

# CREC, CRIEC, CRNEC, MTREC, CMEC

Installation and operating instructions



# CREC, CRIEC, CRNEC, MTREC, CMEC

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## English (GB)

Installation and operating instructions . . . . .	3
Appendix . . . . .	34
Declaration of conformity . . . . .	36
Declaration of conformity . . . . .	37
Declaration of conformity . . . . .	38
Declaration of conformity . . . . .	39

## Original installation and operating instructions

## CONTENTS

	Page		Page
<b>1. Symbols used in this document</b>	<b>4</b>	12.7 Digital inputs	18
1.1 Hazard statements	4	12.8 Signal relays (Relay outputs)	19
1.2 Notes	4	12.9 Operating range	20
<b>2. Abbreviations and definitions</b>	<b>4</b>	12.10 External setpoint function	20
<b>3. General information</b>	<b>5</b>	12.11 "Stop function" (Low-flow stop function)	21
<b>4. General description</b>	<b>5</b>	12.12 Ramps	23
4.1 Pumps without factory-fitted sensor	5	12.13 Alarm handling	23
4.2 Pumps with factory-fitted pressure sensor	5	12.14 ""Number" (Pump number)	23
4.3 Settings	5	12.15 "Radio communication" (Enable/disable radio comm.)	23
4.4 Radio communication	5	12.16 "Unit configuration" (Units)	23
<b>5. Receiving the product</b>	<b>5</b>	12.17 "Recall settings" (Recall stored settings)	23
5.1 Transporting the product	5	12.18 "Pump name"	23
5.2 Inspecting the product	5	12.19 "Connection code"	24
<b>6. Mechanical installation</b>	<b>6</b>	12.20 Alarm log	24
6.1 Handling the product	6	12.21 Warning log	24
6.2 Mounting	6	12.22 Assist	24
6.3 Cable entries	6	12.23 Assisted pump setup	24
6.4 Cable glands	6	12.24 Assisted fault advice	24
6.5 Ensuring motor cooling	6	<b>13. Bus signal</b>	<b>25</b>
6.6 Outdoor installation	6	<b>14. Priority of settings</b>	<b>25</b>
6.7 Drain holes	7	<b>15. Grundfos Eye</b>	<b>26</b>
<b>7. Electrical installation</b>	<b>7</b>	<b>16. Signal relay</b>	<b>27</b>
7.1 Protection against electric shock, indirect contact	7	<b>17. Installing a communication interface module</b>	<b>28</b>
7.2 Cable requirements	7	<b>18. Changing the position of the operating panel</b>	<b>29</b>
7.3 Mains supply	8	<b>19. Servicing the product</b>	<b>31</b>
7.4 Additional protection	8	19.1 Motor	31
7.5 Connection terminals	9	19.2 Pump	31
7.6 Signal cables	11	<b>20. Cleaning the product</b>	<b>31</b>
7.7 Bus connection cable	11	<b>21. Megging</b>	<b>31</b>
<b>8. Operating conditions</b>	<b>11</b>	<b>22. Technical data, three-phase motors</b>	<b>31</b>
8.1 Maximum number of starts and stops	11	22.1 Supply voltage	31
8.2 Ambient temperature	11	22.2 Leakage current (AC)	31
8.3 Installation altitude	12	<b>23. Inputs/outputs</b>	<b>31</b>
8.4 Humidity	12	<b>24. Other technical data</b>	<b>32</b>
8.5 Motor cooling	12	24.1 Sound pressure level	33
<b>9. User interfaces</b>	<b>12</b>	<b>25. Disposing of the product</b>	<b>33</b>
<b>10. Basic operating panel</b>	<b>13</b>		
<b>11. Grundfos GO Remote</b>	<b>13</b>		
11.1 Communication	13		
11.2 Menu overview for Grundfos GO Remote	14		
<b>12. Description of functions</b>	<b>16</b>		
12.1 Setpoint	16		
12.2 Operating mode	16		
12.3 Set manual speed	16		
12.4 "Set user-defined speed"	16		
12.5 "Control mode"	16		
12.6 Analog inputs	17		



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

## 1. Symbols used in this document

### 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 hazard

Consequence of ignoring the warning.  
- Action to avoid the hazard.

### 1.2 Notes

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



Observe these instructions for explosion-proof products.



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



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



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



Tips and advice that make the work easier.

## 2. 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.
ELCB	Earth leakage circuit breaker.
FM	Functional module.
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.
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.

### 3. General information

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

### 4. General description

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

#### 4.1 Pumps without 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 temperature
- constant curve

The pumps have been factory-set to constant-curve control mode. You can change the control mode with Grundfos GO Remote.

#### 4.2 Pumps with 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 have been factory-set to constant-pressure control mode. The pumps are typically used to keep a constant pressure in variable-demand systems.

#### 4.3 Settings

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 two ways:

- via an input for external setpoint signal
- with Grundfos GO Remote.

##### Other settings

Make all other settings with Grundfos GO Remote.

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

### 4.4 Radio communication

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

For use in USA and Canada, see page 34.

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

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

### 5. Receiving the product

#### 5.1 Transporting the product

##### WARNING

##### Falling objects



- Death or serious personal injury
- Secure the product during transportation to prevent it from tilting or falling down.

##### CAUTION

##### Crushing of feet



- Minor or moderate personal injury
- Wear safety shoes when moving the product.

Do not stack more than two motors in their original packaging.

#### 5.2 Inspecting the product

Before you install the product, do the following.

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

## 6. Mechanical installation

### 6.1 Handling the product

Observe local regulations setting limits for manual lifting or handling. The motor weight 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 and attach lifting equipment to the motor eyebolts when handling the product.



Do not lift the product by the terminal box.

### 6.2 Mounting

#### CAUTION



#### Crushing of feet

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



In order to maintain the UL mark, additional requirements apply to the equipment. See page 34.

### 6.3 Cable entries

See the size of the cable entries in section 24. *Other technical data.*

### 6.4 Cable glands

The number and size of cable glands delivered with the pump depends on the motor size. See section 24. *Other technical data.*

### 6.5 Ensuring motor cooling

Leave at least 50 mm between the end of the fan cover and a wall or other fixed objects. See fig. 1.

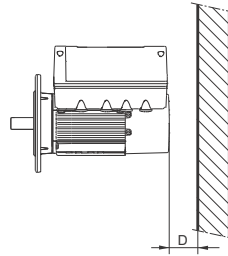


Fig. 1 Minimum distance (D) from the motor to a wall or other fixed objects

### 6.6 Outdoor installation

If you install the motor outdoors, provide the motor with a suitable cover and open the drain holes to avoid condensation on the electronic components. See figs 2 and 3.



When fitting a cover to the motor, observe the guideline in section 6.5 *Ensuring motor cooling.*

The cover must be sufficiently large to ensure that the motor is not exposed to direct sunlight, rain or snow. Grundfos does not supply covers. We therefore recommend that you have a cover built for the specific application. In areas with high humidity, we recommend that you connect the motor permanently to the mains supply and activate the built-in standstill heating function.

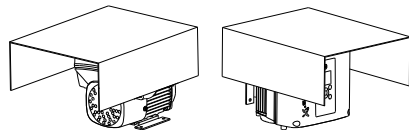


Fig. 2 Examples of covers (not supplied by Grundfos)



In order to maintain the UL mark, additional requirements apply to the equipment. See page 34.

TM05 5236 3512

TM05 3496 3512

## 6.7 Drain holes

When the motor is installed in moist surroundings or areas with high humidity, the bottom drain hole must be open. The enclosure class of the motor will then be lower. This helps prevent condensation in the motor as the motor becomes self-venting, and it allows water and humid air to escape.

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

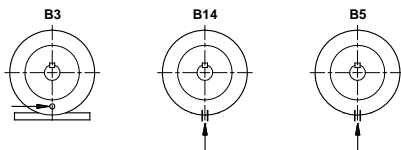


Fig. 3 Drain holes

TM02 9037 1604

## 7. Electrical installation

### DANGER

#### Electric shock

- Death or serious personal injury
- Switch off the power supply to the motor and to the signal relay. Wait at least 5 minutes before you make any connections in the terminal box. Make sure that the power supply cannot be accidentally switched on.



### DANGER

#### Electric shock

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



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

The user or the installer is responsible for the installation of correct earthing and protection according to local regulations. All operations must be carried out by a qualified electrician.

## 7.1 Protection against electric shock, indirect contact

### WARNING

#### Electric shock



- Death or serious personal injury
- Connect the motor to protective earth and provide protection against indirect contact in accordance with local regulations.

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

### 7.1.1 Protection against mains voltage transients

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

### 7.1.2 Motor protection

The motor requires no external motor protection. The motor incorporates thermal protection against slow overloading and blocking.

