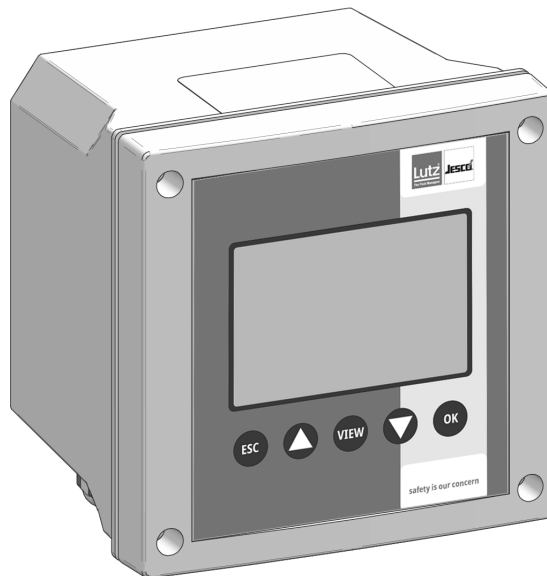


Single-Channel Controller

TOPAX[®] L

Operating Instructions



Read the operating instructions!

The user is liable for improper installation and operation.

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1 Notes for the Reader

These operating instructions contain information and instructions for the safe and designated operation of the **TOPAX® L** single-channel controller.

Observe the following principles:

- Read the entire operating instructions prior to starting-up the device.
- Ensure that everyone who works with or on the device has read the operating instructions and follows them.
- Maintain the operating instructions throughout the service life of the device.
- Pass the operating instructions on to any subsequent owner of the device.
- Before using the device, ensure that all safety requirements have been met.
- The device must not be powered on or connected to other devices until all of the safety conditions have been met.

1.1 General Non-Discrimination

These operating instructions use only the masculine gender in cases in which the rules of grammar would allow for gender allocation. This approach serves the purpose of legibility. Readers of all genders are always addressed equally.

1.2 Explanation of Signal Words

Different signal words in combination with warning signs are used in these operating instructions. Signal words illustrate the gravity of possible injuries if the risk is ignored:

Signal word	Meaning
DANGER	Refers to imminent danger. Ignoring this sign may lead to death or the most serious injuries.
WARNING	Refers to a potentially hazardous situation. Failure to follow this instruction may lead to death or severe injuries.
CAUTION	Refers to a potentially hazardous situation. Failure to follow this instruction may lead to minor injury or damage to property.
PLEASE NOTE	Refers to a danger which, if ignored, may lead to risk to the machine and its function.

Tab. 1: Explanation of Signal Words

1.3 Explanation of Warning Signs

Warning signs represent the type and source of a danger:

Warning sign	Type of danger
	General danger
	Danger from electrical voltage

Tab. 2: Explanation of Warning Signs

1.4 Identification of Warnings

Warnings are intended to help you recognise risks and avoid negative consequences.

This is how warnings are identified:

Warning sign	SIGNAL WORD
Description of danger. Consequences if ignored. ⇒ The arrow signals a safety precaution to be taken to eliminate the danger.	

1.5 Identification of Action Instructions

This is how pre-conditions for action are identified:

- ✓ Pre-condition for action which must be met before taking action.
- ✘ A resource such as a tool or auxiliary materials required to perform the operating instructions.

This is how instructions for action are identified:

- ➔ Separate step with no follow-up action.
- 1. First step in a series of steps.
- 2. Second step in a series of steps.
 - ▶ Result of the above action.
- ✓ **Action completed, aim achieved.**

2 Safety

2.1 General Warnings

The following warnings are intended to help you eliminate the dangers that can arise while handling the device. Risk prevention measures always apply regardless of any specific action.

Safety instructions warning against risks arising from specific activities or situations can be found in the respective sub-chapters.

	DANGER
Mortal danger from electric shock! Wrongly connected or located cables or damaged ones can cause injuries. ⇒ Replace damaged cables without delay. ⇒ Do not use extension cables. ⇒ Do not bury cables. ⇒ Fix all cables to prevent them from being damaged.	

	WARNING
Increased risk of accidents due to insufficient qualification of personnel! The device may only be installed, operated and maintained by personnel with sufficient qualifications. Insufficient qualification will increase the risk of accidents. ⇒ Ensure that all action is taken only by personnel with sufficient and corresponding qualifications. ⇒ Prevent access to the system for unauthorised persons.	

	PLEASE NOTE
Do not dispose of the device in the domestic waste! Do not dispose of electric devices via the domestic waste. ⇒ The device and its packaging must be disposed of in accordance with locally-valid laws and regulations. ⇒ Dispose of different materials separately and ensure that they are recycled. ⇒ Pay special attention to critical components. The device has a liquid crystal display (LCD) that contains small amounts of toxic substances.	

2.2 Hazards Due to Non-Compliance with the Safety Instructions

Failure to follow the safety instructions may endanger not only persons, but also the environment and the device.

The specific consequences can be:

- Failure of major unit and system functions.
- Failure of required maintenance and repair methods
- Risk to persons when working on the device
- Danger to the environment from overdosing

2.3 Working in a Safety-Conscious Manner

Besides the safety instructions specified in these operating instructions, further safety rules may apply. Always comply with all safety-relevant regulations and guidelines which apply at the usage location of the product. Note in particular the following items:

- Safety regulations on handling electricity and live components
- Safety regulations on handling hazardous substances
- Accident prevention regulations
- Safety and operating provisions
- Environmental protection provisions
- other applicable directives and laws

2.4 Personnel Qualification

Any personnel who work on the device must have appropriate special knowledge and skills.

Anybody who works on the device should meet the conditions below:

- Attendance at all the training courses offered by the owner
- Personal suitability for the respective activity
- Sufficient qualification for the respective activity
- Training in how to handle the device
- Knowledge of safety equipment and the way this equipment functions
- Knowledge of these operating instructions, particularly of safety instructions and sections relevant for the activity
- Knowledge of fundamental regulations regarding health and safety and accident prevention

All persons must have one of the following minimum qualifications:

- Training as specialists to carry out work on the device unsupervised
- Sufficient training that they can work on the device under the supervision and guidance of a trained specialist

2.4.1 Specialist Staff

Thanks to their professional training, knowledge, experience and knowledge of the relevant specifications, specialist staff are able to perform the job allocated to them and recognise and/or eliminate any possible dangers by themselves.

2.4.2 Trained Electricians

Due to their professional training, knowledge and experience as well as knowledge of specific standards and provisions, trained electricians are able to do the electrical work assigned to them and to recognise and avoid any potential dangers by themselves.

They are specially trained for their specific working environment and are familiar with relevant standards and provisions.

They must comply with the legally binding regulations on accident prevention.

2.4.3 Trained Persons

Trained persons have received training from the operator about the tasks they are to perform and about the dangers stemming from improper behaviour.

Trained persons have attended all trainings offered by the operator.

2.4.4 Personnel Tasks

In the table below, you can check what personnel qualifications are required for the respective tasks. Only people with appropriate qualifications are allowed to perform these tasks!

Qualification	Activities
Specialist staff	■ Transportation ■ Mechanical installation ■ Commissioning ■ Taking out of operation ■ Fault rectification ■ Maintenance ■ Repairs ■ Disposal
Trained electricians	■ Electrical installation
Trained persons	■ Control

Tab. 3: Personnel Qualification

2.5 Electrical Safety

All of the control unit's connections are isolated from the grounding system (non-insulated grounding conductor). Do not connect any of these connections to the grounding connector.

To guarantee maximum conditions of safety for the operator, it is recommended to follow all of the instructions listed in this guide:

- Only power the device using a mains power supply that complies with the device's specifications (85 – 265 V AC 50/60Hz or 24 – 48V DC (24 V AC $\pm$ 20%)).
- Replace any damaged parts immediately. Any cables, connectors, accessories or other parts of the device that are damaged or not functioning properly must be replaced immediately. In such cases, contact your nearest authorised technical assistance centre.
- Only use certified accessories and accessories recommended by the supplier. The use of accessories and materials from other manufacturers or not specifically recommended by the supplier will not guarantee the safety and correct operation of the equipment.

2.5.1 Safety in the Operating Environment

The device must be protected against drips, sprays and/or immersion and should not be used in environments where such risks are present. Any devices into which liquids may have accidentally penetrated must be immediately shut off, cleaned and inspected by authorised and qualified personnel.

The transparent panel should be closed once the device has been programmed.

Protection:

- IP65 Complete
- EMI/RFI CEI EN55011 – 05/99 Class A

The device must be used within the specified environmental temperature, humidity and pressure limits. The device is designed to operate under the following environmental conditions:

- Temperature of the operating environment -10 to +50 °C
- Storage and transport temperature -25 °C to +65 °C
- Relative humidity 0 – 100 % condensing

The device must be properly integrated into the system. The system must be operated in full compliance with the foreseen safety regulations.

The parameters set on the analyser's control unit must comply with the applicable regulations.

The control unit's malfunction signals must be located in an area that is constantly supervised by the system's maintenance personnel or operators.

Failure to respect even just one of these conditions could cause the control unit's logic to operate in a potentially dangerous manner for users.

In order to avoid any potentially dangerous situations, the system's service and/or maintenance personnel are advised to work with the utmost care and to signal any alterations in the safety parameters in a timely manner.

As the above issues cannot be monitored by the product in question, the manufacturer shall bear no responsibility for any property damage or personal injury that may result from such malfunctions.

3 Intended Use

3.1 Notes on Product Warranty

Any non-designated use of the device can impair its function and the protection provided. This leads to invalidation of any warranty claims!

Please note that liability is on the side of the user in the following cases:

- The device is operated in a manner that is not consistent with these operating instructions, particularly safety instructions, handling instructions and the section 3 "Intended Use" on page 7.
- Information on usage and environment (5 "Technical Data" on page 10) is not adhered to.
- If people operate the device who are not adequately qualified to carry out their respective activities.
- Unauthorised changes are made to the device.

