

Wilo-Control EC-WP



en Installation and operating instructions



Control EC-WP
<https://qr.wilo.com/1432>

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1 General

1.1 About these instructions

These instructions form part of the product. Compliance with the instructions is essential for correct handling and use:

- Read the instructions carefully before all activities.
- Keep the instructions in an accessible place at all times.
- Observe all product specifications.
- Observe the markings on the product.

The language of the original operating instructions is German. All other languages of these instructions are translations of the original operating instructions.

1.2 Copyright

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1.3 Subject to change

Wilo shall reserve the right to change the listed data without notice and shall not be liable for technical inaccuracies and/or omissions. The illustrations used may differ from the original and are intended as an exemplary representation of the product.

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:

- Risk of personal injury from electrical, electromagnetic or mechanical influences
- Environmental damage from discharge of hazardous substances
- Damage to property
- Failure of important functions

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 Identification of safety instructions

These installation and operating instructions set out safety instructions for preventing personal injury and damage to property, which are displayed in different ways:

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



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 safety instructions will result in serious injury or death!
- **Warning!**
Failure to follow instructions can lead to (serious) injury!
- **Caution!**
Failure to follow instructions can lead to property damage and possible total loss.
- **Notice!**
Useful information on handling the product

Markups

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

Symbols

These instructions use the following symbols:



Danger of electric voltage



Danger – explosive atmosphere



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 electrician
Knowledge regarding tools and fixation material for various structures

2.3 Electrical work

- Operation/control: Operating personnel, instructed in the functioning of the complete system
- Electrical work must be carried out by a qualified electrician.
- Before commencing work, disconnect the product from the mains and safeguard it from being switched on again.
- Observe applicable local regulations when connecting to the mains power supply.
- Adhere to the requirements of the local energy supply company.
- Earth the product.
- Observe technical information.
- Replace a defective connection cable immediately.

2.4 Monitoring devices

Fuses

The size and switching characteristics of the fuses must conform to the rated current of the connected consumer. Observe local regulations.

2.5 Installing/dismantling

- Locally applicable laws and regulations on work safety and accident prevention must be complied with.
- Disconnect the product from the mains and secure it against being switched on again.
- Suitable fixation material must be used for the existing bearing surface.
- The product is not watertight. Select an appropriate installation site!
- Do not deform the housing during installation. Seals could leak and affect the stated IP protection class.
- The product may **not** be installed in potentially explosive areas.

2.6 During operation

- The product is not watertight. Comply with protection class IP54.
- Ambient temperature: 0 ... 40 °C.
- Maximum humidity: 90%, non-condensing.
- Do not open the switchgear.
- The user must notify the person in charge of every fault or irregularity immediately.
- In case of damage to the product or connection cable, switch off the product immediately.

2.7 Maintenance tasks

- Do not use any aggressive cleaners or scouring agents or fluids.
- The product is not watertight. Do not submerge the product in fluids.
- Only carry out maintenance tasks mentioned in these installation and operating instructions.

- Only original parts from the manufacturer may be used for maintenance and repairs. Use of parts other than the original parts releases the manufacturer from any liability.

2.8 Operator responsibilities

- Provide installation and operating instructions in a language which the personnel can understand.
- Make sure that the personnel has had the corresponding training for the specified work.
- Safety and information signs mounted on the device must always be legible.
- Train the personnel on how the system operates.
- Eliminate risk from electrical current.
- To ensure safe working practice, define personnel responsibilities.

Children and persons younger than 16 years or with reduced physical, sensory or mental capacities or limited experience are prohibited from handling the product! A technician must supervise persons younger than 18 years!

3 Application/use

3.1 Intended use

The switchgear is designed for level- or pressure-dependent control of up to two uncontrolled fixed-speed pumps. The level and pressure can be measured using the following sensors: float switch, electrodes, pressure switch or pressure sensor.

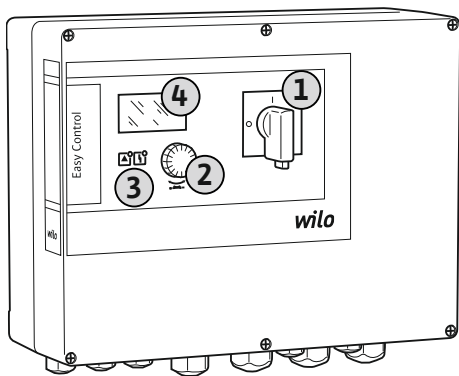
Intended use also includes observance of these instructions. Any other use is regarded as improper.

3.2 Improper use

- Installation in potentially explosive atmospheres
- Overflow of the switchgear

4 Product description

4.1 Structure



1	Main switch
2	Operating button
3	LED indicators
4	LCD display

The front of the switchgear comprises the following main components:

- Main switch for switching the switchgear on/off
- Operating button for menu selection and parameter input
- LEDs for displaying the current operating state
- LCD display for showing the current operating data and individual menu items

The position of the individual operating elements is the same for the plastic and metal housing.

Fig. 1: Switchgear front

4.2 Functional principle

Level and pressure measurement is via a two-position control for each pump. The pumps are individually switched on/off automatically, depending on the fill level or the actual pressure. An optical signal is given upon reaching the dry run or high water level. All pumps are also switched on or off by force. Faults are stored in the fault memory.

The current operating data and operating conditions are shown on the LCD display and indicated by LEDs. Operation and input of operating parameters is carried out using a rotary knob.

The switchgear can operate in three different operating modes:

- **Filling**
When the liquid level in one or two tanks drops, the pumps are automatically switched on individually and deactivated again when the level rises.
- **Draining**
When the liquid level in one or two wells rises, the pumps are automatically switched on individually and deactivated again when the level falls.
- **Pressure control**
The pumps are switched on/off individually and automatically depending on the actual pressure on the output side of the system.

4.3 Technical data

Date of manufacture*	See rating plate
Mains connection	See rating plate
Mains frequency	50/60 Hz
Max. current consumption per pump	See type designation
Max. rated power per pump	See rating plate
Pump activation type	See type designation
Ambient/operating temperature	0 ... 40 °C
Storage temperature	-30 ... +60 °C
Max. relative humidity	90%, non-condensing
Protection class	IP54
Electrical safety	Pollution degree II
Control voltage	See rating plate
Housing material	UV-resistant polycarbonate

Details about the Hardware version (HW) and Software version (SW) can be found on the rating plate!

*The date of manufacture is stated in accordance with ISO 8601: JJJJww

- JJJJ = year
- W = abbreviation for week
- ww = calendar week

4.4 Inputs and outputs

Inputs	EC-WP 1 ...	EC-WP 2 ...
Pressure detection for pressure control		
Passive pressure sensor 4 to 20 mA	1	1
Pressure switch	1	–
Level measurement for filling or draining		
Float switch/electrode	2	4
High water only for filling		
Float switch/electrode	1	1
Dry-running protection pump for pressure control, filling or draining		
Float switch/electrode	1	2
Monitoring		
Thermal winding monitor (bimetallic sensor)	1	2
Thermal winding monitor (PTC sensor)	–	–
Thermal winding monitor (Pt100 sensor)	–	–
Other inputs		
Extern OFF: for remote deactivation of all pumps	1	1

Key

1/2/4 = number of inputs, – = not available

Outputs	EC-WP 1 ...	EC-WP 2 ...
Collective fault signal (changeover contact)	1	1
Collective run signal (changeover contact)	1	1
Individual fault signal (closed contact (NC))	1	2
Individual run signal (open contact (NO))	1	2
Power output (connection load: 24 V=, max. 4 VA) e.g. for connecting an external alarm signal (lamp or horn)	1	1
Display of actual pressure value (0 – 10 V=)	1	1

Key

1/2 = number of outputs, – = not available

4.5 Type key

Example: Wilo-Control EC-WP 2x12A-MT34-DOL-WM-3G	
EC	Version with Easy Control switchgear: EC = switchgear for fixed-speed pumps
WP	Control for submersible pumps
2x	Max. number of pumps that can be connected
12A	Max. rated current per pump in amperes
MT34	Mains connection: <ul style="list-style-type: none"> • MT34 = single-phase current (1~220/230 V) or three-phase current (3~380/400 V) • T34 = three-phase current (3~380/400 V)
DOL	Pump activation type: DOL = direct on line
WM	Wall fixation
3G	Internal code figure

4.6 Operation on electronic start-up controllers

Connect the switchgear directly to the pump and the mains. Intermediate switching of additional electronic start-up controllers, e.g. a frequency converter, is not permitted!

4.7 Installation in potentially explosive atmospheres

The switchgear does not have its own explosion protection class. **Do not** install the switchgear in potentially explosive areas!

4.8 Scope of delivery

- Switchgear
- Installation and operating instructions

4.9 Accessories

- Float switch
- Pressure switch
- Electrode
- Pressure sensor 4 to 20 mA

5 Transportation and storage**5.1 Delivery**

- After delivery, check product and packaging for defects (damage, completeness).
- Defects must be noted on the freight documentation.
- Defects must be notified to the transport company or the manufacturer on the day of receipt of shipment. Claims cannot be asserted if the notification of defects takes place at a later date.

5.2 Transport**CAUTION****Damage to property due to wet packaging!**

Wet packaging may tear. If unprotected, the product may fall on the ground and be irreparably damaged.

- Carefully lift wet packaging and replace it immediately!

- Clean control device.
- Close housing apertures, ensuring they are sealed watertight.
- Impact-resistant and watertight packaging.

5.3 Storage

- Pack the switchgear in dustproof and watertight packaging.
- Maintain storage temperature: $-30 \dots +60 \text{ }^{\circ}\text{C}$, max. relative humidity: 90%, non-condensing.
- Frost-proof storage at a temperature of $10 \text{ }^{\circ}\text{C}$ to $25 \text{ }^{\circ}\text{C}$ with relative humidity of 40 ... 50% is recommended.
- Avoid the formation of condensation at all times.
- All open threaded cable glands must be sealed to prevent water ingress into the housing.
- Attached cables should be protected against kinking, damage, and ingress of moisture.
- To prevent damage to the components, protect the switchgear from direct sunlight and heat.
- Clean the switchgear after storage.
- If there has been water ingress or condensation has formed, have all the electronic components tested for correct function. Contact customer service.

6 Installation

6.1 Personnel qualifications

- Check the switchgear for damage caused during transport. Do **not** install defective switchgears!
- Observe the local guidelines for the design and operation of electronic controls.
- Electrical work: qualified electrician
Person with appropriate technical training, knowledge and experience who can identify and prevent electrical hazards.
- Installation/dismantling work: qualified electrician
Knowledge regarding tools and fixation material for various structures

6.2 Installation types

- Wall fixation

6.3 Operator responsibilities

- The installation location is clean, dry and free of vibration.
- The installation location is overflow-proof.
- The switchgear is not exposed to direct sunlight.
- Installation location outside of potentially explosive atmospheres.

6.4 Installation

- The connection cable and required accessories should be provided by the customer.
- While laying the cable, ensure that there is no tension, no kinking and no pinching that could damage the cable.
- Check the cable cross-section and length for the routing type chosen.
- Seal unused threaded cable glands.
- Ensure that the following ambient conditions are adhered to:
 - Ambient/operating temperature: $0 \dots 40 \text{ }^{\circ}\text{C}$
 - Relative humidity: 40 ... 50%
 - Max. relative humidity: 90%, non-condensing

6.4.1 Basic advice on fixing the switchgear in place

Various structures can be used for installation (concrete wall, mounting rail, etc.). For this reason, the fixation material for the relevant construction must be provided by the customer and the following information must be observed:

- To prevent cracks in the masonry and chipping of the construction material, ensure sufficient clearance to the edge of the structure.
- The depth of the borehole depends on the length of the screws. Drill the borehole approx. 5 mm deeper than the screw length.
- Drilling dust impairs retention force. Always blow the borehole clean or vacuum it out.
- Do not damage the housing during installation.

6.4.2 Installation of switchgear

Screw sizes for plastic housing

- Max. screw diameter: 4 mm
- Max. screw head diameter: 7 mm

Installation

Attach the switchgear to the wall with four screws and wall plugs:

✓ Switchgear is disconnected from the mains supply and is voltage-free.

1. Loosen the screws on the cover and open the cover/switch cabinet door from the side.
2. Align the switchgear on the installation site and mark the position for the drill holes.
3. Drill and clean the mounting holes in accordance with the specifications of the fixation material.

4. Attach the lower part to the wall with the fixation material.
Check the lower part for deformations! Realign deformed housing (e.g. by placing alignment plates below it) to ensure the housing cover closes securely. **NOTICE! If the cover does not close correctly, the protection class is compromised!**
5. Close the cover/switch cabinet door and fasten it with the screws.
 - ▶ Switchgear installed. Now connect the mains supply, pumps and signal transmitter.

6.4.3 Pump dry-running protection

The level can be measured via the following signal transmitters:

- Float switch
The float switch must be able to move freely in the operating space (well, tank)!
- Electrode

A **forced switch-off** of all pumps always takes place in the event of an alarm, irrespective of the selected signal transmitter!

6.5 Electrical connection



DANGER

Danger of death due to electrical current!

Improper conduct when carrying out electrical work can lead to death due to electric shock!

- Before all electrical work, disconnect the product from the mains and secure it against being switched on again without authorisation.
- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!



NOTICE

- Depending on the system impedance and the maximum connections/hour of the connected consumers, voltage fluctuations and/or drops may occur.
 - When using shielded cables, attach the shielding to the earth rail on one side of the control device.
 - Always have connection carried out by a qualified electrician.
 - Observe the installation and operating instructions for the connected pumps and signal transmitters.
-
- The mains connection current and voltage must be as stated on the rating plate.
 - Execute fuse protection on the mains side in accordance with the local guidelines.
 - If circuit breakers are used, the switching characteristics should be selected according to the connected pump.
 - Follow local guidelines if residual-current devices (RCD, type A, sinusoidal current, universal-current-sensitive) are installed.
 - Route connection cable in accordance with the local guidelines.
 - Do not damage the connection cable during routing or installation.
 - Earth the switchgear and all electrical consumers.

6.5.1 Overview of components

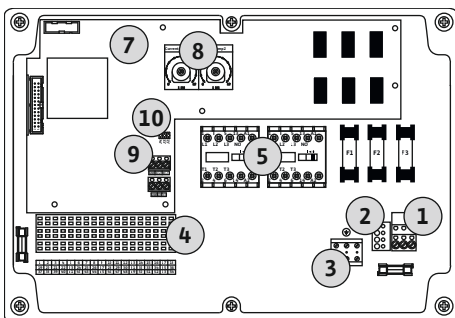


Fig. 2: Control EC-WP 1 .../EC-WP 2 ...

Overview of Control EC-WP 1 .../EC-WP 2 ..., up to 12 A rated current

1	Terminal strip: Mains connection
2	Mains voltage adjustment
3	Terminal strip: Earth (PE)
4	Terminal strip: Controls/sensors
5	Contactor combinations
7	Control board
8	Potentiometer for motor current monitoring
9	ModBus RTU: RS485 interface
10	ModBus RTU: Jumper for termination/polarisation

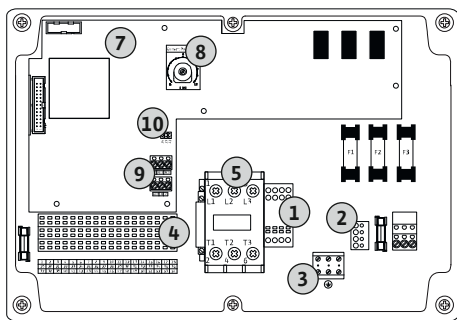


Fig. 3: Control EC-WP 1 x 23A

6.5.2 Switchgear mains connection



DANGER

Danger of death due to electrical current when the main switch is switched off!

Even when the main switch is switched off, there is mains voltage power to the voltage selection terminal.

- Make the voltage selection before connecting the product to the mains.

CAUTION

Risk of property damage due to incorrectly set mains voltage!

If the wrong mains voltage is set, the switchgear will be destroyed. The switchgear can be operated at different mains voltages. The mains voltage is set to 400 V at the factory.

- To use another mains voltage, change the position of the cable jumper before connection.

Mains connection Wilo-Control EC-WP 1 .../EC-WP 2 ... up to 12 A

1	Terminal strip: Mains connection
2	Mains voltage adjustment
3	Terminal strip: Earth (PE)

Insert the connection cable laid by the customer through the threaded cable glands and secure it. Connect the wires to the terminal strip according to the connection diagram.