## 7.2 Cable requirements

### 7.2.1 Cable cross-section

### DANGER

#### Electric shock



- Death or serious personal injury
- Always comply with local regulations as to cable cross-sections.

### 3 x 380-480 V

Power [kW]	Conductor type	Cross section	
		[mm <sup>2</sup> ]	[AWG]
0.25 - 2.2	Solid	1.5 - 10	16-8
	Stranded	1.5 - 10	16-8
3.0 - 5.5	Solid	2.5 - 10	14-8
	Stranded	2.5 - 10	14-8

## 7.2.2 Conductors

### Type

Stranded or solid copper conductors.

### Temperature rating

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

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

## 7.3 Mains supply

### DANGER

#### Electric shock



- Death or serious personal injury
- Use the recommended fuse size. See section 22. *Technical data, three-phase motors.*

### 7.3.1 Three-phase supply voltage

Three-phase motors are available for the voltages below:

- 3 x 380-480 V - 10 %/+ 10 %, 50/60 Hz, PE

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

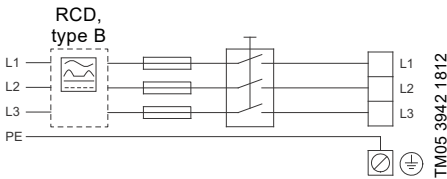
The wires in the motor terminal box must be as short as possible. Excepted from this is the separated protective-earth conductor which must be so long that it is the last one to be disconnected in case the cable is inadvertently pulled out of the cable entry.

In order to avoid loose connections, make sure that you have pressed home the terminal block for L1, L2 and L3 in its socket when you connect the supply cable.

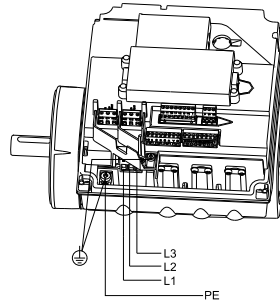
For maximum backup fuse, see section 22. *Technical data, three-phase motors.*



Motors cannot be supplied through an IT network.



**Fig. 4** Example of a mains-connected motor with main switch, backup fuses and additional protection



**Fig. 5** Mains connection, three-phase motors

## 7.4 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 sections 22.1 *Supply voltage* and 22.2 *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 a faulty installation. The motor is stopped 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 this 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 this 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.

## 7.5 Connection terminals

The descriptions and terminal overviews in this section apply to three-phase motors.

For maximum torques, see section [Torques](#), page 33.

### 7.5.1 Connection terminals

The pump has these connections:

- one analog input
- one digital input
- one signal relay output
- GENiBus connection.



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

### DANGER

#### Electric shock

Death or serious personal injury

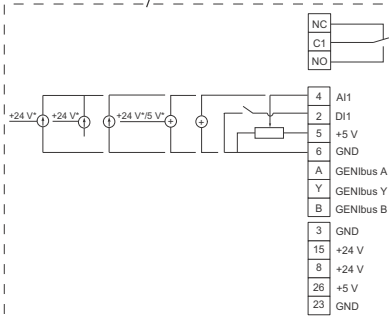
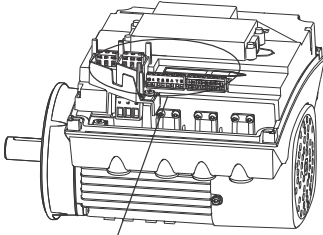
- Make sure that the wires to be connected to the connection groups below are separated from each other by reinforced insulation in their entire lengths.



- 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 by protective extra-low voltage (PELV), thus ensuring protection against electric shock.

- Signal relay output
  - Signal relay 1:
    - LIVE: You can connect supply voltages up to 250 VAC to the output.
    - PELV: The output is galvanically separated from other circuits. Therefore, you can connect the supply voltage or protective extra-low voltage to the output as desired.
- Mains supply (terminals N, PE, L or L1, L2, L3, PE).



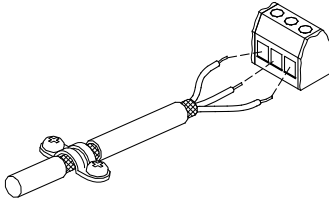
Terminal	Type	Function
NC	Normally closed contact	Signal relay 1 (LIVE or PELV)
C1	Common	
NO	Normally open contact	
<hr/>		
4	AI1	Analog input: 0-20 mA / 4-20 mA 0.5 - 3.5 V / 0-5 V / 0-10 V
2	DI1	Digital input, configurable
5	+5 V	Supply to potentiometer and sensor
6	GND	Ground
A	GENIbus, A	GENIbus, A (+)
Y	GENIbus, Y	GENIbus, GND
B	GENIbus, B	GENIbus, B (-)
<hr/>		
3	GND	Ground
15	+24 V	Supply
8	+24 V	Supply
<hr/>		
26	+5 V	Supply to potentiometer and sensor
23	GND	Ground

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

**Fig. 6** Connection terminals

## 7.6 Signal cables

- Use screened cables with a cross-sectional area of minimum 0.5 mm<sup>2</sup> and maximum 1.5 mm<sup>2</sup> for the external on/off switch, digital input, setpoint and sensor signals.
- 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. See fig. 7.



**Fig. 7** Stripped cable with screen and wire connections

- Always tighten screws for frame connections whether a cable is fitted or not.
- The wires in the motor terminal box must be as short as possible.

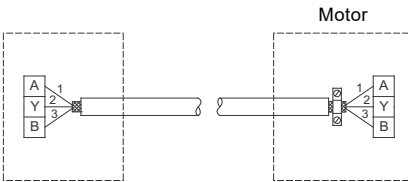
## 7.7 Bus connection cable

### 7.7.1 New installations

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

If the motor is connected to a unit with a cable clamp which is identical to the one on the motor, connect the screen to this cable clamp.

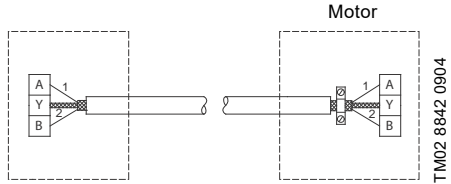
If the unit has no cable clamp leave the screen unconnected at this end. See fig. 8.



**Fig. 8** Connection with screened 3-core cable

## 7.7.2 Replacing a motor

- If a 2-core cable is used in the installation, connect it as shown in fig. 9.



**Fig. 9** Connection with screened 2-core cable

- If a screened 3-core cable is used in the installation, follow the instructions in section 7.7.1 *New installations*.

## 8. Operating conditions

### 8.1 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/stopping the pump.

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

### 8.2 Ambient temperature

#### 8.2.1 Ambient temperature during storage and transportation

Minimum: -30 °C

Maximum: 60 °C.

#### 8.2.2 Ambient temperature during operation

<b>3 x 380-480 V</b>	
Minimum	-20 °C
Maximum	40 °C

The motor can operate with the rated power output (P<sub>2</sub>) at 40 °C, but continuous operation at higher temperatures reduces the expected product life.

TM02 1325 4402

TM05 3973 1812

### 8.3 Installation altitude

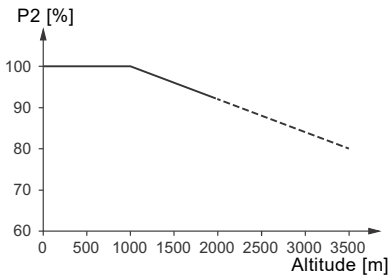
Installation altitude is the height above sea level of the installation site.

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.

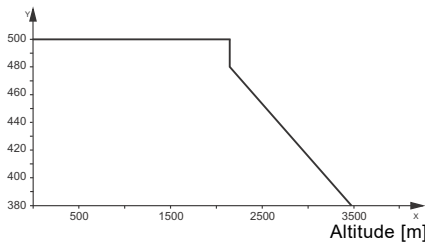


TM05 5243 3717

**Fig. 10** Motor output power in relation to altitude

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

Supply voltage [V]



TM06 9866 3617

**Fig. 11** Supply voltage for three-phase motor in relation to altitude

### 8.4 Humidity

Maximum humidity: 95 %.

If the humidity is constantly high and above 85 %, open the drain holes in the drive-end flange. See section [6.7 Drain holes](#).

### 8.5 Motor cooling

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

- Position the motor in such a way that adequate cooling is ensured. See section [6.5 Ensuring motor cooling](#).
- The temperature of the cooling air must not exceed 50 °C.
- Keep cooling fins and fan blades clean.

## 9. User interfaces

### WARNING



#### Hot surface

Death or serious personal injury

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

You can make the pump settings by means of the following user interfaces:

#### Operating panels

- Basic operating panel.  
See section [10. Basic operating panel](#).

#### Remote controls

- Grundfos GO Remote.  
See section [11. Grundfos GO Remote](#).

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

## 10. Basic operating panel

The pumps are fitted with this operating panel as standard.

