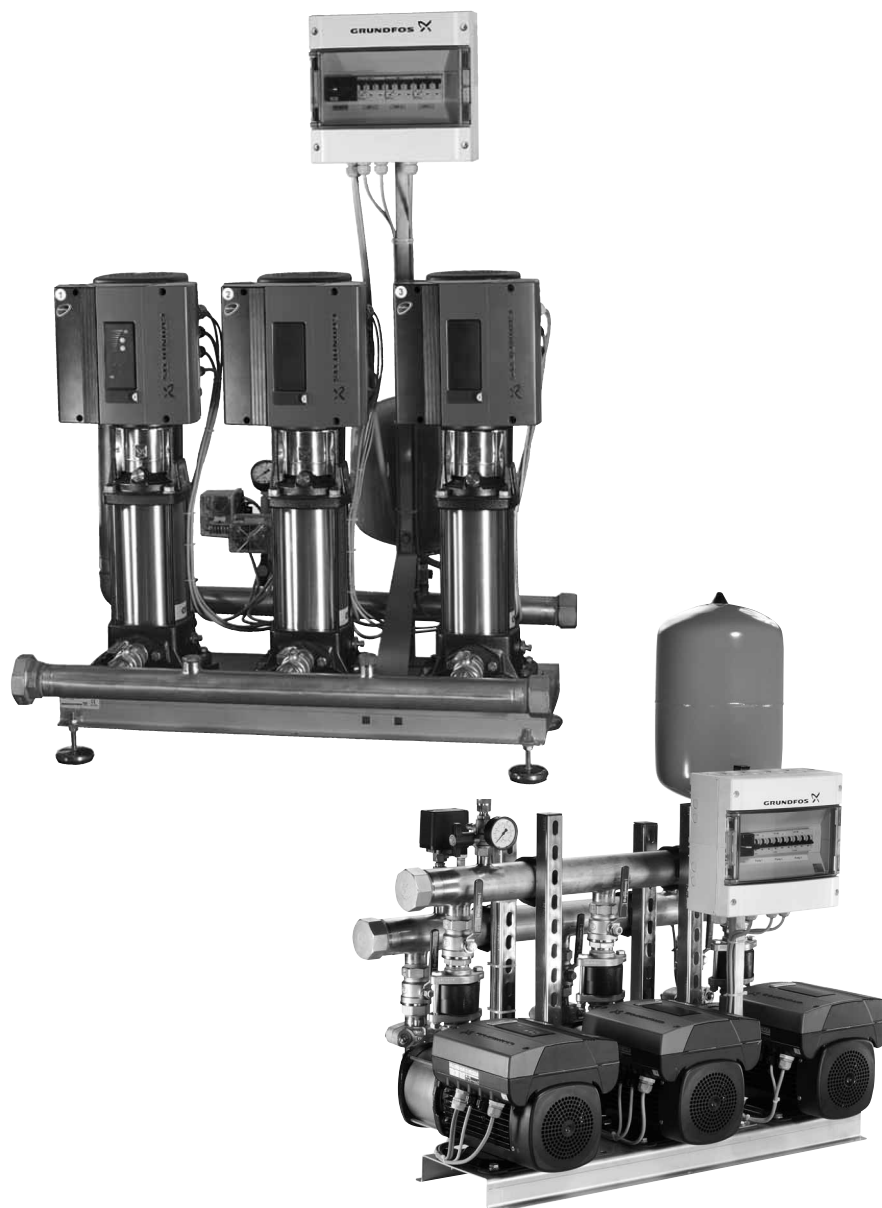


Hydro Multi-E

Installation and operating instructions



Original installation and operating instructions.

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Warning

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

1. Symbols used in this document

Warning

If these safety instructions are not observed, it may result in personal injury.



Warning

If these instructions are not observed, it may lead to electric shock with consequent risk of serious personal injury or death.



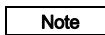
Warning

The surface of the product may be so hot that it may cause burns or personal injury.



Caution

If these safety instructions are not observed, it may result in malfunction or damage to the equipment.



Note

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

2. Scope of these instructions

These installation and operating instructions apply to Grundfos Hydro Multi-E booster systems.

Hydro Multi-E is a range of factory-assembled booster systems, ready for installation and operation.

3. Product description

3.1 General description

Grundfos Hydro Multi-E booster systems are designed for the pressure boosting of clean water in blocks of flats, hotels, hospitals, schools, etc.

The Hydro Multi-E incorporates Grundfos CRE, CRIE, CME-A or CME-I pumps fitted with frequency-controlled single- or three-phase MGE motors and a breaker cabinet.

The Hydro Multi-E maintains a constant pressure through continuously variable adjustment of the speed of the pumps connected.

It adjusts its performance to the demand through cutting in/out the required number of pumps and through parallel control of the pumps in operation.

It performs automatic pump changeover according to the principle "first in, first out" (FIFO).

The Hydro Multi-E has been factory-assembled and tested with the control parameters mentioned in the quick guide supplied with the booster system.

3.2 Functions

The Hydro Multi-E offers the following functions:

- Constant pressure.
- Stop at low flow.
- Cascade control of pumps.
- Manual operation, all pumps stopped or all pumps running at maximum performance.
- Digital input for dry-running protection via level switch or pressure switch.
- Emergency operation, if installed.
- Monitoring functions:
 - dry-running protection (via digital input)
 - motor protection
 - bus communication
 - sensor fault.
- Display and indication functions:
 - green indicator light for operating indications and red indicator light for fault indications
 - potential-free changeover contacts for fault, operating or ready signal
 - yellow light fields indicating the setpoint set.
- Communication via the R100 remote control.
- Connection to bus and building management system via Grundfos CIU units (CIU = Communication Interface Unit).

3.3 Hydro Multi-E

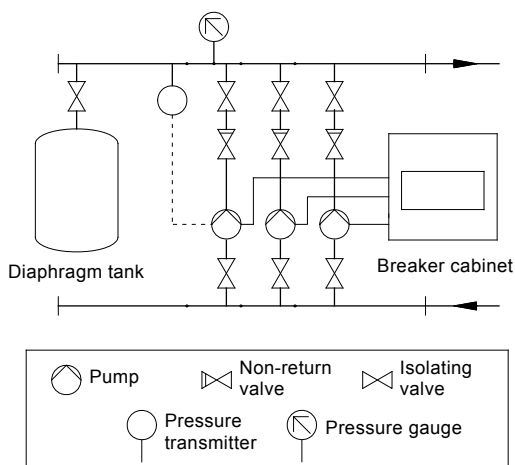


Fig. 1 Hydro Multi-E components

The breaker cabinet incorporates main switch and circuit breakers.

4. Identification

4.1 Nameplate

The nameplate of the booster system is fitted to the base frame.

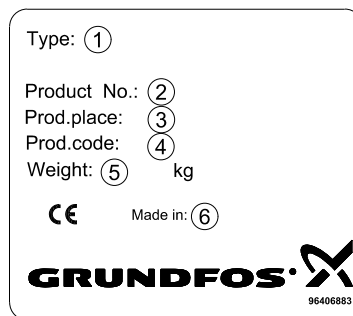


Fig. 2 Nameplate

Pos.	Description
1	Type designation
2	Product number
3	Place of production (Grundfos company)
4	Production code (year and week)
5	Weight [kg]
6	Country of origin

4.2 Type key

Example	Hydro Multi-E	/G	2	CRE 1-7	3 × 400/260 V
Type range					
Subgroup					
Manifold material: : Stainless steel /G: Galvanised steel					
Number of pumps: 2 or 3					
Pump type					
Supply voltage					

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5. Operating conditions

5.1 Temperatures

5.1.1 Ambient temperature

At ambient temperatures ranging from 0 °C to +40 °C, the motors may be loaded 100 %. If the pumps are to be operated at higher ambient temperatures or at altitudes above 1000 meters above sea level, see installation and operating instructions for the pump.

5.1.2 Liquid temperature

0 °C to +60 °C.

5.1.3 Temperature during storage and transportation

-40 °C to +60 °C.

5.2 Relative air humidity

Maximum 95 %.

5.3 Maximum operating pressure

The maximum operating pressure for Hydro Multi-E is 10 bar.

For the following pumps, however, the maximum operating pressure is 16 bar:

- CME-I 5-6
- CME-I 5-8
- CR(I)E 3-15
- CR(I)E 5-16
- CR(I)E 10-9
- CR(I)E 15-7.

5.4 Shaft seal run-in

The seal faces are lubricated by the pumped liquid, meaning that there may be a certain amount of leakage from the shaft seal.

When the pump is started up for the first time, or when a new shaft seal is installed, a certain run-in period is required before the leakage is reduced to an acceptable level. The time required for this depends on the operating conditions, i.e. every time the operating conditions change, a new run-in period will be started.

Under normal conditions, the leaking liquid will evaporate. As a result, no leakage will be detected.

5.5 Minimum inlet pressure

Caution Hydro Multi-E systems with CME pumps require a positive inlet pressure during start-up and operation.

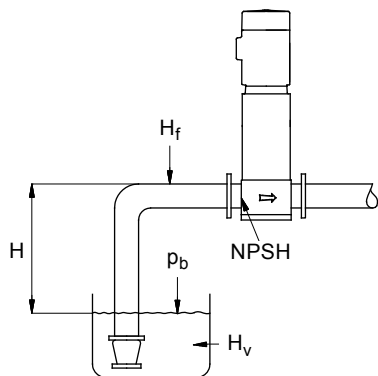


Fig. 3 Parameters for the calculation of minimum inlet pressure

The minimum inlet pressure "H" in metres head required to avoid cavitation in the pumps can be calculated as follows:

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

p_b = Barometric pressure in bar.

(Barometric pressure can be set to 1 bar.)

In closed systems, p_b indicates the system pressure in bar.

