Hydro EN
Grundfos firefighting systems

Compliant with the EN 12845, UNI 10779 and UNI 11292 standards
1. Performance range ........................................... 3
2. Application ..................................................... 4
   General introduction ......................................... 4
3. Type key ....................................................... 5
4. Operating conditions ......................................... 6
   Operation mode .................................................. 6
   Starting the motors ............................................. 6
   Remote signals .................................................. 6
5. Functional diagram .......................................... 7
6. Mechanical and hydraulic configuration ...................... 8
7. Hydraulic components ......................................... 10
8. Pump description .............................................. 11
   Jockey pumps ..................................................... 11
   Electrical-driven duty pumps .................................. 11
   Diesel-driven duty pumps ...................................... 11
9. Control panel .................................................. 12
   Control panel for the jockey pump ............................ 12
   Control panel for the electrical-driven duty pump ........ 12
   Control panel for the diesel-driven duty pump ............ 13
10. Versions on request and accessories ........................ 14
    Suction kit ...................................................... 14
    Test kit ........................................................ 14
    Acoustic and visual alarm panel ............................... 14
    GSM and WEB alarm panels .................................... 14
    MultiLed alarm panel .......................................... 15
    Switches for main valves ...................................... 15
    Diesel engine spare parts ..................................... 15
    Priming tank .................................................... 15
    Residential silencer .......................................... 16
    Manual pump for diesel-tank filling .......................... 16
    Emergency power supply unit for drainage pump ........... 16
    Drainage pump ................................................ 16
    After-sales service ............................................ 16
11. Installation ................................................... 17
    Positive head installation ..................................... 17
    Suction-lift installation ....................................... 17
12. Choosing a pump set .......................................... 18
    Cooling flow ..................................................... 18
    Motors and types of starting .................................. 18
    Type of water supply .......................................... 18
    Pre-calculated HHP and HHS systems ......................... 18
13. Data and performance of the duty pumps .................... 19
14. Performance curves .......................................... 21
    How to read the curves ....................................... 21
15. Performance curves and technical data ...................... 23
16. Documentation ................................................ 35
17. Grundfos Product Center ...................................... 36
1. Performance range

Hydro EN

ISO 9906
2. Application

The Hydro EN pump set for automatic sprinkler systems is in compliance with the following standards:
- **EN 12845** - automatic firefighting sprinkler systems
- **UNI 10779** - hydrant networks
- **UNI 11292** - compartments for installation of firefighting pump sets.

The pump set covers the performance range up to 650 m$^3$/h and heads up to 140 m for each duty pump. Contact Grundfos for performance values in excess of the range described in this data booklet.

**General introduction**

The pump set is designed for operation with clean water and for automatic sprinkler systems such as single, superior single, double or combined water supply sources.

The pump set is compact, robust, modular and supplied in pre-assembled macro blocks to make transportation, handling and installation easier.

The pumps are of the back pull-out design, enabling removal of the motor, coupling, bearing bracket and impeller without disturbing the pump housing or pipework.

The shape of the QH curve is stable. The motors or engines deliver, as minimum, the required power up to the flow rate corresponding to the NPSHr value which is 16 m.

![Fig. 1 Size criteria for the motor and engine](image)

The diesel engine makes it possible to operate continuously at full load with a continuous power rating in compliance with the ISO 3046 standard.

The diesel-driven pump is cooled in one of the following ways:
- With direct air.
- With water and heat exchanger. This solution provides adequate operation that is as unrestricted as possible by the heat elimination conditions of the technical control room.

The diesel tank is sized to ensure at least 6 hours of continuous operation and is equipped with a containment basin and vent connection in compliance with the UNI 11292 standard.

All pump sets are supplied as factory-tested units. In addition, the diesel-driven pumps are supplied with a factory-test report as required by the EN 12845 standard.

The range consists of the following types:
- **Hydro EN-S**: One or two duty pumps operated by an electric motor.
- **Hydro EN-Y**: Two duty pumps. One pump is operated by an electric motor and the other pump is operated by a diesel engine.
- **Hydro EN-T**: One or two duty pumps are operated by a diesel engine.

The systems described above include the following:
- One electrical-driven jockey pump which is controlled by a control panel. The jockey has a 24-litre tank to restore the system pressure in the case of small leaks.
- An independent control panel for each duty pump with operation and control buttons. Two pressure switches for each duty pump which are hydraulically connected to each other with a manifold of 15 mm in diameter.
- A pressure switch on each duty pump to detect the actual pressure supplied.
- Connection for the priming circuit and connection for the recirculation circuit to prevent overheating of the pump when operating against closed valves.

As required by the EN 12845 standard, the periodic pump set performance check must be carried out by the installer of the firefighting system or by qualified personnel. The activities performed must be documented in a dedicated register kept in the building.

The pump sets are equipped with the necessary instrumentation to simplify these operations during tests and commissioning.

These accessories can be provided:
- A suction kit dedicated for installation in suction lift or in positive head conditions, including an eccentric divergent pipe with a controlled taper, a vacuum pressure gauge, a compensation joint on the pipe connection side and an isolating valve (not included in the version for installation in suction lift conditions). All accessories are sized according to the prescriptions provided by the standard.
- A testing kit including a flowmeter, valves and straight pipe sections to get the optimum flow rate reading.

An industrial silencer is supplied as standard for diesel-driven pump sets.
3. Type key

<table>
<thead>
<tr>
<th>Example</th>
<th>Hydro EN</th>
<th>-Y</th>
<th>50-250/263</th>
<th>JS</th>
<th>-A</th>
<th>SD</th>
<th>-U3</th>
<th>-B</th>
<th>-X</th>
</tr>
</thead>
</table>

**Pump set type**

Hydro EN

**Configuration**

| S1 | One electrical-driven duty pump (100 %) |
| S2 | One electrical-driven duty pump and one electrical-driven standby pump (100 % + 100 %) |
| S3 | Two electrical-driven duty pumps and one electrical-driven standby pump (50 % + 50 % + 50 %) |
| T1 | One diesel-driven duty pump (100 %) |
| T2 | One diesel-driven duty pump and one diesel-driven standby pump (100 % + 100 %) |
| T3 | Two diesel-driven duty pumps and one diesel-driven standby pump (50 % + 50 % + 50 %) |
| Y | One electrical-driven duty pump and one diesel-driven standby pump (100 % + 100 %) |
| Y1 | Two electrical-driven duty pumps and one diesel-driven standby pump (50 % + 50 % + 50 %) |
| Y2 | One electrical-driven duty pump and one diesel-driven duty pump and one diesel-driven standby pump (50 % + 50 % + 50 %) |

**Jockey pump**

| JS | With a standard jockey pump |
| JV | With a customised jockey pump (upon request) |
| NJ | Without a jockey pump (upon request) |

**Control panels**

| A | Standard |
| B | IP55 |
| N | Without control panel |
| X | Special execution control panel |

**Starting**

| DL | Direct on line |
| ST | Star-delta |

**Main supply**

| U1 | 3 x 400 V/50 Hz electrical-driven duty pump (or standby pump) - 3 x 400 V/50 Hz electrical-driven jockey pump |
| U2 | 1 x 220 V/50 Hz diesel-driven duty pump (or standby) - 3 x 400 V/50 Hz electrical-driven jockey pump |
| U3 | 3 x 400 V/50 Hz diesel-driven duty pump (or standby pump) - 1 x 220 V/50 Hz diesel-driven duty pump (or standby pump) - 3 x 400 V/50 Hz electrical-driven jockey pump |

**Diesel-engine cooling, if present**

| A | Direct air with fan |
| B | Water/water heat exchanger |

**Other versions**

| X | Other versions based on customer specifications (upon request) |
4. Operating conditions

<table>
<thead>
<tr>
<th>Installation:</th>
<th>Indoors, waterproof room, protect against freezing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation level:</td>
<td>Up to 300 m above sea level.</td>
</tr>
<tr>
<td>Performance:</td>
<td>See the specific curve of the model. Performance according to ISO 9906.</td>
</tr>
<tr>
<td>Nominal pressure:</td>
<td>Components and materials PN16.</td>
</tr>
<tr>
<td>Fluid pumped:</td>
<td>Solid and fibre-free water.</td>
</tr>
<tr>
<td>Water temperature:</td>
<td>0-50 °C.</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>Minimum 10 °C for diesel-driven pumps.</td>
</tr>
<tr>
<td>Suction capacity:</td>
<td>According to specific performance of the model chosen.</td>
</tr>
<tr>
<td>Maximum inlet pressure:</td>
<td>The maximum inlet pressure is linked to the maximum shut-off pressure delivered by the pump, meaning that the sum of the inlet pressure with the shut-off pressure must be less than the nominal pressure of the pump.</td>
</tr>
<tr>
<td>Electric power:</td>
<td>According to specific performance of the model chosen.</td>
</tr>
<tr>
<td>Starting:</td>
<td>Direct up to 30 kW, Star-delta starting from 37 kW.</td>
</tr>
<tr>
<td>Power supply:</td>
<td>3 x 400 V, 50 Hz for electrical-driven pump. 1 x 230 V, 50 Hz. Imax = 4 A for diesel-driven pumps.</td>
</tr>
</tbody>
</table>

**Operation mode**

The jockey pump starts and stops automatically, ensuring pressurisation of the firefighting system in case of leaks and preventing unjustified starting of the duty pumps.

