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Hydro Multi-E

Booster systems with 2 to 4 CRE, CRIE or CME pumps
50/60 Hz



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Table of contents

1. Product introduction 3
Introduction . . . 3
Applications . . . 3
Benefits . . . 4

2. Product data 5
Performance range . . . 5
Type key . . . 7
Operating conditions . . . 8

3. Construction 9
System components . . . 9
Materials . . . 9
Diaphragm tank . . . 10
Environmental considerations . . . 10

4. Functions 11
Overview of functions . . . 11
Description of functions . . . 12
Overview of inputs and outputs . . . 13

5. Installation 14
Mechanical installation . . . 14
Electrical installation . . . 14

6. Control of Hydro Multi-E 15
Control options . . . 15
Control modes . . . 17

7. Sizing 18
Understanding the curve charts . . . 23
How to select a system, example . . . 24

8. Curve conditions 25
How to read the curve charts . . . 25

9. Curve charts and technical data 26
Hydro Multi-E with CRE, CRIE 1-X . . . 26
Hydro Multi-E with CRE, CRIE 3-X . . . 28
Hydro Multi-E with CRE, CRIE 5-X . . . 30
Hydro Multi-E with CRE, CRIE 10-X . . . 32
Hydro Multi-E with CRE, CRIE 15-X . . . 34
Hydro Multi-E with CRE, CRIE 20-X . . . 36
Hydro Multi-E with CME 3-5 . . . 38
Hydro Multi-E with CME 5-X . . . 40
Hydro Multi-E with CME 10-X . . . 42
Hydro Multi-E with CME 15-X . . . 44

10. Optional equipment 46

11. Accessories 48
Grundfos GO Remote . . . 48
Additional documentation . . . 48

12. Grundfos Product Center 49

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1. Product introduction

Introduction

The Hydro Multi-E booster systems consist of two to four Grundfos CRE, CRIE pumps or two or three CME-A, CME-I pumps connected in parallel and mounted on a common base frame with all necessary fittings.

As standard, Hydro Multi-E is supplied with the following components:

- base frame
- pumps
- inlet and outlet manifolds
- pressure switch as dry-running protection
- one or two outlet-pressure sensors, depending on pump size
- non-return valves, one per pump
- isolating valves, two per pump
- pressure gauge
- diaphragm tank
- breaker box.

Hydro Multi-E is factory-tested and ready for operation on delivery.

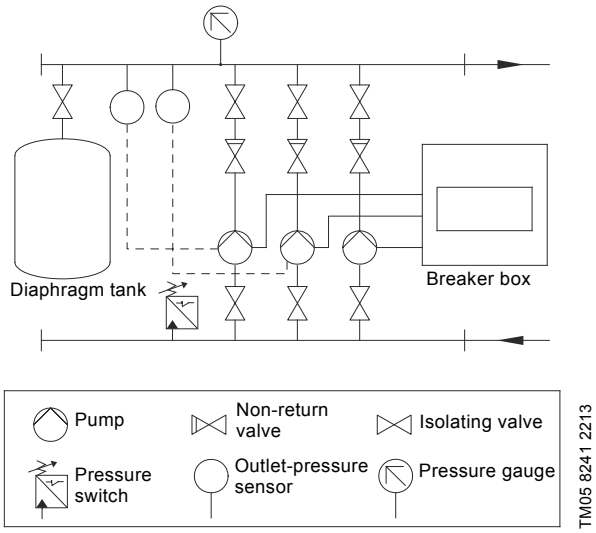


Fig. 1 Schematic drawing of Hydro Multi-E with three single-phase pumps

Hydro Multi-E, 0.37 to 11 kW

The pumps incorporated in this Hydro Multi-E system are fitted with the new-generation MGE motors which are permanent-magnet motors with a high-efficiency frequency converter. The motors ensure an even higher efficiency than the previous version of the booster system. The MGE motors have a total efficiency which exceeds the IE4 Super Premium Efficiency level defined for fixed-speed motors.

Hydro Multi-E with pumps in this range offers additional functions:

- multimaster function
- pipe-filling function
- predefined setpoint
- external setpoint influence
- limit-exceeded function.

Applications

The Grundfos Hydro Multi-E booster systems are designed for the transfer and pressure boosting of clean water in places such as

- blocks of flats
- hotels
- industry
- hospitals
- schools.

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Benefits

Plug-and-pump solution

Hydro Multi-E is supplied as a complete preassembled system mounted on a base frame. The only task left is to connect the pipes and the power supply.

User-friendliness

Hydro Multi-E is a highly intelligent booster system which is capable of controlling two to four speed-controlled pumps in cascade. Hydro Multi-E is one of our most simple booster systems to start up and operate. It has only two buttons for complete control of the system. Alternatively, you can use Grundfos GO Remote for setup and control.

Perfect constant-pressure control

The speed-controlled pumps are perfectly controlled and adjusted by the PI controller of Hydro Multi-E to deliver the correct pressure at the required flow.

Reliability

Grundfos CRE, CRIE and CME pumps are known for their reliability and long life. The PI controller is protected inside the pump and this has proven to be a very reliable solution.

Multimaster function (0.37 to 11 kW)

All pumps that have an outlet-pressure sensor connected are capable of taking control of the entire booster system. This means that the system will continue to operate as a booster system even if one or more of the pumps or sensors are unavailable. Compared to systems with only one sensor, this makes Hydro Multi-E an extremely reliable solution.

Redundant sensor (0.37 to 11 kW)

No system is more reliable than the weakest component. In connection with booster systems, it is common to rely on only one pressure measurement. However, that makes the operation extremely dependent on one single sensor. On Hydro Multi-E, we do not depend on one sensor (single point of failure) as the booster system is supplied with two outlet-pressure sensors as standard.

Tested and ready to use

Before delivery, all Hydro Multi-E systems are carefully tested to Grundfos standard, i.e. pressure-tested and tested for full functionality.

Low energy consumption

Hydro Multi-E ensures low energy consumption through speed-controlled pumps, automatic cascade control of the pumps and highly efficient low-flow operation. The highly efficient motors and pumps also contribute to the overall high efficiency of Hydro Multi-E system.

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2. Product data

Performance range

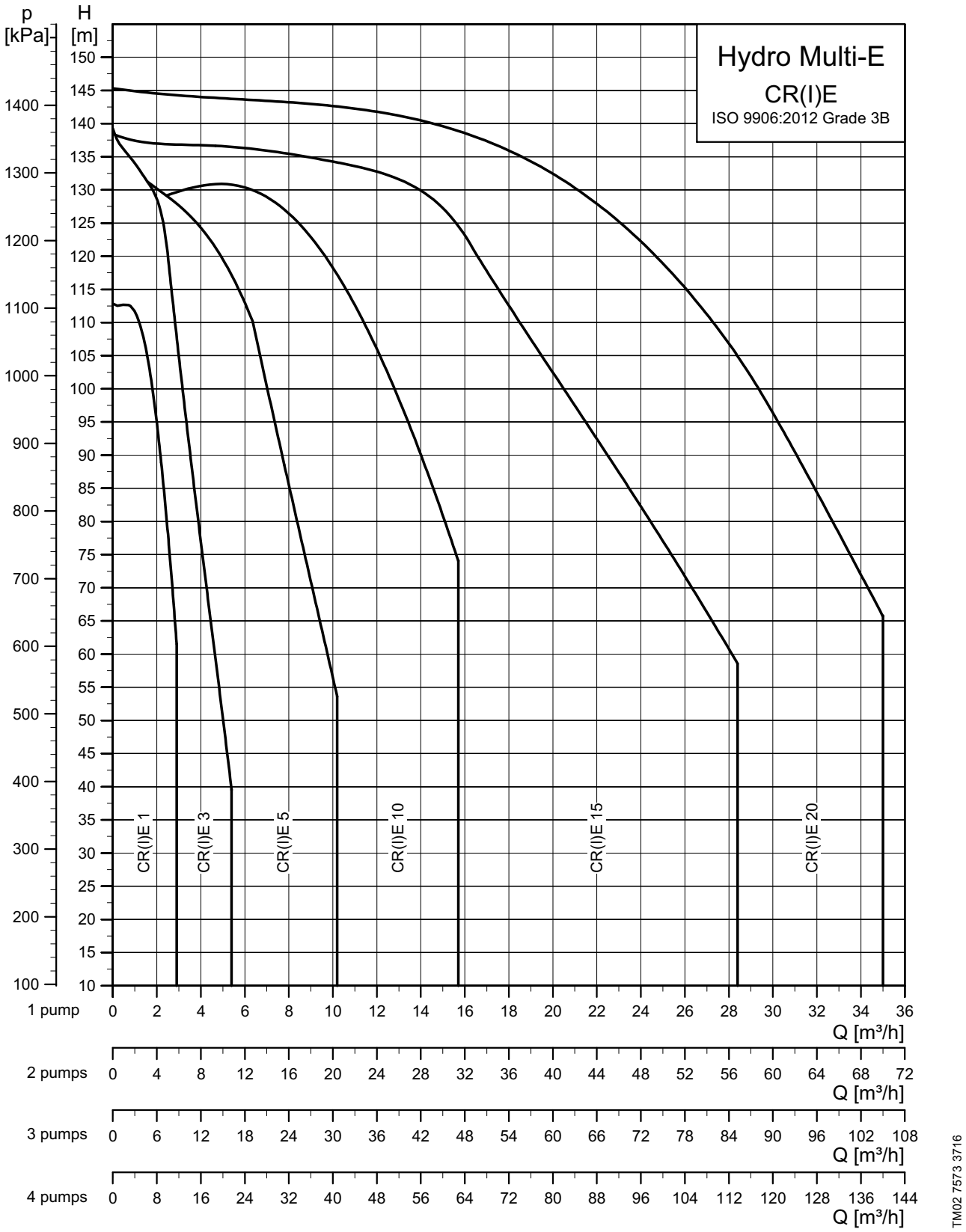


Fig. 2 Performance range, Hydro Multi-E CRE, CRIE

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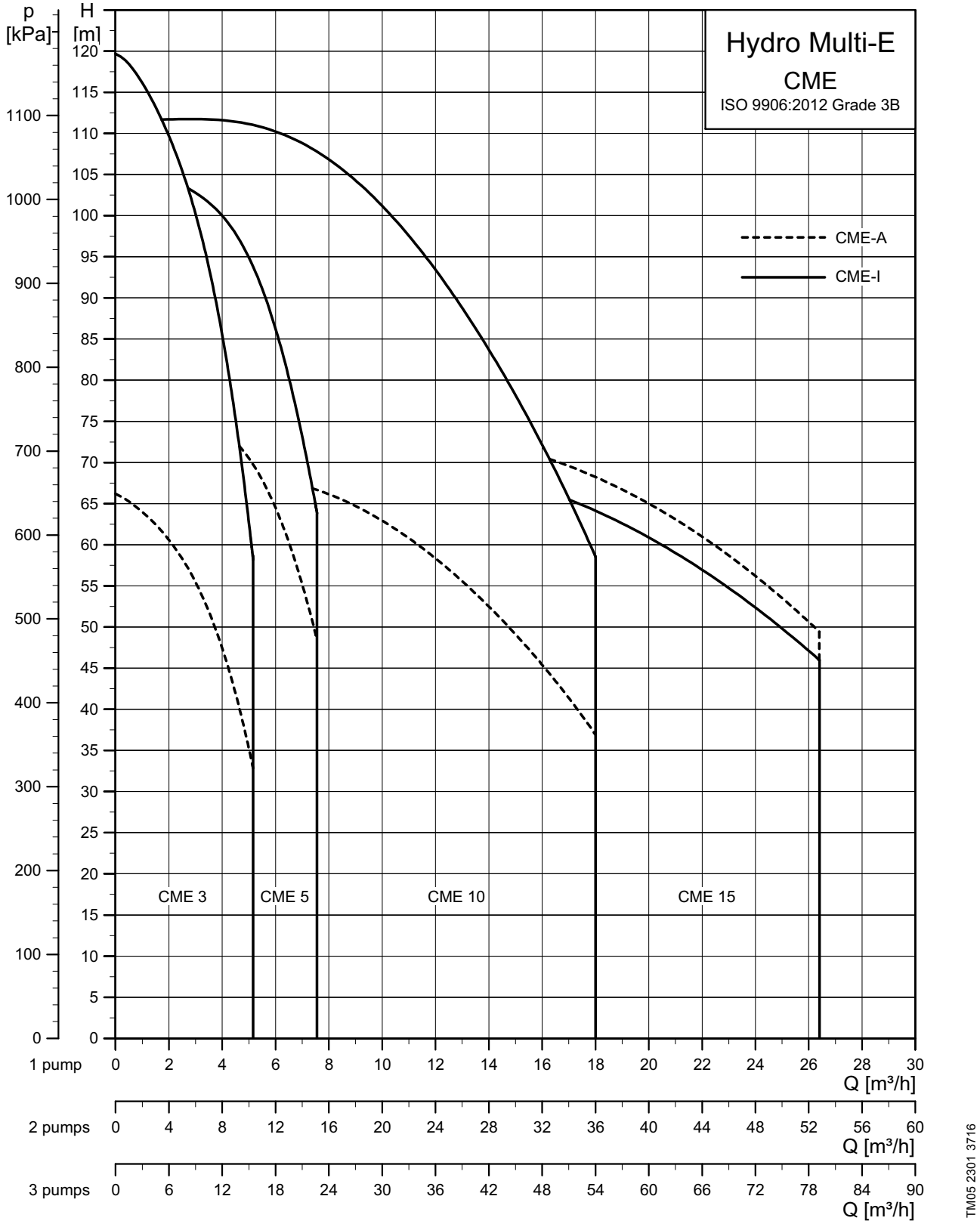


Fig. 3 Performance range, Hydro Multi-E CME

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Type key

Example	Hydro Multi	-E	2	CRIE 15-3	U7	A-	A-	A-	A-	ABCDEF

Name

System type
E: All pumps with E-motor

Number of main pumps

Pump type

Voltage code
U1: 3 x 380-415, N, PE, 50/60 Hz
U2: 3 x 380-415, PE, 50/60 Hz
U7: 1 x 200-240, PE, 50/60 Hz
U8: 1 x 200-240, N, PE, 50/60 Hz

Design
A: Systems with breaker cabinet mounted on the system
B: Systems with wall mounted breaker cabinet and 5 m power supply cable
C: Systems with breaker cabinet mounted on the left side.

Starting method
A: E, variable frequency, VFD

Material combination
A: Stainless steel manifold, base frame and standard valves
B: Stainless steel manifold, base frame and valves
C: Galvanised steel manifold, base frame and standard valves (CM-A pumps only)
G: Galvanised steel manifold, base frame and standard valves
P: Stainless steel manifold, galvanised steel base frame and standard valves

Drinking water approvals
A: ACS-approved components
B: Belgaqua-approved components
D: DVGW-approved components
K: KIWA-approved components
N: NFS-approved components
V: WRAS-approved components
W: WRAS-approved system
Y: No special approval

Options
A: Standard hydraulics
B: No redundant outlet-pressure sensor
C: Outlet-pressure sensor on each pump
D: Sensor as dry-running protection
E: No dry-running protection
F: Level switch as dry-running protection
G: CIM module included

K: No inlet manifold
L: Non-return valves on the inlet side
S: CSU variant
U: Undersized motor
X: More than four options

Note: The type key cannot be used for ordering as not all combinations are possible.

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Operating conditions

Liquid temperature: 0 to +60 °C.

Ambient temperature:

Power range [kW]	Permissible ambient temperature [°C]
0.37 - 11	0 to +50

Minimum inlet pressure

Hydro Multi-E with CRE pumps

The minimum inlet pressure H in metres head required to avoid cavitation in the pump is calculated as follows:

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

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 The NPSH value can be read from the NPSH curve at the highest flow which the individual pump will be delivering.

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

H_v = Vapour pressure in metres head.

H_s = Safety margin of minimum 0.5 metres head.

Hydro Multi-E with CME pumps

Hydro Multi-E systems with CME pumps always require a positive inlet pressure, both during startup and operation.

Note: In some regions, the booster system is available with a low inlet manifold which makes it more suitable for suction-lift operation. Contact Grundfos for further information.

Maximum inlet pressure

The following table shows the maximum permissible inlet pressure. However, the actual inlet pressure plus the pressure against a closed valve must always be lower than the maximum permissible operating pressure.

If the maximum permissible operating pressure is exceeded, the conical bearing in the motor may be damaged and the life of the shaft seal reduced.

Pump type	Maximum permissible inlet pressure [bar]		
	8	10	15
CR(I)E 1-4, 1-6, 1-9		•	
CR(I)E 3-2, 3-4, 3-5, 3-8, 3-11		•	
CR(I)E 5-2, 5-4, 5-5, 5-9		•	
CR(I)E 5-12			•
CR(I)E 10-3, 10-5	•		
CR(I)E 10-6, 10-9		•	
CR(I)E 15-1, 15-2	•		
CR(I)E 15-3, 15-4, 15-5		•	
CR(I)E 20-1	•		
CR(I)E 20-2, 20-3, 20-4		•	

Maximum operating pressure

Pump type	Maximum permissible operating pressure [bar]	
	10	16
CME-A 3-3, 3,5	•	
CME-I 3-3, 3-5	•	
CME-I 3-7, 3-9		•
CME-A 5-3, 5-4, 5-5, 5-6	•	
CME-I 5-3, 5-4, 5-5, 5-6	•	
CME-I 5-8		•
CME-A 10-2, 10-3	•	
CME-I 10-2, 10-3	•	
CME-I 10-4 10-4		•
CME-A 15-1, 15-2, 15-3	•	
CME-A 15-1, 15-2, 15-3	•	
CR(I)E 1-4, 6	•	
CR(I)E 1-9		•
CR(I)E 3-2, 3-4, 3-5, 3-8, 3-17	•	
CR(I)E 3-11		•
CR(I)E5-2, 5-4, 5-5, 5-9	•	
CR(I)E 5-9, 5-12		•
CR(I)E 10-1, 10-3, 10-5	•	
CR(I)E 10-6, 10-9		•
CR(I)E15-1. 15-2	•	
CR(I)E 15-5		•
CR(I)E 20-1, 20-2, 20-3	•	
CR(I)E 20-4		•

Note: The total inlet pressure and the pressure when the pump is running against a closed valve must not exceed the maximum system pressure.

There is no maximum inlet pressure for CME pumps. Make sure that the total system pressure does not exceed the maximum permissible operating pressure

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3. Construction

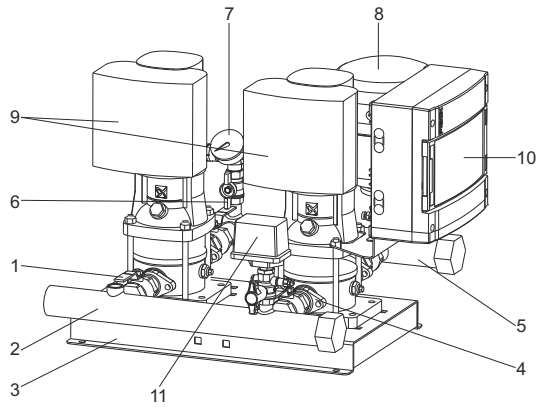


Fig. 4 Hydro Multi-E with two CRE, CRIE pumps

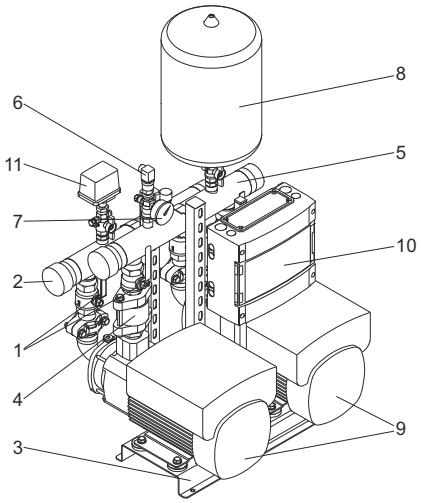


Fig. 5 Hydro Multi-E with two CME pumps

Pos.	Description	Quantity
		Hydro Multi-E 0.37 - 11 kW
1	Isolating valve	2 per pump
2	Inlet manifold	1
3	Base frame	1
4	Non-return valve	1 per pump
5	Outlet manifold	1
6	Outlet-pressure sensor	2
7	Pressure gauge	1
8	Diaphragm tank	1
9	Pump	2 to 4*
10	Breaker box	1
11	Pressure switch as dry-running protection	1

* Only systems with CRE, CRIE pumps are available with four pumps.

