Hydro Multi-E

Systems with 2 to 4 CRE, CRIE or 2 to 3 CME pumps

Installation and operating instructions

Hydro Multi-E
Installation and operating instructions
Safety instructions (all available languages)
http://net.grundfos.com/qr/i/98491894

GRUNDFOS

Hydro Multi-E

English (GB)
Installation and operating instructions 4

Original installation and operating instructions

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1. General information

Read this document before you install the system. 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 Hygiene

Grundfos systems are functionally tested and may therefore contain small amounts of residual water. Contaminated drinking water can endanger health, so before using the system, it must be rinsed or flushed thoroughly. This also applies if the system is not used for a longer period.

Rinsing and flushing must always be done in accordance with local regulations and practices.

1.4 Target group

These installation and operating instructions are intended for professional installers and for the operators of the system.

We recommend that installation be carried out by skilled persons with technical qualifications required by the specific legislation in force.

2. System introduction

2.1 System description

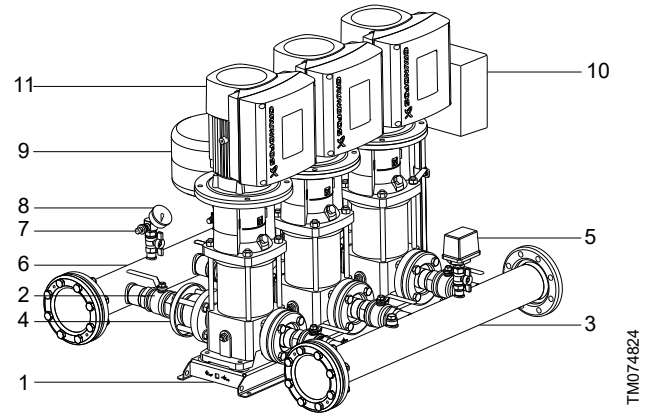
The system incorporates Grundfos CRE, CRIE, CME-A or CME-I pumps with integrated frequency-controlled single- or three-phase MGE motors and a breaker cabinet.

The system adjusts its performance to the demand by cutting the required number of pumps in or out and through parallel control of the pumps in operation.

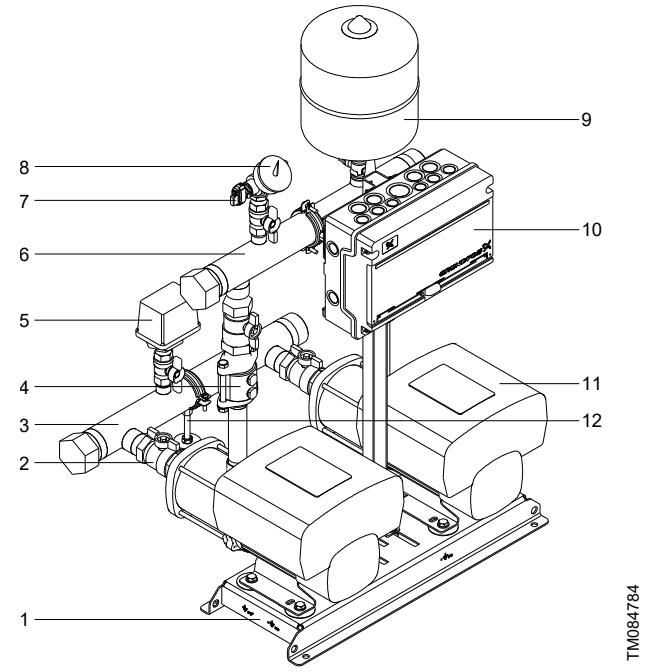
2.2 Intended use

The system is a range of factory-assembled systems ready for installation and operation.

The system maintains a constant pressure through continuous variable adjustment of the speed of the connected pumps.



System with CRE, CRIE pumps



System with CME pumps

Pos.	Description
1	Base frame
2	Isolating valve
3	Inlet manifold
4	Non-return valve
5	Pressure switch
6	Outlet manifold
7	Outlet-pressure sensor
8	Pressure gauge
9	Diaphragm tank
10	Breaker cabinet
11	Pump
12	Support foot

The breaker cabinet incorporates a main switch and circuit breakers.

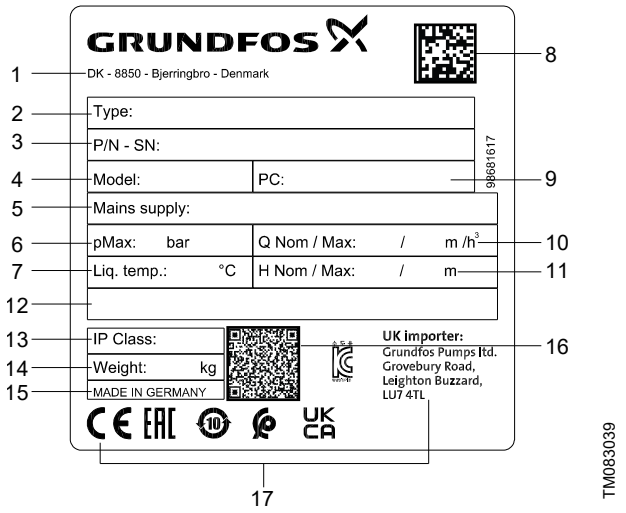
2.3 Applications

The system is designed for pressure boosting of clean water in places such as:

- hotels
- hospitals
- schools
- office buildings
- industry
- irrigation
- wash and clean
- apartment buildings
- blocks of flats.

2.4 Identification

2.4.1 Nameplate



Nameplate example

Pos.	Description
1	Company address
2	System type
3	System number and serial number
4	System model
5	Mains supply
6	Max. operating pressure
7	Liquid temperature
8	Data matrix application identifier
9	Production code
10	Nominal flow rate and max. flow rate
11	Nominal head and max. head
12	Technical documents
13	IP class
14	Weight
15	Country of origin
16	QR code
17	Marks of approval

2.4.2 Type key

Example: Hydro Multi-E 2 CRE 15-3 U7 A-A-A-A-ABC

Code	Explanation		Designation
Hydro Multi			System name
-E	E: All pumps with E-motor		System type
2			Number of main pumps
CRE 15-3			Pump type
U7	U1: 3 × 380-415 V, N, PE, 50/60 Hz U2: 3 × 380-415 V, PE, 50/60 Hz U7: 1 × 200-240 V, PE, 50/60 Hz U8: 1 × 200-240 V, N, PE, 50/60 Hz UJ: 1 × 208-230 V, PE, 60Hz UK: 3 × 208-230 V, PE, 60Hz UL: 3 × 460-480 V, PE, 60Hz UX: Customized variant (special voltage rating)		Voltage code
A-	A: Systems with the breaker cabinet mounted on the system (right side) B: System with the wall-mounted breaker cabinet and 5 m cable C: Systems with the breaker cabinet mounted on the system (left side) O: Other control panel X: Customized variant		Design
A-	A: E		Starting method
A-	A: Stainless steel manifold and base frame(s), with standard valves B: Stainless steel manifold, base frame(s) and valves C: Galvanized steel manifold and base frame(s), with standard valves (for CME-A pumps) G: Galvanized steel manifold and base frame(s), with standard valves (for CRIE, CME-I pumps) H: Black painted carbon steel manifold and base frame, with standard valves I: Stainless steel manifold, black painted base frame(s), with standard valves J: Black painted mild steel manifold and base frame(s), with standard valves P: Stainless steel manifold, galvanized steel base frame, with standard valves X: Customized material combination		Material combination
A-	A: International range B: UK range C: Indian range E: Italian range F: French range G: Chinese range H: Korean range	I: APAC range J: Australian range K: Brazil range N: Dutch range P: Polish range U: US range Z: UAE range	Product range
ABC	A: Standard hydraulic C: Outlet sensor on each pump D: Sensor as dry-running protection E: No dry-running protection F: Level switch for dry-running protection G: CIM module included K: No inlet manifold	L: Non-return valve on the inlet side M: Pressure gauge on the inlet side O: PN 25 pressure rating S: Customized variant T: Certificate U: Undersized motors X: More than three options	Options

2.4.3 Identification of the operating panel

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

Grundfos GO

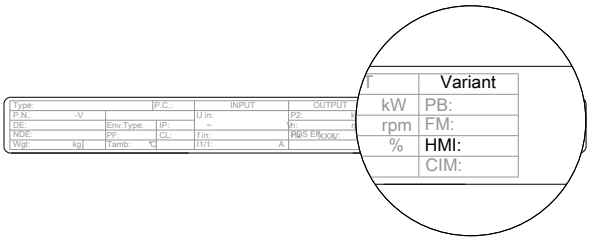
You can identify the operating panel in the **Fitted modules** menu under **Status**.

Motor display

For motors fitted with the HMI 300 or 301 operating panel, you can identify the operating panel in the **Fitted modules** menu under **Status**.

Motor nameplate

You can identify the operating panel with the data on the motor nameplate.