When the network pressure drops, the first duty pump is started automatically by the pressure switches (two redundant). If present on the pump set, the second duty pump is activated automatically if the network pressure drops further.

You can only stop the duty pumps manually by pressing the button on the front door of the control panel.

The standard scope of supply always includes an adjustable timer to automatically shut down the duty pump that permits operation. You can activate the function during commissioning, if necessary.

Specific selectors allow you to start and stop every single pump at any time. This is useful also for the commissioning and the periodic operation check.

**Starting the motors**

The starting of the electrical motors is available as standard in the following configurations:
- direct on line, DL, for powers up to 30 kW;
- star-delta, SD, for powers from 37 kW and higher.

You start the diesel engine with two direct current batteries, which are constantly charged.

An electronic circuit allows alternate use of the two batteries alternating at every startup and automatic cut-out of the battery if it is inefficient.

**Remote signals**

According to the requirements of the EN 12845 standard, you must connect a remote alarm unit to the control panels of the duty pumps in order to monitor the pump set status. The alarm unit must be complete with visual and acoustic signal and installed in a permanently attended room.

For this reason, the panels of the duty pumps have the following outputs available on the terminal block.

**Diesel-driven pump panel:**
- automatic mode off
- diesel engine start failure
- pump running
- control panel failure.

**Electrical-driven pump panel:**
- electric motor powered
- pump starting request
- pump running
- start failure
- mains power not available.
5. Functional diagram

**Fig. 2** Functional diagram

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Ref.</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Check valve</td>
<td>1</td>
<td>Independent inlet connection for electrical-driven duty pump</td>
</tr>
<tr>
<td></td>
<td>Ball valve</td>
<td>2</td>
<td>Independent inlet connection for diesel-driven standby pump</td>
</tr>
<tr>
<td></td>
<td>Butterfly valve</td>
<td>3</td>
<td>Inlet connection for jockey pump</td>
</tr>
<tr>
<td></td>
<td>Concentric divergent</td>
<td>4</td>
<td>Recirculation circuit connection for electrical-driven duty pump or standby pump</td>
</tr>
<tr>
<td></td>
<td>Eccentric divergent</td>
<td>5</td>
<td>Recirculation circuit connection for diesel-driven duty pump or standby pump with direct air cooling.</td>
</tr>
<tr>
<td></td>
<td>Compensation joint</td>
<td>6</td>
<td>Priming circuit connection for electrical-driven duty pump or standby pump</td>
</tr>
<tr>
<td></td>
<td>Flowmeter</td>
<td>7</td>
<td>Priming circuit connection for diesel-driven duty pump or standby pump</td>
</tr>
<tr>
<td>PSS</td>
<td>Pressure switch</td>
<td>8</td>
<td>Priming circuit connection for the jockey pump</td>
</tr>
<tr>
<td></td>
<td>Pressure gauge</td>
<td>9</td>
<td>System outlet connection</td>
</tr>
<tr>
<td></td>
<td>Diaphragm pressure tank</td>
<td>10</td>
<td>Connection for technical room sprinkler</td>
</tr>
<tr>
<td></td>
<td>Control panel</td>
<td>11</td>
<td>Test circuit outlet</td>
</tr>
<tr>
<td></td>
<td>Drain connection</td>
<td>12</td>
<td>Diesel tank vent</td>
</tr>
<tr>
<td></td>
<td>Power and signal electric connections</td>
<td>13</td>
<td>Cooling circuit outlet with water/water heat exchanger, if present</td>
</tr>
<tr>
<td></td>
<td>Main and auxiliary flow pipes</td>
<td>14</td>
<td>Diesel engine exhaust gas outlet</td>
</tr>
</tbody>
</table>
6. Mechanical and hydraulic configuration

The following drawing shows the standard configuration of the pump sets. In the order, you can define any changes, adaptations to specific requests, integration of optional components and/or accessories not listed in our standard equipment described in this catalogue.

![Figure 3: Example of Hydro EN-Y configuration](image)

- Diesel tank sized to ensure at least six hours of continuous operation complete with containment basin
- Electrical-driven duty pump control panel
- Connection for sprinkler circuit in the technical control room
- Connection for priming the jockey pump
- Control panel for the jockey pump
- Jockey pump
- Electrical-driven duty pump with spacer coupling
- Control panel for the diesel-driven standby pump
- Connection for diaphragm pressure tank
- Outlet manifold
- Isolating valve
- Starting circuit complete with two pressure switches and a pressure gauge
- Check valve
- Compensation joint
- Connection to priming circuit
- Concentric divergent with controlled taper
- Pressure switch to detect pump operation
- Standby diesel-driven pump with spacer coupling
- Inlet for independent pump
- Connection for priming circuit
- Isolating valve
- Starting circuit complete with two pressure switches and a pressure gauge
- Check valve
- Compensation joint
- Connection to priming circuit
- Concentric divergent with controlled taper
- Pressure switch to detect pump operation
- Standby diesel-driven pump with spacer coupling

Fig. 3 Example of Hydro EN-Y configuration
The modular construction concept of the Hydro EN range makes transport, handling and positioning at the place of installation easier. All pump sets are supplied in macro blocks which are usually split as below:

- A baseplate for duty pump, jockey pump, relevant control panels with brackets and hydraulic components, in the case of pump sets with two duty pumps
- A second baseplate for the second standby pump, control panel with brackets and hydraulic components.

The arrangement of the parts provides immediate reading of the measurement instruments and signals, making the operations during commissioning and periodic checks of the pumping unit easier.

The following accessories are available on request:

![Fig. 4 Accessories](image-url)
7. Hydraulic components

The hydraulic components are selected and sized in order to minimise the pressure losses and the water speed in compliance with the requirements in the EN 12845 standard, at any flow rate value stated on the performance curve.

The following components are placed on the outlet side of each duty or standby pump:

- A concentric divergent pipe with controlled taper mounted on the outlet side of the pump inclusive connection for the recirculation circuit in order to prevent overheating of the pump when operated against closed valves.
- A compensation joint placed on the long side of the divergent pipe.
- A check valve.
- A isolating valve of the butterfly type with a lockable handle and status indicator. Operation is by handwheel with gearbox for sizes higher than DN 100.
- A 1/2" drain valve on the outlet side of the pump according to the diagram of the standard. See fig. 6.
- A starting device complete with two starting pressure switches, a glycerine bath manometer with 16 bar full scale, an isolating valve, a bypass with a check and drain valve. The operation mode requires two pressure switches for each pump that are connected so that each one can provide automatic start while stopping is manual.
- A 1" connection for the sprinkler circuit of the technical control room.
- A pressure switch on the outlet side to detect that the pump is delivering pressure.
- A flanged outlet manifold for the connection to the system and the testing kit.

The jockey pump is equipped with the following components:

- a connection for priming
- a 1" check valve on the outlet side
- two isolating valves of the ball type with lever operation, one on the outlet side (1") and one on inlet side (1 1/4")
- a pressure switch for starting and stopping the pump
- a diaphragm tank pre-charged at the factory for the optimal jockey pump operation.

Accessories can be provided to complete the supply, including the following:

- A suction kit for positive head or suction head installation including an eccentric divergent pipe with controlled taper, a vacuum pressure gauge, an isolating valve and a compensation joint on the pipe connection side. All accessories are sized according to the requirements stated in the EN 12845 standard. You can choose the suction kit that is best suited for the type of installation that you want.
- A testing kit including a flowmeter, adjustment valves and spacers to get optimum flow rate reading.
8. Pump description

The duty pumps are of the flanged single impeller centrifugal NKF type with horizontal axis and volute casing, axial intake port and radial delivery port with flanges compliant with the EN 1092-2 standard. All pumps are dynamically balanced to prevent unbalancing of the rotating masses and to ensure their reliability and durability.

The duty pumps are made in class PN 16 and therefore for a pressure of 1.6 MPa (16 bar).

The maximum intake pressure allowed is equal to the difference between 16 bar and the maximum head of the specific model.

The pumps are suitable for operation with clean, non-dense, non-explosive liquids that contain neither solids nor fibres, mechanically or chemically non-aggressive for the pump.

