

Hydro MPC

Hydro MPC systems with 2 to 6 pumps and Control MPC

Installation and operating instructions



Hydro MPC
Installation and operating instructions
(all available languages)
<http://net.grundfos.com/qr/i/96605907>



Hydro MPC
Safety instructions
(all available languages)
<http://net.grundfos.com/qr/i/99931501>

Hydro MPC

English (GB)

Installation and operating instructions	4
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English (GB) Installation and operating instructions

Original installation and operating instructions

Table of contents

1. General information	4
1.1 Related instructions	4
1.2 Hazard statements	5
1.3 Notes	5
1.4 Hygiene	5
2. System introduction	5
2.1 System description	5
2.2 Control variants	5
2.3 Identification	7
2.4 Type key	8
3. Receiving the system	9
3.1 Transporting the system	9
3.2 Inspecting the system	9
3.3 Scope of delivery	9
3.4 Handling and lifting the system	9
4. Installing the system	11
4.1 Mechanical installation	11
4.2 Electrical installation	12
5. Starting up the system	13
6. Setting the system	13
6.1 Operating panel, CU 352	13
6.2 Overview of settings	13
6.3 Data communication	14
6.4 Communication interface modules and protocols	15
7. Servicing the system	16
7.1 Maintaining the system	16
7.2 Protecting the system against frost	16
7.3 Taking the system out of operation	16
8. Fault finding	16
8.1 Pumps not running	16
8.2 Pumps starting but stopping immediately	16
8.3 System stopping and failing to restart	16
8.4 Unstable water supply from system	17
8.5 Pumps running but delivering no water	17
8.6 System not reaching the setpoint	17
8.7 Leakage in the shaft seal	17
8.8 Noise	17
8.9 Too frequent starting and stopping	17
9. Technical data	18
9.1 Pressure	18
9.2 Temperature	18
9.3 Relative humidity	18
9.4 Sound pressure level	18
9.5 Electrical data	19
10. Disposal	19
10.1 Precautions for disposal	19
10.2 Disposing of the system	19
11. Document quality feedback	19

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 Related instructions

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

Installation and operating instructions

Title	QR code	Link	Publication number
Control MPC		http://net.grundfos.com/qr/i/99725671	99725671
CR, CRI, CRN		http://net.grundfos.com/qr/i/96462123	96462123
CR, CRN 95-255		http://net.grundfos.com/qr/i/99078486	99078486
CRE, CRIE, CRNE, SPKE, MTRE, CME 0.37 - 11 kW		http://net.grundfos.com/qr/i/98358864	98358864
CRE, CRIE, CRNE, SPKE, MTRE, CME, BMS - E-pumps with MGE Model J, K motor		http://net.grundfos.com/qr/i/92898118	92898118

Service instructions

Title	QR code	Link	Publication number
CR, CRN 95-255		http://net.grundfos.com/qr/i/99233360	99233360

Quick guide

Title	QR code	Link	Publication number
Hydro MPC		http://net.grundfos.com/qr/i/99107595	99107595
Diaphragm tank		http://net.grundfos.com/qr/i/98817081	98817081

1.2 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.



1.3 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.

1.4 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.

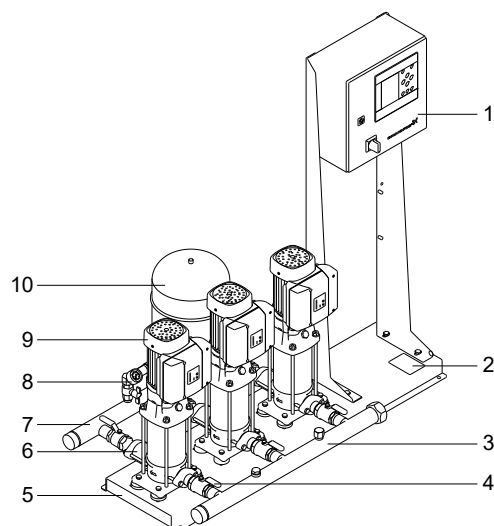
2. System introduction

2.1 System description

As standard, the system consists of two to six CR, CRI, CRE or CRIE pumps. The pumps are connected in parallel and mounted on a common base frame with a control panel and all the necessary fittings such as manifolds, non-return valves, isolating valves, pressure transmitters, pressure gauges, etc.



In some installations, a diaphragm tank must be included.



TM044110

System components

Pos.	Description	Quantity
1	Control panel	1
2	Nameplate	1
3	Inlet manifold	1
4	Isolating valve	2 per pump
5	Base frame	1-2
6	Non-return valve	1 per pump
7	Outlet manifold	1
8	Outlet-pressure sensor and pressure gauge	1
9	Pump	2-6
10	Diaphragm tank (optional)	1