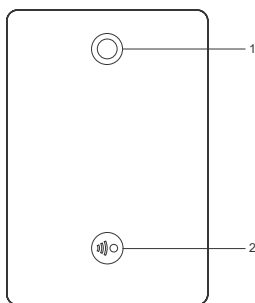



Fig. 12 Basic operating panel

TM05 4847 2712

Pos.	Symbol	Description
1		<p>Grundfos Eye Shows the operating status of the pump. For further information, see section <a href="#">15. Grundfos Eye</a>.</p>
2		<p>Allows radio communication with Grundfos GO Remote and other products of the same type. When you try to establish radio communication between the pump and Grundfos GO Remote or another pump, the green indicator light in Grundfos Eye on the pump flashes continuously. Press  on the pump operating panel to allow radio communication with Grundfos GO Remote and other products of the same type.</p>

## 11. Grundfos GO Remote

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

Grundfos GO Remote enables setting of functions and gives access to status overviews, technical product information and actual operating parameters.

Grundfos GO Remote offers the following mobile interfaces (MI).

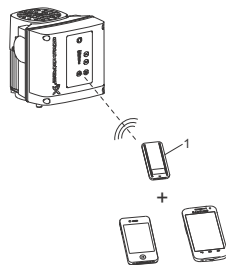


Fig. 13 Grundfos GO Remote communicating with the pump via radio or infrared connection (IR)

TM06 6256 0916

### Pos. Description

- |   |  |
|---|--|
| 1 | <p>Grundfos MI 301:<br/>Separate module enabling radio or infrared communication. You can use the module in conjunction with an Android or iOS-based smart device with Bluetooth connection.</p> |
|---|--|



### 11.1 Communication

When Grundfos GO Remote initiates communication with the pump, the indicator light in the middle of Grundfos Eye flashes green. See section [15. Grundfos Eye](#).

Establish communication using one of these communication types:

- radio communication
- infrared communication.

#### 11.1.1 Radio communication

Radio communication can take place at distances up to 30 m. The first time Grundfos GO Remote communicates with the pump, you must enable communication by pressing  or  on the pump operating panel. Later when communication takes place, the pump is recognised by Grundfos GO Remote and you can select the pump from the "List" menu.

#### 11.1.2 Infrared communication

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

#### 11.1.3 Startup guide

The first time Grundfos GO Remote communicates with the pump, the startup guide starts to guide you through the settings needed for the product to operate in the given application. When the startup guide has been completed, the pump is ready for operation.

## 11.2 Menu overview for Grundfos GO Remote

<b>Dashboard</b>	<b>CMEC, CREC, CRIEC, CRNEC, MTREC</b>
	•
<b>"Status"</b>	<b>CMEC, CREC, CRIEC, CRNEC, MTREC</b>
"Resulting setpoint"	•
"Actual controlled value"	•
"Motor speed"	•
"Power consumption"	•
"Energy consumption"	•
"Operating hours"	•
"Analog input 1"	•
"Digital input 1"	•
"Fitted modules"	•

<b>"Settings"</b>	<b>CMEC, CREC, CRIEC, CRNEC, MTREC</b>	<b>Section</b>	<b>Page</b>
"Setpoint"	•	<a href="#">12.1 Setpoint</a>	16
"Operating mode"	•	<a href="#">12.2 Operating mode</a>	16
"Set user-defined speed"	•	<a href="#">12.4 "Set user-defined speed"</a>	16
"Control mode"	•	<a href="#">12.5 "Control mode"</a>	16
"Stop function"	•	<a href="#">12.11 "Stop function" (Low-flow stop function)</a>	21
"Controller"	•	<a href="#">"Controller" (Controller settings)</a>	19
"Operating range"	•	<a href="#">12.9 Operating range</a>	20
"Ramps"	•	<a href="#">12.12 Ramps</a>	23
"Number"	•	<a href="#">12.14 ""Number" (Pump number)</a>	23
"Radio communication"	•	<a href="#">12.15 "Radio communication" (Enable/disable radio comm.)</a>	23
"Analog input 1"	•	<a href="#">12.6 Analog inputs</a>	17
"Digital input 1"	•	<a href="#">12.7 Digital inputs</a>	18
"External setpoint funct."	•	<a href="#">12.10 External setpoint function</a>	20
"Signal relay 1"	•	<a href="#">12.8 Signal relays (Relay outputs)</a>	19
"Alarm handling"	•	<a href="#">12.13 Alarm handling</a>	23
"Service"	•	<a href="#">12.14 ""Number" (Pump number)</a>	23
"Recall settings"	•	<a href="#">12.17 "Recall settings" (Recall stored settings)</a>	23
"Undo"	•	<a href="#">12.17.1 "Undo"</a>	23
"Pump name"	•	<a href="#">12.18 "Pump name"</a>	23
"Connection code"	•	<a href="#">12.19 "Connection code"</a>	24
"Unit configuration"	•	<a href="#">12.16 "Unit configuration" (Units)</a>	23

<b>"Alarms and warnings"</b>	<b>CMEC, CREC, CRIEC, CRNEC, MTREC</b>	<b>Section</b>	<b>Page</b>
"Alarm log"	•	<a href="#">12.20 Alarm log</a>	24
"Warning log"	•	<a href="#">12.21 Warning log</a>	24
"Reset alarm" button	•		

<b>"Assist"</b>	<b>CMEC, CREC, CRIEC, CRNEC, MTREC</b>	<b>Section</b>	<b>Page</b>
"Assisted pump setup"	•	<a href="#">12.23 Assisted pump setup</a>	24
"Assisted fault advice"	•	<a href="#">12.24 Assisted fault advice</a>	24

## 12. Description of functions

### 12.1 Setpoint

You can set the setpoint for all control modes when you have selected the desired control mode. See section [12.5 "Control mode"](#).

### 12.2 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 rate is required. When operating according to the minimum curve, the pump is operating like an uncontrolled pump.
- Max.  
You can use the maximum curve mode in periods in which a maximum flow rate is required. When operating according to the maximum curve, the pump is operating like an uncontrolled pump.
- Manual  
The pump is operating at a manually set speed. In Manual the setpoint via bus is over-ruled. See section [12.3 Set manual speed](#).
- "User-defined speed"  
The motor is operating at a speed set by the user. See section [12.4 "Set user-defined speed"](#).

All operating modes are illustrated in fig. 14.

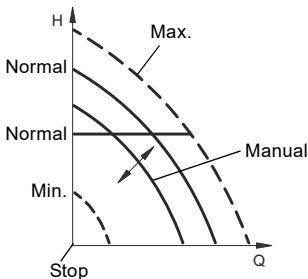


Fig. 14 Operating modes

### 12.3 Set manual speed

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

You can set the pump speed in percentage of the maximum speed. When you have set the operating mode to Manual, the pump starts running at the set speed. The speed can then be changed manually via Grundfos GO Remote.

### 12.4 "Set user-defined speed"

You can set the motor speed in percentage of the maximum speed. When you have set the operating mode to "User-defined speed", the motor runs at the set speed.

### 12.5 "Control mode"

Available control modes:

- "Constant pressure" (Const. pressure)
- "Constant temperature" (Const. temp.)
- "Constant curve" (Const. curve.)

#### 12.5.1 "Constant pressure"

We recommend this control mode if the pump is to deliver a constant pressure, independently of the flow rate in the system. See fig. 15.

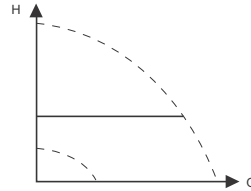


Fig. 15 "Constant pressure"

This control mode uses the factory-fitted pressure sensor, if any, which measures the outlet pressure of the pump.

For pumps without a factory-fitted sensor, you must connect a pressure sensor to the analog input of the pump. You can set the pressure sensor in the Assist menu. See section [12.23 Assisted pump setup](#).

#### Examples

- One external pressure sensor.

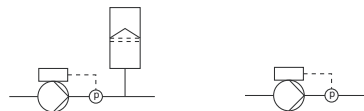


Fig. 16 "Constant pressure"

#### Controller settings

For recommended controller settings, see section ["Controller" \(Controller settings\)](#).

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### 12.5.2 "Constant temperature"

This control mode ensures a constant temperature. Constant temperature is a comfort control mode that you can use in domestic hot-water systems to control the flow to maintain a fixed temperature in the system. See fig. 17.

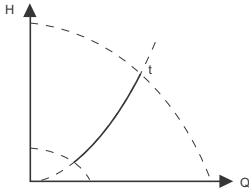


Fig. 17 "Constant temperature"

This control mode requires a temperature sensor placed at the location where the temperature is to be controlled. See the examples below:

#### Examples

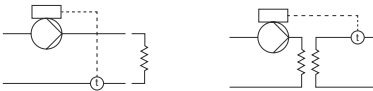


Fig. 18 "Constant temperature"

#### Controller settings

For recommended controller settings, see section ["Controller" \(Controller settings\)](#).