The mechanical seal has standard dimensions compliant with the DIN 24960 standard and is of the Grundfos BAQE type.

Jockey pumps

The jockey pumps are either a Grundfos CM or Grundfos CR series.

The jockey pumps are horizontal multistage centrifugal pumps, not self-priming, with direct-start motor. Install the jockey pump to avoid unnecessary starting of the duty pump and to maintain the system pressure in case of small leakages.

The performance of the jockey pump does not contribute to the calculation of the nominal flow of the system. According to the standard description, the performance of the jockey pump must not be sufficient to supply a single sprinkler.

Electrical-driven duty pumps

The electrical-driven duty pumps are built as back-pull-out and are driven by an electric motor capable of delivering at least the power required for the flow rate corresponding to the value of a NPSHr equal to 16 m.

The pump is coupled to the motor via a spacer coupling so that the pump and engine can be removed independently in order for you to perform maintenance on the parts inside the pump without having to remove the inlet or outlet pipes.

Pump performance is compliant with the ISO 9906:2012 - Grade 3B standard. The characteristic curve QH is stable.

Diesel-driven duty pumps

The diesel-driven duty pumps are driven by a diesel engine capable of delivering at least the power required for the flow rate corresponding to the value of a NPSHr equal to 16 m.

The diesel engines are able to operate continuously at full load. The delivered power is chosen from the continuous power curve (ICN, ICFN, ICXN or NA) according to the ISO 3046 standard and can supply, as minimum, the power required by the pump at the flow rate corresponding to the NPSHr value of 16 m.

The pump is coupled to the diesel engine via a spacer coupling so that the pump and the engine can be removed independently in order for you to perform maintenance on the parts inside the pump without having to remove the inlet or outlet pipes.

The fuel tank complete with containment basin and connection for the vent pipe is sized to ensure at least six hours of operation.

The starting of the diesel engine is guaranteed by two 12 V DC batteries that are constantly charged by two battery chargers.

The battery charger is electronically controlled to achieve consistent and calibrated performance to ensure maximum effectiveness and extended battery life.

The automatic and manual starting systems are independent and use four separate power relays.

The starting of the diesel engines requires an automatic sequence of six alternating attempts, each lasting from 5 to 10 seconds with a maximum pause of 10 seconds, on the two batteries.

Automatic battery changeover is made at every starting attempt and an automatic cut-out of the inefficient battery improves the system reliability.

The exhaust silencer is included in the scope of supply, either integrated or loose for mounting during installation. In the latter case, a flexible pipe is supplied to ease the connection between the silencer and the exhaust manifold of the diesel engine.

In compliance with the requirements of the standard, all diesel-driven pumps are factory-tested and accompanied by a test bulletin.
9. Control panel

Control panel for the jockey pump

The jockey pump is controlled by a specific panel that automatically manages its operation.
The panel is equipped with a general mains switch, padlockable for easy and safe maintenance.
Starting and stopping of the jockey pump is controlled by a low voltage pressure switch which is isolated from the mains by a transformer.
An input to connect a device protecting against dry running is provided.
You can manually start the pump with the button (B) on the front of the panel. This is useful, for example, for priming operations during the commissioning of the pump set.
The starting of the electrical-driven motor is by direct start. To ensure greater safety for the operators, the control pressure switch and the input for dry-running are powered by low voltage isolated from the mains.

Control panel for the electrical-driven duty pump

The electrical-driven duty pumps are controlled by an independent control panel which provides easy reading of the measurement instruments and signals from a single observation point.
The starting of the electrical motors is available as standard in the following configurations:
• direct, DL, for powers up to 30 kW
• star/delta, SD, for 37 kW and higher.
To ensure greater safety for operators, the control pressure switch is powered by low voltage isolated from the mains by a transformer.
The outputs listed below are provided for supervising the pump set from a control room:
Contact type: AC1, potential-free relay contacts.
Maximum voltage: 115 V.
Maximum current: 2 A.

<table>
<thead>
<tr>
<th>Signalling</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric mains:</td>
<td>Mains voltage is missing.</td>
</tr>
<tr>
<td>Motor voltage:</td>
<td>There is no voltage to the motor.</td>
</tr>
<tr>
<td>Starting request:</td>
<td>Request for starting the electrical-driven pump.</td>
</tr>
<tr>
<td>Pump in operation:</td>
<td>Start of the electrical-driven pump.</td>
</tr>
<tr>
<td>Failure to start:</td>
<td>The pump did not start.</td>
</tr>
</tbody>
</table>

The panels include the following components and functions available in the door:

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Ammeter</td>
</tr>
<tr>
<td>B</td>
<td>TEST-0-AUT operation mode selector with a removable key in AUT position</td>
</tr>
<tr>
<td>C</td>
<td>Mains switch, padlockable</td>
</tr>
<tr>
<td>D</td>
<td>EPC 300 control unit with buttons and warning lights</td>
</tr>
</tbody>
</table>

Signalling Description

Electric mains: Mains voltage is missing.
Motor voltage: There is no voltage to the motor.
Starting request: Request for starting the electrical-driven pump.
Pump in operation: Start of the electrical-driven pump.
Failure to start: The pump did not start.

The user interface of the EPC 300 control unit (D) shows the following signal lights and operation buttons:
• stop button
• start button
• pressure switch 1, test button
• pressure switch 2, test button
• signal light, test button
• power not available, LED
• pump on demand, LED
• pump running, LED
• power available to the motor, LED
• start failure, LED.
Control panel for the diesel-driven duty pump

The diesel-driven duty pump is controlled by an independent control panel which provides easy reading of the measurement instruments and signals from a single observation point.

The outputs listed below are provided for supervising the pump set from a system control room.

Contact type: AC1, potential-free relay contacts.

Maximum voltage: 115 V.

Maximum current: 2 A.

### Signalling Description

<table>
<thead>
<tr>
<th>pump in operation:</th>
<th>Indicates the tripping of one of the following alarm conditions: battery charger failure, battery undervoltage or overvoltage, mains power supply, low oil pressure, high motor temperature, failure to start, panel in operating mode other than automatic, fuel reserve, oil or water preheating alarm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>General alarm:</td>
<td>The diesel engine did not start after six attempts.</td>
</tr>
<tr>
<td>Failure to start:</td>
<td>The operation mode selector is positioned on TEST or 0, or the group is not ready to start if requested.</td>
</tr>
<tr>
<td>Operating mode not in automatic:</td>
<td>The DPC 300 control unit is not operating correctly.</td>
</tr>
</tbody>
</table>

The independent battery chargers and all the electromechanical components needed are placed inside the panel.

The panel includes the following components and functions available in the door:

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Mains switch, padlockable</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>DPC 300 control unit with buttons, warning lights and LCD multifunction display</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Manual engine start button using battery 1 or 2, protected by breakable glass</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Manual engine stop button</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Engine test start button</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>TEST-0-AUT operation mode selector, with removable key in AUT position</td>
<td></td>
</tr>
</tbody>
</table>

The user interface has a backlit LCD display so you can read it even when the room lighting is poor. By means of the light signals, the pump set status is always under control.

The indications and their functions are divided as follows.

The LCD display has eight parameters in simultaneous reading:

- engine status or speed with the engine running
- selector status of the operation mode (F)
- operation hour counter
- engine temperature
- oil pressure
- diesel fuel level
- battery 1 voltage
- battery 2 voltage.

Note: In the case of an alarm, the description of the alarm will be displayed instead of the battery voltage.

### Programming area:

- Parameter selection button
- programming button
- confirmation button
- reset button
- LED operation check button.

**Battery 1:**

- battery charger failure (flashing LED) or battery failure (LED is permanently on).

**Battery 2:**

- battery charger failure (flashing LED) or battery failure (LED is permanently on).

### Alarm indication area:

- Control panel failure
- low oil pressure.
- high engine temperature.
- short-circuit of oil or water pre-heating system
- diesel reserve
- engine start failure.

### Status area:

- Automatic start disabled
- pump in operation
- mains present.

### Test area:

- Button for pressure switch 1: test and operation check of the emergency starting circuit
- button for pressure switch 2: test and operation check of the emergency starting circuit.
10. Versions on request and accessories

The following versions are available upon request:

- starting configuration other than standard
- one electrical-driven pump, two diesel-driven duty pumps and one electrical-driven jockey pump
- three electrical-driven duty pumps and one electrical-driven jockey pump
- three diesel-driven duty pumps and one electrical-driven jockey pump
- with performance values in excess of the range described in this catalogue
- with suction manifold
- IP55 panels.

Contact Grundfos for more information about versions not listed above or for accessories not listed in the equipment described in this document.

The following accessories are available upon request.