System components

Hydro Multi-E has a base frame fitted with these components:

Components fitted on the inlet side

- an inlet manifold
- one isolating valve per pump
- a pressure switch for dry-running protection.

Components fitted on the outlet side

- an outlet manifold
- one non-return valve per pump
- one isolating valve per pump
- a pressure gauge
- two outlet-pressure sensors
- a diaphragm tank.

Hydro Multi-E is fitted with a breaker box for switching the power supply on and off.

Materials

Hydro Multi-E incorporates the well-known high-quality Grundfos CRE, CRIE or CME pumps. However, the quality extends beyond the pumps. As standard, Hydro Multi-E is supplied with stainless-steel manifolds (EN 1.4301) manufactured using an extrusion method that creates a smooth surface from the connecting pipe to the manifold. This minimises the risk of stagnant water and reduces noise and friction loss.

Note: In some regions, galvanised-steel manifolds are also available. Contact Grundfos for further information.

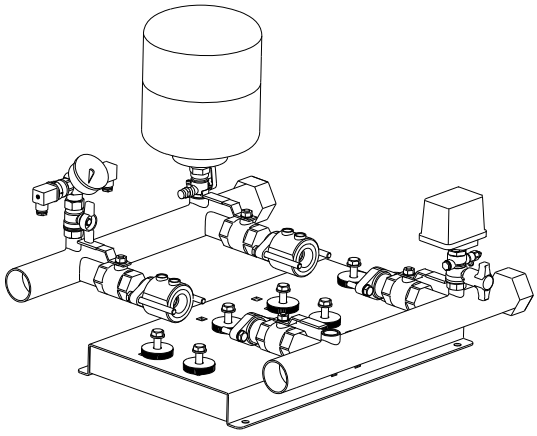


Fig. 6 Base frame, manifolds and valves

Pump type	Material specification for base frame and manifold	
CRE	Stainless steel	EN 1.4301/AISI304
CRIE	Stainless steel	
CME-I	Stainless steel	
CME-A	Galvanised steel	-

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Diaphragm tank

To ensure optimum operation, the tank must be precharged with pressure.

The precharge pressure = 0.7 x setpoint.

The diaphragm tank precharge pressure must be measured in a pressureless system.

We recommend that you refill the tank with nitrogen.

Environmental considerations

We manufacture our motors and other products with a high degree of consideration for the environment in respect of materials, production methods, energy-saving operation and recycling of as many materials as possible.

Grundfos A/S is certified as environmentally friendly in accordance with ISO 14001.

Grundfos A/S is approved in accordance with European certification standard EMAS.

Grundfos A/S holds an ISO 9001 certificate.

CE marking

Hydro Multi-E booster systems on the European market are CE-marked.

CE

TM02 1695 1901

Fig. 7 CE marking

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4. Functions

Overview of functions

Functions	Hydro Multi-E
	0.37 - 11 kW
Automatic cascade control	•
Dry-running protection	•
Pump alternation	•
Limit exceeded 1 and 2	•
Multimaster function	•
Number of starts per hour	•
Stop function	•
Pipe-filling function	•
External setpoint influence	•
Predefined setpoint	•
Communication*	
GENIbus	•
LonWorks	•
PROFIBUS DP	•
Modbus RTU	•
GSM/GPRS	•
Grundfos Remote Management	•
BACnet MS/TP	•
PROFIBUS I/O / Modbus TCP	•

* Communication interface module or unit required.

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Description of functions

Automatic cascade control

Cascade control ensures that the performance of Hydro Multi-E is automatically adapted to the consumption by switching pumps on or off. The system thus runs as energy-efficiently as possible with a constant pressure and only the number of pumps required.

Dry-running protection

This function is very important as dry running may damage bearings and shaft seals.

The inlet pressure of the system or the water level in a possible tank on the inlet side is monitored. If the inlet pressure or the water level becomes too low, all pumps will be stopped.

Level switches, pressure switches or analog sensors signalling water shortage at a set level can be used.

Pump alternation

This function ensures that the operating hours are distributed evenly on the pumps over time.

Limit exceeded 1 and 2

Hydro Multi-E, 0.37 to 11 kW

The limit-exceeded function is used for monitoring one or two values/inputs. The function enables different inputs to activate various outputs and alarms/warnings when the signal input has exceeded predetermined limits. The purpose of this function is to monitor parameters which are central for the application. This will enable the pumps to react to possible abnormal operating conditions.

The function can for instance be used for monitoring the following:

- the inlet pressure if an inlet pressure sensor is connected
- the drinking water temperature if a temperature sensor is connected.

Multimaster function

Hydro Multi-E, 0.37 to 11 kW

All pumps that have an outlet-pressure sensor connected can function as master pump and control the system. As standard, Hydro Multi-E is supplied with two outlet-pressure sensors, one connected to pump 1 and the other to pump 2.

As standard, the pump with the lowest number will be the master pump. From factory, the master pump is marked with number 1.

If the master pump is switched off or stopped due to an alarm, one of the other pumps will automatically take over the control of the system. Thereby, the reliability is increased and stop of operation is prevented.

As an option, the system can be supplied with only one outlet-pressure sensor. In that case, the system will stop if the pump or sensor fails.

The system can also be fitted with sensors on all pumps for maximum reliability.

Number of starts per hour

This function limits the number of pump starts and stops per hour.

Each time a pump starts or stops, the system will calculate when the next pump is allowed to start or stop in order not to exceed the permissible number of starts per hour.

This function always allows pumps to be started to meet the requirement, but pump stops will be delayed, if necessary, in order not to exceed the permissible number of starts/stops per hour.

Stop function

The stop function checks the flow regularly by reducing the speed for a short time, thus checking the change in pressure. If there is no or a small change in pressure, the pump will detect a low flow.

When the pump detects a low flow, the speed will be increased until the stop pressure (actual setpoint + 0.5 x ΔH) is reached, and the pump stops. When the pressure has fallen to the start pressure (actual setpoint - 0.5 x ΔH), the pump will restart.

ΔH indicates the difference between start and stop pressures.

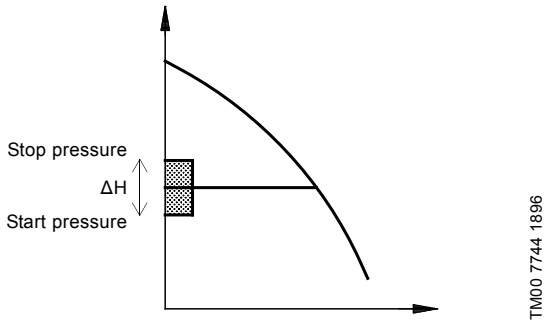


Fig. 8 Start and stop pressures

ΔH is factory-set to 10 % of actual setpoint. ΔH can be set within the range from 5 to 30 % of actual setpoint.

Hydro Multi-E is fitted with a diaphragm tank of an appropriate size to accommodate the operation in low flow. The precharge pressure must be 0.7 times the actual setpoint.

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Pipe-filling function

Hydro Multi-E, 0.37 to 11 kW

This function ensures a soft start of systems with empty pipework.

The function has two phases:

1. The pipework is slowly filled with water.
2. When the pressure sensor of the system detects that the pipework has been filled with water, the pressure is increased until it reaches the setpoint. See fig. 9.

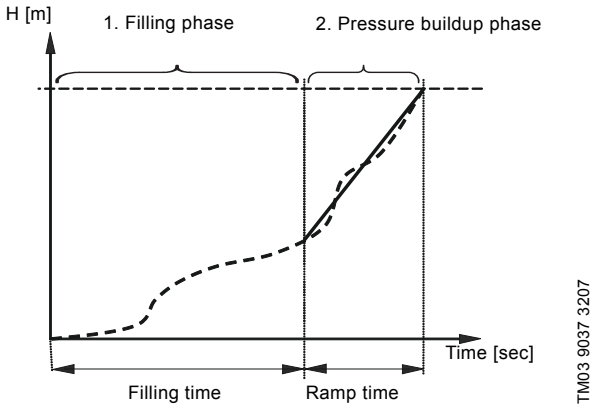


Fig. 9 Filling and pressure buildup phases

The function can be used to prevent water hammer in high-rise buildings with unstable power supply or in irrigation systems.

External setpoint influence

Hydro Multi-E, 0.37 to 11 kW

This function is used for influencing the setpoint via an external setpoint signal. The value of the external setpoint signal is used in a formula calculating a "new" setpoint, the actual setpoint. The function is often used for adjusting the setpoint depending on an external input from a Grundfos VSF flowmeter.

Predefined setpoint

Hydro Multi-E, 0.37 to 11 kW

This function is used for changing between predefined setpoints via digital input signals. This means that the operator can easily change setpoint by pressing a button. Due to the combination of digital inputs, up to three predefined setpoints can be configured.

Overview of inputs and outputs

Terminals	Hydro Multi-E
	0.37 - 11 kW
Digital inputs	2 inputs
Analog inputs	3 inputs
Digital outputs	2 outputs
Digital input/output	2 inputs or 2 outputs

Using the inputs and outputs

Hydro Multi-E, 0.37 to 11 kW

- Two digital inputs
  The digital inputs can be used for remote control of the following functions:
  - external stop
  - setting the pumps to operation on the maximum curve
  - setting the pumps to operation on the minimum curve
  - dry-running protection, pulse flow, flow switch.
- Two analog inputs
  The analog inputs can be used for feedback sensors, setting of setpoint influence or monitoring of analog values with the limit-exceeded function.
- Two digital outputs
  The digital outputs can be used for sending a signal regarding pump operating status:
  - ready
  - fault
  - operating
  - running
  - limit exceeded.

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5. Installation

Mechanical installation

Location

Install the booster system in a well ventilated room to ensure sufficient cooling of the pumps.

Note: The booster system is not designed for outdoor installation and must not be exposed to direct sunlight.

Allow sufficient clearance around the booster system to enable the operator to work freely.

Enclosure class: IP54.

Insulation class: F.

Motor cooling

To ensure adequate cooling of motor and electronics, the following must be observed:

- Place Hydro Multi-E in a well ventilated room.
- The temperature of the cooling air must not exceed 40 °C.
- Keep motor cooling fins, holes in fan cover and fan blades clean.

Pipework

The pipes connected to the booster system must be of adequate size. Fit expansion joints in the inlet and outlet manifolds to avoid resonance.

Connect the pipes to the manifolds of the booster system.

Tighten the booster system before startup.

We recommend that you fit pipe supports for the inlet and outlet pipes.

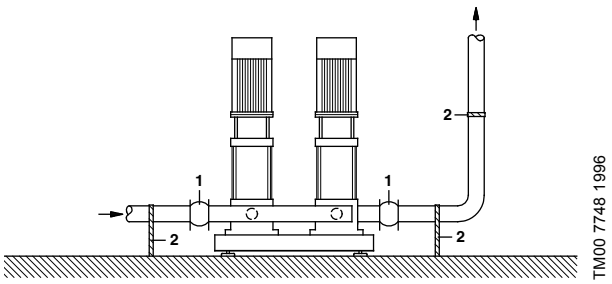


Fig. 10 Pipework

Pos.	Description
1	Expansion joint
2	Pipe support

Note: The expansion joints and pipe supports shown in fig. 10 are not included in a standard booster system.

Foundation

Position the booster system on an even and solid surface, such as a concrete floor or foundation. If the booster system is not fitted with vibration dampers, bolt it to the floor or foundation.

Electrical installation

The electrical connection and protection must be carried out in accordance with local regulations.

- Hydro Multi-E must be correctly earthed.
  Note: 4.0 to 5.5 kW motors must be connected to especially reliable or sturdy earth connections due to an earth leakage current above 3.5 mA.
- The pumps require no external motor protection. The motors incorporate thermal protection against slow overloading and blocking (IEC 34-11: TP 211).
- When the pumps are switched on via the power supply, they start after approximately. 5 seconds.

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

If the system is supplied with a breaker box for wall mounting, the cabinet must be mounted in accordance with local regulations.

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6. Control of Hydro Multi-E

Control options

Communication with Hydro Multi-E is possible by means of the following:

- the control panel on the pumps
- Grundfos GO Remote
- a building management system.

Control panels

The control panel on the pump terminal box enables the operator to change the setpoint and speed and to reset alarms.

The design and functionality of the control panel depend on pump size.

Hydro Multi-E, 0.37 to 11 kW

The pump control panel enables infrared and radio communication.

Light fields indicate the setpoint and the buttons can be used for setpoint setting.

Grundfos Eye is an indicator light that shows the operating status of the pump.

The indicator light will flash in different sequences and provide information about the following:

- power on/off
- pump warnings
- pump alarms
- remote control.

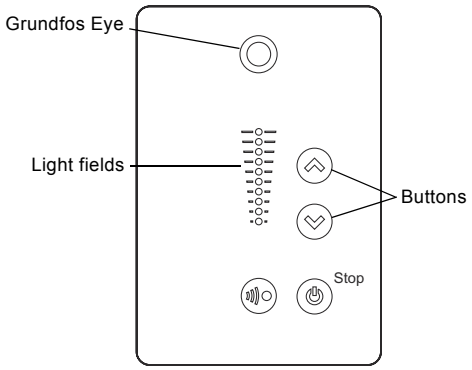


Fig. 11 Standard control panel, 0.37 to 11 kW pumps

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Grundfos GO remote



Fig. 12 Grundfos GO Remote

With Grundfos GO Remote, the operator can remotely monitor and change settings of Hydro Multi-E.

Grundfos GO Remote communicates with the pump via wireless infrared or radio communication, depending on pump size.

Communication interface	Hydro Multi-E 0.37 - 11 kW
Infrared	•
Radio	•

Grundfos GO Remote can be used for the following functions:

- reading of operating data
- reading of warning and alarm indications
- setting of control mode
- setting of setpoint
- selection of external setpoint signal
- allocation of pump number making it possible to distinguish between pumps that are connected via Grundfos GENIbus
- selection of function for digital input
- generation of reports (PDF)
- multipump setup
- displaying relevant documentation
- adjusting stop function
- pipe filling
- PI controller
- analog inputs
- setting of function of relays
- adjusting limits.

Grundfos GO Remote offers three different mobile interfaces (MI). See fig. 13.

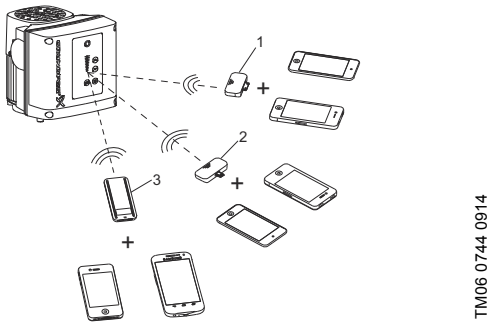


Fig. 13 Grundfos GO Remote

Pos.	Description
1	Grundfos MI 202: Add-on module. You can use MI 202 in conjunction with an Apple iPhone or iPod with 30-pin connector and iOS 5.0 or later, such as fourth-generation iPhone or iPod.
2	Grundfos MI 204: Add-on module. You can use MI 2014 in conjunction with an Apple iPhone or iPod with lightning connector, such as fifth generation iPhone or iPod. MI 204 is also available together with an Apple iPod touch and a cover.
3	Grundfos MI 301: Separate module enabling radio or infrared communication. You can use MI 301 in conjunction with an Android or iOS-based smart device with Bluetooth connection.

Grundfos GO Remote is available as an accessory. See page 48.

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Building management system (BMS)

Communication with Hydro Multi-E is possible even though the operator is not present near Hydro Multi-E. Communication is enabled by having connected Hydro Multi-E to a building management system allowing the operator to monitor and change control modes and setpoint settings of Hydro Multi-E.

The communication interface between Hydro Multi-E system and a central building management system varies, depending on pump size.

Hydro Multi-E, 0.37 to 11 kW

These booster systems can communicate with external systems via a Grundfos communication interface module (CIM) that can be fitted in the pumps. This means that no external communication interface is required.

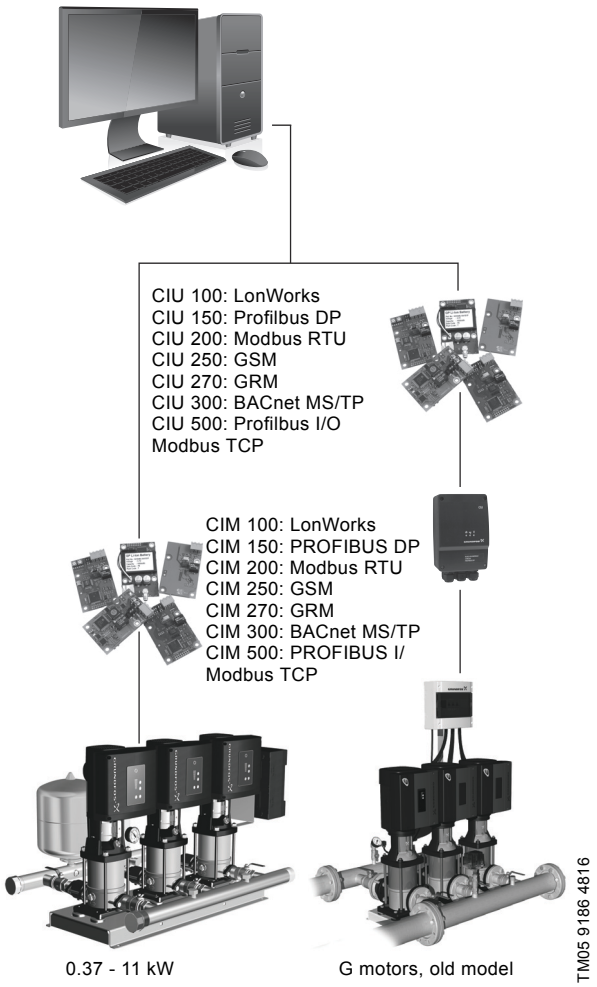


Fig. 14 Structure of a building management system

Control modes

Constant-pressure mode

Hydro Multi-E is suitable for applications where you want to control the pressure on the outlet side of the booster system, irrespective of the flow.

Signals of pressure changes in the piping system are transmitted continuously from the sensor to Hydro Multi-E. The pump responds to the signals by adjusting its performance up or down to compensate for the pressure difference between the actual and the desired pressures. As this adjustment is a continuous process, a constant pressure is maintained in the piping system.

In constant-pressure mode, Hydro Multi-E maintains a preset pressure on the outlet side of the booster system, irrespective of the flow.

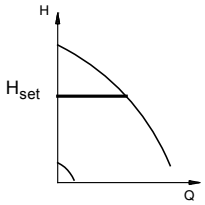


Fig. 15 Constant-pressure mode

To meet the flow requirements of the system, Hydro Multi-E continuously adjusts the number of running pumps.

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7. Sizing

When sizing a booster system, take these parameters 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 the Grundfos Hydro Multi-E booster systems via Grundfos Product Center or this data booklet.

Sizing in Grundfos Product Center (recommended)

We recommend that you size your Hydro Multi-E booster system in Grundfos Product Center, which is a selection program offered by Grundfos. For further information, see page 49.

