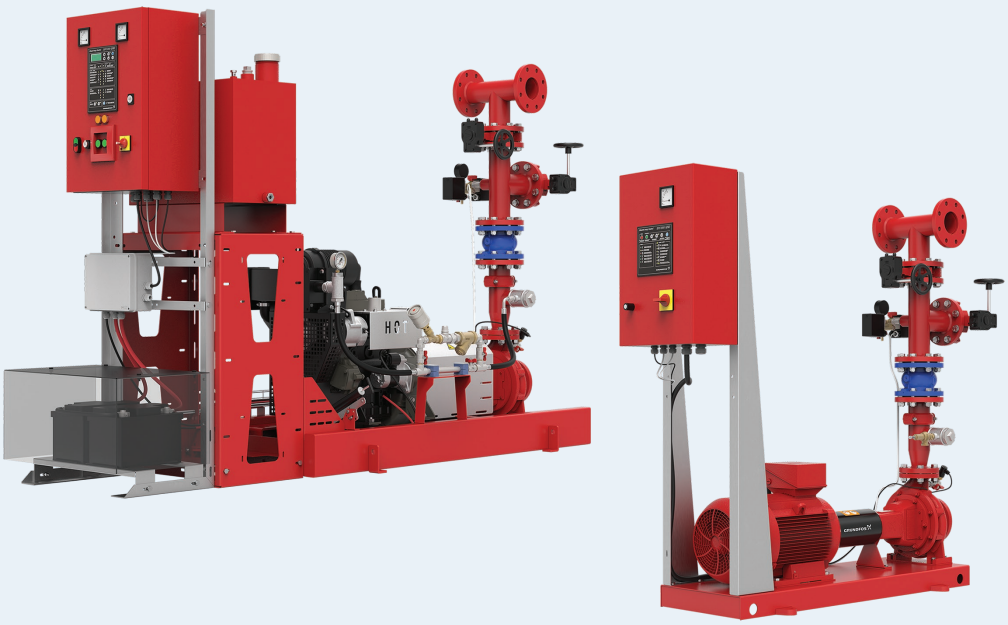
Installation and operating instructions

Fire Hydro EN

Grundfos firefighting systems

Fire Hydro EN
Installation and operating instructions
(all available languages)
http://net.grundfos.com/qr/i/93349467



GRUNDFOS

Fire Hydro EN

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Original installation and operating instructions

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1. General information

Read this document before you install the system. Installation and operation must comply with local regulations and accepted codes of good practice.

1.1 Hazard statements

The symbols and hazard statements below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious personal injury.

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

The hazard statements are structured in the following way:

SIGNAL WORD

Description of the hazard

Consequence of ignoring the warning

- Action to avoid the hazard.

1.2 Notes

The symbols and notes below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.

Observe these instructions for explosion-proof products.

A blue or gray circle with a white graphical symbol indicates that an action must be taken.

A red or gray circle with a diagonal bar, possibly with a black graphical symbol, indicates that an action must not be taken or must be stopped.

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

Tips and advice that make the work easier.

1.3 Target group

These installation and operating instructions are intended for professional installers and for the operators of the system.

We recommend that installation be carried out by skilled persons with technical qualifications required by the specific legislation in force.

1.4 General safety warnings

Before starting any operations, read carefully all the documentation and manuals delivered with the system.

The terminals and wires upstream the main switch of the control panel are live even if the switch is in the OFF position.

DANGER
Electric shock
Death or serious personal injury

- Before any inspection, maintenance, service or repair of the system, make sure that the main switch is in the OFF position, locked and tagged. Attach suitable isolation warning signs to prevent inadvertent reconnection.
- There are more than one control panels. Make sure that you disconnect the correct one belonging to the section of the system that needs intervention.
- The electric system must be designed and installed by a client-appointed authorized electrician in compliance with local regulations.
- Do not do maintenance work when the power supply is switched on.

WARNING
Electric shock
Death or serious personal injury

- Before switching on the power supply, make sure that the electrical insulation and protection are appropriate to avoid unexpected contact with water.

WARNING
Explosion hazard
Death or serious personal injury

- After each pump test against a closed valve, make sure that the safety valve opens as needed or that the bleed line drains enough water to cool the pump properly.

WARNING
Crushing hazard
Death or serious personal injury

- Any kind of activity or intervention on the system must be performed by authorized persons.
- Incorrect use may cause severe damage to the system or the entire firefighting network.

CAUTION
Toxic material
Minor or moderate personal injury

- Do not ingest oil, fuel or coolant. In case of accidental ingestion, refer to the safety sheet of the specific product.

CAUTION
Slipping hazard
Minor or moderate personal injury

- Do not spill liquids like oil, fuel, or coolant on the floor to avoid slippery conditions.
- Use adequate filling tools.

2. System introduction

2.1 System description

The Fire Hydro EN systems comply with EN 12845 for the design, installation and maintenance of automatic sprinkler systems. They are suitable for configurations with single, superior single, duplicate or combined water supply sources.

The pumps have a back pull-out design, allowing removal of the coupling, bearing bracket and impeller without moving the motor, housing or pipes.

The range offers the following types:

- S version: pump operated by an electric motor
- T version: pump operated by a diesel engine.

The systems are equipped with instrumentation to support testing and commissioning.

Duty pumps

Each duty pump, built on a robust baseplate, can deliver 100 % of the required flow rate.

If a fire occurs and network pressure drops, the system starts automatically and runs continuously until stopped manually. If allowed by local regulations, an optional automatic stop function can be added to shut down the duty pump after a set time delay.

The shape of the QH-curve is stable.

Motors or engines are sized in compliance with EN12845.

Depending on power size, the diesel pump is cooled with either direct air or a water/water heat exchanger.

The heat exchanger cooling system has the following parts:

- a water/water heat exchanger with expansion tank
- a manometer with indication of the operational area at the inlet of the expansion tank
- a circuit consisting of a filter and a valve with hydraulic control and pressure regulator
- a bypass circuit with gate valve.

The fuel tank is sized for at least 6 hours of continuous operation and includes a containment basin and vent connection.

As standard, the diesel systems are supplied with an industrial silencer.

Jockey pump

To prevent unnecessary start-up of the duty pumps, an optional jockey electric pump controlled by a dedicated panel can maintain system pressure in case of minor leaks.

Hydraulic components

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

The components include the following:

- two pressure switches for each duty pump that 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
- connection for the priming and recirculation circuits to prevent overheating of the pump when running against closed valves.

Control panel

Each duty and jockey pump is equipped with a dedicated control panel featuring operating and control buttons.

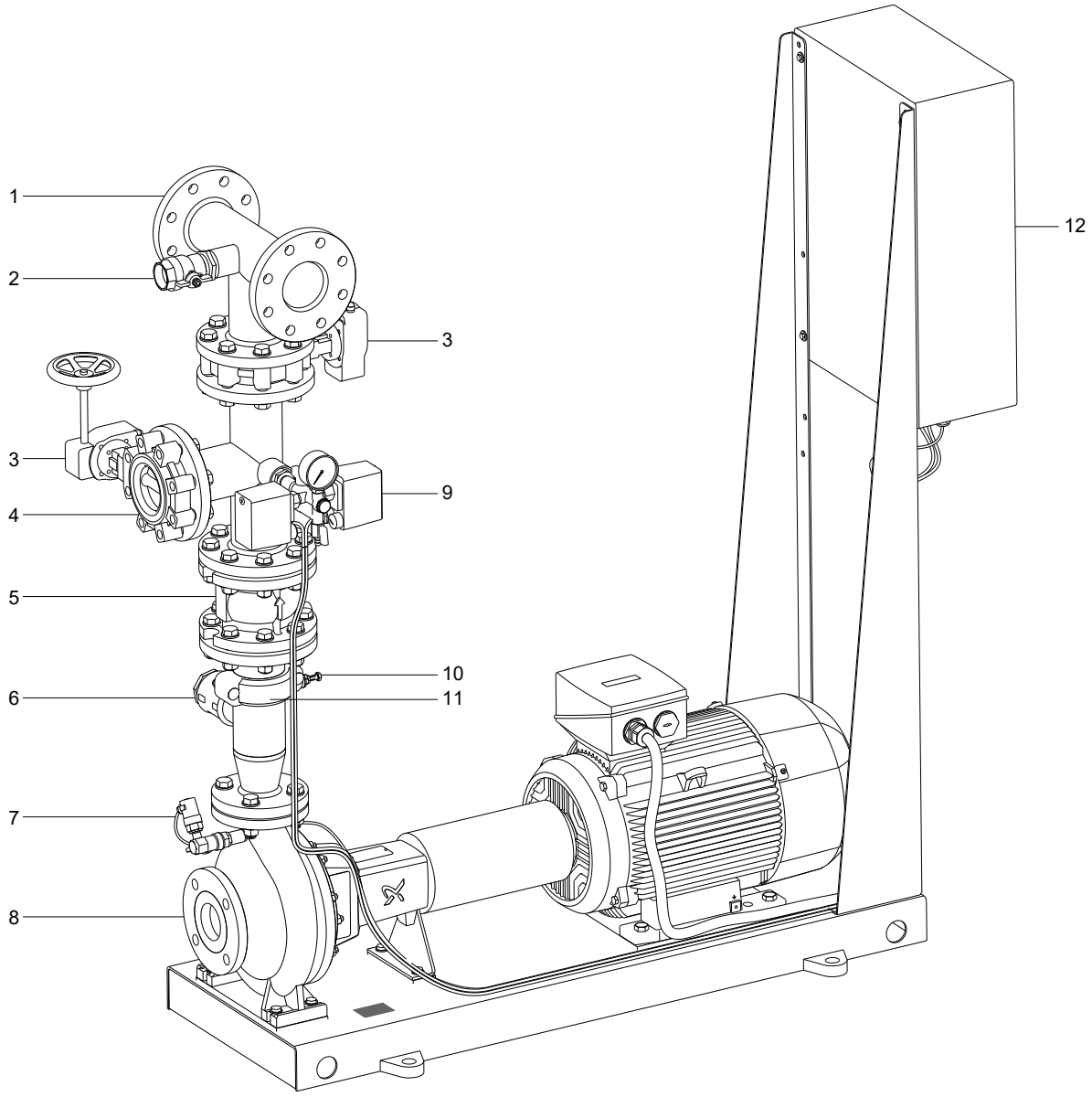
The operating modes must be set individually on each control panel according to the specific needs.

Refer to the dedicated sections to each control panel for the available functions and the relative activation procedures.