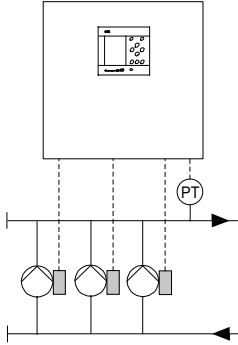
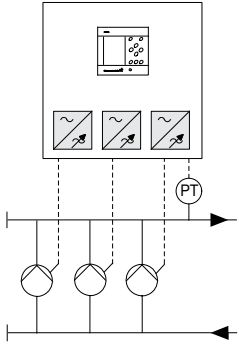
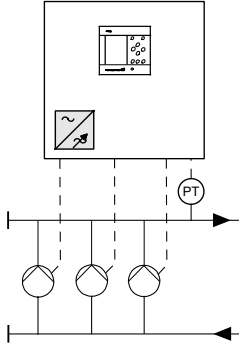
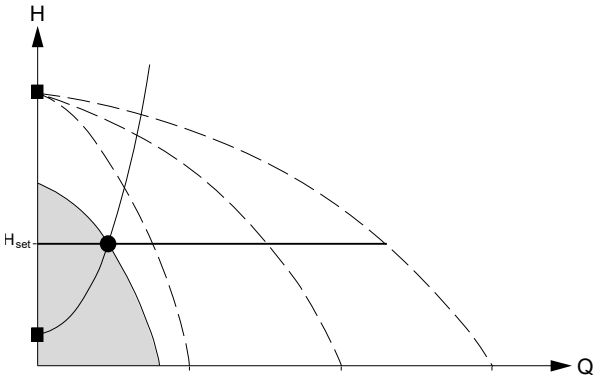
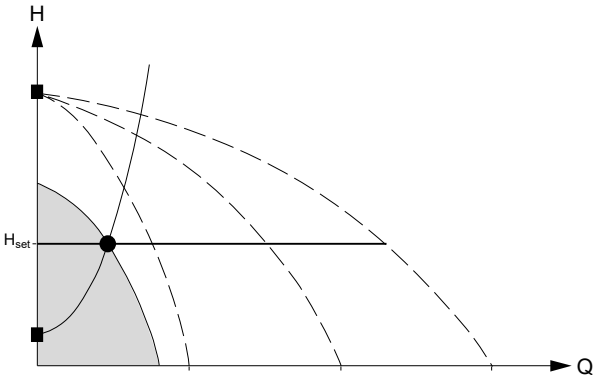
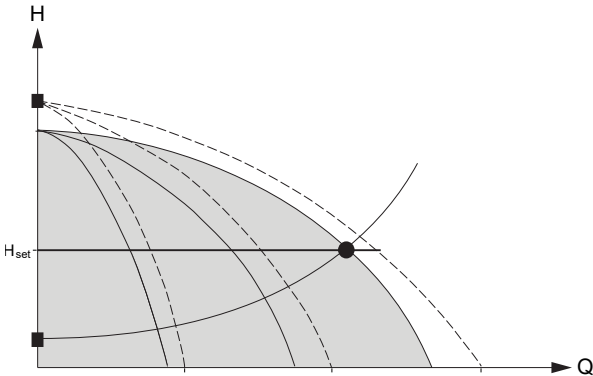
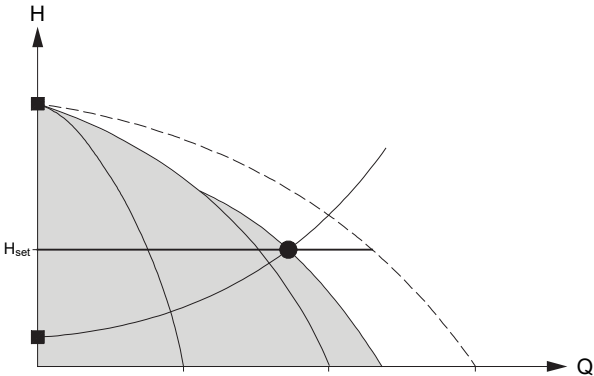
2.2 Control variants

The system is divided into groups based on the control variant:

Control variant	Description
-E/EC	Two to six electronically speed-controlled pumps. E systems are from 0.37 to 22 kW, equipped with CRE, CRIE pumps with integrated frequency converter. EC systems are from 30 kW, equipped with CR pumps connected to Grundfos CUE frequency converters; one per pump.
-F	Two to six CR, CRI pumps connected to a Grundfos CUE frequency converter. The speed-controlled operation alternates among the pumps.

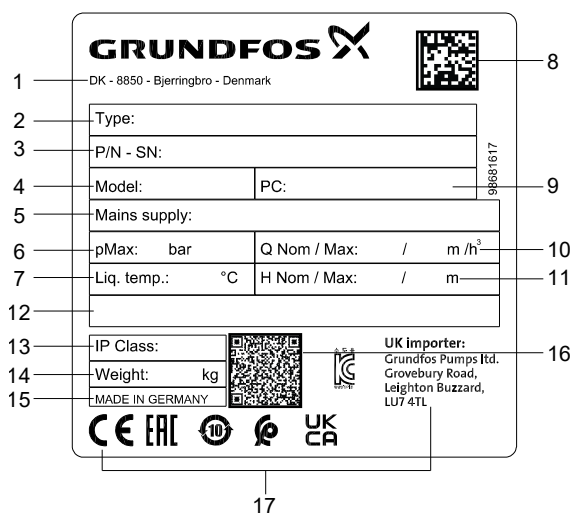
The system has application-optimized software. It can set the system to the application in question.

The table below shows examples of three system groups.

Hydro MPC-E	Hydro MPC-EC	Hydro MPC-F
System with three CR or CRIE pumps.	System with three CR pumps connected to one Grundfos CUE frequency converter in the control panel. The speed-controlled operation alternates among the pumps.	
		
One CR or CRIE pump in operation.	One CR pump connected to one Grundfos CUE frequency converter in operation.	
		
Three CRE or CRIE pumps in operation.	One CR pump connected to one Grundfos CUE frequency converter and two mains-operated CR pumps in operation.	
		
<ul style="list-style-type: none"> The system keeps a constant pressure through continuous adjustment of the pump speed. The system performance is adjusted to the demand by cutting in/out the required number of pumps and parallel control of the pumps in operation. Pump changeover is automatic depending on loads, operating hours and faults. All pumps in operation run at an equal speed. 	<ul style="list-style-type: none"> The system keeps a constant pressure through continuous adjustment of the speed of the CR pump connected to the Grundfos CUE frequency converter. The speed-controlled operation alternates among the pumps. One CR pump connected to the Grundfos CUE frequency converter always starts first. If the pressure cannot be maintained by the pump, one or two mains-operated CR pumps will be cut in. Pump changeover is automatic depending on loads, operating hours and faults. 	

2.3 Identification

2.3.1 Nameplate

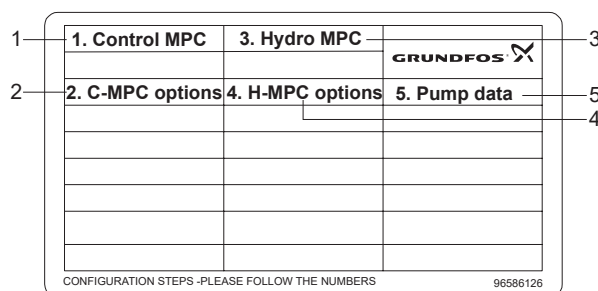


Nameplate example

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

2.3.2 Software label

The software label is placed on the back of CU 352.