NPSH = Net Positive Suction Head in metres head (to be read from the NPSH curve on page 21 at the highest flow the individual pump will be delivering).

H_f = Friction loss in suction manifold in metres head at the highest flow the individual pump will be delivering.

H_v = Vapour pressure in metres head, see page 23.
 t_m = liquid temperature.

H_s = Safety margin = minimum 0.5 metres head.

If the calculated "H" is positive, the individual pump can operate at a suction lift of maximum "H" metres head.

If the calculated "H" is negative, an inlet pressure of minimum "H" metres head is required. There must be a pressure equal to the calculated "H" during operation.

Example

$p_b = 1$ bar.

Pump type: CRE 15, 50 Hz.

Flow rate: 15 m³/h.

NPSH (from page 21): 1.2 metres head.

$H_f = 3.0$ metres head.

Liquid temperature: +60 °C.

H_v (from page 23): 2.1 metres head.

$H = p_b \times 10.2 - \text{NPSH} - H_f - H_v - H_s$ [metres head].

$H = 1 \times 10.2 - 1.2 - 3.0 - 2.1 - 0.5 = 2.8$ metres head.

This means that each pump can operate at a suction lift of maximum 2.8 metres head.

Pressure calculated in bar: $2.8 \times 0.0981 = 0.27$.

Pressure calculated in kPa: $2.8 \times 9.81 = 27.4$.

5.6 Maximum inlet pressure

The maximum inlet pressure must not exceed 8 bar. However, the actual inlet pressure + pressure when the pump is operating against a closed valve must always be lower than the maximum operating pressure.

5.7 Minimum flow rate

Due to the risk of overheating, the pumps should not be used at flows below 10 % of the rated flow of one pump.

Note The pumps must not run against a closed discharge valve.

5.8 Start/stop

The system must not be started and stopped via the mains supply more than four times per hour.

When the system is switched on via the mains supply, it will start after approx. 5 seconds.

5.9 Diaphragm tank

The diaphragm tank precharge pressure has been set to 0.7 x setpoint.

The factory-set setpoint is 0.5 x maximum pressure unless otherwise specified in the quick guide supplied with the Hydro Multi-E.

If the setpoint is changed, the diaphragm tank precharge pressure should be changed accordingly to ensure optimum operation.

Calculate the precharge pressure as follows:

Precharge pressure = 0.7 x setpoint.

Note Measure the precharge pressure while the system is pressureless.

We recommend to use nitrogen gas for precharging.

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6. Installation

6.1 Location

Observe the following to ensure adequate cooling of motor and electronics:

- Position the Hydro Multi-E in such a way that adequate cooling is ensured.
- Keep motor cooling fins and fan blades clean.

The Hydro Multi-E is not suitable for outdoor installation.

The booster system must have a 1-metre clearance in front and on the two sides.

6.2 Mechanical installation

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

The pipes connected to the booster system must be of adequate size. Fit expansion joints in the suction and discharge pipes to avoid resonance. See fig. 4.

Connect the pipes to the manifolds of the booster system.

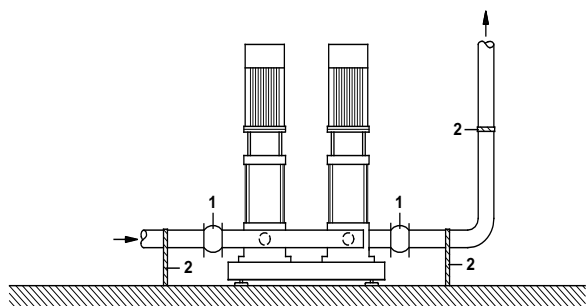
The manifold comes with a screw cap fitted to one end. If this end is to be used, remove the screw cap, apply sealing compound to the other end of the manifold, and fit the screw. Fit a blanking flange with gasket on flanged manifolds.

Tighten up the booster system prior to start-up.

If booster systems are installed in blocks of flats or the first consumer on the line is close to the booster system, we recommend to fit pipe hangers on the suction and discharge pipes to prevent vibration being transmitted through the pipework. See fig. 4.

Position the booster system on a plane and solid surface, for example a concrete floor or foundation. If the booster system is not fitted with vibration dampers, it must be bolted to the floor or foundation.

Fasten the pipes to parts of the building to ensure that they cannot move or be twisted.



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Fig. 4 Installation example with expansion joints and pipe hangers

Pos.	Description
1	Expansion joint
2	Pipe hanger

The expansion joints and pipe hangers shown in fig. 4 are not included in the standard Hydro Multi-E.

6.3 Electrical installation, Hydro Multi-E with single-phase pumps

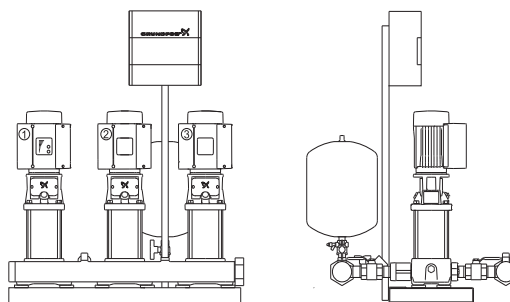


Fig. 5 Hydro Multi-E with single-phase CRE pumps

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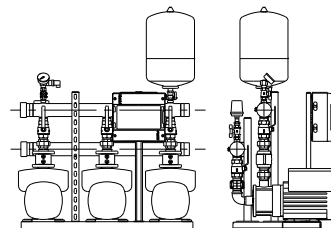


Fig. 6 Hydro Multi-E with single-phase CME pumps

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Note

The user or the installer is responsible for the installation of correct earthing and protection according to local regulations. All work must be carried out by trained personnel.



Warning

Never make any connections in the Hydro Multi-E breaker cabinet or in the terminal box of each individual pump unless the power supply has been switched off for at least 5 minutes.

6.3.1 Protection against electric shock - indirect contact



Warning

The Hydro Multi-E must be earthed and protected against indirect contact in accordance with local regulations.

Protective earth conductors must always have a yellow/green (PE) colour marking.

6.3.2 Additional protection

If the Hydro Multi-E is connected to an electric installation where an earth leakage circuit breaker (ELCB) is used as additional protection, this circuit breaker must be marked with the following symbol:



ELCB

Note

When an earth leakage circuit breaker is selected, the total leakage current of all the electrical equipment in the installation must be taken into account.

The leakage current of the Hydro Multi-E can be found in section [18.2 Leakage current](#).

6.3.3 Motor protection

The Hydro Multi-E requires no external motor protection. The motors incorporate thermal protection against steady overload and stalled condition.

6.3.4 Protection against mains voltage transients

The Hydro Multi-E is protected against mains voltage transients in accordance with EN 61800-3.

6.3.5 Supply voltage

3 × 400/230 V - 10 %/+ 10 %, 50/60 Hz, N, PE.

The supply voltage and frequency are marked on the pump nameplate. Make sure that the pump is suitable for the power supply of the installation site.

The wires in the Hydro Multi-E breaker cabinet must be as short as possible. Excepted from this is the protective earth conductor which must be so long that it is the last one to be disconnected in case the cable is inadvertently pulled out of the cable entry.

For maximum backup fuse, see section 18.1 Supply voltage.

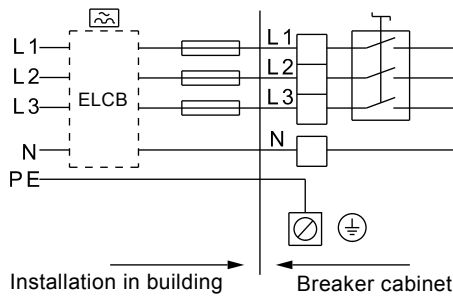


Fig. 7 Example of a mains-connected Hydro Multi-E with backup fuses and additional protection

6.4 Electrical installation, Hydro Multi-E with three-phase pumps

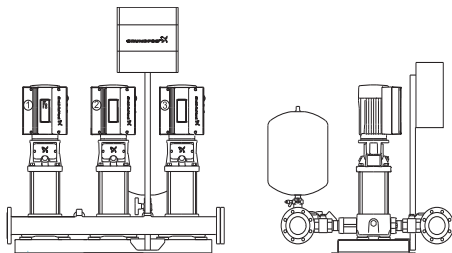


Fig. 8 Hydro Multi-E with three-phase pumps

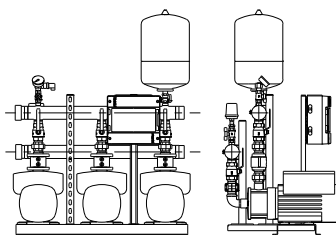


Fig. 9 Hydro Multi-E with single-phase CME pumps

Note The user or the installer is responsible for the installation of correct earthing and protection according to local regulations. All work must be carried out by trained personnel.



Warning Never make any connections in the Hydro Multi-E breaker cabinet or in the terminal box of each individual pump unless the power supply has been switched off for at least 5 minutes.

6.4.1 Protection against electric shock - indirect contact



Warning The Hydro Multi-E must be earthed and protected against indirect contact in accordance with local regulations.

Protective earth conductors must always have a yellow/green (PE) colour marking.

Note As the leakage current of 4 to 5.5 kW motors is > 3.5 mA, these motors must be connected to especially reliable/sturdy earth connections.

The leakage current of the Hydro Multi-E can be found in section 19.2 Leakage current.

EN 50178 and BS 7671 specify the following:

Leakage current > 3.5 mA

The Hydro Multi-E must be stationary and installed permanently. Furthermore, it must be connected permanently to the power supply.

The earth connection must be carried out as duplicate conductors.

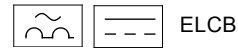
6.4.2 Additional protection

If the Hydro Multi-E is connected to an electric installation where an earth leakage circuit breaker (ELCB) is used as additional protection, this circuit breaker must be of the following type:

- It is suitable for handling leakage currents and cutting-in with short pulse-shaped leakage.
- It trips out when alternating fault currents and fault currents with DC content, i.e. pulsating DC and smooth DC fault currents occur.

