

## Wilo-SiFire FIRST



en Installation and operating instructions



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## 1 General information

### 1.1 About these instructions

These instructions form part of the product. Adherence to these instructions is a requirement for the intended use and correct operation of the product:

- Carefully read the instructions prior to any activities on and with the product.
- Keep the instructions in an accessible place at all times.
- Observe all product specifications and labels on the device.

The language of the original operating instructions is German. Versions of these instructions in any other language are translations of the original operating instructions.

### 1.2 Copyright

Copyright remains with Wilo. Do not:

- Reproduce any content.
- Distribute any content.
- Use any content for competition purposes without authorisation.

Wilo shall reserve the right to change the listed data without notice and shall not be liable for technical inaccuracies and/or omissions.

### 1.3 Subject to change

Wilo shall reserve the rights to make technical changes to the product and individual components. The illustrations used may differ from the original and are intended as a sample representation of the device.

### 1.4 Exclusion from warranty and liability

Wilo shall specifically not assume any warranty or liability in the following cases:

- Inadequate configuration due to inadequate or incorrect instructions by the operator or the client
- Non-compliance with these instructions
- Improper use
- Incorrect storage or transport
- Incorrect installation or dismantling
- Insufficient maintenance
- Unauthorised repairs
- Inadequate construction site
- Chemical, electrical or electrochemical influences
- Wear

## 2 Safety

This chapter contains basic information for the individual phases of the life cycle. Failure to observe this information carries the following risks:

- Injury to persons from electrical, mechanical and bacteriological factors as well as electromagnetic fields
- Environmental damage from discharge of hazardous substances
- Property damage
- Failure of important functions of the product

Failure to observe the information contained herein will result in the loss of claims for damages.

**The instructions and safety instructions in the other chapters must also be observed!**

### 2.1 Symbols and signal words in the operating instructions

These installation and operating instructions set out safety instructions for preventing personal injury and damage to property. These safety instructions are shown differently:

- Safety instructions relating to personal injury start with a signal word, are **preceded by a corresponding symbol** and are shaded in grey.



#### **DANGER**

#### **Type and source of the danger!**

Consequences of the danger and instructions for avoidance.

- Safety instructions relating to property damage start with a signal word and are displayed **without** a symbol.

---

**CAUTION**

**Type and source of the danger!**

Consequences or information.

---

**Signal words**

- **DANGER!**  
Failure to observe the safety instructions will result in serious injuries or death!
- **WARNING!**  
Failure to follow the instructions can lead to (serious) injuries!
- **CAUTION!**  
Failure to follow the instructions can lead to property damage and a possible total loss.
- **NOTICE!**  
Useful information on handling the product

**Markups**

- ✓ Prerequisite
- 1. Work step/list
  - ⇒ Notice/instructions
- ▶ Result

**Notices on the product**

Comply with all notices and marks on the product and keep them in legible condition.

- Direction of rotation/flow symbol
- Mark for connections
- Rating plate
- Warning stickers

**Symbols**

These instructions use the following symbols:



Danger caused by electric voltages



Danger of explosion



Danger of falling



General warning symbol



Warning – highly flammable substances



Warning – risk of poisoning



Warning – risk of chemical burns



Warning – risk of cutting injuries



Warning – hot surface



Warning – suspended loads



Warning – risk of environmental damage



Access prohibited



Do not touch



Smoking prohibited



Open flame prohibited



Useful information

## 2.2 Personnel qualifications

- Personnel have been instructed on locally applicable regulations governing accident prevention.
- Personnel have read and understood the installation and operating instructions.
- Electrical work: qualified electrician  
Person with appropriate technical training, knowledge and experience who can identify and prevent electrical hazards.
- Installation/dismantling work: qualified fire protection specialist according to the state of the art (EN 12845)  
Correct installation and connection of the system to the supply line
- Operation/control: Operating personnel, trained in the functioning of the complete system
- Setting/operating the switchgear: specialised linguistic knowledge in the areas of fire protection and motor technology.
  - English
  - French
  - German
  - Italian
  - Spanish
- Maintenance work: trained fire protection specialist according to the state of the art (EN 12845)  
Use and disposal of operating fluids, trained in the functioning of the complete system
- Lifting work: trained specialist for the operation of lifting devices  
Lifting equipment, lifting gear, attachment points

## 2.3 Electrical work

- Have electrical work carried out by a qualified electrician.
- Establish power connections according to local fire protection regulations.
- Earth the system.
- Before beginning work on the system, disconnect the system from the mains and secure it against being activated again without authorisation.  
**WARNING! Systems with diesel motors have batteries. Also disconnect batteries!**
- Train personnel on how to make electrical connections.
- Train personnel on the options for switching off the system.

## 2.4 Transport

- Wear the following protective equipment:
  - Safety shoes
  - Protective gloves
  - Hard hat
- Locally applicable laws and regulations on work safety and accident prevention must be complied with.

- Demarcate and cordon off the working area.
- Keep unauthorised persons away from the working area.
- Only use legally specified and approved lifting gear.
- Select the lifting gear based on the prevailing conditions (weather, attachment point, load, etc.).
- Always attach the lifting gear to the attachment points.
- Standing under suspended loads is not permitted. Do **not** move loads over workplaces where people are present.

## 2.5 Installing/dismantling

### **NOTICE! Carry out installation and electrical connection according to EN 12845!**

- Wear the following protective equipment:
  - Safety shoes
  - Safety gloves for protection against cuts
  - Hard hat
- Locally applicable laws and regulations on work safety and accident prevention must be complied with.
- Demarcate the working area.
- Keep the working area free of ice.
- Keep the working area free of any objects lying around.
- Keep unauthorised persons away from the working area.
- Work must always be carried out by two persons.
- Disconnect the system from the mains.
  - WARNING! System with diesel motor: Disconnect batteries!**
- Switch off the main switch and secure it against being activated by unauthorised persons.
- Cover open wells and water tanks or attach a safety harness.
- Only use properly functioning hoisting gear.
- Keep away from the hoisting gear's swivel range when hoisting the product.

## 2.6 Operating fluids

Systems with diesel motors use the following operating fluids:

- Diesel fuel
- Motor oil
- Battery acid

These operating fluids are harmful to the environment and must not be released into the soil or waters. Wipe up drips immediately!

### **Diesel fuel**

- R 40 Suspected carcinogenic effect
- R 65 Hazardous to health: may cause lung damage if swallowed.
- R 66 Repeated exposure may cause skin roughness or cracking.
- R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

### **Battery acid**

- R 35 Causes severe burns.

## 2.7 Operator responsibilities

- Provide installation and operating instructions in a language which the personnel can understand.
- Make sure that the personnel have received the required training for the specified work.
- Provide protective equipment. Ensure that the protective equipment is worn by personnel.
- Ensure that safety and information signs mounted on the system are always legible.
- Train the personnel on how the system operates.
- Eliminate any risk from electrical current.
- Equip hazardous components inside the entire system with an on-site guard.
- Demarcate and cordon off the working area.
- Define personnel responsibilities to ensure safe working practice.

Observe the following points when handling the device:

- Use is not permitted for persons under the age of 16.
- Persons under the age of 18 must be supervised by a technician!
- Use is not permitted for persons with limited physical, sensory or mental capacities!

### 3 Application/use

#### 3.1 Intended use

Unit for professional application in sprinkler systems:

→ Increasing and maintaining the water pressure

#### 3.2 Improper use



#### DANGER

#### Explosion due to pumping of explosive fluids!

Pumping of highly flammable and explosive fluids (gasoline, kerosene, etc.) in pure form is strictly prohibited. There is a risk of fatal injury due to explosion! The systems are not designed for these fluids.

The systems **must not be used** for pumping:

→ Drinking water

→ Fluids containing high quantities of abrasive contents (e.g. sand, gravel).

Intended use requires compliance with this manual. Any other use is regarded as non-compliant with intended use.

### 4 Product description

#### 4.1 Structure of pressure-boosting system

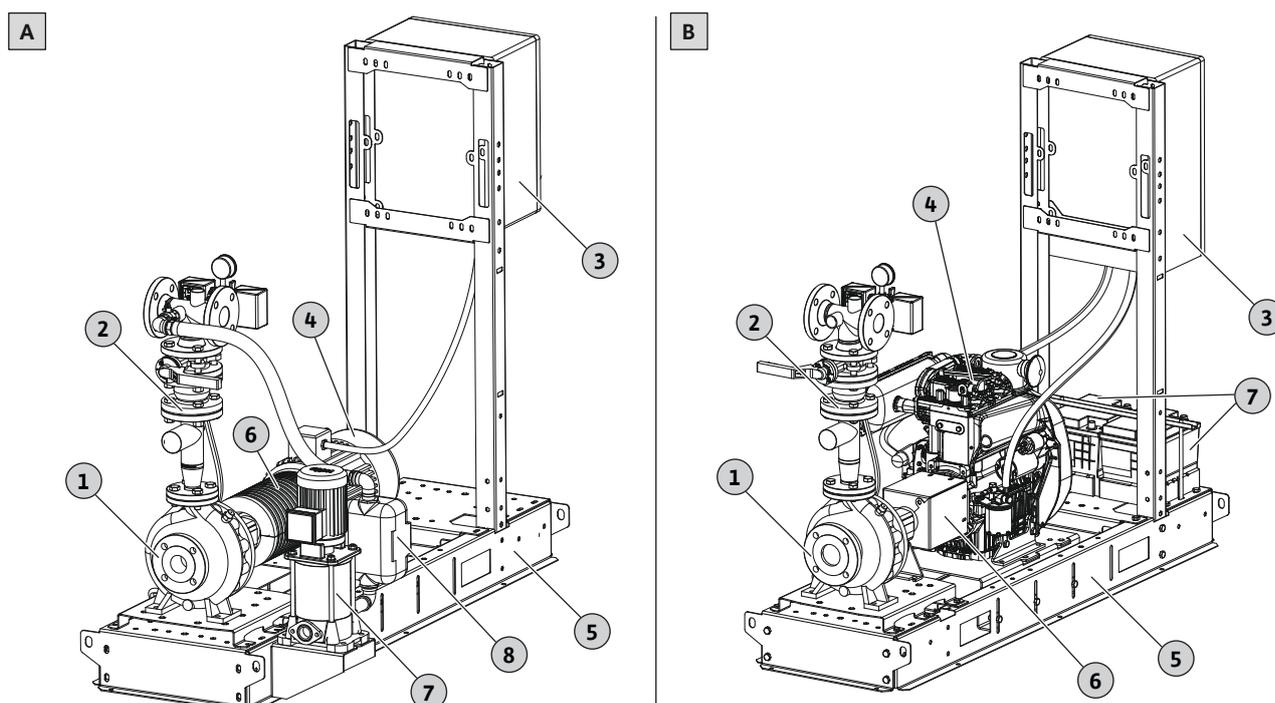


Fig. 1: System structure

#### A: Pressure-boosting system with electric motor and jockey pump

1	Hydraulics (pump)	2	Pipework, on the pressure side
3	Main pump switchgear	4	Electric motor
5	Base frame	6	Hydraulics/motor coupling
7	Jockey pump	8	Jockey pump switchgear

#### B: Pressure-boosting system with diesel motor

1	Hydraulics (pump)	2	Pipework, on the pressure side
3	Main pump switchgear	4	Diesel motor
5	Base frame	6	Hydraulics/motor coupling
7	Batteries		

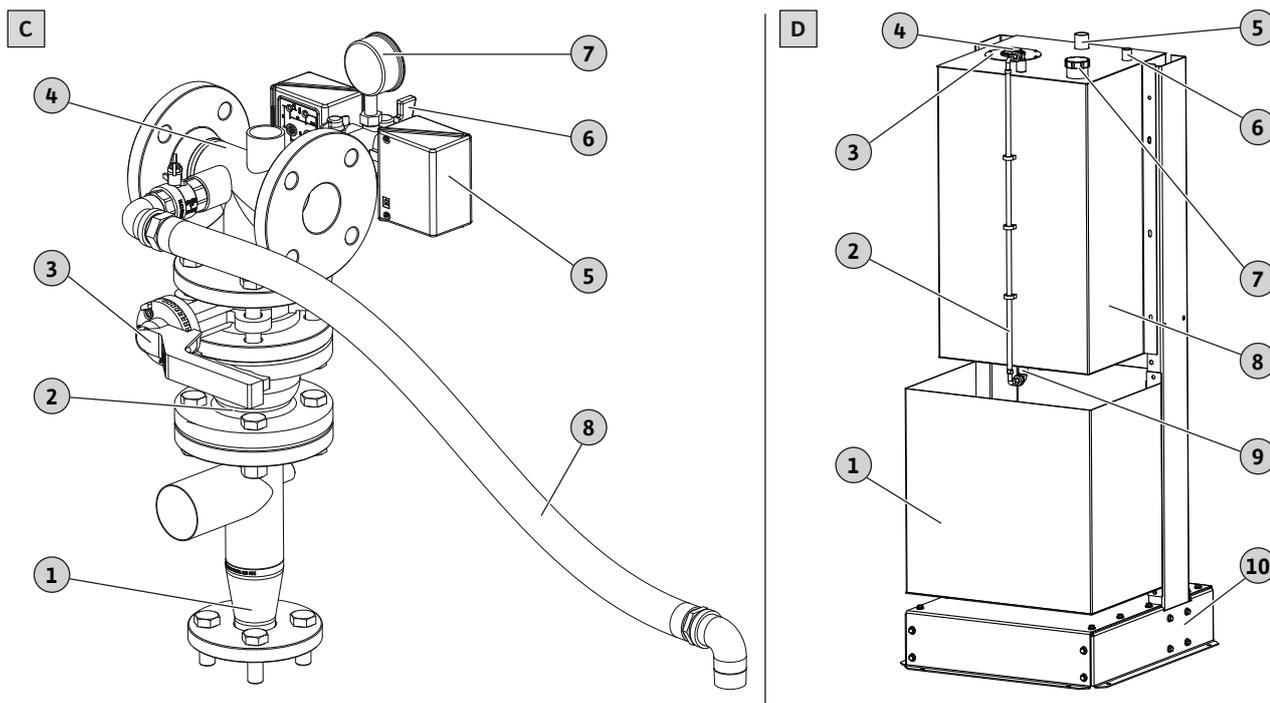


Fig. 2: Structure of pressure outlet and fuel tank

#### C: Pipework, on the pressure side with jockey pump

1	Reducer	2	Non-return valve
3	Gate valve	4	Pipework
5	Start-up pressure switch	6	Pressure switch test valve
7	Manometer	8	Hydraulic connection for jockey pump

#### D: Diesel tank

1	Collector tank	2	Level indicator
3	Floater cover	4	Floater
5	Ventilation connection, min. diameter: 1"	6	Connection for manual fuel pump
7	Filling port	8	Housing
9	Drain	10	Base frame

System mounted on a steel base frame, consisting of the following elements:

- Main pump with electric or diesel motor  
The hydraulics and the motor are connected to a coupling. This enables the hydraulics, impeller and motor to be removed separately.
- Vertical, multistage jockey pump  
Enables small corrections in the event of leakages and keeps the pressure level in the system constant.
- Switchgear  
One switchgear per pump.
- Pipes in steel
- Valves on discharge connection  
The valves can be locked in the open position.
- Non-return valve
- Butterfly valves, pressure gauges, pressure switches
- Dual pressure switch
  - Main pump start
  - Pressure switch functional check
- Pressure switch for automatic start and stop of the jockey pump
- Base frame for switchgears and pipework
- Separate diesel tank, complete with accessories
- Two batteries for starting the diesel motor (if available)

## 4.2 Mode of operation

The operating logic of the system is based on an automatic start and a manual stop of the main pump. This ensures that the maximum amount of water is pumped in the event of fire. The main and jockey pumps are controlled by separate pressure switches.

After switching on the system and activating the automatic mode, the jockey pump is started first. The jockey pump fills the system with water and keeps the system pressure constant. To do this, the jockey pump switches on and off automatically.

**NOTICE! Systems without jockey pumps must be filled with water manually!**

When the water circuits in the sprinkler system are opened, the pressure in the system rapidly decreases. The main pump is activated and the water is pumped into the sprinkler system. Once the water circuits in the sprinkler system are closed again, the system restores the holding pressure.

**NOTICE! The purpose of a sprinkler system is firefighting. Therefore, the main pump is not automatically switched off! To switch off the main pump, press the “Stop” button on the switchgear.**

## 4.3 Frequency converter operation

Do not connect and operate the system on a frequency converter. The pump and switchgear are not designed to operate on a frequency converter.

## 4.4 Technical data

Ambient conditions	
Operating pressure:	→ Without jockey pump: max. 16 bar → With jockey pump: max. 12 bar
Jockey pump drop in pressure:	0.7 bar at 100 l/min
Ambient temperature, minimum:	→ With electric motor: 4 °C → With diesel motor: 10 °C
Ambient temperature, maximum:	→ Without jockey pump: 40 °C → With jockey pump: 35 °C
Relative humidity:	max. 50 % at 40 °C
Installation altitude above sea-level:	→ With electric motor: max. 1000 m → With diesel motor: max. 300 m
Atmospheric pressure:	min. 760 mmHg (*)
Water temperature:	max. 25 °C
Electrical data	
Mains connection:	→ Electric motor: 3~400 V, 50 Hz → Diesel motor: 1~230 V, 50 Hz → Jockey pump: 1~230 V, 50 Hz
Voltage tolerance:	±10 %
Energy efficiency class, electric motor main pump:	IE3
Protection class, electric motor main pump:	IP55
Protection class, electric motor jockey pump:	IP55
Protection class, switchgear main pump:	IP54
Protection class, switchgear jockey pump:	IP65
	→ For additional technical information, see the rating plate on the motor and the switchgear!
	→ * Deviations to standard test conditions: Note details on class deviations for electric and diesel motors regarding temperature, elevation, atmospheric pressure and fuel viscosity. See specific tables and diagrams in catalogues and maintenance manuals.

## 4.5 Type key

SiFire FIRST-40/200-180-7,5/0,55EJ	
SiFire FIRST	Unit for fire-extinguishing/sprinkler systems according to EN 12845
40/200	Pump type
180	Impeller diameter of main pump

SiFire FIRST-40/200-180-7,5/0,55EJ	
7,5/0,55	Rated power in kW: Electric or diesel motor/jockey pump
E	Motor version: → E: pump with electric motor → D: pump with diesel motor
J	With jockey pump

- 4.6 Scope of delivery**
- System ready for connection and pre-assembled on the base frame at the factory, including functional and impermeability tests
  - Installation and operating instructions
  - Accessories as ordered
- 4.7 Accessories**
- Horizontal break tank (500 l) with float valve and alarm pressure switch for low water level
  - Flow meter
  - Suction cone kit with eccentric suction cone and lever or handwheel butterfly valve
  - Vacuum gauge with valve
  - Valve with electric contact
  - Rubber compensator for connection of pipework
  - Switchgear for remote control of A and B alarm transmission
  - Accessories for diesel motors:
    - Density meter for battery
    - Spare part kit
    - Silencer (30 dBA)
    - Hydraulic heat exchanger (standard from 26.5 kW motor power)

More details about installation, calibration and adjustment of the delivered accessories can be found in the manufacturers' instructions. Order accessories separately!

## 5 Transportation and storage

### 5.1 Delivery

After receiving the shipment, this must be checked immediately for defects (damage, completeness). Defects must be noted on the freight documentation! Furthermore, defects must be notified to the transport company or the manufacturer immediately on the day of receipt of shipment. Subsequently notified defects can no longer be asserted.

### 5.2 Transport



#### WARNING

#### Hand and foot injuries due to lack of protective equipment!

Danger of (serious) injuries during work. Wear the following protective equipment:

- Safety gloves for protection against cuts
- Safety shoes
- Safety helmet must be worn if lifting equipment are used!



#### WARNING

#### Standing under suspended loads!

Never allow anyone to stand under suspended loads! Danger of (serious) injuries caused by falling parts. Loads may not be carried over work places where people are present!

**WARNING****Diesel motor: Chemical burns due to battery acid!**

The batteries are filled with an acidic solution. Contact with the acidic solution leads to chemical burns! Always close batteries properly. When working on the battery, wear acid-resistant protective gloves!

**WARNING****Diesel motor: Environmental damage due to leaking operating fluids!**

Systems with diesel motors use the following operating fluids: Motor oil, diesel fuel and battery acid. These operating fluids are harmful to the environment and must not be released into the soil or waters. Attach a suitable protective device (collecting tank, oil mat...) during transport.

Risk numbers:

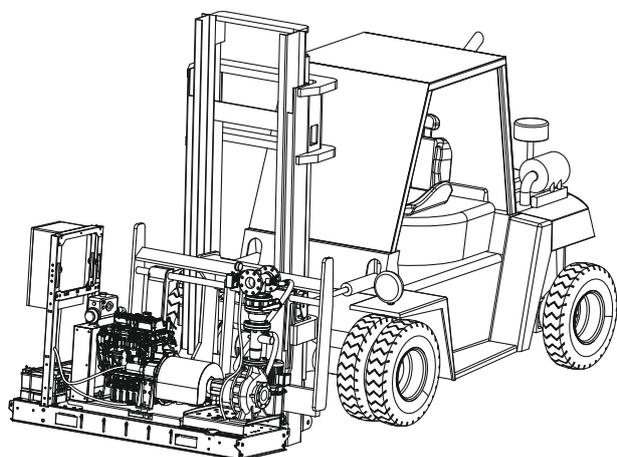
- Diesel fuel: R 40, R 65, R 66, R 51/53
- Battery acid: R 35

**CAUTION****Material damage due to incorrect attachment!**

Do not attach lifting gear on the pressure-side pipework. The pipework is not designed for these loads.

Ensure during attachment that the lifting gear does not impact the pipework. The high bending stress may damage the pipework and lead to leakage!

A



B

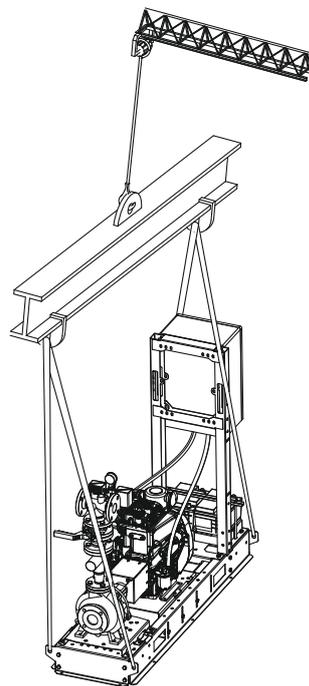


Fig. 3: Transport

A	Transport with forklift
B	Transport with spreader beam and lifting gear

- The unit is delivered on a pallet. The unit is packed in plastic wrap to protect it from humidity and dirt. Remove the outer packaging only once the system is on site.
- If the outer packaging is damaged or no longer present, apply suitable protection from humidity and dirt.
- Demarcate and cordon off the working area.
- Keep unauthorised persons away from the working area.
- Use approved lifting gear: Sling chains or transport straps

- Attach lifting gear to base frame:
  - Transport with forklift: Rectangular recesses in the base frame.
  - Transport with lifting gear:
    - Fixation eyes on base frame: Sling chain with sling hook with safety latch
    - Eye bolt screwed into base frame: Sling chains or transport straps with shackle
- Permissible angle specification for the lifting gear:
  - Fixation with sling hook:  $\pm 24^\circ$
  - Fixation with shackle:  $\pm 8^\circ$
  - If the angle specifications cannot be complied with, use spreader beam!
- System with diesel motor: Keep the unit horizontal during transport to prevent the operating fluids in the motor (motor oil, diesel fuel and battery acid) from leaking.

### 5.3 Storage



#### WARNING

##### **Diesel motor: Environmental damage due to leaking operating fluids!**

Systems with diesel motors use the following operating fluids: Motor oil, diesel fuel and battery acid. These operating fluids are harmful to the environment and must not be released into the soil or waters. Ensure that no operating fluid leaks during storage. Wipe up drips immediately, e.g. place an oil mat underneath.

Risk numbers:

- Diesel fuel: R 40, R 65, R 66, R 51/53
- Battery acid: R 35

- Place the system on a firm and even surface.
- Ambient conditions: 10 °C ... 40 °C, max. humidity: 50 %.
- Dry hydraulics and pipework before packing.
- Protect the system from humidity and dirt.
- Protect the system from direct exposure to sunlight.

## 6 Installation and electrical connection

### 6.1 Personnel qualifications

- Electrical work: qualified electrician  
Person with appropriate technical training, knowledge and experience who can identify and prevent electrical hazards.
- Installation/dismantling work: qualified fire protection specialist according to the state of the art (EN 12845)  
Correct installation and connection of the system to the supply line
- Lifting work: trained specialist for the operation of lifting devices  
Lifting equipment, lifting gear, attachment points

### 6.2 Operator responsibilities

- Observe locally applicable accident prevention and safety regulations.
- The installation company is responsible for ensuring that the entire completed fire protection system complies with the appropriate standards. The installation company provides the operator with the "Installation in accordance with EN 12845" certification as well as the required documents.
- Observe local regulations for operating fire protection systems.
- Check that the available consulting documents (installation plans, installation location, inflow conditions) are complete and accurate.
- Provide protective equipment. Ensure that the protective equipment is worn by personnel.
- Demarcate the working area.
- Keep unauthorised persons away from the working area.
- The foundation must be of sufficient stability in order to allow the system to be fixed in a secure and functional manner. The operator is responsible for the provision and suitability of the foundation!
- Observe all regulations for working with heavy loads and under suspended loads.

