

Wilo-Control SC2.0-Booster



en Installation and operating instructions



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1 General information

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

WILO SE ©

The reproduction, distribution and utilisation of this document in addition to communication of its contents to others without express authorisation is prohibited. Offenders will be held liable for payment of damages. All rights reserved.

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

Symbols

These instructions use the following symbols:



General danger symbol



Danger caused by electric voltage



Notices

Notices on the product

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

- Symbol for direction of rotation/flow
- Mark for connections
- Rating plate
- Warning stickers

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 Installing/dismantling

- Wear protective equipment:
 - Safety shoes
 - Safety gloves for protection against cuts
 - Safety helmet (when using lifting equipment)
- Locally applicable laws and regulations on work safety and accident prevention must be complied with.
- The procedure described in the installation and operating instructions for shutting down the product/unit must be strictly observed.
- All work on the product/unit may only be carried out when it is at a standstill.
- Disconnect the device from the mains and secure it against being switched on again without authorisation.

2.5 Maintenance tasks

- Wear protective equipment:
 - Sealed safety glasses
 - Safety shoes
 - Safety gloves for protection against cuts
- Locally applicable laws and regulations on work safety and accident prevention must be complied with.
- The procedure described in the installation and operating instructions for shutting down the product/unit must be strictly observed.
- Only perform the maintenance work described in these installation and operating instructions.
- Only original parts from the manufacturer may be used for maintenance and repairs. The use of any non-original parts releases the manufacturer from any liability.
- Disconnect the device from the mains and secure it against being switched on again without authorisation.
- All rotating parts must stop.

- Store tools at the designated locations.
 - After completing work, reattach all safety and monitoring devices and check that they function properly.
- 2.6 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!
- 2.7 Improper use**
- The operational reliability of the supplied product is only guaranteed for intended use in accordance with chapter 4 of the installation and operating instructions.
 - Comply with the limits specified in the catalogue/data sheet.
- 3 Application/use**
- 3.1 Intended use**
- The control device is used for automatic, convenient control of pressure-boosting systems (single- and multi-pump systems):
- Control SC-Booster: uncontrolled fixed-speed pumps
 - Control SCe-Booster: electronically controlled variable-speed pumps
- The field of application is water supply in residential towers, hotels, hospitals, offices and industrial buildings. When used in conjunction with suitable pressure transmitters, the pumps offer low-noise and energy-saving operation. The performance of the pumps is adapted to the constantly changing requirements in the water supply system.
- Intended use also includes compliance with this manual. Any other use is regarded as non-compliant with the intended use.
- 4 Transportation and storage**
- 4.1 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.
- 4.2 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.

4.3 Storage

CAUTION

Damage to property due to incorrect storage!

Moisture and certain temperatures can damage the product.

- Protect the product against moisture and mechanical damage.
- Avoid temperatures outside the range of -10 °C to $+50\text{ °C}$.

5 Product description

5.1 Set-up

The set-up of the control device is dependent on the performance of the pumps that are to be connected as well as the version.

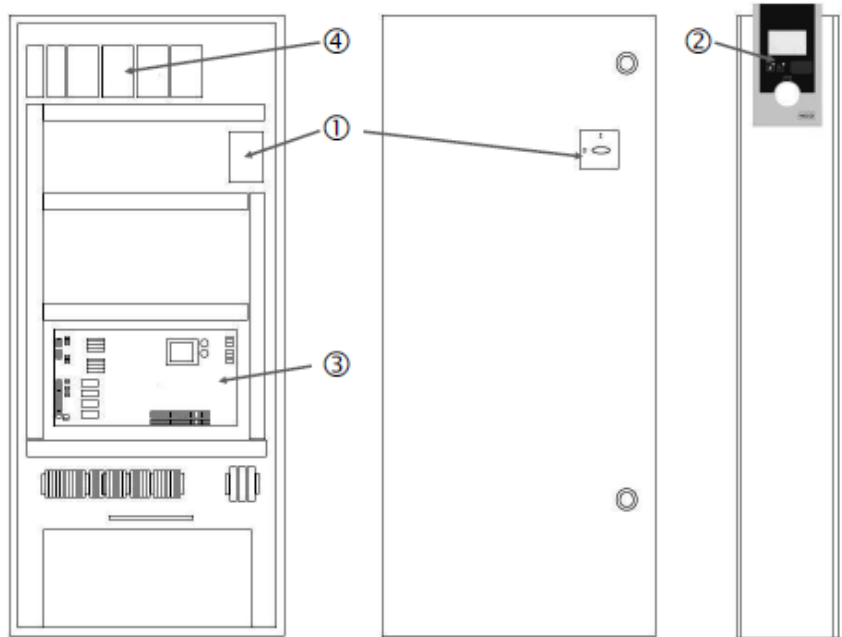


Fig. 1: SCe

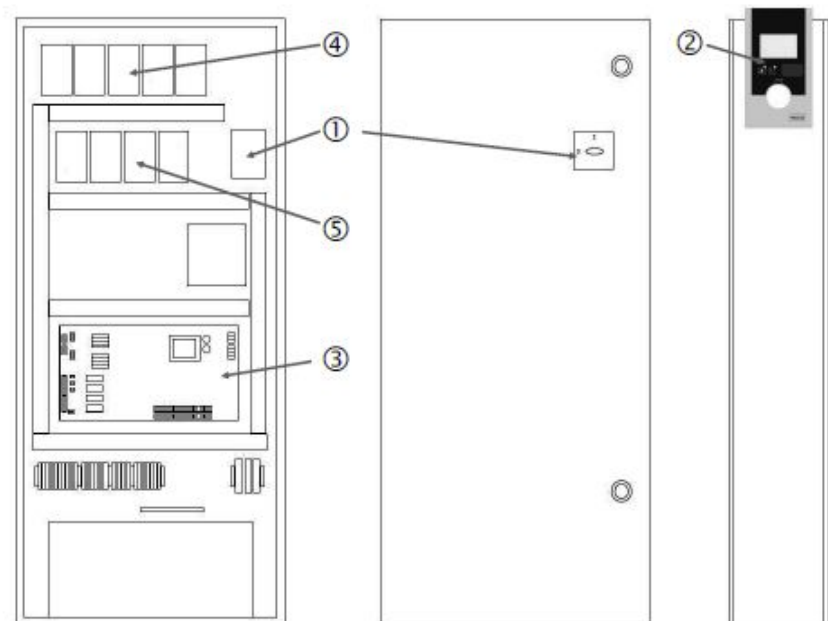


Fig. 2: SC direct starting

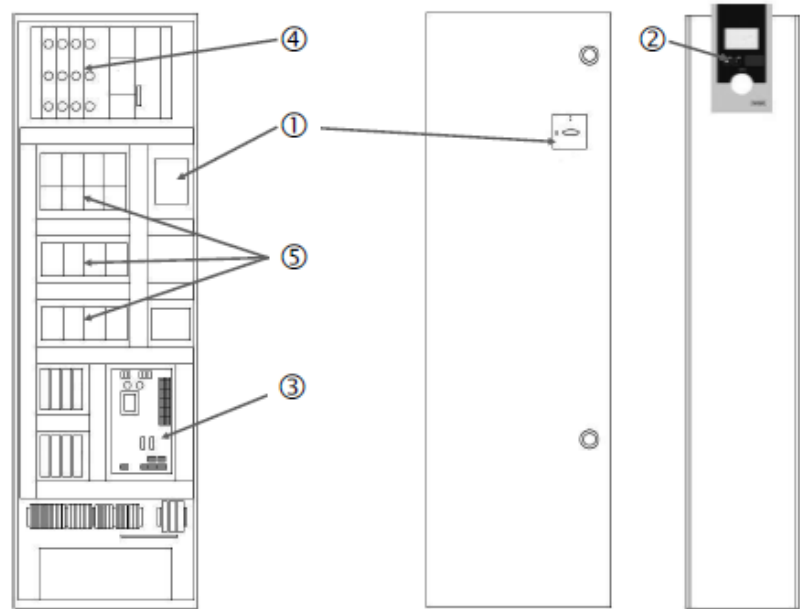


Fig. 3: SC star-delta starting

1	Main switch
2	Human-Machine Interface (HMI)
3	Base board
4	Fuse protection of drives
5	Contactors/contactator combinations

The control device consists of the following main components:

- Main switch: Switches the control device on/off (item 1)
- Human-machine interface (HMI): LCD display for viewing operating data (see menus), LEDs for displaying the operating status (operation/fault), operating button for menu selection and parameter input (item 2)
- Base board: Printed circuit board with microcontroller (item 3)
- Fuse protection of drives: Protection of the pump motors
In the DOL version: Motor protection switch
In the SCe version: Circuit breaker for the fuse for the pump mains supply cable (item 4)
- Contactors/contactator combinations: Contactors for switching on the pumps. In SD (star-delta starting) version control devices, including the thermal tripping devices for over-current protection (default value: $0.58 \times I_N$) and the time relay for the star-delta switchover (item 5)

5.2 Functional principle

The Smart control system, controlled by a microcontroller, is used to control and regulate pressure-boosting systems with up to 4 single pumps. The pressure of a system is measured with corresponding pressure transmitters and controlled in a load-sensitive way.

SCe

Each pump has an integrated frequency converter. In the constant pressure control mode (p-c), only the base-load pump carries out the speed control. In the variable pressure (p-v) control mode, all pumps are controlled and run at the same speed, except when a pump starts or stops.

SC

All pumps are fixed speed pumps. The pressure control is a 2-point control. Non-controlled peak-load pumps are switched on and off automatically depending on the load requirement.

5.3 Operating modes

5.3.1 Normal operation with fixed speed pumps – SC

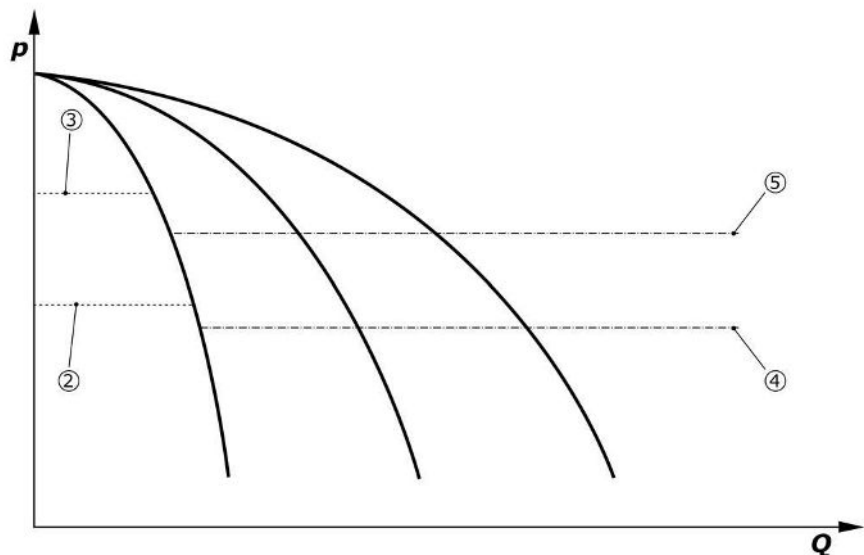


Fig. 4: Normal operation of control device with fixed speed pumps

2	Activation threshold of the base-load pump
3	Deactivation threshold of the base-load pump
4	Activation threshold of the peak-load pumps
5	Deactivation threshold of the peak-load pumps

An electronic pressure transmitter supplies the actual pressure value as a 4 ... 20 mA or 0 ... 20 mA current signal.

- Set measurement range: *System* → *Sensors* → *Discharge side measurement range*
- Set sensor type: *System* → *Sensors* → *Discharge side sensor type*

There is no option for load-sensitive speed adaptation of the base-load pump, as a result of which the system works as a two-position controller and keeps the pressure in the range between the activation and deactivation thresholds.

- *Control setting* → *Setpoints* → *Switching on and off of BLP*
- *Control setting* → *Setpoints* → *Switching on and off of PLP*
- Set the activation and deactivation thresholds relative to the reference setpoint (*Control settings* → *Setpoints* → *Setpoints 1*).

If there is no “external off” message and no fault, and the drives as well as the automatic system are activated, the base-load pump starts when the activation threshold (2) is fallen below. If the power requirement cannot be covered by this pump, a peak-load pump or, if the demand continues to increase, further peak-load pumps (activation threshold (4)) are switched on.

- *Control setting* → *Standby* → *Drives, automatic*
- Set the activation threshold individually for each pump: *Control setting* → *Setpoint-s* → *Switching on and off of PLP*

When the requirement drops to such an extent that a peak-load pump is no longer required to meet the requirement, the peak-load pump switches off (deactivation threshold: (5); individually adjustable per pump).

- Set the deactivation threshold individually for each pump: *Control setting* → *Setpoint-s* → *Switching on and off of PLP*

If no peak-load pump is active, the base-load pump switches off when the deactivation threshold (3) is exceeded and after the delay time has elapsed.

- Set the deactivation threshold: *Control setting* → *Setpoints* → *Switching on and off of BLP*
- Set the delay time: *Control setting* → *Setpoints* → *Delays*

Delay times can be set for activation and deactivation of the peak-load pump.

- Set the delay times: *Control setting* → *Setpoints* → *Delays*

5.3.2 Normal operation with speed control – SCe

With the SCe version, you can choose between 2 control modes:

- p-c

- p-v

Control mode p-c, Vario mode

- Set Vario mode: *Control settings* → *Control* → *BLP selection diagram*

An electronic pressure transmitter supplies the actual pressure value as a 4 ... 20 mA or 0 ... 20 mA current signal. Then the controller maintains the system pressure at a constant level by means of the comparison of the setpoint/actual value.

- Set the measurement range of the pressure sensor: *System* → *Sensors* → *Discharge side measurement range*
- Set sensor type: *System* → *Sensors* → *Discharge side sensor type*
- Set reference setpoint (1): *Control settings* → *Setpoints* → *Setpoints 1*

If there is no “external off” message and no fault, and the drives as well as the automatic system are activated, the base-load pump starts when the activation threshold (2) is fallen below.

- *Control setting* → *Standby* → *Drives, automatic*
- Set the activation threshold individually for each pump: *Control setting* → *Setpoint-s* → *Switching on and off of BLP*

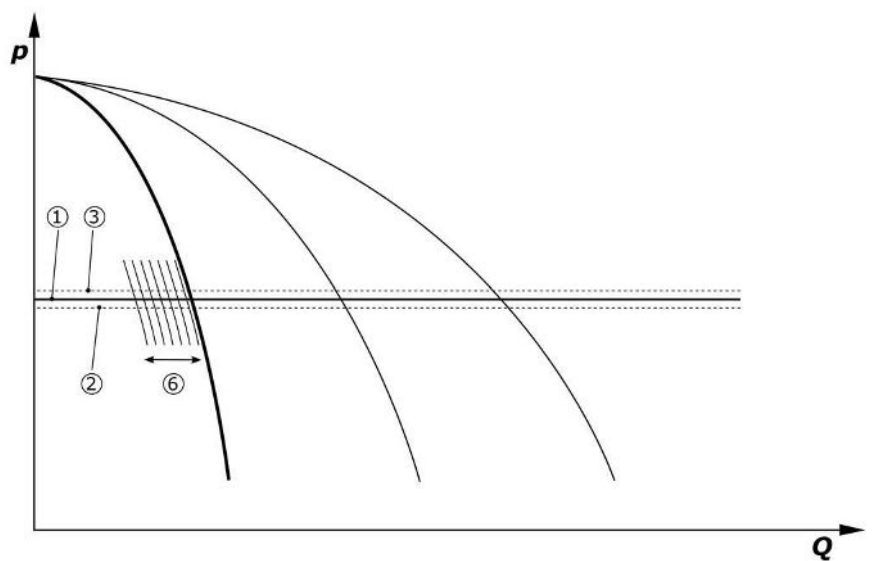


Fig. 5: Starting the load-sensitive speed-controlled base-load pump

If the power requirement can no longer be met by this pump with the set speed, another pump starts when the power falls below the reference setpoint (1) and takes over the speed control.