Software label

Pos.	Description
1	Control MPC - GSC file number
2	Control MPC options - GSC file numbers
3	Hydro MPC - GSC file number ¹⁾
4	Hydro MPC options - GSC file numbers ¹⁾
5	Pump data - GSC file number ²⁾

¹⁾ Applies only to systems.

²⁾ Applies only to CR, CRI, CRN, CRE and CRIE pumps.



A GSC (Grundfos Standard Configuration) file is a configuration data file.

2.4 Type key

Example: Hydro MPC-E 6 CRNE155-1-1 U1 A-A-A-ABCD

Code	Explanation	Designation
Hydro MPC		System name
E	E: All pumps E Motor or CUE F: Fixed speed pumps, 1 CUE	System type
6		Number of main pumps
CRNE155-1-1		Pump type
U1	U1: 3 × 380-415 V, N, PE, 50/60 Hz U2: 3 × 380-415 V, PE, 50/60 Hz U3: 3 × 380-415 V, N, PE, 50 Hz U4: 3 × 380-415 V, PE, 50 Hz U5: 3 × 380-415V, N, PE, 60 Hz U6: 3 × 380-415 V, PE, 60 Hz U7: 1 × 200-240 V, PE, 50/60 Hz U8: 1 × 200-240 V, N, PE, 50/60 Hz U9: 3 × 220-240 V, PE, 60 Hz	UA: 3 × 440-480 V, PE, 60 Hz UB: 1 × 220-240 V, N, PE, 50/60 Hz UC: 1 × 220-240 V, N, PE, 50 Hz UD: 3 × 440-480 V, N, PE, 60 Hz UJ: 1 × 208-230 V, PE, 60 Hz UK: 3 × 208-230 V, PE, 60 Hz UL: 3 × 460-480 V, PE, 60 Hz UX: Customized variant (special voltage rating)
A	A: Systems with the control panel mounted on the same base frame as the pumps. B: Systems with the control panel centered on the base frame. C: Systems with the control panel mounted on its own base for floor mounting. The control panel can be placed up to 2 meters from the pumps. D: Systems with the control panel mounted on its own base frame. The control panel can be placed up to 2 meters from the pumps. W: Systems with the control panel prepared for wall mounting. The control panel can be placed up to 2 meters from the pumps.	Design
A	A: E B: DOL C: SD	Starting method
A	A: Stainless steel manifold and base frame, and standard valves B: Stainless steel manifold, base frame and valves C: Galvanized steel manifold and base frame, and standard valves D: Stainless steel manifold, galvanized steel base frame, and standard valves H: Galvanized steel manifold and base frame painted black, and standard valves I: Stainless steel manifold and base frame painted black, and standard valves X: Customized material combination	Material combination
ABCD	A: Standard hydraulic, PN 16 B: Pilot pump C: Bypass D: NRV on inlet E: Elbow manifold F: No inlet manifold G: Diaphragm tank H: Dry-running protection I: Repair switch J: Redundant sensor or switch K: 1 free pump position L: 2 free pump position M: 3 free pump position	N: PN 10 pressure rating O: PN 25 pressure rating P: Low prepressure Q: PN 40 pressure rating R: RPM = 50 Hz S: Customized variant T: Certificate U: Undersized motor V: Standard controls with options W: Customized controls 3W: Hydro DDD panel X: More than 4 options Y: Control panel with double door

3. Receiving the system

3.1 Transporting the system

Depending on the size, the system is supplied in an open wooden box or cardboard box designed for transport by a fork lift or a similar vehicle.

The forks of the fork lift must be at least two metres long.



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

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

All supplied systems are factory-tested. The following documents are supplied with the system.

- installation and operating instructions
 - for the system
 - for the pump or E-pump when applicable
- safety instructions for the system
- wiring diagram.

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 CR 1 to CR 95 have holes in the base frame for lifting. Systems with CR 125 or larger pumps have eyebolts in the base frame for lifting. For these systems, each lifting strap must be at least three meters long.

- Use certified lifting gear applicable for the load. Straps must be placed to ensure vertical pull to the system.

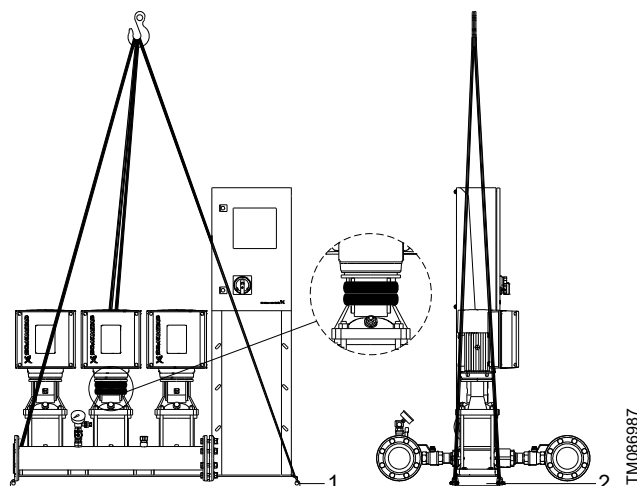
- Use a safety strap around one of the pump motors to prevent the system from tilting.
- Wind the safety strap around the pump head more than one time if there are no eyebolts or brackets on the pump.
- Keep the safety strap tight.
- Use shackles mounted in the holes for lifting when you lift the systems with CR 1 to CR 95.



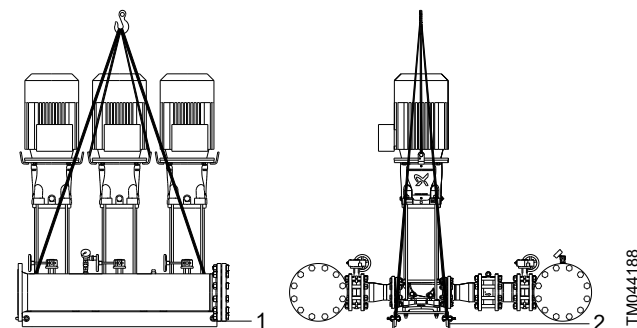
If the system is secured with transport straps, do not remove the straps until the system is installed.