- Elimination of alarm or error messages by insufficiently-qualified personnel
- Bridging the external fuse
- Difficult operation due to insufficient lighting or poor access to the device
- Operation not possible due to dirty or illegible display

3.3.4 Incorrect Maintenance

- Carrying out maintenance during ongoing operation
- No adequate or regular inspection of correct functioning
- No replacement of damaged parts or cables
- No securing against reactivation during maintenance work
- Using the wrong spare parts

3.2 Intended Purpose

As a single-channel controller, the TOPAX L monitors water parameters during water preparation and wastewater treatment and controls a connected dosing system for water treatment in real time. In this way, it ensures constant water values in various applications – taking into account the given standards and directives. Different models of the TOPAX L are available, which differ purely in the measuring and controller inputs. All models measure the temperature.

3.3 Foreseeable Misuse

The following section provides information regarding the device applications which are classified as non-intended use. This section is intended to allow you to detect possible misuse in advance and to avoid it.

Foreseeable misuse is assigned to the individual stages of the product lifetime:

3.3.1 Incorrect Assembly

- Connecting the mains voltage without a protective earth
- Non-fused or non-standard mains voltage
- Not possible to immediately or easily disconnect the power supply
- Wrong connecting cables for mains voltage
- Sensors and actors connected to the incorrect terminals or incorrectly configured
- Protective earth removed

3.3.2 Incorrect Commissioning

- Commissioning with damaged or outdated sensors
- Commissioning without establishing all protective measures, fastenings and so on

3.3.3 Incorrect Operation

- Protective equipment not functioning correctly or dismantled
- Unauthorised modification of the controller
- Ignoring of alarm or error messages

4 Product Description

4.1 Scope of Delivery

Please compare the delivery note with the scope of delivery. The following items are part of the scope of delivery:

- Single-channel controller TOPAX® L
- Quick guide
- Mounting set

4.2 Functions of the Device

The device measures the water parameters using sensors. Controlling actuators such as dosing pumps controls the water parameters to the required setpoint.

4.3 Main Features

The device has the following main features:

- Input for one measurement:

Model	Measurement	Article no.
TOPAX® L CH/CD	Chlorine, chlorine dioxide	40700003
TOPAX® L PH/RD	pH / ORP (Redox)	40700001
TOPAX® L LF	Conductivity	40700002
TOPAX® L MA	Optical measuring cells: turbidity, dissolved oxygen	40700004
	Diaphragm-covered measuring cells: bromine, hydrogen peroxide, chlorite, peracetic acid, total chlorine, chlorine, chlorine dioxide	

- Temperature measurement with Pt100 / Pt1000 probe
- Automatic temperature compensation
- Control panel with 5 buttons
- Graphic display (128x128 pixels) with three-colour backlight (white, green and red)
- Communication port RS485 MODBUS RTU/ASCII
- 2 analogue outputs
- 2 digital outputs (SSR)
- 4 relay outputs for switching loads and transmitting alarms
- 1 reed input for alarm function (sample water missing)

4.4 Control Panel

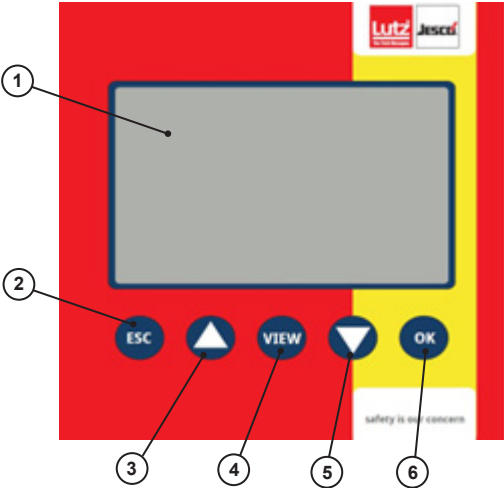


Fig. 1: Control Panel

Item	Description
1	LCD display
2	Cancel action or exit menu
3	Move up or increase the value (▲)
4	Select view
5	Move down or decrease the value (▼)
6	Confirm action or open the menu

Fig. 2: Legend for the Control Panel

4.5 Standard View

The standard view of the device is split into two sections:

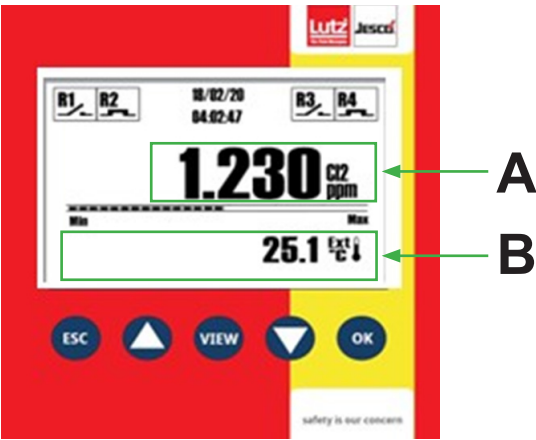


Fig. 3: Standard View

- A: The measured value along with the configured parameters such as the measurement type, unit, etc.
- B: Temperature value from an external sensor (ext) or a manually set value (man), as well as alarms and operational information (such as a service notification).

4.6 Rating Plate

The product is labelled with information about the product's safety or function. This information must stay legible for the duration of the service life of the product.

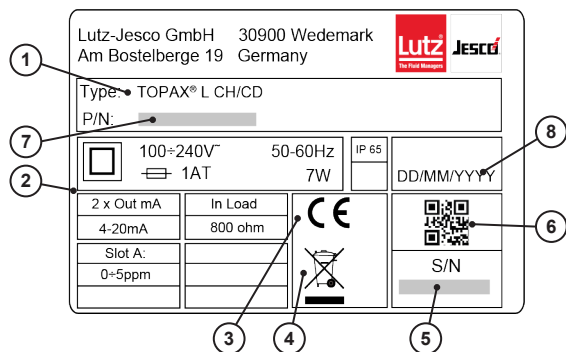


Fig. 4: Rating Plate

Item	Description
1	Product name
2	Technical specifications
3	Label showing conformity with applicable European directives
4	WEEE label
5	Serial number
6	QR code for the serial number
7	Part number
8	Production date

Tab. 4: Legend for the Rating Plate

5 Technical Data

5.1 Measurement Specifications

pH/Redox Specifications	
pH range	0.00 to 14.00 pH
mV range	-2,000 to 2,000 mV
pH resolution	0.01 pH
pH accuracy	± 0.01 pH
mV resolution	1 mV
mV accuracy	± 1 mV
Input impedance	> 10 ¹²

Tab. 5: pH/Redox Specifications

Conductivity/Resistance Specifications	
Range with C 0.01 cm-1 / K 100 sensor	0.005 µS/cm to 200 µS/cm (5 KΩ x cm to 200 MΩ x cm)
Range with C 0.10 cm-1 / K 10 sensor	0.05 µS/cm to 2 mS/cm (500 Ω x cm to 20 MΩ x cm)
Range with C 0.20 cm-1 / K 5 sensor	0.1 µS/cm to 4 mS/cm (250 Ω x cm to 10 MΩ x cm)
Range with C 1.00 cm-1 / K 1 sensor	0.5 µS/cm to 20 mS/cm (50 Ω x cm to 2 MΩ x cm)
Range with C 10.0 cm-1 / K 0.1 sensor	5 µS/cm to 200 mS/cm (5 Ω x cm to 200 KΩ x cm)
Range with C 20.0 cm-1 / K 0.5 sensor	10 µS/cm to 400 mS/cm (2.5 Ω x cm to 100 KΩ x cm)
Cond./resist. resolution	0.0001 / 0.001 / 0.01 / 0.1 / 1 (adjustable in the menu)
Cond./resist. accuracy	± 2 % on the measuring point
Maximal length of the sensor cable	Up to 50 m
TDS range	0.3 to 2.0 ppm/µS

Tab. 6: Conductivity/Resistance Specifications

mA Input Specifications	
Sensor type	Sensor with two or three wires
Sensor power supply 4/20 mA 2 wires	(*) 18 V DC ± 5 %, max 30 mA
Short-circuit protection	Active
Measuring range	0 to 20 mA or 4 to 20 mA
Fault state	OFF, 3.6 mA, 22 mA

mA Input Specifications	
Resolution	1 µA
Accuracy	± 0.2 %

Tab. 7: mA Input Specifications

* To prevent damage to the device, DO NOT exceed the maximum permissible current.

Pt100/Pt1000 Specifications	
Temperature input	Pt100/Pt1000
Pt100/Pt1000 detection	Automatic
Fault state	Automatic detection of disconnected/damaged probe
Supply current	1 mA
Range for temperature measurement	-50.0 to 150.0 °C
Maximum length of the sensor cable	10 to 20 m depending on sensor cable
Temperature resolution	0.1 °C (°F)
Temperature accuracy	Pt100: ± 0.5 °C Pt1000: ± 0.2 °C

Tab. 8: Pt100/Pt1000 Specifications

5.2 Mechanical Specifications

Housing dimensions (W x H x D)	144 x 144 x 122.5 mm
Front frame (W x H)	144 x 144 mm
Weight	1.05 kg
Material	ABS/polycarbonate
Protection	IP65
Relative humidity	0 – 100 % condensing

Tab. 9: Mechanical Specifications

5.3 Environmental Conditions

Storage temperature	-25 to 65 °C
Ambient temperature	-10 to 50 °C
Emissions	Specifications according to EN55011 Class A

Tab. 10: Environmental Conditions

5.4 Electrical Specifications

Power Supply (100 – 240 V AC Version)	
Electrical requirements	100 to 240 V AC $\pm 10\%$, 8 W
Frequency	50 to 60 Hz
Power supply fuse	Fuse glass body 5 x 20 mm, T1.25AL250V
Short-circuit protection	Active
Power Supply (24 – 48 V DC Version)	
Electrical requirements	24 to 48 V DC, or 24 V AC $\pm 20\%$, 8 W
Power supply fuse	Fuse glass body 5 x 20 mm, T1.25AL250V
Short-circuit protection	Active
Reverse polarity protection	Active
Relay Outputs	
RL1, RL2, RL3 and RL4	2-SPST mechanical 250 V AC/ 5 A, 30 V DC/3 A
Relay RL1, RL2 configuration	Load activation
Relay RL3, RL4 configuration	Load activation, probe cleaning (RL3 only), alarm repetition
Cycle time	1 – 3600 s
Delay time	1 – 3600 s
Test mode	ON, OFF
SSR Outputs (Solid State Relay)	
SSR1 and SSR2	2-SPST 60 V, max 100 mA, bidirectional, NPN, PNP
Resistance when switched ON	max. 5 Ω
Leakage current when switched OFF	max. 1 μ A
Configuration SSR1 and SSR2	Pulse output
Frequency range	0 to 400 imp/min.
Pulse duration	100 ms
Test mode	0 to 400 imp/min.
Outputs 4 – 20 mA	
Analogue output signals	2 outputs 4 – 20 mA, galvanically isolated from each other and from the power supply
Measurement error	± 0.01 mA
Load	max. 800 $^{\circ}\Omega$

Fault state	NAMUR: OFF, 3.6 mA, 22 mA
Test mode	3 to 23 mA
Digital Inputs	
REED digital input	Input for potential-free contact, 5 V DC, max. 6 mA
Communication Ports	
Digital communication port RS485	Modbus Server ASCII/RTU standard protocol
Output 24 V DC	
Volt	24 V DC $\pm 5\%$, max. 250 mA ¹
Short-circuit protection	Self-resettable fuse

Tab. 11: Electrical Specifications

¹ To prevent damage to the device, DO NOT exceed the maximum permissible current.

