

MAGNA3

Installation and operating instructions



English (GB) Installation and operating instructions

Original installation and operating instructions

CONTENTS

These installation and operating instructions describe MAGNA3. Sections 1-5 give the information necessary to be able to unpack, install and start up the product in a safe way.

Sections 6-13 give important information about the product, as well as information on service, fault finding and disposal of the product.

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Prior to installation, read this document and the quick guide. 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. General information

1.1 Symbols used in this document

**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 text accompanying the three hazard symbols DANGER, WARNING and CAUTION is structured in the following way:

**SIGNAL WORD****Description of hazard**

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



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.



Notes or instructions that make the work easier and ensure safe operation.

1.2 Safety symbols on the pump



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.



Fit and tighten the screw that holds the clamp to $8 \text{ Nm} \pm 1 \text{ Nm}$.



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 [6.3.1 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.

2.2 Scope of delivery

2.2.1 Plug-connected single-head pump



Fig. 1 Plug-connected single-head pump

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



Fig. 2 Plug-connected twin-head pump

The box contains the following items:

- MAGNA3 pump
- gaskets
- quick guide
- safety instructions
- two ALPHA plugs.

2.2.3 Terminal-connected single-head pump



Fig. 3 Terminal-connected single-head pump

The box contains the following items:

- MAGNA3 pump
- insulating shells
- gaskets
- quick guide
- safety instructions
- box with terminal and cable glands.

2.2.4 Terminal-connected twin-head pump



Fig. 4 Terminal-connected twin-head pump

The box contains the following items:

- MAGNA3 pump
- gaskets
- quick guide
- safety instructions
- two boxes with terminals and cable glands.

TM06 7225 3216

TM05 8159 2013

TM06 7224 3216

TM06 6791 2316

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 fig. 5.

For large pumps, it may be necessary to use lifting equipment. Position the lifting straps as illustrated in fig. 5.



TM05 5820 3216

Fig. 5 Correct lifting of pump



Do not lift the pump head by the control box, i.e. the red area of the pump. See fig. 6.



TM05 5821 3216

Fig. 6 Incorrect lifting of pump

3. Installing the product



3.1 Location

The pump is designed for indoor installation.

3.2 Tools

- 1

0.6 x 3.5
- 2

1.2 x 8.0
- 3

TX10
- 4

TX20
- 5

5.0
- 6
- 7
- 8

TM05 6472 4712

Fig. 7 Recommended tools

Pos.	Tool	Size
1	Screwdriver, straight slot	0.6 x 3.5 mm
2	Screwdriver, straight slot	1.2 x 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 page 59.

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.

To ensure adequate 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.

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.	
2	Close the isolating valves and make sure that the system is not pressurised during the installation of the pump.	
3	Mount the pump with gaskets in the pipes.	
4	<p>Flanged version: Fit bolts and nuts. Use the right size of bolts according to system pressure. For further information about torques, see page 59.</p> <p>Threaded version: Tighten the union nuts.</p>	

3.4 Positioning the pump

Always install the pump with horizontal motor shaft.

- Pump installed correctly in a vertical pipe. See fig. 8, pos. A.
- Pump installed correctly in a horizontal pipe. See fig. 8, pos. B.
- Do not install the pump with vertical motor shaft. See fig. 8, pos. C and D.

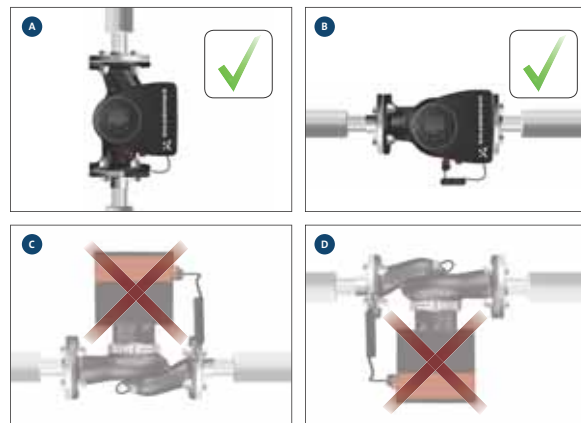


Fig. 8 Pump installed with horizontal motor shaft

TM05 2866 3216

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 fig. 9.

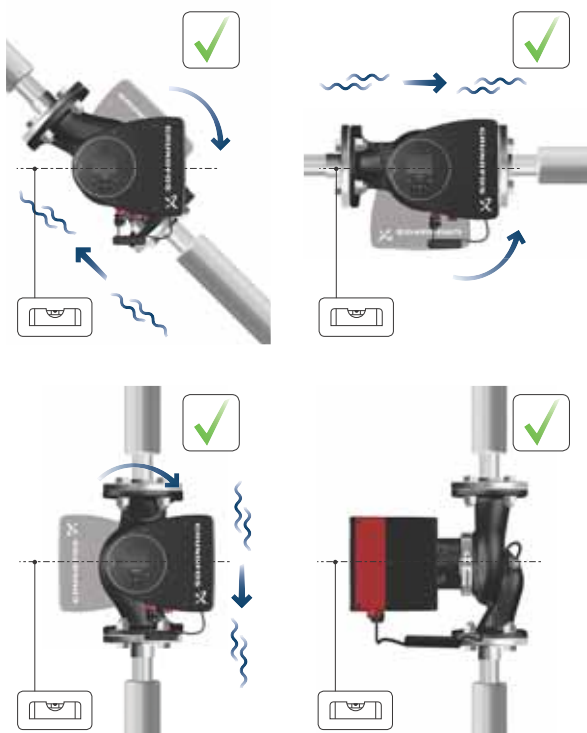


Fig. 9 Pump with control box in horizontal position



Fit twin-head pumps installed in horizontal pipes with an automatic vent, Rp 1/4, in the upper part of the pump housing. See fig. 10.



Fig. 10 Automatic vent

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 11 and 12.
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 fig. 13.



Fig. 11 Correctly centred sealing system



Fig. 12 Incorrectly centred sealing system



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 fig. 13.



Fig. 13 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

Crushing of feet

Minor or moderate personal injury
- Do not drop the pump head when loosening the clamp.

CAUTION

Pressurised system

Minor or moderate personal injury
- Pay special attention to any escaping vapour when loosening the clamp.



Fit and tighten the screw that holds the clamp to $8 \text{ Nm} \pm 1 \text{ Nm}$. 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.



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.	TM05 2867 3216
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.	TM05 2868 3216
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.	TM05 2869 3216
4	Due to the drain hole in the stator housing, position the gap of the clamp as shown in step 4a or 4b.	TM05 2870 0612

Step	Action	Illustration
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.	TM05 2918 3216
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.	TM05 2917 3216
5	Fit and tighten the screw that holds the clamp to $8 \text{ Nm} \pm 1 \text{ Nm}$. Do not retighten the screw if condensed water is dripping from the clamp.	TM05 2872 0612
6	Fit the insulating shells. The insulating shells for pumps in air-conditioning and cooling systems must be ordered separately.	TM05 2874 3216

As an alternative to insulating shells, you can insulate the pump housing and pipes as illustrated in fig. 14.



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



Fig. 14 Insulating the pump housing and pipe

TM05 2889 3216

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.
- If the pump is connected to an electric installation where an electrical circuit breaker (voltage sensing ELCB, residual-current device RCD or residual-current circuit device RCCB) is used as an additional protection, this circuit breaker must be marked with the first or both of the symbols shown below:



- 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 (IEC 34-11: TP 211).
- When switched on via the power supply, the pump starts after approximately 5 seconds.

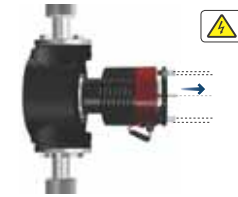
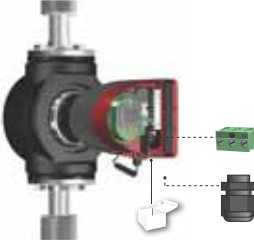
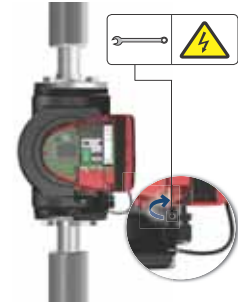

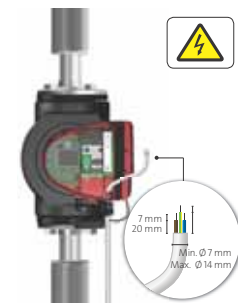
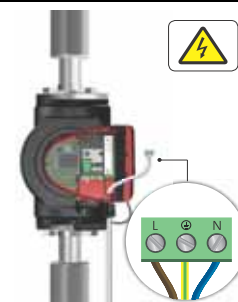
3.8.1 Supply voltage


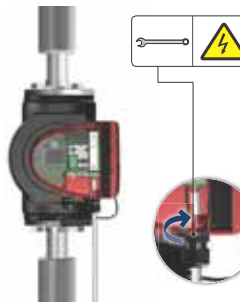
1 x 230 V \pm 10 %, 50/60 Hz, PE.

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.

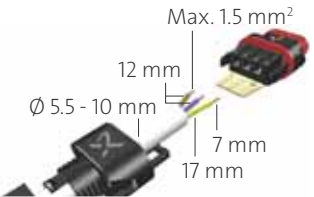



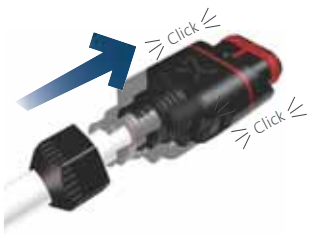
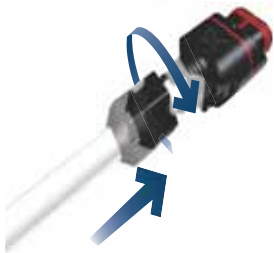
3.9 Connecting the power supply


Terminal-connected versions

Step	Action	Illustration	
1	Remove the front cover from the control box. Do not remove the screws from the cover.		TM05 2875 3416
2	Locate the power supply plug and cable gland in the small cardboard box supplied with the pump.		TM05 2876 3416
3	Connect the cable gland to the control box.		TM05 2877 3416
4	Pull the power supply cable through the cable gland.		TM05 2878 3416
5	Strip the cable conductors as illustrated.		TM05 2879 3416
6	Connect the cable conductors to the power supply plug.		TM05 2880 3416


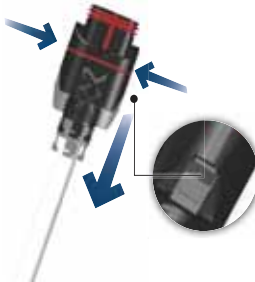
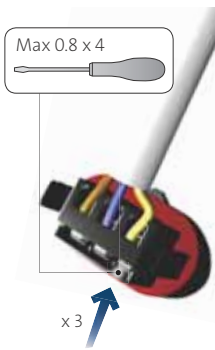

Step	Action	Illustration	
7	Insert the power supply plug into the male plug in the pump control box.		TM05 2881 3416
8	Tighten the cable gland. Fit the front cover.		TM05 2882 3416

Plug-connected versions**Assembling the plug**

Step	Action	Illustration	
1	Fit the cable gland and plug cover to the cable. Strip the cable conductors as illustrated.		TM05 5538 3216
2	Connect the cable conductors to the power supply plug.		TM05 5539 3812
3	Bend the cable with the cable conductors pointing upwards.		TM05 5540 3812
4	Pull out the conductor guide plate and throw it away.		TM05 5541 3812
5	Click the plug cover onto the power supply plug.		TM05 5542 3812
6	Screw the cable gland onto the power supply plug.		TM05 5543 3812

Step	Action	Illustration	
7	Insert the power supply plug into the male plug in the pump control box.		TM05 8454 2313

Disassembling the plug

Step	Action	Illustration	
1	Loosen the cable gland and remove it from the plug.		TM05 5545 3812
2	Pull off the plug cover while pressing on both sides.		TM05 5546 3812
3	Loosen the cable conductors one by one by pressing a screwdriver gently into the terminal clip.		TM05 5547 3812
4	The plug has now been removed from the power supply plug.		TM05 5548 3812

3.9.1 Connection diagram

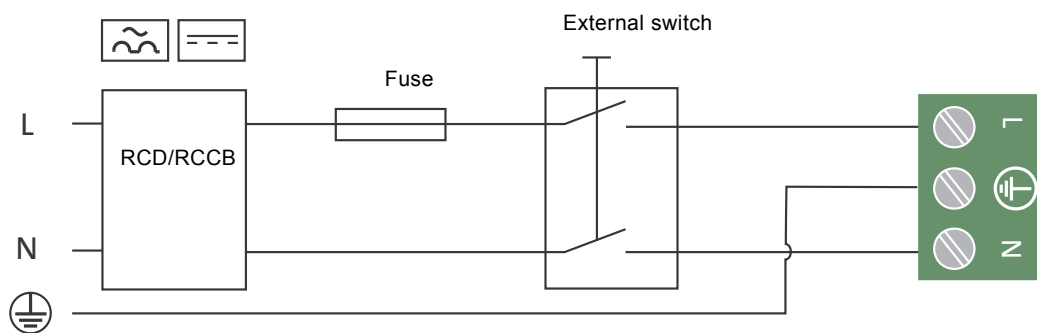


Fig. 15 Example of terminal-connected motor with main switch, backup fuse and additional protection

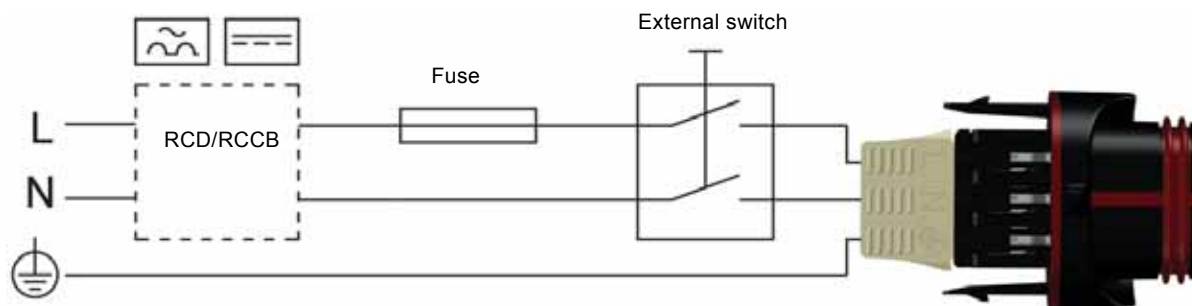


Fig. 16 Example of plug-connected motor with main switch, backup fuse and additional protection



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 75 °C.
Install all cables in accordance with EN 60204-1 and EN 50174-2:2000.

