

## Wilo-Control EC-HVAC



**en** Installation and operating instructions



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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 caused by electric voltage



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
- Operation/control: Operating personnel, instructed in the functioning of the complete system

## 2.3 Electrical work

- 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

### Circuit breaker

The size and switching characteristics of the circuit breakers 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 Intended use

The switchgear is used for pressure-dependent control of 2 fixed-speed pumps and a top-up valve in pressure maintenance systems.

The signal is acquired using a pressure sensor and float switch.

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

## 4 Product description

### 4.1 Structure

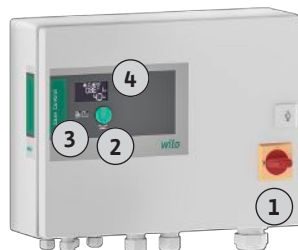


Fig. 1: Switchgear front

1	Main switch
2	Operating knob
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.

### 4.2 How it works

The pumps are switched on/off individually and automatically depending on the actual pressure in the system. The pressure is controlled via a two-position controller. When the dry running level is reached, a visual signal is displayed and a forced switch-off of all the pumps occurs. Faults are stored in the fault memory.

The top-up valve is controlled via the top-up float switch and the enable input (top-up).

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.

#### 4.3 Technical data

Date of manufacture*	See rating plate
Mains connection	1~230 V, 3~400 V
Mains frequency	50/60 Hz
Max. current consumption per pump	12 A
Max. rated power per pump	4 kW
Pump activation type	direct
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	24 V =/~
Housing material	Steel

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

- Analogue input:
  - 1x pressure sensor 4 ... 20 mA
- Digital inputs:
  - 1x float switch used for sensing dry running level/low water level
  - 1x float switch used for detecting the top-up level
- Pump monitoring:
  - 1x input/pump for the thermal winding monitor using a bimetallic sensor

**NOTICE! PTC sensors cannot be connected!**
- Other inputs:
  - 1x External OFF: for remote deactivation of all pumps
  - 1x float switch/pressure switch/electrode for enabling the top-up process

##### Outputs

- Potential-free contacts:
  - 1x changeover contact for collective fault signals
  - 1x changeover contact for collective run signals
  - 1x NC contact for burner collective fault signals
  - 1x NC contact for common pump fault signals
  - 1x NO contact per pump for individual run signals
- Analogue output:
  - 1x 0 – 10 V for output of the current pressure value
- Digital output:
  - 1x 24 VAC power output for controlling the top-up valve

#### 4.5 Type key

Example: Wilo-Control EC-H 2x12A-MT4-DOL-WM	
EC	Easy Control switchgear for fixed-speed pumps
H	Control for HVAC systems
2x	Max. number of pumps that can be connected
12A	Max. rated current per pump in amperes



### Example: Wilo-Control EC-H 2x12A-MT4-DOL-WM

MT4	Mains connection: M = alternating current (1~230 V) T = three-phase current (3~) 4 = 400 V
DOL	Pump activation type: – DOL = direct on line
WM	Wall mounting

#### 4.6 Scope of delivery

- Switchgear
- Installation and operating instructions

#### 4.7 Accessories

- Float switch for dry-running protection
- Pressure switch for dry-running protection
- Pressure sensor (4 ... 20 mA) for system control
- Float switch for top-up level

### 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!

#### 5.3 Storage

- Clean switchgear.
- Close housing apertures, ensuring they are sealed watertight.
- Impact-resistant and watertight packaging.
- Pack the switchgear in dustproof and watertight packaging.
- Maintain storage temperature: –30 ... +60 °C, max. relative humidity: 90%, non-condensing.
- Frost-proof storage at a temperature of 10 °C to 25 °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 and electrical connection

#### 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.
- For setting the pressure control, observe the information on pressure limits and local conditions.
- 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

## 6.3 Operator responsibilities

## 6.4 Installation

- Installation of the switchgear directly onto the pressure-boosting system  
The switchgear is installed directly onto the pressure-boosting system at the factory.
- 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.
- 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 ... 40 °C
  - Relative humidity: 40 ... 50%
  - Max. relative humidity: 90%, non-condensing

### 6.4.1 Fixing instructions

The switchgear is factory-mounted on the mounting bracket of a pressure-boosting system.

## 6.5 Electrical connection



### DANGER

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

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

- Electrical work must be carried out by a qualified electrician in accordance with the locally applicable regulations.
- If the product is disconnected from the mains, secure it against being switched on again.



### 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 switchgear!
- 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

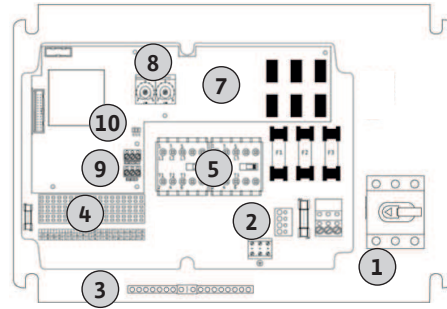


Fig. 2: Interior view

1	Main switch: 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

### 6.5.2 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.



#### **NOTICE**

The switchgear has integrated rotating field monitoring. If there is no clockwise rotating field, error code "E006" appears on the display.

- Connect the switchgear to a clockwise rotating field.



#### **NOTICE**

For single-phase connection, error code "E006" is permanently displayed if the rotating field monitoring has not been deactivated.

- Deactivate rotating field monitoring for single-phase connection in menu 5.68.

- Insert the connection cable laid on-site through the threaded cable glands and secure.