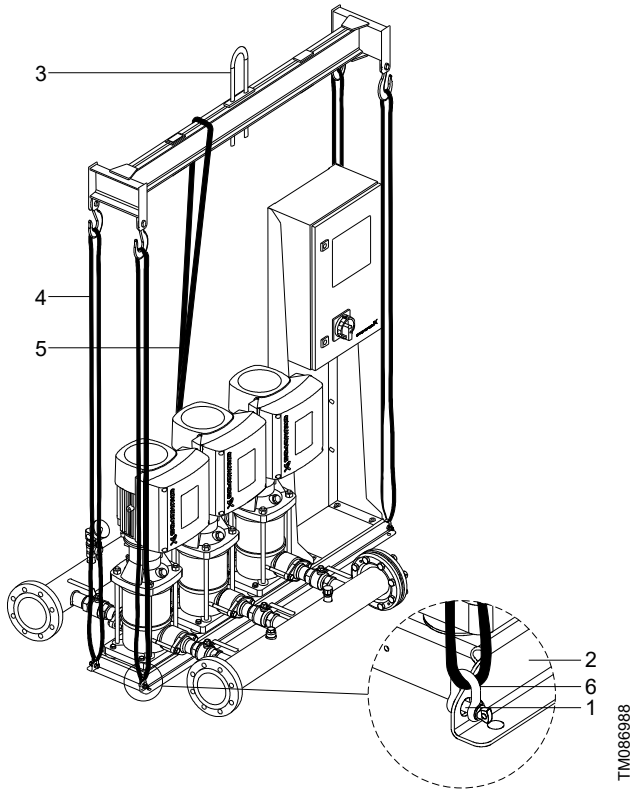
Do not use chains to lift systems with CR 125 or larger pumps, as this may damage the motors.



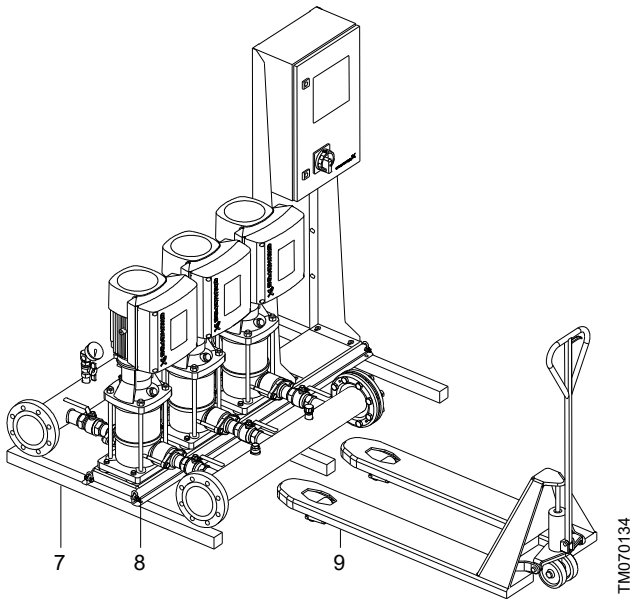
Using lifting gear to lift a system with a base frame made of bent steel plate, with a safety strap around the pump head



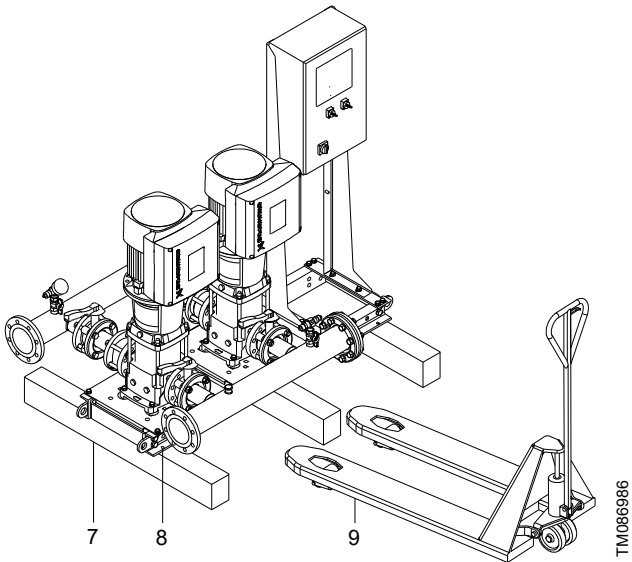
Using lifting gear to lift a pump assembly with a base frame made of bent steel plate



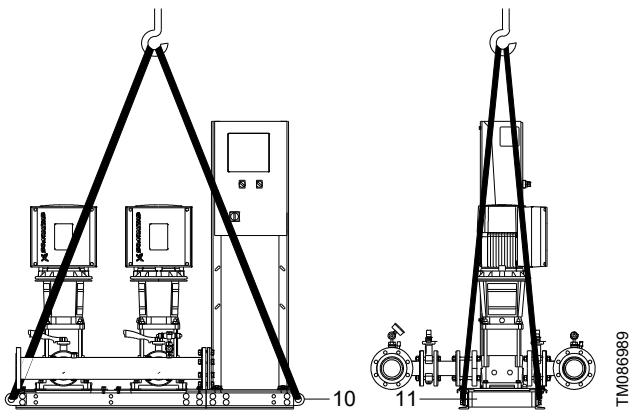
Using lifting gear to lift a system with a base frame made of bent steel plate



Using a fork lift to lift a system with a base frame made of bent steel plate



Using a fork lift to lift a system with a C-profile base frame



Using lifting gear to lift a system with a C-profile base frame

Pos.	Description
1	Lifting hole (included)
2	Base frame made of bent steel plate
3	Lifting gear
4	Lifting strap
5	Safety strap
6	Shackles
7	Wooden beam (included)
8	Wooden screws (included)
9	Fork lift
10	Lifting bucket (included)
11	C-profile base frame

4. 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.

4.1 Mechanical installation

4.1.1 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.

