MAGNA3

Installation and operating instructions

![Grundfos MAGNA3 circulator pumps]

MAGNA3

Original installation and operating instructions

Table of contents

1. General Information

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

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.
Children shall not play with the appliance.
Cleaning and user maintenance shall not be made by children without supervision.

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 Safety symbols on the pump

Check the position of the clamp before you tighten it. Incorrect position of the clamp will cause leakage from the pump and damage the hydraulic parts in the pump head.

Fit and tighten the screw that holds the clamp to 8 Nm ± 1 Nm.
Do not apply more torque than specified even though water is dripping from the clamp. The condensed water is most likely coming from the drain hole under the clamp.

2. Receiving the product

2.1 Inspecting the product

Check that the product received is in accordance with the order.
Check that the voltage and frequency of the product match the voltage and frequency of the installation site. See section Nameplate.

Pumps tested with water containing anticorrosive additives are taped on the inlet and outlet ports to prevent residual test water from leaking into the packaging. Remove the tape before installing the pump.

Related information

2.2 Scope of delivery

2.2.1 Plug-connected single-head pump

TM086917

The box contains the following items:
- MAGNA3 pump
- insulating shells
- gaskets
- quick guide
- safety instructions
- one ALPHA plug.

2.2.2 Plug-connected twin-head pump

TM086916

The box contains the following items:
- MAGNA3 pump
- gaskets
- quick guide
- safety instructions
- two ALPHA plugs.

2.2.3 Terminal-connected single-head pump

TM086843

The box contains the following items:
- MAGNA3 pump
- insulating shells
- quick guide
- safety instructions
- box with terminal and M20 cable gland.

2.2.4 Terminal-connected twin-head pump

TM086845

The box contains the following items:
- MAGNA3 pump
- quick guide
- safety instructions
- two boxes with terminals and M20 cable glands.

2.3 Lifting the pump

Observe local regulations concerning limits for manual lifting or handling.

Always lift directly on the pump head or the cooling fins when handling the pump. See figure below.

For large pumps, it may be necessary to use lifting equipment. Position the lifting straps as illustrated in figure below.

TM055820

Correct lifting of pump

Do not lift the pump head by the control box, i.e. the red area of the pump. See figure below.

TM055821

Incorrect lifting of pump

3. Installing the product

3.1 Location

The pump is designed for indoor installation.

Always install the pump in an dry environment where it will not be exposed to drops or splashes, for example water, from surrounding equipment or structures.

As the pump contains stainless-steel parts, it is important that it is not installed directly in environments, such as:

- Indoor swimming pools where the pump would be exposed to the ambient environment of the pool.
- Locations with direct and continuous exposure to a marine atmosphere.
- In rooms where hydrochloric acid (HCl) can form acidic aerosols escaping from, for example, open tanks or frequently opened or vented containers.

The above applications do not disqualify for installation of MAGNA3. However, it is important that the pump is not installed directly in these environments.

Stainless steel variants of MAGNA3 can be used to pump pool water. See section Pumped liquids.

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

- Position the pump in such a way that sufficient cooling is ensured.
- The ambient temperature must not exceed 40 °C.

Related information

 6.2 Pumped liquids

3.1.2 Minimum clearance

MAGNA requires the following space on the installation sit as shown below.
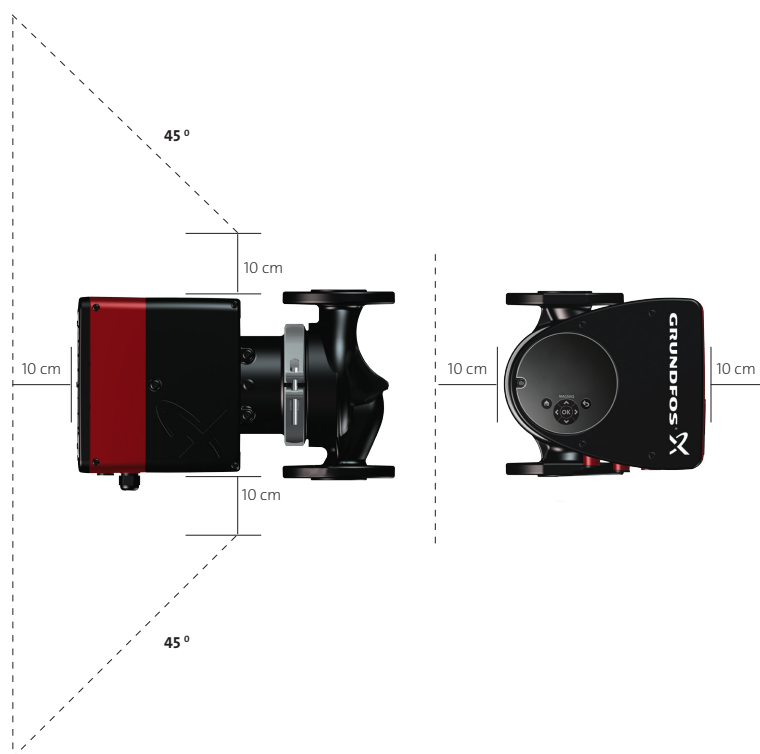
Minimum clearance around Single head pump

3.1.1 Outdoor installation

The pump is intended for indoor installation. However, if the pump is installed outside, please observe the following:

- Make sure the environmental conditions and protection class are at a under permissible level.
- Install pump and housing/cover around pump as weather protection. Housing/cover need to be installed separately and is not provided by Grundfos.
- Ambient temperatures below -10 °C is not permitted and below -20 °C needs glycol mixture.
- Protect the pump from direct exposure to sunlight, snow & rain.
- Implement required steps to remove water condensation.
- Keep the drain hole free.
- Do not expose the pump to UV radiation.

TM060059
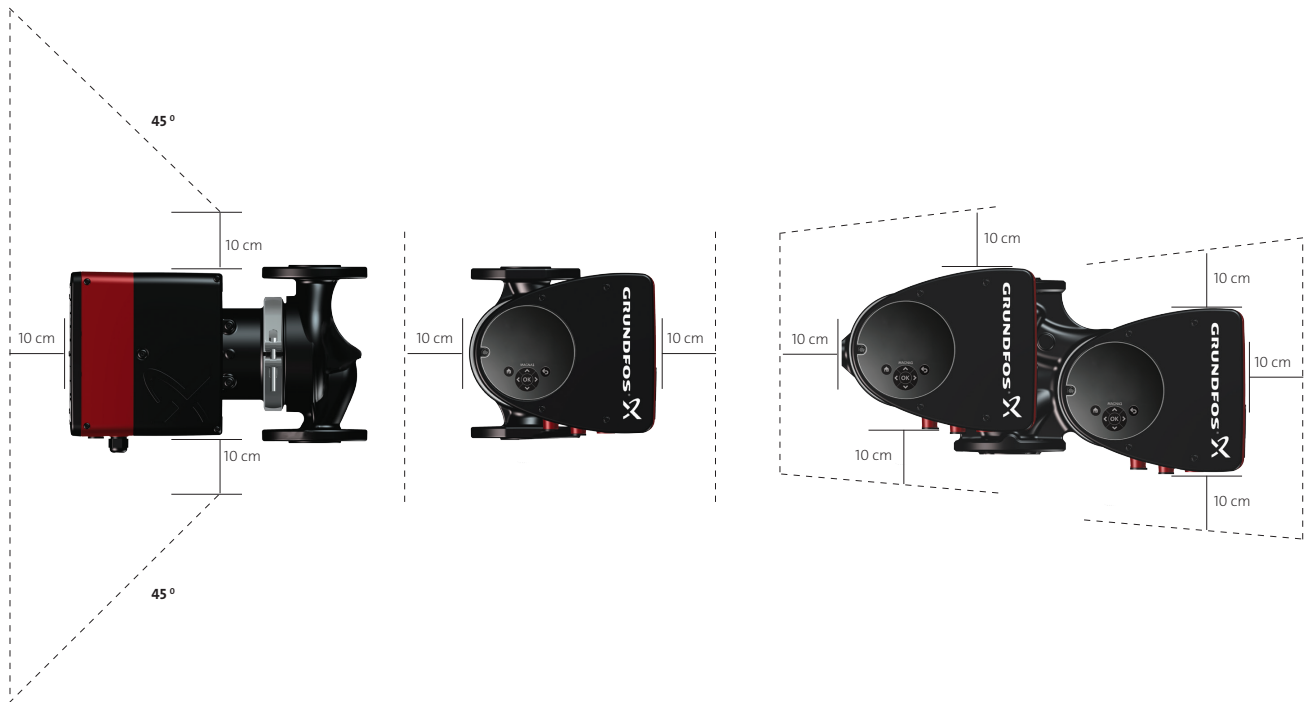
Minimum clearance around Twin-head pump

3.1.3 Cooling applications

In cooling applications condensation may occur on the surface of the pump.

To protect the electronics, power on the pump must be switched on, if the cold water is forced through the pump

3.2 Tools

Recommended tools

Pos.	Tool	Size
1	Screwdriver, straight slot	0.6 × 3.5 mm
2	Screwdriver, straight slot	1.2 × 8.0 mm
3	Screwdriver, torx bit	TX10
4	Screwdriver, torx bit	TX20
5	Hexagon key	5.0 mm
6	Side cutter	
7	Open-end spanner	Depending on DN size
8	Pipe wrench	Only used for pumps with unions

3.3 Mechanical installation

The pump range includes both flanged and threaded versions. These installation and operating instructions apply to both versions but give a general description of flanged versions. If the versions differ, the threaded version will be described separately.

Install the pump so that it is not stressed by the pipes. For maximum permissible forces and moments for pipe connections acting on the pump flanges or threaded connections, see MAGNA3 (Appendix).

You can suspend the pump directly in the pipes, provided that the pipes support the pump.

Twin-head pumps are prepared for installation on a mounting bracket or base plate. The pump housing has a M12 thread.

Step	Action	Illustration
1	Arrows on the pump housing indicate the flow direction through the pump. The flow direction can be horizontal or vertical, depending on the control box position.	TM086920 TM086842
2	Close the isolating valves and make sure that the system is not pressurised during the installation of the pump.	TM052863
3	Mount the pump with gaskets in the pipes.	TM086831

Step	Action	Illustration
4	Flanged version: Fit bolts and nuts. Use the right size of bolts according to system pressure. For further information about torques, see MAGNA3 (Appendix). Threaded version: Tighten the union nuts.	TM086841 TM086921
5	Fit the insulating shells.	TM086833

As an alternative to insulating shells, you can insulate the pump housing and pipes as illustrated in the figure below.

🚫 Do not insulate the control box or cover the operating panel.

TM086837

Insulation of the pump housing and pipe

Related information

3.4 Positioning the pump

Always install the pump with horizontal motor shaft.

- Pump installed correctly in a vertical pipe. See figure (A).
- Pump installed correctly in a horizontal pipe. See figure (B).
- Do not install the pump with vertical motor shaft. See figure (C and D).
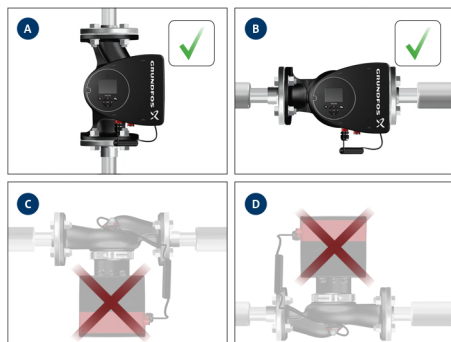
Pump installed with horizontal motor shaft

Automatic vent

3.5 Control box positions

To ensure adequate cooling, make sure that the control box is in horizontal position with the Grundfos logo in vertical position. See figure below.

> **!** Make sure that the isolating valves are closed before rotating the control box.
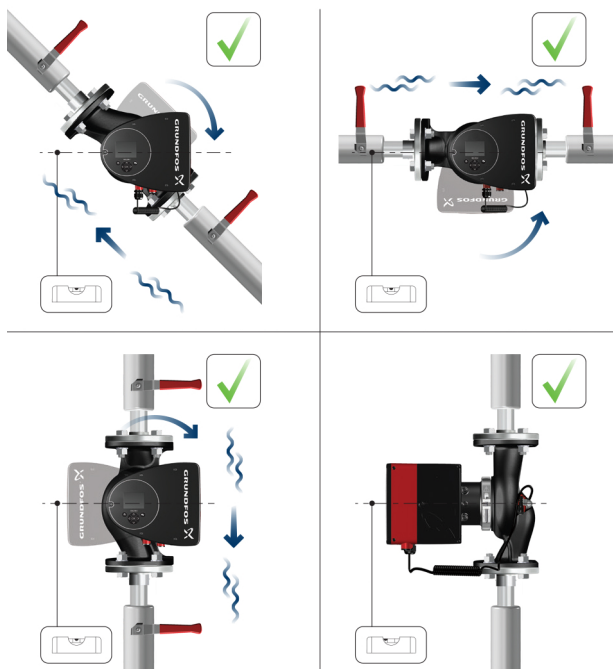
Pump with control box in horizontal position

> **!** For twin-head pumps installed in horizontal pipes, air may be trapped in the pump housing. If this is the case, fit an automatic vent, Rp 1/4 thread, in the upper part of the pump housing. See figure below.

3.6 Pump head position

If you remove the pump head before installing the pump in the pipes, pay special attention when fitting the pump head to the pump housing:

1. Visually check that the floating ring in the sealing system is centred. See figures below.

TM056650

Correctly centred sealing system

TM056651

Incorrectly centred sealing system

2. Gently lower the pump head with rotor shaft and impeller into the pump housing.

3. Make sure that the contact face of the pump housing and that of the pump head are in contact before you tighten the clamp. See figure below.

> ! Observe the position of the clamp before you tighten it. Incorrect position of the clamp will cause leakage from the pump and damage the hydraulic parts in the pump head. See figure below.

TM055837
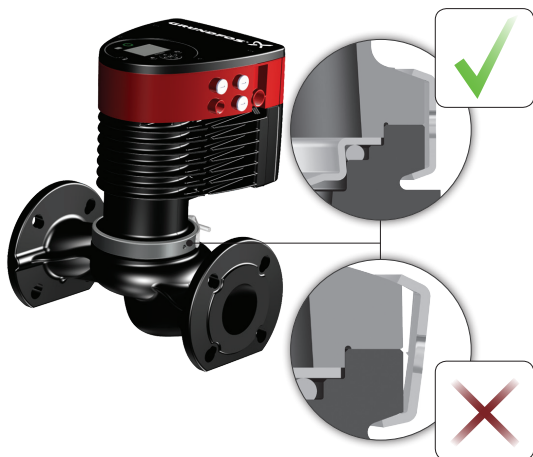
Fitting the pump head to the pump housing

3.7 Changing the control box position

> The warning symbol on the clamp holding the pump head and pump housing together indicates that there is a risk of personal injury. See specific warnings below.

> **CAUTION**
> **Pressurised system**
> Minor or moderate personal injury
> -   Pay special attention to any escaping vapour when loosening the clamp.

> **CAUTION**
> **Crushing of feet**
> Minor or moderate personal injury
> -   Do not drop the pump head when loosening the clamp.

> Fit and tighten the screw that holds the clamp to 8 Nm ± 1 Nm. Do not apply more torque than specified even though water is dripping from the clamp. The condensed water is most likely coming from the drain hole under the clamp.
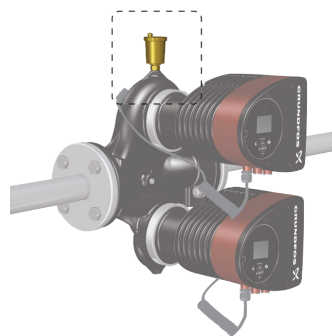
> Check the position of the clamp before you tighten the clamp. Incorrect position of the clamp will cause leakage from the pump and damage the hydraulic parts in the pump head.

> ! Make sure that the isolating valves are closed before rotating the control box.
>
> The pump must be pressureless before the control box is rotated. Drain the system or relieve the pressure inside the pump housing by loosening the thread or flange.

Step	Action	Illustration
1	Loosen the screw in the clamp that holds the pump head and pump housing together. If you loosen the screw too much, the pump head will be completely disconnected from the pump housing.	TM052867
2	Carefully turn the pump head to the desired position. If the pump head is stuck, loosen it with a light blow of a rubber mallet.	TM086832
3	Place the control box in horizontal position so that the Grundfos logo is in vertical position. The motor shaft must be in horizontal position.	TM052869

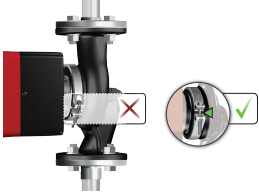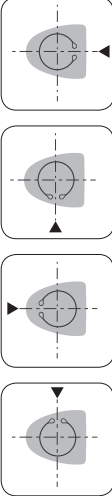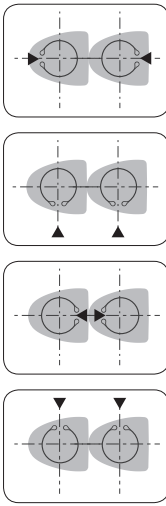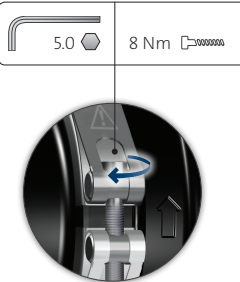| Step	Action	Illustration
4	Due to the drain hole in the stator housing, position the gap of the clamp as shown in step 4a or 4b.	TM052870
4a	Single-head pump. Position the clamp so that the gap points towards the arrow. It can be in position 3, 6, 9 or 12 o'clock.	TM052918
4b	Twin-head pump. Position the clamps so that the gaps point towards the arrows. They can be in position 3, 6, 9 or 12 o'clock.	TM052917
5	Fit and tighten the screw that holds the clamp to 8 Nm ± 1 Nm. Do not retighten the screw if condensed water is dripping from the clamp.	5.0 ⬡ 8 Nm TM052872
6	Fit the insulating shells. The insulating shells for pumps in air-conditioning and cooling systems must be ordered separately.	TM086833

3.8 Electrical installation

Carry out the electrical connection and protection according to local regulations.

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

WARNING
Electric shock
Death or serious personal injury
- Before starting any work on the product, make sure that the power supply has been switched off. Lock the main switch in position 0. Type and requirements as specified in EN 60204-1, 5.3.2.

WARNING
Electric shock
Death or serious personal injury
- Connect the pump to an external main switch with a minimum contact gap of 3 mm in all poles.
- Use earthing or neutralisation for protection against indirect contact.
- **For plug-connected versions:** In case of an insulation fault, the fault current may be a pulsating DC. Observe national legislation about requirements for and selection of Residual Current Device (RCD) when installing the pump.
- **For terminal-connected versions:** In case of an insulation fault, the fault current may be a DC or pulsating DC. Observe national legislation about requirements for and selection of Residual Current Device (RCD) when installing the pump.

Make sure that the fuse is dimensioned according to the nameplate and local legislation.

Connect all cables in accordance with local regulations.

Make sure that all cables are heat-resistant up to 70 °C. Install all cables in accordance with EN 60204-1 and EN 50174-2.

- Make sure that the pump is connected to an external main switch.
- The pump requires no external motor protection.
- The motor incorporates thermal protection against slow overloading and blocking (TP 211 according to IEC 60034-11).
- When switched on via the power supply, the pump starts after approximately 5 seconds.

3.8.1 Supply voltage

1 × 230 V ± 10 %, 50/60 Hz, PE.

The voltage tolerances are intended for mains-voltage variations. Do not use the voltage tolerances for running pumps at other voltages than those stated on the nameplate.

3.9 Wiring diagrams
3.9.1 Connection to power supply, plug-connected versions
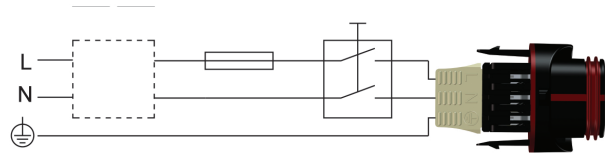
Example of plug-connected motor with main switch, backup fuse and additional protection

Pos.	Description
1	RCD
2	Fuse
3	External switch

3.9.2 Connection to external controllers, plug-connected versions
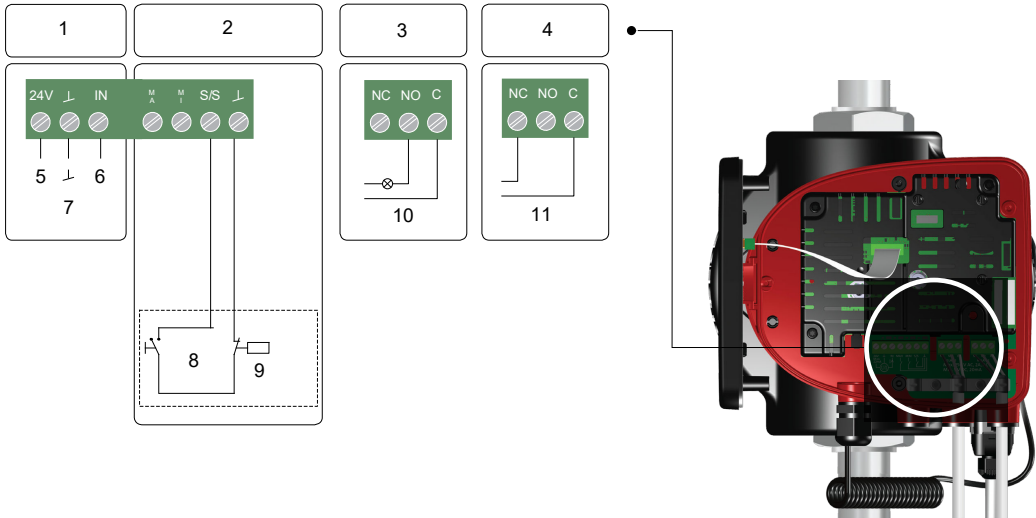
Example of connections in the control box of plug-connected versions

Pos.	Description
1	Analog input
2	Digital input
3	Relay 1
4	Relay 2
5	Vcc
6	Signal
7	Sensor
8	Start/stop
9	On/off timer
10	Operation
11	Alarm

Use C and NC for fault signals as this enables serial connections of more relays and detection of signal cable defects.

The connection terminals of plug-connected versions (figure above) differ from those of terminal-connected versions (figure below, see section Connections in the control box, terminal-connected versions), but they have the same function and connection options.

3.9.3 Connections in the control box, terminal-connected versions
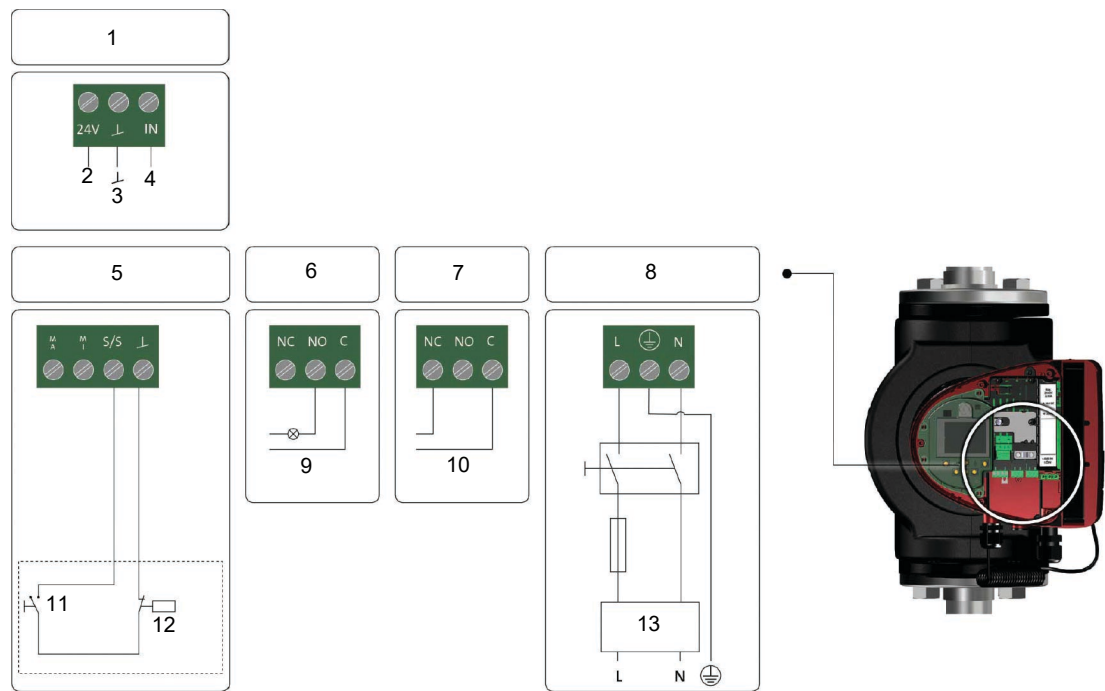
Example of connections in the control box of terminal-connected versions

Pos.	Description
1	Analog input
2	Vcc
3	Sensor
4	Signal
5	Digital input
6	Relay 1
7	Relay 2
8	Power
9	Operation
10	Alarm
11	Start/stop
12	On/off timer
13	RCD
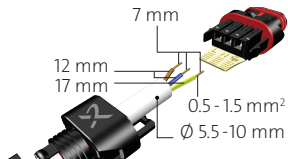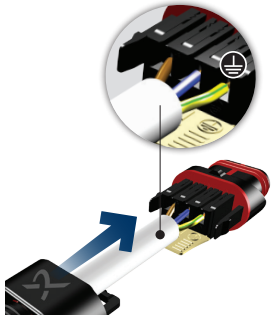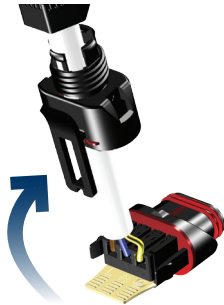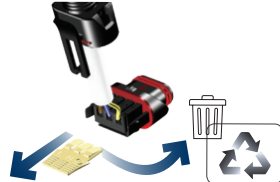
Use C and NC for fault signals as this enables serial connections of more relays and detection of signal cable defects.
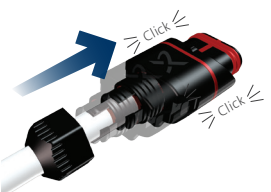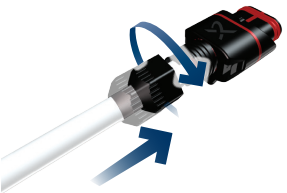
For further information on digital and analog inputs, see sections Digital inputs and Analog input.