- Set speed: *System* → *Frequency converter* → *Limits*

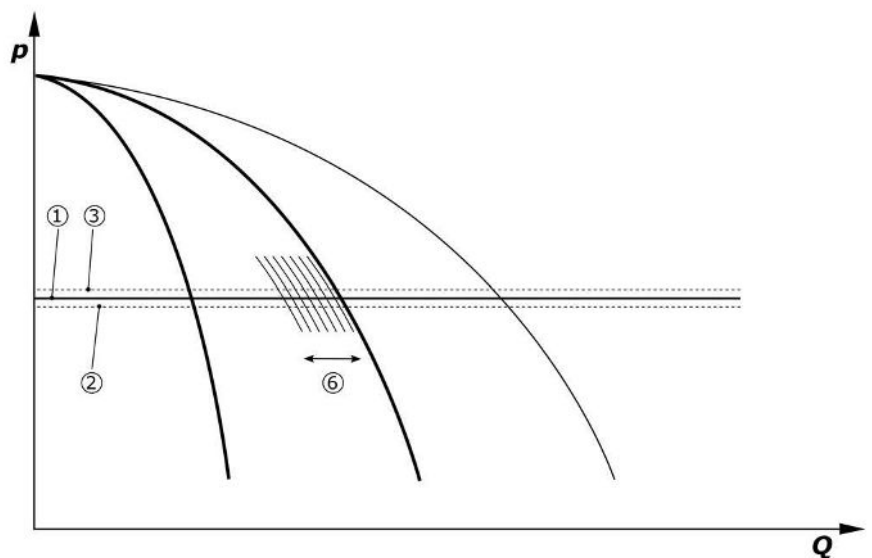


Fig. 6: Starting the second pump

The previous base-load pump continues to run at max. speed as a peak-load pump. This procedure is repeated at increasing load until the maximum number of pumps is reached (here: 3 pumps).

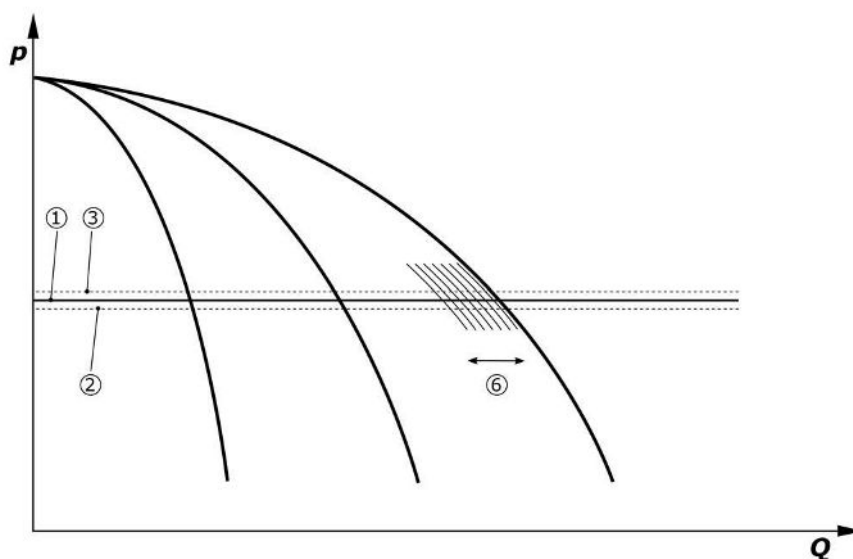


Fig. 7: Starting the third pump

1	Reference setpoint of system pressure
2	Activation threshold of the base-load pump
3	Deactivation threshold of the base-load pump
4	Activation threshold of the peak-load pumps
5	Deactivation threshold of the peak-load pumps
6	Speed setpoint of the base-load pump

If the requirement decreases, the controlling pump is switched off when the set speed is reached and the reference setpoint is exceeded at the same time. A peak-load pump that was previously acting takes over the control.

- Set speed: *System* → *Frequency converter* → *Limits*

If no peak-load pump is active anymore, the base-load pump switches off when the deactivation threshold (3) is exceeded and after the delay time has elapsed, if necessary, after a zero-flow test.

- Set the deactivation threshold: *Control setting* → *Setpoints* → *Switching on and off of BLP*
- Set the delay time: *Control setting* → *Setpoints* → *Delays*

Delay times can be set for activation and deactivation of the peak-load pump.

- Set the delay times: *Control setting* → *Setpoints* → *Delays*

Control mode p-c, cascade mode

In the base-load pump mode “cascade”, the base-load pump is not changed when the peak-load pump is switched on or off and only the speed is adjusted accordingly.

- Set mode: *Control settings* → *Control* → *BLP selection diagram*

p-v control mode

An electronic pressure transmitter supplies the actual pressure value as a 4 ... 20 mA or 0 ... 20 mA current signal. Then the control device maintains the system pressure at a constant level by means of the comparison of the setpoint/actual value.

- Set measurement range: *System* → *Sensors* → *Discharge side measurement range*
- Set sensor type: *System* → *Sensors* → *Discharge side sensor type*

The setpoint is dependent on the current volume flow and is between the setpoint at zero flow (2) and the reference setpoint (1) when the volume flow of the unit is at a maximum (without standby pump) (3).

- *Control settings* → *Setpoints* → *Setpoints 1*

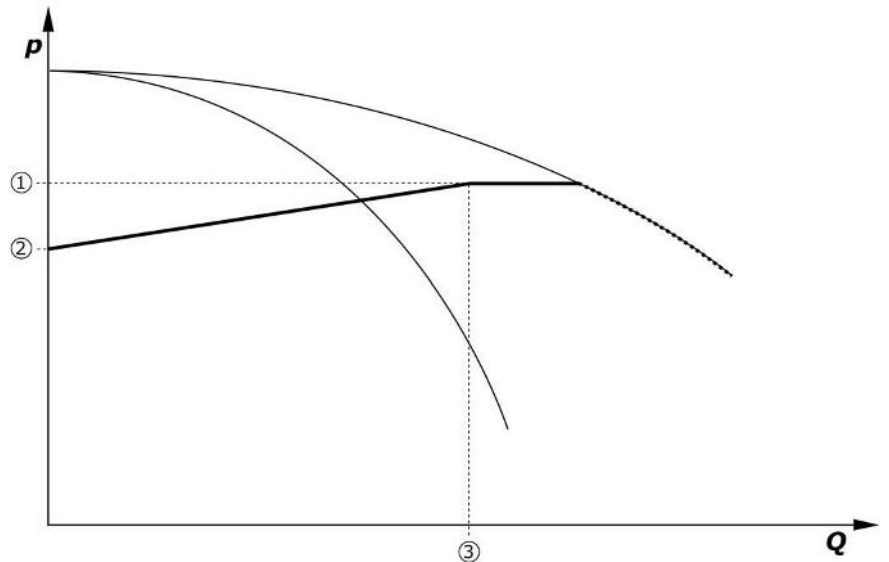


Fig. 8: Setpoint depending on the volume flow

1	Reference setpoint
2	Setpoint in the event of zero flow
3	Maximum volume flow per unit

Please see Fig. 6 for typical default values for the setpoint at zero flow.

Procedure (example: SiBoost Smart 3Helix VE604):

- Based on the reference setpoint (1), the curve to be used is selected (here: 5 bar).
- The point of intersection between this pump curve and the maximum volume flow of the system (2) (here $3 \times 6 = 18 \text{ m}^3/\text{h}$) is used to determine the relative setpoint at zero flow (3) (here 87.5%). **Link not working: See also <https://app.wilo.com/Standalone/Einstellungsoptimierer-SiBoost/Default.aspx?lang=en-GB>.**

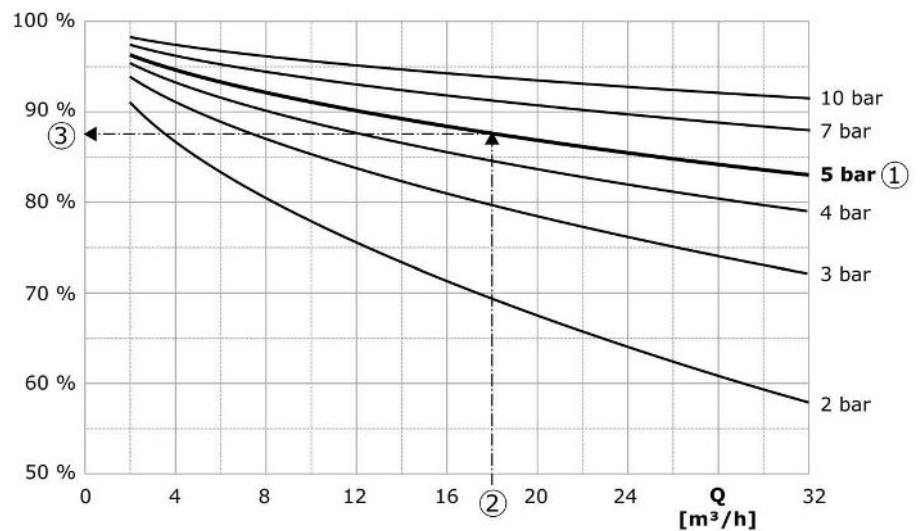


Fig. 9: Typical default values for the setpoint at zero flow

1	Reference setpoint
2	Maximum volume flow per unit
3	Relative setpoint in the event of zero flow



NOTICE

To prevent an inadequate supply, the setpoint at zero flow must be greater than the geodesic head of the highest tap.

If there is no “external off” message and no fault, and the drives and the automatic system are activated, one or more speed-controlled pumps (Fig. 7) start when the value falls below the activation threshold (2). The pumps run at a common, synchronous speed. Only pumps that are switching on or off may briefly run at a different speed.

- *Control setting* → *Standby* → *Drives, automatic*
- Set the activation threshold individually for each pump: *Control setting* → *Setpoint-s* → *Switching on and off of BLP*

Depending on the hydraulic output requirements of the system, the number of running pumps varies and their speed is controlled so that the p-v setpoint curve (1) is followed. The control device minimises the energy demand of the unit.

If only one pump is still active and the demand continues to drop, the base-load pump switches off when the deactivation threshold (3) is exceeded and after the delay time has elapsed, if necessary, after a zero-flow test.

- Set the activation threshold individually for each pump: *Control setting* → *Setpoint-s* → *Switching on and off of BLP*
- Set the delay times: *Control setting* → *Setpoints* → *Delays*

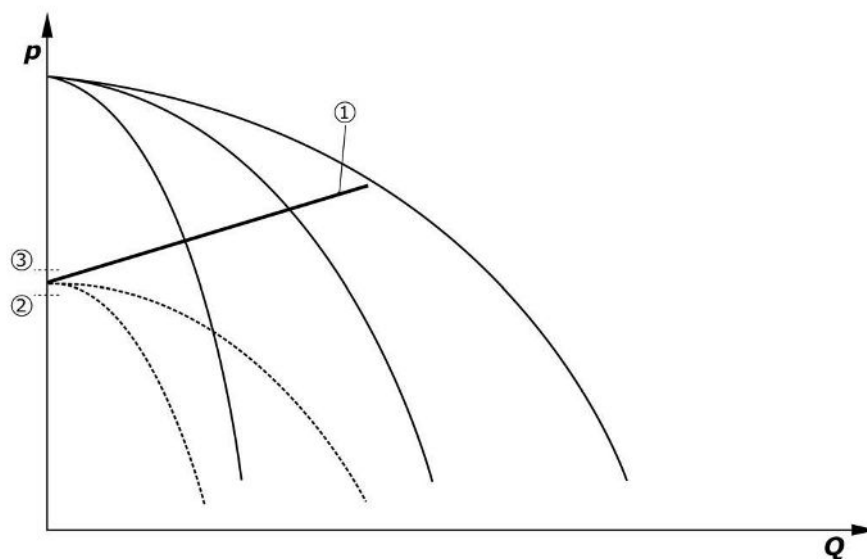


Fig. 10: p-v setpoint curve

1	p-v setpoint curve
2	Activation threshold
3	Deactivation threshold

Delay times can be set for activation and deactivation of the peak-load pump.

- Set the delay times: *Control setting* → *Setpoints* → *Delays*

5.3.3 Further operating modes

Zero-flow test (only SCe version)

When operating only one pump in the lower frequency range and with constant pressure, a zero-flow test is carried out cyclically. This briefly increases the setpoint to a value above the deactivation threshold of the base-load pump. If the pressure does not drop again after the higher setpoint has been reset, there is a zero-flow and the base-load pump is switched off after the follow-up time has elapsed.

- Set the deactivation threshold: *Control setting* → *Setpoints* → *Switching on and off of BLP*
- Set the delay time: *Control setting* → *Setpoints* → *Delays*

In the p-v control mode, a potential zero flow reduction is tested by reducing the setpoint. If the actual value drops to the new setpoint during the reduction, there is no zero-flow.

The parameters of the zero-flow test are preset at the factory and can only be changed by Wilo customer service.

Cyclical pump change

In order to ensure that the load is distributed as evenly as possible between all pumps and to balance the running times of the pumps, various pump cycling mechanisms can be used.

- The base-load pump is cycled for each requirement (after deactivation of all pumps).

- A cyclical change of the base-load pump is activated in the factory and can be deactivated in menu (*Control settings* → *Additional settings* → *Pump change*). The running time between 2 change procedures is adjustable (*Control settings* → *Additional settings* → *Pump change*).

Standby pump

One or more pump(s) can be defined as a standby pump. Activating this operating mode results in these pump(s) not being controlled in normal operation. If a pump fails due to a fault, the standby pump(s) is/are started. However, the standby pumps are subject to standstill monitoring and are included in the test run. Service life optimisation ensures that every pump is defined once as a standby pump.

No standby pump is provided for at the factory. Standby pumps can be defined by Wilo customer service.

Pump test run

To avoid longer downtimes, a cyclical test run of the pumps can be activated. The time between 2 test runs can be set. In the SCe version, the speed of the pump can be adjusted (during the test run).

- Activate pump test run: *Control settings* → *Additional settings* → *Pump test run*

A test run is only performed when the unit has been brought to a standstill. Whether the test run should also take place in the “external off” state can be defined. With drive OFF, there is no test run.

- Set the pump test run to External off: *Control settings* → *Additional settings* → *Pump test run*

Low water

A low water signal can be sent to the control system via a normally closed contact by means of the signal from a suction-side pressure switch or break tank float switch. In the SCe version, the supply pressure is monitored by an analogue supply pressure sensor. The pressure threshold for dry-running detection can be defined. The digital low water contact can be used in addition to the supply pressure sensor.

- Define pressure threshold for dry-running detection: *Control settings* → *Monitoring settings* → *Dry run*

The pumps are switched off after a delay time that can be set has expired. If the signal input is closed again within the delay time or if the supply pressure rises above the pressure threshold (only for SCe), the pumps are not switched off.

- Set the delay time: *Control settings* → *Monitoring settings* → *Dry run*

The system restart after a deactivation due to low water is performed automatically after the signal input closes or the supply pressure threshold for cancelling the dry run is exceeded.

The fault message is reset automatically after the restart, but can be read out from the history memory.

Monitoring of maximum and minimum pressure

The limit values for safe system operation can be set.

- Set the maximum and minimum pressure limits: *Control settings* → *Monitoring settings*

If the maximum pressure is exceeded, the pumps are switched off. The collective fault signal is activated.

- Set maximum pressure: *Control settings* → *Monitoring settings* → *Maximum pressure*

When the pressure drops below the activation threshold, normal operation is enabled again.

If the pressure does not drop due to the system, the error can be reset by increasing the switching threshold and then acknowledging the error.

- Reset fault: *Interaction/Communication* → *Alarms* → *Acknowledge*

It is possible to set the pressure threshold of the minimum pressure monitoring and the delay time. The behaviour of the control device when the pressure falls below the threshold can be selected: Switch off all pumps or continue operation. The collective fault signal is always activated in all cases. If “Deactivation of all pumps” is selected, the fault must be acknowledged manually.

- Set minimum pressure: *Control settings* → *Monitoring settings* → *Minimum pressure*

External Off

It is possible to deactivate the control device externally using a normally closed contact. This function takes priority; all pumps running in automatic mode are switched off.

Operation in the event of an output pressure sensor fault

If an output pressure sensor malfunctions (e.g. wire break), the behaviour of the control device can be set. The system is either switched off or continues to run with a pump. In the SCe version, the speed of this pump can be set in the menu.

- Set the behaviour in case of malfunction of the output pressure sensor: *System* → *Sensors* → *Discharge side sensor fault*

Operation in the event of malfunction of the supply pressure sensor (only SCe)

If a supply pressure sensor malfunctions, the pumps are switched off. If the fault is remedied, the unit switches back to automatic mode.

If emergency operation is required, the unit can continue to be operated temporarily in the p-c control mode. To do so, the use of the supply pressure sensor must be deactivated ("OFF").