Accessories

The supply scope can be extended with the following optional accessories that are sized according to standard requirements:

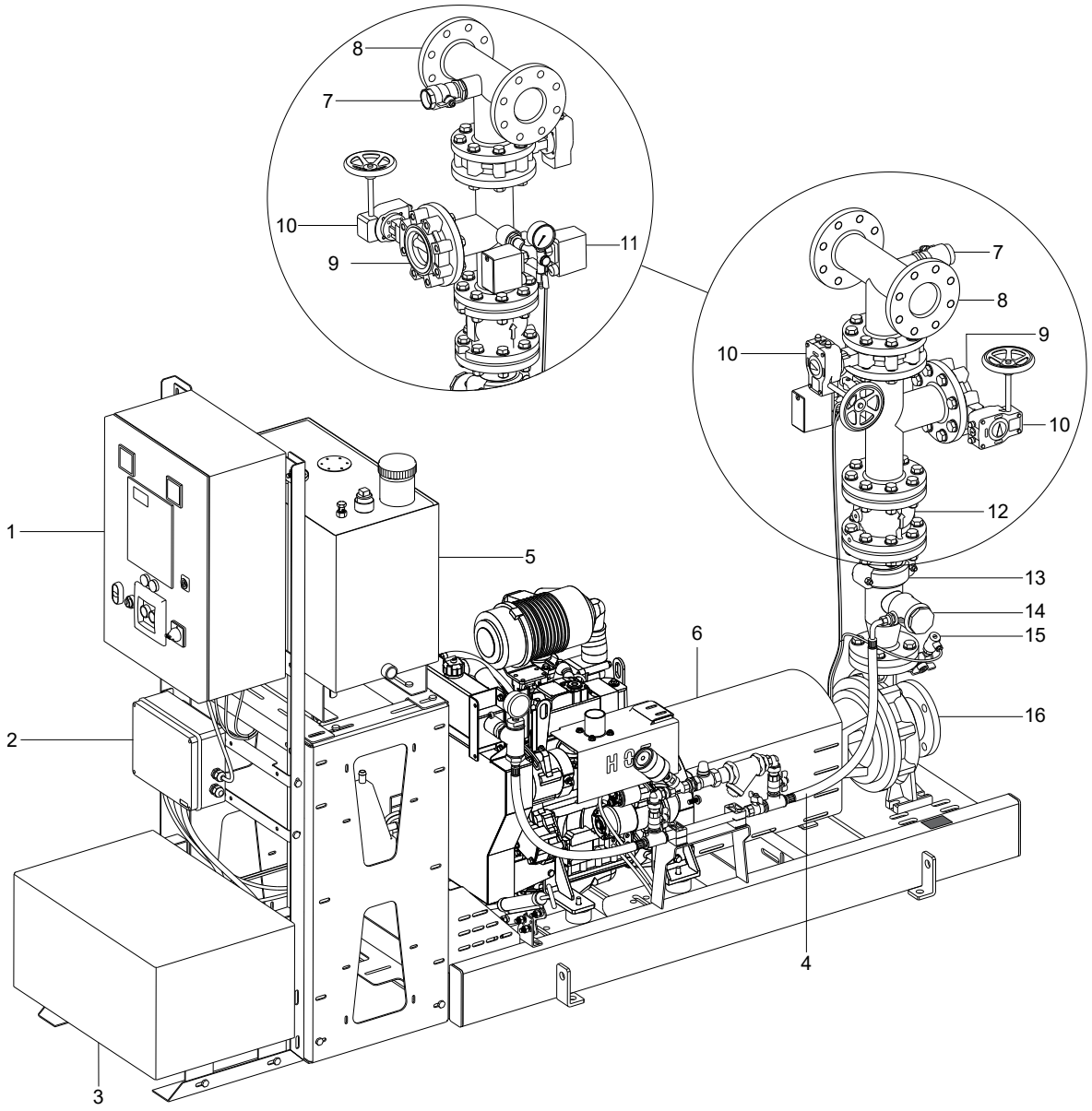
- a suction kit for suction-lift or positive head installations, including:
  - an eccentric divergent pipe with a controlled taper
  - a vacuum pressure gauge
  - an isolating valve (not included for suction-lift installations).
- a testing kit including a flowmeter, valves and straight pipe sections to get the optimal flow-rate reading.



System components for electric system

Pos.	Description
1	Outlet connection
2	Jockey pump connection
3	Isolating valve
4	Test connection
5	Non-return valve
6	Priming tank connection
7	Pressure sensor

Pos.	Description
8	Pump inlet
9	Starting circuit complete with two pressure switches and a pressure gauge in compliance with EN 12845
10	Pressure-relief valve
11	Flexible grooved coupling
12	Electric pump control panel



System components for diesel system

Pos.	Description
1	Diesel pump control panel
2	Starting relay box
3	Batteries within protection box
4	Cooling loop and heat exchanger connection
5	Fuel tank with containment vessel
6	Cardan shaft with coupling guard
7	Jockey pump connection
8	Outlet connection
9	Test connection
10	Isolating valve
11	Starting circuit complete with two pressure switches and a pressure gauge in compliance with EN 12845
12	Non-return valve
13	Flexible grooved coupling
14	Priming tank connection
15	Pressure sensor to detect pump operation
16	Pump inlet

2.2 Identification

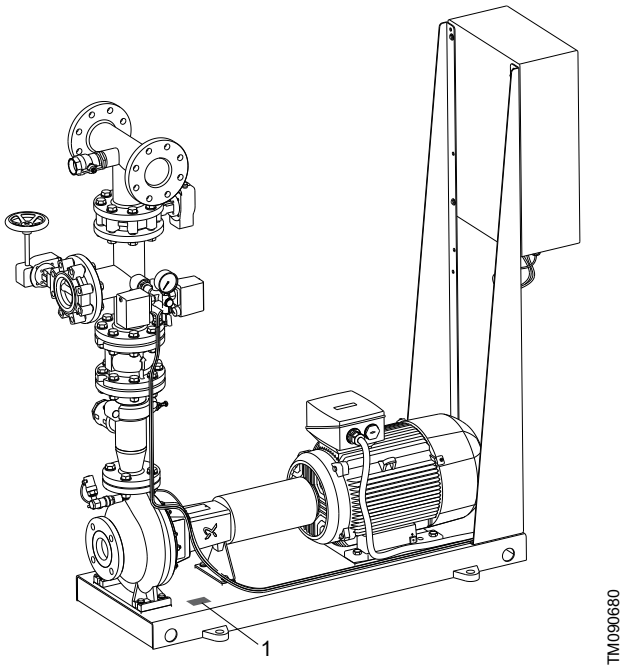
2.2.1 Nameplate

All relevant system data are shown on a nameplate on the base frame of the system.

Example of nameplate

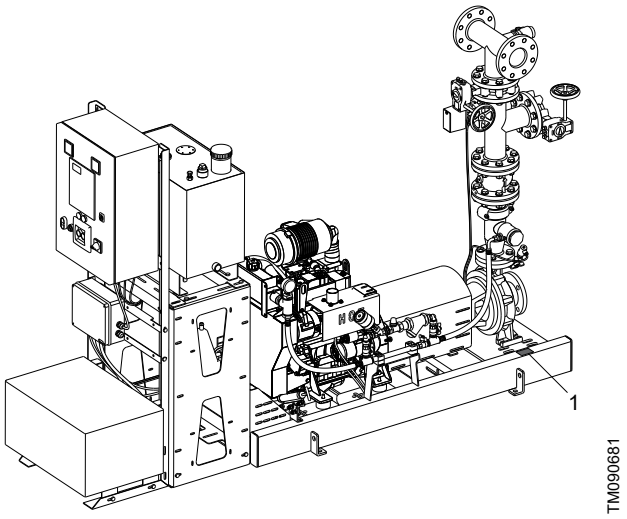
Pos.	Description
1	Type designation
2	Model
3	Serial number
4	Mains supply and engine size for diesel pump
5	Mains supply and motor size for electric pump
6	Mains supply and motor size for jockey pump
7	Flow
8	Head
9	Country of origin
10	QR code
11	Marks of approval
12	Address of manufacturer
13	IP class
14	Weight
15	Speed
16	Data matrix application identifier

The following diagram shows the position of the nameplates on the system.



Position of the nameplate for the electric system

Pos.	Description
1	Nameplate



Position of the nameplate for the diesel system

Pos.	Description
1	Nameplate

The system also includes the following nameplates and labels:

- pump nameplate (one on each pump placed on the bearings bracket)
- nameplate for each electric motor or diesel engine (placed on the motor or engine)
- control panel label (one on each control panel placed on the side of the panel or the inner side of the front door, depending on the model).

2.2.2 Type key

Example: FHEN T 80-260/263 A-U2-B

Code	Explanation	Designation
FHEN		System type
T	S: one duty electric pump (100 %) T: one duty diesel pump (100 %) J: standard jockey pump for FH/EN system	Configuration
80-250/263	Example: NKF 80-250 impeller ∅263	Pump type
A	A: standard B: IP55 X: special execution control panel	Control panel
SD	For duty electric pump only: • DL: Direct-on-line • SD: Star-delta	Starting method
U2	U1: 3 × 400 V, 50 Hz U2: 1 × 230 V, 50 Hz	Mains supply
B	For duty diesel pump only: • A: direct air with fan • B: water/water heat exchanger	Diesel engine cooling type
X	X: other versions based on customer specifications (on request)	Other versions

3. Receiving the system

3.1 Transporting the system

The system is prepared for shipment at the factory to minimize potential damage during handling and transport.

CAUTION
Crushing hazard
Minor or moderate personal injury
- Make sure that the cage is firmly anchored on the truck before shipment.
- Transport must be carried out by authorized persons.

Do not stress the pump excessively during handling and transport.

During transport in cold weather, take precautions to prevent the pump and system components from freezing.

3.2 Inspecting the system

Upon receiving the system, make sure that the delivery matches the order, all components are supplied and the packaging is intact.

3.3 Scope of delivery

All systems are factory-tested. The wooden cage contains the following:

- 1 Fire Hydro EN system
- installation and operating instructions in digital format
  - for the system
  - for the duty electric pumps
  - for the jockey electric pump
  - for the pressure switches
- IOS manual with EC declaration of conformity (hard copy)
- electrical diagrams of the control panels
- assembling and setting verification
- two extra copies of the nameplate of the system
- pump performance curves.

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

With a diesel pump, 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 pump in compliance with EN 12845.

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

3.4 Handling and lifting the system

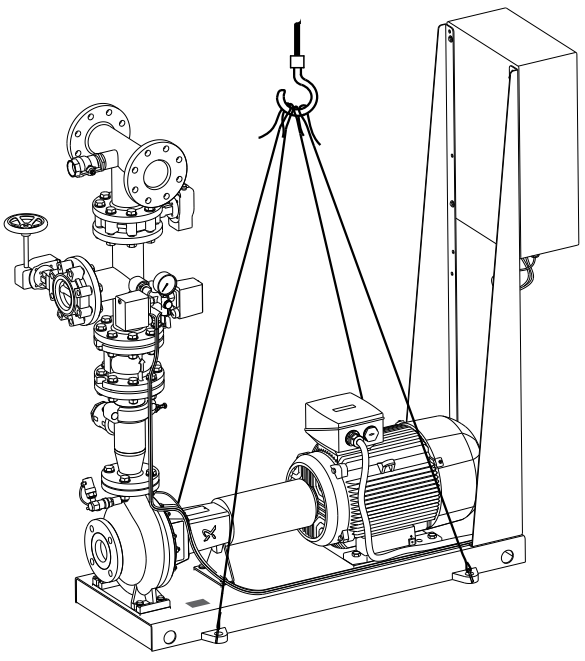
To facilitate handling, systems are shipped in pre-assembled blocks designed for transport by forklift for similar lifting equipment.

WARNING
Overhead load
Death or serious personal injury
- Make sure that the area below and around the lifted system is clear of people during operations.
- Do not allow anyone to stand on, under, or near the load.