For information on relay outputs, see section Relay outputs.

Related information
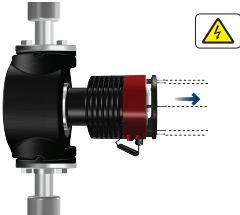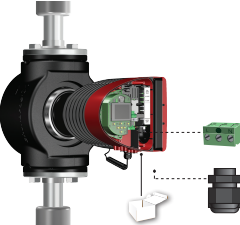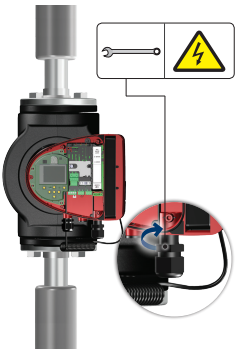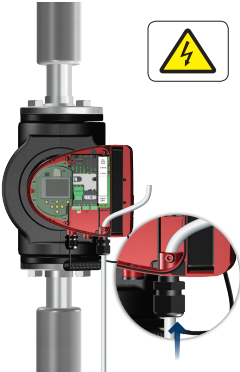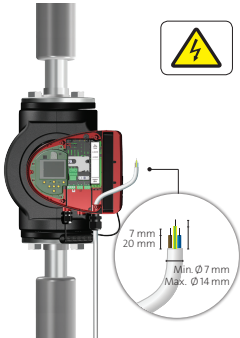
4.3 Multipump pairing

7.9.3 Digital inputs

7.9.4 Analog input

7.9.2 Relay outputs
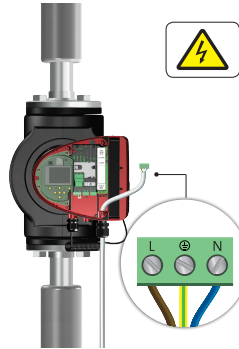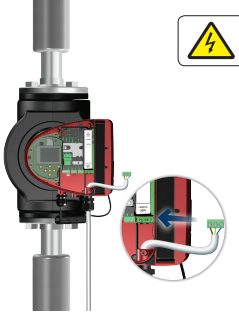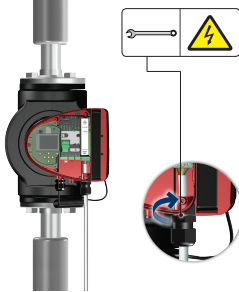
3.10 Connecting the power supply, plug-connected versions

Step	Action	Illustration
1	Fit the cable gland and plug cover to the cable. Strip the cable conductors as illustrated.	7 mm 12 mm 17 mm 0.5 - 1.5 mm² Ø 5.5 -10 mm TM055538
2	Connect the cable conductors to the power supply plug.	TM055539
3	Bend the cable with the cable conductors pointing upwards.	TM055540
4	Pull out the conductor guide plate and throw it away.	TM055541

Step	Action	Illustration
5	Click the plug cover onto the power supply plug.	Click Click TM055542
6	Screw the cable gland onto the power supply plug.	TM055543
7	Insert the power supply plug into the male plug in the pump control box.	GRUNDFOS Click TM086919
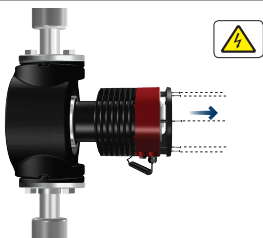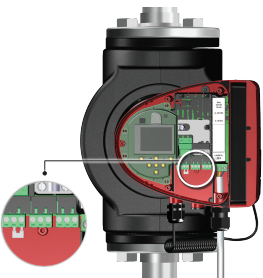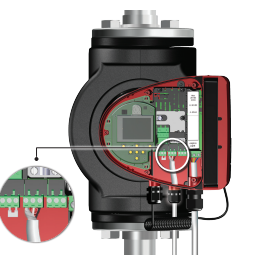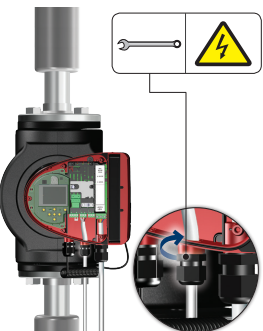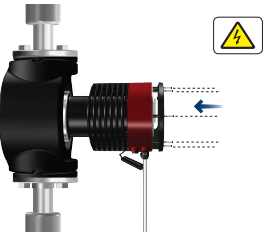
3.11 Connecting the power supply, terminal-connected versions

Step	Action	Illustration
1	Remove the front cover from the control box. Do not remove the screws from the cover.	TM052875
2	Locate the power supply plug and cable gland in the small cardboard box supplied with the pump.	TM052876
3	Connect the cable gland to the control box.	TM052877
4	Pull the power supply cable through the cable gland.	TM052878
5	Strip the cable conductors as illustrated.	7 mm 20 mm Min. Ø 7 mm Max. Ø 14 mm TM052879

Step	Action	Illustration
6	Connect the cable conductors to the power supply plug.	L ⊕ N TM052880
7	Insert the power supply plug into the male plug in the pump control box.	TM052881
8	Tighten the cable gland. Fit the front cover.	TM052882

3.12 Connecting the external control

The example is based on a MAGNA3 terminal-connected version. The connection terminals of plug-connected versions differ from those of terminal-connected versions, but they have the same function and connection options. See sections Wiring diagrams and Input and output communication.

Step	Action	Illustration
1	Remove the front cover from the control box. Do not remove the screws from the cover.	TM070381
2	Locate the digital input terminal connector.	TM070382
3	Pull the cable through a M16 cable gland and one of the cable entries on the pump. Take out the desired terminal, connect the cable conductors and reinsert the terminal. See sections External connections and Input and output communication for instructions on how to connect the cable to the different terminals in the pump.	TM070383
4	Tighten the cable gland.	TM071407
5	Refit the front cover to the control box.	TM070384

Related information

4. Starting up the product

4.1 Single-head pump

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

Do not start the pump until the system has been filled with liquid and vented. Furthermore, the required minimum inlet pressure must be available at the pump inlet. See section Technical data.

Flush the system with clean water to remove all impurities before you start the pump.

The pump is self-venting through the system, and the system must be vented at the highest point.

Step	Action	Illustration
1	Switch on the power supply to the pump. The pump has been factory set to "AUTOADAPT" mode, which starts after approximately 5 seconds.	TM086914
2	Operating panel at first startup. After a few seconds, the pump display changes to the startup guide.	TM086834
3	The startup guide guides you through the general settings of the pump, such as language, date and time. If you do not touch the buttons on the operating panel for 15 minutes, the display goes into sleep mode. When you touch a button, the "**Home**" display appears.	TM086835
4	When you have made the general settings, select the desired control mode or let the pump run in AUTOADAPT mode. For additional settings, see section Control functions.	TM086836

Related information

4.2 Twin-head pump

MAGNA3 D

The pumps are paired from factory. When switching on the power supply, the heads will establish connection. Please allow approximately 5 seconds for this to happen.

Flush the system with clean water to remove all impurities before you start the pump.

4.3 Multipump pairing

Note: Available for pumps with production code from 1838 (Model D and Model E can be paired).

After turning on the power supply, the pump's initial setup menu asks you whether or not you want to keep the multi-pump system activated. Several scenarios can play out.

Keep multipump system

*   **Only one pump head is connected to the power supply.**

    If you have not connected both pump heads to the power supply and you choose to keep the multi-pump system, warning 77 appears in the display. See figure below. Connect the second pump head. Once both pumps are on, the pump heads will establish a connection and the warning will deactivate.

*   **Both pump heads are connected to the power supply.**

    Configuring is only necessary from one of the pump heads.

Dissolve multipump system

*   **Only one pump head is connected to the power supply.**

    If you have not connected both pump heads to the power supply and you choose to dissolve the multi-pump system, the second pump head, if connected to the power supply, will ask you whether or not you want to keep the multi-pump system. Choose to dissolve the multi-pump system.

*   **Both pump heads are connected to the power supply.**

    Configuring is only necessary from one of the pump heads.
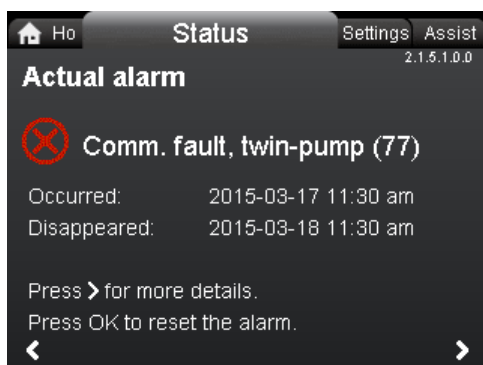
Warning 77

See sections Digital inputs, Relay outputs, and Multipump modes for additional twin-head pump setup options.

Related information

4.3.1 Configuring twin-head pumps

If you replace a pump head of a twin-head pump, the twin-head pump will function as two single pumps until you have configured the pump heads and warning 77 is shown in the pump display. See figure above.

To establish communication between the pump heads, run the multipump setup via the "**Assist**" menu. The pump from which you run the setup will be the master pump. See section "Multipump setup".

Related information

4.4 Connection of Grundfos Go via Bluetooth

The pump communicates wirelessly with Grundfos GO via Bluetooth. Before connecting the product to Grundfos GO Remote, the Grundfos GO Remote app must be downloaded to your smartphone or tablet. The app is free of charge and available for iOS and Android devices.

1. Open Grundfos GO Remote on your device. Make sure that Bluetooth is enabled.

    Your device must be within reach of the product to establish Bluetooth connection.

2. Press the Bluetooth CONNECT button on Grundfos GO on your device.

3. Press the connect button on the operating panel in the pump. The center LED of Grundfos eye above the display is flashing until your device is connected. Once the connection is established, the LED will be permanently on.

Grundfos GO Remote is now ready to setting up and monitoring the product.

5. Handling and storing the product

5.1 Frost protection

> ❗ If the pump is not used during periods of frost, take the necessary steps to prevent frost bursts.

6. Product introduction

MAGNA3 is a complete range of circulator pumps with integrated controller enabling adjustment of pump performance to the actual system requirements. In many systems, this reduces the power consumption considerably, reduces noise from thermostatic radiator valves and similar fittings and improves the control of the system.

You can set the desired head on the operating panel.

6.1 Applications

The pump is designed for circulating liquids in the following systems:

- heating systems
- domestic hot-water systems
- air-conditioning and cooling systems.

You can also use the pump in the following systems:

- ground-source heat-pump systems
- solar-heating systems.

6.1.1 Intended use in the United Kingdom

Safety precautions for UK:

> 🚫 The product is not intended for use in any home appliance, home automation, home control system or consumer product in the UK.

6.2 Pumped liquids

The pump is suitable for thin, clean, non-aggressive and non-explosive liquids, not containing solid particles or fibres that may attack the pump mechanically or chemically.

In heating and cooling systems, the water must meet the requirements of accepted standards, codes, and any authority having jurisdiction (AHJ) requirements.

In heating systems, the water must meet the requirements of accepted standards on water quality in heating systems, for example the German standard VDI 2035.

The pumps are also suitable for domestic hot-water systems.

> ❗ Observe local legislation regarding pump housing material.

Stainless steel variants of MAGNA3 can be used to pump pool water with the one of the following properties:

- Chloride (Cl-) ≤ 150 mg/l and free chlorine ≤ 1.5 mg/l at temperatures ≤ 30 °C
- Chloride (Cl-) ≤ 100 mg/l and free chlorine ≤ 1.5 mg/l at temperatures from 30 to 40 °C.

We strongly recommend that you use stainless-steel pumps in domestic hot-water applications to avoid corrosion.

In domestic hot-water systems, we recommend that you use the pump only for water with a degree of hardness lower than approximately 14 °dH.

In domestic hot-water systems, we recommend that you keep the liquid temperature below 65 °C to eliminate the risk of lime precipitation.

> 🚫 Do not pump aggressive liquids.

> 🚫 Do not pump flammable, combustible or explosive liquids.

6.2.1 Glycol

You can use the pump for pumping water-ethylene-glycol mixtures up to 50 %.

Example of a water-ethylene-glycol mixture:

Maximum viscosity: 50 cSt ~ 50 % water / 50 % ethylene-glycol mixture at -10 °C.

The pump has a power-limiting function that protects it against overload.

The pumping of water-ethylene-glycol mixtures affects the maximum curve and reduces the performance, depending on the water-ethylene-glycol mixture and the liquid temperature.

To prevent the ethylene-glycol mixture from degrading, avoid temperatures exceeding the rated liquid temperature and minimise the operating time at high temperatures.

Clean and flush the system before you add the ethylene-glycol mixture.

To prevent corrosion or lime precipitation, check and maintain the ethylene-glycol mixture regularly. If further dilution of the supplied ethylene-glycol is required, follow the glycol supplier's instructions.

> ❗ Additives with a density and/or kinematic viscosity higher than those/that of water reduce the hydraulic performance.

Pumped liquids, threaded version

6.3 Pump heads in twin-head pumps

The twin-head pump housing has a flap valve on the outlet side. The flap valve seals off the port of the idle pump housing to prevent the pumped liquid from running back to the inlet side. See figure below.

Twin-head pump housing with flap valve

Due to the flap valve, there is a difference in the hydraulics between the two pump heads. See figure below.
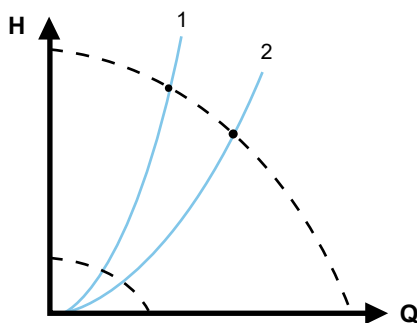
Hydraulic difference between the two pump heads

Pos.	Description
1	Right pump head
2	Left pump head

6.4 Identification

6.4.1 Nameplate
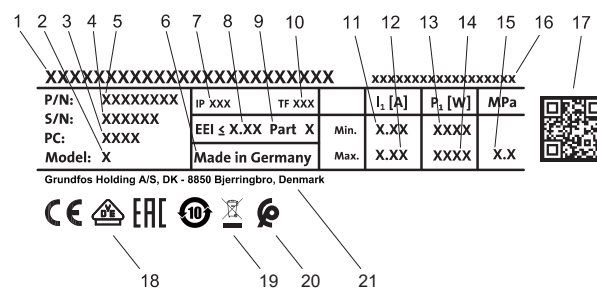
Example of nameplate

Pos.	Description
1	Product name
2	Model
3	Production code, year and week [1]
4	Serial number
5	Product number
6	Country of manufacture
7	Enclosure class
8	Energy Efficiency Index, EEI
9	Part, according to EEI
10	Temperature class
11	Minimum current [A]
12	Maximum current [A]
13	Minimum power [W]
14	Maximum power [W]
15	Maximum system pressure
16	Voltage [V] and frequency [Hz]
17	QR code
18	CE mark and approvals
19	Crossed-out wheeled bin according to EN 50419:2006
20	Moroccan conformity mark
21	Manufacturer's name and address

[1] Example of production code: 1326. The pump was produced in week 26, 2013.

Production code on packaging

6.5 Model type

These installation and operating instructions cover all models. The model version is stated on the nameplate. See figure below.

Model type on the product

You can see the different model versions in the MAGNA3 data booklet.

6.6 Radio communication

The radio part of this product is a class 1 device and can be used anywhere in the EU member states without restrictions.

Intended use

This pump incorporates a radio for remote control.

The pump can communicate with Grundfos GO and with other MAGNA3 pumps of the same type via the built-in radio.

6.7 Closed valve operation

MAGNA3 pumps can operate at any speed against a closed valve for several days without damage to the pump. However, Grundfos recommends to operate at the lowest possible speed curve to minimise energy losses. There are no minimum flow requirements.

> ! Do not close inlet and outlet valves simultaneously, always keep one valve open when the pump is running to avoid pressure buildup.
>
> Media- and ambient temperatures must never exceed the specified temperature range.

6.8 Insulating shells

Insulating shells are available for single-head pumps only.

> ! Limit the heat loss from the pump housing and pipes.

Reduce the heat loss by insulating the pump housing and the pipes. See figure below and see section Mechanical installation.

- Insulating shells for pumps in heating systems are supplied with the pump.
- Insulating shells for applications with ice buildup are available as an accessory. See section Insulating kits for applications with ice buildup.

The fitting of insulating shells increases the pump dimensions.

Insulating shells

Pumps for heating systems are factory-fitted with insulating shells. Remove the insulating shells before installing the pump.

Related information

3.3 Mechanical installation

11.7 Insulating kits for applications with ice buildup

6.9 Non-return valve

If a non-return valve is fitted in the pipe system, make sure that the set minimum outlet pressure of the pump is always higher than the closing pressure of the valve. See figure below. This is especially important in proportional-pressure control mode with reduced head at low flow.
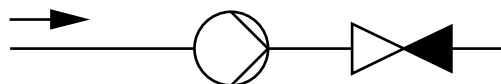
Non-return valve

7. Control functions

7.1 Quick overview of control modes

AUTOADAPT

- Recommended for most heating systems.
- During operation, the pump automatically makes the necessary adjustment to the actual system characteristic.
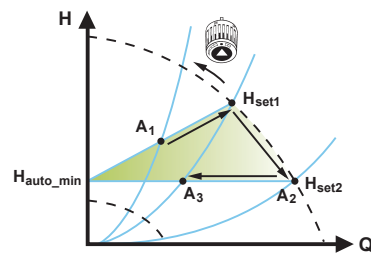
For further information, see section *7.3.2 AUTOADAPT* .

FLOWADAPT

The FLOWADAPT control mode combines a control mode and a function:

- The pump is running in AUTOADAPT.
- The delivered flow from the pump will never exceed a selected FLOWLIMIT.
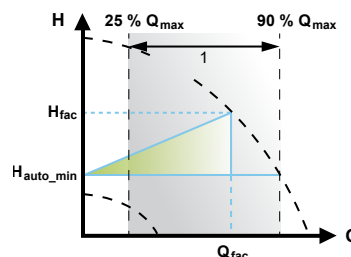
For further information, see section *7.3.3 FLOWADAPT* .

Proportional pressure

- Used in systems with relatively large pressure losses in the distribution pipes.
- The head of the pump will increase proportionally to the flow in the system to compensate for the large pressure losses in the distribution pipes.
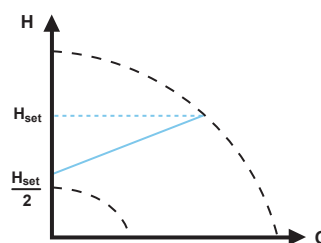
For further information, see section *7.3.4 Proportional pressure*.

Constant pressure

- We recommend this control mode in systems with relatively small pressure losses.
- The pump head is kept constant, independent of the flow in the system.
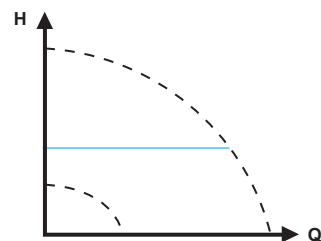
For further information, see section *7.3.5 Constant pressure* .

Constant temperature

In systems with a fixed system characteristic, for example domestic hot-water systems, the control of the pump according to a constant return-pipe temperature is relevant.
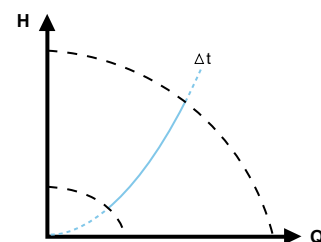
For further information, see section *7.3.6 Constant temperature*.

Differential temperature

- Ensures a constant differential temperature drop across heating and cooling systems.
- The pump will maintain a constant differential temperature between the pump and the external sensor.
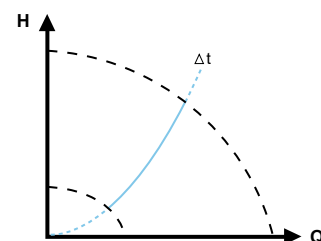
For further information, see section *7.3.7 Differential temperature*.

Constant flow

Note: Available for pumps with production code from 1838.

- The pump maintains a constant flow in the system independently of the head.
- It is not possible to use an external sensor, instead, the pump uses its internal sensor.
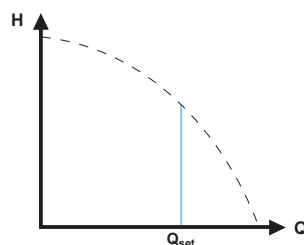
For further information, see section *7.3.8 Constant flow* .

Constant curve

- The pump can be set to operate according to a constant curve, like an uncontrolled pump.
- Set the desired speed in % of the maximum speed in the range from minimum to 100 %.
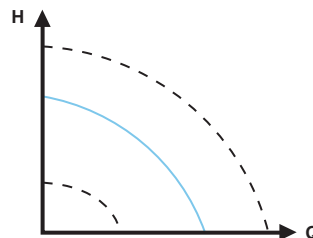
For further information, see section *7.3.9 Constant curve* .

Multipump modes

- Alternating operation:
  Only one pump is operating at a time.
- Backup operation:
  One pump is operating continuously. In the event of a fault, the backup pump starts automatically.
- Cascade operation:
  The pump performance is automatically adapted to the consumption by switching pumps on and off.

For further information, see section *7.5.1 Multipump function*.

Related information

7.2 Operating modes

Normal

The pump runs according to the selected control mode.

💡 You can select the control mode and setpoint even if the pump is not running in **Normal** mode.

Stop

The pump stops.

Min.

You can use the minimum curve mode in periods in which a minimum flow is required. This operating mode is for instance suitable for manual night setback if automatic night setback is not desired.

The minimum curve can be adjusted. See section Operating modes.

Max.

You can use the maximum curve mode in periods in which a maximum flow is required. This operating mode is for instance suitable for hot-water priority.

The maximum curve can be adjusted. See section Operating modes.
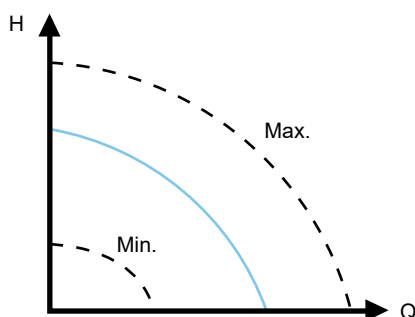
Maximum and minimum curves

Related information

7.3 Control modes

7.3.1 Factory setting

The pumps have been factory-set to AUTOADAPT without automatic night setback, which is suitable for most installations.

The setpoint has been factory-set.

7.3.2 AUTOADAPT

We recommend the AUTOADAPT control mode for most heating systems, especially in systems with relatively large pressure losses in the distribution pipes, and in replacement situations where the proportional-pressure duty point is unknown.

This control mode has been developed specifically for heating systems and we do not recommend it for air-conditioning and cooling systems.

Characteristics and key benefits

- Automatically adjusts the pump to actual system characteristics.
- Ensures minimum energy consumption and a low noise level.
- Reduced operating costs and increased comfort.

Technical specifications
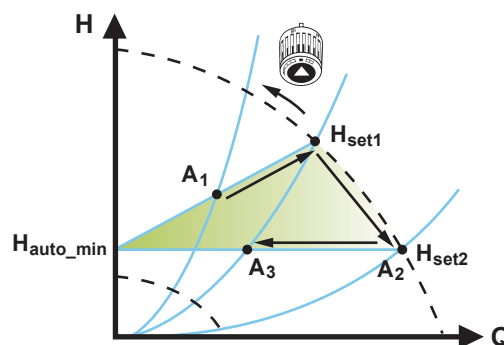
AUTOADAPT control

A_1:	Original duty point.
A_2:	Lower registered head on the max. curve.
A_3:	New duty point after AUTOADAPT control.
H_{set1}:	Original setpoint setting.
H_{set2}:	New setpoint after AUTOADAPT control.
H_{auto_min}:	A fixed value of 1.5 m.

The AUTOADAPT control mode is a form of proportional-pressure control where the control curves have a fixed origin, H_{auto_min}.

When you have enabled AUTOADAPT, the pump will start with the factory setting, H_{set1}, corresponding to approx. 55 % of its maximum head, and then adjust its performance to A_1. See figure above.

When the pump registers a lower head on the maximum curve, A_2, the AUTOADAPT function automatically selects a correspondingly lower control curve, H_{set2}. If the valves in the system close, the pump adjusts its performance to A_3. See figure above.

💡 Manual setting of the setpoint is not possible.

7.3.3 FLOWADAPT

The FLOWADAPT control mode combines AUTOADAPT and FLOWLIMIT, meaning that the pump runs AUTOADAPT while at the same time ensuring that the flow never exceeds the entered FLOWLIMIT value. This control mode is suitable for systems where a maximum flow limit is desired and where a steady flow through the boiler in a boiler system is required. Here, no extra energy is used for pumping too much liquid into the system.