Mains connection 1~230 V:

- Cable: 3-core
- Wire: L, N, PE
- Mains voltage adjustment: Converter bridge 230/COM

Mains connection 3~230 V:

- Cable: 4-core
- Wire: L1, L2, L3, PE
- Mains voltage adjustment: Converter bridge 230/COM

Mains connection 3~380 V:

- Cable: 4-core
- Wire: L1, L2, L3, PE
- Mains voltage adjustment: Converter bridge 380/COM

Mains connection 3~400 V:

- Cable: 4-core
- Wire: L1, L2, L3, PE
- Mains voltage adjustment: Converter bridge 400/COM (**factory setting**)

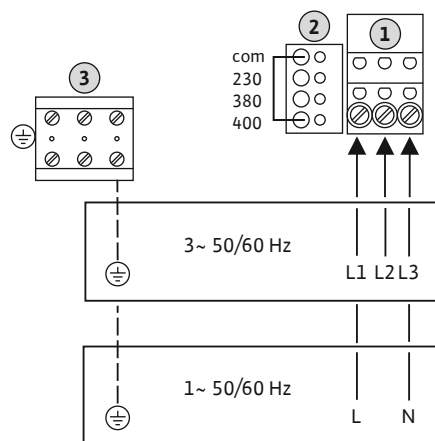


Fig. 4: Mains connection Wilo-Control EC-WP 1.../EC-WP 2...

Mains connection Wilo-Control EC-WP 1 ... up to 23 A



NOTICE

Neutral conductor required

A neutral conductor is required at the mains connection for the correct functioning of the controls.

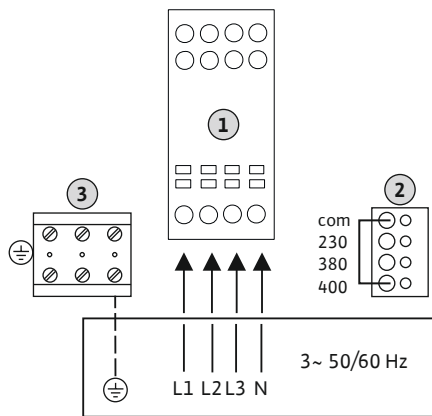


Fig. 5: Mains connection Wilo-Control EC-WP 1... up to 23 A

6.5.3 Mains connection: Fixed-speed pump

6.5.3.1 Connect pump(s)

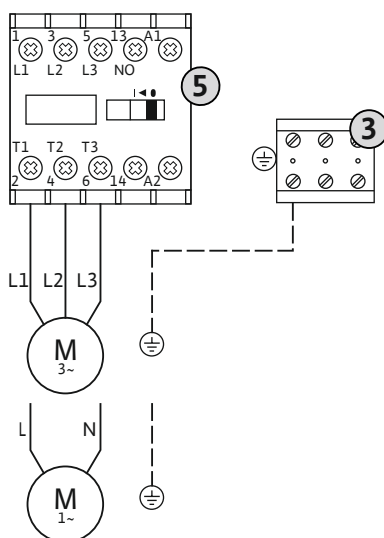


Fig. 6: Pump connection

6.5.3.2 Adjust motor current monitoring

The **minimum and maximum** motor current of the connected pumps is monitored:

1	Terminal strip: Mains connection
2	Mains voltage adjustment
3	Terminal strip: Earth (PE)

Insert the connection cable laid by the customer through the threaded cable glands and secure it. Connect the wires to the main switch as per connection diagram.

Mains connection 3~230 V:

- Cable: 5-core
- Wire: L1, L2, L3, N, PE
- Mains voltage adjustment: Converter bridge 230/COM

Mains connection 3~380 V:

- Cable: 5-core
- Wire: L1, L2, L3, N, PE
- Mains voltage adjustment: Converter bridge 380/COM

Mains connection 3~400 V:

- Cable: 5-core
- Wire: L1, L2, L3, N, PE
- Mains voltage adjustment: Converter bridge 400/COM (**factory setting**)



NOTICE

Power supply and pump connection rotating field

The rotating field is routed from the mains connection directly to the pump connection.

- Check the required rotating field of the pumps to be connected (clockwise or counter-clockwise).
- Observe the installation and operating instructions of the pumps.

3	Terminal strip: Earth (PE)
5	Contactor

Insert the connection cable laid by the customer through the threaded cable glands and secure. Connect the wires to the contactor as per the connection diagram.

NOTICE! After all pumps have been connected, set the motor current monitoring!

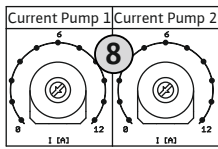


Fig. 7: Set the rated motor current at the potentiometer

6.5.4 Connection, thermal motor monitoring

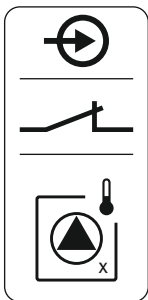


Fig. 8: Connection overview symbol

6.5.5 Pressure control connection

- Minimum motor current monitoring
The value is permanently stored in the switchgear: 300 mA or 10% of the set motor current.
- Maximum motor current monitoring
Adjust the value in the switchgear.

NOTICE! Monitoring can be disabled in Menu 5.69.

NOTICE! Monitoring cannot be disabled!

Monitoring of the maximum motor current is carried out via electronic motor current monitoring.

The same potentiometers are used for switchgears up to 12 A and up to 23 A: scale 0 to 12. The following applies to the adjustment of the rated currents:

- Switchgears up to 12 A: The value corresponds 1:1 to the scale, e.g. 6 = 6 A. Maximum adjustable value: 12 A
- Switchgears up to 23 A: The value corresponds 1:2 to the scale, e.g. 6 = 12 A. Maximum adjustable value: 24 A

After connecting the pumps, set the rated motor current of the pump.

8 Potentiometer for motor current monitoring

Use a screwdriver to set the rated motor current at the respective potentiometer.

NOTICE! "0" setting on the potentiometer leads to an error when the pump is activated!

Precise adjustment of motor current monitoring can be performed during commissioning. During commissioning, the set and the actual rated motor current can be shown on the display:

- Currently **set** value of the motor current monitoring (Menu 4.25 – 4.26)
- Currently **measured** operating current of the pump (Menu 4.29 – 4.30)

CAUTION

Property damage due to external voltage!

An external voltage which is applied destroys the component.

- Do not apply external voltage (connect potential-free).

One thermal motor monitoring device with bimetallic sensors can be connected per pump. Do not connect PTC or Pt100 sensors!

The terminals are fitted with a converter bridge at the factory.

Insert the connection cable laid by the customer through the threaded cable glands and secure it. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.** The number shown in location "x" on the symbol indicates which pump it refers to:

- 1 = pump 1
- 2 = Pump 2

Pressure measurement

The pressure can be measured using the following sensors:

- Pressure switch (only Control EC-WP1 ...)
The pressure switch acts as a normally open contact (NO):
 - Pressure switch open: Pump on
 - Pressure switch shut: Pump off
- Analogue pressure sensor 4 to 20 mA
 - **NOTICE! Do not attach an active pressure sensor.**
 - **NOTICE! Use shielded connection cables! Apply the shielding on one side!**
 - **NOTICE! Observe the correct polarity of the pressure sensor!**

Pump dry-running protection

The level for dry-running protection can also be monitored via the following sensors:

- Float switch
- Electrode

Connection is protected against reverse polarity!

The input acts as a normally open contact (NO):

- Float switch open or electrode non-immersed: water level below min. level
- Float switch shut or electrode immersed: water level sufficient

The terminals are fitted with a converter bridge at the factory.

Sensor connection

CAUTION

Property damage due to external voltage!

An external voltage which is applied destroys the component.

- Do not apply external voltage (connect potential-free).

Insert the connection cable laid by the customer through the threaded cable glands and secure it. Connect the wires to the terminal strip according to the connection diagram. For more information on the **control modes and how they work, as well as the individual terminal numbers**, please refer to the relevant description:

- “Constant pressure control p-c” control mode: 1x pump, with pressure switch [▶ 34]
- “Constant pressure control p-c” control mode: 1x pump, with pressure sensor [▶ 35]
- “Constant pressure control p-c” control mode: 2x pumps, with pressure sensor [▶ 36]

Use of electrodes

Electrodes can be connected in the following ways:

A	1x electrode with reference earth on the tank
B	2x electrodes with reference earth via the electrode

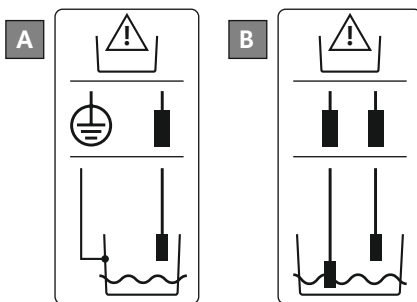


Fig. 9: Electrode connection types

6.5.6 Level control connection

Level measurement

The level can be measured using the following sensors:

- Float switch
- Electrode

Connection is protected against reverse polarity!

The inputs act as a normally open contact (NO):

- Float switch open or electrode non-immersed: Pump on
- Float switch shut or electrode immersed: Pump off

Pump dry-running protection

The level for dry-running protection can also be monitored via the following sensors:

- Float switch
- Electrode

Connection is protected against reverse polarity!

The input acts as a normally open contact (NO):

- Float switch open or electrode non-immersed: water level below min. level
- Float switch shut or electrode immersed: water level sufficient

The terminals are fitted with a converter bridge at the factory.

High water level

The high water level can also be monitored by the following sensors:

- Float switch
- Electrode
Connection is protected against reverse polarity!

The input acts as a normally open contact (NO):

- Float switch open or electrode non-immersed: no high water
- Float switch shut or electrode immersed: High water alarm

Sensor connection

CAUTION

Property damage due to external voltage!

An external voltage which is applied destroys the component.

- Do not apply external voltage (connect potential-free).

Insert the connection cable laid by the customer through the threaded cable glands and secure it. Connect the wires to the terminal strip according to the connection diagram. For more information on the **control modes and how they work, as well as the individual terminal numbers**, please refer to the relevant description:

- **Control modes for filling**
 - “Filling” control mode: 1x well, 1x pump, 1x float switch or electrode [► 20]
 - “Filling” control mode: 1x well, 1x pump, 2x float switches or electrodes [► 21]
 - “Filling” control mode: 1x well, 2x pumps, 2x float switches or electrodes [► 22]
 - “Filling” control mode: 1x well, 2x pumps, 3 float switches or electrodes [► 23]
 - “Filling” control mode: 1x well, 2x pumps, 4x float switches or electrodes [► 24]
 - “Filling” control mode: 2x wells, 2x pumps, 2x float switches or electrodes [► 25]
 - “Filling” control mode: 2x wells, 2x pumps, 4x float switches or electrodes [► 26]
- **Control modes for draining**
 - “Drain” control mode: 1x well, 1x pump, 1x float switch or electrode [► 27]
 - “Drain” control mode: 1x well, 1x pump, 2x float switches or electrodes [► 28]
 - “Drain” control mode: 1x well, 2x pumps, 2x float switches or electrodes [► 29]
 - “Drain” control mode: 1x well, 2x pumps, 3 float switches or electrodes [► 30]
 - “Drain” control mode: 1x well, 2x pumps, 4x float switches or electrodes [► 31]
 - “Drain” control mode: 2x wells, 2x pumps, 2x float switches or electrodes [► 32]
 - “Drain” control mode: 2x wells, 2x pumps, 4x float switches or electrodes [► 33]

Use of electrodes

Electrodes can be connected in the following ways:

A	1x electrode with reference earth on the tank
B	2x electrodes with reference earth via the electrode

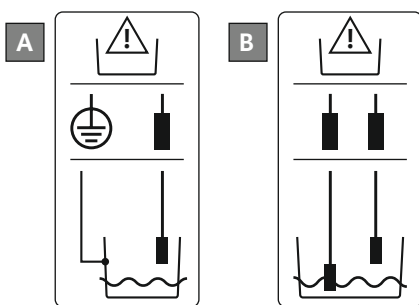


Fig. 10: Electrode connection types

6.5.7 “Extern OFF” connection: Remote deactivation

CAUTION

Property damage due to external voltage!

An external voltage which is applied destroys the component.

- Do not apply external voltage (connect potential-free).

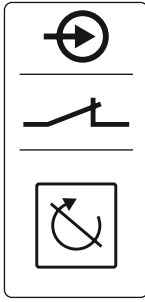


Fig. 11: Connection overview symbol

6.5.8 Collective run signal (SBM) connection

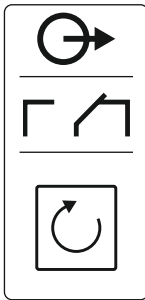


Fig. 12: Connection overview symbol

6.5.9 Collective fault signal connection (SSM)

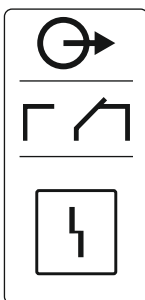


Fig. 13: Connection overview symbol

Remote deactivation of all pumps can be performed using a separate switch:

- Contact closed: pumps enabled
- Contact open: all pumps deactivated – the display shows the “Extern OFF” symbol.

The terminals are fitted with a converter bridge at the factory.

NOTICE! Remote deactivation is prioritised. All pumps are deactivated regardless of their current pressure value. The pumps cannot be operated in manual mode!

Insert the connection cables laid by the customer through the threaded cable glands and secure. Remove the converter bridge and connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.**



DANGER

Danger of death due to electrical current!

The external electrical power supply is also present at the terminals when the main switch is switched off!

- Disconnect the external power supply before any work.
- Electrical work must be carried out by a qualified electrician.
- Observe local regulations.

A run signal is issued for all pumps (SBM) via a separate output:

- Contact type: potential-free changeover contact
- Contact load:
 - Minimum: 12 V=, 10 mA
 - Maximum: 250 V~, 1 A
- Insert the connection cables laid by the customer through the threaded cable glands and secure.
- Connect the wires to the terminal strip according to the connection diagram.
- Use the terminal number shown in the connection overview on the switchgear cover.



DANGER

Danger of death due to electrical current!

The external electrical power supply is also present at the terminals when the main switch is switched off!

- Disconnect the external power supply before any work.
- Electrical work must be carried out by a qualified electrician.
- Observe local regulations.

A fault message is output for all pumps (SSM) via a separate output:

- Contact type: potential-free changeover contact
- Contact load:
 - Minimum: 12 V=, 10 mA
 - Maximum: 250 V~ 1 A
- Insert the connection cables laid by the customer through the threaded cable glands and secure.
- Connect the wires to the terminal strip according to the connection diagram.
- Use the terminal number shown in the connection overview on the switchgear cover.

6.5.10 Individual run signal (EBM) connection

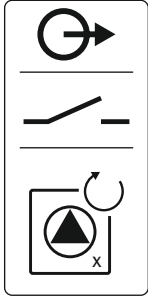


Fig. 14: Connection overview symbol

6.5.11 Individual fault signal (ESM) connection

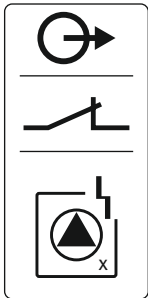


Fig. 15: Connection overview symbol

6.5.12 Connecting an external alarm signal



DANGER

Danger of death due to electrical current!

The external electrical power supply is also present at the terminals when the main switch is switched off!

- Disconnect the external power supply before any work.
- Electrical work must be carried out by a qualified electrician.
- Observe local regulations.

A run signal is output for each pump (EBM) via a separate output:

- Contact type: potential-free NO contact
- Contact load:
 - Minimum: 12 V₌, 10 mA
 - Maximum: 250 V_~, 1 A
- Insert the connection cables laid by the customer through the threaded cable glands and secure.
- Connect the wires to the terminal strip according to the connection diagram.
- Use the terminal number shown in the connection overview on the switchgear cover.

The number shown in location “x” on the symbol indicates which pump it refers to:

- 1 = pump 1
- 2 = pump 2



DANGER

Danger of death due to electrical current!

The external electrical power supply is also present at the terminals when the main switch is switched off!

- Disconnect the external power supply before any work.
- Electrical work must be carried out by a qualified electrician.
- Observe local regulations.

A fault message is output for each pump (ESM) via a separate output:

- Contact type: potential-free NC contact
- Contact load:
 - Minimum: 12 V₌, 10 mA
 - Maximum: 250 V_~, 1 A

Insert the connection cable laid by the customer through the threaded cable glands and secure it. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.** The number shown in location “x” on the symbol indicates which pump it refers to:

- 1 = pump 1
- 2 = Pump 2

CAUTION

Property damage due to external voltage!

An external voltage which is applied destroys the component.

- Do not apply external voltage (connect potential-free).