TM082852

Operating panel variants:

- HMI 200
- HMI 201 [1)]
- HMI 300
- HMI 301 [1)].

1) For motors without a radio module.

2.4.4 Identification of the functional module

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

Grundfos GO

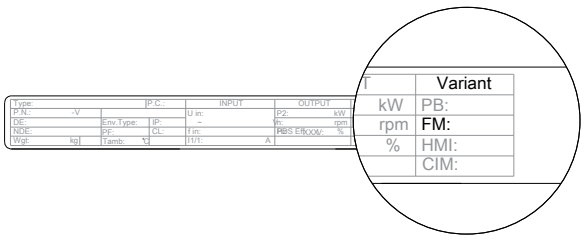
You can identify the functional module in the **Fitted modules** menu under **Status**.

Motor display

For motors fitted with the HMI 300 or 301 operating panel, you can identify the functional module in the **Fitted modules** menu under **Status**.

Motor nameplate

You can identify the fitted module with the data on the motor nameplate.



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Functional module variants:

- FM300
- FM310
- FM311 [2)].

2) Without Bluetooth (BLE).

3. Receiving the system

3.1 Transporting the system

Depending on the size, the system is supplied in a wooden cage, a closed wooden box, wrapped on a pallet or cardboard box designed for transport by a forklift truck or a similar vehicle.

3.2 Inspecting the system

Upon receiving the system, make sure that the delivery matches the order, all components are supplied and the packaging is intact.

3.3 Scope of delivery

The box contains the following:

- 1 Hydro Multi-E system
- installation and operating instructions for the system
- installation and operating instructions for the pump
- a quick guide for the system
- wiring diagrams for the breaker cabinet.

3.4 Handling and lifting the system

Only lift the system with the manifolds mounted to prevent the base frame from bending if the weight of the pumps are too high.

DANGER
Overhead load
Death or serious personal injury
- Do not use the eyebolts of the motors when you lift the system.
- Do not lift the system by the manifolds.

DANGER
Fall hazard
Death or serious personal injury
- Do not stand on the manifolds.

WARNING
Overhead load
Death or serious personal injury
- Do not stand under or close to the load that is lifted.
- Comply with local regulations when you lift or handle the system.

WARNING
Crushing of feet
Death or serious personal injury
- Before you lift the system, make sure that the lifting equipment is capable of handling the load, as listed on the nameplate and packaging label.

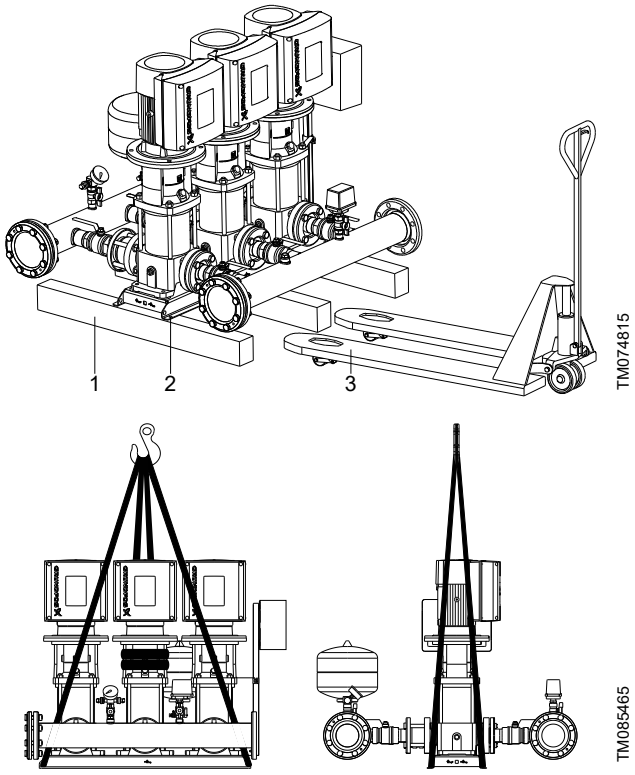
CAUTION
Overhead load
Minor or moderate personal injury
- Use appropriate lifting equipment when you place the system.

When you lift the system, the lifting point must always be above the center of gravity to ensure stability.

Systems with a base frame made of bent steel plate are designed with holes in the base frame for lifting.

- Use certified lifting gear suitable for the load. Each lifting strap must be at least 3 m long. Straps must be placed to ensure vertical pull to the system.
- Wind the safety strap around the pump head more than one time if there are no eyebolts or brackets on the pump.
- Keep the safety strap tight.
- Use shackles mounted in the holes for lifting the systems with a base frame made of bent steel plate.

If the system is secured with transport straps, do not remove the straps until the system is installed.



Lifting a system with a base frame made of bent steel plate

Pos.	Description
1	Wooden beam (included)
2	Wooden screws (included)
3	Forklift

4. Installation requirements

4.1 Location

The system is designed only for indoor installation and must not be exposed to direct sunlight.

- Install the system in a well-ventilated room to ensure sufficient cooling of the control panel and pumps.
- Install the system with a one-meter clearance on all sides for easy inspection and removal.

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

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

Related information

4.3 Motor cooling

4.2 Network interfaces and services

The system exposes the following network interfaces in the factory default state:

Interface	Description
RJ45	Wired Ethernet connectivity

The system exposes the following services over network interfaces in the factory default state:

Interface	Exposes service	Description
RJ45	GENIpro TCP	It is used for connecting the product to a service tool on an engineering workstation. Pairing is required before communication can take place. The GENIpro TCP pairing state is persistent.

4.3 Motor cooling

Observe the following to ensure adequate cooling of the motor and electronics.

- When installing the motor, make sure that the distance between the end of the fan cover and the wall or another fixed object is at least 50 mm (2 inches).
- Make sure that the ambient temperature must not exceed 40 °C.
- Keep cooling fins and fan blades clean.

5. Installing the system

WARNING
Crushing
Death or serious personal injury

- Use professional installation tools when you move or lift the system or its components.
- Use safety equipment when you mount the base frame.
- Use the supplied wooden beams to support the system when you mount the vibration dampers.
- Only trained persons can carry out the installation.

CAUTION
Overhead load
Minor or moderate personal injury

- Use appropriate lifting equipment when you place the system.

CAUTION
Crushing of feet
Minor or moderate personal injury

- Use safety equipment when you install the pipes and the tank.

CAUTION
Sharp element
Minor or moderate personal injury

- Wear safety gloves.

5.1 Mechanical installation

5.1.1 Foundation

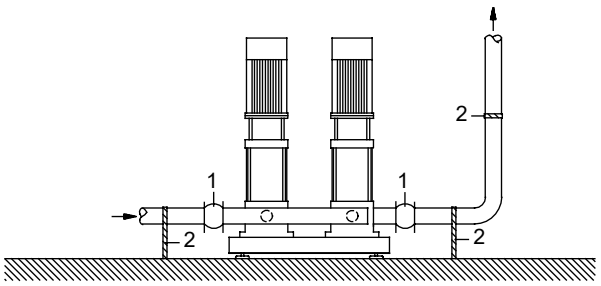
Position the system on an even and solid surface, such as a concrete floor or foundation. If the system does not have vibration dampers, secure it to the floor or foundation with bolts.

5.1.2 Pipework

Arrows on the pump base show the direction of the water flow through the pump.

The pipes connected to the system must be of adequate size. Fit expansion joints in the inlet and outlet pipes to avoid resonance.

1. Connect the pipes to the manifolds of the system.
   The manifold has a screw cap at one end. If this end is to be used, remove the screw cap, apply sealing compound to the other end of the manifold, and fit the screw cap. Fit a blanking flange with a gasket on flanged manifolds.
2. Fasten all screws and bolts before starting the pump.
   If systems are installed in blocks of flats or the first consumer on the line is close to the system, we recommend that you fit expansion joints on the inlet and outlet pipes to prevent vibration from being transmitted through the pipes.
3. Fasten the pipes to parts of the building to ensure that the pipes cannot move or be twisted.



Installation example with expansion joints and pipe supports

Pos.	Description
1	Expansion joint
2	Pipe support (and recommended location for isolating valve)

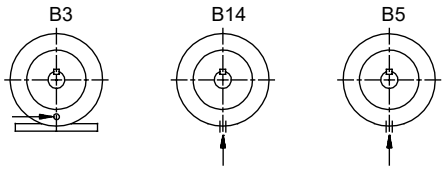
The expansion joints and pipe supports shown in above figure are not included in the standard system.

5.1.3 Drain holes

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

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

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



5.2 Electrical connection

DANGER
Electric shock
Death or serious personal injury

- Disconnect the power supply and make sure that the power supply cannot be accidentally switched on.
- Make sure that the wires connected to the connection groups are separated from each other by reinforced insulation along their entire lengths.

WARNING
Electric shock
Death or serious personal injury

- All electrical connections must be carried out by qualified persons and according to local regulations.

