# Hydro Multi-E

**Installation and operating instructions**

GB D F I E P GR NL S FIN
DK PL RU HR RO CZ TR

## (GB) 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:

— 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.

— Pressure Equipment Directive (97/23/EC).
Standard used: EN 13831: 2007.

## (D) 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:

— Maschinenrichtlinie (2006/42/EG).
Normen, die verwendet wurden: EN 809: 1998 und EN 60204-1: 2006.

— EMV-Richtlinie (2004/108/EG).
Normen, die verwendet wurden: EN 61000-6-2: 2005 und EN 61000-6-3: 2007.

— Richtlinie über Druckeinrichtungen (97/23/EG).
Norm, die verwendet wurde: EN 13831: 2007.

## (F) Déclaration de Conformité

Nous, Grundfos, déclarons sous notre seule responsabilité, que les produits Hydro Multi-E, auxquels 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 :

— Directive Machines (2006/42/CE).
Normes utilisées : EN 809: 1998 et EN 60204-1: 2006.

— Directive Compatibilité Electromagnétique CEM (2004/108/CE).
Normes utilisées : EN 61000-6-2: 2005 et EN 61000-6-3: 2007.

— Directive concernant les équipements sous pression (97/23/CE).
Norme utilisée : EN 13831: 2007.

## (I) Dichiarazione di Conformità

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:

— Direttiva Macchine (2006/42/CE).
Norme applicate: EN 809: 1998 e EN 60204-1: 2006.

— Direttiva EMC (2004/108/CE).
Norme applicate: EN 61000-6-2: 2005 e EN 61000-6-3: 2007.

— Direttiva sulle apparecchiature a pressione (97/23/CE).
Norma applicata: EN 13831: 2007.

## (E) Declaración 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 las Estados Miembros del EM:

— Directiva de Maquinaria (2006/42/CE).
Normas aplicadas: EN 809: 1998 y EN 60204-1: 2006.

— Directiva EMC (2004/108/CE).
Normas aplicadas: EN 61000-6-2: 2005 y EN 61000-6-3: 2007.

— Directiva de equipos a presión (97/23/CE).
Norma aplicada: EN 13831: 2007.

## (P) Declaração de Conformidade

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:

— Directiva Máquinas (2006/42/CE).
Normas utilizadas: EN 809: 1998 e EN 60204-1: 2006.

— Directiva EMC (compatibilidade electromagnética) (2004/108/CE).
Normas utilizadas: EN 61000-6-2: 2005 e EN 61000-6-3: 2007.

— Directiva relativa a equipamento sob pressão (97/23/CE).
Norma utilizada: EN 13831: 2007.

## (GR) Δήλωση Συμμόρφωσης

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:

— Οδηγία για μηχανήματα (2006/42/EC).
Πρότυπα που χρησιμοποιήθηκαν: EN 809: 1998 και EN 60204-1: 2006.

— Οδηγία Ηλεκτρομαγνητικής Συμβατότητας (EMC) (2004/108/EC).
Πρότυπα που χρησιμοποιήθηκαν: EN 61000-6-2: 2005 και EN 61000-6-3: 2007.

— Οδηγία Εξοπλισμού Πίεσης (97/23/EC).
Πρότυπο που χρησιμοποιήθηκε: EN 13831: 2007.

## (NL) 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:

— Machine Richtlijn (2006/42/EC).
Gebruikte normen: EN 809: 1998 en EN 60204-1: 2006.

— EMC Richtlijn (2004/108/EC).
Gebruikte normen: EN 61000-6-2: 2005 en EN 61000-6-3: 2007.

— Richtlijn Drukapparatuur (97/23/EC).
Gebruikte norm: EN 13831: 2007.

## (S) 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:

— Maskindirektivet (2006/42/EG).
Tillämpade standarder: EN 809: 1998 och EN 60204-1: 2006.

— EMC-direktivet (2004/108/EG).
Tillämpade standarder: EN 61000-6-2: 2005 och EN 61000-6-3: 2007.

— Direktiv för tryckutrustning (97/23/EG).
Tillämpad standard: EN 13831: 2007.

## (FIN) 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:

— Konedirektiivi (2006/42/EY).
Sovellettavat standardit: EN 809: 1998 ja EN 60204-1: 2006.

— EMC-direktiivi (2004/108/EY).
Sovellettavat standardit: EN 61000-6-2: 2005 ja EN 61000-6-3: 2007.

— Painelaitteita koskeva direktiivi (97/23/EY).
Sovellettu standardi: EN 13831: 2007.

## (DK) 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:

— Maskindirektivet (2006/42/EF).
Anvendte standarder: EN 809: 1998 og EN 60204-1: 2006.

— EMC-direktivet (2004/108/EF).
Anvendte standarder: EN 61000-6-2: 2005 og EN 61000-6-3: 2007.

— Trykudstyrsdirektivet (97/23/EF).
Anvendt standard: EN 13831: 2007.

## (PL) Deklaracja zgodności

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

— Dyrektywa Maszynowa (2006/42/WE).
Zastosowane normy: EN 809: 1998 oraz EN 60204-1: 2006.

— Dyrektywa EMC (2004/108/WE).
Zastosowane normy: EN 61000-6-2: 2005 oraz EN 61000-6-3: 2007.

— Dyrektywa Urządzeń ciśnieniowych (97/23/WE).
Zastosowana norma: EN 13831: 2007.

## (RU) Декларация о соответствии

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:

— Механические устройства (2006/42/EC).
Применявшиеся стандарты: EN 809: 1998 и EN 60204-1: 2006.

— Электромагнитная совместимость (2004/108/EC).
Применявшиеся стандарты: EN 61000-6-2: 2005 и EN 61000-6-3: 2007.

— Директива по оборудованию, работающему под давлением (97/23/EC).
Применявшийся стандарт: EN 13831: 2007.

## (HR) Izjava o usklađenosti

Mi, Grundfos, izjavljujemo pod vlastitom odgovornošću da je proizvod Hydro Multi-E, na koji se ova izjava odnosi, u skladu s direktivama ovog Vijeća o usklađivanju zakona država članica EU:

— Direktiva za strojeve (2006/42/EZ).
Korištene norme: EN 809: 1998 i EN 60204-1: 2006.

— Direktiva za elektromagnetsku kompatibilnost (2004/108/EZ).
Korištene norme: EN 61000-6-2: 2005 i EN 61000-6-3: 2007.

— Direktiva za tlačnu opremu (97/23/EZ).
Korištena norma: EN 13831: 2007.

## (RO) Declarație de Conformitate

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:

— Directiva Utilaje (2006/42/CE).
Standarde utilizate: EN 809: 1998 şi EN 60204-1: 2006.

— Directiva EMC (2004/108/CE).
Standarde utilizate: EN 61000-6-2: 2005 şi EN 61000-6-3: 2007.

— Directiva echipamentelor de presiune (97/23/CE).
Standard utilizat: EN 13831: 2007.

## (CZ) 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:

— Směrnice pro strojní zařízení (2006/42/ES).
Použité normy: EN 809: 1998 a EN 60204-1: 2006.

— Směrnice pro elektromagnetickou kompatibilitu (EMC) (2004/108/ES).
Použité normy: EN 61000-6-2: 2005 a EN 61000-6-3: 2007.

— Směrnice pro tlaková zařízení (97/23/ES).
Použitá norma: EN 13831: 2007.

## (TR) 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:

— Makineler Yönetmeliği (2006/42/EC).
Kullanılan standartlar: EN 809: 1998 ve EN 60204-1: 2006.

— EMC Diretifi (2004/108/EC).
Kullanılan standartlar: EN 61000-6-2: 2005 ve EN 61000-6-3: 2007.

— Basınç Ekipman Yönetmeliği (97/23/EC).
Kullanılan standart: EN 13831: 2007.

Bjerringbro, 25th January 2010

Jan Strandgaard
Technical Director

# Hydro Multi-E

**Original installation and operating instructions.**

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## CONTENTS

Before beginning installation procedures, these installation and operating instructions should be studied carefully. The installation and operation should also be in accordance with local regulations and accepted codes of good practice.

# 1. Product description

## 1.1 General description

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

The Hydro Multi-E incorporates Grundfos CRE 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.
- adjusts its performance to the demand through cutting in/out the required number of pumps and through parallel control of the pumps in operation.
- 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 Hydro Multi-E Quick Guide supplied with the booster set.

## 1.2 Functions

The Hydro Multi-E offers the 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.
- System 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.
- Grundfos bus communication.
- Connection to a building management system via Grundfos G10-LON interface or G100 gateway.

## 1.3 Hydro Multi-E

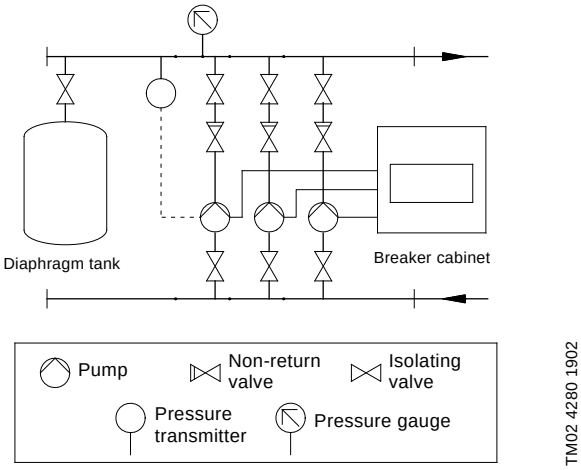


**Fig. 1** Hydro Multi-E components

The breaker cabinet incorporates the components:

- mains switch and
- circuit breakers for cutting in/out the required number of pumps.

# 2. Operating conditions

## 2.1 Temperature ranges

**Ambient temperature**

At ambient temperatures ranging from 0°C to +40°C, the motors may be loaded 100%.

If the ambient temperature exceeds +40°C, or if the motors are located 1000 metres above sea level, the motor output (P2) must be reduced, see fig. 2.

This means that larger motors must be used.

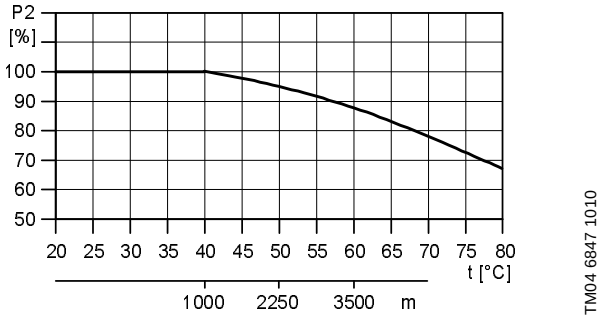


**Fig. 2** Motor output reduction in relation to ambient temperature and altitude above sea level

**Liquid temperature**

0 °C to +70 °C.

**Note:** The liquid temperature applies to the pumps only.

**Temperature during storage/transport**

–40 °C to +60 °C.

## 2.2 Relative air humidity

Maximum 95 %.

## 2.3 Maximum operating pressure

Figure A, page 368, shows the maximum operating pressure for the pumps.

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## 2.4 Minimum inlet pressure

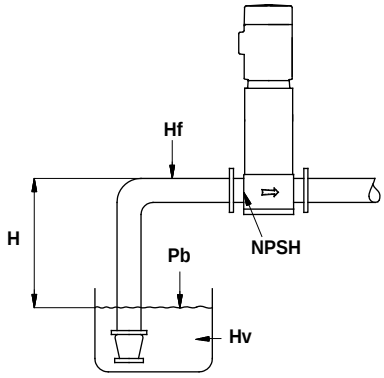


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**Fig. 3** Parameters for the calculation of minimum inlet pressure

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

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

$p_b$ = 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 367 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 fig. C, page 371.
$t_m$ = 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 367): 1.2 metres head.