### 6.3 Information on monitoring devices

- For the main pump, only a fuse protection against short-circuiting is provided. The fuse protection in accordance with EN 12845 is installed in the switchgear.
- Do **not** provide thermal overload protection for the main pump!

- For the jockey pump, thermal overload protection is provided. The overload protection is installed in the switchgear for the jockey pump. Set overload protection to the rated current of the jockey pump shown on the rating plate.
- Do **not** provide protection against low water!
- Systems with diesel motors: The switchgear controls the operating parameters of the diesel motor. Alarm signals are signalled on the switchgear. Additional information can be found in the chapter "Switchgear for diesel motors".

## 6.4 Installation



### DANGER

#### Danger of falling into wells and basins!

Open wells and water tanks for the water supply are located near the system. Danger of falling. Cover open basins or attach a safety harness during installation.



### DANGER

#### Diesel motor: Risk of personal injury due to inadvertent start!

The system with diesel motor has two starter batteries. This makes it possible for the system to be activated inadvertently. Danger of serious injuries! Check that the batteries are disconnected before installation. If the batteries are not disconnected, have the batteries disconnected by a qualified electrician.



### DANGER

#### Risk of fatal injury due to dangerous lone working practices!

Work in chambers and narrow rooms as well as work involving risk of falling are dangerous work. Such work may not be carried out autonomously! A second person must be present for safety reasons.



### WARNING

#### Hand and foot injuries due to lack of protective equipment!

Danger of (serious) injuries during work. Wear the following protective equipment:

- Safety gloves for protection against cuts
- Safety shoes
- Safety helmet must be worn if lifting equipment are used!



### NOTICE

#### Use only properly functioning lifting equipment!

Use only properly functioning lifting equipment to lift and lower the pump. Ensure that the pump does not become jammed during lifting and lowering. Do **not** exceed the maximum bearing capacity of the lifting equipment! Check that lifting equipment is functioning properly before use!



### NOTICE

#### Installations for sprinkler systems

The systems are used for fire protection. Installation and electrical connection must be carried out in accordance with EN 12845 and the local regulations!

### 6.4.1 Operating modes

Operate the systems in accordance with EN 12845:

- Inlet mode
- Suction mode

If possible, operate the system in inlet mode. If inlet mode is not possible, operate the system in suction mode.

## 6.4.1.1 Inlet mode

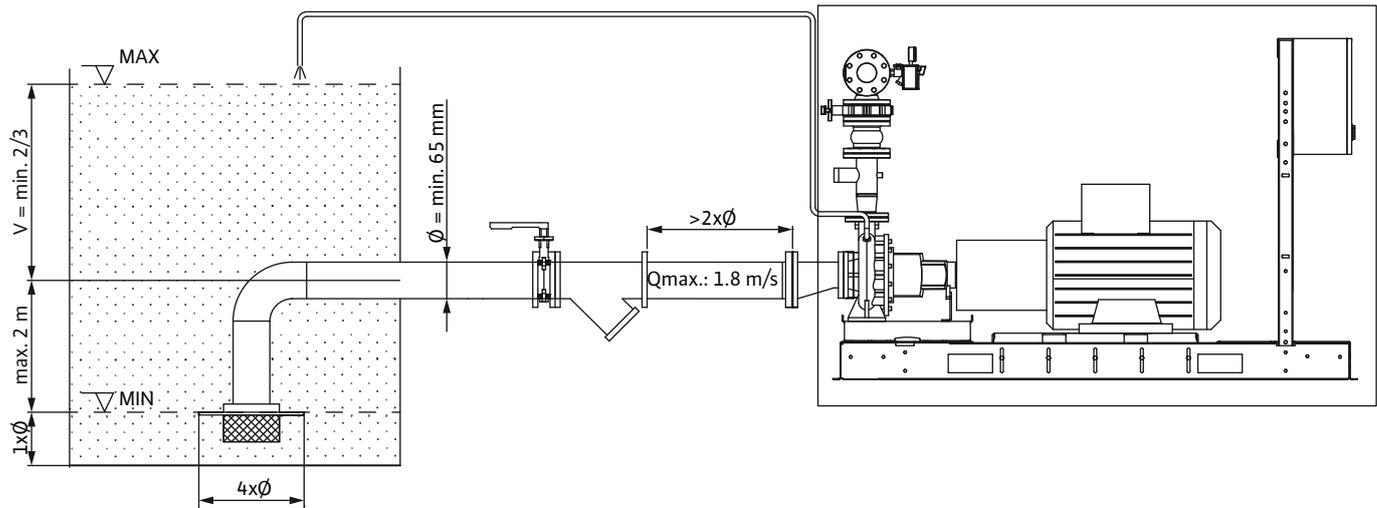


Fig. 4: Example of installation: Inlet mode

- At least 2/3 of the useable volume of the water tank is located above the centre line of the pump.
- The centre line of the pump must not be located more than 2 m above the lowest water level in the water tank.
- Suction line diameter: min. 65 mm.
- Flow rate in the suction line: max. 1.8 m/s at maximum volume flow.
- Install a suction strainer in the suction line:
  - Diameter: at least 1.5 times the nominal diameter of the suction line
  - Grain/particle size: max. 5 mm
  - Install a shut-off valve between the filter and the water tank.

## 6.4.1.2 Suction mode

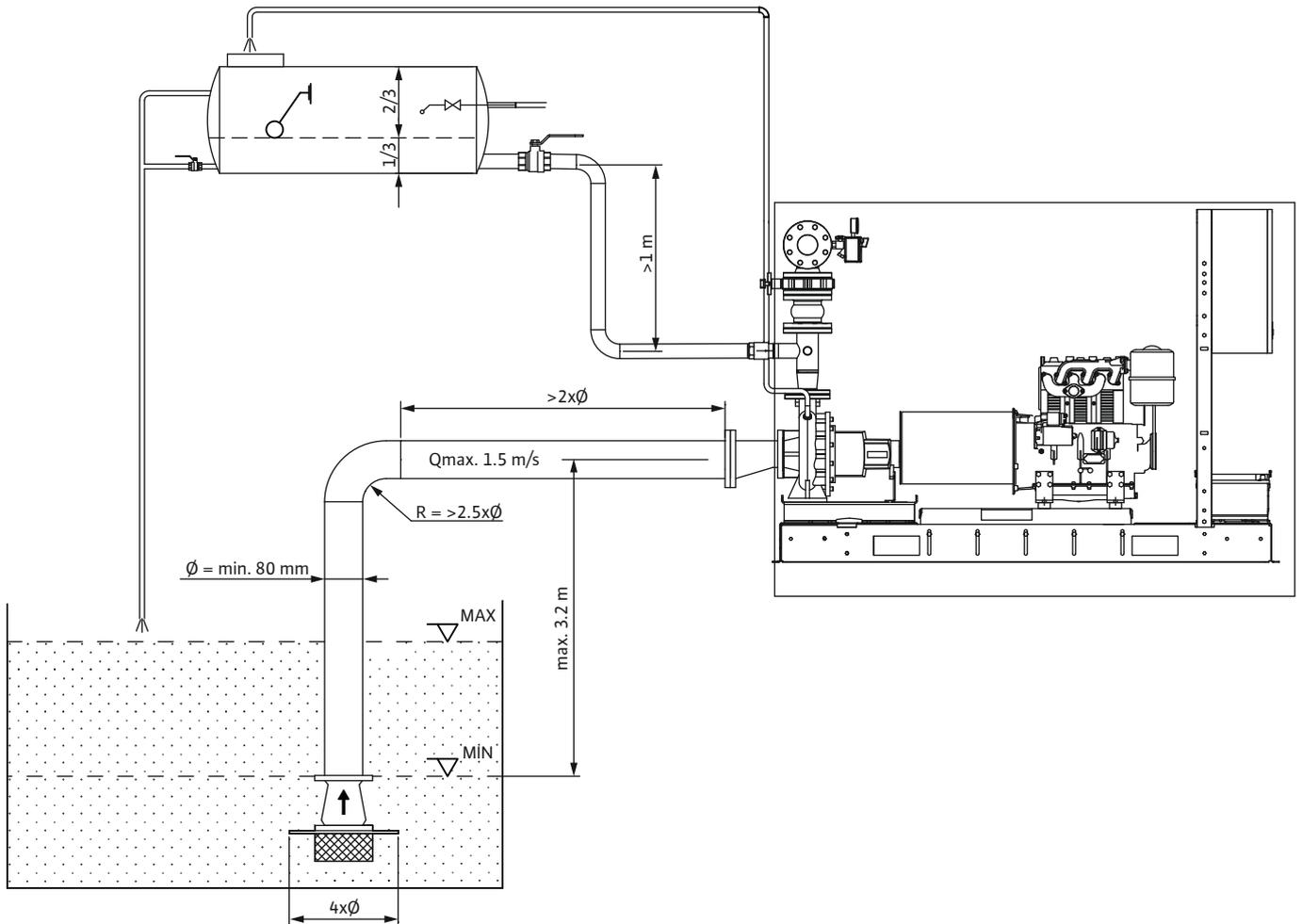


Fig. 5: Example of installation: Suction mode

- The centre line of the pump must not be located more than 3.2 m above the lowest water level in the water tank.
  - Suction line diameter: min. 80 mm.
  - Flow rate in the suction line: max. 1.5 m/s at maximum volume flow.
  - Provide a separate suction line for each pump. The suction lines must not be connected to each other!
  - Install a foot valve at the lowest point in the suction line.
  - Install a suction strainer upstream of the foot valve:
    - Diameter: at least 1.5 times the nominal diameter of the suction line
    - Grain/particle size: max. 5 mm
    - The suction strainer must be able to be cleaned without draining the water tank.
  - Install one automatic priming device per pump:
    - The priming device consists of: break tank, pipe with non-return valve descending to the discharge side of the pump.
    - Break tank, pump and suction line must always be filled with water. **NOTICE! Also ensure that the water level is maintained in the event of a leakage in the foot valve!**
- When the water level in the break tank goes down to 2/3 of the normal water level, start the pump. **NOTICE! If the pump does not start up, trigger an alarm at a constantly monitored location!**

## 6.4.2 Requirement at the installation location



### WARNING

#### Diesel motor: Environmental damage due to leaking operating fluids!

In systems with diesel motors, drops of operating fluids (motor oil, diesel fuel and battery acid) can leak out. These operating fluids are harmful to the environment and must not be released into the soil or waters. The installation location must be fluid-resistant!

Set up installation location according to the specifications in EN 12845! Only install fire-extinguishing equipment at the installation location!

- Select the site of the installation location, preferably in this order:
  - A free-standing building.
  - A building adjacent to a building with a sprinkler system. With direct access from the outside!
  - A room located in a building with a sprinkler system. With direct access from the outside!
- Ensure fire resistance!
  - At least: 60 min
  - Recommended: 120 min
- Directly and easily accessible from the outside at any time. Mark entrance with signs and provide lighting.
- Ensure that only authorised personnel has access.
- Protection from rain, snow and frost.
- Ambient temperature and max. humidity:
  - System with electric motor: 4 °C...40 °C
  - System with diesel motor: 10 °C...40 °C
  - Max. humidity: 50 %
- Even installation surface. Sufficiently stable foundation.
 

**NOTICE! The operator is responsible for the provision and suitability of the foundation!**
- To ensure that the motor is sufficiently cooled, provide external openings for air circulation. Note the following positioning of the ventilation openings:
  - Supply air opening: bottom/near floor
  - Exhaust air opening: top/near ceiling
- System with diesel motor: discharge exhaust fumes to the outside!
 

If the supply air and exhaust air openings are on the same side, provide an exhaust pipe above the motor.

If the supply air and exhaust air openings are installed opposite each other (cross ventilation), the exhaust pipe can be omitted. Ensure the following minimum air flow  $Q$  in  $m^3/h$ :

  - Air-cooled motor:  $Q = 100 \times \text{motor power in kW}$
  - Water-cooled motor:  $Q = 50 \times \text{motor power in kW}$
- Provide sprinkler protection in accordance with EN 12845.
 

Sprinkler protection can be connected directly to the pipework on the pressure side of the system.
- Maintain a clearance of 800 mm around the system for maintenance work.

### 6.4.3 Setting up the system

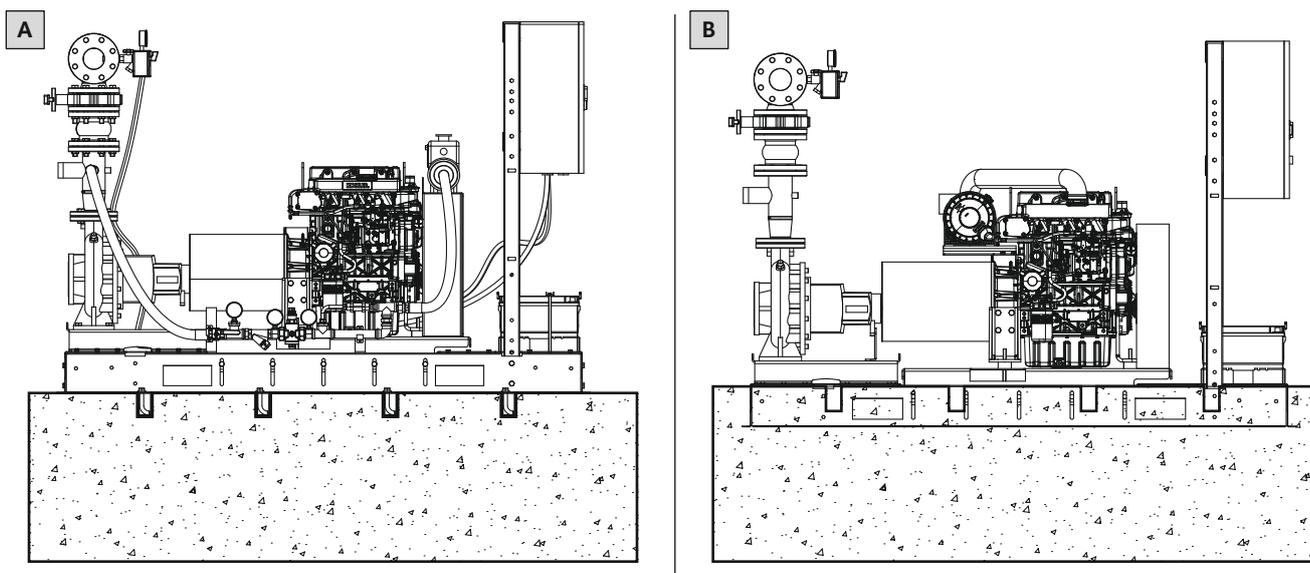


Fig. 6: Installation types

A	Fixation with anchor bolt
B	Base frame sealed in concrete foundation.

- ✓ Installation location prepared for the installation of the system.
- ✓ Fixation material available: Anchor bolts in a suitable size for fixing the base frame to the foundation.
  1. Place the system at the installation location.
  2. Drill holes through the base frame directly into the foundation. Borehole depth as specified by the anchor bolt manufacturer.
  3. Place the anchor bolts. Observe the manufacturer specifications.
  4. When the anchor bolts have hardened in place, fix the base frame to the foundation. Apply thread-locking fluid, e.g. Loctite, to screwed connections.
- ▶ System installed. Connect the pipes.

Alternatively, the system can also be sealed to the foundation. In this case, the base frame is cast into the concrete foundation. The concrete foundation must weigh at least 2.5 times as much as the system.

### 6.4.4 Connecting the pipes



#### NOTICE

##### Connection to the public water supply network

When making the connection, observe the applicable regulations, guidelines and requirements of the water suppliers.

In addition, take into account the special features of the location. E.G. If the suction pressure is too high or too variable, install a pressure reducer.

To ensure that the system functions correctly, note the following points when connecting the pipework:

- All pipes must be self-supporting. The system must not bear the weight of the pipe.
- Connect all pipes to the system without mechanical tension. Use compensators to connect the pipes!
- Lay the pipes so that air cushions do not form in the piping.
- Pipes must be tight.
- Prevent foreign, pathogenic substances from entering the piping (infiltration).

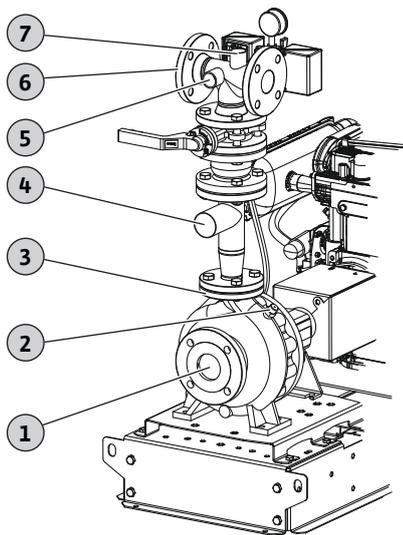


Fig. 7: Overview of connections

1	Main pump: Inlet connection	2	Hydraulic pressure relief valve
3	Main pump: Discharge connection	4	Break tank connection
5	Jockey pump connection	6	Discharge connection for sprinkler system
7	Sprinkler system connection for installation location		

Connect the following circuits in accordance with EN 12845:

- Connect the sprinkler system to the discharge connection.
  - Connect the suction line to the inlet connection of the main pump.
    - Keep pipe as short as possible.
    - Connect the piping to the pump with a straight or conical pipe. The pipe must be at least twice as long as the nominal diameter. The reducer must run straight at the top. The angle must be no more than 20°.
    - Install gate valve.
    - Lay the piping horizontal or with a slight continuous gradient toward the pump.
    - If the centre line of the pump is located above the lowest water level in the water tank, install a foot valve.
    - Dimensioning of NPSH value including all valves and fittings at max. fluid temperature: The NPSH value at the pump connection must exceed the required NPSH value by 1 m (at max. volume flow).
  - Connect a separate suction line to the inlet connection of the jockey pump.
  - Recirculation circuit. Separate water circuit for manual operation and test runs.
  - Guide hydraulic pressure relief valve back into the water tank or break tank.
  - Optional circuits:
    - Connect sprinkler system to protect the system.
    - Connect volume flow measuring circuit to control the pump. **NOTICE! Omitted for systems with jockey pumps!**
- Run the return of the measuring circuit into the water tank or to the drain.

### Connections

Pump type	Main pump: Inlet connection	Pressure relief valve connection	Main pump: Discharge connection	Break tank connection	Jockey pump connection	Discharge connection for sprinkler system	Sprinkler system connection for installation location	Jockey pump: Inlet connection
SiFire FIRST 32/ ...	DN 50	DN xxx	DN 32	DN 50	DN 25	DN 50	DN 25	Rp 1
SiFire FIRST 40/ ...	DN 65	DN xxx	DN 40	DN 50	DN 25	DN 50	DN 25	Rp 1
SiFire FIRST 50/ ...	DN 65	DN xxx	DN 50	DN 50	DN 25	DN 65	DN 25	Rp 1
SiFire FIRST 65/ ...	DN 80	DN xxx	DN 65	DN 50	DN 25	DN 80	DN 25	Rp 1
SiFire FIRST 80/ ...	DN 100	DN xxx	DN 80	DN 50	DN 25	DN 125	DN 25	Rp 1
SiFire FIRST 100/ ...	DN 125	DN xxx	DN 100	DN 50	DN 25	DN 150	DN 25	Rp 1

### 6.4.5 Diesel motor: Exhaust system and ventilation

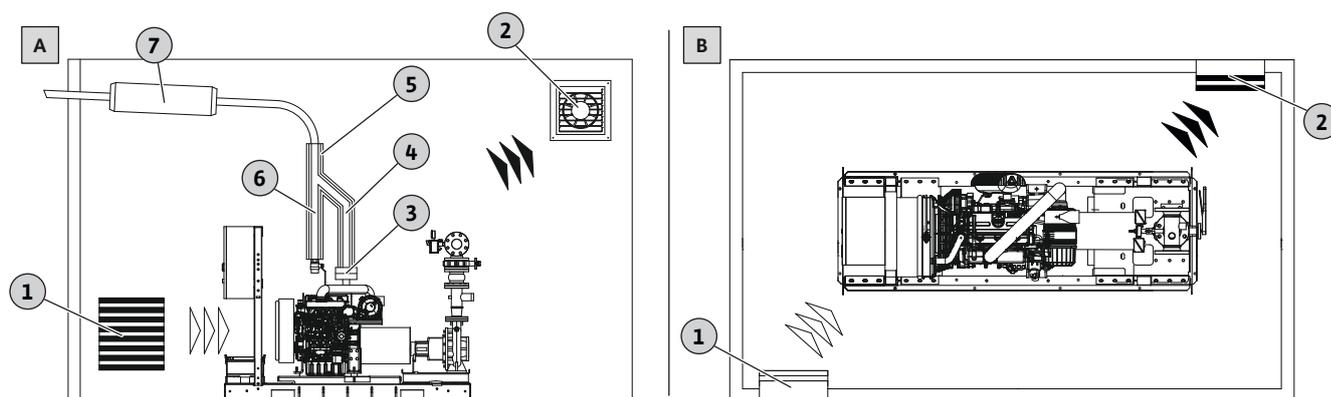


Fig. 8: Ventilation and exhaust system

#### A: Single-side room ventilation with exhaust system

1	Supply air opening
2	Exhaust air opening
3	Rubber compensator for vibration damping
4	Exhaust pipe
5	Thermal insulation, guard
6	Condensate return pipe
7	Silencer

#### B: Room ventilation with cross ventilation without exhaust system

1	Supply air opening
2	Exhaust air opening

If the system is equipped with a diesel motor, the waste heat and combustion gases must be evacuated outside. Provide appropriate supply air and exhaust air openings for this purpose. Position the ventilation openings as follows:

- Supply air opening: bottom/near floor
- Exhaust air opening: top/near ceiling

The exhaust gases can be evacuated outside as follows:

- Via an exhaust system
  - If the supply air and exhaust air openings are on the same side, install an exhaust pipe on the motor.
- Room ventilation with cross ventilation
  - If the supply air and exhaust air openings are installed opposite each other (cross ventilation), the exhaust pipe can be omitted. Ensure a minimum air flow according to the following table.

Motor power	Motor cooling	Required air flow for motor cooling	Required quantity of cooling water	Required air flow for room cooling
4.2 kW	Air cooling	300 m <sup>3</sup> /h	–	420 m <sup>3</sup> /h
6.8 kW	Air cooling	522 m <sup>3</sup> /h	–	680 m <sup>3</sup> /h
10.5 kW	Air cooling	710 m <sup>3</sup> /h	–	1050 m <sup>3</sup> /h
12.9 kW	Air cooling	792 m <sup>3</sup> /h	–	1290 m <sup>3</sup> /h
17.7 kW	Air cooling	1578 m <sup>3</sup> /h	–	1770 m <sup>3</sup> /h
26.5 kW	Water cooling	–	8 m <sup>3</sup> /h	1325 m <sup>3</sup> /h
31.5 kW	Water cooling	–	8 m <sup>3</sup> /h	1575 m <sup>3</sup> /h
37 kW	Water cooling	–	8 m <sup>3</sup> /h	1850 m <sup>3</sup> /h
47.7 kW	Water cooling	–	8 m <sup>3</sup> /h	2385 m <sup>3</sup> /h
66 kW	Water cooling	–	10 m <sup>3</sup> /h	3300 m <sup>3</sup> /h

**NOTICE!** The required air flow may vary depending on the ambient conditions. Observe the motor cooling specifications from the motor manufacturer.

**Requirements for the exhaust system**

- Run the exhaust pipe to the outside.
- Provide the exhaust pipe with a suitable silencer.
- The total counter pressure must not exceed the values prescribed by the motor manufacturer. See motor instructions.
- Apply a guard to hot surfaces on the exhaust pipe.
- Do not install the exhaust pipe near doors or windows.
- To prevent exhaust gases from flowing back into the operating space, lay exhaust pipe accordingly.
- Lay exhaust pipe as required by the weather conditions (entrance of rain and snow).
- Prevent condensate from flowing back into the motor.
- NOTICE! Produce condensate drain from acid-resistant material!**
- Keep exhaust pipe as short as possible (max. 5 m).  
Avoid bends. Max. bend radius: 2.5 times the pipe diameter.

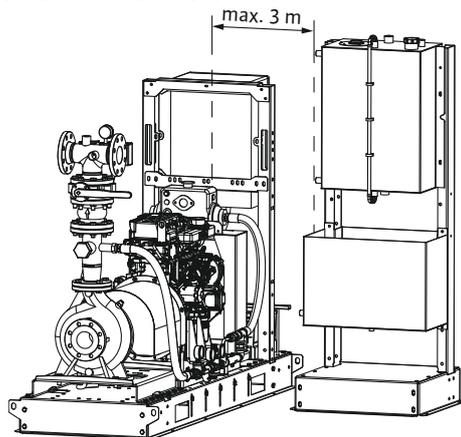
**6.4.6 Diesel motor: Fuel tank**

Fig. 9: Installation of the fuel tank

- Distance between fuel tank and fuel pump: max. 3 m.
- To achieve overpressure in the fuel circuit, install the fuel tank higher than the fuel pump of the motor. Do not install the fuel tank directly above the motor.
- Place all valves between the fuel tank and motor directly next to the fuel tank.
- Only install valves with position indication and safeguards in the "open" position.
- Make sure fuel pipes are made of metal.
- Attach fuel supply pipe at least 20 mm above the bottom of the tank.
- Vent the fuel tank to the outside.