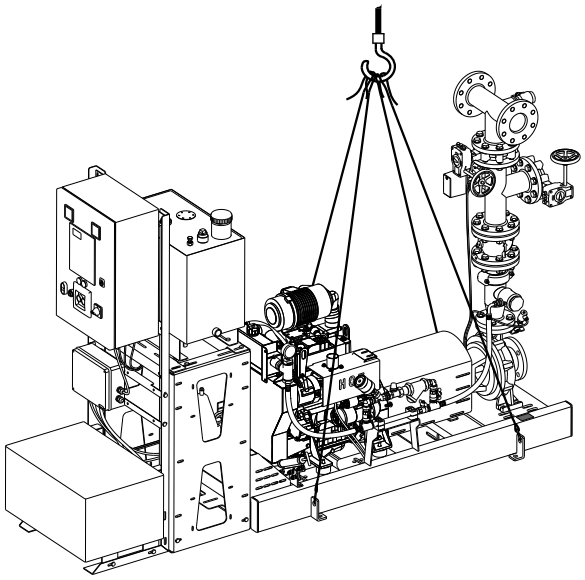
WARNING
Crushing hazard
Death or serious personal injury
- Before starting any handling operations with the package, make sure that all the bolts for anchoring the system to the package are in place.
- Before lifting, make sure that the load is balanced.
- Whenever possible, handle the system with a forklift.
- When using chains or belts, hook the system to the base in the designated lifting points.
- Never use the lifting eyes of the individual components to lift the system.
- Lock the door of the control panel before moving the system.
- Only use lifting equipment that is in good condition and suitable for lifting the weight and shape of the system.
- Handling operations must be carried out by authorized persons.

CAUTION
Crushing hazard
Minor or moderate personal injury
- Before handling, make sure that the package is intact.

CAUTION
Sharp element
Minor or moderate personal injury
- Use the dedicated DPI (gloves) to remove the packaging.



Lifting the electric system



Lifting the diesel system

See also the installation and operating instructions for the diesel engine.

4. Installation requirements

Refer to the system design for the information of the room installation, specifically for the construction works, ventilation, air exchange, power supply system and the exhaust gas evacuation of the diesel engine. The installation must be carried out timely by specialists appointed by the client, in compliance with relevant regulations and provisions.

The main criteria for installing firefighting systems are described in EN 12845. You also need to refer to the local regulations if applicable.

4.1 Location

DANGER
Crushing hazard
Death or serious personal injury

- The system must be installed in an access-controlled area. Make sure that only authorized persons have access to this area.
- If the site is left unattended before installation is complete, all openings must be covered to prevent entry of foreign objects or unauthorized persons.
- Use unbreakable covers that cannot be removed without tools.

WARNING
Crushing hazard
Death or serious personal injury

- Ensure sufficient clearance in the technical room during design to allow installation, operation, maintenance and disassembly of the system.
- The technical room must be designed by a client-appointed authorized designer in compliance with local regulations.

Before installation, make sure that the following conditions are fulfilled:

- The technical room dimensions are adequate for the system to be installed.
- The room has proper air circulation.

The system must be installed in a weatherproof room protected from freezing. The room must be well ventilated to ensure proper cooling of the electric motors and diesel engines.

Ensure operating conditions within the limits specified in the section about operating conditions.

Ensure the proper exhaust gas evacuation of the diesel engine. For this purpose, adequate ventilation ducts must be installed.

The technical room of the system must be properly sized according to regulations and good practices. You must take the following into account:

- the overall dimensions of the system
- easy access to the parts of the system for commissioning, routine checks and maintenance
- adequate air exchange in the room to ensure proper machine cooling.

When sizing room openings for effective air exchange, account for installation location and nearby equipment or heat sources.

The installation of motors and engines in closed environments always requires proper circulation of fresh air in the room to ensure elimination of heat generated during operation and maintain proper machine cooling.

Openings and ventilation ducts for hot air evacuation must be dimensioned based on analytic calculation.

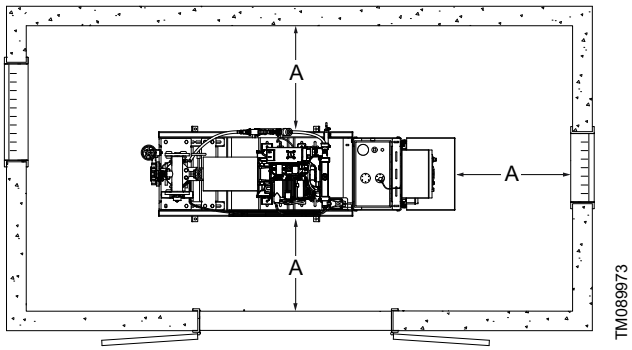
- Secure large openings to prevent people or animals from entering.
- Use unbreakable protection that cannot be removed without tools.

Related information

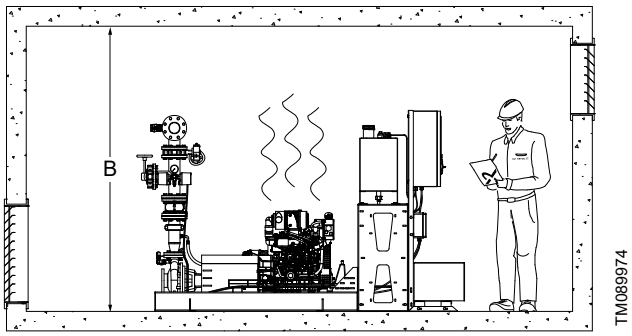
14.1 Operating conditions

4.1.1 Minimum space

The pictures below show the minimum clearance required around the system.



Top view of the technical room



Side view of the technical room

Pos.	Description
A	Minimum 800 mm
B	Minimum 2400 mm

4.2 Diesel pumps with direct air cooling

A fan, driven by the engine itself, generates air flow that is conveyed to the engine and ensures cooling. The heat is then released into the environment and must be extracted from the room.

4.3 Diesel pumps with water/water heat exchanger

Liquid-cooled engines are cooled via a water/water heat exchanger with an expansion tank.

When the engine is hot, pressure builds in the cooling circuits, potentially causing burn hazards and forceful discharge of hot fluid. Cooling circuits may remain hot and pressurized after shutdown.

CAUTION
Hot surface
Death or serious personal injury
- Open the coolant tank cap only when the engine is cold and only if strictly necessary.

The engine is cooled by the water of the firefighting system.

Do not let the engine run at a speed lower than the nominal speed. A low speed rotation may lead to insufficient cooling flow of water through the heat exchanger, thus potentially damage the engine.

Do not obstruct the outlet of the heat exchanger. Avoid long and complex piping that may restrict water flow. Do not install components, such as a gate valve, that could impair cooling water circulation.

Install the outlet pipe of the heat exchanger to visually inspect proper water circulation.

The heat exchanger outlet must be installed close to the diesel pump.

Clean the filter regularly, and make sure that there is proper water circulation in the cooling system.

Make sure that the flow through the cooling system meets the minimum requirement as specified in the technical documentation for the specific model.

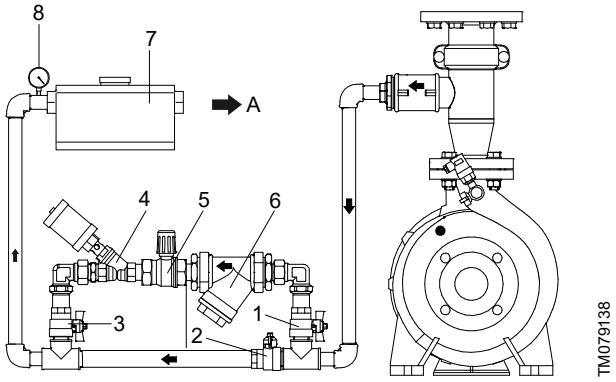
The outlet of the heat exchanger must be connected to the drain pipe with a flexible joint to avoid any mechanical stress.

The heat exchanger circuit is connected to the pump outlet upstream of the check valve with a properly sized pipe.

During pump operation, a portion of the flow circulates through the heat exchanger to cool the diesel engine.

This flow does not support the firefighting system and must be accounted for in hydraulic calculations and system selection.

For the required minimum flow through the heat exchanger, refer to the system performance curves.



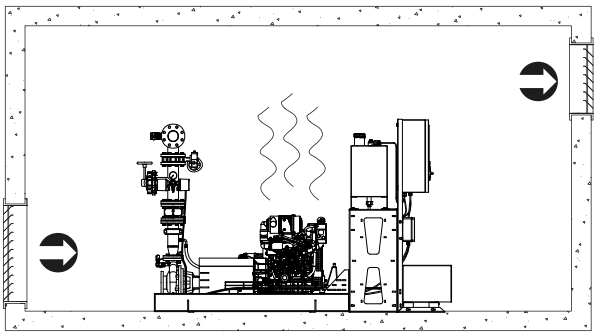
Heat exchanger

Pos.	Description
A	Outlet of the cooling flow
1	Isolating valve: normally open
2	Bypass isolating valve: normally closed [1]
3	Isolating valve: normally open
4	Valve with hydraulic control: normally closed (opens when the motor starts)
5	Flow regulator: to adjust the inlet flow to the exchanger
6	Filter
7	Heat exchanger with expansion tank
8	Pressure gauge with the optimal operational area indicated

1) The bypass line must only be used for service purposes.

While the cooling system dissipates most heat, the running engine still releases residual thermal energy into the surrounding environment. Therefore, it is necessary to ensure that the ventilation openings are sized to maintain the desired temperature in the room.

The following figure shows a possible solution.



Example of room ventilation

4.4 Diesel tank with containment basin and vent connection

CAUTION
Toxic material
Minor or moderate personal injury

- The fuel vent pipe must be installed properly, all the parts must be firmly supported, and all the connections perfectly sealed to avoid concentration of fuel vapors in the technical room.
- Regularly check the vent pipe for damage or leaks.

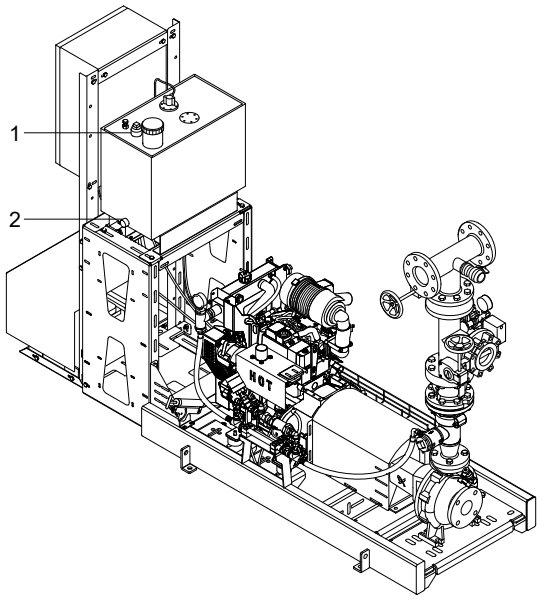
CAUTION
Harm to persons
Minor or moderate personal injury

- During refueling, use adequate tools.
- Apply appropriate lifting techniques, and avoid lifting excessive loads or bending at the waist.
- Use only approved fuel as specified in the engine manual. Using unsuitable fuel may cause fire hazards and severe damage to the system and the firefighting network.
- Smoking and live flames are prohibited when refueling.

The diesel pump includes a fuel tank equipped with a containment basin sized to match the capacity of the tank itself.

The basin prevents diesel from leaking if the tank breaks or leaks.

As shown in the figure below, the basin includes a sight glass for visual inspection of the fluid level. The diesel tank is also fitted with a vent pipe connection.



Fuel tank

Pos.	Description
1	Connection for vent pipe
2	Sight glass

4.5 Exhaust gas outlet of the diesel pumps

WARNING
Toxic material
Death or serious personal injury

- The exhaust pipe and the muffler must be installed properly so that all the parts are firmly supported to avoid imposing load on the engine.
- All connections must be perfectly sealed to avoid gas leak inside the technical room.
- Regularly check the exhaust pipe for damage or leaks.
- Position the exhaust outlet away from walkways and occupied areas, in compliance with applicable regulations.
- The installation of the exhaust pipe must be designed by a client-appointed authorized designer in compliance with local regulations.
- Incorrect sizing of the exhaust pipe can cause the system to fail.