- Set control mode: *Control settings* → *Control* → *Control mode*
- Deactivate the supply pressure sensor: *System* → *Sensors* → *Suction side measurement range*

CAUTION

Damage to property due to dry run!

Dry running can damage the pump.

- We recommend connecting additional digital protection against low water level.

The emergency operation setting must be cancelled after replacement of the supply pressure sensor to ensure the reliable operation of the unit.

Operation in the event of malfunction of the bus connection between the control device and pumps (only SCe)

There is the option to choose between stopping the pumps and operating at a defined speed in the event of a communication malfunction. The setting can only be made by Wilo customer service.

Pump operating mode

The operating mode can be set for pumps 1 to 4 (Manual, Off, Auto). In the SCe version, the speed can be set in "Manual" operating mode.

- Set operating mode of each pump: *Control settings* → *Standby* → *Pump mode*

Setpoint changeover

The control system can work with 2 different setpoints. They are set in the menus "Control settings → Setpoints → Setpoints 1" and "Setpoints 2".

- Set setpoint changeover: *Control settings* → *Setpoints* → *Setpoints 1* and *Control settings* → *Setpoints* → *Setpoints 2*

Setpoint 1 is the reference setpoint. Switching to setpoint 2 is performed by closing the external digital input (according to the circuit diagram) or by activation via preset timing.

- Activate timing: "*Control settings* → *Setpoints* → *Setpoints 2*" menu

Remote setpoint adjustment

Remote adjustment of the setpoint via an analogue current signal can be carried out using the corresponding terminals (according to the circuit diagram).

- Activate remote setpoint adjustment: *Control settings* → *Setpoints* → *External setpoint*

The input signal is always related to the sensor measuring range (e.g., 16 bar sensor: 20 mA corresponds to 16 bar).

If the input signal is not available when remote setpoint adjustment is activated (e.g., due to a cable break in the 4 ... 20 mA measurement range), an error message is issued and the control device uses the selected internal setpoint 1 or 2 (see "Setpoint changeover").

Logic reversal of the collective fault signal (SSM)

The desired logic of the SSM can be set in the menu. It is possible to select between negative logic (falling edge in case of a fault = “fall”) or positive logic (rising edge in case of a fault = “raise”).

- Set collective fault signal: *Interaction/Communication* → *BMS* → *SBM, SSM*

Function of the collective run signal (SBM)

The desired function of the SBM can be set in the menu. It is possible to select between “Ready” (control device is ready for operation) and “Run” (at least one pump is running).

- Set collective run signal: *Interaction/Communication* → *BMS* → *SBM, SSM*

Fieldbus connection

The control device is prepared for connection via ModBus TCP as standard. Connection is established via an Ethernet interface (electrical connection as per chapter 7.2.10).

The control device works as a Modbus slave.

Different parameters can be read and also changed to some extent via the Modbus interface. See the appendix for an overview of individual parameters and a description of the data types used.

- Set fieldbus connection: *Interaction/Communication* → *BMS* → *Modbus TCP*

Pipe filling

To avoid pressure peaks when filling empty or low-pressure pipes or to fill pipes as quickly as possible, the pipe filling function (“tube filling function”) can be activated and configured. It is possible to select the mode “One pump” or “All pumps”.

- Define pipe filling: *Control settings* → *Additional settings* → *Tube filling function*

If the pipe filling function is activated, the system operates according to the table below following a restart (activation of mains voltage; external on; drives on) for a time that can be set in the menu:

Device	“One pump” mode	“All pumps” mode
SCe	One pump runs at a speed acc. to “tube filling function” menu.	All pumps run at a speed acc. to “tube filling function” menu.
SC	1 pump runs at fixed speed.	All pumps run at fixed speed.

Table 1: Operating modes for pipe filling

Fault-actuated switchover of multi-pump system

- Control devices with fixed speed pumps – SC: If the base-load pump has a fault, it is switched off and one of the peak-load pumps is managed by the switchgear as a base-load pump.
- Control devices in the SCe version: If the base-load pump malfunctions, it is switched off and another pump assumes the control function.
A malfunction of a peak-load pump always leads to its shutdown and the activation of another peak-load pump (possibly also the standby pump).

5.3.4 Motor protection

Excessive temperature protection

Motors with an WSK (thermal winding contact) signal an excessive winding temperature to the control device by opening a bimetal strip contact. The connection of the WSK is carried out according to the circuit diagram. Faults on motors that are equipped with a temperature-dependent resistor (PTC) for excessive temperature protection can be detected using optional evaluation relays.

Overcurrent protection

Direct-starting motors are protected by motor protection switches with thermal and electromagnetic tripping devices. The trigger current must be set directly on the motor protection switch.

Motors with star-delta starting are protected by motor protection relays. The motor protection relays are installed directly on the motor protections. The trigger current must be set and is $0.58 \times I_{nom}$ with the star-delta starting of the pumps used.

Pump faults which reach the control device result in deactivation of the corresponding pump and activation of the collective fault signal. After the cause of the fault has been rectified, it is necessary to acknowledge the fault.

The motor protection is also active in manual mode and leads to deactivation of the corresponding pump.

In the SCe version, the pump motors protect themselves by mechanisms integrated in the frequency converters. The error messages from the frequency converters are handled in the control device as described above.

5.4 Technical data

Mains supply voltage	3~380/400 V (L1, L2, L3, PE)
Frequency	50/60 Hz
Control voltage	24 VDC; 230 VAC
Max. current consumption	See rating plate
Protection class	IP54
Max. fuse protection on mains side	See circuit diagram
Ambient temperature	0 °C to +40 °C
Electrical safety	Pollution degree 2

5.5 Type key

Example: SC-Booster 2x6.3A DOL FM	
SC	Version: <ul style="list-style-type: none"> • SC = Control device for fixed-speed pumps • SCe = Control device for electronically controlled variable-speed pumps
Booster	Control for pressure-boosting systems
2x	Max. number of pumps that can be connected
6.3 A	Max. rated current per pump in amperes
DOL SD	Pump activation type: <ul style="list-style-type: none"> - DOL = direct start (Direct online) - SD = star-delta starting
FM BM WM	Installation type: <ul style="list-style-type: none"> - FM = Control device is mounted on the base frame (frame mounted) - BM = Floor model (base mounted) - WM = Control device is mounted on a mounting bracket (wall mounted)

5.6 Scope of delivery

- Control device
- Circuit diagram
- Installation and operating instructions
- Factory test protocol

5.7 Accessories

Optional	Description
Communication module "ModBus RTU"	Bus communication module for "ModBus RTU" networks
Communication module "BACnet MSTP"	Bus communication module for "BACnet MSTP" networks (RS485)
Communication module "BACnet IP"	Bus communication module for "BACnet IP" networks
WilCare 2.0	Connection to internet-based remote maintenance



NOTICE

Only one bus option can be active at any given time.

Other options on request

- Order accessories separately.

6 Installation and electrical connection

6.1 Installation types



WARNING

Risk of personal injury!

- Adhere to existing accident prevention regulations.

Installation on base frame, FM (frame mounted)

For compact pressure-boosting systems, the control device (depending on the system series) can be mounted on the base frame of the compact unit with 5 screws (M10).

Floor model, BM (base mounted)

The control device is set up free-standing on a level surface (with sufficient load-bearing capacity). In the standard version, there is an up-right panel support (height 100 mm) for the cable inlet. Other supports are available on request.

Wall fixation, WM (wall mounted)

In compact pressure-boosting systems, the control device (depending on the system series) can be mounted on a mounting bracket with 4 screws (M8).

6.2 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

All cables to be connected must be inserted through threaded cable glands (FM and WM installation type) or cable inlet plates (BM installation type) into the control device and secured so that they are not under tension.

6.2.1 Connecting cable shields

EMC threaded cable glands

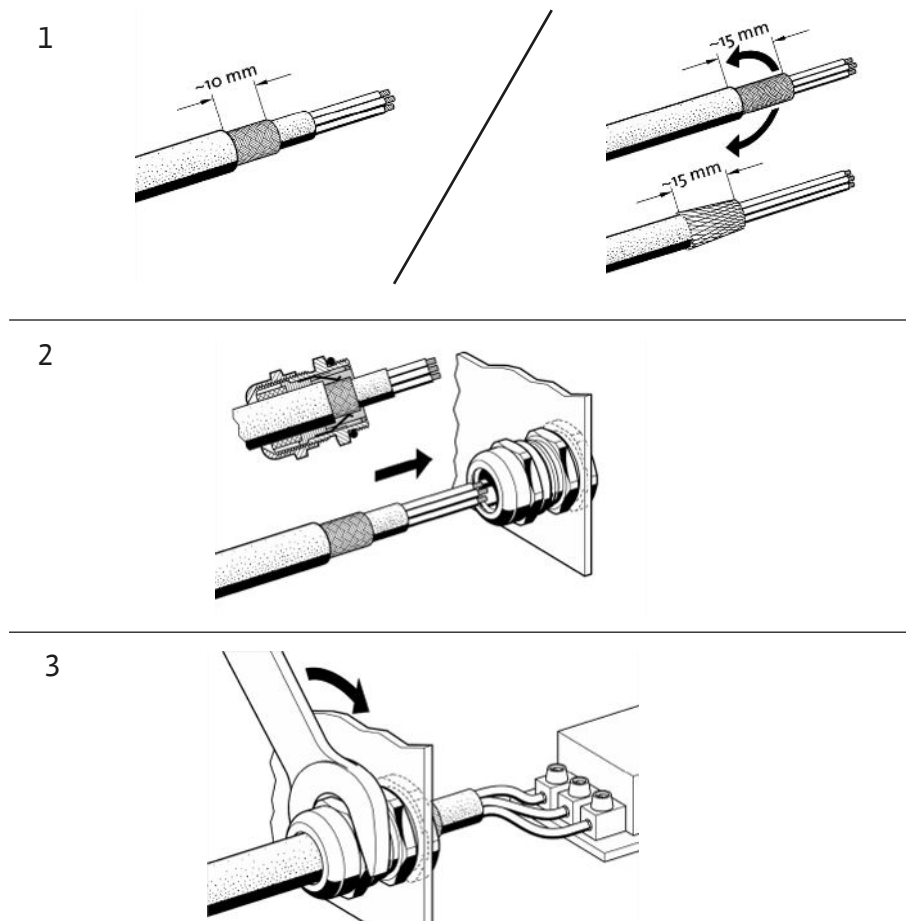


Fig. 11: Connecting cable shields to the EMC threaded cable connections

1. Connect the cable shield with the EMC threaded cable gland according to the figure.

Connection with shield clamps

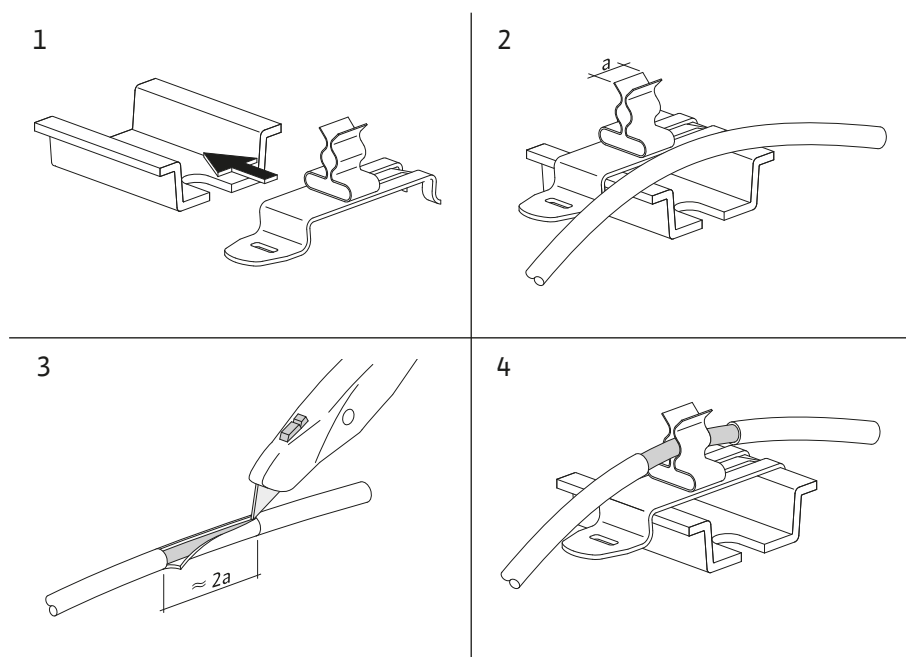


Fig. 12: Connecting cable shields to the earth rail

1. Connect the cable shields with the shield clamp according to the figure.
2. Adjust the cutting length to the width of the clamp used.

When connecting shielded cables without using EMC threaded cable glands or shield clamps, the cable shield should be connected to the earth rail of the control device as a "pigtail".

6.2.2 Mains 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.



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 type, current type and voltage of the mains connection must match the details on the rating plate of the control device.
 - Fuse on mains side in accordance with the information in the circuit diagram.
 - The 4-wire cable (L1, L2, L3, PE) is to be provided on-site.
1. Connect the cable to the main switch (Fig. 1-3, item 1) or, in the case of systems with a higher output, to the terminal strips according to the circuit diagram, PE to the earth rail.

6.2.3 Pump connections

CAUTION

Damage to property due to incorrect installation!

An incorrect electrical connection will damage the pump.

- Observe the installation and operating instructions for the pumps.

Mains connection

1. Connect the pumps to the mains connection at the terminal strips according to the circuit diagram.
2. Connect PE to the earth rail.

Connection of thermal winding contact (version: SC)

CAUTION

Property damage due to external voltage!

External voltage at the signal terminals will damage the product.

- Do not connect any external voltage to the terminals.

Connect the thermal winding contact (WSK) of the pumps to the terminals according to the circuit diagram.

Connection of bus connection to pump control (version: SCe)

CAUTION

Property damage due to external voltage!

External voltage at the signal terminals will damage the product.

- Do not connect any external voltage to the terminals.

1. Bus connection of the pumps to the terminals in accordance with the circuit diagram.
 2. Only use shielded CAN cable (characteristic impedance 120 Ohm).
 3. Shield on both sides; use EMC threaded cable glands on the control device.
 4. Connect the individual frequency converters of the pumps in parallel to the bus cable according to the circuit diagram. The cable should be terminated at each end to prevent signal reflexions.
- Necessary settings, see circuit diagram (for the SCe control device) or installation and operating instructions of the pumps (for the frequency converter).

6.2.4 Sensor connection

CAUTION

Property damage due to external voltage!

External voltage at the signal terminals will damage the product.

- Do not connect any external voltage to the terminals.

- Connect the sensors properly to the terminals according to the installation and operating instructions of the sensor and according to the circuit diagram.
- Only use shielded cables.
- Place the shielding on one side in the switchbox.
- Use EMC threaded cable glands (FM/WM) and shield clamps (BM).

6.2.5 Analogue input connection for remote setpoint adjustment

Remote adjustment of the setpoint is possible using an analogue signal (4 ... 20 mA) by means of the corresponding terminals in accordance with the circuit diagram.

- Connect the remote adjustment to the terminals according to the circuit diagram.
- Only use shielded cables.
- Place the shielding on one side in the switchbox.
- Use EMC threaded cable glands (FM/WM) and shield clamps (BM).

6.2.6 Setpoint changeover connection

CAUTION

Property damage due to external voltage!

External voltage at the signal terminals will damage the product.

- Do not connect any external voltage to the terminals.

Via the corresponding terminals in accordance with the circuit diagram, it is possible to force a switchover from setpoint 1 to setpoint 2 by means of a potential-free contact (normally open contact).

6.2.7 External activation/deactivation

CAUTION

Property damage due to external voltage!

External voltage at the signal terminals will damage the product.

- Do not connect any external voltage to the terminals.

- Remote on/off can be connected via a potential-free contact (normally closed contact).
- Connect the corresponding terminals according to the circuit diagram.
- Remove the factory pre-assembled converter bridge.

Contact closed

Automatic ON

Contact open	Automatic OFF, signal by symbol on the display
--------------	--

6.2.8 Protection against low water level

CAUTION

Property damage due to external voltage!

External voltage at the signal terminals will damage the product.

- Do not connect any external voltage to the terminals.

- The protection against low water level can be connected via a potential-free contact (normally closed contact).
- Connect the corresponding terminals according to the circuit diagram.
- Remove the factory pre-assembled converter bridge.