$H_f$ = 3.0 metres head.
Liquid temperature: +60°C.
$H_v$ (from fig. C, page 371): 2.1 metres head.

$H = p_b \times 10.2 - NPSH - H_f - H_v - H_s$ [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 x 0.0981 = 0.27 bar.
Pressure calculated in kPa: 2.8 x 9.81 = 27.4 kPa.

## 2.5 Maximum inlet pressure

Figure B, page 370, shows the maximum permissible inlet pressure. However, the actual inlet pressure + pressure when the pump is operating against a closed valve must always be lower than the “maximum operating pressure”.

The pumps have been pressure-tested at a pressure of 1.5 times the values stated in fig. B, page 370.

## 2.6 Minimum flow rate

Due to the risk of overheating, the pumps should **not** be used at flows below the minimum flow rate.

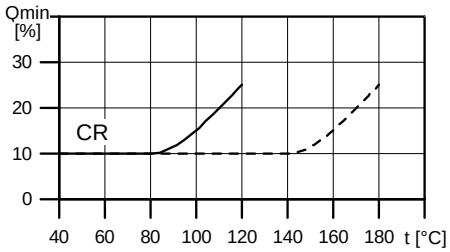


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**Fig. 4** Minimum flow rate as a percentage of the nominal flow rate in relation to the liquid temperature

**Note:** The pumps must never operate against a closed discharge valve.

## 2.7 Start/stop

The number of starts and stops via the mains voltage must not exceed 4 times per hour.
When the Hydro Multi-E is switched on via the mains, it will start after approx. 5 seconds.

## 2.8 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.

The precharge pressure must be measured in a pressure-less system.

It is recommended to use nitrogen gas for precharging.

## 3. Installation

The Hydro Multi-E should be installed in accordance with local regulations and accepted codes of good practice.

### 3.1 Location

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

- Place the Hydro Multi-E in such a way that adequate cooling is ensured.
- Motor cooling fins and fan blades must be kept clean.

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

The Hydro Multi-E should be placed with a 1 metre clearance in front and on the two sides.

### 3.2 Mechanical installation

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

The pipes connected to the Hydro Multi-E must be of adequate size. To avoid resonance, expansion joints should be fitted in the discharge and suction pipes, see fig. 5.

Connect the pipes to the manifolds of the booster set.

Either end can be used. Apply sealing compound to the unused end of the manifold and fit the screw cap. For manifolds with flanges, a blind flange with gasket must be fitted.

The booster set should be tightened up prior to start-up.

If booster sets are installed in blocks of flats or the first consumer on the line is close to the booster set, it is advisable to fit pipe hangers on the suction and discharge pipes to prevent vibration being transmitted through the pipework, see fig. 5.

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

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

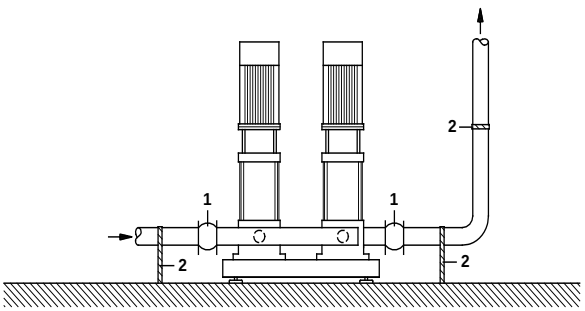


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**Fig. 5** Installation example with expansion joints and pipe hangers

1. Expansion joint.
2. Pipe hanger.

Expansion joints, pipe hangers and vibration dampers shown in fig. 5 are not included in the standard Hydro Multi-E.

## 4. Electrical connection – Hydro Multi-E with single-phase pumps

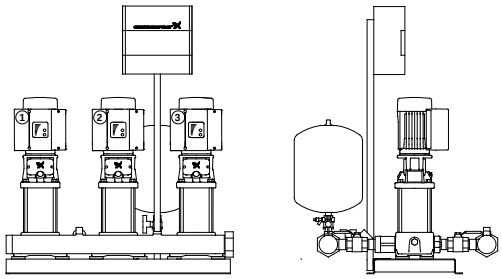

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**Fig. 6** Hydro Multi-E booster set with single-phase pumps

**Note:** The user or the installer is responsible for the installation of the correct earthing and protection according to valid national and local standards. All operations must be carried out by a qualified electrician.

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

### 4.1 Mains switch

The Hydro Multi-E must be connected to an external all-pole mains switch with a contact separation of at least 3 mm in each pole according to IEC 364.

### 4.2 Protection against electric shock – indirect contact

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

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

### 4.3 Additional protection

If the Hydro Multi-E is connected to an electric installation where an earth leakage circuit breaker 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 *17.2 Leakage current*.

### 4.4 Motor protection

The Hydro Multi-E requires no external motor protection. The motors incorporate thermal protection against slow overloading and blocking (IEC 34-11: TP 211).

### 4.5 Protection against mains voltage transients

The Hydro Multi-E is protected against mains voltage transients in accordance with EN 61 800-3.

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## 4.6 Supply voltage

3 x 400/230 V ±10%, 50/60 Hz, N, PE.

The supply voltage and frequency are marked on the pump nameplate. Please make sure that the motor is suitable for the electricity supply on which it will be used.

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 *17.1 Supply voltage.*

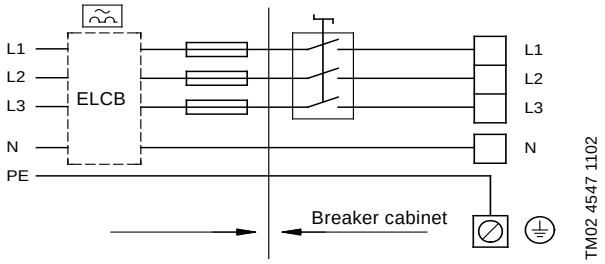



**Fig. 7** Example of a mains-connected Hydro Multi-E with back-up fuses and additional protection

## 4.7 Other connections

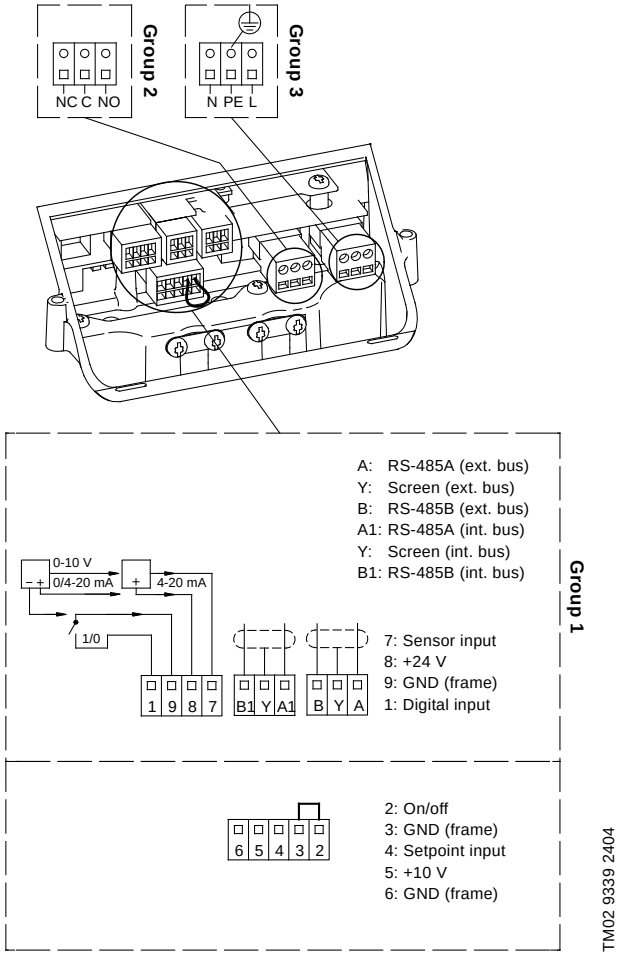



**Fig. 8** Connection terminals in pump 1

**Note:** As a precaution, the wires to be connected to the following connection groups must be separated from each other by reinforced insulation in their entire lengths:

1. **Inputs** (external digital function, sensor signal, terminals 1, 7, 8, 9, and bus connection, terminals B, Y, A and B1, Y, A1).

   All inputs (group 1) are internally separated from the mains-conducting parts by reinforced insulation and galvanically separated from other circuits.
   All control terminals are supplied by protective extra-low voltage (PELV), thus ensuring protection against electric shock.
2. **Output** (relay signal, terminals NC, C, NO).

   The output (group 2) is galvanically separated from other circuits. Therefore, the supply voltage or protective extra-low voltage can be connected to the output as desired.
3. **Mains supply** (terminals N, PE, L).

A galvanically safe separation must fulfil the requirements for reinforced insulation including creepage distances and clearances specified in EN 60335.

If the mains supply cable is damaged between the breaker cabinet and the pump, it **must** be replaced by the manufacturer, the manufacturer's service partner or similarly qualified persons in order to avoid a hazard.

## 5. Electrical connection – Hydro Multi-E with three-phase pumps

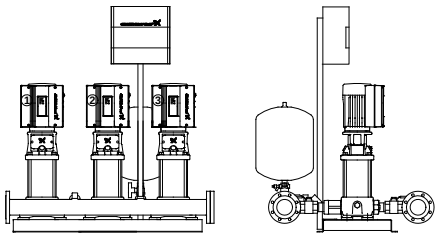



**Fig. 9** Hydro Multi-E booster set with three-phase pumps

**Note:** The user or the installer is responsible for the installation of the correct earthing and protection according to valid national and local standards. All operations must be carried out by a qualified electrician.

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

### 5.1 Mains switch

The Hydro Multi-E must be connected to an external all-pole mains switch with a contact separation of at least 3 mm in each pole according to IEC 364.

### 5.2 Protection against electric shock – indirect contact

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

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

**Note:** As the leakage current of 4 kW to 7.5 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 *18.2 Leakage current*.

EN 50 178 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 electricity supply.

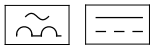
- The earth connection must be carried out as duplicate conductors.

### 5.3 Additional protection

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

- which is suitable for handling leakage currents and cutting-in with short pulse-shaped leakage.
- which 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 sets 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 *18.2 Leakage current*.

### 5.4 Motor protection

The Hydro Multi-E requires no external motor protection. The motors incorporate thermal protection against slow overloading and blocking (IEC 34-11: TP 211).

### 5.5 Protection against mains voltage transients

The Hydro Multi-E is protected against mains voltage transients in accordance with EN 61 800-3.

### 5.6 Supply voltage

3 x 380-480 V ±10%, 50/60 Hz, PE.

The supply voltage and frequency are marked on the pump nameplate. Please make sure that the motor is suitable for the electricity supply on which it will be used.

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*.