You can set the pump to operate according to a constant curve, like an uncontrolled pump. See fig. 19.

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

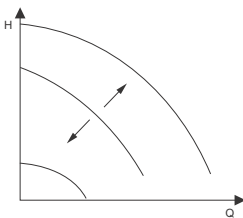


Fig. 19 "Constant curve"

#### Controller settings

For recommended controller settings, see section ["Controller" \(Controller settings\)](#).

## 12.6 Analog inputs

Function (terminal)	FM 200* (standard)
Analog input 1, setup (4)	•

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 section [12.23 Assisted pump setup](#).

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

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

#### Function

The analog input can be set to these functions:

- Not active
- Feedback sensor  
The sensor is used for the selected control mode.
- Ext. setpoint infl.  
See section [12.10 External setpoint function](#).
- Other function.

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### Measured parameter

Select one of the parameters listed below, that is the parameter to be measured in the system by the sensor connected to the actual analog input. See fig. 20.

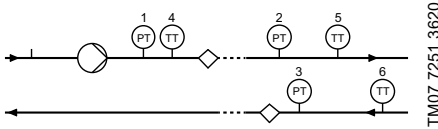


Fig. 20 Overview of sensor locations

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Sensor function/measured parameter	Pos.
Discharge press.	3
Press. 1, external	6
Press. 2, external	7
Liquid temp.	13
Temperature 1	14
Temperature 2	15
Ambient temp.	Not shown
Other parameter	Not shown

### Unit

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

### Electrical signal

Select signal type:

- 0.5-3.5 V
- 0-5 V
- 0-10 V
- 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.

## 12.7 Digital inputs

To set the digital input, make the settings below.

### Function

Select one of these 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 is stopped 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 can be detected. When lack of inlet pressure or water shortage (dry running) is detected, the pump is stopped. The pump cannot restart as long as the input is activated. This requires the use of an accessory, such as these:
  - a pressure switch installed on the inlet side of the pump
  - a float switch installed on the inlet side of the pump.

The priority of the selected functions in relation to each other appears from section 14. [Priority of settings.](#)

A stop command always has the highest priority.

### 12.8 Signal relays (Relay outputs)

The pump incorporates one signal relay for potential-free signalling

#### Function

You can configure the signal relay 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 rate. See section "[Low-flow detection](#)" on page 22.
- "Running" (Pump running).  
The pump is running.
- Warning.  
There is an active warning.
- "Controller" (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:

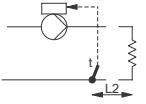
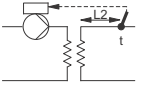
- Set the gain within the range from 0.1 to 20.
- Set the integral-action time within the range from 0.1 to 3600 seconds.  
If you select 3600 seconds, the controller functions as a PI controller.

Furthermore, you can set the controller to inverse control.

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

### Guidelines for setting of PI controller

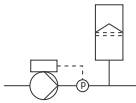
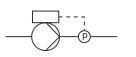
The tables below show the recommended controller settings:

Constant temperature	$K_p$		$T_i$
	Heating system <sup>1)</sup>	Cooling system <sup>2)</sup>	
	0.5	-0.5	10 + 5L2
	0.5	-0.5	30 + 5L2

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

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

L2: distance in metres between heat exchanger and sensor.

Constant pressure	$K_p$	$T_i$
	0.5	0.5
	0.5	0.5

#### 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.

### 12.9 Operating range

Set the operating range as follows:

- Set the minimum speed within the range from fixed minimum speed to user-set maximum speed.
- Set the maximum speed within the range from user-set minimum speed to fixed maximum speed.

The range between the user-set minimum and maximum speeds is the operating range. See fig. 21.

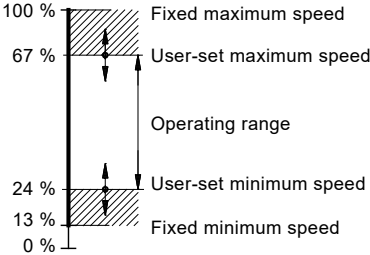


Fig. 21 Example of minimum and maximum settings

### 12.10 External setpoint function

You can influence the setpoint by an external signal via the analog input.



Before you can enable the function, you must set the analog input to *External setpoint function*.

See sections 12.6 Analog inputs and 12.7 Digital inputs.

#### Example with constant pressure with linear influence

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

At a sensor min. of 0 bar, a setpoint of 2 bar and an external setpoint of 60 %, the actual setpoint is 0.60 x (2 - 0) + 0 = 1.2 bar. See fig. 22.

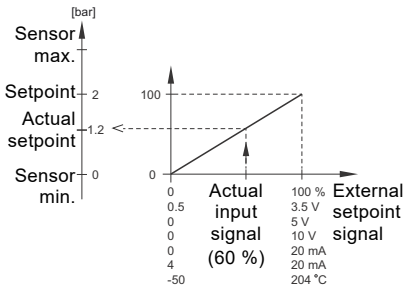


Fig. 22 Example of setpoint influence with sensor feedback

#### Example with constant curve with linear influence

Actual setpoint: actual input signal x (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 0.60 x (85 - 25) + 25 = 61 %. See fig. 23.

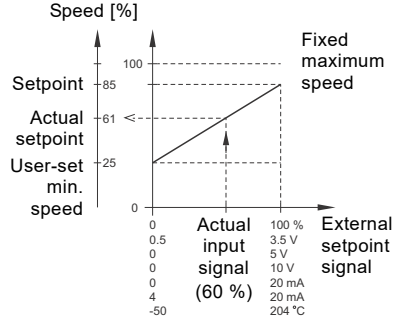


Fig. 23 Example of setpoint influence with constant curve

#### 12.10.1 "Setpoint influence" functions

You can select these functions:

- Not active. When set to Not active, the setpoint is not influenced from any external function.
- Linear function. The setpoint is influenced linearly from 0 to 100 %. See fig. 24.

#### Setpoint influence [%]

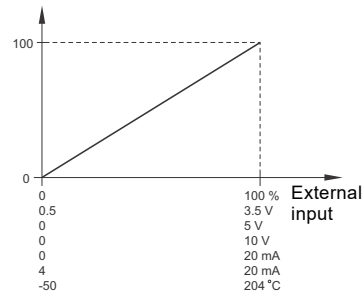


Fig. 24 Linear function

- 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 pump changes to operating mode Stop.  
If the input signal is increased above 15 %, the operating mode is changed back to Normal. See fig. 25.

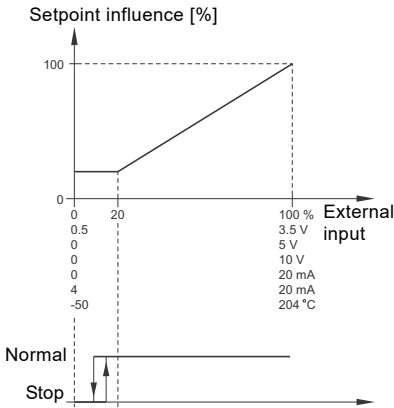


Fig. 25 Linear with Stop

### 12.11 "Stop function" (Low-flow stop function)

You can set the "Low-flow stop function" to these 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 rate is monitored. If the flow rate becomes lower than the set minimum flow rate ( $Q_{min}$ ), the pump changes from continuous operation at constant pressure to start-stop operation and stops if the flow rate reaches zero.

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

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

The disadvantages of enabling the "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/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 flowrate ( $Q_{min1}$ ) and other internal parameters. See fig. 26.
- 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 flowrate ( $Q_{min2}$ ) and other internal parameters. See fig. 26.
- "User-defined mode" (Customised operating mode):  
The pump uses the parameters set for  $\Delta H$  and minimum flow rate ( $Q_{min3}$ ) respectively for the stop function. See fig. 26.

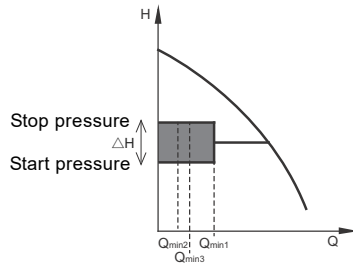


Fig. 26 Difference between start and stop pressures ( $\Delta H$ ) and minimum flow rate

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In start-stop operation, the pressure varies between the start and stop pressures. See fig. 26.

In "User-defined mode" (Customised operating mode),  $\Delta H$  has been factory-set to 10 % of the actual setpoint.  $\Delta H$  can be set within the range from 5 to 30 % of the actual setpoint.

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

The minimum flow rate is set in percentage of the nominal flow rate of the pump (see the pump nameplate).

