Hydro Multi-B

Booster systems with 2 or 3 pumps

60 Hz
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1. Introduction

The Grundfos Hydro Multi-B is a booster system designed to maintain a constant pressure, regardless of flow fluctuations.

The system can be installed in buildings where the water supply does not deliver a sufficient pressure or is unstable.

The system is ideal for any clean-water pressure-boosting application where adaptability and user comfort are in focus.

Examples:
- Office buildings
- Apartment buildings
- Hotels
- Shopping centers
- Hospitals
- Schools.

As standard, Hydro Multi-B booster systems consist of two or three CM(E) pumps coupled in parallel and mounted on a common base frame with all the necessary fittings and a control panel.

The pumps are controlled in automatic cascade via the control panel. The CU 323 controller controls the speed of the CM(E) pumps and starts and stops the required number of CM(E) pumps in order to adapt perfectly to the water demand of the application.

Benefits

Pressure boosting made simple
The Hydro Multi-B is developed with focus on user-friendliness and ease of operation.

The pumps are controlled via the CU 323 controller which features a simple interface that makes it easy to control and monitor the system.

When the system has been set up, the controller takes care of the daily operation.

![CU 323 controller](image)

Fig. 1 CU 323 controller

Compact and designed to last
The components and design of the Hydro Multi-B have been chosen with focus on robustness and compactness. The booster system offers the user all the benefits of a complete solution with a single supplier who takes the responsibility for the complete system.

Ready, Set, Pump
Grundfos does not compromise when it comes to quality. Therefore, every system is thoroughly tested before it leaves the factory. The system is completely assembled, tested and after commissioning, is ready to pump as soon as it is connected to the water and power supplies.
2. Product data

Performance range, 60 Hz

Note: The performance range is based on the standard range of the CME pumps.
# Product range

## Control variant

### Hydraulic data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum head ft [m]</td>
<td>231 [70]</td>
</tr>
<tr>
<td>Flow rate gpm [m³/h]</td>
<td>0 to 330 [0 to 75]</td>
</tr>
<tr>
<td>Liquid temperature °F [°C]</td>
<td>0 to 140 [0 to +60]</td>
</tr>
<tr>
<td>Maximum operating pressure psi [bar]</td>
<td>145 [10]</td>
</tr>
</tbody>
</table>

### Pump and motor data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pumps</td>
<td>2 or 3</td>
</tr>
<tr>
<td>Motor power hp</td>
<td>1.5 to 7.5</td>
</tr>
</tbody>
</table>

### Shaft seal

- AQQE (SiC/SiC/EPDM)

### Materials

- CM(E) 3 to CM(E) 15: A-version CI/304 SS
- Manifold: Stainless steel

### Pipework connection

- NPT: 1.5" to 2.5"
- ANSI flange: 3" and 4"

### Approvals

- UL Listed - Packaged pumping systems: Category QCZJ
- NSF 61 - NSF 372: Drinking water system component approved

### Functions

- Constant-pressure control
- Pump cascade control
- Automatic pump changeover
- Stop function
- Integrated frequency converter
- Water shortage protection
- CIM (Communication Interface Module)
- Redundant primary sensor
- Standby pumps

- Available as standard.
- ☀ can be configured with PC Tools / available as accessory.
Type key

<table>
<thead>
<tr>
<th>Code</th>
<th>Example</th>
<th>Hydro Multi-B</th>
<th>E</th>
<th>2 CME 10-3 A</th>
<th>3 x 460 V, 60 Hz</th>
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<tbody>
<tr>
<td></td>
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</table>

- **Type range**
- **System variants**
  - Two or three pumps with integrated frequency converter
- **Number of pumps with integrated frequency converter, pump type and pump material**
  - Cast iron (EN-GJL-200)
- **Supply voltage, frequency**

Operating conditions

**Maximum operating pressure**
As standard, the maximum operating pressure is 145 psi (10 bar).

**Temperatures**
Liquid temperature: 0 °F to 140 °F (0 °C to +60 °C).
Ambient temperature: 0 °F to 104 °F (0 °C to +40 °C).

**Relative air humidity**
Maximum 95 %.
3. Construction

Pump
The Grundfos CME pumps are non-self-priming, horizontal, multistage, end-suction centrifugal pumps. The pumps are of the close-coupled type.
CME pumps have an integrated frequency converter.
CME pumps have mechanical shaft seals.

Manifold
A 316 stainless-steel manifold is fitted on the suction and discharge side of the pumps.
An isolating valve and a non-return valve are fitted between the discharge manifold and the individual pumps.
The suction manifold is secured to the base frame by special supports that keep the manifold in the right position and ensure that no stress is transferred to the pumps.