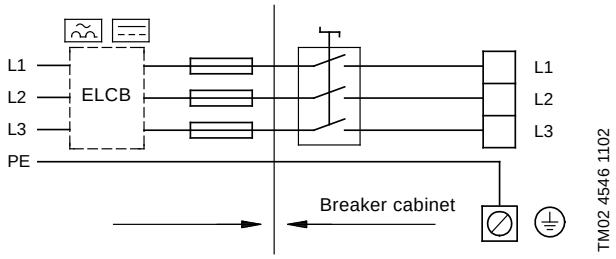



**Fig. 10** Example of a mains-connected Hydro Multi-E with back-up fuses and additional protection

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## 5.7 Other connections

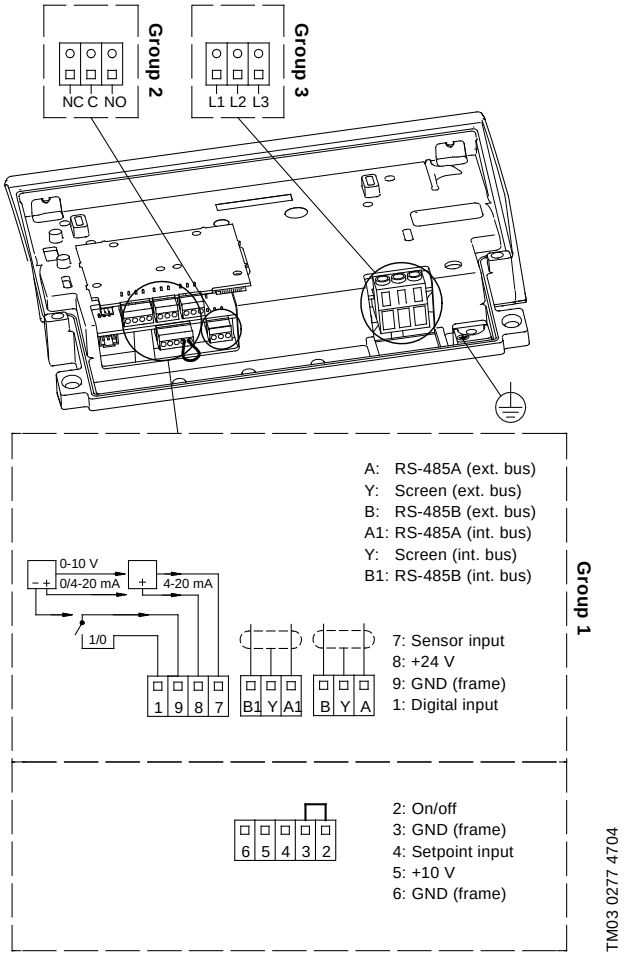


**Fig. 11** Connection terminals in pump 1

**Note:** As a precaution, the wires to be connected to the following connection groups must be separated from each other by reinforced insulation in their entire lengths:

1. **Inputs** (external digital function, sensor signal, terminals 1, 7, 8, 9, and bus connection, terminals B, Y, A and B1, Y, A1).

   All inputs (group 1) are internally separated from the mains-conducting parts by reinforced insulation and galvanically separated from other circuits.

2. **Output** (relay signal, terminals NC, C, NO).

   The output (group 2) is galvanically separated from other circuits. A maximum supply voltage of 250 V or protective extra-low voltage can be connected to the output as desired.

3. **Mains supply** (terminals L1, L2, L3, PE).

A galvanically safe separation must fulfil the requirements for reinforced insulation including creepage distances and clearances specified in EN 60335.

If the mains supply cable is damaged between the breaker cabinet and the pump, it must be replaced by the manufacturer, the manufacturer's service partner or similarly qualified persons in order to avoid a hazard.

## 5.8 Signal cable

- Use a screened cable having a cross-sectional area of min. 0.5 $mm^2$ and max. 1.5 $mm^2$ for the digital input.
- The screen of the cable must be connected to frame at both ends with good frame connection. It must be as close as possible to the terminals, fig. 12.

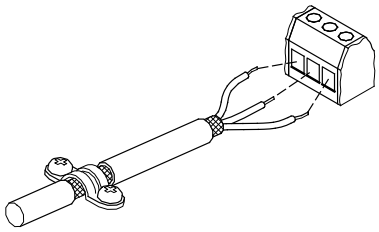


**Fig. 12** Stripped cable with screen and wire connection

- Screws for frame connections must always be tightened whether a cable is fitted or not.
- The wires must be as short as possible.

## 5.9 Bus connection cable

For the bus connection a screened 3-core cable having a cross-sectional area of min. 0.5 $mm^2$ and max. 1.5 $mm^2$ must be used.

- If the Hydro Multi-E is connected to a unit with a cable clamp which is identical to the one on the Hydro Multi-E, the screen must be connected to this cable clamp.
- If the unit has no cable clamp as shown in fig. 13, the screen is left unconnected at this end.

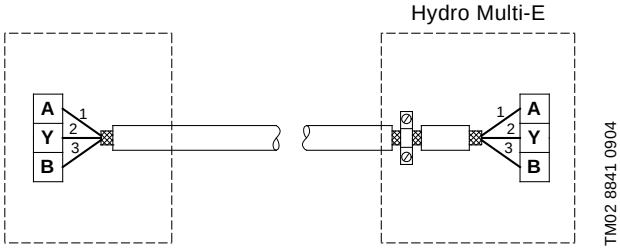


**Fig. 13** Connection with screened 3-core cable

## 5.10 Emergency operation

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.

### 5.10.1 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.

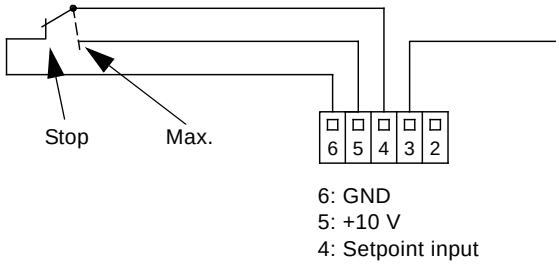


**Fig. 14** Connection of pressure switches

### 5.10.2 Setting of pressure switches

Figure 15 shows

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

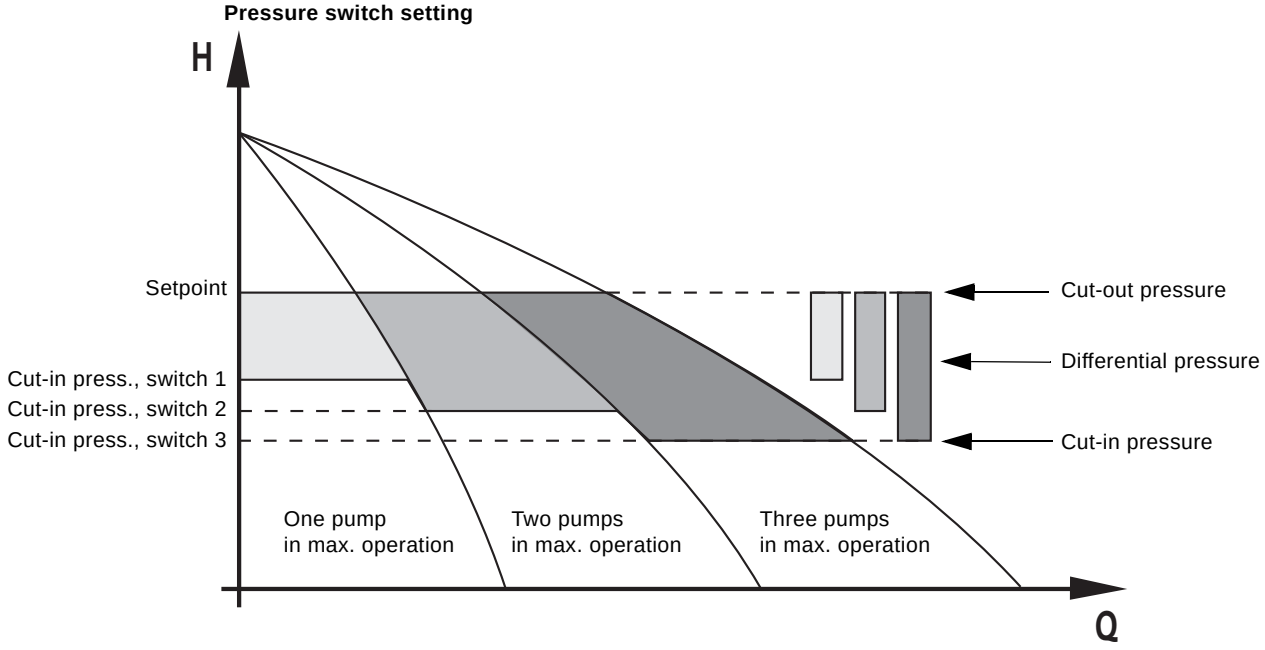


**Fig. 15** Functional diagram

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## 5.11 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.

### 5.11.1 Hydro Multi-E without emergency operation

Type of dry-running protection:

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

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

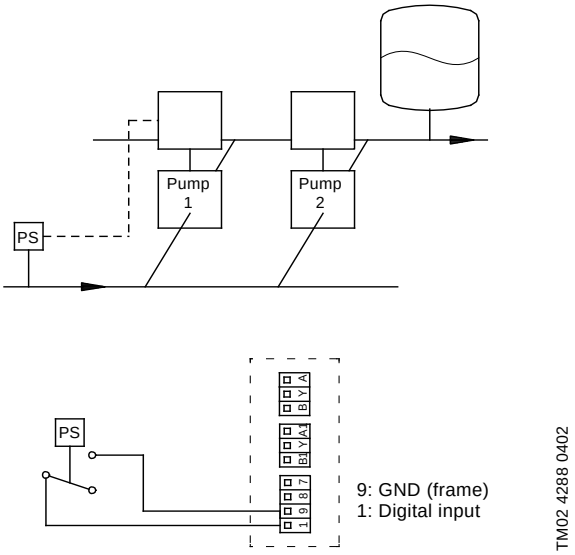


**Fig. 16** Pressure switch connected to pump 1

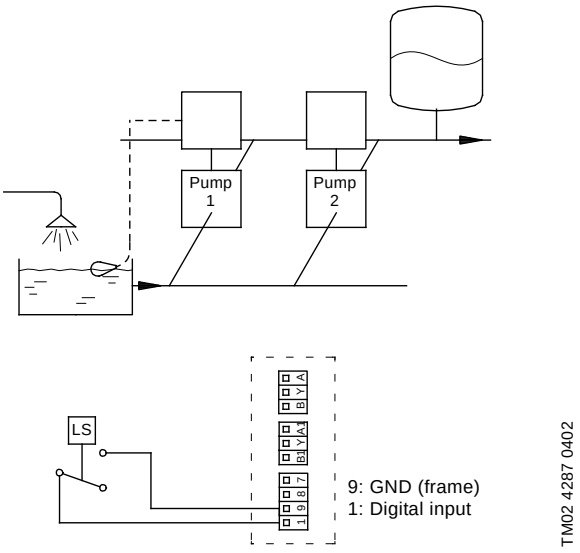


**Fig. 17** Level switch connected to pump 1

### 5.11.2 Hydro Multi-E with emergency operation

If the Hydro Multi-E control unit fails, terminals 1 and 9 are 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 wiring diagram in the breaker cabinet.