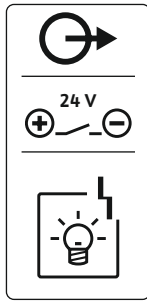


Fig. 16: Connection overview symbol

6.5.13 Connection of an actual pressure value display (pressure control only)

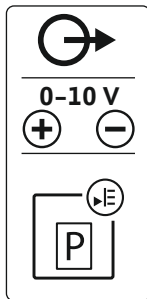


Fig. 17: Connection overview symbol

6.5.14 Connection ModBus RTU



Fig. 18: Jumper position

6.6 Control modes: Description and connection of the sensors

An external alarm signal (horn, flashing light, etc.) can be connected. The output is switched in parallel to the collective fault signal (SSM).

- Alarm signal suitable for DC voltage.
- Connection load: 24 V=, max. 4 VA
- **NOTICE! Observe the correct polarity when connecting!**
- Activate output in menu 5.67.

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.**

CAUTION

Property damage due to external voltage!

An external voltage which is applied destroys the component.

- Do not apply external voltage (connect potential-free).

The actual pressure value is transmitted via a separate output. A voltage of 0 to 10 V= is provided for this at the output:

- 0 V = pressure sensor value "0"
 - 10 V = pressure sensor upper limit
- Example:
- Pressure sensor measurement range: 0 – 16 bar
 - Display range: 0 – 16 bar
 - Setting: 1 V = 1.6 bar

Insert the connection cable laid by the customer through the threaded cable glands and secure it. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.**

CAUTION

Property damage due to external voltage!

An external voltage which is applied destroys the component.

- Do not apply external voltage (connect potential-free).

See Overview of components [▶ 11] for position numbers

9	ModBus: RS485 interface
10	ModBus: Jumper for termination/polarisation

The ModBus protocol is available for connection to a building management system.

- Insert the connection cable laid by the customer through the threaded cable glands and secure.
- Connect the wires to the terminal strip according to the connection diagram.

Observe the following points:

- Interface: RS485
- Field bus protocol settings: Menu 2.01 to 2.05.
- The switchgear is terminated at the factory. Remove termination: Remove jumper "J2".
- If the ModBus requires a polarisation, plug in jumpers "J3" and "J4".

The individual control modes and the corresponding connections of the individual sensors are described in the following sections.

6.6.1 “Filling” control mode: 1x well, 1x pump, 1x float switch or electrode

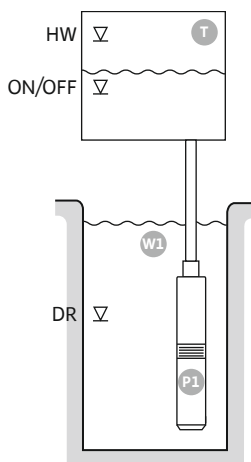


Fig. 19: Application diagram

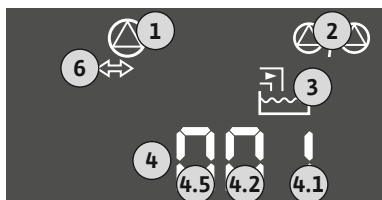


Fig. 20: Screen display

HW	High water level
ON/OFF	Switch-on and off level, switching cycle is determined by the cable length
DR	Dry-running level

When the fill level in the tank drops and the switch on-level is reached, the pump switches on. The tank is filled. When the switch off level is reached, the pump switches off after the set switch-off delay has elapsed. The switching cycle is defined by the cable length of the float switch.

To prevent the tank from overflowing, install a float switch or electrode in the tank:

- If the high water level is exceeded, the pump switches off. An error message appears on the display and an alarm sounds.
- If the water level falls below the high water level, the alarm and error message are automatically reset.

To protect the pump from a dry run, install an additional float switch or electrode in the well:

- If the water level falls below the dry running level, the pump switches off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

1	Current pump status	4.1	DR
2	Standby pump activated	4.2	ON/OFF
3	Control mode	4.5	HW
4	Switching status of the float switch/electrode		
6	Fieldbus active		

Overview of terminals

Function	DR	-	ON/OFF	-	-	-	-	HW
Terminal overview symbol	25 26 [Pump icon] [Switch icon] [Float icon]	27 28 [Pump icon] [Switch icon] [off]	29 30 [Pump icon] [Switch icon] [on/off]	31 32 [Pump icon] [Switch icon] [Float icon]	33 34 [Pump icon] [Switch icon] [off]	35 36 [Pump icon] [Switch icon] [on/off]	45 46 [Pump icon] [4-20 mA In icon] [Pump icon]	49 50 [Pump icon] [Switch icon] [Float icon]

Float switch operating principle	DR	-	ON/OFF	-	-	-	-	HW
Top contact	closed	-	closed	-	-	-	-	closed
Bottom contact	Open	-	Open	-	-	-	-	Open

Required menu settings

Menu and value to be set	501 FILL	502 1		572 1
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6.6.2 “Filling” control mode: 1x well, 1x pump, 2x float switches or electrodes

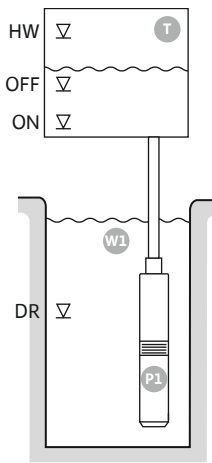


Fig. 21: Application diagram

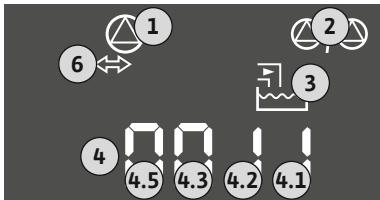


Fig. 22: Screen display

HW	High water level
OFF	Switch-off level
ON	Switch-on level
DR	Dry-running level

When the fill level in the tank drops and the switch on-level is reached, the pump switches on. The tank is filled. When the switch off level is reached, the pump switches off after the set switch-off delay has elapsed.

To prevent the tank from overflowing, install a float switch or electrode in the tank:

- If the high water level is exceeded, the pump switches off. An error message appears on the display and an alarm sounds.
- If the water level falls below the high water level, the alarm and error message are automatically reset.

To protect the pump from a dry run, install an additional float switch or electrode in the well:

- If the water level falls below the dry running level, the pump switches off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

1	Current pump status	4.1	DR
2	Standby pump activated	4.2	OFF
3	Control mode	4.3	ON
4	Switching status of the float switch/electrode	4.5	HW
6	Fieldbus active		

Overview of terminals

Function	DR	OFF	ON	-	-	-	-	HW
Terminal overview symbol	25 26 [Pump icon] [Switch icon] [Well symbol]	27 28 [Pump icon] [Switch icon] [Well symbol]	29 30 [Pump icon] [Switch icon] [Well symbol]	31 32 [Pump icon] [Switch icon] [Well symbol]	33 34 [Pump icon] [Switch icon] [Well symbol]	35 36 [Pump icon] [Switch icon] [Well symbol]	45 46 4-20 mA [In] [Out] [Pump icon]	49 50 [Pump icon] [Switch icon] [Well symbol]

Float switch operating principle

Top contact	closed	closed	closed	-	-	-	-	closed
Bottom contact	Open	Open	Open	-	-	-	-	Open

Required menu settings

Menu and value to be set	501 FILL	502 1		572 2
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6.6.3 “Filling” control mode: 1x well, 2x pumps, 2x float switches or electrodes

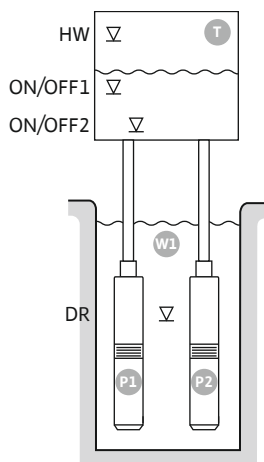


Fig. 23: Application diagram

HW	High water level
ON/OFF1	Switch-on/switch-off level 1
ON/OFF2	Switch-on/switch-off level 2
DR	Dry-running level
P1	Pump 1
P2	Pump 2

When the fill level in the tank drops and the first switch on-level (ON/OFF1) is reached, the first pump switches on. The tank is filled. When the water level in the tank continues to drop and the second switch on-level (ON/OFF2) is reached, the second pump switches on.

When the switch-off levels (ON/OFF2 and ON/OFF1) are reached, the pumps switch off after the set switch-off delay has elapsed. The switching cycle is defined by the cable length of the respective float switch. **NOTICE! The base-load and peak-load pumps are cycled alternately (see menu 5.60).**

To prevent the tank from overflowing, install a float switch or electrode in the tank:

- If the high water level is exceeded, all pumps switch off. An error message appears on the display and an alarm sounds.
- If the water level falls below the high water level, the alarm and error message are automatically reset.

To protect the pumps from a dry run, install an additional float switch or electrode in the well:

- If the water level falls below the dry-running level, the pumps switch off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

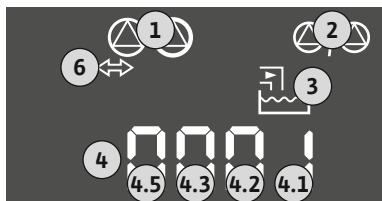


Fig. 24: Screen display

1	Current pump status	4.1	DR
2	Standby pump activated	4.2	ON/OFF2
3	Control mode	4.3	ON/OFF1
4	Switching status of the float switch/electrode	4.5	HW
6	Fieldbus active		

Overview of terminals

Function	DR	-	ON/OFF1	-	-	ON/OFF2	-	HW
Terminal overview symbol	25 26 [Symbol]	27 28 [Symbol]	29 30 [Symbol]	31 32 [Symbol]	33 34 [Symbol]	35 36 [Symbol]	45 46 [Symbol]	49 50 [Symbol]

Float switch operating principle	DR	-	ON/OFF1	-	-	ON/OFF2	-	HW
Top contact	closed	-	closed	-	-	closed	-	closed
Bottom contact	Open	-	Open	-	-	Open	-	Open

Required menu settings

Menu and value to be set	501	502	571	572
	FILL	2	1	2

6.6.4 "Filling" control mode: 1x well, 2x pumps, 3 float switches or electrodes

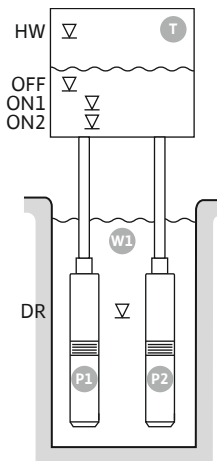


Fig. 25: Application diagram

HW	High water level
OFF	Switch-off level
ON1	Switch-on level 1
ON2	Switch-on level 2
DR	Dry-running level
P1	Pump 1
P2	Pump 2

When the fill level in the tank drops and the first switch on-level (ON1) is reached, the first pump switches on. The tank is filled. When the water level in the tank continues to drop and the second switch on-level (ON2) is reached, the second pump switches on.

When the switch-off level (OFF) is reached, all pumps switch off after the set switch-off delay has elapsed. **NOTICE! The base-load and peak-load pumps are cycled alternately (see menu 5.60).**

To prevent the tank from overflowing, install a float switch or electrode in the tank:

- If the high water level is exceeded, all pumps switch off. An error message appears on the display and an alarm sounds.
- If the water level falls below the high water level, the alarm and error message are automatically reset.

To protect the pumps from a dry run, install an additional float switch or electrode in the well:

- If the water level falls below the dry-running level, the pumps switch off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

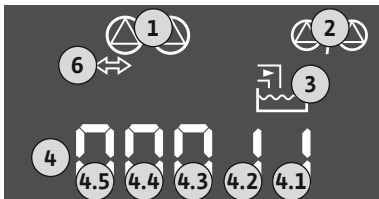


Fig. 26: Screen display

1	Current pump status	4.1	DR
2	Standby pump activated	4.2	ON1
3	Control mode	4.3	ON2
4	Switching status of the float switch/electrode	4.4	OFF
6	Fieldbus active	4.5	HW

Overview of terminals

Function	DR	OFF	ON1	-	-	ON2	-	HW
Terminal overview symbol	25 26 	27 28 	29 30 	31 32 	33 34 	35 36 	45 46 	49 50

Float switch operating principle

	DR	OFF	ON1	-	-	ON2	-	HW
Top contact	closed	closed	closed	-	-	closed	-	closed
Bottom contact	Open	Open	Open	-	-	Open	-	Open

Required menu settings

Menu and value to be set	501	502	571	572
	FILL	2	1	3

6.6.5 “Filling” control mode: 1x well, 2x pumps, 4x float switches or electrodes

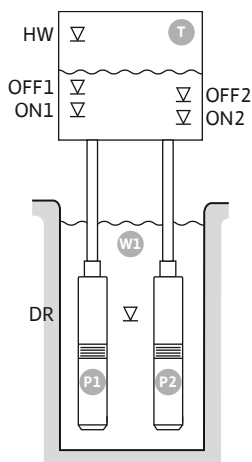


Fig. 27: Application diagram

HW	High water level
OFF1	Switch-off level 1
ON1	Switch-on level 1
OFF2	Switch-off level 2
ON2	Switch-on level 2
DR	Dry-running level
P1	Pump 1
P2	Pump 2

When the fill level in the tank drops and the first switch on-level (ON1) is reached, the first pump switches on. The tank is filled. When the water level in the tank continues to drop and the second switch on-level (ON2) is reached, the second pump switches on.

When the switch-off levels (OFF2 and OFF1) are reached, the respective pump switches off after the set switch-off delay has elapsed. **NOTICE! The base-load and peak-load pumps are cycled alternately (see menu 5.60).**

To prevent the tank from overflowing, install a float switch or electrode in the tank:

- If the high water level is exceeded, all pumps switch off. An error message appears on the display and an alarm sounds.
- If the water level falls below the high water level, the alarm and error message are automatically reset.

To protect the pumps from a dry run, install an additional float switch or electrode in the well:

- If the water level falls below the dry-running level, the pumps switch off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

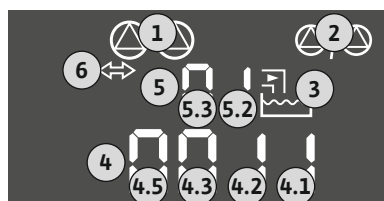


Fig. 28: Screen display

1	Current pump status	4.1	DR
2	Standby pump activated	4.2	ON1
3	Control mode	4.3	OFF1
4	Switching status of the float switch/electrode	4.5	HW
5	Switching status of the float switch/electrode	5.2	ON2
6	Fieldbus active	5.3	OFF2

Overview of terminals

Function	DR	OFF1	ON1	-	OFF2	ON2	-	HW
Terminal overview symbol	25 26	27 28	29 30	31 32	33 34	35 36	45 46	49 50
Float switch operating principle	Top contact closed, Bottom contact Open	Top contact closed, Bottom contact Open	Top contact closed, Bottom contact Open	Top contact -, Bottom contact -	Top contact closed, Bottom contact Open	Top contact closed, Bottom contact Open	Top contact -, Bottom contact -	Top contact closed, Bottom contact Open

Top contact	closed	closed	closed	-	closed	closed	-	closed
Bottom contact	Open	Open	Open	-	Open	Open	-	Open

Required menu settings

Menu and value to be set	501 FILL	502 2	571 1	572 4
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6.6.6 "Filling" control mode: 2x wells, 2x pumps, 2x float switches or electrodes

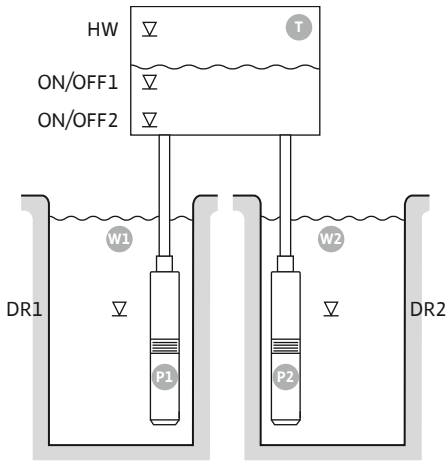


Fig. 29: Application diagram

HW	High water level
ON/OFF1	Switch-on/switch-off level 1
ON/OFF2	Switch-on/switch-off level 2
W1	Well 1
DR1	Dry-running level 1
P1	Pump 1
W2	Well 2
DR2	Dry-running level 2
P2	Pump 2

When the fill level in the tank drops and the first switch on-level (ON/OFF1) is reached, the first pump switches on. The tank is filled. When the water level in the tank continues to drop and the second switch on-level (ON/OFF2) is reached, the second pump switches on. The switching cycle is defined by the cable length of the float switch.