User Interface	
Connection terminals	Removable screw terminals AWG 14 < 2.5 mm ²
Machine cycle time	approx. 1 s
Control panel	5 tactile feedback keys
Display	Graphic LCD with 128x128 pixels, FSTN, transreflective
Refresh display	500 ms
Backlight	White, green and red with energy-saving function

Tab. 12: User Interface

6 Dimensions

All dimensions in mm

6.1 Outer Dimensions

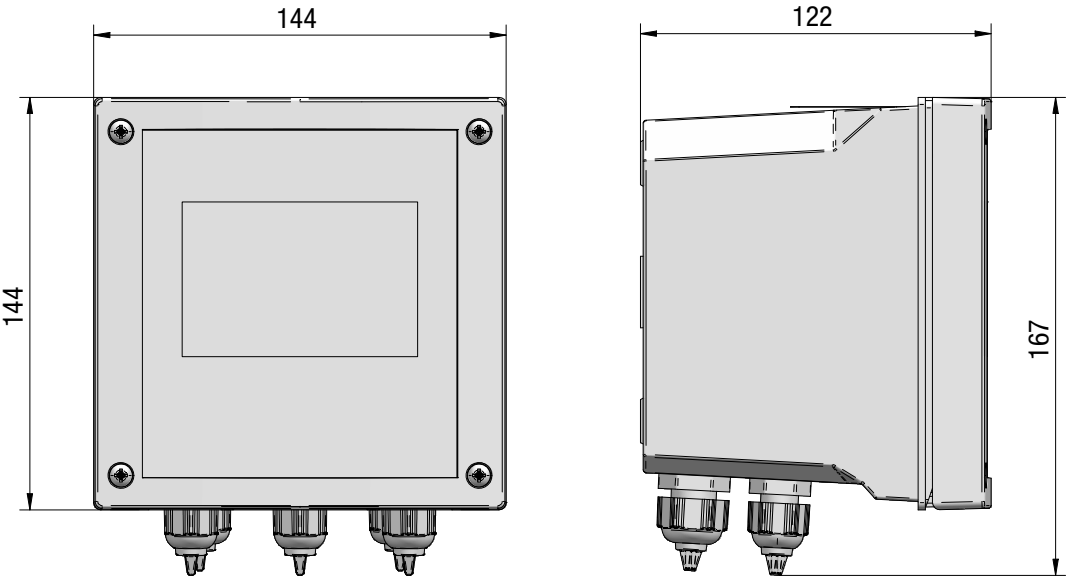


Fig. 5: Outer Dimensions

6.2 Drillhole Dimensions

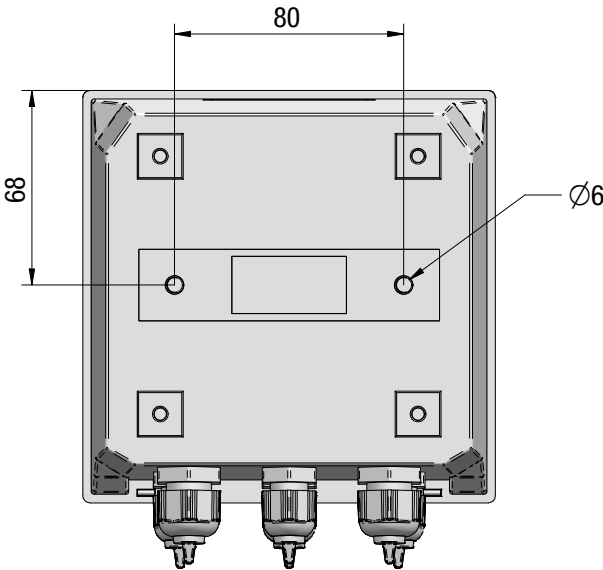


Fig. 6: Drillhole Dimensions

7 Installation

7.1 Principles

Make sure that the installation location complies with the following requirements:

- The display is easily accessible and is visible.
- Leave enough space for installing cables underneath the device.
- You must be able to install the cables without kinking or damaging them.
- Various lines (e.g. voltage supply, data cable and sensitive lines for measuring purposes) must be installed separately. The different lines should only cross at an angle of 90° to prevent interference.
- Electrical, magnetic and electromagnetic fields affect signal transmission and can destroy electronic components.
- Compliance with the permissible ambient temperatures (see section 5 "Technical Data" on page 10).

7.2 Mounting the Device on the Wall

Pre-conditions for actions:

- ✓ **The wall must be level.**

Resources required:

- ✂ Assembly kit
- ✂ Drill
- ✂ Screwdriver

Perform the following work steps:

1. Drill the two holes for mounting the device on the wall (see Fig. 6 "Drillhole Dimensions" on page 12).
2. Remove the four screws on the front side of the device.
 - ▶ You can now open the front panel.
3. Open the device and use the screws provided to secure the device to the wall.
4. Attach the screw caps provided.
5. Close the device and tighten the four screws on the front side of the device.



The cable glands for the electrical connections are located on the lower part of the control unit. To facilitate the connections, any other devices must be positioned at least 15 cm apart.

- ✓ **Device mounted on the wall.**

7.3 Connecting the Power Supply

If possible, keep any live signal and control cables at a distance and lay them separately (these could cause inductive disturbances, especially for the analogical part of the system).

Absolutely avoid connecting the device to a power supply that has been modified (for example, using transformers) and where the same power supply is also used to power other systems (e.g. of inductive type). This could lead to high voltage spikes, which are difficult to block and/or eliminate once emitted.



DANGER

Mortal danger from electric shock!

Improperly installed or damaged components in the electronics installation can cause injury.

- ⇒ The electrical line must be equipped with an appropriate circuit breaker, in compliance with the proper installation standards.
- ⇒ The power supply and the quality of the grounding connector must be checked to avoid electrical interference.

7.4 Installation Recommendations

7.4.1 RC Protection for Relays

When connecting to the relays, note that inductive loads must be suppressed. If this is not possible, the relay contact on the device terminal must be protected by an RC protective circuit / interference suppression element.

If devices with inductive loads from a nominal current of 1 A are connected to a relay, the contacts in the relay may become bonded. Thus, the device will operate in an uncontrolled manner. To prevent bonding if the load circuit suffers a short-circuit, the relays must be protected separately on the maximum relay switching current.

Pre-conditions for actions:

- ✓ You want to connect an inductive load to the relay.

Perform the following work steps:

1. Switch off the device.
2. Clamp the interference suppression element parallel to the inductive load.
3. If you cannot perform step 2, clamp the interference suppression element parallel to the relay output.

- ✓ **RC protection for relay connected.**



PLEASE NOTE

Danger
Failure to observe this note may lead to risk to the device and its function.
⇒ When a relay output is used to operate a third-party device with an inductive/capacitive load input (such as contactors, motors, etc.), overvoltage protection is highly recommended. Check the options of the third-party devices (see Fig. 8 "Relay Cable Segregation" on page 14).



Fig. 7: Overvoltage Protection

Keep the relay output cable separate from any other cable connected to the device (see **a** in Fig. 8). A 90° crossing between the cables is allowed (see **b** in Fig. 8).

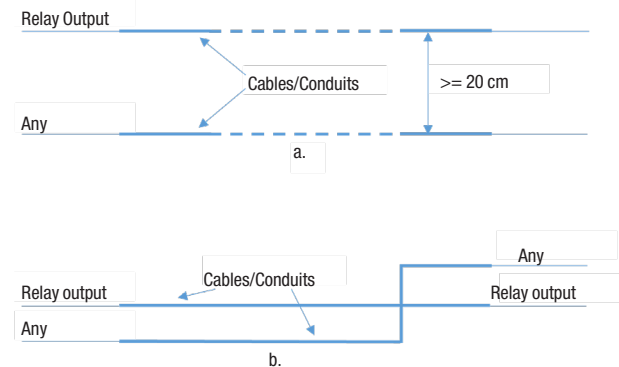


Fig. 8: Relay Cable Segregation

7.5 Terminal Block

L / +		N / -		RL 1	RL 1	RL 2	RL 2	RL 3	RL 3	RL 4	RL 4
COM		NO		COM	NO	COM	NO	COM	NO	COM	NO
1		2		3	4	5	6	7	8	9	10

11		12	13	14	15	16	17	18
NC		NC	RS485 B+	RS485 A-	RS485 GND	NC	NC	NC

19	20	21	22	23	24	25	26
OUT 24V DC	GND	RTD OUT+	RTD IN +	RTD IN -	RTD OUT -	REED	REED

27	28	29	30	31	32	33	34
SSR1 +	SSR1 **	SSR2 +	SSR2 **	OUT mA1 +	OUT mA1 -	OUT mA2 +	OUT mA2 -

SLOT A	A	B	C	D	E	F

Fig. 9: Terminal Block

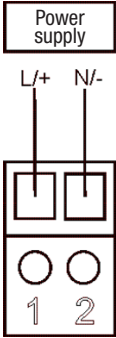
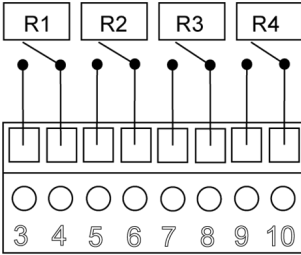
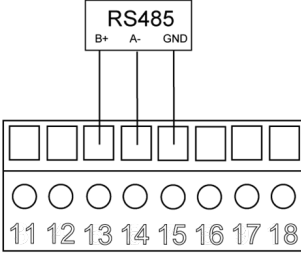
Terminal	Terminal Designation		Description
1	L / +		Power supply
2	N / -		
3	RL1	COM	Relay 1 contact
4		NO	
5	RL2	COM	Relay 2 contact
6		NO	
7	RL3	COM	Relay 3 contact
8		NO	
9	RL4	COM	Relay 4 contact
10		NO	
11 – 12	Not used		Not used
13	RS485	B+	Communication port RS485 MODBUS RTU/ASCII
14		A-	
15		RS485 GND ¹	
16 – 18	Not used		Not used
19	OUT 24 V DC	+	24 V DC power supply for 4 – 20 mA output sensors
20		GND	
21	RTD	OUT +	Pt100 or Pt1000 temperature sensor input
22		IN +	
23		IN -	
24		OUT -	
25	REED	+	REED sensor input
26		-	
27	SSR1	+	Frequency output 1
28		-	
29	SSR 2	+	Frequency output 2
30		-	
31	OUT mA1	+	4 – 20 mA current output 1
32		-	
33	OUT mA2	+	4 – 20 mA current output 2
34		-	