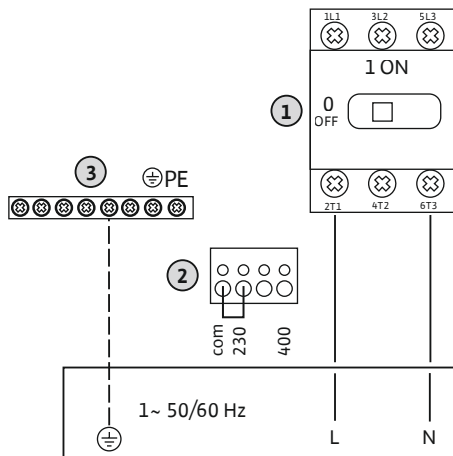


Fig. 3: Mains connection 1~230 V

- Connect the wires to the terminal strip according to the connection diagram.

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

Mains connection **1~230 V**:

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

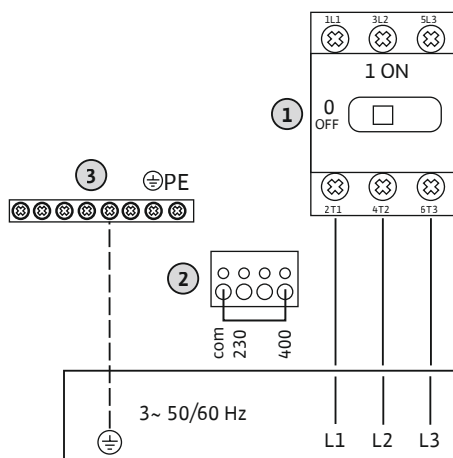


Fig. 4: Mains connection 3~400 V

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

Mains connection **3~400 V**:

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

### 6.5.3 Pump mains connection

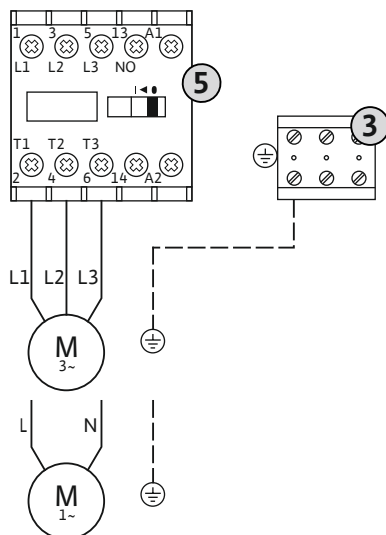


Fig. 5: Pump connection

### 6.5.4 Connection, thermal motor monitoring

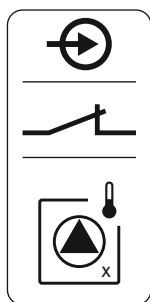


Fig. 6: Connection overview symbol

### 6.5.5 Pressure sensor connection



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

#### CAUTION

##### Property damage due to external voltage!

An external voltage which is applied destroys the component.

- Do not apply external voltage.

One bimetallic sensor thermal motor monitoring device can be connected to each connected pump.

- Do not connect PTC or Pt100 sensors.
- 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.

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.

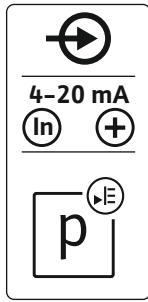


Fig. 7: Connection overview symbol

#### 6.5.6 Connection to the dry-running (low water level) protection

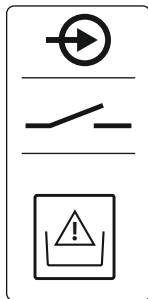


Fig. 8: Connection overview symbol

#### 6.5.7 Top-up level connection

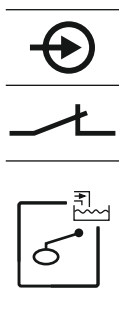


Fig. 9: Connection overview symbol

#### 6.5.8 “Extern OFF” connection: Remote deactivation

Pressure detection is performed using an analogue pressure sensor (4 ... 20 mA).

**NOTICE! Do not use an active pressure sensor.**

- Only use shielded connection cables.
- Insert the connection cables laid by the customer through the threaded cable glands and secure.
- Apply the shielding on one side.
- Observe the correct polarity of the pressure sensor.
- 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.

### CAUTION

#### Property damage due to external voltage!

An external voltage which is applied destroys the component.

- Do not apply external voltage.

The low water level (dry-running protection) can be monitored with a potential-free contact:

- Contact open: dry run
- Contact closed: no dry run

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

- 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 switchgear cover.

### CAUTION

#### Property damage due to external voltage!

An external voltage which is applied destroys the component.

- Do not apply external voltage.

The level for the top-up process can be monitored with a potential-free contact:

- Contact open: Top-up process
- Contact closed: no top-up process

To enable the top-up process, the “Enabling the top-up process” input must also be closed.

- 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 switchgear cover.

### CAUTION

#### Property damage due to external voltage!

An external voltage which is applied destroys the component.

- Do not apply external voltage.

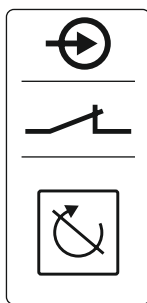


Fig. 10: Connection overview symbol

#### 6.5.9 Connection to enable the top-up process: Remote deactivation

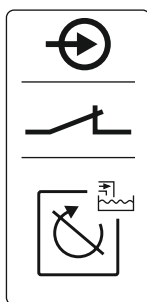


Fig. 11: Connection overview symbol

#### 6.5.10 Collective run signal (SBM) connection

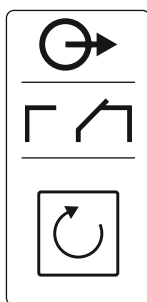


Fig. 12: Connection overview symbol

A potential-free contact can be used to remotely deactivate all pumps and the top-up valve:

- Contact closed: Pumps and valve enabled
- Contact open: All pumps and valve 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 switchgear cover.