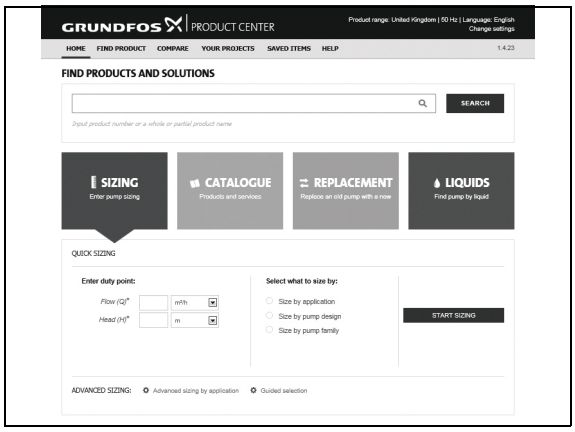


Fig. 16 Sizing in Grundfos Product Center

Sizing via this data booklet

There are seven steps:

1. Maximum flow requirement
2. Required outlet pressure
3. System layout
4. Consumption profile and load profile
5. Inlet pressure
6. Selection of booster system
7. Accessories.

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1. Maximum flow requirement

The total consumption and the required maximum flow rate depend on the application in question. The maximum flow requirement can be calculated by means of the table below which is based on statistical data.

Consumer	Unit	Q_{year}	Consumption period d	Q_{day}	fd	$Q(m)_{day}$	ft	Maximum flow rate
		m^3/year	days/year	m^3/day		m^3/day		m^3/h
Residence building	Residence (2.5 persons)	183	365	0.5	1.3	0.65	1.7	0.046
Office building	Employee	25	250	0.1	1.2	0.12	3.6	0.018
Shopping centre	Employee	25	300	0.08	1.2	0.1	4.3	0.018
Supermarket	Employee	80	300	0.27	1.5	0.4	3.0	0.05
Hotel	Bed	180	365	0.5	1.5	0.75	4.0	0.125
Hospital	Bed	300	365	0.8	1.2	1.0	3.0	0.12
School	Pupil	8	200	0.04	1.3	0.065	2.5	0.007

fd: Maximum consumption factor, day
ft: Maximum consumption factor, hour

Example: Hotel with 540 beds

Number of beds: n.
Total annual consumption: Q_{year} x n.
Consumption period: d.
Average consumption per day: (Q_{year} x n)/d.
Maximum consumption per day: $Q(m)_{day}$ = fd x Q_{day}.
Maximum flow requirement per hour: Q_{max} = maximum flow rate/hour x the number of beds.

Calculation

n = 540 beds.
Q_{year} x n = 180 x 540 = 97,200 m^3/year.
d = 365 days/year.
(Q_{year} x n)/d = 97,200/365 = 266.3 m^3/day.
$Q(m)_{day}$ = fd x Q_{day} = 1.5 x 266.3 = 399.4 m^3/day.
Q_{max} = Maximum flow rate/hour x number of beds = 0.125 x 540 = 67.5 m^3/h.

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2. Required outlet pressure

The required outlet pressure of Hydro Multi-E can be calculated with the following equation:

$p_{set} = p_{tap(min)} + p_f + (h_{max}/10.2)$

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

Key

p_{set} = Required outlet pressure in bar

$p_{tap(min)}$ = Required minimum pressure at the highest tapping point in bar

p_f = Total pipe friction loss in metres

h_{max} = Height from booster outlet port to highest tapping point in metres

$p_{in(min)}$ = Minimum inlet pressure in bar

p_{boost} = Required boost in bar.

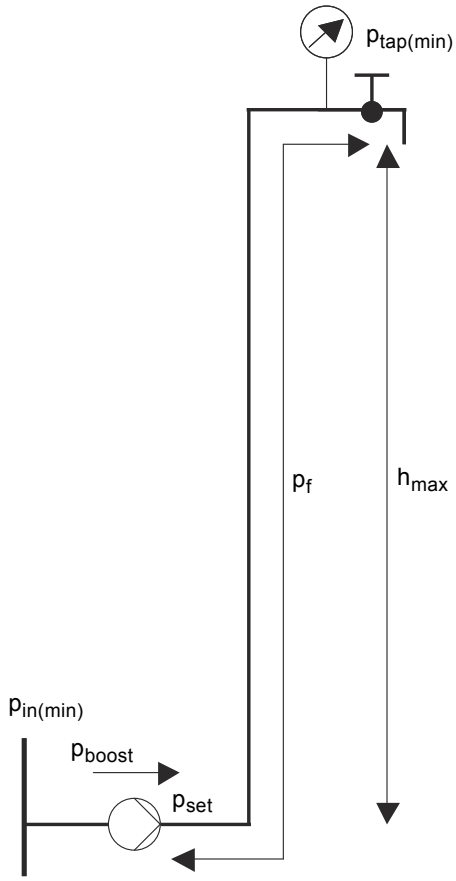


Fig. 17 Calculation of required outlet pressure

Calculation

$p_{tap(min)}$ = 2 bar

p_f = 1.2 bar

h_{max} = 41.5 metres

$p_{in(min)}$ = 2 bar

p_{set} = 2 + 1.2 + (41.5/10.2) = 7.3 bar

p_{boost} = 7.3 - 2 = 5.3 bar.

3. System layout

What is the system layout?

a) Direct boosting
Example: Hydro Multi-E connected to water mains designed to distribute water from one place to another.

b) Break tank
Example: Hydro Multi-E connected to a break tank installed before the booster system). Hydro Multi-E connected to a break tank installed before the booster system.

c) Pressure boosting in zones
Example: High-rise building or hilly landscape where the water supply system is divided into zones.

d) Roof tank
Example: Hydro Multi-E distributes water to a roof tank on top of a high-rise building.

4. Consumption profile and load profile

The consumption pattern of the installation can be illustrated as a 24-hour consumption profile and a load profile.

24-hour consumption profile

The 24-hour consumption profile is the relation between the time of the day and the flow rate.

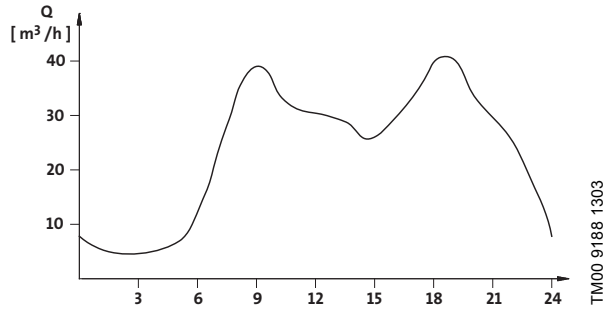


Fig. 18 Example of 24-hour consumption profile

Note: If the consumption is variable and optimum comfort is required, use pumps with continuously variable speed.

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Load profile

When the 24-hour consumption profile has been determined, the load profile can be made.

The load profile gives an overview of how many per cent per day the booster system operates at a specific flow rate.

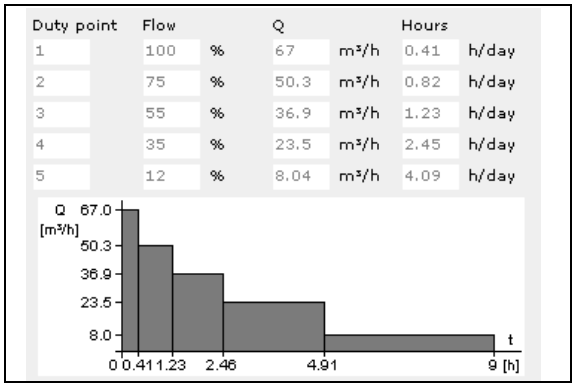
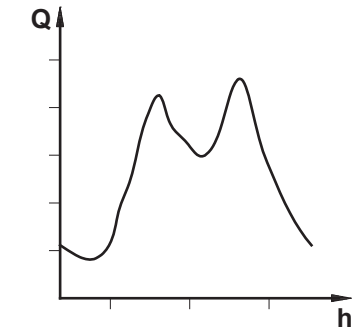
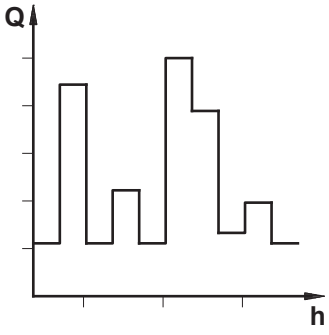
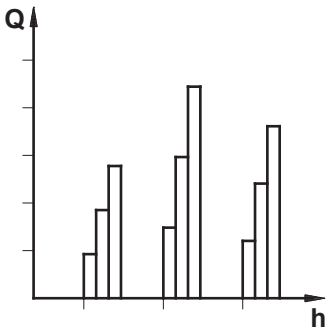
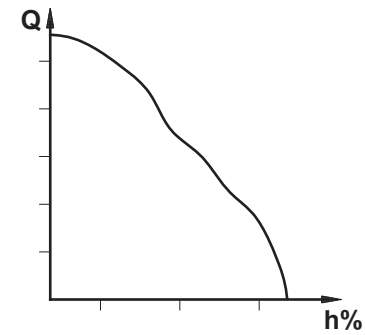
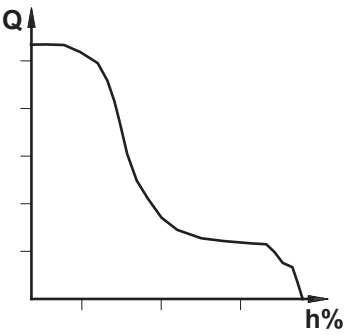
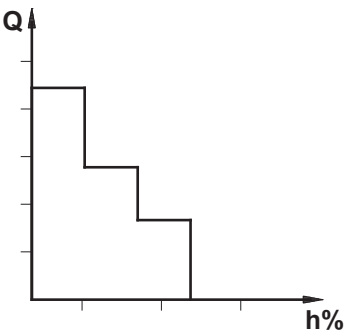


Fig. 19 Load profile

Examples of typical 24-hour consumption profiles and their load profiles:

	Water supply	Industry	Irrigation
24-hour profile		 TM00 9197 1705	 TM00 9200 1705 TM00 9198 1705
	Flow rate: Highly variable **Pressure:** Constant	**Flow rate:** Highly variable with sudden changes **Pressure:** Constant	**Flow rate:** Constant and known **Pressure:** Constant
Duty-time profile		 TM00 9201 1705	 TM00 9199 1705 TM00 9202 1705
	Consumption is highly variable. Continuously variable speed control of the pumps is recommended. **Recommended types:** -E and -F	Consumption is highly variable with sudden changes. Continuously variable speed control of the pumps is recommended. **Recommended types:** -E and -F	Variations in consumption are regular, yet known. Simple control is recommended. **Recommended types:** -S

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5. Inlet pressure

Is there a positive inlet pressure? If so, take the inlet pressure into consideration to ensure safe operation.

If there is a positive inlet pressure, this has to be added to the outlet pressure supplied by the booster system in order to evaluate the resulting maximum outlet pressure.

Example

A Hydro Multi-E-E booster system with 3 CRIE 20-7 pumps has been selected.

Maximum operating pressure: 16 bar.

Maximum inlet pressure: 10 bar.

Outlet pressure against a closed valve: 10 bar.

The selected system is allowed to start at an inlet pressure of maximum 5.8 bar, as the maximum operating pressure is limited to 16 bar. If the maximum inlet pressure exceeds 5.8 bar, select a system rated PN 25.

6. Selection of Hydro Multi-E booster system

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

7. Accessories

When you have selected the optimum Hydro Multi-E booster system, consider whether you require any of the accessories mentioned below.

Dry-running protection

Every booster system must be protected against dry running.

The inlet conditions determine the type of dry-running protection:

- If the system draws water from a tank or a well, select a level switch or an electrode relay for dry-running protection.
- If the system has an inlet pressure, select a pressure transmitter or a pressure switch for dry-running protection.

Optional equipment and accessories

Hydro Multi-E can be fitted with equipment for communication, dry-running protection, emergency operation, etc.

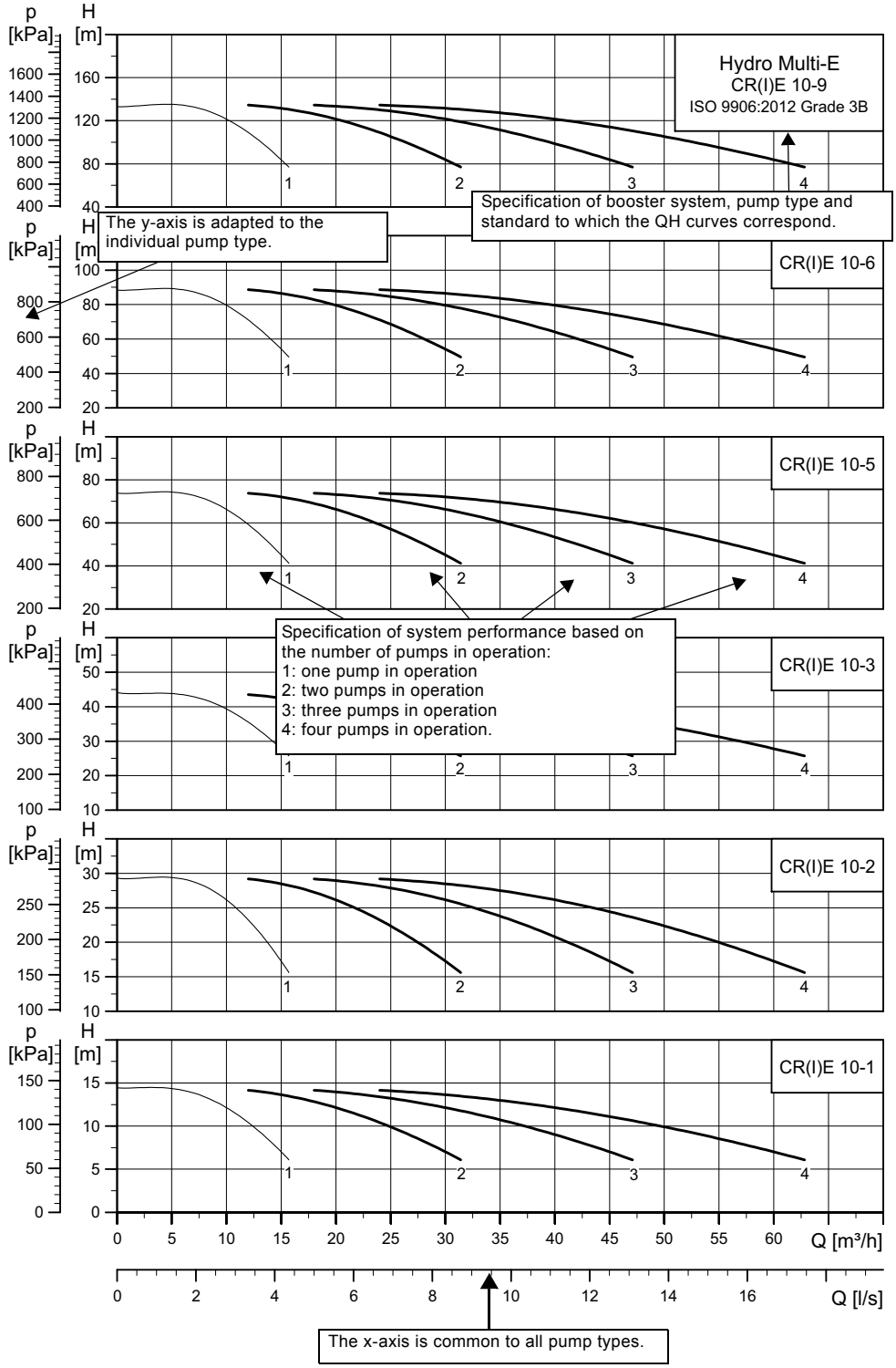
See sections *Optional equipment*, page 46, and *Accessories*, page 48, for more details.

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Understanding the curve charts

The x-axis showing the flow rate (Q) in m^3/h is common to all the curves; the y-axis showing the head (H) in metres has been adapted to the individual pump type.



TM02 7559 3803

Fig. 20 Understanding the curve charts

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How to select a system, example

- A flow rate of 18 m^3/h is required.
- A head of 45 m is required.

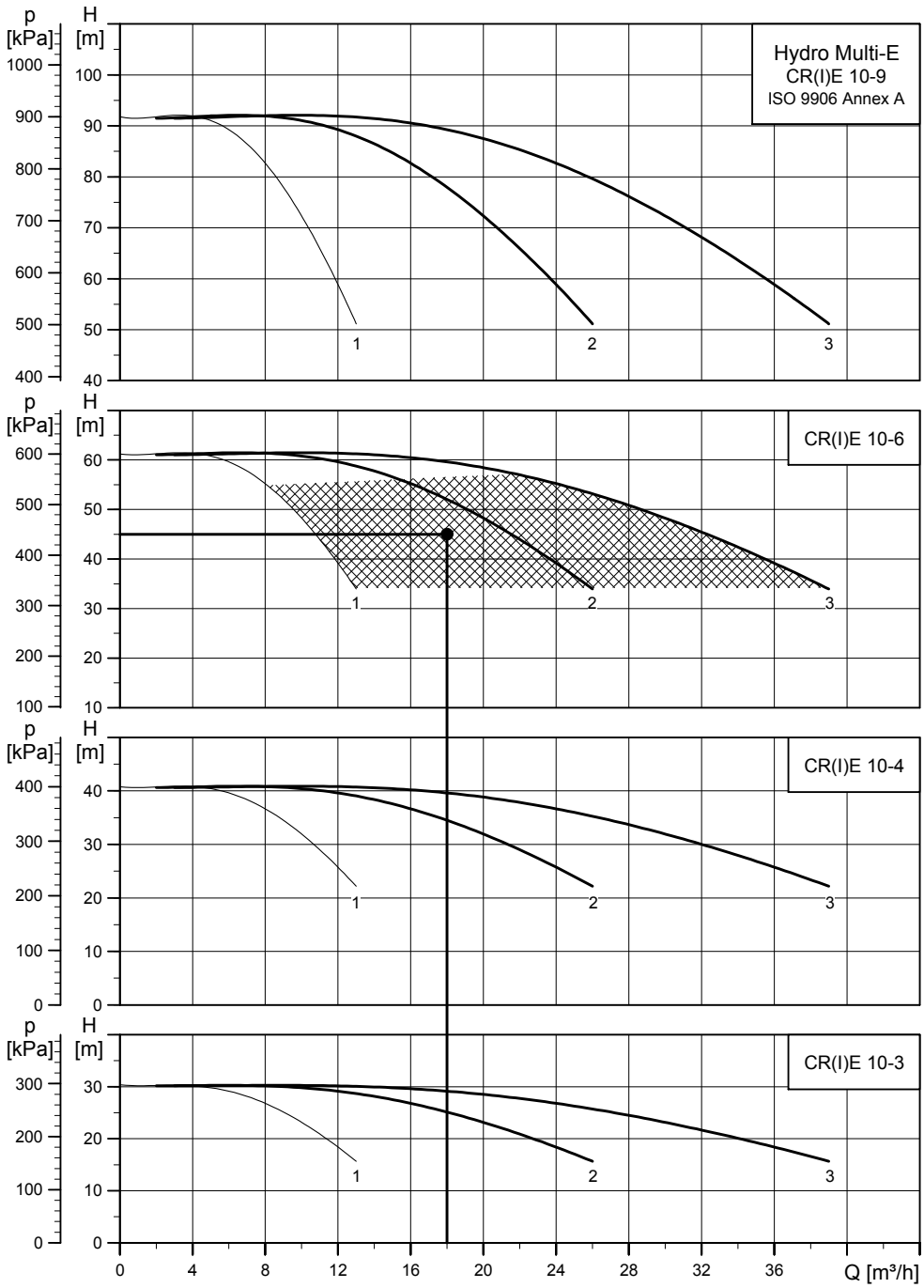
Draw a vertical line from the required flow rate

Draw a horizontal line from the required head.

The intersection of the two lines gives the number of pumps required for the system (two CRE, CRIE 10-6).