Control panel and CU 323
The control panel contains all the necessary electrical components to control the pumps. The CU 323 is located in the front panel.
The CU 323 is the controller for the Hydro Multi-B and features two digital displays, two system indicator lights and three additional indicator lights per pump in the system. Furthermore, it has indicator lights for water shortage and sensor fault. The CU 323 has four buttons plus one button per pump in the system.
The controller enables manual setting and change of parameters such as setpoint, start/stop of system or individual pumps, resetting of alarms and monitoring of system performance.
The CU 323 comes with software for constant pressure boosting as standard.

Base frame
The Hydro Multi-B booster system has a common base frame. The pumps are secured to the base frame by bolts. The control panel is secured to the base frame by means of a stand.

### Integrated VFD/motor (MLE)

The MLE motor (E-motor) fitted to the CME pumps used in the Hydro Multi-B systems incorporate an integrated variable frequency drive. The E-motor up to and including 2 hp in 1 x 230 V power and up to and including 3 hp in 3 x 460 V power are permanent magnet motors. These motors have a total efficiency (VFD and motor) which exceeds NEMA premium efficiency levels of motors alone.
System components

Fig. 3  Front view of Hydro Multi-B booster system

Fig. 4  Rear view of Hydro Multi-B booster system

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control cabinet</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Suction manifold (316 SS)</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Discharge manifold (316 SS)</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Isolating valve (Nickel Plated Brass)</td>
<td>2 per pump</td>
</tr>
<tr>
<td>5</td>
<td>Non-return valve (Polyacetal (POM))</td>
<td>1 per pump</td>
</tr>
<tr>
<td>6</td>
<td>Pump (CME A-version Cl/304 SS)</td>
<td>2-3</td>
</tr>
<tr>
<td>7</td>
<td>Base frame (304 SS)</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Pressure transmitter and pressure gauge</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Inlet pressure switch and pressure gauge</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Oval flange connection (CME 3 - CME 10)</td>
<td>2 per pump</td>
</tr>
<tr>
<td></td>
<td>Intermediate adapter connection (CME 15)</td>
<td>1 per pump</td>
</tr>
<tr>
<td>11</td>
<td>Screw cap or blanking flange</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>Optional diaphragm tank (available as accessory)</td>
<td></td>
</tr>
</tbody>
</table>
4. Functions

Control variants

Control variant E

Two or three speed-controlled CME pumps

One CME pump in operation.

Three CME pumps in operation.

Overview of functions

<table>
<thead>
<tr>
<th>Control variants</th>
<th>Constant-pressure boosting</th>
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</thead>
<tbody>
<tr>
<td>Functions via the CU 323 control panel</td>
<td></td>
</tr>
<tr>
<td>Pump cascade control</td>
<td>●</td>
</tr>
<tr>
<td>Automatic pump changeover</td>
<td>●</td>
</tr>
<tr>
<td>Standby pumps</td>
<td>○</td>
</tr>
<tr>
<td>Redundant primary sensor</td>
<td>○</td>
</tr>
<tr>
<td>Digital input for external start/stop relay</td>
<td>●</td>
</tr>
<tr>
<td>Water shortage protection</td>
<td>●</td>
</tr>
<tr>
<td>Alarm and operation outputs</td>
<td>●</td>
</tr>
<tr>
<td>Motor protection</td>
<td>●</td>
</tr>
<tr>
<td>Maximum pressure protection</td>
<td>●</td>
</tr>
<tr>
<td>Protection in case of sensor fault</td>
<td>●</td>
</tr>
<tr>
<td>Button lock function</td>
<td>●</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
</tr>
<tr>
<td>CIM module (CIM = Communication Interface Module)</td>
<td>○</td>
</tr>
<tr>
<td>External GENIBus connection (option)</td>
<td>○</td>
</tr>
</tbody>
</table>

• Standard.
○ Requires PC Tools/service engineer to configure.

Description of selected functions

Pump cascade control

The Hydro Multi-B automatically ensures that the required number of pumps are running so that the system demand is met in the most efficient way. Furthermore, the speed-controlled pumps in the system are ramped up and down according to the demand, thus offering perfect constant-pressure control.

• Control variant E for constant-pressure applications maintains a constant pressure through continuous adjustment of the speed of the pumps.
• The system performance is adjusted to the demand by cutting the required number of pumps in and out and through parallel speed control of the pumps in operation.
• Changeover among the pumps is automatic and depends on load, time and fault.
Water shortage protection
The inlet pressure of the booster system or the level in a tank, if any, on the inlet side is monitored. If the inlet pressure or the water level is too low, all pumps will be stopped.
The pressure or level can be monitored by one of the following:
• float switch
• analog sensor
• external electrode relay
• pressure transmitter
• pressure switch. (standard).
Furthermore, the system can be set to be reset and restarted manually or automatically after a water shortage situation.