CAUTION
Hot surface
Death or serious personal injury

- The exhaust pipe and the muffler must be insulated and protected by materials suitable for high temperatures to prevent contact with hot surfaces and limit heat release into the technical room.
- Regularly check the insulation layer for wear or damage.
- Surfaces may remain hot after the system is shut off. Do not touch the hot surface before it cools down. If it is not possible to wait, wear protective gloves.

Regarding the exhaust duct, the following conditions must be observed:

- It must discharge gases outdoors directly or via piping, in accordance with local regulations.
- It must be protected against weather exposure.
- It must be positioned to avoid disturbing persons or damaging equipment.
- It must be constructed from sealed, durable steel.
- It must be securely installed, with all components, including the muffler, properly supported to avoid imposing load on the engine.

If the muffler is directly mounted on the engine, use a flexible joint to connect the exhaust outlet pipe to avoid any mechanical stress on the engine.

Due to thermal expansion of the exhaust gas ducts, we recommend using compensation joints suitable for the application.

A suitable condensation collection and a drain point must also be provided.

4.6 Exhaust back pressure

Incorrect exhaust pipe sizing may impair system performance.

The exhaust gases must be discharged from the technical room avoiding long ducts. Long ducts create a high back pressure that decreases the efficiency of the engine.

After ensuring optimal exhaust gas discharge, measure the exhaust back pressure under the following conditions:

- with the exhaust gas system in its final configuration
- after engine warm-up
- at full load
- at the nominal speed of the engine defined for the specific model.

The resulting value cannot be greater than the maximum value recommended by the manufacturer of the engine.

5. Mechanical installation

WARNING
Crushing of hands
Death or serious personal injury

- All pipes must be supported.
- Pipe and component supports must ensure long-term stability and be capable of withstanding static loads, dynamic forces, and system vibrations during operation.
- Installations in seismically active areas must be thoroughly assessed.
- Unstable supports may cause severe damage to the system or the entire firefighting network.
- The system supports must be designed and installed by client-appointed specialists in compliance with relevant standards and local regulations.

Do not step on the components of the system.

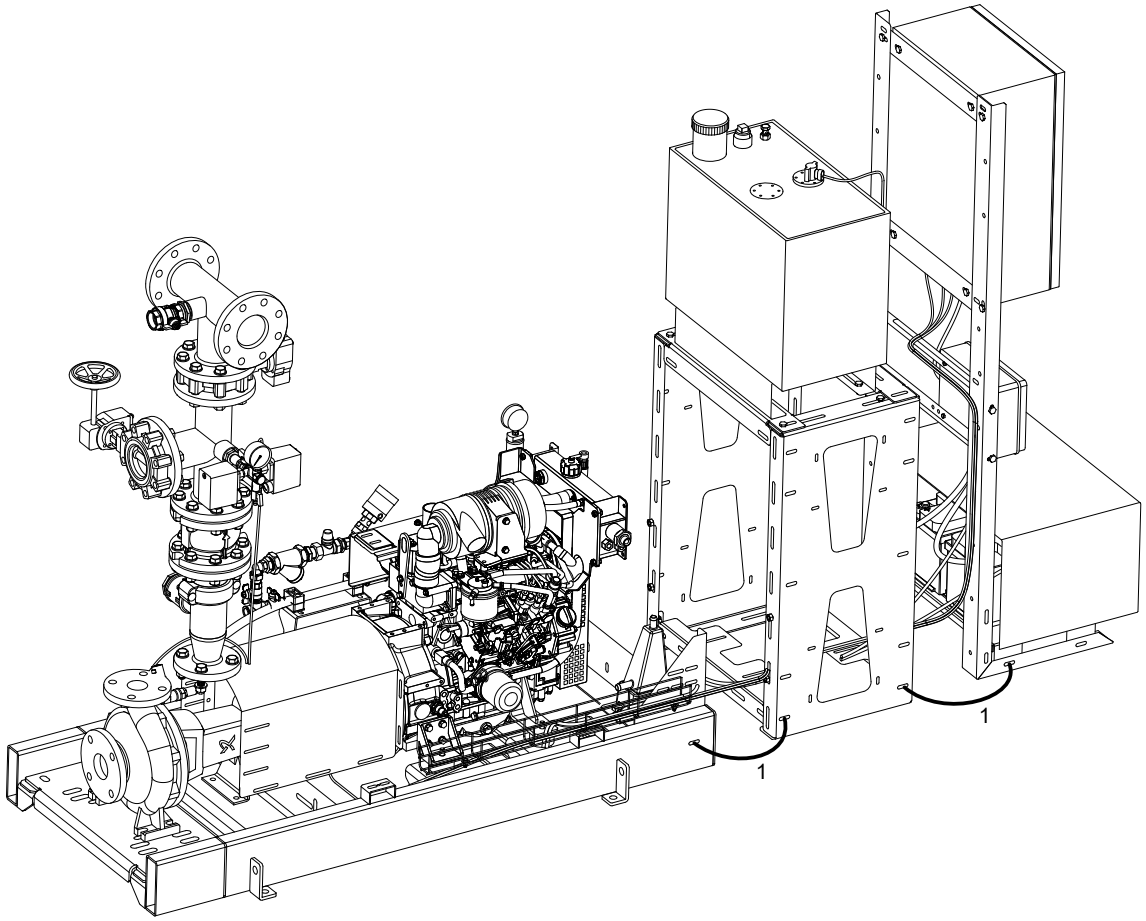
Do not place other parts or equipment on the system components.

The system is supplied in pre-assembled blocks that must be assembled before performing any operation.

The system must be placed on a flat and smooth surface, for example, on solid floor or concrete foundation.

The control panel of the diesel pump must be mounted separately from the motor frame and secured to the ground to prevent vibration transfer to the electrical components.

Ensure a strong electrical earth connection between the engine frame and the control panel stand using a large cross-section cable (equal to or larger than the supplied cable) or a metal braid.



Earth connection

Pos.	Description
1	Cable for earth connection

If necessary, the fuel tank can be removed from the motor frame. In this case, make sure that the tank is positioned on the same foundation as the engine, or at least at the same height, to ensure that the fuel feeds the injection pump by gravity.

The pipes connected to the system must be properly sized, and the inlet pipes must comply with EN 12845 regarding the water speed in the pipes (1.8 m/s for positive head installation and 1.5 m/s for suction-lift installation).

Carefully select components and design the inlet pipe path to ensure that the available NPSH at the pump inlet is at least 1 m higher than the required NPSH at maximum flow rate.

Always prevent the inlet pipe from having a reverse gradient that results in a drain-trap effect that can lead to noisy operation, swirling of liquid around the suspended pump, premature bearing failure and cavitation damage to the impeller and inlet casing.

Pipe supports must be installed on both the inlet and outlet sides of the system, as required by EN 12845, to prevent pipe weight from bearing on the pumps.

5.1 Foundation and anchorage

WARNING
Crushing hazard
Death or serious personal injury

- The anchoring system must ensure the stability and alignment of the system over time, and must withstand static loads, dynamic forces, and system vibrations during operation.
- Installations in seismically active areas must be thoroughly assessed.
- Unstable anchorage may cause severe damage to the system or the entire firefighting network.
- The anchoring system must be designed and installed by client-appointed specialists in compliance with relevant standards and local regulations.

If a seismic analysis is required, consult the governing bodies for grouting and foundation requirements.

We recommend that you contact a civil engineering designer or equivalent to check and approve the support structure and anchoring system.

The system must be placed on a flat surface such as a solid floor or a concrete foundation.

As a rule of thumb, the weight of the concrete foundation should be at least 1.5 times the weight of the system.

The width and length of the foundation must be larger than the size of the system it accommodates.

The fastening must ensure tightness over time and must withstand the system vibration during operation.

5.2 Connecting the priming circuit

In compliance with EN 12845, pumps must include priming connections for suction-lift installations.

Connect the priming circuit using the 2-inch connection on the system.

Hydraulic components are not included in the scope of delivery.

5.3 Connecting the recirculation circuits

In compliance with EN 12845, pumps include connections for recirculation circuit.

The pressure-relief valve is installed on the duty pump, except on the diesel pumps equipped with water/water heat exchanger (refer to the schematic diagram). To adjust the valve setting, follow the steps below:

1. Make sure that the pressure-relief valve outlet is properly connected.
2. Start the pump in manual mode using the control panel.
3. Close the pump outlet valve and adjust the pressure-relief valve setpoint until water discharges from the outlet.

In the case of diesel pumps with water/water heat exchanger cooling system, the circulation is performed through the cooling system.

See the section on diesel pumps with water/water heat exchanger and refer to the functional diagram.

Related information

4.3 Diesel pumps with water/water heat exchanger
7. Functional diagram

6. Electrical installation

WARNING
Electric shock
Death or serious personal injury

- The electric system must be designed and installed by a client-appointed authorized electrician in compliance with local regulations.
- Before installing any connections, check the compatibility of the system supply voltage.

CAUTION
Harm to persons
Minor or moderate personal injury

- Before connecting to batteries, make sure that the cables are connected according to the electrical diagram.
- Before charging the batteries, make sure that the charger is compatible with the voltage and capacity of the batteries.
- This operation must be carried out by authorized persons.
- Make sure that neutralizing powder for battery acid is always available in the technical room.
- Do not weld near batteries and ensure a proper ground connection to prevent current leakage that could damage them.
- Do not place tools on or near the batteries. This could result in a short circuit.

Make sure that all connections, including electrical ones, comply with applicable safety and fire prevention regulations.

Make sure that the control panel and the pumps are suitable for the mains voltage.

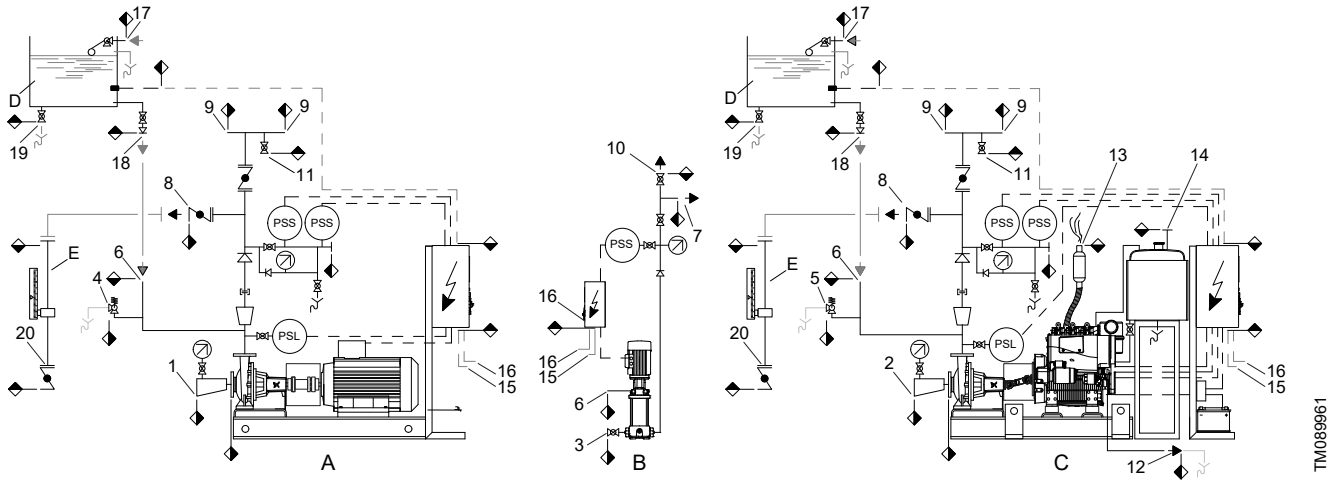
Make sure that the control panel is mechanically disconnected from the frame of the diesel engine and is fixed to the ground.