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

If the power supply cable is damaged, it must be replaced by the manufacturer, the manufacturer's service partner or a person with similar qualifications.

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

Secure and install the system in a place permanently. Furthermore, connect the system permanently to the power supply.

Carry out the earth connection with duplicate conductors.

If the system cannot be installed where the power disconnecting device is located at least 0.6 m above the service level as specified in EN 60204-1, paragraph 5.3.4, install the system with an external supply disconnecting device made according to EN 60204-1, paragraph 5.3.2. The system must be provided with a device that can lock it in OFF (isolated) position.

5.2.1 Electrical supply system

DANGER
Electric shock
Death or serious personal injury
- Connect the system 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.

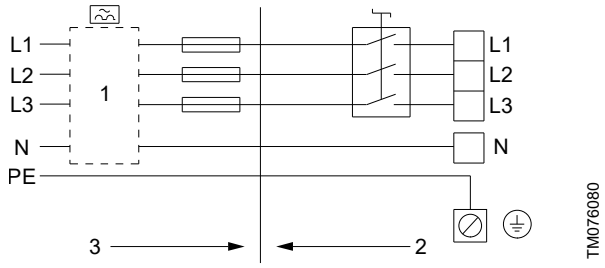
Check that the supply voltage and frequency correspond to the values stated on the nameplate.

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

The internal EMC filter remains connected, and subsequently no reduced leakage current variant is available.

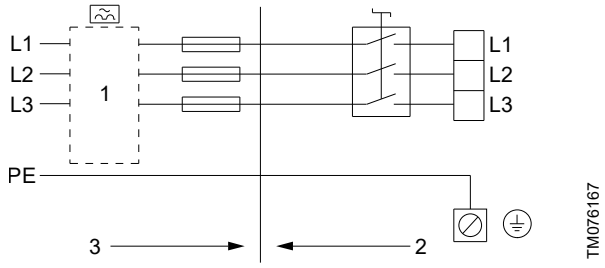
The wires in the breaker cabinet must be as short as possible. However, the separate earth conductor is an exception. Its length must be long enough so that it is the last one to be disconnected in case the cable is inadvertently pulled out of the cable entry.

For the maximum backup fuse, see section Supply voltage.



Example of a mains-connected system with backup fuses and additional protection (applies only for systems with single-phase motors)

Pos.	Description
1	ELCB (GFCI)
2	Breaker cabinet
3	Installation in building



Example of a mains-connected system with backup fuses and additional protection (applies only for systems with three-phase motors)

Pos.	Description
1	ELCB (GFCI)
2	Breaker cabinet
3	Installation in building

Related information

13.2 Supply voltage

5.2.2 Motor protection

All models (including H and I): The motor incorporates thermal protection against slow overloading and blocking. No external motor protection is required.

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.

The motor is also protected against power supply voltage transients in accordance with EN 61800-3.

5.2.3 Insulation resistance

Do not measure the insulation resistance of motor windings or an installation incorporating motors with integrated frequency converters using high-voltage megging equipment, as this may damage the built-in electronics.

5.2.4 Additional protection

Systems with single-phase motors

If the system is connected to an electric installation where an earth leakage circuit breaker (ELCB) or ground fault circuit interrupter (GFCI) is used as additional protection, this circuit breaker or interrupter must be marked with the following symbol:

	ELCB (GFCI)	RDC Type A

When an earth leakage circuit breaker or ground fault circuit interrupter is selected, the total leakage current of all the electrical equipment in the installation must be taken into account.

The leakage current of the system can be found in section Leakage current.

Systems with three-phase motors

If the system is connected to an electric installation where an earth leakage circuit breaker (ELCB) or ground fault circuit interrupter (GFCI) is used as additional protection, this circuit breaker or interrupter must have the following capabilities:

- It must be suitable for handling leakage currents and cutting-in with short pulse-shaped leakage.
- It must trip in the event of alternating fault currents and fault currents with DC content, such as pulsating DC and smooth DC fault currents.

You must use a type B earth leakage circuit breaker or a ground fault circuit interrupter for the system.

This circuit breaker or interrupter must be marked with the following symbols:

		ELCB (GFCI)	RDC Type B

The leakage current of the system can be found in section Leakage current.

Protection against phase unbalance

Phase unbalance in the power supply must be minimised.

The three-phase motor must be connected to a power supply that meets the quality requirements specified in IEC 60146-1-1, class C. This also ensures long life of the components.

Related information

13.3 Leakage current

5.3 Functional modules

The functional modules are add-on boards that contain various types of input and output terminals for the user to connect different types of sensors, switches and relays.

The system can only contain one functional module at the time.

The following functional modules are available:

- FM300
- FM310
- FM311 [3].

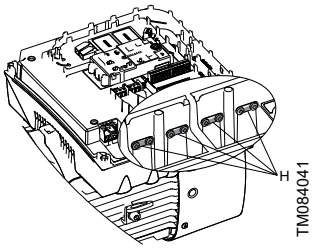
3) Without Bluetooth (BLE).

The selection of module depends on the application and the required number of inputs and outputs.

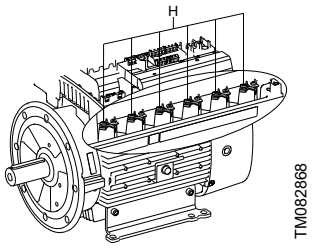
Cable connections

The screen of signal cables and bus connection cables must be grounded via one of the earth clamps (H).

See the section on signal cables and bus connection cables.



Model J



Model K

Related information

2.4.4 Identification of the functional module

5.5 Signal cables

5.3.1 Functional module, FM300

Inputs and outputs

The module has these connections:

- three analog inputs
- one analog output
- two dedicated digital inputs
- two configurable digital inputs or open-collector outputs
- Grundfos Digital Sensor input and output
- two Pt100/1000 inputs
- two LiqTec sensor inputs
- two signal relay outputs
- GENIbus connection.

Signal relay 1

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

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

Signal relay 2

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

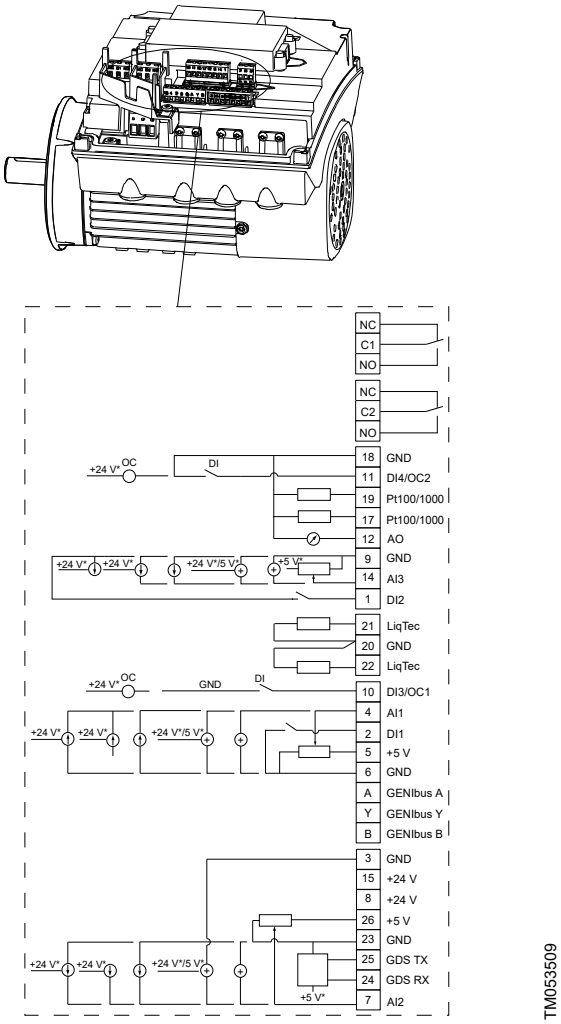
Connection terminals for inputs and outputs

DANGER
Electric shock
Death or serious personal injury
- Make sure that the wires to be connected to the relays below are separated from each other by reinforced insulation along their entire lengths.

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

Cables for the relays must be double insulated or reinforced and rated at least 250V/2A.

The Ethernet cable must be rated at least Cat5e/Cat6 with screening.