For these booster systems an earth leakage circuit breaker type B must be used.

This circuit breaker must be marked with the following symbols:



Note When an earth leakage circuit breaker is selected, the total leakage current of all the electrical equipment in the installation must be taken into account.

The leakage current of the Hydro Multi-E can be found in section 19.2 Leakage current.

6.4.3 Motor protection

The Hydro Multi-E requires no external motor protection. The motors incorporate thermal protection against steady overload and stalled condition.

6.4.4 Protection against mains voltage transients

The Hydro Multi-E is protected against mains voltage transients in accordance with EN 61800-3.

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6.4.5 Supply voltage

3 × 380-480 V - 10 %/+ 10 %, 50/60 Hz, PE.

The supply voltage and frequency are marked on the pump nameplate. Make sure that the pump is suitable for the power supply of the installation site.

The wires in the Hydro Multi-E breaker cabinet must be as short as possible. Excepted from this is the protective earth conductor which must be so long that it is the last one to be disconnected in case the cable is inadvertently pulled out of the cable entry.

For maximum backup fuse, see section 19.1 Supply voltage.

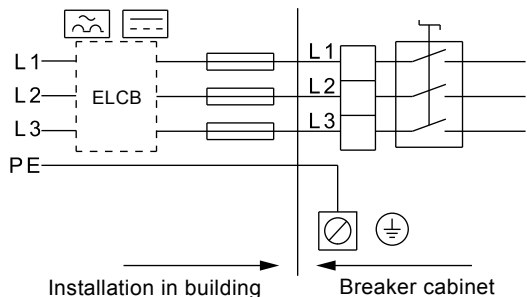


Fig. 10 Example of a mains-connected Hydro Multi-E with backup fuses and additional protection

6.5 Emergency operation (optional)

The emergency operation feature ensures the supply of water even if the sensor or control unit fails. In this situation, all pumps will operate at maximum performance.

6.5.1 Connection of pressure switches

The pressure switches for emergency operation must be connected to terminals 4, 5 and 6 of each Hydro Multi-E pump.

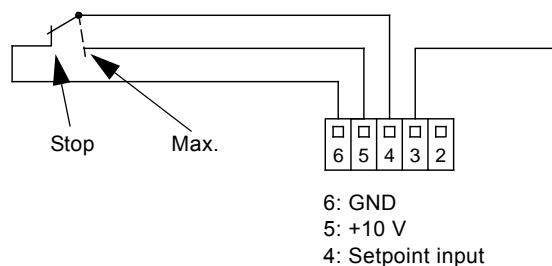


Fig. 11 Connection of pressure switches

6.5.2 Setting of pressure switches

Figure 12 shows the following:

- relationship between cut-out, differential and cut-in pressures
- pressure switch settings
- number of pumps in emergency operation.

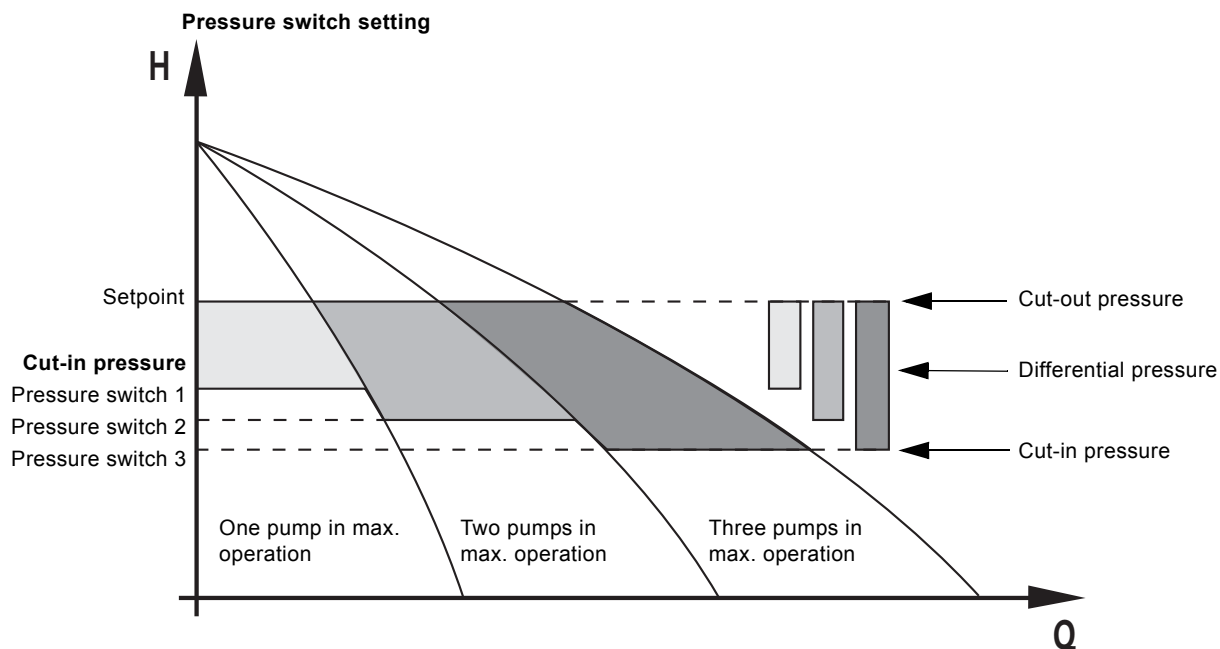


Fig. 12 Functional diagram

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6.6 Dry-running protection

Note The Hydro Multi-E must be protected against dry running.

The dry-running protection is described in two situations:

- Hydro Multi-E without emergency operation.
- Hydro Multi-E with emergency operation.

6.6.1 Hydro Multi-E without emergency operation

Types of dry-running protection:

- a pressure switch fitted in the suction manifold (factory-fitted and set to 1.5 bar as standard)
- a level switch fitted in a water tank.

The dry-running protection has been connected to terminals 1 and 9 in pump 1.

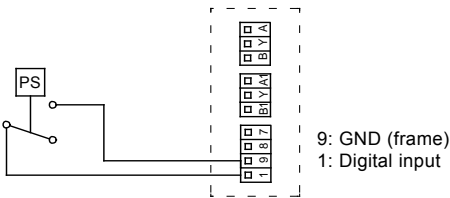
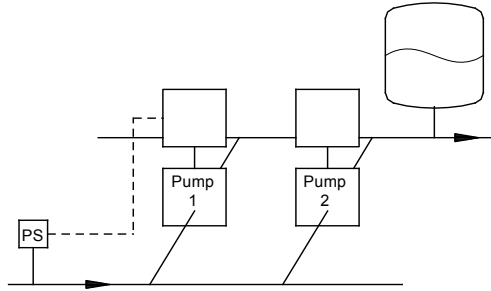


Fig. 13 Pressure switch connected to pump 1

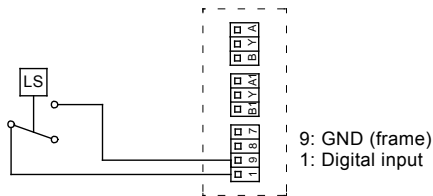
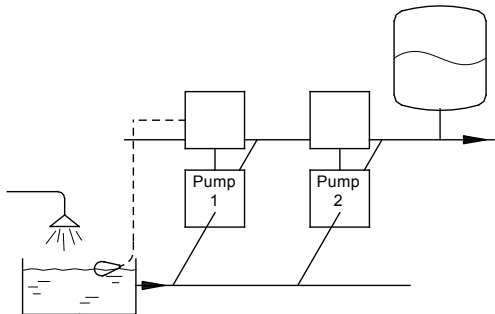


Fig. 14 Level switch connected to pump 1

6.6.2 Hydro Multi-E with emergency operation

If the Hydro Multi-E control unit fails, terminals 1 and 9 will be inactive. To ensure the dry-running protection, an additional wiring has been made in the terminal box of pump 1 and between the pumps. See also the wiring diagram in the breaker cabinet.

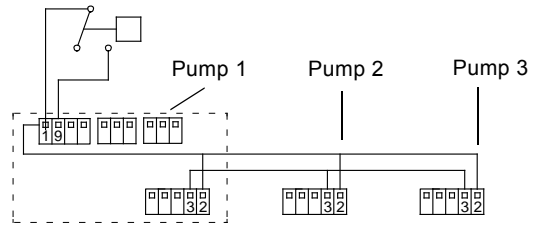
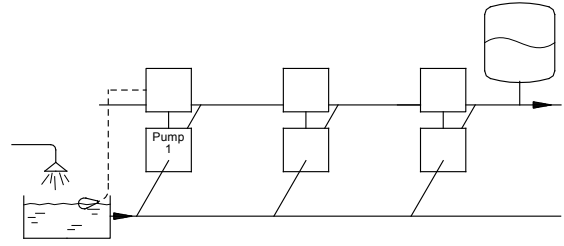


Fig. 15 Wiring of dry-running protection in emergency operation

Note The short-circuit wire between terminals 2 and 3 has been removed (standard Hydro Multi-E). Instead the terminals 2 and 3 have been configured to external fault.

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7. Start-up

Caution

Do not start the pumps until they have been filled with liquid.



Warning

When pumping hot liquids, ensure that persons cannot accidentally come into contact with hot surfaces of the product.

7.1 Hydro Multi-E in system with positive inlet pressure

When you have carried out the mechanical and electrical installation described in section 6. *Installation*, proceed as follows:

1. Check that the Hydro Multi-E corresponds to order and that no single parts have been damaged.
2. Switch off the main switch.
3. Switch off the circuit breakers of all pumps.
4. Check that the precharge pressure in the diaphragm tank is 0.7 times the required discharge pressure (setpoint).