### CAUTION

#### Property damage due to external voltage!

An external voltage which is applied destroys the component.

- Do not apply external voltage.

A potential-free contact can be used to remotely deactivate the top-up process:

- Contact closed: Top-up process enabled
- Contact open: Top-up process not possible, or the current process is aborted.

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

**NOTICE! Remote deactivation is prioritised. The top-up process is switched off regardless of the current state of the float switch. The valve 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 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 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.

### 6.5.11 Collective fault signal connection (SSM)

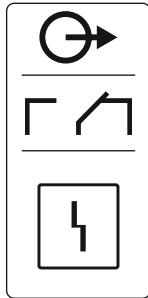


Fig. 13: Connection overview symbol

### 6.5.12 Burner collective fault signal connection (B-SSM)

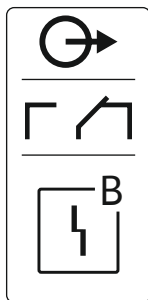


Fig. 14: Connection overview symbol

### 6.5.13 Individual run signal (EBM) connection



#### 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.



#### 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 for a burner control unit (B-SSM) is output via a separate output. The B-SSM contact is switched in the event of dry running, underpressure, overpressure and sensor error:

- Contact type: potential-free NC 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.



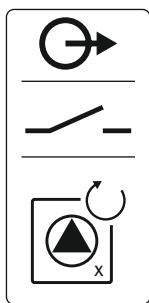


Fig. 15: Connection overview symbol

#### 6.5.14 Combined pump fault signal connection (ESM pump 1/2)

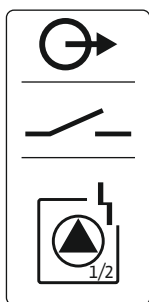


Fig. 16: Connection overview symbol

## 7 Operation

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

- Contact type: potential-free NO contact
- Contact load:
  - Minimum: 12 V<sub>~</sub>, 10 mA
  - Maximum: 250 V<sub>~</sub>, 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 combined fault message (PSM) is issued via a separate output if one or both pumps have a fault:

- Contact type: potential-free NC contact
- Contact load:
  - Minimum: 12 V<sub>~</sub>, 10 mA
  - Maximum: 250 V<sub>~</sub>, 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!

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 How it works

### 7.1.1 Normal operation

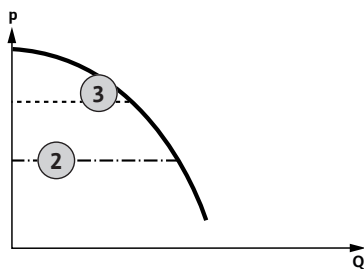


Fig. 17: Functional diagram

2	Activation threshold
3	Deactivation threshold for base-load pump

An electronic pressure sensor (set measurement range: menu 5.11) supplies the actual pressure value as a 4 ... 20 mA signal. The system works as a two-position controller and keeps the actual pressure value in the range between the activation and deactivation thresholds (menu 1.04 and 1.07).

- Set the activation and deactivation thresholds relative to the reference setpoint (menu 1.01).

If there is no "External Off" message, no fault and the drives are activated (menu 3.01), the base-load pump starts as soon as the value falls below the activation threshold (Item 2) (menu 1.04). If there are 2 pumps in the system, the standby pump mode is always active so that only one pump can run. Operation with base-load and peak-load pump is not intended. If the demand drops and the deactivation threshold Item 3 is exceeded, the base-load pump (menu 1.07) switches off after the delay time (menu 1.09) has elapsed.

The top-up function works independently of the pump control. A float switch with normally open contact signals the water level. If there is enough water in the tank, the contact is closed. If the water level drops, the contact opens. The switchgear opens the top-up valve when the enable input and the "External Off" input are closed and the drives are activated.

The switchgear monitors the duration, frequency and time interval of the top-up processes.

An alarm is triggered and the running pumps are switched off if:

- the opening time of the top-up valve (menu 5.80) is exceeded.
- top-up processes occur over a longer period of time with a time interval of  $\leq 6$  minutes.

The top-up valve remains closed.

The intervals are listed in the table below:

Interval between two top-up processes [min]	Delay until alarm [min]
> 6	Continuous normal operation
$\leq 6$	60
$\leq 5$	45
$\leq 4$	25
$\leq 3$	15

### 7.1.2 Pump cycling

The base-load pump is regularly switched in order to prevent irregular running times of the individual 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!**

### 7.1.3 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

### 7.1.4 Standby pump

If there are 2 pumps, the standby pump mode is automatically activated. The standby 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 also activated during pump replacement and pump kick.

### 7.1.5 Operation with a defective pressure sensor

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.

#### Emergency operation

To ensure water supply in the event of a fault, emergency operation can be activated:

- Menu 5.45
- Number of active pumps
- The pumps are uncontrolled during emergency operation.

### 7.1.6 Low water/dry-running protection

The water level in the break tank can be monitored using a pressure or float switch and reported to the switchgear. Observe the following points:

- Contact type: NC contact
- Low water: The pumps are switched off after the delay time has elapsed (menu 5.62).  
**NOTICE! If the contact is closed again during the delay time, deactivation will not occur.**
- Reactivation: When the contact is closed again and the delay time has elapsed (10 s), the system will start automatically.