Ensure a strong connection between the engine frame and the control panel stand using a large cross-section cable (equal to or larger than the supplied cable) or a metal braid.

Use connection cables with sufficient cross-section for the current requirements of the pump, in compliance with EN 12845 and local regulations.

Refer to the supplied wiring diagrams for the electrical connections of the control panel.

7. Functional diagram



Functional diagram

Pos.	Connection/description
1	Independent inlet connection for the electric pump
2	Independent inlet connection for the diesel pump
3	Inlet connection for the jockey pump
4	Recirculation circuit connection for the electric pump
5	Recirculation circuit connection for the diesel pump
6	Priming circuit connection for the electric, diesel and jockey pump
7	Pressure tank connection
8	Test circuit connection
9	System outlet connection for the electric and diesel pump
10	Outlet connection for the jockey pump
11	Connection with the jockey pump outlet connection
12	Recirculatory/cooling circuit outlet with water/ water heat exchanger, if present
13	Diesel engine exhaust-gas outlet
14	Diesel tank vent
15	Electric power wiring connection
16	Electric signal wiring connection
17	Float valve connection of the priming tank
18	Outlet connection of the priming tank
19	Drain connection of the priming tank
20	Test circuit outlet
A	Electric pump set
B	Jockey pump set
C	Diesel pump set
D	Priming tank
E	Kit test

Symbol	Description
	Non-return valve
	Ball valve
	Butterfly valve

Symbol	Description
	Concentric divergent
	Eccentric divergent
	Grooved coupling
	Flowmeter
PSS	Pressure switch
	Pressure gauge
PSL	Pressure switch - pump running
	Pressure-relief valve
	Control panel
	Drain connection
	Float valve
	Water level sensor
	Power and signal connections
	Main and auxiliary flow pipes
	Scope of supply limit

8. Commissioning the system

CAUTION
Pressurised system
Minor or moderate personal injury

- Before filling and pressurizing the pipes, make sure that all the hydraulic connections are correctly tightened and there are no open circuit parts.
- Water is under pressure inside the pipes. Be careful and keep a safe distance from the pipes.

Before commissioning, recharge the batteries for at least 12 hours with an external battery charger.

Prime the pumps by filling the inlet pipes and the pumps with liquid, making sure that no air pockets are left in the system.

- Check the pump coupling alignment after securing all the hydraulic connections.
- Make sure that all the gate valves for the heat exchanger circuit are fitted in the operational configuration.
- Make sure that all connections, including electrical ones, comply with applicable safety and fire prevention regulations.
- Check the tightness and sealing of all hydraulic connections.
- Make sure that the positioning and tightening of the exhaust gas duct for the diesel pump is correct.
- Ensure adequate room ventilation to maintain proper machine cooling and prevent exceeding the limits of the operating conditions.

9. Startup

WARNING
Automatic startup
Death or serious personal injury

- The system can start up automatically at any time. The system must be installed in an access-controlled area.
- As the noise level of the system during operation is high, ear protection must be worn or readily available to all authorized persons entering the technical room.
- Observe health and safety regulations and limit the exposure of persons to excessive noise.

The system can start up automatically but can only be stopped manually under automatic operating mode by a dedicated key removable from the control panel. Due to regulation of fire safety and protection of the system, it is required not to have any emergency stop.

WARNING
Harm to persons
Death or serious personal injury

- Clearly indicate where the key is stored in the technical room.
- Each time when people enter the technical room, or before any inspection, maintenance, service or repair of the system, make sure that the key is available.

WARNING
Pressurised system
Death or serious personal injury

- Keep a safe distance from the system when you are in the technical room.
- Regularly check the proper tightening of hydraulic connections and the integrity of all the components.

CAUTION
Hot surface
Minor or moderate personal injury

- Surfaces may remain hot after the system is shut off. Do not touch the hot surface before it cools down. If it is not possible to wait, wear protective gloves.

For operations and checks, refer to the dedicated section.

9.1 Alignment of the pumps

DANGER
Automatic startup
Death or serious personal injury

- The system can start up automatically at any time. If the system is not out of order, it is mandatory to keep a safe distance from any of its parts.
- Before any inspection, maintenance, service or repair of the system, make sure that the main switch is in the OFF position, locked and tagged. Attach suitable isolation warning signs to prevent inadvertent reconnection.

- In case of diesel pumps, isolate the fuel supply to the engine and disconnect the batteries by removing the negative terminal connector, before working on any part of the fuel supply or control system.
- Make sure that you wear suitable clothing on site. Do not let long hair down, wear loose or frayed clothing or jewelry to prevent being trapped into the equipment.
- Do not place fingers, hands, arms or tools into any openings.
- Under no circumstances should the system be operated without the coupling guard in place and suitably secured.

Alignment of the duty electric pumps

WARNING
Crushing hazard
Death or serious personal injury

- Regularly check the alignment of the spacer coupling based on the operating hours.

The coupling between the pump and electric motor is operated via spacer coupling. The alignment of this coupling is essential for the proper functioning of the system and must be carried out by trained persons.

Although motors and pumps are precisely aligned at the factory, additional alignment is required after installation and pipe connection due to movement and stress during transport and assembly.

It is also important to check the alignment after the first startup when the machine reaches working temperature.

Follow the detailed procedure in the relevant installation and operating instructions of the pump.

Alignment of the duty diesel pumps

WARNING
Crushing hazard
Death or serious personal injury

- Regularly confirm that all screws are in place and correctly tightened.

The coupling between the pump and diesel engine is operated via cardan shaft. This kind of coupling do not require specific alignment.

9.2 Priming the pumps

Before starting the priming operations, read the installation and operating instructions.

CAUTION
Electric shock
Death or serious personal injury
- Make sure that all electrical covers and protections are secured.

CAUTION
Pressurised system
Minor or moderate personal injury
- Observe the direction of the vent hole and make sure that no person can be hurt by the escaping liquid.

In case of suction-lift installations, an automatic priming device can be requested and installed for each duty pump.

During commissioning or in case of service, ensure correct priming of the pump. Refer to the documentation for the pumps supplied with the system.

The following procedure must be completed for each pump in the system:

1. Make sure that all the other pumps in the system are switched off.
2. Close all isolating valves on the outlet side of the pump and test circuit (if present).
3. Initiate the priming of the pump by opening the inlet isolating valve.
4. Remove the priming cap and slowly pour water into the pump until it is completely filled.
5. Put the cap back on and carefully close it.
6. Set the operating mode selector to manual position and start the pump.
7. Vent the pump.

In some cases, the procedure may need to be repeated multiple times to fully purge the air from the pumps.

9.3 Adjustment of the diesel pump speed

Changing the speed of the diesel pump can compromise the proper functioning of the system and must only be performed by authorized persons.

A low rotation speed implies a lower water flow to the heat exchanger and a possible engine damage due to overheating.

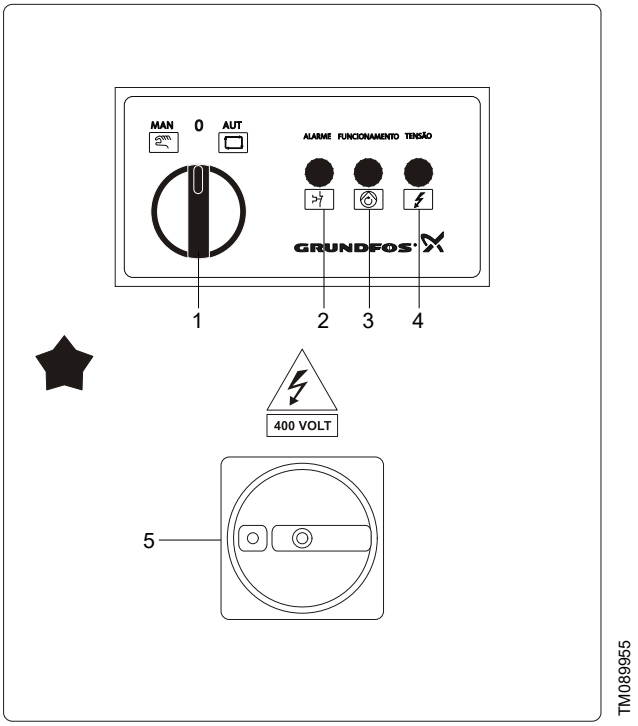
The rotation speed of the diesel pump is fixed at the factory during testing operations. It can be adjusted during initial startup to better suit the system requirements. Adjustment is limited by fasteners on the accelerator.

10. Control functions

10.1 Control panel for the jockey pump

The jockey pump is controlled by a dedicated control panel that allows easy setup and provides clear visibility of the various warning lights.

The control panel includes the following components and functions available on the front door.



Operating panel for the jockey pump

Pos.	Description
1	MAN-0-AUT operating mode selector
2	Thermal relay trip indicator light
3	Pump running indicator light
4	Mains indicator light
5	Main switch, lockable

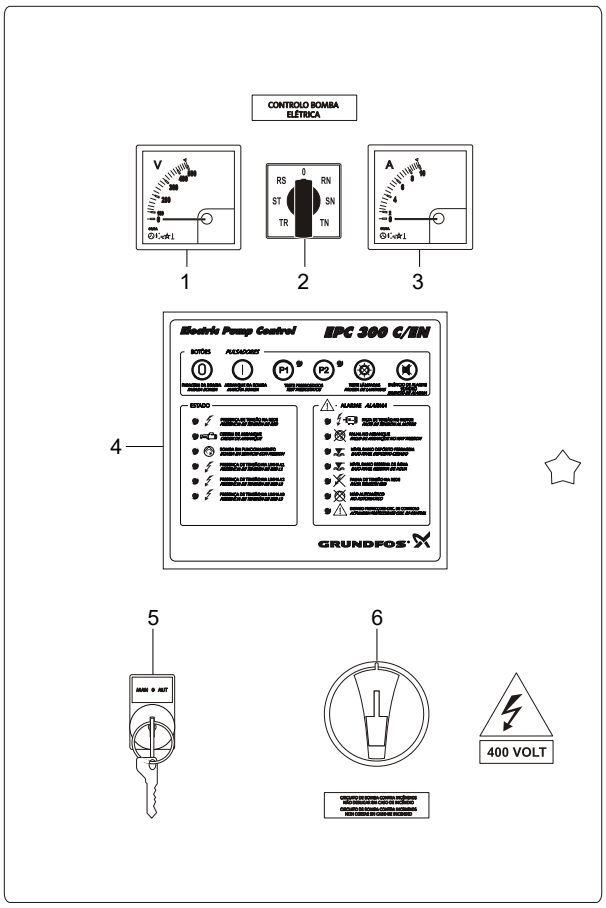
10.2 Control panel for the duty electric pump

The duty electric pump is controlled by a dedicated control panel that provides clear visibility of the measuring instruments and indicator lights.

The starting of the electric motor is available as standard in the following configurations:

- direct-on-line, DOL, for powers up to 4 kW included
- star/delta, SD, for powers from 5.5 kW included and higher.

The control panel includes the following components and functions available on the front door.