When the switch-off levels (ON/OFF2 and ON/OFF1) are reached, the respective pump switches off after the set switch-off delay has elapsed. **NOTICE! The base-load and peak-load pumps are cycled alternately (see menu 5.60).**

To prevent the tank from overflowing, install a float switch or electrode in the tank:

- If the high water level is exceeded, all pumps switch off. An error message appears on the display and an alarm sounds.
- If the water level falls below the high water level, the alarm and error message are automatically reset.

To protect the pumps from a dry run, install a float switch or electrode in each well:

- If the water level falls below the dry running level, the corresponding pump switches off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

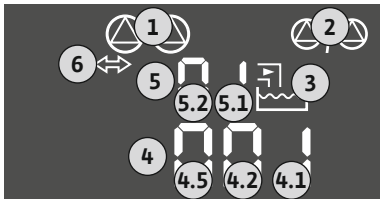


Fig. 30: Screen display

1	Current pump status	4.1	DR
2	Standby pump activated	4.2	ON/OFF1
3	Control mode	4.5	HW
4	Switching status of the float switches/electrodes for well 1	5.1	DR2
5	Switching status of the float switches/electrodes for well 2	5.2	ON/OFF2
6	Fieldbus active		

Overview of terminals

Function	DR1	-	ON/OFF1	DR2	-	ON/OFF2	-	HW
Terminal overview symbol	25 26 [Symbol: Pump 1, float switch]	27 28 [Symbol: Pump 2, float switch]	29 30 [Symbol: Pump 1, float switch]	31 32 [Symbol: Pump 2, float switch]	33 34 [Symbol: Pump 2, float switch]	35 36 [Symbol: Pump 2, float switch]	45 46 [Symbol: 4-20 mA, float switch]	49 50 [Symbol: Pump 2, float switch]

Float switch operating principle

Top contact	closed	-	closed	closed	-	closed	-	closed
Bottom contact	Open	-	Open	Open	-	Open	-	Open

Required menu settings

Menu and value to be set	501 FILL	502 2	571 2	572 2
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6.6.7 “Filling” control mode: 2x wells, 2x pumps, 4x float switches or electrodes

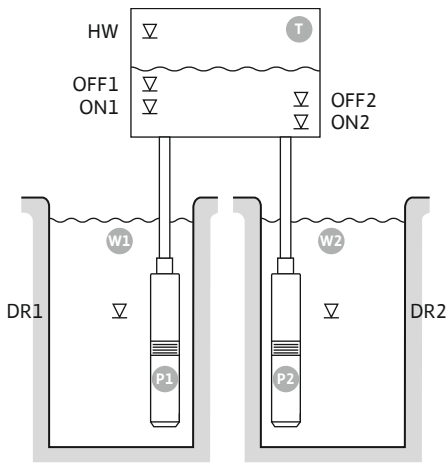


Fig. 31: Application diagram

HW	High water level
OFF1	Switch-off level 1
ON1	Switch-on level 1
OFF2	Switch-off level 2
ON2	Switch-on level 2
W1	Well 1
DR1	Dry-running level 1
P1	Pump 1
W2	Well 2
DR2	Dry-running level 2
P2	Pump 2

When the fill level in the tank drops and the first switch on-level (ON1) is reached, the first pump switches on. The tank is filled. When the water level in the tank continues to drop and the second switch on-level (ON2) is reached, the second pump switches on.

When the switch-off levels (OFF2 and OFF1) are reached, the respective pump switches off after the set switch-off delay has elapsed. **NOTICE! The base-load and peak-load pumps are cycled alternately (see menu 5.60).**

To prevent the tank from overflowing, install a float switch or electrode in the tank:

- If the high water level is exceeded, all pumps switch off. An error message appears on the display and an alarm sounds.
- If the water level falls below the high water level, the alarm and error message are automatically reset.

To protect the pumps from a dry run, install a float switch or electrode in each well:

- If the water level falls below the dry running level, the corresponding pump switches off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

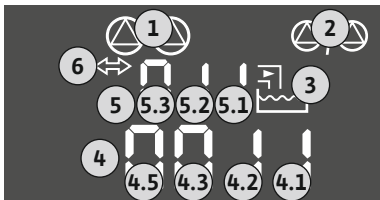


Fig. 32: Screen display

1	Current pump status	4.1	DR1
2	Standby pump activated	4.2	ON1
3	Control mode	4.3	OFF1
4	Switching status of the float switches/electrodes for well 1	4.5	HW
5	Switching status of the float switches/electrodes for well 2	5.1	DR2
6	Fieldbus active	5.2	ON2
		5.3	OFF2

Overview of terminals

Function	DR1	OFF1	ON1	DR2	OFF2	ON2	-	HW
Terminal overview symbol	25 26 [Symbol]	27 28 [Symbol]	29 30 [Symbol]	31 32 [Symbol]	33 34 [Symbol]	35 36 [Symbol]	45 46 4-20 mA In [Symbol]	49 50 [Symbol]

Float switch operating principle	DR1	OFF1	ON1	DR2	OFF2	ON2	-	HW
Top contact	closed	closed	closed	closed	closed	closed	-	closed
Bottom contact	Open	Open	Open	Open	Open	Open	-	Open

Required menu settings

Menu and value to be set	501	502	571	572
	FILL	2	2	4

6.6.8 "Drain" control mode: 1x well, 1x pump, 1x float switch or electrode

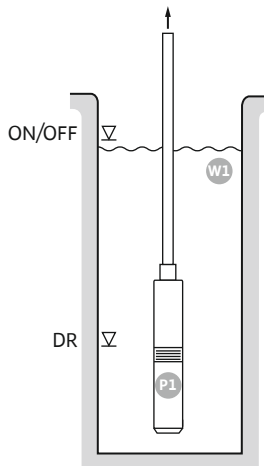


Fig. 33: Application diagram

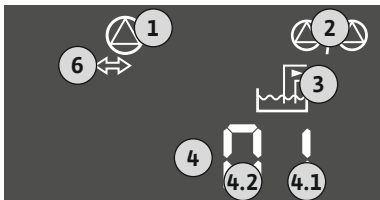


Fig. 34: Screen display

ON/OFF	Switch-on and off level, switching cycle is determined by the cable length
DR	Dry-running level

When the fill level in the well rises and the switch on-level is reached, the pump switches on. The well is drained. When the switch off level is reached, the pump switches off after the set switch-off delay has elapsed. The switching cycle is defined by the cable length of the float switch.

To protect the pump from a dry run, install an additional float switch or electrode in the well:

- If the water level falls below the dry running level, the pump switches off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

1	Current pump status	4.1	DR
2	Standby pump activated	4.2	ON/OFF
3	Control mode		
4	Switching status of the float switch/electrode		
6	Fieldbus active		

Overview of terminals

Function	DR	-	ON/OFF	-	-	-	-	-
Terminal overview symbol	25 26 [Pump icon] [Switch icon] [Float icon]	27 28 [Pump icon] [Switch icon] [Float icon]	29 30 [Pump icon] [Switch icon] [Float icon]	31 32 [Pump icon] [Switch icon] [Float icon]	33 34 [Pump icon] [Switch icon] [Float icon]	35 36 [Pump icon] [Switch icon] [Float icon]	45 46 [Pump icon] [Switch icon] [Float icon] 4-20 mA In ⊕	49 50 [Pump icon] [Switch icon] [Float icon]

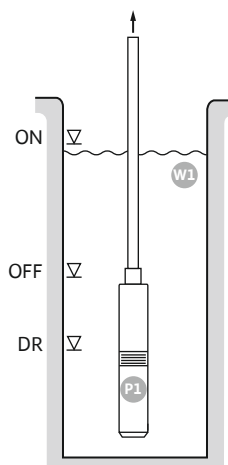
Float switch operating principle

Top contact	closed	-	closed	-	-	-	-	closed
Bottom contact	Open	-	Open	-	-	-	-	Open

Required menu settings

Menu and value to be set	50 drAl n	502		572
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6.6.9 “Drain” control mode: 1x well, 1x pump, 2x float switches or electrodes



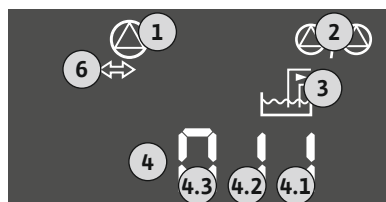
ON	Switch-on level
OFF	Switch-off level
DR	Dry-running level

When the fill level in the well rises and the switch on-level is reached, the pump switches on. The well is drained. When the switch off level is reached, the pump switches off after the set switch-off delay has elapsed.

To protect the pump from a dry run, install an additional float switch or electrode in the well:

- If the water level falls below the dry running level, the pump switches off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

Fig. 35: Application diagram



1	Current pump status	4.1	DR
2	Standby pump activated	4.2	OFF
3	Control mode	4.3	ON
4	Switching status of the float switch/electrode		
6	Fieldbus active		

Overview of terminals

Fig. 36: Screen display

Function	DR	OFF	ON	-	-	-	-	-
Terminal overview symbol	25 26 [Symbol]	27 28 [Symbol]	29 30 [Symbol]	31 32 [Symbol]	33 34 [Symbol]	35 36 [Symbol]	45 46 [Symbol]	49 50 [Symbol]

Float switch operating principle	DR	OFF	ON	-	-	-	-	-
Top contact	closed	closed	closed	-	-	-	-	closed
Bottom contact	Open	Open	Open	-	-	-	-	Open

Required menu settings

Menu and value to be set	501	502	572
	drain	1	2

6.6.10 "Drain" control mode: 1x well, 2x pumps, 2x float switches or electrodes

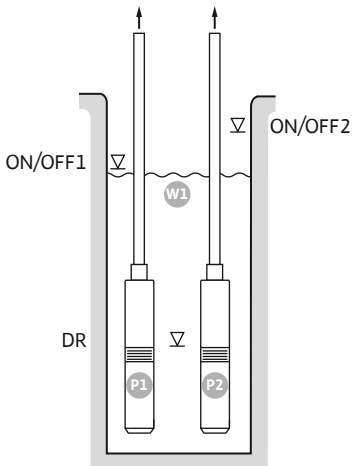


Fig. 37: Application diagram

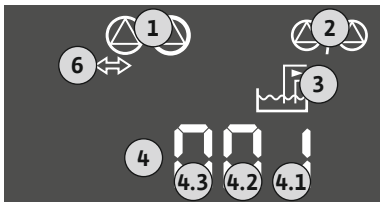


Fig. 38: Screen display

ON/OFF1	Switch-on/switch-off level 1
ON/OFF2	Switch-on/switch-off level 2
DR	Dry-running level
P1	Pump 1
P2	Pump 2

When the fill level in the well rises and the first switch on-level (ON/OFF1) is reached, the first pump switches on. The well is drained. When the water level in the well continues to rise and the second switch on-level (ON/OFF2) is reached, the second pump switches on.

When the switch-off levels (ON/OFF1 and ON/OFF2) are reached, the pumps switch off after the set switch-off delay has elapsed. The switching cycle is defined by the cable length of the respective float switch. **NOTICE! The base-load and peak-load pumps are cycled alternately (see menu 5.60).**

To protect the pumps from a dry run, install an additional float switch or electrode in the well:

- If the water level falls below the dry-running level, the pumps switch off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

1	Current pump status	4.1	DR
2	Standby pump activated	4.2	ON/OFF1
3	Control mode	4.3	ON/OFF2
4	Switching status of the float switch/electrode		
6	Fieldbus active		

Overview of terminals

Function	DR	-	ON/OFF1	-	-	ON/OFF2	-	-
Terminal overview symbol	25 26 [Symbol]	27 28 [Symbol]	29 30 [Symbol]	31 32 [Symbol]	33 34 [Symbol]	35 36 [Symbol]	45 46 4-20 mA [Symbol]	49 50 [Symbol]

Float switch operating principle

	DR	-	ON/OFF1	-	-	ON/OFF2	-	-
Top contact	closed	-	closed	-	-	closed	-	closed
Bottom contact	Open	-	Open	-	-	Open	-	Open

Required menu settings

Menu and value to be set	501	502	571	572
	drAl n	2	1	2

6.6.11 “Drain” control mode: 1x well, 2x pumps, 3 float switches or electrodes

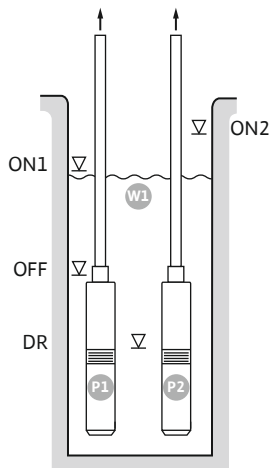


Fig. 39: Application diagram

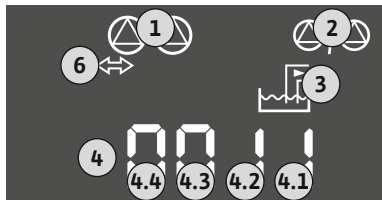


Fig. 40: Screen display

ON1	Switch-on level 1
ON2	Switch-on level 2
OFF	Switch-off level
DR	Dry-running level
P1	Pump 1
P2	Pump 2

When the fill level in the well rises and the first switch on-level (ON1) is reached, the first pump switches on. The well is drained. When the water level in the well continues to rise and the second switch on-level (ON2) is reached, the second pump switches on.

When the switch-off level (OFF) is reached, all pumps switch off after the set switch-off delay has elapsed. **NOTICE! The base-load and peak-load pumps are cycled alternately (see menu 5.60).**

To protect the pumps from a dry run, install an additional float switch or electrode in the well:

- If the water level falls below the dry-running level, the pumps switch off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

1	Current pump status	4.1	DR
2	Standby pump activated	4.2	OFF
3	Control mode	4.3	ON1
4	Switching status of the float switch/electrode	4.4	ON2
6	Fieldbus active		

Overview of terminals

Function	DR	OFF	ON1	-	-	ON2	-	-
Terminal overview symbol	25 26 [Symbol]	27 28 [Symbol]	29 30 [Symbol]	31 32 [Symbol]	33 34 [Symbol]	35 36 [Symbol]	45 46 [Symbol]	49 50 [Symbol]

Float switch operating principle

Top contact	closed	closed	closed	-	-	closed	-	closed
Bottom contact	Open	Open	Open	-	-	Open	-	Open

Required menu settings

Menu and value to be set	501 drAl n	502 2	571 1	572 3
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6.6.12 “Drain” control mode: 1x well, 2x pumps, 4x float switches or electrodes

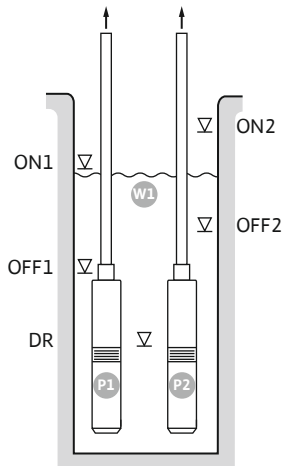


Fig. 41: Application diagram

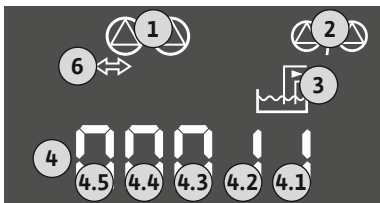


Fig. 42: Screen display

ON1	Switch-on level 1
OFF1	Switch-off level 1
ON2	Switch-on level 2
OFF2	Switch-off level 2
DR	Dry-running level
P1	Pump 1
P2	Pump 2

When the fill level in the well rises and the first switch on-level (ON1) is reached, the first pump switches on. The well is drained. When the water level in the well continues to rise and the second switch on-level (ON2) is reached, the second pump switches on.

