉ, CME
Limit 1 exceeded	Not active	Not active	Not active
Limit 2 exceeded	Not active	Not active	Not active
LiqTec function ¹³⁾	Not active	Not active	_ ¹³⁾
Detection delay time ¹³⁾	10 seconds	10 seconds	_ ¹³⁾
Standstill heating	Not active	Not active	Not active
Motor bearing monitoring	Not active	Not active	Not active
Pump name	-	-	-
Connection code	-	-	-
Units	SI	SI	SI

¹³⁾ It is only available if an advanced functional module, type FM 300, is fitted.

8. Servicing the product

DANGER

Electric shock

Death or serious personal injury



- Switch off the power supply to the motor and the signal relays. Wait at least 5 minutes before starting any work on the motor. 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.

8.1 Motor

If service is needed on the product, contact Grundfos Service.

8.2 Pump

Service documentation is available in Grundfos Product Center (<http://product-selection.grundfos.com/>).

If you have any questions, contact the nearest Grundfos company or service workshop.

8.3 Cleaning the product

WARNING

Electric shock

Death or serious personal injury



- Switch off the power supply to the motor and the signal relays. Confirm that the terminal box cover is intact before spraying water on the product.

To avoid condensation in the motor, let the motor cool down before spraying it with cold water.

9. Technical data

9.1 Operating conditions

9.1.1 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 pump starts after approximately 5 seconds.

If a higher number of starts and stops is desired, use the input for external start-stop when starting or stopping the pump.

When started via an external on/off switch, the pump starts immediately.

9.1.2 Ambient temperature

9.1.2.1 Ambient temperature during storage and transportation

Minimum: -30 °C.

Maximum: 60 °C.

9.1.2.2 Ambient temperature during operation

	3 × 200-240 V	3 × 380-500 V
Minimum	-20 °C	-20 °C
Maximum	40 °C	50 °C

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

9.1.3 Installation altitude

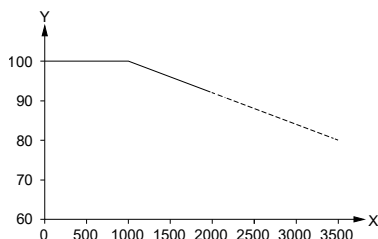
Installation altitude is the height of the installation site above sea level.

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

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



Motors 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.

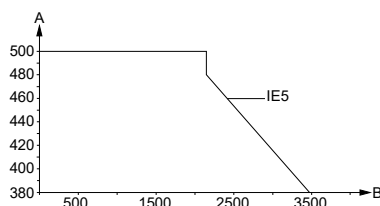


TM055243

Motor output power in relation to altitude

Pos.	Description
X	Altitude [m]

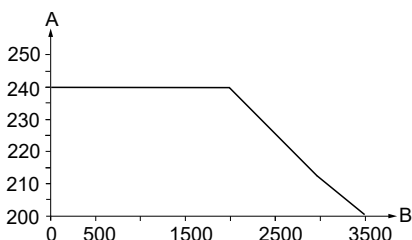
To maintain the galvanic isolation and ensure correct clearance according to EN 60664-1:2007, you must adapt the supply voltage to the altitude.



TM069866

Supply voltage for three-phase motor in relation to altitude

Pos.	Description
A	Supply voltage [V]
B	Altitude [m]



TM069867

Supply voltage for single-phase motor in relation to altitude

Pos.	Description
A	Supply voltage [V]
B	Altitude [m]

9.1.4 Humidity

Maximum humidity: 95 %.

If the humidity is constantly high and above 85 %, open the drain holes in the drive-end flange. See the sections on outdoor installation and drain holes.

Related information

[4.5 Installing the product outdoors or in areas with high humidity](#)

[4.6 Drain holes](#)

9.1.5 Motor cooling

To ensure cooling of motor and electronics, observe the following:

- Position the motor in a way that ensures adequate cooling.
- The temperature of the cooling air must not exceed 50 °C.
- Keep the cooling fins and fan blades clean.

9.2 Electrical data

9.2.1 Single-phase motors

9.2.1.1 Supply voltage

1 × 200-240 V-10 % / +10 %, 50/60 Hz, PE.