Note

Measure the precharge pressure while the system is pressureless.

5. Connect water and power supplies to the system.
6. Open all pump suction and discharge valves.
7. Vent all pumps by means of the air vent screws.

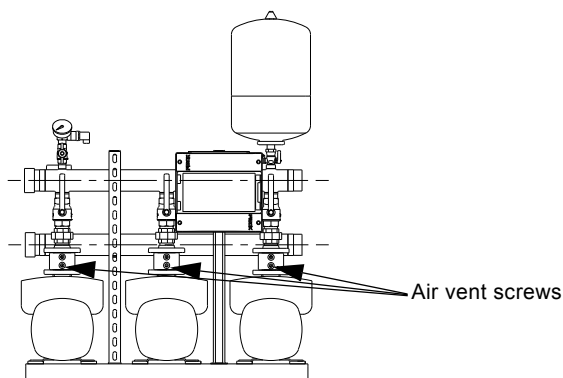


Fig. 16 Position of air vent screws in systems with CME-A/-I pumps

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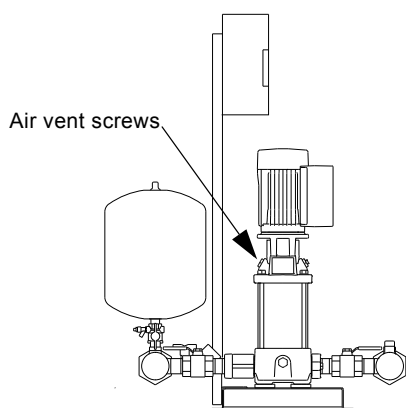


Fig. 17 Position of air vent screws in systems with CR(I)E pumps

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8. Switch on the main switch.
9. Start pump 1 by switching on the circuit breaker.
10. Vent pump 1 by means of the air vent screw.
11. Repeat steps 9 and 10 for the other pumps in the system.
12. Set the desired discharge pressure.

Note

If you change the discharge pressure, you must change the diaphragm tank precharge pressure accordingly.

13. Check that the pumps are cutting in and out, thus adjusting the performance to the demand.

Hydro Multi-E is now in automatic mode and ready for operation.

7.2 Hydro Multi-E in system without inlet pressure

Caution

Hydro Multi-E systems with CME pumps require a positive inlet pressure during start-up and operation. The following start-up procedure therefore only applies to Hydro Multi-E systems with CRE or CRIE pumps.

When you have carried out the mechanical and electrical installation described in section 6. *Installation*, proceed as follows:

1. Check that the Hydro Multi-E corresponds to order and that no single parts have been damaged.
2. Switch off the main switch.
3. Switch off the circuit breakers of all pumps.
4. Check that the precharge pressure in the diaphragm tank is 0.7 times the required discharge pressure (setpoint).

Note

Measure the precharge pressure while the system is pressureless.

5. Connect water and power supplies to the system.
6. Open all pump suction valves.
7. Close all pump discharge valves, and prime all pumps and the suction pipe.

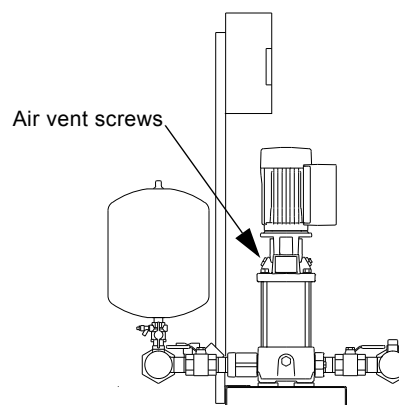


Fig. 18 Position of air vent and filling screws

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8. Switch on the main switch.
9. Start pump 1 by switching on the circuit breaker.
10. Vent the pump by means of the air vent screw.
11. Slowly open the discharge valve approximately 50 %.
12. Repeat steps 9 and 11 for the other pumps in the system.
13. Slowly fully open all pump discharge valves.
14. Wait for a few minutes.
15. Set the desired discharge pressure.

Note

If you change the discharge pressure, you must change the diaphragm tank precharge pressure accordingly.

16. Check that the pumps are cutting in and out, thus adjusting the performance to the demand.

Hydro Multi-E is now in automatic mode and ready for operation.

8. Operating modes

The operating modes are the operating conditions that the booster system can be brought in by the user.

Possible operating modes:

- Stop
All pumps stopped.
- Normal (factory setting)
One or more pumps are operating to maintain the set pressure.
- Max.
All pumps running at maximum speed.

The operating modes can be selected on the control panel, via the R100 or via bus.

8.1 Normal operation

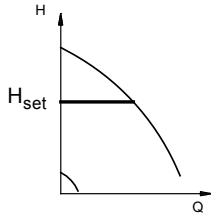


Fig. 19 Hydro Multi-E in normal operation, i.e. constant-pressure mode

In constant-pressure mode, the Hydro Multi-E adjusts its performance to the desired setpoint.

8.2 Stop or max. operation

In addition to normal operating mode, you can select the operating modes "Stop" or "Max.". See the example in fig. 20.

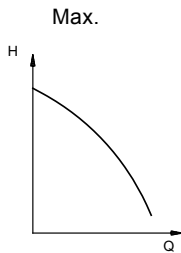


Fig. 20 Hydro Multi-E in operating mode "Max."

Max. operation can for instance be used in connection with the venting and start-up procedures.

8.3 Operating condition in case of disconnection of power supply

If the power supply to the Hydro Multi-E is disconnected, the settings will be stored. The Hydro Multi-E will restart in the same operating condition as it was in before the disconnection.

8.4 Other settings

You can make other settings with the R100.

See section 10. *Setting via the R100.*

Factory settings are marked with bold-faced type under each individual display in sections 10.1 *Menu OPERATION* and 10.3 *Menu INSTALLATION*.

9. Setting via the control panel

The control panel, fig. 21 or 22, has these elements:

- operating buttons, ⤴ and ⤵, for setpoint setting
- light fields, yellow, for indication of setpoint
- indicator lights, green (operation) and red (fault).

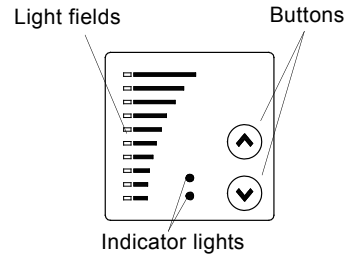


Fig. 21 Control panel, single-phase Hydro Multi-E

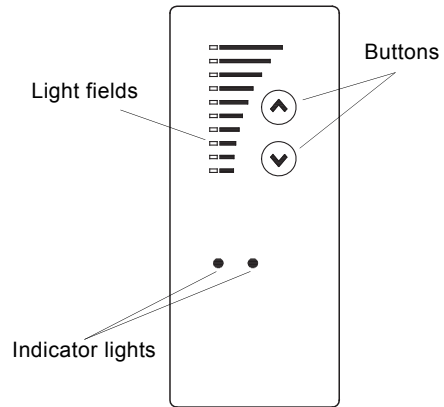


Fig. 22 Control panel, three-phase Hydro Multi-E

9.1 Setpoint setting

Set the desired setpoint by pressing ⤴ and ⤵.

The light fields on the control panel indicate the setpoint set.

9.2 Hydro Multi-E in constant-pressure operation

Figure 23 shows that the light fields 5 and 6 are activated, indicating a desired setpoint of 5 bar with a sensor measuring range from 0 to 10 bar. The setting range is equal to the sensor measuring range (see sensor nameplate).

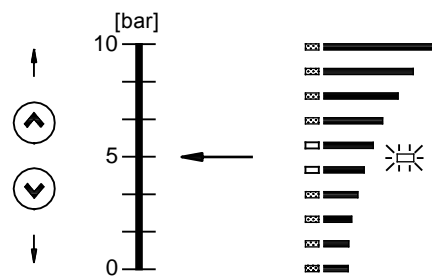


Fig. 23 Setpoint set to 5 bar

TM02 4328 0602

TM02 4318 0602

TM00 7600 0304

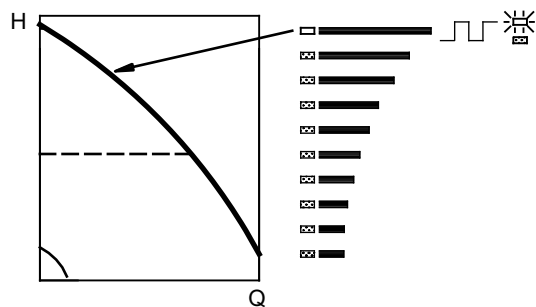
TM02 8513 0304

TM03 0236 4604

9.3 Setting to max. curve duty

Press \odot continuously to change to the max. curve of the Hydro Multi-E (top light field flashes). When the top light field is on, press \odot for 3 seconds until the light field starts flashing.

To change back, press \ominus continuously until the desired setpoint is indicated.



TM00 7345 1304

Fig. 24 Max. curve duty

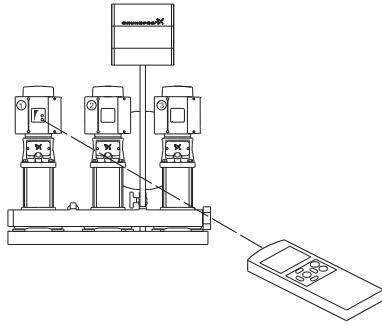
9.4 Start/stop

Start the Hydro Multi-E by continuously pressing \odot until the desired setpoint is indicated.

Stop the Hydro Multi-E by continuously pressing \ominus until none of the light fields are activated and the green indicator light flashes.

10. Setting via the R100

The Hydro Multi-E is designed for wireless communication with the Grundfos R100 remote control.



TMO2 4303 1111

Fig. 25 R100 communicating with the Hydro Multi-E via infra-red light

During communication, the R100 must be pointed at the control panel. When the R100 communicates with the Hydro Multi-E, the red indicator light will flash rapidly.

