# MAGNA1

**Model C**

**Circulator pumps**

**50/60 Hz**




GRUNDFOS

# 3. Operation

## Operating conditions

### General recommendations

| | |
|---|---|
| **Water in heating systems** | Water quality according to local standards such as the German standard VDI 2035 |
| **Domestic hot water** | Degree of hardness up to 14 °dH |
| **Water containing glycol** | Maximum viscosity = 10 cSt ~ 50 % water and 50 % glycol at -10 °C |

### 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.

### Ambient conditions

| **Ambient conditions** | |
|---|---|
| Ambient temperature during operation | -20 to +40 °C |
| Ambient temperature during storage and transport | -40 to +70 °C |
| Relative humidity | Max. 95 % |

#### Ambient temperatures below 0 °C

When operating the pump at ambient temperatures below 0 °C, observe below requirements to reduce condensation and avoid ice buildup.

| **Requirements for operation below 0 °C** | **Media type** | |
|---|---|---|
| | **Glycol mix** | **Water** |
| Media temperature at min. 5 °C | - | • |
| Power switched on permanently | • | • |
| Continuous operation | - | • |
| Twin-head pumps: cascade operation every 24 hours | • | • |

### Closed valve operation

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

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

### Location

The product is designed for indoor use only.

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

- Position the product in such a way that sufficient cooling is ensured.
- The ambient temperature must not exceed 40 °C.
- The altitude must not exceed 2000 m above sea level.

#### Requirements to the installation site

Always install the product in a dry environment where it will not be exposed to drops or splashes of liquid from surrounding equipment or structures, for example condensed water.

The product is intended for indoor installation only. If you install the product in a location where the environmental conditions may vary, follow all local regulations and requirements and make sure to fulfill these requirements:

- Comply with the operating conditions and enclosure class specified for the product.
- Provide shielding from direct exposure to sunlight, rain, snow and other environmental factors.
- Do not expose the product to UV radiation.
- Keep the drain holes clear of any blockage.
- Collect and remove condensation buildup.

#### Aggressive environments

It is important to avoid direct installation in aggressive environments such as the following:

- indoor swimming pools, where the product is exposed to the ambient environment of the pool
- locations with direct and continuous exposure to a marine atmosphere
- locations where hydrochloric acid (HCl) can form acidic aerosols, for example when acid escapes from open tanks or from frequently opened or vented containers.

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

#### Related information

*Pumped liquids*

### Cooling applications

In cooling applications condensation may occur on the surface of the pump. In certain cases, it is necessary to mount a drip tray.

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

## Pumped liquids

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

The product is not intended for pumping liquids such as diesel oil, petrol, acids and seawater.

Whether a pump is suitable for a particular liquid depends on a number of factors of which the most important are lime content, pH value, temperature and content of solvents and oils. Additives with a density or kinematic viscosity higher than that of water will reduce the hydraulic performance.

**Liquid requirements for heating and cooling systems**

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

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

You can pump water-glycol mixtures with up to 50 %glycol.

**Liquid requirements for pool applications**

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

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

**Liquid requirements for domestic hot-water applications**

In domestic hot-water applications, Grundfos strongly recommends the following:

- stainless-steel pumps to avoid corrosion
- water hardness degree below 14 °dH and liquid temperature below 65 °C to eliminate the risk of lime precipitation.

## Pumping glycol mixtures

The product is designed for pumping water-glycol mixtures with up to 50 % glycol.

Example of a water-ethylene-glycol 50/50 mixture:

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

Depending on the water-glycol mixture and the liquid temperature, the density and kinematic viscosity of the mixture will affect the maximum curve and reduce the hydraulic performance of the pump. The pump is protected against overload by an integrated power-limiting function.

1. Clean and flush the system before you add the water-glycol mixture.
2. Maintain the water-glycol mixture regularly to prevent corrosion or lime precipitation.
3. If further dilution of the supplied glycol is required, follow the glycol supplier's instructions.