**6.5 Electrical connection****DANGER****Risk of death due to electrocution!**

Improper conduct when carrying out electrical work can lead to death due to electric shock! Electrical work must be carried out by a qualified electrician in accordance with the locally applicable regulations.

**DANGER****Risk of fatal injury due to electrical current!**

There is a risk of fatal injury when performing work on the open switchgear! The components carry current! Always have work carried out by a qualified electrician.

**NOTICE****Observe motor instructions!**

For more information, read and comply with the separate motor instructions.

**6.5.1 Requirements for the power supply****NOTICE! Carry out mains connection and main control cabinet according to EN 12845!**

- The mains connection must match the specifications on the rating plate (switchgear and motor).
- Provide mains connection only for the system.
- Connect each system to its own mains connection.
- Make mains connection upstream of the main switch for the building.
- Always maintain mains connection.
- WARNING! If other consumers are switched off, do not switch off the mains connection for the system!**

- Secure the mains connection only against short-circuit and fault current. Earth the system!
  - WARNING! Protection against overload is strictly prohibited!**
- Use single, continuously running cables.
- Select and lay cables to ensure that the system functions in the event of fire:
  - Use flame-resistant cables. Min. fire resistance: 180 min!
  - Laid underground with a covering of at least 70 cm
  - Laid in non-flammable materials with sufficient covering
  - Laid in rooms with sprinklers
- Connect the system as specified in the wiring diagrams in the switchgear.

### 6.5.2 Diesel motor: Connecting the batteries



#### **DANGER**

#### **Risk of fatal electrical shock from pre-charged batteries!**

The installed batteries are pre-charged. There is a risk of fatal injury caused by electric shock. Do not touch or short circuit both poles.



#### **DANGER**

#### **Diesel motor: Risk of personal injury due to inadvertent start!**

After the starter batteries have been connected, the system may activate inadvertently. Danger of serious injuries! After the batteries have been connected, check whether the main switch is switched off. Secure the main switch against being activated inadvertently.

- ✓ Main switch switched off. Secure against being activated inadvertently.
  1. Connect battery to the switchgear.
    - ▶ Batteries connected. Once the switchgear has been activated, the batteries begin charging.

### 6.5.3 Diesel motor: Installing the heating

To heat the motor oil and diesel fuel, connect an appropriate heating element as required.

### 6.5.4 Jockey pump

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#### **CAUTION**

#### **Systems with jockey pump: Jockey pump starts immediately!**

When the mains plug is inserted into the socket, the jockey pump starts. The jockey pump fills the system with water and establishes the holding pressure.

Before plugging in the mains plug, read the notes on commissioning!

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- The jockey pump comes pre-assembled and pre-wired.
- Provide a shock-proof socket on-site for the mains connection. Fuse protection: 16 A.

## 7 Commissioning

For correct operation and safety, the pump unit in question requires the installation of other mandatory system components for compliance with the applicable directives and standards.

Therefore, according to the Machinery Directive 2006/42/EC Annex II-1B, the commissioning of the pump unit is PROHIBITED before the entire system in which it has been installed has been completed and declared to be in conformity with the applicable directives and standards.

For initial commissioning, we recommend that you contact your local Wilo service agent or our service call centre. The commissioning of the pressure-boosting system must be carried out by qualified personnel.

## 7.1 Initial operations and general checks

Refer to Appendix A before commissioning.

- Before initial commissioning, check that the wiring is correct, in particular the ground connection.
- Ensure that rigid connections are not exposed to mechanical stress.
- Fill the system and search for possible faults during visual inspection.
- Open the shut-off valves on the pump side and on the pressure line.

### CAUTION

#### Material damage due to dry run

The system must never run dry. Dry running will destroy the mechanical seal of the pump.

If there is no more water in the jockey pump's diaphragm pressure vessel, inflate it to a pressure 0.5 bar lower than the starting pressure of the jockey pump.

Do not exceed the maximum inflation value for the diaphragm pressure vessel.



### DANGER

#### Risk of fatal injury due to electrical current!

Do not remove the protection of live parts. Prevent any possibility of operating the elements insulating the system or the subassemblies on which maintenance is to be carried out.

### CAUTION

#### Material damage!

Tighten all supply terminals before commissioning the pressure-boosting system!

If tests have to be carried out during installation, make sure that the pumps are correctly filled with water before switching them on.

Before filling the pump unit with water, check the tightness of the components, which may have come loose during transport and handling.

Do not leave the pressure-boosting system in automatic mode before the fire-fighting system has been completely assembled according to the standard. The commissioning of an incomplete fire-fighting system will invalidate the warranty.

## 7.2 Procedure for commissioning

- When setting the automatic operation of the pump-motor unit, it is necessary to define the procedures of the maintenance program and the responsibilities for intervention in case of accidental starting.
- For diesel motor models, check that the batteries are correctly recharged before operation.
- Follow the manufacturer's instructions when inspecting batteries.
- Keep batteries away from flames and sparks. For safety reasons, do not lean over the batteries during operation and during their installation or removal.
- Check the fuel level of diesel motors and, if necessary, top up the fuel when the motors are cold.
- Do not spill fuel on motors or rubber or plastic parts of the system.
- Do not add fuel when motors are hot.
- Before switching on the main pumps check the correct alignment between pump and motor. Qualified personnel must carry out the motor pump alignment.
- Only qualified technicians may carry out the installation.

### 7.2.1 System with positive suction head

The following measures must be taken when commissioning a system installed with positive suction head:

- Check that the air vent valve of each pump is open.
- Close the valves on the delivery pumps.
- Slowly open the valves on the final pressure side and check whether water is leaking from the vent circuit of each pump.
- Briefly start the pumps in manual operation.
- Make sure there is no air in the circuits and pumps.

- Repeat the operation until all the air in the pipeline is eliminated.
- Close the vent plug of the jockey pump.
- Fully open the valves on the suction and discharge side.
- Check that the water flow is not obstructed (presence of dirt, solid debris, etc.).

### 7.2.2 System in suction lift

The following measures must be taken when commissioning a system installed in suction lift:

- Check that the air vent valve of each pump is open.
- Close the valves on the pump delivery.
- Fill the main pumps through the priming tank circuits.
- Fill the jockey pump through the appropriate cap following the instructions given in the user manual.
- Briefly start the pumps in manual operation.
- Make sure there is no air in the circuits and pumps.
- Repeat the operation until all the air in the pipeline is eliminated.
- Fully open the valves on the suction and discharge side.
- Check that the water flow is not obstructed (presence of dirt, solid debris, etc.).

## 7.3 Commissioning checks

### 7.3.1 Commissioning the main electric pump

- Check that all the hydraulic, mechanical and electrical connections indicated in this manual have been made correctly.
- Ensure that the valves on the suction and final pressure side of the pump are open.
- Make sure the pump is primed.
- Make sure that the power supply matches the data on the pump's rating plate and that all three phases are connected correctly.
- Follow the commissioning instructions in the chapter on the electric pump controller.

---

#### CAUTION

##### Material damage due to overheating!

To avoid overheating that could damage the main pumps, always check that the water flow through the recirculation circuit meets the requirements of the pump data sheet. In case of problems with the recirculation circuit, or if the minimum level used to check the starting and operation of the pumps is not guaranteed, open other circuits (e.g. flow meter, leak test valve of the shut-off valve, drain valve, etc.).

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#### CAUTION

##### Material damage due to...

Make sure that none of the following conditions are met. If they are present, stop the pump immediately and rectify the cause of the malfunction before restarting it (see also chapter Faults, causes and remedies):

- rotating parts in contact with fixed parts
  - unusual vibrations and noises
  - loose bolts
  - high temperature on the motor housing
  - current differences between phases
  - leaks from mechanical seal
  - vibration, noise and excessive temperatures may be due to misalignment of the motor/pump coupling
- 

### 7.3.2 Commissioning the main diesel pump

- Check that all the hydraulic, mechanical and electrical connections indicated in this manual have been made correctly.
- Ensure that the valves on the suction and final pressure side of the pump are open.
- Make sure that the pump is primed and that air is expelled through the cap on the pump housing.

- Check that the supply voltage is present and corresponds to that indicated on the pump's rating plate.
- Check that the fuel is compatible with the motor in use and that the tank is completely full (the fuel level in the tank can be seen on the fuel gauge next to the tank).
- Check that the connections to the pipes are made correctly, without connections between the tank and the motor.
- Ensure that the electric float cable of the tank is correctly connected to the diesel pump's switchgear.
- Check motor oil and coolant level
- If the motor is cooled with water via a radiator or heat exchanger, perform the specific procedures indicated in the operating instructions of the motor.
- For topping up, use the oil and coolant recommended in the diesel motor operating instructions enclosed with this installation and operating instructions. Follow the commissioning procedures indicated in the chapter on the diesel pump switchgear.

---

#### CAUTION

##### **Material damage due to overheating!**

To avoid overheating that could damage the main pumps, always check that the water flow through the recirculation circuit meets the requirements of the pump data sheet. In case of problems with the recirculation circuit, or if the minimum level used to check the starting and operation of the pumps is not guaranteed, open other circuits (e.g. flow meter, leak test valve of the shut-off valve, drain valve, etc.).

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#### CAUTION

##### **The diesel motor may start at maximum speed!**

Leave the pump running for 20 minutes to check whether the motor speed is compatible with the specification on the system's rating plate.

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#### CAUTION

##### **Material damage due to...**

Make sure that none of the following conditions are met. If they are present, stop the pump immediately and rectify the cause of the malfunction before restarting it (see also chapter Faults, causes and remedies):

- rotating parts in contact with fixed parts
  - unusual vibrations and noises
  - loose bolts
  - high temperature on the motor housing
  - current differences between phases
  - leaks from mechanical seal
  - vibration, noise and excessive temperatures may be due to misalignment of the motor/pump coupling
- 

### 7.3.3 Commissioning of the jockey pump

#### **Manual start**

Follow the commissioning instructions in the section related to the jockey pump switchgear.

---

#### CAUTION

##### **Incorrect volume flow can result in a fault!**

Perform flow rate adjustment for the jockey pump using the gate valve at the inlet to the manifold to ensure that the jockey pump delivers less flow than is required by a single sprinkler dispenser. For jockey pump settings, see the characteristic curves for the various pump types shown in the relevant catalogue. If there are problems

with starting the pump, refer to the chapter Faults, causes and remedies in the jockey pump user manual or related control equipment.

---

### 7.3.4 Filling the system

- If the system is not filled, use the jockey pump after checking that the procedures described in the previous chapter have been performed correctly.
- At this stage, open one or more of the sprinkler circuit exhaust pipes to let air escape from the system.
- Start the jockey pump. The system will fill slowly and the air will be expelled. As soon as water starts to flow out of the exhaust pipes, close them and wait until the preset pressure is reached and the jockey pump stops.

If the pump does not stop, check for leaks. The pump will only stop at zero flow. The system reaches the maximum pressure of the jockey pump, which must be higher than the automatic starting pressure of the main pump. Wait for the pressure to stabilise. Then switch the system to automatic mode.

### 7.3.5 Test of automatic mode

#### **Main electric pump**

Before carrying out the test, make sure that the return circuit in the tank is closed and that the pressure in the main circuit is sufficient to prevent accidental starting of the pump.

Start the system using one pressure switch at a time in order to check the correct operation of both pressure switches. See Fig. 10: Close valve 2 and open valve 1 to carry out the test. Close valve 1 and open valve 2 to end the test and restore the pressure in the circuit. Then follow the instructions on the pump's switchgear to check the correct functioning of the automatic mode.

---

#### **CAUTION**

##### **Material damage due to overheating!**

To avoid overheating that could damage the main pumps, always check that the water flow through the recirculation circuit meets the requirements of the pump data sheet. In case of problems with the recirculation circuit, or if the minimum level used to check the starting and operation of the pumps is not guaranteed, open other circuits (e.g. flow meter, leak test valve of the shut-off valve, drain valve, etc.).

---



#### **DANGER**

##### **Danger due to non-activated fire-extinguishing system**

Before moving away from the system and/or after a manual deactivation, remember to return the system to automatic mode (see chapter on the switchgear). OTHERWISE THE FIRE ALARM SYSTEM IS NOT ACTIVATED.

---

#### **CAUTION**

##### **Incorrect pressure level can result in a fault!**

If the system pressure does not return to the starting level of the main pump pressure switches, please refer to the chapter on the switchgear for the manual start of the pump.

---

#### **Automatic start test with float switch (pump with electric motor)**

- Empty the priming tank (or simulate the effect) to start the electric pump via the float switch signal.
- Then follow the instructions on the pump's switchgear to check the correct operation of the pump.

**Pump with diesel motor**

Before carrying out the test, make sure that the return circuit in the tank is closed and that the pressure in the main circuit is sufficient to prevent accidental starting of the pump.

Start the system using one pressure switch at a time in order to check the correct operation of both pressure switches. See Fig. 10: Close valve 2 and open valve 1 to carry out the test. Close valve 1 and open valve 2 to end the test and restore the pressure in the circuit. Then follow the instructions on the pump's switchgear to check the correct functioning of the automatic mode.

**CAUTION****Material damage due to overheating!**

To avoid overheating that could damage the main pumps, always check that the water flow through the recirculation circuit meets the requirements of the pump data sheet. In case of problems with the recirculation circuit, or if the minimum level used to check the starting and operation of the pumps is not guaranteed, open other circuits (e.g. flow meter, leak test valve of the shut-off valve, drain valve, etc.).

**Automatic start test with float switch (diesel pump)**

- Empty the priming tank (or simulate the effect) to start the electric pump via the float switch signal.
- Then follow the instructions on the pump's switchgear to check the correct operation of the pump.

**CAUTION****Incorrect pressure level can result in a fault!**

If the system pressure does not return to the starting level of the main pump pressure switches, please refer to the chapter on the switchgear for the manual start of the pump.

**8 Maintenance**

See Annex A for maintenance.

The fire-fighting system is a safety equipment that protects objects and people, therefore any modifications and repairs that affect its efficiency must be carried out in such a way as to minimise the state of "out of order".

Isolate the pumps one at a time by means of the selection switches on the switchgear and the appropriate shut-off valves.

**DANGER****Risk of fatal injury due to electrical current!**

Do not remove the protection of live parts. Prevent any possibility of operating the elements insulating the system or the subassemblies on which maintenance is to be carried out.

**DANGER****Risk of fatal injury due to electrical current!**

When working with one of the switchgear doors open, the input terminals of the power supply line and those for remote alarm transmission may still be live, even after opening the main switch-disconnector.

**DANGER****Danger from automatic start-up!**

Before carrying out any work on the diesel motor it is advisable to disconnect the positive battery terminal to prevent undesired starting.

**DANGER****Risk of injury from hot and pressurised operating fluids!**

Before changing the motor oil make sure that the temperature is below 60 °C. In the case of water-cooled motors, remove the radiator or heat exchanger cover very slowly. Refrigeration systems are generally under pressure and a violent spillage of hot liquid can occur. Check that the motor fluid level (oil/water) is correct and that the water and oil circuit plugs are tightened correctly. **DO NOT TOP UP THE COOLANT IN AN OVERHEATED MOTOR. ALLOW IT TO COOL DOWN FIRST.** In the case of diesel motors with a water/water heat exchanger, check that the cooling system valves are locked in the open position. Check the oil and diesel fuel hoses and ensure that there are no fluid leaks.

**WARNING****Personal injury due to a lack of protective equipment!**

Personnel must always wear personal protective equipment. Maintenance must be performed **ONLY** by qualified personnel. In case of lack of instructions, always contact the supplier or qualified personnel. Never perform work alone that requires the presence of more than one person.

**WARNING****Injuries due to sparking at the battery terminal!**

Sparks may be generated when connecting or disconnecting the battery. Never connect or disconnect the battery while the motor is running.

**WARNING****Injuries due to burns!**

On the hot surfaces of the diesel motor and exhaust pipe.

**WARNING****Risk of fire or explosion!**

Potentially explosive gases can form while charging the diesel pump batteries. Avoid flames and sparks.

Never leave flammable liquids or acid-soaked rags near the water pressurization system or electrical equipment. Ensure proper ventilation of the room and fuel tank.

**CAUTION****Material damage due to the system not being switched off!**

The hydraulic pressure-boosting system does **NOT** have an emergency stop. The main pumps can only be stopped manually by deactivating the switchgear.

**FOR THIS REASON, BEFORE WORKING ON THE PUMPS, MAKE SURE THAT YOU ARE IN POSSESSION OF THE CONTROL KEY OF THE CIRCUIT BREAKERS OR (IF PRESENT) OF THE MANUAL SWITCHES.**

Open the main switch in the switchgear of the respective pump.

**WARNING****Personal injury due to missing protective device!**

Do not remove guards from rotating parts, belts, hot surfaces, etc. Never leave tools or disassembled parts on or near the system.

**NOTICE**

Unauthorised people are not permitted to enter the pump room!

**NOTICE**

For heating the oil/water of the diesel motor, an immersion or contact heating element, supplied with 230 V, can be installed.

**NOTICE****No smoking and no naked flames**

DO NOT SMOKE OR USE FLAMES WHEN CHANGING MOTOR OIL OR REFUELLING.



Units installed in accordance with these instructions normally operate with minimal maintenance. The periodic inspections and controls planned and specified in EN 12845 are intended to keep the fire-fighting system and the water pressurization systems efficient. Please refer to the weekly, monthly, quarterly, six-monthly, annual, three-yearly and ten-yearly inspection and control schedule specified in EN 12845.

**NOTICE**

Maintenance must be carried out by qualified personnel.

## 8.1 General maintenance requirements

- Perform general inspection of the assembly (including hydraulic and electrical power supply systems) to check the external condition of all components.
- Carry out general cleaning.
- Check the tightness of the check valves
- Check the operating configuration of the controller
- Check that the warning lights on the connector set are working properly
- Check that the minimum tank/well level alarm is working properly
- Check electrical connections for insulation damage, burns, loosening of terminals, etc.
- See also the procedures indicated in the user manuals specific for the various components of the pressure-boosting system.
- Check that the minimum service material required by EN 12845 is available in stock for rapid restoration of the system to full operation in the event of a fault
- Check that the idle fuel level alarm is working properly
- Check the battery charge level and charger voltage
- Check the correct operation of the solenoid shut-off valve on the diesel motor body.
- Check the level and viscosity of the lubrication oil of the pump bearing supports where applicable.
- Check the priming circuit (especially in installations above the door leaf). During all checks, check the following points:
  - All water and air pressure gauges of the system, main piping and pressure tanks
  - All water levels of storage tanks fed by aqueducts, rivers, canals, lakes (including pump priming tanks and pressure tanks)
  - The correct position of all main shut-off valves

## 8.2 Automatic pump start test

The tests for automatic starting of the pumps shall include the following checks:

1. Check the oil and fuel level of the motor
2. Reduce the water pressure on the starter to simulate an automatic start request (see Chapter 8).

3. When the pump starts, check and record the starting pressure.
4. Check the oil pressure of the diesel pump and the water flow rate in the cooling circuit.

---

### CAUTION

#### Malfunction due to missing operating fluids!

Always refill the fuel and other fluids after these checks.

---

### 8.3 Diesel pump automatic start test

After the starting test perform the following checks on the diesel motor:

1. Leave the motor running for 20 minutes or the time recommended by the manufacturer. Then switch off the motor and restart it immediately using the "manual start" button;
2. Check the water level in the primary cooling system.

During the test it is necessary to check the oil pressure, motor temperature and coolant flow rate.

Then check the oil hoses and carry out a general inspection for any leaks of fuel, coolant or exhaust fumes.

### 8.4 Periodic checks

#### WEEKLY CHECKS

1. Check ventilation and room temperature.
2. General inspection of the unit (including electrical and water supplies) to check the apparent state of all components (no leakage).
3. Carry out general cleaning.
4. Check the tightness of the check valves.
5. Check that the switchgear is in auto-start mode.
6. Check the efficiency of the electrical switchgear.
7. Check the efficiency of the switchgear alarm LEDs.
8. Check the efficiency of the minimum level alarm of the tank/tank for fire-fighting purposes/level well.
9. Check the electrical connections for burns, insulation damage and loose screws on the terminal blocks.
10. Check the preload of the expansion vessels (if any).
11. Check the efficiency of the minimum fuel level alarm.
12. Check battery charge level and charger efficiency.
13. Check the efficiency of the stop solenoid.
14. Check the viscosity and coolant oil level of the pump.
15. Check the suction pipe. The water must flow in without air pockets, check venting devices.

During all checks, take note of the following:

- all pressure readings on water and air pressure gauges (system, main ducts and pressure tanks)
- all water levels in the water supply such as rivers, canals, lakes, storage tanks (including pump priming tanks and pressurised tanks)
- the correct position of all main valves on/off

#### Automatic start test

The following aspects of automatic pumps must be checked and tested:

1. check the fuel and lubricating oil levels in diesel engines;
2. lower the water pressure in the starter to simulate automatic start conditions;
3. When the pump starts, check and record the starting pressure.

4. check oil pressure in diesel motor pumps;
5. check whether the water flow through the heat exchanger (if any) is adequate.

#### ***Diesel motor restart test***

Check the diesel motor immediately after the above pump start test:

1. Run the motor for 20 minutes at rated operating point. Stop the motor and then restart immediately with the manual start test button.
2. Check the water level in the primary closed circuit cooling circuit.
3. Check the oil pressure (read on pressure gauges), motor temperature and coolant flow during this test. Check the oil pipes and inspect the system in general for leaks (fuel, coolant or exhaust fumes).
4. Check the suction/ventilation system (air filter, operations, obstructions).

#### ***MONTHLY CHECKS***

1. Check the level and density of electrolyte in all lead-acid battery cells (including diesel motor starter batteries and those used to power the electrical switchgear).
  - ⇒ If the density is low, check the battery charger.
  - ⇒ If the device works correctly, replace the defective battery.

#### ***QUARTERLY CHECKS***

To be performed with a deadline of at least 13 weeks.

1. An inspection report must be signed, dated and handed over to the end-user. The report must contain details of each procedure performed or planned and details of external factors such as weather conditions that may have affected the results.
2. Check pipes and supports for signs of corrosion and, if necessary, paint them.
3. Check the grounding of the piping. Sprinkler system piping cannot be used for electrical grounding. Remove all such ground connections and use an alternative solution.
4. Check the water supply to each control station in the system. The pump(s) should start automatically, and the measured pressure and flow rate values should not be less than those given in the factory design.
5. Record all changes.
6. Check the correct operation of all valves supplying the sprinklers with water. Then return the valves to their normal operating position. Repeat the same operation for all water supply, control and alarm valves and all local or auxiliary circuit valves.
7. Verify and check the quantity and packaging of spare parts in stock.

#### ***SIX-MONTHLY CHECKS***

To be performed every 6 months.

1. Check the alarm and remote message system of the central switchgear.

#### ***ANNUAL CHECKS***

To be performed with a deadline of at least 12 months.

1. Check the efficiency of each pump at full load (connect the test line to the pump discharge circuit) and make sure that the pressure and flow rate values of the pump correspond to those on the rating plate.
2. Check for pressure losses in the supply lines and valves between the water source and each control station. Check that the diesel motor under test conditions does not start and check that the no-start alarm is working in accordance with the requirements of the applicable standard.
3. Then start the diesel motor immediately with the manual starting procedure.
4. Check that the float valves in the tanks are working correctly.
5. Check the suction baskets on the suction side of the pumps and the filtering accessories in the storage tank. Clean if necessary.

#### ***TRIENNIAL CHECKS***

To be performed every 3 years.

1. Empty all tanks and check them for corrosion on the outside and inside. If necessary, paint all tanks or re-apply corrosion protection.
2. Examine all water supply valves, alarm valves and control valves. If necessary, replace or service them.

#### **CHECK EVERY 10 YEARS**

To be performed every 10 years.

1. Clean and examine the inside of all water supply sources. Check tightness. For overhaul or replacement procedures for parts of the system that are damaged or no longer function properly, contact Wilo service or a specialist centre.
2. Refer to the detailed maintenance operations indicated in the manual supplied with the system. Always replace components with original spare parts or parts with the same certified characteristics.



#### **NOTICE**

Wilo accepts no liability for damage caused by unqualified personnel or when replacing original parts with spare parts having different characteristics.

### **8.5 Residual risks during the operation of the system**



#### **DANGER**

#### **Risk of fatal injury due to overpressure in the diaphragm pressure vessel!**

To avoid possible explosions, do not exceed the rated pressure limits of the jockey pump's diaphragm pressure vessel.



#### **DANGER**

#### **Risk of fatal injury due to electrical current!**

The personnel in charge of connecting the electrical equipment and motors must be qualified for the type of work and must connect it according to the wiring diagrams supplied and in compliance with the regulations and laws in force. They must also make sure that they have disconnected the power supply before carrying out any operation that involves possible contact with parts that are normally live. Check the earthing continuity.



#### **DANGER**

#### **Risk of suffocation by diesel exhaust fumes!**

Avoid switching on the diesel pumps if the gas exhaust pipes are not connected to the outside of the room.



#### **DANGER**

#### **Risk of fatal injury!**

Consequences include the risk of unintentional starting. Do not carry out maintenance work on the pump unit if automatic mode is switched on.



#### **WARNING**

#### **Cutting injuries due to sharp edges and unprotected threaded parts!**

Sharp edges or unprotected threaded parts carry the risk of cutting. Take the necessary precautions to avoid injury and use protective equipment (wear protective gloves).