Operating panel for the duty electric pump

Pos.	Description
1	Voltmeter
2	Phase selector to check the voltage of each phase
3	Ammeter
4	EPC 300 C/EN control unit with pushbuttons and indicator lights
5	MAN-0-AUT operating mode selector with a removable key in **AUT**
6	Main switch, lockable

10.2.1 Pushbuttons

The following pushbuttons can be found on the operating panel:

Pump stop
When it is pressed, the pump stops.

Pump start
When it is pressed, the pump starts.

Test pressure switches
You can use them (P1 and P2) to test the pressure switches.

Test indicator light and audible alarm
When it is pressed, all the indicator lights are on and the alarm is activated.

Buzzer OFF
It turns off the alarm sound for 15 minutes after you reset the alarm.

10.2.2 Indicator lights

The control panel features indicator lights that provide a visual status of the duty electric pump. Their functions are detailed below.

Status

Mains voltage	Mains voltage active
Starting request	Pump start request active
Pump in operation	Pump started, generating pressure in the system
L1 voltage	L1 voltage active
L2 voltage	L2 voltage active
L3 voltage	L3 voltage active

When each signaling occurs, it activates an internal buzzer to generate an acoustic signal.

Alarms

No motor voltage	No active motor voltage
Failure to start	Pump start failure
Low water level for the priming tank	Low water level in the priming tank
Low water level for the water tank	Low water level in the water tank
No mains voltage	No active mains voltage
Non-automatic	Operating mode selector not in **AUT**
Action protection control circuit	Abnormal condition (overload or short circuit)

When an alarm is triggered, its corresponding indicator light turns on and an internal buzzer emits an acoustic signal.

10.2.3 Operating modes

Testing the pressure switches

Two pressure switches are provided for system startup, as required by EN 12845.

Each pressure switch must be tested regularly. To support this, the control panel includes a device for verifying their operation.

1. Set the operating mode selector to **MAN**.
2. Press the **P1** button.
3. Open the water valve to make the system pressure drop.
   The control panel starts the pump through pressure switch 1.
4. Close the water valve and wait for the system to reach the nominal pressure.
5. Switch off the pump via the **Pump stop** button.
6. Press the **P2** button and repeat the above procedure to test the pressure switch 2.

Testing the indicator lights and audible alarm

Press the indicator light button. All indicator lights turn on and the buzzer sounds, confirming proper operation.

Manual operating mode

1. Set the operating mode selector to **MAN**.
2. Start the pump via the **Pump start** button.
3. Perform the necessary tests.
4. Stop the pump via the **Pump stop** button.

Automatic operating mode

Set the operating mode selector to **AUT**.

If the pressure drops below the set threshold, the pressure switches provide the input for starting the pump. You can stop the pump by setting the operating mode selector to **MAN** and pressing the **Pump stop** button.

Delayed start function

The control panel for the duty electric pump is equipped with a delayed start function.

The function allows setting a time delay between the start request and the actual start of the pump by an adjustable timer. The timer is integrated in the pump starting circuit and acts as a mandatory component for pump start-up.

To ensure that a timer malfunction does not prevent the pump set from starting, two independent timers are installed in the control panel, one for each starting pressure switch.

When a start request occurs, generated by the opening of one or both pressure switch contacts, the corresponding timer(s) are activated. After the preset delay time elapses, the pump starts.

When the timer is set to the minimum value (1 s), the pump starts with no intentional delay.

The control panel is factory set with the timers adjusted to the minimum value.

It is essential that both timers within the same control panel are set to the same delay time. If different settings are applied, the timer with the shorter delay takes priority.

For timer adjustment, refer to the installation and operating instructions of the specific timer component supplied as part of the system documentation.

10.2.4 Output signals

The control panel has the following relay outputs (potential-free contacts) available for monitoring the system from a technical room.

Output	Description
Low voltage	The contact closure indicates the mains power loss.
Non-automatic	The contact closure indicates that the system is not in the automatic operating mode. The operating mode selector is in **0** or **MAN**.
Starting request	The contact closure indicates the request to start the pump.
Pump in operation	The contact closure indicates that the pump has started and generates pressure in the system.
Failure to start	The contact closure indicates that the pump has failed to start.

Contact characteristics:

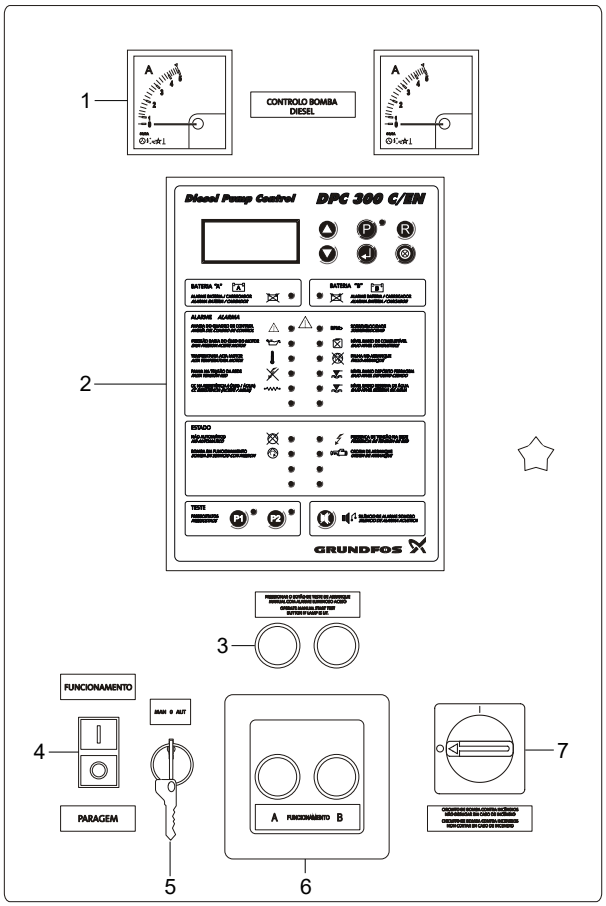
- Contact type: AC1
- Maximum voltage: 115 V
- Maximum current: 2 A.

10.3 Control panel for the duty diesel pump

The duty diesel pump is controlled by a dedicated control panel that provides clear visibility of the measuring instruments and indicator lights.

The control panel houses two independent battery chargers. It integrates the DPC 300 C/EN control unit that manages operating modes, monitors system parameters, and coordinates all essential electromechanical components.

A backlit LCD multifunction display ensures readability in low-light conditions, while indicator lights continuously display system status. The front door of the control panel includes all key components and functions for user interaction.



Operating panel for the duty diesel pump

Pos.	Description
1	Battery ammeter A and B
2	DPC 300 C/EN control unit with an LCD multifunction display, pushbuttons and indicator lights
3	Pushbuttons for verifying the emergency start circuit
4	**Pump start** and **Pump stop** buttons in the manual operating mode
5	MAN-0-AUT operating mode selector with a removable key in **AUT**
6	Engine start button with battery A and B, protected by breakable glass
7	Main switch, lockable

10.3.1 General description

The control panel is powered by single-phase mains voltage and both batteries. It remains off when the main switch is set to **0**. The duty diesel pump can be started in either manual (**MAN**) or automatic (**AUT**) mode. Upon a start request, the control panel initiates up to six start attempts, three per battery, alternating between them.

Engine shutdown is manual: set the mode selector to **0** or **MAN**, then press the **Pump stop** button. If the automatic stop option is installed, the pump can also shut down via an internal timer.

To start the engine manually, press the **Pump start** button. Each press alternates the battery used until the engine starts. The two electronic chargers maintain full battery charge without risk of damage. Charging current for each battery is shown on two ammeters located on the front door.

10.3.2 Parameters on the LCD multifunction display

The DPC 300 C/EN control unit features an LCD multifunction display that can continuously shows system status, fuel level, engine temperature, oil pressure, operating hours, and battery voltage.

During startup, it displays the active battery and the number of start attempts.

All alarm types are clearly indicated and the interface supports multiple languages: Italian, French, English, German, Spanish and Portuguese.

Engine off

When the engine is off, the following parameters are displayed:

- engine status
- position of the operating mode selector
- engine temperature
- oil pressure
- operating hours
- fuel level in percent
- battery A voltage
- battery B voltage.

Engine on

When the engine is running, the following parameters are displayed:

- number of engine RPM
- position of the operating mode selector
- engine temperature
- oil pressure
- operating hours
- fuel level in percent
- battery A voltage
- battery B voltage.

10.3.3 Pushbuttons

The pushbuttons of the operating panel are described in the table below.

Buttons	Description
	UP and DOWN In programming mode, the buttons are used to scroll through various parameters. Outside programming mode, they adjust the contrast of the LCD multifunction display.
	P Press to access or exit the programming mode.
	ENTER Press to access the selected parameter and confirm the value.
	R Press to remove the stored alarms from the display and reset the operating hour counter.
	Test indicator light and audible alarm Pressing this button turns on the indicator lights and activates the alarm.
	Test pressure switches You can use these buttons (P1 and P2) to test the pressure switches.
	Buzzer OFF It turns off the alarm sound for 15 minutes after you reset the alarm.

10.3.4 Indicator lights

In addition to the LCD multifunction display, the control panel includes a set of indicator lights that provide a quick visual overview of the duty diesel pump. These indicator lights are described in the table below:

Batteries (A and B)

Battery A or charger alarm	• battery A alarm • flashing, charger alarm
Battery B or charger alarm	• battery B alarm • flashing, charger alarm

Alarms

Control unit failure	It indicates a fault for the DCP 300 C/EN control unit.
Low engine oil pressure	It indicates that the oil pressure is low while the engine is running.
High engine temperature	It indicates high engine temperature.
Power supply failure	It indicates that there is no power supply.
Control circuit oil or water resistor	It indicates that the protection for the heating element is tripped.
Overspeed	It indicates that engine exceeds the maximum speed.
Low fuel level	It indicates a shortage of diesel in the tank.
Failure to start	It indicates that the engine failed to start after six attempts.
Low water level for the priming tank	It indicates low water level in the priming tank (level indicator not included).
Low water level for the water tank	It indicates low water level in the water tank (level indicator not included).

When an alarm is triggered, its corresponding indicator light turns on and an internal buzzer emits an acoustic signal.

Status

Non-automatic	It indicates that the operating mode selector is not in **AUT**.
Pump in operation	It indicates that the pump has started and generates pressure in the system.
Mains voltage	It indicates mains voltage.
Starting request	It indicates the request to start the pump.

When an alarm is triggered, its corresponding indicator light turns on and an internal buzzer emits an acoustic signal.

10.3.5 Alarms

In compliance with EN 12845, the duty diesel pump cannot be stopped by any alarm. The duty diesel pump can only be stopped manually unless the optional automatic stop function is installed, in which case it stops automatically via an internal timer.

The DPC 300 C/EN control unit displays the alarms as described below while a buzzer (85 db) is triggered by any of the alarms.

There are two alarm types:

- memorized alarms

  These alarms remain visible on the display even after the condition clears. Once the underlying cause is resolved, the alarm can be reset by pressing the **R** button.
- non-memorized alarms

  These alarms are only visible on the display while they are active. Once the cause is resolved, they are automatically reset.

Memorized alarms

Alarm	Description
Battery A alarm	Battery 1 voltage is below 9.6 V or over 16.2 V.
Battery B alarm	Battery 2 voltage is below 9.6 V or over 16.2 V.
Low engine oil pressure	Low engine oil pressure: The control panel starts monitoring the oil pressure 60 seconds after engine startup.
High engine temperature	High engine coolant temperature: The control panel starts monitoring the engine temperature 10 seconds after engine startup.
Failure to start	The engine fails to start after six attempts.
Overspeed	The engine exceeds the maximum speed.
Pick-up	No signal is detected from the speed sensor while the engine is running and the display shows **STOP**. If pressing the **R** button does not reset the alarm, press the **STOP** button.