Stop function and low-flow mode
The stop function makes it possible to stop the last pump in operation if there is no or a very small consumption. This function also prevents heating of the pumped liquid.
The operation of Hydro Multi-B is continuously monitored to detect a low flow rate. If the CU 323 detects no or a low flow rate \( Q < Q_{\text{min}} \), it will change from normal constant-pressure operation to on/off control of the last pump in operation. As long as the flow rate is lower than \( Q_{\text{min}} \), the pump will run in on/off operation. If the flow rate is increased to more than \( Q_{\text{min}} \), the system will return to normal constant-pressure operation.

Automatic pump changeover
The CU 323 automatically ensures an equal number of operating hours of the pumps by always cutting in the pump with the lowest number of operating hours. This function also ensures that, if a running pump fails, the next available pump will be started.

Standby pumps (requires PC Tools to configure)
This function makes it possible to limit the maximum performance of the Hydro Multi-B by selecting one or more pumps as standby pumps.
If a three-pump system has one standby pump, maximum two pumps are allowed to operate at a time.
If one of the two pumps in operation has a fault and is stopped, the standby pump will be started. The performance of the booster system is thus not reduced.
The status as standby pump alternates between all pumps.
This function is optional and available on request.
**Note:** This function must be configured by a Grundfos service engineer.

Protection functions
• Maximum number of starts and stops per hour
• minimum time between start and stop
• water shortage protection
• protection in case of sensor fault
• maximum-pressure alarms
• motor protection.

Communication options
The Hydro Multi-B can be fitted with a communication module that enables it to communicate with a SCADA system or a mobile phone. The communication interface module (CIM) card is available as an accessory and can be installed in the CU 323 controller.
5. Installation

Mechanical installation

Location
The Hydro Multi-B must be installed in a well ventilated room to ensure sufficient cooling of the pumps and the control panel.

Note: The booster system is not designed for outdoor installation and must not be exposed to direct sunlight. The booster system should have a 3 ft. clearance on all sides for inspection and removal.

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

Note: The pipework connected to the booster system must be of adequate size.

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

It is advisable to install pipe supports for the suction and discharge pipes. See fig. 6.

If booster systems are installed where the first consumer on the line is close to the booster system, it is advisable to fit expansion joints on the suction and discharge pipes to prevent vibration being transmitted through the pipework.

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Expansion joint (recommended accessory)</td>
</tr>
<tr>
<td>2</td>
<td>Pipe support (good location for system isolation valves)</td>
</tr>
<tr>
<td>3</td>
<td>Mounting bolts</td>
</tr>
</tbody>
</table>

Note: Expansion joints, pipe supports and mounting bolts shown in fig. 6 above are not supplied with a standard booster system.

The pipes must be fastened to parts of the building to ensure that they cannot move or be twisted.

Foundation
The booster system should be positioned on an even and solid surface, such as a concrete floor or foundation. The booster system must be bolted to the floor or foundation.

Note: As a rule of thumb, the weight of a concrete foundation should be 1.5 x the weight of the booster system.
Expansion joints

Expansion joints provide these advantages:
- absorption of thermal expansion and contraction of pipework caused by variations in liquid temperature.
- reduction of mechanical influences in connection with pressure surges in the pipework.
- isolation of structure-borne noise in the pipework (only rubber bellows expansion joints).

Note: Expansion joints must not be installed to compensate for inaccuracies in the pipework, such as center displacement of flanges.

Fit expansion joints at a distance of minimum 1 to 1.5 times the nominal flange diameter from the manifold on the suction as well as on the discharge side. This prevents the development of turbulence in the expansion joints, resulting in better suction conditions and a minimum pressure loss on the discharge side.

Electrical installation

The electrical installation must be carried out by an authorized person in accordance with local regulations and the relevant wiring diagram.
- The electrical installation of the booster system must be carried out in accordance with enclosure class UL type 3R.
- Make sure that the booster system is suitable for the power supply to which it is to be connected. Contact Grundfos if you have special voltage requirements.
- Make sure that the wire cross-section corresponds to the specifications in the wiring diagram.

Expansion joints with limiting rods can be used to minimize the forces caused by the expansion joints. Expansion joints with limiting rods are always recommended for flanges larger than 4".