TM03 2397 3216

TM05 5277 3712









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 12. [Technical data](#).

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 starts in "AUTO _{ADAPT} " mode after approximately 5 seconds.			TM05 2884 0612
2	Control panel at first startup. After a few seconds, the pump display changes to the startup guide.			TM05 2885 3216
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 control panel for 15 minutes, the display goes into sleep mode. When you touch a button, the "Home" display appears.			TM05 2886 3216
4	When you have made the general settings, select the desired control mode or let the pump run in AUTO _{ADAPT} mode. For additional settings, see section 7. Control functions .			TM05 2887 3216

4.2 Twin-head pump



Fig. 17 MAGNA3 D



Check that the second pump head is connected to the power supply.

If you have not connected the second pump head to the power supply, warning 77 appears in the display. See fig. 18. Connect the second pump head, and restart the pump.

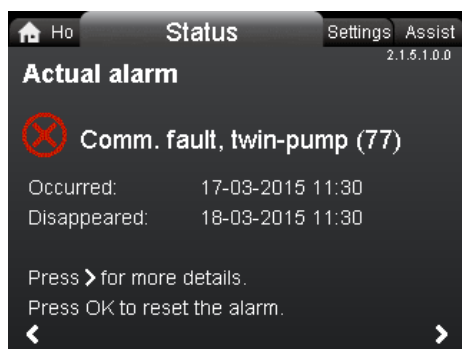


Fig. 18 Warning 77

5. Storing and handling 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 control 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.

6.2 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 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.

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



Fig. 19 Pumped liquids, threaded version

6.3 Identification

6.3.1 Nameplate

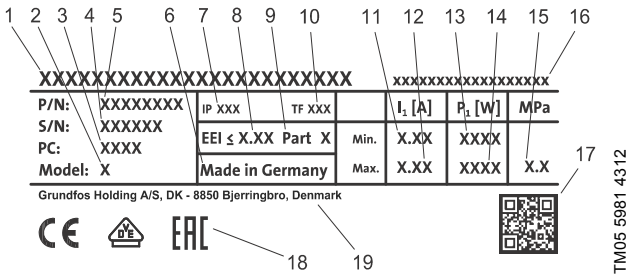


Fig. 20 Example of nameplate

Pos.	Description
1	Product name
2	Model
3	Production code, PC, year and week*
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	Manufacturer's name and address

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



Fig. 21 Production code on packaging

6.4 Model type

These installation and operating instructions cover all models. The model version is stated on the nameplate. See fig. 22.



Fig. 22 Model type on the product

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

6.5 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.

6.6 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 figures 23 and 14.

- Insulating shells for pumps in heating systems are supplied with the pump.
- Insulating shells for pumps in air-conditioning and cooling systems, down to -10 °C, must be ordered separately. See section 11.7 *Insulating kits for air-conditioning and cooling systems*.

The fitting of insulating shells increases the pump dimensions.



Fig. 23 Insulating shells

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

6.7 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 fig. 24. This is especially important in proportional-pressure control mode with reduced head at low flow.

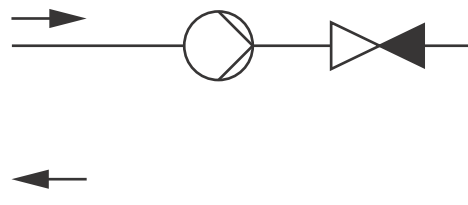


Fig. 24 Non-return valve

TM05 2859 3216

TM05 3055 0912

7. Control functions



7.1 Overview of settings

You can make all settings on the pump control panel or with Grundfos GO.

Menu	Submenu	Further information
"Setpoint"		See section 8.6.1 "Setpoint" .
"Operating mode"	<ul style="list-style-type: none"> • "Normal" • "Stop" • "Min." • "Max." 	See section 8.6.2 "Operating mode" .
"Control mode"	<ul style="list-style-type: none"> • "AUTOADAPT" • "FLOWADAPT" • "Prop. press." • "Const. press." • "Const. temp." • "Differential temp." • "Constant curve" 	See section 8.6.3 "Control mode" . See section "AUTOADAPT" . See section "FLOWADAPT" . See section "Prop. press." . See section "Const. press." . See section "Const. temp." . See section "Differential temp." . See section "Constant curve" .
"Controller settings"	<ul style="list-style-type: none"> • "Controller gain Kp" • "Control. integr. action time Ti" 	See section 8.6.4 "Controller settings" .
"FLOWLIMIT"	<ul style="list-style-type: none"> • "Set FLOWLIMIT" 	See section 8.6.5 "FLOWLIMIT" .
"Automatic Night Setback"	<ul style="list-style-type: none"> • "Not active" • "Active" 	See section 8.6.6 "Automatic Night Setback" .
"Analog Input"	<ul style="list-style-type: none"> • "Function of analog input" • "Unit" • "Sensor range, min. value" • "Sensor range, max. value" • "Electrical signal" 	See section 8.6.7 "Analog Input" . See section "Function of analog input" .
"Relay outputs"	<ul style="list-style-type: none"> • "Relay output 1" • "Relay output 2" 	See section 8.6.8 "Relay outputs" .
"Setpoint influence"	<ul style="list-style-type: none"> • "External setpoint function" • "Temperature influence" 	See section 8.7 Setting values for control modes . See section "External setpoint function" . See section "Temperature influence" .
"Bus communication"	<ul style="list-style-type: none"> • "Pump number" 	See section 8.7.2 "Bus communication" . See section "Pump number" .
"Forced local mode"	<ul style="list-style-type: none"> • "Enable" • "Disable" 	See section "Forced local mode" .
"General settings"	<ul style="list-style-type: none"> • "Language" 	See section 8.7.3 "General settings" . See section "Language" .
"Multi-pump system"	<ul style="list-style-type: none"> • "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" 	See section "Set date and time" . See section "Units" . See section "Enable/disable settings" . See section "Alarm and warning settings" . See section "Delete history" . See section "Define Home display" . See section "Display brightness" . See section "Return to factory settings" . See section "Run start-up guide" .

7.2 External connections

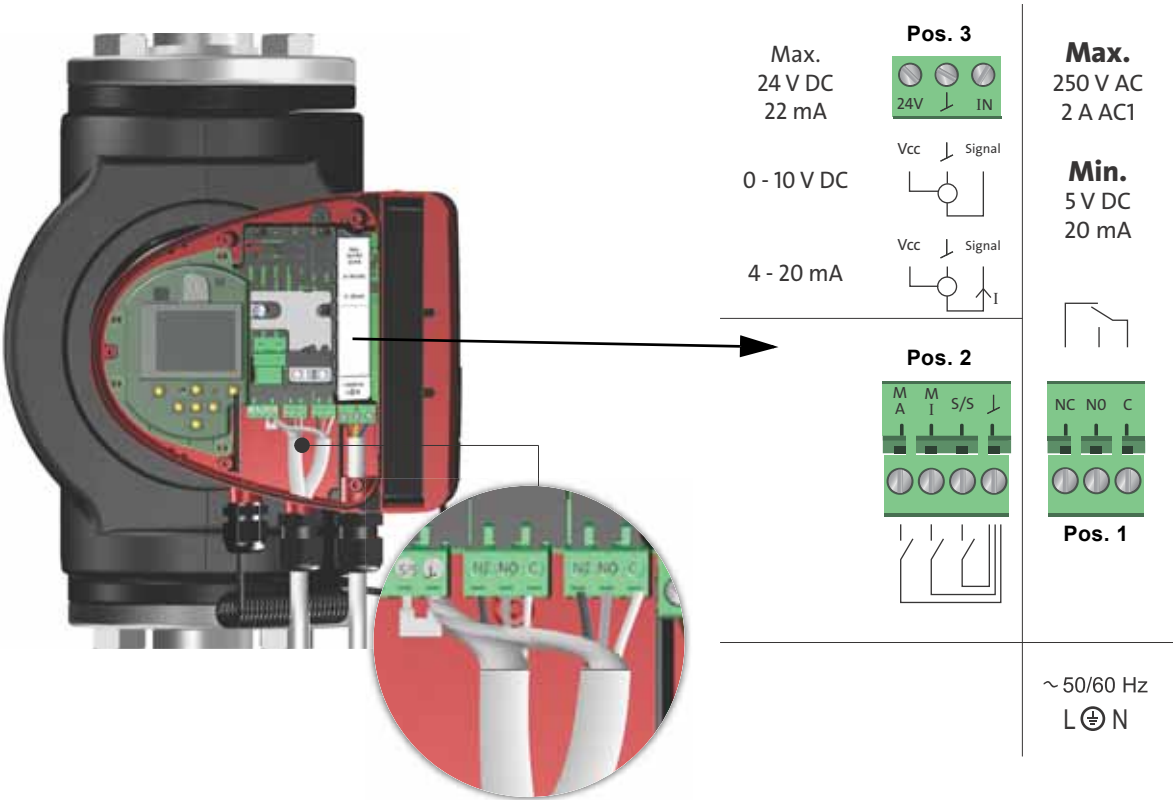


Fig. 25 Wiring diagram, terminal-connected versions

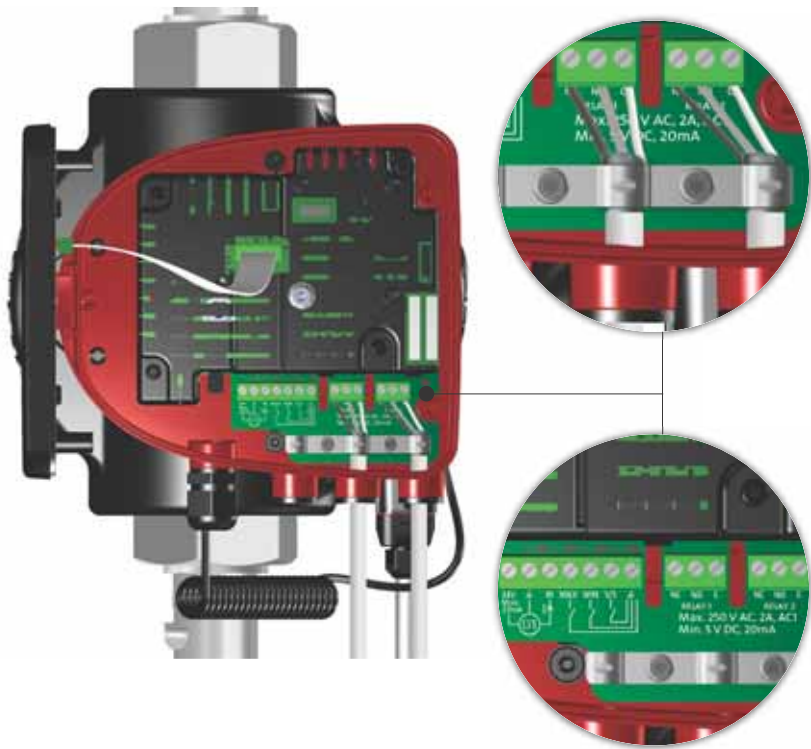


Fig. 26 Wiring diagram, plug-connected versions

TM05 6060 2313 - TM05 3343 2313

TM05 8539 2413

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 12. [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 fig. 25.
- Plug-connected versions:
Connect the cable screen to earth via cable clamp. See fig. 26.

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 75 °C.

Install all cables in accordance with EN 60204-1 and EN 50174-2:2000.



Connect all cables in accordance with local regulations.

7.3 Input and output communication

- Relay outputs
Alarm, ready and operating indication via signal relay.
- Digital input
 - Start and stop (S/S)
 - 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.



7.4 Priority of settings

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

Priority	Possible settings		
	Control 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"		

7.4.1 Relay outputs

See fig. 25, pos. 1.

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

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

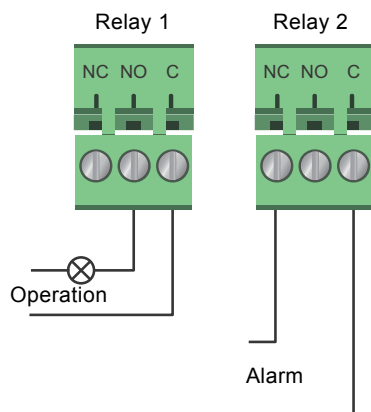
The relays can be used for outputs up to 250 V and 2 A.



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.



TM05 3338 1212

Fig. 27 Relay output

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: <ul style="list-style-type: none"> The power supply has been switched off. The pump has not registered a fault.

	Activated: <ul style="list-style-type: none"> The pump has registered a fault.
--	---

Signal relay	Ready signal
	Not activated: <ul style="list-style-type: none"> The pump has registered a fault and is unable to run. The power supply has been switched off.

	Activated: <ul style="list-style-type: none"> The pump has been set to stop, but is ready to run. The pump is running.
--	--

Signal relay	Operating signal
	Not activated: <ul style="list-style-type: none"> The power supply has been switched off.