* If you use an external supply source, it must be connected 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	Signal ground
11	DI4/OC2	Digital input/output, configurable Open collector: Maximum 24 V resistive or inductive
19	Pt100/1000 input 2	Pt100/1000 sensor input
17	Pt100/1000 input 1	Pt100/1000 sensor input

Terminal	Type	Function
12	AO	Analog output: • 0-20 mA or 4-20 mA • 0-10 V.
9	GND	Signal ground
14	AI3	Analog input: • 0-20 mA or 4-20 mA • 0-10 V
1	DI2	Digital input, configurable
21	LiqTec sensor input 1	LiqTec sensor input (white conductor)
20	GND	Signal ground (brown and black conductors)
22	LiqTec sensor input 2	LiqTec sensor input (blue conductor)
10	DI3/OC1	Digital input/output, configurable Open collector: Maximum 24 V resistive or inductive
4	AI1	Analog input: • 0-20 mA or 4-20 mA • 0.5 - 3.5 V, 0-5 V or 0-10 V.
2	DI1	Digital input, configurable Digital input 1 is factory-set to be the start-stop input for the situation when an open circuit results in a stop. A jumper is factory-fitted between terminals 2 and 6. Remove the jumper if you want to use digital input 1 for external start-stop or any other external function.
5	+5 V	Supply to potentiometer and sensor
6	GND	Signal ground
A	GENIbus, A	GENIbus, A (+)
Y	GENIbus, Y	GENIbus, GND
B	GENIbus, B	GENIbus, B (-)
3	GND	Signal ground
15	+24 V	Supply
8	+24 V	Supply
26	+5 V	Supply to potentiometer and sensor
23	GND	Signal ground
25	GDS TX	Grundfos Digital Sensor output
24	GDS RX	Grundfos Digital Sensor input
7	AI2	Analog input: • 0-20 mA or 4-20 mA • 0.5 - 3.5 V, 0-5 V or 0-10 V.

5.3.2 Functional module, FM310 and FM311

Inputs and outputs

The FM311 functional module does not include Bluetooth connection.

The module has these connections:

- three analog inputs
- one analog output
- two dedicated digital inputs
- two configurable digital inputs or open-collector outputs
- Grundfos Digital Sensor input and output
- two Pt100/1000 inputs
- two LiqTec sensor inputs
- two signal relay outputs
- GENIbus/Modbus connection
- two Safe Torque Off (STO) inputs
- Ethernet connection
- Bluetooth (BLE) connection [4].

4) FM311 is without Bluetooth.

Signal relay 1

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

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

Signal relay 2

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

Connection terminals for inputs and outputs

DANGER
Electric shock
Death or serious personal injury

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

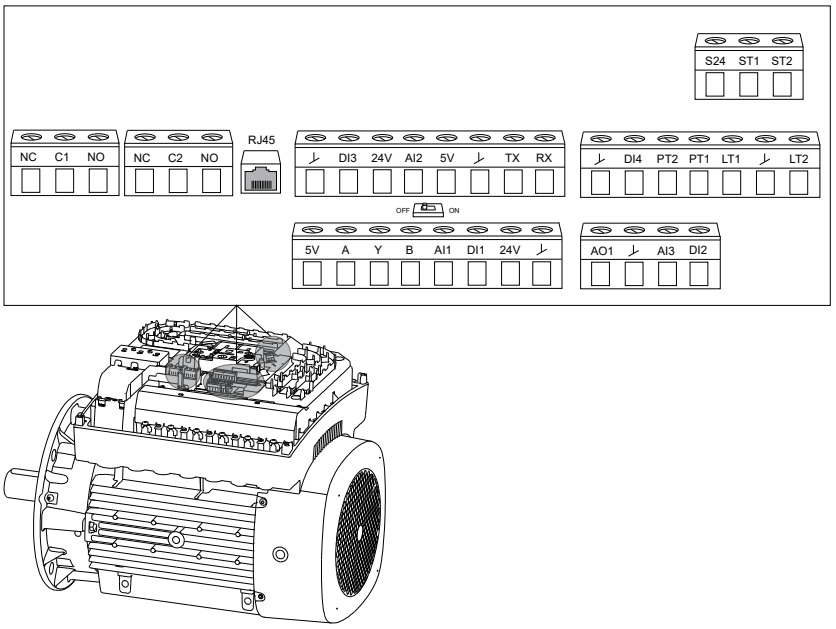
Digital input 1 is factory-set to be the start-stop input when open circuit results in stop. A jumper is factory-fitted between terminals 2 and 6. Remove the jumper if digital input 1 is to be used as external start-stop or any other external function.

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

Cables for the relays must be double insulated or reinforced and rated at least 250V/2A.

The Ethernet cable must be rated at least Cat5e/Cat6 with screening.

The 250 V contacts of the alarm relay (NC/C1/NO) on the functional modules FM310 and FM311 must not be connected directly to the mains supply, but energised by an isolated power supply or transformer with galvanic isolation.



TM082862

Terminal	Type	Function
NC	Normally closed contact	Signal relay 1: LIVE or SELV
C1	Common	
NO	Normally open contact	
NC	Normally closed contact	Signal relay 2: SELV only
C2	Common	
NO	Normally open contact	
RJ45	Ethernet	Ethernet communication
GND	GND	Signal ground
DI3	DI3/OC1	Digital input/output, configurable Open collector: Maximum 24 V resistive or inductive
24V	+24 V	Power supply
AI2	AI2	Analog input: • 0-20 mA or 4-20 mA • 0.5 - 3.5 V, 0-5 V or 0-10 V.
5V	+5 V	Power supply to a potentiometer or sensor
GND	GND	Signal ground
TX	GDS TX	Grundfos Digital Sensor output
RX	GDS RX	Grundfos Digital Sensor input
GND	GND	Signal ground
DI4	DI4/OC2	Digital input/output, configurable Open collector: Maximum 24 V resistive or inductive
PT2	Pt100/1000 input 2	Pt100/1000 sensor input 2
PT1	Pt100/1000 input 1	Pt100/1000 sensor input 1
LT1	LiqTec sensor input 1	LiqTec sensor input 1 White conductor
GND	GND	Signal ground Brown and black conductors
LT2	LiqTec sensor input 2	LiqTec sensor input 2 Blue conductor
5V	+5 V	Power supply to a potentiometer or sensor
A	GENIbus, A	GENIbus, A (+) / Modbus, D1 (+)
Y	GENIbus, Y	GENIbus, GND / Modbus, GND
B	GENIbus, B	GENIbus, B (-) / Modbus, D0 (-)

Terminal	Type	Function
AI1	AI1	Analog input: • 0-20 mA or 4-20 mA • 0.5 - 3.5 V, 0-5 V or 0-10 V.
DI1	DI1	Digital input, configurable Digital input 1 is factory-set to be start-stop input for the situation when an open circuit results in a stop. A jumper is factory-fitted between terminals DI1 and GND. Remove the jumper if you want to use digital input 1 for external start-stop or any other external function.
24V	+24 V	Power supply
GND	GND	Signal ground
AO1	AO	Analog output: • 0-20 mA or 4-20 mA • 0-10 V.
GND	GND	Signal ground
AI3	AI3	Analog input: • 0-20 mA or 4-20 mA • 0.5 - 3.5 V, 0-5 V or 0-10 V.
DI2	DI2	Digital input, configurable
S24	+24 V (STO)	Power supply to the Safe Torque Off inputs
ST1	STO1	Safe Torque Off - Input 1
ST2	STO2	Safe Torque Off - Input 2

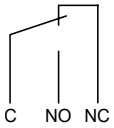
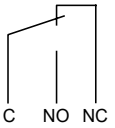
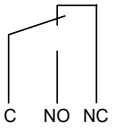
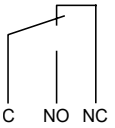
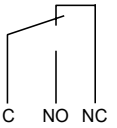
5.4 Signal relays

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

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

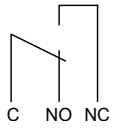
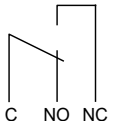
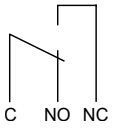
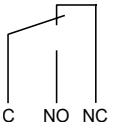
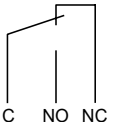
Grundfos Eye is off

The power is off.

Operation	Pump running	Ready	Alarm	Warning	Operating mode
					-

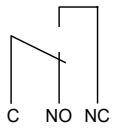
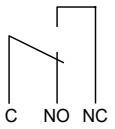
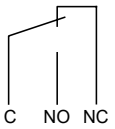
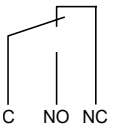
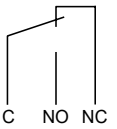
Grundfos Eye is rotating green

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

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

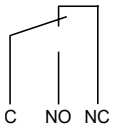
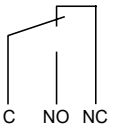
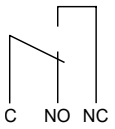
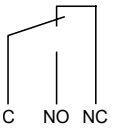
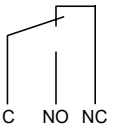
Grundfos Eye is rotating green

The pump runs in **Manual** mode.

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

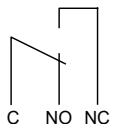
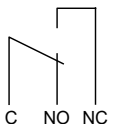
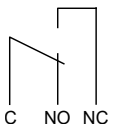
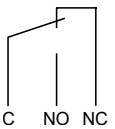
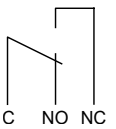
Grundfos Eye is permanently green

The pump is ready for operation but is not running.