The pipes should be anchored so that they do not stress the expansion joints, manifolds and the pump. Follow the supplier’s instructions and pass them on to advisers or pipe installers.
6. Sizing

When sizing a booster system, the following must be taken into account:

- The performance of the booster system must meet the highest possible demand, both in terms of flow rate and pressure.
- The booster system must not be oversized. This is important in relation to installation and operating costs.

You can size Grundfos Hydro Multi-B booster systems via the Grundfos Product Center or this data booklet.

**Sizing in Grundfos Product Center**

We recommend that you size your Hydro Multi-B booster system in the Grundfos Product Center, which is a selection program offered by Grundfos. For further information, see page 25.

The Grundfos Product Center features a user-friendly and easy-to-use virtual guide which leads you through the selection of the optimum booster system for the application in question.

**Selection of diaphragm tank**

It is recommended Hydro Multi-B booster sets are equipped with a diaphragm tank due to the stop function. Hydro Multi-B systems with the following pump types on system have the corresponding recommended diaphragm tank size:

<table>
<thead>
<tr>
<th>Pump Type</th>
<th>Tank size [gal.]</th>
</tr>
</thead>
<tbody>
<tr>
<td>CME 3</td>
<td>4.4</td>
</tr>
<tr>
<td>CME 5</td>
<td>4.4</td>
</tr>
<tr>
<td>CME 10</td>
<td>10.3</td>
</tr>
<tr>
<td>CME 15</td>
<td>10.3</td>
</tr>
</tbody>
</table>

**Fig. 8 Sizing in Grundfos Product Center**

**Sizing via this data booklet**

There are seven steps:

1. maximum flow requirement
2. required discharge pressure
3. system layout
4. consumption profile and load profile
5. inlet pressure
6. selection of booster system
7. accessories.
Required discharge pressure

The required discharge pressure, $p_{\text{set}}$, of the Hydro Multi-B can be calculated from the following formula:

$$p_{\text{set}} = p_{\text{tap(min)}} + \left(\frac{p_f}{2.31}\right) + \left(\frac{h_{\text{max}}}{2.31}\right)$$

$$p_{\text{boost}} = p_{\text{set}} - p_{\text{in(min)}}$$

**Key**

- $p_{\text{set}}$ = Required discharge pressure [psi].
- $p_{\text{tap(min)}}$ = Required minimum pressure at the highest tapping point [psi].
- $p_f$ = Total pipe friction loss [ft].
- $h_{\text{max}}$ = Height from booster discharge port to highest tapping point [ft].
- $p_{\text{in(min)}}$ = Minimum inlet pressure [psi].
- $p_{\text{boost}}$ = Required boost [psi].

![Fig. 9 Calculation of required discharge pressure](image)

**System layout**

Not relevant for Hydro Multi-B.

**Consumption profile and load profile**

Not relevant for Hydro Multi-B.

**Inlet pressure**

The inlet pressure must be taken into consideration to ensure safe operation.

The values for inlet pressure and operating pressure should not be considered individually, but should always be compared.

**Selection of booster system**

Select the booster system on the basis of these factors: maximum flow requirement, required discharge pressure, load profile, number of pumps required, possible standby pumps, etc.

**Accessories**

When the optimum Hydro Multi-B booster system has been selected, consider whether accessories are required.

**Water shortage protection**

Any booster system must be protected against water shortage.

The inlet conditions determine the type of water shortage protection to be used:

- If the system draws water from a tank or well, select a float switch, analog sensor or external electrode relay.
- If the system has an inlet pressure, select a pressure transmitter or a pressure switch.

**Calculation**

- $p_{\text{tap(min)}} = 45$ psi
- $p_f = 25$ ft.
- $h_{\text{max}} = 50$ ft.
- $p_{\text{in(min)}} = 30$ psi
- $p_{\text{set}} = 45 + \left(\frac{25}{2.31}\right) + \left(\frac{50}{2.31}\right) = 77.5$ psi
- $p_{\text{boost}} = 77.5 - 30 = 47.5$ psi
Understanding the curve charts

The x-axis showing the flow rate (Q) in gpm [m³/h] is common to all the curves; the y-axis showing the head (H) in ft. [meters] has been adapted to the individual pump type.

**Fig. 10** Understanding the curve charts
How to select a system, example

- A flow rate of 312 gpm [70.9 m³/h] is required.
- A head of 175 ft [53.34 meters] is required.

Draw a vertical line from the specified flow rate.
Draw a horizontal line from the head required.
The intersection of the two lines gives the number of pumps required for the system, i.e. three CME 15-3 pumps.
The pump type best meeting this specification is found by means of the y-axis, for instance three CME 15-3 pumps.

Only booster systems with performance ranges within the hatched area in the example should be selected.