	Activated: <ul style="list-style-type: none"> The pump is running.
--	---

Factory settings of relays:

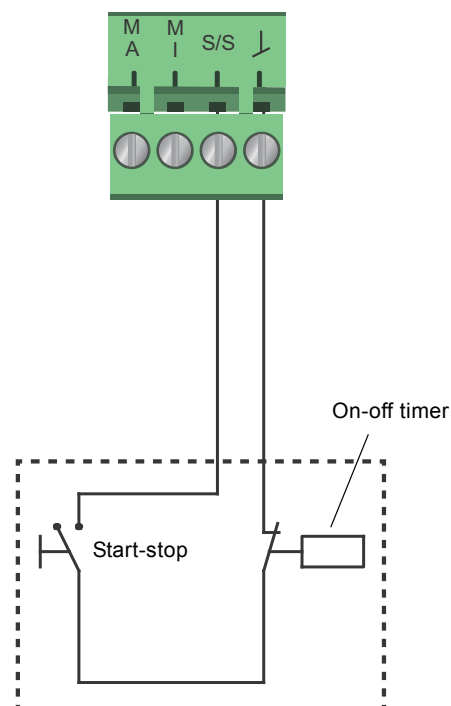
Relay	Function
1	Operating signal
2	Alarm signal

7.4.2 Digital inputs

See fig. 25, pos. 2.

You can use the digital input for external control of start-stop or forced maximum or minimum curve.

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



TM05 3339 1212

Fig. 28 Digital input

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

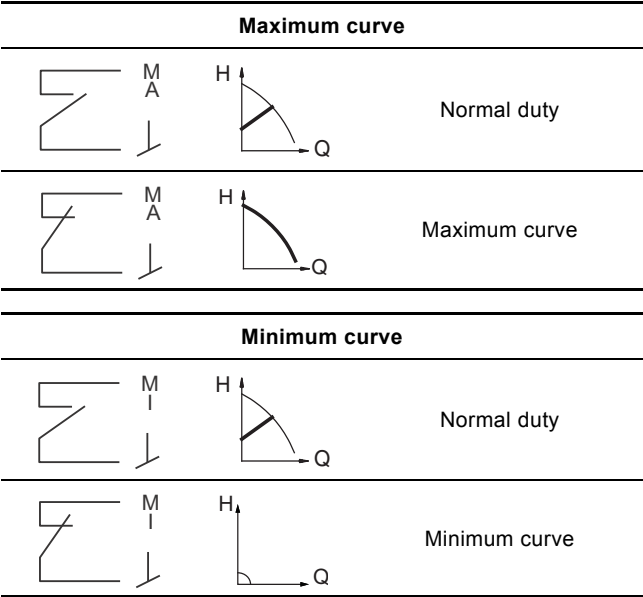
External start-stop

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

Start-stop	
	<p>Normal duty Factory setting with jumper between start-stop and \downarrow.</p>
	<p>Stop</p>

Externally forced maximum or minimum curve

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



Select the function of the digital input on the pump control panel or with Grundfos GO.

7.4.3 Analog input

See fig. 25, pos. 3.

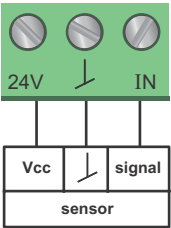
You can use the analog input for the connection of an external sensor for measuring temperature or pressure. See fig. 31.

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. See fig. 32.

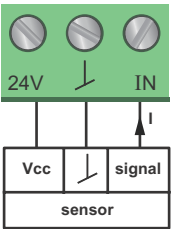
- When the input is used for the heat energy monitor, install a temperature sensor in the return pipe.
- If the pump is installed in the return pipe of the system, install the sensor in the flow pipe.
- If the constant-temperature control mode has been enabled and the pump is installed in the flow pipe 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 control panel or with Grundfos GO.



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Fig. 29 Analog input for external sensor, 0-10 V

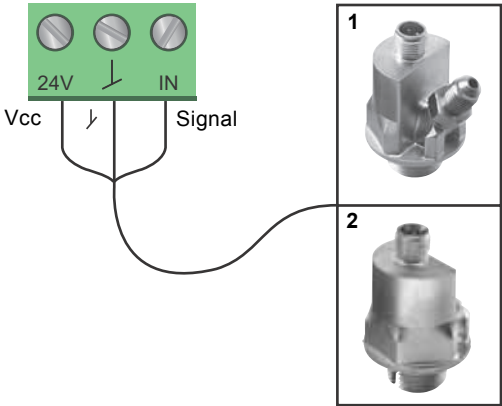


TM05 2948 0612

Fig. 30 Analog input for external sensor, 4-20 mA

In order to optimise the pump performance, you can use external sensors in the following cases:

Function or control mode	Sensor type
Heat energy monitor	Temperature sensor
Constant temperature	Temperature sensor
Proportional pressure	Pressure sensor

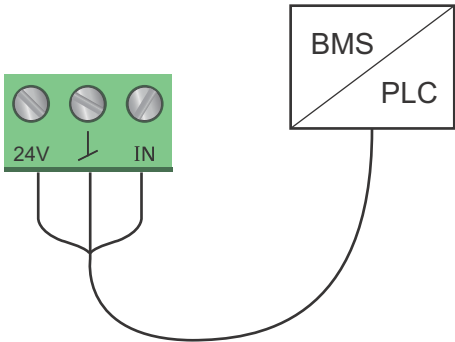


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Fig. 31 Examples of external sensors

Pos.	Sensor type
1	Combined temperature and pressure sensor, Grundfos type RPI T2. 1/2" connection and 4-20 mA signal.
2	Pressure sensor, Grundfos type RPI. 1/2" connection and 4-20 mA signal.

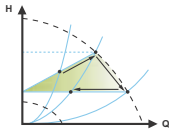
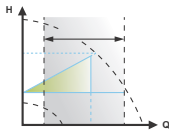
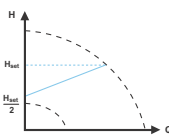
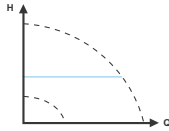
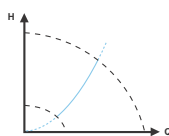
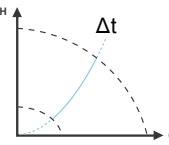
For further details, see section 11.4 External sensors.

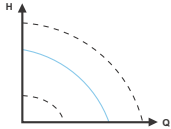


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Fig. 32 Examples of external signal for the control via BMS or PLC

8. Setting the product

System application	Select this control mode
<p>Recommended for most heating systems, especially in systems with relatively large pressure losses in the distribution pipes. See the description under proportional pressure.</p> <p>In replacement situations where the proportional-pressure duty point is unknown.</p> <p>The duty point has to be within the $AUTO_{ADAPT}$ operating range. During operation, the pump automatically adjusts to the actual system characteristic.</p> <p>This setting ensures minimum energy consumption and noise level from valves, which reduces operating costs and increases comfort.</p>	<p>$AUTO_{ADAPT}$</p> 
<p>The $FLOW_{ADAPT}$ control mode is a combination of $AUTO_{ADAPT}$ and $FLOW_{LIMIT}$.</p> <p>This control mode is suitable for systems where you want a maximum flow limit, $FLOW_{LIMIT}$. The pump continuously monitors and adjusts the flow, thus ensuring that the selected $FLOW_{LIMIT}$ is not exceeded.</p> <p>Recommended for main pumps in boiler applications where a steady flow through the boiler is required. No extra energy is used for pumping too much liquid into the system.</p> <p>In systems with mixing loops, you can use the control mode to control the flow in each loop.</p> <p>Benefits:</p> <ul style="list-style-type: none"> • Enough water for all loops at peak load conditions if you have set each loop to the right maximum flow. • The dimensioned flow for each zone, required heat energy, is determined by the flow from the pump. You can set this value in the $FLOW_{ADAPT}$ control mode without the use of throttling valves. • When the flow is set lower than the balancing valve setting, the pump ramps 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. 	<p>$FLOW_{ADAPT}$</p> 
<p>Recommended in systems with relatively large pressure losses in the distribution pipes and in air-conditioning and cooling systems.</p> <ul style="list-style-type: none"> • Two-pipe heating systems with thermostatic valves and the following: <ul style="list-style-type: none"> – very long distribution pipes – strongly throttled balancing valves – differential-pressure regulators – large pressure losses in those parts of the system through which 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: <ul style="list-style-type: none"> – heat exchangers, fan coils – cooling ceilings – cooling surfaces. 	<p>Proportional pressure</p> 
<p>Recommended in systems with relatively small pressure losses in the distribution pipes.</p> <ul style="list-style-type: none"> • Two-pipe heating systems with thermostatic valves and the following: <ul style="list-style-type: none"> – sized for natural circulation – small pressure losses in those parts of the system through which the total quantity of water flows, for example boiler, heat exchanger and distribution pipe up to the first branching or 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. 	<p>Constant pressure</p> 
<p>In heating systems with a fixed system characteristic, for example domestic hot-water systems, it may be relevant to control the pump according to a constant return-pipe temperature.</p> <p>You can use $FLOW_{LIMIT}$ with advantage to control the maximum circulation flow.</p>	<p>Constant temperature</p> 
<p>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.</p>	<p>Differential temperature</p>
<p>This control mode requires an external temperature sensor in addition to the internal one.</p>	

System application	Select this control mode
<p>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.</p> <p>You can also set the pump to operate according to the maximum or minimum curve, like an uncontrolled pump:</p> <ul style="list-style-type: none"> • 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. • 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 you do not want automatic night setback. 	<p>Constant curve</p> 
<p>In systems with pumps connected in parallel.</p> <p>The multipump function enables the control of two to four single-head pumps connected in parallel and twin-head pumps without the use of external controllers. See section 8.8.3 "Multi-pump setup". The pumps in a multipump system communicate with each other via the wireless GENIair connection.</p>	<p>"Assist" menu "Multi-pump setup"</p>

8.1 Operating the product

CAUTION

Hot surface



Minor or moderate personal injury

- At high liquid temperatures, the pump housing may be so hot that only the control panel should be touched to avoid burns.



Fig. 33 Control panel

Button	Function
	Goes to the "Home" menu.
	Returns to the previous display.
	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.
	Saves changed values, resets alarms and expands the value field.

8.1.1 Menu structure

The pump incorporates a startup guide which is started at the first startup. After the startup guide, the four main menus appear in the display. See section 7. [Control functions](#).

"Home"

This menu shows up to four user-defined parameters with shortcuts or a graphical illustration of a performance curve. See section 8.2 ["Home" menu](#).

Status

This menu shows the status of the pump and system as well as warnings and alarms. See section 8.4 [Status menu](#).



You cannot make settings in this menu.

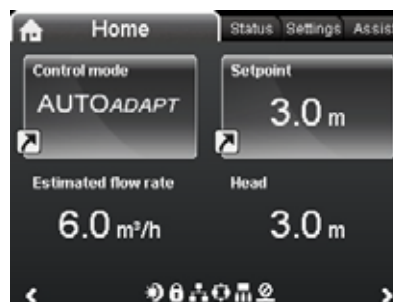
"Settings "

This menu gives access to all setting parameters. You can make a detailed setting of the pump in this menu. See section 8.6 ["Settings" menu](#).

"Assist"

This menu enables assisted pump setup, provides a short description of the control modes and offers fault advice. See section 8.8 ["Assist" menu](#).

8.2 "Home" menu



Navigation

"Home"

Press to go to the "Home" menu.

"Home" menu, factory setting

- Shortcut to control mode settings
- Shortcut to setpoint settings
- "Estimated flow rate"
- "Head".

Navigate in the display with or and change between the two shortcuts with or .

You can define the Home display. See section ["Define Home display"](#).

8.2.1 "Home" 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.

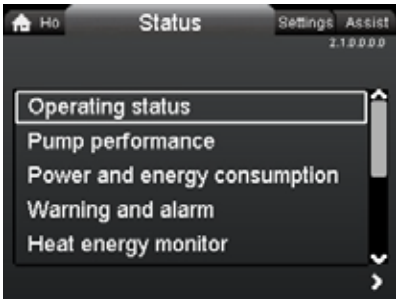
Undef-010

8.3 Menu overview

Status	"Settings"	"Assist"
"Operating status"	"Setpoint"	"Assisted pump setup"
"Operating mode, from"	"Operating mode"	"Setting of pump"
"Control mode"	"Normal"	"Setting of date and time"
"Pump performance"	"Stop"	"Date format, date and time"
"Max. curve and duty point"	"Min."	"Date only"
"Resulting setpoint"	"Max."	"Time only"
"Liquid temperature"	"Control mode"	"Multi-pump setup"
"Speed"	"AUTOADAPT"	"Setup, analog input"
"Operating hours"	"FLOWADAPT"	"Description of control mode"
"Power and energy consumption"	"Prop. press."	"AUTOADAPT"
"Power consumption"	"Const. press."	"FLOWADAPT"
"Energy consumption"	"Const. temp."	"Prop. press."
"Warning and alarm"	"Diff. temp."	"Const. press."
"Actual warning or alarm"	"Constant curve"	"Const. temp."
"Warning log"	"Controller settings (not model A)"	"Differential temp."
"Warning log 1 to 5"	"Controller gain Kp"	"Constant curve"
"Alarm log"	"Control. integr. action time Ti"	"Assisted fault advice"
"Alarm log 1 to 5"	"FLOWLIMIT"	"Blocked pump"
"Heat energy monitor"	"Enable FLOWLIMIT function"	"Pump communication fault"
"Heat power"	"Set FLOWLIMIT"	"Internal fault"
"Heat energy"	"Automatic Night Setback"	"Internal sensor fault"
"Estimated flow rate"	"Analog Input"	"Dry running"
"Volume"	"Function of analog input"	"Forced pumping"
"Hours counter"	"Unit"	"Undervoltage"
"Temperature 1"	"Sensor range, min. value"	"Overvoltage"
"Temperature 2"	"Sensor range, max. value"	"High motor temperature"
"Differential temp."	"Electrical signal"	"External sensor fault"
"Operating log"	"Relay outputs"	"High liquid temperature"
"Operating hours"	"Relay output 1"	"Comm. fault, twin-head pump"
"Trend data"	"Relay output 2"	
"Duty point over time"	"Not active"	
"3D showing (Q, H, t)"	"Ready"	
"3D showing (Q, T, t)"	"Alarm"	
"3D showing (Q, P, t)"	"Operation"	
"3D showing (T, P, t)"	"Setpoint influence"	
"Fitted modules"	"External setpoint function"	
"Date and time"	"Temperature influence"	
"Date"	"Bus communication"	
"Time"	"Pump number"	
"Pump identification"	"Forced local mode"	
"Multi-pump system"	"Enable"	
"Operating status"	"Disable"	
"Operating mode, from"	"General settings"	
"Control mode"	"Language"	
"System performance"	"Set date and time"	
"Duty point"	"Select date format"	
"Resulting setpoint"	"Set date"	
"System identification"	"Select time format"	
"Power and energy consumption"	"Set time"	
"Power consumption"	"Units"	
"Energy consumption"	"SI or US units"	
"Other pump 1, multi-pump sys."	"Customised units"	
"Other pump 1, multi-pump sys."	"Pressure"	
	"Differential pressure"	
	"Head"	
	"Level"	

"Flow rate"
"Volume"
"Temperature"
"Differential temp."
"Electrical power"
"Electrical energy"
"Heat power"
"Heat energy"
"Enable/disable settings"
"Alarm and warning settings"
"Dry running (57)"
"Internal sensor fault (88)"
"Internal fault (157)"
"Delete history"
"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"

8.4 Status menu



Navigation

"Home" > Status

Press and go to the Status menu with .