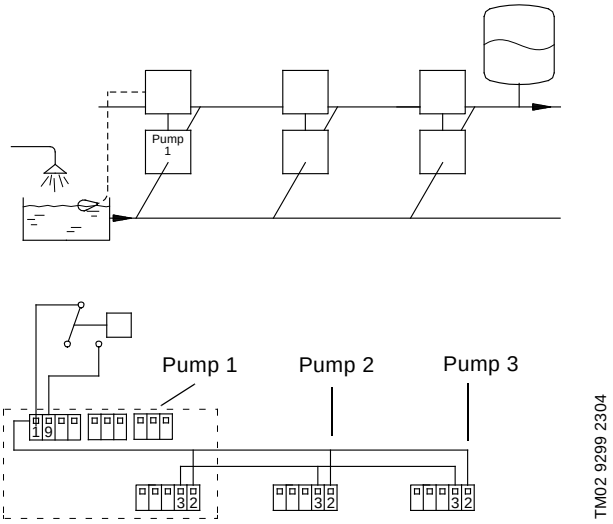


**Fig. 18** Wiring of dry-running protection in emergency operation

**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.

## 6. Start-up

### 6.1 Hydro Multi-E in system with inlet pressure

To start up a booster set with inlet pressure, proceed as follows:

| Step | Action | Result |
|---|---|---|
| 1. | Check that the Hydro Multi-E corresponds to order and that no single parts have been damaged. | |
| 2. | Switch off the electricity supply by means of the mains switch. | The installation is now safe to work on. |
| 3. | Connect water and electricity supplies. | |
| 4. | Close the discharge valves of the pumps. | |
| 5. | Check that the diaphragm tank precharge pressure is 0.7 times the desired discharge pressure (setpoint). | |
| 6. | Open the suction valve of each pump and vent the pumps one by one by means of the vent screw and recirculation screw. | |
| 7. | Switch on the electricity supply by means of the mains switch. | The Hydro Multi-E starts and increases the speed to maximum. |
| 8. | Slowly open the discharge valve of each pump. | No impurities will be flushed into the system. |
| 9. | Wait for a few minutes. | The Hydro Multi-E reduces the speed. |
| 10. | Set the desired discharge pressure.<br>**Note:** When changing the discharge pressure, change the diaphragm tank precharge pressure accordingly. | |
| 11. | Check that the pumps are cutting in and out, thus adjusting the performance to the demand. | The Hydro Multi-E is now ready for operation. |

### 6.2 Hydro Multi-E in system without inlet pressure

To start up a booster set without inlet pressure, proceed as follows:

| Step | Action | Result |
|---|---|---|
| 1. | Check that the Hydro Multi-E corresponds to order and that no single parts have been damaged. | |
| 2. | Switch off the electricity supply by means of the mains switch and switch off the circuit breaker of each pump. | The installation is now safe to work on. |
| 3. | Connect water and electricity supplies. | |
| 4. | Check that the diaphragm tank precharge pressure is 0.7 times the desired discharge pressure (setpoint). | |
| 5. | Open the suction valve of pump 1. | |
| 6. | Close the discharge valve of pump 1. | |
| 7. | Prime the suction pipe and pump 1. | |
| 8. | Switch on the electricity supply to pump 1 by means of the corresponding circuit breaker. | The pump starts and increases the speed to maximum. |
| 9. | Vent pump 1 by means of the vent screw and recirculation screw. | |
| 10. | Slowly open the discharge valve of pump 1. | |
| 11. | Wait for a few minutes. | The pump reduces the speed. |
| 12. | Close the discharge valve and switch off the electricity supply to pump 1 by means of the corresponding circuit breaker. | The Hydro Multi-E stops. |
| 13. | Repeat from point 5 until all pumps have been vented. | |
| 14. | Switch on the electricity supply to all pumps. | The Hydro Multi-E starts and increases the speed to maximum. |
| 15. | Slowly open all discharge valves. | |
| 16. | Wait for a few minutes. | The Hydro Multi-E reduces the speed. |
| 17. | Set the desired discharge pressure.<br>**Note:** When changing the discharge pressure, change the diaphragm tank precharge pressure accordingly. | |
| 18. | Check that the pumps are cutting in and out, thus adjusting the performance to the demand. | The Hydro Multi-E is now ready for operation. |

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## 7. Operating modes

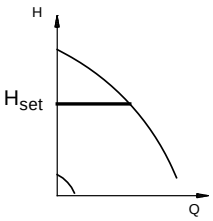
The operating modes are the operating conditions that the booster set can be brought in by the user.

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.

### 7.1 Normal operation



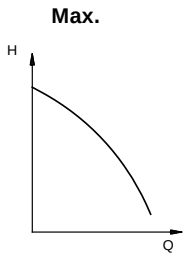

TM02 4328 0602

**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.

### 7.2 Stop or max. operation

In addition to normal operating mode, the **Stop** or **Max.** operating mode can be selected. See the example in fig. 20.




TM02 4318 0602

**Fig. 20** Hydro Multi-E in max. operation mode

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

### 7.3 Operating condition in case of disconnection of electricity supply

If the electricity 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.

### 7.4 Other settings

Other Hydro Multi-E settings can be made by means of the R100, see section *9. Setting by means of the R100.*

Factory settings are marked with **bold**-faced type under each individual display in sections *9.1 Menu OPERATION* and *9.3 Menu INSTALLATION.*

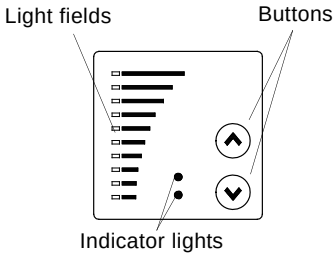
### 7.5 Priority of settings

No priority of settings - the last given command applies.

## 8. Setting by means of control panel

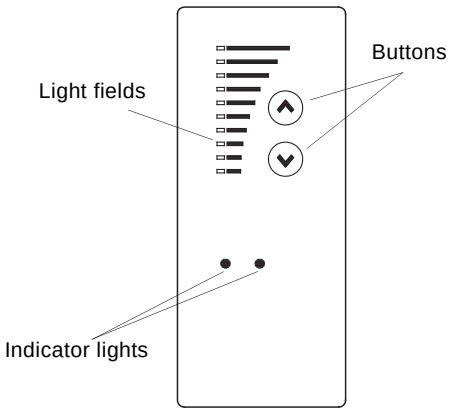
The control panel, fig. 21 or 22, incorporates:

- Buttons, ⊛ and ⊛, for setpoint setting.
- Light fields, yellow, for indication of setpoint.
- Indicator lights, green (operation) and red (fault).




TM00 7600 0304

**Fig. 21** Control panel for single-phase Hydro Multi-E




TM02 8513 0304

**Fig. 22** Control panel for three-phase Hydro Multi-E

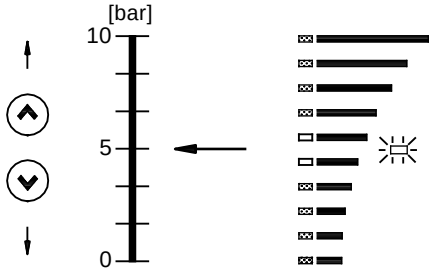
### 8.1 Setpoint setting

Set the desired setpoint by pressing the buttons ⊛ and ⊛.

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

### 8.2 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).




TM03 0236 4604

**Fig. 23** Setpoint set to 5 bar

### 8.3 Setting to max. curve duty

Press ⊛ continuously to change over to the max. curve of the Hydro Multi-E (top light field flashes). When the top light field is on, ⊛ must be pressed for 3 seconds before the light field starts flashing.

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

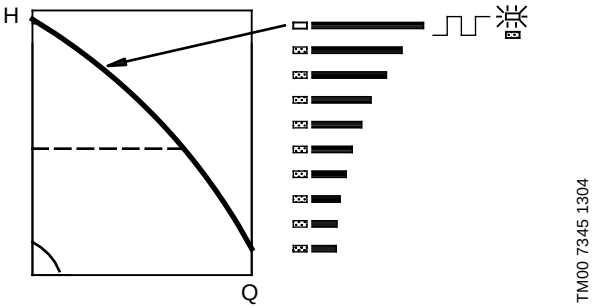



**Fig. 24** Max. curve duty

### 8.4 Start/stop

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

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

## 9. Setting by means of the R100

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

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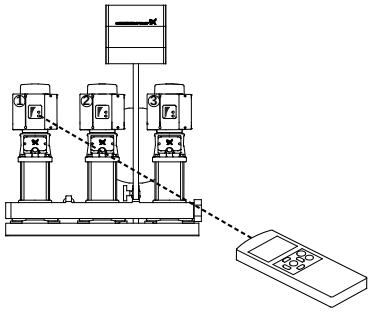


TM02 4303 3205

**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 displays are divided into four parallel menus, fig. 26:

0. GENERAL (see operating instructions for the R100)
1. OPERATION
2. STATUS
3. INSTALLATION

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

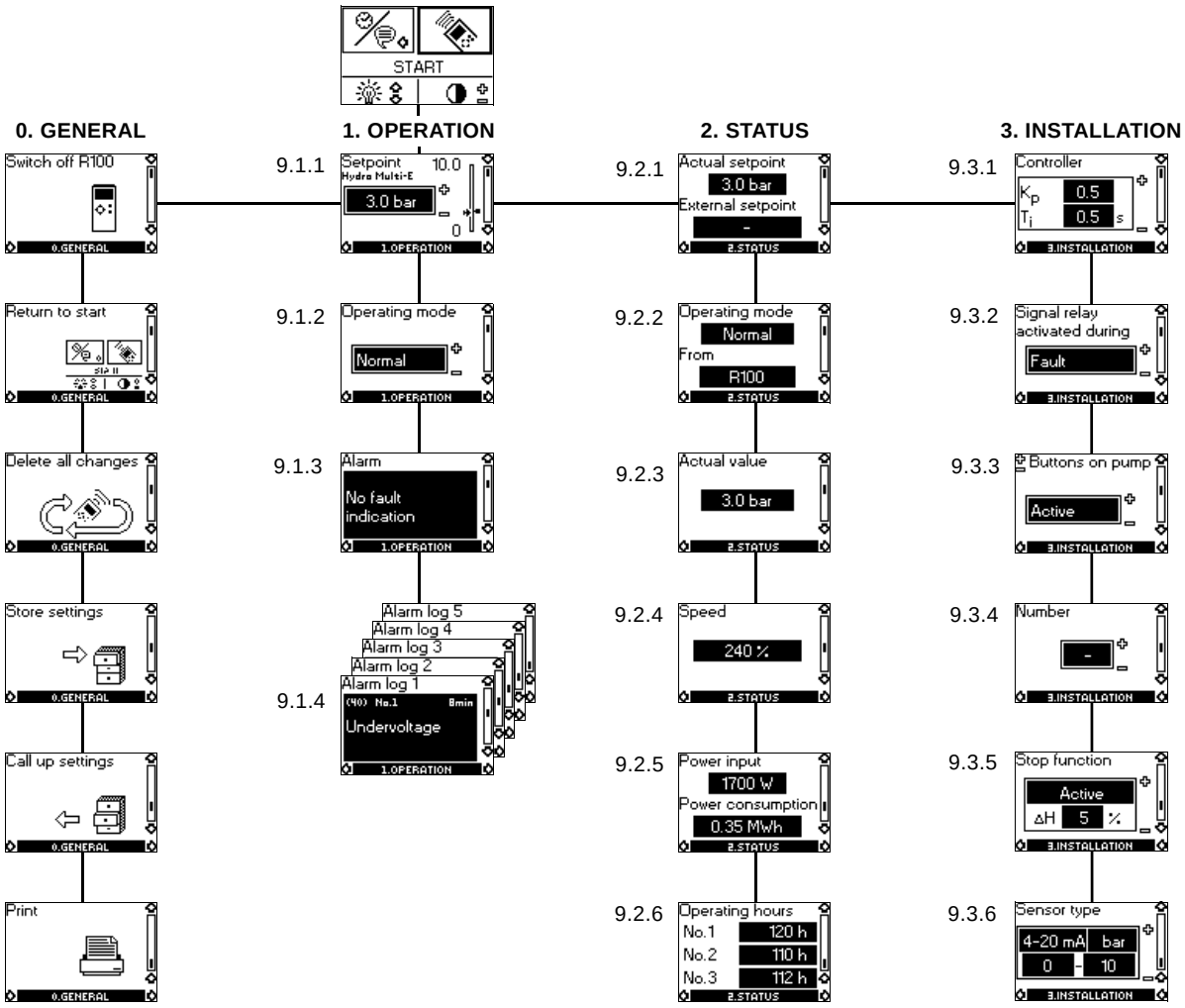



**Fig. 26** Menu overview

## 9.1 Menu OPERATION

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

### 9.1.1 Setpoint setting


- Setpoint set
- Actual value

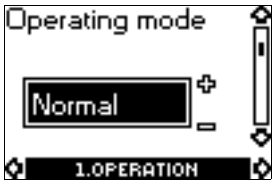
In this display, the setpoint is set.