The R100 offers setting and status displays for the Hydro Multi-E. The displays are divided into four parallel menus (see fig. 26):

0. GENERAL (see operating instructions for the R100)

1. OPERATION

2. STATUS

3. INSTALLATION

The number above each individual display in fig. 26 refers to the section in which the display is described.

Note The menus may differ depending on remote control model.

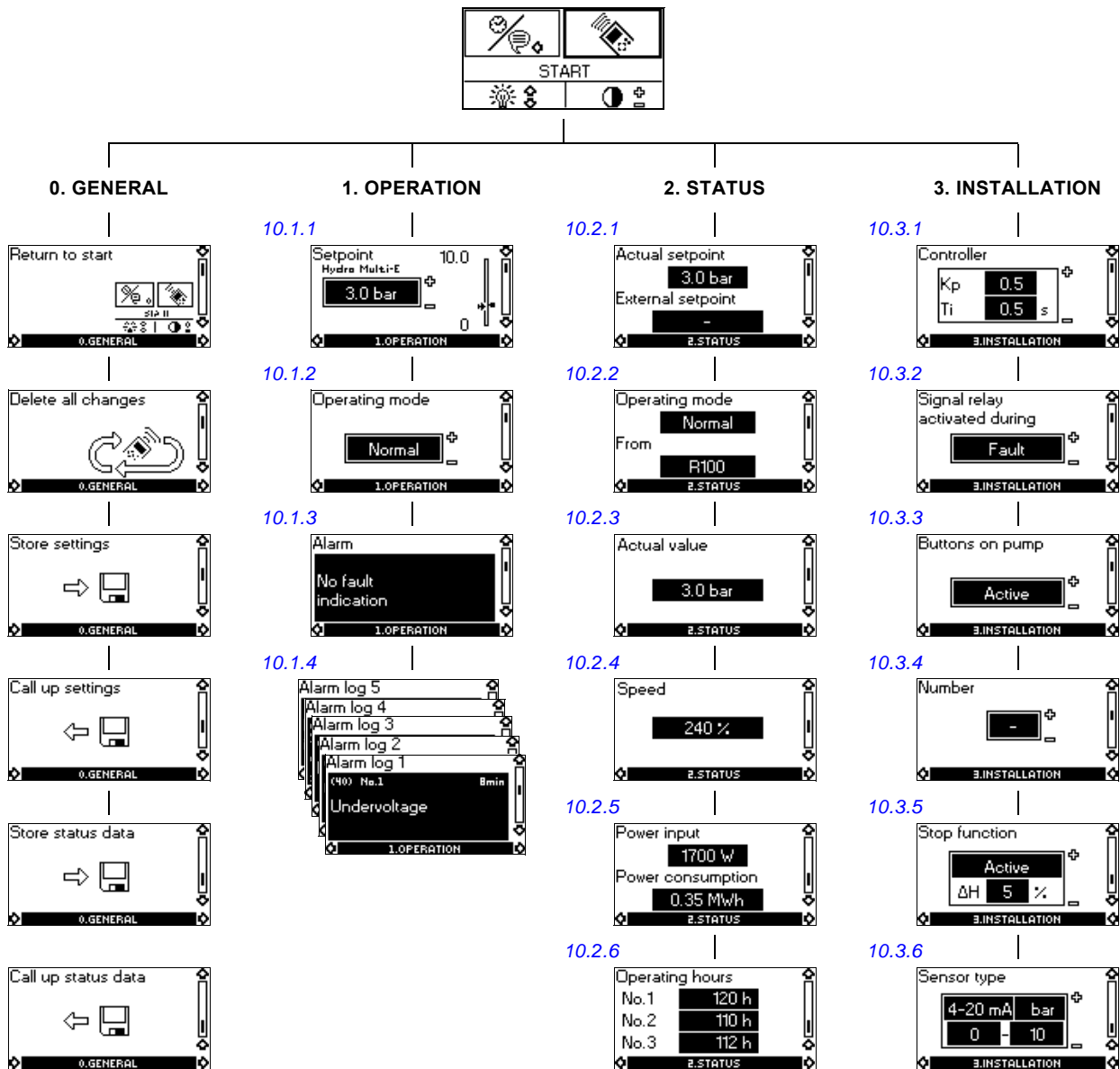


Fig. 26 Menu overview

10.1 Menu OPERATION

When communication between the R100 and the Hydro Multi-E has been established, the first display in this menu will appear.

10.1.1 Setpoint



- ▶ Setpoint set
- ▣ Actual value

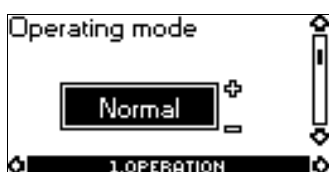
Set the setpoint in this display.

In normal operating mode (factory setting), the setting range is equal to the sensor measuring range.

One of the following operating modes can be selected:

- Stop
- Max. (max. curve).

10.1.2 Operating mode

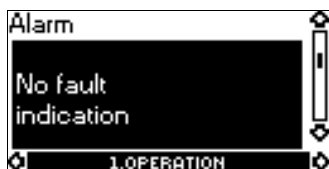


Set one of the following operating modes:

- Stop
- **Normal** (duty)
- Max.

The operating modes can be set without changing the setpoint setting.

10.1.3 Fault indications



In case of a fault, the cause will appear in this display.

Possible causes:

- Too high motor temperature
- Undervoltage
- Overvoltage
- Too many restarts (after faults)
- Overload
- Sensor signal outside signal range (only 4-20 mA)
- External fault
- Dry running (emergency operation only)
- Other fault.

A fault indication can be reset in this display if the cause of the fault has disappeared.

10.1.4 Alarm log



In case of faults, the last five fault indications will appear in the alarm log. "Alarm log 1" shows the latest fault, "Alarm log 2" shows the latest fault but one, etc.

The example above gives this information:

- The fault indication "Undervoltage" for pump 1 (No. 1).
- The fault code (40).
- The number of minutes the Hydro Multi-E has been connected to the power supply after the fault occurred, 8 min.

10.2 Menu STATUS

The displays appearing in this menu are status displays only. It is not possible to change or set values.

The displayed values are the values that applied when the last communication between the Hydro Multi-E and the R100 took place. If a status value is to be updated, point the R100 at the control panel and press [OK].

If a parameter, e.g. speed, should be called up continuously, press [OK] constantly during the period in which the parameter in question should be monitored.

The tolerance of the displayed value is stated under each display. The tolerances are stated as a guide in % of the maximum values of the parameters.

10.2.1 Actual setpoint



Tolerance: $\pm 2\%$

This display shows the actual setpoint.

It is not possible to connect an external setpoint signal.

10.2.2 Operating mode



This display shows the actual operating mode (Stop, Normal (duty) or Max.). Furthermore, it shows where this operating mode was selected (R100, Pump, Bus, External or Stop func.).

For further details about the stop function, see section [10.3.5](#).

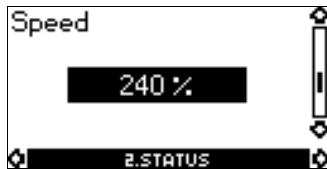
10.2.3 Actual value



This display shows the value actually measured by a connected sensor.

If no sensor is connected to the Hydro Multi-E, "-" will appear in the display.

10.2.4 Total actual output in %



Tolerance: $\pm 5\%$

The actual output of all operating pumps will appear in this display.

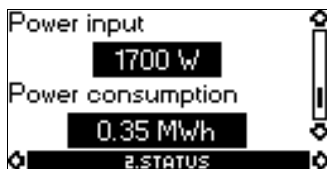
Example

300 % corresponding to 3 pumps running at 100 % speed.

150 % corresponding to 2 pumps running at 75 % speed.

80 % corresponding to 1 pump running at 80 % speed.

10.2.5 Power input and power consumption



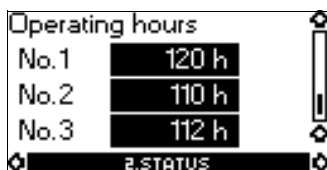
Tolerance: $\pm 10\%$

This display shows the actual Hydro Multi-E input power from the mains supply. The power is displayed in W.

The Hydro Multi-E power consumption can also be read from this display. The value of power consumption is an accumulated value calculated from the Hydro Multi-E's birth, and it cannot be reset.

If a pump is replaced, the accumulated power consumption will be stored.

10.2.6 Operating hours



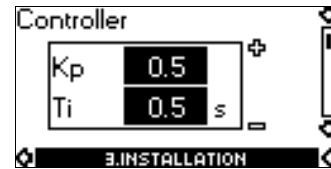
Tolerance: $\pm 2\%$

This display shows the operating hours for each individual pump of the Hydro Multi-E. The number of operating hours is an accumulated value, and it cannot be reset.

If a pump is replaced, the number of operating hours will be reset.

10.3 Menu INSTALLATION

10.3.1 Controller



The gain (K_p) and the integral-action time (T_i) of the built-in PI controller can be set in this display if the factory setting is not the optimum setting:

- The gain (K_p) can be set within the range from 0.1 to 20.
- The integral-action time (T_i) can be set within the range from 0.1 to 3600 s. If "3600 s" is selected, the controller will function as a P controller.

10.3.2 Signal relay



Select in which operating situation the signal relay should be activated:

- **Fault**
- Operation
- Ready.

See section 13. *Indicator lights and signal relay.*

10.3.3 Buttons on the control panel



The operating buttons \odot and \ominus on the control panel can be set to these values:

- **Active**
- Not active.

10.3.4 Number



A number between 1 and 64 can be allocated to the Hydro Multi-E. In the case of bus communication, a number must be allocated to each Hydro Multi-E.