Status menu

This menu offers the following status information:

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

Navigate between the submenus with or .

8.5 "Operating status"



Navigation

"Home" > Status > "Operating status"

"Operating status"

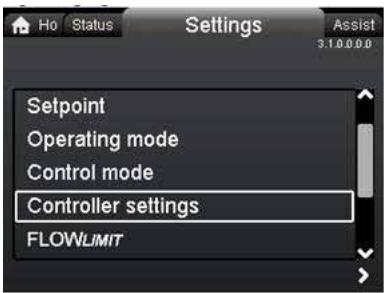
- "Operating mode, from"
- "Control mode".

This example shows that the pump runs in normal operation in a multipump system.

The status in the submenus gives information about the pump settings and other operational parameters.

Navigate between the submenus with or .

8.6 "Settings" menu



Navigation

"Home" > "Settings"

Press and go to the "Settings" menu with .

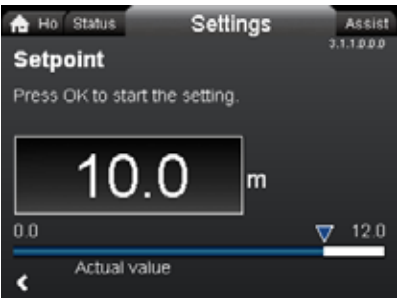
"Settings" menu

This menu offers the following setting 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 .

8.6.1 "Setpoint"



Navigation

"Home" > "Settings" > "Setpoint"

"Setpoint"

Set the setpoint so that it matches the system.

Setting:

1. Press [OK].
2. Select digit with and and adjust with or .
3. Press [OK] to save.

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	%

8.6.2 "Operating mode"



3.1.2.0.0.0 Operating mode

Navigation

"Home" > "Settings" > "Operating mode"

"Operating mode"

- "Normal"
The pump runs according to the selected control mode.
- "Stop"
The pump stops.
- "Min."
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 you do not want to use automatic night setback.
- "Max."
Use the maximum-curve mode in periods in which a maximum flow is required. This operating mode is for instance suitable for systems with hot-water priority.

Setting:

1. Select operating mode with ∇ or \blacktriangle .
2. Press [OK] to save.

You can set the pump to operate according to the maximum or minimum curve, like an uncontrolled pump. See fig. 34.

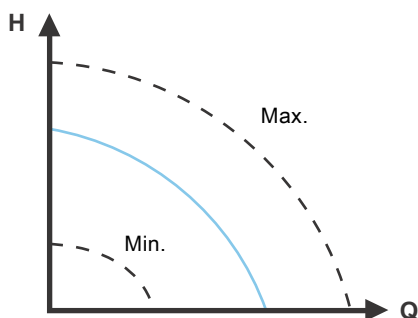
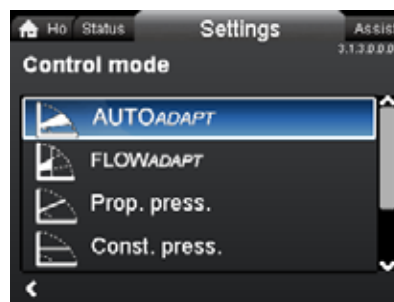


Fig. 34 Maximum and minimum curves

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8.6.3 "Control mode"



3.1.3.0.0.0 Control mode

Navigation

"Home" > "Settings" > "Control mode"

"Control mode"

- "AUTOADAPT"
- "FLOWADAPT"
- "Prop. press." (proportional pressure)
- "Const. press." (constant pressure)
- "Const. temp." (constant temperature)
- "Differential temp." (differential temperature)
- "Constant curve".



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

Setting:

1. Select control mode with ∇ or \blacktriangle .
2. Press [OK] to enable the control mode.

You can change the setpoint for all control modes, except $AUTO_{ADAPT}$ and $FLOW_{ADAPT}$, in the "Setpoint" submenu under "Settings" when you have selected the desired control mode.

You can combine all control modes, except "Constant curve", with automatic night setback. See section 8.6.6 "Automatic Night Setback".

You can also combine the $FLOW_{LIMIT}$ function with the last five control modes mentioned above. See section 8.6.5 "FLOWLIMIT".

"AUTOADAPT"

The $AUTO_{ADAPT}$ control mode continuously adapts the pump performance according to the actual system characteristic.

Manual setting of the setpoint is not possible.

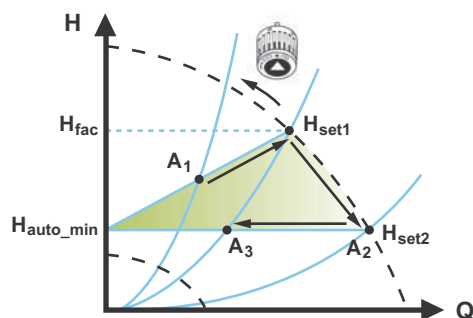


Fig. 35 $AUTO_{ADAPT}$

When the $AUTO_{ADAPT}$ control mode has been enabled, the pump starts with the factory setting, H_{fac} is equal to H_{set1} , corresponding to approximately 55 % of its maximum head, and then adjust its performance to A_1 . See fig. 35.

When the pump registers a lower head on the maximum curve, A_2 , the $AUTO_{ADAPT}$ 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 .

- A_1 : Original duty point.
- A_2 : Lower registered head on the maximum curve.
- A_3 : New duty point after $AUTO_{ADAPT}$ control.
- H_{set1} : Original setpoint setting.
- H_{set2} : New setpoint after $AUTO_{ADAPT}$ control.
- H_{fac} : See section 8.7 *Setting values for control modes*.
- H_{auto_min} : A fixed value of 1.5 m.

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

The $AUTO_{ADAPT}$ control mode has been developed specifically for heating systems and we do not recommend that you use it for air-conditioning and cooling systems.

To reset $AUTO_{ADAPT}$, see section *"Return to factory settings"*.

"FLOWADAPT"

When you select $FLOW_{ADAPT}$, the pump runs $AUTO_{ADAPT}$ and ensures that the flow never exceeds the entered $FLOW_{LIMIT}$ value.

The setting range for the $FLOW_{LIMIT}$ is 25 to 90 % of the maximum flow rate of the pump.

The factory setting of the $FLOW_{LIMIT}$ is the flow where the $AUTO_{ADAPT}$ factory setting meets the maximum curve. See fig. 36.

Do not set the $FLOW_{LIMIT}$ lower than the dimensioned duty point.

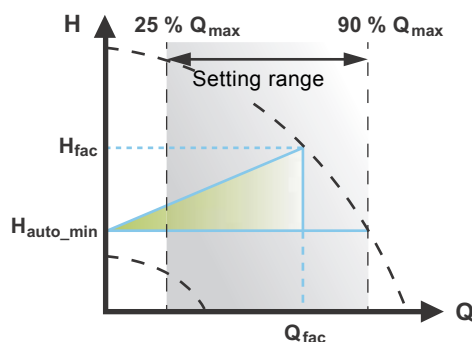


Fig. 36 $FLOW_{ADAPT}$

"Prop. press."

The head is reduced at decreasing flow demand and increased at rising flow demand. See fig. 37.

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

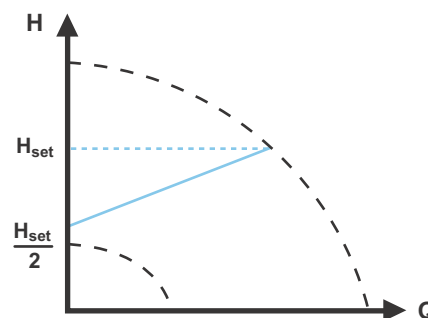


Fig. 37 Proportional pressure

"Const. press."

We recommend this control mode if the pump is to deliver a constant pressure, independently of the flow in the system. See fig. 38.

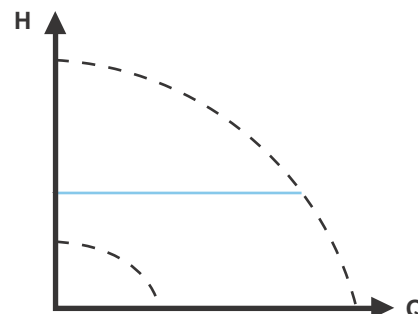


Fig. 38 Constant pressure

"Const. temp."

This control mode ensures a constant temperature. Constant temperature is a comfort control mode that you can use in domestic hot-water systems to control the flow to maintain a fixed temperature in the system. See fig. 39. When you use this control mode, do not install any balancing valves in the system.

If the pump is installed in the flow pipe, install a temperature sensor in the return pipe of the system. Install the sensor as close as possible to the consumer for example a radiator or heat exchanger.

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 for example a radiator or heat exchanger.

The constant-temperature control mode also reduces the risk of bacterial growth in the system, for example legionella.

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.

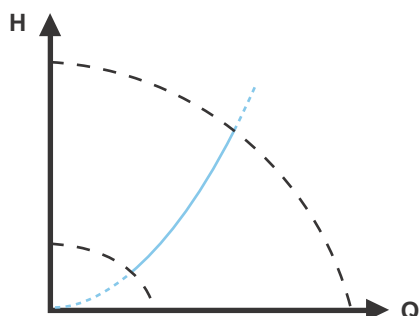


Fig. 39 Constant temperature

"Differential temp."

This control mode ensures a constant differential-temperature drop across heating and cooling systems.

The differential-temperature control mode is available from model B. The model version is stated on the nameplate. See fig. 22.

In this control mode, the pump maintains a constant differential temperature between the pump and the external sensor. See figures 40 and 41.

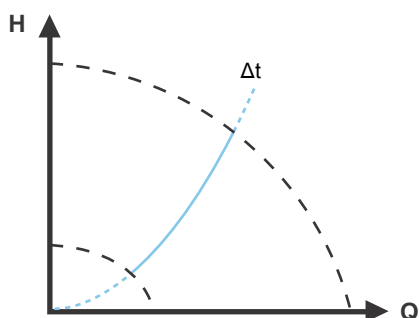


Fig. 40 Differential temperature



It is necessary to install an external temperature sensor.

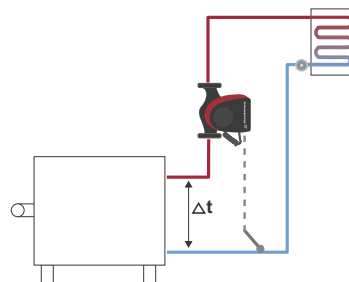


Fig. 41 Differential temperature

The controller constants, that is the gain, K_p , and integral time, T_i , are factory-set to gain is equal to 1 and integral time is equal to 8 seconds. In some cases, you must change the settings depending on the application and controlled parameter. See section 8.6.4 "Controller settings".

"Constant curve"

You can set the pump to operate according to a constant curve, like an uncontrolled pump. See fig. 42.

You can set the desired speed in % of maximum speed in the range from minimum to 100 %.

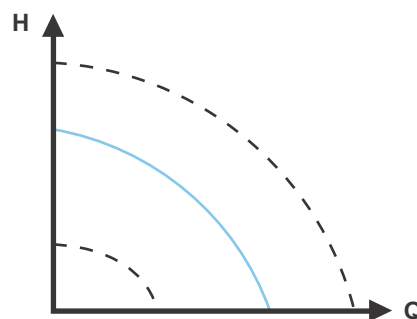


Fig. 42 Constant curve

If you have set the pump speed 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 fig. 43.

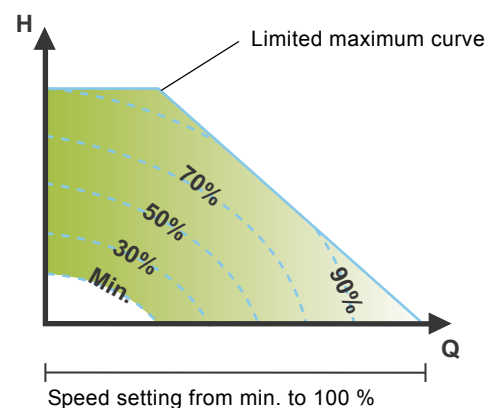


Fig. 43 Power and pressure limitations influencing the maximum curve

TM05 8236 2113

TM05 2451 5111

TM05 2446 0312

TM05 2451 5111

TM05 4266 2212

8.6.4 "Controller settings"

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.