Suction kit

To make sure that an installation comply with the guidelines in the EN 12845 standard, you need an installation kit including an eccentric divergent pipe with a controlled taper, a vacuum pressure gauge, an isolating valve and a compensation joint on the side where the pipe is connected. The components are sized in accordance with the requirements of the standard regarding the minimum diameter and the maximum water velocity prescribed at the maximum flow rate stated on the performance curve:

- positive head installation: minimum permissible diameter DN 65 for the standard and maximum water speed of 1.8 m/s
- suction lift installation: minimum permissible diameter DN 80 for the standard and maximum water speed of 1.5 m/s.

Test kit

A complete flow rate test circuit is available as an option. The test circuit includes a flowmeter, spacers and an adjustment valve. With this configuration you can measure the flow rate with adequate accuracy. This accessory is essential in order to verify the performance as required by the standard when carrying out inspection and periodic verifications.

Acoustic and visual alarm panel

The panel allows you to monitor the operation of the pumps from a permanently attended room. The panel provides a visual and acoustic indication of the alarms from the duty pump panels. The panel meets the requirements of the EN 12845 standard:

- seven digital alarm inputs
- a yellow control lamp and acoustic alarm, 85 dB
- a buffer battery with 30 hours of continuous operation and battery charger
- a mains control lamp
- a lamp and acoustic signal test button
- an acoustic alarm silencing button.

GSM and WEB alarm panels

GSM version

The Micro Alarm 2 GSM (CIU 251) alarm panel meets the requirements of the EN 12845 standard for remote monitoring of pump functions. When there is an alarm, the alarm panel sends a text message to the user.

The following functions are added to the features of the acoustic and visual alarm panel described above:

- Integrated modem for sending text messages to four phone numbers.
- One analog and three digital inputs that can receive an alarm signal for sending text messages.

WEB versions

The CIU 271 alarm panel meets the requirements of the EN 12845 standard for remote monitoring of pump functions. The alarm panel has the same functions as the CIU 251 alarm panel. In addition, CIU 271 also displays alarms and the analog input parameter via WEB on a Grundfos website.
MultiLed alarm panel

There are 12 yellow LEDs for alarm type B and four red LEDs for alarm type A available. The purpose of the LEDs is to monitor system components as well as the pump set alarms.

A label system allows the user to customise the description of each LED alarm.

Due to a buffer battery, the panel ensures the display of the alarms, individually selectable NO or NC, even in the absence of mains voltage.

When an alarm is activated, the LED lights up on the panel and a buzzer and a yellow control lamp are activated.

A type A alarm relay and type B alarm relay are activated at the same time.

You can decide to store the alarm. In that case, the LED remains on even if the alarm disappears. In this case, use the R button to turn off the LED.

You can use a button that mutes the buzzer with time recovery. If you press this button for more than three seconds, it tests the LEDs and buzzer.

There is also an RS 485 port with Modbus-RTU protocol that allows various information to be communicated.

Switches for main valves

According to the EN 12845 standard, you must monitor the status of each isolating valve remotely.

Upon request, the following isolating valves can be equipped with a micro-switch:

- inlet valve*
- outlet valve
- test circuit valve*.

* If the relevant kit is included.

The use and connection of the monitoring system is the responsibility of the installer.

Diesel engine spare parts

To meet the requirements of the EN 12845 standard, you can request a set of diesel-engine spare parts:

- two series of fuel filters with seals
- two series of oil filters with seals
- two series of belts, if used on the engine
- a full set of connections, seals and hoses for the engine
- two injector nozzles.

Priming tank

A 500-litre water priming tank suitable for suction lift installation and complete with accessories is available on request.
Residential silencer
The residential silencer is either integrated or loose for mounting during installation. In case of the latter, a flexible pipe is delivered to ease the connection between the silencer and the exhaust manifold of the diesel engine.
A diesel engine equipped with a residential silencer for further reduction of the noise generated by the motor exhaust is available on request.

Manual pump for diesel-tank filling
A manual pump for diesel-tank filling is available on request. The manual pump makes it easy to refill the diesel tank as you can build a fixed filling system on the outside of the technical control room.

Emergency power supply unit for drainage pump
The emergency power supply unit, SE 2000, is ideal in case of electricity blackouts as the unit automatically goes into operation and generates electricity from a series of buffer batteries.
Combined with a single-phase Grundfos drainage pump, the unit meets the requirements of the UNI 11292 standard.
Characteristics:
• Output voltage: single-phase 230 VAC, 50 Hz
• Input voltage, batteries: 48 V
• Nominal power rating: 2000 VA
• Metal enclosure IP20
• Warning lights indicating the operating status of the emergency power supply unit
• Protection against reversing the battery connection
• Thermal protection of the panel
• Protection fuses for output.

Drainage pump
To be compliant with the UNI 11292, the system must consist of two properly sized pumps.
Contact Grundfos for more information about drainage pumps that are suitable to combine with the emergency power supply unit described above.

After-sales service
Grundfos offers after-sales service with competent personnel and original spare parts.
This service can be extended with a maintenance contract or check and inspection agreements depending on your needs.
11. Installation

The criteria for installing firefighting pump sets are described in the EN 12845 and UNI 11292 standards. Refer to these standards for all the necessary guidelines.

In order for the pump set to perform efficiently, it is important that the inlet pipes comply with the criteria listed in the EN 12845 standard regarding the water speed in the pipes:

• 1.8 m/s for positive head installation
• 1.5 m/s for suction lift installation.

We recommend that you select a suction kit according to the type of installation. The suction kit is available on request.

The points of the EN 12845 standard regarding the installation type are summarised below.

Positive head installation

To be in accordance with the EN 12845 standard, you must install the firefighting pump sets in positive head and according to the following conditions:

• At least two-thirds of the water reserve must be above the level of the duty pump axis.
• The minimum water level in the inlet tank is no more than 2 metres below the level of the pump axis.
• You must install a foot valve if the axis of the duty pump is above the minimum level of the water to be sucked.

Suction-lift installation

You can install the firefighting pump sets in the suction lift as long as the following conditions are met:

• The minimum water level in the inlet tank must be no more than 3.2 metres below the level of the pump axis.
• You must install a foot valve in the lowest point of the inlet pipe.
12. Choosing a pump set

Before choosing the pump set, check the requirements and specifications of the equipment designer, the prescriptions of the authorities and local regulations, the implications regarding the place and method of installation, etc.

To assess the effect of the installation conditions on the performance provided, proceed as follows when selecting the pump model for the pump set.

1. Use the above-mentioned values to choose the pump set.
2. Use a part of the generated flow as a continuous flow to prevent overheating when the pump operates against a closed valve or to feed the heat exchanger to cool the diesel engine, if available.
3. Add this flow rate to the design flow rate in order to make the selection.
4. The outlet pressure is influenced by the installation conditions:
   • Suction lift installation: Deduct the height in metres between the level of the pump axis and the minimum water level in the inlet tank from the head values specified in the tables.
   • Positive head installation: Add the height in metres between the level of the pump axis and the minimum water level in the inlet tank to the head values specified in the tables.
5. Deduct the friction losses in the inlet line (foot valve, pipes, curves, etc.), calculated at the design flow rate, from the head value.
6. Respect the minimum condition NPSHd ≥ NPSHr +1 [m] including the suction head and the suction head losses that has to be evaluated by the designer. You find the NPSHr value in the performance curve section.

Cooling flow

As specified in the EN 12845 standard, you must install a device on the pump set that meets the following purposes:
   • prevent overheating when the pump operates against close valves.
   • supply the water/water heat exchanger for diesel engine cooling, if available

See the performance curves and technical data for more information about the minimum flow rate values which are necessary to meet the purposes listed above.

Motors and types of starting

The motors deliver, as minimum, the required power up to the flow rate corresponding to the NPSHr value which is 16 m.

The electrical data refer to single electrical-driven duty pumps.

In the standard version, the electrical motor starting is direct, DL, for powers up to 30 kW, and star/delta, SD, for powers 37 kW and higher.

Type of water supply

The pump sets are designed for water supplies where each duty pump must deliver the following:
   • 100 % of the specified performance if there are one or two pumps installed. The second duty pump is considered a standby pump.
   • 50 % of the specified performance if there are three pumps installed. The third duty pump is considered a standby pump. The three-pump version is available on request.

According to the EN 12845 standard, when more than one pump is installed in a superior or duplicate water supply, only one pump must be driven by an electric motor.

Pre-calculated HHP and HHS systems

According to the EN 12845 standard, the pump for the pre-calculated HHP and HHS systems must supply 140 % of the design flow rate at a head of minimum 70 % of the head at the design flow rate of the pump.
13. Data and performance of the duty pumps

The complete performance curves and the technical data for each pump are shown in the specific charts. You can use the values shown entirely, and the last point is not the end of the curve. The cells corresponding at NPSHr values less than or equal to 5 metres are highlighted with a grey background. The sections with white background indicate the pump performance that is the maximum limit suggested.