Contact closed	no low water
Contact open	Low water

6.2.9 Collective run/collective fault signals



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.

- Potential-free contacts (changeover contacts) for external collective run and collective fault signals (SBM/SSM) can be activated.
- Connect the corresponding terminals according to the circuit diagram.
- Min. contact load: 12 V, 10 mA
- Max. contact load: 250 V, 1 A

6.2.10 Display target pressure

CAUTION

Property damage due to external voltage!

External voltage at the signal terminals will damage the product.

- Do not connect any external voltage to the terminals.

A 0...10 V signal is available for an external measurement / display option of the current controlled variable actual value.

0 V corresponds to the pressure sensor signal 0 and 10 V corresponds to the pressure sensor limit value.

- Connect the corresponding terminals according to the circuit diagram.

Sensor	Display pressure range	Voltage/pressure
16 bar	0 ... 16 bar	1 V = 1.6 bar

6.2.11 ModBus TCP connection

CAUTION

Property damage due to external voltage!

External voltage at the signal terminals will damage the product.

- Do not connect any external voltage to the terminals.

The ModBus TCP protocol is available for connection to a building management system. Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect via LAN1 bush on the printed circuit board.

Observe the following points:

- Interface: Ethernet RJ45 plug

7 Operation

7.1 Operating elements



Fig. 13: Display structure

- Set fieldbus protocol: *Interaction/Communication* → *BMS* → *Modbus TCP*



Main switch


- On/Off
- Lockable in “Off” position


LCD display


1	LCD display
2	Back button
3	LED arc
4	Context menu button
5	Rotate and press button
6	Main menu
7	Menu display
8	Status display
9	Info and help area
10	Active influences

Carry out settings by turning and pressing the operating button. Turn the operating button to the left or right to browse the menus or configure settings. A green focus indicates navigation in the menu. A yellow focus indicates a configuration of settings.

- Green focus: Navigation in menu
- Yellow focus: Change settings
- Turn : Menu selection and parameter setting
- Press : Activation of menus or confirming settings

Pressing the back button  returns the focus to the previous focus. Consequently, the focus moves one level further up in the structure or to a previous setting.

Pressing the back button  after having changed a setting (yellow focus) without confirming the changed value returns the focus to the previous focus. The adjusted value will be discarded. The previous value remains unchanged.

If the back button  is pressed for more than 2 seconds, the main menu appears and the pump can be operated via the main menu.



NOTICE

If there are no warning or error messages, the display on the control module will switch off 2 minutes after the last time it was operated.

- If the operating button is pressed or turned again within 7 minutes, the previously exited menu will appear. You can continue to configure settings.
- If the operating button is not pressed or turned for more than 7 minutes, any unconfirmed settings will be lost. Pressing the button again opens the main menu on the display and the pump can be operated from the main menu.



Current faults



Current alarms







	Fieldbus status
	Main screen
	Control settings
	Interaction / Communication
	System
	Help

Table 2: Main menu symbols














	Pump off
	Pump in operation
	Pump runs in manual mode
	Pump has a warning
	Pump has a fault
	Pump started by pump test run
	Pump not available

Table 3: Pump status symbols

	Alarm active
	Automatic mode is switched off
	Base-load pump scheme Cascade active
	Constant speed control mode
	Drives are switched off
	External off is not allowed



	External setpoint is activated
	Frequency converter fault
	Fieldbus is active
	Display locked by fieldbus
	Frost protection mode active
	At least one pump is running
	No fieldbus active
	Tube filling function is active
	Sensor fault is present
	Setpoint 1 is active
	Setpoint 2 is active
	Setpoint 3 is active
	System is ready for operation
	Base-load pump scheme Synchro is active
	Base-load pump scheme Vario is active
	Zero-flow test is being carried out

Table 4: Influences symbols

7.2 Menu control

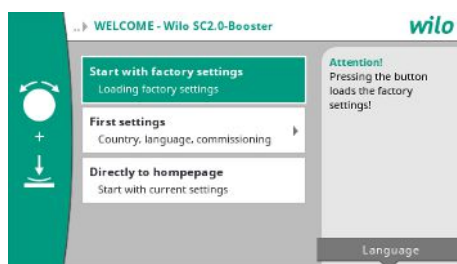


Fig. 14: Initial settings menu

Initial settings menu

The settings menu will appear in the display during initial commissioning of the unit.

- If necessary, press the Context button and go to Language menu in Settings to change the language.

When the initial settings menu is displayed, the unit is deactivated.

- If you do not want to make adaptations in the initial commissioning menu, select “Start with factory settings” to quit the menu.

The display changes to the home screen. The unit can be operated via the main menu.

- To adapt the unit to the required application, set the most important initial commissioning settings (e.g. language, units, control mode and setpoint) in the “First settings” menu.
- Confirm the selected initial settings with “End initial settings”.

The display changes to the home screen when you exit the first settings menu. The unit can be operated via the main menu.

Menu structure

The menu structure of the control system is divided into 3 levels.

Navigation in the individual menus as well as the parameter input are described in the following example (change in low water follow-up time):



Fig. 15: Menu structure

A description of the individual menu items follows in the following section. The menu structure adjusts automatically according to the settings made or options available in the control device. Not all menus are always visible.

Home screen

- The status of the pumps is displayed in the centre area.
- On the right-hand side, the relevant setpoints and actual values for the selected control mode are displayed.
- In the lower area, the active influences that affect the behaviour of the unit are displayed.

In the p-v control mode, the setpoint is changed depending on the determined volume flow.

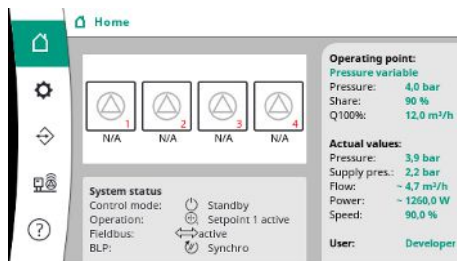


Fig. 16: Main screen in p-v control mode

In the p-c control mode, the pressure in the system is kept constant at the setpoint value, regardless of the volume flow.

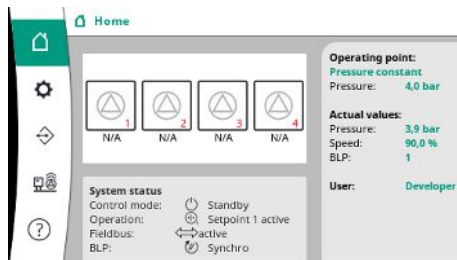
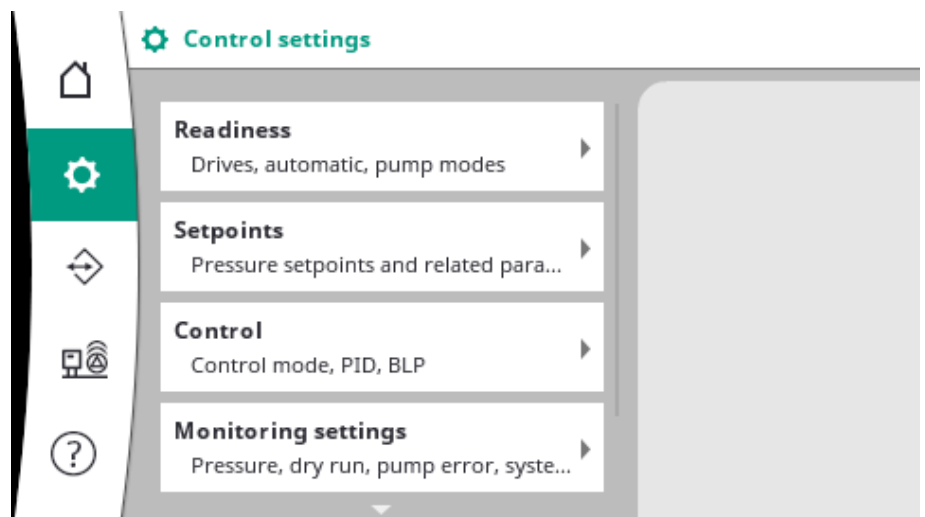


Fig. 17: Main screen in the p-c control mode

7.2.1 Control settings menu



7.2.1.1 Control settings -> Standby menu

Settings for the drives, automatic release and the mode of the individual pump.

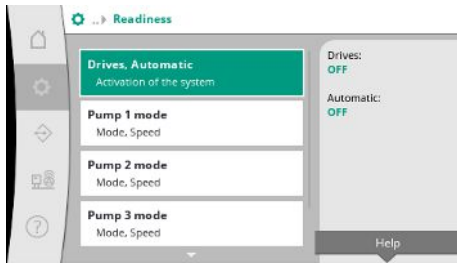


Fig. 18: Settings -> Standby menu item

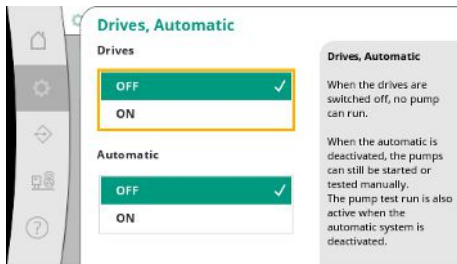


Fig. 19: Settings -> Standby -> Drives, automatic menu item

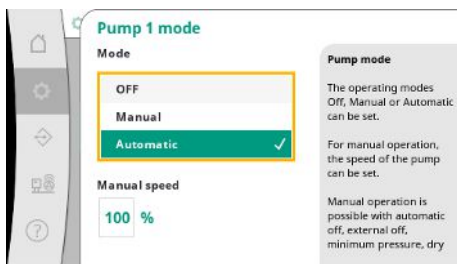


Fig. 20: Control settings -> Standby -> Pump 1 mode menu item

7.2.1.2 Control settings -> Setpoints menu

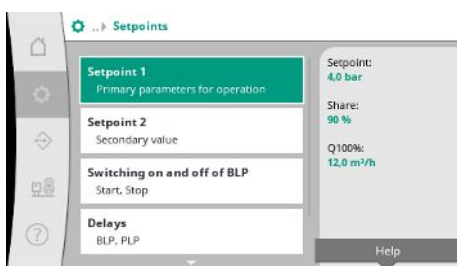


Fig. 21: Settings -> Setpoints -> Setpoint 1 menu item



Fig. 22: Settings -> Setpoints -> Setpoint 1 menu item

The “ON” state for drives releases the pumps so that they can be started automatically or manually.

If the drives are set to “OFF”, no pump test run can be carried out.

The “ON” state for automatic setting enables automatic control so that pumps that are set to automatic can be started and stopped by the controller.

If the automatic setting is set to “OFF”, and the drives are set to “ON”, the pumps can be started manually or by the pump test run.

A separate menu item is available for each existing pump.

With “OFF”, the pump is deactivated and is not included in the pump test run.

With “Manual”, the pump is started at the speed set under “Manual speed”.

The setpoints are the essential setting for the operation of the unit.

The available Setpoints depend on the selected control mode.

The current values are displayed in the area on the right-hand side.

The values can be adjusted.

With the p-v control mode, the values pressure setpoint, share at zero-flow rate and maximum flow rate can be set.

With the p-c control mode, only the pressure setpoint can be changed.

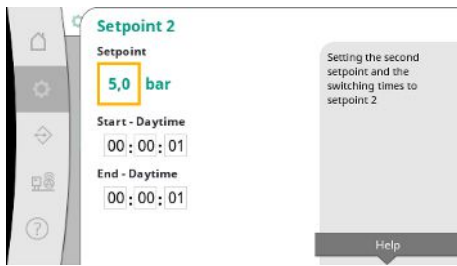


Fig. 23: Settings → Setpoints → Setpoint 2 menu item

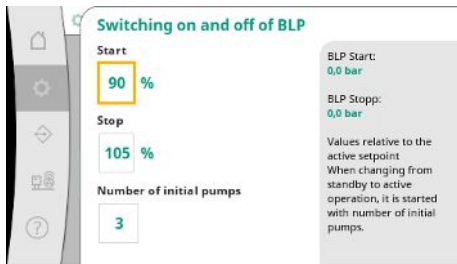


Fig. 24: Settings → Setpoints → Switching on and off of BLP menu item

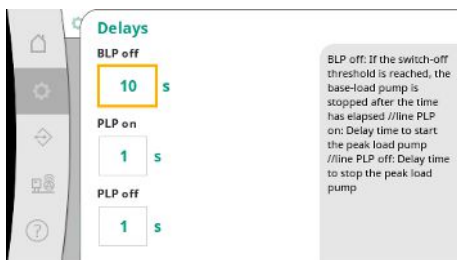


Fig. 25: Settings → Setpoints → Delays menu item

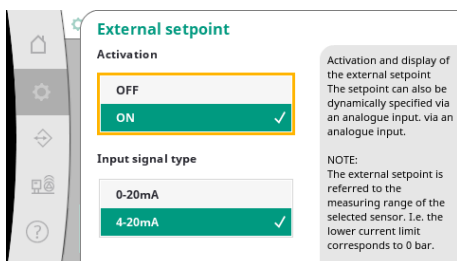


Fig. 26: Settings → Setpoints → External setpoint menu item

With the 2nd setpoint, a further pressure setpoint can be set.

In the p-v control mode, the share and maximum flow rate are taken from the 1st setpoint. The 2nd setpoint can be activated by a digital input or via a preset timing.

Start and stop thresholds are given as relative values and are calculated based on the active setpoint.

The calculated absolute pressure thresholds are displayed in the info area on the right-hand side.

When the unit is ready for operation and the current pressure falls below the start threshold, the BLP is started.

With the p-v control mode, it is possible to define how many pumps the system should start with when falling below the start threshold.

In the p-c control mode, always start with one pump. Depending on the actual decrease, pumps are switched off again or additional pumps are started.

In the p-c control mode, relative start and stop thresholds can be set for switching peak-load pumps on and off.

The absolute pressure values are calculated based on the active setpoint and displayed on the right-hand side.

In addition to the pressure thresholds, the speed of the BLP is used to switch other pumps on and off.

The parameters are not available in the p-v control mode.

Pump activation and deactivation is automatically controlled while optimising energy consumption.

If only the BLP is running, after the deactivation threshold for the BLP is exceeded, the switch-off is delayed by the specified value "BLP off".

If, in the meantime, the pressure falls below the shut-off threshold, the BLP is not stopped.

For the PLP, there is a delay for switching off and on in each case.

If the operating pressure of the system is to be variable, it can be specified via an analogue input.

This function is switched on by activating the external setpoint.

The current range of the input signal can be set.

In the 4–20 mA current range, a conductivity test takes place.

The adjustable pressure range corresponds to the range of the set pressure sensor for the output side.

7.2.1.3 Control settings -> Control menu

Parameters and functions that have an impact on the control.

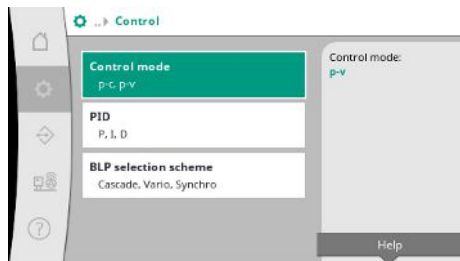


Fig. 27: Settings -> Control menu item

The control modes p-c and p-v can be set.

With the p-c control mode, automatic control is based on the deviation between actual and nominal pressure.

With the p-v control mode, the energy consumption is also taken into account.

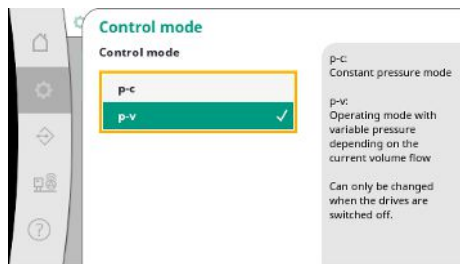


Fig. 28: Settings -> Control -> Control mode menu item

In speed-controlled systems, a PID controller is used for control.

The P and I shares can be adjusted according to local conditions.

The D share is adjustable, but should be left at 0.0 s.

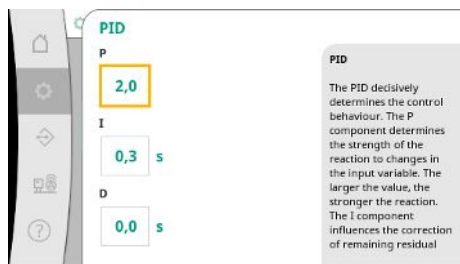


Fig. 29: Settings -> Control -> PID menu item

With the p-v control mode, the “Synchro” scheme is used.