**WARNING**

**Injuries due to protruding parts!**

Be careful with protruding parts or at eye level. Use protective clothing to prevent accidents.



**WARNING**

**Danger of burns!**

Take precautions to avoid contact with hot motor parts. Use guards for motor and exhaust pipe parts. Only fill the fuel tank when the diesel motor is cold. When filling the tank, take care not to spill fuel on hot diesel motor parts. Wear special gloves.



**WARNING**

**Diesel motor: Chemical burns due to battery acid!**

The batteries are filled with an acidic solution. Contact with the acidic solution leads to chemical burns! Always close batteries properly. When working on the battery, wear acid-resistant protective gloves!



**WARNING**

**Diesel motor: Environmental damage due to leaking operating fluids!**

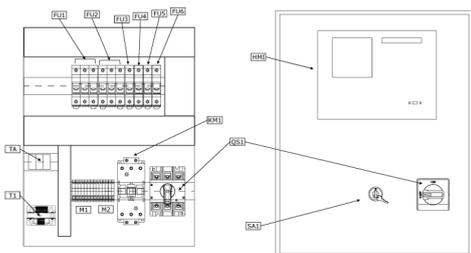
Systems with diesel motors use the following operating fluids: Motor oil, diesel fuel and battery acid. These operating fluids are harmful to the environment and must not be released into the soil or waters. Attach a suitable protective device (collecting tank, oil mat...) during transport.

Risk numbers:

- Diesel fuel: R 40, R 65, R 66, R 51/53
- Battery acid: R 35

**9 Electric pump switchgear**

**Fig. 11**



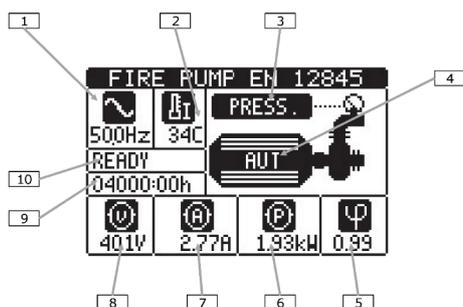
	Description
FU1-6	Fuses
HMI	Human Machine Interface
KM1	Contactur
M1, M2	Clamps
QS1	Main switch
SA1	Automatic, manual and emergency mode key switch
T1	Power transformer
TA	Amperometric transformer

**9.1 Functions**

**9.1.1 Main screen**

**Fig. 11.2**

	Description
1	Network frequency
2	Pump room temperature
3	Pressure switches status
4	Operating mode
5	Cos phi motor
6	Motor power
7	Motor current



8	Line voltage
9	Motor working hours
10	Electric pump status

### 9.1.2 Operating mode

- The device is normally in automatic mode.
- The mode selection is obtained by means of the external selector switch.
- When the switchgear is not in automatic mode, the red front LED (d) lights up to indicate that it is not ready to start from the pressure switch signal.

#### Automatic mode:

- In this mode it monitors the status of the pressure switches and in case of lack of detected pressure it proceeds with the starting of the electric pump.
- The lack of the signal (opening of the contact) of the pressure switches is highlighted by the flashing of the backlight of the display (visible from a great distance) and by the flashing word PRESS on the display synoptic, as well as by the turning on of the front LED Start request.
- In case of activation of the priming tank float, "LIV.ADESC." is flashing on the display screen.
- The correct starting of the electric pump is monitored through its electrical parameters (presence of balanced currents of adequate intensity, active power within the nominal range).
- The status of the pump started is highlighted by the corresponding green LED on the front panel.
- Once started automatically, the motor is no longer stopped unless the pressure switches have been reset and an operator has performed the stop by pressing the front STOP button.

#### Manual mode:

- When the device is in manual mode (situation highlighted by the red LED and the message on the display screen) it does not monitor the status of the pressure switches.
- In this operating mode it is possible to activate the manual "START" button to verify the correct functioning of the system during the verification and maintenance operations.

#### Emergency operation:

- When the unit is in emergency mode, the pump starts even if the HMI is faulty.

#### Test procedure:

- The periodic verification procedure involves the simulation of pressure loss of the system with the consequent attempt to start automatically.

### 9.1.3 Procedure for commissioning

Fig. 11.3



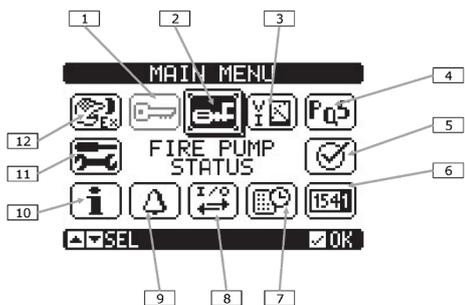
- From this page, by pressing the key , it is possible to test the signalling LEDs on the front panel.

- From this page, pressing the key , will start the motor by simulating the lack of signal from the pressure switch.
- Each time the tests are performed, the date of execution is saved and shown on the display.

### 9.1.4 Main menu

Fig. 11.4

Description



1	Password entry – Setting the numerical code that allows access to protected functions (setting parameters, execution of commands)
2	Main page access
3	Electrical measurements
4	Motor power
5	Commissioning
6	Counters
7	Events list
8	Input/output status
9	Alert status
10	System information
11	Settings – Access point for parameter programming
12	Command menu – Access point to the command menu where authorised users can perform a series of reset and restore actions

→ The main menu consists of a set of graphic icons that allow quick access to measurements and settings.

→ Starting from the page display, press the button . The display shows the quick menu.

→ Press  or  to rotate clockwise/counterclockwise until the desired function is selected. The selected icon is highlighted and the text in the central part of the display indicates the description of the function.

→ Press  to activate the selected function.

→ If some functions are not available, the corresponding icon will be disabled, i.e. displayed in light grey.

9.1.5 Access via password

- The password is used to enable or block access to the setup menu and the command menu.
- If the passwords have been enabled, you must first enter the relevant numerical access code to gain access.
- To enable the use of passwords and define the access codes, refer to the relevant setting menu.
- There are two levels of access, depending on the code entered:
  - User level access – allows you to reset the registered values and modify some settings of the device.
  - Advanced level access – same rights as the user with the possibility to modify all settings.
- From the main screen, press to call up the main menu, then select the password icon and press it.
- The password setting window will appear in the figure:

Fig. 11.5



→ Use the  and  keys to change the value of the selected digit.

→ Use the  and  keys to move between digits.

- Enter all the digits of the password, then move to the key icon.
- When the password entered corresponds to the User Level Password or Advanced Level Password, the corresponding unlock message appears.
- Once the password is unlocked, access will remain enabled until you unlock it:
  - the device is switched off.
  - the device is reset (after exiting the settings menu).
  - more than 2 minutes elapse without the operator touching any keys.

→ Press the key  to leave the password setting and exit.

9.1.6 Scrolling display pages

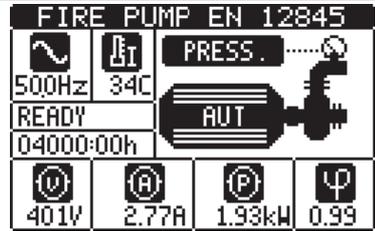
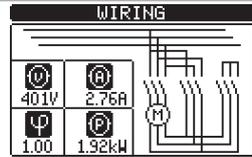
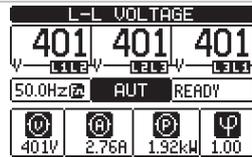
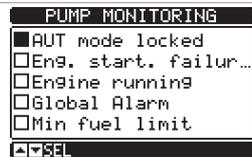
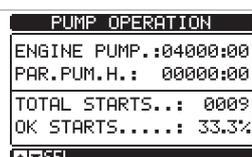


- The  and  keys scroll through the measurement display pages one at a time. The current page is recognisable by the title bar.
- Some of the measurements may not be displayed depending on the programming and connection of the unit (e.g. if a fuel level sensor is not set, the relevant page is not displayed).

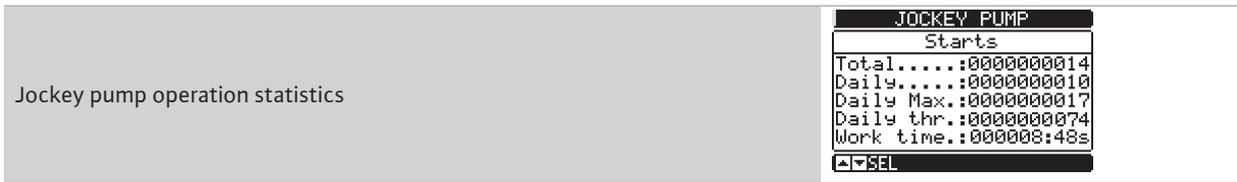


- For some pages there are sub-pages accessible via the button .
- The user has the possibility to specify on which page and on which sub-page the display must return automatically after a time has elapsed without pressing any keys.
- It is also possible to program the system so that the display always remains in the position where it was left.
- For the setting of these functions, see the relevant menu.

Overview of display pages

Page	Example
Main page	
Wiring	
Measure Voltage Current Power PF	
Pump monitoring	
Commissioning	
Pump operation statistics	

Maintenance	<p><b>MAINTENANCE</b></p> <p>MNT02</p> <p> 00699:40h</p> <p>INTERVAL...: 00720:00h LAST 04/11/2017</p> <p>▲▼SEL MNT02 ◀▶1...3</p>																																																	
Event log	<p><b>EVENT LOG</b></p> <p>CODE064 NR: E1100</p> <p>04/17/17 11:45:23</p> <p>MODE CHANGE TO: MAN MODE</p> <p>▲▼SEL ◀▶064/064</p>																																																	
Inputs/outputs	<p><b>INPUTS/OUTPUTS</b></p> <table border="1"> <thead> <tr> <th colspan="3">INP</th> <th colspan="3">OUT</th> </tr> </thead> <tbody> <tr> <td>01</td><td>06</td><td>11 16</td> <td>01</td><td>06</td><td>11 16</td> </tr> <tr> <td>02</td><td>07</td><td>12 17</td> <td><b>02</b></td><td><b>07</b></td><td>12 17</td> </tr> <tr> <td>03</td><td>08</td><td>13 18</td> <td><b>03</b></td><td>08</td><td>13 18</td> </tr> <tr> <td>04</td><td>09</td><td>14 19</td> <td><b>04</b></td><td><b>09</b></td><td>14 19</td> </tr> <tr> <td>05</td><td>10</td><td>15 20</td> <td><b>05</b></td><td>10</td><td>15 20</td> </tr> </tbody> </table> <p>▲▼SEL</p>	INP			OUT			01	06	11 16	01	06	11 16	02	07	12 17	<b>02</b>	<b>07</b>	12 17	03	08	13 18	<b>03</b>	08	13 18	04	09	14 19	<b>04</b>	<b>09</b>	14 19	05	10	15 20	<b>05</b>	10	15 20													
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Digital inputs statuses	<p><b>INPUTS</b></p> <p>INP01 Press. switch-...</p> <p>INP02 Priming tank 1...</p> <p>INP03 AUT mode locke...</p> <p>INP04 Disabled</p> <p>INP05 Disabled</p> <p>INP06 Disabled</p> <p>▲▼SEL ◀▶1...20</p>																																																	
Digital outputs statuses	<p><b>OUTPUTS</b></p> <p>OUT01 Line contactor</p> <p>OUT02 Star contactor</p> <p>OUT03 Delta contacto...</p> <p>OUT04 Mains failure</p> <p>OUT05 Pump start. fa...</p> <p>OUT06 Pump running</p> <p>▲▼SEL ◀▶1...20</p>																																																	
Remote alarms	<p><b>REMOTE ALARMS</b></p> <p>RAL01 Mains failure</p> <p>RAL02 Pump start. fa...</p> <p>RAL03 Pump running</p> <p>RAL04 Starting reque...</p> <p>RAL05 Global Alarm</p> <p>RAL06 AUT mode locke...</p> <p>▲▼SEL ◀▶1...14</p>																																																	
Alarm status	<p><b>ALARMS STATUS</b></p> <table border="1"> <tbody> <tr><td>A01</td><td>A08</td><td>A15</td><td>A22</td><td>A29</td><td>A36</td><td>A43</td></tr> <tr><td>A02</td><td>A09</td><td>A16</td><td>A23</td><td>A30</td><td>A37</td><td>A44</td></tr> <tr><td>A03</td><td>A10</td><td>A17</td><td>A24</td><td>A31</td><td>A38</td><td>A45</td></tr> <tr><td>A04</td><td>A11</td><td>A18</td><td>A25</td><td>A32</td><td>A39</td><td>A46</td></tr> <tr><td>A05</td><td>A12</td><td>A19</td><td>A26</td><td>A33</td><td>A40</td><td>A47</td></tr> <tr><td>A06</td><td>A13</td><td>A20</td><td>A27</td><td>A34</td><td>A41</td><td>A48</td></tr> <tr><td>A07</td><td>A14</td><td>A21</td><td>A28</td><td>A35</td><td>A42</td><td>A49</td></tr> </tbody> </table> <p>▲▼SEL ◀▶</p>	A01	A08	A15	A22	A29	A36	A43	A02	A09	A16	A23	A30	A37	A44	A03	A10	A17	A24	A31	A38	A45	A04	A11	A18	A25	A32	A39	A46	A05	A12	A19	A26	A33	A40	A47	A06	A13	A20	A27	A34	A41	A48	A07	A14	A21	A28	A35	A42	A49
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A07	A14	A21	A28	A35	A42	A49																																												
Date/time	<p><b>DATE / TIME</b></p> <p>12:00:07</p> <p>hh:mm:ss</p> <p>01/01/2018</p> <p>mm/dd/yyyy</p> <p>◀▶SEL ▲▼INCR/DEC <input checked="" type="checkbox"/>OK</p>																																																	
System page	<p><b>SYSTEM PAGE</b></p> <p>FPL</p> <p>MODEL...:FFL800EP</p> <p>SW. REV...:00</p> <p>HW. REV...:00</p> <p>PAR. REV...:00</p> <p>BOOTLOADER:00</p> <p>SER. NO...:00000000</p> <p>▲▼SEL ◀▶MORE ◀▶TEST</p>																																																	



**9.1.7 Communication channel**

- The standard RS485 port mounted on the switchgear is mapped as COM1.
- The communication channels are completely independent, both from the hardware point of view (physical interface type) and from the communication protocol point of view.

**9.1.8 Inputs, outputs, internal variables, counters, analogue inputs**

- The inputs and outputs are identified by an abbreviation and a progressive number. For example, digital inputs are called INP<sub>x</sub>, where x represents the input number. In the same way, digital outputs are called OUT<sub>x</sub>.
- The numbering of the inputs/outputs is simply based on the mounting position of the expansion modules, with progressive numbering from top to bottom.

**9.1.9 Limit thresholds (LIM<sub>x</sub>)**

- The LIM<sub>x</sub> limit thresholds are internal variables whose status depends on a measurement performed by the system (for example: line voltage above 420 VAC).
- To speed up the setting of the thresholds, which can range extremely wide, each of them must be set with a base value + a multiplicative coefficient (example: 2 x 1k = 2000).
- Two thresholds (upper and lower) are available for each interactive whiteboard. The upper threshold must always be set to a higher value than the lower one.
- The meaning of the thresholds depends on the following functions:

**Min. function:**

With the Min. function, the lower threshold is switched on and the upper reset threshold is reset. When the selected measured value is below the lower limit, the threshold is triggered after the set delay. When the measured value is higher than the upper limit, the reset is triggered after the set delay.

**Max. function:**

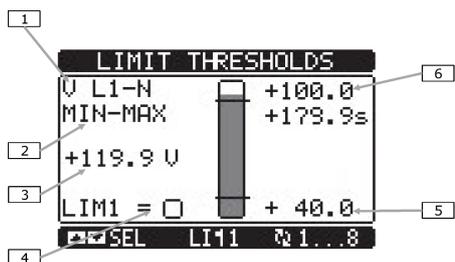
With the Max. function, the upper limit is tripped and the lower limit is reset. When the selected measured value is higher than the upper threshold, after the set delay the threshold is activated. When the measured value is lower than the lower threshold, the reset is triggered after the set delay.

**Min. + Max. function:**

With the Min. + Max. function, the lower and upper threshold values are triggered simultaneously if the selected measurement value is lower than the lower threshold or higher than the upper threshold. The threshold is tripped after the respective delay. When the measurement value is within the limits, it is immediately reset.

- Triggering of the LIM<sub>x</sub> thresholds may open or close the relay depending on the setting.
- If the LIM<sub>x</sub> threshold is set with memory, the alarm must be reset manually. The reset can be performed via the relevant command in the command menu.
- The following figure describes the relevant setting menu.

**Fig. 11.6**



	Description
1	Type of measure
2	Function
3	Measurement value
4	Variable state limit
5	Lower threshold
6	Upper threshold

**9.1.10 Remote variables (REM<sub>x</sub>)**

- A maximum of 16 remotely controlled variables can be managed (REM1 ... REM16).

- These are variables whose status can be modified at will by the user through the communication protocol and which can be used in combination with the outputs, Boolean logic, etc.
- Example: It is possible to activate and deactivate a relay freely via the monitoring software by using a remote variable (REMX) as source of an output (OUTx). This would allow the output relays to be used to control loads such as lighting or other.
- Another use of REM variables can be to enable or disable certain functions remotely, inserting them in a Boolean logic in AND with inputs or outputs.

**9.1.11 User alarms (UAx)**

- The user has the possibility to define a maximum of 8 programmable alarms (UA1 ... UA8).
- For each alarm it is possible to establish:
  - the source, i.e. the condition that generates the alarm;
  - the text of the message that must appear on the display when this condition occurs;
  - the properties of the alarm (as for standard alarms), i.e. how it interacts with the control of the pumping system.
- The condition that generates the alarm can be, for example, the exceeding of a threshold. In this case the source will be one of the LIMx limit thresholds.
- If, on the other hand, the alarm must be displayed as a result of the activation of an external digital input, then the source will be an INPx.
- With the same criterion it is possible to combine with an alarm also complex conditions resulting from the Boolean logic combination of inputs, thresholds, etc. In this case the PLCx variables will be used.
- For each alarm the user has the possibility to define a freely programmable message that will appear on the alarm pop-up window.
- For user alarms it is possible to define the properties, in the same way used for normal alarms. It will then be possible to decide whether a certain alarm should stop the motor, activate the siren or close the global alarm output etc. See chapter "Overview of alarms".
- If several alarms are present at the same time, they are shown in rotation and the total number is indicated.
- To reset an alarm that has been programmed with memory, use the appropriate command in the command menu.
- To define the alarms, see the relevant setting menu.

**9.2 Parameter programming**

To access the parameter programming menu (setup):

1. set the switchgear in MAN mode (using the key selector SA1 - The red 'padlock' led on the front lights up);

2. from the normal measurement display, press  to recall the main menu;
3. select the settings icon. If it is not enabled (displayed in grey) it means that it is necessary to enter the unlock password.

4. press  to access the settings menu.

The following table with the selection of the setting sub-menus will be displayed. All the parameters are grouped according to a criterion linked to their function.

**Fig. 11.7**



- Select the desired menu using the buttons and confirm with .
- To exit and return to the measurement display press STOP.

The following table lists the available submenus:

Code	MENU	DESCRIPTION
M01	UTILITIES	Language, brightness, display pages etc.
M02	GENERAL	System characteristic data
M03	PASSWORD	Setting access codes
M04	ROOM TEMPERATURE	Measurement source, limit thresholds

Code	MENU	DESCRIPTION
M05	PROTECTIONS	Protection alarm thresholds
M06	AUDIBLE ALARMS	Internal buzzer and external siren control
M07	AUTOMATIC TEST	Period, duration, automatic test mode
M08	MAINTENANCE	Maintenance intervals
M09	DIGITAL INPUTS	Programmable digital input functions
M10	DIGITAL OUTPUTS	Programmable digital output functions
M11	COMMUNICATION	Address, format, protocol
M12	LIMITED THRESHOLDS	Programmable limit thresholds on measures
M13	CONTACTORS	Generic programmable counters
M14	REMOTE ALARMS	Alarm/Status indication on external relays
M15	TIMER	Programmable timers for PLC logic
M16	ANALOGUE INPUTS	Voltage/current/temperature inputs
M18	USER ALARMS	Programmable alarms
M19	ALARM TABLE	Enabling and effect of alarms

Select the sub-menu and press the key  to display the parameters. All parameters are displayed with code, description, current value.

→ If you want to change the value of a parameter, after selecting it press .

If you have not entered the Advanced level password, you will not be able to access the edit page and you will see a denied login message. If you are logged in, the edit page

will be displayed. When in edit mode, the value can be changed with the  and  keys. A bar graph will also be displayed indicating the setting range, the minimum possible values, the previous value and the default value.

→ Pressing  +  sets the value to the minimum possible and pressing  +  sets the maximum possible. Pressing  +  simultaneously returns the setting to the default value.

When entering text, use the  and  keys to select the alphanumeric character and use  and  to move the cursor within the text. Pressing  +  simultaneously positions the alphanumeric selection directly on the "A" character.

→ Press  to return to parameter selection. The value entered remains stored.

Press **STOP** to save the changes and exit the settings. The switchgear performs a reset and returns to normal operation. If no keys are pressed for 2 consecutive minutes, the setup menu is automatically exited and the system returns to normal operation without saving parameters.

You can make a back-up copy to the EEPROM memory, for keyboard editable set-up data only. These can be restored to the working memory. Backup and restore data commands are available in the command menu.

### 9.3 Overview of the most important parameters

The controller is programmed and preset at the factory for fully automatic operation. However, some of the main parameters contained in the respective menus are:

M01 – Utilities		Unit	Standard	Area
P01.01	Language – Language selection for the texts on the display		English	English Italian French Spanish German
P01.02	Power on clock setup – Activate automatic access to clock setup after power up		OFF	OFF – ON
P01.03	Display contrast – Adjusting the contrast of the LCD display	%	50	0–100
P01.04	High display backlight intensity	%	100	0–100
P01.05	Low display backlight intensity	%	25	0–50
P01.06	Low backlighting transition delay	S	180	5–600
P01.07	Return to default page – Delay in resetting the default page display. If set to OFF the display always remains on the last manually selected page	S	300	OFF/10–600
P01.08	Default page – Default page shown on the display at power on and after the delay.		Global	(pages list)
P01.09	Electric pump description		FFL	String 20 char.

These parameters are accessible with user level passwords.

M02 – General		Unit	Standard	Area
P02.01	Rated voltage	VAC	400	110...600
P02.02	Type of connection		L1–L2–L3	L1–L2–L3–N L1–L2–L3
P02.03	Rated frequency	Hz	50	50/60
P02.04	Rated current	A	10.0	0.1...1000.0
P02.05	Rated power	kW	AUT	AUT / 1.0...1000.0
P02.06	Primary TA	A	5	1...5000
P02.07	Secondary TA	A	5	1 or 5
P02.08	TA measurement		3–TA	<b>1–TA–L1 (PRESET)</b> 1–TA–L2 1–TA–L3 3–TA
P02.09	Type of start-up		Star–delta	Star–delta <b>Direct (PRESET)</b> Static Impedances Autotransformer
P02.10	Reduced start-up time	S	15	1...60
P02.11	Top interlock time, between reduced voltage and full voltage	S	0.10	0.02 ... 0.50
P02.12	Temperature unit of measurement		°C	°C / °F
P02.13	Start delay from pressure switch	S	1.0	0.0–60.0
P02.14	Delayed departure from priming float	S	1.0	0.0–60.0
P02.21	Maximum pilot pump operating time	Min.	OFF	OFF/1...1000
P02.22	Delay A25–A26 – Alarm activation delay A25 Pump not under pressure and A26 Pump under pressure.	S	60	1–1000

M03 – PASSWORD		Unit	Standard	Area
P03.01	Enabling password for menu access		OFF	OFF – ON (PRESET)
P03.02	User level password		1000	0-9999
P03.03	Advanced level password		2000	0-9999
P03.04	Remote access password		OFF	OFF/1-9999

M05 – Protection		Unit	Standard	Area
P05.01	MIN voltage limit	%	85	70-100
P05.02	MAX voltage limit	%	115	100-130 / OFF
P05.03	MIN frequency limit	%	90	OFF/80-100
P05.04	MAX frequency limit	%	110	100-120/OFF
P05.05	Voltage asymmetry limit MAX	%	15	OFF / 5-25
P05.06	Current MIN threshold	%	30	OFF/ 20-100
P05.07	Current threshold MAX	%	150	130-180 / OFF
P05.08	MIN power threshold	%	30	OFF/ 20-100
P05.09	MAX power threshold	%	150	130-180 / OFF
P05.10	Start alarm inhibition time	S	AUT	AUT / 5...120
P05.11	Start attempt duration	S	30	5...120
P05.12	MAX pump pressure time	S	30	5...120
P05.13	Dry running PF threshold		0.25	0.10...1.00
P05.14	Current asymmetry threshold	%	30	10...100

M08 – Maintenance (MNTn, n=1 ... 3)		Unit	Standard	Area
P08.n.01	Maintenance interval	H	720	1-9999
P08.n.02	Maintenance hours count		Total hours	Total hours Pump hours

**Note: This menu is divided into 3 sections, referring to the 3 independent MNT1 ... MNT3 maintenance intervals.**

**P08.n.01** – Defines the scheduled maintenance period, expressed in hours. If set to OFF, this maintenance interval is disabled.