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).

### 9.1.2 Setting of operating mode

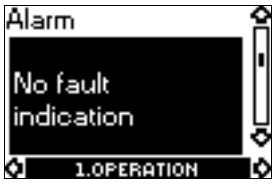



Select one of the following operating modes:

- *Stop*,
- ***Normal*** (operation),
- *Max.*

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

### 9.1.3 Fault indications



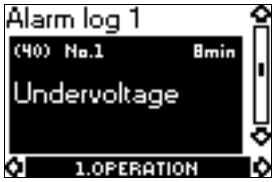

If the Hydro Multi-E is faulty, the cause will appear in this display.

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.

### 9.1.4 Alarm log




If faults have been indicated, the last five fault indications will appear in the alarm log. “Alarm log 1” shows the newest/latest fault.

The example shows the fault indication “Undervoltage” for pump No. 1, the fault code and the number of minutes the Hydro Multi-E has been connected to the electricity supply after the fault occurred.

## 9.2 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.

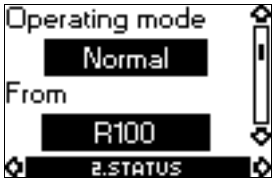
### 9.2.1 Display of actual setpoint


Tolerance: ±2%

This display shows the actual setpoint.

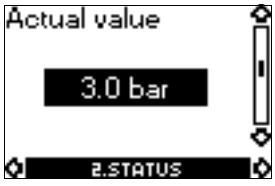
It is not possible to connect an external setpoint signal.

### 9.2.2 Display of operating mode




This display shows the actual operating mode (*Stop, Normal* (operation) 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 *(Stop func.), see section 9.3.5 Setting of stop function.*

### 9.2.3 Display of actual value




The actually measured value of a connected sensor will appear in this display.

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

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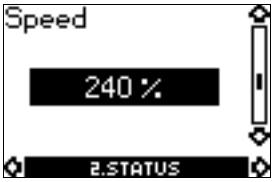
#### 9.2.4 Display of total actual output in %




Tolerance: ±5%

The actual output of all operating pumps can be read in this display.

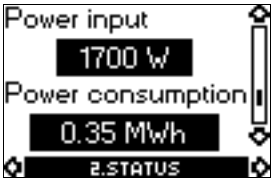
**Example:**

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.

#### 9.2.5 Display of input power and power consumption



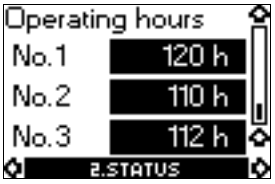

Tolerance: ±10%

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.

#### 9.2.6 Display of operating hours



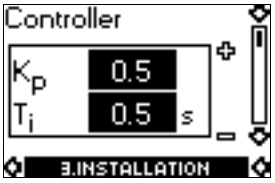

Tolerance: ±2%

This display shows the operating hours for each individual pump of the booster set. The number of operating hours is an accumulated value and cannot be reset.

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

### 9.3 Menu INSTALLATION

#### 9.3.1 Selection of controller




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

- The gain (Kp) is set within the range from *0.1* to *20*.
- The integral-action time (Ti) is set within the range from *0.1* to *3600* s. If *3600* s is selected, the controller will function as a P controller.

#### 9.3.2 Selection of fault, operating or ready signal relay


It can be selected in which situation the relay should be activated:

- ***Fault*** (fault indication),
- *Operation* (operating indication),
- *Ready* (ready indication).

See section *12. Indicator lights and signal relay*.

#### 9.3.3 Blocking of the buttons on the control panel

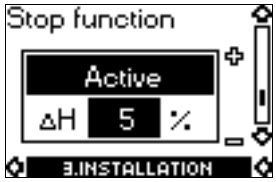

The buttons ⊙ and ⊙ on the control panel can be set to:

- ***Active*,**
- *Not active*.

#### 9.3.4 Allocation of 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.

#### 9.3.5 Setting of 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:

- ***Active***,
- *Not active.*

The low-flow detection is carried out 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 a small change in pressure, the Hydro Multi-E will detect a low flow.

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

∆H indicates the difference between start and stop pressures, fig. 27.

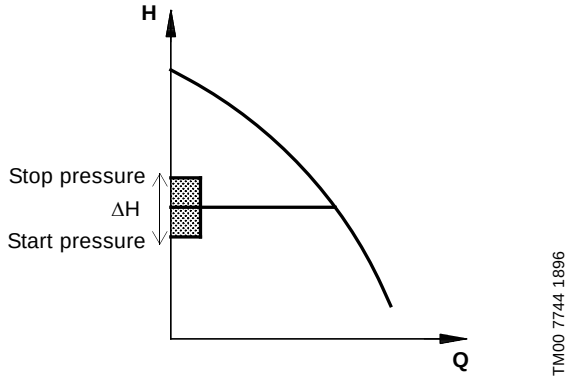
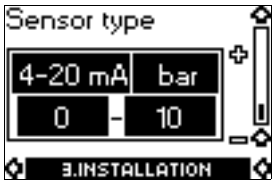



**Fig. 27** Difference between start and stop pressures (∆H)

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

The stop function requires a tank precharge pressure of 0.7 x actual setpoint.

#### 9.3.6 Setting of sensor




**Note:** The sensor setting is only relevant for normal operation.

Select the following:

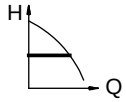
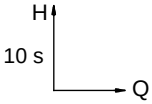
- Sensor output signal *(0-10 V, 0-20 mA or 4-20 mA),*
- sensor measuring unit *(bar, mbar, m, kPa, psi, ft, m³/h, m³/s, l/s, gpm, °C, °F or %)* and
- sensor measuring range.

## 10. Digital input

The Hydro Multi-E has a digital input for external fault.

The digital input has been factory-set to external fault and will be **active** in closed condition.

**Functional diagram: Input for digital function:**

| | **Digital function (terminals 1 and 9)** | |
|---|---|---|
|  |   | **Normal duty** |
|  |   | **External fault** |

If the digital input is activated 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.

## 11. Bus signal

The Hydro Multi-E enables external serial communication via an RS-485 input. The communication is carried out according to the Grundfos bus protocol, GENIbus, and enables connection to a building management system or another external control system.

Via the bus signal, it is possible to remote-set Hydro Multi-E operating parameters, like setpoint, operating mode, etc. At the same time, the Hydro Multi-E can provide status information about important parameters, like actual value of control parameter, input power, fault indications, etc.

Contact Grundfos for further details.

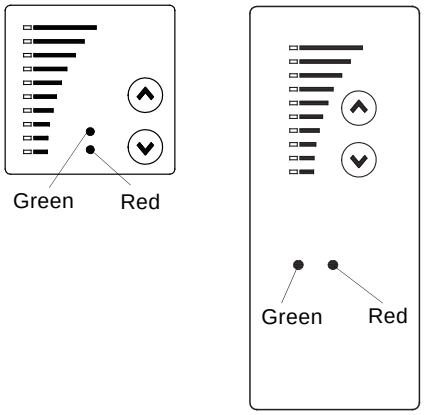
**Note:** If a bus signal is used, the number of settings available via the R100 will be reduced.

If the Hydro Multi-E is to be connected to a building management system, it must communicate with the system via a Grundfos G10-LON interface or G100 gateway.

GB

## 12. 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.



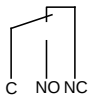
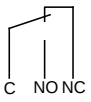
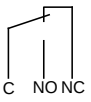
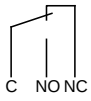
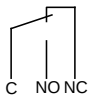
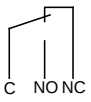
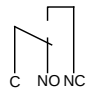
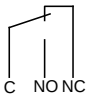
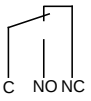
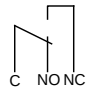
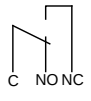
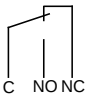
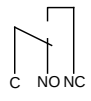
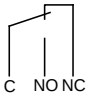
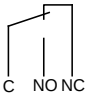

TM00 7600 0304 / TM02 8513 0304

**Fig. 28** Indicator lights on control panels of single- and three-phase Hydro Multi-E

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

The signal output can be set to fault, operating or ready indication by means of the R100, see section *9.3.2 Selection of fault, operating or ready signal relay.*

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

| Indicator lights | | Signal relay activated during: | | | Description |
|---|---|---|---|---|---|
| Fault (red) | Operation (green) | Fault | Operation | Ready | |
| Off | Off |  |  |  | The electricity supply has been switched off. |
| Off | Permanently on |  |  |  | The Hydro Multi-E is operating. |
| Off | Flashing |  |  |  | The Hydro Multi-E has been set to stop via the control panel, R100 or bus. |
| Permanently on | Off |  |  |  | The Hydro Multi-E has stopped because of a fault and will attempt to restart.<br>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. |
| Permanently on | Permanently on |  |  |  | The Hydro Multi-E is still operating, but one or two pumps are faulty. The fault will be reset automatically when the fault has disappeared. |
| Permanently on | Flashing |  |  |  | The Hydro Multi-E has been set to stop via the control panel, 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.

## 13. Megging

**Note:** Megging of an installation incorporating CRE pumps is not allowed, as the built-in electronics may be damaged.

## 14. Maintenance

Before starting work on the Hydro Multi-E, make sure that the electricity supply has been switched off for at least 5 minutes and that it cannot be accidentally switched on.



### 14.1 Pumps

Pump bearings and shaft seals are maintenance-free.

If the pump is 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.

### 14.2 Motors

To ensure sufficient cooling of the motor and electronics, the motor cooling fins and fan blades must be cleaned regularly.

#### 14.2.1 Motor bearings

Motors up to and including 7.5 kW are maintenance-free.

In the case of seasonal operation (motor is idle for more than 6 months of the year), it is recommended to grease the motor when the Hydro Multi-E is taken out of operation.

### 14.3 Breaker cabinet

The breaker cabinet is maintenance-free. It must be kept clean and dry.

## 15. Taking out of operation

To take the Hydro Multi-E out of operation, switch off the mains switch in the breaker cabinet.

The leads in front of the mains switch are still energized.

Each individual pump is taken out of operation by switching off the corresponding circuit breaker.

### 15.1 Frost protection

Pumps which are not being used during periods of frost should be drained to avoid damage.

Drain the pumps by loosening the vent screw in the pump head and by removing the drain plug from the base.

Do not tighten the vent screw and replace the drain plug until the Hydro Multi-E is to be used again.