**NOTICE! The fault will be automatically resolved. The error can be called up in the fault memory.**

### 7.2 Menu control

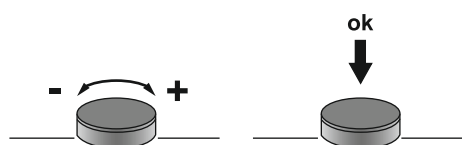


Fig. 18: Operating button function

The menu is controlled via the operating button:

- **Turn:** Menu selection or settings values.
- **Press:** Change menu level, confirm error number or value.

### 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 <b>NOTICE! Menu item is only shown when an error is present.</b>
	<b>Manual operation pump 1</b> Corresponds to the value “Hand” in menu 3.02. If the operating button is pressed, pump 1 runs for 15 seconds. After 15 seconds, the last set operating mode is active again.

	<b>Manual operation pump 2</b> Corresponds to the value "Hand" in menu 3.03. If the operating button is pressed, pump 1 runs for 15 seconds. After 15 seconds, the last set operating mode is active again.
	<b>Pump 1 deactivated.</b> Corresponds to the "off" value in menu 3.02.
	<b>Pump 2 deactivated.</b> Corresponds to the "off" value in menu 3.03.
	<b>Automatic mode, pump 1</b> Corresponds to the "Auto" value in menu 3.02.
	<b>Automatic mode, pump 2</b> Corresponds to the "Auto" value in menu 3.03.
	<b>Top-up valve open</b> Corresponds to the value "Open" in menu 3.06. When the drives are activated and the enable input and External Off are closed, the top-up valve is opened. The top-up valve remains open until the mode is changed to "Shut" or "Auto". <b>NOTICE! The manual top-up process must be monitored. When finished, set the top-up valve to "Auto" or "Shut" mode.</b>
	<b>Close top-up valve</b> Corresponds to the "Shut" value in menu 3.06. The valve remains closed regardless of the fill level.
	<b>Automatic mode top-up valve</b> Corresponds to the "Auto" value in menu 3.06.

## 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



### NOTICE

#### Error message during operation with alternating current connection

The switchgear has a rotating field monitor and motor current monitor. The rotating field monitoring only works fault-free at the three-phase connection and is activated at the factory. If the switchgear is used for an alternating current connection, the following error messages are shown in the display:

- Rotating field monitoring: Error code "E006"
  - To switch off rotating field monitoring: Select "off" in menu 5.68.
- Motor current monitoring: Error code "E080.x"
  - Set the potentiometer for the nominal pump current correctly (see Adjust motor current monitoring [► 29]).
    - Three-phase current monitoring is deactivated and motor current is set. The switchgear now functions without problems when using an alternating current connection.



### 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.

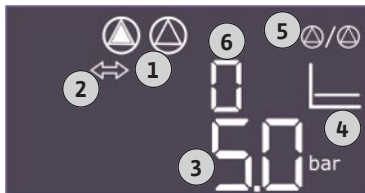


Fig. 19: Start screen

Following a power failure, the switchgear will automatically start up in the last operating mode set.

1	Current pump status: – Number of registered pumps – Pump activated/deactivated – Pumps On/Off
2	Fieldbus active
3	Actual pressure value
4	Control mode (e.g. p-c)
5	Standby pump function activated
6	Top-up valve status (0: closed; 1: open)

- ✓ Switchgear is closed.
  - ✓ Installation has been performed correctly.
  - ✓ All signal transmitters and consumers are connected and installed in the operating space.
  - ✓ If a low-water cut-out switchgear (dry-running protection) is available, the switching point has been correctly set.
  - ✓ 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.

## 8.3 Start initial configuration

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

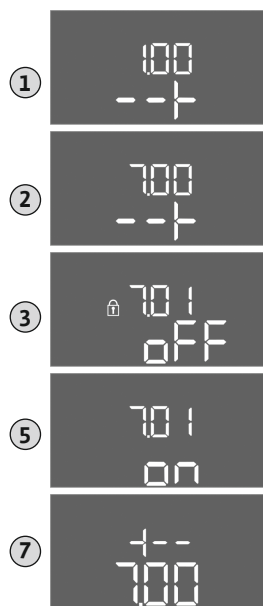


Fig. 20: Enable parameter input

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.

### 8.3.2 Menu 5: Basic settings



Fig. 21: Menu 5.01



Fig. 22: Menu 5.02



Fig. 23: Menu 5.11



Fig. 24: Menu 5.17

Menu no.	5.01
<b>Software version: All</b>	
Description	Control mode
Value range	P-c2
Factory setting	Constant pressure control (p-c2)

Menu no.	5.02
<b>Software version: All</b>	
Description	Number of connected pumps
Value range	1 ... 2
Factory setting	2

Menu no.	5.11
<b>Software version: All</b>	
Description	Pressure sensor measurement range
Value range	1 ... 16 bar
Factory setting	16 bar

Menu no.	5.17
<b>Software version: All</b>	
Description	Overpressure detection threshold value
Value range	102 ... 200%
Factory setting	150%
Explanation	<p>The overpressure monitoring is <b>always active</b>, i.e. the pressure in the system is continuously monitored. An alarm is triggered under the following conditions:</p> <ul style="list-style-type: none"> <li>• The system pressure rises above the set threshold.</li> <li>• The delay time for overpressure and underpressure detection has expired (menu 5.74).</li> </ul> <p><b>NOTICE! The value must be greater than the deactivation threshold in menu 1.07!</b></p>