The pump type best meeting this specification is found by means of the y-axis, for instance CRE, CRIE 10-6).

Select only booster systems with performance ranges within the hatched area in the example.



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Fig. 21 Example of how to select a system

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8. Curve conditions

How to read the curve charts

The guidelines below apply to the curves on the following pages:

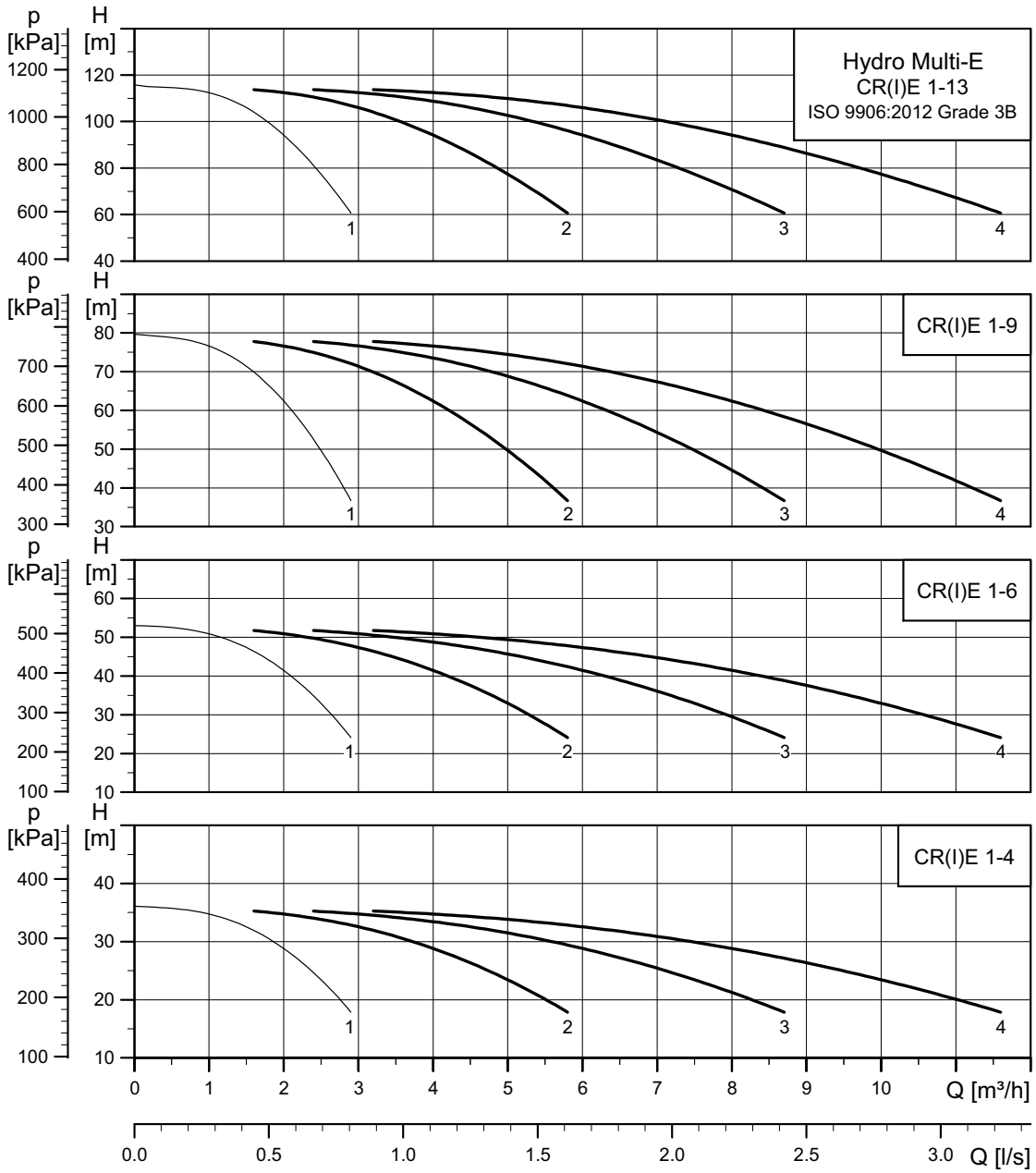
- Tolerances to ISO 9906:2012 Grade 3B, Annex A.
- Measurements have been made with airless water at a temperature of 20 °C.
- The curves apply to a kinematic viscosity of υ equal to 1 mm^2/s (1 cSt).
- The QH curves apply to fixed speeds of 3480 min^{-1} at 60 Hz.
  Note: In most cases, the actual speed deviates from the above-mentioned speeds. For realistic curves, please refer to Grundfos Product Center where the pump curves include the characteristics of the selected motor and therefore show curves at actual speeds.
  In Grundfos Product Center, you can also adjust the curves depending on the density and viscosity.
- The conversion between head H (m) and pressure p (kPa) applies to a water density of ρ equal to 1000 kg/m^3.

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9. Curve charts and technical data

Hydro Multi-E with CRE, CRIE 1-X

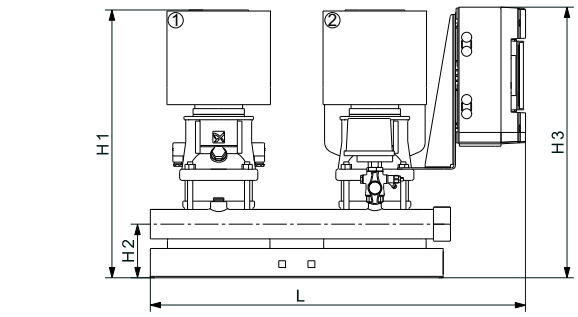


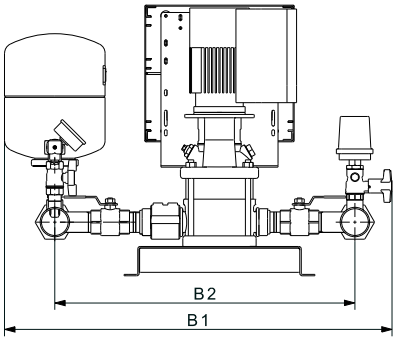
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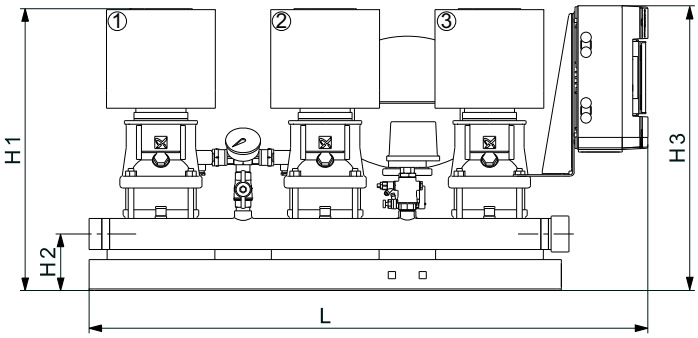
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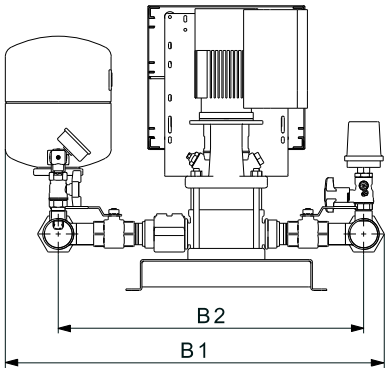
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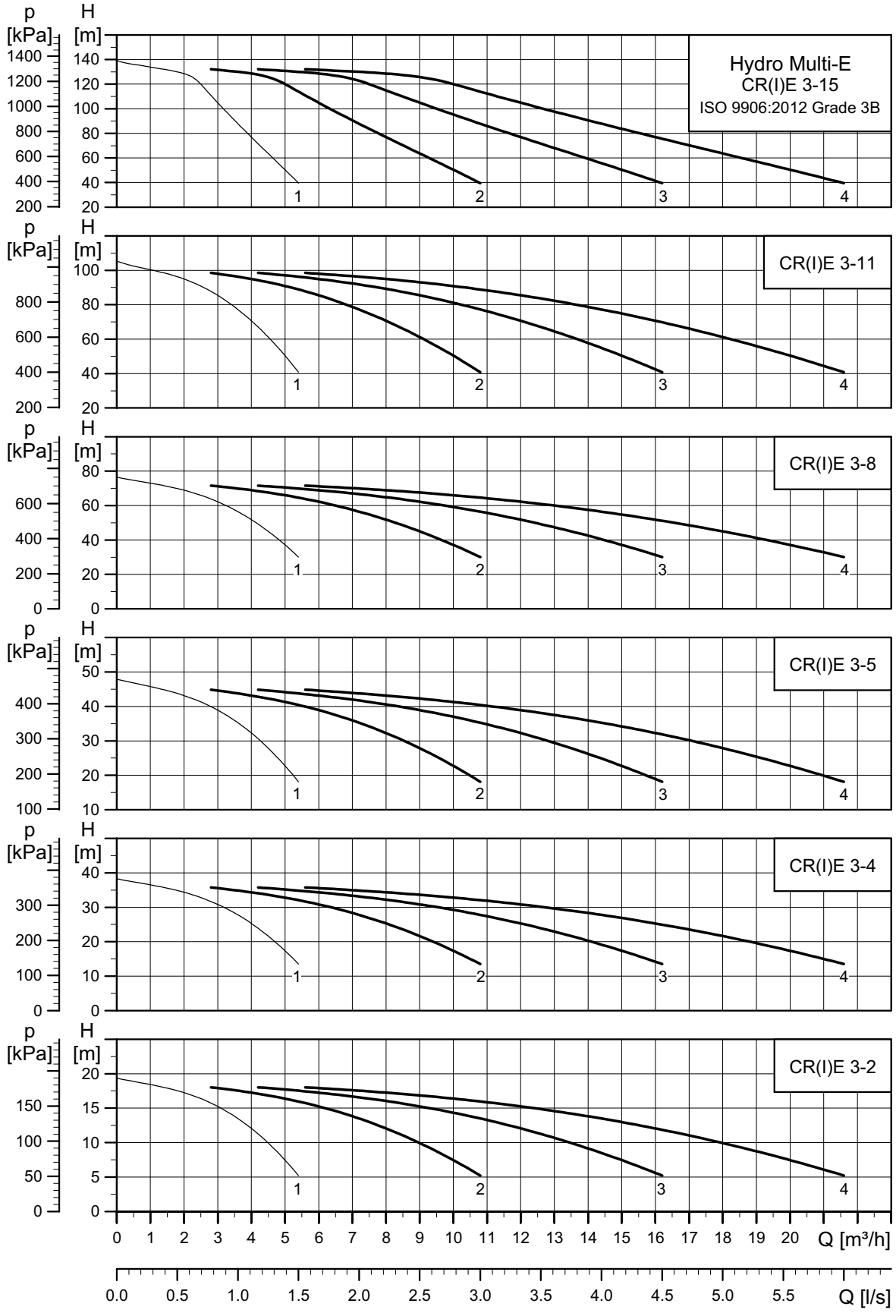
Number of pumps	Pump type	Motor [kW] 1)	Max. IN [A] 2)	Max. I0 [A] 3)	Supply voltage: Single-phase motor 3 x 400 V, PE, N	Supply voltage: Three-phase motor 3 x 400 V, PE	Manifold: Stainless steel	Manifold: Galvanised	Diaphragm tank [litres]	Connections	B1 [mm]	B2 [mm]	L [mm]	H1 [mm]	H2 [mm]	H3 [mm]	Net weight [kg]	Ship. vol. [m³]
2	CR(I)E 1-4	0,37	3,1	3,1	•	-	•	-	8	R 2	790	650	760	559	120	559	57	0,28
			2,1	-	-	•	•	-	8	R 2	785	650	770	559	120	559	86	0,28
3			3,8	3,8	•	-	•	-	8	R 2	785	650	1090	559	120	559	83	0,43
			3,1	-	-	•	•	-	8	R 2	785	650	1090	559	120	559	121	0,43
4			4,3	4,3	•	-	•	-	8	R 2 1/2	785	645	1410	559	120	559	114	0,60
			3,9	-	-	•	•	-	8	R 2 1/2	785	645	1410	559	120	559	157	0,60
2	CR(I)E 1-6	0,55	4,3	4,3	•	-	•	-	8	R 2	790	650	760	595	120	595	59	0,28
			2,7	-	-	•	•	-	8	R 2	785	650	770	595	120	595	88	0,28
3			5,3	5,3	•	-	•	-	8	R 2	785	650	1090	595	120	595	84	0,43
			4,0	-	-	•	•	-	8	R 2	785	650	1090	595	120	595	123	0,43
4			6,1	6,1	•	-	•	-	8	R 2 1/2	785	650	1410	595	120	595	118	0,60
			5,4	-	-	•	•	-	8	R 2 1/2	785	650	1410	595	120	595	161	0,60
2	CR(I)E 1-9	0,75	5,8	5,8	•	-	•	-	12	R 2	820	650	770	655	120	655	63	0,28
			3,4	-	-	•	•	-	12	R 2	820	650	770	655	120	655	96	0,28
3			7,1	7,1	•	-	•	-	12	R 2	820	650	1090	655	120	655	92	0,43
			5,0	-	-	•	•	-	12	R 2	820	650	1090	655	120	655	134	0,43
4			8,0	8	•	-	•	-	12	R 2 1/2	820	650	1410	655	120	655	126	0,60
			6,7	-	-	•	•	-	12	R 2 1/2	820	650	1410	655	120	655	174	0,60

1) Motor [kW] is the power per pump.
2) Max. IN [A] applies to the current for the specific Hydro Multi-E at a specific voltage (230 or 400 V).
3) Max. I0 [A] applies to single-phase MGE motors. The value of maximum I0 [A] never exceeds the value of maximum IN [A].

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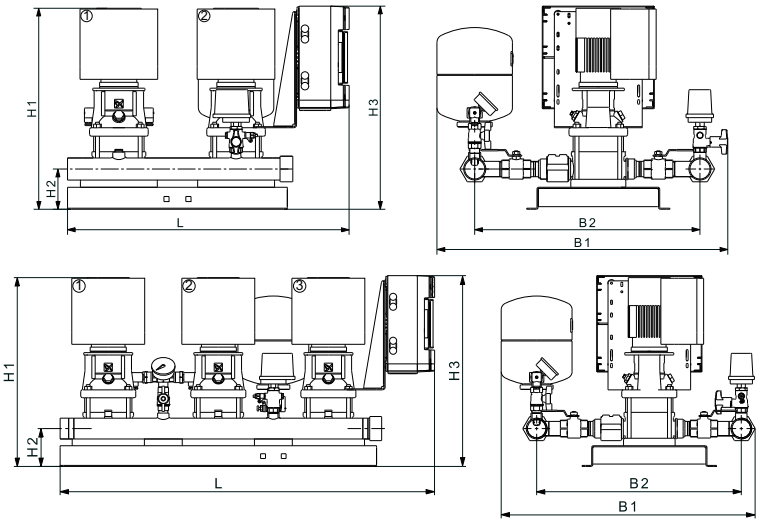
Hydro Multi-E with CRE, CRIE 3-X



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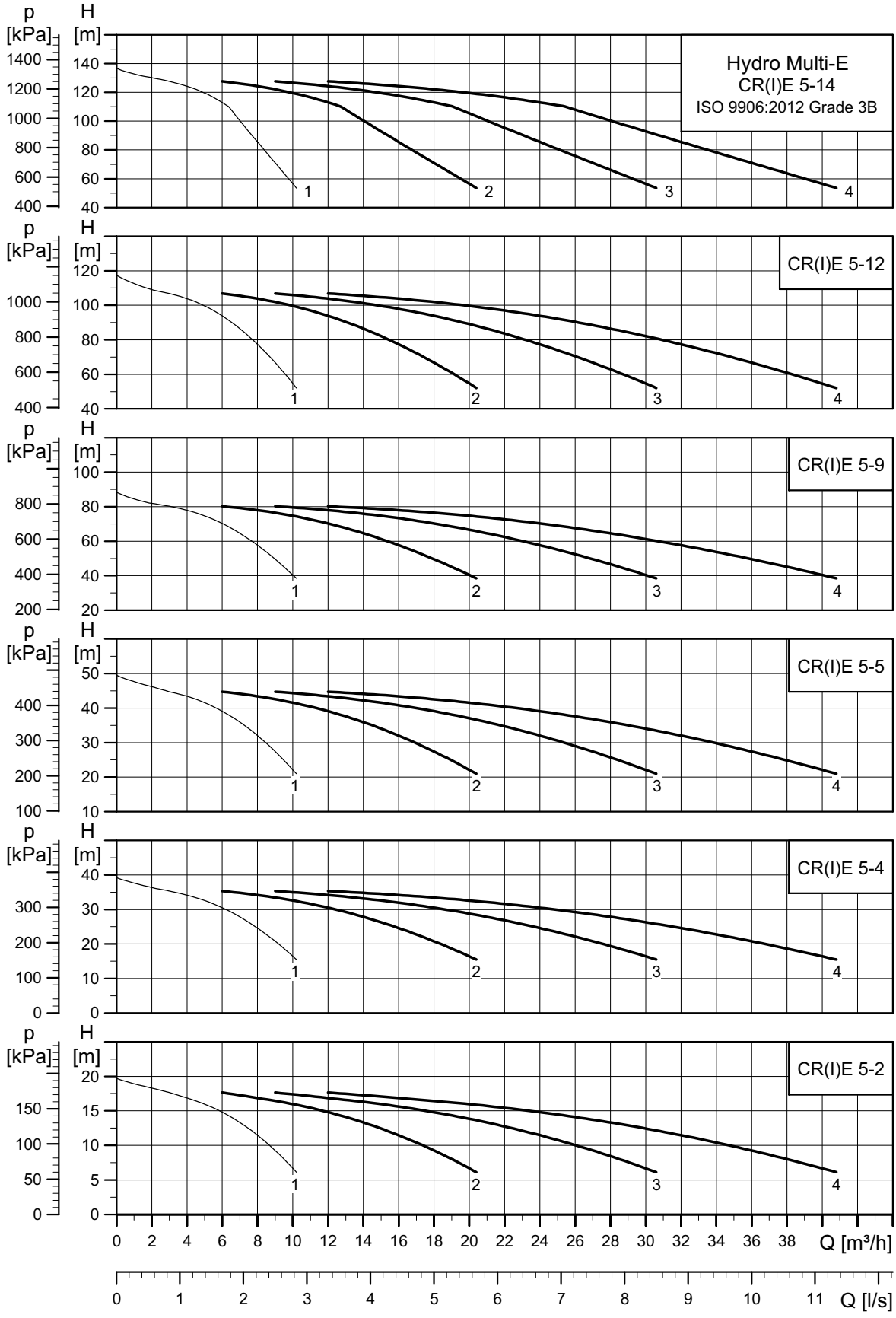
Number of pumps	Pump type	Motor [1] [kW]	Max. IN [2] [A]	Max. I0 [3] [A]	Supply voltage: Single-phase motor 3 x 400 V, PE, N	Supply voltage: Three-phase motor 3 x 400 V, PE	Manifold: Stainless steel	Manifold: Galvanised	Diaphragm tank [litres]	Connections	B1 [mm]	B2 [mm]	L [mm]	H1 [mm]	H2 [mm]	H3 [mm]	Net weight [kg]	Ship. vol. [m³]
2	CR(I)E 3-2	0,37	3,1	3,1	•	-	•	-	8	R 2	785	650	770	541	120	541	55	0,26
			2,1	-	-	•	•	-	8	R 2	785	650	770	541	120	541	85	0,26
3			3,8	3,8	•	-	•	-	8	R 2	785	650	1090	541	120	541	80	0,40
			3,1	-	-	•	•	-	8	R 2	785	650	1090	541	120	541	119	0,40
4			4,3	4,3	•	-	•	-	8	R 2 1/2	795	650	1410	541	120	541	110	0,60
			4,2	-	-	•	•	-	8	R 2 1/2	795	650	1410	541	120	541	155	0,60
2	CR(I)E 3-4	0,55	4,3	4,3	•	-	•	-	8	R 2	785	650	770	559	120	559	82	0,26
			2,7	-	-	•	•	-	8	R 2	785	650	770	559	120	559	86	0,26
3			5,3	5,3	•	-	•	-	8	R 2	785	650	1090	559	120	559	115	0,40
			4,0	-	-	•	•	-	8	R 2	785	650	1090	559	120	559	121	0,40
4			6,1	6,1	•	-	•	-	8	R 2 1/2	795	650	1410	559	120	559	114	0,60
			5,4	-	-	•	•	-	8	R 2 1/2	795	650	1410	559	120	559	157	0,60
2	CR(I)E 3-5	0,75	5,8	5,8	•	-	•	-	8	R 2	785	650	770	583	120	583	61	0,26
			3,0	-	-	•	•	-	8	R 2	785	650	770	583	120	583	89	0,26
3			7,1	7,1	•	-	•	-	8	R 2	785	650	1090	583	120	583	136	0,40
			5,0	-	-	•	•	-	8	R 2	785	650	1090	583	120	583	126	0,40
4			8,0	8	•	-	•	-	8	R 2 1/2	795	650	1410	583	120	583	122	0,60
			6,7	-	-	•	•	-	8	R 2 1/2	795	650	1410	583	120	583	164	0,60
2	CR(I)E 3-8	1,1	8,3	8,3	•	-	•	-	8	R 2	785	650	770	637	120	637	90	0,28
			4,3	-	-	•	•	-	8	R 2	785	650	770	637	120	637	94	0,28
3			10,2	10,2	•	-	•	-	8	R 2	790	650	1080	633	120	633	127	0,43
			6,5	-	-	•	•	-	8	R 2	785	650	1090	637	120	637	132	0,43
4			11,4	11,4	•	-	•	-	8	R 2 1/2	795	650	1410	637	120	637	130	0,60
			8,4	-	-	•	•	-	8	R 2 1/2	795	650	1410	637	120	637	172	0,60
2	CR(I)E 3-11	1,5	11,3	11,3	•	-	•	-	12	R 2	820	650	770	727	120	727	71	0,33
			5,6	-	-	•	•	-	12	R 2	820	650	770	727	120	727	103	0,33
3			13,8	13,8	•	-	•	-	12	R 2	820	650	1090	727	120	727	104	0,50
			8,5	-	-	•	•	-	12	R 2	820	650	1090	727	120	727	145	0,50
4			15,6	15,6	•	-	•	-	12	R 2 1/2	820	650	1410	727	120	727	142	0,60
			11,3	-	-	•	•	-	12	R 2 1/2	820	650	1410	727	120	727	189	0,60
2	CR(I)E 3-15		9,2	9,2	•	-	•	-	12	R 2	820	650	770	790	120	762	113	0,50
			6,0	-	-	•	•	-	12	R 2	820	650	770	830	120	762	117	0,52
3			13,8	13,8	•	-	•	-	12	R 2	820	650	1090	790	120	762	161	0,71