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

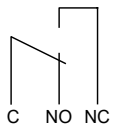
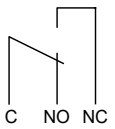
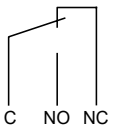
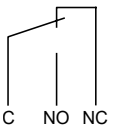
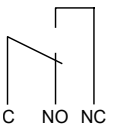
Grundfos Eye is rotating yellow

Warning, but the pump is running.

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

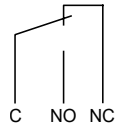
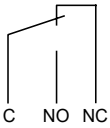
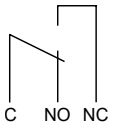
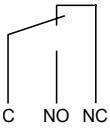
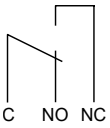
Grundfos Eye is rotating yellow

Warning, but the pump is running.

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

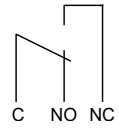
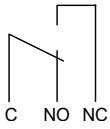
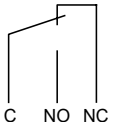
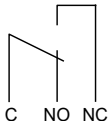
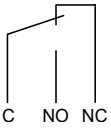
Grundfos Eye is permanently yellow

Warning, but the pump is stopped via a **Stop** command.

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

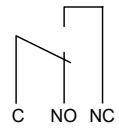
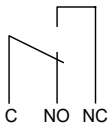
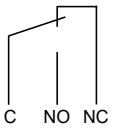
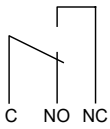
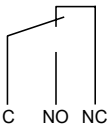
Grundfos Eye is rotating red

Alarm, but the pump is running.

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

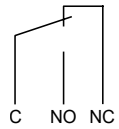
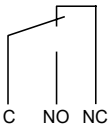
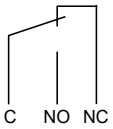
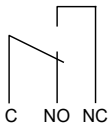
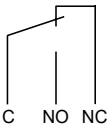
Grundfos Eye is rotating red

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**

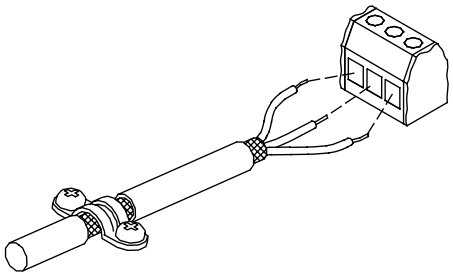
5.5 Signal cables

Use screened cables with a cross-sectional area from 0.5 mm^2 to 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.

5.5.1 Connecting signal cables

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



TM021325

2. Connect the signal cables to the terminals.
3. Depending on the model, tighten one or two earth clamp screws.

   Always tighten screws for frame connections, whether a cable is fitted or not.

5.6 Installing a communication interface module

Always install the CIM module in pump 1. If there is a need for redundant communication, an additional CIM module can be installed in pump 2.

When using multiple CIM modules, make sure to send the same command to both CIM modules at the same time to avoid conflicts between CIM modules.

See the installation and operating instructions of the pump for installation.

5.6.1 Communication interface modules and protocols

The following communication interface modules can be used for the system. CIM modules are optional equipment which can be ordered separately.

CIM	Protocol	Part number
CIM 110	LONWorks	96824798
CIM 150	PROFIBUS DP	96824793
CIM 200	Modbus RTU	96824796
CIM 290-MA	LPWAN GiC	92865300
CIM 300	BACnet MS/TP	96893770
CIM 500	PROFINET IO, Modbus TCP, Ethernet/IP, BACnet IP	98301408
CIM 550	Ethernet GiC	92546689

6. Starting up the system

DANGER
Electric shock
Death or serious personal injury

- Disconnect the power supply and wait at least five minutes before you make any connections in the breaker cabinet or control panel.
- Before you start the system, make sure that the power supply is disconnected and cannot be accidentally switched on.
- Tighten the wire connections.

DANGER
Electric shock
Death or serious personal injury

- Connect the motor to protective earth and provide protection against indirect contact according to local regulations.
- Before you start the system, make sure that there is no short-circuit.

WARNING
Contaminated drinking water
Death or serious personal injury

- Flush the system before you start it in compliance with local legislation.

WARNING
High temperature
Death or serious personal injury

- Before you operate, make sure that the system can handle the load specified on the nameplate.

CAUTION
Hot surface
Minor or moderate personal injury

- Make sure that the escaping hot liquid does not cause injury to persons or damage to the equipment.
- Do not touch wet components.

CAUTION
High noise level
Minor or moderate personal injury

- Use ear protection.

CAUTION
Sharp element
Minor or moderate personal injury

- Wear safety gloves.

Make sure that the the main switch and the circuit breakers are switched off.

Do not start the pumps until they are filled with liquid.

Systems with CME pumps require a positive inlet pressure during startup and operation. The following startup procedure therefore only applies to systems with CRE or CRIE pumps.

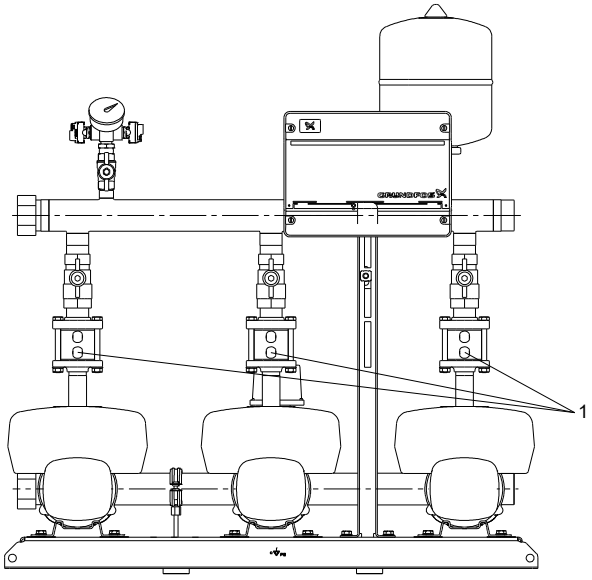
Make sure that the dry-running protection device is appropriate for no or low inlet pressure.

After you complete the mechanical and electrical installation described in section Installing the system, proceed as follows:

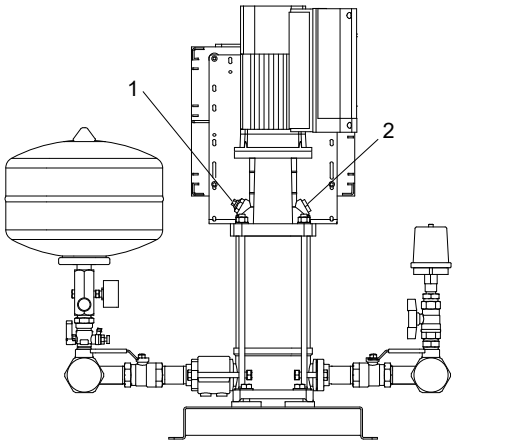
1. Check that the system corresponds to the order and that no single parts are damaged.
2. Check that the precharge pressure in the diaphragm tank is 0.7 times the required outlet pressure (setpoint).

Measure the precharge pressure while the system is pressureless.

3. Connect water and power supplies to the system.
4. Open all pump inlet valves.
5. Close all pump outlet valves, and prime all pumps and the inlet pipe.



Position of vent screw in systems with CME pumps



Position of vent screw and filling screw in systems with CRE pumps

Pos.	Description
1	Vent screw
2	Filling screw

6. Switch on the main switch.
7. Start pump 1 by pressing the start/stop button on the pump operating panel.
8. Vent pump 1 using the vent screw.
9. Gradually open the outlet valve and maintain a small flow until all trapped air has been expelled from the pump.
10. Repeat steps 7 and 9 for the other pumps in the system.
11. Set the desired outlet pressure.

If you change the outlet pressure, change the diaphragm tank precharge pressure accordingly.

12. Check that the pumps are cutting in and out, thus adjusting the performance to the demand.

The system is now in automatic mode and ready for operation. The standard settings can be changed using Grundfos GO, see sections Multi-pump function or Control functions.

Related information

5. *Installing the system*
7. *Control functions*
8. *Multi-pump function*

7. Control functions

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

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

You can change the settings by means of the following user interfaces:

- HMI operating panel
- Grundfos GO
- Grundfos GO Link.

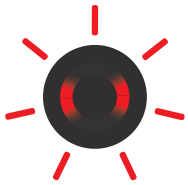
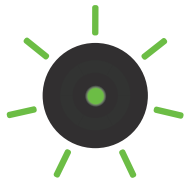
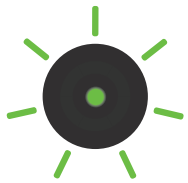
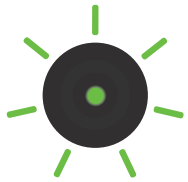
All settings are saved if the power supply is switched off.

For the control functions of user interfaces, see the installation and operating instructions of the pump.