Always check that the requirements in the standard are met when you select the pump: NPSHd ≥ NPSHr + 1 [m].

A part of the flow rate delivered by the pump is used as a cooling flow and therefore it must be added to the design flow rate, as specified by the EN 12845 standard. For more information on the specific data, see the pump performance curves.

<table>
<thead>
<tr>
<th>Model</th>
<th>Electric-driven pump [kW]</th>
<th>Diesel-driven pump [kW]</th>
<th>Flow rate [m³/h]</th>
<th>Head [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro EN 32-200/171</td>
<td>4</td>
<td>4.5</td>
<td>37</td>
<td>19</td>
</tr>
<tr>
<td>Hydro EN 32-200/185</td>
<td>5.5</td>
<td>6.6</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td>Hydro EN 32-200/200</td>
<td>7.5</td>
<td>11.2</td>
<td>55</td>
<td>67</td>
</tr>
<tr>
<td>Hydro EN 32-200/219</td>
<td>11</td>
<td>14.8</td>
<td>67</td>
<td>87</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Electric-driven pump [kW]</th>
<th>Diesel-driven pump [kW]</th>
<th>Flow rate [m³/h]</th>
<th>Head [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro EN 32-200/171</td>
<td>4</td>
<td>4.5</td>
<td>37</td>
<td>19</td>
</tr>
<tr>
<td>Hydro EN 32-200/185</td>
<td>5.5</td>
<td>6.6</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td>Hydro EN 32-200/200</td>
<td>7.5</td>
<td>11.2</td>
<td>55</td>
<td>67</td>
</tr>
<tr>
<td>Hydro EN 32-200/219</td>
<td>11</td>
<td>14.8</td>
<td>67</td>
<td>87</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Electric-driven pump [kW]</th>
<th>Diesel-driven pump [kW]</th>
<th>Flow rate [m³/h]</th>
<th>Head [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro EN 32-200/171</td>
<td>4</td>
<td>4.5</td>
<td>37</td>
<td>19</td>
</tr>
<tr>
<td>Hydro EN 32-200/185</td>
<td>5.5</td>
<td>6.6</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td>Hydro EN 32-200/200</td>
<td>7.5</td>
<td>11.2</td>
<td>55</td>
<td>67</td>
</tr>
<tr>
<td>Hydro EN 32-200/219</td>
<td>11</td>
<td>14.8</td>
<td>67</td>
<td>87</td>
</tr>
</tbody>
</table>
## Data and performance of the duty pumps

<table>
<thead>
<tr>
<th>Model</th>
<th>Electric-driven pump [kW]</th>
<th>Diesel-driven pump [kW]</th>
<th>Flow rate [m³/h]</th>
<th>Head [m]</th>
<th>Flow rate [m³/h]</th>
<th>Head [m]</th>
<th>Flow rate [m³/h]</th>
<th>Head [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro EN 80-200/188</td>
<td>30</td>
<td>36.5</td>
<td>0</td>
<td>48</td>
<td>100</td>
<td>48</td>
<td>120</td>
<td>48</td>
</tr>
<tr>
<td>Hydro EN 80-200/202</td>
<td>37</td>
<td>53</td>
<td>48</td>
<td>55</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Hydro EN 80-200/213</td>
<td>45</td>
<td>53</td>
<td>50</td>
<td>63</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Hydro EN 80-200/222</td>
<td>55</td>
<td>73.5</td>
<td>65</td>
<td>68</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Hydro EN 80-250/216</td>
<td>45</td>
<td>53</td>
<td>65</td>
<td>75</td>
<td>74</td>
<td>74</td>
<td>74</td>
<td>74</td>
</tr>
<tr>
<td>Hydro EN 80-250/233</td>
<td>55</td>
<td>73.5</td>
<td>75</td>
<td>91</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>Hydro EN 80-250/255</td>
<td>75</td>
<td>104.8</td>
<td>91</td>
<td>106</td>
<td>104</td>
<td>104</td>
<td>104</td>
<td>104</td>
</tr>
<tr>
<td>Hydro EN 80-250/270</td>
<td>90</td>
<td>104.8</td>
<td>91</td>
<td>106</td>
<td>104</td>
<td>104</td>
<td>104</td>
<td>104</td>
</tr>
<tr>
<td>Hydro EN 100-200/209</td>
<td>45</td>
<td>53</td>
<td>61</td>
<td>65</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Hydro EN 100-200/215</td>
<td>55</td>
<td>73.5</td>
<td>65</td>
<td>69</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Hydro EN 100-200/219</td>
<td>75</td>
<td>73.5</td>
<td>65</td>
<td>69</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Hydro EN 125-250/238</td>
<td>90</td>
<td>104.8</td>
<td>75</td>
<td>85</td>
<td>84</td>
<td>84</td>
<td>84</td>
<td>84</td>
</tr>
<tr>
<td>Hydro EN 125-250/251</td>
<td>110</td>
<td>145</td>
<td>95</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>Hydro EN 125-250/263</td>
<td>132</td>
<td>145</td>
<td>95</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>Hydro EN 125-250/237</td>
<td>110</td>
<td>145</td>
<td>83</td>
<td>93</td>
<td>93</td>
<td>93</td>
<td>93</td>
<td>93</td>
</tr>
<tr>
<td>Hydro EN 125-250/245</td>
<td>132</td>
<td>145</td>
<td>93</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>Hydro EN 125-250/255</td>
<td>160</td>
<td>197</td>
<td>93</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>Hydro EN 125-250/269</td>
<td>200</td>
<td>222</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>Hydro EN 125-315/289</td>
<td>132</td>
<td>145</td>
<td>116</td>
<td>129</td>
<td>128</td>
<td>128</td>
<td>128</td>
<td>128</td>
</tr>
<tr>
<td>Hydro EN 125-315/302</td>
<td>160</td>
<td>197</td>
<td>145</td>
<td>129</td>
<td>128</td>
<td>128</td>
<td>128</td>
<td>128</td>
</tr>
<tr>
<td>Hydro EN 125-315/316</td>
<td>200</td>
<td>222</td>
<td>145</td>
<td>145</td>
<td>144</td>
<td>144</td>
<td>144</td>
<td>144</td>
</tr>
<tr>
<td>Hydro EN 150-400/2/351</td>
<td>-</td>
<td>180</td>
<td>87</td>
<td>112</td>
<td>112</td>
<td>112</td>
<td>112</td>
<td>112</td>
</tr>
<tr>
<td>Hydro EN 150-400/2/366</td>
<td>-</td>
<td>206</td>
<td>94</td>
<td>113</td>
<td>113</td>
<td>113</td>
<td>113</td>
<td>113</td>
</tr>
<tr>
<td>Hydro EN 150-400/2/384</td>
<td>-</td>
<td>290</td>
<td>104</td>
<td>111</td>
<td>111</td>
<td>111</td>
<td>111</td>
<td>111</td>
</tr>
<tr>
<td>Hydro EN 150-400/2/398</td>
<td>-</td>
<td>290</td>
<td>111</td>
<td>122</td>
<td>122</td>
<td>122</td>
<td>122</td>
<td>122</td>
</tr>
<tr>
<td>Hydro EN 150-400/2/418</td>
<td>-</td>
<td>290</td>
<td>122</td>
<td>122</td>
<td>122</td>
<td>122</td>
<td>122</td>
<td>122</td>
</tr>
<tr>
<td>Hydro EN 150-400/2/420</td>
<td>-</td>
<td>290</td>
<td>123</td>
<td>123</td>
<td>123</td>
<td>123</td>
<td>123</td>
<td>123</td>
</tr>
</tbody>
</table>
14. Performance curves

How to read the curves

Performance curve table

Il tratto in grassetto della curva indica prestazioni (Q - H) con NPSH ≤ S.
Le condizioni in aspirazione del sistema (i.e.: perdite di carico, livello minimo vasca, ecc.) devono garantire il rispetto del punto di norma EN 12845 (10.6.2.1): NPSH_a ≥ NPSH + 1 [m].
Contattare Grundfos per prestazioni eccedenti il limite max. suggerito riportato nel grafico.

The bold part of the curve indicates the performances (Q - H) with NPSH ≤ S.
The system suction conditions (i.e.: friction loss, minimum water level, etc.) must allow to respect the following norm prescription EN 12845 (10.6.2.1): NPSH_a ≥ NPSH + 1 [m].
Please contact Grundfos, for performance exceeding the max. suggested limit shown in the chart.