1) Motor [kW] is the power per pump.
2) Max. IN [A] applies to the current for the specific Hydro Multi-E at a specific voltage (230 or 400 V).
3) Max. I0 [A] applies to single-phase MGE motors. The value of maximum I0 [A] never exceeds the value of maximum IN [A].

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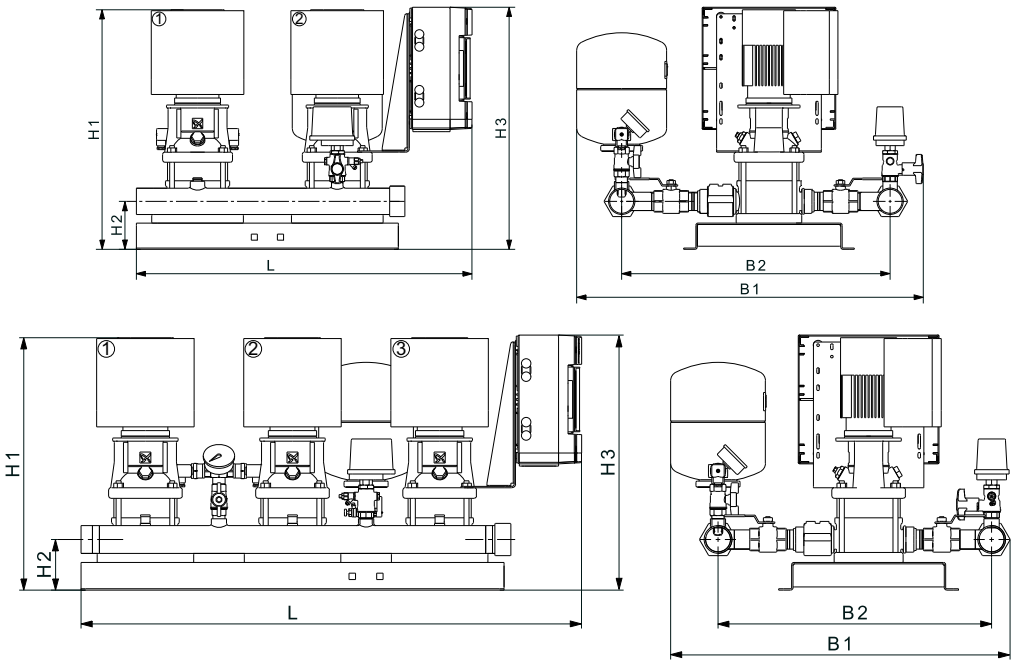
Hydro Multi-E with CRE, CRIE 5-X



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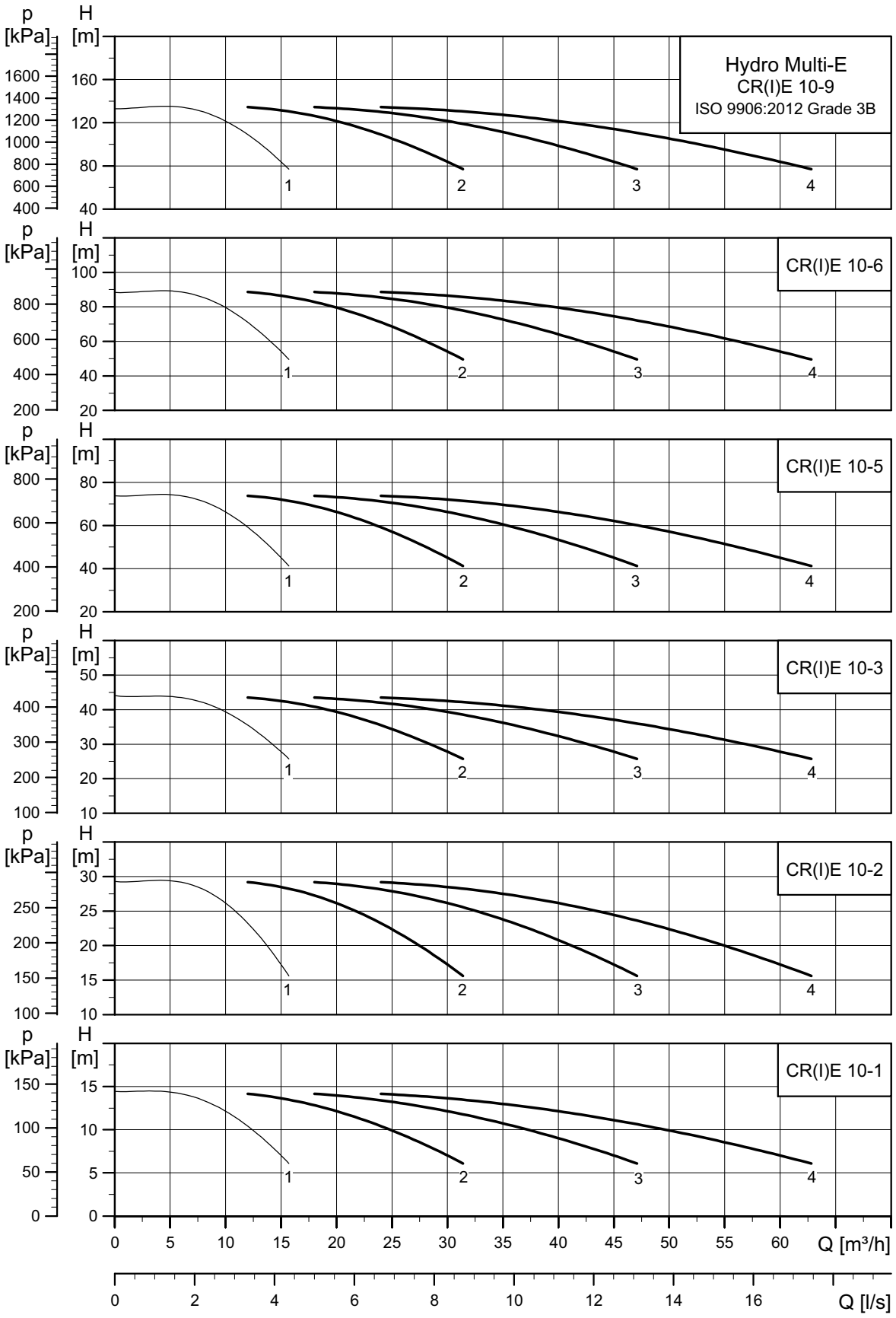
Number of pumps	Pump type	Motor [1] [kW]	Max. IN [2] [A]	Max. I0 [3] [A]	Supply voltage: Single-phase motor 3 x 400 V, PE, N	Supply voltage: Three-phase motor 3 x 400 V, PE	Manifold: Stainless steel	Manifold: Galvanised	Diaphragm tank [litres]	Connections	B1 [mm]	B2 [mm]	L [mm]	H1 [mm]	H2 [mm]	H3 [mm]	Net weight [kg]	Ship. vol. [m³]
2	CR(I)E 5-2	0,55	4,3	4,3	•	-	•	-	18	R 2	820	650	600	541	120	541	55	0,29
			2,7	-	-	•	•	-	18	R 2	820	650	600	541	120	541	89	0,29
3			5,3	5,3	•	-	•	-	18	R 2	820	650	920	541	120	541	80	0,44
			4	-	-	•	•	-	18	R 2	820	650	920	541	120	541	124	0,44
4			6,1	6,1	•	-	•	-	18	R 2 1/2	830	650	1410	541	120	541	110	0,60
			5,4	-	-	•	•	-	18	R 2 1/2	830	650	1410	541	120	541	160	0,60
2	CR(I)E 5-4	1,1	8,3	8,3	•	-	•	-	18	R 2	820	650	600	601	120	601	93	0,29
			4,3	-	-	•	•	-	18	R 2	820	650	600	601	120	601	96	0,29
3			10,2	10,2	•	-	•	-	18	R 2	820	650	920	601	120	601	128	0,44
			6,5	-	-	•	•	-	18	R 2	820	650	920	601	120	601	134	0,44
4			11,8	11,8	•	-	•	-	18	R 2 1/2	830	650	1410	601	120	601	126	0,60
			8,4	-	-	•	•	-	18	R 2 1/2	830	650	1410	601	120	601	173	0,60
2	CR(I)E 5-5	1,5	11,3	11,3	•	-	•	-	18	R 2	820	650	600	704	120	704	71	0,32
			5,6	-	-	•	•	-	18	R 2	820	650	600	704	120	704	102	0,32
3			13,8	13,8	•	-	•	-	18	R 2	820	650	920	704	120	704	104	0,36
			8,5	-	-	•	•	-	18	R 2	820	650	920	704	120	704	142	0,36
4			15,6	15,6	•	-	•	-	18	R 2	830	650	1410	704	120	704	142	0,60
			11,3	-	-	•	•	-	18	R 2	830	650	1410	704	120	704	185	0,60
2	CR(I)E 5-9	2,2	8,1	-	-	•	•	-	12	R 2	820	650	600	812	120	812	108	0,42
3			12,1	-	-	•	•	-	12	R 2	820	650	920	812	120	812	152	0,65
4			16,1	-	-	•	•	-	12	R 2 1/2	830	650	1410	812	120	812	198	0,60
2	CR(I)E 5-12	3	11	-	-	•	•	-	12	R 2	820	650	770	949	120	762	135	0,60
3			17	-	-	•	•	-	12	R 2	820	650	1090	949	120	762	194	0,85
4			23	-	-	•	•	-	12	R 2 1/2	830	650	1410	949	120	762	249	1,11
2	CR(I)E 5-14		11	-	-	•	•	-	12	R 2	820	650	770	1003	120	762	137	0,63
3			17	-	-	•	•	-	12	R 2	820	650	1090	1003	120	762	197	0,90
4			23	-	-	•	•	-	12	R 2 1/2	830	650	1410	1003	120	762	253	1,17

1) Motor [kW] is the power per pump.
2) Max. IN [A] applies to the current for the specific Hydro Multi-E at a specific voltage (230 or 400 V).
3) Max. I0 [A] applies to single-phase MGE motors. The value of maximum I0 [A] never exceeds the value of maximum IN [A].

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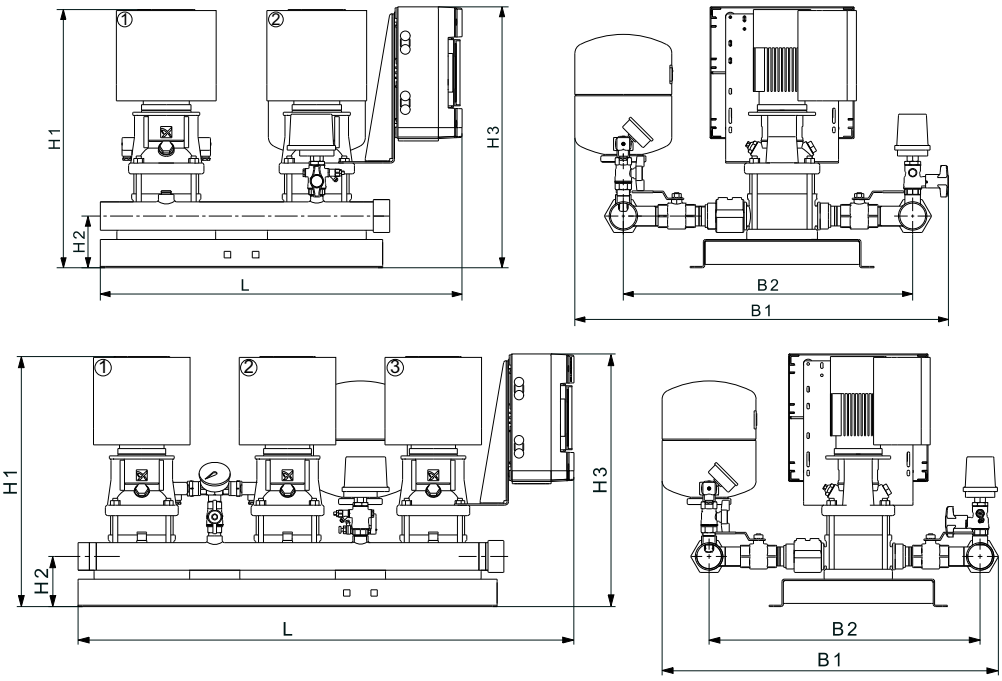
Hydro Multi-E with CRE, CRIE 10-X



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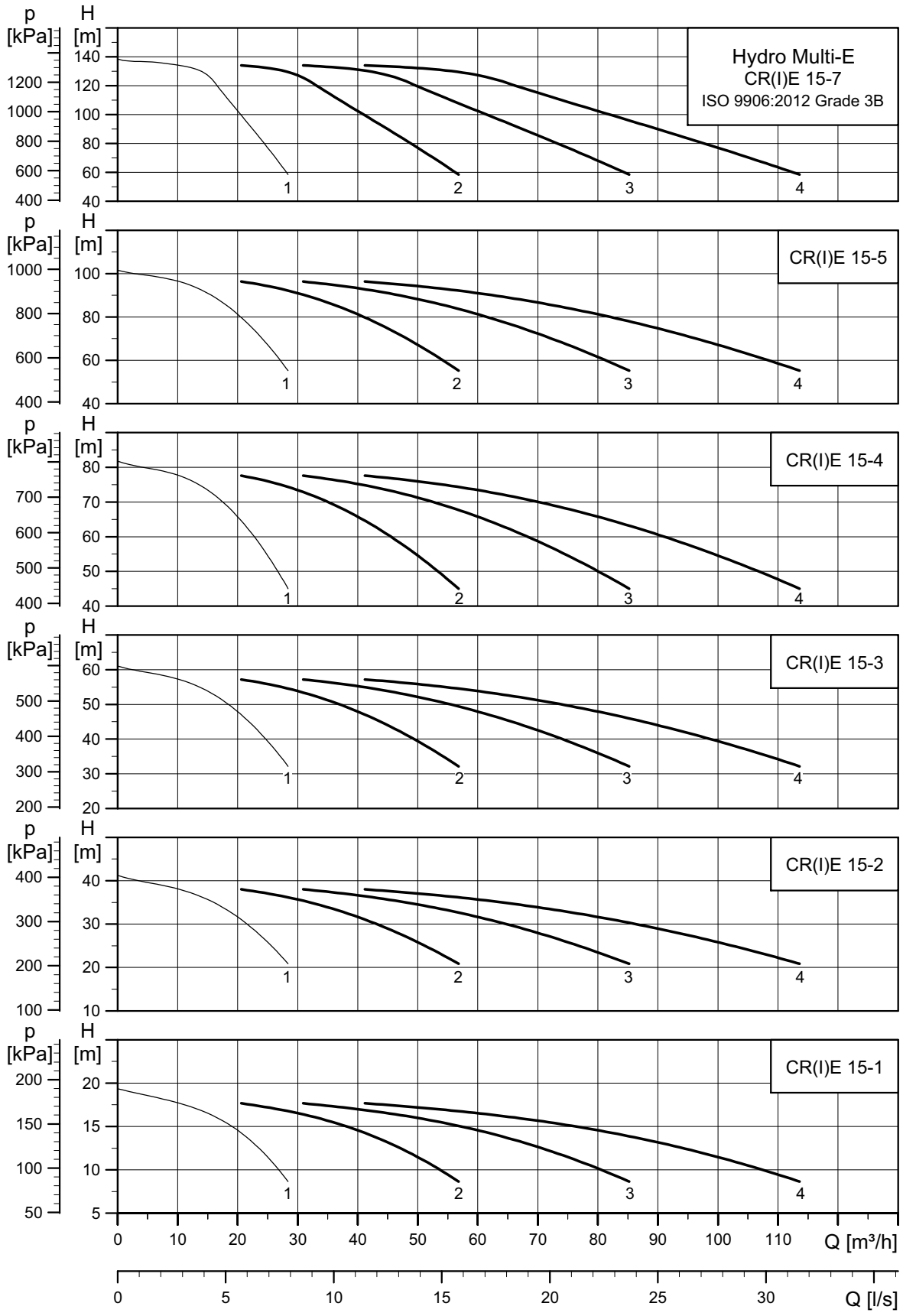
Number of pumps	Pump type	Motor [1] [kW]	Max. IN [2] [A]	Max. I0 [3] [A]	Supply voltage: Single-phase motor 3 x 400 V, PE, N	Supply voltage: Three-phase motor 3 x 400 V, PE	Manifold: Stainless steel	Manifold: Galvanised	Diaphragm tank [litres]	Connections	B1 [mm]	B2 [mm]	L [mm]	H1 [mm]	H2 [mm]	H3 [mm]	Net weight [kg]	Ship. vol. [m³]
2	CR(I)E 10-1	0,75	5,8	5,8	•	-	•	-	25	R 2 1/2	990	810	830	641	150	641	81	0,45
			3	-	-	•	•	-	25	R 2 1/2	990	810	830	641	150	641	167	0,45
3			6,9	6,9	•	-	•	-	25	DN 80	990	810	1150	641	150	641	119	0,66
			5	-	-	•	•	-	25	DN 80	990	810	1150	641	150	641	262	0,66
4			8	8	•	-	•	-	25	DN 80	1045	800	1470	641	150	641	162	0,80
			6,7	-	-	•	•	-	25	DN 80	1045	800	1470	641	150	641	306	0,80
2	CR(I)E 10-2	1,5	11,3	11,3	•	-	•	-	25	R 2 1/2	990	810	830	717	150	717	93	0,45
			5,6	-	-	•	•	-	25	R 2 1/2	990	810	830	717	150	717	175	0,45
3			13,8	13,8	•	-	•	-	25	DN 80	990	810	1150	717	150	717	137	0,66
			8,5	-	-	•	•	-	25	DN 80	990	810	1150	717	150	717	274	0,66
4			15,6	15,6	•	-	•	-	25	DN 80	1045	800	1470	717	150	717	186	0,80
			11,3	-	-	•	•	-	25	DN 80	1045	800	1470	717	150	717	350	0,80
2	CR(I)E 10-3	2,2	8,1	-	-	•	•	-	25	R 2 1/2	985	800	820	651	150	651	146	0,48
3			12,1	-	-	•	•	-	25	DN 80	985	800	1090	651	150	651	283	0,66
4			16,1	-	-	•	•	-	25	DN 80	1045	800	1470	747	150	747	362	0,80
2	CR(I)E 10-5	3	11	-	-	•	•	-	25	R 2 1/2	990	810	845	863	150	762	164	0,72
3			17	-	-	•	•	-	25	DN 80	990	810	1223	863	150	762	258	1,05
4			23	-	-	•	•	-	25	DN 80	1045	800	1513	863	150	762	324	1,36
2	CR(I)E 10-6	4	15	-	-	•	•	-	12	R 2 1/2	990	810	845	893	150	762	180	0,75
3			22	-	-	•	•	-	12	DN 80	990	810	1223	893	150	762	282	1,08
4			29	-	-	•	•	-	12	DN 80	1045	800	1513	893	150	762	356	1,41
2	CR(I)E 10-9	5,5	20	-	-	•	•	-	12	R 2 1/2	990	810	845	1046	150	762	226	0,88
3			30	-	-	•	•	-	12	DN 80	990	810	1223	1046	150	762	351	1,27
4			40	-	-	•	•	-	12	DN 80	1045	800	1513	1046	150	762	448	1,65

1) Motor [kW] is the power per pump.
2) Max. IN [A] applies to the current for the specific Hydro Multi-E at a specific voltage (230 or 400 V).
3) Max. I0 [A] applies to single-phase MGE motors. The value of maximum I0 [A] never exceeds the value of maximum IN [A].