Fig. 25: Menu 5.18



Fig. 26: Menu 5.40



Fig. 27: Menu 5.41



Fig. 28: Menu 5.42

Menu no.	5.18
<b>Software version: All</b>	
Description	Threshold value for underpressure detection
Value range	0 ... 98%
Factory setting	50%
Explanation	<p>As soon as a pump is running, the minimum pressure monitoring is active. An alarm is triggered under the following conditions:</p> <ul style="list-style-type: none"> <li>• The system pressure drops below the set threshold.</li> <li>• The delay time for overpressure and underpressure detection has expired (menu 5.74).</li> </ul> <p>Menu 5.73 is used to set how the system reacts in case of an alarm.</p> <ul style="list-style-type: none"> <li>• <b>NOTICE! To deactivate the minimum pressure monitoring, set the value to "0%".</b></li> <li>• <b>WARNING! The value must be less than the activation threshold in menu 1.04!</b></li> </ul>

Menu no.	5.40
<b>Software version: All</b>	
Description	Switch "pump kick" function On/Off
Value range	off, on
Factory setting	on
Explanation	<p>To prevent longer standstill times for the connected pumps, a periodical test run can be performed (pump kick function):</p> <ul style="list-style-type: none"> <li>• off = pump kick deactivated</li> <li>• on = pump kick activated</li> </ul> <p>If the pump kick function is activated, the following menu items can be set:</p> <ul style="list-style-type: none"> <li>• Menu 5.41: Allows "pump kick" when status is Extern OFF</li> <li>• Menu 5.42: Pump kick interval</li> <li>• Menu 5.43: Pump kick duration</li> </ul>

Menu no.	5.41
<b>Software version: All</b>	
Description	Allows "pump kick" when status is Extern OFF
Value range	off, on
Factory setting	on
Explanation	<p>Select whether a pump kick may take place or not if the Extern OFF input is active:</p> <ul style="list-style-type: none"> <li>• off = pump kick deactivated if Extern OFF is active.</li> <li>• on = pump kick activated if Extern OFF is active.</li> </ul>

Menu no.	5.42
<b>Software version: All</b>	
Description	"Pump kick interval"
Value range	1 ... 336 h
Factory setting	24 h
Explanation	Time after which a pump kick takes place.



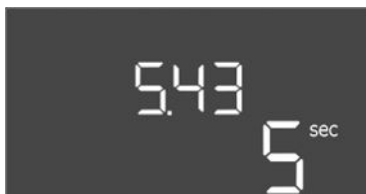


Fig. 29: Menu 5.43

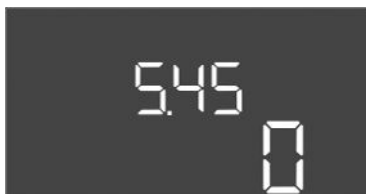


Fig. 30: Menu 5.45



Fig. 31: Menu 5.58



Fig. 32: Menu 5.59

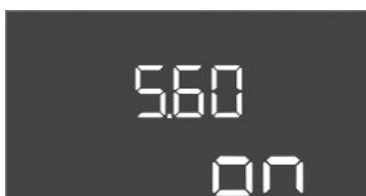


Fig. 33: Menu 5.60



Fig. 34: Menu 5.62

Menu no.	5.43
<b>Software version: All</b>	
Description	"Pump kick duration"
Value range	0 ... 60 s
Factory setting	5 s
Explanation	How long a pump kick runs for a pump.

Menu no.	5.45
<b>Software version: All</b>	
Description	Behaviour during sensor fault – number of pumps to be switched on
Value range	0 ... 1
Factory setting	0

Menu no.	5.58
<b>Software version: All</b>	
Description	Collective run signal (SBM) function
Value range	on, run
Factory setting	run
Explanation	<p>A run signal for the switchgear or attached pump can sent via a separate output:</p> <ul style="list-style-type: none"> <li>• "on": Switchgear ready for operation</li> <li>• "run": At least one pump is running.</li> </ul>

Menu no.	5.59
<b>Software version: All</b>	
Description	Collective fault signal (SSM) function
Value range	fall, raise
Factory setting	raise
Explanation	<p>In case of an error, a general fault message can be sent via a separate output:</p> <ul style="list-style-type: none"> <li>• "fall": The relay drops out. Optionally, this function can be used for controlling the mains voltage supply.</li> <li>• "raise": The relay picks up.</li> </ul>

Menu no.	5.60
<b>Software version: All</b>	
Description	Pump cycling
Value range	on, off
Factory setting	on

Menu no.	5.62
<b>Software version: All</b>	
Description	Dry-running protection: Deactivation delay
Value range	0 ... 180 s
Factory setting	10 s
Explanation	Time until the pump are deactivated after reaching the dry run level.