<table>
<thead>
<tr>
<th>Gruppo pompaggio</th>
<th>Elettropompa</th>
<th>Risciclo</th>
<th>Motopompa</th>
<th>Risciclo</th>
<th>Pompa mantenimento pressione</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mod.</td>
<td>P [kW]</td>
<td>I_1 [A]</td>
<td>Qmin [m³/h]</td>
<td>P [kW]</td>
<td>Qmin [m³/h]</td>
</tr>
<tr>
<td>Hydro EN 80-250/216</td>
<td>45.0</td>
<td>77.0</td>
<td>4.0</td>
<td>48.2</td>
<td>4.0</td>
</tr>
<tr>
<td>Hydro EN 80-250/233</td>
<td>55.0</td>
<td>99.5</td>
<td>4.0</td>
<td>66.8</td>
<td>6.0</td>
</tr>
<tr>
<td>Hydro EN 80-250/255</td>
<td>75.0</td>
<td>134.0</td>
<td>4.0</td>
<td>95.3</td>
<td>6.9</td>
</tr>
<tr>
<td>Hydro EN 80-250/270</td>
<td>90.0</td>
<td>160.0</td>
<td>4.0</td>
<td>95.3</td>
<td>6.9</td>
</tr>
</tbody>
</table>

- Motor diesel raffreddato ad Aria / Diesel engine Air cooled
- Motor diesel raffreddato a liquido / Diesel engine Liquid cooled
### Performance curves

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Indicates the size of the pump.</td>
</tr>
<tr>
<td>B</td>
<td>Indicates the diameter in mm of the impeller installed on the duty pumps.</td>
</tr>
<tr>
<td>C</td>
<td>The bold part of the curve indicates the performance, QH, corresponding to a NPSHr less than 5 metres. You should not select a pump set with a performance left of the bold part of the curve.</td>
</tr>
<tr>
<td>D</td>
<td>Indicates the limit of 5 metres of NPSHr.</td>
</tr>
<tr>
<td>E</td>
<td>Indicates the maximum limit suggested for this pump.</td>
</tr>
<tr>
<td>F</td>
<td>Power curve [P2].</td>
</tr>
<tr>
<td>G</td>
<td>NPSHr curve extended up to 16 metres regarding the maximum impeller diameter in this pump.</td>
</tr>
<tr>
<td>H</td>
<td>NPSHr curve extended up to 16 m regarding the minimum impeller diameter in this pump.</td>
</tr>
<tr>
<td>I</td>
<td>Pump set.</td>
</tr>
<tr>
<td>L</td>
<td>Electric motor power installed on the electrical-driven duty pump, if available.</td>
</tr>
<tr>
<td>M</td>
<td>Rated current of the electric motor installed on the electrical-driven duty pump, if available.</td>
</tr>
<tr>
<td>N</td>
<td>Flow rate of the recirculation circuit installed on the electrical-driven duty pump.</td>
</tr>
</tbody>
</table>
| O    | Cooling system used by the diesel engine, if available:  
- ☐: direct air-cooled engine  
- ●: liquid-cooled engine by a water/water heat exchanger. |
| P    | Rated power of the diesel engine compliant with the ISO 3046 standard. In the case of pump sets equipped with air-cooled motors, it indicates the flow of the recirculation circuit on the diesel-driven duty pump.  
- The first number indicates the power available for firefighting use, while the number in brackets indicates the rated power supplied by the engine.  
- In the case of liquid-cooled motors, the number indicates the cooling flow rate of the diesel engine. It also acts as recirculation for the pump coupled to the diesel engine. |
| Q    | The version of the installed jockey pump. |
| S    | Electric motor power installed on the electrical-driven jockey pump, if available. |
| T    | Rated current of the electric motor installed on electrical-driven jockey pump, if available. |
15. Performance curves and technical data

The bold part of the curve indicates the performances \( (Q \cdot H) \) with \( NPSH_r \leq 5 \).
The system suction conditions (i.e., friction loss, minimum water level, etc.) must allow to respect the following norm prescription EN 12845 (10.6.2.1): \( NPSH_r \geq NPSH \_a + 1 \left[ m \right] \).
Please contact Grundfos for performance exceeding the max. suggested limit shown in the chart.

<table>
<thead>
<tr>
<th>Pumping set</th>
<th>Elettropompa</th>
<th>Ricircolo</th>
<th>Motopompa</th>
<th>Ricircolo</th>
<th>Pompa mantenimento pressione</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mod.</td>
<td>Electric pump</td>
<td>By-pass</td>
<td>Diesel Pump</td>
<td>By-pass</td>
<td>Jockey pump</td>
</tr>
<tr>
<td>Hydro EN 32-200/171</td>
<td>4.0</td>
<td>8.0</td>
<td>4.1</td>
<td>0.5</td>
<td>CM 1-7</td>
</tr>
<tr>
<td>Hydro EN 32-200/185</td>
<td>5.5</td>
<td>12.2</td>
<td>5.9</td>
<td>0.5</td>
<td>CM 1-8</td>
</tr>
<tr>
<td>Hydro EN 32-200/200</td>
<td>7.3</td>
<td>14.8</td>
<td>10.2</td>
<td>0.5</td>
<td>CM 1-9</td>
</tr>
<tr>
<td>Hydro EN 32-200/219</td>
<td>11.0</td>
<td>22.2</td>
<td>13.5</td>
<td>0.5</td>
<td>CM 1-10</td>
</tr>
</tbody>
</table>

○ Motore diesel raffreddato ad Aria / Diesel engine Air cooled  ● Motore diesel raffreddamento a liquido / Diesel engine Liquid cooled
Il tratto in grassetto della curva indica prestazioni (Q - H) con NPSH_R ≤ 5.
Le condizioni in aspirazione del sistema (es.: perdite di carico, livello minimo vasca, ecc.) devono garantire il rispetto del punto di norma EN 12845 (10.6.2.1): NPSH_D ≥ NPSH_R + 1 [m].
Contattare Grundfos per prestazioni eccedenti il limite max. suggerito riportato nel grafico.

The bold part of the curve indicates the performances (Q - H) with NPSH_R ≤ 5.
The system suction conditions (i.e.: friction loss, minimum water level, etc.) must allow to respect the following norm prescription EN 12845 (10.6.2.1): NPSH_D ≥ NPSH_R + 1 [m].
Please contact Grundfos, for performance exceeding the max. suggested limit shown in the chart.
Il tratto in grassetto della curva indica prestazioni \((Q - H)\) con NPSHr \leq 5.  
Le condizioni in aspirazione del sistema (es.: perdite di carico, livello minimo vasca, ecc.) devono garantire il rispetto del punto di norma EN 12845 (10.6.2.1): \(\text{NPSH}_D \geq \text{NPSH}_R + 1\ [m]\).  
Contattare Grundfos per prestazioni eccedenti il limite max. suggerito riportato nel grafico.

The bold part of the curve indicates the performances \((Q - H)\) with NPSHr \leq 5.  
The system suction conditions (i.e.: friction loss, minimum water level, etc.) must allow to respect the following norm prescription EN 12845 (10.6.2.1): \(\text{NPSH}_D \geq \text{NPSH}_R + 1\ [m]\).  
Please contact Grundfos, for performance exceeding the max. suggested limit shown in the chart.

- **Motore diesel raffreddato ad Aria / Diesel engine Air cooled**  
- **Motore disele raffreddamento a liquido / Diesel engine Liquid cooled**

<table>
<thead>
<tr>
<th>Gruppo pompaggio</th>
<th>Elettropompa</th>
<th>Ricircolo</th>
<th>Motopompa</th>
<th>Ricircolo</th>
<th>Pompa mantenimento pressione</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pumping set</strong></td>
<td><strong>Electric pump</strong></td>
<td><strong>By-pass</strong></td>
<td><strong>Diesel Pump</strong></td>
<td><strong>By-pass</strong></td>
<td><strong>Jockey pump</strong></td>
</tr>
<tr>
<td><strong>Mod.</strong></td>
<td><strong>P [kW]</strong></td>
<td><strong>I_{1/1} [A]</strong></td>
<td><strong>Qmin [m³/h]</strong></td>
<td><strong>Na [Np] [kW]</strong></td>
<td><strong>Qmin [m³/h]</strong></td>
</tr>
<tr>
<td>Hydro EN 50-200/170</td>
<td>11,0</td>
<td>21,2</td>
<td>2,0</td>
<td>13,5 (14,8)</td>
<td>2,0</td>
</tr>
<tr>
<td>Hydro EN 50-200/194</td>
<td>15,0</td>
<td>28,5</td>
<td>2,0</td>
<td>17,0 (18,7)</td>
<td>2,0</td>
</tr>
<tr>
<td>Hydro EN 50-200/207</td>
<td>18,5</td>
<td>35,0</td>
<td>2,0</td>
<td>26,1 (28,5)</td>
<td>2,0</td>
</tr>
<tr>
<td>Hydro EN 50-200/219</td>
<td>22,0</td>
<td>41,5</td>
<td>2,0</td>
<td>26,1 (28,5)</td>
<td>2,0</td>
</tr>
</tbody>
</table>
The bold part of the curve indicates the performances \((Q - H)\) with \(NPSH_r \leq 5\).