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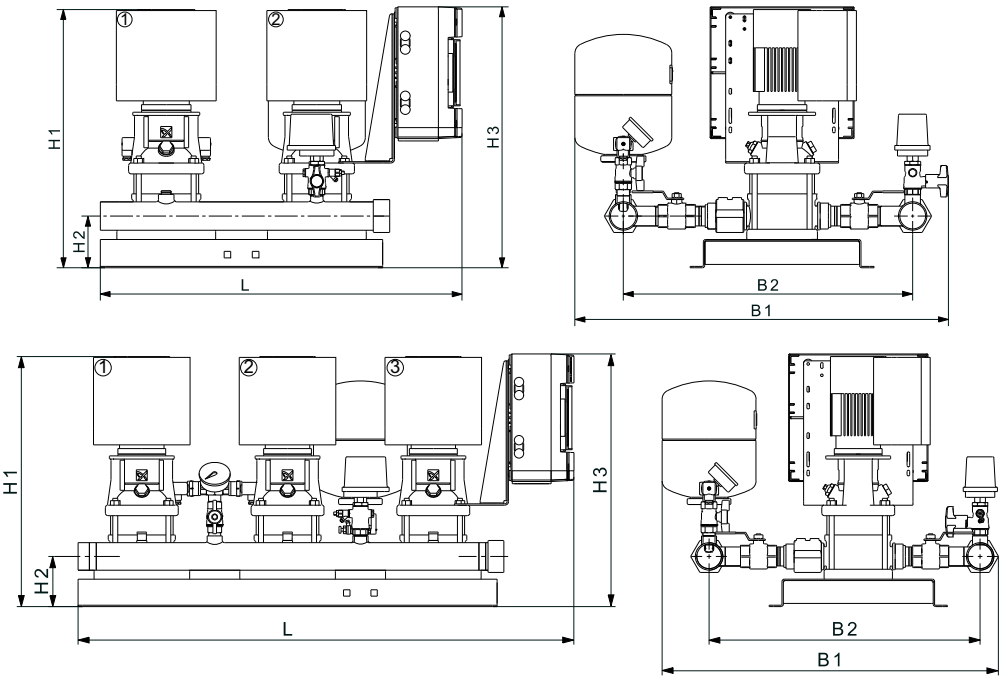
Hydro Multi-E with CRE, CRIE 15-X



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TM05 9150 3413 - TM05 9148 3413

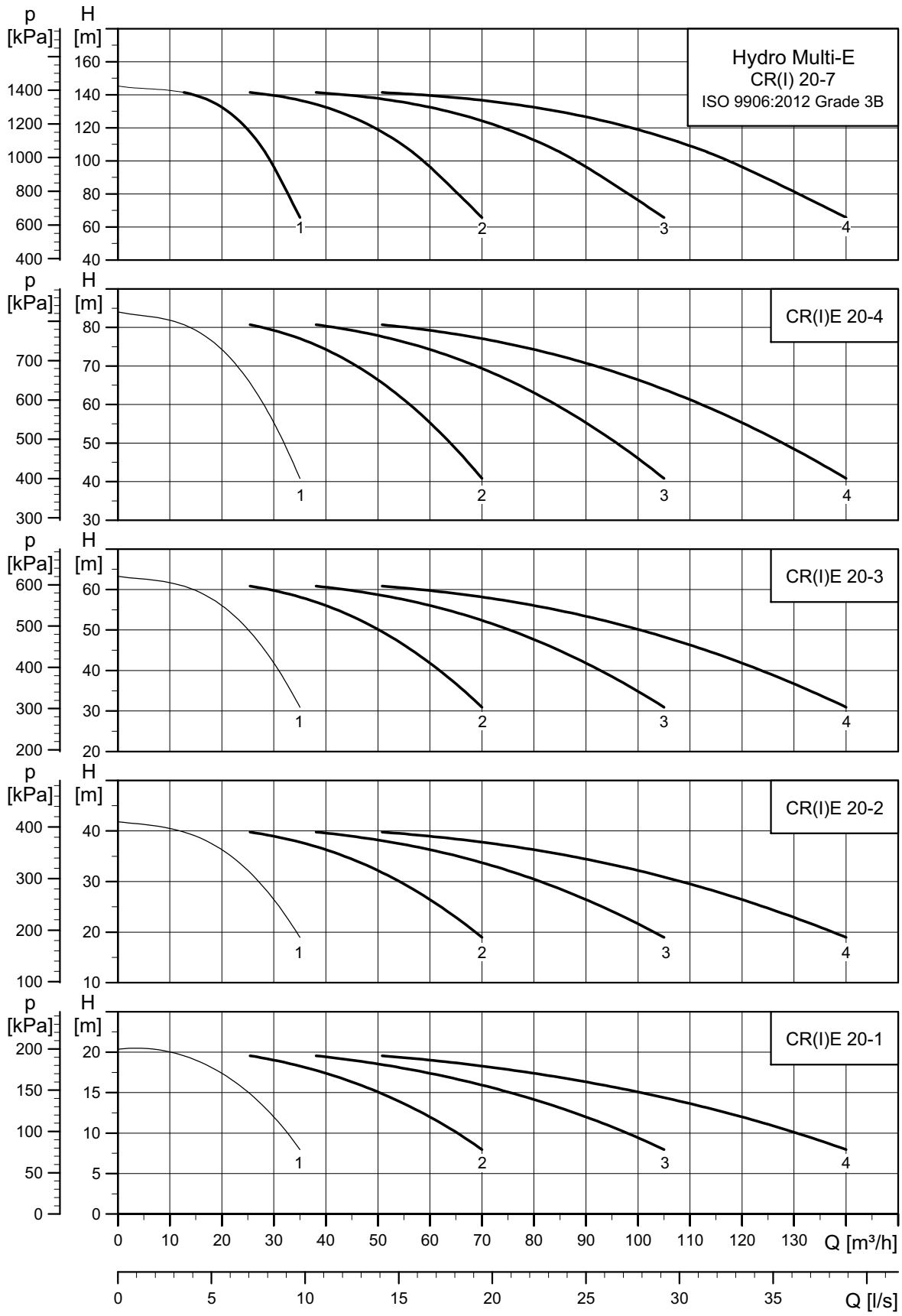
Number of pumps	Pump type	Motor [1] [kW]	Max. IN [2] [A]	Max. I0 [3] [A]	Supply voltage: Single-phase motor 3 x 400 V, PE, N	Supply voltage: Three-phase motor 3 x 400 V, PE	Manifold: Stainless steel	Manifold: Galvanised	Diaphragm tank [litres]	Connections	B1 [mm]	B2 [mm]	L [mm]	H1 [mm]	H2 [mm]	H3 [mm]	Net weight [kg]	Ship. vol. [m³]
2	CR(I)E 15-1	1,5	11,3	11,3	•	-	•	-	33	DN 80	1230	950	890	757	160	757	95	0,69
			5,6	-	-	•	•	-	33	DN 80	1230	950	890	757	160	757	165	0,69
3			13,8	13,8	•	-	•	-	33	DN 100	1240	950	1150	757	160	757	140	1,00
			8,5	-	-	•	•	-	33	DN 100	1240	950	1150	757	160	757	229	1,00
4			15,6	15,6	•	-	•	-	33	DN 100	1240	950	1530	757	160	757	190	1,20
			11,3	-	-	•	•	-	33	DN 100	1240	950	1530	757	160	757	290	1,20
2	CR(I)E 15-2	3	11	-	-	•	•	-	33	DN 80	1230	950	903	813	160	762	191	0,90
3			17	-	-	•	•	-	33	DN 100	1240	950	1223	813	160	762	270	1,23
4			23	-	-	•	•	-	33	DN 100	1240	950	1543	813	160	762	339	1,56
2	CR(I)E 15-3	4	15	-	-	•	•	-	33	DN 80	1230	950	903	858	160	762	209	0,95
3			22	-	-	•	•	-	33	DN 100	1240	950	1223	858	160	762	297	1,30
4			29	-	-	•	•	-	33	DN 100	1240	950	1543	858	160	762	375	1,64
2	CR(I)E 15-4	5,5	20	-	-	•	•	-	12	DN 80	1230	950	903	966	160	762	252	1,07
3			30	-	-	•	•	-	12	DN 100	1240	950	1223	966	160	762	361	1,47
4			40	-	-	•	•	-	12	DN 100	1240	950	1543	966	160	762	462	1,85
2	CR(I)E 15-5	7,5	27	-	-	•	•	-	12	DN 80	1230	950	1193	1035	160	762	269	1,52
3			41	-	-	•	•	-	12	DN 100	1240	950	1693	1035	160	762	383	2,17
4			54	-	-	•	•	-	12	DN 100	1240	950	2193	1035	160	762	492	2,81

1) Motor [kW] is the power per pump.
2) Max. IN [A] applies to the current for the specific Hydro Multi-E at a specific voltage (230 or 400 V).
3) Max. I0 [A] applies to single-phase MGE motors. The value of maximum I0 [A] never exceeds the value of maximum IN [A].

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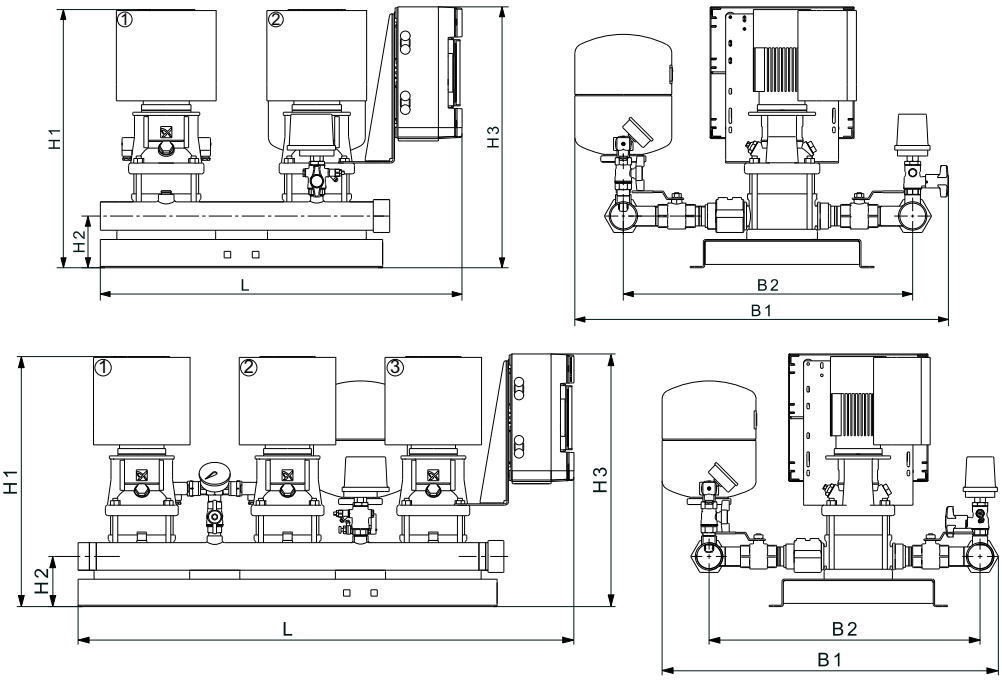
Hydro Multi-E with CRE, CRIE 20-X



TM02 7561 3716

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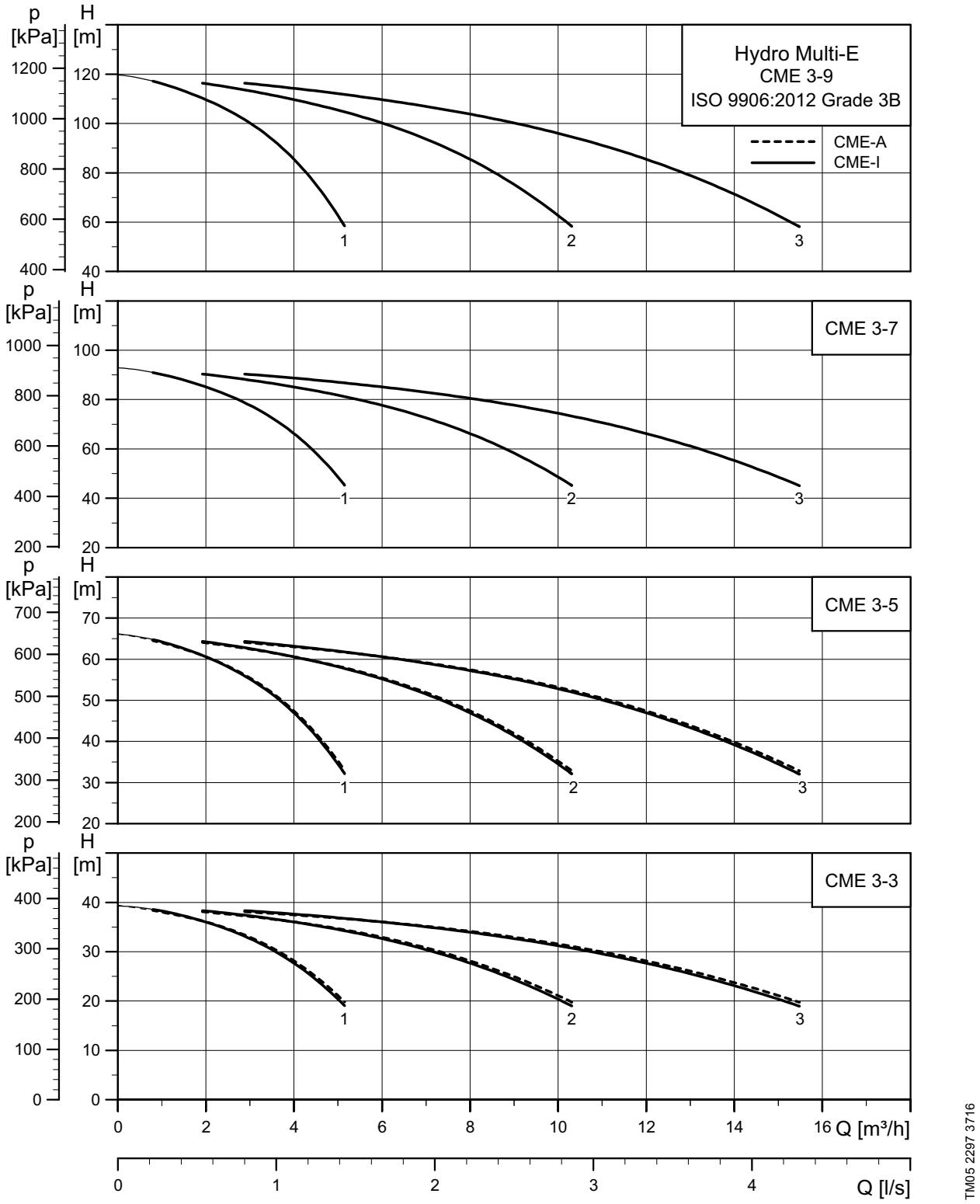
TM05 9150 3413 - TM05 9148 3413

Number of pumps	Pump type	Motor [1] [kW]	Max. IN [2] [A]	Max. I0 [3] [A]	Supply voltage: Single-phase motor 3 x 400 V, PE, N	Supply voltage: Three-phase motor 3 x 400 V, PE	Manifold: Stainless steel	Manifold: Galvanised	Diaphragm tank [litres]	Connections	B1 [mm]	B2 [mm]	L [mm]	H1 [mm]	H2 [mm]	H3 [mm]	Net weight [kg]	Ship. vol. [m³]
2			8,1	-	-	•	•	-	33	DN 80	890	1172	740	757	160	757	169	0,69
3	CR(I)E 20-1	2,2	12,1	-	-	•	•	-	33	DN 100	1210	1185	1210	757	160	757	235	1,00
4			16,1	-	-	•	•	-	33	DN 100	2170	1185	1530	757	160	757	298	1,20
2			15	-	-	•	•	-	33	DN 80	890	1172	903	813	160	762	207	0,65
3	CR(I)E 20-2	4	22	-	-	•	•	-	33	DN 100	1210	1185	1223	813	160	762	294	1,20
4			29	-	-	•	•	-	33	DN 100	2170	1185	1543	813	160	762	371	2,72
2			20	-	-	•	•	-	33	DN 80	890	1172	903	921	160	762	249	0,74
3	CR(I)E 20-3	5,5	30	-	-	•	•	-	33	DN 100	1210	1185	1223	921	160	762	357	1,36
4			40	-	-	•	•	-	33	DN 100	2170	1185	1543	921	160	762	455	3,08
2			27	-	-	•	•	-	12	DN 80	890	1172	1193	990	160	762	267	1,05
3	CR(I)E 20-4	7,5	41	-	-	•	•	-	12	DN 100	1210	1185	1693	990	160	762	380	2,03
4			54	-	-	•	•	-	12	DN 100	1240	1151	2193	990	160	762	488	2,69

1) Motor [kW] is the power per pump.
2) Max. IN [A] applies to the current for the specific Hydro Multi-E at a specific voltage (230 or 400 V).
3) Max. I0 [A] applies to single-phase MGE motors. The value of maximum I0 [A] never exceeds the value of maximum IN [A].