**P08.n.02** – Defines how the time elapsed for the specific maintenance interval is to be counted: Total hours = The actual time elapsed since the date of the previous maintenance is counted. Pump hours = Pump operating hours are counted.

M11 – Communication (COMn, n=1 ... 3)		Unit	Standard	Area
P11.n.01	Node serial address		1	1-255
P11.n.02	Serial speed	bps	9600	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
P11.n.03	Data formats		8 bit - n	8 bit, none 8 bit, odd bit, even 7 bit, odd 7 bit, even
P11.n.04	Stop bits		1	1-2
P11.n.05	Protocol		Modbus RTU	Modbus RTU Modbus ASCII Modbus TCP

#### 9.4 Overview of alarms

Different properties can be assigned to each alarm, including user alarms:

- Alarm enabled – General alarm enabled. If not enabled, it is as if it does not exist.
- Reasonable alarm – Remains stored even if the cause of the alarm has been removed until manually silenced by the operator.

- Global alarm – Activates the output assigned to this function.
- Alarm type A – Activates the output assigned to this function.
- Alarm type B – Activates the output assigned to this function.
- Siren – Activates the output assigned to this function, with the modes defined in menu M06 Audible alarms.
- Sir.04 – If the siren has been silenced and the alarm is still active after 4 hours, the acoustic alarm will be reactivated.
- Sir.24 – If the siren has been silenced and the alarm is still active after 24 hours, the acoustic signal will be reactivated.
- In Motorcycle – Alarm enabled only when the motor is running.
- Inhibit – The alarm can be temporarily disabled by activating a programmable input with the Inhibit alarm function.
- Modem – A modem connection is made with the modes foreseen by the relative set-up data set.
- No LCD – The alarm is managed normally but is not shown on the display.

		Enabled	Retentive	Global	Type A	Type B	Siren	Sir.04	Sir.24	Running	Inhibit	Modem	No LCD
CODE	DESCRIPTION	DEFAULT ALARM PROPERTIES											
A01	Low mains voltage	•		•		•	•		•			•	
A02	High voltage grid	•		•		•	•		•			•	
A03	Low network frequency	•		•		•	•		•			•	
A04	High frequency network	•		•		•	•		•			•	
A05	Mains voltage asymmetry	•		•		•	•		•			•	
A06	Phase failure	•		•		•	•		•			•	
A07	Incorrect phase sequence	•		•		•	•		•			•	
A08	Failure to start the pump	•	•	•		•	•	•		•		•	
A09	Locked rotor	•	•	•		•	•	•		•		•	
A10	Dry running	•	•	•		•	•	•		•		•	
A11	Current too low	•	•	•		•	•	•		•		•	
A12	Current too high	•	•	•		•	•	•		•		•	
A13	Unbalanced currents	•	•	•		•	•	•		•		•	
A14	Unexpected current		•	•		•	•	•				•	
A15	Wrong CT connection	•		•		•	•		•			•	
A16	System error xx	•	•	•		•	•					•	
A17	Low pump room temperature	•	•	•		•	•					•	
A18	High local pump temperature	•	•	•		•	•					•	
A19	Water reserve	•		•		•	•					•	
A20	Low tank level	•		•		•	•					•	
A21	Empty tank	•		•		•	•					•	
A22	Low priming tank level	•		•		•	•					•	
A23	System not in automatic mode	•		•		•	•					•	
A24	Electric pump in operation	•		•	•	•	•					•	•
A25	Non-pressure pump	•		•		•	•					•	
A26	Pressure pump	•		•		•	•					•	
A27	Maintenance request 1	•	•	•		•	•					•	
A28	Maintenance request 2	•	•	•		•	•					•	
A29	Maintenance request 3	•	•	•		•	•					•	
A30	Partially open suction valve	•	•	•		•	•	•				•	

		Enabled	Retentive	Global	Type A	Type B	Siren	Sir.04	Sir.24	Running	Inhibit	Modem	No LCD
A31	Delivery valve partially open	•	•	•		•	•	•				•	
A32	Local sprinkler pumps in operation	•	•	•	•		•	•				•	
A33	Maximum number of pilot pump starts	•	•	•		•	•	•				•	
A34	Pilot pump failure	•	•	•		•	•	•				•	
A35	Maximum pilot pump time	•	•	•		•	•	•				•	
A36	Drainage pump failure	•	•	•		•	•	•				•	
A37	Communication error	•		•		•	•	•				•	
A38	Pressure switch test error	•		•		•	•	•				•	
A39	Test valve open	•	•	•		•	•	•				•	
A40	Power too low	•	•	•		•	•	•		•		•	
A41	Power too high	•	•	•		•	•	•		•		•	
UA1	User Alarm 1	•											
...	...												
UA8	User Alarm 8	•											

#### 9.4.1 Description of alarms

CODE	DESCRIPTION	CAUSE
A01	Low mains voltage	Mains voltage below the threshold set in P05.01.
A02	High voltage grid	Grid voltage above the threshold set in P05.02.
A03	Low network frequency	Grid frequency below the threshold set in P05.03.
A04	High frequency network	Grid frequency above the threshold set in P05.04.
A05	Mains voltage asymmetry	Grid voltage asymmetry higher than the threshold set in P05.05.
A06	Phase failure	Lack of one of the phases.
A07	Incorrect phase sequence	Incorrect phase sequence.
A08	Failure to start the pump	The motor has not started with a current greater than 10% of the rated current in the times defined in the M05 menu or the input programmed with the pump pressure switch function has not closed.
A09	Locked rotor	Motor current higher than 500% of the rated for a time longer than 5s.
A10	Dry running	Pump runs with vacuum. Measured power factor lower than the threshold set in P05.13
A11	Current too low	The motor current is below the threshold set in P05.06.
A12	Current too high	The motor current is higher than the threshold set in P05.07.
A13	Unbalanced currents	The maximum current asymmetry threshold set in P05.14 has been exceeded.
A14	Unexpected current	The printed circuit board detects a current greater than 5 % of the $I_n$ even though it has no influence on the motor start
A15	Wrong CT connection	One or more current transformers are not connected correctly (negative active power is measured). Check the connections at terminals 57, 58, 59, 60
A16	System error xx	Internal error. Contact Technical Support
A17	Low pump room temperature	The pump room temperature is below the threshold set in P04.02 for longer than P04.03.
A18	High local pump temperature	The pump room temperature is above the threshold set in P04.04 for longer than P04.05.
A19	Water reserve	Alarm generated by the input programmed with the Water Reserve function.
A20	Low tank level	Water level in the tank below the threshold set in P02.18.
A21	Empty tank	Water level in the tank below the threshold set in P02.19.

CODE	DESCRIPTION	CAUSE
A22	Low priming tank level	The input programmed with the Priming Float function is activated.
A23	System not in automatic mode	System not in automatic mode for more than 24 hours.
A24	Electric pump in operation	Alarm generated by the input programmed with the 'Start pressure switch' function active.
A25	Non-pressure pump	Alarm generated by the input programmed with the Pump pressure switch function not active after 1 minute with the motor running.
A26	Pressure pump	Alarm generated by the input programmed with the Pump pressure switch function active for 1 minute with the motor not running.
A27	Maintenance request 1	Alarm generated when the maintenance hours of the relative interval reach zero. See menu M08. Use the command menu to reset the operating hours and reset the alarm to zero.
A28	Maintenance request 2	
A29	Maintenance request 3	
A30	Partially open suction valve	Alarm generated by the input programmed with the "Partially open suction valve" function. In this situation, the suction valve on the suction side is not able to deliver the maximum flow rate required by the electric pump
A31	Delivery valve partially open	Alarm generated by the input programmed with the "Delivery valve partially open" function. In this situation the pressure-side valve is not able to deliver the maximum flow rate required for the sprinkler system
A32	Local sprinkler pumps in operation	Alarm generated by the programmed inlet with the 'Sprinkler activated' function.
A33	Maximum number of pilot pump starts	Alarm generated when the threshold set in parameter P02.20 is exceeded if there is an input programmed with the 'Pilot pump active' function.
A34	Pilot pump failure	Alarm generated by the input programmed with the 'Pilot pump failure' function.
A35	Maximum pilot pump time	Alarm generated when the threshold set in parameter P02.21 is exceeded if there is an input programmed with the 'Pilot pump active' function.
A36	Drainage pump failure	Alarm generated by the input programmed with the 'Drain pump failure' function.
A37	Communication error	Communication via RS-485 does not work correctly. Check wiring and communication parameter settings in M11 menu.
A38	Pressure switch test error	During the automatic test (in ON-OUT mode) the pressure switch remains closed for more than one minute.
A39	Test valve open	Alarm generated by the input programmed with the 'Test valve' function.
A40	Power too low	The motor power is below the threshold set in P05.08.
A41	Power too high	The motor power is higher than the threshold set in P05.09.
UA1	User Alarm 1	The user alarm is generated by the activation of the variable or associated input via the M18 menu.
...	...	
UA8	User Alarm 8	

## 9.5 Overview of functions

### 9.5.1 Overview of input functions

The following table shows all the functions that can be associated with INPn programmable digital inputs. Each input can then be set so as to have an inverted function (NO/NC), to be delayed when energised or de-energised with independent settable times. Some functions require an additional numerical parameter, defined with the index (x) specified by parameter P09.n.02. See menu M09 Digital Inputs for more details.

Function	Description
Disabled	Input disabled.
Configurable	Free user configuration To be used, for example, if the input is used in a PLC logic
Starting pressure switch	Electric pump starting from pressure switch contacts.
Solicitation float	Electric pump starting by priming float switch contacts.
Automatic start lock	Automatic mode exclusion selector.
Water reserve	Water reserve alarm.
Start automatic test	Start periodic test
Remote control lock	Locks command and write operations via serial port. Data reading is always possible.
Lock set-up	Inhibits access to the programming menu.

Function	Description
Keypad lock	Locks the operation of the front keyboard, excluding page navigation keys.
Silencing siren	Disables the siren.
Alarm inhibition	If activated, it allows to disable the alarms with the property "Alarm Inhibition" activated
Reset alarms	Reset of the alarm whose triggering condition has ceased
Command menu Cxx	Executes the command menu command defined by the index parameter (x).
STOP button	Closing the input is equivalent to pressing the STOP key.
RESET button	Closing the input is equivalent to pressing the RESET key.
TEST inhibition	Prevents automatic test execution
LED test	Turns on all LEDs on the front panel (lamp test).
Automatic stop enable	When closed, it enables the automatic motor stop parameter P02.16. To comply with EN 12845 this input must be deactivated.
Pump pressure switch	When the input is activated it indicates that the pump is under pressure.
Partially open suction valve	With input activated, it signals alarm A30 Partially open suction valve.
Delivery valve partially open	With input activated, it signals alarm A31 Partially open delivery valve.
Sprinkler activated	With input activated, it signals alarm A32 Sprinkler pump room in operation.
Pilot pump (jockey) active	With input activated, it signals that the pilot pump is started.
Pilot pump failure	With input active, it signals that the pilot pump in the pump room is not working (e.g. thermal trip).
Drainage pump failure	With active input it signals that the drainage pump in the pump room is not able to operate (e.g. thermal trip).
Flood valve	With active input it signals the active deluge valve
OFF mode	With active input, the pump control outputs are opened and further starts are inhibited.
Test valve	With active input, it signals alarm A39 Test valve open.
Modbus writing inhibited	With active input, it inhibits write commands via Modbus.

#### Default input functions

Input	Function
INP1	Starting pressure switch
INP2	Solicitation float
INP3	Automatic start lock
INP4	Pilot pump start control

#### 9.5.2 Overview of output functions

The following table shows all the functions that can be associated with OUTn programmable digital outputs. Each output can then be set to have normal or inverted function (NOR or REV). Some functions require an additional numeric parameter, defined with the index (x) specified by parameter P10.n.02. See menu M10 Digital Outputs for more details.

Function	Description
Disabled	Output disabled
Configurable	Free user configuration To be used, for example, if the output is used in a PLC logic
Line contactor	Line contactor control.
Star contactor	Star contactor command.
Triangle contactor	Triangle contactor command.
Truck contactor	Autotransformer contactor command.
Bypass contactor	Bypass contactor command.
AUT mode locked	Indicates that the automatic mode has been excluded.
Lack of tension	Indicates power failure.
Failure to start	Indicates that the motor has not started (alarm A08).
Start-up request	The pressure switches have requested the activation of the electric pump.

Function	Description
Motorcycle pump	Indicates that the pump is started.
Global alert	Output activated in the presence of any alarm with global alarm properties activated.
Siren	Power supply to the alarm siren.
Remote alarms	Pulsed output for communication with the FFLRA unit when performed in digital I/O mode
Room temperature heater	Controls the output of the room heater, driven by room temperature
Type A failure	Fire alarm.
Type B failure	Technical fault alarm.
Device failure	Output normally energised. De-energises for system errors (all) or if microprocessor is not in control
Local ventilation	Output energised when pump room temperature is close to A18 (3 degrees lower) alarm. Stops when the temperature has fallen below the threshold for 1 minute.
PLC(x)	Output controlled by PLCx flag.
REM(x)	Output controlled by remote variable REMx.
Interactive whiteboard (x)	Output controlled by LIM(x) limit threshold status.
TIMx	Output controlled by TIMx timer variable.
Partially open suction valve	Output active if the inlet function is programmed Partially open inlet valve and this inlet is active.
Delivery valve partially open	Output active if the inlet function is programmed Partially open inlet valve and this inlet is active.
Sprinkler activated	Output active if the Sprinkler input function is programmed and this input is active.
Drainage pump failure	Output active if the drain pump failure input function is programmed and this input is active.
Low pump room temperature	Output energised when alarm A17 Pump room temperature too low is active.
Pilot pump failure (jockey)	Output active if pilot pump failure input function is programmed and this input is active.
AUTOMATIC TEST start	This output is activated during the first 20 seconds of the automatic test, see parameter P07.01
Axx	Output energised when alarm Axx is active (xx = 1 ... number of alarms)
UAx	Output energised when user alarm UAx is active.

#### **Default output functions**

Output	Function
OUT1	Line contactor
OUT4	Lack of tension
OUT5	Failure to start
OUT6	Motorcycle pump
OUT9	Start-up request

## 9.6 Command menu

The command menu allows you to perform occasional operations such as zeroing measurements, counters, alarms, etc. If you have entered the password for advanced access, then you can also use the command menu to perform automatic operations useful for configuring the instrument. The following table shows the functions available with the command menu, divided according to the level of access required.

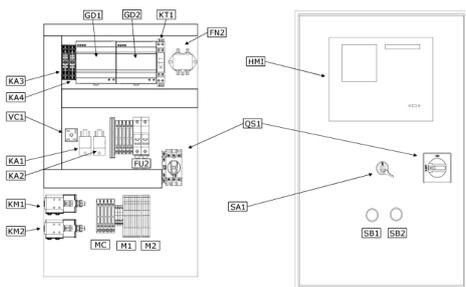
CODE	COMMAND	ACCESS	DESCRIPTION
C01	Reset maintenance interval 1	User	Resets the MNT1 maintenance alarm and recharges the maintenance counter at the set hours. Maintenance can only be reset if all the following conditions have occurred in the previous hours: → the motor must be started; → opening of the pressure switch; → no active alarm excluding the maintenance alarm.
C02	Reset maintenance interval 2	User	As above, referring to MNT2.
C03	Reset maintenance interval 3	User	As above, referring to MNT3.
C04	Partial engine hour meter reset	User	Resets the partial hour meter of the electric pump to zero.
C05	Reset generic CNTx counters	User	Resets the generic CNTx counters

CODE	COMMAND	ACCESS	DESCRIPTION
C06	Reset LIMx limits status	User	Resets the status of the retention LIMx limits.
C07	Total engine hour counter reset	Advanced	Resets the total hours counter of the electropump.
C08	Motor hour meter setting	Advanced	It allows to set the total hours counter of the electric pump to a desired value.
C09	Startup counter reset	Advanced	Resets the start attempt counter and the percentage of successful attempts
C10	Reset MAX/MIN	Advanced	Resets the maximum and minimum values.
C11	Reset event list	Advanced	Resets the list of events history.
C12	Reset parameters to default	Advanced	Resets all set-up menu parameters to factory setting
C13	Save parameters to backup memory	Advanced	Copies the currently set parameters to a backup area for future restoration.
C14	Reload parameters from backup memory	Advanced	Transfers the parameters saved in the backup memory to the active settings memory.
C15	I/O Forcing	Advanced	Enables the test mode that allows you to manually energise any output. <b>NOTICE:</b> <b>In this mode, the responsibility for controlling the outputs is completely entrusted to the end-user.</b>
C16	PLC program reset	Advanced	Clears the program with PLC logic from the internal memory

Once you have selected the desired command, press  to execute it. The instrument will ask for confirmation. Pressing again  the command will be executed. To cancel the execution of a selected command press STOP. To exit the command menu press STOP.

## 10 Switchgear of diesel pump

Fig. 12

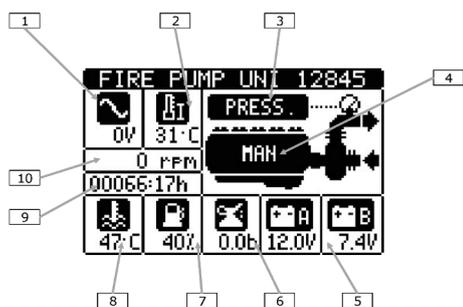


	Description
FN2	EMC filter
FU2	Fuses
GD1	Battery charger - Battery 1
GD2	Battery charger - Battery 2
HMI	Human Machine Interface
KA1-4	Auxiliary relays
KM1-2	Battery power contactor
KT1	Amperometric transformer
M1, M2	Clamps
MC	Fuse clamps
QS1	Main switch
SA1	Auto mode key switch
SB1	Manual emergency start button - Battery 1
SB2	Manual emergency start button - Battery 2
VC1	Diode bridge

### 10.1 Functions 10.1.1 Main screen

Fig. 12.2

	Description
--	-------------



1	Network frequency
2	Pump room temperature
3	Pressure switches status
4	Operating mode
5	Battery voltage A and B
6	Motor oil pressure
7	Fuel level
8	Motor oil temperature
9	Motor working hours
10	Motor speed

### 10.1.2 Operating mode

- Operating mode selection is obtained by means of the external selection switch.
- When the control unit is not in automatic mode, the red front LED (d) lights up to indicate that it is not ready to start from the pressure switch signal.

#### **Automatic mode:**

- In this mode it monitors the status of the pressure switches or the priming tank float and in the event of a lack of pressure detected it proceeds with attempts to start the motor.
- The lack of the signal (opening of the contact) of the pressure switches is highlighted by the flashing of the backlight of the display (visible from a great distance) and by the flashing word PRESS on the display screen.
- In case of activation of the priming tank float, "LIV.ADESC." is flashing on the display screen.
- As per regulations, the automatic starting attempts are alternated between battery A and battery B. The device always remembers with which battery the last attempt was made and the next one will be on the alternative battery. The currently selected battery is indicated by the yellow LED.
- As soon as one of the starting relays is energised, it is verified that the feedback signal of the inserted pinion is at the correct voltage. If this is not the case, the relay is de-energised and then re-inserted with a new attempt.
- If the motor start is detected (speed higher than the set threshold) the starting relay is de-energised. The state of the motor running is indicated by the green LED.
- If, on the other hand, the motor does not start, the attempt continues for the set maximum time (default 6s) and then pauses and attempts with the alternative battery relay.
- The attempts are alternated up to the set maximum number, after which the alarm A31 failed motor start is generated.
- When the A31 alarm occurs, the display shows the instructions for manual reset of the alarm (LED/MAN TEST button). The reset will only be possible after the motor has started successfully.
- Once the motor has started automatically, it will not stop again until the pressure switches have not been reset and an operator has not performed the stop by pressing the front STOP button.

#### **Manual mode:**

- When the device is in manual mode (situation highlighted by the red LED and the message on the display screen) it does not monitor the status of the pressure switches or the priming tank float.
- In this mode it is possible to operate the manual keys START A and START B to verify the correct functioning of the system during the verification and maintenance operations.
- The above-mentioned keys are operative only in the manual mode or in case of an internal failure of the switchgear.

#### **Test procedure:**

- The periodic verification procedure involves the simulation of pressure loss of the system with the consequent attempt to start automatically.
- According to the regulations, it must be verified that, by artificially preventing the motor from starting (fuel shutdown) the system is able to make all the expected starting attempts and to generate the A31 alarm.
- As a consequence of this situation, the fuel must be restored and it must be verified that the next starting cycle is successful. This second start cycle is started by pressing the MAN TEST key (yellow led activated).

→ The alarm can only be reset if the start is successful.

### 10.1.3 Procedure for commissioning

Fig. 12.3



→ From this page, by pressing the key , it is possible to test the signalling LEDs on the front panel.

→ From this page, pressing the key , will start the motor by simulating the lack of signal from the pressure switch. The duration and pause of the starting attempts are those foreseen by the standard in the commissioning test on site.

→ Each time the tests are performed, the date of execution is saved and shown on the display.

→ Detection of the motor speed: The setting is protected by the extended password when activated. Start the motor. When the motor reaches the RPM with a constant

speed, press  and  simultaneously to start the automatic motor RPM acquisition procedure. During the procedure it is still possible to increase and de-

crease the motor RPM value. By pressing  it decreases and with  it increases.

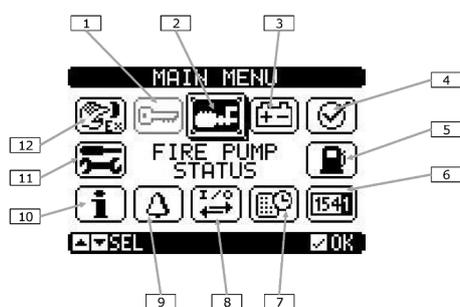


#### NOTICE

This procedure is also useful for checking the state of the batteries: In the event that a correct value voltage is measured at the ends of a battery due to the voltage generated by the battery charger, it may happen that this value drops sharply during start-up.

### 10.1.4 Main menu

Fig. 12.4



	Description
1	Password entry - Setting the numerical code that allows access to protected functions (setting parameters, execution of commands)
2	Main page access
3	Battery status
4	Commissioning
5	Fuel tank status
6	Counters
7	Events list
8	Input/output status
9	Alert status
10	System information
11	Settings – Access point for parameter programming
12	Command menu – Access point to the command menu where authorised users can perform a series of reset and restore actions

→ The main menu consists of a set of graphic icons that allow quick access to measurements and settings.

→ Starting from the page display, press the button . The display shows the quick menu.

→ Press  or  to rotate clockwise/counterclockwise until the desired function is selected. The selected icon is highlighted and the text in the central part of the display indicates the description of the function.



- Press  to activate the selected function.
- If some functions are not available, the corresponding icon will be disabled, i.e. displayed in light grey.

### 10.1.5 Access via password

- The password is used to enable or block access to the setup menu and the command menu.
- If the passwords have been enabled, you must first enter the relevant numerical access code to gain access.
- To enable the use of passwords and define the access codes, refer to the relevant setting menu.
- There are two levels of access, depending on the code entered:
  - User level access - allows you to reset the registered values and modify some settings of the device.
  - Advanced level access - same rights as the user with the possibility to modify all settings.
- From the main screen, press to call up the main menu, then select the password icon and press it.
- The password setting window will appear in the figure:

Fig. 11.5



- Use the  and  keys to change the value of the selected digit.
- Use the  and  keys to move between digits.
- Enter all the digits of the password, then move to the key icon.
- When the password entered corresponds to the User Level Password or Advanced Level Password, the corresponding unlock message appears.
- Once the password is unlocked, access will remain enabled until you unlock it:
  - the device is switched off.
  - the device is reset (after exiting the settings menu).
  - more than 2 minutes elapse without the operator touching any keys.



- Press the key  to leave the password setting and exit.

### 10.1.6 Scrolling display pages



- The  and  keys scroll through the measurement display pages one at a time. The current page is recognisable by the title bar.
- Some of the measurements may not be displayed depending on the programming and connection of the unit (e.g. if a fuel level sensor is not set, the relevant page is not displayed).

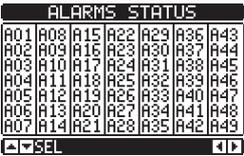
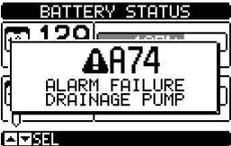


- For some pages there are sub-pages accessible via the button .
- The user has the possibility to specify on which page and on which sub-page the display must return automatically after a time has elapsed without pressing any keys.
- It is also possible to program the system so that the display always remains in the position where it was left.
- For the setting of these functions, see the relevant menu.