In systems with mixing loops, you can use FLOWADAPT to control the flow in each loop.

Characteristics and key benefits

- The dimensioned flow for each zone (required heat energy) is determined by the flow from the pump. This flow can be set precisely in the FLOWADAPT control mode without using throttling valves.

- When the flow is set lower than the balancing valve setting, the pump will ramp down instead of losing energy by pumping against a balancing valve.

- Cooling surfaces in air-conditioning systems can operate at high pressure and low flow.

Note: The pump cannot reduce the flow on the inlet side, but is able to control that the flow on the outlet side is at least the same as on the inlet side. This is due to the fact that the pump has no built-in valve.

Technical specifications
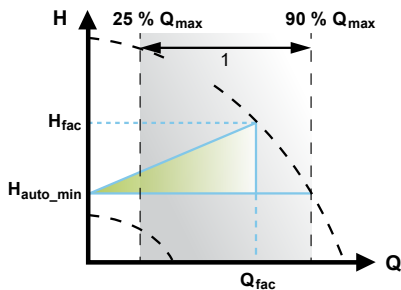
FLOWADAPT control

Pos.	Description
1	Setting range

The factory setting of the FLOWADAPT is the flow where the AUTOADAPT factory setting meets the maximum curve. See figure above.

The typical pump selection is based on the required flow and calculated pressure losses. The pump is typically oversized by 30 to 40 % to ensure that it can overcome the pressure losses in the system. Under these conditions, the full benefit of AUTOADAPT cannot be obtained.

To adjust the maximum flow of this "oversized" pump, balancing valves are built into the circuit to increase the resistance and thus reduce the flow.

The FLOWADAPT function reduces the need for a pump throttling valve, see figure below, but does not eliminate the need for balancing valves in heating systems.
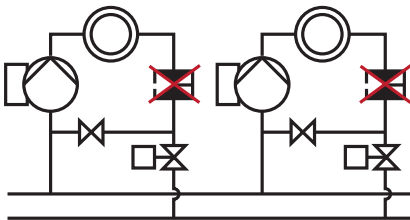
Reduced need for a pump throttling valve

7.3.4 Proportional pressure

Proportional pressure is suitable in systems with relatively large pressure losses in the distribution pipes and in air-conditioning and cooling systems:

- Two-pipe heating systems with thermostatic valves and the following:
  - very long distribution pipes
  - strongly throttled pipe balancing valves
  - differential-pressure regulators
  - large pressure losses in those parts of the system where the total quantity of water flows (for example boiler, heat exchanger and distribution pipe up to the first branching).

- Primary circuit pumps in systems with large pressure losses in the primary circuit.

- Air-conditioning systems with the following:
  - heat exchangers (fan coils)
  - cooling ceilings
  - cooling surfaces.

Characteristics and key benefits

- The head of the pump increases proportionally to the flow in the system.

- Compensates for large pressure losses in the distribution pipes.

**Technical specifications**
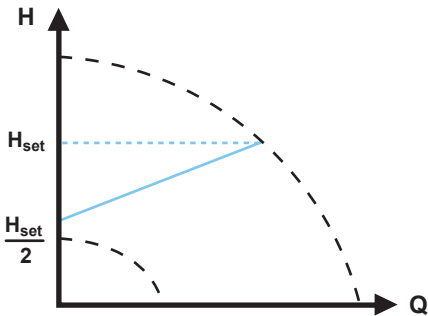
Proportional-pressure control

The head is reduced at decreasing flow demand and increased at rising flow demand.

The head against a closed valve is half the setpoint H_{set}. You can set the setpoint with an accuracy of 0.1 metre.

7.3.5 Constant pressure

A constant pressure is advantageous in systems with relatively small pressure losses in the distribution pipes:

- Two-pipe heating systems with thermostatic valves:
    - dimensioned for natural circulation
    - small pressure losses in those parts of the system where the total quantity of water flows (for example boiler, heat exchanger and distribution pipe up to the first branching)
    - modified to a high differential temperature between flow pipe and return pipe (for example district heating).
- Underfloor heating systems with thermostatic valves.
- One-pipe heating systems with thermostatic valves or pipe balancing valves.
- Primary circuit pumps in systems with small pressure losses in the primary circuit.

Characteristics and key benefits

- The pump pressure is kept constant, independent of the flow in the system.

Technical specifications
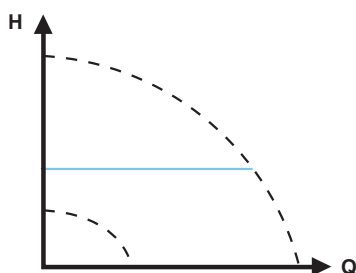
Constant-pressure control

7.3.6 Constant temperature

This control mode is suitable in systems with a fixed system characteristic, for example domestic hot-water systems, where control of the pump according to a constant return-pipe temperature is relevant.

The pump is from factory set to operate in a heating system with a controller gain, Kp, equal to 1. If the pump operates in a cooling system, the gain must be changed to a negative value, for example -1. See section "Controller settings".

Characteristics and key benefits

- The temperature is kept constant.
- Use FLOWLIMIT to control the maximum circulation flow.

Technical specifications
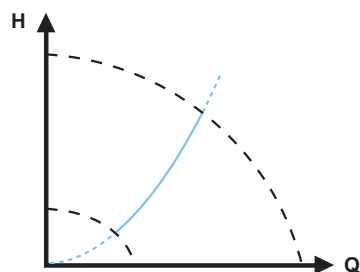
Constant-temperature control

When you use this control mode, do not install any balancing valves in the system.
The inverse control for cooling application is available from model B.

Temperature sensor

If the pump is installed in the flow pipe, install an external temperature sensor in the return pipe of the system. See figure below. Install the sensor as close as possible to the consumer (radiator, heat exchanger, etc.).
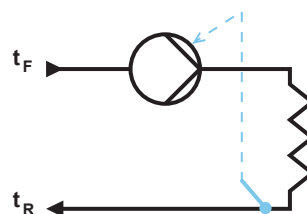
Pump with external sensor

We recommend that you install the pump in the flow pipe.

If the pump is installed in the return pipe of the system, you can use the internal temperature sensor. In this case, install the pump as close as possible to the consumer (radiator, heat exchanger, etc.).
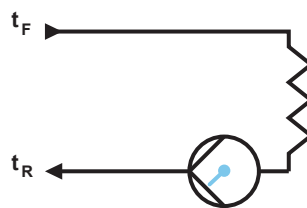
Pump with internal sensor

Sensor range:
- minimum -10 °C
- maximum +130 °C

To ensure that the pump is able to control the temperature, we recommend that you set the sensor range between -5 and +125 °C.

Related information

8.7.4 "Controller settings"

7.3.7 Differential temperature

Select this control mode if the pump performance is to be controlled according to a differential temperature in the system where the pump is installed.

Characteristics and key benefits

- Ensures a constant differential temperature drop across heating and cooling systems.
- Ensures a constant differential temperature between the pump and the external sensor, see figures below.
- Requires two temperature sensors, the internal temperature sensor together with an external sensor.

Technical specifications
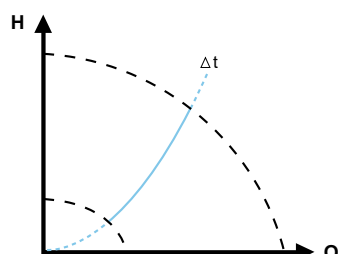
Differential temperature

The differential-temperature control mode is available in model B. The model version is stated on the nameplate. See section Model type.

Temperature sensor

To measure the temperature difference of the flow and return pipe, you must use both the internal sensor and an external sensor.

If the pump is installed in the flow pipe, the external sensor must be installed in the return pipe and vice versa. Always install the sensor as close as possible to the consumer (radiator, heat exchanger, etc.). See figure below.
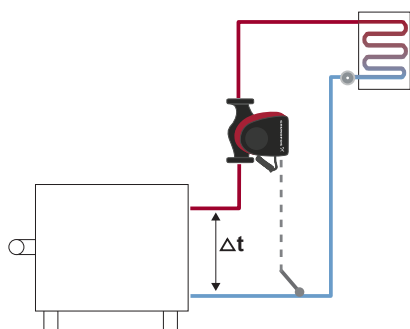
Differential temperature

Related information

7.3.8 Constant flow

Note: Available for pumps with production code from 1838.

The pump maintains a constant flow in the system independently of the head. See figure below.

Constant flow is suitable in applications such as air handling units, hot-water systems and ground-source heating systems.

Characteristics and key benefits

- It is not possible to use an external sensor, instead, the pump uses its internal sensor.
- In multipump systems constant flow is only available in alternating and backup operation, not cascade operation.
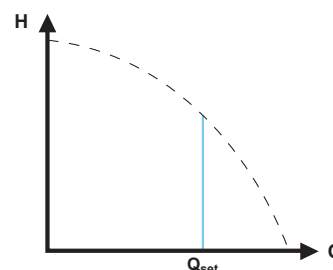
Constant flow rate

7.3.9 Constant curve

A constant curve is suitable for systems where there is a demand for both constant flow and constant head, i.e.:

- heating surfaces
- cooling surfaces
- heating systems with 3-way valves
- air-conditioning systems with 3-way valves
- chiller pumps.

Characteristics and key benefits

- If an external controller is installed, the pump is able to change from one constant curve to another, depending on the value of the external signal.
- Depending on your preferences, the pump can be controlled according to either a maximum or minimum curve.

Technical specifications
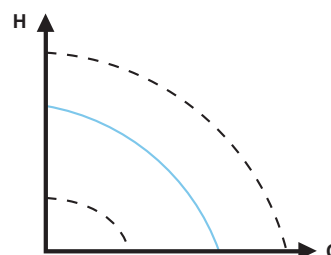
Constant-curve duty

The pump can be set to operate according to a constant curve, like an uncontrolled pump. See figure above.

Depending on the pump model, you can set the desired speed in % of the maximum speed. The span of control depends on the minimum speed, power and pressure limitation of the pump.

If the pump speed is set in the range between minimum and maximum, the power and pressure are limited when the pump is running on the maximum curve. This means that the maximum performance can be achieved at a speed lower than 100 %. See figure below.
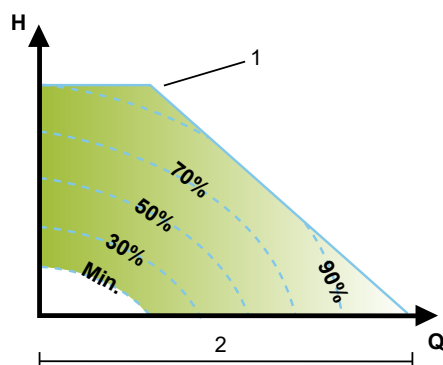
Power and pressure limitations influencing the maximum curve

Pos.	Description
1	Limited max. curve
2	Speed setting from 0 to 100 %

You can also set the pump to operate according to the maximum or minimum curve, like an uncontrolled pump:

• You can use the maximum curve mode in periods in which a maximum flow is required. This operating mode is for instance suitable for hot-water priority.

• You can use the minimum curve mode in periods in which a minimum flow is required. This operating mode is for instance suitable for manual night setback if automatic night setback is not desired.

You can select these two operating modes via the digital inputs.

In the control mode constant curve, you can obtain constant flow by choosing a setpoint at 100 % and choosing the desired value for the flow with the flow limit function FLOWLIMIT. Take the accuracy of the flow estimation into consideration.

7.4 Additional control mode features

MAGNA3 offers additional features for the control modes to meet specific demands.

7.4.1 FLOWLIMIT

The feature is an integrated part of the FLOWADAPT control mode, but can also be used in:

• proportional-pressure mode

• constant-pressure mode

• constant-temperature mode

• constant-curve mode

• differential-temperature mode.

Characteristics and key benefits

• A control mode feature that, when activated, ensures that the rated maximum flow is never exceeded.

By enabling FLOWLIMIT in systems where MAGNA3 has full authority, the rated flow is never exceeded, thus eliminating the need for throttling valves.

Technical specifications
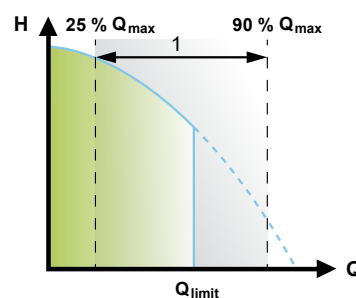
FLOW $_{LIMIT}$

Pos.	Description
1	Setting range

The factory setting of the FLOWLIMIT is the flow where the AUTOADAPT factory setting meets the maximum curve.

The setting range for the FLOWLIMIT is 25 to 90 % of the Q_{max} of the pump. Do not set the FLOWLIMIT lower than the dimensioned duty point.

In the flow range between 0 and Q_{limit}, the pump will run according to the selected control mode. When Q_{limit} is reached, the FLOWLIMIT function will reduce the pump speed to ensure that the flow never exceeds the FLOWLIMIT set, no matter if the system requires a higher flow due to increased resistance in the system.
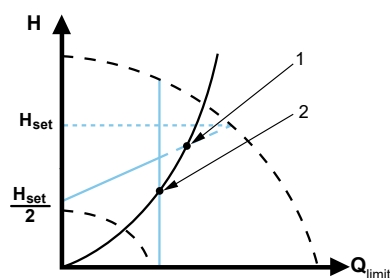
Proportional-pressure control with FLOWLIMIT

Pos.	Description
1	Normal proportional-pressure duty point
2	FLOWLIMIT duty point
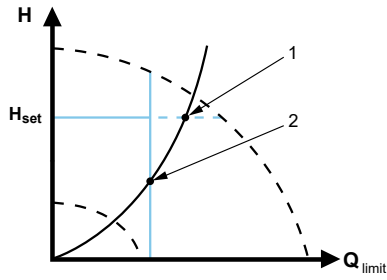
Constant-pressure control with FLOWLIMIT

Pos.	Description
1	Normal constant-pressure duty point
2	FLOWLIMIT duty point
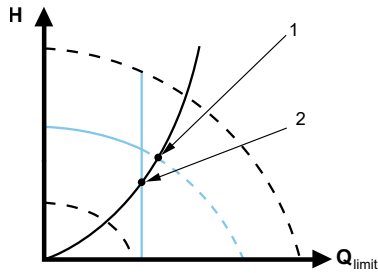
Constant curve with FLOWLIMIT

Pos.	Description
1	Normal constant-curve duty point
2	FLOWLIMIT duty point

7.4.2 Automatic night setback

A night setback system is often integrated into a building management system (BMS), or as part of an equivalent electronic control system, which has a built-in timer.

The feature is not beneficial in a room that has underfloor heating because of the regulating inertia of the underfloor heating.

Characteristics and key benefits

- Automatic night setback lowers the room temperature at night, which reduces heating costs.
- The pump automatically changes between normal duty and night setback (duty at low demand) depending on the flow pipe temperature.
- Once activated, the pump runs on the minimum curve.

Technical specifications

The pump automatically changes to night setback when the built-in sensor registers a flow-pipe temperature drop of more than 10 to 15 °C within approximately two hours. The temperature drop must be at least 0.1 °C/min.

Changeover to normal duty takes place without time lag when the temperature has increased by approximately 10 °C.

💡 You cannot enable automatic night setback when the pump is in constant-curve mode.

7.5 Multipump modes

7.5.1 Multipump function

The multipump function enables the control of single-head pumps connected in parallel and twin-head pumps without the use of external controllers. The pump is designed for multipump connection via the wireless GENIair connection. The built-in wireless GENIair module enables communication between pumps and with Grundfos GO without the use of add-on modules. See sections Servicing the product and Grundfos GO.

Pump system:

- Twin-head pump.
- Two single-head pumps connected in parallel. The pumps must be of equal size and type. Each pump requires a non-return valve in series with the pump.

A multipump system is set via a selected pump, i.e. the master pump (first selected pump). The multipump functions are described in the following sections.

Configuration of twin-head pumps is described in section Twin-head pump.

For information about input and output communication in a multipump system, see section External connections in a multipump system.

7.5.2 Alternating operation

Only one pump is operating at a time. The change from one pump to the other depends on time or energy. If a pump fails, the other pump will take over automatically.

7.5.3 Backup operation

One pump is operating continuously. The backup pump is operating at intervals to prevent seizing up. If the duty pump stops due to a fault, the backup pump will start automatically.

7.5.4 Cascade operation

Cascade operation ensures that the pump performance is automatically adapted to the consumption by switching pumps on or off. The system thus runs as energy-efficiently as possible with a constant pressure and a limited number of pumps.

The slave pump will start when the master pump either runs at 90 % of the maximum speed or runs on the maximum curve.

The slave pump stops if one of the following conditions are fulfilled:

- One of the two pumps runs on minimum curve.
- One of the two pumps runs below 50 % of the maximum speed and at the same time runs below 50 % of the maximum power consumption.

Cascade operation is available in constant speed and constant pressure. You can with advantage choose a twin-head pump, as the backup pump will start for a short period in peak-load situations.

All pumps in operation will run at equal speed. Pump changeover is automatic and depends on speed, operating hours and faults.

7.6 Flow estimation accuracy

The internal sensor estimates the difference in pressure between the inlet and outlet port of the pump. The measurement is not a direct differential-pressure measurement, but by knowing the hydraulic design of the pump, you can estimate the differential pressure across the pump. The speed and power give a direct estimation of the actual duty point at which the pump is running.

The calculated flow rate has a typical accuracy of ± 5 % of Q_{max}. The less flow through the pump, the less accurate the reading will be. In worst case scenarios, such as closed valve operation, the accuracy can be up to 10 % of Q_{max}.

See also section Heat energy monitor.

Example:

Q_{max}
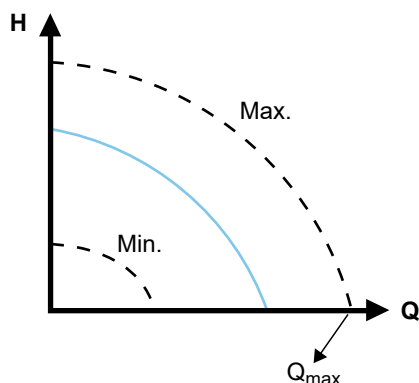
1. MAGNA3 65-60 has a Q_{max} of 40 m^3/h. Typically 5 % accuracy means 2 m^3/h inaccuracy of Q_{max} ± 2 m^3/h.

2. This accuracy is valid for the entire QH area. If the pump indicates 10 m^3/h, the measurement is 10 ± 2 m^3/h.

3. The flow rate can be from 8-12 m^3/h.

The use of a mixture of water and ethylene-glycol will reduce the accuracy.

If the flow is less than 10 % of Qmax, the display shows a low flow.

Related information

7.9.5 *Heat energy monitor*

7.7 External connections

WARNING
Electric shock
Minor or moderate personal injury
-   Separate wires connected to supply terminals, outputs NC, NO, C and start-stop input from each other and from the supply by reinforced insulation.

Make sure that all cables are heat-resistant up to 70 °C.
Install all cables in accordance with EN 60204-1 and EN 50174-2.

Connect all cables in accordance with local regulations.

The connection terminals of plug-connected versions differ from those of terminal-connected versions, but they have the same function and connection options.

Concerning demands on signal wires and signal transmitters, see section Technical data.

Use screened cables for external on-off switch, digital input, sensor and setpoint signals.

Connect screened cables to the earth connection as follows:

•   Terminal-connected versions:
    Connect the cable screen to earth via the digital-input terminal. See figure below.
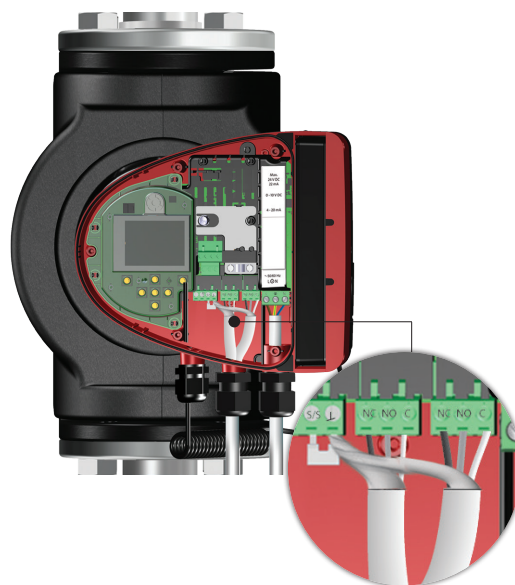
Connection of cable screen, terminal-connected versions

• Plug-connected versions:

Connect the cable screen to earth via cable clamp. See figure below.
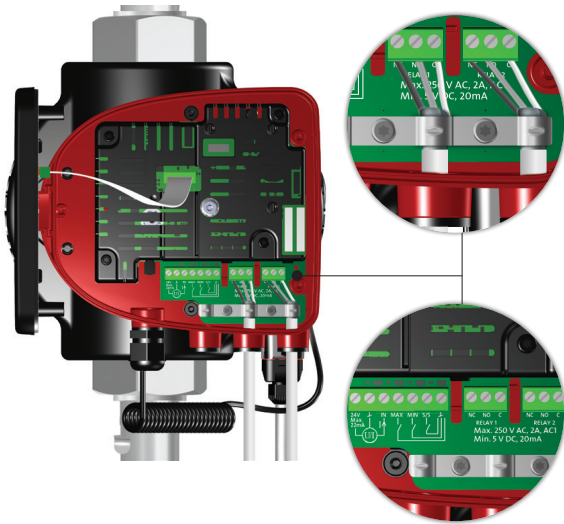
Connection of cable screen, plug-connected versions

Related information

12. Technical data

7.8 Priority of settings

The external forced-control signals influence the settings available on the pump operating panel or with Grundfos GO. However, you can always set the pump to maximum-curve duty or stop the pump on the operating panel or with Grundfos GO.

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

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

Example: If the pump has been forced to stop via an external signal, the operating panel or Grundfos GO can only set the pump to maximum curve.

Priority	Possible settings		
	Operating panel or Grundfos GO	External signals	Bus signal
1	"Stop"		
2	"Max. curve"		
3		"Stop"	
4			"Stop"
5			"Max. curve"
6			"Min. curve"
7			"Start"
8		"Max. curve"	
9	"Min. curve"		
10		"Min. curve"	
11	"Start"		

7.9 Input and output communication

• Relay outputs

Alarm, ready and operating indication via signal relay.

• Digital input

- Start and stop (S/S)

To ensure a trouble-free operation, Grundfos recommends using a Solid State Relay with a minimum load current below 1 mA. These relays typically have a MOSFET transistor as output drive. Relays with gold contacts for small signal operation can also be used. Relays with a Thyristor output drive cannot be used.

- Minimum curve (MI)

- Maximum curve (MA).

• Analog input

0-10 V or 4-20 mA control signal. To be used for external control of the pump or as sensor input for the control of the external setpoint. The 24-V supply from pump to sensor is optional and is normally used when an external supply is not available.

> **WARNING**
> **Electric shock**
> Death or serious personal injury
> - Separate input voltages from external equipment from live parts by reinforced insulation.

7.9.1 External connections in a multipump system

The following external connections need only to be fitted to the master pump:

• analog input

• digital input

• communication interface module, CIM

If you want to monitor a slave pump, mount a communication interface module on the slave pump too.

The following external connections need to be fitted on both the master and slave pumps:

• Relays (from model B)

The following are system parameters shared between the pumps:

• Operating mode, control mode and setpoint

• Heat energy monitor:

Both pumps display the heat energy for the entire system and not only for the individual pump. Please note that all calculations are made in the master pump. If the master pump loses power, the heat energy will cease to increment. See also section Heat energy monitor.

For more information about input and output communication in multipump systems, see sections Relay outputs, Digital inputs and Analog input.

Related information

7.9.3 Digital inputs

7.9.4 Analog input

7.9.2 Relay outputs

7.9.5 Heat energy monitor

7.9.2 Relay outputs

The pump has two signal relays with a potential-free changeover contact for external fault indication. See sections Wiring diagrams.

The two signal relays are protected by a relay cover. To access the relays, you must remove the cover by unscrewing the screw located at the top of the cover. See figure below.
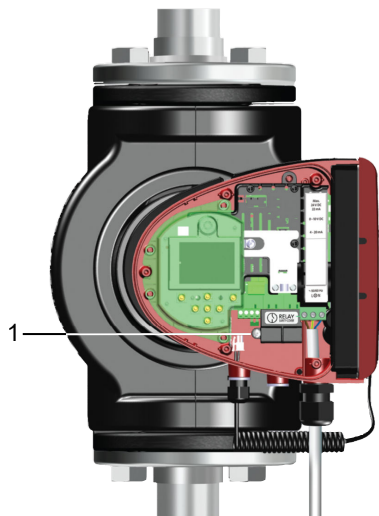
Pos.	Description
1	Relay cover
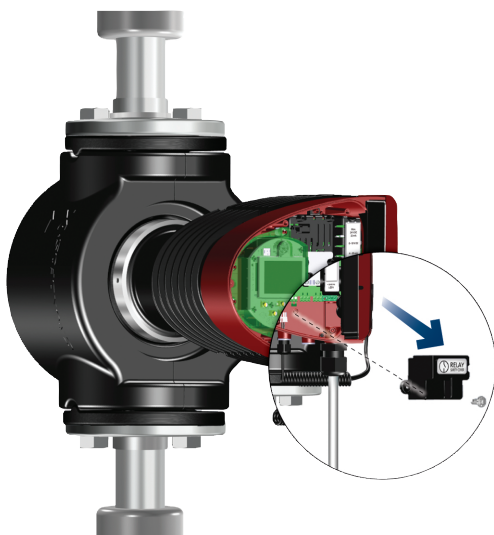
Removing the relay cover

You can set the function of the signal relay to **"Alarm"**, **"Ready"** or **"Operation"** on the operating panel or with Grundfos GO.