4.1.2 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	VNC	VNC server for remote HMI

4.1.3 Pipes

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

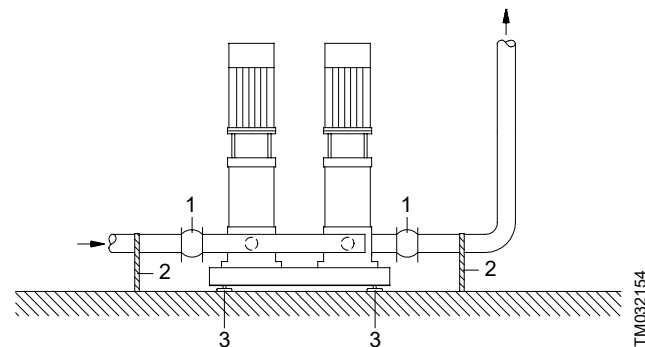
The pipes connected to the system must be of adequate size.

Connect the pipes to the system's manifolds. Either end can be used. Apply sealing compound to the unused end of the manifold, and fit the screw cap. For manifolds with flanges, fit a blanking flange with a gasket.

To optimize operation and minimize noise and vibration, consider vibration dampening of the system.

Noise and vibration are generated by the pump and motor rotations, as well as the flow in pipes and fittings. The impact on the environment is subjective and depends on correct installation and the condition of other system components.

If the system is installed in blocks of flats or if 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.



Example showing the position of expansion joints, pipe supports and machine shoes

Pos.	Description
1	Expansion joint
2	Pipe support
3	Vibration damper (machine shoe)



Expansion joints, pipe supports and vibration dampers are not included in a standard system.

Proceed with the following steps before you start up the system:

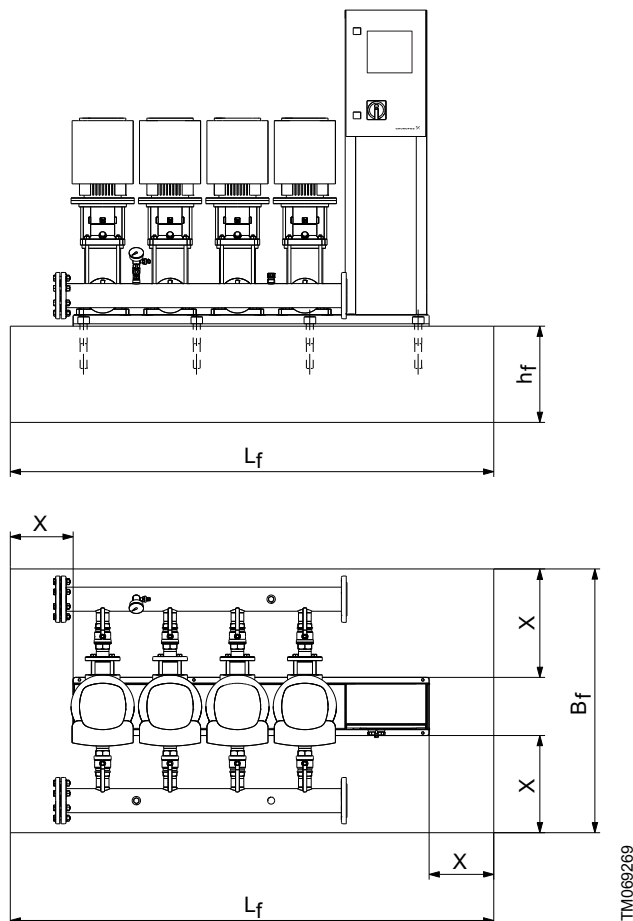
1. Tighten all nuts before startup.
2. Secure the pipes to parts of the building to ensure that they cannot move or twist.

4.1.4 Foundation

We recommend that you install the system on a plane and rigid concrete foundation which is heavy enough to provide permanent support for the entire system. The foundation must be capable of absorbing any vibration, normal strain or shock.



The weight of a concrete foundation must be 1.5 times the weight of the system.



Foundation

The minimum height of the foundation, h_f , is calculated as follows:

$$h_f = \frac{m_{\text{pump}} \times 1.5}{L_f \times B_f \times \delta_{\text{concrete}}}$$

The density δ of concrete is usually taken as 2200 kg/m³.

4.1.5 Vibration dampers

To prevent the transmission of vibration to buildings, we recommend that you use the vibration dampers to isolate the system foundation from the building parts.

The appropriate damper varies depending on the installation situation. An inappropriate damper may cause an increased vibration level. Therefore, vibration dampers must be sized by the supplier. If the system is installed on a base frame with vibration dampers, always install expansion joints on the manifolds. This is important to prevent the system from "hanging" on the pipes.

4.1.6 Expansion joints

Fitting expansion joints can:

- absorb expansions or contractions in the pipes caused by changing liquid temperature
- reduce mechanical strains in connection with pressure surges in the pipes
- isolate mechanical structure-borne noise in the pipes (only applicable to rubber bellows expansion joints).

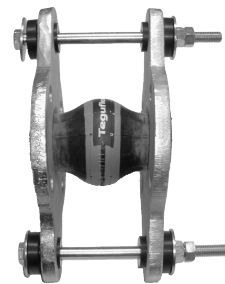


Do not fit expansion joints to compensate for inaccuracies in the pipes such as center displacement of flanges.

The expansion joints must be fit at a distance of minimum 1 to 1 1/2 times the nominal flange diameter from the manifold on both the inlet and outlet sides. This prevents the turbulence development in the expansion joints, resulting in better inlet conditions and a minimum pressure loss on the pressure side.



Examples of rubber bellows expansion joints without limiting rods



Examples of rubber bellows expansion joints with limiting rods

Expansion joints with limiting rods can be used to minimize the forces caused by the expansion joints. We always recommend that you use expansion joints with limiting rods for flanges larger than DN 100.

Anchor the pipes so that they do not stress the expansion joints and the pump. Follow the supplier's instructions and pass them on to advisers or pipe installers.

4.1.7 Prefilling of diaphragm tank, if applicable

If a diaphragm tank is connected to the system, prefill the tank with nitrogen to this pressure: $0.7 \times$ the setpoint



Use nitrogen to avoid corrosion.

4.2 Electrical installation

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



- Installation must be carried out by qualified persons, and according to local regulations.