The system suction conditions (i.e.: friction loss, minimum water level, etc.) must allow to respect the following norm prescription EN 12845 (10.6.2.1): \(NPSH_r \geq NPSH_h + 1\) [m].

Please contact Grundfos, for performance exceeding the max. suggested limit shown in the chart.

### Table: Performance Curves and Technical Data

<table>
<thead>
<tr>
<th>Pumping set</th>
<th>Elettropompa</th>
<th>Ricircolo</th>
<th>Motopompa</th>
<th>Ricircolo</th>
<th>Pompa mantenimento pressione</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mod.</td>
<td>Electric pump</td>
<td>By-pass</td>
<td>Diesel Pump</td>
<td>By-pass</td>
<td>Jockey pump</td>
</tr>
<tr>
<td>Hydro EN 50-250/205</td>
<td>18.5</td>
<td>35.0</td>
<td>2.0</td>
<td>17.0</td>
<td>(18.7)</td>
</tr>
<tr>
<td>Hydro EN 50-250/220</td>
<td>22.0</td>
<td>41.5</td>
<td>2.0</td>
<td>26.1</td>
<td>(28.5)</td>
</tr>
<tr>
<td>Hydro EN 50-250/249</td>
<td>30.0</td>
<td>54.5</td>
<td>2.0</td>
<td>33.2</td>
<td>(36.5)</td>
</tr>
<tr>
<td>Hydro EN 50-250/263</td>
<td>37.0</td>
<td>66.5</td>
<td>2.0</td>
<td>48.2</td>
<td>(53.0)</td>
</tr>
</tbody>
</table>

- Motore diesel raffreddato ad Aria / Diesel engine Air cooled
- Motore diesel raffreddamento a liquido / Diesel engine Liquid cooled

In the choice of the pump model, add the by-pass flow (see table at the bottom) to the design flow rate.

When choosing the pump model, the by-pass flow must be added to the design flow rate.
The bold part of the curve indicates the performances (Q - H) with \( \text{NPSH}_{\text{R}} \leq 5 \). The system suction conditions (i.e.: friction loss, minimum water level, etc.) must allow to respect the following norm prescription EN 12845 (10.6.2.1): \( \text{NPSH}_{\text{D}} \geq \text{NPSH}_{\text{R}} + 1 \text{ [m]} \).

Please contact Grundfos, for performance exceeding the max. suggested limit shown in the chart.

<table>
<thead>
<tr>
<th>Gruppo pompaggio</th>
<th>Elettropompa</th>
<th>Ricircolo</th>
<th>Motopompa</th>
<th>Ricircolo</th>
<th>Pompa mantenimento pressione</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumping set</td>
<td>Electric pump</td>
<td>By-pass</td>
<td>Diesel Pump</td>
<td>By-pass</td>
<td>Jockey pump</td>
</tr>
<tr>
<td>Mod.</td>
<td>P [kW]</td>
<td>( I_{1/1} ) [A]</td>
<td>Qmin [m³/h]</td>
<td>( I_{1/1} ) [A]</td>
<td>Qmin [m³/h]</td>
</tr>
<tr>
<td>Hydro EN 65-200/170</td>
<td>15,0</td>
<td>28,5</td>
<td>2,5</td>
<td>13,5 (14,8)</td>
<td>2,5</td>
</tr>
<tr>
<td>Hydro EN 65-200/185</td>
<td>18,5</td>
<td>35,0</td>
<td>2,5</td>
<td>26,1 (28,5)</td>
<td>2,5</td>
</tr>
<tr>
<td>Hydro EN 65-200/195</td>
<td>22,0</td>
<td>41,5</td>
<td>2,5</td>
<td>26,1 (28,5)</td>
<td>2,5</td>
</tr>
<tr>
<td>Hydro EN 65-200/215</td>
<td>30,0</td>
<td>54,5</td>
<td>2,5</td>
<td>33,2 (36,5)</td>
<td>3,0</td>
</tr>
</tbody>
</table>

- Motore diesel raffreddato ad Aria / Diesel engine Air cooled
- Motore diesel raffreddato a liquido / Diesel engine Liquid cooled
The bold part of the curve indicates the performance (Q - H) with NPSH ≥ 5. When choosing the pump model, the bypass flow rate must be added to the design flow rate. Contact Grundfos for performance exceeding the max. suggested limit shown in the chart.

Le condizioni in aspirazione del sistema (es.: perdite di carico, livello minimo vasca, ecc.) devono garantire il rispetto del punto di norma EN 12845 10.6.2.1: NPSH ≥ NPSH + 1 [m].

When choosing the pump model, the bypass flow rate must be added to the design flow rate. Contact Grundfos for performance exceeding the max. suggested limit shown in the chart.

Il tratto in grassetto della curva indica prestazioni (Q - H) con NPSH ≥ 5. Per prestazioni eccedenti il limite max. suggerito riportato nel grafico, contattare Grundfos.
When choosing the pump model, the by-pass flow (see table at the bottom) must be added to the design flow rate.

*The bold part of the curve indicates the performances (Q - H) with \(NPSH_r \leq 5\).*

The system suction conditions (i.e.: friction loss, minimum water level, etc.) must allow to respect the following norm prescription EN 12845 (10.6.2.1): \(NPSH_D \geq NPSH_R + 1\) [m].

Please contact Grundfos, for performance exceeding the max. suggested limit shown in the chart.

<table>
<thead>
<tr>
<th>Gruppo pompaggio</th>
<th>Mod.</th>
<th>P [kW]</th>
<th>(I_{1/1} [A])</th>
<th>Qmin [m³/h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elettropompa</td>
<td></td>
<td>45,0</td>
<td>77,0</td>
<td>4,0</td>
</tr>
<tr>
<td>Hydro EN 80-250</td>
<td></td>
<td>55,0</td>
<td>99,5</td>
<td>4,0</td>
</tr>
<tr>
<td>216</td>
<td></td>
<td>75,0</td>
<td>134,0</td>
<td>4,0</td>
</tr>
<tr>
<td>233</td>
<td></td>
<td>90,0</td>
<td>160,0</td>
<td>4,0</td>
</tr>
<tr>
<td>Motopompa</td>
<td></td>
<td>48,2</td>
<td>53,0</td>
<td>4,0</td>
</tr>
<tr>
<td>Diesel Pump</td>
<td></td>
<td>66,8</td>
<td>73,5</td>
<td>6,0</td>
</tr>
<tr>
<td>Na (Nb)</td>
<td></td>
<td>95,3</td>
<td>104,8</td>
<td>6,0</td>
</tr>
<tr>
<td>Motore disele</td>
<td></td>
<td>95,3</td>
<td>104,8</td>
<td>6,0</td>
</tr>
<tr>
<td>Raffreddamento</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Il tratto in grassetto della curva indica prestazioni \(Q - H\) con \(NPSH_r \leq 5\).

Le condizioni in aspirazione del sistema (es.: perdite di carico, livello minimo vasca, ecc.) devono garantire il rispetto del punto di norma EN 12845 (10.6.2.1): \(NPSH_D \geq NPSH_a + 1\ [m]\).

Contattare Grundfos per prestazioni eccedenti il limite max. suggerito riportato nel grafico.

The bold part of the curve indicates the performances \(Q - H\) with \(NPSH_r \leq 5\).

The system suction conditions (i.e.: friction loss, minimum water level, etc.) must allow to respect the following norm prescription EN 12845 (10.6.2.1): \(NPSH_D \geq NPSH_a + 1\ [m]\).

Please contact Grundfos, for performance exceeding the max. suggested limit shown in the chart.