The relays can be used for outputs up to 250 V and 2 A.

💡 Warnings do not activate the alarm relay.

💡 Use C and NC for fault signals as this enables serial connections of more relays and detection of signal cable defects.
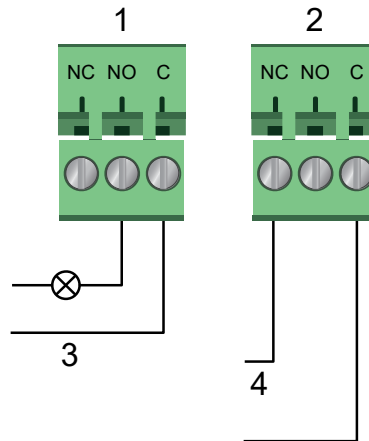
Relay output

Pos.	Description
1	Relay 1
2	Relay 2
3	Operation
4	Alarm

Contact symbol	Function
NC	Normally closed
NO	Normally open
C	Common

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

Signal relay	Alarm signal
	Not activated: • The power supply has been switched off. • The pump has not registered a fault.
	Activated: • The pump has registered a fault.

Signal relay	Ready signal
	Not activated: • The pump has registered a fault and is unable to run. • The power supply has been switched off.
	Activated: • The pump has been set to stop, but is ready to run. • The pump is running.

Signal relay	Operating signal
	Not activated: • The power supply has been switched off.
	Activated: • The pump is running.

Factory settings of relays:

Relay	Function
1	Operating signal
2	Alarm signal

Relay output in twin-head pumps

The relay output for both the "**Alarm**", "**Ready**" and "**Operation**" functions operates independently on each pump head. If, for example, a fault occurs in one of the pumps, its respective relay is triggered.

7.9.3 Digital inputs

The pump has a digital input for external control of start-stop or forced maximum or minimum curve. See sections Wiring diagrams.

If no external on-off switch is connected, the jumper between terminals start-stop (S/S) and frame ($\perp$) must be maintained. This connection is the factory setting.
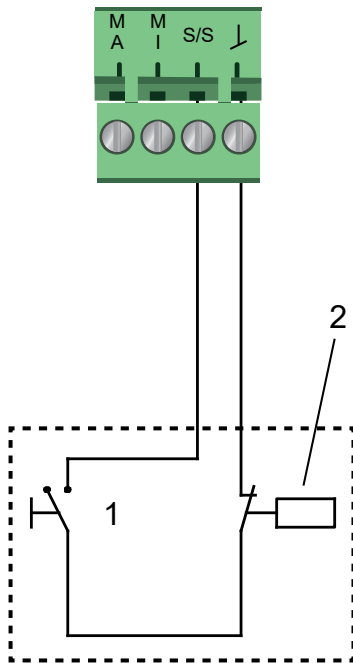
Digital input

Pos.	Description
1	Start-stop
2	On-off timer

Contact symbol	Function
M A	Maximum curve
	100 % speed
M I	Minimum curve
S/S	Start-stop
$\perp$	Frame connection

External start-stop

You can start and stop the pump via the digital input.

Start-stop	
	Normal duty
	Factory setting with jumper between start-stop and $\perp$.

Start-stop	
	Stop
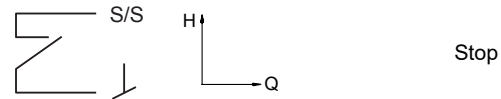
Externally forced maximum or minimum curve

You can force the pump to operate on the maximum or minimum curve via the digital input.

Maximum curve	
	Normal duty
	Maximum curve
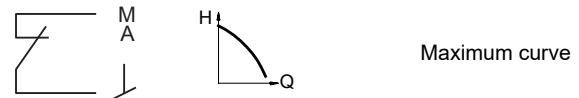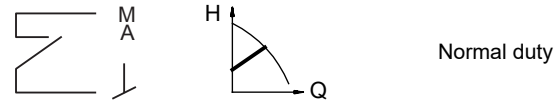
Minimum curve	
	Normal duty
	Minimum curve
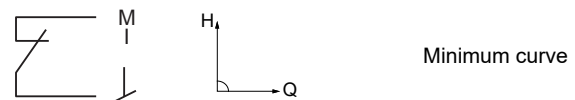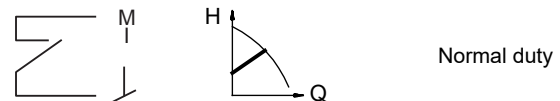
Select the function of the digital input using the pump's operating panel or Grundfos GO.

Digital input on twin-head pumps

The Start/Stop input operates on system level, meaning that if the master pump head receives a stop signal, the system stops.

As a main rule, the digital input is only effective on the master, which is why it is important to know which pump is assigned as master, see figure below.
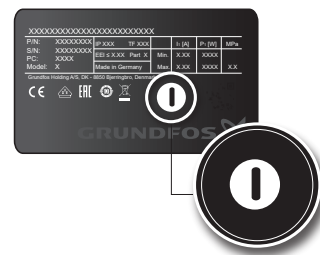
Identifying the master pump head on the nameplate

For redundancy purposes, the digital input can be used concurrently on the slave pump head. However, as long as the master is powered up, the input on the slave will be ignored. In the event of power loss on the master, the digital input of the slave will take over. When the master pump head is back on, the master takes over and controls the system.

7.9.4 Analog input

The pump has an analog input for the connection of an external sensor for measuring temperature or pressure. See sections Wiring diagrams.

You can use sensor types with 0-10 V or 4-20 mA signal.

You can also use the analog input for an external signal for the control from a building management system or similar control system.

- When the input is used for the heat energy monitor, install a temperature sensor in the return pipe.
- If the pump is installed in the return pipe of the system, install the sensor in the flow pipe.
- If the constant-temperature control mode has been enabled and the pump is installed in the flow pipe of the system, install the sensor in the return pipe.
- If the pump is installed in the return pipe of the system, you can use the internal temperature sensor.

You can change the sensor type, 0-10 V or 4-20 mA, on the operating panel or with Grundfos GO.
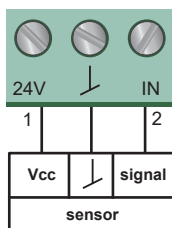
Analog input for external sensor, 0-10 V
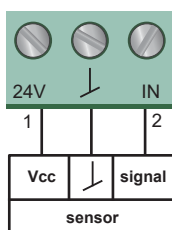
Analog input for external sensor, 4-20 mA

Pos.	Sensor type
1	Vcc
2	signal

To optimise pump performance, you can use the analog input for the connection of an external sensor in the following cases:

Function/control mode	Sensor type
Heat energy monitor	Temperature sensor
Constant temperature	
Differential temperature	
Constant pressure	Differential-pressure transmitter

> When using a differential-pressure transmitter to control the flow, make sure that the pump is set to run in constant-pressure mode and that "Differential-pressure control" has been activated in the "Analog input" menu on the pump's operating panel. See section "Analog Input".
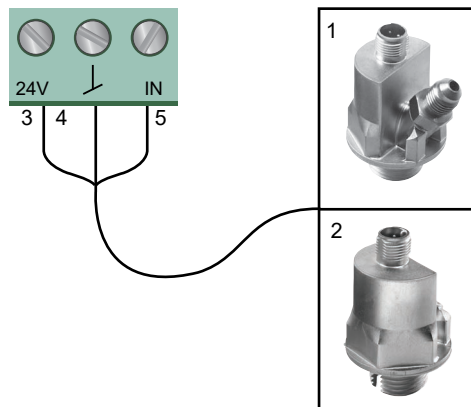
Examples of external sensors

Pos.	Description
1	Combined temperature and pressure sensor, Grundfos type RPI T2. 1/2" connection and 0-10 V signal
2	Pressure sensor, Grundfos type RPI. 1/2" connection and 4-20 mA signal.
3	Vcc
4	
5	Signal

For further details, see sections External sensors.
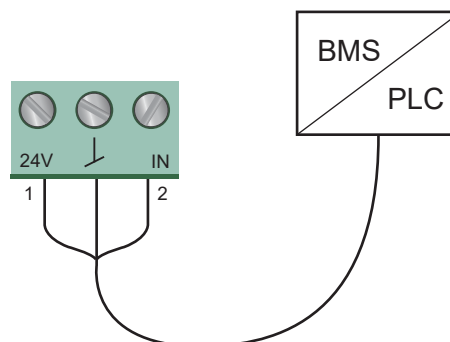
Examples of external signal for the control via BMS or PLC

Analog input on twin-head pumps

For redundancy purposes, the analog input can be used concurrently on the slave pump head. As long as the master is powered up, the input on the slave will be ignored. However, in the event of power loss on the master, the analog input of the slave will take over. When the master pump head is back on, the master takes over and controls the system.

Related information

7.9.5 Heat energy monitor

The heat energy monitor calculates the heat energy consumption within the system. The built-in flow estimation needed for the calculation has a typical accuracy of ± 5 % of Q_{max}. The less flow through the pump, the less accurate the reading will be. In worst case scenarios, such as closed valve operation, the accuracy can be up to 10 % of Q_{max}. The actual accuracy in a duty point will be shown in the MAGNA3 display (available for pumps with production code from 1838). The temperature measurement accuracy also depends on the sensor type. Therefore, you cannot use the heat energy value for billing purposes. However, the value is perfect for optimisation purposes in order to prevent excessive energy costs. See also section *Flow estimation accuracy*.

To counterbalance any inaccuracy on either the internal and external sensor it is possible to manually enter a temperature offset. The offset is entered in integers, for example 2 degrees. The offset range is within ± 20 °C. To set the temperature offset, see section *"Controller settings"*.

Note: Temperature sensor offset is available for pumps with production code from 1838.

The flow and volume accuracy is calculated and shown in the display, see sections *"Estimated flow rate, accuracy"* and *"Accuracy of values"*.

The heat energy monitor requires an additional temperature sensor installed in the flow pipe or return pipe depending on where the pump is installed.
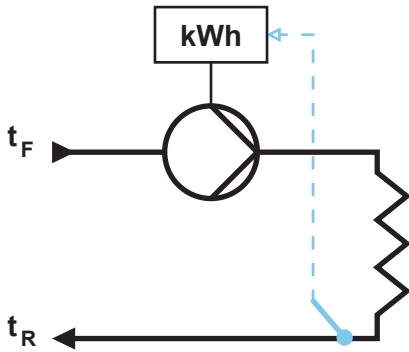
MAGNA3 with built-in heat energy monitor

You can measure both heating and cooling in the same system. If a system is used for both heating and cooling, two counters are automatically shown in the display. See section *"Heat energy"*.

Monitoring heat energy in multipump systems

In a multipump system, the master pump calculates the heat energy regardless of which pump, master or slave, is running.

If the master loses power or has a fault on the external sensor, the accumulation of heat energy will not be counted until the master is powered back on or the external sensor error is remedied. If the master is replaced, the heat energy values for the system is reset.

Related information

7.6 Flow estimation accuracy

8.6.1 "Heat energy monitor"

8.7.4 "Controller settings"

7.9.6 External setpoint function

You can use the analog input to influence the setpoint externally. The external setpoint function can be used in two different ways:

*   **"Linear with Min."**
*   **"Linear with Stop"** (available for pumps with production code from 1838)

In both modes the input signal range is influenced linearly.

"Linear with Min."

Here, a 0-10 V or 4-20 mA signal controls the pump speed range in a linear function. The range of control depends on the minimum speed, power and pressure limits of the pump. See figs *"Linear with Min.", 0-10 V* and *Control range and setpoint*.
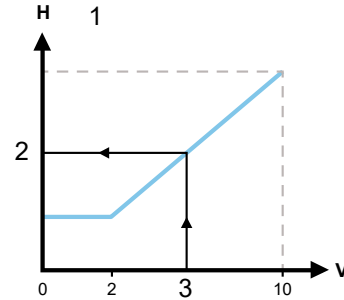

"Linear with Min.", 0-10 V

Pos.	Description
1	(user setpoint)
2	Resulting setpoint
3	Analog input

Control range and setpoint

Control	
0-2 V (0-20 %)	Resulting setpoint is equal to minimum.
2-10 V (20-100 %)	Resulting setpoint is between minimum and user setpoint.

The external setpoint function operates differently depending on the model. For models A, B and C, the maximum speed is often obtained at voltages lower than 10 V, as the span of control is limited.

In models newer than A, B and C, the internal scaling has been optimised making the dynamic area bigger, thus giving a better control of the pump speed when using the external setpoint function.

The same applies if the pump is receiving a setpoint from Building Management Systems.

"Linear with Stop"

Note: Available for pumps with production code from 1838.

Here, if the input signal is below 10 %, the pump changes to operating mode "**Stop**". If the input signal is increased above 15 %, the operating mode is changed back to "**Normal**".

"Linear with Stop", 0-10 V

Pos.	Description
1	Normal
2	Stop

8. Setting the product

CAUTION
Hot surface
Minor or moderate personal injury
- At high liquid temperatures, the pump housing may be so hot that only the operating panel may be touched to avoid burns.

8.1 Operating panel

Operating panel

Button	Function
	Goes to the "**Home**" menu.
	Bluetooth connect button.
‹ ›	Navigates between main menus, displays and digits. When the menu is changed, the display always shows the top display of the new menu.
⌃ ⌄	Navigates between submenus.
OK	Saves changed values, resets alarms and expands the value field.

8.2 Menu structure

"Home"

This menu shows up to four user-defined parameters with shortcuts or a graphical illustration of a performance curve. See section "Home" menu.

Status

This menu shows the status of the pump and system as well as warnings and alarms. See section "Status" menu.

You cannot make settings in this menu.

Data is stored once per hour. If the pump is turned off and on via the power supply more frequently than that, the data will be incorrect.

If you need to start and stop the pump more than once per hour, we recommend that you use the operating modes "**Stop**" and "**Normal**".

"Settings"

This menu gives access to all setting parameters. You can make a detailed setting of the pump in this menu. See section "Settings" men.

"Assist"

This menu enables assisted pump setup, provides a short description of the control modes and offers fault advice. See section "Assist" menu.

- Shortcut to "**Control mode**" settings
- Shortcut to "**Setpoint**" settings
- "**Estimated flow**"
- "**Head**".

Related information

8.3 Startup guide

At first startup you are asked to choose a language after which a startup guide helps you set the date and time.

Follow the instructions given by the display and use the arrows to navigate.

8.3.1 "Multipump pairing", twin-head pumps
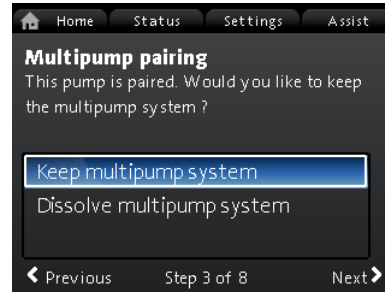
Note: Available for pumps with production code from 1838.

Twin-head pumps are paired from factory. When starting up a twin-head pump for the first time, the startup guide will ask whether or not to keep the multipump system enabled.

Setting

1. Select "**Keep multipump system**" or "**Dissolve multipump system**" with ⌄ or ⌃ .

2. Press [OK] followed by ⟩ .

3. Press [OK] to confirm.

The multipump system can be reestablished in the "**Assist**" menu. See section "Multipump setup".

Related information

8.3.2 "Setting of pump"
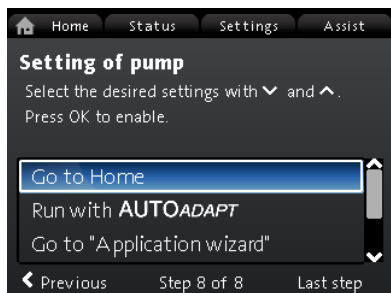
STARTUPGUIDE_AUTO_ADAPT_1

Startup guide: Setting of the pump

"Run with AUTOADAPT"

If you choose "**Run with AUTOADAPT**", the pump operates according to its factory settings. See section Factory setting.

"Go to "Application wizard""

Note: Available for pumps with production code from 1838.

The "**Application wizard**" helps you choose the correct control mode for your application and includes the following:

• **Boiler pump**
• **Radiator**
• **Fan coil unit**
• **Air handling unit**
• **Underfloor/ceiling**
• **Hot water**
• **Ground source**
• **Chiller pump**.

You can exit the wizard by pressing the "**Home**" button .

You can also launch the wizard in the "**Assist**" menu. See section "Application wizard".

"External speed control"

Note: Available for pumps with production code from 1838.

When selecting the "**External speed control**", you can choose between the following:

• "**0-10 V input**" and "**4-20 mA input**"

  Allows you to select either "**Linear with Min.**" or "**Linear with Stop**". See also section External setpoint function..

• "**Bus controlled**"

  When selected and when the startup guide has completed, go to the "**Settings**" menu to configure the "**Bus communication**". See section "Bus communication".

Related information

8.4 Menu overview

"Home"	Status	"Settings"	"Assist"
Control mode	Operating status	Setpoint	Application wizard [2]
Setpoint	Operating mode, from	Operating mode	Boiler pump
Estimated flow	Control mode	Normal	Radiator
Low flow [2] [3]	Pump performance	Stop	Fan coil unit
Head	Max. curve and duty point	Min.	Air handling unit
	Resulting setpoint	Max.	Underfloor/ceiling
	Temperature	Control mode	Hot water
	Speed	AUTOADAPT	Ground source
	Operating hours	FLOWADAPT	Chiller pump
	Power and energy consumption	Prop. press.	Setting of date and time
	Power consumption	Const. press.	Date format, date and time
	Energy consumpt.	Const. temp.	Date only
	Warning and alarm	Diff. temp.	Time only
	Actual warning or alarm	Constant flow [2]	Multipump setup
	Warning log	Constant curve	Setup, analog input
	Warning log 1 to 5	Controller settings (not model A)	Description of control mode
	Alarm log	Controller gain Kp	AUTOADAPT
	Alarm log 1 to 5	Control. integr. action time Ti	FLOWADAPT
	Heat energy monitor	Temperature sensor offset [2]	Prop. press.
	Heat power	FLOWLIMIT	Const. press.
	Heat energy	Enable FLOWLIMIT function	Const. temp.
	Estimated flow	Not active	Differential temp.
	Volume	Active	Constant curve
	Hours counter	Set FLOWLIMIT	Assisted fault advice
	Temperature 1	Automatic Night Setback	Blocked pump
	Temperature 2	Not active	Pump communication fault
	Differential temp.	Active	Internal fault
	Accuracy of values	Analog Input	Internal sensor fault
	Estimated flow	Function of analog input	Forced pumping
	Volume	Not active	Undervoltage
	Operating log	Differential-pressure control	Overvoltage
	Operating hours	Constant-temperature control	High motor temperature
	Trend data	Differential-temperature control	External sensor fault
	Duty point over time	Heat energy monitor	High liquid temperature
	3D showing (Q, H, t)	External setpoint influence	Comm. fault, twin-head pump
	3D showing (Q, T, t)	Unit	
	3D showing (Q, P, t)	°C	
	3D showing (T, P, t)	°F	
	Fitted modules	Sensor range, min. value	
	Date and time	Sensor range, max. value	
	Date	Electrical signal	
	Time	0-10 V	
	Pump identification	4-20 mA	
	Multipump system	Relay outputs	
	Operating status	Relay output 1	
	Operating mode, from	Not active	
	Control mode	Ready	
	System performance	Alarm	
	Duty point	Operation	
	Resulting setpoint	Relay output 2	
	System identification	Not active	
	Power and energy consumption	Ready	
	Power consumption	Alarm	

"Home"	Status	"Settings"	"Assist"
	Energy consumpt.	Operation	
	Other pump, multipump system	Operating range	
	Operating mode, from	Set min. speed	
	Speed	Set max. speed	
	Operating hours	Setpoint influence	
	Pump identification	External setpoint function	
	Power consumption	Not active	
	Actual warning or alarm	Linear with Min.	
		Linear with Stop [2]	
		Temperature influence	
		Not active	
		Active, Tmax. = 50 °C	
		Active, Tmax. = 80 °C	
		Bus communication	
		Pump number	
		Forced local mode	
		Enable	
		Disable	
		Multipump profile selection	
		Compatibility for models A, B, C	
		Generic Grundfos profile	
		Automatic	
		General settings	
		Language	
		Set date and time	
		Select date format	
		Set date	
		Select time format	
		Set time	
		Units	
		SI or US units	
		Customised units	
		Differential pressure	
		Head	
		Level	
		Flow rate	
		Volume	
		Temperature	
		Differential temp.	
		Electrical power	
		Electrical energy	
		Heat power	
		Heat energy	
		Enable/disable settings	
		Enable	
		Disable	
		Alarm and warning settings	
		Internal sensor fault (88)	
		Enable	
		Disable	
		Internal fault (157)	
		Enable	
		Disable	
		Delete history	

"Home"	Status	"Settings"	"Assist"
		Delete operating log	
		Delete heat energy data	
		Delete energy consumption	
		Define Home display	
		Select Home display type	
		List of data	
		Graphical illustration	
		Define Home display contents	
		List of data	
		Graphical illustration	
		Display brightness	
		Brightness	
		Return to factory settings	
		Run start-up guide	

2) Available for pumps with production code from 1838.

3) Activated when the pump experiences a flow below 10 %. See section Low-flow indication.

Related information

8.5 "Home" menu
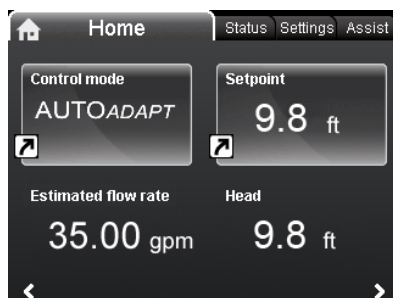
Navigation

"**Home**"

Press ⊛ to go to the "**Home**" menu.

This menu offers the following (factory setting):

- Shortcut to "**Control mode**" settings
- Shortcut to "**Setpoint**" settings
- **Estimated flow**
- **Head**.

Navigate in the display with ⌄ or ⌃ , and change between the two shortcuts with › or ‹ .

Display icons

Symbol	Description
	Automatic night setback function is enabled.
	Settings are locked. You cannot adjust settings from the display.
	The pump is in remote mode, for example from fieldbus.
	The multipump system is active.
	Master pump in a multipump system.
	Slave pump in a multipump system.
	Forced local mode is active. You cannot set the pump to remote mode, for example from fieldbus.
	Radio communication disabled. The radio communication is enabled/disabled by pressing connect button for 15 seconds.

You can define the "**Home**" display. See section General settings .

Related information

8.7.11 "General settings"

8.5.1 Low-flow indication
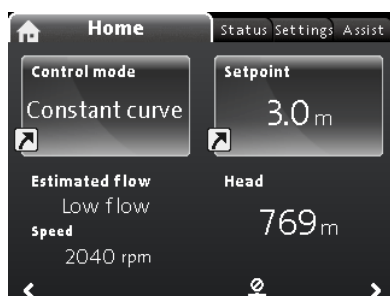
Note: Available for pumps with production code from 1838.

The pump can experience low flow due to for example valves being shut. In cases where the flow is below 10 %, thus too low for the pump's internal sensor to measure, it will be stated in the "**Home**" menu. The speed below the low-flow indication tells you that the pump is still running.

When the flow is high enough for the pump to measure, the "**Home**" display will return back to normal.

8.6 "Status" menu
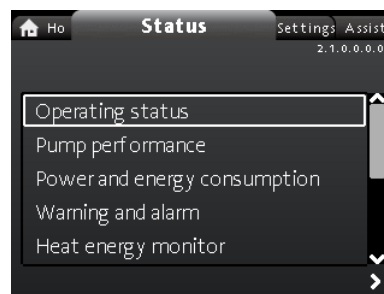
Navigation

"**Home**" > "**Status**"

Press ⊛ and go to the "**Status**" menu with › .

This menu offers status information on the following:

- **Operating status**
- **Pump performance**
- **Power and energy consumption**
- **Warning and alarm**
- **Heat energy monitor**
- **Operating log**
- **Fitted modules**
- **Date and time**
- **Pump identification**
- **Multipump system**.

Data is stored once per hour. If the pump is turned off and on via the power supply more frequently than that, the data will be incorrect.

If you need to start and stop the pump more than once per hour, we recommend that you use the operating modes "**Stop**" and "**Normal**".

Navigation

1. Navigate between the submenus with ⌄ or ⌃ .

2. Choose a submenu with [OK] or › .

3. Return to the **Status** menu with ‹ .

Detailed information on "**Heat energy monitor**" is available in the following section "Heat energy monitor".
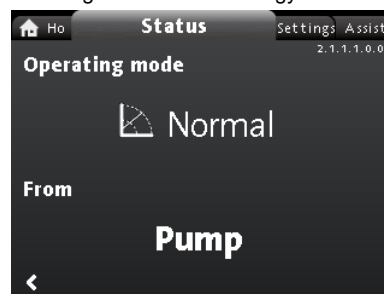
*Example of the submenu "**Operating status**" showing the pump running in normal operation in a multipump system.*

Related information

8.6.1 "Heat energy monitor"

8.6.1 "Heat energy monitor"
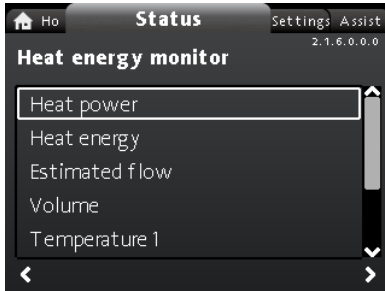
Navigation

"**Home**" > **Status** > "**Heat energy monitor**"

The "**Heat energy monitor**" calculates the heat energy consumption within a system. For detailed information, see section Heat energy monitor.