When the switch-off levels (OFF1 and OFF2) are reached, the respective pump switches off after the set switch-off delay has elapsed. **NOTICE! The base-load and peak-load pumps are cycled alternately (see menu 5.60).**

To protect the pumps from a dry run, install an additional float switch or electrode in the well:

- If the water level falls below the dry-running level, the pumps switch off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

1	Current pump status	4.1	DR
2	Standby pump activated	4.2	OFF1
3	Control mode	4.3	ON1
4	Switching status of the float switch/electrode	4.4	OFF2
6	Fieldbus active	4.5	ON2

Overview of terminals

Function	DR	OFF1	ON1	-	OFF2	ON2	-	-
Terminal overview symbol	25 26	27 28	29 30	31 32	33 34	35 36	45 46	49 50

Float switch operating principle

Top contact	closed	closed	closed	-	closed	closed	-	closed
Bottom contact	Open	Open	Open	-	Open	Open	-	Open

Required menu settings

Menu and value to be set				
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6.6.13 “Drain” control mode: 2x wells, 2x pumps, 2x float switches or electrodes

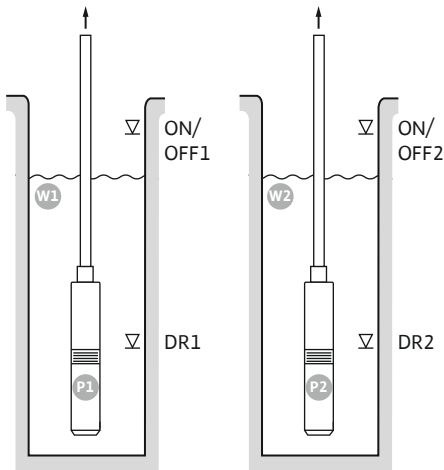


Fig. 43: Application diagram

W1	Well 1
ON/OFF1	Switch-on/switch-off level 1
DR1	Dry-running level 1
P1	Pump 1
W2	Well 2
ON/OFF2	Switch-on/switch-off level 2
DR2	Dry-running level 2
P2	Pump 2

When the fill level in the well rises and the switch on-level (ON/OFF1 or ON/OFF2) is reached, the pump switches on. The corresponding well is drained. The switching cycle is defined by the cable length of the float switch.

When the switch-off levels (ON/OFF1 or ON/OFF2) are reached, the respective pump switches off after the set switch-off delay has elapsed.

To protect the pumps from a dry run, install a float switch or electrode in each well:

- If the water level falls below the dry running level, the corresponding pump switches off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

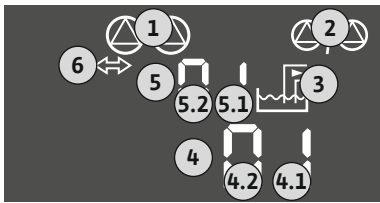


Fig. 44: Screen display

1	Current pump status	4.1	DR1
2	Standby pump activated	4.2	ON/OFF1
3	Control mode	5.1	DR2
4	Switching status of the float switches/electrodes for well 1	5.2	ON/OFF2
5	Switching status of the float switches/electrodes for well 2		
6	Fieldbus active		

Overview of terminals

Function	DR1	-	ON/OFF1	DR2	-	ON/OFF2	-	-
Terminal overview symbol	25 26	27 28	29 30	31 32	33 34	35 36	45 46	49 50

Float switch operating principle

Top contact	closed	-	closed	closed	-	closed	-	closed
Bottom contact	Open	-	Open	Open	-	Open	-	Open

Required menu settings

Menu and value to be set				
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6.6.14 “Drain” control mode: 2x wells, 2x pumps, 4x float switches or electrodes

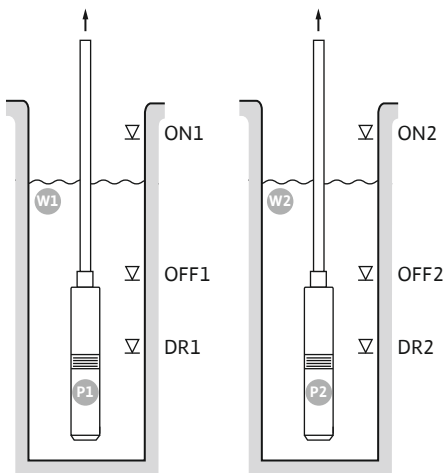


Fig. 45: Application diagram

W1	Well 1
ON1	Switch-on level 1
OFF1	Switch-off level 1
DR1	Dry-running level 1
P1	Pump 1
W2	Well 2
ON2	Switch-on level 2
OFF2	Switch-off level 2
DR2	Dry-running level 2
P2	Pump 2

When the fill level in the well rises and the switch on-level (ON1 or ON2) is reached, the pump switches on. The corresponding wells are drained.

When the switch-off levels (OFF1 or OFF2) are reached, the respective pump switches off after the set switch-off delay has elapsed.

To protect the pumps from a dry run, install a float switch or electrode in each well:

- If the water level falls below the dry running level, the corresponding pump switches off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

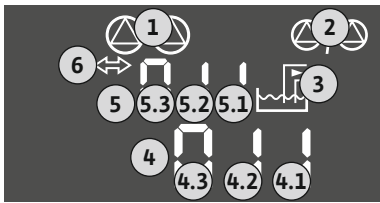


Fig. 46: Screen display

1	Current pump status	4.1	DR1
2	Standby pump activated	4.2	OFF1
3	Control mode	4.3	ON1
4	Switching status of the float switches/electrodes for well 1	5.1	DR2
5	Switching status of the float switches/electrodes for well 2	5.2	OFF2
6	Fieldbus active	5.3	ON2

Overview of terminals

Function	DR1	OFF1	ON1	DR2	OFF2	ON2	-	-
Terminal overview symbol	25 26	27 28	29 30	31 32	33 34	35 36	45 46	49 50
Float switch operating principle								

Top contact	closed	closed	closed	closed	closed	closed	-	closed
Bottom contact	Open	Open	Open	Open	Open	Open	-	Open

Required menu settings

Menu and value to be set				
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6.6.15 “Constant pressure control p-c”
control mode: 1x pump, with pressure switch

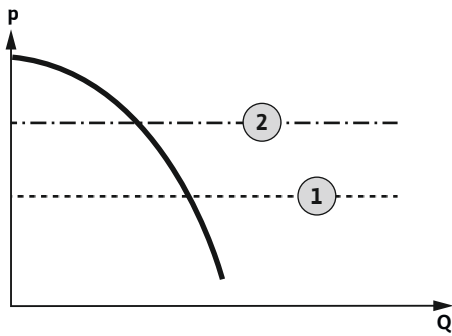


Fig. 47: Functional diagram



Fig. 48: Screen display

1	Activation point
2	Deactivation point

NOTICE! If a pressure switch is used, only one pump can be controlled. The pressure switch used detects the actual pressure value and defines the activation and deactivation threshold:

- If the pressure in the system falls below the activation threshold, the pump switches on.
- If the deactivation threshold is exceeded, the pump switches off after the set switch-off delay has elapsed.

To protect the pump from a dry run, install an additional float switch or electrode in the well:

- If the water level falls below the dry running level, the pump switches off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

1	Current pump status
3	Control mode
4	Switching state of pressure switch
6	Fieldbus active

Overview of terminals

Function	DR	-	ON/OFF	-	-	-	-	-
Terminal overview symbol	25 26	27 28	29 30	31 32	33 34	35 36	45 46	49 50

Float switch operating principle

Top contact	closed	-	-	-	-	-	-	-
Bottom contact	open	-	-	-	-	-	-	-

Pressure switch operating principle

Contact closed	-	-	Pump off	-	-	-	-	-
Contact open	-	-	Pump on	-	-	-	-	-

Required menu settings

Menu and value to be set				
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6.6.16 “Constant pressure control p-c” control mode: 1x pump, with pressure sensor

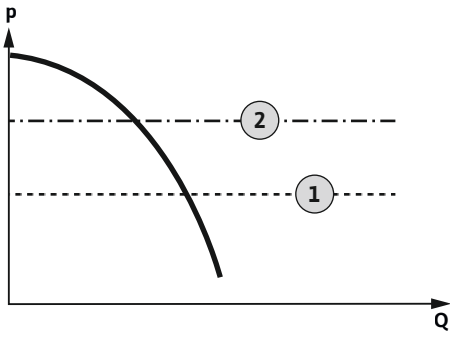


Fig. 49: Functional diagram

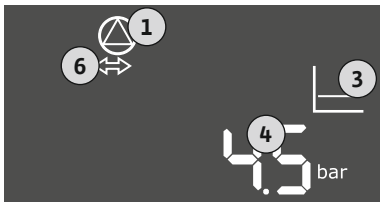


Fig. 50: Screen display

1	Activation point
2	Deactivation point

The pressure sensor detects the actual pressure value. The pump is switched on and off depending on the set thresholds:

- If the pressure in the system falls below the activation threshold, the pump switches on.
- If the deactivation threshold is exceeded, the pump switches off after the set switch-off delay has elapsed.

To protect the pump from a dry run, install an additional float switch or electrode in the well:

- If the water level falls below the dry running level, the pump switches off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

1	Current pump status
3	Control mode
4	Current pressure in the tank
6	Fieldbus active

Overview of terminals

Function	DR	-	-	-	-	-	Pressure sensor	-
Terminal overview symbol	25 26 [Pump icon] [Switch icon] [Relay icon]	27 28 [Pump icon] [Switch icon] [Relay icon]	29 30 [Pump icon] [Switch icon] [Relay icon]	31 32 [Pump icon] [Switch icon] [Relay icon]	33 34 [Pump icon] [Switch icon] [Relay icon]	35 36 [Pump icon] [Switch icon] [Relay icon]	45 46 [Pump icon] [4-20 mA sensor icon] [Relay icon]	49 50 [Pump icon] [Switch icon] [Relay icon]
Float switch operating principle								
Top contact	closed	-	-	-	-	-	-	-
Bottom contact	open	-	-	-	-	-	-	-

Required menu settings

Menu and value to be set	501 P-c	502 1	506 SenSo	511 16 bar	101 40 bar
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NOTICE! The values shown in menus 5.11 and 1.01 correspond to the factory setting. Enter the system-specific values here.

6.6.17 “Constant pressure control p-c” control mode: 2x pumps, with pressure sensor

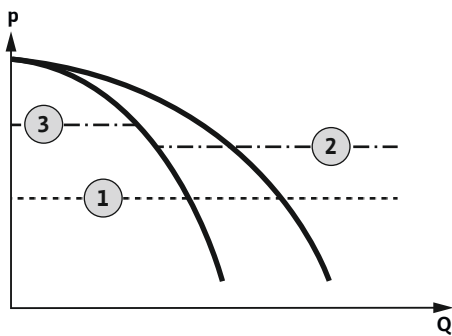


Fig. 51: Functional diagram

1	Activation point
2	1st deactivation point
3	2nd deactivation point

The pressure sensor detects the actual pressure value. The pumps are switched on and off depending on the set thresholds:

- If the pressure in the system falls below the activation threshold, both pumps switch on.
- When the first deactivation threshold is exceeded, the first pump switches off after the set switch-off delay has elapsed.
- When the second deactivation threshold is exceeded, the second pump switches off after the set switch-off delay has elapsed.

To protect the pump from a dry run, install an additional float switch or electrode in the well:

- If the water level falls below the dry running level, the pump switches off. An error message appears on the display and an alarm sounds.
- If the dry-running level is exceeded, the alarm and error message are automatically reset.

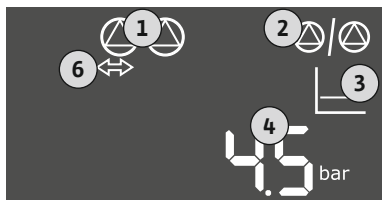


Fig. 52: Screen display

1	Current pump status
2	Standby pump activated
3	Control mode
4	Current pressure in the tank
6	Fieldbus active

Overview of terminals

Function	DR	-	-	-	-	-	Pressure sensor	-
Terminal overview symbol	25 26	27 28	29 30	31 32	33 34	35 36	45 46	49 50
Float switch operating principle	Top contact closed Bottom contact open	-	-	-	-	-	-	-

Required menu settings

Menu and value to be set	501 P-c	502 2	506 SenSo	511 16 bar	101 40 bar
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NOTICE! The values shown in menus 5.11 and 1.01 correspond to the factory setting. Enter the system-specific values here.

7 Operation

DANGER
Danger of death due to electrical current!
 There is danger of death from open switchgear.

- Only operate the switchgear when closed.
- Electrical work on the internal components must be carried out by a qualified electrician.

7.1 Functional principle

7.1.1 "Level control" operating principle

In automatic mode, the pumps are switched on and off depending on the water level and control mode. During operation, a visual indicator appears on the LCD display and the green LED lights up. If two pumps are connected, pump cycling is carried out every time the pump is switched off to optimise the pump running times.

An alarm signal is shown on the LCD display in case of a fault. If more than one pump is connected, automatic changeover to a fully-functional pump occurs. The internal buzzer can emit an audible alarm signal. Furthermore, the outputs for the collective fault signal (SSM) and individual fault signal (ESM) are activated. The output for the external alarm signal is activated in parallel to the collective fault signal output. This can also be used to control an external alarm.

Monitoring for the dry-running and high water level works as follows:

- **Dry-running protection system**
Monitoring always refers to the fill level on the pump. If the water level **falls below** the dry-running level, the pump(s) undergo(es) forced switch-off.
- **High water**
Monitoring always refers to the fill level in the tank. If the high water level is **exceeded**, the pump(s) undergo(es) forced switch-off.

An alarm signal is also shown on the LCD display. The internal buzzer can emit an audible alarm signal. Furthermore, the output for the collective fault signal (SSM) is activated. The output for the external alarm signal is activated in parallel to the collective fault signal output. This can also be used to control an external alarm.

7.1.2 "Pressure control" operating principle

In automatic mode, the system maintains the specified pressure. As soon as the pressure in the tank falls below the set pressure, the pumps are switched on. When the pressure in the tank exceeds the set pressure again, the pumps are switched off. If two pumps are connected, pump cycling is carried out every time the pump is switched off to optimise the pump running times.

An alarm signal is shown on the LCD display in case of a fault. If more than one pump is connected, automatic changeover to a fully-functional pump occurs. The internal buzzer can emit an audible alarm signal. Furthermore, the outputs for the collective fault signal (SSM) and individual fault signal (ESM) are activated. The output for the external alarm signal is activated in parallel to the collective fault signal output. This can also be used to control an external alarm.

Monitoring for the dry-running level works as follows:

- **Dry-running protection system**
Monitoring always refers to the fill level on the pump. If the water level **falls below** the dry-running level, the pump(s) undergo(es) forced switch-off.

An alarm signal is also shown on the LCD display. The internal buzzer can emit an audible alarm signal. Furthermore, the output for the collective fault signal (SSM) is activated. The output for the external alarm signal is activated in parallel to the collective fault signal output. This can also be used to control an external alarm.

7.1.3 Pump cycling

To prevent irregular running times of the individual pumps, the base-load pump is regularly cycled if there are two pumps. When all pumps are switched off, the base-load pump will change the next time the system is activated.

Additionally, repeated pump cycling is activated as a factory setting. This causes the base-load pump to be switched every 6 hours. **NOTICE! To deactivate this function: Menu 5.60!**

7.1.4 Standby pump

One pump can be used as a standby pump. This pump is not activated during normal operation. The standby pump is only activated in the event of pump failure due to a fault. The standby pump is subject to standstill monitoring. The standby pump is therefore activated during pump cycling and pump kick.

7.1.5 Dry-running protection system

To protect the pumps from a dry run, a float switch or an electrode can also be installed in the well:

- Contact type: Normally open contact
- Float switch operating principle:
 - Top contact = closed
 - Bottom contact = open

7.1.6 Operation with defective pressure sensor (for pressure control with sensor only)

If the pressure sensor does not transfer a measured value (e.g. due to a wire break or defective sensor), all pumps are switched off. Furthermore, the red LED fault signal lights up and the collective fault signal is activated.

7.1.7 Pump kick (cyclical test run)

To avoid longer periods of standstill for the activated pumps, a cyclical test run (pump kick function) is provided as a factory setting. **NOTICE! To deactivate this function: Menu 5.40!** Observe the following points for this function:

- **Menu 5.41:** Pump kick permitted in “Extern OFF”
Start test run when the pumps are switched off using “Extern OFF”?
- **Menu 5.42:** Pump kick interval
Time interval after which a test run takes place. **NOTICE! The time interval will start when all pumps are switched off!**
- **Menu 5.43:** Pump kick running time
Pump running time during the test run

7.2 Menu control

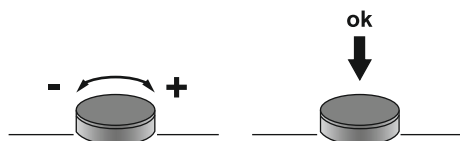


Fig. 53: Operating button function

7.3 Menu type: Main menu or Easy Actions menu

There are two different menus.