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

### "Low-flow detection"

Low flow rate can be detected in two ways:

1. A built-in low-flow detection function which is active if the digital input is set for flow switch.
  2. A flow switch connected to the digital input.
1. Low-flow detection function:
 

The pump checks the flow rate 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 a low flow rate. The speed is increased until the stop pressure (actual setpoint +  $0.5 \times \Delta H$ ) is reached and the pump stops. When the pressure has fallen to the start pressure (actual setpoint -  $0.5 \times \Delta H$ ), the pump restarts.

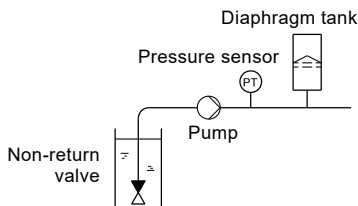
    - If the flow rate is higher than the set minimum flow rate, the pump returns to continuous operation at constant pressure.
    - If the flow rate is still lower than the set minimum flow rate ( $Q_{\min}$ ), the pump continues in start-stop operation until the flow rate is higher than the set minimum 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. Flow switch:
 

When the digital input is activated for more than 5 seconds because there is a low flow rate, the speed is increased until the stop pressure (actual setpoint +  $0.5 \times \Delta H$ ) is reached, and the pump stops. When the pressure has fallen 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.

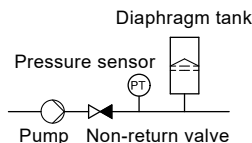
### Operating conditions for the low-flow stop function

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. See figs 27 and 28.



**Fig. 27** Position of the non-return valve and pressure sensor in system with suction lift operation



**Fig. 28** Position of the non-return valve and pressure sensor in a system with a positive inlet pressure

### "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 rated flow rate.

### "Diaphragm tank volume"

The stop function requires a diaphragm tank of a certain minimum size. Set the size of the installed tank in this display.

In order to reduce the number of start-stops per hour or to reduce the  $\Delta H$ , install a larger tank.

Install the tank immediately after the pump. The recharge pressure must be  $0.7 \times$  actual setpoint.

Recommended diaphragm tank size:

Rated flow rate of pump [m <sup>3</sup> /h]	Typical diaphragm tank size [litres]
0-6	8
7-24	18
25-40	50

## 12.12 Ramps

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

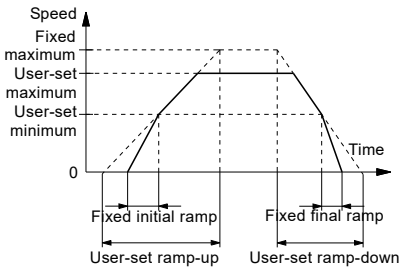
You can set the following:

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

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

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

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



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Fig. 29 Ramp-up and Ramp-down

## 12.13 Alarm handling

The alarm handling determines how the pump must react in case of a sensor failure.

Input	Alarm handling
"Analog input 1"	<p><b>Warning:</b> no change of operation</p> <p><b>Stop:</b> an alarm is given, and the pump stops</p> <p><b>Min:</b> an alarm is given, and the pump reduces speed to minimum</p> <p><b>Max:</b> an alarm is given, and the pump increases speed to maximum</p> <p><b>User-defined speed:</b> an alarm is given, and the pump runs at a speed set by the user</p>

## 12.14 "Number" (Pump number)

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

## 12.15 "Radio communication" (Enable/disable radio comm.)

You can set the radio communication to either enabled or disabled. You can use this function in areas where radio communication is not allowed.



IR communication remains active.

## 12.16 "Unit configuration" (Units)

In this menu, you can select between SI and US units. The setting can be made generally for all parameters, or you can customise for each parameter.

In this menu, you can store the actual settings for later use in the same pump or in other pumps of the same type.

## 12.17 "Recall settings" (Recall stored settings)

### Grundfos GO Remote

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

### 12.17.1 "Undo"

In this display, you can undo all settings that have been made with Grundfos GO Remote in the current communication session. Once you have recalled settings, you cannot undo.

## 12.18 "Pump name"

In this display, you can give the pump a name. In this way, you can easily identify the pump when connecting with Grundfos GO Remote.

## 12.19 "Connection code"

You can set a connection code to avoid having to press the connection button each time and to restrict remote access to the product.

### Setting the code in the product using Grundfos GO Remote

1. Connect Grundfos GO Remote to the product.
2. In the product dashboard, select "Settings".
3. Choose "Connection code".
4. Enter the wanted code and press [OK].  
The code must be a character string (ASCII).  
You can always change the code. The old code is not needed.

### Setting the code in Grundfos GO Remote

You can define a default connection code in Grundfos GO Remote so that it automatically attempts to connect to the selected product via this code.

When you select a product with the same connection code in Grundfos GO Remote, Grundfos GO Remote automatically connects to the product and you do not have to press the connection button on the module.

Define the default code in Grundfos GO Remote in this way:

1. In the main menu, under "General", select "Settings".
2. Choose "Remote".
3. Enter the connection code in the field "Preset connection code". The field now says "Connection code set".

You can always change the default connection code by pressing [Delete] and entering a new one.

If Grundfos GO Remote fails to connect and asks you to press the connection button on the product, it means that the product has no connection code or has a different connection code. In this case, you can only establish connection via the connection button.



After setting a connection code, switch off the product until the light in Grundfos Eye turns off before you can use the new connection code.

## 12.20 Alarm log

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

## 12.21 Warning log

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

## 12.22 Assist

This menu consists of a number of different assist functions which are small guides that take you through the steps needed to set the pump.

## 12.23 Assisted pump setup

This menu guides you through the following:

### Setting of pump

- Selection of control mode. See page 16.
- Configuration of feedback sensors.
- Adjusting the setpoint. See page 16.
- Controller settings. See page 19.
- Summary of settings.

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

#### Grundfos GO Remote

1. Open the Assist menu.
2. Select Assisted pump setup.
3. Select control mode "Constant pressure" (Const. pressure).
4. Read the description for this control mode.
- 5.
6. Select sensor function according to where the sensor is installed in the system. See fig. 20 on page 18.
7. Select electrical input signal according to the sensor specifications.
8. Select 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 section "[Controller](#)" ([Controller settings](#)).
12. Type the desired pump name.
13. Check the summary of settings and confirm them.

## 12.24 Assisted fault advice

This menu gives guidance and corrective actions in case of pump failures.



### 13. Bus signal

The pump supports serial communication via an RS-485 input. The communication is carried out according to the Grundfos GENIbus 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 remote-set pump operating parameters, such as setpoint and operating mode. At the same time, the pump can, via the bus, provide status information about important parameters, such as actual value of control parameter, input power and fault indications.

Contact Grundfos for further information.



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

### 14. Priority of settings

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

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

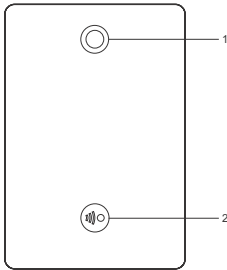
The priority of the settings appears from the table below:

Priority	Grundfos GO Remote	Digital input	Bus communication
1	Stop*		
2	Manual		
3	"Max. speed"* / "User-defined speed"		
4		Stop	
5		"User-defined speed"	
6			Stop
7			"Max. speed"
8			"Min. speed"
9			"Start"
10		"Max. speed"	
11	"Min. speed"		
12		"Min. speed"	
13		"Start"	
14	"Start"		

\* "Stop" and "Max. speed" settings made with Grundfos GO Remote 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 Grundfos GO Remote.

## 15. Grundfos Eye

The operating condition of the pump is indicated by Grundfos Eye on the operating panel. See fig. 30, A.



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Fig. 30 Grundfos Eye

















































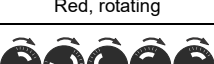





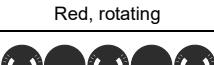











Grundfos Eye	Indication	Description
	No lights are on.	The power is off. The pump is not running.
	The two opposite green indicator lights are rotating in the direction of rotation of the pump when seen from the non-drive end.	The power is on. The pump is running.
	The two opposite green indicator lights are permanently on.	The power is on. The pump is not running.
	One yellow indicator light is rotating in the direction of rotation of the pump when seen from the non-drive end.	Warning. The pump is running.
	One yellow indicator light is permanently on.	Warning. The pump is stopped.
	The two opposite red indicator lights flash simultaneously.	Alarm. The pump is stopped.
	The green indicator light in the middle flashes quickly four times.	This is a feedback signal which the pump gives in order to ensure identification of itself.
	The green indicator light in the middle flashes continuously.	Grundfos GO Remote or another pump is trying to communicate with the pump. Press  on the pump operating panel to allow communication.
	The green indicator light in the middle is permanently on.	Remote control with Grundfos GO Remote via radio. The pump is communicating with Grundfos GO Remote via radio connection.
	The green indicator light in the middle flashes quickly while Grundfos GO Remote is exchanging data with the pump. It takes a few seconds.	Remote control with Grundfos GO Remote via infrared light. The pump is receiving data from Grundfos GO Remote via infrared communication.