Learn how to set an input temperature sensor for monitoring heat energy in section "Setup, analog input".

The following submenus are explored in the following:

•   **Heat energy**

•   **Estimated flow**

•   **Accuracy of values**.

"Heat energy"
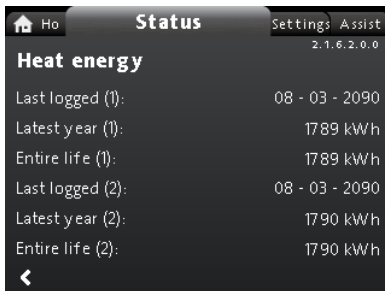
Navigation

"**Home**" > **Status** > "**Heat energy monitor**" > "**Heat energy**"

You can measure both heating and cooling in the same system. If a system is used for both heating and cooling, two counters are automatically shown in the display.

The time stamp of the date indicates the latest use of the specific counter.

The value of "**Latest year (2):**" represents the last 52 consecutive weeks where the pump has been supplied with power. The user can reset the value manually. See section "Delete history".

"Estimated flow rate, accuracy"
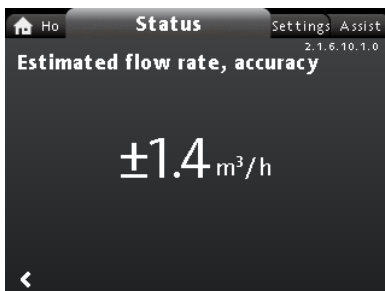
Navigation

"**Home**" > **Status** > "**Heat energy monitor**" > "**Estimated flow**"

The internal sensor estimates the difference in pressure between the inlet and outlet ports of the pump. The measurement is not a direct differential-pressure measurement, but by knowing the hydraulic design of the pump, you can estimate the differential pressure across the pump.

For further information, see section Flow estimation accuracy.

"Accuracy of values"
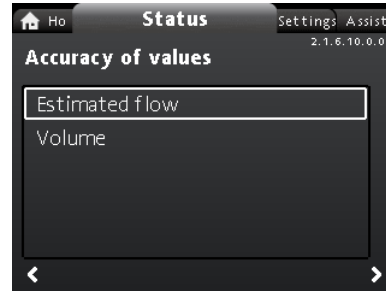
Navigation

"**Home**" > **Status** > "**Heat energy monitor**" > "**Accuracy of values**"

This menu offers the following options:

•   **Estimated flow**

•   **Volume**.

Select submenu with ˅ or ˄ .

This menu allows you to view the current flow rate tolerance and the average volume accuracy over the last 52 consecutive weeks ("**Latest year:**") and the pump's entire life span.

Related information

7.6 Flow estimation accuracy

7.9.5 Heat energy monitor

8.7.11 "General settings"

8.8.4 "Setup, analog input"

8.7 "Settings" menu
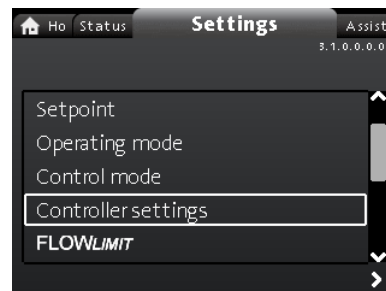
Navigation

"**Home**" > "**Settings**"

Press ⊛ and go to the "**Settings**" menu with ˃ .

This menu offers the following options:

•   **Setpoint**

•   **Operating mode**

•   **Control mode**

•   **Controller settings**, not model A

•   FLOWLIMIT

•   **Automatic Night Setback**

•   **Analog Input**

•   **Relay outputs**

•   **Setpoint influence**

•   **Bus communication**

•   **General settings**.

Navigate between the submenus with ˅ or ˄ .

8.7.1 "Setpoint"
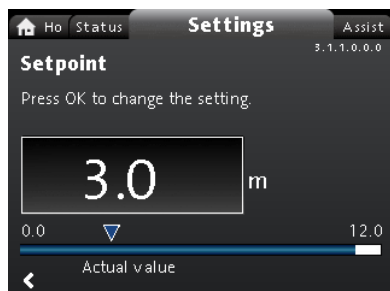
Navigation
"**Home**" > "**Settings**" > "**Setpoint**"

Setting

1. Press [OK].

2. Select digit with ‹ and › and adjust with ⌄ or ⌃ .

3. Press [OK] to save.

You can set the setpoint with an accuracy of 0.1 meter. The head against a closed valve is the setpoint.

Set the setpoint so that it matches the system. A too high setting may result in noise in the system whereas a too low setting may result in insufficient heating or cooling in the system.

Control mode	Measuring unit
Proportional pressure	m, ft
Constant pressure	m, ft
Constant temperature	°C, °F, K
Constant curve	%

8.7.2 "Operating mode"
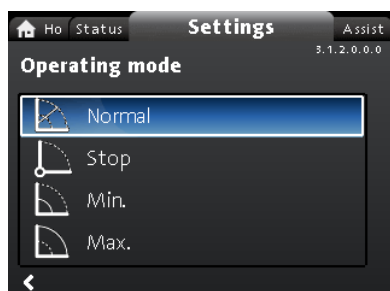
Navigation
"**Home**" > "**Settings**" > "**Operating mode**"
This menu offers the following options:

- **Normal**
- **Stop**
- **Min.**
- **Max.**

Setting

1. Select operating mode with ⌄ or ⌃ .

2. Press [OK] to save.

For detailed information about the operating modes, see section Operating modes.

Related information
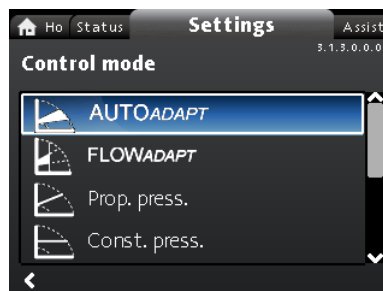
8.7.3 "Control mode"

Navigation
"**Home**" > "**Settings**" > "**Control mode**"

> Set the operating mode to "**Normal**" before you enable a control mode.

This menu offers the following setting options:

- AUTOADAPT (the pump starts with the factory setting)
- FLOWADAPT
- **Prop. press.** (proportional pressure)
- **Const. press.** (constant pressure)
- **Const. temp.** (constant temperature)
- **Differential temp.** (differential temperature)
- **Constant flow** (available for pumps with production code from 1838)
- **Constant curve**.

Setting

1. Select control mode with ⌄ or ⌃ .

2. Press [OK] to enable the control mode.

For details on the different control modes, see sections Control modes.

Setpoint

When you have selected the desired control mode, you can change the setpoint for all control modes, except AUTOADAPT and FLOWADAPT, in the "**Setpoint**" submenu. See section "Setpoint".

Control mode features

You can combine all control modes, except "**Constant curve**", with automatic night setback. See section "Automatic Night Setback".

You can also combine the FLOWLIMIT function with the control modes mentioned above. See section "FLOWLIMIT".

Related information

8.7.4 "Controller settings"
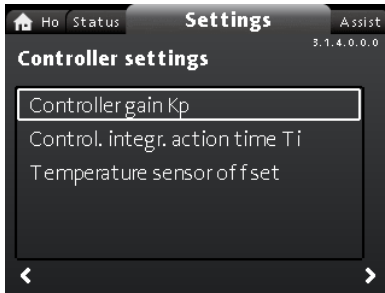
Not available for MAGNA3 model A.

Navigation

"**Home**" > "**Settings**" > "**Controller settings**"

This menu offers the following options:

- **Controller gain Kp**
- **Control. integr. action time Ti**
- **Temperature sensor offset** (available for pumps with production code from 1838).

Setting

1. Select "**Controller settings**" with ∨ or ∧ and press [OK].
2. Choose either "**Controller gain Kp**", "**Control. integr. action time Ti**" or "**Temperature sensor offset**" with ∨ or ∧ . Press [OK].
3. Press [OK] to start the setting.
4. Select digit with ‹ and › and adjust with ∨ or ∧ .
5. Press [OK] to save.

A change of the gain and integral-time values affects all control modes. If you change the control mode to another control mode, change the gain and integral-time values to the factory settings.

Factory settings for all other control modes:

The gain, K_p, is equal to 1.

The integral time, T_i, is equal to 8.

The table below shows the suggested controller settings:

If you use a built-in temperature sensor as one of the sensors, you must install the pump as close as possible to the consumer.

System/ application	K_p		T_i
	Heating system [4]	Cooling system [5]	
	0.5	- 0.5	10 + 5 $(L_1 + L_2)$
[6]		- 0.5	10 + 5 $(L_1 + L_2)$
	0.5	- 0.5	$30 + 5L_2$

[4] In heating systems, an increase in pump performance results in a rise in temperature at the sensor.

[5] In cooling systems, an increase in pump performance results in a drop in temperature at the sensor.

[6] Built-in temperature sensor.

L1: Distance in metres between pump and consumer.

L2: Distance in metres between consumer and sensor.

Guidelines for setting of PI controller

For most applications, the factory setting of the controller constants, gain and integral time, ensures optimum pump operation. However, in some applications an adjustment of the controller may be required.

You find the setpoint displayed in figures below.
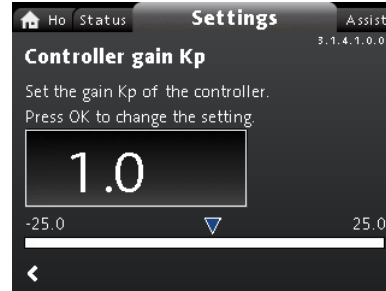
"Controller gain Kp"

"Control. integr. action time Ti"
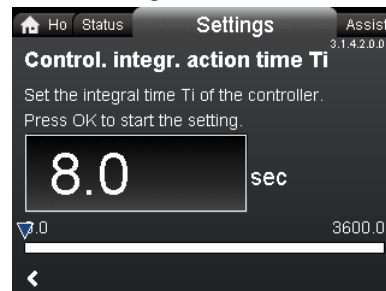
Proceed as follows:

1. Increase the gain until the motor becomes unstable. Instability can be seen by observing if the measured value starts to fluctuate. Furthermore, instability is audible as the motor starts hunting up and down. Some systems, such as temperature controls, are slow-reacting, meaning that it may be several minutes before the motor becomes unstable.
2. Set the gain to half the value of the value which made the motor unstable.
3. Reduce the integral time until the motor becomes unstable.
4. Set the integral time to twice the value which made the motor unstable.

Rules of thumb

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

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

Model A:

Use Grundfos GO to change the controller constants, gain and integral time. You can only set positive values.

Models B, C and D:

Change the control settings by means of the display or Grundfos GO. You can set both positive and negative values.

8.7.5 "FLOWLIMIT"
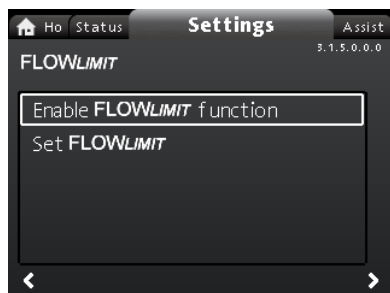
Navigation

"**Home**" > "**Settings**" > "**FLOWLIMIT**"

This menu offers the following options:

• **Enable FLOWLIMIT function**

• **Set FLOWLIMIT**.

Setting

1. To enable the function, select "**Enable FLOWLIMIT function**" with ⌄ or ⌃ and press [OK].

2. To set the FLOWLIMIT, press [OK].

3. Select digit with ‹ and › and adjust with ⌄ or ⌃ .

4. Press [OK] to save.

You can combine the FLOWLIMIT function with the following control modes:

• FLOWADAPT

• **Prop. press.**

• **Const. press.**

• **Const. temp.**

• **Constant curve**

• **Differential temp.**

For more information about FLOWLIMIT, see section FLOWLIMIT.

"Automatic Night Setback"
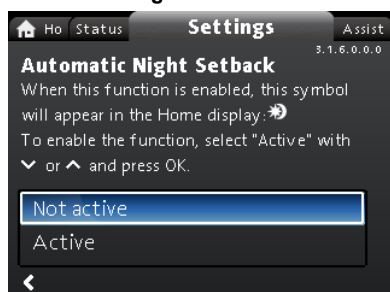
Navigation

"**Home**" > "**Settings**" > "**Automatic Night Setback**"

Setting

To enable the function, select "**Active**" with ⌄ or ⌃ and press [OK].

For more information about **Automatic Night Setback**, see section Automatic night setback.

Related information
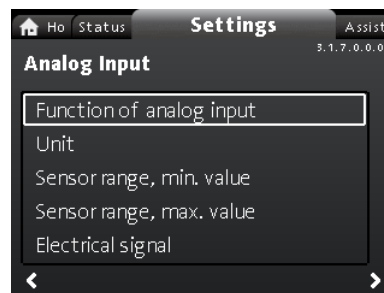
8.7.6 "Analog Input"

Navigation

"**Home**" > "**Settings**" > "**Analog Input**"

This menu offers the following options:

• **Function of analog input**

• **Unit**

• **Sensor range, min. value**

• **Sensor range, max. value**

• **Electrical signal**.

Setting

1. Choose "**Function of analog input**" with ⌄ or ⌃ and press [OK].

2. Choose the function of input with ⌄ or ⌃ :
    • **Not active**
    • **Differential-pressure control**
    • **Constant-temperature control**
    • **Differential-temperature control**
    • **Heat energy monitor**
    • **External setpoint influence**

3. Press [OK] to enable the function mode.
   When you have selected the desired function, specify the sensor parameters:

4. Return to the "**Analog Input**" menu with ‹ .

5. Now adjust the sensor parameters "**Unit**", "**Sensor range, min. value**", "**Sensor range, max. value**" and "**Electrical signal**".

6. Choose the desired parameter with ⌄ or ⌃ and press [OK].

7. Select value or adjust digits with ⌄ or ⌃ and press [OK].

8. Return to the "**Analog Input**" menu with ‹ .

Note: You can also use the "**Assist**" menu to set the analog input. Here a wizard guides you through each step of the configuration. See section *"Setup, analog input"*.

For more information on "**Analog Input**", see section *Analog input*.

For further information on "**Heat energy monitor**" see section *Heat energy monitor* .

Related information
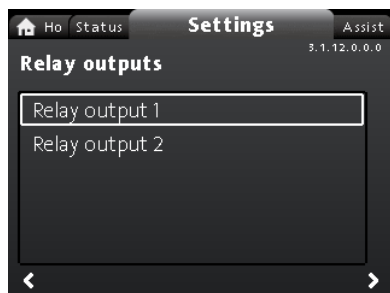
8.7.7 "Relay outputs"

Navigation

"**Home**" > "**Settings**" > "**Relay outputs**"

This menu offers the following options:

- **Relay output 1**
- **Relay output 2**.

Setting

1. Choose "**Relay output 1**" with ⌄ or ⌃ and press [OK].

2. Choose the function of input with ⌄ or ⌃ :
   - "**Not active**": The signal relay is deactivated.
   - "**Ready**": The signal relay is active when the pump is running or has been set to stop, but is ready to run.
   - "**Alarm**": The signal relay is activated together with the red indicator light on the pump.
   - "**Operation**": The signal relay is activated together with the green indicator light on the pump.

3. Press [OK] to save.

Repeat steps 1-3 for "**Relay output 2**".

For detailed information on "**Relay outputs**", see section Relay outputs.

The duty ranges for proportional-pressure and constant-pressure control appear from the data sheets in the *MAGNA3 data booklet*.

In constant-curve duty, you can control the pump from minimum to 100 %. The range of control depends on the minimum speed, power and pressure limits of the pump.

8.7.8 Operating range
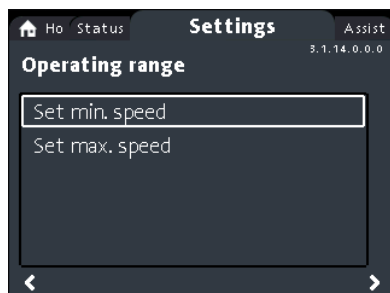
Navigation

"**Home**" > "**Settings**" > "**Operating range**"

This menu offers the following options:

- **Set min. speed**
- **Set max. speed**.

Setting

The minimum and maximum curve can be adjusted. Do as follows:

1. Choose "**Set min. speed**" with ⌄ or ⌃ and press [OK].

2. Press [OK].

3. Select digit with ‹ and › and adjust with ⌄ or ⌃ .

4. Press [OK] to save.

Repeat steps 1 to 4 for "**Set max. speed**".

8.7.9 "Setpoint influence"
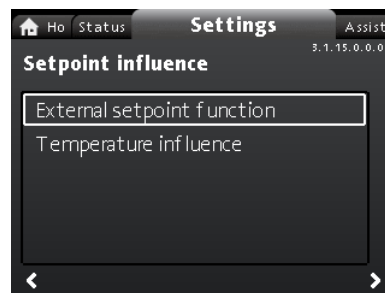
Navigation

"**Home**" > "**Settings**" > "**Setpoint influence**"

This menu offers the following options:

- **External setpoint function**
- **Temperature influence**.

"External setpoint function"
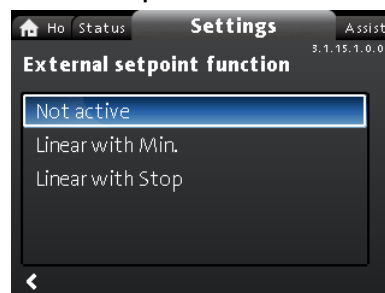
Navigation

"**Home**" > "**Settings**" > "**Setpoint influence**" > "**External setpoint function**"

Setting

1. Select "**Linear with Min.**" or "**Linear with Stop**" (available for pumps with production code from 1838) with ⌄ or ⌃ and press [OK].

Note: The analog input must be set to "**External setpoint influence**" before the "**External setpoint function**" can be enabled.

If the analog input is set to external setpoint influence, the external setpoint function is automatically activated with "**Linear with Min.**". See section Analog input.

For detailed information on "**External setpoint function**", see section External setpoint function.

"Temperature influence"

Navigation

"**Home**" > "**Settings**" > "**Setpoint influence**" > "**Temperature influence**"

This menu offers the following options:

- **Not active**
- **Active, Tmax. = 50 °C**
- **Active, Tmax. = 80 °C**.

Setting

1. Select **"Temperature influence "** with ⌄ or ⌃ and press [OK].
2. Choose the desired maximum temperature with ⌄ or ⌃ and press [OK].

When this function is enabled in proportional- or constant-pressure control mode, the setpoint for head is reduced according to the liquid temperature.

You can set the temperature influence to function at liquid temperatures below 80 or 50 °C. These temperature limits are called T_{max}. The setpoint is reduced in relation to the head set which is equal to 100 %, according to the characteristics below.
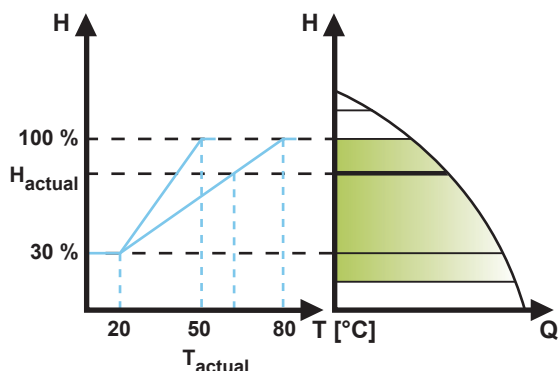
"Temperature influence"

In the above example, $T_{max.}$, which is equal to 80 °C, has been selected. The actual liquid temperature, T_{actual}, causes the setpoint for head to be reduced from 100 % to H_{actual}.

Requirements

The temperature influence function requires the following:

- proportional-pressure, constant-pressure or constant-curve control mode
- pump installed in flow pipe
- system with flow-pipe temperature control.

Temperature influence is suitable for the following systems:

- Systems with variable flows for example two-pipe heating systems, in which the enabling of the temperature influence function ensures a further reduction of the pump performance in periods with small heating demands and consequently a reduced flow-pipe temperature.
- Systems with almost constant flows, for example one-pipe heating systems and underfloor heating systems, in which variable heating demands cannot be registered as changes in the head as is the case with two-pipe heating systems. In such systems, you can only adjust the pump performance by enabling the temperature influence function.

Selection of maximum temperature

In systems with a dimensioned flow-pipe temperature:

- Up to and including 55 °C, select a maximum temperature equal to 50 °C.
- Above 55 °C, select a maximum temperature equal to 80 °C.

You cannot use the temperature influence function in air-conditioning and cooling systems.

Related information

8.7.10 "Bus communication"
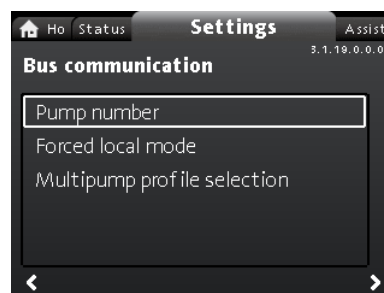
Navigation

"Home" > **"Settings"** > **"Bus communication"**

This menu offers the following options:

- **Pump number**
- **Forced local mode**
- **Multipump profile selection**

"Pump number"
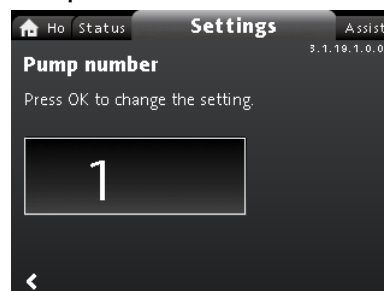
Navigation

"Home" > **"Settings"** > **"Bus communication"** > **"Pump number"**

Setting

1. Press [OK] to start the setting. The pump allocates a unique number to the pump.

The unique number enables you to distinguish between the pumps in connection with bus communication.
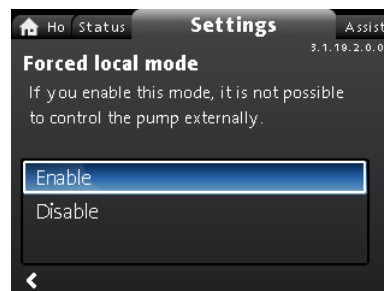
"Forced local mode"

Navigation

"Home" > **"Settings"** > **"Bus communication"** > **"Forced local mode"**

Setting

To enable the function, choose **"Enable"** with ⌄ or ⌃ and press [OK]. To disable the function, choose **"Disable"** with ⌄ or ⌃ and press [OK].

You can temporarily override remote commands from a building management systems to make local settings. Once you have disabled **"Forced local mode"**, the pump reconnects to the network when it receives a remote command from the building management system.

"Multipump profile selection"
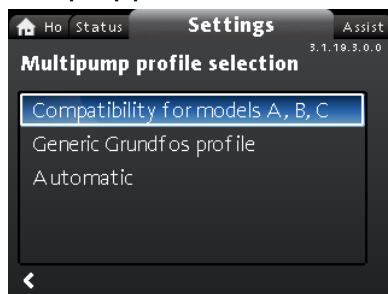
Navigation

"**Home**" > "**Settings**" > "**Bus communication**" > "**Multipump profile selection**"

This menu offers the following options:

- **Compatibility for models A, B, C**
- **Generic Grundfos profile**
- **Automatic**.

Setting

Select mode with ˅ and ˄ and press [OK].

All settings must be done from the master pump.

The MAGNA3 from model D pump is able to automatically detect and adjust itself to an existing system with older version pumps or an older BMS. You enable this function by choosing "**Automatic**" in the display.

"**Generic Grundfos profile**" overrules auto detection, and the pump runs as a MAGNA 3 from model D and onwards. However, if your BMS system or existing pumps are older versions, we recommend that you choose either "**Automatic**" or "**Compatibility for models A, B, C**".

See section Auto detection of CIM modules for further information on auto detection.

Related information

11.2.4 Auto detection of CIM modules

8.7.11 "General settings"
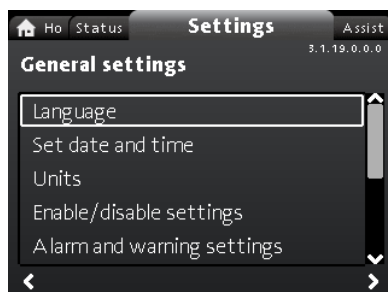
Navigation

"**Home**" > "**Settings**" > "**General settings**"

This menu offers the following options:

- **Language**
- **Set date and time**
- **Units**
- **Enable/disable settings**
- **Alarm and warning settings**
- **Delete history**
- **Define Home display**
- **Display brightness**
- **Return to factory settings**
- **Run start-up guide**.

"Language"
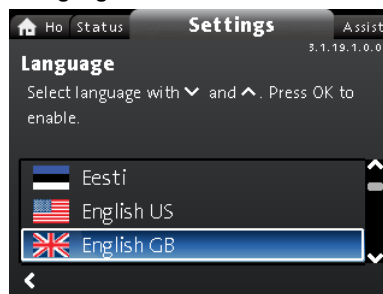
Navigation

"**Home**" > "**Settings**" > "**General settings**" > "**Language**"

Setting

1. Select language with ˅ and ˄ .

2. Press [OK] to enable the language.
   The display can be shown in any of the following languages:
   - Bulgarian
   - Croatian
   - Czech
   - Danish
   - Dutch
   - English
   - Estonian
   - Finnish
   - French
   - German
   - Greek
   - Hungarian
   - Italian
   - Japanese
   - Korean
   - Latvian
   - Lithuanian
   - Polish
   - Portuguese
   - Romanian
   - Russian
   - Serbian
   - Simplified Chinese
   - Slovak
   - Slovenian
   - Spanish
   - Swedish
   - Turkish
   - Ukrainian.

Measuring units are automatically changed according to the selected language.