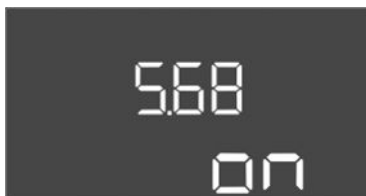


Fig. 35: Menu 5.68

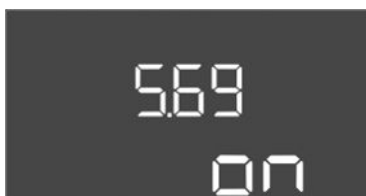


Fig. 36: Menu 5.69



Fig. 37: Menu 5.73

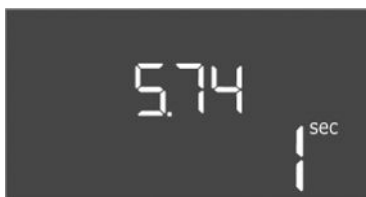


Fig. 38: Menu 5.74



Fig. 39: Menu 5.80

Menu no.	5.68
<b>Software version: All</b>	
Description	Mains connection rotating field monitoring On/Off
Value range	on, off
Factory setting	on
Explanation	<p>Integrated rotating field monitoring for the mains connection. If no clockwise rotating field is present, an error message occurs.</p> <ul style="list-style-type: none"> <li>off = rotating field monitoring deactivated</li> <li>on = rotating field monitoring activated</li> </ul> <p><b>NOTICE! When operating the switchgear via a single-phase current connection, switch off this function!</b></p>
Menu no.	5.69
Description	Internal minimum current monitoring on/off
Value range	on, off
Factory setting	on
Explanation	<p>If the motor current is below the set minimum, the integrated motor current monitoring reports an error.</p> <ul style="list-style-type: none"> <li>off = motor current monitoring deactivated</li> <li>on = motor current monitoring activated</li> </ul>
Menu no.	5.73
<b>Software version: All</b>	
Description	Reaction to underpressure detection
Value range	off, Cont
Factory setting	Cont
Explanation	<ul style="list-style-type: none"> <li>Cont: The system continues to operate normally. The error code is shown in the LCD display.</li> <li>off: The system triggers an alarm and all pumps are switched off. The error code is shown on the LCD display and the red LED lights up. The output for the collective fault signal (SSM) is activated.</li> </ul>
Menu no.	5.74
<b>Software version: All</b>	
Description	Delay time for overpressure and underpressure detection
Value range	0 ... 60 s
Factory setting	1 s
Explanation	If the threshold value for the overpressure is exceeded or the threshold value for the underpressure is not reached, an alarm is only triggered after the set time has elapsed.
Menu no.	5.80
<b>Software version: All</b>	
Description	Maximum allowed duration for top-up process
Value range	10 ... 3600 s
Factory setting	300 s

### 8.3.3 Menu 1: Values for switching on and off



Fig. 40: Menu 1.01



Fig. 41: Menu 1.04



Fig. 42: Menu 1.07



Fig. 43: Menu 1.09

### 8.3.4 Menu 2: ModBus RTU connection

Menu no.	1.01
<b>Software version: All</b>	
Description	Pressure setpoint
Value range	0.1 ... 25.0* bar
Factory setting	4 bar
Explanation	* The maximum value is dependent on the set measurement range of the pressure sensor (menu 5.11).

Menu no.	1.04
<b>Software version: All</b>	
Description	Activation threshold of the pump in % of the pressure setpoint
Value range	75 ... 99%
Factory setting	90%

Menu no.	1.07
<b>Software version: All</b>	
Description	Base-load pump deactivation threshold in % of pressure setpoint
Value range	101 ... 125%
Factory setting	115 %

Menu no.	1.09
<b>Software version: All</b>	
Description	Base-load pump deactivation delay
Value range	0 ... 180 s
Factory setting	10 s
Explanation	Time until the base-load pump is switched off when the deactivation threshold is reached.

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.

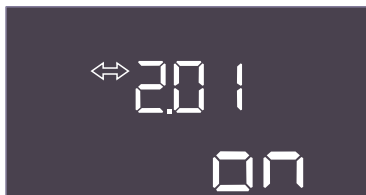


Fig. 44: Menu 2.01



Fig. 45: Menu 2.02

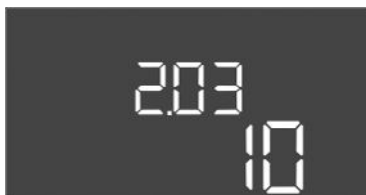


Fig. 46: Menu 2.03

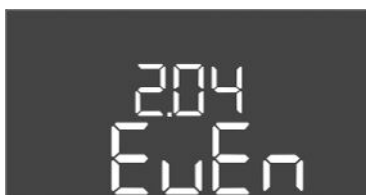


Fig. 47: Menu 2.04

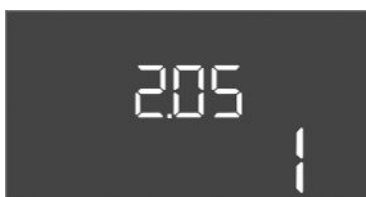


Fig. 48: Menu 2.05

### 8.3.5 Menu 3: Enable pumps



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

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

Menu no.	2.02
Description	Baud rate
Value range	9600; 19200; 38400; 76800
Factory setting	19200

Menu no.	2.03
Description	Slave address
Value range	1 ... 254
Factory setting	10

Menu no.	2.04
Description	Parity
Value range	none, even, odd
Factory setting	even

Menu no.	2.05
Description	Number of stop bits
Value range	1; 2
Factory setting	1

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.  
**NOTICE! If the number of pumps is increased in menu 5.02, check the operating mode of the new pump and change it to “Auto” if necessary.**
- 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 perform the initial configuration:

- Switch off the pumps: Set menu 3.02 and 3.03 to “off”.



Fig. 49: Menu 3.02



Fig. 50: Menu 3.06

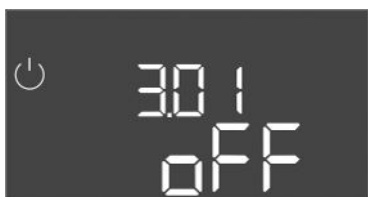


Fig. 51: Menu 3.01

### 8.3.6 Adjust motor current monitoring

- Enable pumps: Set menu 3.01 to “on”.