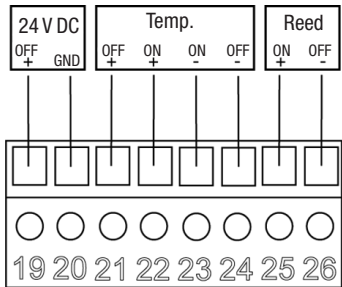
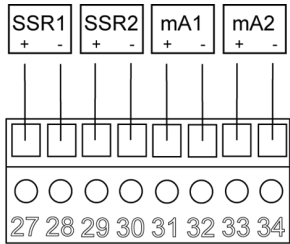
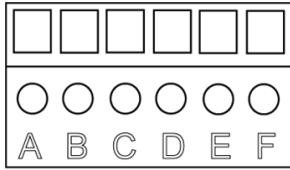
¹RS485 GND terminal is isolated from GND (terminal 20)

Terminal	Terminal Designation	Description
A	The connections depend on the existing modules. For specific connections, see the section for the corresponding measurements.	
B		
C		
D		
E		
F		

Tab. 13: Terminal Assignment

7.5.1 Terminal Connections

Description	Graphic
Power supply of the device: 100 – 240 V AC or 24 – 48 V DC (24 V AC) Note: Check the product label.	
Outputs: R1, R2, R3 and R4: Electromechanical relays (250 V AC or 30 V DC, 5 A resistive)	
Communication ports: RS485: Serial port for data transmission	

Description	Graphic
Inputs and outputs: 24 V OUT: Voltage supply Temperature: Pt100/Pt1000 sensor input Reed: Dry contact signal input	
Outputs: SSR1 and SSR2: Frequency outputs mA1 and mA2: 4 – 20 mA current sensors	
Slot A: The connections depend on the existing modules. For specific connections, see the section for the corresponding measurements.	

Tab. 14: Terminal Connections

7.5.2 Connecting Probes and Sensors

- ✓ Switch off the device.
 - ✓ Do not lay the cable near high-power or inverter cables to avoid interference with the measurement.
- ➔ Connect the cable of the sensor to the terminal strip of the device.

7.5.2.1 Connecting a pH/Redox Probe (TOPAX L PH/RD)

- ✓ Observe the polarity.
 - ✓ Observe the maximum cable length (10 m) for the pH/Redox sensor.
- ➔ Connect the probes to the terminals.

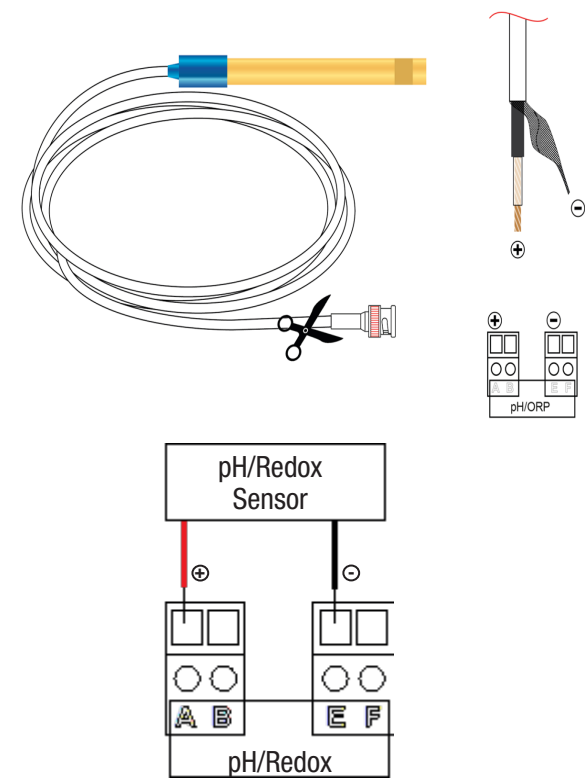


Fig. 10: Connecting a pH/Redox Probe

Terminal	Description
A	Input of the pH/Redox probe (+)
B	Not used
C	None
D	None
E	Input of the pH/Redox probe (-)
F	Not used

Tab. 15: Connecting a pH/Redox Probe

7.5.2.2 Connecting a Conductivity Probe (TOPAX L LF)

- ✓ Observe the polarity.
 - ✓ Observe the maximum cable length (50 m) for the conductivity sensor.
- ➔ Connect the probes to the terminals.

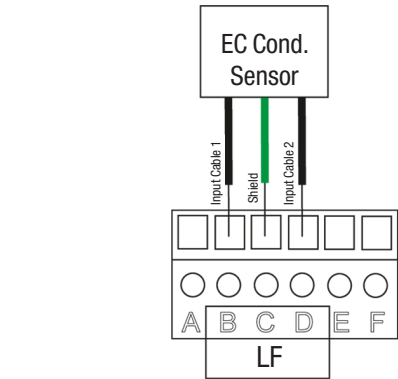


Fig. 11: Connecting a Conductivity Probe

Terminal	Description
A	Not used
B	Conductivity probe input
C	Conductivity cable shield
D	Conductivity probe input
E	Not used
F	Not used

Tab. 16: Connecting a Conductivity Probe

7.5.2.3 Connecting a 0/4 – 20 mA Sensor (TOPAX L MA)

- ✓ Observe the polarity.
- ➔ Connect the probes to the terminals.

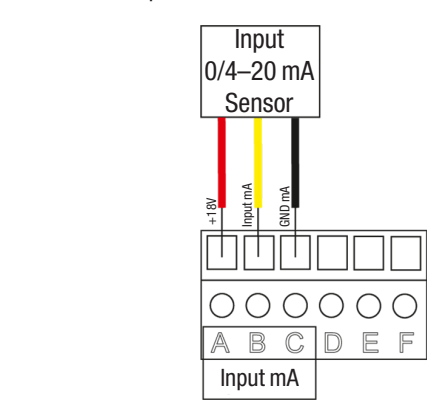


Fig. 12: Connecting a 0/4 – 20 mA Sensor

Terminal	Description
A	+18 V power supply output for the sensor
B	Current input from sensor (0/20 mA or 4/20 mA)
C	GND mA used to connect the three-wire sensors
D	Not used
E	Not used
F	Not used

Tab. 17: Connecting a 0/4 – 20 mA Sensor

7.5.2.4 Connecting an Amperometric Copper-Platinum Chlorine Sensor (TOPAX L CH/CD)

- ✓ Observe the polarity.

→ Connect the probes to the terminals.

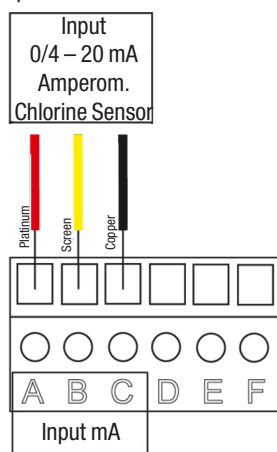


Fig. 13: Connecting an Amperometric Copper-Platinum Chlorine Sensor

Terminal	Description
A	Working electrode or measuring electrode (platinum)
B	Conductivity cable shield
C	Reference electrode (copper)
D	Not used
E	Not used
F	Not used

Tab. 18: Connecting an Amperometric Copper-Platinum Chlorine Sensor

7.5.3 Connection Examples

7.5.3.1 Power Supply

- ✓ 24 – 48 V DC or 100 – 240 V AC; see product label
- ✓ Observe the polarity.
- ✓ Observe maximum power consumption (see 5.4 "Electrical Specifications" on page 11).

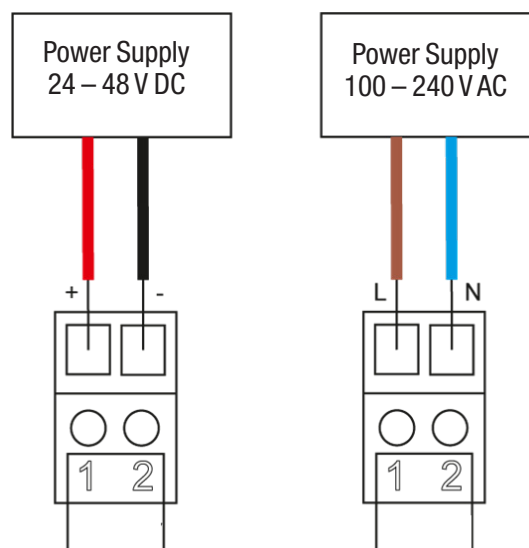


Fig. 14: Connection Example for the Power Supply

7.5.3.2 Frequency Outputs SSR1 and SSR2

✓ Contact closed 5 Ω.