"Set date and time"
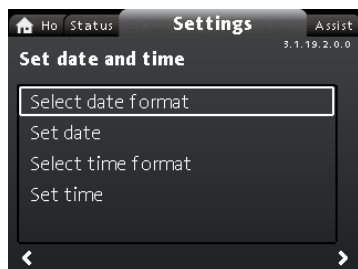
Navigation

"**Home**" > "**Settings**" > "**General settings**" > "**Set date and time**"

This menu offers the following options:

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

Setting the date

1. Choose "**Select date format**" with ⌄ or ⌃ and press [OK]. Choose either "**YYYY-MM-DD**", "**DD-MM-YYYY**" or "**MM-DD-YYYY**".

2. Press ‹ to return to "**Set date and time**".

3. Select "**Set date**" with ⌄ or ⌃ and press [OK].

4. Select digit with ‹ and › and adjust with ⌄ or ⌃ .

5. Press [OK] to save.

Setting the time

1. Choose "**Select time format**" with ⌄ or ⌃ and press [OK]. Choose either "**HH:MM 24-hour clock**" or "**HH:MM am/pm 12-hour clock**".

2. Press ‹ to return to "**Set date and time**".

3. Select "**Set time**" with ⌄ or ⌃ and press [OK].

4. Select digit with ‹ and › and adjust with ⌄ or ⌃ .

5. Press [OK] to save.

"Units"
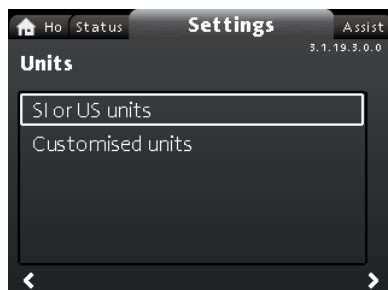
Navigation

"**Home**" > "**Settings**" > "**General settings**" > "**Units**"

This menu offers the following:

- **SI or US units**
- **Customised units**.

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

- **Pressure**
- **Differential pressure**
- **Head**
- **Level**
- **Flow rate**
- **Volume**
- **Temperature**
- **Differential temp.**
- **Power**
- **Energy**.

Setting, general

1. Select "**SI or US units**" with ⌄ or ⌃ and press [OK].

2. Choose either SI or US units with ⌄ or ⌃ and press [OK].

Setting, customised

1. Select "**Customised units**" with ⌄ or ⌃ and press [OK].

2. Select parameter and press [OK].

3. Select unit with ⌄ or ⌃ . Press [OK].

4. Return to parameters with ‹ . Repeat steps 2-4 if necessary.

   If you have selected **SI or US units**, the customised units are reset.

"Enable/disable settings"
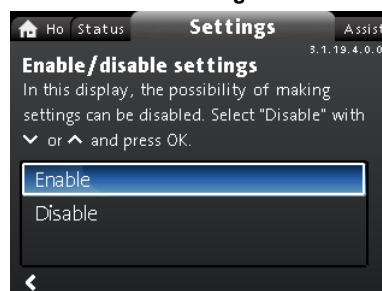
Navigation

"**Home**" > "**Settings**" > "**General settings**" > "**Enable/disable settings**"

Setting

5. Select "**Disable**" with ⌄ or ⌃ and press [OK].The pump is now locked for settings. Only the "**Home**" display is available.

In this display, you can disable the possibility of making settings. To unlock the pump and allow settings, press ⌄ and ⌃ simultaneously for at least 5 seconds or enable the settings again in the menu.

"Alarm and warning settings"
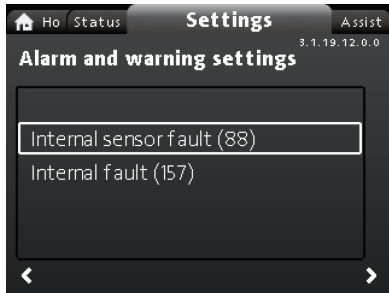
Navigation

"Home" > "Settings" > "General settings" > "Alarm and warning settings"

This menu offers the following:

- **Internal sensor fault (88)**
- **Internal fault (157)**.

"Internal sensor fault (88)"

Navigation

"Home" > "Settings" > "General settings" > "Internal sensor fault (88)"

Setting

1. Select either "Enable" or "Disable" with ˅ or ˄ and press [OK].

In case of a sensor problem related to the quality of the liquid, the pump is able to continue operation with satisfactory performance in most situations. In such situations, you can disable "Internal sensor fault (88)".

"Internal fault (157)"

Navigation

"Home" > "Settings" > "General settings" > "Internal fault (157)"

Setting

1. Select either "Enable" or "Disable" with ˅ or ˄ and press [OK].

If the real-time clock is out of order, for example due to a dead battery, a warning is shown. You can disable the warning.

"Delete history"
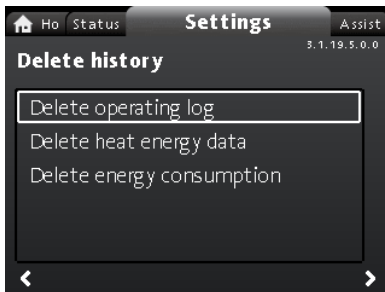
Navigation

"Home" > "Settings" > "General settings" > "Delete history"

This menu offers the following:

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

Setting

1. Select submenu with ˂ or ˃ and press [OK].

2. Select "Yes" with ˅ or ˄ and press [OK] or press ⊗ to cancel.

You can delete data from the pump, for example if the pump is moved to another system or if new data are required due to changes to the system.

"Define Home display"
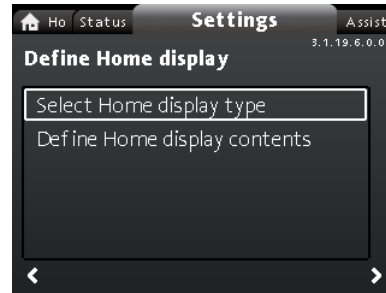
Navigation

"Home" > "Settings" > "General settings" > "Define Home display"

This menu offers the following:

- **Select Home display type**
  - **List of data**
  - **Graphical illustration**
- **Define Home display contents**.
  - **List of data**.

In this menu, you can set the "Home" display to show up to four user-set parameters or a graphical illustration of a performance curve.

Setting: "Select Home display type"

1. Choose "Select Home display type" with ˅ or ˄ and press [OK].

2. Select "List of data" with ˅ or ˄ . Press [OK].

3. A list of parameters appears in the display. Select or deselect with [OK].

4. Return to "Select Home display type" with ˂ .

5. Select "Graphical illustration" with ˅ or ˄ and press [OK].

6. Select the desired curve. Press [OK] to save.

To specify the contents, go to "Define Home display contents".

Setting: "Define Home display contents"

1. Choose "Define Home display contents" with ˅ or ˄ and press [OK].

2. To set "List of data" with ˅ or ˄ . Press [OK].

3. A list of parameters appears in the display. Select or deselect with [OK].

The selected parameters are now visible in the "Home" menu. See figure below. The arrow indicates that the parameter links to the "Settings" menu and works as a shortcut for quick settings.
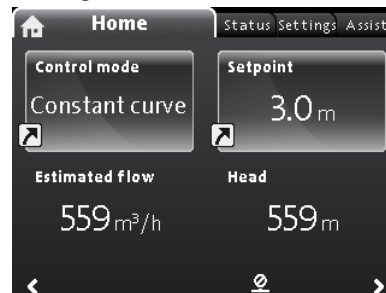
Example: "Home" menu parameters

"Display brightness"
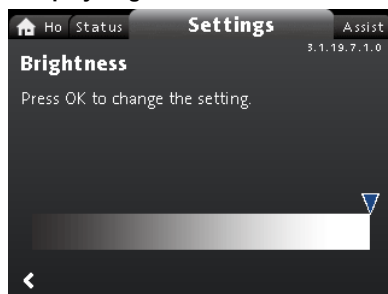
Navigation

"**Home**" > "**Settings**" > "**General settings**" > "**Display brightness**"

Setting

1. Press [OK].

2. Set brightness with ◄ and ► .

3. Press [OK] to save.

"Return to factory settings"
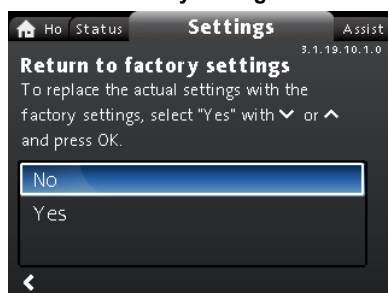
Navigation

"**Home**" > "**Settings**" > "**General settings**" > "**Return to factory settings**"

Setting

To overwrite the current settings with the factory settings, select "**Yes**" with ˅ or ˄ and press [OK].

You can recall the factory settings and overwrite the current settings. All user settings in the "**Settings**" and "**Assist**" menus are set back to the factory settings. This also includes language, units, setup of analog input, multipump function, etc.

"Run start-up guide"
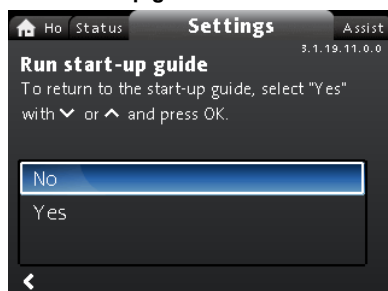
Navigation

"**Home**" > "**Settings**" > "**General settings**" > "**Run start-up guide**"

Setting

To run the startup guide, select "**Yes**" with ˅ or ˄ and press [OK].

The startup guide automatically starts when you start the pump for the first time; however, you can always run the startup guide later via this menu.

The startup guide guides you through the general settings of the pump, such as language, date and time.

8.8 "Assist" menu
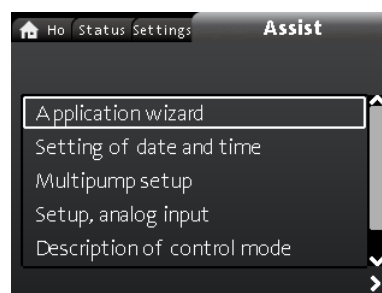
Navigation

"**Home**" > "**Assist**"

Press ⊛ and go to the "**Assist**" menu with ► .

The menu guides you through and offers the following:

- **Application wizard** (available for pumps with production code from 1838)
- **Setting of date and time**
- **Multipump setup**
- **Setup, analog input**
- **Description of control mode**
- **Assisted fault advice**.

The "**Assist**" menu guides the user through the setting of the pump. In each submenu, there is a guide that guides the user through the setting of the pump.

8.8.1 "Application wizard"
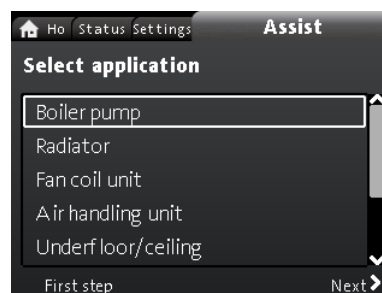
Available for pumps with production code from 1838.

Navigation

"**Home**" > "**Assist**" > "**Application wizard**"

This menu guides you through a complete pump setup and helps you set the correct control mode.

Applications available in this menu:

- **Boiler pump**
- **Radiator**
- **Fan coil unit**
- **Air handling unit**
- **Underfloor/ceiling**
- **Hot water**
- **Ground source**
- **Chiller pump**.

Setting

1. Choose the system that applies to the function of your pump with ˅ or ˄ and press [OK] followed by ► .

2. Select the characteristics applicable to your system with ˅ or ˄ and press [OK] followed by ► .

3. Continue this process until the setup has been completed.

If you wish to change the selected control mode, either launch the "**Application wizard**" again or choose a control mode in the "**Settings**" menu. See section "Control mode".

The application wizard menu which guides through a complete pump setup and set correct control mode in available in Grundfos go app. This helps to perform above settings remotely using smart phones.

Related information

8.7.3 "Control mode"

8.8.2 "Setting of date and time"

Navigation

"**Home**" > "**Assist**" > "**Setting of date and time**"

This menu guides you through the setup of time and date. See also section "Set date and time".

Related information

8.7.11 "General settings"

8.8.3 "Multipump setup"
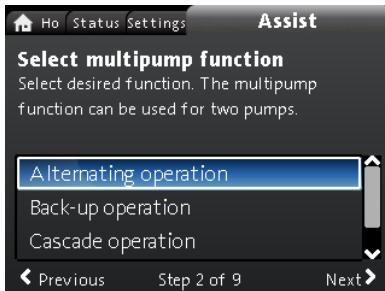
Navigation

"**Home**" > "**Assist**" > "**Multipump setup**"

This menu offers the following:

•   **Alternating operation**

•   **Back-up operation**

•   **Cascade operation**

•   **No multipump function**.

Setting: "Alternating operation", "Back-up operation" and "Cascade operation"

1.   Select the desired operating mode with ⌄ or ⌃ and press [OK].

2.   Follow the step-by-step guide to complete the multipump setup.

3.   Check the entered values.

4.   Press [OK] to confirm and enable the settings.

You can set a multipump system from a selected pump, which will then be the master pump. Check the display to identify the master pump in a multipump system. See figure below and section "Home" menu.
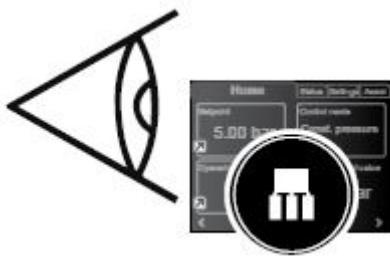
Identify the master pump in a multipump system

A twin-head pump is set to multipump function from factory. Here pump head I is defined as master pump. Check the nameplate to identify the master pump. See figure below.
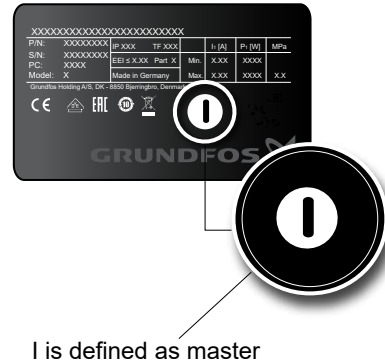
I is defined as master

Identify the master pump on a twin-head pump

For detailed information on the control modes, see section Multipump function.

Setting: "No multipump function"

1.   Select the "**No multipump function** " with ⌄ or ⌃ and press [OK].

2.   The pumps run as single-head pumps.

Related information

4.2 Twin-head pump

7.9.1 External connections in a multipump system

8.5 "Home" menu

9. Servicing the product

11.1 Grundfos GO

8.8.4 "Setup, analog input"
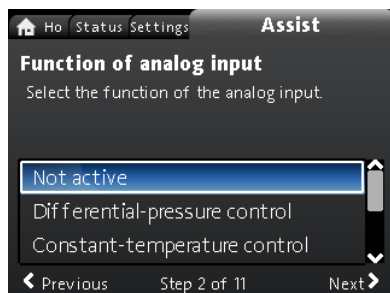
Navigation

"**Home**" > "**Assist**" > "**Setup, analog input**"

Setting, example: "Analog Input" > "Heat energy monitor"

1. To enable the sensor input, select "**Heat energy monitor**" with ⌄ or ⌃ and press [OK].

2. Follow the step-by-step guide to complete the sensor-input setup. Start with selecting the unit of the sensor, see figure below, and end with the summary display.

3. Check the entered values.

4. Press [OK] to confirm and enable the settings.
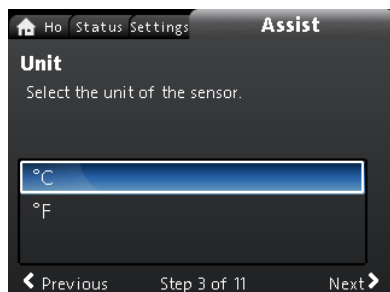
Unit display

Learn more about "**Heat energy monitor**" in section Heat energy monitor and "**Heat energy**" in section "Heat energy monitor".

Related information

8.9 "Description of control mode"

Navigation

"**Home**" > "**Assist**" > "**Description of control mode**"

This menu describes the possible control modes.

8.10 "Assisted fault advice"

Navigation

"**Home**" > "**Assist**" > "**Assisted fault advice**"

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

9. Servicing the product

Before dismantling

> **WARNING**
> **Electric shock**
> Death or serious personal injury
> - Switch off the power supply for at least 3 minutes before you start any work on the product.
> - Lock the main switch in position 0. Type and requirements as specified in EN 60204-1, 5.3.2.

> **WARNING**
> **Electric shock**
> Death or serious personal injury
> - Make sure that other pumps or sources do not force flow through the pump even if the pump is stopped. This will cause the motor to act like a generator, resulting in voltage on the pump.

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

9.1 Differential-pressure and temperature sensor

The pump incorporates a differential-pressure and temperature sensor. The sensor is located in the pump housing in a channel between the inlet and outlet ports. The sensors of twin-head pumps are connected to the same channel and the pumps therefore register the same differential pressure and temperature.

Via a cable, the sensor sends an electrical signal for the differential pressure across the pump and for the liquid temperature to the controller in the control box.

If the sensor fails, the pump continues using the last measurement from the sensor and operate based on this. In earlier software versions, model A, the pump runs at maximum speed in case of a sensor fault.

When the fault has been corrected, the pump continues operating according to the parameters set.

The differential-pressure and temperature sensor offers substantial benefits:
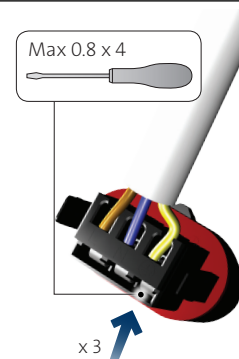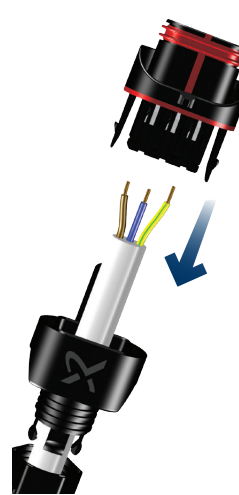
- direct feedback on the pump display
- complete pump control
- measurement of the pump load for precise and optimum control resulting in higher energy efficiency.

9.2 External sensor condition

In case of missing sensor signal:

- Pumps produced before week 4, 2016: The pump runs at maximum speed.
- Pumps produced after week 4, 2016: The pump runs at 50 % of the nominal speed.

9.3 Disassembling the plug

Step	Action	Illustration
1	Loosen the cable gland and remove it from the plug.	TM055545
2	Pull off the plug cover while pressing on both sides.	TM055546
3	Loosen the cable conductors one by one by pressing a screwdriver gently into the terminal clip.	Max 0.8 x 4 x 3 TM055547
4	The plug has now been removed from the power supply plug.	TM055548

10. Fault finding the product

10.1 Grundfos Eye operating indications

Grundfos Eye	Indication	Cause
	No lights are on.	The power is off. The pump is not running.
	Two opposite green indicator lights running in the direction of rotation of the pump.	The power is on. The pump is running.
	Two opposite green indicator lights are permanently on.	The power is on. The pump is not running.
	One yellow indicator light running in the direction of rotation of the pump.	Warning. The pump is running.
	One yellow indicator light is permanently on.	Warning. The pump has stopped.
	Two opposite red indicator lights flashing simultaneously.	Alarm. The pump has stopped.
	One green indicator light in the middle is permanently on in addition to another indication.	Remote-controlled. The pump is currently being accessed by Grundfos GO.

Signals from Grundfos Eye

The operating condition of the pump is indicated by Grundfos Eye on the operating panel when it communicates with a remote control.

Indication	Description	Grundfos Eye
The green indicator light in the middle flashes quickly four times.	This is a feedback signal which the pump gives in order to ensure identification of itself.	
The green indicator light in the middle flashes continuously.	Grundfos GO or another pump is trying to communicate with the pump. Press [OK] on the pump operating panel to allow communication.	
The green indicator light in the middle is permanently on.	Remote control with Grundfos GO via radio. The pump is communicating with Grundfos GO via radio connection.	

10.1.1 Operating indications related to a multipump system

When connecting Grundfos GO Remote to a multipump setup and choosing 'system view', Grundfos GO Remote indicates the system's operating status and not the status of the pump itself. Therefore, the indicator light in Grundfos GO Remote might differ from the indicator light shown on the pump's operating panel. See table below.

Grundfos Eye, master pump	Grundfos Eye, slave pump	Grundfos Eye, Grundfos GO Remote
Green	Green	Green
Green/yellow	Yellow/red	Yellow
Yellow/red	Green/yellow	Yellow
Red	Red	Red

10.2 Fault finding

WARNING
Electric shock
Death or serious personal injury

- Switch off the power supply for at least 3 minutes before you start any work on the product. Lock the main switch in position 0. Type and requirements as specified in EN 60204-1, 5.3.2.

WARNING
Electric shock
Death or serious personal injury

- Make sure that other pumps or sources do not force flow through the pump even if the pump is stopped.

CAUTION
Pressurised system
Minor or moderate personal injury

- Before dismantling the pump, drain the system or close the isolating valve on either side of the pump. The pumped liquid may be scalding hot and under high pressure.

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

Reset a fault indication in one of the following ways:

- When you have eliminated the fault cause, the pump reverts to normal duty.
- If the fault disappears by itself, the fault indication is automatically reset.

The fault cause is stored in the pump alarm log.

10.3 Fault finding table

Warning and alarm codes	Fault	Automatic reset and restart	Remedy
"Pump communication fault" (10) "Alarm"	Communication fault between different parts of the electronics.	Yes	Contact Grundfos Service, or replace the pump. Check if the pump is running in turbine operation. See code (29) "**Forced pumping**".
"Forced pumping" (29) "Alarm"	Other pumps or sources force flow through the pump even if the pump is stopped and switched off.	Yes	Switch off the pump on the main switch. If the light in Grundfos Eye is on, the pump is running in forced-pumping mode. Check the system for defective non-return valves and replace the valves, if necessary. Check the system for correct position of non-return valves, etc.
"Undervoltage" (40, 75) "Alarm"	The supply voltage to the pump is too low.	Yes	Make sure that the power supply is within the specified range.
"Blocked pump" (51) "Alarm"	The pump is blocked.	Yes	Dismantle the pump, and remove any foreign matter or impurities preventing the pump from rotating.
"High motor temperature" (64) "Alarm"	The temperature in the stator windings is too high.	No	Contact Grundfos Service, or replace the pump.
"Internal fault" (72 and 155) "Alarm"	• Internal fault in the pump electronics. • Irregularities in the voltage supply can cause alarm 72. • Overload of the 24 VDC output can cause alarm 72. See section Input and output communication.	Yes	There might be turbine flow in the application that forces a flow through the pump. Check if the sensor is blocked by sediments. This can occur if the media is impure. Replace the pump, or contact Grundfos Service.
"Overvoltage" (74) "Alarm"	The supply voltage to the pump is too high.	Yes	Make sure that the power supply is within the specified range.
"Comm. fault, twin-head pump" (77) "Warning"	The communication between pump heads was disturbed or broken.	-	Make sure that the second pump head is powered on or connected to the power supply.
"Internal fault" (84, 85 and 157) "Warning"	Fault in the pump electronics.	-	Contact Grundfos Service, or replace the pump.
"Internal sensor fault" (88) "Warning"	The pump is receiving a signal from the internal sensor which is outside the normal range.	-	Make sure that the plug and cable are connected correctly in the sensor. The sensor is located on the back of the pump housing. Replace the sensor, or contact Grundfos Service.
"External sensor fault" (93) "Warning"	The pump is receiving a signal from the external sensor which is outside the normal range.	-	Does the electrical signal set (0-10 V or 4-20 mA) match the sensor output signal? If not, change the setting of the analog input, or replace the sensor with one that matches the setup. Check the sensor cable for damage. Check the cable connection at the pump and at the sensor. Correct the connection, if required. See section Differential-pressure and temperature sensor. The sensor has been removed, but the analog input has not been disabled. Replace the sensor, or contact Grundfos Service.

Warnings do not activate the alarm relay.

Related information

11. Accessories

11.1 Grundfos GO

The pump is designed for wireless radio or infrared communication with Grundfos GO. Grundfos GO enables setting of functions and gives access to status overviews, technical product information and actual operating parameters.

> The radio communication between the pump and Grundfos GO is encrypted to protect against misuse.

Grundfos GO is available in Apple App Store and Google Play.

Grundfos GO replaces the Grundfos R100 remote control. This means that all products supported by R100 are now supported by Grundfos GO.

Groundfos Go app in devices can directly communicate with Pump using bluetooth connection.

You can use Grundfos GO for the following:

- Reading of operating data.
- Reading of warning and alarm indications.
- Setting of control mode.
- Setting of setpoint.
- Selection of external setpoint signal.
- Allocation of pump number to distinguish between pumps that are connected via GENIbus.
- Selection of function for digital input.
- Generation of reports in PDF.
- Assist function.
- Application Wizard menu
- Multipump setup.
- Display of relevant documentation.

For function and connection to the pump, see separate installation and operating instructions for the desired type of Grundfos GO setup.

11.2 Communication interface module, CIM

The pump can communicate via the wireless GENIair connection or a communication module.

This enables the pump to communicate with other pumps and with different types of network solutions.

The Grundfos communication interface modules enable the pump to connect to standard fieldbus networks.
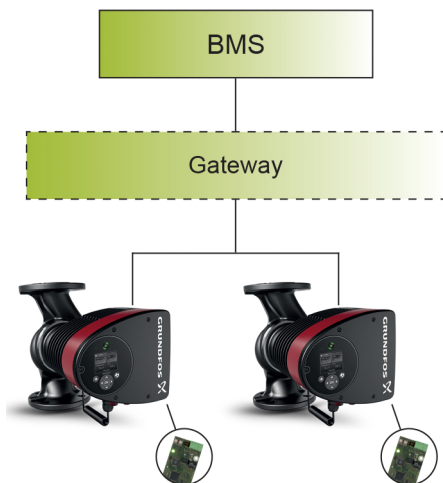
Building management system, BMS, with two pumps connected in parallel

Pos.	Description
1	BMS
2	Gateway

A communication interface module is an add-on communication interface module.