7.1 Grundfos Eye

Grundfos Eye is an indicator light on the operating panel. It indicates the operating condition of the motor.

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 in the same direction as the motor when seen from the non-drive end.	**Power on** The motor is running.
	Two opposite green indicator lights are permanently on.	**Power on** The motor is not running.
	One yellow indicator light is rotating in the same direction as the motor when seen from the non-drive end.	**Warning** The motor is running with a warning.
	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.
	The green indicator light in the middle flashes quickly four times.	Grundfos Eye flashes four times when you press the Grundfos Eye symbol next to the motor name in Grundfos GO.
	The green indicator light in the middle is flashing continuously.	You have selected the motor in 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 Grundfos GO or exchanging data with Grundfos GO.
	The green indicator light in the middle is permanently on.	The motor is connected to Grundfos GO.

8. Multi-pump function

Systems with two or more outlet-pressure sensors

If two or more pumps in the system are configured with an outlet-pressure sensor (standard option), they can all function as master pumps. Normally, the pump with the lowest number is the master pump. At the factory, the master pump is marked with number 1.

If master pump 1 is switched off or stopped due to an alarm, one of the other master pumps will automatically take control of the system.

9. Setting the system

You can set control functions via Grundfos GO, Grundfos GO Link or the operating panel. The system is delivered from factory in constant pressure control mode. The system can be used in different control modes, with an additional sensor that complies to the control mode.

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

Function	Menu or function available for the pump	Menu or function available for the system
Control mode		●
Setpoint		●
Operating mode		●
Set manual speed	●	
Set user-defined speed	●	
Set the proportional pressure		●
Analog inputs	●	
Grundfos Direct Sensor	●	
Pt100/1000 inputs	●	
Digital inputs	●	
Digital inputs/outputs	●	
Signal relay (Relay outputs)	●	
Analog output	●	
Operating range	●	
External setpoint function	●	●
Predefined setpoints		●
Limit-exceeded function	●	●
LiqTec (LiqTec function)	●	
Stop function (Low-flow stop function)		●
Stop at min. speed		●
Pipe filling function		●
Pulse flowmeter (Pulse flowmeter setup)	●	●
Ramps	●	
Direction of rotation	●	
Standstill heating	●	
Alarm handling	●	
Motor bearing monitoring	●	
Service intervals	●	
Communication	●	
Date and time (Set date and time)	●	
Unit configuration (Units)	●	
Buttons on product (Enable/ disable settings)	●	
Delete history	●	
Define Home display	●	
Display settings	●	
Store settings (Store actual settings)	●	
Recall settings (Recall stored settings)	●	
Undo	●	
Pump name	●	
Connection code	●	
Run start-up guide	●	
Alarm log	●	●
Warning log	●	●
Assist	●	
Assisted pump setup	●	
Multi-pump function	●	●
Assisted fault advice	●	●

For detailed information on setting the system, see the installation and operating instructions of the pump.

9.1 Priority of settings

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

The priority of the settings appears from the table below.

Priority	Start/stop button	Grundfos GO 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 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**, that is selected with Grundfos GO or the operating panel.

10. Protective functions

Make sure that any protective function, for example dry-running protection or external start/stop that is detected via a digital input, is connected to and configured on all the pumps with an outlet-pressure sensor.

If an additional sensor is used, for example, a sensor with the limit-exceeded function or setpoint influence, this sensor must also be connected to all pumps with an outlet-pressure sensor. Alternatively, you can install an additional sensor for each pump with an outlet-pressure sensor.

10.1 Dry-running protection

The system must be protected against dry running.

Types of dry-running protection:

- A pressure switch or an inlet-pressure sensor is factory-fitted to the inlet manifold. See sections Pressure switch and Inlet pressure sensor.
- A level switch is fitted in a water tank (optional). See section Level switch.

Related information

10.1.1 Pressure switch

10.1.2 Level switch

10.1.3 Inlet-pressure sensor

10.1.1 Pressure switch

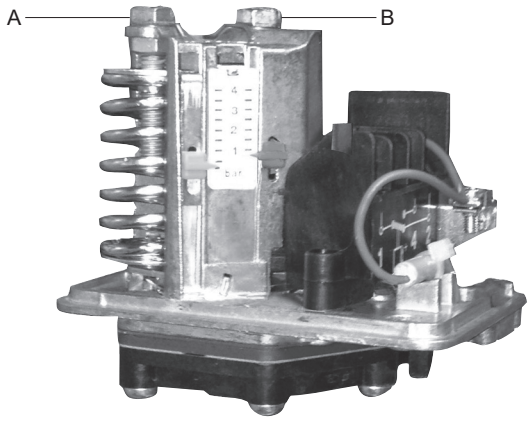
The system can be fitted with an adjustable pressure switch for dry-running protection. The pressure switch is fitted to the inlet manifold.

If the inlet pressure is below the lower switching point, the system cannot start.

If the pressure switch has stopped the system during operation due to insufficient inlet pressure, the inlet pressure must increase to a level higher than the upper switching point before the system can restart.

If necessary, adjust the lower switching point by turning screw A and adjust the upper switching point to a value higher than the lower switching point by turning screw B. See figure below.

Do not set the lower switching point to a value below the minimum inlet pressure. See section Minimum inlet pressure.



Adjustment of switching points

Pos.	Description
A	Low pressure switching point
B	High pressure switching point

Related information

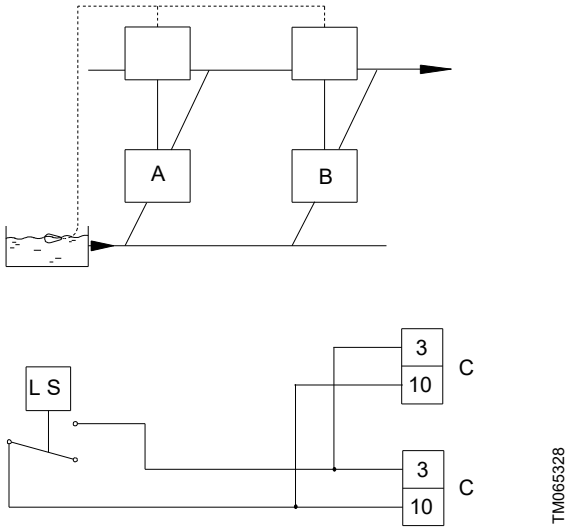
13.1.5 Minimum inlet pressure

10.1.2 Level switch

If there is no inlet pressure, the system can be optionally fitted with a level switch, either from factory or after delivery. The level switch can, for instance, monitor the water level in a tank connected to the inlet manifold. And the level switch must be connected to terminal 3 and 10 in all pumps. See section Functional modules.

Furthermore, the digital input must be configured with Grundfos GO to detect dry running.

The system starts up automatically if it is stopped due to dry running. It can be set to manual restart with Grundfos GO.



Level switch connected to each pump

Pos.	Description
A	Pump 1
B	Pump 2
C	3: GND (frame) 10: Digital input

Related information

5.3 Functional modules

10.1.3 Inlet-pressure sensor

The system can be fitted with one or two inlet-pressure sensors, either from factory or after delivery. The sensor can monitor the pressure in the inlet manifold and must be connected to one of the analog input. See section Functional modules.

The analog input is configured with Grundfos GO or via the HMI 300 and 301 operating panels. The limit-exceeded function can be configured to detect dry running. From factory the system is set to start automatically if it is stopped due to dry running. It can be changed to manual restart with Grundfos GO or via the HMI 300 and 301 operating panels.

Related information

5.3 Functional modules

11. Servicing the system

DANGER
Electric shock
Death or serious personal injury
- Before you maintain the system, make sure that the power supply is disconnected and cannot be accidentally switched on.

WARNING
Contaminated drinking water
Death or serious personal injury
- Flush the system after a standstill period in compliance with local legislation.

WARNING
Overhead load
Death or serious personal injury
- Wear a safety helmet.

CAUTION
Overhead load
Minor or moderate personal injury
- Use appropriate tools and lifting equipment for maintenance.

11.1 Maintaining the system

11.1.1 Pumps

Pump bearings and shaft seals do not require maintenance.

If pumps are to be drained for a long period of inactivity, remove one of the coupling guards to apply a few drops of silicone oil on the shaft between the pump head and the coupling. This will prevent the shaft seal faces from sticking.

11.1.2 Motors

Keep motor cooling fins and fan blades clean to ensure sufficient cooling of the motor and electronics.

Motors above 7.5 kW must be lubricated according to the recommended intervals and with correct type of bearing grease stated on the motor.

11.1.3 Breaker cabinet

The breaker cabinet does not require maintenance. Keep it clean and dry.

11.1.4 Service kits

See Grundfos Product Center at www.grundfos.com for service manuals.

11.2 Taking the system out of operation

DANGER
Electric shock
Death or serious personal injury
- Make sure that the power supply is disconnected and cannot be accidentally switched on.

Drain the system if you do not use it for a long time.