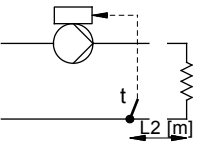
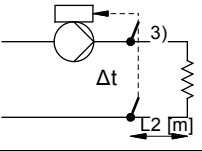
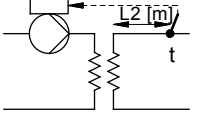
Factory settings for all other control modes:

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 ¹⁾	Cooling system ²⁾	
	0.5	- 0.5	10 + 5 ($L_1 + L_2$)
	- 0.5		10 + 5 ($L_1 + L_2$)
	0.5	- 0.5	30 + 5 L_2

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

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

3) Built-in temperature sensor.

L_1 : Distance in metres between pump and consumer.

L_2 : 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 44 and 45. For further information about setup, see the "Assist" menu in section 8.8.1 "Assisted pump setup".



Fig. 44 "Controller gain K_p "



Fig. 45 "Control. integr. action time T_i "

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.

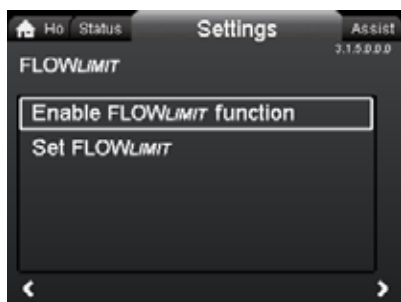
Model B and C:

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

undef-079

undef-080

8.6.5 "FLOWLIMIT"



3.1.5.0.0.0 FLOWLIMIT

Navigation

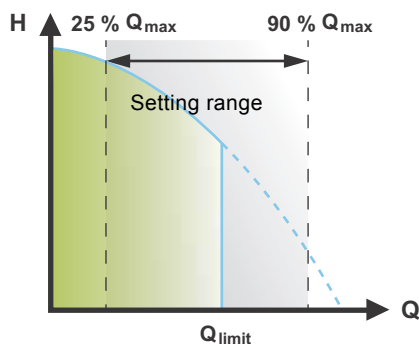
"Home" > "Settings" > "FLOWLIMIT"

"FLOW_{LIMIT}"

- "Enable FLOWLIMIT function"
- "Set FLOWLIMIT".

Setting:

1. To enable the function, select "Active" with ∇ or \blacktriangle and press [OK].
2. To set the FLOW_{LIMIT}, press [OK].
3. Select digit with \leftarrow and \rightarrow and adjust with ∇ or \blacktriangle .
4. Press [OK] to save.



TM05 2445 1212

Fig. 46 FLOW_{LIMIT}

You can combine the FLOW_{LIMIT} function with the following control modes:

- "Prop. press."
- "Const. press."
- "Const. temp."
- "Constant curve".

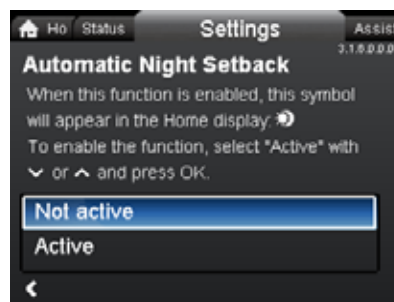
A flow-limiting function ensures that the flow never exceeds the entered FLOW_{LIMIT} value.

The setting range for FLOW_{LIMIT} is 25 to 90 % of the Q_{\max} of the pump.

The factory setting of the FLOW_{LIMIT} is the flow where the AUTO_{ADAPT} factory setting meets the maximum curve. See fig.

36.

8.6.6 "Automatic Night Setback"



3.1.6.0.0.0 Automatic Night Setback

Navigation

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

"Automatic Night Setback"

To enable the function, select "Active" with ∇ or \blacktriangle and press [OK].

Once you have enabled automatic night setback, the pump automatically changes between normal duty and night setback, i.e. duty at low demand. The changeover depends on the flow-pipe temperature.

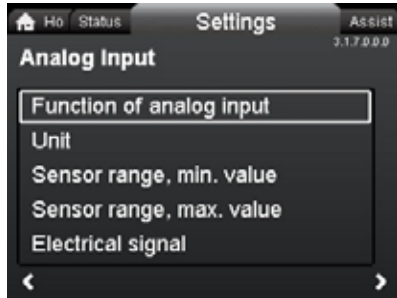
The pump automatically changes over to night setback when the built-in sensor registers a flow-pipe temperature drop of more than 10 to 15 °C within approximately two hours. The temperature drop must be at least 0.1 °C/min.

Changeover to normal duty takes place without a 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.

8.6.7 "Analog Input"

In this menu, you can set an analog input such as a temperature sensor to activate the heat-energy-monitor function. See fig. 57.



3.1.7.0.0.0 Analog input

Navigation

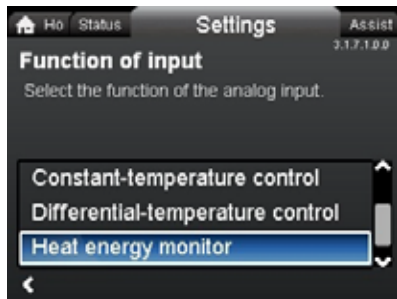
"Home" > "Settings" > "Analog Input"

"Analog Input"

- "Function of analog input"
- "Unit"
- "Sensor range, min. value"
- "Sensor range, max. value"
- "Electrical signal".

"Function of analog input"

Choose the function of input, for example heat energy monitor as in the example below.



3.1.7.1.0.0 Function of input

Navigation

"Home" > "Settings" > "Analog Input" > "Function of analog input"

- "Not active"
- "Differential-pressure control"
- "Constant-temperature control"
- "Differential-pressure control"
- "Heat energy monitor"
- "External setpoint influence"

Setting:

1. Select function mode with ▼ or ▲.
2. Press [OK] to enable the function mode.

When you have selected the function of the input, specify the sensor parameters by filling in the right values in unit, sensor range, etc.

You can also set the analog input via the "Assist" menu where a wizard guides you through each step of the configuration. See [8.8.5 "Setup, analog input"](#).

8.6.8 "Relay outputs"



3.1.12.0.0.0 Relay outputs

Navigation

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

"Relay outputs"

- "Relay output 1"
- "Relay output 2".

You can set the relay outputs to the following:

- "Not active"
- "Ready"
- "Alarm"
- "Operation".

The pump incorporates two signal relays for a potential-free alarm signal, ready signal and operating signal. For further information, see section [7.4.1 Relay outputs](#).

Set the function of the signal relays, alarm signal (factory setting), ready signal and operating signal on the pump control panel.

The output is electrically separated from the rest of the controller.

The signal relay is operated as follows:

- "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.

8.7 Setting values for control modes

The setting values for $FLOW_{ADAPT}$ and $FLOW_{LIMIT}$ are indicated as percent of maximum flow, but you must enter the value in m^3/h in the "Settings" menu.

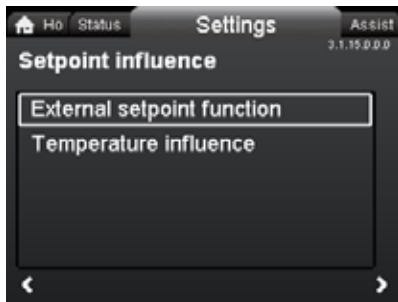
The maximum flow is a theoretical value corresponding to H is equal to 0. The actual maximum flow is dependent on the system characteristics.

Pump type	AUTO _{ADAPT} H _{fac} [m]	Q _{max} [m ³ /h]	FLOW _{ADAPT} and FLOW _{LIMIT}	
			Q _{fac} [m ³ /h]	Q _{max} 90 % [m ³ /h]
MAGNA3 25-40 (N)	2.5	8	3.7	7.2
MAGNA3 25-60 (N)	3.5	10	5.0	9.0
MAGNA3 25-80 (N)	4.5	11	5.5	9.9
MAGNA3 25-100 (N)	5.5	12	6.1	10.8
MAGNA3 25-120 (N)	6.5	13	6.2	11.7
MAGNA3 (D) 32-40 (F) (N)	2.5	9	5.0	8.1
MAGNA3 (D) 32-60 (F) (N)	3.5	11	5.9	9.9
MAGNA3 (D) 32-80 (F) (N)	4.5	12	6.4	10.8
MAGNA3 (D) 32-100 (F) (N)	5.5	13	6.7	11.7
MAGNA3 32-120 (N)	6.5	13	6.2	11.7
MAGNA3 (D) 32-120 F (N)	6.5	23	12.0	20.7
MAGNA3 (D) 40-40 F (N)	2.5	16	7.5	14.4
MAGNA3 (D) 40-60 F (N)	3.5	19	10.5	17.1
MAGNA3 (D) 40-80 F (N)	4.5	22	13.0	19.8
MAGNA3 (D) 40-100 F (N)	5.5	24	15.0	21.6
MAGNA3 (D) 40-120 F (N)	6.5	29	16.0	26.1
MAGNA3 (D) 40-150 F (N)	8.0	32	18.0	28.8
MAGNA3 (D) 40-180 F (N)	9.5	32	15.0	28.8
MAGNA3 (D) 50-40 F (N)	2.5	22	13.0	19.8
MAGNA3 (D) 50-60 F (N)	3.5	29	17.0	26.1
MAGNA3 (D) 50-80 F (N)	4.5	31	17.0	27.9
MAGNA3 (D) 50-100 F (N)	5.5	34	18.0	30.6
MAGNA3 (D) 50-120 F (N)	6.5	39	19.0	35.1
MAGNA3 (D) 50-150 F (N)	8.0	42	20.0	37.8
MAGNA3 (D) 50-180 F (N)	9.5	45	19.0	40.5
MAGNA3 (D) 65-40 F (N)	2.5	33	18.0	29.7
MAGNA3 (D) 65-60 F (N)	3.5	40	24.0	36
MAGNA3 (D) 65-80 F (N)	4.5	45	25.0	40.5
MAGNA3 (D) 65-100 F (N)	5.5	48	26.0	43.2
MAGNA3 (D) 65-120 F (N)	6.5	52	30.0	46.8
MAGNA3 (D) 65-150 F (N)	8.0	61	40.0	54.9
MAGNA3 (D) 80-40 F	2.5	49	32.0	44.1
MAGNA3 (D) 80-60 F	3.5	58	37.0	52.2
MAGNA3 (D) 80-80 F	4.5	66	40.0	59.4
MAGNA3 (D) 80-100 F	5.5	69	47.0	62.1
MAGNA3 (D) 80-120 F	6.5	74	48.0	66.6
MAGNA3 (D) 100-40 F	2.5	55	40.0	49.5
MAGNA3 (D) 100-60 F	3.5	63	43.0	56.7
MAGNA3 (D) 100-80 F	4.5	73	50.0	65.7
MAGNA3 (D) 100-100 F	5.5	79	52.0	71.1
MAGNA3 (D) 100-120 F	6.5	85	57.0	76.5

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.

8.7.1 "Setpoint influence"



Navigation

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

"Setpoint influence"

- "External setpoint function"
- "Temperature influence".

"External setpoint function"

An external 0-10 V or 4-20 mA signal controls the pump speed in a range from minimum to 100 % in a linear function. See fig. 47.

Range		
4-20 mA	[0-100 %]	
0-10 V	[0-100 %]	
Control		
0-20 %	e.g. 0-2 V	Setpoint is equal to minimum.
20-100 %	e.g. 2-10 V	Setpoint is equal from minimum to setpoint.

If the analog input is set to external setpoint influence, the external setpoint function is automatically activated with "Linear with MIN". See section 7.4.3 [Analog input](#).

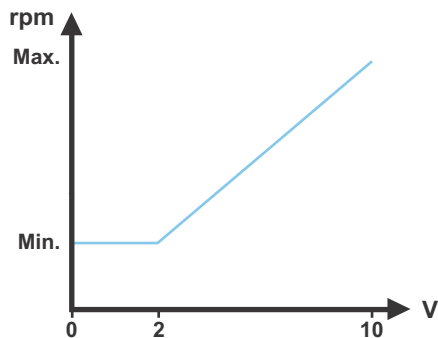
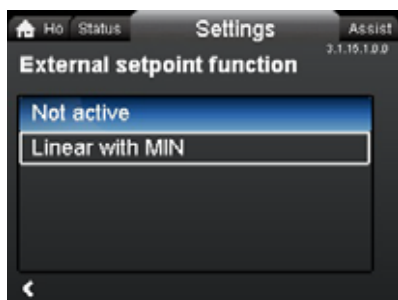


Fig. 47 "External setpoint function", 0-10 V

The range of control depends on the minimum speed, power and pressure limits of the pump.

You can configure the analog input to an external setpoint function in "Settings" or in the "Assist" menu. See section 7.4.3 [Analog input](#).



"Temperature influence"

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.

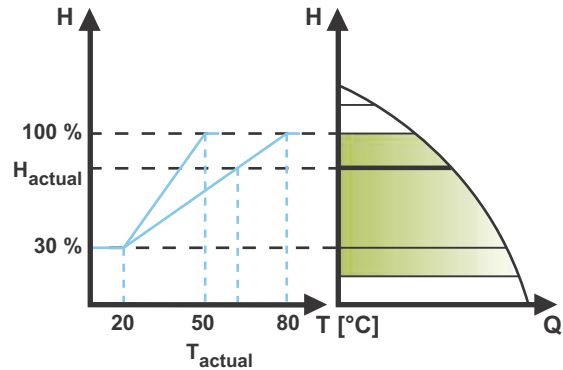


Fig. 48 "Temperature influence"

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} .

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.

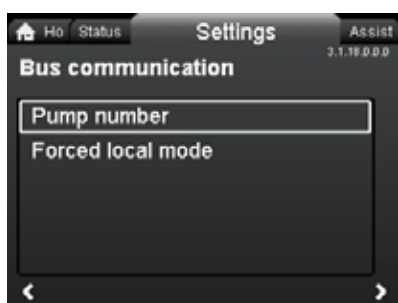
Selection of maximum temperature

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.