- Main menu: Access to all settings for a complete configuration.
- Easy Actions menu: Quick access to certain functions.
Observe the following points when using the Easy Actions menu:
 - The Easy Actions menu only offers access to the selected functions. It is not possible to perform a complete configuration with this.
 - Perform an initial configuration to use the Easy Actions menu.
 - The Easy Actions menu is enabled at the factory. Note, the Easy Actions menu can be **disabled in menu 7.06.**

7.4 Call up the menu

Call up the main menu

1. Press operating button for 3 seconds.
 - ▶ Menu item 1.00 appears.

Call up the Easy Actions menu

1. Turn operating button 180°.
 - ⇒ The “Resetting error messages” or “Manual operation pump 1” function appears
2. Turn operating button an additional 180°.
 - ▶ The other functions are shown. The main screen appears at the end.







7.5 Quick access to “Easy Actions”

The following functions can be called up using the Easy Actions menu:



Reset the current error message

NOTICE! Menu item is only shown when an error is present!

	Manual operation pump 1 When the control knob is pressed, pump 1 runs. When the control knob is released, the pump switches off. The last set operating mode is active again.
	Manual operation pump 2 When the control knob is pressed, pump 2 runs. When the control knob is released, the pump switches off. The last set operating mode is active again.
	Pump 1 deactivated. Corresponds to the “off” value in menu 3.02.
	Pump 2 deactivated. Corresponds to the “off” value in menu 3.03.
	Automatic mode, pump 1 Corresponds to the “Auto” value in menu 3.02.
	Automatic mode, pump 2 Corresponds to the “Auto” value in menu 3.03.

7.6 Factory settings

To reset the switchgear to the factory settings, contact customer service.

8 Commissioning

8.1 Operator responsibilities



NOTICE

Observe additional documentation

- Carry out the commissioning measures in accordance with the installation and operating instructions for the overall system.
- Observe the installation and operating instructions for the connected products (sensors and pumps) as well as the system documentation.

- Provide installation and operating instructions at the switchgear or at a place specially reserved for it.
- Make the installation and operating instructions available in a language the personnel can understand.
- Make sure that the installation and operating instructions have been read and understood by all personnel.
- The installation site of the switchgear is overflow-proof.
- The switchgear is properly fused and earthed.
- Safety devices and precautions (incl. emergency off) for the entire system are switched on and have been checked for problem-free operation.
- The switchgear is suitable for use under the specified operating conditions.

8.2 Activating the switchgear

8.2.1 Possible error message during activation

Depending on the mains connection and the basic settings, the following error message may occur during activation. The error codes listed and their description apply to commissioning. A complete overview can be found in Chapter “Error codes”.

Code*	Faults	Cause	Remedies
E006	Rotating field error	<ul style="list-style-type: none"> • Incorrect rotating field • Operation with single-phase AC current connection. 	<ul style="list-style-type: none"> • Establish a clockwise rotating field at the mains connection. • Deactivate rotating field monitoring (menu 5.68)!
E080.x	Pump fault	<ul style="list-style-type: none"> • No pump connected. • Motor current monitoring not set. 	<ul style="list-style-type: none"> • Connect pump or deactivate minimum current monitoring (menu 5.69)! • Set the motor current monitoring to the pump’s rated current.

8.2.2 Activating the device

Key:

* "x" = represents the pump to which the fault shown applies.



NOTICE

Observe the error code on the display

If the red fault LED lights up or flashes, observe the error code on the display! If the error has been confirmed, the previous error will be stored in menu 6.02.

- ✓ Switchgear is closed.
 - ✓ Installation has been performed correctly.
 - ✓ All signal transmitters and consumers are connected and installed in the operating space.
 - ✓ If dry-running protection is present, switching point set correctly.
 - ✓ Motor protection is preset according to the pump data.
1. Turn the main switch to the "ON" position.
 2. Switchgear starts.
 - All LEDs light up for 2 s.
 - The display illuminates and the start screen appears.
 - The standby symbol appears in the display.
- ▶ The switchgear is ready for operation. Start the initial configuration or automatic mode.

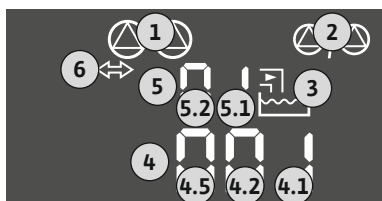


Fig. 54: Display screen with float switch or electrode

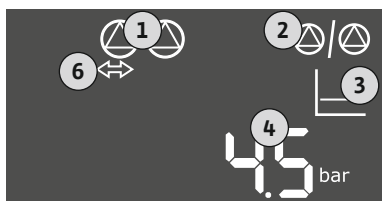


Fig. 55: Display screen with pressure sensor

8.3 Start initial configuration

1	Current pump status
2	Standby pump function activated
3	Control mode (e.g. p-c)
4	Switching status of float switches/electrodes
5	Switching status of float switches/electrodes
6	Fieldbus active

1	Current pump status
2	Standby pump function activated
3	Control mode (e.g. p-c)
4	Actual pressure value
6	Fieldbus active

Set the following parameters during initial configuration:

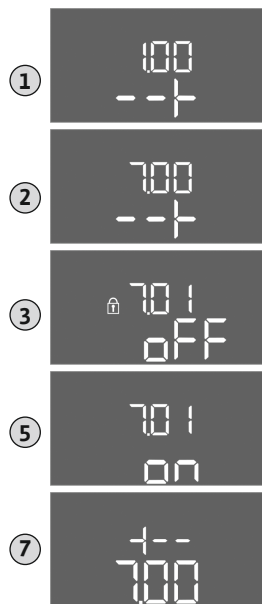
- Enable parameter input.
- Menu 5: Basic settings
- Menu 1: Activation/deactivation values
- Menu 2: Fieldbus connection (if available)
- Menu 3: Enable pumps.
- Set motor current monitoring.
- Check the direction of rotation of the connected pumps.

Observe the following points during the configuration:

- If there is no input or operation for 6 minutes:
 - the display illumination is switched off.
 - the display returns to the main screen.
 - parameter input is locked.
- Some settings can only be adjusted when there is no pump in operation.

- The menu is automatically adapted based on the settings. Example: The Menus 5.41 ... 5.43 are only visible when the "pump kick" function (Menu 5.40) is activated.
- The menu structure is valid for all EC switchgears (e.g. HVAC, Booster, Lift, Fire, etc.). This may lead to gaps in the menu structure.

8.3.1 Enable parameter input



As standard, the values are only displayed. To change the values, the parameter input in Menu 7.01 must be enabled:

1. Press the operating button for 3 s.
⇒ Menu item 1.00 appears
2. Turn the operating button until menu 7 appears.
3. Press the operating button.
⇒ Menu 7.01 appears.
4. Press the operating button.
5. Change the value to "on": Turn the operating button.
6. Save value: Press the operating button.
⇒ The menu is enabled and can be changed.
7. Turn the operating button until the end of menu 7 appears.
8. Press the operating button.
⇒ Back to the main menu level.
▶ Start initial configuration.

Fig. 56: Enable parameter input

8.3.2 Overview of available parameters

The available parameters are shown in the following table.

Parameter (menu item)	Filling	Draining	Pressure switch	Pressure sensor
1.00 Values for switching on and off				
1.01 Pressure setpoint	–	–	–	•
1.04 Activation threshold of the pump in % of pressure setpoint	–	–	–	•
1.07 Deactivation threshold of the base-load pump in % of pressure setpoint	–	–	–	•
1.08 Peak-load pump deactivation threshold in % of pressure setpoint	–	–	–	•
1.09 Deactivation delay base-load pump	•	•	•	•
1.10 Activation delay peak-load pump	•	•	•	•
1.11 Deactivation delay peak-load pump	•	•	•	•
2.00 Fieldbus connection for ModBus RTU				
2.01 ModBus RTU interface On/Off	•	•	•	•
2.02 Baud rate	•	•	•	•
2.03 User address	•	•	•	•
2.04 Parity	•	•	•	•
2.05 Stop bits	•	•	•	•
3.00 Enable pumps				
3.01 Enable pumps	•	•	•	•
3.02 Pump 1 to Pump 2 operating mode	•	•	•	•
3.10 Running time of pumps in manual operation	•	•	•	•
4.00 Information				
4.02 Current pressure value in bar	–	–	–	•
4.05 Status of float switches	•	•	•	–
4.12 Running time of switchgear	•	•	•	•
4.13 Running time: Pump 1	•	•	•	•

Parameter (menu item)	Filling	Draining	Pressure switch	Pressure sensor
4.14 Running time: Pump 2	•	•	•	•
4.17 Switching cycles switchgear	•	•	•	•
4.18 Switching cycle: Pump 1	•	•	•	•
4.19 Switching cycle: Pump 2	•	•	•	•
4.22 Serial number of switchgear	•	•	•	•
4.23 Switchgear type	•	•	•	•
4.24 Software version	•	•	•	•
4.25 Set value for the motor current monitoring: Pump 1	•	•	•	•
4.26 Set value for the motor current monitoring: Pump 2	•	•	•	•
4.29 Actual current in A for pump 1	•	•	•	•
4.30 Actual current in A for pump 2	•	•	•	•
5.00 Basic settings				
5.01 Control mode	•	•	•	•
5.02 Number of connected pumps	•	•	•	•
5.03 Standby pump	•	•	•	•
5.06 Signal acquisition pressure	–	–	•	•
5.11 Pressure sensor measurement range	–	–	–	•
5.39 Alarm signal with active “Extern OFF” input	•	–	–	–
5.40 Switch “pump kick” function On/Off	•	•	•	•
5.41 “Pump kick” permitted in “Extern OFF”	•	•	•	•
5.42 “Pump kick interval”	•	•	•	•
5.43 “Pump kick duration”	•	•	•	•
5.44 Delay system	•	•	•	•
5.45 Behaviour during sensor fault – number of pumps to be switched on	•	•	•	•
5.57 Maximum running time for single-pump operation	•	•	•	•
5.58 Collective run signal (SBM) function	•	•	•	•
5.59 Collective fault signal (SSM) function	•	•	•	•
5.60 Pump cycling	•	•	•	•
5.62 Low water level (dry-running protection): Deactivation delay	•	•	•	•
5.63 Low water level (dry-running protection): Reactivation time delay	•	•	•	•
5.66 Acoustic alarm	•	•	•	•
5.67 Output for an external signalling unit On/Off	•	•	•	•
5.68 Mains connection rotating field monitoring On/Off	•	•	•	•
5.69 Minimum motor current monitoring On/Off	•	•	•	•
5.70 Max. switching frequency per hour, per pump	•	•	•	•
5.71 Number of wells	•	•	–	–
5.72 Number of float switches for pump levels	•	•	–	–

8.3.3 Menu 5: Basic settings



Fig. 57: Menu 5.00



Fig. 58: Menu 5.01

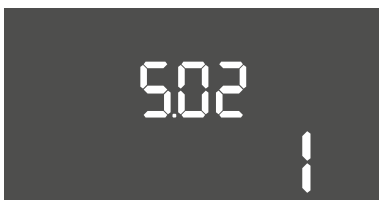


Fig. 59: Menu 5.02

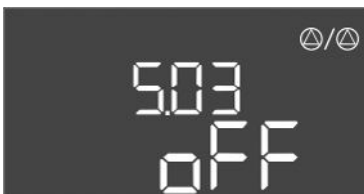


Fig. 60: Menu 5.03



Fig. 61: Menu 5.06

Menu no.	5.00
Name	Installation
Description	Settings made during the installation of the switchgear.

Menu no.	5.01
Name	Control mode
Value range	fill, drain, p-c
Factory setting	drain
Description	<p>The active control mode of the switchgear. It is selected depending on the intended application.</p> <ul style="list-style-type: none"> “drain” control mode: The pumps are activated when the level rises and switched off when the level falls. “fill” control mode: The pumps are activated when the level falls and switched off when the level rises. “p-c” control mode: Constant pressure control

Menu no.	5.02
Name	Number of pumps
Value range	1 ... 2
Factory setting	1
Description	Number of pumps in the system

Menu no.	5.03
Name	Standby pump
Value range	on, off
Factory setting	off
Description	<p>Determines whether or not a pump should be kept in stock as a replacement for a failed pump.</p> <p>One pump can be used as a standby pump. This pump is not activated during normal operation. The standby pump is only activated in the event of pump failure due to a fault. The standby pump is subject to standstill monitoring. The standby pump is therefore activated during pump cycling and pump kick.</p> <ul style="list-style-type: none"> on = Standby pump activated off = Standby pump deactivated

Menu no.	5.06
Name	Signal acquisition pressure
Value range	digi, senso
Factory setting	senso
Description	<p>Determines whether the pressure is measured by a pressure switch or an analogue pressure sensor.</p> <p>digi = pressure switch</p> <p>senso = pressure sensor</p>



Fig. 62: Menu 5.11



Fig. 63: Menu 5.39



Fig. 64: Menu 5.40



Fig. 65: Menu 5.41



Fig. 66: Menu 5.42

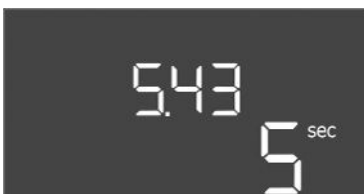


Fig. 67: Menu 5.43

Menu no.	5.11
Name	Pressure sensor measurement range
Value range	4 – 25 bar
Factory setting	16 bar
Description	Defines the end value for the pressure range of the sensor.

Menu no.	5.39
Name	Alarm signal with active “Extern OFF” input
Value range	off, on
Factory setting	off
Description	If “Extern OFF” is used as input for a float switch, a “Priority Off” alarm can be activated.

Menu no.	5.40
Name	Pump kick
Value range	off, on
Factory setting	on
Description	Switch the “Pump kick” function on or off: <ul style="list-style-type: none"> • off = pump kick deactivated • on = pump kick activated

Menu no.	5.41
Name	“Pump kick” for Extern OFF
Value range	off, on
Factory setting	on
Description	Select whether a pump kick may take place or not if the Extern OFF input is active: <ul style="list-style-type: none"> • off = pump kick deactivated if Extern OFF is active. • on = pump kick activated if Extern OFF is active.

Menu no.	5.42
Name	“Pump kick interval”
Value range	1 ... 336 h
Factory setting	24 h
Description	The time interval between two test runs or after all pumps have stopped.

Menu no.	5.43
Name	“Pump kick” duration
Value range	0 ... 60 s
Factory setting	5 s
Description	The switch-on time of the pump during the test run

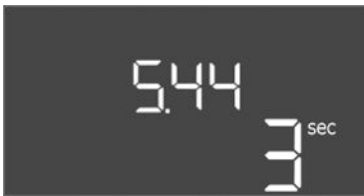


Fig. 68: Menu 5.44



Fig. 69: Menu 5.45

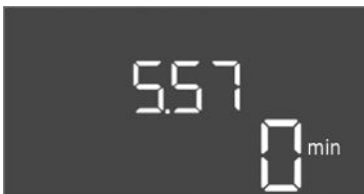


Fig. 70: Menu 5.57



Fig. 71: Menu 5.58



Fig. 72: Menu 5.59

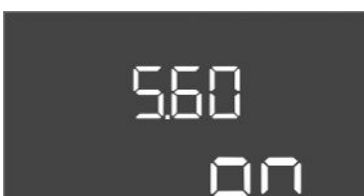


Fig. 73: Menu 5.60

Menu no.	5.44
Name	Delay system
Value range	0 – 180 s
Factory setting	3 s
Description	Waiting time after activation of the switchgear until a pump can be started. This can be utilised when using several switchgears in order to reduce power peaks by starting them simultaneously.

Menu no.	5.45
Name	Number of pumps with sensor error
Value range	0 – 4
Factory setting	0
Description	Defines the number of pumps to be started if a sensor error has occurred.

Menu no.	5.57
Name	Maximum running time for single-pump operation
Value range	0 ... 60 min
Factory setting	0 min
Description	If only one pump is activated and exceeds the set maximum running time, an alarm is generated. The setting "0 min" switches the running time monitoring off.

Menu no.	5.58
Name	Collective run signal (SBM) behaviour
Value range	on, run
Factory setting	run
Description	The mode for the collective run signal: <ul style="list-style-type: none"> • "on": Switchgear ready for operation • "run": At least one pump is running.