## 16. Signal relay

The pump has one output for potential-free signal via an internal relay.

You can set the signal output to Operation, Pump running, Ready, Alarm and Warning.

The functions of the signal relay appear from the table below:

Description	Grundfos Eye	Contact position of signal relays when activated					Operating mode
		Operation	Pump running	Ready	Alarm	Warning	
The power is off.	 Off						-
The pump runs in Normal mode.	 Green, rotating						Normal, Min. or Max.
The pump runs in Manual mode.	 Green, rotating						Manual
The pump is in operating mode Stop.	 Green, steady						Stop
Warning, but the pump is running.	 Yellow, rotating						Normal, Min. or Max.
Warning, but the pump runs in Manual mode.	 Yellow, rotating						Manual
Warning, but the pump was stopped via a Stop command.	 Yellow, steady						Stop
Alarm, but the pump is running.	 Red, rotating						Normal, Min. or Max.
Alarm, but the pump runs in Manual mode.	 Red, rotating						Manual
The pump is stopped due to an alarm.	 Red, flashing						Stop
The pump is stopped due to Low-flow stop function.	 Green, steady						Normal

## 17. Installing a communication interface module

### DANGER

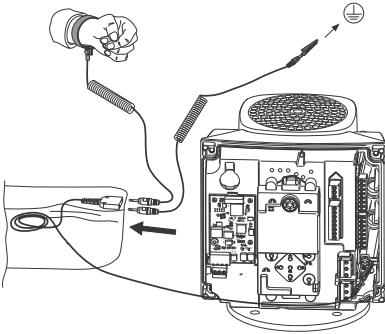
#### Electric shock

Death or serious personal injury  
 - Switch off the power supply to the motor and to the signal relay. Wait at least 5 minutes before starting any work on the motor. Make sure that the power supply cannot be accidentally switched on.



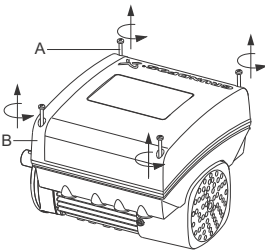
Always use an antistatic service kit when handling electronic components. This prevents static electricity from damaging the components.

When unprotected, place the component on the antistatic cloth.



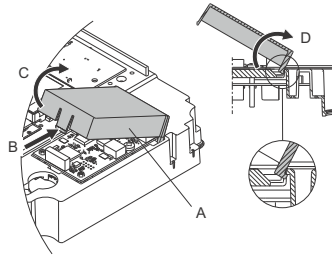
**Fig. 31** Antistatic service kit

1. Loosen the four screws (fig. 32, A) and remove the terminal box cover (fig. 32, B).



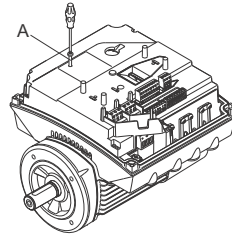
**Fig. 32** Removing the terminal box cover

2. Remove the CIM cover (fig. 33, A) by pressing the locking tab (fig. 33, B) and lifting the end of the cover (fig. 33, C). Then lift the cover off the hooks (fig. 33, D).



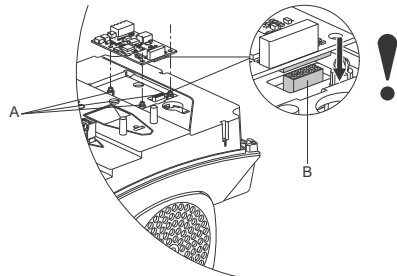
**Fig. 33** Removing the CIM cover

3. Remove the securing screw (fig. 34, A).



**Fig. 34** Removing the securing screw

4. Fit the CIM module by aligning it with the three plastic holders (fig. 35, A) and the connecting plug (fig. 35, B). Press home the module using your fingers.



**Fig. 35** Fitting the CIM module

5. Fit and tighten the securing screw (fig. 34, A) to 1.3 Nm.
6. Make the electrical connections to the CIM module as described in the instructions delivered with the module.

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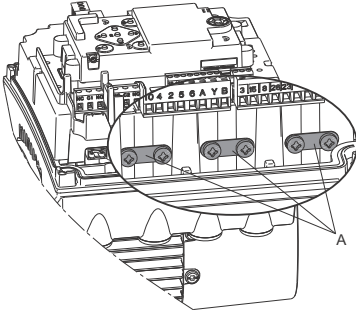
TM06 4082 1515

TM06 4462 2315

TM06 4081 1515

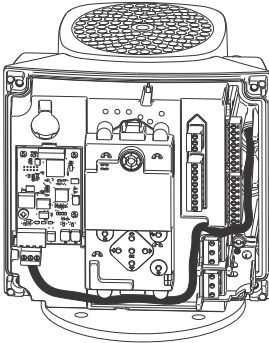
TM06 4083 1515

7. Connect the cable screens of the bus cables to protective earth via one of the earth clamps (fig. 36, A).



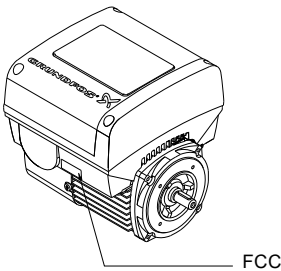
**Fig. 36** Connecting the cable screens to protective earth

8. Route the wires for the CIM module. See the example in fig. 37.



**Fig. 37** Example of wire routing

9. Fit the CIM cover.
10. If the CIM module is supplied with an FCC label, then place this on the terminal box. See fig. 38.



**Fig. 38** FCC label

11. Fit the terminal box cover (fig. 32, B) and cross-tighten the four mounting screws (fig. 32, A) to 6 Nm.



Make sure that the terminal box cover is aligned with the operating panel. See section 18. *Changing the position of the operating panel.*

## 18. Changing the position of the operating panel

### DANGER

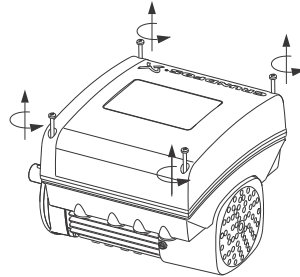
#### Electric shock



Death or serious personal injury  
 - Switch off the power supply to the motor and to the signal relay. Wait at least 5 minutes before starting any work on the motor. Make sure that the power supply cannot be accidentally switched on.

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

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



**Fig. 39** Loosening the screws

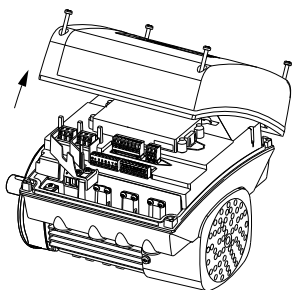
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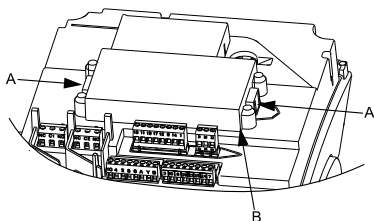
TM05 5351 3612

- Remove the terminal box cover.



**Fig. 40** Removing the terminal box cover

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

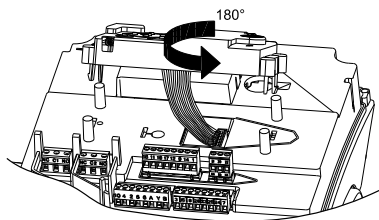


**Fig. 41** Lifting the plastic cover

- Turn the plastic cover 180 °.

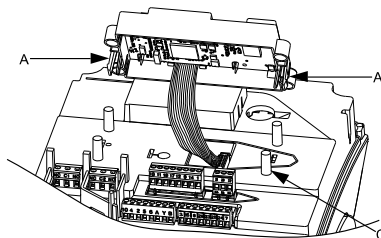


Do not twist the cable more than 90 °.



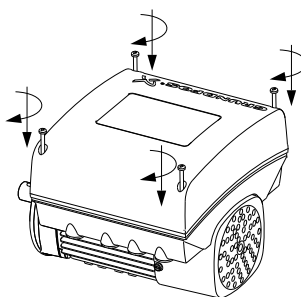
**Fig. 42** Turning the plastic cover

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



**Fig. 43** Positioning the plastic cover

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



**Fig. 44** Fitting the terminal box cover

## 19. Servicing the product

### DANGER

#### Electric shock

- Death or serious personal injury
- Switch off the power supply to the motor and to the signal relay. Wait at least 5 minutes before starting any work on the motor. Make sure that the power supply cannot be accidentally switched on.