10.3.5 Stop function



The purpose of the stop function is to stop the Hydro Multi-E at a very low flow in order to avoid unnecessary power consumption.

The function is only active when one pump is operating.

The stop function can be set to these values:

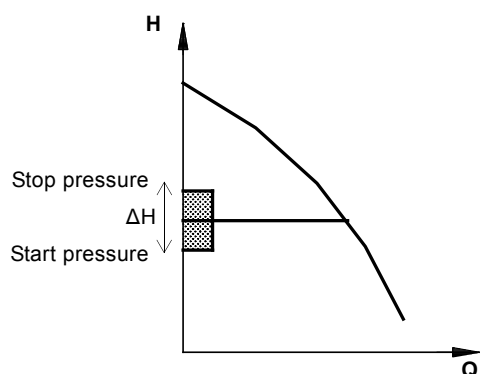
- **Active**
- Not active.

Low flow is detected by means of the built-in "low-flow detector". The Hydro Multi-E will check the flow regularly by reducing the speed for a short time, thus checking the change in pressure. If there is no or only a small change in pressure, this means that there is low flow.

When the Hydro Multi-E detects a low flow, the speed will be increased until the stop pressure (actual setpoint + $0.5 \times \Delta H$) is reached and the Hydro Multi-E will stop. When the pressure has fallen to the start pressure (actual setpoint - $0.5 \times \Delta H$), the Hydro Multi-E will restart.

ΔH indicates the difference between start and stop pressures.

See fig. 27.



TM00 7744 1896

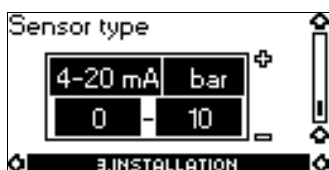
Fig. 27 Difference between start and stop pressures (ΔH)

ΔH is factory-set to 10 % of actual setpoint.

ΔH can be set within the range from 5 % to 30 % of actual setpoint.

The stop function requires a tank precharge pressure of $0.7 \times$ actual setpoint.

10.3.6 Sensor



Note

The setting of the sensor is only relevant for normal operation.

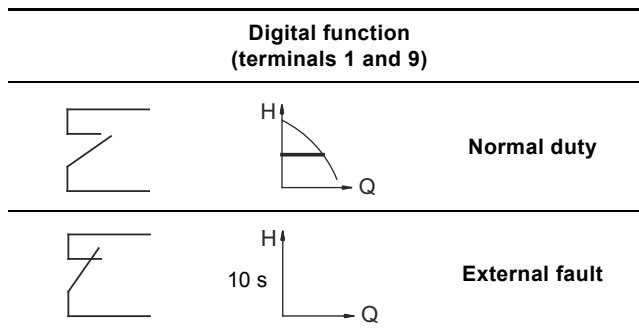
Select among the following values:

- sensor output signal:
 - 0-10 V
 - 0-20 mA
 - 4-20 mA
- unit of measurement of sensor:
 - bar, mbar, m, kPa, psi, ft, m^3/h , m^3/s , l/s, gpm, °C, °F, %
- sensor measuring range.

11. Digital input

The Hydro Multi-E has a digital input for external fault. The input has been factory-set to external fault and will be active in closed condition.

Functional diagram: input for digital function



If the digital input is active for more than 10 seconds, the Hydro Multi-E will stop because of an external fault.

The digital input is used for the dry-running protection.

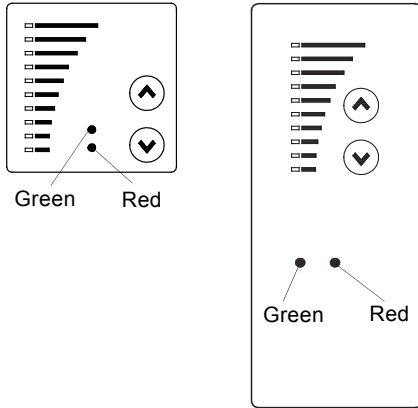
12. Data communication

It is possible to connect the system to an external network. The connection can be made via a GENIbus-based network or a network based on another fieldbus protocol via a gateway.

The gateway may be a Grundfos CIU communication interface unit or a third-party gateway. For further information on the CIU units, see www.grundfos.com (WebCAPS) or contact Grundfos.

13. Indicator lights and signal relay

The operating condition of the Hydro Multi-E is indicated by the green and red indicator lights on the control panel. See fig. 28.



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Fig. 28 Position of indicator lights on the control panel of single- and three-phase Hydro Multi-E

Besides, the Hydro Multi-E incorporates an output for a potential-free signal via an internal relay.

For signal relay output values, see section 10.3.2 [Signal relay](#).

The functions of the two indicator lights and the signal relay are as shown in the table below:

Indicator lights		Signal relay activated during:			Description
Fault (red)	Operation (green)	Fault	Operation	Ready	
Off	Off				The power supply has been switched off.
Off	On				The Hydro Multi-E is operating.
Off	Flashing				The Hydro Multi-E has been set to stop via the control panel, the R100 or bus.
On	Off				The Hydro Multi-E has stopped because of a fault and will attempt to restart. If the cause is "Sensor signal outside signal range", the Hydro Multi-E will stop and the fault indication cannot be reset until the signal is inside the signal range.
On	On				The Hydro Multi-E is still operating, but one or two pumps are faulty. The fault indication will be reset automatically when the fault has disappeared.
On	Flashing				The Hydro Multi-E has been set to stop via the control panel, the R100 or bus, but one or two pumps are faulty.

Resetting of fault indications

A fault indication (red indicator light) will be automatically reset by the Hydro Multi-E when the fault has disappeared.

14. Insulation resistance

Caution

Do not measure the insulation resistance of motor windings or an installation incorporating motors with integrated frequency converters using high-voltage megging equipment, as this may damage the built-in electronics.

15. Maintenance



Warning

Before starting work on the product, switch off the power supply for at least 5 minutes. Make sure that the power supply cannot be accidentally switched on.

15.1 Pumps

Pump bearings and shaft seals are maintenance-free.

If CRE or CRIE pumps are to be drained for a long period of inactivity, remove one of the coupling guards to inject a few drops of silicone oil on the shaft between the pump head and the coupling. This will prevent the shaft seal faces from sticking.

15.2 Motors

Keep motor cooling fins and fan blades clean to ensure sufficient cooling of the motor and electronics.

15.2.1 Motor bearings

Motors up to and including 5.5 kW are maintenance-free.

CRE and CRIE pumps: In the case of seasonal operation (motor is idle for more than six months of the year), we recommend to grease the motor when you take the Hydro Multi-E out of operation.

15.3 Breaker cabinet

The breaker cabinet is maintenance-free. Keep it clean and dry.

16. Shutdown

Shut down the system with the main switch in the breaker cabinet.



Warning

The wires in front of the main switch are still energised.

To shut down a pump, switch off the circuit breaker of the pump.

16.1 Frost protection

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

Drain the pump by loosening the air vent screw in the pump head and remove the drain plug from the base.

Do not tighten the air vent screw and replace the drain plug until the system is to be used again.

16.2 Service kits

See www.grundfos.com (WebCAPS) or WinCAPS.

17. Fault finding



Warning

Before starting fault finding, switch off the power supply for at least 5 minutes.
Make sure that it cannot be accidentally switched on.

Fault	Cause	Remedy	
1. The Hydro Multi-E does not run when started.	a) The actual pressure is higher than or equal to the setpoint set.	Wait until the pressure has dropped, or lower the pressure on the discharge side of the Hydro Multi-E, and check that the booster system starts.	
	b) Power supply disconnected.	Connect the power supply.	
	c) Circuit breakers cut out.	Correct the fault and cut in the-circuit breakers.	
	d) Internal motor protection activated.	Contact Grundfos.	
	e) Circuit breaker defective.	Replace the circuit breaker.	
	f) Motor defective.	Repair or replace the motor.	
	g) Pressure transmitter fault. – Pressure transmitter defective.	Replace the pressure transmitter. Transmitters with 0-20 mA or 4-20 mA output signals are monitored by the Hydro Multi-E.	
	– Cable broken or short-circuited.	Repair or replace the cable.	
2. The Hydro Multi-E starts, but stops immediately afterwards. The operating pressure is not reached.	a) Dry running or no inlet pressure.	Check the supply of water to the Hydro Multi-E. When the inlet pressure has been reestablished, the pumps will restart after 15 seconds.	
3. The Hydro Multi-E is stopped and cannot restart.	a) Pressure transmitter fault. – Pressure transmitter defective.	Replace the pressure transmitter. Transmitters with 0-20 mA or 4-20 mA output signals are monitored by the Hydro Multi-E.	
		– Cable broken or short-circuited.	Repair or replace the cable.
	b) Control unit fault. – Power supply disconnected on pump 1.	Connect the power supply.	
		– Control unit defective.	Replace the terminal box of pump 1. Contact Grundfos.
4. Unstable water delivery from Hydro Multi-E (applies only to very low consumption).	a) Inlet pressure too low.	Check the suction pipe and possible suction strainer.	
	b) Suction pipe or pumps partly blocked by impurities.	Clean the suction pipe or pumps.	
	c) Pumps suck air.	Check the suction pipe for leakages.	
	d) Pressure transmitter defective.	Replace the pressure transmitter.	
5. Pumps are running, but deliver no water.	a) Suction pipe or pumps blocked by impurities.	Clean the suction pipe or pumps.	
	b) Non-return valve blocked in closed position.	Clean the non-return valve. The non-return valve must move freely.	
	c) Suction pipe leaky.	Check the suction pipe for leakages.	
	d) Air in suction pipe or pumps.	Vent the pumps. Check the suction pipe for leakages.	
6. The Hydro Multi-E is unable to reach the setpoint.	a) Cable broken or short-circuited (GENIbus communication between pump 1 and pump 2/3).	Repair or replace the cable.	
	b) Pump 2 or 3 out of operation.	Connect the power supply to the pump and check the pump condition.	
7. Leakage from a shaft seal.	a) Shaft seal defective.	Replace the shaft seal.	
	b) CRE and CRIE pumps: Height adjustment of pump shaft inaccurate.	Readjust the shaft height.	
8. Noise.	a) The pumps are cavitating.	Clean the suction pipe or pumps and possible suction strainer.	
	b) CRE and CRIE pumps: The pumps do not rotate freely (frictional resistance) due to inaccurate height adjustment of the pump shaft.	Readjust the shaft height. See the CR, CRI, CRN installation and operating instructions supplied with the Hydro Multi-E.	
9. Very frequent starts and stops.	a) Wrong diaphragm tank precharge pressure.	Check the precharge pressure.	
	b) The difference between start and stop pressures is too small. Note: This situation will only arise if emergency operation is installed.	Increase the differential pressure setting on each pressure switch.	