### 15.2 Service kits

Service kits for Hydro Multi-E pumps, see www.grundfos.com (WebCAPS) or WinCAPS.

## 16. Fault finding chart

Before making any connections in pumps, terminal boxes or breaker cabinet, make sure that the electricity supply has been switched off for at least 5 minutes and that it cannot be accidentally switched on.

GB

| Fault | Cause | Remedy |
|---|---|---|
| 1. The Hydro Multi-E does not run when started. | a) 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 set starts. |
| | b) Electricity supply disconnected. | Connect the electricity 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 secs. |
| 3. The Hydro Multi-E is stopped and cannot restart. | b) 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. |
| | c) Control unit fault. | |
| | - Electricity supply disconnected on pump 1. | Connect the electricity supply. |
| | - Control unit defective. | Replace the terminal box on 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 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 electricity supply to the pump and check the pump condition. |
| 7. Leakage from a shaft seal. | a) Shaft seal defective. | Replace the shaft seal. |
| | b) 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) The pumps do not rotate freely (frictional resistance) due to inaccurate height adjustment of the pump shaft. | Readjust the shaft height. Follow the procedure in fig. D or E at the end of these instructions. |
| 9. Very frequent starts and stops. | a) Wrong diaphragm tank precharge pressure. | Check the diaphragm tank 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. |

## 17. Technical data – Hydro Multi-E with single-phase pumps

### 17.1 Supply voltage

3 x 400/230 V ±10%, 50/60 Hz, N, PE.

Cable: 0.5 - 1.5 $mm^2$.

See nameplate.

**Recommended fuse size**

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

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

### 17.2 Leakage current

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

The leakage currents are measured in accordance with EN 60 355-1.

### 17.3 Inputs/output

**Digital**

External potential-free switch.
Voltage: 5 VDC.
Current: < 5 mA.
Screened cable: 0.5 - 1.5 $mm^2$.

**Sensor signals**

- Voltage signal
  0-10 VDC, $R_i$ > 50 kΩ (via internal voltage supply).
  Tolerance: +0%/–3% at maximum voltage signal.
  Screened cable: 0.5 - 1.5 $mm^2$.
  Maximum cable length: 500 m.
- Current signal
  DC 0-20 mA/4-20 mA, $R_i$ = 175 Ω.
  Tolerance: +0%/–3% at maximum current signal.
  Screened cable: 0.5 - 1.5 $mm^2$.
  Maximum cable length: 500 m.
- Electricity 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 $mm^2$.
Maximum cable length: 500 m.

**Bus input**

Grundfos bus protocol, GENIbus protocol, RS-485.
Screened 3-core cable: 0.5 - 1.5 $mm^2$.
Maximum cable length: 500 m.

## 18. Technical data – Hydro Multi-E with three-phase pumps

### 18.1 Supply voltage

3 x 380-480 V ±10%, 50/60 Hz, PE.

Cable: 6-10 $mm^2$.

See nameplate.

**Recommended fuse size**

Motor sizes from 1.5 kW to 5.5 kW: Max. 16 A.
Motor size 7.5 kW: Max. 32 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 set | Leakage current [mA] |
|---|---|---|
| 1.5 to 3.0 (supply voltage < 460 V) | 2 | < 7 |
| | 3 | < 10.5 |
| 1.5 to 3.0 (supply voltage > 460 V) | 2 | < 10 |
| | 3 | < 15 |
| 4.0 to 5.5 | 2 | < 10 |
| | 3 | < 15 |
| 5.5, 4-pole | 2 | < 20 |
| | 3 | < 30 |
| 7.5 | 2 | < 20 |
| | 3 | < 30 |

The leakage currents are measured in accordance with EN 60 355-1.

### 18.3 Inputs/output

**Digital**

External potential-free switch.
Voltage: 5 VDC.
Current: < 5 mA.
Screened cable: 0.5 - 1.5 $mm^2$.

**Sensor signals**

- Voltage signal
  0-10 VDC, $R_i$ > 50 kΩ (via internal voltage supply).
  Tolerance: +0%/–3% at maximum voltage signal.
  Screened cable: 0.5 - 1.5 $mm^2$.
  Maximum cable length: 500 m.
- Current signal
  DC 0-20 mA/4-20 mA, $R_i$ = 175 Ω.
  Tolerance: +0%/–3% at maximum current signal.
  Screened cable: 0.5 - 1.5 $mm^2$.
  Maximum cable length: 500 m.
- Electricity 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 $mm^2$.
Maximum cable length: 500 m.

**Bus input**

Grundfos bus protocol, GENIbus protocol, RS-485.
Screened 3-core cable: 0.5 - 1.5 $mm^2$.
Maximum cable length: 500 m.

## 19. Other technical data

**EMC (electromagnetic compatibility)**

EN 61 800-3.

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

GB

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

Contact Grundfos for further information.

**Enclosure class**

Standard: IP 55 (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 set | | Sound pressure level [dB(A)] |
|---|---|---|---|
| | 2 | 3 | |
| 0.37 to 1.1 | ● | | 60 |
| | | ● | 63 |

**Hydro Multi-E with three-phase pumps:**

| Motor size [kW] | Number of pumps in booster set | | 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 |
| 7.5 | ● | | 77 |
| | | ● | 79 |

## 20. Disposal

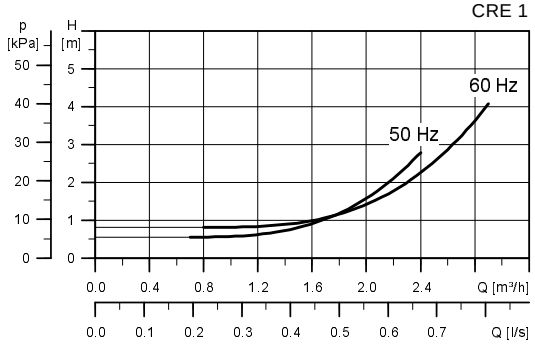
Disposal of this product or parts of it must be carried out according to the following guidelines:

1. Use the local public or private waste collection service.
2. In case such waste collection service does not exist or cannot handle the materials used in the product, please deliver the product or any hazardous materials from it to your nearest Grundfos company or service workshop.

Subject to alterations.

**NPSH**

CRE 1

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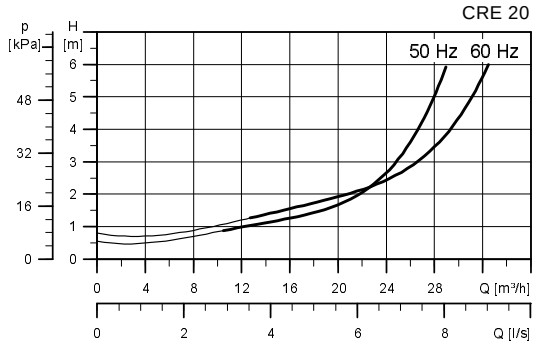
CRE 20

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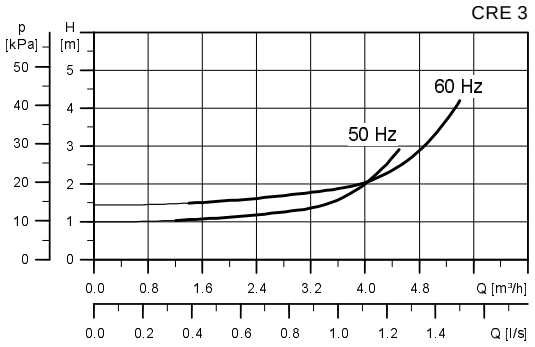
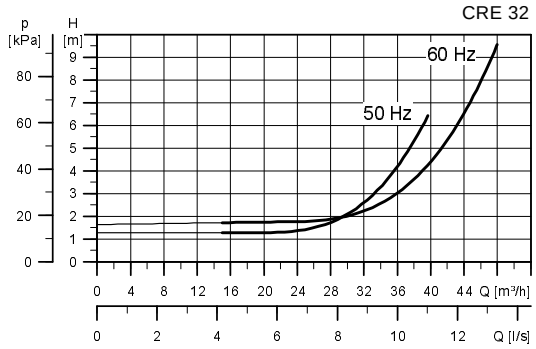
CRE 3



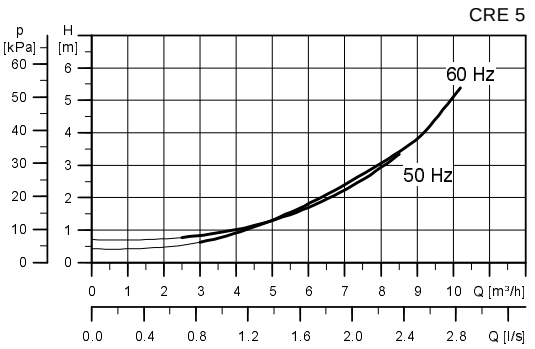

TM01 9883 1103

CRE 32



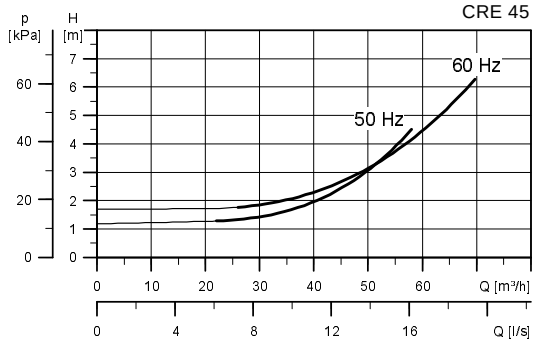

TM01 1934 1103

CRE 5



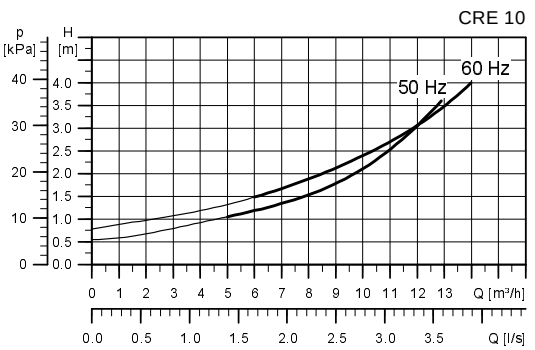

TM01 9884 1103

CRE 45



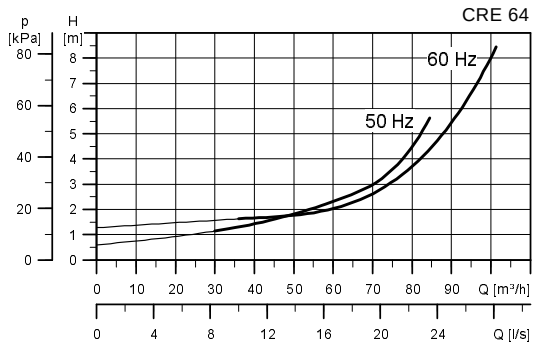

TM01 1935 1103

CRE 10



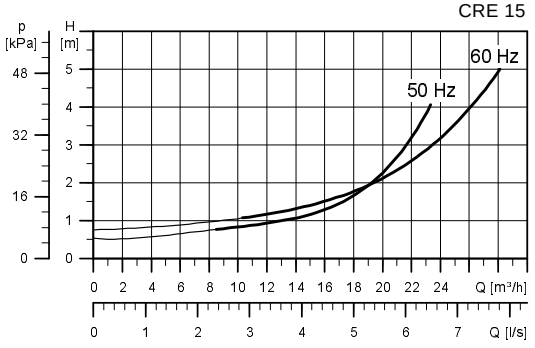

TM02 7125 2703

CRE 64



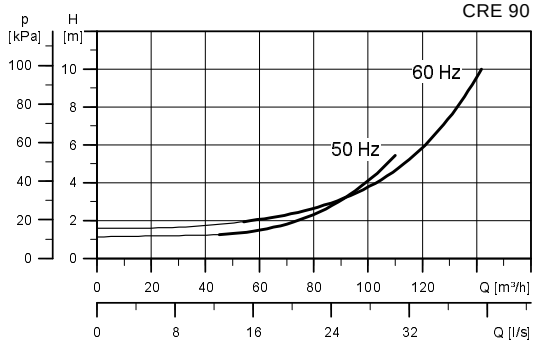

TM01 1936 1103

CRE 15




TM02 7126 2703

CRE 90




TM01 1937 1103

**Fig. A**

(GB) **Maximum permissible operating pressure / liquid temperature range:**

(D) **Max. zulässiger Betriebsdruck / Medientemperaturbereich:**

(F) **Pression de fonctionnement maxi autorisée / gamme de températures du liquide:**