Fig. 11 Example of selection of system
7. Curve conditions

How to read the curve charts

The guidelines below apply to the curves shown on the following pages:
• Tolerances to ISO 9906, Annex A, if indicated.
• Measurements have been made with airless water at a temperature of 68 °F [+20 °C].
• The curves apply to the following kinematic viscosity: $\nu = 1 \text{ mm}^2/\text{s} (1 \text{ cSt})$.
• The QH curves apply to fixed speed $3480 \text{ min}^{-1}$ (60 Hz).

Note: Please refer to Grundfos Product Center for pump curves which include the characteristic of the selected motor. In Grundfos Product Center, it is also possible to adjust the curves, depending on the density and viscosity.
8. Performance curves

Hydro Multi-B E with CME 3

Hydro Multi-B CME 3-3 /E 60 Hz
ISO 9906:1999 Annex A

CME 3-5 /E

Q [US GPM] H [m] H [ft]
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 110 120 130

Q [m³/h] H [m] H [ft]
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

1 2 3

Performance curves

Hydro Multi-B
Hydro Multi-B E with CME 10

![Graph of Hydro Multi-B E with CME 10 performance curves.](image)
Hydro Multi-B E with CME 15

Hydro Multi-B
CME 15-1
/E
60 Hz
ISO 9906:1999 Annex A

CME 15-2
/E

CME 15-3
/E

Q [US GPM]

Q [m³/h]
9. Technical data

Dimensional sketches

Fig. 12 Hydro Multi-B booster system with three CM(E) pumps

Fig. 13 Hydro Multi-B booster system with two CM(E) pumps
### Hydro Multi-B/E with CME 3

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>2</td>
<td>CME 3-3</td>
<td>1.5</td>
<td>U1</td>
<td>13.1</td>
<td>2” NPT</td>
<td>27.6</td>
<td>25.6</td>
<td>9.5</td>
<td>7.6</td>
<td>18.4</td>
<td>22.8</td>
<td>4.4</td>
<td>193</td>
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<td>CME 3-3</td>
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<td>43.3</td>
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### Hydro Multi-B/E with CME 5

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</thead>
<tbody>
<tr>
<td>2</td>
<td>CME 5-3</td>
<td>1.5</td>
<td>U1</td>
<td>13.1</td>
<td>2” NPT</td>
<td>27.6</td>
<td>26.1</td>
<td>9.5</td>
<td>7.8</td>
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*E system with two or three CME pumps.
Supply voltage U1: 1 x 208-230 V - 10 %/+ 10 %, N, PE.
Supply voltage U2: 3 x 208-230 V - 5 %/+ 5 %, N, PE.
Supply voltage U3: 3 x 460 V - 5 %/+ 5 %, N, PE.
Dimensions may vary by ± 1 in.
10. Accessories

CIM communication module

The CU 323 can be connected to an external communication network via an add-on fieldbus CIM module.

<table>
<thead>
<tr>
<th>Module</th>
<th>Fieldbus protocol</th>
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For further information about communication via CIM modules, data transfer and fieldbus protocols, see the CIM documentation available on www.grundfos.com (Grundfos Product Center).

Additional documentation

The publication numbers below refer to the printed documentation for Hydro Multi-B (group versions).

<table>
<thead>
<tr>
<th>Document</th>
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<tbody>
<tr>
<td>Installation and operating instructions</td>
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<tr>
<td>Quick guide</td>
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In addition to the printed documentation, Grundfos offers product information at the Grundfos Product Center.
11. Grundfos Product Center

Online search and sizing tool to help you make the right choice.

http://product-selection.grundfos.com

*SIZING* enables you to size a pump based on entered data and selection choices.

*REPLACEMENT* enables you to find a replacement product. Search results will include information on:
- the lowest purchase price
- the lowest energy consumption
- the lowest total life cycle cost.

“CATALOG” gives you access to the Grundfos product catalog.

“LIQUIDS” enables you to find pumps designed for aggressive, flammable or other special liquids.

All the information you need in one place
Performance curves, technical specifications, pictures, dimensional drawings, motor curves, wiring diagrams, spare parts, service kits, 3D drawings, documents, system parts. The Product Center displays any recent and saved items — including complete projects — right on the main page.

Downloads
On the product pages, you can download Installation and Operating Instructions, Data Booklets, Service Instructions, etc. in PDF format.

Subject to alterations.
Grundfos GO

Mobile solution for professionals on the GO!

Grundfos GO is the mobile tool box for professional users on the go. It is the most comprehensive platform for mobile pump control and pump selection including sizing, replacement and documentation. It offers intuitive, handheld assistance and access to Grundfos online tools, and it saves valuable time for reporting and data collection.