Non-memorized alarms

Alarm	Description
Battery charger A failure	Charger A is faulty.
Battery charger B failure	Charger B is faulty.
Fuel level warning	The fuel level falls below 60 % of the tank volume.
Mains failure	There is no mains voltage.

10.3.6 Operating modes

Testing the indicator lights and audible alarm

Press the indicator light button. All indicator lights turn on and the buzzer sounds, confirming proper operation.

Testing the pressure switches

Two pressure switches are provided for system startup, as required by EN 12845.

Each pressure switch must be tested regularly. To support this, the control panel includes a device for verifying their operation.

1. Set the operating mode selector to **MAN**.
2. Press the **P1** button.
3. Open the water valve to make the system pressure drop.

   The control panel starts the pump through pressure switch 1.
4. Close the water valve and wait for the system to reach the nominal pressure.
5. Switch off the pump via the **Pump stop** button.
6. Press the **P2** button and repeat the above procedure to test the pressure switch 2.

Testing the emergency starting circuit

The control panel includes two emergency start buttons under glass. Their operation must be tested periodically without breaking the glass.

These button lights turn on only in the following cases:

- after an automatic engine start followed by a stop
- after six failed start attempts.

Test procedure:

1. When the button light is on, press the **Start** button to start the engine.
2. After a few minutes, press the **Stop** button to stop the engine.

   The light of the used button turns off.
3. Repeat the test on the second button.

The test is completed when both lights are off.

Manual operating mode

1. Set the operating mode selector to **MAN**.
2. Start the pump via the **Pump start** button.
3. Perform the necessary tests.
4. Stop the pump via the **Pump stop** button.

After pressing the **Pump stop** button, the display shows **STOP** until the engine shuts down.

Automatic operating mode

1. Set the operating mode selector to **AUT**.
2. If the pressure drops, the engine starts.
3. Investigate the cause of the pressure drop, unless it was triggered for testing.
4. Stop the pump by setting the operating mode selector to **MAN** and pressing the **Pump stop** button.

After pressing the **Pump stop** button, the display shows **STOP** until the engine shuts down.

If the optional automatic stop function is installed, the pump can also stop automatically via an internal timer.

Emergency operating mode

In case of an emergency or when the duty diesel pump does not start, you can start the engine directly from the batteries regardless of control panel settings or pressure switch command.

Each battery has a dedicated button for activation, housed under a transparent protective cover.

Resetting the alarms

Alarms are reset by pressing the **R** button and setting the operating mode selector to **AUT**.

Only the engine start failure resets when the selector is set to **0**.

The alarms of low oil pressure and high engine temperature reset only after engine shutdown.

Adjusting the contrast of the LCD multifunction display

To optimize the reading of the LCD multifunction display, use the **UP** and **DOWN** buttons to increase and decrease the display contrast.

10.3.7 Operating parameters

When the control panel is connected to the mains, the control panel automatically sets the ON time to 16 seconds and the OFF time to 11 seconds for a commissioning test, in compliance with EN 12845. This setting remains active for 12 hours, after which user-defined timings apply.

The following parameters can be customized on the DCP 300 C/EN control unit.

Freely accessible parameters

Parameter	Description
Language	Italian, French, English, German, Portuguese and Spanish
Stop time	Holding time of the stop command activated by pressing the **Pump stop** button (adjustable between 5 and 25 seconds)
ON starting time	Closing time of the start relay (adjustable between 5 and 10 seconds)
OFF starting time	Time interval between start attempts (adjustable between 5 and 10 seconds)
Number of starts	Number of start attempts (value = 6, non-editable)
Automatic stop time	Pump running time after the restoration of the delivery pressure This parameter is available only if the automatic stop function is enabled.
Engine calibration ON	Enables the engine calibration function
Speed calibration	Maximum rated speed of the engine (adjustable between 1000 and 4000)
Maximum speed	Overspeed warning threshold, auto-calculated parameter set at 10 % above the max. speed (modification only by authorized persons)
Password	Code to access the protected parameters

Password-protected parameters

Parameter	Description
Battery voltage	For selecting the battery voltage (12 or 24 V)
External inputs	Not available
Serial port	Not available
Tachometer sensor	For selecting the type of the speed sensor (pick-up)
Constant RPM	For calculating the parameter automatically during calibration
Engine ON threshold	Value of engine RPM ON, automatic calculation during the calibration
Temperature sensor	Analog or digital value for temperature
Oil pressure sensor	Analog or digital value for oil pressure
Fuel level sensor	Analog or digital value for fuel level
Automatic stop	For setting automatic stop feature
Reset counter	For resetting the operating hour counter
Change password	For changing the password to access the protected parameters The password is disabled when you set the value to 0.

The password-protected parameters are only available to authorized persons.

You can select and customize various parameters as described below:

1. Set the operating mode selector to **0**.
2. Press the **P** button, and the green indicator light next to the button turns on.
3. Browse the menu via the **UP** and **DOWN** buttons to select the desired parameter.
4. Press **ENTER**, and the indicator light flashes green.
5. Select the desired value of the parameter with the **UP** and **DOWN** buttons.
6. Press **ENTER** to confirm the value.
7. Press the **P** button to exit programming.
8. At the end of programming, switch off the control panel with the main switch.
9. Switch on the control panel with the main switch, and the customized configuration is set.

10.3.8 Output signals

The control panel has the following relay outputs (potential-free contacts) available in the terminal board for monitoring the system from a technical room. For connections, see the wiring diagram supplied with the control panel.

Output	Description
Pump in operation	The contact closure indicates that the pump has started and generates pressure in the system.
Failure to start	The contact closure indicates that the pump has failed to start.
Starting request	The contact closure indicates the request to start the pump.
Non-automatic	The contact closure indicates that the system is not in automatic mode. The operating mode selector is in **0** or **MAN**.
Control system failure	The contact closure indicates failure of the control system.
Alarm for system fault	The contact closure indicates activation of an alarm.

Contact characteristics:

- Contact type: AC1
- Maximum voltage: 115 V
- Maximum current: 2 A.

10.3.9 Setting the control panel

DANGER
Crushing hazard
Death or serious personal injury

- Under no circumstances should the system be operated without the belt guard in place and secured.
- To measure the exact speed of the engine, remove the protective cover near the mechanical seal and use an optical tachometer aimed at the shaft to read the rotation speed.
- Keep fingers, hands, tools, and so on away from the shaft seal opening.
- Restore the protective cover near the mechanical seal after completing the work.
- This operation must be carried out by authorized persons.

Modifying the calibration parameters of the control panel may impact system performance. The procedure described below must be performed by authorized persons.

The control panel of the duty diesel pump is factory-calibrated and tested, requiring no further calibration.

Recalibrating is only recommended for specific service-related needs.

Calibrating the engine speed

1. Select the value in parameter **CALIB. SPEED**.
2. Set the maximum engine speed.
   See the specific engine model.
3. Confirm by pressing **ENTER**.
4. Set the operating mode selector to **MAN**.
5. Start the engine at full speed and wait for the calibration to be completed.
   During calibration, the display shows **?CAL?**. Once complete, it displays the configured speed value.

The calibration process takes a few seconds.

Setting the Engine ON parameter

1. Set the operating mode selector to **MAN** and start the engine at minimum speed. Wait for speed stabilization.
2. Select the parameter **calibration engine ON**.
3. Confirm by entering **YES** and pressing **ENTER**.
   The display shows **?CAL?**, flashing until the calibration is complete.

The self-learning process takes a few seconds.

11. Service

11.1 Maintenance

DANGER
Electric shock
Death or serious personal injury

- Before any inspection, maintenance, service or repair on the system, make sure that the main switch is in the OFF position, locked and tagged. Attach suitable isolation warning signs to prevent accidental reconnection.
- There are more than one control panels. Make sure that you disconnect the correct one belonging to the system section requiring attention.
- The electrical installation must be carried out by a client-appointed authorized electrician in compliance with local regulations.

DANGER
Automatic startup
Death or serious personal injury

- The system can start up automatically at any time. If the system is not out of order, it is mandatory to keep a safe distance from any of its parts.
- Before any inspection, maintenance, service or repair on the system, make sure that the main switch is in the OFF position, locked and tagged. Attach suitable isolation warning signs to prevent inadvertent reconnection.
- In case of diesel pumps, isolate the fuel supply to the engine and disconnect the batteries by removing the negative terminal connector before working on any part of the fuel supply or control system.
- Make sure that you wear suitable clothing on site. Do not let long hair down, wear loose or frayed clothing or jewelry to prevent being trapped into the equipment.
- Keep fingers, hands, arms or tools away from openings.
- Under no circumstances should the system be operated without the coupling guard in place and secured.

DANGER
Trapping hazard
Death or serious personal injury

- The system can start up automatically at any time. Keep a safe distance from the system when you are in the technical room.
- Do not inspect, maintain, service, or repair the system while the motor or engine is running. If unavoidable, make sure that all guards against rotating or hot components are securely in place.
- Make sure that you wear suitable clothing on site. Do not let long hair down, wear loose or frayed clothing or jewelry to prevent being trapped into the equipment.
- Keep fingers, hands, arms or tools away from openings.

WARNING
Automatic startup
Death or serious personal injury

- The system can start up automatically at any time. The system must be installed in an access-controlled area.
- As the noise level of the system during operation is high, ear protection must be worn or readily available to all authorized persons entering the technical room.
- Observe health and safety regulations and limit the exposure of persons to excessive noise.

WARNING
Crushing hazard
Death or serious personal injury

- Any kind of maintenance on the system must be performed by authorized persons.
- Maintenance performed by unauthorized persons or incorrect use can cause severe damage to the system or the entire firefighting network.

WARNING
Harm to persons
Death or serious personal injury

- Do not remove the protections during engine operation. Keep a safe distance from any of its parts.

CAUTION
Harm to persons
Minor or moderate personal injury

- Do not change the oil or refuel the tank when the engine is hot.
- Let the engine cool down before you run any operations with oil or fuel.

CAUTION
Pressurised system
Minor or moderate personal injury
- Water is under pressure inside the pipes. Make sure to gradually decrease the pressure and empty the pipes before operation. This operation must be carried out by authorized persons.

11.2 Verification and checks

WARNING
Automatic startup
Death or serious personal injury
- The system can start up automatically at any time. Before any operation on the coupling, make sure that the main switch is in the OFF position, locked and tagged. Attach suitable isolation warning signs to prevent accidental reconnection.
- In case of diesel pumps, before working on any part of the fuel supply or control system, disconnect the batteries by removing the negative terminal connector.
- Regularly check the alignment of the spacer coupling based on operating hours.
- Regularly confirm that all screws are in place and correctly tightened.
- Before closing the coupling guard after the alignment (if required), make sure that all screws are correctly tightened.
- Under no circumstances should the system be operated without the coupling guard in place and secured.
- This operation must be carried out by authorized persons.

As required by EN 12845, system performance must be periodically verified by the installer or authorized persons. All activities must be recorded in a dedicated logbook kept on-site.

11.2.1 Duty electric pump

WARNING
Crushing hazard
Death or serious personal injury
- Regularly check the alignment of the spacer coupling based on operating hours.

For electric pumps, inspection and replacement of wear parts must follow established good workmanship practices.

For more information about the maintenance of electric pumps, refer to the specific documentation provided with the system.

11.2.2 Duty diesel pump

WARNING
Crushing hazard
Death or serious personal injury
- Regularly confirm that all screws are in place and correctly tightened.