### DANGER

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



### 19.1 Motor

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

### 19.2 Pump

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

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

## 20. Cleaning the product

### WARNING

#### Electric shock

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



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

## 21. Megging

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

## 22. Technical data, three-phase motors

### 22.1 Supply voltage

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

#### Recommended fuse size

- 3 x 380-480 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

### 22.2 Leakage current (AC)

Speed [min <sup>-1</sup> ]	Power [kW]	Mains voltage [V]	Leakage current [mA]
	0.25 - 2.2	≤ 400	< 3.5
		> 400	< 5
2900-4000	3 - 5.5	≤ 400	< 3.5
		> 400	< 3.5

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

## 23. Inputs/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.

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 input, 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 mm<sup>2</sup>, 28-16 AWG.

Maximum cable length: 500 m.

**Analog input, 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 $\Omega$  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 to 292  $\Omega$ .

Current overload protection: Yes. Change to voltage signal.

Measurement tolerance: - 0/+ 3 % of full scale (maximum-point coverage).

Screened cable: 0.5 - 1.5 mm<sup>2</sup>, 28-16 AWG.

Maximum cable length: 500 m excluding potentiometer.

Potentiometer connected to +5 V, GND:

Use maximum 10 k $\Omega$ .

Maximum cable length: 100 m.

**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.

**Relay**

Potential-free changeover contacts.

Minimum contact load when in use: 5 VDC, 10 mA.

Screened cable: 0.5 - 2.5 mm<sup>2</sup>, 28-12 AWG.

Maximum cable length: 500 m.

**Bus input**

Grundfos GENIbus protocol, RS-485.

Screened 3-core cable: 0.5 - 1.5 mm<sup>2</sup>, 28-16 AWG.

Maximum cable length: 500 m.

**24. Other technical data****EMC (electromagnetic compatibility)**

Standard used: EN 61800-3.

The table below shows the emission category of the motor.

C2 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 (PWHHD) 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<sup>2</sup>.

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	
	2900-4000 min <sup>-1</sup>	
0.25	C2	
0.37	C2	
0.55	C2	
0.75	C2	
1.1	C2	
1.5	C2	
2.2	C2	
3	C2	
4	C2	
5.5	C2	

Immunity: The motor fulfils the requirements for industrial areas.

Contact Grundfos for further information.

**Enclosure class**

Standard: IP44 (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 min <sup>-1</sup>	
0.25 - 1.5	4 x M20	
2.2	4 x M20	
3-4	1 x M25 + 4 x M20	
5.5	1 x M25 + 4 x M20	

## Cable glands delivered with the pump

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

## 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

## 24.1 Sound pressure level

Motor [kW]	Maximum speed stated on nameplate [min <sup>-1</sup> ]	Speed [min <sup>-1</sup> ]	Sound pressure level ISO 3743 [dB(A)]
			3-phase motors
0.25 - 0.75	4000	3000	50
		4000	60
1.1	4000	3000	50
		4000	60
1.5	4000	3000	57
		4000	64
2.2	4000	3000	57
		4000	64
3	4000	3000	60
		4000	69
4	4000	3000	61
		4000	69
5.5	4000	3000	61
		4000	69

The grey fields indicate that the motor is not available in this MGE motor range.

## 25. 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.

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



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](http://www.grundfos.com/product-recycling).

## Appendix

### Installation in the USA and Canada

In order to maintain the cURus approval, follow these additional installation instructions. The UL approval is according to UL 1004-1.

Note

#### For Canada

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

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

#### Electrical codes

##### For USA

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

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

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

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

##### Pour le Canada

#### Codes de l'électricité

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

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

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

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

### Radio communication

#### For USA

This device complies with part 15 of the FCC rules and RSS210 of IC rules.

Operation is subject to the following two conditions:

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

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

#### Pour le Canada

#### Communication radio

Ce dispositif est conforme à la partie 15 des règles de la FCC et aux normes RSS210 de l'IC.

Son fonctionnement est soumis aux deux conditions suivantes:

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

## Identification numbers

### For USA

Grundfos Holding A/S

Contains FCC ID: OG3-RADIOM01-2G4.

### For Canada

Grundfos Holding A/S

Model: RADIOMODULE 2G4

Contains IC: 10447A-RA2G4M01.

### Pour le Canada

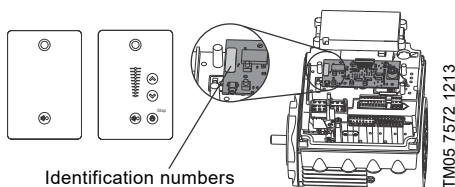
### Numéros d'identification

Grundfos Holding A/S

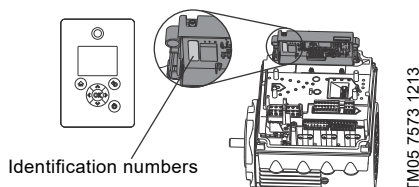
Modèle: RADIOMODULE 2G4

Contient IC: 10447A-RA2G4M01.

### Location of identification numbers



**Fig. 1** Identification numbers



**Fig. 2** Identification numbers

## Electrical connection

### Conductors

See section [7.2 Cable requirements](#), page [7](#).

### Torques

Maximum tightening torques for the terminals can be found in section [Torques](#), page [33](#).

### Line reactors

Maximum line reactor size must not exceed 1.5 mH.

### Short-circuit current

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

### Fuses

Fuses used for motor protection must be rated for minimum 500 V.

Motors up to and including 10 hp require class K5 UL-listed fuses. Any UL-listed fuse can be used for motors of 15 hp.

### Branch circuit protection

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

### Overload protection

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

## Declaration of conformity

**GB: EC/EU declaration of conformity**

We, Grundfos, declare under our sole responsibility that the products MGE 71, MGE 80, MGE 90, MGE 100, MGE 112, MGE 132, MGE160, MLE 71, MLE 80, MLE 90, MLE100, MLE112, MLE132, MLE160, models H, I, J, to which this declaration relates, are in conformity with the Council directives listed below on the approximation of the laws of the EC/EU member states.

**DK: EF-/EU-overensstemmelseserklæring**

Vi, Grundfos, erklærer under ansvar at produkterne MGE 71, MGE 80, MGE 90, MGE 100, MGE 112, MGE 132, MGE160, MLE 71, MLE 80, MLE 90, MLE100, MLE112, MLE132, MLE160, model H, I, J som erklæringen nedenfor omhandler, er i overensstemmelse med Rådets direktiver der er nævnt nedenfor, om indbyrdes tilnærmelse til EF/EU-medlemsstaternes lovgivning.

**FR: Déclaration de conformité CE/UE**

Nous, Grundfos, déclarons sous notre seule responsabilité, que les produits MGE 71, MGE 80, MGE 90, MGE 100, MGE 112, MGE 132, MGE160, MLE 71, MLE 80, MLE 90, MLE100, MLE112, MLE132, MLE160, modèle H, I, J, auxquels se réfère cette déclaration, sont conformes aux Directives du Conseil concernant le rapprochement des législations des États membres CE/UE relatives aux normes énoncées ci-dessous.

**DE: EG-/EU-Konformitätserklärung**

Wir, Grundfos, erklären in alleiniger Verantwortung, dass die Produkte MGE 71, MGE 80, MGE 90, MGE 100, MGE 112, MGE 132, MGE160, MLE 71, MLE 80, MLE 90, MLE100, MLE112, MLE132, MLE160, Modell H, I, J, auf die sich diese Erklärung beziehen, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EG-/EU-Mitgliedsstaaten übereinstimmen.

**ES: Declaración de conformidad de la CE/UEX**

Grundfos declara, bajo su exclusiva responsabilidad, que los productos MGE 71, MGE 80, MGE 90, MGE 100, MGE 112, MGE 132, MGE160, MLE 71, MLE 80, MLE 90, MLE100, MLE112, MLE132, MLE160, modelo H, I, J a los que hace referencia la siguiente declaración cumplen lo establecido por las siguientes Directivas del Consejo sobre la aproximación de las legislaciones de los Estados miembros de la CE/UE.

**CN: 欧盟符合性声明**

我们，格兰富，在我们的全权责任下声明，产品 MGE 71, MGE 80, MGE 90, MGE 100, MGE 112, MGE 132, MGE160, MLE 71, MLE 80, MLE 90, MLE100, MLE112, MLE132, MLE160, 模型 H, I, J 系列，其制造和性能完全符合以下所列欧盟委员会指令。

- Eco design Directive (2009/125/EC)  
Commission Regulation (EC) No. 640/2009  
Commission Regulation (EU) No. 4/2014  
Standards used: EN 60034-2-1:2007

Applicable for products labelled with HMI 100, HMI 200 or HMI 300 and CIM 250 or CIM 270

- Radio Equipment Directive (2014/53/EU)  
Standards used: EN 61800-5-1:2007,  
EN 61800-3:2004+A1:2018, EN 62479:2010,  
EN 301 489-1 V2.2.0, EN 301 489-17 V2.2.1,  
EN 301 489-52 V1.1.0 EN 301 489-7 V1.3.1,  
EN 300 328 V2.1.1, EN 301 511 V12.5.1

Applicable for products labelled with HMI 100, HMI 200 or HMI 300 and all other than CIM 250 or CIM 270, incl. none.