## Sound pressure level

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

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

# Electrical data

| Pump type | MAGNA1 (D) |
|---|---|
| **Enclosure class** | IPX4D (EN 60529) |
| **Insulation class** | F |
| **Supply voltage** | 1 × 230 V ± 10 %, 50/60 Hz, PE |
| **Digital input** | External potential-free contact.<br>Contact load: 5 V, 10 mA.<br>Screened cable.<br>Loop resistance: Maximum 130 Ω. |
| **Relay output** | Internal potential-free changeover contact.<br>Maximum load: 250 V, 2 A, AC1.<br>Minimum load: 5 VCD, 20 mA.<br>Screened cable, depending on signal level. |
| **Leakage current** | $I_{leakage}$ < 3.5 mA.<br>The leakage current is measured in accordance with EN 60335-1. |
| **EMC** | EN 55014-1:2006 + A1:2009 + A2:2011,<br>EN 55014-1:2017, EN 61000-6-2:2005,<br>EN 61000-3-2:2014, EN 61000-3-3:2013 |

# 5. Control and communication

| | Models A and B | Model C | Section |
|---|---|---|---|
| **Control modes** | | | |
| Proportional pressure | • | • | Control modes |
| Constant pressure | • | • | |
| Constant curve | • | • | |
| **Twin-head pump function** | | | |
| Alternating operation | | • | *Twin-head pump function* |
| **External control and monitoring** | | | |
| Digital input | | • | *External control and monitoring* |
| Relay output | | • | |
| **Communication** | | | |
| Grundfos GO Remote | | • | *Grundfos GO Remote* |

**Related information**

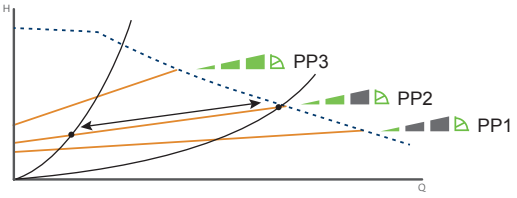
*Twin-head pump function*
*External control and monitoring*
*Grundfos GO Remote*

## Control modes

### Proportional-pressure curve (PP1, PP2 or PP3)

Proportional-pressure control adjusts the pump performance to the actual flow demand in the system, but the pump performance follows the selected performance curve, PP1, PP2 or PP3. See fig. *Three proportional-pressure curves or settings* where PP2 has been selected.

For further information, see section Control modes.



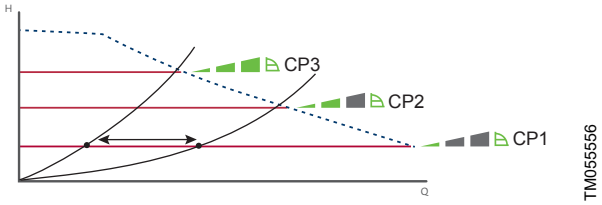

*Three proportional-pressure curves or settings*

The selection of the right proportional-pressure setting depends on the characteristics of the system in question and the actual flow demand.

### Constant-pressure curve (CP1, CP2 or CP3)

Constant-pressure control adjusts the pump performance to the actual flow demand in the system, but the pump performance follows the selected performance curve, CP1, CP2 or CP3. See fig. *Three constant-pressure curves or settings* where CP1 has been selected.

For further information, see section Control modes.



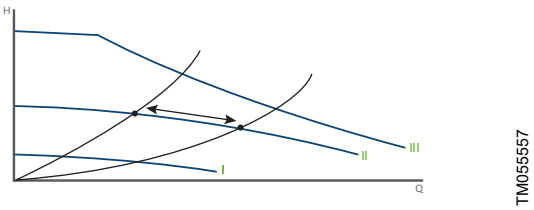

*Three constant-pressure curves or settings*

The selection of the right constant-pressure setting depends on the characteristics of the system in question and the actual flow demand.