The diesel engine is coupled to the pump through a cardan shaft. This kind of coupling does not require alignment.

For more information about the maintenance of diesel engines, refer to the specific documentation provided with the system.

Diesel engines, like all internal combustion engines, require scheduled maintenance based on operating hours or time since commissioning, such as periodic checks of engine oil and coolant levels.

11.2.2.1 Oil check and replacement

CAUTION
Harm to persons
Minor or moderate personal injury
- During oil replacement, use adequate tools to avoid lifting excessive loads.

Regularly check the oil level and refill if necessary.

For more information about the maintenance of diesel engines, refer to the specific documentation provided with the system.

11.2.2.2 Cooling circuit of the diesel engine

WARNING
Hot surface
Death or serious personal injury
- The cooling circuits may remain hot and pressurized after engine shutdown. Open the coolant tank cap only when the engine is cold and if strictly necessary.

Regularly check the cooling circuit based on engine operating hours, time since commissioning, and the water quality used in the secondary heat exchanger circuit, that is, the water from the system.

11.2.2.3 Checking the coolant level

WARNING
Toxic material
Death or serious personal injury
- Do not ingest oil, fuel or coolant. In case of ingestion, consult the safety data sheet for the specific substance.

1. Make sure that the engine is turned off.
2. Open the cap of the heat exchanger.
3. Check the coolant level inside the water/water heat exchanger.
4. Refill the coolant, if necessary.
   Use a mixture of demineralized water and antioxidant or inhibited ethylene glycol-based antifreeze fluid suitable for the application.

11.2.2.4 Checking the water flow in the heat exchanger

1. During diesel pump operation, make sure that the pressure remains within the range indicated on the upstream pressure gauge of the heat exchanger.
2. Excessive pressure indicates that there is an obstruction in the heat exchanger or in the output of the circuit. Make sure that the obstruction is cleared.
3. Visually confirm proper water circulation in the heat exchanger during operation.
4. Make sure that the cooling system flow meets the minimum requirement specified in the technical documentation for the specific model.

11.2.2.5 Cleaning the circuit of the heat exchanger

Regularly clean the filter located upstream of the heat exchanger. Cleaning frequency depends on the water quality used for the system.

1. Make sure that the engine is turned off.
2. Close the shut-off valves upstream and downstream of the filter.
3. Open the bypass circuit. See the dedicated section about diesel pumps with water/water heat exchanger.
4. Remove the filter and clean it.
5. After cleaning is complete, open the gate valve.

Related information

4.3 Diesel pumps with water/water heat exchanger

11.2.3 Diaphragm tank

Regularly check and adjust the tank precharge to ensure proper system performance.

11.2.4 Flowmeter (optional)

The flowmeter requires no particular maintenance.

Impurities in the pressure holes can cause significant reading errors, so we recommend cleaning the measurement flange regularly and ensuring the pressure holes are clear.

If deposits form in the glass graduated tube of the flowmeter, clean the internal duct as instructed in the installation and operating manual.

11.2.5 Batteries (for diesel pump starting)

CAUTION
Explosion hazard
Minor or moderate personal injury
- Replace the batteries at least every two years.

The batteries are sealed and ready for use. They are charged by the electronic battery chargers housed in the control panel.

Regularly check the condition of the connections on the battery terminals. If there is corrosion, clean the battery terminals.

11.2.6 Checking the performance of the system

At periodic checks, the flow rate is measured by a flowmeter with direct reading.

The optional Grundfos kit includes a shut-off valve, a flowmeter and a control valve, all configured in compliance with EN 12854.

Make sure that the flowmeter is free of air pockets and impurities, as these significantly reduce measurement accuracy. If needed, use the bleeder screw on top of the instrument.

To check the performance of the system, perform the following steps:

1. Set the main switch of the jockey pump to **0**.
2. Close the gate valves on the outlet connection of the system.
3. Set the operating mode of the duty pumps to **TEST**.
4. Open the gate valve of the flow rate test circuit.
5. Partially open the gate valve located downstream of the flowmeter on the test circuit to allow the measurement of the flow rate.
6. Check the outlet pressure on the manometer.
7. Check the pressure on the vacuum pressure gauge.

The difference between the outlet pressure and the inlet pressure is the total head of the pump.

11.2.7 Bolt and connection checks

CAUTION
Crushing hazard
Minor or moderate personal injury
- Regularly check the tightness of the bolts that may loosen due to vibrations generated by the system operation.

12. Storage

The system must be stored in a frost-free room protected from direct exposure to the environment.

Standard factory packaging is suitable for protection during shipment and covered storage at the jobsite for a short period between installation and startup.

Keep all pump openings covered to prevent ingress of water, dust, dirt, or small animals until piping is connected.

See also the installation and operating instructions for the diesel engine.

13. Fault finding

DANGER
Electric shock
Death or serious personal injury

- Before any inspection, maintenance, service or repair of the system, make sure that the main switch is in the OFF position, locked and tagged. Attach suitable isolation warning signs to prevent accidental reconnection.

For failures relating to the diesel engine or pump, refer to the specific installation and operating instructions delivered with the system.

13.1 The electric pump does not start

Cause	Remedy
There is no mains supply.	• Connect the power supply.
The main switch is off.	• Turn on the main switch.
The fuse is defective.	• Replace the fuse.
The electrical circuit is interrupted or defective.	• Check and repair the electrical circuit.
The pump is blocked.	• The hydraulics are blocked. Disassemble and clean the pump. See the installation and operating instructions of the pump.
There is an electric motor failure.	• Repair or replace the electric motor. See the installation and operating instructions of the electric motor.

13.2 The diesel pump does not start

Cause	Remedy
There is no fuel.	• Fill the tank.
There is a battery failure.	• Check the battery and replace if necessary.
There is a diesel engine failure.	• Repair or replace the diesel engine. See the installation and operating instructions of the diesel engine.

13.3 The thermal relay trips

Cause	Remedy
There is excessive energy consumption due to faulty motor winding. It only applies to jockey pumps.	• Replace the motor. Contact Grundfos.
The pump is operating under mechanical strain.	• Disassemble and clean the pump.

13.4 The flow rate of the system is not as desired

Cause	Remedy
There are air pockets in the inlet pipe.	• Replace the inlet pipe or change its arrangement.
The inlet pressure is too low (cavitation).	• Restore the correct inlet condition.
The inlet pipe is too narrow.	• Check the correct sizing of the inlet pipe.
The pipe is clogged.	• Clean or replace the pipe.
The foot valve is blocked.	• Clean or replace the foot valve.
The direction of rotation is incorrect.	• Restore the correct direction of rotation.
The pump is clogged.	• Clean the pump. See the installation and operating instructions of the pump.
The flowmeter has been installed incorrectly.	• Check and correct the installation.
There are air pockets in the flowmeter.	• Bleed air from the flowmeter.
The measurement flange of the flowmeter is clogged.	• Clean the measurement flange.

13.5 Water hammer in the system

Cause	Remedy
Water hammer occurs when the outlet valves are closed.	• Install additional diaphragm tanks or a bigger diaphragm tank.
Water hammer occurs when the system is stopped.	• The foot valve closes late. Replace the foot valve.

13.6 Leaks from the mechanical seal

Cause	Remedy
The mechanical seal is damaged.	• See the installation and operating instructions of the pump.

14. Technical data

14.1 Operating conditions

Installation	Indoors, waterproof room protected against freezing
Installation level	Electric pumps: up to 1000 m above sea level Diesel pumps: up to 300 m above sea level
Performance	See the specific curve of the model. Performance according to ISO 9906.
Nominal pressure	Components and materials PN 16
Fluid pumped	Solid- and fibre-free clean water
Water temperature	0-40 °C
Ambient temperature	4-40 °C Minimum 10 °C for diesel pumps
Suction capacity	Depending on the specific performance of the selected model
Maximum inlet pressure	The maximum inlet pressure must be lower than the nominal pressure minus the shut-off pressure of the pump. For water-cooled diesel pumps, the max inlet pressure is 2 bar.
Electric power	Depending on the specific performance of the selected model
Starting method	Direct-on-line up to 4 kW Star-delta starting from 5.5 kW
Power supply	3 × 400 V, 50 Hz for electric pumps 1 × 230 V, 50 Hz, Imax = 4 A for diesel pumps

15. Disposing

15.1 Precautions for disposal

WARNING
Electric shock
Death or serious personal injury

- Before dismantling the system, make sure that the main switch is in the OFF position, locked and tagged. Attach suitable isolation warning signs to prevent inadvertent reconnection.
- Before loosening the bolts, make sure that the electrical connections are disconnected.
- Before loosening the bolts, drain the water from all components to be dismantled, and make sure that all electrical covers and protections are secured.

WARNING
Overhead load
Death or serious personal injury

- Make sure that the area below and around the lifted system is clear of people during operations.
- Do not allow anyone to stand on, under, or near the load.

WARNING
Crushing hazard
Death or serious personal injury

- Whenever possible, handle the system with a forklift.
- When using chains or belts, lift the system to the base by the designated lifting points.
- Never use the lifting eyes of the individual components to lift the system.
- Only use lifting equipment that is in good condition and is suitable to lift the weight and the shape of the system.
- Inspect the lifting points for damage before handling. They may be compromised after the lifecycle.
- Be aware of the center of gravity when removing components.
- Lock the door of the control panel before moving the system.
- Before loosening the bolts, make sure that the parts to be dismantled are properly supported by a lifting tool suitable for the purpose.

CAUTION
Slipping hazard
Minor or moderate personal injury

- Remove all liquid from the system before dismantling.
- Do not spill liquids like oil, fuel, or coolant on the floor to avoid slippery conditions.

15.2 Disposing of the system

This system or its components must be disposed of in an environmentally sound way:

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

16. Document quality feedback

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GB: EU declaration of conformity

For products with CE marking on the nameplate.

We, Grundfos, declare under our sole responsibility that products (1) declared below are in conformity with the relevant union harmonisation legislation (2), harmonised standards or other technical specifications (3).

This declaration of conformity refers to the Grundfos document: 93349467

ES: Declaración de conformidad UE

Para productos con marcado CE en la placa de identificación.

Grundfos declara, bajo su exclusiva responsabilidad, que los productos (1) que a continuación se detallan son conformes con la legislación (2), las normas u otras especificaciones técnicas (3) armonizadas de la Unión que correspondan.

La presente declaración de conformidad concierne al siguiente documento de Grundfos: 93349467

PT: Declaração de conformidade UE

Para produtos com marcação CE na chapa de características.

A Grundfos declara sob sua única responsabilidade que os produtos (1) declarados abaixo estão em conformidade com a legislação de harmonização (2), as normas de harmonização ou outras especificações técnicas (3) relevantes da União.

Esta declaração de conformidade refere-se ao documento Grundfos: 93349467

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Fire Hydro EN (1)

Union harmonisation legislation (2)
Harmonised standards or other technical specifications (3)

- **2006/42/EC** and **2009/127/EC** (Machinery Directives) are applicable until 19 January 2027
  (EU) 2023/1230 (Machinery Regulation) applies from 20 January 2027
  Pump - EN 809:1998 + A1:2009
  Panel - EN 60204–1: 2018-12
- **2014/35/EU** (Low Voltage)
  Panel - EN IEC 61439–2: 2021-12 (to the extent not inconsistent with the EN 60204-1)
- **2014/30/EU** (Electromagnetic compatibility EMC Directive)
- **(EU) 2025/40** (Packaging and Packaging Waste)

Bjerringbro, May 28, 2026

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