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

Recommended fuse size

Motor size [kW]	Min. [A]	Max. [A]
0.25 - 0.75	6	10
1.1 - 1.5	10	16

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

9.2.1.2 Leakage current

The earth leakage current must be less than 3.5 mA AC.

The earth leakage current must be less than 10 mA DC.

The leakage currents are measured in accordance with the EN 61800-5-1:2007.

9.2.2 Three-phase motors

9.2.2.1 Supply voltage

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

Recommended fuse size

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

Motor size [kW]	Min. [A]	Max. [A]
0.25 - 1.1	6	6
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 × 200-240 V-10 % / +10 %, 50/60 Hz, PE:

Motor size [kW]	Min. [A]	Max. [A]
1.1	10	20
1.5	10	20
2.2	13	35
3	16	35
4	25	35
5.5	32	35

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

9.2.2.2 Leakage current (AC)

Speed rpm	Power [kW]	Mains voltage [V]	Leakage current [mA]
1400-2000 1450-2200	0.25 - 1.5	≤ 400	< 3.5
		> 400	< 5
	2.2 - 4	≤ 400	< 3.5
		> 400	< 3.5
	5.5 - 7.5	≤ 400	< 3.5
		> 400	< 5
2900-4000	0.25 - 2.2	≤ 400	< 3.5
		> 400	< 5
	3 - 5.5	≤ 400	< 3.5
		> 400	< 3.5
	7.5 - 11	≤ 400	< 3.5
		> 400	< 5
4000-5900	0.25 - 2.2	≤ 400	< 3.5
		> 400	< 5
	3 - 5.5	≤ 400	< 3.5
		> 400	< 3.5
	7.5 - 11	≤ 400	< 3.5
		> 400	< 5

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

9.2.3 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/output terminals: -0.5 to 26 VDC or less than 15 mADC.

Digital inputs, DI:

Internal pull-up current greater than 10 mA at V_i equal 0 VDC.

Internal pull-up to 5 VDC (currentless for V_i greater than 5 VDC).

Certain low logic level: V_i less than 1.5 VDC.

Certain high logic level: V_i greater than 3.0 VDC.

Hysteresis: No.

Screened cable: 0.5 - 1.5 mm², 28-16 AWG.

Maximum cable length: 500 m.

Open-collector digital outputs, OC:

Current sinking capability: 75 mADC, no current sourcing.

Load types: Resistive 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 mm², 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: R_i greater than 100 k Ω 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: R_i is equal 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 mm², 28-16 AWG.

Maximum cable length: 500 m excluding potentiometer.

Potentiometer connected to +5 V, GND, any AI:

Use maximum 10 k Ω .

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 k Ω
- 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 mm², 28-16 AWG.

Maximum cable length: 500 m.

Pt100/1000 inputs, Pt:

Temperature range:

- Minimum: -30 °C. 88 Ω / 882 Ω .
- Maximum: 180 °C. 168 Ω / 1685 Ω .

Measurement tolerance: \pm 1.5 °C.

Measurement resolution: less than 0.3 °C.

Automatic range detection, Pt100 or Pt1000: Yes.

Sensor fault alarm: Yes.

Screened cable: 0.5 - 1.5 mm², 28-16 AWG.

Use the Pt100 for short wires.

Use the Pt1000 for long wires.

LiqTec sensor inputs:

Use Grundfos LiqTec sensor only.

Screened cable: 0.5 - 1.5 mm², 28-16 AWG.

Grundfos Digital Sensor input and output, GDS:

Use Grundfos Digital Sensor only.

Power supplies:

+5 V:

- output voltage: 5 VDC -5 % / +5 %
- maximum current: 50 mADC (sourcing only)
- overload protection: Yes.

+24 V:

- output voltage: 24 VDC -5 % / +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 mm², 28-12 AWG.

Maximum cable length: 500 m.

Bus input:

Grundfos GENIbus protocol, RS-485.

Screened 3-core cable: 0.5 - 1.5 mm², 28-16 AWG.

Maximum cable length: 500 m.

9.3 Megging

Do not meg an installation incorporating MGE motors as the built-in electronics may be damaged.