- Radio Equipment Directive (2014/53/EU)  
Standards used: EN 61800-5-1:2007,  
EN 61800-3:2004+A1:2012, EN 62479:2010,  
EN 301 489-1 V2.2.0, EN 301 489-17 V2.2.1,  
EN 300 328 V2.1.1

Applicable for products labelled with HMI 101, HMI 201 or HMI 301 and CIM 250 or CIM 270

- Radio Equipment Directive (2014/53/EU)  
Standards used: EN 61800-5-1:2007,  
EN 61800-3:2004+A1:2012, EN 62479:2010,  
EN 301 489-1 V2.2.1, EN 301 489-52 V1.1.0,  
EN 301 511 V12.5.1

Applicable for products labelled with HMI 101, HMI 201 or HMI 301

- Low Voltage Directive (2014/35/EU).  
Standard used: EN 61800-5-1:2007.
- EMC Directive (2014/30/EU).  
Standard used: EN 61800-3:2004+A1:2012.

This EC/EU declaration of conformity is only valid when published as part of the Grundfos installation and operating instruction (publication number 99955183).

Bjerringbro, 27 November 2019



Erdélyi Árpád  
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8850 Bjerringbro, Denmark

Person authorised to compile technical file and empowered to sign the EC/EU declaration of conformity.

## Declaration of conformity

**GB: EC/EU declaration of conformity**

We, Grundfos, declare under our sole responsibility that the product CRE, CREC, CRIE, CRIEC, CRNE, CRNEC, CRTE, SPKE, MTRE, MTREC, CME, CMEC to which the declaration below relates, is in conformity with the Council Directives listed below on the approximation of the laws of the EC/EU member states.

**DK: EF-/EU-overensstemmelseserklæring**

Vi, Grundfos, erklærer under ansvar at produkterne CRE, CREC, CRIE, CRIEC, CRNE, CRNEC, CRTE, SPKE, MTRE, MTREC, CME, CMEC som erklæringen nedenfor omhandler, er i overensstemmelse med Rådets direktiver der er nævnt nedenfor, om indbyrdes tilnærmelse til EF-/EU-medlemsstaternes lovgivning.

**FR: Déclaration de conformité CE/UE**

Nous, Grundfos, déclarons sous notre seule responsabilité, que les produits CRE, CREC, CRIE, CRIEC, CRNE, CRNEC, CRTE, SPKE, MTRE, MTREC, CME, CMEC auxquels se réfère cette déclaration, sont conformes aux Directives du Conseil concernant le rapprochement des législations des États membres CE/UE relatives aux normes énoncées ci-dessous.

**DE: EG-/EU-Konformitätserklärung**

Wir, Grundfos, erklären in alleiniger Verantwortung, dass die Produkte CRE, CREC, CRIE, CRIEC, CRNE, CRNEC, CRTE, SPKE, MTRE, MTREC, CME, CMEC auf die sich diese Erklärung bezieht, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EG-/EU-Mitgliedsstaaten übereinstimmen.

**ES: Declaración de conformidad de la CE/UE**

Grundfos declara, bajo su exclusiva responsabilidad, que los productos CRE, CREC, CRIE, CRIEC, CRNE, CRNEC, CRTE, SPKE, MTRE, MTREC, CME, CMEC a los que hace referencia la siguiente declaración cumplen lo establecido por las siguientes Directivas del Consejo sobre la aproximación de las legislaciones de los Estados miembros de la CE/UE.

**CN: 欧盟符合性声明**

我们，格兰富，在我们的全权责任下声明，产品 CRE, CREC, CRIE, CRIEC, CRNE, CRNEC, CRTE, SPKE, MTRE, MTREC, CME, CMEC 系列，其制造和性能完全符合以下所列欧盟委员会指令。

- Machinery Directive (2006/42/EC).  
Standard used: EN 809:1998 + A1:2009.
- Ecodesign Directive (2009/125/EC).  
Water pumps:  
Commission Regulation No 547/2012.  
Applies only to water pumps marked with the minimum efficiency index MEI. See the pump nameplate.
- RoHS Directives: 2011/65/EU and 2015/863/EU  
Standard used: EN IEC 63000:2018.

This EC/EU declaration of conformity is only valid when published as part of the Grundfos installation and operating instruction (publication number 99955183).

Bjerringbro 1st of September 2020



Erik Andersen  
Senior Manager  
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Person authorized to compile technical file and empowered to sign the EC/EU declaration of conformity.

## Declaration of conformity

## UK declaration of conformity

We, Grundfos, declare under our sole responsibility that the products to which the declaration below relates, is in conformity with UK regulations, standards and specifications to which conformity is declared, as listed below:

Valid for Grundfos products:

MGE 71, MGE 80, MGE 90, MGE 100, MGE 112, MGE 132, MGE160, MLE 71, MLE 80, MLE 90, MLE100, MLE112, MLE132, MLE160, models H, I, J

- The Ecodesign for Energy-Related Products and Energy Information Regulations 2019.  
Regulation (EC) No 640/2009 and Regulation (EU) No 4/2014.  
Electric motors  
Standards used: BS EN 60034-30:2009  
Applicable for products labelled with HMI 100, HMI 200 or HMI 300 and CIM 250 or CIM 270.
- Radio Equipment Regulations 2017.  
Standards used: BS EN 61800-5-1:2007  
BS EN 61800-3:2004+A1:2012, BS EN 62479:2010,  
BS EN 301 489-1 V2.2.0, BS EN 301 489-17 V2.2.1,  
BS EN 301 489-52 V1.1.0 BS EN 301 489-7 V1.3.1,  
BS EN 300 328 V2.1.1, BS EN 301 511 V12.5.1  
Applicable for products labelled with HMI 100, HMI 200 or HMI 300 and all other than CIM 250 or CIM 270, incl. none.
- Radio Equipment Regulations 2017.  
Standards used: BS EN 61800-5-1:2007  
BS EN 61800-3:2004+A1:2012, BS EN 62479:2010,  
BS EN 301 489-1 V2.2.0, BS EN 301 489-17 V2.2.1,  
BS EN 300 328 V2.1.1  
Applicable for products labelled with HMI 101, HMI 201 or HMI 301 and CIM 250 or CIM 270.
- Radio Equipment Regulations 2017.  
Standards used: BS EN 61800-5-1:2007  
BS EN 61800-3:2004+A1:2012, BS EN 62479:2010,  
BS EN 301 489-1 V2.2.1, BS EN 301 489-52 V1.1.0,  
BS EN 301 511 V12.5.1  
Applicable for products labelled with HMI 101, HMI 201 or HMI 301.
- Electrical Equipment (Safety) Regulations 2016.  
Standard used: BS EN 61800-5-1:2007
- Electromagnetic Compatibility Regulations 2016.  
Standard used: BS EN 61800-3:2004+A1:2012
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2019.  
Standard used: BS EN 50581:2012

These motors must not be put into service until the machinery into which they are to be incorporated has been declared in conformity with the relevant directives.

This UK declaration of conformity is only valid when accompanying Grundfos instructions.

UK Importer: Grundfos Pumps Ltd. Grovebury Road, Leighton Buzzard, LU7 4TL.

Bjerringbro, January 1, 2021



Dorte Jepsen  
Senior Manager  
Grundfos Holding A/S  
Poul Due Jensens Vej 7  
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Manufacturer and person empowered to sign the UK declaration of conformity.

10000337399

## UK declaration of conformity

We, Grundfos, declare under our sole responsibility that the products to which the declaration below relates, is in conformity with UK regulations, standards and specifications to which conformity is declared, as listed below:

Valid for Grundfos products:

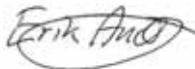
CRE, CREC, CRIE, CRIEC, CRNE, CRNEC, CRTE, SPKE, MTRE, MTREC, CME, CMEC

- Supply of Machinery (Safety) Regulations 2008.  
Standard used: BS EN 809:1998 + A1:2009.
- The Ecodesign for Energy-Related Products and Energy Information Regulations 2019.  
Water pumps:  
Regulation (EU) No 547/2012.  
Applies only to water pumps marked with the minimum efficiency index MEI. See pump nameplate.
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2019.  
Standard used: BS EN IEC 63000:2018.

This UK declaration of conformity is only valid when accompanying Grundfos instructions.

UK importer: Grundfos Pumps Ltd. Grovebury Road, Leighton Buzzard, LU7 4TL.

Bjerringbro October 5, 2020



Erik Andersen  
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Addresses Revised 09.09.2020

**99955183** 01.2021

ECM: 1304647

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