- The electrical installation of the system must comply with enclosure class IP54.
- Check and make sure that the power supply and frequency correspond to the values stated on the nameplate.
- Make sure that the conductor cross-section meets the specifications in the wiring diagram.
- If the system cannot be installed with the supply disconnecting device located at least 0.6 m above the service level (ground level), 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 means to lock it in the OFF (isolated) position. Based on a risk assessment performed by the installer or end-user, the device must be installed in a position according to EN 60204-1, paragraph 5.3.4. The system must be connected to an external emergency stop device or an emergency switch-off device according to the requirements of EN ISO 13850.

5. 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 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.

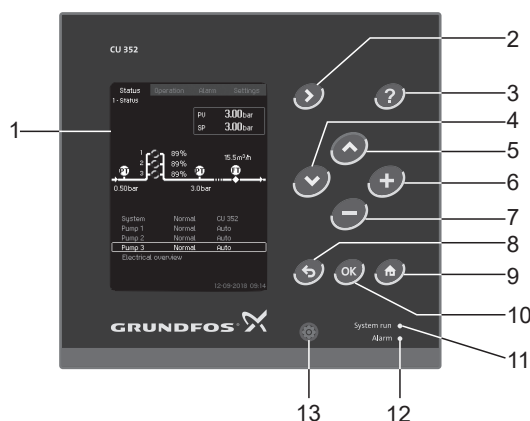
After having carried out the mechanical and electrical installation proceed as follows:

1. Switch on the power supply.
2. Wait for the first display to appear.
3. The first time CU 352 is switched on; a startup wizard guides the user through the basic settings.
4. Follow the instructions in each display.
5. When the wizard is completed, check that all pumps are set to **Auto** in the menu **Status**.
6. Go to the menu **Operation**.
7. Select the operating mode **Normal** and press [OK].
8. The system is now ready for operation.

6. Setting the system

6.1 Operating panel, CU 352

The operating panel in the front door of the control panel features a display, a number of buttons and two indicator lights. The operating panel enables manual setting and monitoring of the performance of the system.



CU 352 operating panel

Pos.	Description
1	Display
2	Arrow to the right
3	Help
4	Down
5	Up
6	Plus
7	Minus
8	Esc.
9	Home
10	OK
11	Indicator light, operation (green)
12	Indicator light, fault (red)
13	Display brightness

For detailed information about setting the system, see the installation and operating instructions of Control MPC.

6.2 Overview of settings

For the overview of the settings, see the installation and operating instructions of Control MPC.

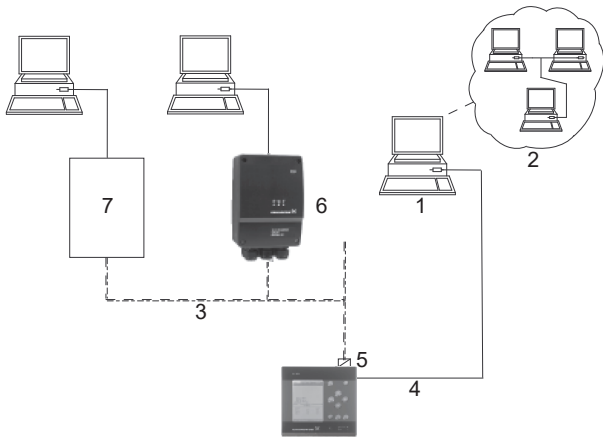
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6.3 Data communication

CU 352 is equipped with a hardware enabling communication with external units, such as a computer, via an external GENIbus or ethernet connection.



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



TM053235

Data communication via external GENIbus and ethernet connection

Pos.	Description
1	Intranet
2	Internet
3	External GENIbus connection
4	Ethernet connection
5	External GENIbus module (option)
6	Grundfos CIU communication interface
7	Third-party gateway

6.3.1 Ethernet

Ethernet is the most widely used standard for local networks (LAN). The standardisation of this technology has created some of the easiest and cheapest ways of creating communication between electric units, for instance between computers or between computers and control units.

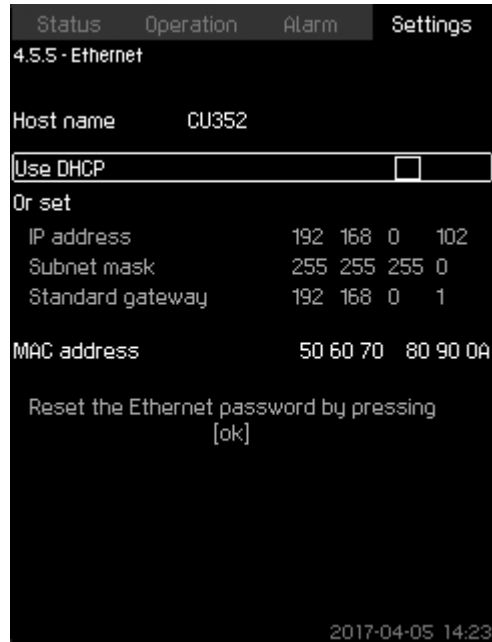
The webserver of CU 352 makes it possible to connect a computer to CU 352 via an ethernet connection. The user interface can thus be exported from CU 352 to a computer so that CU 352 and consequently the system can be monitored and controlled externally.



We recommend that you protect the connection to CU 352 according to your safety requirements in consultation with the system administrator.

In order to use the webserver, you must know the IP address of CU 352. All network units must have a unique IP address to communicate with each other. The IP address of CU 352 from factory is 192.168.0.102.

Alternatively to the factory-set IP address, it is possible to use a dynamic assignment of IP address. This is possible by activating a DHCP (Dynamic Host Configuration Protocol) in CU 352 or via the webserver. See the example in figure below.



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Example of setting of ethernet

Dynamic assignment of an IP address for CU 352 requires a DHCP server in the network. The DHCP server assigns a number of IP addresses to the electric units and makes sure that two units do not receive the same IP address.

A standard internet browser is used for connection to the webserver of CU 352.

If you want to use the factory-set IP address, no changes are required in the display. Open the internet browser and enter the IP address of CU 352.

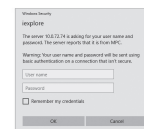
If you want to use dynamic assignment, you must enable the function by selecting **Use DHCP** and clicking [ok]. A check mark shows that the function has been enabled.