9.4 Other technical data

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 that when connected to a public network, 11 kW motors do not comply with the partial weighted harmonic distortion (PWHd) 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 that when the motors are installed in residential areas, supplementary measures may be required as the motors may cause radio interference.

Motor [kW]	Emission category	
	1450-2000 rpm	2900-4000 rpm 4000-5900 rpm
0.25	C1	C1
0.37	C1	C1
0.55	C1	C1
0.75	C1	C1
1.1	C1	C1
1.5	C1	C1
2.2	C1	C1
3	C1	C1
4	C1	C1
5.5	C3/C1 ¹⁴⁾	C1
7.5	C3/C1 ¹⁴⁾	C3/C1 ¹⁴⁾
11	-	C3/C1 ¹⁴⁾

¹⁴⁾ C1, if equipped with an external Grundfos EMC filter

Immunity: The motor fulfils the requirements for industrial areas.

Contact Grundfos for further information.

Enclosure class

Standard: IP55 (IEC 34-5).

Optional: IP66 (IEC 34-5).

Insulation class

F (IEC 85).

Standby power consumption

5-10 W.

Cable entries

Motor [kW]	Number and size of cable entries	
	2900-4000 rpm	4000-5900 rpm
0.25 - 1.5	4 × M20	4 × M20
2.2	4 × M20	4 × M20
3-4	1 × M25 + 4 × M20	1 × M25 + 4 × M20
5.5	1 × M25 + 4 × M20	1 × M25 + 4 × M20
7.5 - 11	1 × M32 + 5 × M20	1 × M32 + 5 × M20

Cable glands delivered with the pump

Motor [kW]	Quantity	Thread size	Cable diameter [mm]
0.25 - 2.2	2	M20 × 1.5	5
	1		7-14
3 - 5.5	4	M20 × 1.5	5
	1	M25 × 1.5	9-18
7.5 - 11	4	M20 × 1.5	5
	1	M32 × 1.5	14-25

Torques

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

9.5 Accessories

The following are the communication interface modules intended for use with the product:

Protocol	Communication interface module
GENiBus	CIM 50
LonWorks (Single)	CIM 100
PROFIBUS DP	CIM 150
Modbus RTU	CIM 200
BACnet MS/TP	CIM 300
Modbus TCP, BACnet IP, PROFINET, GiC/GRM IP, EtherNet IP	CIM 500

Installing a communication interface module not listed above might affect the compliance level of the product.

9.6 Sound pressure level

Motor [kW]	Maximum speed stated on nameplate rpm	Speed rpm	Sound pressure level ISO 3743 [dB(A)]	
			1-phase motors	3-phase motors
0.25 - 0.75	2000	1500	37	37
		2000	43	43
	4000	3000	50	50
		4000	60	60
	5900	4000	58	58
		5900	68	68
1.1	2000	1500	-	37
		2000	-	43
	4000	3000	50	50
		4000	60	60
	5900	4000	58	58
		5900	68	68
1.5	2000	1500	-	42
		2000	-	47
	4000	3000	57	57
		4000	64	64
	5900	4000	58	58
		5900	68	68

Motor [kW]	Maximum speed stated on nameplate rpm	Speed rpm	Sound pressure level ISO 3743 [dB(A)]	
			1-phase motors	3-phase motors
2.2	2000	1500	-	48
		2000	-	55
	4000	3000	-	57
		4000	-	64
	5900	4000	-	58
		5900	-	68
3	2000	1500	-	48
		2000	-	55
	4000	3000	-	60
		4000	-	69
	5900	4000	-	64
		5900	-	74
4	2000	1500	-	48
		2000	-	55
	4000	3000	-	61
		4000	-	69
	5900	4000	-	64
		5900	-	74
5.5	2000	1500	-	58
		2000	-	61
	4000	3000	-	61
		4000	-	69
	5900	4000	-	64
		5900	-	74
7.5	2000	1500	-	58
		2000	-	61
	4000	3000	-	66
		4000	-	73
	5900	4000	-	69
		5900	-	79
11	4000	3000	-	66
		4000	-	73
	5900	4000	-	69
		5900	-	79

Fields marked with a dash (-) indicate that the motor is not available in this MGE motor range.

10. Disposing of the product

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

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



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

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

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