The communication interface module enables data transmission between the pump and an external system, for example a building management system or SCADA system.

The communication interface module communicates via fieldbus protocols.

> A gateway is a device that facilitates the transfer of data between two different networks based on different communication protocols.

Pumps older than model C must have a CIM module mounted in both the slave and master pump. Pumps from model C have an integrated booster profile, which enables data in the slave to be monitored by the master. This booster profile supports newer versions of CIM modules, making it possible only to mount the CIM module on the master pump. The CIM modules supporting the booster profile are indicated in the overview below.

Available communication interface modules

Module	Fieldbus protocol	Product number
CIM 050	GENIbus	96824631
CIM 100	LonWorks	96824797
CIM 110	LonWorks for Twinpump	96824798
CIM 150	PROFIBUS DP	96824793
CIM 200	Modbus RTU	96824796
CIM 260-EU [7]	EU 3G/4G cellular	99439302
CIM 280-EU GIC GEN2 [7]	Cellular GiC	99895383
CIM 280-US GIC GEN2 [8]	Cellular GiC	99895386
CIM 300	BACnet MS/TP	96893770
CIM 500	Ethernet	98301408
CIM 550 Ethernet GIC	GiC	92546689

[7] CIM 260-EU and CIM 280-EU GiC GEN2 is for Europe only.
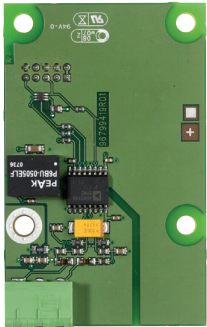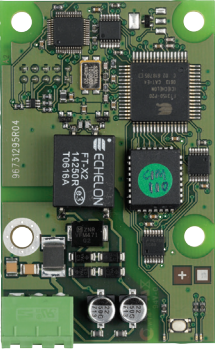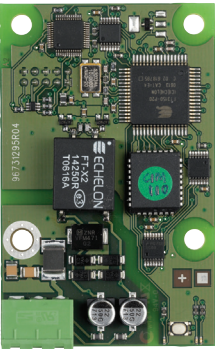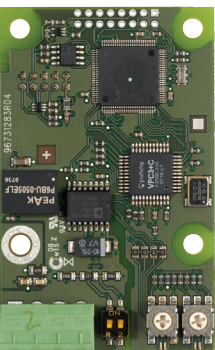
[8] CIM 280-US GIC GEN2 is for USA/Canada only.
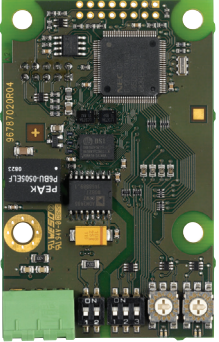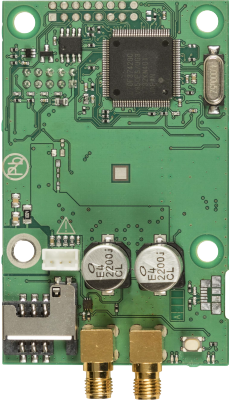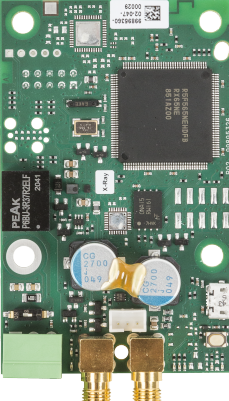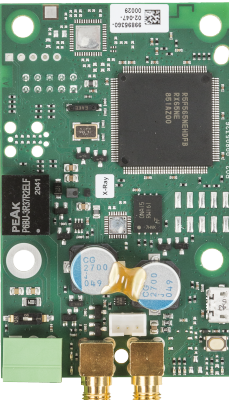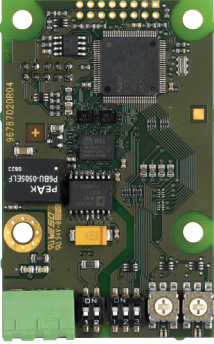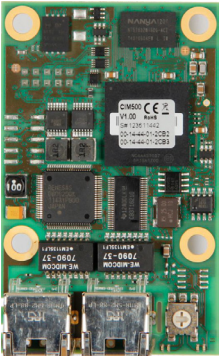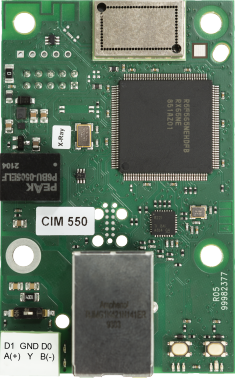
> Use booster functional profiles for twin-head pumps.

For further information about data communication via CIM modules, see the CIM documentation available in Grundfos Product Center.

11.2.1 Description of communication interface modules

Module	Fieldbus protocol	Description	Functions
CIM 050 TM067238	GENIbus	CIM 050 is a Grundfos communication interface module used for communication with a GENIbus network.	CIM 050 has terminals for the GENIbus connection.
CIM 100 TM067279	LonWorks	CIM 100 is a Grundfos communication interface module used for communication with a LonWorks network.	CIM 100 has terminals for the LonWorks connection. Two LEDs are used to indicate the actual status of the CIM 100 communication. One LED is used for indication of correct connection to the pump, and the other is used to indicate LonWorks communication status.
CIM 110 TM067279	LONworks for Twinpump	CIM 110 is a Grundfos communication interface module for communication with a LON network to be used in master head of a Twinpump.	CIM 110 has FTT-10 terminals for the LonWorks connection. Two LEDs are used to indicate the actual status of the CIM 100 communication. One LED is used for indication of correct connection to the pump, and the other is used to indicate LonWorks communication status.
CIM 150 TM067280	PROFIBUS DP	CIM 150 is a Grundfos communication interface module used for communication with a PROFIBUS network.	CIM 150 has terminals for the PROFIBUS DP connection. DIP switches are used to set line termination. Two hexadecimal rotary switches are used to set the PROFIBUS DP address. Two LEDs are used to indicate the actual status of the CIM 150 communication. One LED is used for indication of correct connection to the pump, and the other is used to indicate PROFIBUS communication status.

Module	Fieldbus protocol	Description	Functions
CIM 200	Modbus RTU	CIM 200 is a Grundfos communication interface module used for communication with a Modbus RTU network.	CIM 200 has terminals for the Modbus connection. DIP switches are used to select parity and stop bits, to select transmission speed and to set line termination. Two hexadecimal rotary switches are used to set the Modbus address. Two LEDs are used to indicate the actual status of the CIM 200 communication. One LED is used for indication of correct connection to the pump, and the other is used to indicate Modbus communication status.
CIM 260-EU	EU 3G/4G cellular	CIM 260 is a Grundfos communication interface module, which communicates using Modbus TCP via cellular data transmission to a SCADA system or SMS communication to mobile phones. CIM 260-EU is for europe only	CIM 260 has a SIM-card slot and an SMA connection to the cellular antenna. CIM 260 can be fitted with a lithium-ion battery. Two LEDs are used to indicate the actual status of the CIM 260 communication. One LED is used for indication of correct connection to the pump, and the other is used to indicate cellular communication status. **Note**: The SIM card is not supplied with the CIM 260.
CIM 280-EU GIC GEN2	Cellular GiC	CIM 280-EU GIC GEN2 is a Grundfos communication interface for communication via cellular network to Grundfos iSolution Could applications. CIM 280-EU GIC GEN2 is for Europe only	CIM 280-EU GIC GEN2 has a SIM-card slot and an SMA connection for a cellular antenna. CIM 280-EU GIC GEN2 can be fitted with a lithium-ion battery. Two LEDs are used to indicate the actual status of the CIM 280-EU GIC GEN2 communication. One LED is used for indication of correct connection to the pump, and the other is used to indicate cellular communication status. **Note**: A eUICC SIM card is supplied with the CIM 280. Reach out to Grundfos to verify if your Grundfos iSolution Could application is supported. Require a related 3G/4G antenna
CIM 280-US GIC GEN2	Cellular GiC	CIM 280-US GIC GEN2 is a Grundfos communication interface for communication via cellular network to Grundfos iSolution Could applications. CIM 280-US GIC GEN2 is for North America/Canada only.	CIM 280-US GIC GEN2 has a SIM-card slot and an SMA connection for a cellular antenna. CIM 280-US GIC GEN2 can be fitted with a lithium-ion battery. Two LEDs are used to indicate the actual status of the CIM 280-EU GIC GEN2 communication. One LED is used for indication of correct connection to the pump, and the other is used to indicate cellular communication status. **Note**: A eUICC SIM card is supplied with the CIM 280. Reach out to Grundfos to verify if your Grundfos iSolution Could application is supported and your country fit due to frequency bands and approvals. Require a related 3G/4G antenna.

Module	Fieldbus protocol	Description	Functions
CIM 300 TM067281	BACnet MS/TP	CIM 300 is a Grundfos communication interface module used for communication with a BACnet MS/TP network.	CIM 300 has terminals for the BACnet MS/TP connection. DIP switches are used to set transmission speed and line termination and to select the custom Device Object Instance Number. Two hexadecimal rotary switches are used to set the BACnet address. Two LEDs are used to indicate the actual status of the CIM 300 communication. One LED is used for indication of correct connection to the pump, and the other is used to indicate BACnet communication status.
CIM 500 TM067283	Ethernet	CIM 500 is a Grundfos communication interface module used for data transmission between an industrial Ethernet network and a Grundfos product. CIM 500 supports various industrial Ethernet protocols: PROFINET Modbus TCP BACnet IP EtherNet/IP	CIM 500 supports various industrial Ethernet protocols. CIM 500 is configured via the built-in web server, using a standard web browser on a PC.
CIM 550 TM084171	Ethernet GiC	CIM 550 Ethernet GIC interface is a Grundfos communication interface for communication via LAN and internet to Grundfos iSolution Could applications.	CIM 550 Ethernet GIC has a RJ 45 interface for LAN connection, a RS 485 port for future Modbus RTU slave connection and a BLE radio for commissioning via Grundfos GO. LEDs are used to indicate the actual status of the CIM 550 communication. One LED is used for indication of correct connection to the pump, and the other is used to indicate LAN connection to Grundfos iSolution Could applications. Reach out to Grundfos to verify if your Grundfos iSolution Could application is supported and your country fit due to approvals.

11.2.2 Installing a communication interface module

WARNING
Electric shock
Death or serious personal injury
- Make sure that other pumps or sources do not force flow through the pump even if the pump is stopped. This will cause the motor to act like a generator, resulting in voltage on the pump.
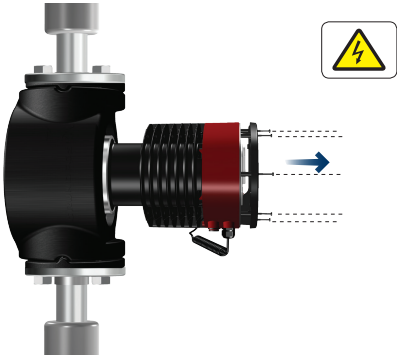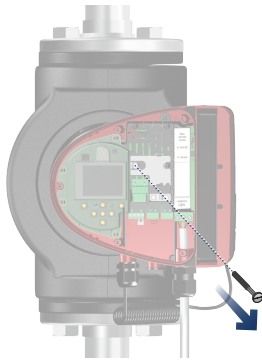
WARNING
Electric shock
Death or serious personal injury
- Switch off the power supply for at least 3 minutes before you start any work on the product. Make sure that the power supply cannot be accidentally switched on.
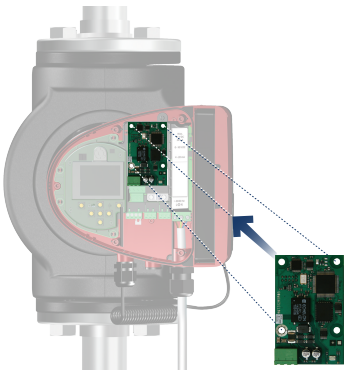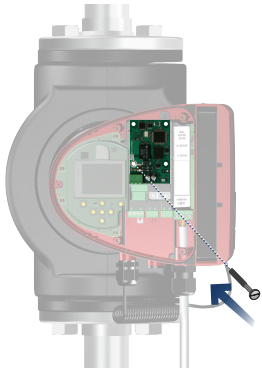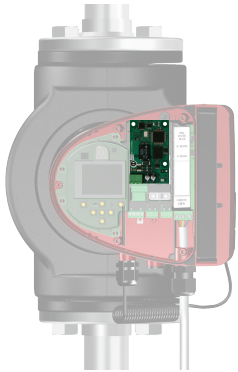
- It must be possible to lock the main switch in position 0. Type and requirements as specified in EN 60204-1, 5.3.2.

Pumps older than model C must have a CIM module mounted in both the slave and master pump.

Pumps from model C together with newer versions of CIM modules only require for the CIM module to be mounted on the master pump, not on the slave. See section Communication interface module, CIM.

Step	Action	Illustration
1	A. Terminal-connected versions: Remove the front cover from the control box. B. Plug-connected versions: Open the front cover.	A TM052875 B TM082063
2	Unscrew the earth connection.	TM066907

Step	Action	Illustration
3	Fit the communication interface module as illustrated and click it on.	TM052914
4	Tighten the screw holding the communication interface module and secure the earth connection.	TM052912
5	For connection to fieldbus networks, see the installation and operating instructions for the desired communication interface module.	TM052913

Related information

11.2 Communication interface module, CIM

11.2.3 Reuse of communication interface modules

You can reuse a communication interface module in a CIU unit used together with Grundfos MAGNA Series 2000 in MAGNA3. Before you use the CIM module in the pump, reconfigure the module. Contact your nearest Grundfos company.
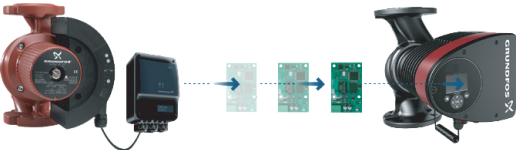
Reuse of communication interface module

11.2.4 Auto detection of CIM modules

If a pump in a system with multiple pumps is replaced with a newer version (from Model D), the new pump automatically detects if the existing pump(s) and/or BMS system are older and adjusts itself accordingly.

Auto detection in twin-head pumps happens if one of the pumps is replaced and paired with a newer model than the existing one i.e. MAGNA 3 from model 'D'). The new pump automatically detects the model version of the existing pump. If the old pump is an older model, the new pump will adjust itself making it compatible with the old system.

Auto detection can be manually overruled if the system is controlled by a SCADA system. However, when integrating a newer model with an older setup, we recommend that you choose compatibility mode.

For more information on how to manage auto detection directly on the pump, see section "Bus communication".

Related information

11.2.5 Grundfos Remote Management

Grundfos Remote Management is an easy-to-install, low-cost solution for wireless monitoring and management of Grundfos products. It is based on a centrally hosted database and a web server with wireless data collection via GSM or GPRS modem. The system only requires an internet connection, a web browser, a Grundfos Remote Management modem and an antenna as well as a contract with Grundfos allowing you to monitor and manage Grundfos pump systems.

You have wireless access to your account anywhere and anytime you have an internet connection, for example via a mobile device. Warnings and alarms can be sent by e-mail or SMS to your mobile device.

Application	Description	Product number
CIM 280	Grundfos Remote Management Requires a contract with Grundfos and a SIM card.	99439724
GSM antenna for roof-mounting	Antenna for use on top of metal cabinets. Vandal-proof. 2-metre cable. Quad band for global use.	97631956
GSM antenna for desk-mounting	Antenna for general-purpose application, for example inside plastic cabinets. To be fixed with the double-adhesive tape supplied. 4-metre cable. Quad band for global use.	97631957

For Grundfos Remote Management contract, contact your local Grundfos company.

11.3 Pipe connections

Adapters for threads and flanges are available as accessories, making it possible to install the pump in any pipe. See data booklet for *MAGNA3*, Accessories section, for the right dimension and product number.

TM086790

11.4 External sensors

11.4.1 Temperature sensor

Sensor	Type	Measuring range [bar]	Measuring range [°C]	Transmitter output [VDC]	Power supply [VDC]	Process connection	Product number
Combined pressure and temperature sensor	RPI T2	0-16	-10 to +120	2 × 0 - 10 4 wires	16.6 - 30	G 1/2	98355521

11.4.2 Pressure sensor

Sensor	Type	Supplier	Measuring range [bar]	Sensor output [mA]	Power supply [VDC]	Process connection	Product number
Pressure sensor	RPI	Grundfos	0 - 0.6	4-20	12-30	G 1/2	97748907
			0 - 1.0				97748908
			0 - 1.6				97748909
			0 - 2.5				97748910
			0 - 4.0				97748921
			0 - 6.0				97748922
			0-12				97748923
			0-16				97748924

11.4.3 DPI V.2 transmitter

Combined differential-pressure and temperature transmitter

Scope of delivery:

- DPI V.2 transmitter
- open 2 m cable with M12 connection in one end
- capillary tube with fitting
- quick guide.

TM047866

DPI V.2 transmitter

Sensor	Measuring range [bar]	Measuring range [°C]	Transmitter output	Power supply [VDC]	Temperature measurement	O-ring EPDM [9]	Process connection	Product number
Grundfos DPI	0 - 0.6	0-100	4-20 mA	12.5 - 30		●		97747194
			0-10 VDC	16.5 - 30	●	●		97747202
Grundfos DPI	0 - 1.0	0-100	4-20 mA	12.5 - 30		●	G 1/2	97747195
			0-10 VDC	16.5 - 30	●	●		97747203
Grundfos DPI	0 - 1.6	0-100	4-20 mA	12.5 - 30		●	G 1/2	97747196
			0-10 VDC	16.5 - 30	●	●		97747204
Grundfos DPI	0 - 2.5	0-100	4-20 mA	12.5 - 30		●	G 1/2	97747197
			0-10 VDC	16.5 - 30	●	●		97747205

[9] **Note:** EPDM: approved for potable water.

11.5 Cable for sensors

Description	Length [m]	Product number
Screened cable	2.0	98374260
Screened cable	5.0	98374271

11.6 Blanking flange

The accessory is used to blank off the opening when one of the pump heads of a twin-head pump is removed for service to enable uninterrupted operation of the other pump.

The accessory set consists of a blanking flange and a fastener set.

TM068518
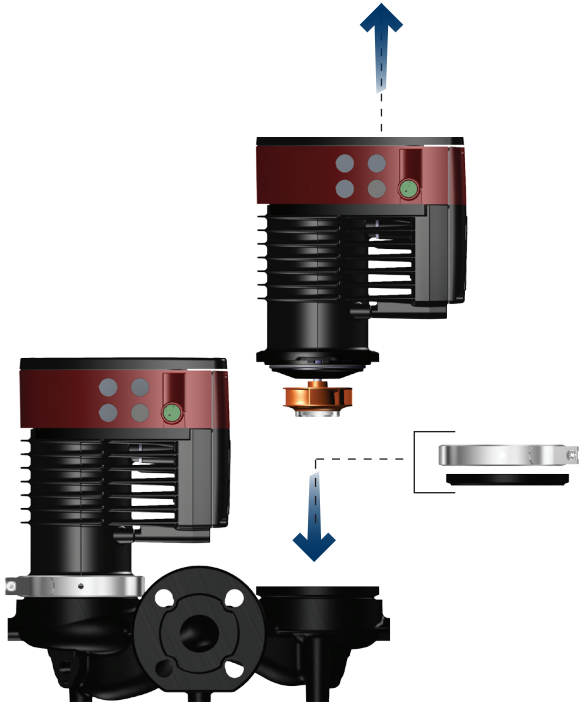
Position of blanking flange

Pump type	Product number
MAGNA3 32-40/60/80/100 (F) MAGNA3 40-40/60 F	98159373
MAGNA3 32-120 F MAGNA3 40-/80/100/120/150/180 F MAGNA3 50-40/60/80/100/120/150/180 F MAGNA3 65-40/60/80/100/120/150 F MAGNA3 80-40/60/80/100/120 F MAGNA3 100-40/60/80/100/120 F	98159372

11.7 Insulating kits for applications with ice buildup

The accessory is for single-head MAGNA pumps used in applications with ice buildup.

The accessory set consists of two polyurethane (PUR) shells and metal clamps to ensure tight assembly.

Pump type	Product number
MAGNA3 25-40/60/80/100/120 (N)	98354534
MAGNA3 32-40/60/80/100/120 (N)	98354535
MAGNA3 32-40/60/80/100 F (N)	98354536
MAGNA3 32-120 F (N)	98063287
MAGNA3 40-40/60 F (N)	98354537
MAGNA3 40-80/100 F (N)	98063288
MAGNA3 40-120/150/180 F (N)	98145675
MAGNA3 50-40/60/80 F (N)	98063289
MAGNA3 50-100/120/150/180 F (N)	98145676
MAGNA3 65-40/60/80/100/120 F (N)	96913593
MAGNA3 65-150 F (N) [10]	99608813
MAGNA3 80-40/60/80/100/120 F	98134265
MAGNA3 100-40/60/80/100/120 F	96913589

[10] If the control box of the pump is turned, the insulating shells are not applicable. Contact Grundfos for assistance.

Specifications:

- Specific volume resistance greater than or equal to 10^{15} Ωcm, DIN 60093
- Thermal conductivity at 10 °C 0.036 W/mK and at 40 °C 0.039 W/mK, DIN 52612
- Density 33 ± 5 kg/m^3, ISO 845
- Working temperature range -40 to +90 °C, ISO 2796.

12. Technical data

Supply voltage

1 × 230 V ± 10 %, 50/60 Hz, PE.

Motor protection

The pump requires no external motor protection.

Enclosure class

IPX4D (EN 60529).

Insulation class

F.

Relative humidity

Maximum 95 %.

Ambient temperature

0 to 40 °C.

> Ambient temperatures below 0 °C require the following conditions:
> • The media temperature is 5 °C.
> • The media contains glycol.
> • The pump runs continuously and does not stop.
> • For twin-head pumps cascade operation every 24 hours is mandatory.

Ambient temperature during transport: -40 to +70 °C.

In cooling applications condensation may occur on the surface of the pump.

Condensating application allowed only if the power is on.

Temperature class

TF110 (EN 60335-2-51).

Liquid temperature

Continuously: -10 to +110 °C.

Stainless-steel pumps in domestic hot-water systems:

In domestic hot-water systems, we recommend that you keep the liquid temperature below 65 °C to eliminate the risk of lime precipitation.

System pressure

> The actual inlet pressure and the pump pressure against a closed valve must be lower than the maximum permissible system pressure.

The maximum permissible system pressure is stated on the pump nameplate:

PN 6: 6 bar / 0.6 MPa

PN 10: 10 bar / 1.0 MPa

PN 12: 12 bar / 1.2 MPa

PN 16: 16 bar / 1.6 MPa.

Note: Not all variants are available in all markets.

Test pressure

The pumps can withstand test pressures as indicated in EN 60335-2-51. See below.

• PN 6: 7.2 bar / 0.72 MPa

• PN 10: 12 bar / 1.2 MPa

• PN 6/10: 12 bar / 1.2 MPa

• PN 12: 12 bar / 1.2 MPa

• PN 16: 19.2 bar / 1.92 MPa.

Not all variants are available in all markets.

During normal operation, do not use the pump at higher pressures than those stated on the nameplate.

The pressure test has been made with water containing anticorrosive additives at a temperature of 20 °C.

Min. inlet pressure

The following relative minimum inlet pressure must be available at the pump inlet during operation to avoid cavitation noise and damage to the pump bearings.

> The values in the table below apply to single-head pumps and twin-head pumps in single-head operation.

In the case of cascade operation, the required relative inlet pressure must be increased by 0.1 bar / 0.01 MPa compared to the stated values for single-head pumps or twin-head pumps in single-head operation.

MAGNA3	Liquid temperature			
	25 °C	75 °C	95 °C	110 °C
	Inlet pressure [bar] / [MPa]			
25-40/60/80/100/120	0.0	0.10 / 0.01	0.35 / 0.035	1.0 / 0.10
32-40/60/80/100/120	0.0	0.10 / 0.01	0.35 / 0.035	1.0 / 0.10
32-40/60/80/100/120 F	0.0	0.10 / 0.01	0.35 / 0.035	1.0 / 0.10
32-120 F	0.0	0.10 / 0.01	0.20 / 0.020	0.7 / 0.07
40-40/60 F	0.0	0.10 / 0.01	0.35 / 0.035	1.0 / 0.10
40-80/100/120/150/180 F	0.0	0.10 / 0.01	0.50 / 0.05	1.0 / 0.10
50-40/60/80 F	0.0	0.10 / 0.01	0.40 / 0.04	1.0 / 0.10
50-100/120 F	0.0	0.10 / 0.01	0.50 / 0.05	1.0 / 0.10
50-150/180 F	0.4	0.70 / 0.07	1.20 / 0.12	1.7 / 0.17
65-40/60/80/100/120/150 F	0.4	0.70 / 0.07	1.20 / 0.12	1.7 / 0.17
80-40/60/80/100/120 F	0.2	0.50 / 0.05	1.00 / 0.10	1.5 / 0.15
100-40/60/80/100/120 F	0.4	0.70 / 0.07	1.20 / 0.12	1.7 / 0.17

The relative minimum inlet pressures apply to pumps installed up to 300 metres above sea level. For altitudes above 300 metres, the required relative inlet pressure must be increased by 0.01 bar / 0.001 MPa per 100 metres altitude. The MAGNA3 pump is only approved for an altitude of 2000 metres above sea level.