With the p-c control mode, you can choose between “Vario” and “Cascade”.

“Vario” offers better control quality compared to “Cascade”.

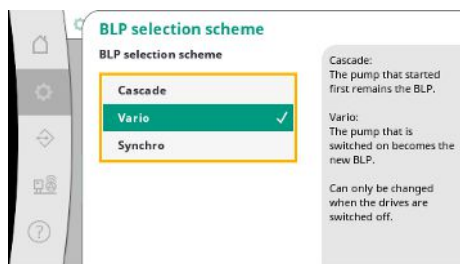


Fig. 30: Settings -> Control -> BLP selection scheme menu item

7.2.1.4 Control settings -> Monitoring functions menu

The monitoring functions ensure the operation of the units in the approved range.

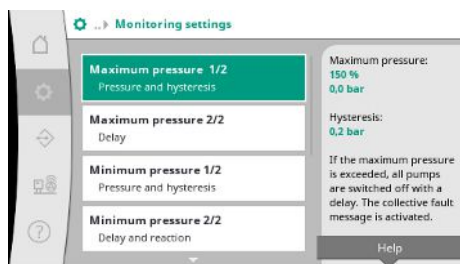


Fig. 31: Settings -> Monitoring settings menu item

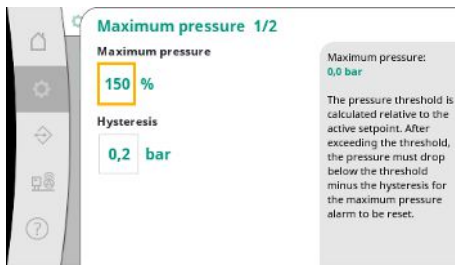


Fig. 32: Settings → Monitoring setting-
s → Maximum pressure 1/2 menu item



Fig. 33: Settings → Monitoring setting-
s → Maximum pressure 2/2 menu item

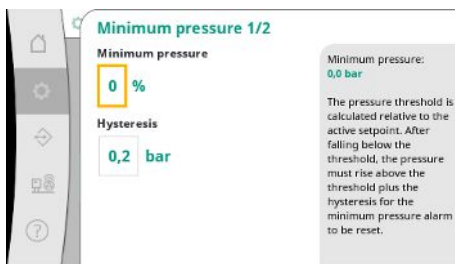


Fig. 34: Settings → Monitoring settings → Min-
imum pressure 1/2 menu item

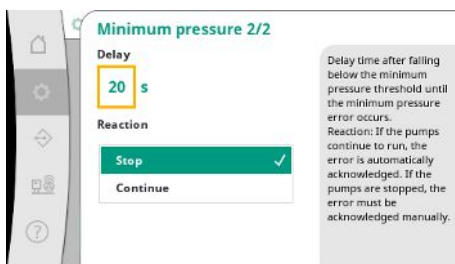


Fig. 35: Settings → Monitoring settings → Min-
imum pressure 2/2 menu item



Fig. 36: Settings → Monitoring settings → Dry
run 1/2 menu item

The relative pressure threshold refers to the current setpoint.

The corresponding absolute value is displayed on the right-hand side.

After the overpressure alarm has been triggered, the pressure must drop below the threshold minus the hysteresis for the maximum pressure alarm to be reset.

Exceeding the maximum pressure leads to a delayed switch-off of all pumps, according to the value set at “Delay”.

The relative pressure threshold refers to the current setpoint.

The corresponding absolute value is displayed on the right-hand side.

After the low-pressure alarm has been triggered, the pressure must rise above the threshold plus the hysteresis for the minimum pressure alarm to be reset.

Falling below the minimum pressure leads to a delayed reaction of the system, according to the set value.

If the pumps continue to run, the fault is automatically acknowledged.

If the pumps are stopped, the fault must be acknowledged manually.

The dry-running protection monitors the supply pressure via sensor and an optional pressure switch and serves to protect the pumps.

The alarm is triggered with a delay according to the set time.

When the pressure has risen above the dry-run threshold again and the set restart delay has elapsed, the pumps are restarted.



Fig. 37: Settings → Monitoring settings → Dry run 2/2 menu item

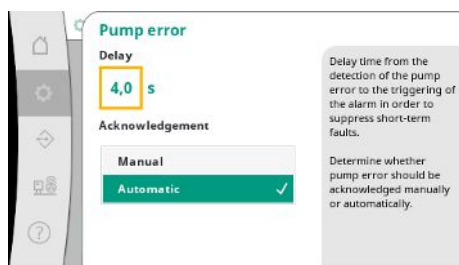


Fig. 38: Settings → Monitoring settings → Pump faults menu item

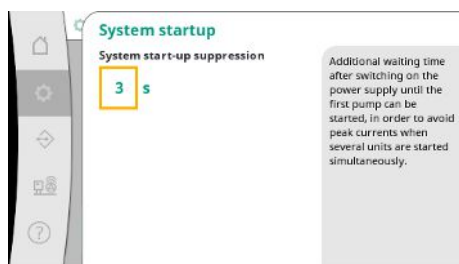


Fig. 39: Settings → Monitoring settings → System start-up menu item

7.2.1.5 Control settings → Additional settings menu

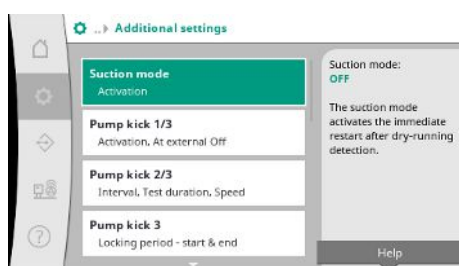


Fig. 40: Settings → Additional settings menu item

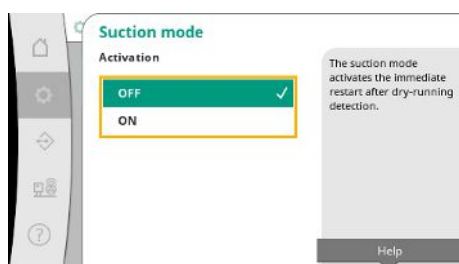


Fig. 41: Settings → Additional settings → Suction mode menu item

The settings for dry-running detection are made via the supply pressure sensor.

If the alarm threshold is fallen below and the delay time has elapsed, the dry-run alarm is triggered.

After the reset threshold has been exceeded and the restart delay has elapsed, the alarm is reset.

To suppress short-term faults, the delay time from the detection of the pump fault to the triggering of the alarm can be set.

It can be set whether pump errors must be acknowledged manually or automatically.

If the pump error has been corrected, the system can restart itself with automatic acknowledgement.

To avoid peak currents when several units start simultaneously, an additional waiting time can be set after switching on the power supply until the first pump can start.

Further functions for pump maintenance for long trouble-free operation of the system and for adaptation to local conditions.

“Suction mode” activates the immediate restart after acknowledgement of a dry-run alarm without taking the set restart time into account.

This mode can be helpful for systems with a break tank if the pumps have to suck in the water before pressure can be generated.

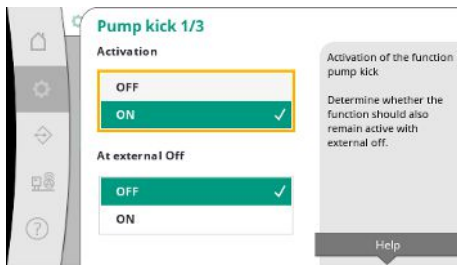


Fig. 42: Settings → Additional settings → Pump test run 1/3 menu item

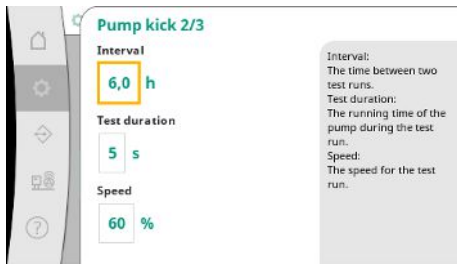


Fig. 43: Settings → Additional settings → Pump test run 2/3 menu item

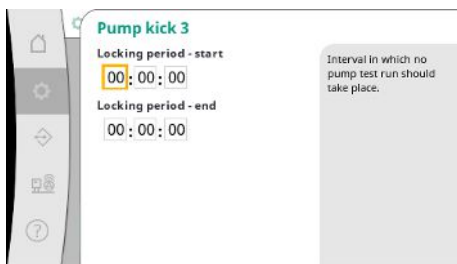


Fig. 44: Settings → Additional settings → Pump test run 3/3 menu item

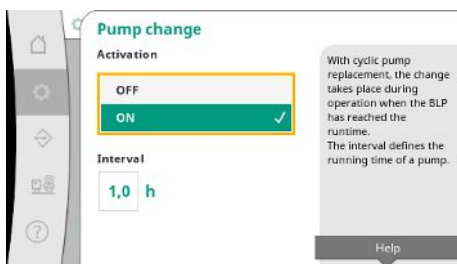


Fig. 45: Settings → Additional settings → Pump change menu item

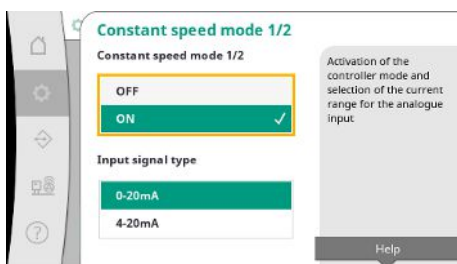


Fig. 46: Settings → Additional settings → Constant speed 1/2 menu item

A cyclical test run can be activated in order to avoid lengthy standstill periods.

It can be specified whether the pump test run should also take place when the “External off” contact is open.

When the time for a pump test run is reached, a pump is started.

During the next test run, another pump starts.

“Interval” defines the time between two pump test runs if the unit was not started by the automatic control in between.

“Test duration” determines the running time of the pump during the test run.

“Speed” determines the speed of the pump during the test run.

“Pump test run” can be suppressed.

The daily time frame can be defined via the start and end of the locking period.

To avoid longer downtimes, a cyclical test run can be activated in addition to the always active pulse cycling.

The pulse cycling takes place after the base-load pump has been stopped.

In contrast to pulse cycling, the cyclical pump change takes place with the base-load pump running.

“Constant speed” enables speed control for one or all pumps via an analogue input.

When “Constant speed” is active, automatic control is deactivated.

The current range can be selected.

With 4–20 mA, a conductivity test of the input is possible.

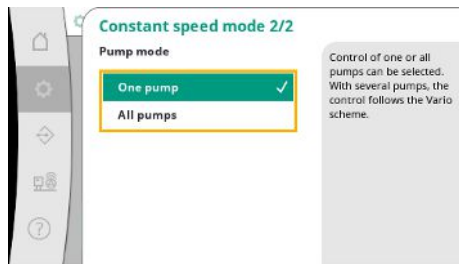


Fig. 47: Settings → Additional settings → Constant speed 2/2 menu item

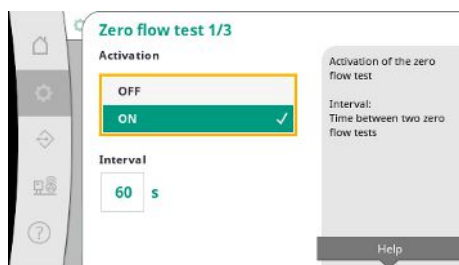


Fig. 48: Settings → Additional settings → Zero-flow test 1/3 menu item

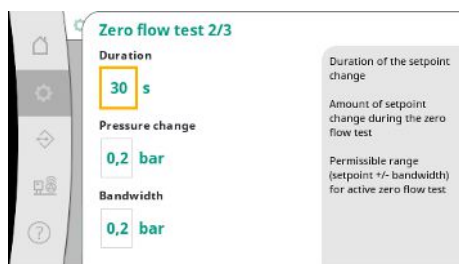


Fig. 49: Settings → Additional settings → Zero-flow test 2/3 menu item

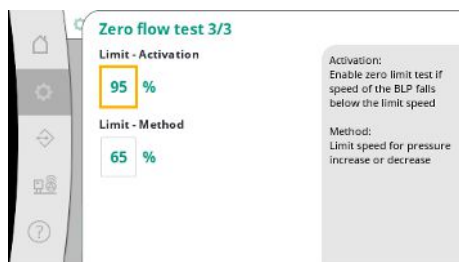


Fig. 50: Settings → Additional settings → Zero-flow test 3/3 menu item

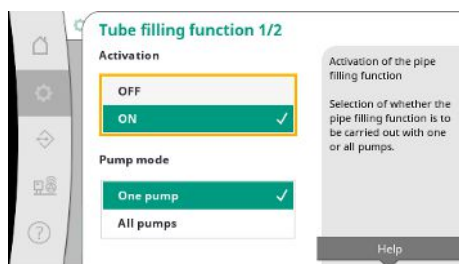


Fig. 51: Settings → Additional settings → Tube filling function 1/2 menu item

Control of one or all pumps can be selected.

With several pumps, the control follows the “Vario” scheme.

“Zero-flow test” is used to switch off the system if the switch-off pressure is not reached, only one pump is still running and there is no more reduction.

The function can be activated.

The interval defines the time between two zero-flow tests if the 1st test did not cause the unit to deactivate.

“Duration” describes the maximum length of time the system needs to reach the changed pressure setpoint for the zero flow.

“Pressure change” is used to calculate the pressure setpoint for the zero-flow test.

“Bandwidth” defines a pressure range to keep the current pressure at a constant pressure for the test.

If the pressure is kept within this range, the pressure is defined as constant.

Sets the lower limit of the speed of the base-load pump at which a zero-flow test is carried out.

Limit value for selecting the increasing or decreasing zero-flow test.

If the speed of the base-load pump is higher, the pressure is decreased, otherwise the increasing zero-flow test.

The “tube filling function” (pipe filling function) is used to safely fill the installation with the aim of reducing pressure surges.

Tube filling function is active during the commissioning and restart of the unit.

The pipe system can be filled with one or all pumps.

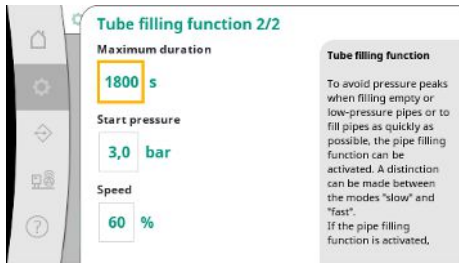


Fig. 52: Settings → Additional settings → Tube filling function 2/2 menu item

If the current pressure is below the set start pressure, the tube filling function is activated. The system operates in this state until the pressure exceeds the above level again or the maximum running time (adjustable) of the pipe filling is reached. After that, the controller operates in automatic mode.

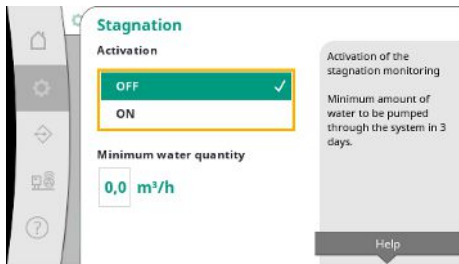
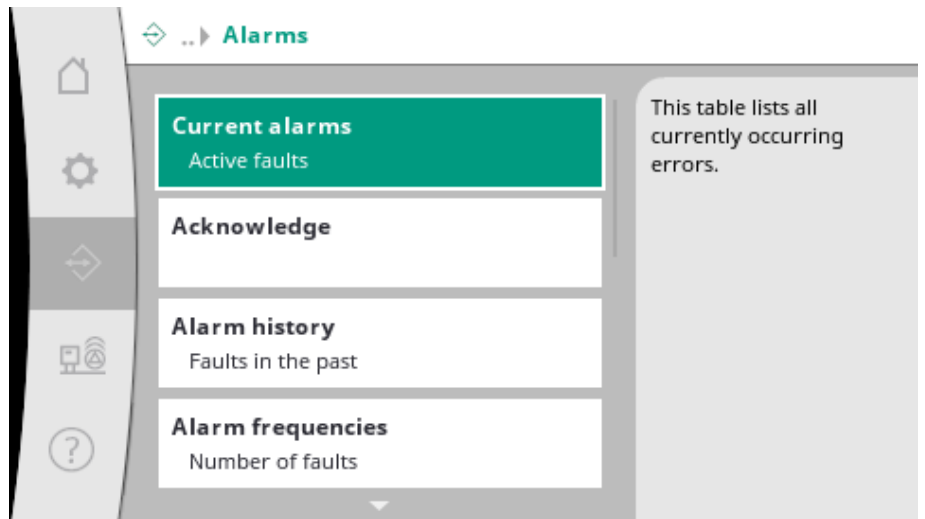


Fig. 53: Settings → Additional settings → Stagnation menu item

Stagnation monitoring is available in the p-v control mode. If the function is active, it is checked that at least the specified amount of water is pumped through the unit within 3 days. If the specified quantity is not conveyed by the unit, a stagnation warning is generated. This does not affect the operation of the unit.