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Hydro Multi-E with CME 3-5

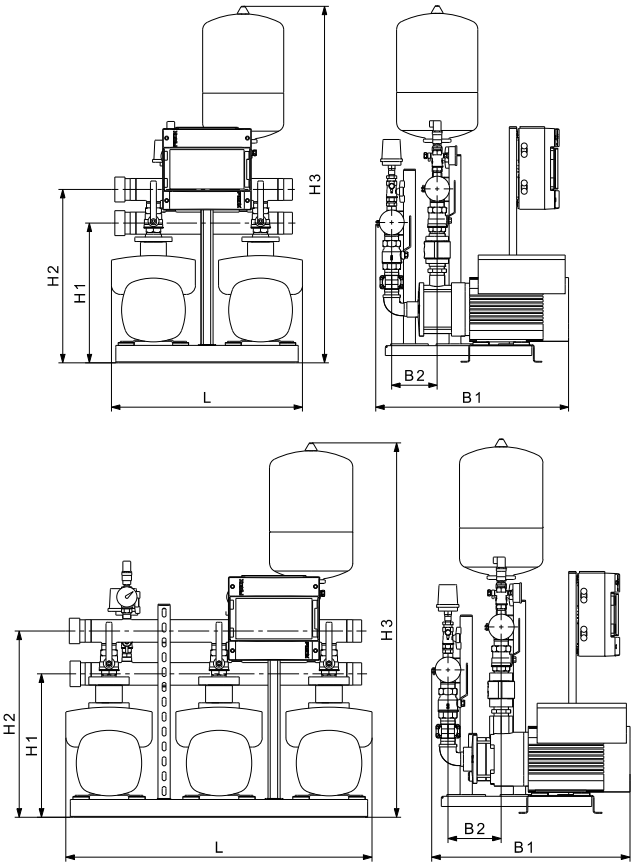


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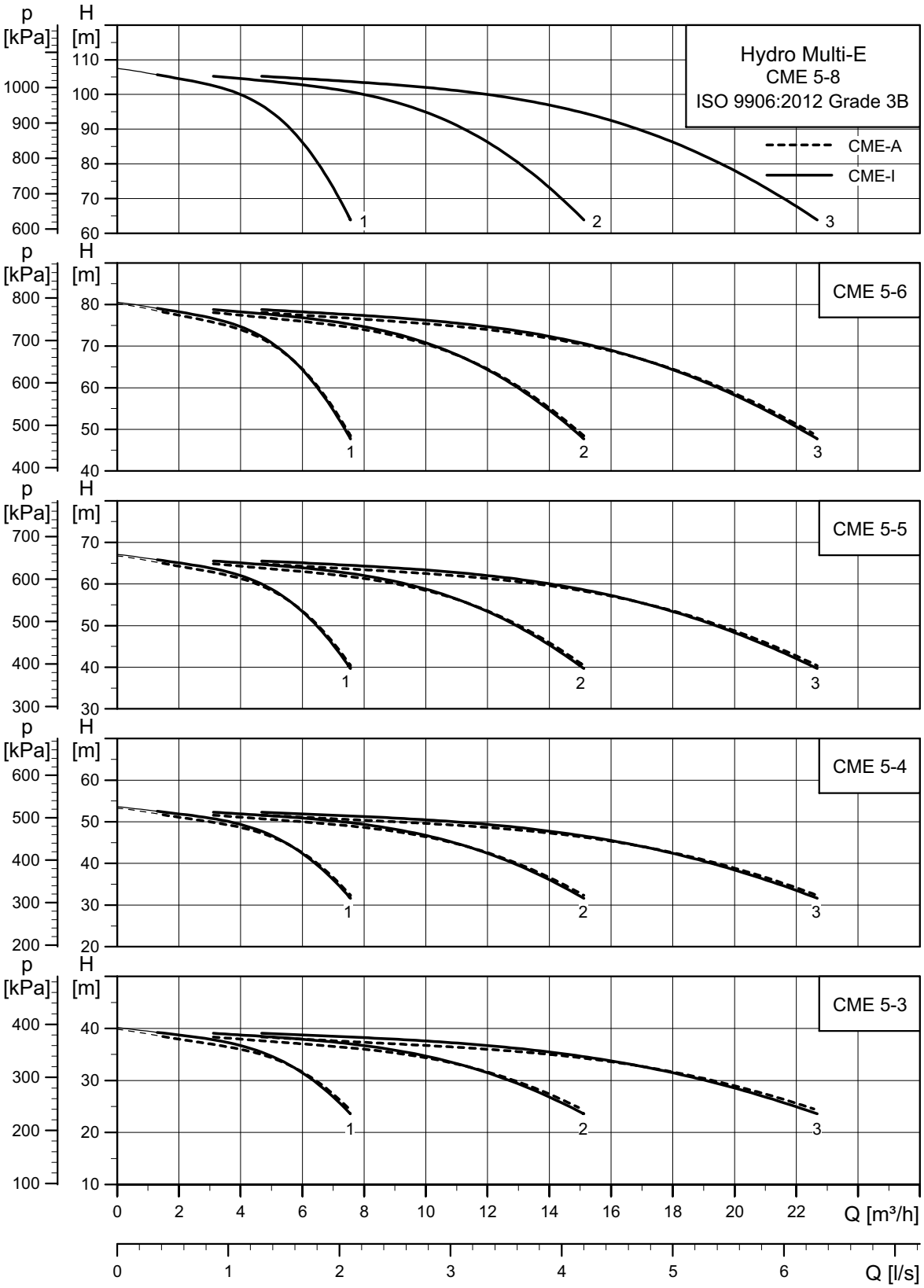
TM03 0924 0805 - TM03 0923 0805

Number of pumps	Pump type	Motor [1] [kW]	Max. IN [2] [A]	Max. I0 [3] [A]	Supply voltage: Single-phase motor 3 x 400 V, PE, N	Supply voltage: Three-phase motor 3 x 400 V, PE	Manifold: Stainless steel	Manifold: Galvanised	Diaphragm tank [litres]	Connections	B1 [mm]	B2 [mm]	L [mm]	H1 [mm]	H2 [mm]	H3 [mm]	Net weight [kg]	Ship. vol. [m³]
2	CME-I 3-3	1,1	8,3	8,3	•	-	•	-	8	R 1 1/2	600	600	154	350	536	916	72	0,32
			4,2	-	-	•	•	-	8	R 1 1/2	600	600	154	350	536	916	70	0,32
3			10,2	10,2	•	-	•	-	8	R 1 1/2	920	600	154	350	536	916	89	0,51
			6,5	-	-	•	•	-	8	R 1 1/2	920	600	154	350	536	916	91	0,51
2	CME-A 3-3		8,3	8,3	•	-	-	•	8	R 1 1/2	600	600	154	350	520	870	74	0,32
			4,3	-	-	•	-	•	8	R 1 1/2	600	600	154	350	520	870	74	0,32
3			10,2	10,2	•	-	-	•	8	R 1 1/2	920	600	154	350	520	870	91	0,51
			6,5	-	-	•	-	•	8	R 1 1/2	920	600	154	350	520	870	91	0,51
2	CME-I 3-5	1,1	8,3	8,3	•	-	•	-	8	R 1 1/2	600	600	154	350	520	900	69	0,32
			4,3	-	-	•	•	-	8	R 1 1/2	600	600	154	350	520	900	71	0,32
3			10,2	10,2	•	-	•	-	8	R 1 1/2	920	600	154	350	520	900	90	0,51
			6,3	-	-	•	•	-	8	R 1 1/2	920	600	154	350	520	900	93	0,51
2	CME-A 3-5		8,3	8,3	•	-	-	•	8	R 1 1/2	600	600	154	350	520	885	76	0,32
			4,3	-	-	•	-	•	8	R 1 1/2	600	600	154	350	520	885	76	0,32
3			10,2	10,2	•	-	-	•	8	R 1 1/2	920	600	154	350	520	885	92	0,51
			6,5	-	-	•	-	•	8	R 1 1/2	920	600	154	350	520	885	92	0,51
2	CME-I 3-7	1,5	11,3	11,3	•	-	•	-	12	R 1 1/2	600	600	226	365	535	915	75	0,32
			5,6	-	-	•	•	-	12	R 1 1/2	600	600	226	365	535	915	78	0,32
3			13,8	13,8	•	-	•	-	12	R 1 1/2	920	600	226	365	535	915	91	0,51
			8,5	-	-	•	•	-	12	R 1 1/2	920	600	226	365	535	915	102	0,51
2	CME-I 3-9	2,2	8,1	-	•	-	•	-	12	R 1 1/2	600	600	262	365	535	915	82	0,32
3			12,1	-	-	•	•	-	12	R 1 1/2	920	600	262	365	535	915	108	0,51

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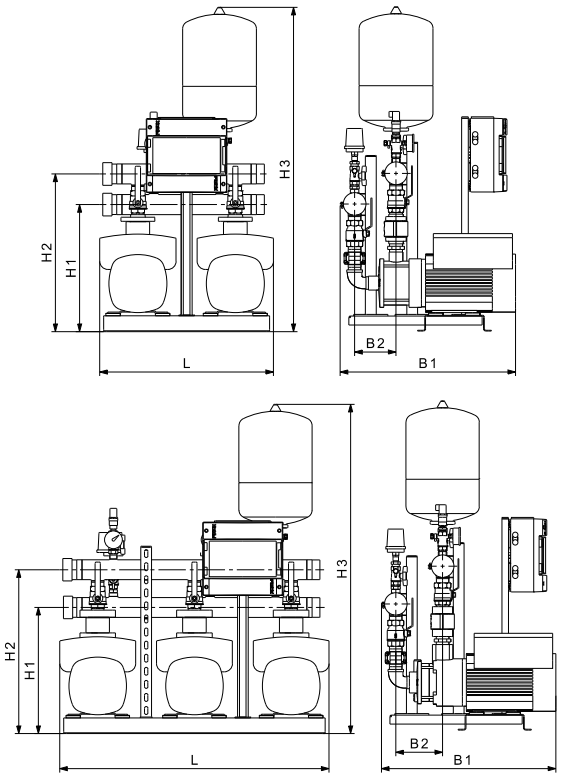
Hydro Multi-E with CME 5-X



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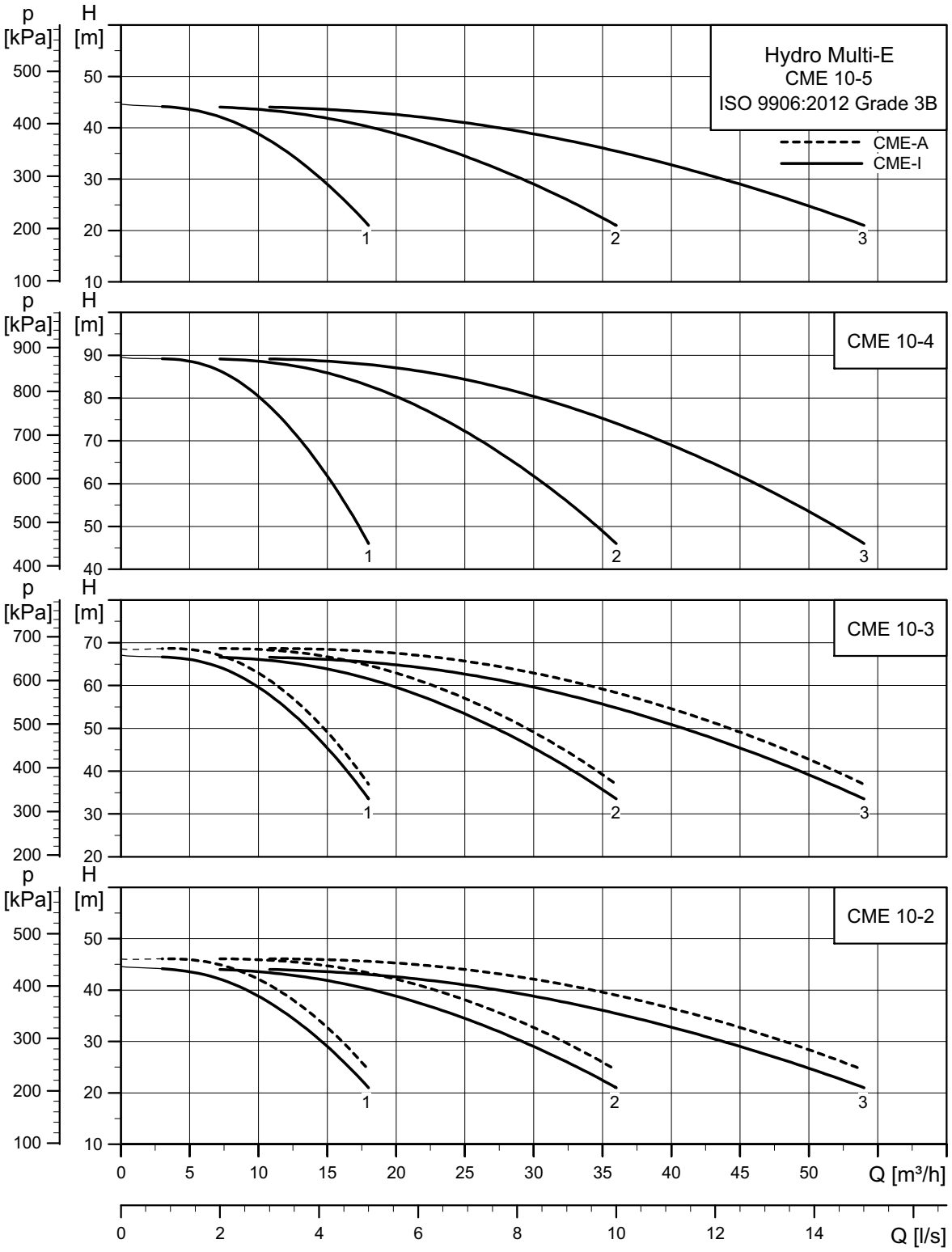


TM03 0924 0805 - TM03 0923 0805

Number of pumps	Pump type	Motor [1] [kW]	Max. IN [2] [A]	Max. I0 [3] [A]	Supply voltage: Single-phase motor 3 x 400 V, PE, N	Supply voltage: Three-phase motor 3 x 400 V, PE	Manifold: Stainless steel	Manifold: Galvanised	Diaphragm tank [litres]	Connections	B1 [mm]	B2 [mm]	L [mm]	H1 [mm]	H2 [mm]	H3 [mm]	Net weight [kg]	Ship. vol. [m³]
2	CME-I 5-3	1,1	8,3	8,3	•	-	•	-	18	R 2	600	605	132	385	610	1080	77	0,42
3			4,3	-	-	•	•	-	18	R 2	600	605	132	385	610	1080	79	0,42
2	CME-A 5-3		10,2	10,2	•	-	•	-	18	R 2	920	605	132	385	610	1080	60	0,66
3			6,5	-	-	•	•	-	18	R 2	920	605	132	385	610	1080	105	0,66
2	CME-I 5-4	1,5	8,3	8,3	•	-	-	•	18	R 2	644	584	150	390	605	1080	42	0,42
3			4,2	-	-	•	-	•	18	R 2	600	605	132	385	610	1075	42	0,42
2	CME-A 5-4		10,2	10,2	•	-	-	•	18	R 2	920	605	132	385	610	1075	63	0,66
3			6,5	-	-	•	-	•	18	R 2	920	605	132	385	610	1075	63	0,66
2	CME-I 5-5	2,2	11,3	11,3	•	-	•	-	18	R 2	600	600	150	400	610	1080	62	0,42
3			5,6	-	-	•	•	-	18	R 2	600	600	150	400	610	1080	82	0,42
2	CME-A 5-5		13,8	13,8	•	-	•	-	18	R 2	920	600	150	400	610	1080	93	0,66
3			8,5	-	-	•	•	-	18	R 2	920	600	150	400	610	1080	110	0,66
2	CME-I 5-6	2,2	11	11	•	-	-	•	25	R 2	600	600	150	400	610	1185	64	0,42
3			5,6	-	-	•	-	•	25	R 2	600	600	150	400	610	1185	64	0,42
2	CME-A 5-6		13,8	13,8	•	-	-	•	25	R 2	920	600	150	400	610	1185	96	0,66
3			8,5	-	-	•	-	•	25	R 2	920	600	150	400	610	1185	96	0,66
2	CME-I 5-8	3	8,1	-	-	•	•	-	18	R 2	600	605	168	400	610	1080	86	0,42
3			12,1	-	-	•	•	-	18	R 2	920	605	168	400	610	1080	116	0,66
2	CME-A 5-8		8,1	-	-	•	-	•	18	R 2	600	605	168	400	610	1065	77	0,42
3			12,1	-	-	•	-	•	18	R 2	920	605	168	400	610	1065	118	0,66
2	CME-I 5-10	2,2	8,1	-	-	•	•	-	18	R 2	600	605	204	400	610	1080	87	0,42
3			12,1	-	-	•	•	-	18	R 2	1014	584	180	390	585	975	117	0,66
2	CME-A 5-10		8,1	-	-	•	-	•	18	R 2	600	605	204	400	589	1065	77	0,42
3			12,1	-	-	•	-	•	18	R 2	920	605	204	400	589	1065	121	0,66
2	CME-I 5-12	3	11,3	-	-	•	•	-	12	R 2	661	600	240	400	589	1059	98	0,42
3			16,9	-	-	•	•	-	12	R 2	1031	600	240	400	589	1059	146	0,66

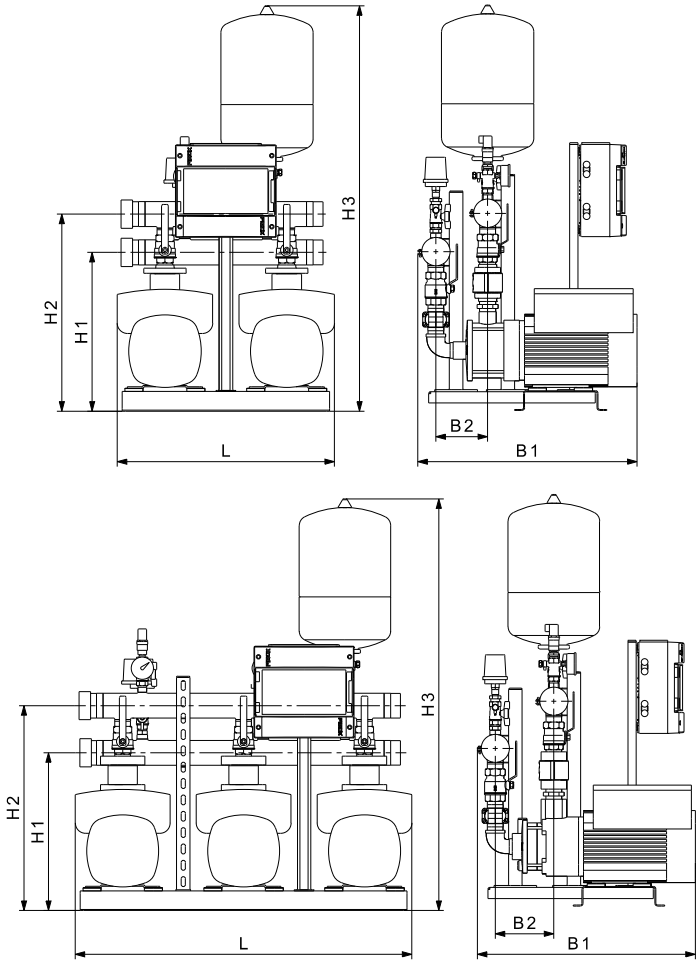
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Hydro Multi-E with CME 10-X