### Constant curve or constant speed (I, II or III)

In constant-curve or constant-speed operation, the pump runs at a constant speed, independent of the actual flow demand in the system. The pump performance follows the selected performance curve, I, II or III. See fig. *Three constant-curve or constant-speed settings* where II has been selected.

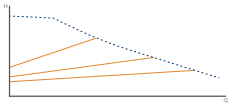
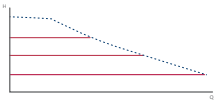
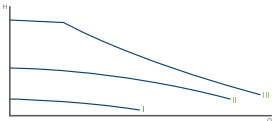
For further information, see section Control modes.




*Three constant-curve or constant-speed settings*

The selection of the right constant-curve or constant-speed setting depends on the characteristics of the system in question.

## Selecting control mode

| System application | Select this control mode |
|---|---|
| In systems with relatively large pressure losses in the distribution pipes and in air-conditioning and cooling systems.<br>• Two-pipe heating systems with thermostatic valves and><br>- very long distribution pipes<br>- strongly throttled balancing valves<br>- differential-pressure regulators<br>- large pressure losses in those parts of the system through which the total quantity of water flows, for example a boiler, a heat exchanger and a distribution pipe up to the first branching.<br>• Primary circuit pumps in systems with large pressure losses in the primary circuit.<br>• Air-conditioning systems with<br>- heat exchangers (fan coils)<br>- cooling ceilings<br>- cooling surfaces. | Proportional pressure<br><br>PROPORTIONAL_CURVE2 |
| In systems with relatively small pressure losses in the distribution pipes.<br>• Two-pipe heating systems with thermostatic valves and><br>- dimensioned for natural circulation<br>- small pressure losses in those parts of the system through which the total quantity of water flows, for example a boiler, a heat exchanger and a distribution pipe up to the first branching or<br>- modified to a high differential temperature between the flow pipe and return pipe, for example district heating.<br>• Underfloor heating systems with thermostatic valves.<br>• One-pipe heating systems with thermostatic valves or pipe balancing valves.<br>• Primary circuit pumps in systems with small pressure losses in the primary circuit. | Constant pressure<br><br>CONSTANT_CURVE2 |
| For operation according to the maximum or minimum curve, like an uncontrolled pump:<br>• Use the maximum curve mode in periods in which a maximum flow rate is required. This operating mode is for instance suitable for hot-water priority in domestic hot-water systems.<br>• Use the minimum curve mode in periods in which a minimum flow rate is required. | Constant curve<br><br>CONSTANT_CURVE3 |

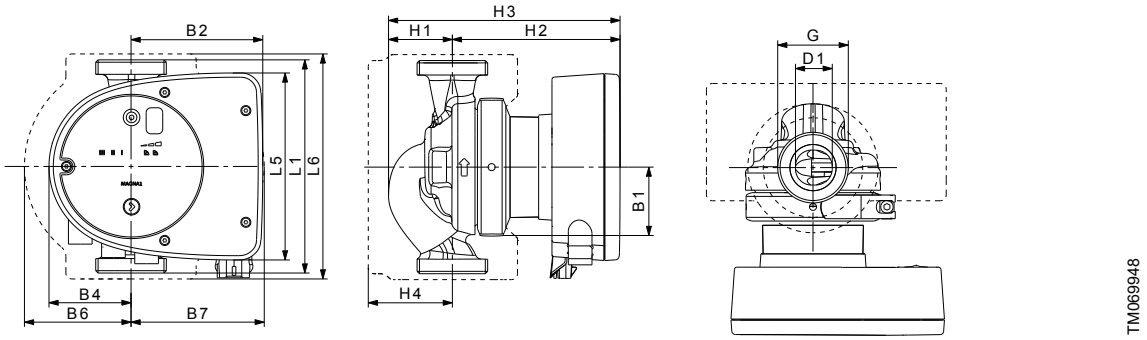
## Twin-head pump function

The twin-head pump function allows you to control twin-head pumps without the use of an external controller. The pumps operate in alternating mode, meaning that only one pump runs at a time. The two pumps communicate with each other via wireless connection and change from one pump to the other every 24 hours or if one the pumps experiences an alarm.