Sound pressure level

The sound pressure level of the pump is dependent on the power consumption. Levels are determined in accordance with ISO 3745 and ISO 11203, method Q2.

Pump size	Max. [dB(A)]
25-40/60/80/100/120 32-40/60/80/100/120 40-40/60 50-40	39
32-120 F 40-80/100 50-60/80 65-40/60 80-40	45
40-120/150/180 50-100/120/150/180 65-80/100/120 80-60/80 100-40/60	50
65-150 80-100/120 100-80/100/120	55

Leakage current

The mains filter will cause a leakage current to earth during operation. The leakage current is less than 3.5 mA.

Consumption when the pump is stopped

4 to 10 W, depending on activity, such as reading the display, use of Grundfos GO, interaction with modules.

4 W when the pump is stopped and there is no activity.

Input and output communication

Two digital inputs	External potential-free contact. Contact load: 5 V, 10 mA. Screened cable. Loop resistance: Maximum 130 Ω.
Analog input	4-20 mA, load: 150 Ω. 0-10 VDC, load: Greater than 10 kΩ.
Two relay outputs	Internal potential-free changeover contact. Maximum load: 250 V, 2 A, AC1. Minimum load: 5 VDC, 20 mA. Screened cable, depending on signal level.
24 VDC supply	Maximum load: 22 mA. Capacitive load: Less than 470 µF.

Cable glands

Use M16 cable glands for the input and output connections (not supplied with the pump).

Power factor

The terminal-connected versions have built-in an active power factor correction which gives a cos φ from 0.98 to 0.99.

The plug-connected versions have built-in passive PFC, with coil and resistors which ensures that the current drawn from the grid is in phase with the voltage. The current is approximately sinusoidal which gives a cos φ from 0.55 to 0.98.

12.1 Sensor specifications

12.1.1 Temperature

Temperature range during operation	Accuracy
-10 to +35 °C	± 2 °C
+35 to +90 °C	± 1 °C
+90 to +110 °C	± 2 °C

13. Disposing of the product

This product has been designed with focus on the disposal and recycling of materials. The following average disposal values apply to all variants of pumps:

- 85 % recycling
- 10 % incineration
- 5 % depositing.

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

1. Use the public or private waste collection service.

2. If this is not possible, contact the nearest Grundfos company or service workshop.

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

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

WARNING
Magnetic field
Death or serious personal injury

- Persons with pacemakers disassembling this product must exercise care when handling the magnetic materials embedded in the rotor.

A.1. Appendix

Dimensions
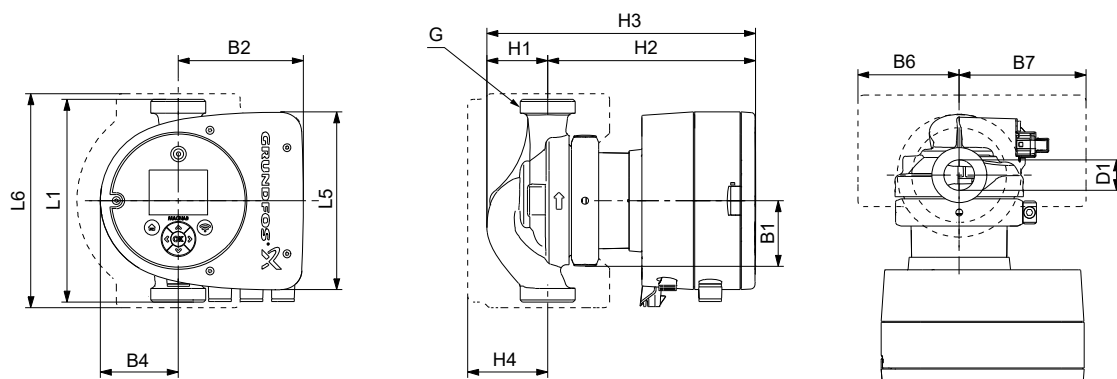
Dimensions, single-head pumps, threaded versions

Pump type	Dimensions [mm]													
	L1	L5	L6	B1	B2	B4	B6	B7	H1	H2	H3	H4	D1	G
MAGNA3 25-40 (N)	180	158	190	58	111	69	90	113	54	185	239	71	25	1 1/2
MAGNA3 25-60 (N)	180	158	190	58	111	69	90	113	54	185	239	71	25	1 1/2
MAGNA3 25-80 (N)	180	158	190	58	111	69	90	113	54	185	239	71	25	1 1/2
MAGNA3 25-100 (N)	180	158	190	58	111	69	90	113	54	185	239	71	25	1 1/2
MAGNA3 25-120 (N)	180	158	190	58	111	69	90	113	54	185	239	71	25	1 1/2
MAGNA3 32-40 (N)	180	158	190	58	111	69	90	113	54	185	239	71	32	2
MAGNA3 32-60 (N)	180	158	190	58	111	69	90	113	54	185	239	71	32	2
MAGNA3 32-80 (N)	180	158	190	58	111	69	90	113	54	185	239	71	32	2
MAGNA3 32-100 (N)	180	158	190	58	111	69	90	113	54	185	239	71	32	2
MAGNA3 32-120 (N)	180	158	190	58	111	69	90	113	54	185	239	71	32	2
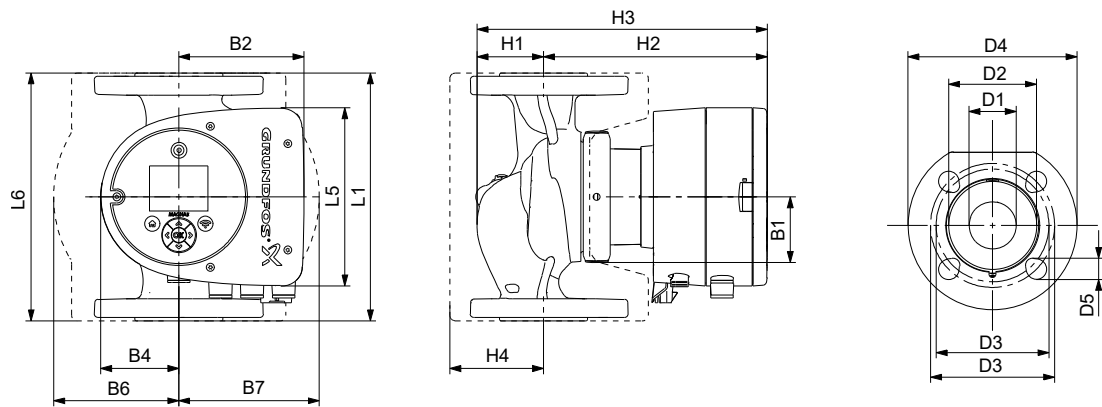
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Dimensions, single-head pumps, flanged versions

Pump type	Dimensions [mm]																
	L1	**L5**	**L6**	**B1**	**B2**	**B4**	**B6**	**B7**	**H1**	**H2**	**H3**	**H4**	**D1**	**D2**	**D3**	**D4**	**D5**
MAGNA3 32-40 F (N)	220	158	220	58	111	69	100	110	65	185	250	82	32	76	90/100	140	14/19
MAGNA3 32-60 F (N)	220	158	220	58	111	69	100	110	65	185	250	82	32	76	90/100	140	14/19
MAGNA3 32-80 F (N)	220	158	220	58	111	69	100	110	65	185	250	82	32	76	90/100	140	14/19
MAGNA3 32-100 F (N)	220	158	220	58	111	69	100	110	65	185	250	82	32	76	90/100	140	14/19
MAGNA3 40-40 F (N)	220	158	220	58	111	69	105	105	65	199	264	83	40	84	100/110	150	14/19
MAGNA3 40-60 F (N)	220	158	220	58	111	69	105	105	65	199	264	83	40	84	100/110	150	14/19
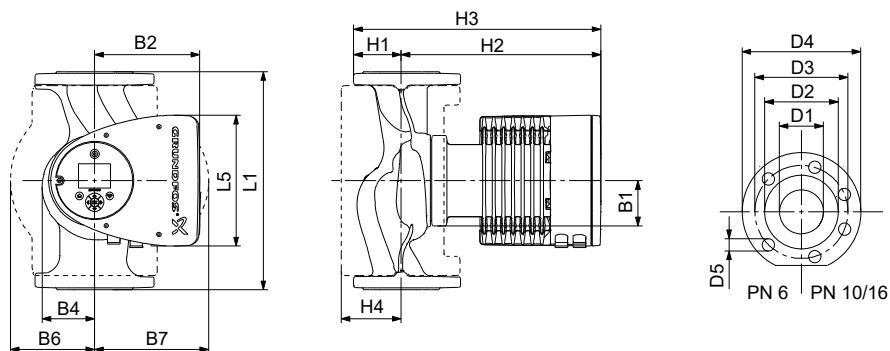
Dimensions, single-head pumps, flanged versions

Pump type	Dimensions [mm]															
	L1	L5	B1	B2	B4	B6	B7	H1	H2	H3	H4	D1	D2	D3	D4	D5
MAGNA3 32-120 F (N)	220	204	84	164	73	106	116	65	301	366	86	32	76	90/100	140	14/19
MAGNA3 40-80 F (N)	220	204	84	164	73	106	128	65	304	369	83	40	84	100/110	150	14/19
MAGNA3 40-100 F (N)	220	204	84	164	73	106	128	65	304	369	83	40	84	100/110	150	14/19
MAGNA3 40-120 F (N)	250	204	84	164	73	106	128	65	304	369	83	40	84	100/110	150	14/19
MAGNA3 40-150 F (N)	250	204	84	164	73	106	128	65	304	369	83	40	84	100/110	150	14/19
MAGNA3 40-180 F (N)	250	204	84	164	73	106	128	65	304	369	83	40	84	100/110	150	14/19
MAGNA3 50-40 F (N)	240	204	84	164	73	127	127	71	304	374	97	50	102	110/125	165	14/19
MAGNA3 50-60 F (N)	240	204	84	164	73	127	127	71	304	374	97	50	102	110/125	165	14/19
MAGNA3 50-80 F (N)	240	204	84	164	73	127	127	71	304	374	97	50	102	110/125	165	14/19
MAGNA3 50-100 F (N)	280	204	84	164	73	127	127	72	304	376	97	50	102	110/125	165	14/19
MAGNA3 50-120 F (N)	280	204	84	164	73	127	127	72	304	376	97	50	102	110/125	165	14/19
MAGNA3 50-150 F (N)	280	204	84	164	73	127	127	72	304	376	97	50	102	110/125	165	14/19
MAGNA3 50-180 F (N)	280	204	84	164	73	127	127	72	304	376	97	50	102	110/125	165	14/19
MAGNA3 65-40 F (N)	340	204	84	164	73	133	133	74	312	386	94	65	119	130/145	185	14/19
MAGNA3 65-60 F (N)	340	204	84	164	73	133	133	74	312	386	94	65	119	130/145	185	14/19
MAGNA3 65-80 F (N)	340	204	84	164	73	133	133	74	312	386	94	65	119	130/145	185	14/19
MAGNA3 65-100 F (N)	340	204	84	164	73	133	133	74	312	386	94	65	119	130/145	185	14/19
MAGNA3 65-120 F (N)	340	204	84	164	73	133	133	74	312	386	94	65	119	130/145	185	14/19
MAGNA3 65-150 F (N)	340	204	84	164	73	133	133	74	312	386	94	65	119	130/145	185	14/19
MAGNA3 80-40 F	360	204	84	164	73	163	163	96	318	413	115	80	128	150/160	200	19
MAGNA3 80-60 F	360	204	84	164	73	163	163	96	318	413	115	80	128	150/160	200	19
MAGNA3 80-80 F	360	204	84	164	73	163	163	96	318	413	115	80	128	150/160	200	19
MAGNA3 80-100 F	360	204	84	164	73	163	163	96	318	413	115	80	128	150/160	200	19
MAGNA3 80-120 F	360	204	84	164	73	163	163	96	318	413	115	80	128	150/160	200	19
MAGNA3 100-40 F	450	204	84	164	73	178	178	103	330	433	120	100	160	170	220	19
MAGNA3 100-60 F	450	204	84	164	73	178	178	103	330	433	120	100	160	170	220	19
MAGNA3 100-80 F	450	204	84	164	73	178	178	103	330	433	120	100	160	170	220	19
MAGNA3 100-100 F	450	204	84	164	73	178	178	103	330	433	120	100	160	170	220	19
MAGNA3 100-120 F	450	204	84	164	73	178	178	103	330	433	120	100	160	170	220	19

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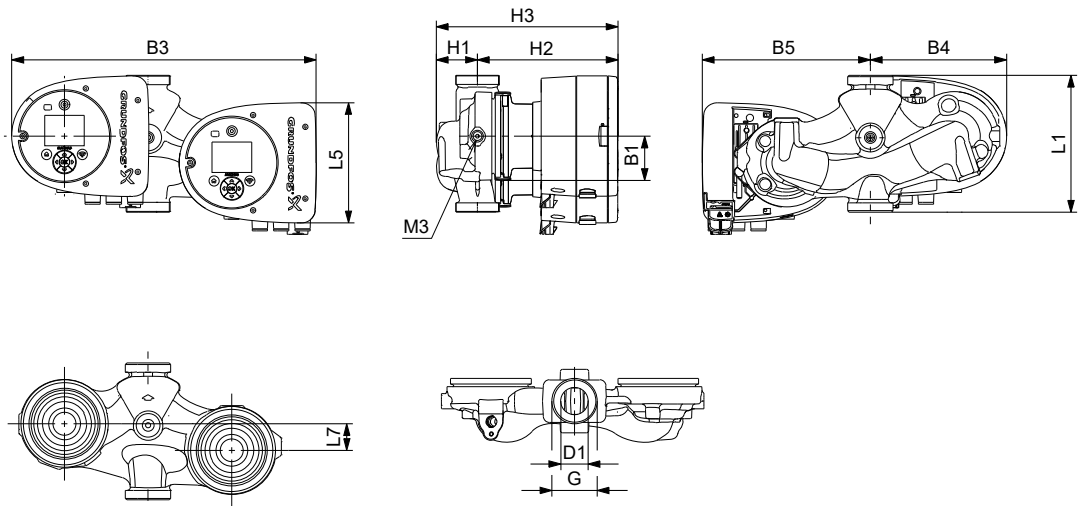
Dimensions, twin-head pumps, threaded versions

Pump type	Dimensions [mm]												
	L1	L5	L7	B1	B3	B4	B5	H1	H2	H3	D1	G	M3
MAGNA3 D 32-40	180	158	35	58	400	179	221	54	185	239	32	2	1/4
MAGNA3 D 32-60	180	158	35	58	400	179	221	54	185	239	32	2	1/4
MAGNA3 D 32-80	180	158	35	58	400	179	221	54	185	239	32	2	1/4
MAGNA3 D 32-100	180	158	35	58	400	179	221	54	185	239	32	2	1/4

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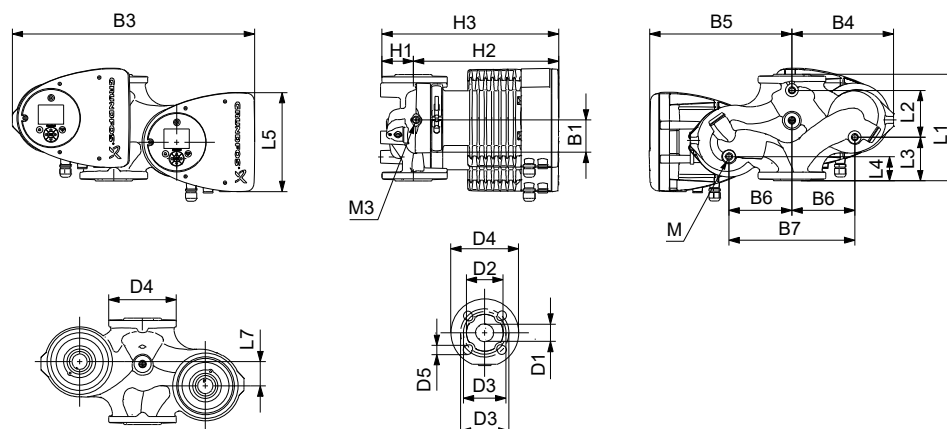
Dimensions, twin-head pumps, flanged versions

Pump type	Dimensions [mm]																					
	L1	L2	L3	L4	L5	L7	B1	B3	B4	B5	B6	B7	H1	H2	H3	D1	D2	D3	D4	D5	M	M3
MAGNA3 D 32-40 F	220	73	120	85	158	35	58	400	179	221	130	260	69	185	254	32	76	90/100	140	14/19	M12	Rp 1/4
MAGNA3 D 32-60 F	220	73	120	85	158	35	58	400	179	221	130	260	69	185	254	32	76	90/100	140	14/19	M12	Rp 1/4
MAGNA3 D 32-80 F	220	73	120	85	158	35	58	400	179	221	130	260	69	185	254	32	76	90/100	140	14/19	M12	Rp 1/4
MAGNA3 D 32-100 F	220	73	120	85	158	35	58	400	179	221	130	260	69	185	254	32	76	90/100	140	14/19	M12	Rp 1/4
MAGNA3 D 32-120 F	220	97	90	50	204	50	84	502	210	294	130	260	68	300	368	32	76	90/100	140	14/19	M12	Rp 1/4
MAGNA3 D 40-40 F	220	53	140	60	158	15	58	452	211	241	130	260	76	199	275	40	84	100/110	150	14/19	M12	Rp1/4
MAGNA3 D 40-60 F	220	53	140	60	158	15	58	452	211	241	130	260	76	199	275	40	84	100/110	150	14/19	M12	Rp1/4
MAGNA3 D 40-80 F	220	53	140	60	204	15	84	502	210	294	130	260	76	303	379	40	84	100/110	150	14/19	M12	Rp 1/4
MAGNA3 D 40-100 F	220	53	140	60	204	15	84	502	210	294	130	260	76	303	379	40	84	100/110	150	14/19	M12	Rp 1/4
MAGNA3 D 50-40 F	240	48	160	45	204	45	84	515	221	294	130	260	75	304	379	50	102	110/125	165	14/19	M12	Rp 1/4
MAGNA3 D 50-60 F	240	48	160	45	204	45	84	515	221	294	130	260	75	304	379	50	102	110/125	165	14/19	M12	Rp 1/4
MAGNA3 D 50-80 F	240	48	160	45	204	45	84	515	221	294	130	260	75	304	379	50	102	110/125	165	14/19	M12	Rp 1/4
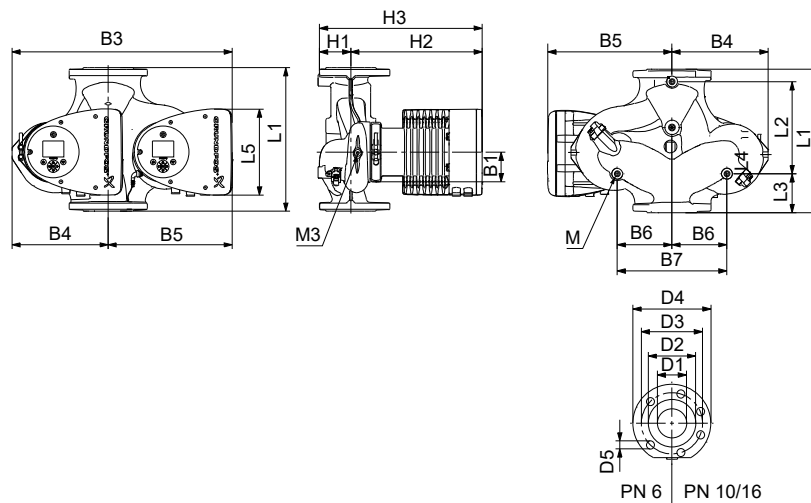
Dimensions, twin-head pumps

Pump type	Dimensions [mm]																			
	L1	L2	L3	L4	L5	B1	B3	B4	B5	B6	B7	H1	H2	H3	D1	D2	D3	D4	D5	M	M3
MAGNA3 D 40-120 F	250	58	155	75	204	84	512	220	294	130	260	69	303	372	40	84	100/110	150	14/19	M12	Rp 1/4
MAGNA3 D 40-150 F	250	58	155	75	204	84	512	220	294	130	260	69	303	372	40	84	100/110	150	14/19	M12	Rp 1/4
MAGNA3 D 40-180 F	250	58	155	75	204	84	512	220	294	130	260	69	303	372	40	84	100/110	150	14/19	M12	Rp 1/4
MAGNA3 D 50-100 F	280	175	75	75	204	84	517	223	294	130	260	75	304	379	50	102	110/125	165	14/19	M12	Rp 1/4
MAGNA3 D 50-120 F	280	175	75	75	204	84	517	223	294	130	260	75	304	379	50	102	110/125	165	14/19	M12	Rp 1/4
MAGNA3 D 50-150 F	280	175	75	75	204	84	517	223	294	130	260	75	304	379	50	102	110/125	165	14/19	M12	Rp 1/4
MAGNA3 D 50-180 F	280	175	75	75	204	84	517	223	294	130	260	75	304	379	50	102	110/125	165	14/19	M12	Rp 1/4
MAGNA3 D 65-40 F	340	218	92	92	204	84	522	228	294	130	260	77	312	389	65	119	130/145	185	14/19	M12	Rp 1/4
MAGNA3 D 65-60 F	340	218	92	92	204	84	522	228	294	130	260	77	312	389	65	119	130/145	185	14/19	M12	Rp 1/4
MAGNA3 D 65-80 F	340	218	92	92	204	84	522	228	294	130	260	77	312	389	65	119	130/145	185	14/19	M12	Rp 1/4
MAGNA3 D 65-100 F	340	218	92	92	204	84	522	228	294	130	260	77	312	389	65	119	130/145	185	14/19	M12	Rp 1/4
MAGNA3 D 65-120 F	340	218	92	92	204	84	522	228	294	130	260	77	312	389	65	119	130/145	185	14/19	M12	Rp 1/4
MAGNA3 D 65-150 F	340	218	92	92	204	84	522	228	294	130	260	77	312	389	65	119	130/145	185	14/19	M12	Rp 1/4
MAGNA3 D 80-40 F	360	218	102	102	204	84	538	244	294	130	260	97	318	415	80	128	150/160	200	19	M12	Rp 1/4
MAGNA3 D 80-60 F	360	218	102	102	204	84	538	244	294	130	260	97	318	415	80	128	150/160	200	19	M12	Rp 1/4
MAGNA3 D 80-80 F	360	218	102	102	204	84	538	244	294	130	260	97	318	415	80	128	150/160	200	19	M12	Rp 1/4
MAGNA3 D 80-100 F	360	218	102	102	204	84	538	244	294	130	260	97	318	415	80	128	150/160	200	19	M12	Rp 1/4
MAGNA3 D 80-120 F	360	218	102	102	204	84	538	244	294	130	260	97	318	415	80	128	150/160	200	19	M12	Rp 1/4
MAGNA3 D 100-40 F	450	243	147	147	204	84	551	252	299	135	270	103	330	434	100	160	170	220	19	M12	Rp 1/4
MAGNA3 D 100-60 F	450	243	147	147	204	84	551	252	299	135	270	103	330	434	100	160	170	220	19	M12	Rp 1/4

Pump type	Dimensions [mm]																				
	L1	L2	L3	L4	L5	B1	B3	B4	B5	B6	B7	H1	H2	H3	D1	D2	D3	D4	D5	M	M3
MAGNA3 D 100-80 F	450	243	147	147	204	84	551	252	299	135	270	103	330	434	100	160	170	220	19	M12	Rp 1/4
MAGNA3 D 100-100 F	450	243	147	147	204	84	551	252	299	135	270	103	330	434	100	160	170	220	19	M12	Rp 1/4
MAGNA3 D 100-120 F	450	243	147	147	204	84	551	252	299	135	270	103	330	434	100	160	170	220	19	M12	Rp 1/4

Flange forces and moments

Maximum permissible forces and moments from the pipe connections acting on the pump flanges or threaded connections are indicated in fig. *Forces and moments from the pipe connections acting on the pump flanges or threaded connections*.
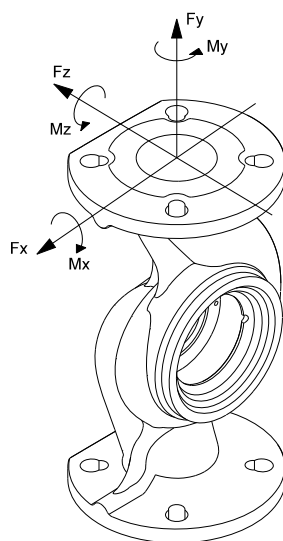
Forces and moments from the pipe connections acting on the pump flanges or threaded connections

Diameter DN	Force [N]				Moment [Nm]			
	Fy	Fz	Fx	ΣFb	My	Mz	Mx	ΣMb
25 *	350	425	375	650	300	350	450	650
32 *	425	525	450	825	375	425	550	800
40	500	625	550	975	450	525	650	950
50	675	825	750	1300	500	575	700	1025
65	850	1050	925	1650	550	600	750	1100
80	1025	1250	1125	1975	575	650	800	1175
100	1350	1675	1500	2625	625	725	875	1300

* The values also apply to pumps with threaded connection.

Forces are static.

The above values apply to cast-iron versions. For stainless-steel versions, the values can be multiplied by two according to the ISO 5199 standard.

Tightening torques for bolts

Recommended tightening torques for bolts used in flanged connections:

Bolt dimension	Torque
M12	27 Nm
M16	66 Nm

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