8.7.2 "Bus communication"



3.1.18.0.0.0 Bus communication

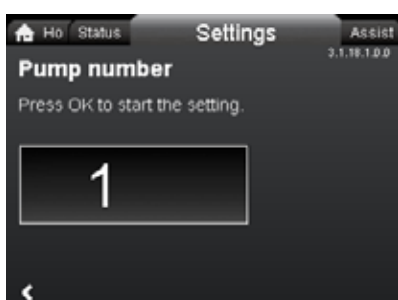
Navigation

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

"Bus communication"

- "Pump number"
- "Forced local mode"

"Pump number"



3.1.18.1.0.0 Pump number

Navigation

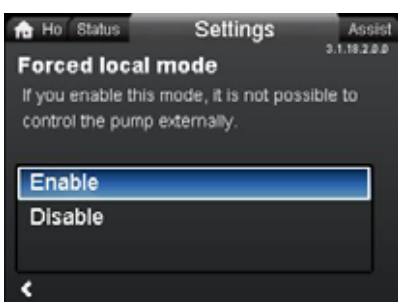
"Home" > "Settings" > "Bus communication" > "Pump number"

"Pump number"

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

"Forced local mode"

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.



3.1.18.2.0.0 Forced local mode

Navigation

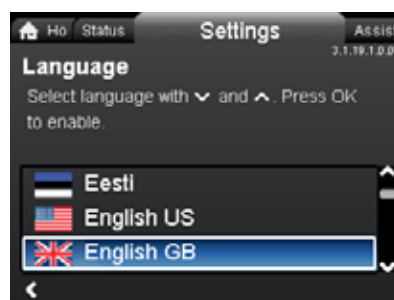
"Home" > "Settings" > "Bus communication" > "Forced local mode"

"Forced local mode"

- "Enable"
- "Disable".

8.7.3 "General settings"

"Language"



3.1.19.1.0.0 Language

Navigation

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

"Language"

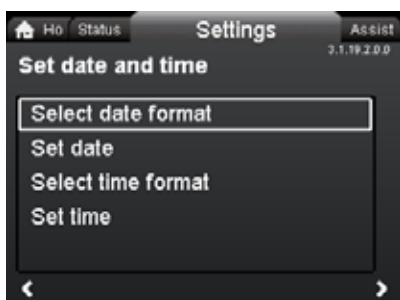
The display can be shown in any of the following languages:

- 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.

Setting:

1. Select language with ▼ and ▲.
2. Press [OK] to enable the language.

"Set date and time"

3.1.19.2.0.0 Set date and time

Navigation

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

"Set date and time"

- "Select date format"
- "Set date"
- "Select time format"
- "Set time".

Set the real-time clock in this menu.

"Select date format"

- "YYYY-MM-DD"
- "DD-MM-YYYY"
- "MM-DD-YYYY".

Setting:

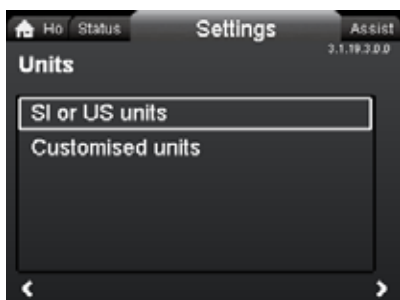
1. Select "Set date".
2. Press [OK].
3. Select digit with ◀ and ▶ and adjust with ▼ or ▲.
4. Press [OK] to save.

"Select time format"

- "HH:MM 24-hour clock"
- "HH:MM am/pm 12-hour clock".

Setting:

1. Select "Set time".
2. Press [OK].
3. Select digit with ◀ and ▶ and adjust with ▼ or ▲.
4. Press [OK] to save.

"Units"

3.1.19.3.0.0 Units

Navigation

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

"Units"

- "SI or US units"
- "Customised units".

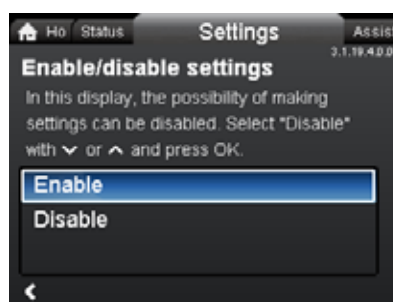
In this menu you can select between SI and US units. The setting can be made generally for all parameters or customised for each individual parameter.

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

Setting:

1. Select parameter and press [OK].
2. Select unit with ▼ or ▲.
3. Press [OK].

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

"Enable/disable settings"

3.1.19.4.0.0 Enable/disable settings

Navigation

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

"Enable/disable settings"

In this display, you can disable the possibility of making settings. Select "Disable" with ▼ or ▲ and press [OK].

The pump is now locked for settings. Only the "Home" display is available.

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"

3.1.19.12.0.0 Alarm and warning settings

Navigation

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

"Settings"

- "Dry running (57)"
- "Internal sensor fault (88)"
- "Internal fault (157)"

"Dry running (57)"

- "Enable"
- "Disable"

The dry running detection is disabled by default on all pumps from production code 1529. The production code is on the nameplate. Enable the dry-running function, if there is a risk of dry running.

"Internal sensor fault (88)"

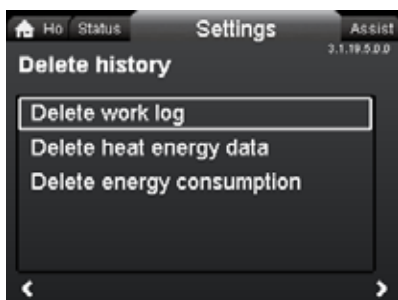
- "Enable"
- "Disable"

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)"

- "Enable"
- "Disable"

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"

3.1.19.5.0.0 Delete history

Navigation

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

"Delete history"

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

In this menu, 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.

Setting:

1. Select submenu and press [OK].
2. Select "Yes" with ▼ or ▲ and press [OK] or press ⏮ to cancel.

"Define Home display"

3.1.19.6.0.0 Define Home display

Navigation

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

"Define Home display"

- "Select Home display type"
- "Define Home display contents".

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.

"Select Home display type"

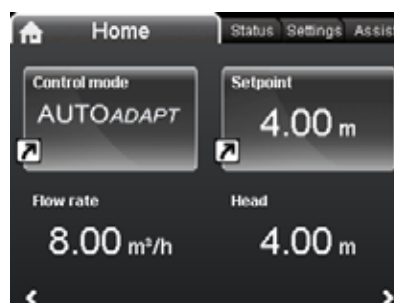
1. Select "List of data" or "Graphical illustration" with ▼ or ▲.
2. Press [OK] to save.

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

"Define Home display contents"

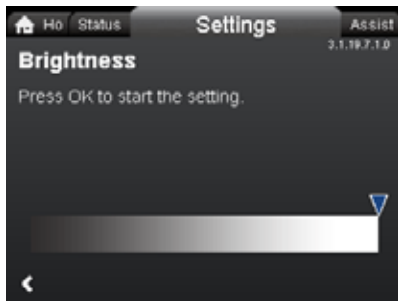
1. To set "List of data", press [OK]. A list of parameters appears in the display.
2. Select or deselect with [OK].

The selected parameters are shown below. The arrow indicates that the parameter links to the "Settings" menu and works as a shortcut for quick settings.



Define Home display contents

1. To set "Graphical illustration", press [OK].
2. Select the desired curve.
3. Press [OK] to save.

"Display brightness"

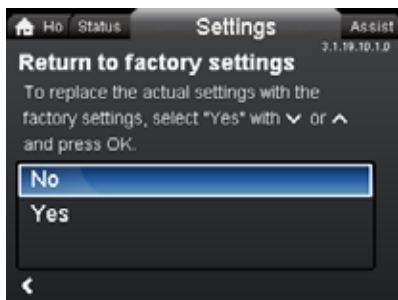
3.1.19.7.1.0 Brightness

Navigation

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

"Brightness"

1. Press [OK].
2. Set brightness with ◀ and ▶.
3. Press [OK] to save.

"Return to factory settings"

3.1.19.10.1.0 Return to factory settings

Navigation

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

"Return to factory settings"

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.

To overwrite the current settings with the factory settings, select "Yes" with ▼ or ▲ and press [OK].

"Run start-up guide"

3.1.19.11.0.0 Run start-up guide

Navigation

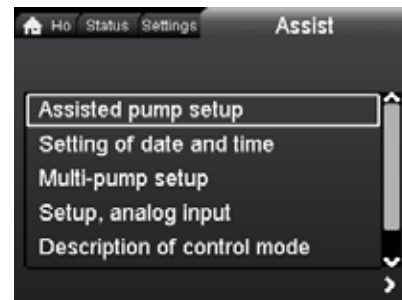
"Home" > "Settings" > "General settings" > "Run start-up guide"

"Run start-up guide"

The startup guide automatically starts when you start the pump for the first time.

You can always run the startup guide later via this menu. The startup guide guides the user through the general settings of the pump, such as language, date and time.


To run the startup guide, select "Yes" with ▼ or ▲ and press [OK].

8.8 "Assist" menu

Assist

Navigation

"Home" > "Assist"

Press  and go to the "Assist" menu with ▶.

"Assist" menu

This menu offers the following:

- "Assisted pump setup"
- "Setting of date and time"
- "Multi-pump 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.

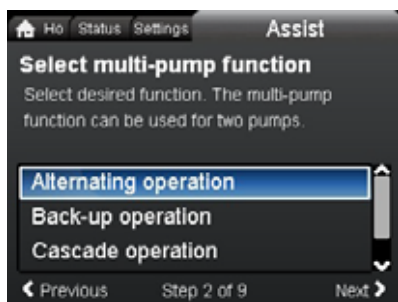
8.8.1 "Assisted pump setup"

This menu guides you through a complete pump setup, starting with a presentation of the control modes and ending with the setpoint setting.

8.8.2 "Setting of date and time"

See section ["Set date and time"](#).

8.8.3 "Multi-pump setup"



Navigation

"Home" > "Assist" > "Multi-pump setup"

1. Follow the step-by-step guide to complete the multipump setup.
2. Check the entered values.
3. Press [OK] to confirm and enable the settings.

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 pumps in a multipump system communicate with each other via the wireless GENlair connection.

Pump system:

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

You can set a multipump system from a selected pump, which will then be the master pump.



Fig. 49 Single-head pumps connected in parallel

Check the display to identify the master pump in a multipump system. See fig. 50 and ["Home" display icons](#).

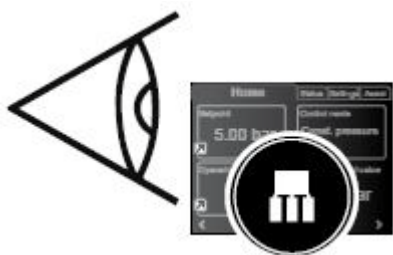


Fig. 50 Identify the master pump in a multipump system

A twin-head pump is set to multipump function from factory. Here pump head I is defined as master pump.



Fig. 51 Twin-head pumps

Check the nameplate to identify the master pump. See fig. 52.



I is defined as master.

Fig. 52 Identify the master pump on a twin-head pump

"Alternating operation"



Fig. 53 "Alternating operation"

Alternating operation functions as a duty-standby operating mode and is possible with two pumps of same size and type connected in parallel. The main purpose of the function is to ensure an even amount of running hours and to ensure that the standby pump takes over if the running pump stops due to an alarm.

"Back-up operation"



Fig. 54 "Back-up operation"

Backup operation is possible with two pumps of same size and type connected in parallel. Each pump requires a non-return valve in series with the pump.

One pump is running continuously. The backup pump is operated for a short time each day to prevent seizing up. If the duty pump stops due to a fault, the backup pump starts automatically.

Under-083 Select multi pump function

TM067498 3516

TM06 7499 3516

TM06 7500 3516

TM06 6890 2516

TM06 7501 3516

TM06 7502 3516

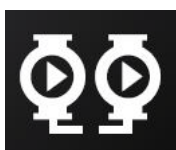
"Cascade operation"**Fig. 55** "Cascade operation"

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.

When a twin-head pump is running in constant-pressure control mode, the second pump starts at 90 % of the maximum performance. The second pump stops automatically when it is no longer needed to fulfil the system demand. If both pumps are running, they run at the same speed.

Pump system:

- Set the control mode to "Const. press." or "Constant curve".

"No multi-pump function"**Fig. 56** "No multi-pump function"

The pumps run as single-head pumps.

8.8.4 External connections in a multipump systems

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

- analog input
- digital input
- communication interface module, CIM.

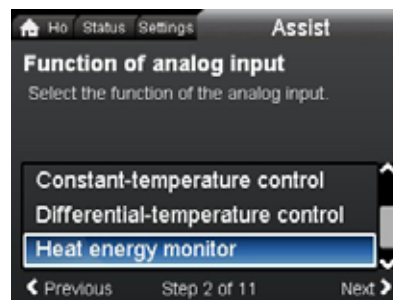
If you want to monitor a slave pump, mount a communication interface module on the slave pump too.

Set the following on both the master and slave pump:

- Relays
From model B. Configure on both master and slave pump.
- Operating mode, control mode and setpoint
These modes are system parameters and they are shared between the two pumps.
- Heat energy monitor
The heat energy monitor works on the system level.
Therefore, both pumps display the heat energy for the system, not for the individual pump.

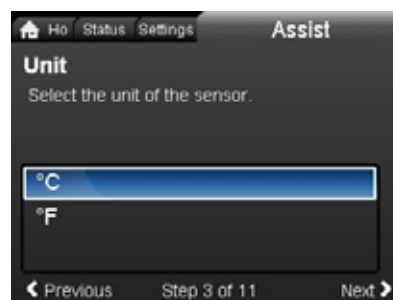
8.8.5 "Setup, analog input"

This menu guides you through the setup of the analog inputs, for example a temperature sensor input to a heat energy monitor.

**Navigation**

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

1. To enable the sensor input, select "Heat energy monitor" with ∇ or \blacktriangle and press [OK].

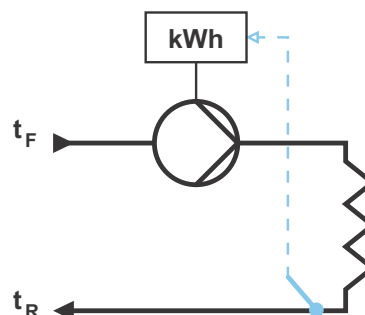


2. Follow the step-by-step guide to complete the sensor-input setup. Start with the unit display and end with the summary display.
3. Check the entered values.
4. Press [OK] to confirm and enable the settings.