18. Technical data, Hydro Multi-E with single-phase pumps

18.1 Supply voltage

3 × 400/230 V - 10 %/+ 10 %, 50/60 Hz, N, PE.

Cable: 0.5 - 1.5 mm².

See nameplate.

Recommended fuse size

Motor sizes from 0.37 to 1.1 kW: Max. 10 A.

Standard as well as quick-blow or slow-blow fuses may be used.

18.2 Leakage current

Motor size [kW]	Number of pumps in booster system	Leakage current [mA]
0.37 - 1.1	2	< 7
	3	< 10.5

The leakage currents are measured in accordance with EN 60355-1.

18.3 Inputs/outputs

Digital

External potential-free switch.

Voltage: 5 VDC.

Current: < 5 mA.

Screened cable: 0.5 - 1.5 mm².

Sensor signals

- Voltage signal
0-10 VDC, $R_i > 50 \text{ k}\Omega$ (via internal voltage supply).
Tolerance: + 0 %/- 3 % at maximum voltage signal.
Screened cable: 0.5 - 1.5 mm².
Maximum cable length: 500 m.
- Current signal
DC 0-20 mA/4-20 mA, $R_i = 175 \Omega$.
Tolerance: + 0 %/- 3 % at maximum current signal.
Screened cable: 0.5 - 1.5 mm².
Maximum cable length: 500 m.
- Power supply to sensor:
+24 VDC, max. 40 mA.

Signal output

Potential-free changeover contact.

Maximum contact load: 250 VAC, 2 A.

Minimum contact load: 5 VDC, 10 mA.

Screened cable: 0.5 - 2.5 mm².

Maximum cable length: 500 m.

Bus input

Grundfos bus protocol, GENIbus protocol, RS-485.

Screened 3-core cable: 0.5 - 1.5 mm².

Maximum cable length: 500 m.

19. Technical data, Hydro Multi-E with three-phase pumps

19.1 Supply voltage

3 × 380-480 V - 10 %/+ 10 %, 50/60 Hz, PE.

Cable: 6-10 mm².

See nameplate.

Recommended fuse size

Motor sizes from 1.5 to 5.5 kW: Max. 16 A.

Standard as well as quick-blow or slow-blow fuses may be used.

19.2 Leakage current

Motor size [kW]	Number of pumps in booster system	Leakage current [mA]
1.5 - 3.0 (supply voltage < 460 V)	2	< 7
	3	< 10.5
1.5 - 3.0 (supply voltage > 460 V)	2	< 10
	3	< 15
4.0 - 5.5	2	< 10
	3	< 15
5.5, 4-pole	2	< 20
	3	< 30

The leakage currents are measured in accordance with EN 60355-1.

19.3 Inputs/outputs

Digital

External potential-free switch.

Voltage: 5 VDC.

Current: < 5 mA.

Screened cable: 0.5 - 1.5 mm².

Sensor signals

- Voltage signal
0-10 VDC, $R_i > 50 \text{ k}\Omega$ (via internal voltage supply).
Tolerance: + 0 %/- 3 % at maximum voltage signal.
Screened cable: 0.5 - 1.5 mm².
Maximum cable length: 500 m.
- Current signal
DC 0-20 mA/4-20 mA, $R_i = 175 \Omega$.
Tolerance: + 0 %/- 3 % at maximum current signal.
Screened cable: 0.5 - 1.5 mm².
Maximum cable length: 500 m.
- Power supply to sensor:
+24 VDC, max. 40 mA.

Signal output

Potential-free changeover contact.

Maximum contact load: 250 VAC, 2 A.

Minimum contact load: 5 VDC, 10 mA.

Screened cable: 0.5 - 2.5 mm².

Maximum cable length: 500 m.

Bus input

Grundfos bus protocol, GENIbus protocol, RS-485.

Screened 3-core cable: 0.5 - 1.5 mm².

Maximum cable length: 500 m.

20. Other technical data

EMC (electromagnetic compatibility) to EN 61800-3

Residential areas - unlimited distribution, corresponding to CISPR 11, class B, group 1.

Industrial areas - unlimited distribution, corresponding to CISPR 11, class A, group 1.

Contact Grundfos for further information.

Enclosure class

Standard: IP54 (IEC 34-5).

Insulation class

F (IEC 85).

Ambient temperature

- During operation: 0 °C to +40 °C.
- During storage/transport: -40 °C to +60 °C.

Relative air humidity

Maximum 95 %.

Sound pressure level

Hydro Multi-E with single-phase pumps

Motor size [kW]	Number of pumps in booster system		Sound pressure level [dB(A)]
	2	3	
0.37 - 1.1	•		60
		•	63

Hydro Multi-E with three-phase pumps

Motor size [kW]	Number of pumps in booster system		Sound pressure level [dB(A)]
	2	3	
1.5	•		66
		•	68
2.2	•		67
		•	69
3.0	•		67
		•	69
4.0	•		71
		•	73
5.5	•		71
		•	73

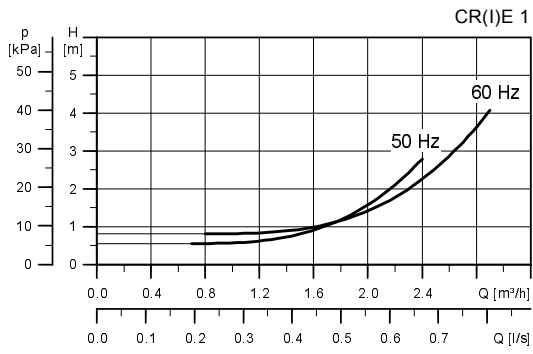
21. Disposal

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

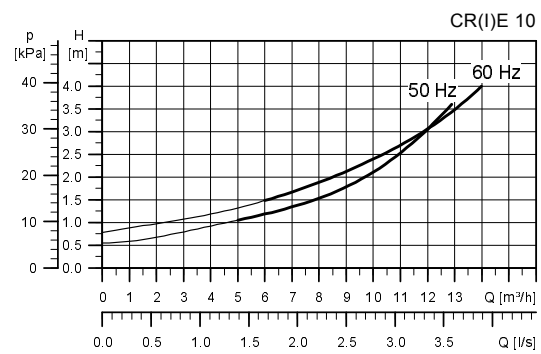
1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

Subject to alterations.