(I) **Massima pressione di esercizio possibile / temperatura del liquido:**

(E) **Presión máxima de funcionamiento permitida / gama de temperatura del líquido:**

(P) **Pressão máxima de funcionamento permissível / gama de temperaturas do líquido:**

(GR) **Μέγιστη επιτρεπτή πίεση λειτουργίας / περιοχή θερμοκρασιών υγρού:**

(NL) **Maximaal toelaatbare bedrijfsdruk / vloeistoftemperatuurbereik:**

(S) **Max. tillåtet driftstryck / vätsketemperaturområde:**

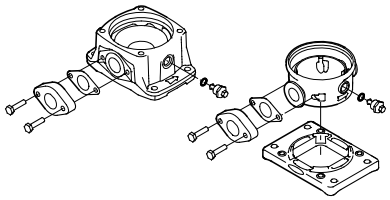
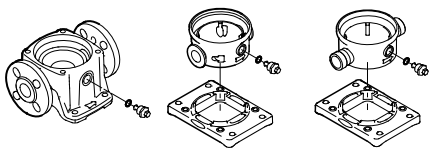
(DK) **Maks. tilladeligt driftstryk / medietemperaturområde:**

(PL) **Maksymalne, dopuszczalne ciśnienie pracy / temperatura cieczy:**

(RU) **Максимально допустимое рабочее давление / Диапазон температур рабочей жидкости:**

(RO) **Presiune maxima permisa de functionare/ gama temperaturii lichide:**

(CZ) **Maximální dovolený provozní tlak / teplotní rozsah kapaliny:**

| | | **Oval** | | **PJE - CLAMP - CA - UNION DIN - FGJ** | |
|---|---|---|---|---|---|
| | |  | |  | |
| | | **Operating pressure** | **Liquid temperature range** | **Operating pressure** | **Liquid temperature range** |
| | CRE 1 | 16 bar | –20°C – +120°C | 25 bar | –20°C – +120°C |
| | CRE 3 | 16 bar | –20°C – +120°C | 25 bar | –20°C – +120°C |
| | CRE 5 | 16 bar | –20°C – +120°C | 25 bar | –20°C – +120°C |
| | CRE 10-1 → CRE 10-16 | 16 bar | –20°C to +120°C | | |
| | CRE 10-1 → CRE 10-22 | | | 25 bar | –20°C to +120°C |
| | CRE 15-1 → CRE 15-7 | 10 bar | –20°C to +120°C | | |
| | CRE 15-1 → CRE 15-10 | 16 bar | –20°C to +120°C | | |
| | CRE 15-1 → CRE 15-17 | | | 25 bar | –20°C to +120°C |
| | CRE 20-1 → CRE 20-7 | 10 bar | –20°C to +120°C | | |
| | CRE 20-1 → CRE 20-10 | 16 bar | –20°C to +120°C | | |
| **50 Hz** | CRE 20-1 → CRE 20-17 | | | 25 bar | –20°C to +120°C |
| | CRE 32-1-1 → CRE 32-7 | | | 16 bar | –30°C – +120°C |
| | CRE 32-8-2 → CRE 32-12 | | | 25 bar | –30°C – +120°C |
| | CRE 32-13-2 → CRE 32-14 | | | 40 bar | –30°C – +120°C |
| | CRE 45-1-1 → CRE 45-5 | | | 16 bar | –30°C – +120°C |
| | CRE 45-6-2 → CRE 45-9 | | | 25 bar | –30°C – +120°C |
| | CRE 45-10-2 → CRE 45-10 | | | 40 bar | –30°C – +120°C |
| | CRE 64-1-1 → CRE 64-5 | | | 16 bar | –30°C – +120°C |
| | CRE 64-6-2 → CRE-64 7-1 | | | 25 bar | –30°C – +120°C |
| | CRE 90-1-1 → CRE 90-4 | | | 16 bar | –30°C – +120°C |
| | CRE 90-5-2 → CRE 90-6 | | | 25 bar | –30°C – +120°C |

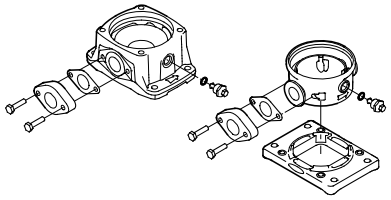
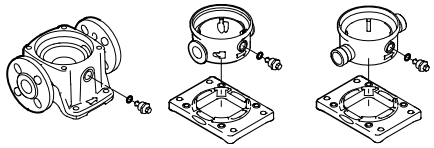
| | | Oval | | PJE - CLAMP - CA - UNION<br>DIN - FGJ | |
|---|---|---|---|---|---|
| | |  | |  | |
| | | **Operating pressure** | **Liquid temperature range** | **Operating pressure** | **Liquid temperature range** |
| **60 Hz** | CRE 1 | 16 bar | –20°C – +120°C | 25 bar | –20°C – +120°C |
| | CRE 3 | 16 bar | –20°C – +120°C | 25 bar | –20°C – +120°C |
| | CRE 5 | 16 bar | –20°C – +120°C | 25 bar | –20°C – +120°C |
| | CRE 10-1 → CRE 10-10 | 16 bar | –20°C to +120°C | | |
| | CRE 10-1 → CRE 10-17 | | | 25 bar | –20°C to +120°C |
| | CRE 15-1 → CRE 15-5 | 10 bar | –20°C to +120°C | | |
| | CRE 15-1 → CRE 15-8 | 16 bar | –20°C to +120°C | | |
| | CRE 15-1 → CRE 15-12 | | | 25 bar | –20°C to +120°C |
| | CRE 20-1 → CRE 20-5 | 10 bar | –20°C to +120°C | | |
| | CRE 20-1 → CRE 20-7 | 16 bar | –20°C to +120°C | | |
| | CRE 20-8 → CRE 20-10 | | | 25 bar | –20°C to +120°C |
| | CRE 32-1-1 → CRE 32-5 | | | 16 bar | –30°C – +120°C |
| | CRE 32-6-2 → CRE 32-8 | | | 25 bar | –30°C – +120°C |
| | CRE 32-9-2 → CRE 32-10-2 | | | 40 bar | –30°C – +120°C |
| | CRE 45-1-1 → CRE 45-4 | | | 16 bar | –30°C – +120°C |
| | CRE 45-5-2 → CRE 45-6 | | | 25 bar | –30°C – +120°C |
| | CRE 64-1-1 → CRE 64-3 | | | 16 bar | –30°C – +120°C |
| | CRE 64-4-2 → CRE-64-4-1 | | | 25 bar | –30°C – +120°C |
| | CRE 90-1-1 → CRE 90-3 | | | 16 bar | –30°C – +120°C |
| | CRE 90-4-2 | | | 25 bar | –30°C – +120°C |

**Fig. B**

(GB) **Maximum inlet pressure:**

(D) **Max. Zulaufdruck:**

(F) **Pression maximum d'entrée:**

(I) **Massima pressione in aspirazione:**

(E) **Presión máxima de entrada:**

(P) **Pressão máxima de admissão:**

(GR) **Μέγιστη πίεση εισόδου:**

(NL) **Maximale inlaatdruk:**

(S) **Max. tilloppstryck:**

(DK) **Maks. tilløbstryk:**

(PL) **Maksymalne ciśnienie wlotowe:**

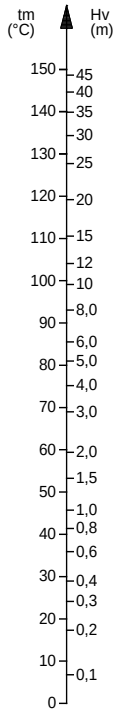
(RU) **Максимальное давление подпора:**

(RO) **Presiune maxima de intrare:**

(CZ) **Maximální tlak na vstupu:**

| 50 Hz | | 60 Hz | |
|---|---|---|---|
| **CRE 1s** | | | |
| CRE 1s-2 → CRE 1s-36 | 10 bar | CRE 1s-2 → CRE 1s-27 | 10 bar |
| **CRE 1** | | | |
| CRE 1-2 → CRE 1-36 | 10 bar | CRE 1-2 → CRE 1-25<br>CRE 1-27 | 10 bar<br>15 bar |
| **CRE 3** | | | |
| CRE 3-2 → CRE 3-29<br>CRE 3-31 → CRE 3-36 | 10 bar<br>15 bar | CRE 3-2 → CRE 3-15<br>CRE 3-17 → CRE 3-25 | 10 bar<br>15 bar |
| **CRE 5** | | | |
| CRE 5-2 → CRE 5-16<br>CRE 5-18 → CRE 5-36 | 10 bar<br>15 bar | CRE 5-2 → CRE 5-9<br>CRE 5-10 → CRE 5-24 | 10 bar<br>15 bar |
| **CRE 10** | | | |
| CRE 10-1 → CRE 10-6<br>CRE 10-7 → CRE 10-22 | 8 bar<br>10 bar | CRE 10-1 → CRE 10-5<br>CRE 10-6 → CRE 10-17 | 8 bar<br>10 bar |
| **CRE 15** | | | |
| CRE 15-1 → CRE 15-3<br>CRE 15-4 → CRE 15-17 | 8 bar<br>10 bar | CRE 15-1 → CRE 15-2<br>CRE 15-3 → CRE 15-12 | 8 bar<br>10 bar |
| **CRE 20** | | | |
| CRE 20-1 → CRE 20-3<br>CRE 20-4 → CRE 20-17 | 8 bar<br>10 bar | CRE 20-1<br>CRE 20-2 → CRE 20-10 | 8 bar<br>10 bar |
| **CRE 32** | | | |
| CRE 32-1-1 → CRE 32-4<br>CRE 32-5-2 → CRE 32-10<br>CRE 32-11-2 → CRE 32-14 | 4 bar<br>10 bar<br>15 bar | CRE 32-1-1 → CRE 32-2<br>CRE 32-3-2 → CRE 32-6<br>CRE 32-7-2 → CRE 32-10-2 | 4 bar<br>10 bar<br>15 bar |
| **CRE 45** | | | |
| CRE 45-1-1 → CRE 45-2<br>CRE 45-3-2 → CRE 45-5<br>CRE 45-6-2 → CRE 45-13-2 | 4 bar<br>10 bar<br>15 bar | CRE 45-1-1 → CRE 45-1<br>CRE 45-2-2 → CRE 45-3<br>CRE 45-4-2 → CRE 45-7 | 4 bar<br>10 bar<br>15 bar |
| **CRE 64** | | | |
| CRE 64-1-1 → CRE 64-2-2<br>CRE 64-2-1 → CRE 64-4-2<br>CRE 64-4-1 → CRE 64-8-1 | 4 bar<br>10 bar<br>15 bar | CRE 64-1-1<br>CRE 64-1 → CRE 64-2-1<br>CRE 64-2 → CRE 64-5-2 | 4 bar<br>10 bar<br>15 bar |
| **CRE 90** | | | |
| CRE 90-1-1 → CRE 90-1<br>CRE 90-2-2 → CRE 90-3-2<br>CRE 90-3 → CRE 90-6 | 4 bar<br>10 bar<br>15 bar | CRE 90-1-1 → CRE 90-2-2<br>CRE 90-2-1 → CRE 90-4-2 | 10 bar<br>15 bar |