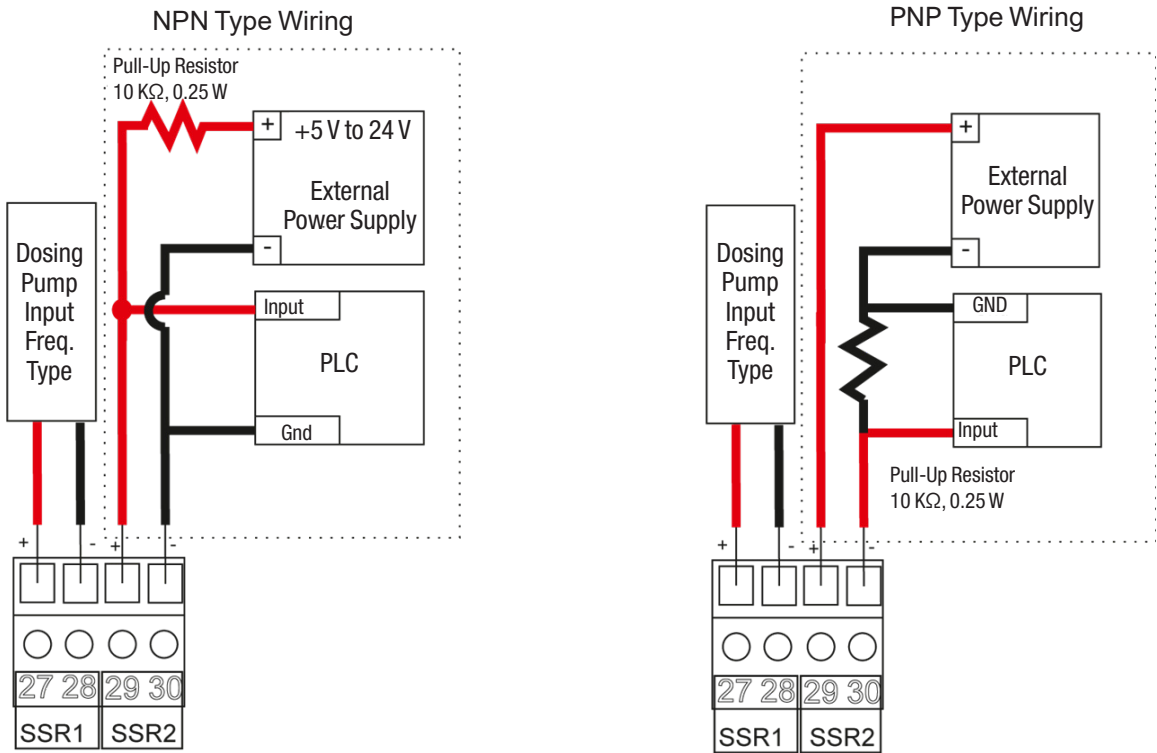


Fig. 15: Connection Example for Frequency Outputs SSR1 and SSR2

7.5.3.3 Relay Outputs 1, 2, 3 and 4

✓ Maximum load 5 A resistive.

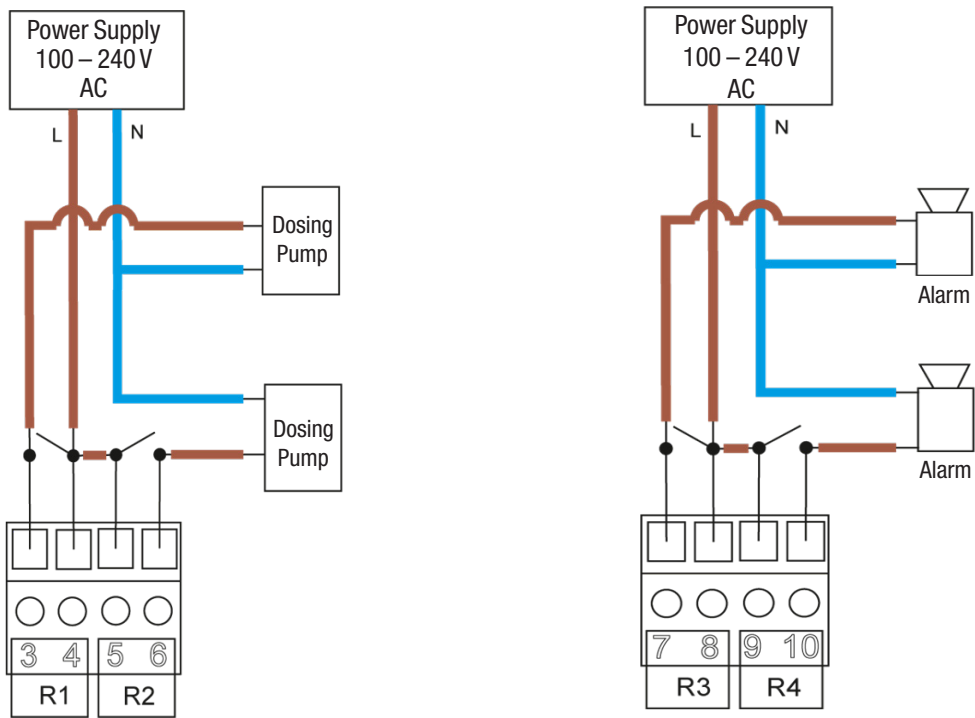


Fig. 16: Connection Example for Relay Outputs 1, 2, 3 and 4

7.5.3.4 Current Outputs mA 1 and 2

- ✓ 4 – 20 mA with a maximum load of 800 K Ω .
- ✓ Observe the polarity of the cables.

7.5.3.5 RS485 Communication Port

- ✓ Communication protocol ModBus RTU/ASCII.
- ✓ Add 120 Ω termination resistor between A and B.
- ✓ Observe the polarity of the cables.

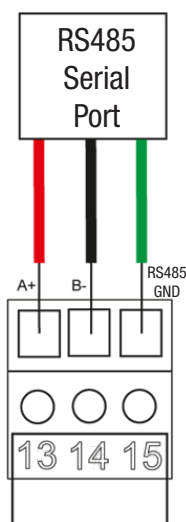


Fig. 17: Connection Example for RS485 Communication

7.5.3.6 Reed Sensor Input

- ✓ Input for dry contact or semiconductor (open collector) 5 V DC, max. 6 mA.
- ✓ Observe the maximum cable length (20 m) for the reed sensor.

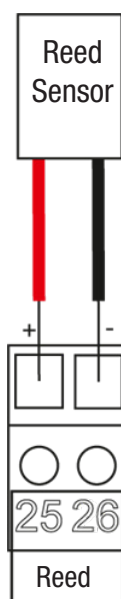


Fig. 18: Connection Example for Reed Sensor

7.5.3.7 Input for Temperature Measurement

- ✓ Connect the probes to the terminals.
- ✓ Observe the polarity.
- ✓ Observe the maximum cable length (20 m) for the Pt100/Pt1000 sensor.
- ✓ Note the wiring of the sensor (2, 3 or 4 wires).
- ✓ Select 2/4 or 3 wires in sub-menu 2C1.

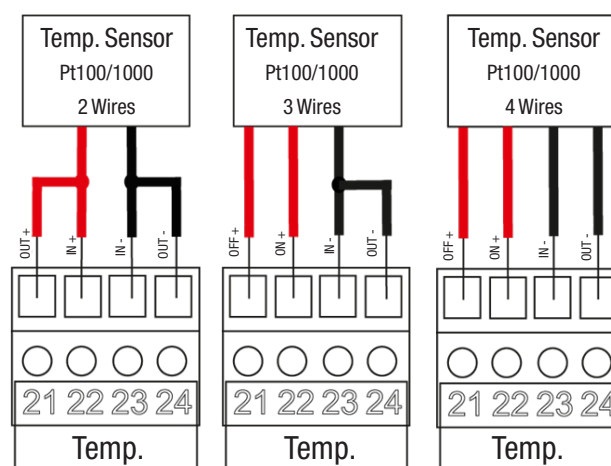


Fig. 19: Connection Example for Temperature Measurement Input

8 Start-Up

The device performs a hardware test of the internal memory and displays the message "Read Data Memory".

The device activates all measuring functions within 5 seconds.

8.1 Displaying Measured Values and Outputs

In view mode, you can toggle between the following views by pressing the **VIEW** button:



Standard



Complete



Two Big Measurements



One Big Measurement



Analogue

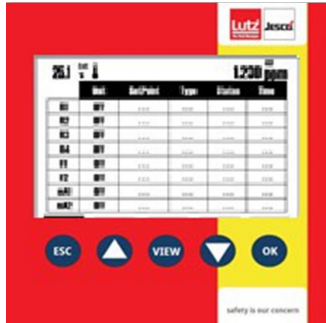


Table of Inputs and Outputs

Fig. 20: View Types

8.2 Displaying the Menu

In view mode, you can display the menu as follows:

- Press the **ESC** button.
 - The device displays a message asking whether you want to deactivate the outputs.
 - Press the **ESC** button again.
- ✓ **The menu is displayed.**



When an alarm is displayed, briefly press the **OK** button to navigate to sub-menu 4B **Alarm**.

9 Calibration

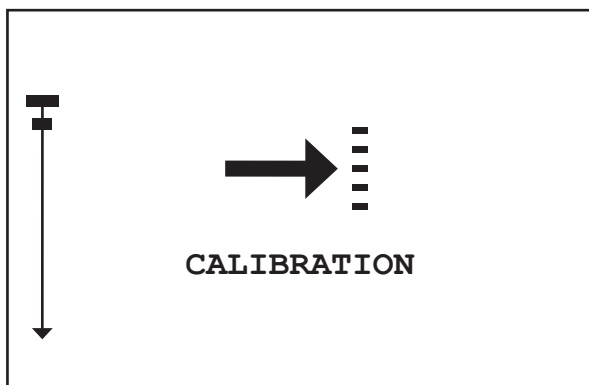


Fig. 21: Menu 1 Calibration



In view mode, press and hold the **OK** button for 3 seconds to go directly to the calibration menu.

9.1 Calibrating a pH and Redox Measurement (1A)

Menu 1 **Calibration** enables the calibration of pH and Redox measurements:

Choose **Measure A** to access the following sub-menus:

Sub-Menu		Description
1A1	Automatic	The device requires the standard buffer solutions 7 pH, 4 pH or 9.22 pH.
1A2	Manual	The device proposes the buffer solutions from the default values, but the value can be changed.
1A3	Reference	The calibration of the pH or Redox measurement can be set manually with an external reference value. The device corrects the value by adding an offset value to the real measurement.
1A4	Report	Displays a summary of the last calibration.
1A5	Cal. Reset	The calibrations can be deleted and the default values restored.