8.8.6 "Heat energy monitor"

The heat energy monitor is a monitoring function that calculates the heat energy consumption within a system. The built-in flow estimation needed for the calculation has an inaccuracy of $\pm 10\%$ of the maximum flow. Also, the temperature measurements needed for the calculation have some inaccuracy depending 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 caused by system imbalances.

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

**Fig. 57** MAGNA3 with built-in heat energy monitor

"Heat energy"

Status		Settings Assist
Heat energy		
Last logged (1):	16 - 06 - 2016	
Latest year (1):	320 kWh	
Entire life (1):	534 kWh	
Last logged (2):	16 - 06 - 2016	
Latest year (2):	249 kWh	
Entire life (2):	349 kWh	

2.1.6.2.0.0 Heat energy

Navigation

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

"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.

8.9 External setpoint influence

External setpoint influence is typically used to control the speed according to a setpoint by means of a 0-10 V signal.

Follow the step-by-step guide to complete the sensor input setup. Start with the unit display and end with the summary display.

1. Check the entered values.
2. Press [OK] to confirm and enable the settings.
3. Return to the "Settings" menu and find "External setpoint function".
4. Choose "Linear with MIN" function. See section ["External setpoint function"](#).

8.10 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 an accuracy specified as $\pm xx\%$ of Q_{\max} . The less flow through the pump, the less accurate the reading will be. See also section [8.8.6 "Heat energy monitor"](#).

Example:

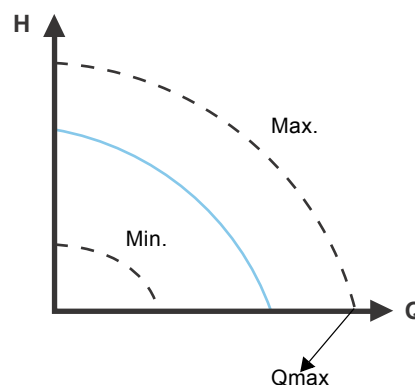


Fig. 58 Q_{\max}

1. MAGNA3 65-60 has a Q_{\max} of 40 m³/h. Typically 5 % accuracy means 2 m³/h inaccuracy of $Q_{\max} \pm 2$ m³/h.
2. This accuracy is valid for the entire QH area. If the pump indicates 10 m³/h, the measurement is 10 \pm 2 m³/h.
3. The flow rate can be from 8-12 m³/h.

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

If the flow is less than 10 % of Q_{\max} , the display shows a low flow.

8.11 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 [fig. 59](#). Due to the flap valve there is a difference in the hydraulic between the two pump heads. See [fig. 60](#).



Fig. 59 Twin-head pump housing with flap valve

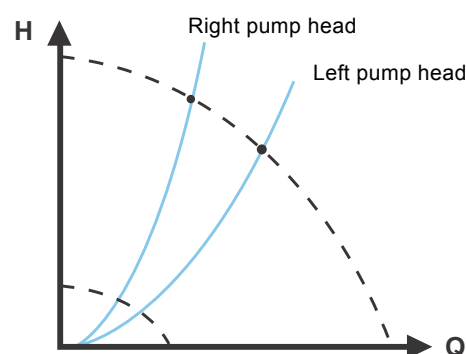


Fig. 60 Hydraulic difference between the two pump heads

The table below shows the flow accuracy of the complete MAGNA3 range. The typical accuracy is displayed along with the worst-case value.

Pump type	Q_{\max}	Single-head pumps and left-side pump head of twin-head pumps		Right-side pump head of twin-head pumps	
		5 % typical	10 % worst case	7 % typical	12 % worst case
	[m ³ /h]	[m ³ /h]	[m ³ /h]	[m ³ /h]	[m ³ /h]
MAGNA3 25-40 (N)	8	0.4	0.8	-	-
MAGNA3 25-60 (N)	10	0.5	1.0	-	-
MAGNA3 25-80 (N)	11	0.55	1.1	-	-
MAGNA3 25-100 (N)	12	0.6	1.2	-	-
MAGNA3 25-120 (N)	13	0.65	1.3	-	-
MAGNA3 (D) 32-40 (F) (N)	9	0.45	0.9	0.63	1.08
MAGNA3 (D) 32-60 (F) (N)	11	0.55	1.1	0.77	1.32
MAGNA3 (D) 32-80 (F) (N)	12	0.6	1.2	0.84	1.44
MAGNA3 (D) 32-100 (F) (N)	13	0.65	1.3	0.91	1.56
MAGNA3 32-120 (N)	13	0.65	1.3	-	-
MAGNA3 (D) 32-120 F (N)	23	1.15	2.3	1.61	2.76
MAGNA3 (D) 40-40 F (N)	16	1.3	1.6	1.12	1.92
MAGNA3 (D) 40-60 F (N)	19	1.45	1.9	1.33	2.28
MAGNA3 (D) 40-80 F (N)	22	1.1	2.2	1.54	2.64
MAGNA3 (D) 40-100 F (N)	24	1.2	2.4	1.68	2.88
MAGNA3 (D) 40-120 F (N)	29	1.45	2.9	2.03	3.48
MAGNA3 (D) 40-150 F (N)	32	1.6	3.2	2.24	3.84
MAGNA3 (D) 40-180 F (N)	32	1.6	3.2	2.24	3.84
MAGNA3 (D) 50-40 F (N)	22	1.1	2.2	1.54	2.64
MAGNA3 (D) 50-60 F (N)	29	1.45	2.9	2.03	3.48
MAGNA3 (D) 50-80 F (N)	31	1.55	3.1	2.17	3.72
MAGNA3 (D) 50-100 F (N)	34	1.7	3.4	2.38	4.08
MAGNA3 (D) 50-120 F (N)	39	1.95	3.9	2.73	4.68
MAGNA3 (D) 50-150 F (N)	42	2.1	4.2	2.94	5.04
MAGNA3 (D) 50-180 F (N)	45	2.25	4.5	3.15	5.40
MAGNA3 (D) 65-40 F (N)	33	1.65	3.3	2.31	3.96
MAGNA3 (D) 65-60 F (N)	40	2.0	4.0	2.80	4.80
MAGNA3 (D) 65-80 F (N)	45	2.25	4.5	3.15	5.40
MAGNA3 (D) 65-100 F (N)	48	4.4	4.8	3.36	5.76
MAGNA3 (D) 65-120 F (N)	52	2.6	5.2	3.64	6.24
MAGNA3 (D) 65-150 F (N)	61	3.05	6.1	4.27	7.32
MAGNA3 (D) 80-40 F	49	2.45	4.9	3.43	5.88
MAGNA3 (D) 80-60 F	58	2.9	5.8	4.06	6.96
MAGNA3 (D) 80-80 F	66	3.3	6.6	4.62	7.92
MAGNA3 (D) 80-100 F	69	3.45	6.9	4.83	8.28
MAGNA3 (D) 80-120 F	74	3.7	7.4	5.18	8.88
MAGNA3 (D) 100-40 F	55	2.75	5.5	3.85	6.60
MAGNA3 (D) 100-60 F	63	3.15	6.3	4.41	7.56
MAGNA3 (D) 100-80 F	73	3.65	7.3	5.11	8.76
MAGNA3 (D) 100-100 F	79	3.95	7.9	5.53	9.48
MAGNA3 (D) 100-120 F	85	4.25	8.5	5.95	10.20

8.12 "Description of control mode"

This menu describes the possible control modes.

8.13 "Assisted fault advice"

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

8.14 Wireless GENlair

The pump is designed for multipump connection via the wireless GENlair connection. The built-in wireless GENlair module enables communication between pumps and with Grundfos GO without the use of add-on modules:

- Multipump function.
See section [9. Servicing the product](#).
- Grundfos GO.
See section [11.1 Grundfos GO](#).

9. Servicing the product

Before dismantling

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.
- Lock the main switch in position 0. Type and requirements as specified in EN 60204-1, 5.3.2.

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.




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 control 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 control 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.	

10.2 Fault finding

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.

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.

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.

Warning and alarm codes	Fault	Automatic reset and restart	Corrective actions
"Pump communication fault" (10) "Alarm"	Communication fault between different parts of the electronics.	Yes	Replace the pump, or contact Grundfos Service. 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.
"Dry running" (57) "Alarm"	No water at the pump inlet or the water contains too much air.	No	Prime and vent the pump before a new startup. Check that the pump is operating correctly. If not, replace the pump, or contact Grundfos Service.
"High motor temperature" (64) "Alarm"	The temperature in the stator windings is too high.	No	Replace the pump, or contact Grundfos Service.
"Internal fault" (72 and 155) "Alarm"	Internal fault in the pump electronics. Irregularities in the voltage supply can cause alarm 72.	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.
"Internal fault" (84 and 157) "Warning"	Fault in the pump electronics.	-	Check if turbine operation is present in the application. 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.
"Communication 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 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 9.1 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.

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.

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.
- 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.

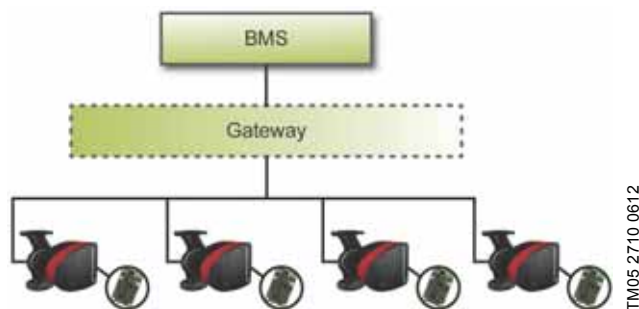


Fig. 61 Building management system, BMS, with four pumps connected in parallel

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.

The following communication interface modules are available:

Module	Fieldbus protocol	Product number
CIM 050	GENIbus	96824631
CIM 100	LonWorks	96824797
CIM 150	PROFIBUS DP	96824793
CIM 200	Modbus RTU	96824796
CIM 250	GSM/GPRS	96824795
CIM 270	GRM	96898815
CIM 300	BACnet MS/TP	96893770
CIM 500	Ethernet	98301408

11.2.1 Description of communication interface modules

Module	Fieldbus protocol	Description	Functions
CIM 050 	 TM06 7238 3416 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 	 TM06 7279 3416 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 150 	 TM06 7280 3416 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.
CIM 200 	 TM06 7281 3416 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 250 	 TM06 7282 3416 GSM/GPRS	CIM 250 is a Grundfos communication interface module used for GSM or GPRS communication. CIM 250 is used to communicate via a GSM network.	CIM 250 has a SIM-card slot and an SMA connection to the GSM antenna. The CIM 250 also has an internal backup battery. Two LEDs are used to indicate the actual status of the CIM 250 communication. One LED is used for indication of correct connection to the pump, and the other is used to indicate GSM/GPRS communication status. Note: The SIM card is not supplied with the CIM 250. The SIM card from the service provider must support data/fax service to use call service from PC Tool or SCADA. The SIM card from the service provider must support GPRS service to use ethernet service from PC Tool or SCADA.

Module	Fieldbus protocol	Description	Functions
CIM 270 	Grundfos Remote Management TM06 7282 3416	CIM 270 is a Grundfos GSM or GPRS modem used for communication with a Grundfos Remote Management system. It requires a GSM antenna, a SIM card and a contract with Grundfos.	With CIM 270 you have wireless access to your account anywhere, anytime when you have an internet connection, for example via a smartphone, tablet PC, laptop or computer. Warnings and alarms can be sent by e-mail or SMS to your mobile phone or computer. You will get a complete status overview of the entire Grundfos Remote Management system. It allows you to plan maintenance and service based on actual operating data.
CIM 300 	BACnet MS/TP TM06 7281 3416	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 	Ethernet TM06 7283 3416	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: <ul style="list-style-type: none"> • 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. See the specific functional profile on the DVD-ROM supplied with the Grundfos CIM module.

11.2.2 Installing a communication interface module

WARNING
Electric shock



Death or serious personal injury.

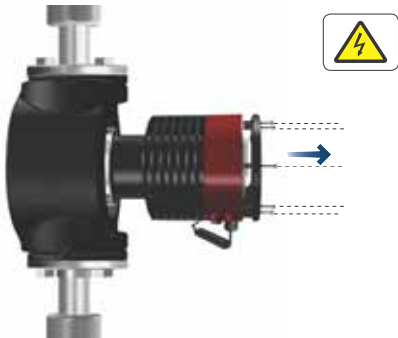


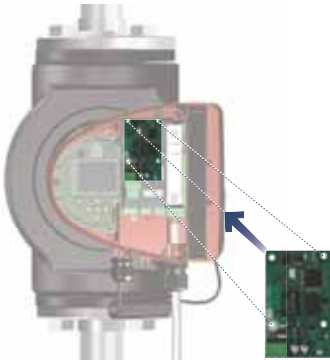
- Make sure that other pumps or sources do not force flow through the pump even if the pump is stopped. This will cause the motor to act like a generator, resulting in voltage on the pump.



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.

Step	Action	Illustration
1	Terminal-connected versions: Remove the front cover from the control box.	
2	Plug-connected versions: Open the front cover.	
3	Unscrew the earth connection.	
4	Fit the communication interface module as illustrated and click it on.	

Step	Action	Illustration
5	Tighten the screw holding the communication interface module and secure the earth connection.	
6	For connection to fieldbus networks, see the installation and operating instructions for the desired communication interface module.	

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TM05 2913 3416

11.2.3 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, anytime when you have an internet connection, for example via a mobile device. Warnings and alarms can be sent by email or SMS to your mobile device.

Application	Description	Product number
CIM 270	Grundfos Remote Management Requires a contract with Grundfos and a SIM card.	96898815
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.