Menu no.	3.02 ... 3.03
<b>Software version: All</b>	
Description	Operating mode for pump 1 and pump 2
Value range	off, Hand, Auto
Factory setting	Auto
Explanation	<ul style="list-style-type: none"> <li>• off = pump switched off</li> <li>• Hand = manual operation pump, as long as the button is pressed.</li> <li>• Auto = automatic operation of the pump depending on the pressure control</li> </ul> <p><b>NOTICE! Change the value to “off” for the initial configuration!</b></p>

Menu no.	3.06
<b>Software version: All</b>	
Description	Operating mode for top-up valve
Value range	Shut, Open, Auto
Factory setting	Auto
Explanation	<ul style="list-style-type: none"> <li>• Shut = top-up valve permanently closed</li> <li>• Open = top-up valve permanently open.</li> <li>• Auto = automatic operation of the top-up valve depending on the switching state of the top-up float switch</li> </ul> <p><b>NOTICE! Monitor the manual top-up process! When finished, set the top-up valve to the “Auto” or “Shut” mode.</b></p>

Menu no.	3.01
<b>Software version: All</b>	
Description	Enable pump/top-up valve
Value range	on, off
Factory setting	off
Explanation	<ul style="list-style-type: none"> <li>• off = pumps and top-up valve are locked and cannot be started.</li> </ul> <p><b>NOTICE! Manual operation or forced switch-on are also not possible!</b></p> <ul style="list-style-type: none"> <li>• on = pumps and top-up valve are switched on/off, depending on the operating mode set</li> </ul>



#### 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.).

In the factory, monitoring a maximum (overload of the pump) and minimum (no media delivery of the pump) flowing current for the motors is activated. Maximum current monitoring is always active. Minimum current monitoring can be deactivated in menu 5.69.

#### Indicate the current value of the motor current monitoring

1. Press the operating button for 3 s.  
⇒ Menu 1.00 appears.
2. Turn the operating button until menu 4.00 appears.
3. Press the operating button.  
⇒ Menu 4.01 appears.

4. Turn the operating button 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

- ✓ Motor current monitoring settings checked.
1. Turn the operating button 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.  
**DANGER! Danger of death due to electric current! There is danger of death when performing work on the open switchgear! This work must be carried out by a qualified electrician!**
  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.

### 8.3.7 Check the direction of rotation of the connected pumps (only for 3~)



#### 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.



#### NOTICE

If the error code "E006" appears on the display after activation, the mains connection has a phase fault.

- Swap over 2 phases/conductors of the power supply on mains side to the switchgear.

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 the operating button 180°.
  2. Select the pump's manual operation mode: Turn the operating button until the menu item is displayed:
    - Pump 1: P1 Hand
    - Pump 2: P2 Hand
  3. Start test run: Press the operating button. The pump runs until the operating button is released.
  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 the operating button 180°.
  2. Select the pump for automatic mode: Turn the operating button until the menu item is displayed:
    - Pump 1: P1 Auto
    - Pump 2: P2 Auto
  3. Press the operating button.
    - ⇒ Automatic mode is set for the selected pump. Alternatively, setting can be performed in menu 3.02 to 3.03.
    - ▶ Automatic mode switched on. The pumps are switched on and off automatically, depending on the actual pressure value.

### Automatic mode after shutdown

- ✓ The switchgear is closed.
  - ✓ Checked configuration.
  - ✓ 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 “on”.
  6. Press the operating button.
    - ⇒ Value saved, pump enabled.
    - ▶ Automatic mode switched on. The pumps are switched on and off automatically, depending on the fill levels.

## 8.5 During operation

Make sure the following points are observed during operation:









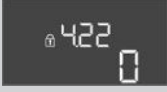







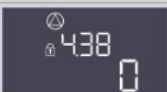
- Keep the switchgear closed and secure it against unauthorised opening.
- Switchgear attached in an overflow-proof manner (protection class IP54).
- Not exposed to direct sunlight.
- Ambient temperature: 0 ... 40 °C.

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

- Pump status:
  - Number of registered pumps
  - Pump activated/deactivated
  - Pump On/Off
- Status of top-up valve (0: closed, 1: open)
- Operation with standby pump
- Operating mode
- Actual pressure value
- Active fieldbus operation

Furthermore, the following information is available via menu 4:

1. Press the operating button for 3 s.
  - ⇒ Menu 1.00 appears.
2. Turn the operating button until menu 4 appears.
3. Press the operating button.
  - ▶ Menu 4.xx appears.

	Actual pressure value in bar
	Top-up valve status (0: closed; 1: open)
	Switchgear running time The time will be displayed in minutes (min), hours (h) or days (d) depending on the unit.
	Running time: Pump 1 The time is stated in minutes (min), hours (h) or days (d) depending on the unit. The display varies depending on the timespan: <ul style="list-style-type: none"> <li>• 1 hour: Display in 0 ... 59, unit: min</li> <li>• 2 hours to 24 hours: Display in hours and minutes separated by a decimal point, e.g. 10.59, unit: h</li> <li>• 2 days to 999 days: Display in days and hours separated by a decimal point, e.g. 123.7, unit: d</li> <li>• From 1000 days: Display in days, unit: d</li> </ul>
	Running time: Pump 2 The time is stated in minutes (min), hours (h) or days (d) depending on the unit.
	Switchgear switching cycles
	Switching cycles: Pump 1
	Switching cycles: Pump 2
	Serial number Display switches between the 1st and 2nd four digits.
	Switchgear type
	Software version
	Set value for the motor current monitoring: Pump 1 Max. rated current in A
	Set value for the motor current monitoring: Pump 2 Max. rated current in A
	Actual current for pump 1 in A Display alternates between L1, L2 and L3 Press and hold the operating button. The pump starts after 2 s of pumping operation until the operating button is released.
	Actual current for pump 2 in A Display alternates between L1, L2 and L3 Press and hold the operating button. The pump starts after 2 s of pumping operation until the operating button is released.
	Display of the total opening time of the top-up valve. The time is stated in minutes (min), hours (h) or days (d) depending on the unit.
	Display of the switching cycles of the top-up valve



## 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**

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

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

- Electrical work must be carried out by a qualified electrician!
- 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

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

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

- Electrical work must be carried out by a qualified electrician!
- 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.