1. Switch off the main switch to take the system out of operation.
2. Switch off the corresponding motor protective circuit breaker and the automatic circuit breaker to take the individual pump out of operation.

11.2.1 Frost protection

If pumps are not used during periods of frost, they must be drained to avoid damage.

Drain the pump by loosening the vent screw in the pump head and removing the drain plug from the base.

Do not tighten the vent screw or refit the drain plug until the system is to be used again.

11.3 Startup the system after standstill

WARNING
Contaminated drinking water
Death or serious personal injury
- Flush the system after a standstill period in compliance with local legislation.

See section Starting up the system for further instructions.

Related information

6. Starting up the system

12. Fault finding

DANGER
Electric shock
Death or serious personal injury

- Switch off the power supply and wait at least five minutes before you make any connections in the breaker cabinet or control panel.
- Make sure that the power supply is disconnected and cannot be accidentally switched on.

12.1 The system does not run when started

The system does not run when started.

Cause	Remedy
The actual pressure is higher than or equal to the setpoint.	Wait until the pressure drops, or decrease the pressure on the outlet side of the system, and check if the system starts.
The power supply is disconnected.	Connect the power supply.
The circuit breakers have cut out.	Correct the fault and cut in the circuit breakers.
The internal motor protection is activated.	Contact Grundfos.
The circuit breaker is defective.	Replace the circuit breaker.
The motor is defective.	Repair or replace the motor.
Outlet-pressure sensor fault. • The outlet-pressure sensor is defective. • The cable is broken or short-circuited.	• Replace the outlet-pressure sensor. • Repair or replace the cable.

12.2 The system starts but stops immediately afterwards

The system starts but stops immediately afterwards. The operating pressure is not reached.

Cause	Remedy
Dry running or no inlet pressure.	Check the water supply to the system. When the inlet pressure is re-established, the pumps will restart after 15 seconds.

12.3 The system stops and cannot restart

The system stops and cannot restart.

Cause	Remedy
Outlet-pressure sensor fault. • The outlet-pressure sensor is defective. • The cable is broken or short-circuited.	• Replace the outlet-pressure sensor. Outlet-pressure sensors with 0-20 mA or 4-20 mA output signals are monitored by the system. • Repair or replace the cable.
Terminal box unit fault. • The power supply is disconnected on pump 1. • The terminal box is defective.	• Connect the power supply. • Replace the terminal box of pump 1. • Contact Grundfos.

12.4 Unstable water supply from the system

The water supply from the system is unstable (only applies to very low consumption).

Cause	Remedy
The inlet pressure is too low.	Check the inlet pipe and possible inlet strainer.
The inlet pipe or pumps are partly blocked by impurities.	Clean the inlet pipe or pumps.
The pumps suck air.	Check the inlet pipe for leakages.
The outlet-pressure sensor is defective.	Replace the outlet-pressure sensor.

12.5 Pumps are running but deliver no water

Pumps are running but deliver no water.

Cause	Remedy
The inlet pipe or pumps are blocked by impurities.	Clean the inlet pipe or pumps.
The non-return valve is blocked in the closed position.	Clean the non-return valve. The non-return valve must move freely.
The inlet pipe is leaky.	Check the inlet pipe for leakages.
Air in the inlet pipe or pumps.	Vent the pumps. Check the inlet pipe for leakages.

12.6 The system cannot reach the setpoint

The system cannot reach the setpoint.

Cause	Remedy
The cable is broken or short-circuited (GENIbus communication between pump 1 and pump 2 or 3).	Repair or replace the cable.
Pump 2 or 3 does not operate.	Connect the power supply to the pump and check the pump condition.

12.7 Leakage from a shaft seal

The shaft seal has leakage.

Cause	Remedy
The shaft seal is defective.	Replace the shaft seal.
The height adjustment of the pump shaft is inaccurate.	Re-adjust the shaft height.

12.8 There is noise when the pumps are operating

There is noise when the pumps are operating.

Cause	Remedy
The pumps are cavitating.	Clean the inlet pipe or pumps, and if necessary, the inlet strainer.
The pumps do not rotate freely (frictional resistance) due to inaccurate height of the pump shaft.	Re-adjust the shaft height. See the installation and operating instructions of the pump supplied with the system.

12.9 Very frequent starts and stops

The starts and stops of pumps are frequent.

Cause	Remedy
Wrong diaphragm tank precharge pressure.	Check the precharge pressure.
The difference between start and stop pressures is too small.	Increase the differential pressure setting on each pressure switch.
This situation only occurs in systems with emergency operation.	

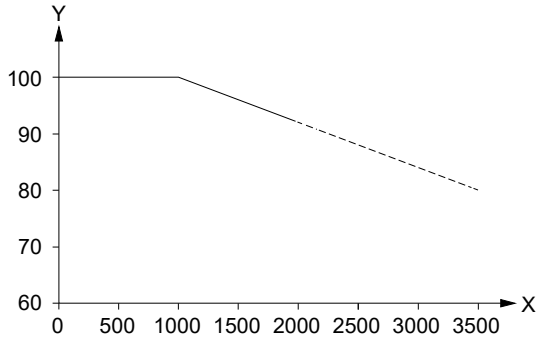
13. Technical data

13.1 Operating conditions

13.1.1 Installation altitude

Installation altitude is the height above sea level of the installation site. Motors installed below 1000 m above sea level can be loaded 100 %. The motors can be installed up to 3500 m above sea level.

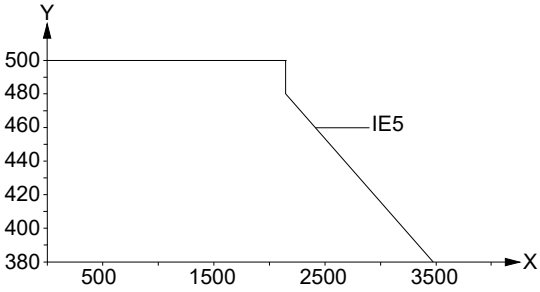
Motors installed more than 1000 m above sea level must not be fully loaded due to the low air density, which affects the cooling efficiency.



Motor output power in relation to altitude

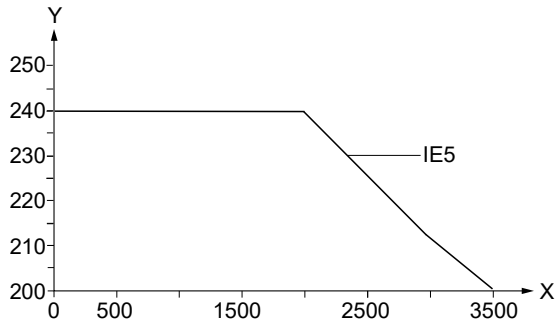
Pos.	Description
X	Altitude [m]
Y	P2 [%]

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



Supply voltage for three-phase motor in relation to altitude

Pos.	Description
X	Altitude [m]
Y	Supply voltage [V]



Supply voltage for single-phase motor in relation to altitude

Pos.	Description
X	Altitude [m]
Y	Supply voltage [V]

13.1.2 Temperature

Ambient temperature

- During storage and transportation: see the installation and operating instructions of the pump
- During operation: 0-40 °C

Liquid temperature

- 5-60 °C

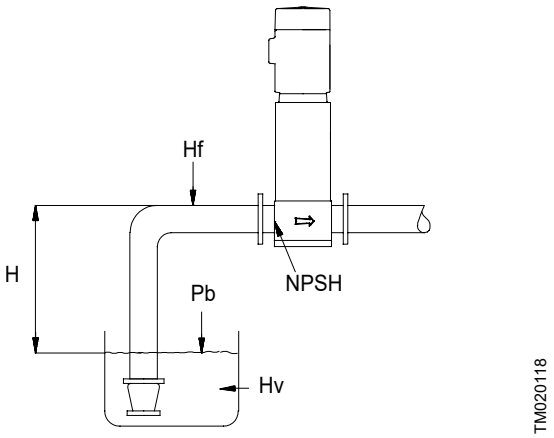
13.1.3 Humidity

Maximum 95 %.

13.1.4 Maximum operating pressure

See system nameplate.

13.1.5 Minimum inlet pressure



Parameters for the calculation of minimum inlet pressure

The minimum inlet pressure "H" in meters of head required to avoid cavitation in the pumps can be calculated as follows.

H	pb × 10.2 - NPSH - Hf - Hv - Hs
pb	Barometric pressure in bar. Barometric pressure can be set to 1 bar. In closed systems, p_b indicates the system pressure in bar.
NPSH	Net Positive Suction Head in meters of head The NPSH value can be read from the NPSH curve at the highest flow which the individual pump delivers.
Hf	Friction loss in the inlet manifold in meters of head at the highest flow which the individual pump delivers. **Note:** If a non-return valve is installed on the inlet side of the pump, the friction loss in the valve must be added. See the manufacturer's data.
Hv	Vapor pressure in meters of head
Hs	Safety margin of min. 0.5 meters of head

See Grundfos Product Center for more information.