Tab. 19: Measure A Sub-Menus for Calibrating a pH/Redox Measurement

9.1.1 Calibrating a pH Measurement

To calibrate a pH measurement, proceed as follows:

- Choose the sub-menu for manual pH calibration (1A2).
- Insert the probe into the 7.00 pH buffer solution and set the value of the buffer solution using the **▲** and **▼** buttons.
- After setting the value, press **OK**.
- Hold the probe firmly in the buffer solution.
 - The device displays the quality percentage for the selected buffer solution.
- Wash the pH probe with clear water and let it drip off.

- Insert the probe into the 4.00 pH buffer solution or select the value used.
- After setting the value, press **OK**.
- Hold the probe firmly in the buffer solution.
- The device displays the percentage of quality of the buffer solution used for calibration.



100%: excellent probe quality
75%: good probe quality
50%: sufficient probe quality
25%: poor probe quality; replacement is recommended

- Enter the calibration date and confirm with **OK**.

✓ **pH measurement calibrated.**



The device displays a calibration error for all invalid measurements of the buffer solution.
It is recommended to always use a new buffer solution and repeat the calibration procedure.
If the message is still displayed, replace the pH probe.
Hold the probe firmly in the buffer solution for the entire time period indicated by the device.

9.1.2 Calibrating a Redox Measurement

To calibrate a Redox measurement, proceed as follows:

- Choose the sub-menu for manual Redox calibration (1A2).
- Insert the probe into the 475 mV buffer solution and adjust the value of the buffer solution using the **▲** and **▼** buttons.
- After setting the value, press **OK**.
- Hold the probe firmly in the buffer solution for the entire time period indicated by the device.
 - The device displays the quality percentage for the 475 mV buffer solution.



100%: excellent probe quality
75%: good probe quality
50%: sufficient probe quality
25%: poor probe quality; replacement is recommended

- Enter the calibration date and confirm with **OK**.

✓ **Redox measurement calibrated.**



The device displays a calibration error for all invalid measurements of the buffer solution.
It is recommended to always use a new buffer solution and repeat the calibration procedure.
If the message is still displayed, replace the Redox probe.

9.2 Calibrating a Conductivity Measurement (1A)

Menu 1 **Calibration** enables the calibration of conductivity measurements:

Select **Measure A** to access the following sub-menus:

Sub-Menu	Description
1A1	1 point
1A2	Reference
1A3	Report
1A4	Cal. Reset

Tab. 20: Measure A Sub-Menus for Calibrating a Conductivity Measurement



All calibrations must be made with absolute conductivity values, i.e. without temperature compensation.

9.2.1 Calibrating a Conductivity Measurement

To calibrate a conductivity measurement, proceed as follows:

- Choose the sub-menu for 1-point calibration (1A1).
- Check whether the sensor has been connected properly and is measuring.
- Press **OK** to calibrate.
- Set the calibration value using the **▲** and **▼** buttons.
- Confirm by pressing **OK**.
 - The device displays the following:
 - Point 1: calibration value used
 - Gain: gain value calculated
 - Offset: offset value calculated
- Select "Save" and press **OK**.
- Select "Yes" and press **OK**.
 - The device saves the calibration parameters and returns to the calibration menu.

✓ **Conductivity measurement calibrated.**

9.2.2 Calibration Report

In sub-menu 1A3, you can view all parameters for the last calibration:

Sub-Menu 1A3	
Parameter	Description
Cal. Type	Displays the calibration type: - None 1 point 2 points

Sub-Menu 1A3	
Parameter	Description
Point 1	Shows the value entered for point 1
Gain	Displays the angle coefficient calculated
Offset	Displays the offset value calculated
Adjust	Displays the offset value that was saved using the "Reference" calibration type. If the calibration is performed for 1 point or 2 points, the "Adjust" value is automatically set to zero.
Last calibration	Displays the date of the last calibration

Tab. 21: Explanation of Parameters in Calibration Report

9.2.3 Calibration Errors (Conductivity Measurement)

Calibration Error	Possible Cause
Probe shorted.	- Damaged wiring - Foreign body in contact with the electrodes
Probe is in the air.	- Damaged wiring - Liquid missing
The values set must be greater than zero.	The values set using the ▲ and ▼ buttons must be positive and greater than zero.
The values set must not match.	The values set using the ▲ and ▼ buttons must not match only in the case of 2-point calibration.
The two calibration points must differ by at least 10%.	The second calibration point must be at least 10 % larger than the first calibration point.

Tab. 22: Calibration Errors (Conductivity Measurement)

9.3 Calibrating an mA Input (1A)

Menu 1 **Calibration** enables the calibration of an mA input.

Select **Measure A** to access the following sub-menus:

Sub-Menu	Description
1A1	1 point
1A2	2 points
1A3	Reference
1A4	Report
1A5	Cal. Reset

Tab. 23: Measure A Sub-Menus for Calibrating an mA Input

9.3.1 Calibrating an mA Input

9.3.1.1 1-Point Calibration

For 1-point calibration, proceed as follows:

1. Choose the sub-menu for 1-point calibration (1A1).
2. Check whether the sensor has been connected properly and is measuring.
3. Press **OK** to calibrate.
4. Set the calibration value using the **▲** and **▼** buttons.
5. Confirm by pressing **OK**.
 - ▶ The device displays the following:
 - Point 1: calibration value used
 - Gain: gain value calculated
 - Offset: offset value calculated
6. Select "Save" and press **OK**.
7. Select "Yes" and press **OK**.
 - ▶ The device saves the calibration parameters and returns to the calibration menu.

✓ **1-point calibration completed.**

9.3.1.2 2-Point Calibration

For 2-point calibration, proceed as follows:

1. Select the sub-menu for 2-point calibration (1A2).
2. Check whether the sensor has been connected properly and is measuring.
3. Press **OK** to calibrate.
4. Set the calibration value using the **▲** and **▼** buttons.
5. Confirm by pressing **OK**.
6. Prepare the second calibration point of the sensor and insert the sensor into the second buffer solution.
7. Press **OK** to calibrate.
8. Set the calibration value using the **▲** and **▼** buttons.
9. Confirm by pressing **OK**.
 - ▶ The device displays the following:
 - Point 1: calibration value used for the first point
 - Point 2: calibration value used for the second point
 - Gain: gain value calculated
 - Offset: offset value calculated
10. Select "Save" and press **OK**.
11. Select "Yes" and press **OK**.
 - ▶ The device saves the calibration parameters and returns to the calibration menu.

✓ **2-point calibration completed.**

9.3.2 Entering a Calibration Reference

To enter a calibration reference, proceed as follows:

1. Choose the Reference sub-menu (1A3).
2. Check whether the sensor has been connected properly and is measuring.
3. Press **OK** to adjust the value.
4. Set the reference value using the **▲** and **▼** buttons.
5. Confirm by pressing **OK**.
6. Select "Save" and press **OK**.
7. Select "Yes" and press **OK**.
 - ▶ The device saves the reference value and returns to the calibration menu.

✓ **Reference value for the calibration entered.**

9.3.3 Calibration Report

In sub-menu 1A3, you can view all parameters for the last calibration in the calibration report:

Sub-Menu 1A3	
Parameter	Description
Cal. Type	Displays the calibration type: ■ None ■ 1 point ■ 2 points
Point 1	Shows the value entered for point 1
Point 2	Shows the value entered for point 2
Gain	Displays the angle coefficient calculated
Offset	Displays the offset value calculated
Adjust	Displays the offset value that was saved using the "Reference" calibration type. If the calibration is performed for 1 point or 2 points, the "Adjust" value is automatically set to zero.
Last calibration	Displays the date of the last calibration

Tab. 24: Explanation of Parameters in Calibration Report

9.3.4 Calibration Errors (mA input)

Calibration Error	Possible Cause
Power supply +18 V short circuited.	■ Damaged wiring ■ Sensor shorted
mA input less than 3.6 mA.	■ Damaged wiring ■ Sensor missing Note: This alarm is active only if: ■ The input current is less than 3.6 mA ■ The input current is set to a range of 4 – 20 mA ■ The underrange menu is set to 3.6 mA
mA input greater than 22 mA.	■ Damaged wiring ■ Sensor missing Note: This alarm is active only if: ■ The input current is less than 22 mA ■ The sub-menu is set to 22 mA
The values set must not match.	The values set using the ▲ and ▼ buttons must not match only in the case of 2-point calibration.
The two calibration points must differ by at least 10%.	The second calibration point must be at least 10 % larger than the first calibration point.
The values set must not be zero.	The values set using the ▲ and ▼ buttons must not be equal to zero only in the case of 1-point calibration.

Tab. 25: Calibration Errors (mA input)

9.4 Calibrating an Amperometric Measuring Cell (1A)

Menu 1 **Calibration** enables the calibration of an amperometric disinfection measuring cell, e.g. CS120.

Choose **Measure A** to access the following sub-menus:

Sub-Menu	Description
1A1	2 points
1A2	Reference
1A3	Report
1A4	Cal. Reset

Tab. 26: Measure A Sub-Menus for Calibrating an Amperometric Measuring Cell

9.4.1 Calibrating an Amperometric Measuring Cell

To calibrate an amperometric disinfection measuring cell, proceed as follows:

1. Choose the sub-menu for 2-point calibration (1A1).



In the case of an oxygen probe, enter the password (1310) to calibrate the first point at 0%.

2. Check whether the sensor has been connected properly and is measuring.
3. Press **OK** to calibrate.
4. Set the calibration value using the ▲ and ▼ buttons.
5. Confirm by pressing **OK**.
6. Prepare the second calibration point of the sensor and insert the sensor into the second buffer solution.
7. Press **OK** to calibrate.
8. Set the second calibration value using the ▲ and ▼ buttons. For the oxygen probe, the air saturation is 100%.
9. Confirm by pressing **OK**.
 - The device displays the following:
 - Point 1: calibration value used for the first point
 - Point 2: calibration value used for the second point.
 - Gain: calculated gain.
 - Offset: calculated offset value.
10. Select "Save" and press **OK**.
11. Select "Yes" and press **OK**.
 - The device saves the calibration parameters and returns to the calibration menu.