| Speed | P1 [W] | $I_{1/1}$ [A] |
|---|---|---|
| **Min.** | 9 | 0.09 |
| **Max.** | 56 | 0.45 |
| The pump incorporates overload protection. | | |

| Net weight [kg] | Gross weight [kg] | Ship. vol. [$m^3$] |
|---|---|---|
| 4.4 | 5.4 | 0.012 |

| | |
|---|---|
| Connections: | See section *8.6 Pipe connections*. |
| System pressure: | Max. 1.0 MPa (10 bar) |
| Liquid temperature: | -10 to 110 °C (TF 110) |
| Also available with: | Stainless-steel pump housing, type N |
| Specific EEI: | 0.20 |




TM069948

| Pump type | Dimensions [mm] | | | | | | | | | | | | | [inch] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L1 | L5 | L6 | B1 | B2 | B4 | B6 | B7 | H1 | H2 | H3 | H4 | D1 | G |
| MAGNA1 25-40 (N) | 180 | 158 | 190 | 58 | 111 | 69 | 90 | 113 | 54 | 142 | 196 | 71 | 25 | 1 1/2 |

For product numbers, see section Product numbers.

# 9. Product numbers

## Single-head pumps

| Pump type | Port-to-port length [mm] | Threaded pipe connection | | | Section |
|---|---|---|---|---|---|
| | | Cast iron | | Stainless steel | |
| | | PN 10 | PN 16 | PN 10 | |
| MAGNA1 25-40 (N) | 180 | 99221216 | 99224453 | 99221223 | . MAGNA1 25-40 (N) PN 10 |
| MAGNA1 25-60 (N) | 180 | 99221217 | | 99221224 | . MAGNA1 25-60 (N) PN 10 |
| MAGNA1 25-80 (N) | 180 | 99221213 | | 99221225 | . MAGNA1 25-80 (N) PN 10 |
| MAGNA1 25-100 (N) | 180 | 99221214 | | 99221226 | . MAGNA1 25-100 (N) PN 10 |
| MAGNA1 25-120 (N) | 180 | 99221215 | | 99221227 | . MAGNA1 25-120 (N) PN 10 |
| MAGNA1 32-40 (N) | 180 | 99221233 | | 99221253 | . MAGNA1 32-40 (N) PN 10 |
| MAGNA1 32-60 (N) | 180 | 99221234 | | 99221254 | . MAGNA1 32-60 (N) PN 10 |
| MAGNA1 32-80 (N) | 180 | 99221235 | | 99221255 | . MAGNA1 32-80 (N) PN 10 |
| MAGNA1 32-100 (N) | 180 | 99221236 | | 99221256 | . MAGNA1 32-100 (N) PN 10 |
| MAGNA1 32-120 (N) | 180 | 99221281 | | 99221283 | . MAGNA1 32-120 (N) PN 10 |