In some regions, the system can be equipped with a low inlet manifold, which makes it more suitable for suction lift operation. Contact Grundfos for further information.

Non-return valve on the inlet side

For suction-lift operation, the non-return valve must be moved to the inlet side. This is often used in combination with a foot valve if the system is drawing water from a tank.

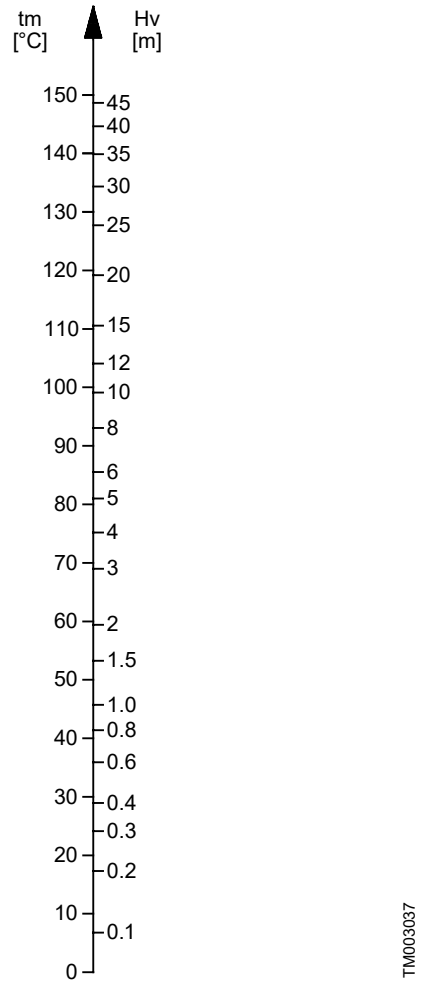
Example

pb	1 bar
Pump type	CRE 15, 50 Hz
Flow rate	15 m^3/h
NPSH	1.2 meters of head
Hf	3 meters of head
Liquid temperature	+60 °C
Hv	2.1 meters of head
H	pb × 10.2 - NPSH - Hf - Hv - Hs [meters of head]
H	1 × 10.2 - 1.2 - 3.0 - 2.1 - 0.5 = 3.4 meters of head

This means that each pump can operate with a maximum suction lift of 3.4 meters of head.

Pressure calculated in bar: 3.4 × 0.0981 = 0.33.

Pressure calculated in kPa: 3.4 × 9.81 = 33.4.



Vapor pressure

13.1.6 Maximum inlet pressure

There is no maximum inlet pressure for CME pumps.

The total of the actual inlet pressure and the pressure at which the pump is operating against a closed valve must always be lower than the maximum system pressure.

13.1.7 Minimum flow rate

Due to the risk of overheating, do not use the pumps at flow rates below 10 % of the rated flow rate of one pump.

The pumps must not run against a closed outlet valve.

13.1.8 Maximum starts and stops

Limit the system starts and stops via the power supply to 4 times per hour.

When the system is switched on via the power supply, it will start after approximately 5 seconds.

For more frequent starts and stops, use the external start-stop input.

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

13.1.9 Diaphragm tank

Set the diaphragm tank precharge pressure to 0.7 times the setpoint. Adjust the precharge pressure if the setpoint changes to ensure optimal operation.

Measure the precharge pressure while the system is pressureless.

We recommend that you use nitrogen gas for precharging.

13.2 Supply voltage

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

You can use both standard and quick-blow or slow-blow fuses.

System with single-phase pumps

3 × 380-415 V ± 10 %, 50/60 Hz, N, PE.

Recommended fuse size

Motor size [kW]	Min. [A]	Max. [A]
0.37 - 0.75	6	10
1.1 - 1.5	10	16

System with three-phase pumps

3 × 380-480 V ± 10 %, 50/60 Hz, PE.

Recommended fuse size

Motor size [kW]	Min. [A]	Max. [A]
0.37 - 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

13.3 Leakage current

Motor size [kW]	Number of pumps in system	Leakage current [mA]
0.37 - 11 (supply voltage ≤ 400 V)	2	< 7
	3	< 10.5
	4	< 14
0.37 - 11 (supply voltage > 400 V)	2	< 10
	3	< 15
	4	< 20

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

13.4 Sound pressure level

The sound pressure depends on the specific pump type and motor size. You can find the sound pressure level in the installation and operating instructions of the pump.

In systems with multiple pumps, the maximum total sound pressure $L_{p,tot}$ increases proportionally with the total number of pumps. You can calculate the value using the equation stated below.

Multiple sound sources may generally be added as [6)]

$$L_{p,\,tot} = 10 Log_{10} \sum_{i} 10^{\frac{L_{p,\,i}}{10}}$$

This means that for a system with multiple identical pumps N, the total system sound level $L_{p,tot}$ may be calculated by adding the values below to the sound level of the specific pump type.

$$L_{p,\,tot} = L_p + \Delta L_p$$

Number of pumps N	ΔL_p
	dB(A)
1	0
2	3
3	5
4	6
5	7
6	8

13.5 Other technical data

EMC (electromagnetic compatibility)

According to EN 61000-6-2:2005 and 61000-6-3:2007.

Residential areas, unlimited distribution, corresponding to CISPR 11, class B, group 1.

Industrial areas, unlimited distribution, corresponding to CISPR 11, class A, group 1.

See the installation and operating instructions of the pump.

Enclosure class

IP54.

Insulation class

F (IEC 85).

13.5.1 Torques

Torques for terminals

Terminal	Recommended torque [Nm]
L1, L2, L3	2.2
PE	6
NC, C1, C2, NO	0.5
DI1, DI2, DI3, DI4, AI1, AI2, AI3, AO1, PT1, PT2, LT1, LT2, GND, 24V, 5V, TX, RX, A, Y, B, S24, ST1, ST2	0.5

Torques for other parts

Part designation	Recommended torque [Nm]
Control box, upper part	6.5 - 7
Cover for mains	1.0 - 1.3
Cable glands:	
M20/M40	1 - 1.5
Blind plugs:	
M20	1 - 1.5
½" NPT	8 - 10

6) Leo Beranek and Istvan L. Ver, *Noise and Vibration Control Engineering*, John Wiley and Sons, 1992

13.6 Factory settings

●	Function is enabled.
❍	Function is disabled.
-	Function is not available.

Settings	
Setpoint	30 % of sensor range
Operating mode	**Normal**
Control mode	**Constant pressure**
Pipe filling function	❍
Buttons on product	●
Stop function (**Low-flow stop function**)	●
Controller (**Controller settings**)	●
Ti	0.5
Kp	0.5
Operating range	25-100 %
Ramps	
Ramp-up	1 second
Ramp-down	3 seconds
Number (**Pump number**)	-
Radio communication	●
Analog input 1	**4-20 mA**
Analog input 2	❍
Analog input 3	❍ [7]
Pt100/1000 input 1	❍
Pt100/1000 input 2	❍
Digital input 1	**External stop**
Digital input 2	❍
Digital input/output 3	**Dry running** [8]
Digital input/output 4	❍
Pulse flowmeter	❍
Predefined setpoints	❍
Analog output	❍
External setpoint function	❍
Signal relay 1	**Ready**
Signal relay 2	**Running**
Limit 1 exceeded	❍
Limit 2 exceeded	❍
LiqTec function	❍
Standstill heating	❍
Motor bearing monitoring	●
Pump name	Hydro Multi-E

[7] Active if the inlet sensor is factory-fitted.

[8] Not active if the inlet sensor is factory-fitted.

14. Product manuals

You can find further product information about the system in the following documents. The documents are available in Grundfos Product Center on www.grundfos.com.

Title	Document type	QR code	Publication number
CR, CRI, CRN	Installation and operating instructions		96462123
CM	Installation and operating instructions		95121197
CRE, CRIE, CRNE, SPKE, MTRE, MTHE, CME, BMS MGE Model J, K	Installation and operating instructions		92898118
CRE, CRIE, CRNE, SPKE, MTRE, MTHE, CME MGE 0.37 - 11 kW	Installation and operating instructions		98358864

15. Disposal

15.1 Precautions for disposal

DANGER
Electric shock
Death or serious personal injury
- Before you dismantle the system, make sure that the power supply is disconnected and cannot be accidentally switched on.

WARNING
Crushing of feet
Death or serious personal injury
- Before you lift the system, make sure that the lifting equipment is capable of handling the load, as listed on the nameplate and packaging label.

WARNING
Hot surface
Death or serious personal injury
- Before you dismantle the system, make sure that the system cools down.

CAUTION
Overhead load
Minor or moderate personal injury
- When you dismantle the system, use safety equipment.

CAUTION
Sharp element
Minor or moderate personal injury
- When you dismantle the system, use safety gloves.

15.2 Disposing of the system

This system or its components 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.

16. Document quality feedback

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