✓ **Amperometric disinfection measuring cell calibrated.**

9.4.2 Entering a Calibration Reference

To enter a calibration reference, proceed as follows:

1. Choose the Reference sub-menu (1A2).
2. Check whether the sensor has been connected properly and is measuring.
3. Press **OK** to adjust the value.
4. Set the reference value using the ▲ and ▼ buttons.
5. Confirm by pressing **OK**.
6. Select "Save" and press **OK**.
7. Select "Yes" and press **OK**.
 - The device saves the reference value and returns to the calibration menu.

✓ **Calibration reference value entered.**

9.4.3 Calibration Report

In sub-menu 1A3, you can view all parameters for the last calibration in the calibration report:

Sub-Menu 1A3	
Parameter	Description
Cal. Type	Displays the calibration type: ■ None ■ 1 point ■ 2 points
Point 1	Shows the value entered for point 1
Point 2	Shows the value entered for point 2
Gain	Displays the angle coefficient calculated
Offset	Displays the offset value calculated
Adjust	Displays the offset value that was saved using the "Reference" calibration type. If the calibration is performed for 1 point or 2 points, the "Adjust" value is automatically set to zero.
Slope	Indicates the calibrated slope of the electrode
Last calibration	Displays the date of the last calibration

Tab. 27: Explanation of Parameters in Calibration Report

9.4.4 Calibration Errors (Amperometric Measuring Cell)

Calibration Error	Possible Cause
The values set must not match.	The values set using the ▲ and ▼ buttons must not match only in the case of 2-point calibration.
The two calibration points must differ by at least 10%.	The second calibration point must be at least 10 % larger than the first calibration point.
The values set must not be zero.	The values set using the ▲ and ▼ buttons must not be equal to zero only in the case of 1-point calibration.

Tab. 28: Calibration Errors (Amperometric Disinfection Measuring Cell)

9.5 Calibrating the Temperature (1B)

Menu 1 **Calibration** also allows the temperature to be calibrated.

Choose **Temperature** to enter the sub-menu (1B). Here you can calibrate the temperature measurement manually using an external reference value. The device corrects the value by adding an offset value to the real measurement.



The device displays a calibration error if the probe is damaged or has been deactivated in the menu.

10 Setup

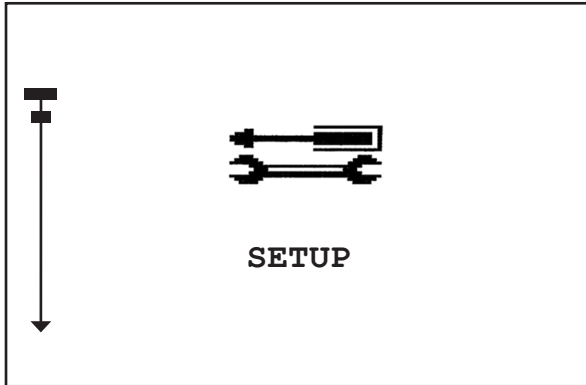


Fig. 22: Menu 2 Setup

Menu 2 **Setup** allows you to configure the following settings:

- General settings
- Measurement value
- Temperature measurement

10.1 General Settings (2A)

You can configure the following settings here:

- Language
- Password
- Date/time
- Display
- RS485 setting
- Default settings

10.1.1 Language (2A1)

Here you can set the dialogue language for the menus and messages of the device by using the ▲ and ▼ buttons. The device automatically changes the menu language and returns to the previous level.

10.1.2 Password (2A2)

Here you can configure password protection for the **Calibration** and **Setup** menus.

Sub-Menu 2A2	
Parameter	Description
Set password	Enter a numeric value. Note: If a password exists, it is displayed (e.g. "old password 1234"). To remove the existing password, enter four zeros (0000) and confirm with OK .
Calibration Menu	Select "Yes" or "No" to activate or deactivate password protection for the Calibration menu.
Setup Menu	Select "Yes" or "No" to activate or deactivate password protection for the Setup menu.

Tab. 29: Configuring Password Protection

10.1.3 Set Date (2A3)

You can set the date and time here using the ▲ and ▼ buttons. Press **OK** to confirm. The device saves the changes and returns to the previous level.

10.1.4 Display (2A4)

You can configure the following settings here:

Sub-Menu 2A4	
Parameter	Description
Contrast	Adjust the backlight
Mode	Switch the backlight on/off (ON/OFF/ECO)
ON	Brightness setting for ON mode
ECO	Brightness setting for ECO mode
Reverse	Inverts the display (white font on a black background)

Tab. 30: Display Settings

10.1.5 RS485 Setting (2A5)

You can configure the serial interface settings here:

Sub-Menu 2A5	
Parameter	Description
Mode	Standard protocol used (RTU/ASCII)
Address	Communication address (ID 1 – 247)
Baude rate	Communication speed (1,200-115,200 bps)
Parity bit	Parity bit for checking the transmission (none, odd, even)
Stop bit	Stop bits for setting the wait time (1, 2)

Tab. 31: RS485 Settings



Communication is always (RTU/ASCII) with 8 data bits.

The minimum transmission time is set to 200 ms.

The permitted commands are:

- Report Slave ID
- Write multiple registers (max. 4 registers per query)
- Read hold registers (max. 4 registers per query)

The system always responds to these commands.

If you are not in view mode or in the RS485 control panel, you receive an error code as a response and the command is not executed.

Each write operation with positive results in the registers writes a certain value to the respective register. To store the value written to the register in the device's memory, execute a write memory command that is executed with a Write Multiple Registers operation (amount of data to be written 1) at the address of the command register (4000) with parameter 2. Alternatively, if you exit programming, the system prompts you to save the changes that you made to the parameters because the system automatically detects that the stored parameters have been modified. If you switch off the device WITH-OUT saving the written registers, the system restarts with the values that were previously set in the memory.

Example:

Relay 1 set as "Measure ON/OFF". Setpoint to be set [Index 2A1]: 950.52 ppm

Conversion decimal -> hexadecimal:

95052 -> 0 x 1734 C

Number of decimal points for the setpoint: 2

The following values are to be written to the registers for the setpoint RL1:

Address 3100: 0 x 734 C (setpoint L)

Address 3101: 0 x 0001 (setpoint H)

Address 3102: 0 x 0002 (decimal setpoint)

Command: Write Multiple Registers

Ad- dress	Function	Start Address H	Start address L	Data Word H	Data Word L	Num- ber of Data Bytes	Data 3100 H	Data 3100 L	Data 3101 H	Data 3101 L	Data 3102 H	Data 3102 L	CRC H	CRC L
0x01	0x10	0x0C	0x1C	0x00	0x03	0x06	0x73	0x4C	0x00	0x01	0x00	0x02	0xD2	0xB6

Tab. 32: Command: Write Multiple Registers

To read the setpoint RL1, execute the following command:

Command: Read Input Register

Address	Function	Start Address H	Start Address L	Data Word H	Data Word L	CRC H	CRC L
0x01	0x04	0x0C	0x1C	0x00	0x03	0xC7	0x5D

Tab. 33: Command: Read Input Register

The setpoint read is formatted as follows:

Address 3100: 0 x 734 C (setpoint L)

Address 3101: 0 x 0001 (setpoint H)

Address 3102: 0 x 0002 (decimal setpoint)

The reconstructed data gives the following value: 950.52 ppm

To check the data configured, check the menu item Setpoint RL1 for index 2A1.

10.1.6 System Reset (2A6)

Here you can reset the device to the factory settings.

10.2 Setting the Measured Value (2B)

The settings for the measured value depend on the parameter to be measured.

10.2.1 pH/Redox Measurement

You can make the following settings for the pH/Redox measurement:

Sub-Menu 2B1	
Parameter	Description
Meas. Unit	Select the unit of the chemical measured value: pH or mV (Redox). Note: If you change the unit of measure, the parameters are reset to the default values.
Temp Comp	The measurement is temperature compensated: ■ MTC = Manually with a fixed value set ■ ATC = Automatically with a temperature sensor Note: It has no effect on Redox measurements.
Filter	The measurement is filtered based on an arithmetic mean: ■ Low = arithmetic mean every 4 s ■ Medium = arithmetic mean every 8 s ■ High = arithmetic mean every 16 s

Tab. 34: Explanation of Parameters for pH/Redox Measurement

10.2.2 Conductivity Measurement

You can make the following settings for measuring conductivity:

Sub-Menu 2B1	
Parameter	Description
Meas. Unit	Select the unit of measurement for conductivity. Note: If you change the unit of measure, the parameters are reset to the default values. You can use the units of measurement ppm (parts per million) and ppb (parts per billion) by setting the TDS value (sub-menu 2B1).
Temp Comp	The measurement is temperature compensated: ■ OTC = Compensation deactivated ■ MTC = Manually with a fixed value set ■ ATC = Automatically with a temperature sensor
Filter	The measurement is filtered based on an arithmetic mean: ■ Low = arithmetic mean every 4 s ■ Medium = arithmetic mean every 8 s ■ High = arithmetic mean every 16 s
TDS	Conductivity can be used as an indicator for total dissolved solids (TDS) in a solution. It is expressed in ppm/μS.
Dec. Point	Set the position of the decimal point for the measurement to highlight the decimal value.

Sub-Menu 2B1	
Parameter	Description
Comp. Type	Set the compensation procedure: ■ Pure H₂O Select this element for conductivity measurements in pure water or below 0.2 μS (from 5 MΩ to 18 MΩ). The compensation function complies with ASTM D1125 and D5391 standards. ■ Linear up to 25 °C Select this element for conductivity measurements greater than 0.2 μS (lower than 5 MΩ). The measurement compensation is linear, in relation to the temperature of 25 °C. ■ Linear up to 20 °C Select this element for conductivity measurements greater than 0.2 μS (lower than 5 MΩ). The measurement compensation is linear, in relation to the temperature of 20 °C.
Lin. Coeff.	Set the percentage increase (SLOPE) used for linear compensation.
Cell constant	Set the parameters of the cell constant: ■ Type: type of sensor used (standard or custom). ■ Standard: list of values of the cell constants for the standard measurement. ■ Custom: adjustable cell constant for a custom measurement. ■ Actual: displays the cell constant used, i.e. the setpoint or the value calculated during calibration.