7.2.2 Interaction / Communication menu



7.2.2.1 Interaction / Communication → Alarms menu

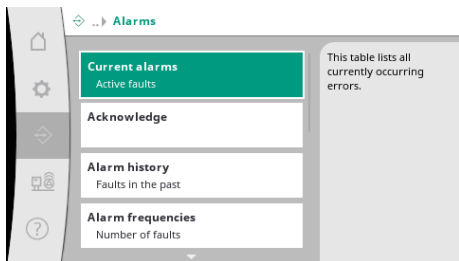


Fig. 54: Communication → Alarms menu item

The menu contains the overview of current and previous alarms and warnings of the system.

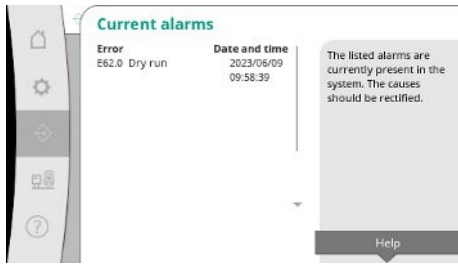


Fig. 55: Communication → Alarms → Current alarms menu item

“Current alarms” shows the faults currently present on the system and the time they occurred.

To ensure unrestricted operation, the cause of the fault must be eliminated.

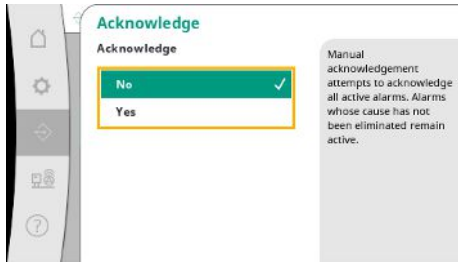


Fig. 56: Communication → Alarms → Acknowledge menu item

Alarms can be acknowledged manually.

Manual acknowledgement attempts to acknowledge all active alarms.

Alarms where the cause has not been eliminated remain active.



Fig. 57: Communication → Alarms → Alarm history menu item

List of the last 13 alarms (current and already corrected alarms).

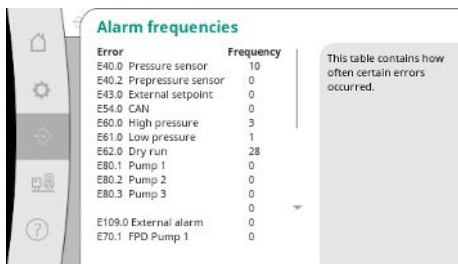


Fig. 58: Communication → Alarms → Alarm frequencies menu item

Number of error messages per alarm.

Clear identification of which fault occurs frequently.

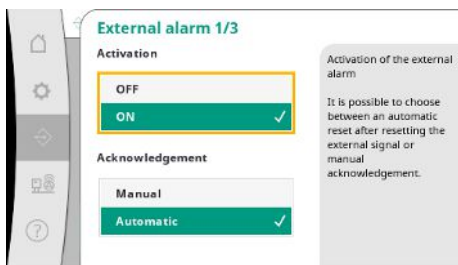


Fig. 59: Communication → Alarms → External alarm 1/3 menu item

The external alarm is controlled via a digital input of the PLC.

The type of signal can be set.

It is possible to choose between an automatic reset after the external alarm has ceased or manual acknowledgement.

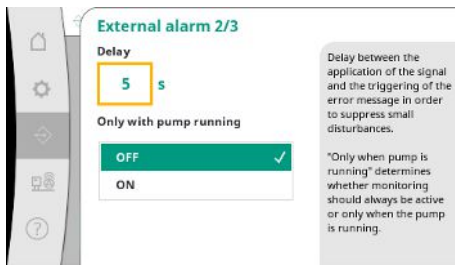


Fig. 60: Communication → Alarms → External alarm 2/3 menu item

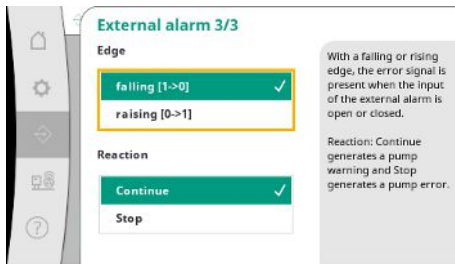


Fig. 61: Communication → Alarms → External alarm 3/3 menu item

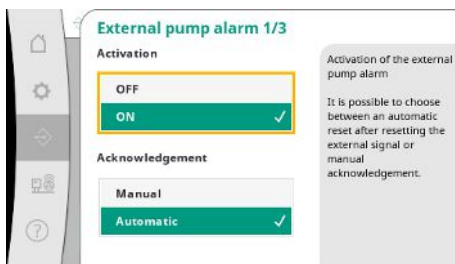


Fig. 62: Communication → Alarms → External pump alarm 1/3 menu item

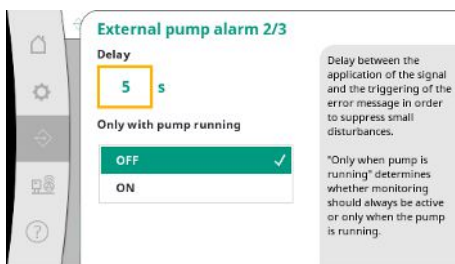


Fig. 63: Communication → Alarms → External pump alarm 2/3 menu item

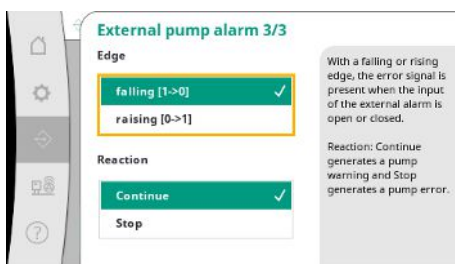


Fig. 64: Communication → Alarms → External pump alarm 3/3 menu item

To hide minor faults, the “delay” between the application of the alarm and the triggering of the error message can be set.

“Only with pump running” determines whether monitoring should always be active or only when the pump is running.

With a “falling” edge, the fault signal is present when the input of the external alarm is open. With a “raising” edge, the fault signal is present when the input of the external alarm is closed.

The external pump alarm is an additional alarm input per pump.

The alarm is triggered with a delay when the input is opened.

The “Continue” reaction generates a pump warning.

The “Stop” reaction generates a pump fault.

Sets “Delay” until the alarm is triggered.

Alarm monitoring only when the pump is running or permanent monitoring of the pump.

With a “falling” edge, the fault signal is present when the input of the external alarm is open.

With a “raising” edge, the fault signal is present when the input of the external alarm is closed.

The “Continue” reaction generates a pump warning.

The “Stop” reaction generates a pump fault.

7.2.2.2 Interaction / Communication -> Diagnosis and measured values menu

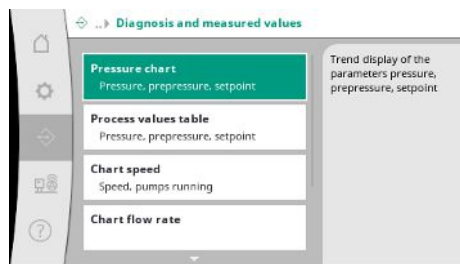


Fig. 65: Communication → Diagnosis and measured values menu item

Information about the control device, states and measured values for evaluating the operation of the system.

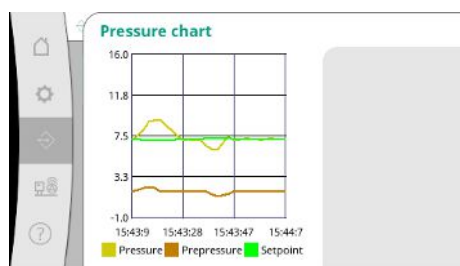


Fig. 66: Communication → Diagnosis and measured values → Pressure chart menu item

Displays the supply pressure and end pressure in the past minutes.

Time	Prepressure [bar]	Pressure [bar]	Setpoint [bar]
10:50:52	1,6	4,0	4,0
10:50:42	1,7	4,1	4,0
10:50:32	1,6	4,0	4,0
10:50:22	1,7	4,0	4,0
10:50:12	1,8	4,1	4,0
10:50:02	1,6	4,2	4,0
10:49:52	1,7	4,1	4,0
10:49:42	1,9	4,0	4,0
10:49:32	2,0	4,0	4,0

Fig. 67: Communication → Diagnosis and measured values → Process values table menu item

Displays the measured values in the past minutes as numerical values.

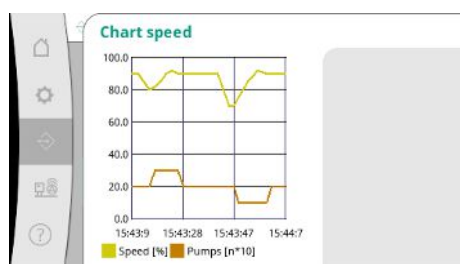


Fig. 68: Communication → Diagnosis and measured values → Speed chart menu item

History of pump speed in the past minutes.

History of the estimated flow rate in the past minutes.

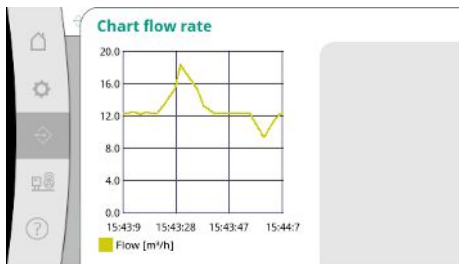


Fig. 69: Communication → Diagnosis and measured values → Flow rate chart menu item

Displays the estimated total power consumption as well as the monthly consumption of the last two years.

Month	Consumption
Summe	15710,90 kWh
06/2023	672,70 kWh
05/2023	520,30 kWh
04/2023	772,90 kWh
03/2023	874,10 kWh
02/2023	832,00 kWh
01/2023	977,80 kWh
12/2022	1242,30 kWh
11/2022	932,70 kWh
10/2022	778,40 kWh
09/2022	682,60 kWh
08/2022	572,90 kWh
07/2022	477,70 kWh

Display of the total consumption as well as the monthly consumption of the last two years.

Fig. 70: Communication → Diagnosis and measured values → Energy consumption table menu item

7.2.2.3 Interaction / Communication → BMS menu

Menu for the interfaces to the building management system.

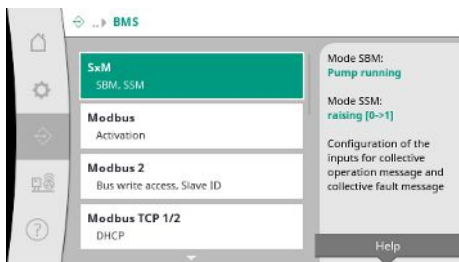


Fig. 71: Communication → BMS menu item

For “SBM”, you can choose between “Standby” (control device is ready for operation) and “Pump running” (at least one pump is running).

For “SSM”, you can choose between negative logic (falling edge in case of error) or positive logic (rising edge in case of fault).

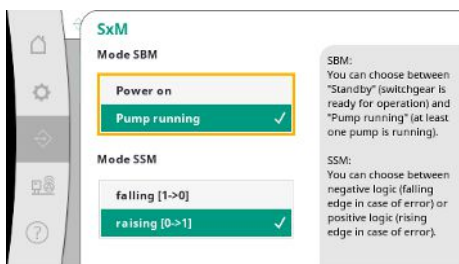


Fig. 72: Communication → BMS → SxM menu item

An Ethernet-based or a serial Modbus interface can be activated.

Specific settings of the interface can be made.

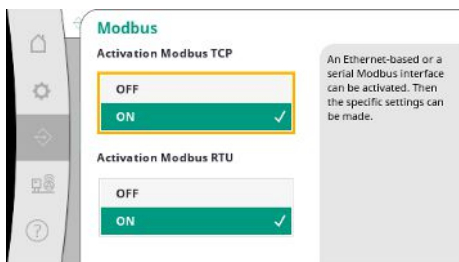


Fig. 73: Communication → BMS → Modbus menu item

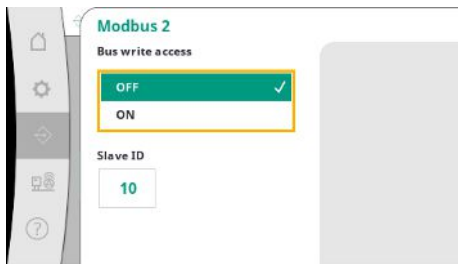


Fig. 74: Communication → BMS → Modbus 2 menu item

For Modbus, the “Slave ID” must be set.

Bus write access can be disabled.

If bus write access is disabled, the data points can only be read.

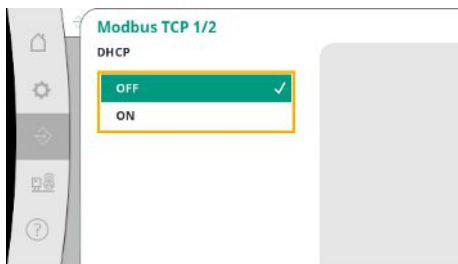


Fig. 75: Communication → BMS → Modbus TCP 1 menu item

If DHCP is activated, the network settings are requested from a DHCP server in the network and not entered manually.

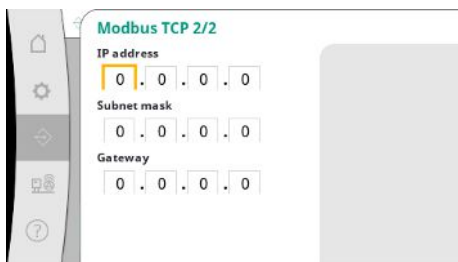


Fig. 76: Communication → BMS → Modbus TCP 2 menu item

The IP address can only be configured via the WCP web pages.

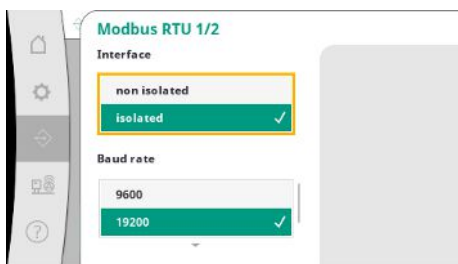


Fig. 77: Communication → BMS → Modbus RTU 1 menu item

“Interface”: “Isolated”, is intended for the Modbus RTU or BACnet MS/TP option.

“Not isolated” is the setting for Wilo internal use.

For Modbus RTU, the “baud rate” and the interfaces of the WCP can be selected.

The Modbus RTU option is required for the isolated interface.

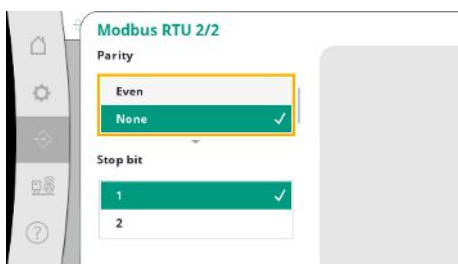


Fig. 78: Communication → BMS → Modbus RTU 2 menu item

The “parity” (“even”, “odd”, “none”) and the number of stop bits (1 or 2) can be set.

7.2.2.4 Interaction /Communication -> Display settings menu

Passwords, user language, date and time, and LCD settings can be set.

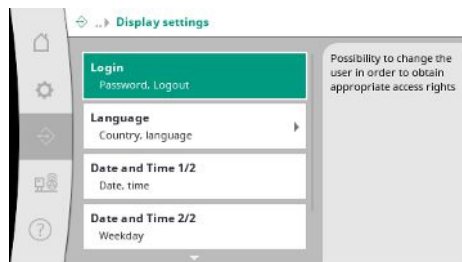


Fig. 79: Communication -> Display settings menu item

Different users and therefore authorisation levels can be selected via the login.

“User 1” (password “1111”) is the default user and has read rights.

“User 2” (password “2222”) has additional write rights for the parameters of normal operation.