**Fig. C**

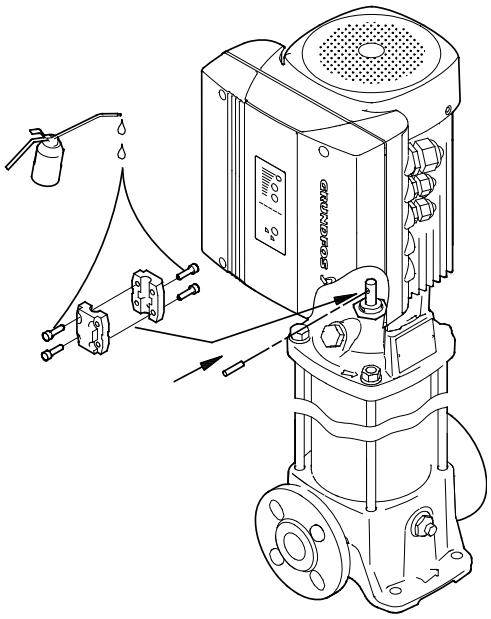



TM00 3037 3493

**Hydro Multi-E, with CRE 1/3/5**

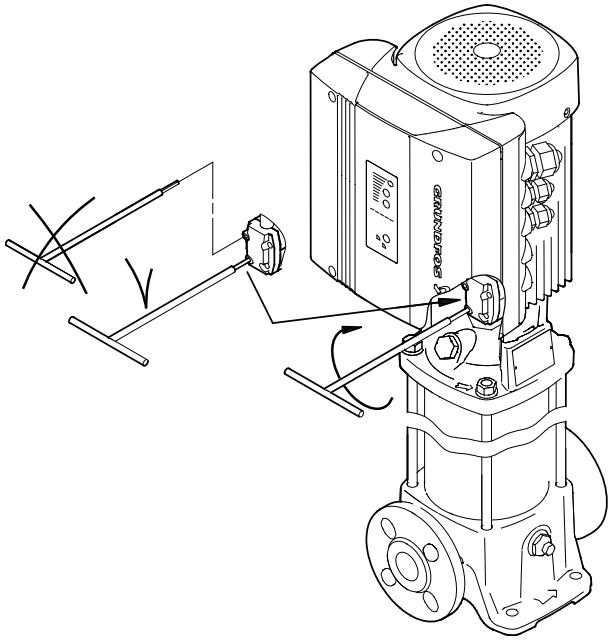
**Fig. D**

**A**



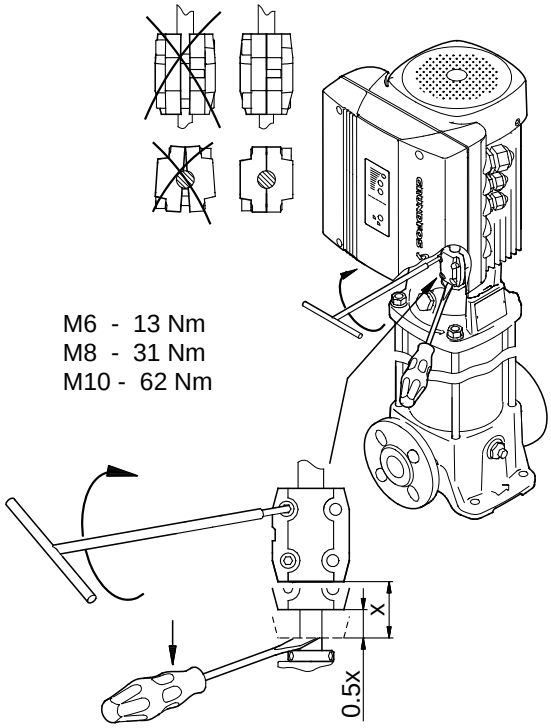
TM03 2432 4305

**B**



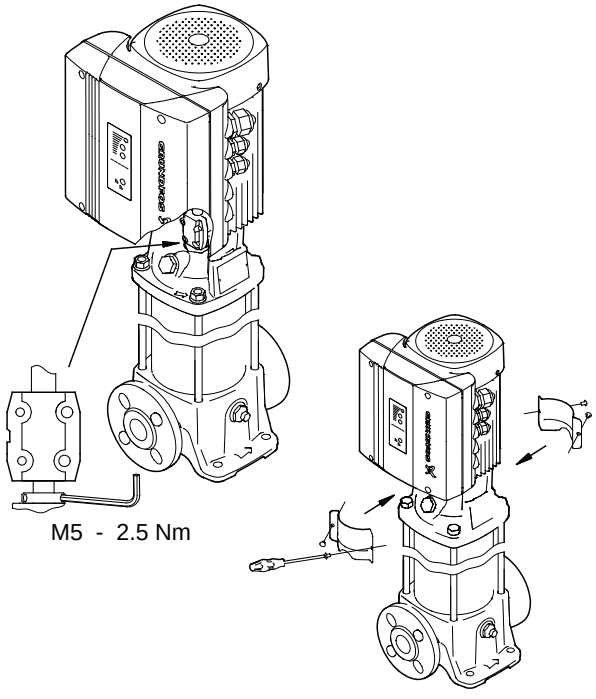
TM03 2433 4305

**C**




TM03 2434 4305

**D**

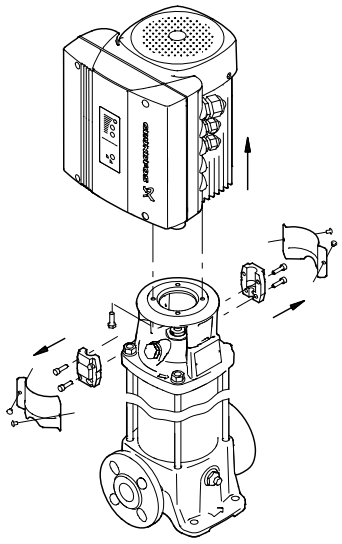



TM03 2435 4305

## Hydro Multi-E with CRE 10/15/20

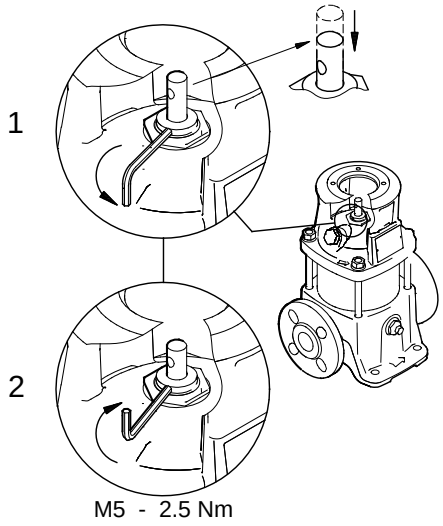
**Fig. E**

**A**



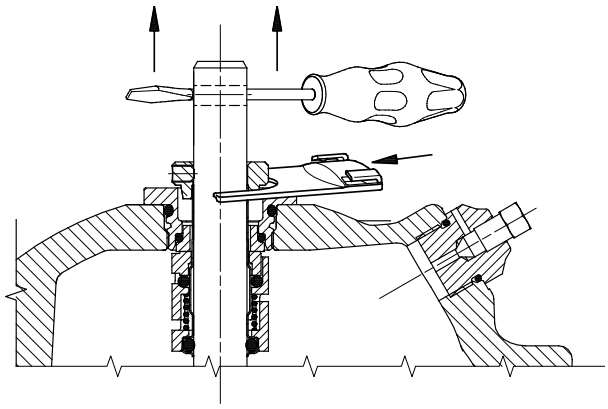
TM03 2436 4305

**B**



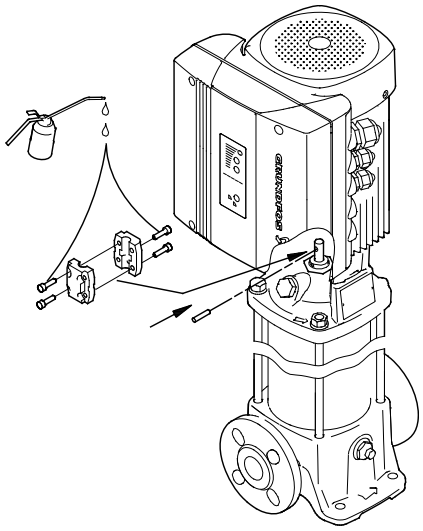

TM02 8500 0304

**C**



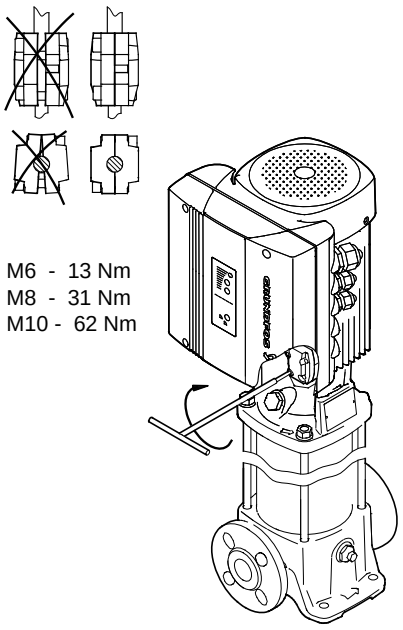
TM02 7923 4403

**D**



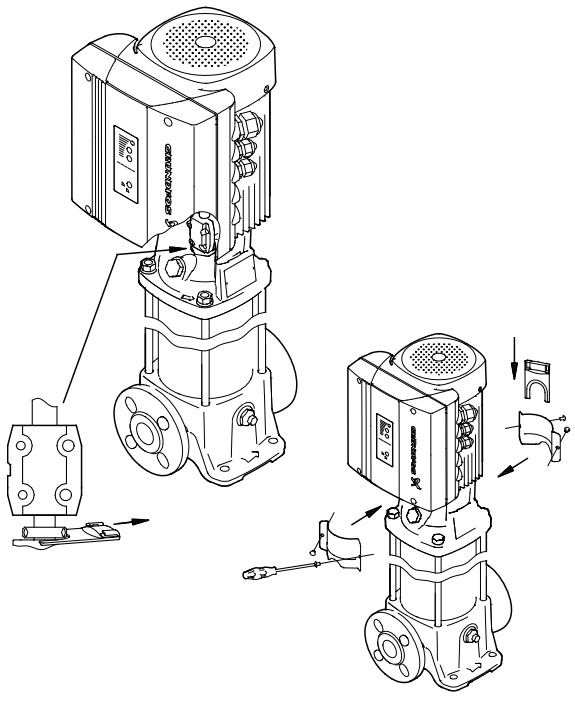
TM03 2432 4305

**E**




TM03 2438 4305

**F**



TM03 2439 4305

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