Menu no.	5.59
Name	Collective fault signal (SSM) behaviour
Value range	fall, raise
Factory setting	raise
Description	The switching behaviour of the collective fault signal: <ul style="list-style-type: none"> • "fall": falling edge • "raise": rising edge

Menu no.	5.60
Name	Pump cycling
Value range	on, off
Factory setting	on
Description	Activate or deactivate automatic pump cycling after 6 hours of operation. <ul style="list-style-type: none"> • "on": Pump cycling activated • "run": Pump cycling deactivated



Fig. 74: Menu 5.62



Fig. 75: Menu 5.63



Fig. 76: Menu 5.66



Fig. 77: Menu 5.67

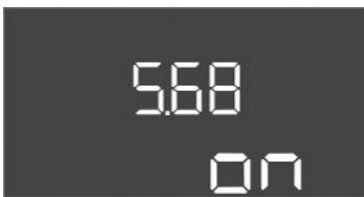


Fig. 78: Menu 5.68

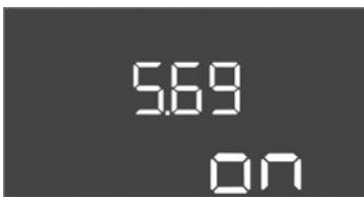


Fig. 79: Menu 5.69

Menu no.	5.62
Name	Delay dry-running protection
Value range	0 – 180 s
Factory setting	0 s
Description	The delay for detecting dry run to avoid false alarms caused by short impulses.

Menu no.	5.63
Name	Delay restart after dry run
Value range	0 – 1800 s
Factory setting	10 s
Description	Time until the pumps start again after the end of the dry running signal.

Menu no.	5.66
Name	Acoustic alarm
Value range	off, error
Factory setting	off
Description	Enables the activation of an acoustic signal when an alarm occurs. <ul style="list-style-type: none"> • off = alarm off • error = alarm on

Menu no.	5.67
Name	Output for an external signalling unit On/Off
Value range	off, error
Factory setting	off
Description	Enables the activation of an optical signal when an alarm occurs. <ul style="list-style-type: none"> • off = output deactivated • error = output activated

Menu no.	5.68
Name	Rotating field detection
Value range	on, off
Factory setting	on
Description	Activation or deactivation of the phase rotating field detection when single-phase pumps are used. <ul style="list-style-type: none"> • off = rotating field detection deactivated • on = rotating field detection activated

Menu no.	5.69
Name	Minimum current detection pumps
Value range	on, off
Factory setting	on
Description	Activate or deactivate undercurrent detection for the pumps: If the motor current is below the set minimum, the minimum current detection reports an error. <ul style="list-style-type: none"> • off = minimum current detection deactivated • on = minimum current detection activated

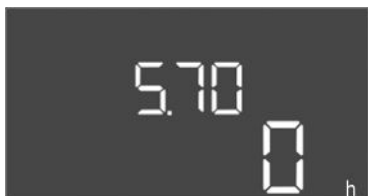


Fig. 80: Menu 5.70



Fig. 81: Menu 5.71

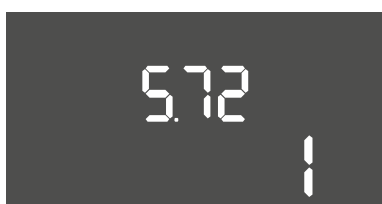


Fig. 82: Menu 5.72

Menu no.	5.70
Name	Max. switching frequency per hour, per pump
Value range	0 ... 60
Factory setting	0
Description	If the max. number of starts has been exceeded, an alarm is generated. To deactivate the function, set the value "0" .

Menu no.	5.71
Name	Number of wells
Value range	1 ... 2
Factory setting	1
Description	Number of wells for systems with 2 pumps. This has an effect on dry-running detection and pump selection. For 1 pump, the number is always 1.

Menu no.	5.72
Name	Number of float switches for pump levels
Value range	1 – 4
Factory setting	1
Description	The total number of float switches for controlling pump start and pump stop. Setting options: <ul style="list-style-type: none"> • Systems with 1 pump: Number = 1 or 2 • Systems with 2 pumps and 1 well: Number = 2, 3 or 4 • Systems with 2 pumps and 2 wells: Number = 2 or 4

8.3.4 Menu 1: Values for switching on and off



Fig. 83: Menu 1.00



Fig. 84: Menu 1.01



Fig. 85: Menu 1.04



Fig. 86: Menu 1.07



Fig. 87: Menu 1.08



Fig. 88: Menu 1.09

Menu no.	1.00
Name	Setpoints
Description	Setting the control setpoints

Menu no.	1.01
Name	Pressure setpoint
Value range	0.1 – 25.0 bar
Factory setting	4 bar
Description	The pressure setpoint defines the pressure at the booster output.

Menu no.	1.04
Name	Pump start activation threshold
Value range	75 – 99%
Factory setting	95 %
Description	Activation threshold of the pump in % of the pressure setpoint for starting the base-load pump or for pumps in general

Menu no.	1.07
Name	Deactivation threshold for base-load pump
Value range	101 – 125%
Factory setting	115 %
Description	Deactivation threshold of the base-load pump in % of the pressure setpoint for stopping the base-load pump when only this is running.

Menu no.	1.08
Name	Deactivation threshold for peak-load pumps
Value range	101 – 125%
Factory setting	110 %
Description	Deactivation threshold of the peak-load pumps in % of the pressure setpoint for stopping a peak-load pump when two or more pumps are running.

Menu no.	1.09
Name	Base-load pump deactivation delay
Value range	0 ... 60 s
Factory setting	0 s
Description	Delays the stop of the base-load pump when the stop threshold has been reached and the actual value remains permanently above the deactivation threshold.



Fig. 89: Menu 1.10



Fig. 90: Menu 1.11

Menu no.	1.10
Name	Peak-load pump activation delay
Value range	1 – 30 s
Factory setting	3 s
Description	Delay for starting a peak-load pump when the start threshold has been reached and the current value remains permanently above the activation threshold.

Menu no.	1.11
Name	Peak-load pump switch-off delay
Value range	0 ... 30 s
Factory setting	1 s
Description	Delays the stop of a peak-load pump when the stop threshold has been reached and the actual value remains permanently above the deactivation threshold.

8.3.5 Menu 2: ModBus RTU connection

The switchgear is equipped with an RS485 interface for connection via ModBus RTU. Different parameters can be read and also changed to some extent via the interface. In this case, the switchgear works as a Modbus slave. An overview of individual parameters and a description of the data types used are shown in the appendix.

To use the ModBus interface, the settings must be changed in the following menus:



Fig. 91: Menu 2.00



Fig. 92: Menu 2.01



Fig. 93: Menu 2.02

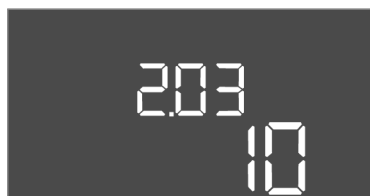


Fig. 94: Menu 2.03



Fig. 95: Menu 2.04

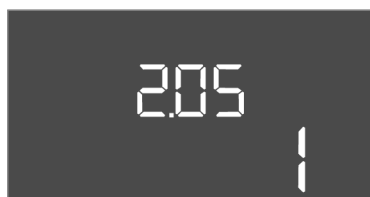


Fig. 96: Menu 2.05

Menu no.	2.00
Name	Communication settings
Description	ModBus setting

Menu no.	2.01
Name	ModBus RTU interface On/Off
Value range	on, off
Factory setting	on
Description	Switch the ModBus interface on or off.

Menu no.	2.02
Name	Baud rate
Value range	9600; 19200; 38400; 76800
Factory setting	19200
Description	Set the ModBus transmission rate according to the connected bus.

Menu no.	2.03
Name	User address
Value range	1 – 254
Factory setting	10
Description	User address of the Control EC-WP in the ModBus network

Menu no.	2.04
Name	Parity
Value range	none, even, odd
Factory setting	even
Description	Parity setting for the ModBus RTU serial connection

Menu no.	2.05
Name	Stop bits
Value range	1; 2
Factory setting	1
Description	Number of stop bits for the ModBus RTU serial connection

8.3.6 Menu 3: Enable pumps

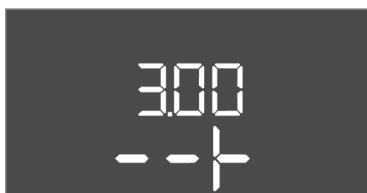


Fig. 97: Menu 3.00



Fig. 98: Menu 3.01



Fig. 99: Menu 3.02



Fig. 100: Menu 3.03

8.3.7 Adjust motor current monitoring

To operate the system, the operating mode must be set for each pump and the pumps enabled:

- Every pump is set to the “auto” operating mode as the factory setting.
- Automatic mode starts after the pumps have been enabled in Menu 3.01.

Required settings for the initial configuration

Carry out the following work during initial configuration:

- Check direction of rotation of the pumps
- Set precise motor current monitoring

Use the following settings to carry out this work:

- Switch off the pumps: Set menu 3.02 to 3.03 to “off”.
- Enable pumps: Set menu 3.01 to “on”.

Menu no.	3.00
Name	Operating settings
Description	Settings for the drives and mode of the pumps

Menu no.	3.01
Name	Enable pumps
Value range	on, off
Factory setting	off
Description	Deactivation or release of all pumps

Menu no.	3.02
Name	Operating mode, pump 1
Value range	off, Hand, Auto
Factory setting	Auto
Description	For the operating mode of pump 1, manual on (hand-operated), manual off (off) and automatic mode can be selected. In manual operation, alarms such as dry run and thermal winding contact are still taken into account.

Menu no.	3.03
Name	Operating mode, pump 2
Value range	off, Hand, Auto
Factory setting	Auto
Description	In the operating mode of pump 2, you can choose between manual on (Hand), manual off (off) and automatic mode (Auto). In manual mode, alarms such as dry run and or thermal motor monitoring are still taken into account.

Display the current value of the motor current monitoring

1. Press the control knob for 3 s.
⇒ Menu 1.00 appears.
2. Turn the control knob until Menu 4.00 appears.
3. Press the control knob.
⇒ Menu 4.01 appears.
4. Turn the control knob until menu 4.25 to 4.26 appears.
⇒ Menu 4.25: Shows the set motor current for pump 1.

- ⇒ Menu 4.26: Shows the set motor current for pump 2.
- ▶ Current value of the motor current monitoring checked.
Compare the set value with the specification on the rating plate. If the set value differs from the specification on the rating plate, adjust the value.

Adjust the motor current monitoring value



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!

- Have work carried out by a qualified electrician.
- Avoid contact with earthed metal parts (pipes, frames etc.).

- ✓ Motor current monitoring settings checked.
1. Turn the control knob until menu 4.25 to 4.26 appears.
 - ⇒ Menu 4.25: Shows the set motor current for pump 1.
 - ⇒ Menu 4.26: Shows the set motor current for pump 2.
 2. Open the switchgear.
 3. Correct the motor current on the potentiometer with a screwdriver (see “Overview of components”). Read changes directly off the display.
 4. Once all of the motor currents have been corrected, close the switchgear.
 - ▶ Motor current monitoring set. Perform direction of rotation check.

8.3.8 Check the direction of rotation of the connected pumps



NOTICE

Power supply and pump connection rotating field

The rotating field is routed from the mains connection directly to the pump connection.

- Check the required rotating field of the pumps to be connected (clockwise or counter-clockwise).
- Observe the installation and operating instructions of the pumps.

Perform a test run to check the direction of rotation of the pumps. **CAUTION! Property damage! Perform the test run under the prescribed operating conditions.**

- ✓ The switchgear is closed.
 - ✓ Configuration of menu 5 and menu 1 complete.
 - ✓ All pumps are switched off in menu 3.02 to 3.03: Value is “off”.
 - ✓ The pumps are enabled in menu 3.01: Value is “on”.
1. Start Easy Actions menu: Turn control knob 180°.
 2. Select the pump’s manual operation mode: Turn the control knob until the menu item is displayed:
 - Pump 1: P1 Hand
 - Pump 2: P2 Hand
 3. Start test run: Press the control knob. Pump runs for the set time (Menu 3.10) and then switches off again.
 4. Check direction of rotation.
 - ⇒ **Incorrect direction of rotation:** Exchange two phases on the pump connection.
 - ▶ Direction of rotation checked and corrected as necessary. The initial configuration is complete.

8.4 Start automatic mode

Automatic mode after initial configuration

- ✓ The switchgear is closed.
- ✓ Configuration complete.

- ✓ Direction of rotation correct.
 - ✓ Motor current monitoring set correctly.
1. Start Easy Actions menu: Turn control knob 180°.
 2. Select the pump for automatic mode: Turn the control knob until the menu item is displayed:
 - Pump 1: P1 Auto
 - Pump 2: P2 Auto
 3. Press the control knob.
 - ⇒ Automatic mode is set for the selected pump. Alternatively, setting can be performed in menu 3.02 to 3.03.
 - ▶ Automatic mode switched on.

Automatic mode after shutdown

- ✓ The switchgear is closed.
 - ✓ Checked configuration.
 - ✓ Parameter input enabled: Menu 7.01 shows on.
1. Press the control knob for 3 s.
 - ⇒ Menu 1.00 appears.
 2. Turn the control knob until menu 3.00 appears
 3. Press the control knob.
 - ⇒ Menu 3.01 appears.
 4. Press the control knob.
 5. Change value to “on”.
 6. Press the control knob.
 - ⇒ Value saved, pump enabled.
 - ▶ Automatic mode switched on.

8.5 During operation

Make sure the following points are observed during operation:

- Keep the switchgear closed and secure it against unauthorised opening.
- Switchgear attached in an overflow-proof manner (protection class IP54).
- Not exposed to direct sunlight.
- Ambient temperature: 0 ... 40 °C.

The following items of information are shown on the main screen:

- Pump status:
 - Number of registered pumps
 - Pump activated/deactivated
 - Pump On/Off
- Operation with standby pump
- Control mode
- Actual pressure value or float switch status
- Active fieldbus operation

Furthermore, the following information is available via Menu 4:

1. Press the control knob for 3 s.
 - ⇒ Menu 1.00 appears.
2. Turn the control knob until Menu 4 appears.
3. Press the control knob.



Fig. 101: Menu 4.00



Fig. 102: Menu 4.02



Fig. 103: Menu 4.05



Fig. 104: Menu 4.12



Fig. 105: Menu 4.13



Fig. 106: Menu 4.14

► Menu 4.xx appears.

Menu no.	4.00
Name	Information
Description	Current operating data for pumps and switchgear

Menu no.	4.02
Name	Actual pressure value in bar
Value range	0.0 – 25.0 bar
Factory setting	0.0 bar
Description	Value measured by the pressure sensor on the output side.

Menu no.	4.05
Name	Status of float switches
Value range	0, 1
Description	Float switch status: <ul style="list-style-type: none"> • 0 = closed • 1 = open If necessary, the status of all float switches is indicated by alternating lines on the display.

Menu no.	4.12
Name	Switchgear running time
Description	Total runtime during which the switchgear was supplied with voltage.

Menu no.	4.13
Name	Running time pump 1
Description	Operating hours of pump 1 with rotating motor.

Menu no.	4.14
Name	Running time pump 2
Description	Operating hours of pump 2 with rotating motor.



Fig. 107: Menu 4.17



Fig. 108: Menu 4.18



Fig. 109: Menu 4.19



Fig. 110: Menu 4.22



Fig. 111: Menu 4.23

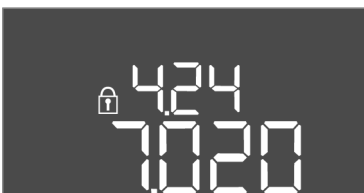


Fig. 112: Menu 4.24

Menu no.	4.17
Name	Switching cycles of switchgear
Value range	0 – 65535
Description	Number of starts and stops for the switchgear

Menu no.	4.18
Name	Switching cycles of pump 1
Value range	0 – 65535
Description	Number of starts and stops for pump 1

Menu no.	4.19
Name	Switching cycles of pump 2
Value range	0 – 65535
Description	Number of starts and stops for pump 2

Menu no.	4.22
Name	Serial number switchgear
Description	The serial number can be changed as long as the number of switching cycles of the switchgear is less than or equal to 5. After that, it can no longer be changed.

Menu no.	4.23
Name	Switchgear type
Value range	EC-bH
Factory setting	EC-bH
Description	Type of switchgear, for Control EC-WP always EC-bH (bore-hole)

Menu no.	4.24
Name	Software version
Description	Version for the software used in the switchgear



Fig. 113: Menu 4.25



Fig. 114: Menu 4.26



Fig. 115: Menu 4.29



Fig. 116: Menu 4.30

Menu no.	4.25
Name	Set value for the motor current monitoring: Pump 1
Value range	0.0 – 12.0
Factory setting	0.0
Description	Value for the maximum rated current in A for pump 1, which was set on the potentiometer on the printed circuit board.

Menu no.	4.26
Name	Set value for the motor current monitoring: Pump 2
Value range	0.0 – 12.0
Factory setting	0.0
Description	Value for the maximum rated current in A for pump 2, which was set on the potentiometer on the printed circuit board.