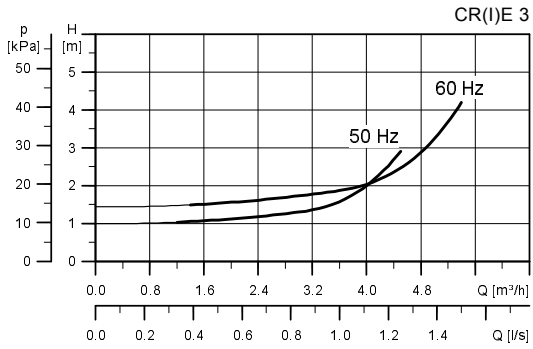
NPSH



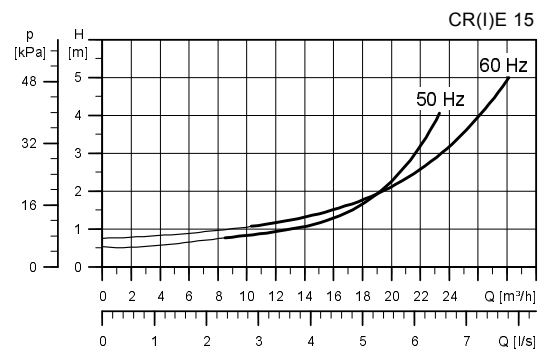
TM01 9882 1103



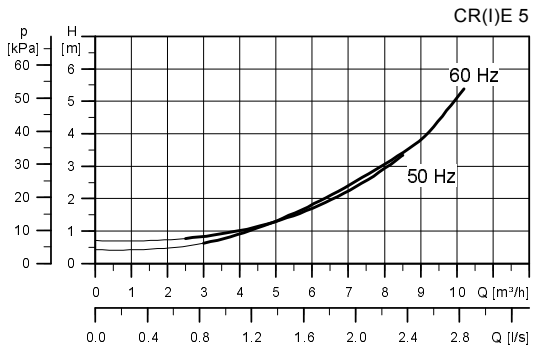
TM02 7125 2703



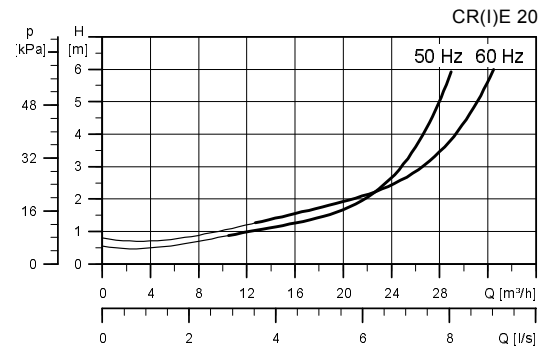
TM01 9883 1103



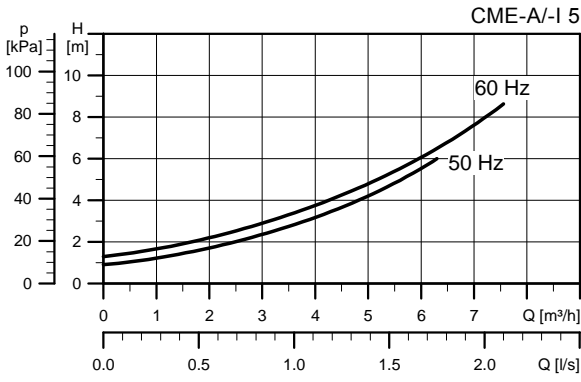
TM02 7126 2703



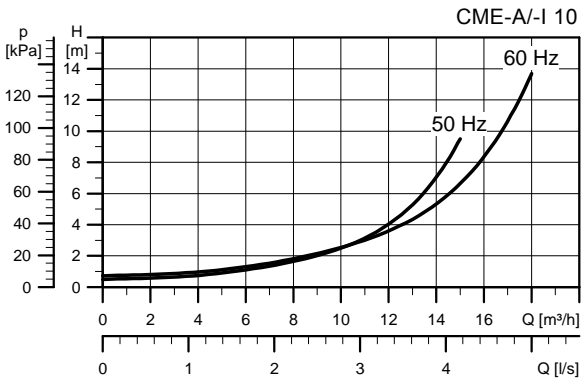
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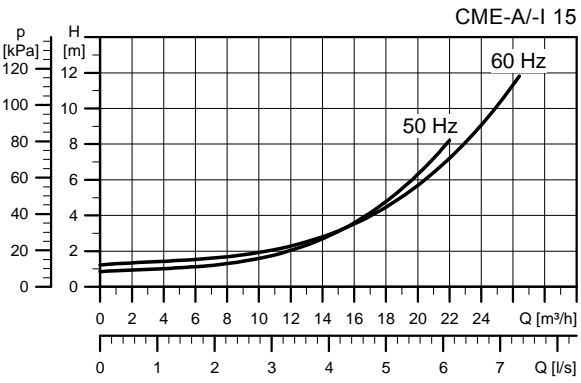
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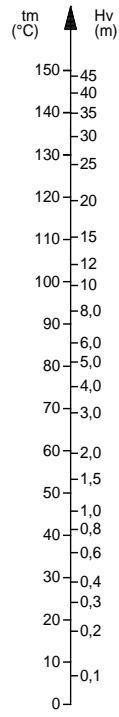


TM05 2005 4211



TM05 2006 4211

Vapour pressure



TM00 3037 3493

Declaration of conformity

GB: EC declaration of conformity

We, Grundfos, declare under our sole responsibility that the products Hydro Multi-E, to which this declaration relates, are in conformity with these Council directives on the approximation of the laws of the EC member states:

DK: EF-overensstemmelseserklæring

Vi, Grundfos, erklærer under ansvar at produkterne Hydro Multi-E som denne erklæring omhandler, er i overensstemmelse med disse af Rådets direktiver om indbyrdes tilnærmelse til EF-medlemsstaternes lovgivning:

EE: EL vastavusdeklaratsioon

Meie, Grundfos, deklareerime enda ainuvastutusel, et toode Hydro Multi-E, mille kohta käesolev juhend käib, on vastavuses EÜ Nõukogu direktiividega EMÜ liikmesriikide seaduste ühitamise kohta, mis käsitlevad:

FR: Déclaration de conformité CE

Nous, Grundfos, déclarons sous notre seule responsabilité, que les produits Hydro Multi-E, aux quels se réfère cette déclaration, sont conformes aux Directives du Conseil concernant le rapprochement des législations des Etats membres CE relatives aux normes énoncées ci-dessous :

HR: EZ izjava o usklađenosti

Mi, Grundfos, izjavljujemo pod vlastitom odgovornošću da je proizvod Hydro Multi-E, uz kuru attiecas šis paziņojums, atbilst šādām Padomes Vijeća o usklađivanju zakona država članica EU:

LV: EK atbilstības deklarācija

Sabiedrība GRUNDFOS ar pilnu atbildību dara zināmu, ka produkts Hydro Multi-E, uz kuru attiecas šis paziņojums, atbilst šādām Padomes direktīvām par tuvināšanos EK dalībvalstu likumdošanas normām:

HU: EK megfelelőségi nyilatkozat

Mi, a Grundfos, egyedüli felelősséggel kijelentjük, hogy a Hydro Multi-E termékek, amelyekre jelen nyilatkozik vonatkozik, megfelelnek az Európai Unió tagállamainak jogi irányelveit összehangoló tanács alábbi előírásainak:

PL: Deklaracja zgodności WE

My, Grundfos, oświadczamy z pełną odpowiedzialnością, że nasze wyroby Hydro Multi-E, których deklaracja niniejsza dotyczy, są zgodne z następującymi wytycznymi Rady d/s ujednoczenia przepisów prawnych krajów członkowskich WE:

RU: Декларация о соответствии ЕС

Мы, компания Grundfos, со всей ответственностью заявляем, что изделия Hydro Multi-E, к которым относится настоящая декларация, соответствуют следующим Директивам Совета Евросоюза об унификации законодательных предписаний стран-членов ЕС:

SI: ES izjava o skladnosti

V Grundfosu s polno odgovornostjo izjavljamo, da so naši izdelki Hydro Multi-E, na katere se ta izjava nanaša, v skladu z naslednjimi direktivami Sveta o približevanju zakonodaje za izenačevanje pravnih predpisov držav članic ES:

FI: EY-vaatimustenmukaisuusvakuutus

Me, Grundfos, vakuutamme omalla vastuullamme, että tuotteet Hydro Multi-E, joita tämä vakuutus koskee, ovat EY:n jäsenvaltioiden lainsäädännön yhdenmukaistamiseen tähtäävien Euroopan neuvoston direktiivien vaatimusten mukaisia seuraavasti:

CZ: ES prohlášení o shodě

My firma Grundfos prohlašujeme na svou plnou odpovědnost, že výrobky Hydro Multi-E, na něž se toto prohlášení vztahuje, jsou v souladu s ustanoveními směrnice Rady pro sblížení právních předpisů členských států Evropského společenství v oblastech:

DE: EG-Konformitätserklärung

Wir, Grundfos, erklären in alleiniger Verantwortung, dass die Produkte Hydro Multi-E, auf die sich diese Erklärung bezieht, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EU-Mitgliedsstaaten übereinstimmen:

ES: Declaración CE de conformidad

Nosotros, Grundfos, declaramos bajo nuestra entera responsabilidad que los productos Hydro Multi-E, a los cuales se refiere esta declaración, están conformes con las Directivas del Consejo en la aproximación de las leyes de los Estados Miembros del EM:

GR: Δήλωση συμμόρφωσης EC

Εμείς, η Grundfos, δηλώνουμε με αποκλειστικά δική μας ευθύνη ότι τα προϊόντα Hydro Multi-E στα οποία αναφέρεται η παρούσα δήλωση, συμμορφώνονται με τις εξής Οδηγίες του Συμβουλίου περί προσέγγισης των νομοθεσιών των κρατών μελών της ΕΕ:

IT: Dichiarazione di conformità CE

Grundfos dichiara sotto la sua esclusiva responsabilità che i prodotti Hydro Multi-E, ai quali si riferisce questa dichiarazione, sono conformi alle seguenti direttive del Consiglio riguardanti il riavvicinamento delle legislazioni degli Stati membri CE:

LT: EB atitikties deklaracija

Mes, Grundfos, su visa atsakomybe pareiškiame, kad gaminys Hydro Multi-E, kuriam skirta ši deklaracija, atitinka šias Tarybos Direktyvas dėl Europos Ekonominės Bendrijos šalių narių įstatymų suderinimo:

NL: EC overeenkomstigheidsverklaring

Wij, Grundfos, verklaren geheel onder eigen verantwoordelijkheid dat de producten Hydro Multi-E waarop deze verklaring betrekking heeft, in overeenstemming zijn met de Richtlijnen van de Raad in zake de onderlinge aanpassing van de wetgeving van de EG Lidstaten betreffende:

PT: Declaração de conformidade CE

A Grundfos declara sob sua única responsabilidade que os produtos Hydro Multi-E, aos quais diz respeito esta declaração, estão em conformidade com as seguintes Directivas do Conselho sobre a aproximação das legislações dos Estados Membros da CE:

RO: Declarație de conformitate CE

Noi, Grundfos, declarăm pe propria răspundere că produsele Hydro Multi-E, la care se referă această declarație, sunt în conformitate cu aceste Directive de Consiliu asupra armonizării legilor Statelor Membre CE:

SE: EG-försäkran om överensstämmelse

Vi, Grundfos, försäkrar under ansvar att produkterna Hydro Multi-E, som omfattas av denna försäkran, är i överensstämmelse med rådets direktiv om inbördes närmande till EU-medlemsstaternas lagstiftning, avseende:

TR: EC uygunluk bildirgesi

Grundfos olarak bu beyannameye konu olan Hydro Multi-E ürünlerinin, AB Üyesi Ülkelerin kanunlarını birbirine yaklaştırma üzerine Konsey Direktifleriyle uyumlu olduğunun yalnızca bizim sorumluluğumuz altında olduğunu beyan ederiz:

- Machinery Directive (2006/42/EC).
Standards used: EN 809:1998 and EN 60204-1:2006.
- EMC Directive (2004/108/EC).
Standards used: EN 61000-6-2:2005 and EN 61000-6-3:2007.

Bjerringbro, 15th December 2011



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Technical Director
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Person authorised to compile technical file and empowered to sign the EC declaration of conformity.

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