#### Overview of display pages

Page	Example
Main page	

Page	Example
Battery status	<p>BATTERY STATUS</p> <p>120 100%</p> <p>120 100%</p> <p>SEL</p>
Auxiliary voltage	<p>AUXILIARY VOLTAGE</p> <p>0 0%</p> <p>SEL</p>
Pump monitoring	<p>PUMP MONITORING</p> <p><input checked="" type="checkbox"/> AUT mode locked</p> <p><input type="checkbox"/> Eng. start. failure...</p> <p><input type="checkbox"/> Engine running</p> <p><input type="checkbox"/> Global Alarm</p> <p><input type="checkbox"/> Min fuel limit</p> <p>SEL</p>
Commissioning	<p>COMMISSIONING</p> <p>01/04/2016</p> <p>LED TEST</p> <p>01/12/2016</p> <p>ENGINE STARTING TEST</p> <p>D+ = 0.0V rpm = 0</p> <p>ST-FB= 0.0V RPM AUT</p> <p>SEL</p>
Pump operation statistics	<p>ENGINE OPERATION</p> <p>ENGINE HOURS:00066:19</p> <p>PAR EN.HOURS:00022:19</p> <p>TOTAL STARTS.A: 0598</p> <p>OK STARTS...A: 16.8%</p> <p>TOTAL STARTS.B: 0592</p> <p>OK STARTS...B: 11.1%</p> <p>SEL</p>
Maintenance	<p>MAINTENANCE</p> <p>MNT02</p> <p>00699:40h</p> <p>INTERVAL...: 00720:00h</p> <p>LAST 04/11/2017</p> <p>SEL MNT02 1...3</p>
Event log	<p>EVENT LOG</p> <p>CODE064 NR: E1100</p> <p>04/17/17 11:45:23</p> <p>MODE CHANGE TO:</p> <p>MAN MODE</p> <p>SEL 064/064</p>
Digital input list and status	<p>INPUTS</p> <p>INP01 Disabled</p> <p>INP02 Prining tank 1...</p> <p>INP03 AUT mode locke...</p> <p>INP04 Fuel level</p> <p>INP05 Low engine tem...</p> <p>INP06 Oil pressure</p> <p>SEL 1...20</p>
Digital output list and status	<p>OUTPUTS</p> <p>OUT01 Starting A mot...</p> <p>OUT02 Starting B mot...</p> <p>OUT03 Eng.on- key cr...</p> <p>OUT04 Stop magnet</p> <p>OUT05 AUT mode locke...</p> <p>OUT06 Eng. start. fa...</p> <p>SEL 1...20</p>

Page	Example
Alarm status	
Pop-up pages when an alarm occurs	 
Pilot pump operation statistics	

**10.1.7 Communication channel**

- A maximum of 2 communication modules, called COMn, can be connected in addition to the RS-485 on board the control unit. The communications setup menu then includes three sections (n=1 ... 3) of parameters for setting the communication ports.
- The RS485 port mounted as standard on the control unit is mapped as COM1, so any additional channels will be named COM2 and COM3.
- The communication channels are completely independent, both from the hardware point of view (physical interface type) and from the communication protocol point of view.
- The communication channels can work simultaneously.
- Through appropriate programming (see parameter P17.n.09) FFL can act as Modbus main pump, collecting the information of the other devices of the fire-fighting system equipped with RS485 to coordinate them and send them to the alarm remote control system.

**10.1.8 Compliance with EN 12845**

With the control unit set by default the operation complies with the EN12845 standard. For this condition to be maintained, the following conditions must be met:

1. the automatic test must be disabled (P13.01 = OFF);
2. the motor detection started must come from the pick-up signal (P07.01 ≠ OFF and P12.02 ≠ OFF);
3. the delayed automatic stop parameter must be disabled (P02.10 = OFF);
4. the input with the Enable automatic stop function must be disabled or the function must not be combined with any input (as default);
5. the motor stop must be made exclusively through the Stop Magnet function combined with a programmable output.

If any of the prescriptions are not respected, the writing EN12845 disappears from the main page of the display.

**10.2 Parameter programming**

To access the parameter programming menu (setup):

1. set the switchgear in MAN mode (using the key selector SA1 – The red 'padlock' led on the front lights up);

2. from the normal measurement display, press  to recall the main menu;
3. select the settings icon. If it is not enabled (displayed in grey) it means that it is necessary to enter the unlock password.
4. Press  to access the settings menu.

The following table with the selection of the setting sub-menus will be displayed. All the parameters are grouped according to a criterion linked to their function.

Fig. 12.6



- Select the desired menu using the buttons   and confirm with .
- To exit and return to the measurement display press STOP.

The following table lists the available submenus:

Code	MENU	DESCRIPTION
M01	UTILITIES	Language, brightness, display pages etc.
M02	GENERAL	System characteristic data
M03	PASSWORD	Setting access codes
M04	ROOM TEMPERATURE	Measurement source, limit thresholds
M05	BATTERY	Battery parameters
M06	AUDIBLE ALARMS	Internal buzzer and external siren control
M07	ENGINE ROUTES	RPM measurement source, limit thresholds
M08	OIL PRESSURE	Measurement source, limit thresholds
M09	ENGINE TEMPERATURE 1	Measurement source, limit thresholds
M10	ENGINE TEMPERATURE 2	Measurement source, limit thresholds
M11	FUEL LEVEL	Measurement source, limit thresholds
M12	ENGINE START	Motor start and stop mode
M13	AUTOMATIC TEST	Period, duration, automatic test mode
M14	MAINTENANCE	Maintenance intervals
M15	DIGITAL INPUTS	Programmable digital input functions
M16	DIGITAL OUTPUTS	Programmable digital output functions
M18	COMMUNICATION	Address, format, protocol
M19	LIMITED THRESHOLDS	Programmable limit thresholds on measures
M20	CONTACTORS	Generic programmable counters
M21	REMOTE ALARMS	Alarm/Status indication on external relays
M22	TIMER	Programmable timers for PLC logic
M23	ANALOGUE INPUTS	Voltage/current/temperature inputs
M24	USER ALARMS	Programmable alarms
M25	ALARM TABLE	Enabling and effect of alarms

- Select the sub-menu and press the key  to display the parameters. All parameters are displayed with code, description, current value.

- If you want to change the value of a parameter, after selecting it press .

If you have not entered the Advanced level password, you will not be able to access the edit page and a denied access message will be displayed. If you are logged in, the edit

page will be displayed. When in edit mode, the value can be changed with the .

and  keys. A bar graph will also be displayed indicating the setting range, the minimum possible values, the previous value and the default value.

→ Pressing  +  sets the value to the minimum possible and pressing  +  sets the maximum possible. Pressing  +  simultaneously returns the setting to the default value.

When entering text, use the  and  keys to select the alphanumeric character and use  and  to move the cursor within the text. Pressing  +  simultaneously positions the alphanumeric selection directly on the "A" character.

- Press  to return to parameter selection. The value entered remains stored.
- Press **STOP** to save the changes and exit the settings. The switchgear performs a reset and returns to normal operation. If no keys are pressed for 2 consecutive minutes, the setup menu is automatically exited and the system returns to normal operation without saving parameters.

You can make a back-up copy to the EEPROM memory, for keyboard editable set-up data only. These can be restored to the working memory. Backup and restore data commands are available in the command menu.

### 10.3 Overview of the most important parameters

The controller is programmed and preset at the factory for fully automatic operation. However, some of the main parameters contained in the respective menus are:

M01 – Utilities		Unit	Standard	Area
P01.01	Language – Language selection for the texts on the display		English	English Italian French Spanish German
P01.02	Power on clock setup – Activate automatic access to clock setup after power up		OFF	OFF – ON
P01.03	Display contrast – Adjusting the contrast of the LCD display	%	50	0–100
P01.04	High display backlight intensity	%	100	0–100
P01.05	Low display backlight intensity	%	25	0–50
P01.06	Low backlighting transition delay	S	180	5–600
P01.07	Return to default page – Delay in resetting the default page display. If set to OFF the display always remains on the last manually selected page	S	300	OFF/10–600
P01.08	Default page – Default page shown on the display at power on and after the delay.		Global	(pages list)
P01.09	Motor pump description		FFL	String 20 char.

These parameters are accessible with user level passwords.

M02 – General		Unit	Standard	Area
P02.01	Rated motor speed	S	1.0	0.0–60.0
P02.02	Temperature unit of measurement		°C	°C / °F

M02 – General		Unit	Standard	Area
P02.03	Start delay from pressure switch	S	1.0	0.0–60.0
P02.04	Delayed departure from priming float	S	1.0	0.0–60.0
P02.05	Waiting time automatic stop from priming float	S	OFF	OFF/1 ... 10000
P02.06	Rated aux voltage	VAC	230	100–240
P02.07	Minimum aux voltage threshold	%	75	OFF/50–100
P02.08	Maximum aux voltage threshold	%	120	100–130/OFF
P02.09	Aux voltage alarm delay	S	30	0–600
P02.10	Waiting time automatic stop from pressure switch	S	OFF	OFF/0...10000
P02.15	Analogue AINx channel for water level monitoring in the storage tank		OFF	OFF/1–4
P02.16	Low water level threshold in the tank	%	20	0–100
P02.17	Threshold for water level in cooling circuit	%	10	0–100
P02.18	Water level threshold for	S	60	0...10000
P02.19	Maximum number of pilot starts		OFF	OFF/0...10000
P02.20	Maximum pilot pump operating time	Min.	OFF	OFF/1...1000
P02.21	Alarm delay A56–A57 .	S	60	1–1000
M03 – PASSWORD		Unit	Standard	Area
P03.01	Enabling password for menu access		OFF	OFF – ON (PRESET)
P03.02	User level password		1000	0–9999
P03.03	Advanced level password		2000	0–9999
P03.04	Remote access password		OFF	OFF/1–9999
M04 – Ambient temperature		Unit	Standard	Area
P05.01	Room temperature reading –Defines the source from which the room temperature measurement is taken. OFF = measurement disabled. INT = measurement from sensor incorporated in the control unit. EXT = temperature measurement taken from NTC remote probe connected to terminals 53 and 54.		INT	OFF INT EXT
P05.02	Minimum temperature alarm threshold for alarm A46	°	4	0–70
P05.03	Minimum temperature alarm delay for alarm A46	S	10	0–600
P05.04	Maximum temperature alarm threshold for alarm A47	°	40	0–160
P05.05	Maximum temperature alarm delay for alarm A47	S	10	0–600
P05.06	Room heater start threshold	°	8	0–70
P05.07	Room heater stop threshold	°	10	0–70
P05.08	Heater start/stop delay	S	10	0–600
M05 – Batteries		Unit	Standard	Area
P05.01	Rated battery voltage	V	12	12/24
P05.02	MAX voltage limit	%	130	110–140
P05.03	MIN voltage limit	%	75	60–130
P05.04	MIN/MAX voltage delay	S	10	0–120
P05.05	Battery boost interval	H	168	1–1000
P05.06	Battery boost duration	Min.	60	1–240

M07 – Motor speed		Unit	Standard	Area
P07.01	<p>W/Pick-up motor speed measurement mode.</p> <p>Selects the source from which to take the motor speed measurement.</p> <p>OFF = speed not displayed and controlled.</p> <p>Pick-up LF = speed measured by low sensitivity pick-up sensor.</p> <p>Pick-u HF = as receding, with high sensitivity. See technical characteristics at the end of the manual.</p> <p>Pick-up LCD LF = speed measured by low-sensitivity pick-up sensor. Speed measurement is used only for rpm display. Pick-up LCD HF = as above, with high sensitivity input.</p> <p><b>To comply with EN 12845, this setting must NOT be left "OFF"!</b></p>		High Freq	OFF Low Freq High Freq LCD Low Freq LCD High Freq
P07.02	<p>RPM / W- pick-up ratio.</p> <p>Ratio between rpm and frequency of the W or pick-up signal. Can be set manually or automatically by following this procedure: From the STARTING IN SERVICE page, with the motor running at rated speed, press the left and right arrow keys simultaneously for 5 seconds. The system will acquire the current speed as the nominal one, using the current frequency of the W/pick-up to calculate the value of parameter P07.02.</p>		1,000	0.001-50.000
P07.03	MAX speed limit for alarm A26	%	110	100-120
P07.04	Delay MAX. speed alarm for alarm A26	S	3.0	0.5-60.0
P07.05	MIN speed limit for alarm A25	%	90	80-100
P07.06	Delay MIN. Speed alarm for alarm A25	S	5	0-600
M8 – Oil pressure		Unit	Standard	Area
P08.01	<p>Source measure.</p> <p>Specifies from which source the fuel level measurement is taken. OFF= not managed. RES3 = taken from the resistive sensor with analogue input on terminal RES3. AINx = taken from the analogue input of an EXP expansion module. RES AN= taken from the resistive input of an EXP expansion module.</p>		OFF	OFF RES3 AINx RES AN
P08.02	<p>Channel number.</p> <p>Channel number (x) to be specified if AINx has been selected in the previous parameter.</p>		1	1 ... 4
P08.03	<p>Resistive sensor type.</p> <p>If a resistive sensor is used, select which curve to use. Characteristic curves can be set freely using the Xpress software.</p>		VDO	VDO / DATCON / VEGLIA / MURPHY
P08.04	<p>Resistive sensor offset.</p> <p>If a resistive sensor is used, it allows to add or remove an offset in Ohm to the set the curve to compensate, for example, the cable length. This value can also be set without entering setup using the quick function in the command menu which allows you to see the measurements while performing calibration.</p>	Ohm	0	-30.0 ... +30.0
P08.05	Pressure measuring unit		Bar	bar/psi
P08.06	MIN Pre alarm pressure	bar/psi	3.0	0.1-180.0
P08.07	MIN pressure alarm limit	bar/psi	2.0	0.1-180.0

M09 – Motor temperature 1		Unit	Standard	Area
P09.01	Source measure. Specifies from which source the fuel level measurement is taken. OFF= not managed. RES1 = taken from the resistive sensor with analogue input on terminal RES1. AINx = taken from the analogue input of an EXP expansion module. RES AN= taken from the resistive input of an EXP expansion module.		OFF	OFF RES3 AINx RES AN
P09.02	Channel number. Channel number (x) to be specified if AINx has been selected in the previous parameter.		1	1 ... 4
P09.03	Resistive sensor type. If a resistive sensor is used, select which curve to use. Characteristic curves can be set freely using the Xpress software.		VDO	VDO /DATCON /VEGLIA /MURPHY
P09.04	Resistive sensor offset. If a resistive sensor is used, it allows to add or remove an offset in Ohm to the set the curve to compensate, for example, the cable length. This value can also be set without entering setup using the quick function in the command menu which allows you to see the measurements while performing calibration.	Ohm	0	-30.0 ... +30.0
P09.05	MAX Pre-alarm temperature	°	90	20-300
P09.06	MAX Alarm limit temperature	°	100	20-300
P09.07	MIN Alarm limit temperature	°	OFF	OFF/ 20-300
P09.08	Heater activation threshold	°	OFF	OFF/ 20-300
P09.09	Heater deactivation threshold	°	OFF	OFF/ 20-300
P09.10	Faulty temperature sensor alarm delay	Min.	OFF	OFF/1-60
M10 – Motor temperature 2		Unit	Standard	Area
P10.01	Source measure. Specifies from which source the fuel level measurement is taken. OFF= not managed. RES2 = taken from the resistive sensor with analogue input on terminal RES2. AINx = taken from the analogue input of an EXP expansion module. RES AN= taken from the resistive input of an EXP expansion module.		OFF	OFF RES3 AINx RES AN
P10.02	Channel number. Channel number (x) to be specified if AINx has been selected in the previous parameter.		1	1 ... 4
P10.03	Resistive sensor type. If a resistive sensor is used, select which curve to use. Characteristic curves can be set freely using the Xpress software.		VDO	VDO /DATCON /VEGLIA /MURPHY
P10.04	Resistive sensor offset. If a resistive sensor is used, it allows to add or remove an offset in Ohm to the set the curve to compensate, for example, the cable length. This value can also be set without entering setup using the quick function in the command menu which allows you to see the measurements while performing calibration.	Ohm	0	-30.0 ... +30.0
P10.05	MAX Pre-alarm temperature	°	90	20-300
P10.06	MAX Alarm limit temperature	°	100	20-300

M10 – Motor temperature 2		Unit	Standard	Area
P10.07	MIN Alarm limit temperature	°	OFF	OFF/20-300
P10.08	Heater activation threshold	°	OFF	OFF/20-300
P10.09	Heater deactivation threshold	°	OFF	OFF/20-300
P10.10	Faulty temperature sensor alarm delay	Min.	OFF	OFF/1-60
M11 – Fuel level		Unit	Standard	Area
P11.01	Source measure. Specifies from which source the fuel level measurement is taken. OFF= not managed. RES3 = taken from the resistive sensor with analogue input on terminal RES3. AINx = taken from the analogue input of an EXP expansion module. RES AN= taken from the resistive input of an EXP expansion module.		OFF	OFF RES3 AINx RES AN
P11.02	Channel number. Channel number (x) to be specified if AINx has been selected in the previous parameter.		1	1 ... 4
P11.03	Resistive sensor type. If a resistive sensor is used, select which curve to use. Characteristic curves can be set freely using the Xpress software.		VDO	VDO /DATCON /VEGLIA / MURPHY
P11.04	Resistive sensor offset. If a resistive sensor is used, it allows to add or remove an offset in Ohm to the set the curve to compensate, for example, the cable length. This value can also be set without entering setup using the quick function in the command menu which allows you to see the measurements while performing calibration.	Ohm	0	-30.0 ... +30.0
P11.05	Capacity unit of measurement		%	% /l /gal
P11.06	Tank capacity		OFF	OFF /1-30000
P11.07	Rated hourly motor consumption	(P11.05)/h	OFF	OFF /0.0-200.0
P11.08	MIN Pre-alarm fuel	%	OFF	OFF /1-100
P11.09	MIN Fuel level	%	66	OFF /1-100
P11.10	Start level fuel topping up pump	%	OFF	OFF /1-100
P11.11	Fuel filler pump stop level	%	OFF	OFF /1-100
P11.12	MAX Pre-alarm fuel	%	90	OFF /1-100
P11.13	MAX fuel level alarm	%	95	OFF /1-100
M12 – Motor start		Unit	Standard	Area
P12.01	Battery charger alternator voltage threshold With the motor running and the voltage below the set threshold, the A42 battery charger alternator failure alarm is generated. In the event of absence of the signal W there is the recognition threshold of the motor in motion by the battery charger alternator voltage (D+/AC).	VDC	10.0	OFF/3.0-30
P12.02	Threshold started by motor speed. Threshold recognition of motor running by speed signal 'W' or pick-up	%	30	OFF/10-100
P12.03	Glow plugs preheating time	S	OFF	OFF/1-60
P12.04	Number of start-up attempts	S	6	1-30
P12.05	Start attempt duration	S	8	1-60
P12.06	Pause between start-up attempts	S	8	1-60

M12 – Motor start		Unit	Standard	Area
P12.07	Interrupted and subsequent start-up pause	S	OFF	OFF/1-60
P12.08	Pinion threshold inserted	%	66	OFF/50-100
P12.09	Pinion detection delay engaged. If the motor pump start is required and the pinion feedback has a value lower than the threshold set in parameter P12.08 for a longer time than the one set in P12.09, the alarm A28 Pinion not on is generated. <b>To comply with EN 12845, this setting must NOT be left "OFF"!</b>	S	1.00	0.05-5.00
P12.10	Pinion threshold off		20	0-30
P12.11	Pinion detection delay switched off (brushes). If no motor pump start is required and the pinion feedback has a value higher than the threshold set in parameter P12.10 for a time longer than the time set in P12.11, the A27 Pinion on alarm is generated.	S	30	1-60
P12.12	Alarm inhibition time after insertion. Alarm inhibition time immediately after motor start. Used for alarms with the motor running property activated. For example: Minimum oil pressure	S	8	1-120
P12.13	Over speed inhibition time after starting. Output excitation time programmed with stop magnet function.	S	8	1-300
P12.14	Stop magnet time	S	10	OFF/1-60
P12.15	Glow plugs operation mode. Normal = The glow plug output is energised before starting for the set duration. +Start = The glow plug output remains activated even during the starting phase. +Cycle = The glow plug output remains activated during the entire starting cycle.		Normal	Normal +start +cycle
P12.16	Stop magnet operation mode. Normal = The stop magnet output is activated during the stop phase and after the actual motor stop is extended for the set time. Pulse= the stop magnet output remains activated only during a timed pulse. No pause= during the pause between one start and the next, the stop magnet output is not activated. During the stop phase the stop magnet output remains activated until the set time has elapsed.		No pause	Normal Impulse No pause
M14 – Maintenance (MNTn, n=1 ... 3)		Unit	Standard	Area
P14.n.01	Maintenance interval	H	720	1-9999
P14.n.02	Maintenance hours count		Total hours	Total hours/pump hours

**Note: This menu is divided into 3 sections, referring to the 3 independent MNT1 ... MNT3 maintenance intervals.**

P08.n.01 – Defines the scheduled maintenance period, expressed in hours. If set to OFF, this maintenance interval is disabled. P08.n.02

– Defines how the time elapsed for the specific maintenance interval is to be counted: Total hours = The actual time elapsed since the date of the previous maintenance is counted. Pump hours = Pump operating hours are counted.

#### 10.4 Overview of alarms

Different properties can be assigned to each alarm, including user alarms:

- Alarm enabled – General alarm enabled. If not enabled, it is as if it does not exist.
- Retentive alarm – Remains stored even if the cause of the alarm has been removed until manually silenced by the operator.
- Global alarm – Activates the output assigned to this function.
- Alarm type A – Activates the output assigned to this function.

- Alarm type B – Activates the output assigned to this function.
- Siren – Activates the output assigned to this function, with the modes defined in menu M06 Audible alarms.
- Repeat 4h – If the siren has been silenced and the alarm is still active after 4 hours, the acoustic alarm will be reactivated.
- Repeat 24h – If the siren has been silenced and the alarm is still active after 24 hours, the acoustic signal will be reactivated.
- Motor started – Alarm enabled only with motor started.
- Inhibit – The alarm can be temporarily disabled by activating a programmable input with the Inhibit alarms function.
- Modem – A modem connection is made with the modes foreseen by the relative set-up data set.
- No LCD – The alarm is managed normally but is not shown on the display.

		Enabled	Retentive	Global	Type A	Type B	Siren	Repeat. 4h	Repeat. 24h	Engine started	Inhibit	Modem	No LCD
CODE	DESCRIPTION	DEFAULT ALARM PROPERTIES											
A01	Motor temperature pre-alarm 1 (analogue sensor)	•		•			•			•		•	
A02	High temperature motor 1 (analogue sensor)	•	•	•		•	•	•		•		•	
A03	Temperature sensor fault 1 (analogue sensor)	•	•	•		•	•					•	
A04	Low motor temperature 1 (analogue sensor)	•	•	•		•	•		•			•	
A05	Pre-alarm motor temperature 2 (analogue sensor)	•		•			•			•		•	
A06	High temperature motor 2 (analogue sensor)	•	•	•		•	•	•		•		•	
A07	Analogue temperature sensor fault 2	•	•	•		•	•					•	
A08	Low temperature motor 2 (analogue sensor)	•	•	•		•	•		•			•	
A09	High motor temperature (digital sensor)	•	•	•		•	•	•				•	
A10	Motor temperature too low (digital). Heater failure. (Motor temperature too low (digital), heater failure.)	•	•	•		•	•		•			•	
A11	Oil pressure pre-alarm (analogue sensor)	•		•			•			•		•	
A12	Low oil pressure (analogue sensor)	•	•	•		•	•	•		•		•	
A13	Analogue pressure sensor failure	•	•	•		•	•					•	
A14	Low oil pressure (digital sensor)	•	•	•		•	•	•		•		•	
A15	Fault digital oil pressure sensor	•	•	•		•	•					•	
A16	Low fuel prewarning (analogue sensor)	•		•			•		•			•	
A17	Low fuel level (analogue sensor)	•		•		•	•		•			•	
A18	High fuel level pre-alarm (analogue sensor)	•					•					•	
A19	High fuel level (analogue sensor)	•					•					•	
A20	Analogue level sensor failure	•	•	•		•	•					•	
A21	Low fuel level (digital sensor)	•	•	•		•	•		•			•	

		Enabled	Retentive	Global	Type A	Type B	Siren	Repeat. 4h	Repeat. 24h	Engine started	Inhibit	Modem	No LCD
A22	Low radiator liquid level	•	•	•		•	•					•	
A23	Signal failure "W/pick-up"	•	•	•		•	•					•	
A24	"W/pick-up" disconnected	•	•	•		•	•					•	
A25	Low speed "W/pick-up" motor	•	•	•		•	•					•	
A26	Low fuel prewarning (analogue sensor)	•	•	•		•	•	•				•	
A27	Pinion inserted (feedback on during pause)	•	•	•		•	•					•	
A28	Pinion not engaged (feedback off during cranking)		•	•		•	•					•	
A29	Pinion sensor disconnected	•	•	•		•	•					•	
A30	Water in fuel	•	•	•		•	•		•			•	
A31	Failure to start	•	•	•		•	•	•				•	
A32	Unexpected stop	•	•	•		•	•					•	
A33	Failure to stop	•	•	•		•	•					•	
A34	Battery voltage A high	•	•	•		•	•		•			•	
A35	Battery voltage A low	•	•	•		•	•		•			•	
A36	Inefficient A battery	•	•	•		•	•		•			•	
A37	Battery charger alarm A	•	•	•		•	•		•			•	
A38	Battery voltage B high	•	•	•		•	•		•			•	
A39	Battery voltage B low	•	•	•		•	•		•			•	
A40	Inefficient B battery	•	•	•		•	•		•			•	
A41	Battery charger alarm B	•	•	•		•	•		•			•	
A42	Battery charger alternator failure	•	•	•		•	•		•			•	
A43	Auxiliary voltage too low	•	•	•		•	•		•			•	
A44	Auxiliary voltage too high	•	•	•		•	•		•			•	
A45	System error	•	•	•		•	•					•	
A46	Ambient temperature too low (analogue)	•	•	•		•	•					•	
A47	Ambient temperature too high (analogue)	•	•	•			•					•	
A48	Water reserve (digital)	•		•	•		•					•	
A49	Low water reserve level (analogue)	•		•	•		•					•	
A50	Empty water reserve (analogue)	•		•	•		•					•	
A51	Low level priming tank	•		•		•	•					•	
A52	Output power supply disconnected	•	•	•		•	•					•	
A54	System not in automatic mode (for 24 hours)	•		•		•	•					•	
A55	Motor pump in operation	•		•	•		•					•	•
A56	Pump failure	•		•	•		•					•	
A57	Pressure pump (with motor off)	•		•	•		•					•	
A58	Maintenance request 1	•	•	•		•	•					•	
A59	Maintenance request 2	•	•	•		•	•					•	

		Enabled	Retentive	Global	Type A	Type B	Siren	Repeat. 4h	Repeat. 24h	Engine started	Inhibit	Modem	No LCD
A60	Maintenance request 3	•	•	•		•	•					•	
A69	Partially open suction valve	•	•	•		•	•	•				•	
A70	Delivery valve partially open	•	•	•		•	•	•				•	
A71	Local sprinkler pumps	•	•	•	•		•	•				•	
A72	Jockey pump starts alarm	•	•	•		•	•	•				•	
A73	Thermal alarm jockey pump	•	•	•		•	•	•				•	
A74	Drainage pump alarm	•	•	•		•	•	•				•	
A75	Fuel liquid leakage	•	•	•		•	•	•				•	
A76	Communication error	•		•								•	
A77	Jockey pump timeout	•	•	•		•	•	•					
A78	Open test valve	•	•	•		•	•	•				•	
UA1	User alarm 1	•											
...	...	•											
UA8	User alarm 8	•											

#### 10.4.1 Description of alarms

CODE	DESCRIPTION	CAUSE
A01	Motor temperature pre-alarm 1 (analogue sensor)	Motor temperature above the pre-alarm threshold set with P09.05.
A02	High temperature motor 1 (analogue sensor)	Motor temperature above the alarm threshold set with P09.06.
A03	Temperature sensor fault 1 (analogue sensor)	The resistive temperature sensor is an open circuit (disconnected).
A04	Low motor temperature 1 (analogue sensor)	Motor temperature below the alarm threshold set by P09.07.
A05	Pre-alarm motor temperature 2 (analogue sensor)	Motor temperature above the pre-alarm threshold set by P10.05.
A06	High temperature motor 2 (analogue sensor)	Motor temperature above the alarm threshold set by P10.06.
A07	Analogue temperature sensor fault 2	The resistive temperature sensor is an open circuit (disconnected).
A08	Low temperature motor 2 (analogue sensor)	Motor temperature below the alarm threshold set by P10.07.
A09	High motor temperature (digital sensor)	Motor excess temperature signalled by activation of the digital input programmed with the appropriate function - High motor temperature.
A10	Motor temperature too low (digital). Heater failure. (Motor temperature too low (digital), heater failure.)	Alarm generated by the input programmed with the function - Motor temperature too low.
A11	Oil pressure pre-alarm (analogue sensor)	Motor oil pressure lower than the pre-alarm threshold set with P08.06.
A12	Low oil pressure (analogue sensor)	Motor oil pressure lower than the alarm threshold set with P08.07.
A13	Analogue pressure sensor failure	The resistive pressure sensor is an open circuit (disconnected).
A14	Low oil pressure (digital sensor)	Low oil pressure signalled by activation of the digital input programmed with the appropriate function.