11.2.4 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.



TM05 2911 1312

Fig. 62 Reuse of communication interface module

11.3 Counterflanges

Counterflange kits consist of two flanges, two gaskets and bolts and nuts, making it possible to install the pump in any pipework. See [MAGNA3 data booklet](#), Accessories section, for the right dimension and product number.

11.4 External sensors

11.4.1 Temperature sensor

Sensor	Type	Measuring range [bar]	Measuring range [°C]	Transmitter output [mA]	Power supply [VDC]	Process connection	Product number
Combined pressure and temperature sensor	RPI T2	0-16	-10 to +120	4-20	0-10	G 1/2	98355521

11.4.2 Pressure sensor

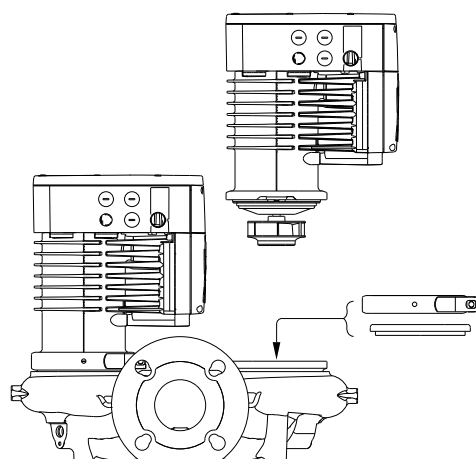
Sensor	Type	Supplier	Measuring range [bar]	Sensor output [mA]	Power supply [VDC]	Process connection	Product number
Pressure sensor	RPI	Grundfos	0 - 0.6	4-20	12-30	G 1/2	97748907
			0 - 1.0				97748908
			0 - 1.6				97748909
			0 - 2.5				97748910
			0 - 4.0				97748921
			0 - 6.0				97748922
			0-12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

11.5 Cable for sensors

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

11.6 Blanking flange

A blanking flange 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. See fig. 63.



TM05 5994 4312

Fig. 63 Position of blanking flange

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

11.7 Insulating kits for air-conditioning and cooling systems

You can fit single-head pumps for air-conditioning and cooling systems with insulating shells. A kit consists of two shells made of polyurethane and a self-adhesive seal to ensure tight assembly.

The dimensions of the insulating shells for pumps in air-conditioning and cooling systems differ from those of the insulating shells for pumps in heating systems.

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 65-40/60/80/100/120/150 F (N)	96913593
MAGNA3 80-40/60/80/100/120 F	98134265
MAGNA3 100-40/60/80/100/120 F	96913589

Insulating shells for single-head pumps for heating systems are supplied with the pump.

12. Technical data

Supply voltage

1 x 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 air humidity

Maximum 95 %.

Ambient temperature

0 to +40 °C.

During transport: -40 to +70 °C.

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 16: 16 bar / 1.6 MPa.

Test pressure

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

- PN 6: 7.2 bar
- PN 10: 12 bar
- PN 6/10: 12 bar
- PN 16: 19.2 bar.

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.

Minimum 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.

MAGNA3 DN	Liquid temperature		
	75 °C	95 °C	110 °C
	Inlet pressure [bar] / [MPa]		
25-40/60/80/100/100	0.10 / 0.01	0.35 / 0.04	1.0 / 0.10
32-40/60/80/100/120	0.10 / 0.01	0.35 / 0.04	1.0 / 0.10
32-120 F	0.10 / 0.01	0.50 / 0.05	1.1 / 0.11
40-40/60 F	0.10 / 0.01	0.35 / 0.04	1.0 / 0.10
40-80/100 F	0.10 / 0.01	0.50 / 0.05	1.1 / 0.11
40-120/150/180 F	0.10 / 0.01	0.40 / 0.04	1.0 / 0.10
50-40/60/80 F	0.10 / 0.01	0.10 / 0.01	0.7 / 0.07
50-100 F	0.10 / 0.01	0.50 / 0.05	1.1 / 0.11
50-120 F	0.10 / 0.01	0.40 / 0.04	1.0 / 0.10
50-150/180 F	0.20 / 0.02	0.60 / 0.06	1.2 / 0.12
65-40/60/80/100 F	0.20 / 0.02	0.60 / 0.06	1.2 / 0.12
65-120 F	0.10 / 0.01	0.50 / 0.05	1.1 / 0.11
65-150 F	0.40 / 0.04	0.80 / 0.08	1.2 / 0.12
80-40/60/80/100/120 F	0.50 / 0.05	0.90 / 0.09	1.5 / 0.15
100-40/60/80/100/120 F	0.50 / 0.05	0.90 / 0.09	1.5 / 0.15

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.

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 lower than 43 dB(A).

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

Power factor

The terminal-connected versions have built-in an active power factor correction which gives a $\cos \varphi$ 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 $\cos \varphi$ from 0.55 to 0.98.

12.1 Sensor specifications

12.1.1 Temperature

Temperature range during operation	Accuracy
-10 to +35 °C	± 4 °C
+35 to +90 °C	± 2 °C
+90 to +110 °C	± 4 °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.

Dispose of this product or parts of it in an environmentally sound way according to local regulations.

For further information see the end-of-life information on www.Grundfos.com.

Subject to alterations.

Appendix

Dimensions

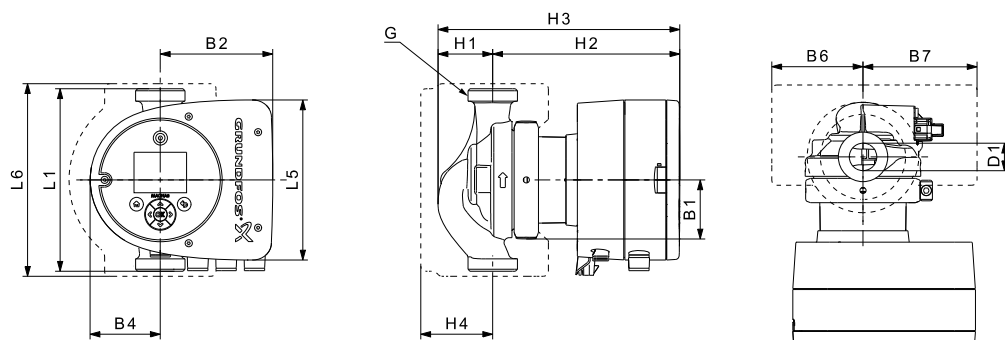


Fig. 1 Dimensions, single-head pumps, threaded versions

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

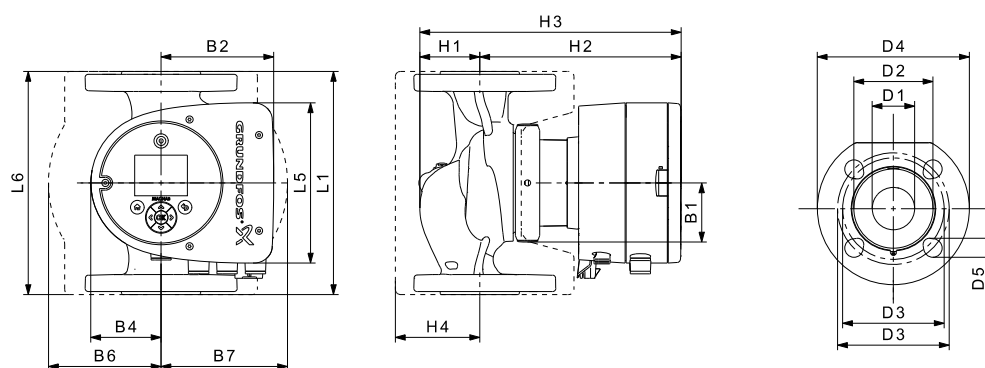


Fig. 2 Dimensions, single-head pumps, flanged versions

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

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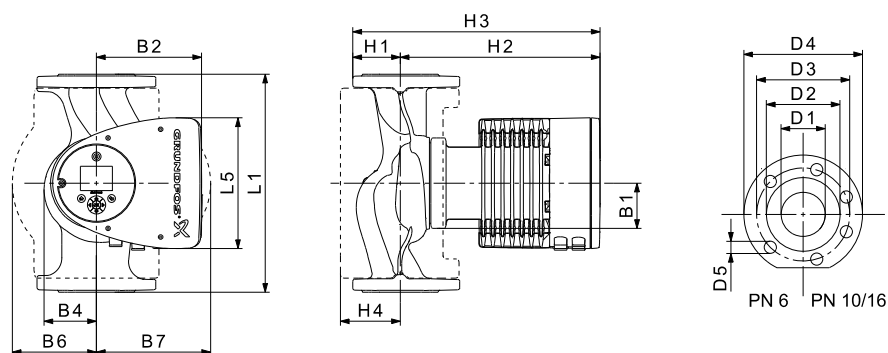


Fig. 3 Dimensions, single-head pumps, flanged versions

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

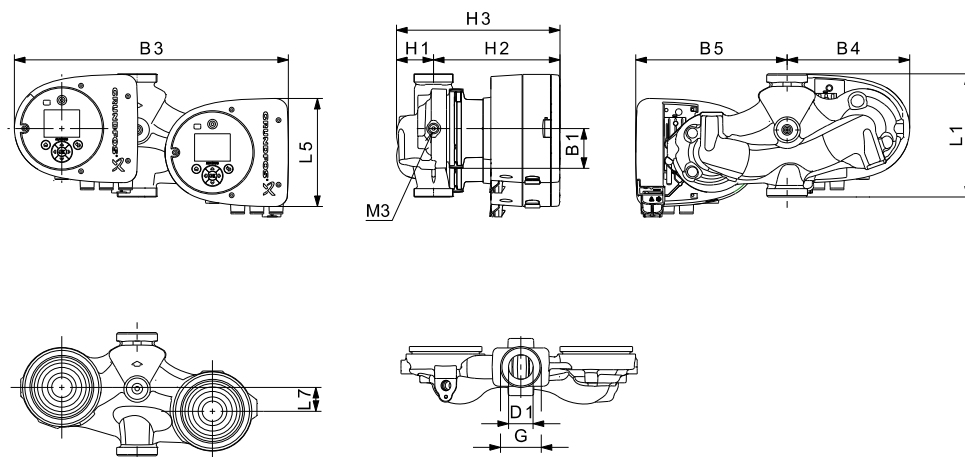


Fig. 4 Dimensions, twin-head pumps, threaded versions

TM05 7939 2013

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

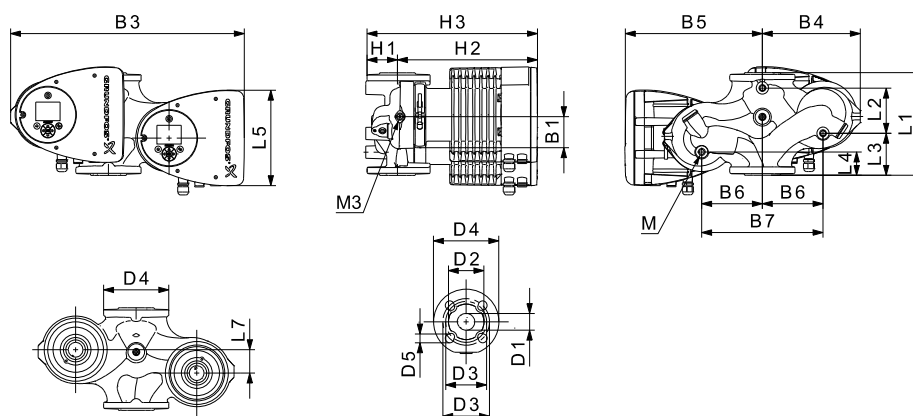


Fig. 5 Dimensions, twin-head pumps, flanged versions

TM05 5294 3612

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

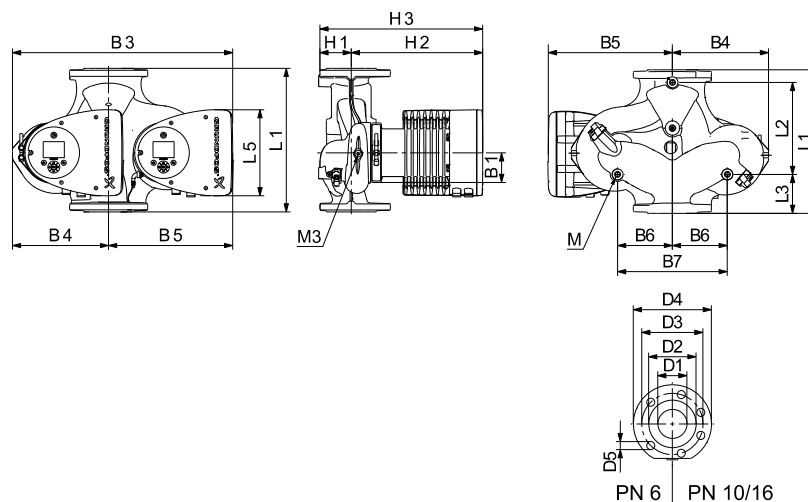


Fig. 6 Dimensions, twin-head pumps

TMO5 5366 2013

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
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

1. 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. 7.

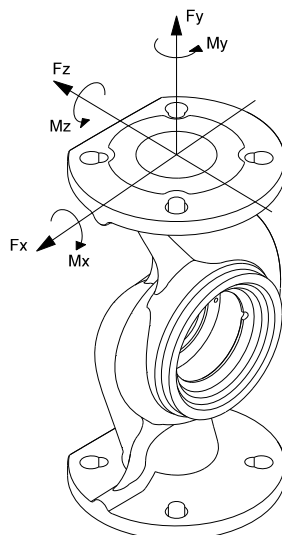


Fig. 7 Forces and moments from the pipe connections acting on the pump flanges or threaded connections

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.

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.

2. Tightening torques for bolts

Recommended tightening torques for bolts used in flanged connections:

Bolt dimension	Torque
M12	27 Nm
M16	66 Nm

TM05 5639 4012

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