Open the internet browser and enter the host name of CU 352 instead of the IP address. The internet browser will now try to connect to CU 352. The host name can be read in the display, but can only be changed by either a GSC file (configuration file) or via a webserver. See section [Change of network setting](#).



A host name is required to use DHCP.

This is the first display shown when connecting to CU 352.



TM032048

Connection to CU 352

Factory settings

User name:	admin
Password:	admin

When you have entered the user name and password, an application starts up in CU 352, provided that a Java Applet has been installed on the computer. If this is not the case, but the computer is connected to the internet, then use the link on the screen to download and install the Java Applet.

The application on CU 352 exports the Java Applet to your browser and gives you access to user interfaces such as display and operating panel.

The Java Applet installation in the browser must be accepted by the user. You can now monitor and control CU 352 from a computer.

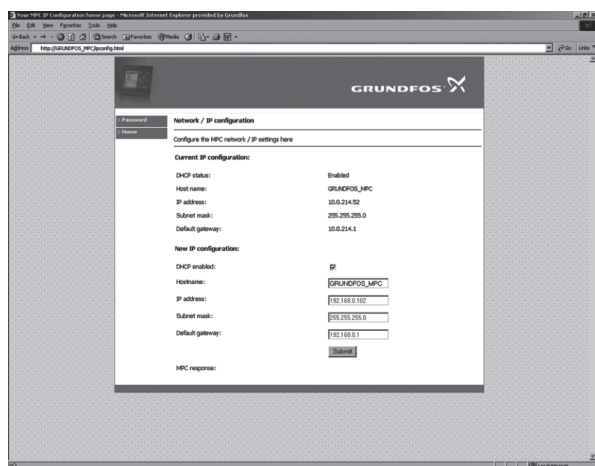


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Network setting

Change of network setting

When connection to the webserver of CU 352 has been established, you can change the network setting.

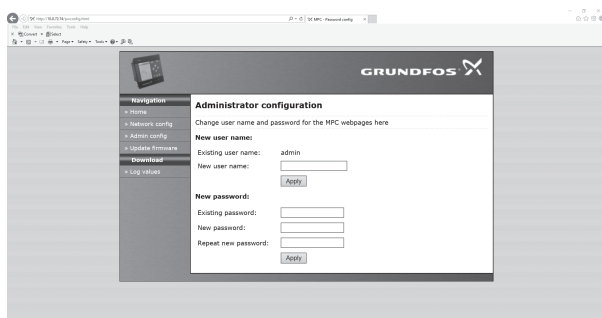


TM032050

Change of network setting

1. Click [>Network admin].
2. Enter the changes.
3. Click [Submit] enable the changes.

Administrator configuration



TM032051

Change of user name and password

1. Click [>Admin config].
2. Enter new user name if applicable.
3. Click [Apply].
4. Enter existing password.
5. Enter new password.
6. Repeat new password.
7. Click [Apply].

6.3.2 GENIbus

By installing a GENIbus module in CU 352, you can connect the system to an external network. The connection can take place via a GENIbus-based network or a network based on another fieldbus protocol via a gateway. See examples in the section Data communication. For further information, contact Grundfos.

The gateway may be a Grundfos CIU communication interface or a third-party gateway. For further information on CIU, see Grundfos Product Center, or contact Grundfos.

6.4 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

7. 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.

7.1 Maintaining the system

7.1.1 Pumps

Pump bearings and shaft seals are maintenance-free.

7.1.2 CU 352

CU 352 is maintenance-free. Keep the unit clean and dry, and protect it against direct sunlight. For ambient temperature, see the section on Technical data.

7.1.3 Motor bearings

Motors without lubricating nipples are maintenance-free.

Lubricate motors with lubricating nipples with a high-temperature lithium-based grease. See the instructions on the fan cover of Grundfos motors.

In seasonal operation when the motor is idle for more than six months of the year, we recommend that you grease the motor before you take the pump out of operation.

7.2 Protecting the system against frost

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

Follow these instructions:

1. Loosen the vent screw in the pump head.
2. Remove the drain plug from the base.



Do not tighten the vent screw and fit the drain plug until you use the pump again.

7.3 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.

8. Fault finding

DANGER Electric shock



Death or serious personal injury

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

8.1 Pumps not running

The pumps are not running.

Cause	Remedy
The actual pressure is higher than or equal to the setpoint.	<ul style="list-style-type: none"> • Wait until the pressure decreases, or lower the pressure on the outlet side of the system. • Check if the pumps start.
The power supply is disconnected.	<ul style="list-style-type: none"> • Connect the power supply.
The main switch is off.	<ul style="list-style-type: none"> • Turn on the main switch.
The main switch is defective.	<ul style="list-style-type: none"> • Replace the main switch.
The motor protection is activated.	<ul style="list-style-type: none"> • Contact Grundfos.
The motor is defective.	<ul style="list-style-type: none"> • Repair or replace the motor.
The pressure transmitter is defective.	<ul style="list-style-type: none"> • Replace the pressure transmitter. Transmitters with 0-20 mA or 4-20 mA output signals are monitored by the system.
The cable is broken or short-circuited.	<ul style="list-style-type: none"> • Repair or replace the cable.

8.2 Pumps starting but stopping immediately

The pumps start but stop immediately. The operating pressure is not reached.

Cause	Remedy
Water shortage or there is no inlet pressure.	<ul style="list-style-type: none"> • Re-establish the water supply to the system. When the inlet pressure is re-established, the pumps restarts in 15 seconds.

8.3 System stopping and failing to restart

The system stops and cannot restart.

Cause	Remedy
The pressure transmitter is defective.	<ul style="list-style-type: none"> • Replace the pressure transmitter. Transmitters with 0-20 mA or 4-20 mA output signals are monitored by the system.
The cable is broken or short-circuited.	<ul style="list-style-type: none"> • Repair or replace the cable.
The power supply of CU 352 is switched off.	<ul style="list-style-type: none"> • Connect the power supply.
CU 352 is defective.	<ul style="list-style-type: none"> • Contact Grundfos.