Menu no.	4.29
Name	Actual current in A for pump 1
Description	Displays the current measured in A for pump 1: <ul style="list-style-type: none"> • Single-phase pump: L1 • Three-phase pump: the display alternates regularly between L1, L2 and L3.

Menu no.	4.30
Name	Actual current in A for pump 2
Description	Displays the current measured in A for pump 2: <ul style="list-style-type: none"> • Single-phase pump: L1 • Three-phase pump: the display alternates regularly between L1, L2 and L3.

9 Shut-down

9.1 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 electrician
Knowledge regarding tools and fixation material for various structures

9.2 Operator responsibilities

- Observe locally applicable accident prevention and safety regulations of trade associations.
- Make sure that the personnel has had the corresponding training for the specified work.
- Train the personnel on how the system operates.
- When working in enclosed spaces, a second person must be present for safety reasons.
- Ensure enclosed spaces have sufficient ventilation.
- Take immediate countermeasures if there is a build-up of toxic or suffocating gases!

9.3 Shut-down

To decommission the pumps, switch off the pumps and switchgear at the main switch. The settings are stored in non-volatile memory in the switchgear and are not deleted. This ensures that the switchgear is always ready for operation. Adhere to the following points during the standstill period:

- Ambient temperature: 0 ... 40 °C
- Max. humidity: 90%, non-condensing
- ✓ Parameter input enabled: Menu 7.01 shows on.

1. Press the operating button for 3 s.
⇒ Menu 1.00 appears.

2. Turn the operating button until menu 3.00 appears
3. Press the operating button.
⇒ Menu 3.01 appears.
4. Press the operating button.
5. Change value to “off”.
6. Press the operating button.
⇒ Value saved, pump switched off.
7. Turn main switch to the “OFF” position.
8. Secure the main switch against being activated by unauthorised persons (e.g. lock main switch)
 - ▶ Switchgear switched off.

9.4 Removal



DANGER

Danger of death due to electrical current!

Improper conduct when carrying out electrical work can lead to death due to electric shock!

- Before all electrical work, disconnect the product from the mains and secure it against being switched on again without authorisation.
- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!

- ✓ Decommissioning performed.
 - ✓ Mains connection is switched so that it is voltage-free and safeguarded against being activated by unauthorised persons.
 - ✓ The power connection for fault and run signals is switched so that it is voltage-free and safeguarded against being activated by unauthorised persons.
1. Open the switchgear.
 2. Disconnect all connection cables and pull them out through the threaded cable connection.
 3. Close off the ends of the connection cables watertight.
 4. Seal threaded cable connections watertight.
 5. Support the switchgear (e.g. get a second person to help).
 6. Loosen the switchgear fastening screws and remove the switchgear from the structure.
 - ▶ Switchgear removed. Observe the following for storage!

10 Maintenance



DANGER

Danger of death due to electrical current!

Improper conduct when carrying out electrical work can lead to death due to electric shock!

- Before all electrical work, disconnect the product from the mains and secure it against being switched on again without authorisation.
- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!



NOTICE

Unauthorised work or structural changes are prohibited!

Only maintenance and repair work described in this manual may be carried out. All other works and any alterations to the construction may only be carried out by the manufacturer.

10.1 Maintenance intervals

Regular

- Clean switchgear.

Annually

- Check electro-mechanical components for wear.

After 10 years

- General overhaul

10.2 Maintenance tasks

Cleaning switchgear

- ✓ Switch off switchgear.

1. Clean switchgear with a damp cotton cloth.

Do not use any aggressive or scouring cleaners or fluids!

Check electro-mechanical components for wear

- Have electro-mechanical components checked for wear by an electrician.
- If wear is ascertained, have the affected components replaced by an electrician or by the Wilo Customer Service.

General overhaul

During a general overhaul, all of the components, wiring and the housing are checked for wear. Defective or worn components are replaced.

11 Faults, causes and remedies



DANGER

Danger of death due to electrical current!

Improper conduct when carrying out electrical work can lead to death due to electric shock!

- Before all electrical work, disconnect the product from the mains and secure it against being switched on again without authorisation.
- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!

11.1 Operator responsibilities

- Observe locally applicable accident prevention and safety regulations of trade associations.
- Make sure that the personnel has had the corresponding training for the specified work.
- Train the personnel on how the system operates.
- When working in enclosed spaces, a second person must be present for safety reasons.
- Ensure enclosed spaces have sufficient ventilation.
- Take immediate countermeasures if there is a build-up of toxic or suffocating gases!

11.2 Fault indication

Possible faults are shown by the fault LEDs and alphanumeric codes on the display.

- Have the system checked according to the displayed fault.
- Have the defective components replaced.

Faults are displayed in various ways:

- Fault in the control/on the switchgear:
 - The red fault signal LED **lights up**.
The red fault signal LED **flashes**: Error message only occurs after a set time (e.g. dry-running protection with deactivation delay).
 - Display of the error code alternates with the main screen. The error code is stored in the fault memory.
 - The collective fault signal is activated.
- Pump fault
Status icon of the respective pump **flashes** on the display.

11.3 Fault acknowledgement

Switch off the alarm display by pressing the operating button. Acknowledge the fault via the main menu or Easy Actions menu.

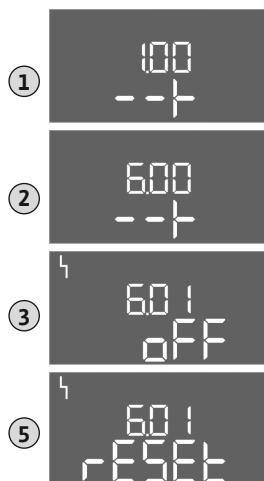


Fig. 117: Acknowledge fault

Main menu

- ✓ All faults rectified.
- 1. Press the operating button for 3 s.
⇒ Menu 1.00 appears.
- 2. Turn the operating button until menu 6 appears.
- 3. Press the operating button.
⇒ Menu 6.01 appears.
- 4. Press the operating button.
- 5. Change the value to “reset”: Turn the operating button.
- 6. Press the operating button.
▶ The fault indication is reset.

Easy Actions menu

- ✓ All faults rectified.
- 1. Starting the Easy Actions menu: Turn the operating button 180°.
- 2. Select menu item “Err reset”.
- 3. Press the operating button.
▶ The fault indication is reset.

Fault acknowledgement failed

If there are further faults, the faults are displayed as follows:

- The fault LED lights up.
- The error code of the last fault is shown in the display.
All other faults can be called up from the fault memory.

If all faults have been rectified, acknowledge the faults again.

11.4 Fault memory

The switchgear stores the last ten faults in the fault memory. The fault memory works according to the first in/first out principle. The faults are displayed in descending order in the menu items 6.02 to 6.11:

- 6.02: the last/latest fault
- 6.11: the oldest fault

11.5 Error codes

The functions may operate differently depending on the software version. That is why a software version is included with every error code.

The details regarding the software version used can be read on the rating plate or displayed via menu 4.24.

Code*	Faults	Cause	Remedies
E006	Rotating field error	<ul style="list-style-type: none"> • Incorrect rotating field • Operation via single-phase current connection 	<ul style="list-style-type: none"> • Establish a clockwise rotating field at the mains connection. • Deactivate rotating field monitoring (menu 5.68)!
E040	Pressure sensor fault	No response from sensor	Check the connection cable and sensor. Replace the defective component.
E062.x	Low water level (dry-running protection) active	Min. water level, below minimum value	<ul style="list-style-type: none"> • Check inlet and system parameters. • Check that the sensor is working correctly, replace the defective component.
E066	High water alarm	High water level reached	<ul style="list-style-type: none"> • Check inlet and system parameters. • Check that the float switch is working correctly, replace the defective component.
E068	External OFF active	All contacts “External OFF” active	<ul style="list-style-type: none"> • Active contact defined as an alarm. • Check the connection of the “External OFF” contact according to the current connection diagram.

Code*	Faults	Cause	Remedies
E080.x	Pump fault**	<ul style="list-style-type: none"> No pump connected. Motor current monitoring not set (potentiometer is at "0") No feedback from the corresponding contactor. Thermal motor monitoring (bimetallic sensor) triggered. Motor current monitoring triggered. 	<ul style="list-style-type: none"> Connect pump or deactivate minimum current monitoring (menu 5.69)! Set the motor current monitoring to the pump's motor current. Check functionality of pump. Check that the motor has sufficient cooling. Check the set motor current and correct if necessary. Contact customer service.
E090.x	Plausibility	Plausibility	

Key:

*"x" = represents the pump or the well/tank to which the fault shown applies.

** Fault must be **manually** acknowledged.

11.6 Further steps for troubleshooting

If the points listed here do not rectify the fault, please contact customer service. Costs may be incurred if other services are used. For more details, please contact customer service.

12 Disposal**12.1 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 for more information about recycling.

13 Appendix**13.1 System impedances****NOTICE****Maximum switching frequency per hour**

The connected motor determines the maximum switching frequency per hour.

- Note the technical data of the connected motor.
- Do not exceed the maximum switching frequency of the motor.



NOTICE

- Depending on the system impedance and the maximum connections/hour of the connected consumers, voltage fluctuations and/or drops may occur.
- When using shielded cables, attach the shielding to the earth rail on one side of the control device.
- Always have connection carried out by a qualified electrician.
- Observe the installation and operating instructions for the connected pumps and signal transmitters.

3~400 V, 2-pole, direct starting		
Power in kW	System impedance in ohms	Connections/h
0.37	2.629	6 ... 30
0.55	1.573	6 ... 30
0.75	0.950	6 ... 18
0.75	0.944	24
0.75	0.850	30
1.1	0.628	6 ... 12
1.1	0.582	18
1.1	0.508	24
1.1	0.458	30
1.5	0.515	6 ... 12
1.5	0.431	18
1.5	0.377	24
1.5	0.339	30
2.2	0.321	6
2.2	0.257	12
2.2	0.212	18
2.2	0.186	24
2.2	0.167	30
3.0	0.204	6
3.0	0.148	12
3.0	0.122	18
3.0	0.107	24
4.0	0.130	6
4.0	0.094	12
4.0	0.077	18
5.5	0.115	6
5.5	0.083	12
5.5	0.069	18

13.2 Overview of the symbols



Standby:
Symbol lights up: The switchgear is switched on and ready for operation.
Symbol flashing: Follow-up time of pump 1 active



Value input not possible:
1. Input disabled
2. The accessed menu only displays values.



Control mode: drain



Control mode: fill



Pumps ready for operation/deactivated:
Symbol lights up: Pump is available and ready for operation.
Symbol flashing: Pump is deactivated.



Pumps working/fault:
Symbol lights up: Pump is in operation.
Symbol flashing: Pump fault



A pump has been set as the standby pump.



“Extern OFF” input active: All pumps switched off



Control mode: Constant pressure control (p-c)



High water level exceeded



Dry-running protection active



There is at least one current (unacknowledged) error message.



The device communicates using a field bus system.

13.3 Terminal diagram overview

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54

Terminal	Function
2/3	Output: Individual run signal for pump 1
4/5	Output: Individual fault signal for pump 1
8/9	Output: Individual fault signal for pump 2
10/11	Output: Individual run signal for pump 2
13/14/15	Output: Collective run signal
16/17/18	Output: Collective fault signal
19/20	Output: External alarm signal
21/22	Input: Extern OFF
25/26	Input: Dry-running protection for pump 1
27/28	Input: Switch-on or switch-off level for level control
29/30	Input: Switch-on or switch-off level for pressure and level control
31/32	Input: Dry-running protection for pump 2
33/34	Input: Switch-on or switch-off level only for level control
35/36	Input: Switch-on or switch-off level only for level control
37/38	Input: Pump 1 thermal winding monitor
39/40	Input: Pump 2 thermal winding monitor
41/42	Output: Actual pressure value 0–10 V for pressure control
45/46	Input: passive pressure sensor 4 – 20 mA for pressure control
49/50	Input: High water level

13.4 ModBus: Data types

Data type	Description
INT16	Integer in the range from -32768 to 32767. The number range actually used for a data point may vary.
UINT16	Unsigned integers in the range from 0 to 65535. The number range actually used for a data point may vary.
ENUM	Is a list. Only one of the values listed in the parameters can be set.
BOOL	A Boolean value is a parameter with exactly two states (0 – false and 1 – true). Generally, all values greater than zero are classified as true.
BITMAP*	Is an array of 16 Boolean values (bits). Values are indexed from 0 to 15. The number read from or written to the register is the sum of all bits with the value 1 multiplied by 2 to the power of its index. <ul style="list-style-type: none"> • Bit 0: $2^0 = 1$ • Bit 1: $2^1 = 2$ • Bit 2: $2^2 = 4$ • Bit 3: $2^3 = 8$ • Bit 4: $2^4 = 16$ • Bit 5: $2^5 = 32$ • Bit 6: $2^6 = 64$ • Bit 7: $2^7 = 128$ • Bit 8: $2^8 = 256$ • Bit 9: $2^9 = 512$ • Bit 10: $2^{10} = 1024$ • Bit 11: $2^{11} = 2048$ • Bit 12: $2^{12} = 4096$ • Bit 13: $2^{13} = 8192$ • Bit 14: $2^{14} = 16384$ • Bit 15: $2^{15} = 32768$
BITMAP32	Is an array of 32 Boolean values (bits). Please check Bitmap for the calculation details.

* Example for clarification:

Bit 3, 6, 8, and 15 are 1. All others are 0. The sum is then $2^3 + 2^6 + 2^8 + 2^{15} = 8 + 64 + 256 + 32768 = 33096$. It is also possible to do the calculation the other way round. Based on the bit with the highest index, check whether the read number is greater than/equal to the power of two. If this is the case, bit 1 is set and the power of two is deducted from the number. Then the check with the bit with the next lower index and the recently calculated residual number is repeated until bit 0 is obtained or the residual number is zero. Example for clarification: The read number is 1416. Bit 15 will be 0, since $1416 < 32768$. Bits 14 to 11 will also be 0. Bit 10 will be 1, since $1416 > 1024$. The remainder will be $1416 - 1024 = 392$. Bit 9 will be 0, since $392 < 512$. Bit 8 will be 1, since $392 > 256$. The remainder will be $392 - 256 = 136$. Bit 7 will be 1, since $136 > 128$. The remainder will be $136 - 128 = 8$. Bits 6 to 4 will be 0. Bit 3 will be 1, since $8 = 8$. The remainder will be 0. The remaining bits 2 to 0 will thus all be 0.

13.5 ModBus: Parameter overview

Holding register (protocol)	Name	Data type	Scaling and unit	Elements	Access*
40001 (0)	Communication profile version	UINT16	0.001		R
40002 (1)	Wink service	BOOL			RW
40003 (2)	Type of switchgear	ENUM		8. EC	R
40014 (13)	BusCommandTimer	ENUM		0. - 1. Off 2. Set 3. Active 4. Reset 5. Manual	RW

Holding register (protocol)	Name	Data type	Scaling and unit	Elements	Access*
40015 (14)	Drives on/off	BOOL			RW
40025 (24)	Control mode	ENUM		0. p-c 10. Filling 11. Draining	R
40026 (25)	Actual value	INT16	0.1 bar		R
40027 (26)	Current setpoint	INT16	0.1 bar		R
40041 (40)	Pump mode 1	ENUM		0. Off 1. Manual 2. Auto	RW
40042 (41)	Pump mode 2	ENUM		0. Off 1. Manual 2. Auto	RW
40062 (61)	General status	BITMAP		0: SBM 1: SSM 8: EBM pump 1 9: EBM pump 2	R
40068 (67)	Setpoint 1	UINT16	0.1 bar		RW
40074 (73)	Application	ENUM		2nd WP	R
40139 – 40140 (138 – 139)	Fault status	BITMAP32		0: Sensor fault 4: Dry running 5: Pump 1 error 6: Pump 2 error 15: High water 16: Overriding Off 18: Plausibility 20: Supply	R
40141 (140)	Acknowledge	BOOL			R
40142 (141)	Alarm history index	UINT16	1		RW
40143 (142)	Fault number alarm history	UINT16	0.1		R
40198 (197)	Status of float switch	BITMAP		0: Dry running 1: Pumps off 2: Pump 1 on 3: Pump 2 on 4: High water 5: Dry run 2 6: Pump 1 off 7: Pump 2 off	R

Key

* R = read-only, RW = read- and write-accessible







wilo



Local contact at
www.wilo.com/contact

Pioneering for You

WILO SE
Wilopark 1
44263 Dortmund
Germany
T +49 (0)231 4102-0
T +49 (0)231 4102-7363
wilo@wilo.com
www.wilo.com