CODE	DESCRIPTION	CAUSE
A15	Fault digital oil pressure sensor	With the motor stopped for more than one minute, the oil sensor is not closed to signal lack of pressure. It is therefore assumed that the connection is interrupted.
A16	Low fuel prewarning (analogue sensor)	Fuel level below the pre-alarm threshold set with P11.08.
A17	Low fuel level (analogue sensor)	Fuel level below the alarm threshold set with P11.09.
A18	High fuel level pre-alarm (analogue sensor)	Is activated when the threshold set with P11.12 is exceeded and is used to activate the siren.
A19	High fuel level (analogue sensor)	Is activated when the threshold set with P11.13 is exceeded and is used to activate the siren.
A20	Analogue level sensor failure	The resistive fuel level sensor is an open circuit (disconnected).
A21	Low fuel level (digital sensor)	Low fuel level indicated by activation of the digital input programmed with the appropriate function.
A22	Low radiator liquid level	Alarm generated when the liquid level of cooling is below the minimum level. Activated by digital input.
A23	Signal failure "W/pick-up"	With speed measurement enabled, the alarm occurs when the D+ signal is detected (presence of battery charger alternator signal) but the speed signal 'W/pick-up' is not detected within 5 seconds.
A24	"W/pick-up" disconnected	With speed measurement enabled, the alarm occurs when the 'W/pick-up' sensor is disconnected even with the motor stopped.
A25	Low speed "W/pick-up" motor	It occurs when the motor is running (presence of battery charger alternator signal), not decelerated, and the speed signal 'W/pick-up' remains below the threshold of P07.05 for the time set in P07.06.
A26	Low fuel prewarning (analogue sensor)	This occurs when the speed signal 'W/pick-up' remains above the threshold of P07.03 for the time set in P07.04.
A27	Pinion inserted (feedback on during pause)	Alarm generated when the analogue input of the pinion signals that the motor start is on but has not been requested.
A28	Pinion not engaged (feedback off during cranking)	Alarm generated when the analogue input of the pinion signals that it is not engaged and the motor start has not been requested.
A29	Pinion sensor disconnected	Alarm generated when the pinion analogue input is not correctly connected.
A30	Water in fuel	Alarm generated when the contact signals the presence of water in the fuel. Activated by digital input.
A31	Failure to start	Occurs when, after having made the number of attempts to start the motor, the motor still has not started.
A32	Unexpected stop	This alarm occurs when the motor stops autonomously, after the time when the alarms have been activated, without the appliance having intentionally caused it to shut down.
A33	Failure to stop	Alarm generated if the motor has not yet stopped 65 seconds after the start of the stop phase.
A34	Battery voltage A high	Battery voltage higher than the set threshold with for a time longer than P05.04.
A35	Battery voltage A low	Battery voltage lower than the threshold set with P05.03 for a time longer than P05.04.
A36	Inefficient A battery	Maximum number of attempts to start from battery A exhausted. Battery voltage lowered below the minimum supply threshold.
A37	Battery charger alarm A	Alarm generated by the input programmed with the function – Battery Charger Alarm A – connected to an external battery charger when the mains voltage is within the limits.

CODE	DESCRIPTION	CAUSE
A38	Battery voltage B high	Battery voltage higher than the threshold set with P05.02 for a time longer than P05.04.
A39	Battery voltage B low	Battery voltage lower than the threshold set with P05.03 for a time longer than P05.04.
A40	Inefficient B battery	Maximum number of attempts to start from battery B exhausted. Battery voltage lowered below the minimum supply threshold.
A41	Battery charger alarm B	Alarm generated by the input programmed with the function – Battery Charger Alarm B – connected to an external battery charger when the mains voltage is within the limits.
A42	Battery charger alternator failure	Occurs when the motor is running ('W/pick- UP') but the battery charger alternator signal (D+) remains below the motor voltage threshold P12.01 started for more than 4 seconds.
A43	Auxiliary voltage too low	Auxiliary voltage lower than the threshold set with P02.07 for longer than P02.09.
A44	Auxiliary voltage too high	Auxiliary voltage higher than the threshold set with P02.08 for longer than P02.09.
A45	System error	An internal error has occurred. Contact customer service
A46	Ambient temperature too low (analogue)	Ambient temperature below the alarm threshold set with P04.02 for longer than P04.03.
A47	Ambient temperature too high (analogue)	Ambient temperature above the alarm threshold set with P04.04 for longer than P04.05.
A48	Water reserve (digital)	Alarm generated by the input programmed with the function – Water reserve
A49	Low water reserve level (analogue)	The water level in the reservoir tank is below the threshold set with P02.16.
A50	Empty water reserve (analogue)	The water level in the water storage tank is below the threshold set with P02.17.
A51	Low level priming tank	Alarm generated by the input programmed with the function – Priming tank level
A52	Output power supply disconnected	Alarm generated by power failure on terminal 25.
A54	System not in automatic mode (for 24 hours)	System not in automatic mode for more than 24 hours.
A55	Motor pump in operation	Alarm generated by the input programmed with the function – Start pressure switch
A56	Pump failure	Alarm generated by the input programmed with the function – Pump pressure switch started – not active and motor running for the time set in parameter P02.21.
A57	Pressure pump (with motor off)	Alarm generated by the input programmed with the function – Pump pressure switch started – active and motor not running for the time set in parameter P02.21.
A58	Maintenance request 1	Alarm generated when the maintenance hours of the relevant interval reach zero. See menu M14. Use the command menu to reset the operating hours and reset the alarm to zero.
A59	Maintenance request 2	
A60	Maintenance request 3	
A69	Partially open suction valve	Alarm generated by the input programmed with the "Partially open suction valve" function. In this situation the suction valve is able to deliver the maximum flow rate required by the pump
A70	Delivery valve partially open	Alarm generated by the input programmed with the "Delivery valve partially open" function. In this situation the pressure-side valve is not able to deliver the maximum flow rate required for the sprinkler system
A71	Local sprinkler pumps	Alarm generated by the programmed inlet with the pump room sprinkler function.

CODE	DESCRIPTION	CAUSE
A72	Jockey pump starts alarm	Alarm generated when the threshold set in parameter P02.19 is exceeded if there is an input programmed with the - Pilot pump function.
A73	Thermal alarm jockey pump	Alarm generated by the input programmed with the function - Thermal pilot pump.
A74	Drainage pump alarm	Alarm generated by the input programmed with the function - Drain pump fault.
A75	Fuel liquid leakage	Alarm generated by the input programmed with the function - Fuel leakage alarm.
A76	Communication error	When parameter P17.n.9 is set as main pump+1 or main pump+2 and the device is not able to communicate with 1 or 2 devices.
A77	Jockey pump timeout	Alarm generated when the threshold set in parameter P02.20 is exceeded if there is an input programmed with the function - Pilot pump in operation.
A78	Open test valve	Alarm generated by the input programmed with the function - Test valve.
UA1	User alarm 1	The user alarm is generated by activation of the variable or the associated input via the M24 menu.
...	...	
UA8	User alarm 8	

## 10.5 Overview of functions

### 10.5.1 Overview of input functions

The following table shows all the functions that can be associated with INPn programmable digital inputs. Each input can then be set so as to have an inverted function (NO/NC), to be delayed when energised or de-energised with independent settable times. Some functions require an additional numerical parameter, defined with the index (x) specified by parameter P15.n.02. See menu M15 Programmable Inputs for more details.

Function	Description
Disabled	Input disabled.
Configurable	Free user configuration. To be used, for example, if the input is used in a PLC logic.
Start pressure switch	Motor pump starting from pressure switch contacts.
Start from priming tank level	Priming level sensor for start.
Automatic start lock	Automatic mode exclusion selector.
Oil pressure	Digital motor oil low pressure sensor.
Low motor temperature	Digital minimum motor temperature sensor (heater failure).
High motor temperature	Maximum motor temperature digital sensor.
Fuel level	Low fuel level digital sensor.
Water reserve	Water reserve alarm.
External automatic test	Starts the periodic test managed by an external timer.
Remote control lock	Locks command and write operations via serial port. Data reading is always possible.
Lock set-up	Inhibits access to the programming menu.
Keypad lock	Locks the operation of the front keyboard, excluding page navigation keys.
Radiator liquid level	When the input is activated, a low radiator liquid alarm is generated.
Siren OFF	Disables the siren.
Battery charger alarm A	With input activated, it signals battery charger A failure alarm. The alarm is generated only with mains voltage present.
Battery charger alarm B	With input activated, it signals battery charger B failure alarm. The alarm is generated only with mains voltage present.
Alarm inhibition	If activated, it allows to disable the alarms with the property "Alarm Inhibition" activated
Reset alarms	Reset of the alarm whose triggering condition has ceased
Command menu Cxx	Executes the command menu command defined by the index parameter (x).
Simulate STOP key	Closing the input is equivalent to pressing the STOP key.

Function	Description
Simulate RESET key	Closing the input is equivalent to pressing the RESET key.
Simulate START A key	Closing the input is equivalent to pressing the START A key.
Simulate START B key	Closing the input is equivalent to pressing the START B button.
Automatic test inhibition	Prevents automatic test execution
LED test	Turns on all LEDs on the front panel (lamp test).
Automatic stop enabled	When closed, it enables the automatic motor stop parameter P02.16. To comply with EN 12845 this input must be deactivated.
Pump pressure switch started	When the input is activated it indicates that the pump is under pressure.
Partially open suction valve	With input activated, it signals alarm A69 Suction valve partially open.
Delivery valve partially open	With input activated, it signals alarm A70 Partially open delivery valve.
Local pump sprinkler alarm	With input activated, it signals alarm A71 Pump room sprinkler in operation.
Pilot pump (jockey) active	With input activated, it signals that the pilot pump is started.
Thermal pilot pump (jockey)	With input active, it signals that the thermal protection of the pilot pump has been activated. Alarm A73 Jockey pump thermal alarm is generated.
Drainage pump anomaly	With active input signals that the drainage pump in the pump room is not working.
Fuel leakage alarm	With active input it signals that there is a leakage of fuel from the tank.
High speed motor	With active input it signals that the motor is in alarm for too high a speed.
Drainage pump	With active input indicates that the drainage pump is active.
OFF mode	Automatic mode override selector and motor start inhibition. If the motor is running, it is stopped
Test valve	With active input, it signals alarm A78 Test valve open.
Modbus script inhibition	Inhibits that Modbus writes commands.

### 10.5.2 Overview of output functions

The following table shows all the functions that can be associated with OUTn programmable digital outputs. Each output can then be set to have normal or inverted function (NOR or REV). Some functions require an additional numeric parameter, defined with the index (x) specified by parameter P16.n.02. See menu M16 Programmable Outputs for more details.

Function	Description
Disabled	Output disabled
Configurable	Free user configuration. To be used for example if the output is used in a PLC logic.
Start A	Start from battery A
Start B	Start from battery B
EV/excitation	Excited with motor starting or running
Stop magnet	"Stop motor" output active
Automatic mode excluded	Indicates that the automatic mode has been excluded.
Failure to start	Indicates that after attempts to start the motor, it has not started.
Motor pump in operation	Indicates that the motor has started.
Global alarm	Output activated in the presence of any alarm with global alarm properties activated.
Minimum fuel level	Output activated in the presence of the minimum fuel level alarm.
Siren	Powers the audible warning siren.
Alarm removal	Pulsed output for communication with the FFLRA unit when performed in digital I/O mode
Heater 1 (motor heater)	Controls the control output of the motor heater, driven by motor temperature 1.
Heater 2 (motor heater)	Controls the motor heater control output, driven by motor temperature 2.
Room heater	Controls the output of the room heater, driven by room temperature
Alarm type A	Fire alarm.
Alarm type B	Technical fault alarm.
Switchgear problem	Output normally always energised. De-energises for system errors (all) or if microprocessor is not in control

Function	Description
Local ventilation	Output activated with motor running and for a set time at the end of operation.
Topping up pump	Check the fuel topping up pump. See parameters P11.10 and P11.11.
Solenoid valve cooling	Energised with motor stopped, de-energised with motor running.
Boost charger	Output activated after an interval defined in parameter P05.05 for a duration defined in parameter P05.06.
PLC flag(x)	Output controlled by PLCx flag.
Remote variable REM(x)	Output controlled by remote variable REMx.
LIM limits (x)	Output controlled by LIM(x) limit threshold status.
TIMx	Output controlled by TIMx timer variable.
Partially open suction valve	Output active if the inlet function is programmed Partially open inlet valve and this inlet is active.
Delivery valve partially open	Output active if the inlet function is programmed Partially open inlet valve and this inlet is active.
Local pump sprinkler alarm	Output active if the input function is programmed Pump local sprinkler alarm and this input is active.
Drainage pump alarm	Output active if the drainage pump alarm input function is programmed and this input is active.
Low temperature alarm	Output energised when Alarm A46 Ambient temperature too low is active.
Pump room	Output active if the Pilot Pump Alarm input function is programmed and this input is active.
Pilot pump alarm (Jockey)	This output is activated during the first 20 seconds of the automatic test, see parameter P13.01
AUTOMATIC TEST start	Output energised when alarm Axx is active (xx = 1 ... number of alarms)
Alarms A01-Axx	Output energised when user alarm UAx is active.

## 10.6 Command menu

The command menu allows you to perform occasional operations such as zeroing of measurements, counters, alarms, etc. If you have entered the password for advanced access, then you can also use the command menu to perform automatic operations useful for configuring the instrument. The following table shows the functions available with the command menu, divided according to the level of access required.

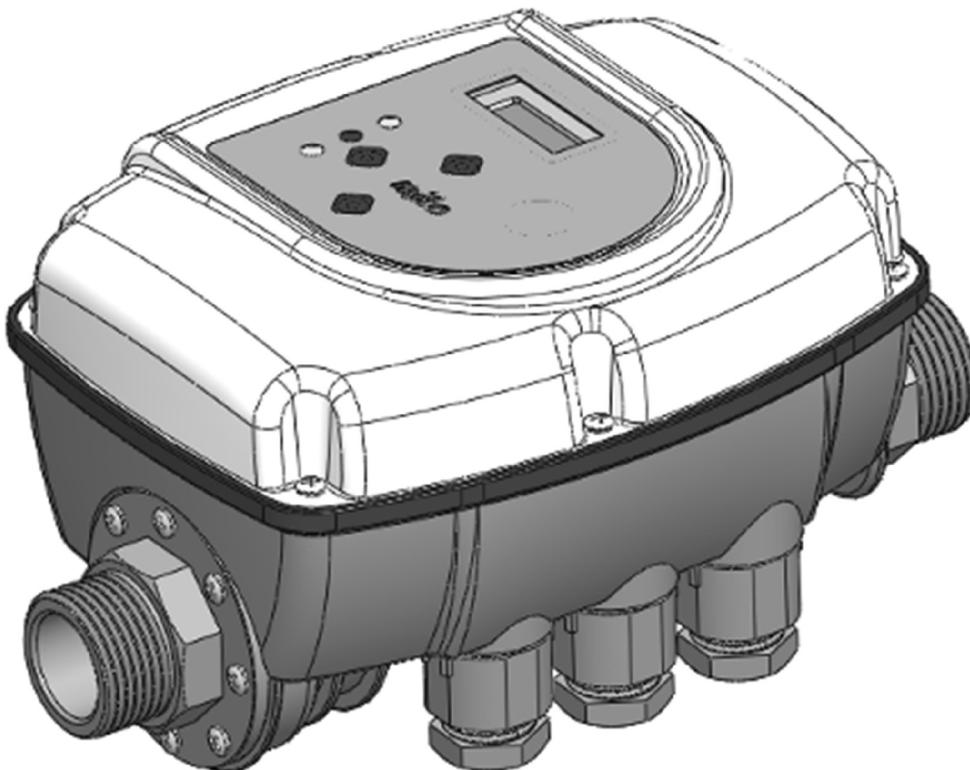
CODE	COMMAND	ACCESS	DESCRIPTION
C01	Reset maintenance interval 1	User	Resets the MNT1 maintenance alarm and recharges the maintenance counter at the set hours. Maintenance can only be reset if all of the following conditions have occurred in the previous 4 hours: all attempts to start with both batteries have been made; the motor must be started; opening of the pressure switch; no active alarm excluding the maintenance alarm.
C02	Reset maintenance interval 2	User	As above, referring to MNT2.
C03	Reset maintenance interval 3	User	As above, referring to MNT3.
C04	Partial motor hour meter reset	User	Resets the partial hour meter of the motor.
C05	Reset generic CNTx counters	User	Resets the generic CNTx counters
C06	Reset LIMx limits status	User	Resets the status of the retention LIMx limits.
C07	Total motor hour counter reset	Advanced	Resets the total hour counter of the motor.
C08	Motor hour meter setting	Advanced	Allows you to set the total motor hour counter to a desired value.
C09	Start-up counter reset	Advanced	Resets the start attempt counter and the percentage of successful attempts
C10	Reset event list	Advanced	Resets the event history list to zero.
C11	Reset parameters to default	Advanced	Resets all set-up menu parameters to factory setting
C12	Save parameters to backup memory	Advanced	Copies the currently set parameters to a backup area for future restoration.

CODE	COMMAND	ACCESS	DESCRIPTION
C13	Reload parameters from backup memory	Advanced	Transfers the parameters saved in the backup memory to the active settings memory.
C14	I/O forcing	Advanced	Enables the test mode that allows you to manually energise any output. <b>NOTICE:</b> <b>In this mode, the responsibility for controlling the outputs is completely entrusted to the end-user.</b>
C15	Offset adjustment resistive sensors	Advanced	Allows resistive sensors to be calibrated by adding/cutting an Ohm value to the resistance measured by the resistive sensors to compensate for cable length or resistance offset. The calibration is done by displaying the measured value in engineering quantities.
C16	PLC program reset	Advanced	Clears the program with PLC logic from the internal memory

Once you have selected the desired command, press  to execute it. The instrument will ask for confirmation. Pressing again  the command will be executed. To cancel the execution of a selected command press STOP. To exit the command menu press STOP.

## 11 Jockey pump switchgear

Fig. 13



### 11.1 Functions

- Automated starting and stopping of the electric pump
- Operation in twin groups with alternation
- Easy and precise adjustment of the working pressures by means of the display
- Dry-running protection with automatic reset
- Can be installed in both horizontal and vertical position
- Digital indication of pressure and current consumption on the display
- LED indicating operating status (network, error, pump running)
- Digital input for float switch or remote control connection

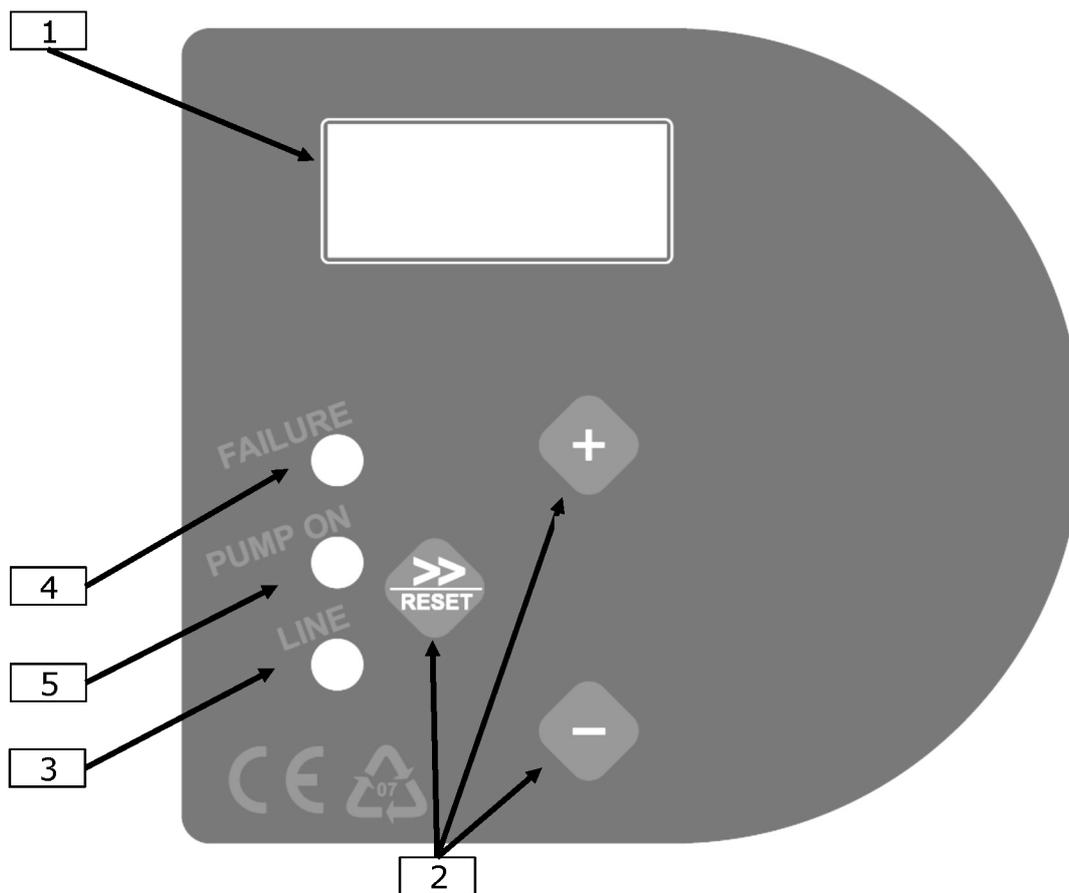
- Configurable relay output
- Extractable electrical terminals for easy wiring
- Alarm history

**11.2 protective devices**

- Dry run
- Amperometric motor protection
- Overpressure
- Frost protection
- Prevention of blocking the mechanical parts of the pump

**11.3 HMI of jockey pump**

**Fig. 13.1**



Item	Description
1	Display with digital pressure indication, error display, and configuration menu.
2	Programming keys
3	Green mains presence warning light (LINE)
4	Red light for signalling error conditions (FAILURE)
5	Yellow indicator light for signalling pump in operation (PUMP ON)

Button	Description
	Arrow key/RESET: Scrolls the menu pages forward and resets the system in case of alarms and/or errors
	Button "+": increases the value of the parameter currently shown on the display; allows the forced operation of the system (starts the pump forcibly and temporarily excludes the dry-running protection to facilitate the load at the first start).