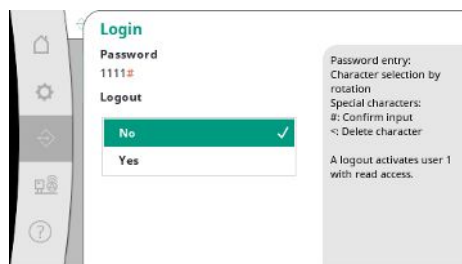


Fig. 80: Communication -> Display settings -> Login menu item

Selection of the desired language and the setting of the country in which the system is located.



Fig. 81: Communication -> Display settings -> Language menu item



Fig. 82: Communication -> Display settings -> Country menu item



Fig. 83: Communication -> Display settings -> Language menu item

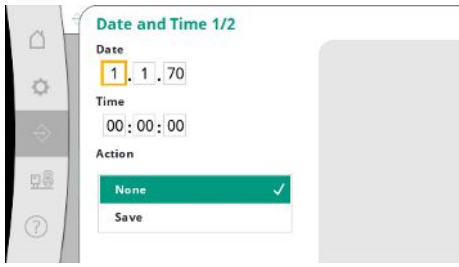


Fig. 84: Communication → Display settings → Date and time 1/2 menu item

Display and possibly correct the date and time.
With the “Save” action, the set date and time are adopted.

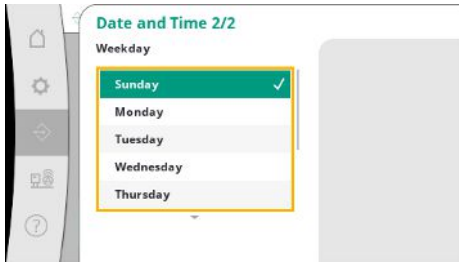


Fig. 85: Communication → Display settings → Date and time 2/2 menu item

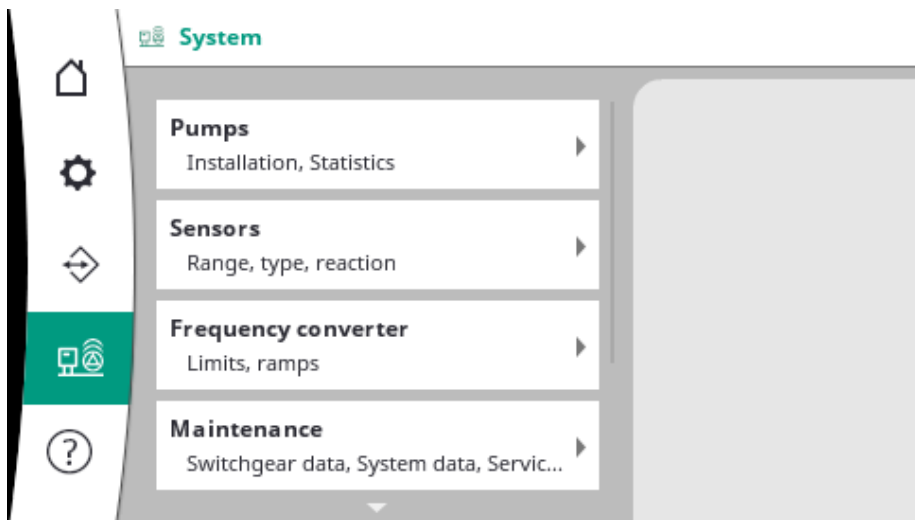
Display of the day of the week resulting from the date.



Fig. 86: Communication → Display Settings → LCD Settings menu item

Presets for adjusting the brightness and the time without pressing a button before the display dims due to lack of user input.
The display does not dim when error messages are displayed.

7.2.3 Menu system



7.2.3.1 Menu system -> Pumps

Settings and data for the pumps used.

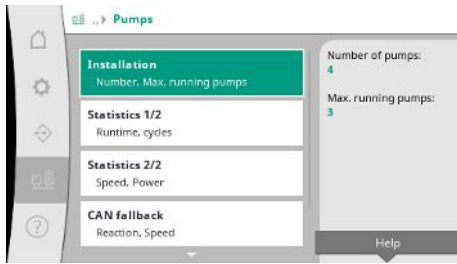


Fig. 87: Menu system -> Pumps menu item

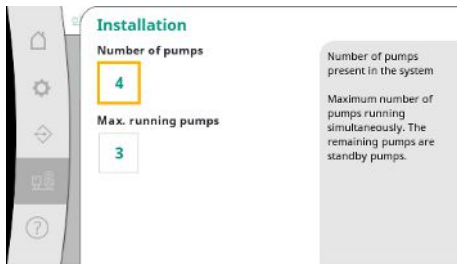


Fig. 88: System -> Pumps -> Installation menu item

Number of pumps installed in the system.

Maximum number of pumps running simultaneously.

The remaining pumps serve as standby pumps.

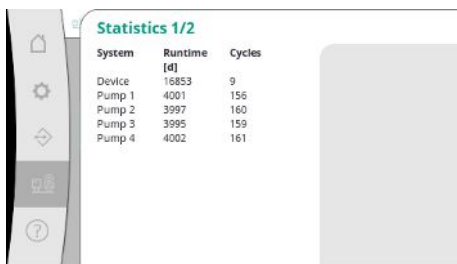


Fig. 89: System -> Pumps -> Statistics 1/2 menu item

Running time data for the control device and the pumps.

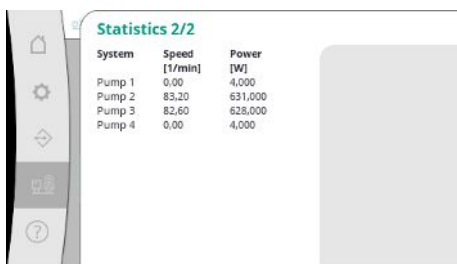


Fig. 90: System -> Pumps -> Statistics 2/2 menu item

Current speeds and calculated power for each pump.

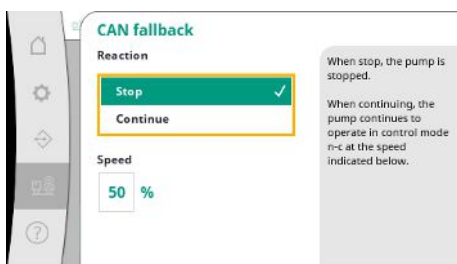


Fig. 91: System -> Pumps -> CAN fallback menu item

The fallback setting in case of a communication problem between the control device and the pump.

The setting determines the behaviour of the pump when the control device no longer performs.

When "Stop" is selected, the pump is stopped.

When "Continue" is selected, the pump continues to operate in the n-c control mode at the speed indicated below.

The speed can then be changed on the pump's HMI. When communication with the control device is re-established, the control device takes over control of the pump.

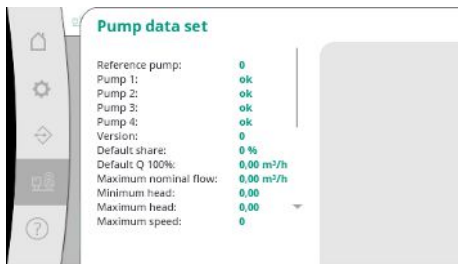
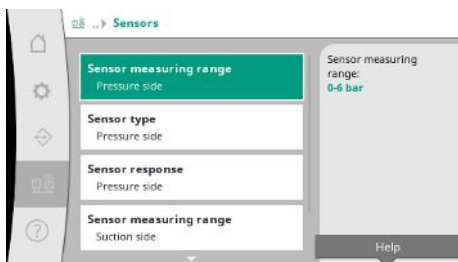


Fig. 92: System → Pumps → Pump data set menu item

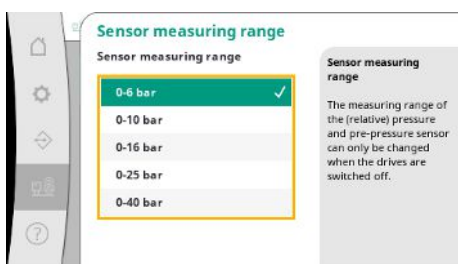
7.2.3.2 System -> Sensors menu

For diagnostic purposes, some data points of the pumps present in the system are displayed here.



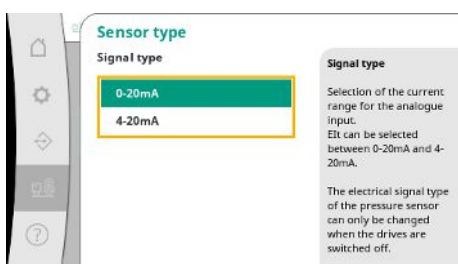
Settings for the upstream and downstream pressure sensors.

Fig. 93: System -> Sensors menu item



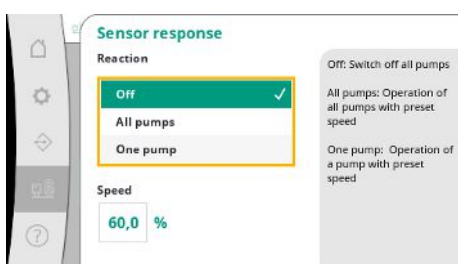
Selection of the sensor measuring range of the installed sensor on the output side (discharge side).

Fig. 94: System → Sensors → Sensor measuring range menu item



Setting for the current range of the end pressure sensor (discharge side). At 4-20 mA, monitoring for a wire break is possible.

Fig. 95: System → Sensors → Sensor type menu item



In the event of a sensor fault, the system can switch to emergency operation until the sensor is functional again. It is possible to run one or all pumps constantly at the set speed.

Fig. 96: System → Sensors → Sensor response menu item

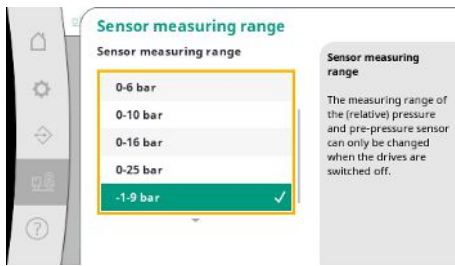


Fig. 97: System → Sensors → Sensor measuring range menu item

Selection of the sensor measuring range of the installed sensor on the input side (supply pressure/suction side).

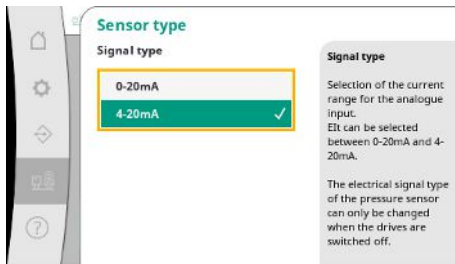


Fig. 98: System → Sensors → Sensor type menu item

Setting for the current range of the supply pressure sensor (suction side). At 4–20 mA, monitoring for a wire break is possible.

7.2.3.3 System → Frequency converter menu

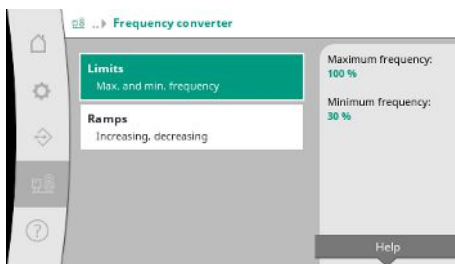


Fig. 99: System → Frequency converter menu item

Certain boundary conditions can be defined for the control of the speed-controlled pumps.

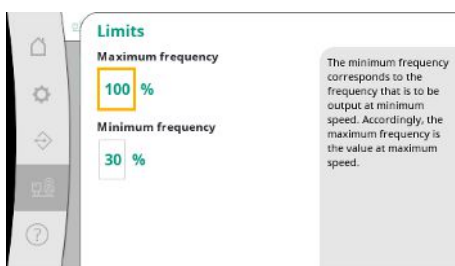


Fig. 100: System → Frequency converter → Limits menu item

In the p-c control mode, it is possible to restrict the speed range. This is not possible in the p-v control mode.

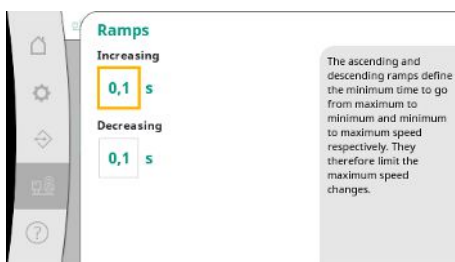


Fig. 101: System → Frequency converter → Ramps menu item

To avoid excessive rapid pressure changes in the installation, the speed of the speed change can be limited. The setting can be made separately for rising and falling speeds.

7.2.3.4 System → Maintenance menu

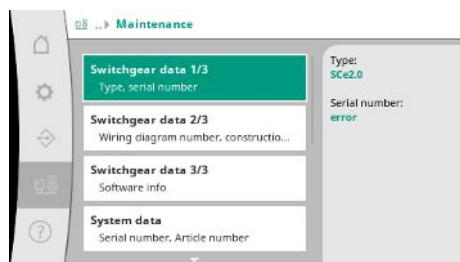


Fig. 102: System → Maintenance menu item

Information about the control devices and pumps.

Certain statistics can be reset.

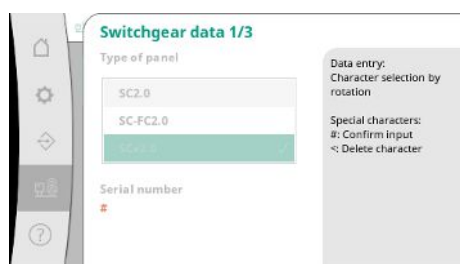


Fig. 103: System → Maintenance → Switchgear data 1/3 menu item

Type of control device used and the corresponding serial number of the control box.

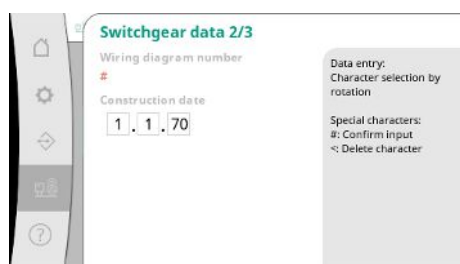


Fig. 104: System → Maintenance → Switchgear data 2/3 menu item

Circuit diagram number and the date of manufacture of the control device.

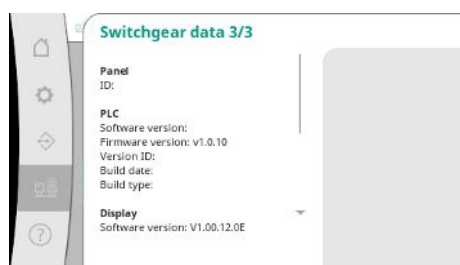


Fig. 105: System → Maintenance → Switchgear data 3/3 menu item

Information on the version of the control device and the operating unit.

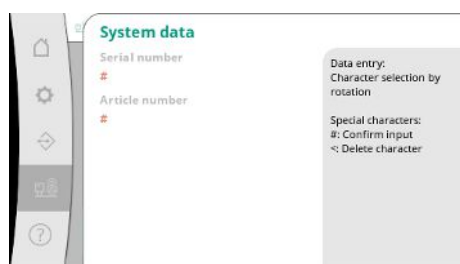


Fig. 106: System → Maintenance → System data menu item

Serial number of the pressure-boosting system and the corresponding article number.

Information for Wilo customer service and a freely selectable unit designation.



Fig. 107: System → Maintenance → Service info menu item

Selection of a memory location for up to 4 parameter sets.

The selected parameter set can be given a name for easier assignment.

A parameter set includes the settings from the menus, but no runtime data.

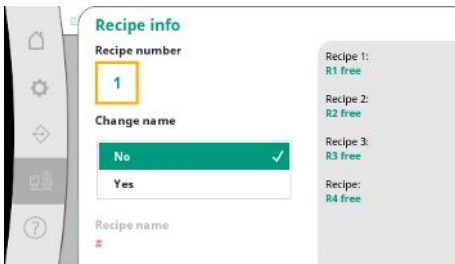


Fig. 108: System → Maintenance → Recipe info menu item

Selection of the action to be performed for the selected parameter set: “Save”, “Load”, “Delete”.

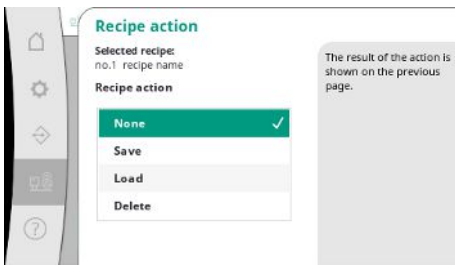


Fig. 109: System → Maintenance → Recipe action menu item

This function allows the control device to be reset to factory settings. This does not affect statistics.