### 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.

## 11 Faults, causes and remedies



### DANGER

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

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

- Electrical work must be carried out by a qualified electrician!
- 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

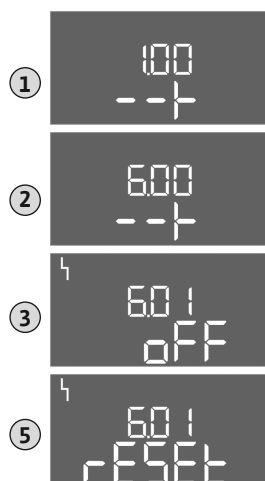


Fig. 52: Acknowledge fault

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

#### 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

Code	Fault	Cause	Remedies
E006	Rotating field error	Mains connection faulty, incorrect rotating field	Establish a clockwise rotating field at the mains connection. <b>In case of an alternating current connection, deactivate rotating field monitoring!</b>
E040	Pressure sensor fault	No connection to the sensor Sensor defective	Check the connection cable and sensor. Replace defective component.
E060	Overpressure	Pressure in the system is above the set overpressure threshold.	Determine and eliminate the cause of excessive pressure.  Set the overpressure threshold to suit the situation on site.

Code	Fault	Cause	Remedies
E061	Underpressure	Pressure in the system is under the set underpressure threshold.	Determine and eliminate the cause of insufficient pressure.  Check the system for leakage.  Set the underpressure threshold to suit the situation on site.
E062	Dry-running protection	Dry-running protection has tripped	Check inlet, supply pressure and break tank.
E063	Top-up processes too frequent**	Top-up valve was opened too frequently.	Check the system for leakage. After eliminating the cause, acknowledge the alarm on the switchgear.
E063.2	Maximum top-up time reached**	Top-up valve is open for too long.	Check the system for leakage. Check float switch and cable, if necessary. Confirm the alarm on the switchgear after the problem has been rectified
E080.x	Pump fault*,**	Overcurrent or excessive temperature monitoring has triggered.	Check functionality of pump. Check that the motor has sufficient cooling. Check the set rated current. Check connection cable Contact customer service.
E080.x	Pump fault*,**	Minimum current monitoring has triggered	Check functionality of pump. Check the set rated current.

**Key:**

\*“x” = represents the pump 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](http://www.wilo-recycling.com) for more information about recycling.



## 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 switchgear!
- 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

Sym- bol	Description
	Standby: Symbol lights up: The switchgear is switched on and ready for operation. Symbol flashing: Follow-up time of base-load pump is active.
	Value input not possible: 1. Input disabled. 2. The accessed menu only displays values.
	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. Automatically activated when 2 pumps are present.
	Control mode: (p-c2)
	The overpressure alarm has triggered.
	The underpressure alarm has triggered.
	Dry-running protection active.
	“Extern OFF” input active: All pumps switched off.
	There is at least one current (unacknowledged) error message.
	The fieldbus system of the unit is activated.

### 13.3 Overview of terminal diagrams

#### Wilo-Control EC-H1... und EC-H2... terminal diagrams

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 pump 1
4/5	Output: Combined fault message pump 1/2

Terminal	Function
8/9	Output: Burner collective fault signal
10/11	Output: Individual run signal pump 2
13/14/15	Output: Collective run signal
16/17/18	Output: Collective fault signal
19/20	Output: Power output for top-up valve
21/22	Input: Extern OFF
25/26	Input: Dry-running protection
27/28	Input: Top-up
29/30	Input: Enable top-up
37/38	Input: Pump 1 thermal winding monitor
39/40	Input: Pump 2 thermal winding monitor
41/42	Output: Analogue output for displaying the current pressure value
45/46	Input: Pressure sensor 4 ... 20 mA

### 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"> <li>• Bit 0: <math>2^0 = 1</math></li> <li>• Bit 1: <math>2^1 = 2</math></li> <li>• Bit 2: <math>2^2 = 4</math></li> <li>• Bit 3: <math>2^3 = 8</math></li> <li>• Bit 4: <math>2^4 = 16</math></li> <li>• Bit 5: <math>2^5 = 32</math></li> <li>• Bit 6: <math>2^6 = 64</math></li> <li>• Bit 7: <math>2^7 = 128</math></li> <li>• Bit 8: <math>2^8 = 256</math></li> <li>• Bit 9: <math>2^9 = 512</math></li> <li>• Bit 10: <math>2^{10} = 1024</math></li> <li>• Bit 11: <math>2^{11} = 2048</math></li> <li>• Bit 12: <math>2^{12} = 4096</math></li> <li>• Bit 13: <math>2^{13} = 8192</math></li> <li>• Bit 14: <math>2^{14} = 16384</math></li> <li>• Bit 15: <math>2^{15} = 32768</math></li> </ul>
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)	Version communication profile	UINT16	0.001		R
40002 (1)	Wink service	BOOL			RW
40003 (2)	Type of switchgear	ENUM		8. EC 9. ECe	R
40014 (13)	Bus command timer	ENUM		0. – 1. Off 2. Set 3. Active 4. Reset 5. Manual	RW
40015 (14)	Drives on/off	BOOL			RW
40025 (24)	Control mode	ENUM		0. p-c	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		1. HVAC	R
40139 – 40140 (138–139)	Fault status	BITMAP32		0: Sensor fault 1: Maximum pressure 2: Minimum pressure 4: Dry running 5: Pump 1 error 6: Pump 2 error 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

#### Key

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











Pioneering for You



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