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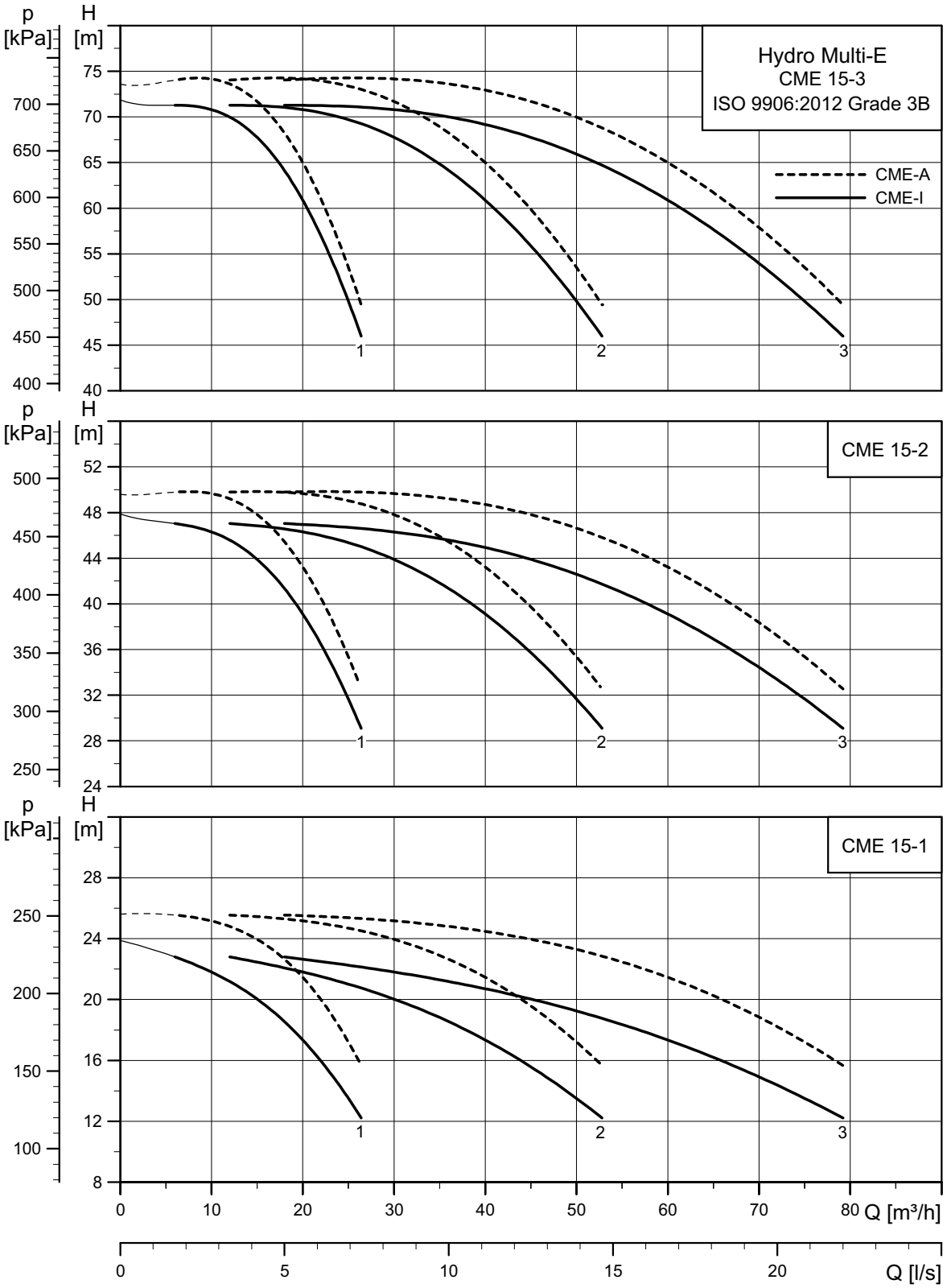
TM03 0924 0805 - TM03 0923 0805

Number of pumps	Pump type	Motor [1] [kW]	Max. IN [2] [A]	Max. I0 [3] [A]	Supply voltage: Single-phase motor 3 x 400 V, PE, N	Supply voltage: Three-phase motor 3 x 400 V, PE	Manifold: Stainless steel	Manifold: Galvanised	Diaphragm tank [litres]	Connections	B1 [mm]	B2 [mm]	L [mm]	H1 [mm]	H2 [mm]	H3 [mm]	Net weight [kg]	Ship. vol. [m³]
2	CME-I 10-2	2,2	8,1	-	-	•	•	-	25	R 2 1/2	660	605	150	470	725	1330	102	0,47
3			12,1	-	-	•	•	-	25	R 2 1/2	980	605	150	470	725	1330	148	0,73
2	CME-A 10-2		8,1	-	-	•	-	•	25	R 2 1/2	644	544	150	465	635	1230	101	0,47
3			12,1	-	-	•	-	•	25	R 2 1/2	1009	544	150	465	635	1230	150	0,73
2	CME-I 10-3	4	14,7	-	-	•	•	-	25	R 2 1/2	661	612	180	480	590	1313	124	0,53
3			22,1	-	-	•	•	-	25	R 2 1/2	1031	612	180	475	590	1190	185	0,75
2	CME-A 10-3		14,7	-	-	•	-	•	25	R 2 1/2	661	612	202	480	740	1325	138	0,54
3			22,1	-	-	•	-	•	25	R 2 1/2	1031	612	202	480	740	1325	192	0,84
2	CME-I 10-4	5,5	19,9	-	-	•	•	-	12	R 2 1/2	661	629	210	480	713	1298	145	0,54
3			29,9	-	-	•	•	-	12	R 2 1/2	1031	629	210	480	713	1298	215	0,84
2	CME-I 10-5		19,9	-	-	•	•	-	12	R 2 1/2	661	629	270	480	713	1123	152	0,47
3			29,9	-	-	•	•	-	12	R 2 1/2	1031	629	270	480	713	1123	220	0,73

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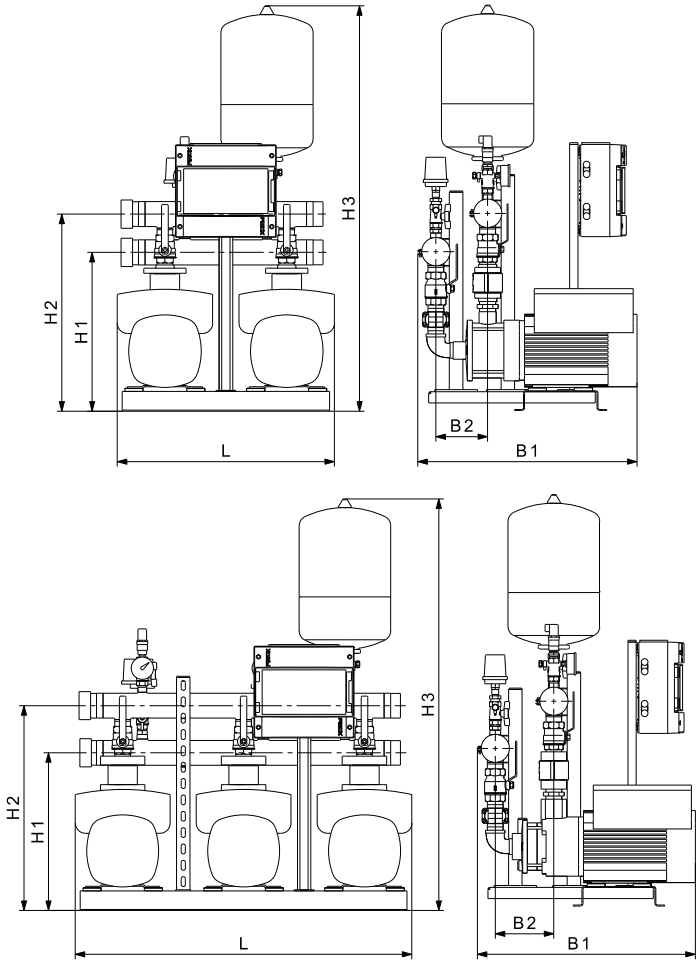
Hydro Multi-E with CME 15-X



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TM03 0924 0805 - TM03 0923 0805

Number of pumps	Pump type	Motor [1] [kW]	Max. IN [2] [A]	Max. I0 [3] [A]	Supply voltage: Single-phase motor 3 x 400 V, PE, N	Supply voltage: Three-phase motor 3 x 400 V, PE	Manifold: Stainless steel	Manifold: Galvanised	Diaphragm tank [litres]	Connections	B1 [mm]	B2 [mm]	L [mm]	H1 [mm]	H2 [mm]	H3 [mm]	Net weight [kg]	Ship. vol. [m³]
2	CME-I 15-1	2,2	8,1	-	-	•	•	-	33	DN 80	720	630	165	510	673	1233	131	0,65
3			12,1	-	-	•	•	-	33	DN 100	1040	630	165	510	673	1233	189	1,00
2	CME-A 15-1		8,1	-	-	•	-	•	25	DN 80	720	630	157	510	700	1225	80	0,65
3			12,1	-	-	•	-	•	25	DN 100	1040	630	157	510	700	1225	113	1,00
2	CME-I 15-2	4	14,7	-	-	•	•	-	33	DN 80	661	647	165	520	688	1243	155	0,53
3			22,1	-	-	•	•	-	33	DN 100	1031	647	165	520	688	1243	225	0,83
2	CME-A 15-2		14,7	-	-	•	-	•	25	DN 80	661	647	157	520	715	1235	150	0,53
3			22,1	-	-	•	-	•	25	DN 100	1031	647	157	520	715	1235	218	0,82
2	CME-I 15-3	7,5	27,2	-	-	•	•	-	33	DN 80	746	700	165	520	690	1243	185	0,65
3			40,9	-	-	•	•	-	33	DN 100	1146	700	165	520	690	1243	266	1,00
2	CME-A 15-3		27,2	-	-	•	-	•	25	DN 80	746	700	165	520	690	1235	192	0,65
3			40,9	-	-	•	-	•	25	DN 100	1146	700	165	520	690	1235	278	0,99

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10. Optional equipment

All optional equipment, if required, must be specified when ordering the booster system, as it must be fitted from factory prior to delivery.

Dry-running protection

Hydro Multi-E, 0.37 to 11 kW

As standard, Hydro Multi-E is fitted with a pressure switch as dry-running protection. The switch is fitted to the inlet manifold.

Optionally, the system can be supplied with a level switch instead of the pressure switch. This is common if the booster system is supplied from a break tank.

As an alternative, the system can be factory-fitted with inlet-pressure sensors for dry-running protection.

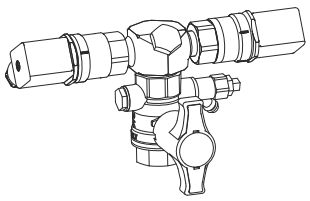
The benefit of this option is that it is easier to adjust the trigger level of a sensor and that the inlet pressure can be monitored with Grundfos GO Remote and via a connected BMS system (CIM module required).

To ensure that the system is properly protected against dry running, an inlet-pressure sensor must be connected to the pumps that can potentially act as master. This means that every pump that has an outlet-pressure sensor connected must also have an inlet-pressure sensor connected.

The sensors are available from 0 to 1 bar and from 0 to 6 bar.

Note: If a sensor is used for dry-running protection, it requires a Grundfos GO Remote to adjust the trigger level of the sensor.

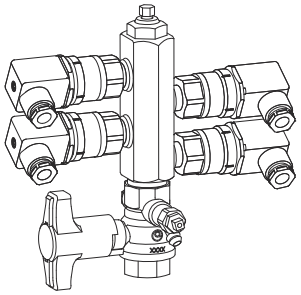
If the system is fitted with two outlet-pressure sensors (standard), the two inlet-pressure sensors are fitted in the inlet manifold with a drain valve and a T-piece. The drain valve allows for test of the dry-running function.



TM05 9127 3413

Fig. 22 Two inlet-pressure sensors fitted to T-piece

If the system is configured with more than two outlet-pressure sensors, a special connecting piece with a built-in vent is used. The connecting piece is fitted to a drain valve.



TM05 9128 3413

Fig. 23 Installation of more than two sensors

Note: The standard pressure switch normally supplied with the system is removed when the system is fitted with inlet-pressure sensors for dry-running protection.

Non-return valve on the inlet side

For suction-lift operation, the non-return valve can be moved to the inlet side. This is often used in combination with a foot valve if the system is drawing water from a tank.

No dry-running protection

Hydro Multi-E can be supplied without dry-running protection.

Note: We always recommend you to protect your system against dry running.

Outlet-pressure sensor on each pump

Hydro Multi-E, 0.37 to 11 kW

As standard, Hydro Multi-E is fitted with two outlet-pressure sensors. If required, the system can be fitted with a sensor on each pump. The benefit is that all pumps in the system can act as master pump and control the system.

When more than two outlet-pressure sensors are connected, the sensors are fitted in a special connecting piece with a built-in vent in the top. The connecting piece is fitted to a drain valve.

No redundant sensor

The system can be supplied with only one outlet-pressure sensor.

Note: This disables the multimaster function.

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Wall-mounted breaker box

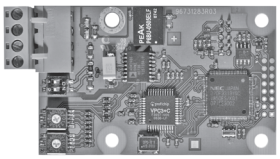
A breaker box for wall-mounting and five metres of flexible cable are supplied with the booster system. With this option the breaker box does not necessarily have to be installed in the same room as the booster system. The pumps are wired with five metres of cable, but not wired into the breaker box. The reason for not connecting the cables in the breaker box is to give the customer the opportunity to adjust the cable length to his need.

Left-side breaker box

As standard, the breaker box is mounted on the right side of the system. As an alternative, the system can be supplied with the breaker box mounted on the left side.

CIM communication interface modules

Hydro Multi-E, 0.37 to 11 kW



GrA6121

Fig. 24 Grundfos CIM communication interface module

The CIM modules enable communication of operating data, such as measured values and setpoints, between Hydro Multi-E and a building management system.

Note: CIM modules must be fitted by authorised personnel.

The CIM module enables transfer of data such as:

- operating mode
- setpoint
- control mode
- warnings and alarms
- power/energy consumption.

We offer the following CIM modules:

Module	Fieldbus protocol
CIM 050	GENIbus
CIM 110	LonWorks
CIM 150	PROFIBUS DP
CIM 200	Modbus RTU
CIM 250	GSM
CIM 270	Grundfos Remote Management
CIM 300	BACnet MS/TP
CIM 500	PROFIBUS I/O / Modbus TCP

Aerials for CIM 250

Description
Aerial for roof
Aerial for desk

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11. Accessories

Grundfos GO Remote

Grundfos GO Remote is used for wireless infrared or radio communication with the pumps.

Various Grundfos GO Remote variants are available. The variants are described in the following.

MI 202 and MI 204

The MI 202 and MI 204 are add-on modules with built-in infrared and radio communication.

- The MI 202 is used in conjunction with Apple iPod Touch 4G, iPhone 4 or IPhone 4S
- The MI 204 is used in conjunction with Apple iPod Touch 5G, iPhone 5 or later.



TM05 3887 1712 - TM05 7704 1513

Fig. 25 MI 202 and MI 204

MI 301

The MI 301 is a module with built-in infrared and radio communication. The MI 301 must be used in conjunction with an Android or iOS-based Smartphone with a Bluetooth connection. The MI 301 has rechargeable Li-ion battery and must be charged separately.



TM05 3890 1712

Fig. 26 MI 301

Supplied with the product:

- battery charger
- quick guide.

Additional documentation

The documents and publication numbers below refer to all Hydro Multi-E documentation available.

Document	Publication number
Installation and operating instructions	
Hydro Multi-E (0.37 - 11 kW)	98491894
Quick guide	
Hydro Multi-E with CME 0.37 - 11 kW	98477597
Hydro Multi-E with CR(I)E 0.37 - 11 kW	98477592

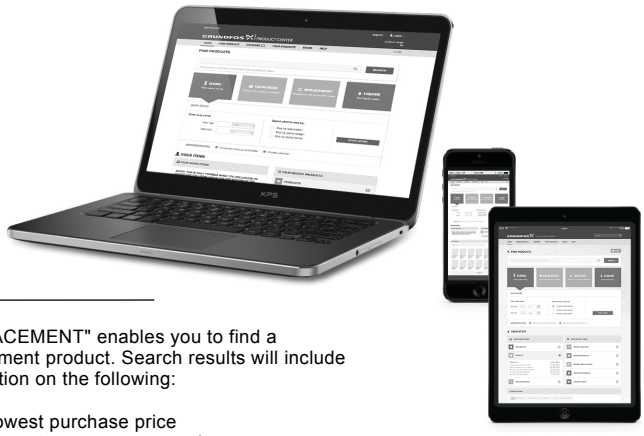
In addition to the printed documentation, Grundfos offers product information in Grundfos Product Center on www.grundfos.com. See also page 49.

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12. Grundfos Product Center

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

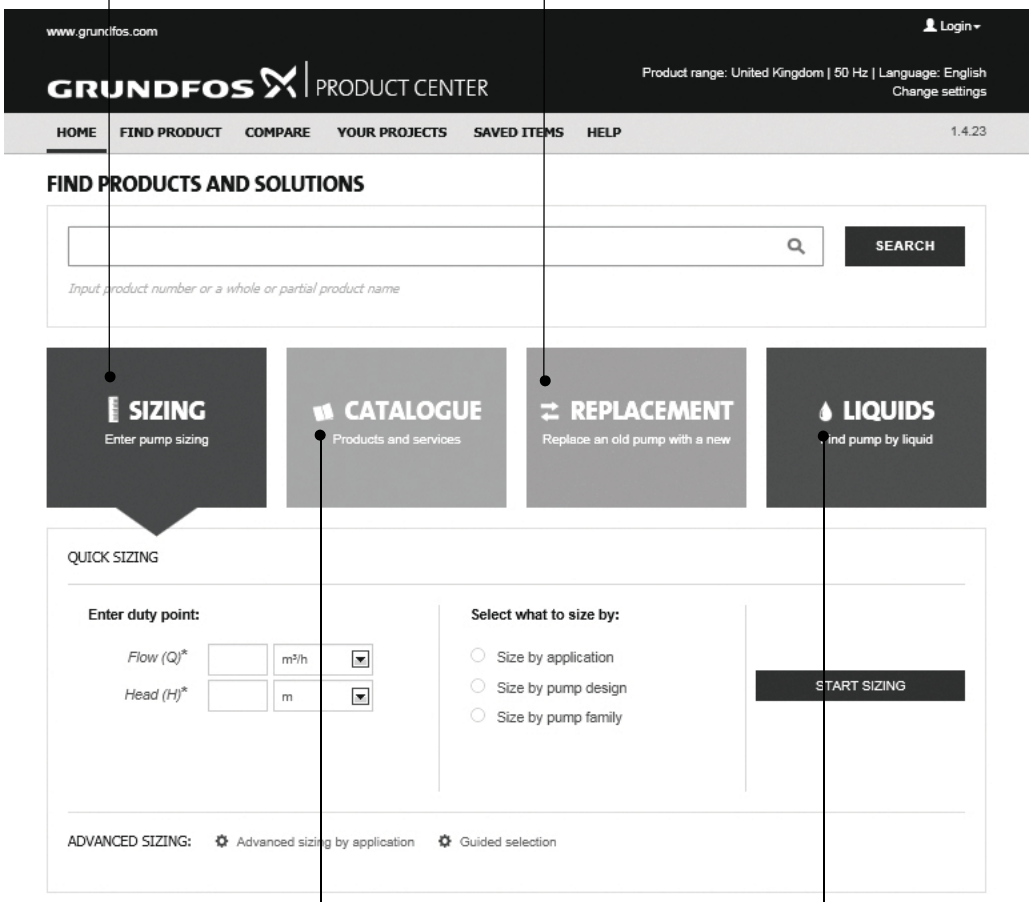
http://product-selection.grundfos.com



"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 following:

- the lowest purchase price
- the lowest energy consumption
- the lowest total life cycle cost.



"CATALOGUE" gives you access to the Grundfos product catalogue.

"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.

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