When resetting without fieldbus, the selected settings for the fieldbus interface are retained.

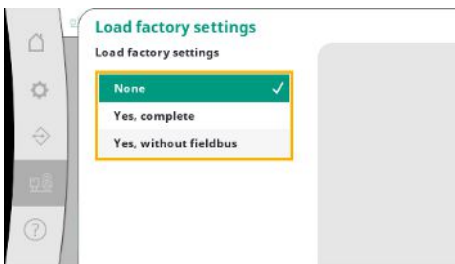


Fig. 110: System → Maintenance → Load factory settings menu item

Certain runtime data can be reset, e.g. after replacement of components or as part of maintenance by the customer service.

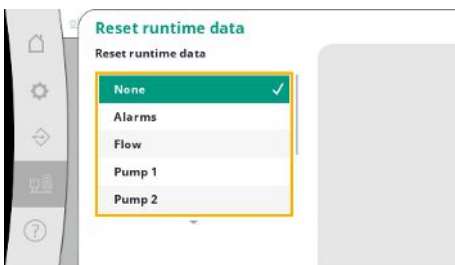


Fig. 111: System → Maintenance → Reset runtime data menu item

7.2.4 Help menu

A shortened version of the manual and contact addresses from Wilo. Below is an example of a help description and the contact addresses.



Fig. 112: Help menu

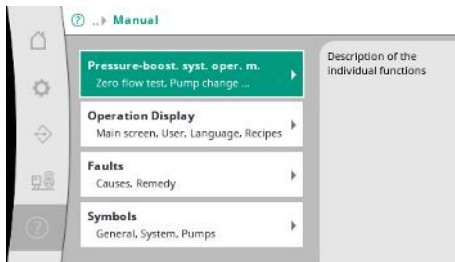


Fig. 113: Help → Manual menu item

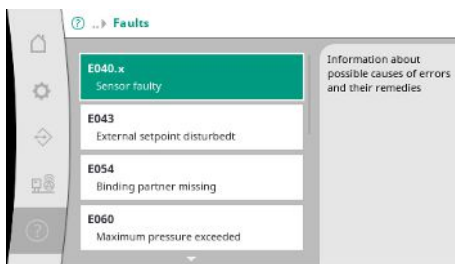


Fig. 114: Help → Manual → Faults menu item

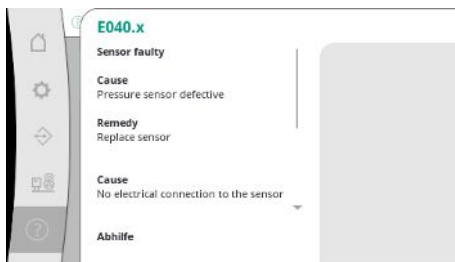


Fig. 115: Help → Manual → Fault → E040.x menu item



Fig. 116: Help → Contact menu item



Fig. 117: Help → Contact → Subsidiary menu item

7.3 User levels

The parameterisation of the control device is separated into the menu areas User 1, User 2 and Service.

The commissioning wizard is sufficient for quick commissioning using the factory defaults. If further parameters are to be changed and data from the unit is to be read out, the settings menu is provided for this as User 2.

The user level Service is reserved for Wilo customer service.

8 Commissioning



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.



DANGER

Danger to life due to improper commissioning!

Improper commissioning poses danger of death.

- Have commissioning performed by qualified personnel only.

We recommend that commissioning be carried out by WILO customer service.

8.1 Preparatory work

1. Check that all on-site wiring has been performed correctly, in particular the earthing, prior to the initial start-up.
2. Check all terminals before commissioning and retighten if necessary.
3. In addition to the activities described here, carry out commissioning in accordance with the installation and operating instructions for the entire system (pressure-boosting system).

8.2 Factory setting

The control system is preset at the factory.

- If the factory setting is to be restored, contact Wilo customer service.

8.3 Motor direction of rotation

- Switch on each pump briefly in “Manual operation” mode and check whether the direction of rotation of the pump in mains operation corresponds to the arrow on the pump housing.
- If the direction of rotation of all pumps in mains operation is wrong, swap any 2 phases of the mains line.

Control device for fixed speed pumps (SC version)

- If the direction of rotation of only one pump is incorrect in mains operation for direct-starting motors, swap any 2 phases in the motor terminal box.
- If the direction of rotation of only one pump is incorrect in mains operation for star-delta-starting motors, swap 4 connections in the motor terminal box. Swap the thread start and thread end of 2 phases (e.g. V1 for V2 and W1 for W2).

- 8.4 Motor protection**
- WSK / PTC: No adjustment is required for the excessive temperature protection.
 - Overcurrent: see chapter Motor protection [► 17]
- 8.5 Signal transmitters and optional modules**
- For signal transmitters and optional additional modules, observe the respective installation and operating instructions.
- 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 Decommissioning**
- Deactivate automatic mode**
1. Select menu item: *Control setting* → *Standby* → *Drives, automatic*.
 2. Select "OFF" drives.
- Temporary shutdown**
- Switch off the pumps and switch off the control device at the main switch ("OFF" position). The settings are stored retentively in the control device and are not deleted. The control device is ready for operation at any time.
- Adhere to the following points during the standstill period:
- Ambient temperature: 0 ... +40 °C
 - Max. humidity: 90 %, non-condensing

CAUTION

Damage to property due to incorrect storage!

Moisture and certain temperatures can damage the product.

- Protect the product against moisture and mechanical damage.
- Avoid temperatures outside the range of -10 °C to +50 °C.

Final shutdown



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.

1. Switch off the control device at the main switch ("OFF" position).
2. Disconnect the entire unit from the power supply and secure it against being switched on again.
3. If the terminals for the SBM, SSM, EBM and ESM are occupied, also de-energise the source of the external voltage present there.
4. Disconnect all power supply lines and pull them out of the threaded cable glands.
5. Seal the ends of the power supply cables so that no moisture can penetrate the cable.

- Dismantle the control device by loosening the screws on the system/structure.

Return delivery

- Pack the control device so that it is shockproof and waterproof.
- Observe the following chapter: Transport [► 7]

Storage

CAUTION

Damage to property due to incorrect storage!

Moisture and certain temperatures can damage the product.

- Protect the product against moisture and mechanical damage.
- Avoid temperatures outside the range of -10 °C to $+50\text{ °C}$.

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 in accordance with the locally applicable regulations.
- If the product is disconnected from the mains, secure it against being switched on again.



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 tasks

Clean control device

- ✓ Disconnect the control device from the mains.
- Clean the control device with a damp cotton cloth.
Do not use any aggressive or scouring cleaners or fluids!

Clean fan

- ✓ Disconnect the control device from the mains.
- Clean fan.
 - Check filter mats in the fans, clean and replace if necessary.

Check contactor contacts

- ✓ Disconnect the control device from the mains.
- From a motor power of 5.5 kW, check contactor contacts for melting.
 - Replace contactor contacts in case of more serious melting.

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 in accordance with the locally applicable regulations.
- If the product is disconnected from the mains, secure it against being switched on again.

11.1 Fault indication

When a fault occurs, the LCD display lights up permanently, the collective fault signal is activated and the fault is shown on the LCD display (error code number).

A faulty pump is indicated on the main screen by a flashing status symbol for the corresponding pump.

- Acknowledge the fault in the menu: *Interaction/Communication* → *Alarms* → *Acknowledge*.

11.2 Fault memory

The control device stores the last 13 errors in the fault memory. The fault memory works according to the first in/first out principle. The frequency of error messages is displayed. The overview of the currently existing alarms can be displayed.

- Call up the fault memory via the menus:
 - *Interaction/Communication* → *Alarms* → *Current alarms*
 - *Interaction/Communication* → *Alarms* → *Alarm history*
 - *Interaction/Communication* → *Alarms* → *Alarm frequency*

11.3 Error codes

Code	Fault	Cause	Remedy
E040	Sensor outlet pressure disturbed	Pressure sensor defective	Replace sensor.
		No electrical connection to the sensor	Make the electrical connection.
E040.2	Supply pressure sensor faulty	Pressure sensor defective	Replace sensor.
		No electrical connection to the sensor	Make the electrical connection.
E043	External setpoint faulty	No electrical connection to the remote station	Make the electrical connection.
E054	Connection partner lost	Fault in the CAN connection between control device and pumps	Check cable connection. Check activation of the terminating resistors.
E060 *	Max. output pressure	Output pressure of the system has risen above the set limit value (e.g. due to a controller fault).	Check controller function.
			Check installation.
E061 *	Min. output pressure	Output pressure of the system has dropped below the set limit value (e.g. due to a burst pipe).	Check whether the default value corresponds to local conditions.
			Check pipe and repair if necessary.
E062	Low water	Protection against low water level triggered.	Check inlet/break tank. Pumps restart automatically.
E065	Stagnation	Not enough water draw-off in the system	Increase water intake to improve hygienic conditions.
E080.1 – E080.4	Pumps 1 ... 4 Alarm	Winding excessive temperature (WSK/PTC)	Clean the cooling fins. Motors are designed for an ambient temperature of +40 °C (see also installation and operating instructions of the pump).
		Motor protection triggered (over-current or short-circuit in the supply line).	Check pump and supply line (see installation and operating instructions of the pump).
		Fault message of the pump via NWB (only for SCe)	Check pump (see installation and operating instructions of the pump).
		Fault in the CAN connection between control device and pump (only for SCe)	Check cable connection.

Legend:

* Fault must be reset manually.

If there is a "W" in front of the error number, it is a warning.



NOTICE

Error messages of the form Exxx.1 to Exxx.4 (exception E040 and E080) occurring in the SCe version are described in the installation and operating instructions of the pump.

- If the fault cannot be rectified, contact Wilo customer service or the nearest representative.

12 Spare parts

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

13 Disposal

13.1 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.

14 Appendix

14.1 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 ohm	Connections/h
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
7.5	0.059	6
7.5	0.042	12
9.0 – 11.0	0.037	6
9.0 – 11.0	0.027	12
15.0	0.024	6
15.0	0.017	12

3~400 V, 2-pole, star-delta starting		
Power in kW	System impedance in ohm	Connections/h
5.5	0.252	18
5.5	0.220	24
5.5	0.198	30
7.5	0.217	6
7.5	0.157	12
7.5	0.130	18
7.5	0.113	24
9.0 – 11.0	0.136	6
9.0 – 11.0	0.098	12
9.0 – 11.0	0.081	18
9.0 – 11.0	0.071	24
15.0	0.087	6
15.0	0.063	12
15.0	0.052	18
15.0	0.045	24
18.5	0.059	6
18.5	0.043	12
18.5	0.035	18
22.0	0.046	6
22.0	0.033	12
22.0	0.027	18

14.2 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.
INT32	Integer in the range from -2,147,483,648 to 2,147,483,647. 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.
UINT32	Unsigned integers in the range from 0 to 4,294,967,295 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 $2^3+2^6+2^8+2^{15} = 8+64+256+32768 = 33096$.

The reverse is also possible. 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 number read 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.

14.3 ModBus: Parameter overview

Holding register (protocol)	Name	Data type	Scaling and unit	Elements	Access*	Supplementary
40001 (0)	Communication profile version	UINT16	0.001		R	31,000
40002 (1)	Wink service	BOOL			RW	31,000

Holding register (protocol)	Name	Data type	Scaling and unit	Elements	Access*	Supplementary
40003 (2)	Control device type	ENUM		0. SC 1. SC...FC 2. SCe 3. CC 4. CC...FC 5. CCe 6. SCe NWB 7. CCe NWB 8. EC 9. ECe 10. ECe NWB	R	31,000
40008 – 40009 (7 – 8)	Control device data ID	UINT32			R	31,000
40014 (13)	BusCommand timer	ENUM		0. – 1. Off 2. Set 3. Active 4. Reset 5. Manual	RW	31,000
40015 (14)	Drives on/off	BOOL			RW	31,000
40026 (25)	Actual value	INT16	0.1 bar 0.1 m 0.1 K 0.1 °C 1 cm 1 min 0.1 h 0.1 psi		R	31,000
40027 (26)	Current setpoint	INT16	0.1 bar 0.1 m 0.1 K 0.1 °C 1/day 1/month 0.1 psi		RW R (dp-v) R (dT-v)	31,000
40028 (27)	Number of pumps	UINT16			R	31,000
40029 (28)	Maximum number of active pumps	UINT16			R	31,000

Holding register (protocol)	Name	Data type	Scaling and unit	Elements	Access*	Supplementary
40033 (32)	Pump status 1	BITMAP		0: Auto 1: Manu 2: Disabled 3: Running 4: 5: Error	R	31,000
40034 (33)	Pump status 2	BITMAP		0: Auto 1: Manu 2: Disabled 3: Running 4: 5: Error	R	31,000
40035 (34)	Pump status 3	BITMAP		0: Auto 1: Manu 2: Disabled 3: Running 4: 5: Error	R	31,000
40036 (35)	Pump status 4	BITMAP		0: Auto 1: Manu 2: Disabled 3: Running 4: 5: Error	R	31,000
40041 (40)	Pump mode 1	ENUM		0. Off 1. Manu 2. Auto	RW	31,000
40042 (41)	Pump mode 2	ENUM		0. Off 1. Manu 2. Auto	RW	31,000
40043 (42)	Pump mode 3	ENUM		0. Off 1. Manu 2. Auto	RW	31,000
40044 (43)	Pump mode 4	ENUM		0. Off 1. Manu 2. Auto	RW	31,000
40062 (61)	General status	BITMAP		0: SBM 1: SSM	R	31,000
40068 (67)	Setpoint 1	UINT16	0.1 bar 0.1 m 0.1 K 0.1 °C 0.1 psi		RW	31,000

Holding register (protocol)	Name	Data type	Scaling and unit	Elements	Access*	Supplementary
40069 (68)	Setpoint 2	UINT16	0.1 bar 0.1 m 0.1 K 0.1 °C 0.1 psi		RW	31,000
40074 (73)	Application	ENUM		0. Booster 1. HVAC 2. WP 3. Lift 4. FFS-Diesel 5. FFS-Electro 6. FLA 7. Clean 8. Rain	R	31,101
40075 (74)	External setpoint	INT16	0.1 bar 0.1 m 0.1 K 0.1 °C 0.1 psi		R	31,000
40076 (75)	Activate external setpoint	BOOL			RW	31,000
40077 – 40078 (76 – 77)	Number of switching-on procedures of the system	UINT32			R	31,000
40079 – 40080 (78 – 79)	Control device data: Operating hours	UINT32	1 h		R	31,000
40081 – 40082 (80 – 81)	Total switching cycles of pump 1	UINT32			R	31,000
40083 – 40084 (82 – 83)	Total switching cycles of pump 2	UINT32			R	31,000
40085 – 40086 (84 – 85)	Total switching cycles of pump 3	UINT32			R	31,000
40087 – 40088 (86 – 87)	Total switching cycles of pump 4	UINT32			R	31,000
40097 – 40098 (96 – 97)	Total operating hours of pump 1	UINT32	1 h		R	31,000
40099 – 40100 (98 – 99)	Total operating hours of pump 2	UINT32	1 h		R	31,000
40101 – 40102 (100 – 101)	Total operating hours of pump 3	UINT32	1 h		R	31,000
40103 – 40104 (102 – 103)	Total operating hours of pump 4	UINT32	1 h		R	31,000

Holding register (protocol)	Name	Data type	Scaling and unit	Elements	Access*	Supplementary
40139 – 40140 (138 – 139)	Fault status	BITMAP32		0: Sensor error 1: P man 2: P min 3: FC 4: TLS 5: Pump 1 Alarm 6: Pump 2 Alarm 7: Pump 3 Alarm 8: Pump 4 Alarm 9: Pump 5 Alarm 10: Pump 6 Alarm 11: – 12: – 13: Frost 14: Battery Low 15: High water 16: External alarm 17: Redundancy 18: Plausibility 22: CAN failure 23: Supply pressure sensor 24: External analogue signal	R	31,000
40141 (140)	Acknowledge	BOOL			W	31,000
40142 (141)	Alarm history index	UINT16			RW	31,000
40143 (142)	Fault number alarm history	UINT16	0.1		R	31,000
40147 (146)	Alarm histogram index	UINT16			RW	31,000
40148 (147)	Fault number alarm histogram	UINT16	0.1		R	31,000
40149 (148)	Fault frequency alarm histogram	UINT16			R	31,000

Legend

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









wilo



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