Button "-": decreases the value of the parameter currently shown on the display; displays the absorbed current (optional).

## 11.4 Commissioning

### CAUTION

#### Fill the suction pipe of the pump when first switching on the switchgear before supplying the system!

Once all electrical connections have been made and checked for correctness, close the cover of the switchgear and power up the system. The switchgear will automatically start the pump to allow the system to be filled. If the pump does not start, or produces abnormal vibrations, check the correct connection of the pump itself and its capacitor.

To make it easier to fill the electric pump, it is possible to keep the "+" key pressed on the main screen, so that the pump can be forced to run without the intervention of the dry-running protection ("Manual" mode).

## 11.5 Parameter and menu description

The menu is divided into two levels: the user level and the installer level. The user level is normally visible during normal operation and allows you to check the operating status of the system, reset any errors and change the language. The various operating parameters at installer level are set at the factory.

### 11.5.1 User parameters

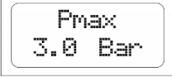
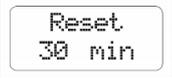
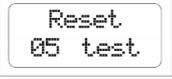
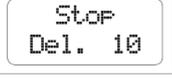
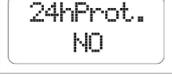
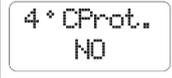
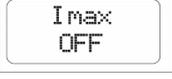
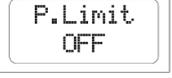
These parameters are normally accessible when the device is powered.

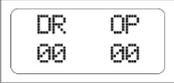
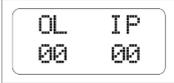
Page	Description	Example
Main page	When the system is working properly, the display indicates the status of the system. The upper line shows the pressure measured in the system while the lower line shows the current absorbed by the motor. In this screen it is possible to keep the "+" key pressed to operate the pump forcibly even in the absence of water, excluding the dry-running protection to allow the loading of the pump itself.	
Language	You can customise the language of menus and alarm messages. Use the "+" and "-" keys to change the parameter value.	

### 11.5.2 Installation parameter

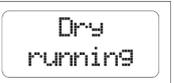
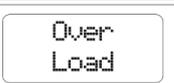
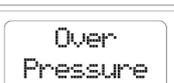
These parameters are contained in hidden screens and are usually only changed during installation. To access these pages, press the "+" and "-" keys simultaneously for 5 seconds. After calling up the background menu, scroll through the pages with the arrow key ">>". Use the "+" and "-" keys to change the parameter value. To return to the main screen, press the "+" and "-" keys simultaneously for 5 seconds.

Page	Description	Example
Modes of operation	<p>This parameter can be used to set the operating mode in which Brio Top Fire controls the start and stop of the pump. In "P+F" operating mode (pressure + flow) the pump is started when the pressure drops below the set value of <math>P_{min}</math> (starting pressure) and is stopped when the water flow is almost zero. In this condition the resulting pressure inside the system will be equivalent to the maximum delivery head of the installed pump.</p> <p><b>CAUTION!</b></p> <p>The system can also operate in P+P mode (pressure + pressure). The pump is started at the set value of <math>P_{min}</math> and is stopped when the pressure in the system reaches the <math>P_{max}</math> value (stop pressure). In this mode it is absolutely essential to install an expansion vessel suitably sized according to the characteristics of the system. In both operating modes, dry-running protection is active and is triggered when the water flow is zero and the pressure in the system is lower than the <math>P_{min}</math> value.</p>	

Page	Description	Example
$P_{min}$	Represents the minimum pressure at which the pump is started. The parameter can be set from 0.5 to 8.0 bar. The factory setting is 1.5 bar. Use the "+" and "-" keys to change the parameter value.	
$P_{max}$	Stop pressure of the electric pump. It is available only when the operating mode is set to "P+P" (pressure + pressure). The parameter can be set from 1.0 to 9.0 bar and in any case at least 0.3 bar higher than the adjusted $P_{min}$ value. Use the "+" and "-" keys to change the parameter value.	
Auto-reset interval	If there is a temporary lack of water in the inlet during operation, the system removes power from the motor to prevent damage. Through this screen it is possible to set after how many minutes the system performs an automatic restart in order to verify a possible new availability of water in suction. If the attempt is successful, the switchgear automatically exits the error condition and the system is working again. Otherwise another attempt will be made after the same time interval. The maximum interval that can be set is 180 minutes (recommended value 60 min.). Use the "+" and "-" keys to change the parameter value.	
No. of auto-reset tests	Defines the number of attempts made to try to resolve a dry run stop condition. Once this limit is exceeded, the system stops and user intervention is required. By setting this value to zero, auto-reset is excluded. The maximum number of attempts is 100. Use the "+" and "-" keys to change the parameter value.	
Delay at stop	It is possible to define after how many seconds the electric pump is stopped after closing all uses in P+F mode. If you notice that at low flows, the pump is continuously switched on and off, increase the switch-off delay to make operation smoother. Increasing this parameter can also be useful in eliminating too frequent intervention of the dry-running protection, especially in submersible pumps or those that have difficulty in self-priming. The value can be increased up to a maximum of 120 seconds. Use the "+" and "-" keys to change the parameter value.	
24h anti-blocking protection	A function that automatically starts the pump after it has been not used for more than 24 hours. If this function is activated and no pump start is performed within 24 hours, a forced cycle of 15 seconds will be performed to prevent system inactivity from causing mechanical components (e.g. mechanical seal) to lock. This will ensure operational reliability of the system.	
4°C protection against ice	A function that can help prevent damage due to lowering of the ambient temperature and possible ice formation. In particular, if the ambient temperature drops below 4 °C, the pump is started every 30 minutes for a duration of 15 seconds to prevent, if possible, the water inside the pump from freezing quickly.  CAUTION! Although this feature may reduce the possibility of damage due to ice, it is a good rule of thumb not to use the switchgear and the electric pump in environments where the temperature may fall below 4 °C . Enabling this function is not sufficient to guarantee the operation and protection of the system at temperatures close to or below 0 °C.	
$I_{max}$	To set the maximum current absorbed by the electric pump in ordinary conditions, so as to allow the motor itself to stop in case of excessive absorption. The stop occurs even if the current read during operation is less than 0.5 A following the interruption of the connection between the motor and the switchgear. The tripping time of the protection for excessive absorption is inversely proportional to the magnitude of the overload in progress, so a slight overload leads to longer tripping times while an intense overload makes the interruption much faster. The parameter can be set from 0.5 to 16 A using the "+" and "-" keys. To deactivate the motor current protection, press the "-" key until "OFF" appears on the display. NOTICE: The factory setting is "OFF". It is therefore necessary to set a maximum current value to activate the protection.	
Pressure limit	Defines a pressure limit threshold whose exceeding causes the overpressure protection to intervene. The factory setting is OFF, indicating that the protection is disabled. To set a limit pressure value use the "+" and "-" keys. To disable the function press the "+" key until OFF appears.	

Page	Description	Example
Alarm history 1	In this screen you can detect the number of alarms that have occurred for Dry Running Protection (DR) and Overpressure (OP). This data can be checked in case of abnormal operation.	
Alarm history 2	In this screen it is possible to detect the number of alarms occurred for excess current protection (OL) and the number of ice protection (IP) interventions. This data can be checked in case of abnormal operation.	
Hour counter	This screen displays the total hours of operation (understood as the time for which the switchgear has been connected to the power supply). By pressing the "+" button on this page it is possible to display the number of hours of operation of the electric pump.	

### 11.6 Alarms

Alarm	Description	Example
Dry running	This message appears when the system is stopped due to lack of water in the pump suction. If the auto-reset function has been activated, automatic attempts are made to check for new water availability. To clear the error condition, press the central "reset" button.	
Over load	This message appears when the current consumption of the electric pump has exceeded the maximum current value set in the $I_{max}$ parameter. This may occur as a result of extremely severe operating conditions of the electric pump, continuous restarts at very close intervals, problems in the motor windings, blocking of the pump rotor or as a result of electrical connection problems between the motor and the switchgear. If this alarm occurs frequently, it is advisable to have the installer check the system. To clear the error condition, press the central "reset" button.	
Over Pressure	The intervention of this alarm indicates a pressure in the system higher than the value set in the "P.Limit" parameter. This can occur in load pump applications, i.e. when the pump pressure is added to the inlet load pressure. If the error occurs frequently try to increase the parameter "Limit" or contact the installer. To clear the error condition, press the central "reset" button.	

### 11.7 Maintenance



#### NOTICE

The unit does not contain any components that can be repaired or replaced by the end user. We therefore recommend that you do not remove the protective cover of the electronic card in order to prevent the warranty from being voided!

The following instructions must be followed to ensure the full functionality of the switchgear for a long time:

- Prevent the switchgear from being exposed to temperatures below 4 °C. If this is not possible, make sure that all the water inside has been drained to prevent it from damaging the plastic body of the switchgear by freezing.
- if the pump is equipped with suction filters, periodically check that they are clean;
- always make sure that the cover is well closed to avoid water infiltration from the outside;
- disconnect the power supply and drain the water from the system when the system is inactive for a long period;
- before using the system with fluids other than water, contact the manufacturer;
- do not carry out operations with the switchgear open;
- before removing the cover of the switchgear wait 3 minutes to allow the condensers to discharge.

## 12 Faults, causes and remedies

The procedures described in the following table must be performed EXCLUSIVELY by experienced personnel. Never perform any work without carefully reading and under-

standing the instructions in this manual. Never attempt to repair materials or equipment without fully understanding its operation.

If personnel do not have sufficient knowledge of the product and the operating logic required by the specific regulations for fire-fighting systems, or if they do not have the necessary technical skills, contact Wilo for regular maintenance checks.

**MAIN ELECTRIC PUMP**

FAULT	CAUSE	REMEDIES	
The motor does not start	Missing power supply	Check the connections and the electrical panel	
	Short-circuit in the windings	Check the windings in the workshop	
	Overload	Check the sizing of the power supply line. Check that the pump is not blocked	
	Switchgear failure/incorrect connections	Check connections	
	Incorrect direction of rotation	Reverse two feeding phases	
The pump, while operating, does not deliver water or has a very low flow rate/delivery head.	Suction depth too high. Pump cavitation	Review calculations based on NPSHr value from pump	
	Piping and suction valves of unsuitable diameter. Pump cavitation	Review calculations based on NPSHr value from pump	
	Air entering the suction line	Check that there are no leakages in the suction line. Check the distance between the suction units. If more than one pump is installed, install anti-vortex plates	
	Partially/totally closed shut-off valves	Open the suction and discharge valves	
	Worn pump	Check and repair	
	Pump impeller blocked	Check and repair	
	Suction strainer/clogged filters	Check and repair	
	Worn pump and motor joint	Check and repair	
	The motor does not reach the rated speed	See next item	
	Voltage too low at the ends of the motor	Check supply voltage, connections and cable cross-sections on the supply line	
	The motor does not reach the rated speed	Bad contacts in the power contactor or starting device failure	Check and repair
		Phase failure	Check line, connection and fuses
		Uncertain contact in power cables	Check the tightening of the terminals
		Earthing or short-circuit at winding	Dismantle the motor and have it repaired at the factory
	Inability to operate under load after start-up	Insufficient sizing of the switch and fuses of the power supply line	Resize and replace
Insufficient voltage		Check the power supply	
Pump blocked		Remove the rotating part and check	
Presence of voltage on the motor housing	Exchange between line and ground cables	Correct connections	
	Wet or aged insulation	Dry the motor or rewind it	
	Short-circuit between terminals and outer housing	Check the insulation between terminals and housing.	
	Overload for partially blocked pump	Dismantle and check	
	Non-axis joint	Align correctly	
	Ambient temperature higher than 40 °C	Conditioning the environment	
	Abnormal heating of the external surface of the motor	Voltage below/above nominal value	Check the upstream power supply
Lack of a phase		Check power supply and fuses	
Insufficient ventilation		Check filters and ducts, resize	

FAULT	CAUSE	REMEDIES
	Slip between stator and rotor	Have it repaired at the factory
	Unbalanced voltages on the three phases	Check the power supply
	Instantaneous overload/foreign body in the pump	Disassemble the pump
Sudden loss of speed	Single-phase operation	Check power supply and fuses
	Voltage drop	Check the power supply
Magnetic noise, sudden whistle	Short-circuits in the motor winding	Factory repairs
	Slip between stator and rotor	Factory repairs
	Loose bolts	Check and tighten
Magnetic noise, sudden whistle	Fan cover screws, loose joint covers	Check and tighten
	Creep between fan and motor cover, between coupling and coupling cover, etc.	Ensure correct distance and reassemble
Mechanical noise	Foreign bodies in the motor or pump	Dismantle and remove
	Non-aligned joint	Realign
	Bearings poorly lubricated or worn/broken	Lubricate with grease or replace
	Damaged bearings	Replace
Overheating of pump/motor bearings	Insufficient lubrication	Re-grease
	Misalignment between pump and motor	Realign
	Pump cavitation	Review the sizing of the system
Abnormal vibrations	Water with high air content	Check that there are no leakages in the suction line. Check the distance between the suction units. If more than one pump is installed, install anti-vortex plates
	Bearing wear, pump/motor shaft	Replace
	Wear on pump/motor coupling rubber plugs	Replace
	Misalignment between pump and motor	Realign
The motor does not stop after pressing the STOP button	It's normal if the pressure in the system is not restored	Deactivate automatic mode with the "AUTOMATIC OFF" switch and then press the STOP button
	Control unit failure	Open (pos. 0 ) the main switch disconnecter of the switchgear

#### MAIN DIESEL PUMP

FAULT	CAUSE	REMEDIES
The motor does not start or tries to start and then stops	Batteries discharged	Check the batteries and chargers. Charge the batteries and replace them if necessary
	Fuel shortage	If not indicated by the light on the switchgear, check the tank and the alarm float. Replace. Fill the tank.
	Presence of air in the fuel circuit	Unplug the circuit by venting the injectors and the fuel filter
	Clogged diesel filter	Replace
	Clogged air filter	Replace
	Fuel circuit failure: injector blocked injection pump failure	Contact customer service

FAULT	CAUSE	REMEDIES
	Temperature too low	Check that the ambient temperature is not below 10 °C. Check that the oil/water heater is working properly. Replace.
	Battery/starter motor/servo relay connections loose or corroded	Check cables and terminals. Rewire. Tighten well. Replace.
	Motor pump switchgear failure on switchgear	Check and replace if necessary
	Starter motor failure	Contact customer service
The starter motor pinion does not retract after starting the motor	Switchgear failure on the control panel.	Contact customer service
The pump does not deliver water or has a very low flow rate or delivery head	Suction depth too high. Pump cavitation	Review calculations based on NPSHr value from pump
	Unsuitable diameter suction pipe and valves. Pump cavitation	Review calculations based on NPSHr value from pump
	Air entering the suction line	Check that there are no leakages in the suction line. Check the distance between the suction units. If more than one pump is installed, install anti-vortex plates
	Partially/totally closed shut-off valves	Open the suction and discharge valves
	Worn pump	Check and repair
	Pump impeller blocked	Check and repair
	Suction strainer/clogged filters	Check and repair
	Worn pump and motor joint	Check and repair
	Motor does not reach rated speed or pendulum speed	Check the rpm on the display of the switchgear. See next item
The motor does not reach the rated speed or it is oscillating	Throttle lever in wrong position	Check, adjust the speed and secure the lever
	Clogged fuel filter	Replace
	Faulty injector/pump	Contact customer service
	Overload for partially blocked pump	Dismantle and check
	Non-axis joint	Align correctly
	Throttle lever in wrong position	Check, adjust the speed and secure the lever
Abnormal heating – high water/oil temperature	Ambient temperature higher than 40 °C	Conditioning the environment
	Insufficient ventilation	Check filters and ducts, clean or resize
	Dirty or clogged radiator/intercooler	Dismantle and clean
	Lack of water in the radiator/ex-changer	After cooling, top up the water and check for leaks
	Heat exchanger circuit valve closed or insufficiently open	Check that the pump is delivering water and open the valve
	Circulator failure	Contact customer service
	Fan belt failure (for air-cooled motors)	Check voltage and replace if necessary
	Malfunction of the relevant alarm	Check probe, connections and switchgear. Replace if necessary
Sudden loss of speed	Instantaneous overload/foreign body in the pump	Stop the motor, disassemble the pump and repair
	Air filter clogged/dirt filter	Replace
Black smoke	Oil level too high	Eliminate excess oil
	Injector failure, fuel pump, etc.	Contact customer service
	Loose bolts	Check and tighten
	Loose joint cover screws	Check and tighten
Abnormal mechanical noise	Creep between fan and guards, between joint and joint cover, etc.	Ensure correct distance and reassemble

FAULT	CAUSE	REMEDIES
	Foreign object in the pump	Dismantle and remove
	Non-aligned joint	Realign
	Bearings poorly lubricated or worn/ broken	Lubricate with grease or replace
	Damaged bearings	Replace
Overheating of pump bearings	Insufficient lubrication	Re-grease
	Misalignment between pump and motor	Realign
	Absence of vibration dampers on the system	Repair
	Pump cavitation	Review the sizing of the system
Abnormal vibrations	Water with high air content	Check that there are no leakages in the suction line. Check the distance between the suction units. If more than one pump is installed, install anti-vortex plates
	Wear on bearings, pump shaft	Replace
	Wear on pump/motor coupling rubber plugs	Replace
	Misalignment between pump and motor	Realign
The motor does not stop after pressing the STOP button	It's normal if the pressure in the system is not restored	Deactivate automatic mode with the "AUTOMATIC OFF" switch and then press the STOP button
	Stop electromagnet/switchgear failure	Manually close the fuel inlet

#### ***ELECTRIC JOCKEY PUMP***

FAULT	CAUSE	REMEDIES
When one of the system taps is opened, the pump does not start, or starts after a few seconds	The adjusted $P_{\min}$ value is too low or a check valve has been installed downstream of the system. Check the setting of the $P_{\min}$ parameter	Check the correct connection between switchgear and electric pump
The pump switches on and off continuously	The system is leaking	Check the various hydraulic connections. On the display, check for the presence of any pressure drops when the taps are closed. Check the switchgear. Check for possible presence of dirt in the check valve that prevents it from closing perfectly. If necessary, clean with compressed air. Install a small expansion vessel at the switchgear outlet.
The device frequently signals a dry-running condition	During periods of system inactivity, the pump suction pipe empties, preventing the pump from being loaded at the next start	Check the tightness of any foot valve
With very low water flows, the pump runs unevenly	The flow values are too low. As this cannot be detected by the device, it will cause the electric pump to stop.	Install a small expansion vessel (1–2 litres) to make the system elastic and reduce the number of restarts
The system pressure has risen above the set value of $P_{\max}$	If the protective devices against ice or against the blocking of mechanical components have been activated, it is normal that an increase in pressure beyond the set values may occur because the pump is forced to start for 15 seconds regardless of the programmed values of $P_{\max}$ and $P_{\min}$	Reduce system pressure
Switchgear does not turn on	The electronic card may have been damaged	Check and replace
The motor does not start	Missing power supply	Check connections and switchgear
	Calibration of the pressure switch at a lower pressure than the main pump	Check and recalibrate
	Short-circuit in the windings	Check the windings in the workshop

FAULT	CAUSE	REMEDIES
	Thermal protection triggered	Check the configuration of the power supply line. Check that the pump is not blocked, check the pressure switch calibration and the pre-charge of the autoclave tank
	Switchgear failure/incorrect connections	Check
	Change the direction of rotation	Reverse two feeding phases
The pump does not deliver water or has a very low flow rate or delivery head	Suction depth too high. Pump cavitation	Review calculations based on NPSHr value from pump
	Piping and suction valves of unsuitable diameter. Pump cavitation	Review calculations based on NPSHr value from pump
	Air entering the suction line	Check that there are no leaks in the suction line
	Partially/totally closed shut-off valves	Open the suction and discharge valves
	Worn pump	Check and repair
	Pump impeller blocked	Check and repair
	Clogged filters	Check and repair
	The motor does not reach the rated speed	See next item
The motor does not reach the rated speed	Voltage too low at the ends of the motor	Check supply voltage, connections and cable cross-sections on the supply line
	Uncertain contacts in the power contactor or starting device failure	Check and repair
	Phase failure	Check line, connection and fuses
	Uncertain contact in power cables	Check the tightening of the terminals
	Earthing or short-circuit at winding	Dismantle the motor and have it repaired at the factory
Inability to operate under load after start-up	Insufficient sizing of the switch and fuses of the power supply line	Resize and replace
	Insufficient voltage	Check the power supply
	Pump blocked	Remove the rotating part and check
Presence of voltage on the motor housing	Exchange between line and ground cables	Check the electrical connections
	Wet or aged insulation	Dry the motor or rewind it
	Short-circuit between terminals and outer housing	Check the insulation between terminals and housing.
	Overload for partially blocked pump	Dismantle and check
Abnormal heating of the external surface of the motor	Ambient temperature higher than 40 °C	Conditioning the environment
	Voltage below/above nominal value	Check the upstream power supply
	Lack of a phase	Check power supply and fuses
	Unbalanced voltages on the three phases	Check the power supply
Sudden loss of speed	Instantaneous overload/foreign body in the pump	Disassemble the pump
	Single-phase operation	Check power supply and fuses
	Voltage drop	Check the power supply
Magnetic noise, sudden whistle	Short-circuits in the motor winding	Have it repaired at the factory
	Slip between stator and rotor	Have it repaired at the factory
	Loose bolts	Check and tighten
	Fan cover screws loosen	Check and tighten
	Swipe between fan and motor cover	Ensure correct distance and reassemble
Mechanical noise	Foreign bodies in the motor or pump	Dismantle and remove

FAULT	CAUSE	REMEDIES
	Bearings poorly lubricated or worn/ broken	Lubricate with grease or replace
	Absence of vibration dampers on the system	Repair
Abnormal vibrations	Pump cavitation	Review the sizing of the system
	Water with high air content	Check that there are no leakages in the suction line. Check distance between the pump units. If more than one pump is installed, install anti-vortex plates
	Worn bearing, pump/motor shaft	Replace
	Change the direction of rotation	Reverse two feeding phases
The pump does not stop automati- cally	Inadequate pressure switch cut-out pressure in relation to pump charac- teristics	Review calibration
	Incorrect setting of the pressure switch	Review calibration
The pump is continuously on and off	Not correct tank size or insufficient discharge	Review sizing and/or preload pressure

### 13 Spare parts

Spare parts are ordered via customer service. To avoid return queries and incorrect orders, the serial or article number must always be supplied. **Subject to change without prior notice!**

#### 13.1 Recommended spare parts inventory

To ensure that interventions can be made and the system can be restored quickly, maintaining a stock of the following spare parts is recommended:

##### **Main pump with electric motor**

- 1x mechanical seal spare part kit
- 1x start-up pressure switch
- 1x coil for step relay
- 1x set of main fuses

##### **Main pump with diesel motor**

- 1x mechanical seal spare part kit
- 1x set of main fuses
- 1x start-up pressure switch
- 1x starter kit
- 2x fuel filters
- 2x oil filters
- 2x belt kits
- 2x diesel motor injection nozzles
- 1x complete valve kit
- 1x complete set of gaskets and hoses for oil and fuel circuit
- 1x set of tools as specified in the motor instructions

##### **Jockey pump**

- 1x mechanical seal spare part kit
- 1x start-up pressure switch
- 1x set of main fuses

### 14 Disposal

#### 14.1 Information on the collection of used electrical and electronic products

Proper disposal and appropriate recycling of this product prevents damage to the environment and danger to your personal health.

**NOTICE****Disposal in domestic waste is prohibited!**

In the European Union this symbol may be included on the product, the packaging or the accompanying documentation. It means that the electrical and electronic products in question must not be disposed of along with domestic waste.

To ensure proper handling, recycling and disposal of the used products in question, please note the following points:

- Hand over these products at designated, certified collection points only.
- Observe the locally applicable regulations!

Please consult your local municipality, the nearest waste disposal site, or the dealer who sold the product to you for information on proper disposal. See [www.wilo-recycling.com](http://www.wilo-recycling.com) for more information about recycling.

**14.2 Diesel motor**

As a result of the design, the diesel motor contains motor oil and diesel fuel. These operating fluids are harmful to the environment and must not be released into the soil or waters.

All information necessary for disposal can be found in the motor instructions. If the disposal information is missing or incomplete, contact the motor manufacturer's customer service.

**14.3 Batteries/rechargeable batteries**

Batteries and rechargeable batteries must not be disposed of with domestic waste and they must be removed before product disposal. End consumers are legally obliged to return all used batteries and rechargeable batteries. For this purpose, you can return used batteries and rechargeable batteries free of charge at municipal collection points or specialist retailers.

**NOTICE****Disposal in domestic waste is prohibited!**

Batteries and rechargeable batteries affected are marked with this symbol. The identifier for the heavy metal they contain is displayed beneath the graphic:

- **Hg** (mercury)
- **Pb** (lead)
- **Cd** (cadmium)





# wilo

Pioneering for You



Local contact at  
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