| Pump type | Port-to-port length [mm] | Flange connection | | | | | Section |
|---|---|---|---|---|---|---|---|
| | | Cast iron | | | | Stainless steel | |
| | | PN 6 | PN 10 | PN 16 | PN 6/10 | PN 6/10 | |
| MAGNA1 32-40 F (N) | 220 | | | | 99221263 | 99221265 | . MAGNA1 32-40 F (N) PN 10 |
| MAGNA1 32-60 F (N) | 220 | | | | 99221269 | 99221271 | . MAGNA1 32-60 F (N) PN 10 |
| MAGNA1 32-80 F (N) | 220 | | | | 99221275 | 99221277 | . MAGNA1 32-80 F (N) PN 10 |
| MAGNA1 32-100 F (N) | 220 | | | | 99221237 | 99221257 | . MAGNA1 32-100 F (N) PN 10 |
| MAGNA1 32-120 F (N) | 220 | | | | 99221285 | 99221289 | . MAGNA1 32-120 F (N) PN 10 |
| MAGNA1 40-40 F (N) | 220 | | | | 99221291 | 99221299 | . MAGNA1 40-40 F (N) 1 |
| MAGNA1 40-60 F (N) | 220 | | | | 99221292 | 99221300 | . MAGNA1 40-60 F (N) |
| MAGNA1 40-80 F (N) | 220 | | | | 99221303 | 99221323 | . MAGNA1 40-80 F (N) PN 10 |
| MAGNA1 40-100 F (N) | 220 | | | | 99221304 | 99221324 | . MAGNA1 40-100 F (N) PN 10 |
| MAGNA1 40-120 F (N) | 250 | | | | 99221305 | 99221325 | . MAGNA1 40-120 F (N) PN 10 |
| MAGNA1 40-150 F (N) | 250 | | | | 99221306 | 99221326 | . MAGNA1 40-150 F (N) PN 10 |
| MAGNA1 40-180 F (N) | 250 | | | | 99221307 | 99221327 | . MAGNA1 40-180 F (N) PN 10 |
| MAGNA1 50-60 F (N) | 240 | | | | 99221333 | 99221358 | . MAGNA1 D 50-40 F PN 10 |
| MAGNA1 50-80 F (N) | 240 | | | | 99221334 | 99221359 | . MAGNA1 50-80 F (N) PN 10 |
| MAGNA1 50-100 F (N) | 280 | | | | 99221335 | 99221360 | . MAGNA1 50-100 F (N) PN 10 |
| MAGNA1 50-120 F (N) | 280 | | | | 99221336 | 99221361 | . MAGNA1 50-120 F (N) PN 10 |
| MAGNA1 50-150 F (N) | 280 | | | | 99221337 | 99221362 | . MAGNA1 50-150 F (N) PN 10 |
| MAGNA1 50-180 F (N) | 280 | | | | 99221338 | 99221363 | . MAGNA1 50-180 F (N) PN 10 |
| MAGNA1 65-40 F (N) | 340 | | | | 99221382 | 99221394 | . MAGNA1 65-40 F (N) PN 10 |
| MAGNA1 65-60 F (N) | 340 | | | | 99221371 | 99221395 | . MAGNA1 65-60 F (N) PN 10 |
| MAGNA1 65-80 F (N) | 340 | | | | 99221372 | 99221396 | . MAGNA1 65-80 F (N) PN 10 |
| MAGNA1 65-100 F (N) | 340 | | | | 99221373 | 99221397 | . MAGNA1 65-100 F (N) PN 10 |
| MAGNA1 65-120 F (N) | 340 | | | | 99221374 | 99221398 | . MAGNA1 65-120 F (N) PN 10 |
| MAGNA1 65-150 F (N) | 340 | | | | 99221375 | 99221399 | . MAGNA1 65-150 F (N) PN 10 |
| MAGNA1 80-60 F | 360 | 99221406 | 99221410 | | | | . MAGNA1 80-60 F PN 10 |
| MAGNA1 80-80 F | 360 | 99221407 | 99221411 | | | | . MAGNA1 80-80 F PN 10 |
| MAGNA1 80-100 F | 360 | 99221408 | 99221412 | | | | . MAGNA1 80-100 F PN 10 |
| MAGNA1 80-120 F | 360 | 99221409 | 99221413 | | | | . MAGNA1 80-120 F PN 10 |
| MAGNA1 100-40 F | 450 | 99221438 | 99221443 | | | | . MAGNA1 100-40 F PN 10 |
| MAGNA1 100-60 F | 450 | 99221439 | 99221444 | | | | . MAGNA1 100-60 F PN 10 |