8.4 Unstable water supply from system

The water supply from the system is unstable.

Cause	Remedy
The inlet pressure is too low.	<ul style="list-style-type: none"> Check the inlet pipe and the inlet strainer, if any. Clean the strainer and check for any leaks or blockages in the inlet pipe.
The inlet pipe, strainer or pumps are partly blocked by impurities.	<ul style="list-style-type: none"> Clean the inlet pipe, strainer or pumps.
The pumps suck air.	<ul style="list-style-type: none"> Check the inlet pipe for leakages. Repair any leakages or exchange the inlet pipe.
The pressure transmitter is defective.	<ul style="list-style-type: none"> Replace the pressure transmitter. Transmitters with 0-20 mA or 4-20 mA output signals are monitored by the system.

8.5 Pumps running but delivering no water

The pumps are running but deliver no water.

Cause	Remedy
The valves are closed.	<ul style="list-style-type: none"> Open the valves.
The inlet pipe or the pumps are blocked by impurities.	<ul style="list-style-type: none"> Clean the inlet pipe or the pumps.
The non-return valve is blocked in the closed position.	<ul style="list-style-type: none"> Clean the non-return valve. Check if the non-return valve moves freely.
The inlet pipe is leaky.	<ul style="list-style-type: none"> Check the inlet pipe for leakages.
There is air in the inlet pipe or the pumps.	<ul style="list-style-type: none"> Vent and prime the pumps. Check the inlet pipe for leakages.

8.6 System not reaching the setpoint

The system is unable to reach the setpoint.

Cause	Remedy
The consumption is too high.	<ul style="list-style-type: none"> Reduce the consumption, if possible. Install a bigger system.
Too many standby pumps are selected.	<ul style="list-style-type: none"> Reduce the number of standby pumps.
There is a pipe fracture or a leakage in the system.	<ul style="list-style-type: none"> Check the system and repair the damaged parts, if necessary.

8.7 Leakage in the shaft seal

There is leakage in the shaft seal.

Cause	Remedy
The shaft seal is defective.	<ul style="list-style-type: none"> Replace the shaft seal.
The height adjustment of the pump shaft is inaccurate.	<ul style="list-style-type: none"> Readjust the shaft height.

8.8 Noise

There is considerable noise in the system.

Cause	Remedy
The pumps are cavitating.	<ul style="list-style-type: none"> Clean the inlet pipe or the pumps, and the inlet strainer if any.
The pumps do not rotate freely (frictional resistance) due to inaccurate height adjustment of the pump shaft.	<ul style="list-style-type: none"> Readjust the shaft height.

8.9 Too frequent starting and stopping

There are too frequent starting and stopping.

Cause	Remedy
The precharge pressure of the diaphragm tank is not correct.	<ul style="list-style-type: none"> Set the correct precharge pressure.

9. Technical data

9.1 Pressure

Inlet pressure

The system can operate with a positive inlet pressure (precharged pressure system) or a negative inlet pressure (vacuum at the inlet manifold).

We recommend that you calculate the inlet pressure in these cases:

- Water is drawn through long pipes.
- Water is drawn from depths.
- Inlet conditions are poor.



In this document, the term "inlet pressure" is defined as the pressure or vacuum which can be measured immediately before the system.

To avoid cavitation, make sure that there is a minimum inlet pressure on the inlet side of the system. The minimum inlet pressure H in metres head can be calculated as follows:

$$H = p_b \times 10.2 - NPSH - H_f - H_v - H_s$$

p_b	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 metres head.
	NPSH can be read from the NPSH curve at the highest flow rate which the individual pump delivers.
H_f	Friction loss in inlet manifold in metres head at the highest flow rate which the individual pump delivers.
	Note: If a non-return valve is installed on the inlet side of the pump, the friction loss of the valve must be added. See the manufacturer's data.
H_v	Vapour pressure in metres head.
H_s	Safety margin of minimum 0.5 metres head.

Maximum inlet pressure

See the installation and operating instructions of the pump supplied with the system.

Operating pressure

As standard, the maximum operating pressure is 16 bar.

On request, Grundfos offers systems with the maximum operating pressure higher than 16 bar.

9.2 Temperature

Liquid temperature	5-60 °C
Ambient temperature	0-40 °C

Systems for higher temperature are available on request.

9.3 Relative humidity

The maximum relative humidity is 95 %.

9.4 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 ³⁾

$$L_{p,tot} = 10 \log_{10} \sum_i 10^{\frac{L_{p,i}}{10}}$$

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

³⁾ Leo Beranek and Istvan L. Ver, *Noise and Vibration Control Engineering*, John Wiley and Sons, 1992

9.5 Electrical data

Supply voltage

See the nameplate.

Backup fuse

See the wiring diagram supplied with the system.

Digital inputs

Open-circuit voltage	24 VDC
Closed-circuit current	5 mA, DC
Frequency range	0-4 Hz



All digital inputs are supplied with PELV voltage (Protective Extra-Low Voltage).

Analog inputs

	0-20 mA
Input current and voltage	4-20 mA 0-10 V
Tolerance	± 3.3 % of full scale
Repetitive accuracy	± 1 % of full scale
Input resistance, current	< 250 Ω
Input resistance, voltage, CU 352	50 kΩ ± 10 %
Input resistance, voltage, IO 351	> 50 kΩ ± 10 %
Supply to sensor	24 V, maximum 50 mA, short-circuit protected



All analog inputs are supplied with PELV voltage (Protective Extra-Low Voltage).

Digital outputs (relay outputs)

Maximum contact load	240 VAC, 2 A
Minimum contact load	5 VDC, 10 mA

All digital outputs are potential-free relay contacts.



Some outputs have a common C terminal.
For further information, see the wiring diagram supplied with the system.

Inputs for PTC sensor or thermal switch

For PTC sensors to DIN 44082. Thermal switches can also be connected.

Open-circuit voltage	12 VDC ± 15 %
Closed-circuit current	2.6 mA, DC



Inputs for PTC sensors are electrically separated from the other inputs and outputs of the system.

10. Disposal

10.1 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.

10.2 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.

11. Document quality feedback

To provide feedback about this document, use your smart device to scan the QR code.



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