<table>
<thead>
<tr>
<th>Gruppo pompaggio Pumping set</th>
<th>Elettropompa Electric pump</th>
<th>Ricircolo By-pass</th>
<th>Motopompa Diesel Pump</th>
<th>Ricircolo By-pass</th>
<th>Pompa mantenimento pressione Jockey pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mod.</td>
<td>P [kW]</td>
<td>(I_{1/1}) [A]</td>
<td>Qmin ([m^3/h])</td>
<td>(NPSH_a)</td>
<td>Mod. P [kW] (I_{1/1}) [A]</td>
</tr>
<tr>
<td>Hydro EN 100-200/209</td>
<td>45,0</td>
<td>77,0</td>
<td>5,0</td>
<td>48,2 (53,0)</td>
<td>CM 3-10 1,20 2,60</td>
</tr>
<tr>
<td>Hydro EN 100-200/215</td>
<td>55,0</td>
<td>93,0</td>
<td>5,0</td>
<td>66,8 (73,5)</td>
<td>CM 3-10 1,20 2,60</td>
</tr>
<tr>
<td>Hydro EN 100-200/219</td>
<td>75,0</td>
<td>134,0</td>
<td>5,0</td>
<td>66,8 (73,5)</td>
<td>CM 3-10 1,20 2,60</td>
</tr>
</tbody>
</table>

- ○ Motore diesel raffreddato ad Aria / Diesel engine Air cooled
- ● Motore disele raffreddamento a liquido / Diesel engine Liquid cooled
Nella scelta del modello di pompa sommare il flusso di ricircolo (vedi tabella in calce) alla portata di progetto. 

When choosing the pump model, the by-pass flow (see table at the bottom) must be added to the design flow rate.

The bold part of the curve indicates the performances (Q - H) with NPSHr ≤ 5.

The system suction conditions (i.e.: friction loss, minimum water level, etc.) must allow to respect the following norm prescription EN 12845 (10.6.2.1): \( NPSH_D \geq NPSH_R + 1 \) [m].

Please contact Grundfos, for performance exceeding the max. suggested limit shown in the chart.

### Gruppo pompaggio Pumping set

<table>
<thead>
<tr>
<th>Mod.</th>
<th>Elettropompa Electric pump</th>
<th>Ricircolo By-pass</th>
<th>Motopompa Diesel Pump</th>
<th>Ricircolo By-pass</th>
<th>Pompa mantenimento pressione Jockey pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro EN 125-250.1/238</td>
<td>90.0, 110.0, 132.0</td>
<td>151.0, 191.0, 236.0</td>
<td>95.3 (104.8), 132.0 (145.0), 132.0 (145.0)</td>
<td>9.0, 9.0, 9.0</td>
<td>CM 3-12, 1,58, 3,10</td>
</tr>
<tr>
<td>Hydro EN 125-250.1/251</td>
<td>110.0, 132.0</td>
<td>191.0, 236.0</td>
<td>132.0 (145.0), 132.0 (145.0)</td>
<td>9.0, 9.0</td>
<td>CM 3-12, 1,58, 3,10</td>
</tr>
<tr>
<td>Hydro EN 125-250.1/263</td>
<td>132.0</td>
<td>236.0</td>
<td>132.0 (145.0)</td>
<td>9.0</td>
<td>CM 3-13, 1,58, 3,10</td>
</tr>
</tbody>
</table>

- ○ Motore diesel raffreddato ad Aria / Diesel engine Air cooled
- ● Motore diesel raffreddamento a liquido / Diesel engine Liquid cooled
The bold part of the curve indicates the performances (Q - H) with NPSHr ≤ 5.
The system suction conditions (i.e.; friction loss, minimum water level, etc.) must allow to respect the following norm prescription EN 12845 (10.6.2.1):  
NPSH_D ≥ NPSH_R + 1 [m].
Please contact Grundfos, for performance exceeding the max. suggested limit shown in the chart.

### Gruppo pompaggio

<table>
<thead>
<tr>
<th>Mod.</th>
<th>Elettropompa</th>
<th>Ricircolo By-pass</th>
<th>Motopompa Diesel Pump</th>
<th>Ricircolo By-pass</th>
<th>Pompa mantenimento pressione</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro EN 125-250/237</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydro EN 125-250/245</td>
<td>110,0 [kW]</td>
<td>191,0 [A]</td>
<td>132,0 (145,0) [kW]</td>
<td>9,0</td>
<td>CM 3-12 1,58 3,10</td>
</tr>
<tr>
<td>Hydro EN 125-250/255</td>
<td>132,0 [kW]</td>
<td>236,0 [A]</td>
<td>132,0 (145,0) [kW]</td>
<td>9,0</td>
<td>CM 3-13 1,58 3,10</td>
</tr>
<tr>
<td>Hydro EN 125-250/269</td>
<td>200,0 [kW]</td>
<td>335,0 [A]</td>
<td>179,0 (197,0) [kW]</td>
<td>9,0</td>
<td>CM 3-14 2,20 4,10</td>
</tr>
</tbody>
</table>

- Motore diesel raffreddato ad Aria / Diesel engine Air cooled
- Motore diesel raffreddamento a liquido / Diesel engine Liquid cooled
The bold part of the curve indicates the performances (Q - H) with NPSHr ≤ 5.
The system suction conditions (i.e.: friction loss, minimum water level, etc.) must allow to respect the following norm prescription EN 12845 (10.6.2.1): NPSH0 ≥ NPSHr + 1 [m].
Please contact Grundfos, for performance exceeding the max. suggested limit shown in the chart.

Il tratto in grassetto della curva indica prestazioni (Q - H) con NPSHr ≤ 5.
Le condizioni in aspirazione del sistema (es.: perdite di carico, livello minimo vasca, ecc.) devono garantire il rispetto del punto di norma EN 12845 (10.6.2.1): NPSH0 ≥ NPSHr + 1 [m].
Contattare Grundfos, per prestazioni eccedenti il limite max. suggerito riportato nel grafico.

<table>
<thead>
<tr>
<th>Gruppo pompaggio</th>
<th>Elettropompa Electric pump</th>
<th>Ricircolo By-pass</th>
<th>Motopompa Diesel Pump</th>
<th>Ricircolo By-pass</th>
<th>Pompa mantenimento pressione Jockey pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mod.</td>
<td>P [kW]</td>
<td>I1/1 [A]</td>
<td>Qmin [m³/h]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydro EN 125-315/289</td>
<td>132,0</td>
<td>236,0</td>
<td>9,0</td>
<td></td>
<td>CR 3-21</td>
</tr>
<tr>
<td>Hydro EN 125-315/302</td>
<td>160,0</td>
<td>282,0</td>
<td>9,0</td>
<td></td>
<td>CR 3-23</td>
</tr>
<tr>
<td>Hydro EN 125-315/316</td>
<td>200,0</td>
<td>356,0</td>
<td>9,0</td>
<td></td>
<td>CR 3-23</td>
</tr>
<tr>
<td>Hydro EN 125-315/302</td>
<td>179,0 (197,0)</td>
<td>9,0</td>
<td></td>
<td>CR 3-23</td>
<td>2,20</td>
</tr>
<tr>
<td>Hydro EN 125-315/316</td>
<td>202,0 (222,0)</td>
<td>9,0</td>
<td></td>
<td>CR 3-23</td>
<td>2,20</td>
</tr>
</tbody>
</table>

- Motore diesel raffreddato ad Aria / Diesel engine Air cooled
- Motore diesel raffreddamento a liquido / Diesel engine Liquid cooled
Nella scelta del modello di pompa sommare il flusso di ricircolo (vedi tabella in calce) alla portata di progetto.

When choosing the pump model, the by-pass flow (see table at the bottom) must be added to the design flow rate.

Il tratto in grassetto della curva indica prestazioni (Q - H) con NPSHr ≤ 5.
Le condizioni in aspirazione del sistema (es.: perdite di carico, livello minimo vasca, ecc.) devono garantire il rispetto del punto di norma EN 12845 (10.6.2.1): \( NPSH_D \geq NPSH_R + 1 \) [m].
Contattare Grundfos per prestazioni eccedenti il limite max. suggerito riportato nel grafico.

The bold part of the curve indicates the performances (Q - H) with NPSHr ≤ 5.
The system suction conditions (i.e.: friction loss, minimum water level, etc.) must allow to respect the following norm prescription EN 12845 (10.6.2.1): \( NPSH_D \geq NPSH_R + 1 \) [m].
Please contact Grundfos, for performance exceeding the max. suggested limit shown in the chart.
16. Documentation

All pump sets are delivered with the following documents in hard copy:
- installation and operating instructions for the pump set with EC declaration of conformity
- installation and operating instructions for the electrical-driven duty pumps
- installation and operating instructions for the electrical-driven jockey pumps
- installation and operating instructions for the pressure switches
- electrical diagrams of the control panels
- assembling and setting verification
- two copies of the nameplate of the pump set in addition to the one on the base frame of the pump set
- pump performance curves.

If available, the kit for measuring the flow rate is supplied with the installation and operating instructions of the flowmeter.

If a diesel-driven pump is available, the following documents are also delivered:
- installation and operating instructions for the diesel engine
- safety data sheet for the batteries
- factory test report for the diesel-driven pump as described in the EN 12845 standard.

If you need specific documents or any additional hard or digital copies of the documents listed above, please request these in the bidding process.
17. 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.