Tab. 35: Explanation of Parameters for Conductivity Measurement

10.2.3 Examples of Settings in Sub-Menu 2B1

10.2.3.1 Example: TDS

To view the measured conductivity value as total dissolved solids (TDS), you have to set a conversion factor between 0.3 and 2. The measurement is converted into ppm or ppb per μS.

The typical TDS value in water is 0.7 and is given by subtracting the total suspended solids (TSS) from the total solids (TS).

Calculation example for total solids:

All substances dissolved and suspended in natural or drained water are given as total solids. Total solids are determined by evaporating the water from the sample into a thermostated oven at 105 °C.

The total solids are equal to:

Total solids (mg/L) = (M1 - M0) x 1000 / VSample where:

M1 = mass in mg of the capsule and the residual material after evaporation

M0 = mass in mg of the empty capsule

VSAMPLE = amount in mL of the analysed sample

Example:

$$\begin{aligned}
 M1 &= 10023.6 \text{ mg} \\
 M0 &= 10000 \text{ mg} \\
 V_{\text{Sample}} &= 100 \text{ ml} \\
 10023.6 - 10000 &= 23.6 \text{ mg} \\
 23.6 \times 1000 / 100 &= 236 \text{ mg/l}
 \end{aligned}$$

Total suspended solids (TSS) represent the part of the substances suspended in a water sample that are separated by filtration through a membrane filter with a porosity of 0.45 µm (micrometre µm).

The solids collected on the filter are dried at a temperature of 103 – 105 °C to a constant weight.

Total suspended solids are calculated as follows:

Total solids (mg/L) = (M1 - M0) x 1000 / V_{Sample} where:

M1 = Mass in mg of capsule + filter and residual material after evaporation

M0 = mass in mg of the capsule + filter

V_{Sample} = quantity in ml of the filtered sample

10.2.3.2 Example: Setting the Linear Coefficient (2B1)

Select the temperature coefficient according to the solution to be measured. Typical indications are:

- Water with neutral pH value (7 pH) = 2.00 %/°C
- Alkaline solution, pH value greater than 7 pH = 1.9 %/°C
- Acidic solution, pH value lower than 7 pH = 1.8 %/°C

To determine the value of the linear coefficient, proceed as follows:

1. Get a container and an electric or gas cooker.
2. Connect the Pt100/Pt1000 sensor to the K100 unit or get a thermometer.
3. Put the sample solution into the container.



This procedure is valid only for conductivity greater than 84 µS.

4. Set the temperature compensation function to OTC.
5. Measure the sample at room temperature and measure the conductivity and the temperature value.
Example: C' = 200 µS T' = 23 °C
6. Heat the sample and increase its temperature to 50 °C.



Wait until the temperature change has slowed down and stabilised.

7. Take a second measurement for conductivity (C'') and temperature (T'').
Example: C'' = 600 µS T'' = 50 °C
8. To calculate the linear coefficient for 25 °C, perform the following calculation:

$$\text{Linear coefficient} = 100 \cdot (CC'' - C') / (C'' \cdot (T'' - 25^\circ\text{C}) - (CC' \cdot (T' - 25^\circ\text{C})))$$

$$\text{Linear coefficient} = 100 \cdot (600\mu\text{S} - 200\mu\text{S}) / (600\mu\text{S} \cdot (50^\circ\text{C} - 25^\circ\text{C}) - (200\mu\text{S} \cdot (23^\circ\text{C} - 25^\circ\text{C})))$$

$$\text{Linear coefficient for } 25^\circ\text{C} = 2.59\% / ^\circ\text{C}$$

10.2.4 mA Input Measurement (2B1)

You can make the following settings for measuring an mA input:

Sub-Menu 2B1	
Parameter	Description
Meas. Unit	Select the unit of measurement. If you select "Custom", the custom unit of measurement is displayed.
Custom Unit	You can enter a custom unit of measurement (max. 4 characters/symbols). It is displayed only if the previous unit of measurement setting has been set to "Custom".
Unit Name	Select the name of the measurement. If you select "Custom", the custom name of the measurement is displayed.
Custom Name	You can enter a custom name (max. 4 characters/symbols) of the measurement. Note: This name is displayed only if the unit of measurement setting has been set to "Custom".
Filter	The measurement is filtered based on an arithmetic mean: ■ Low = arithmetic mean every 4 s ■ Medium = arithmetic mean every 8 s ■ High = arithmetic mean every 16 s
Dec. Point	Set the position of the decimal point for the measurement to highlight the decimal value.
Sensor Type	Select the type of sensor used: 0/20 mA or 4/20 mA.
Min. Range	Set the value to 0 mA or 4 mA accordingly. Value between -99,999 and 99,999.
Max. Range	Set the value to 20 mA accordingly. Value between -99,999 and 99,999
Overrange	■ OFF: Overrange alarm deactivated. ■ 22 mA: If the input current to the device is higher than 22 mA, the overrange alarm is activated.
Underrange	■ OFF: Underrange alarm deactivated. ■ 3.6 mA: If the input current to the device is lower than 3.6 mA, the underrange alarm is activated. Note: The underrange alarm can be activated only if the Y alarm in menu 3B is set to 4 – 20 mA. If the Y alarm is set to 0 – 20 mA, the underrange is configured with OFF and cannot be changed.

Tab. 36: Explanation of Parameters for mA Input Measurement

10.2.5 Amperometric Measurement with a Measuring Cell (2B1)

You can make the following settings for amperometric measurement:

Sub-Menu 2B1	
Parameter	Description
Meas. Unit	Select the unit of measurement.
Unit Name	Select the name of the measurement.
Temp Comp	The measurement is temperature compensated: ■ OTC = Compensation deactivated ■ MTC = Manually with a set fixed value ■ ATC = Automatically with a temperature sensor
Filter	The measurement is filtered based on an arithmetic mean: ■ Low = arithmetic mean every 4 s ■ Medium = arithmetic mean every 8 s ■ High = arithmetic mean every 16 s
Dec. Point	Set the position of the decimal point for the measurement to highlight the decimal value.
Comp. Type	Set the compensation procedure: ■ Linear up to 25 °C The measurement compensation is linear, in relation to the temperature of 25 °C. ■ Linear up to 20 °C The measurement compensation is linear, in relation to the temperature of 20 °C.
Lin. Coeff.	Set the percentage increase (SLOPE) used for linear compensation. Select the temperature coefficient according to the solution to be measured.

Tab. 37: Explanation of Parameters for Amperometric Measurement

Sub-Menu		Description
2C4	Filter	The measurement is filtered based on an arithmetic mean: ■ Low = arithmetic mean every 4 s ■ Medium = arithmetic mean every 8 s ■ High = arithmetic mean every 16 s

Tab. 38: Sub-Menus for Temperature Measurement (2C)

To exit the menu, press **Esc**; if at least one parameter has been changed, the device prompts you to save; confirm by choosing **OK**.

To not save, select "NO" and confirm by choosing **OK**.

10.3 Temperature Measurement (2C)

You can make the following settings for the temperature measurement:

Sub-Menu		Description
2C1	Selection	Pt100 or Pt1000 temperature sensor connected or with a manual temperature value.
2C2	Unit Meas.	Set the unit to Celsius (°C) or Fahrenheit (°F).
2C3	Manual	Set the temperature value without a Pt100 or Pt1000 temperature sensor.

11 Output

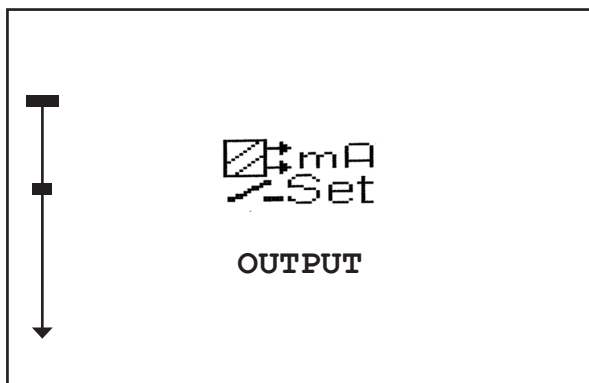


Fig. 23: Menu 3 Output

Menu 3 **Output** allows you to configure the following settings:

- Relay output
- Currents output
- Alarm setting



Check the selected unit of measurement and set the values in the **Setup** menu within the ranges allowed by the sensors used.

11.1 Relay Output (3A)

Relays 1 – 4 can be set either for each type of measurement (pH is used here as an example) or for temperature measurement with the following activation methods:

- OFF: relay is deactivated
- Temp.: temperature is assigned
- Measure A: measurement is assigned to the main measurement

11.1.1 Activation Method: Measure A

If you select Measure A as the activation method, you have the following options:

- On/Off
- Timed
- Impulse length

On/Off

If a value is exceeded, the output switches with a configurable hysteresis:

Sub-Menus 3A1, 3A2, 3A3 and 3A4	
Parameter	Description
Setpoint	Chemical value that must be maintained during the process
Type	Lower: control direction to reach a minimum value
	Lift: control direction to reach a maximum value
Hist.	Incremental or decremental value of the setpoint
OFA	Maximum activation time for the relay

Sub-Menus 3A1, 3A2, 3A3 and 3A4	
Parameter	Description
Delay Start	Delay time for activating the relay
Delay End	Delay time for deactivating the relay
Over R.	A value that is subtracted from and added to the setpoint and defines a measuring range outside of which the measurement error message is displayed

Tab. 39: Explanation of Parameters for On/Off

Timed Method

The same parameters as for "On/Off" can be configured here. In addition, relay closing time and wait time with the relay open can be configured:

Sub-Menus 3A1, 3A2, 3A3 and 3A4	
Parameter	Description
Setpoint	Chemical value that must be maintained during the process
Type	Lower: control direction to reach a minimum value.
	Lift: control direction to reach a maximum value
Hist.	Incremental or decremental value of the setpoint
OFA	Maximum activation time for the relay
Delay Start	Delay time for activating the relay
Delay End	Delay time for deactivating the relay
Over R.	A value that is subtracted from and added to the setpoint and defines a measuring range outside of which the measurement error message is displayed
Time On	Relay closing time
Time Off	Wait time with relay open

Tab. 40: Explanation of Parameters for Timed Method

Impulse Length

Sub-Menus 3A1, 3A2, 3A3 and 3A4	
Parameter	Description
Setpoint	Chemical value that must be maintained during the process
Type	Lower: control direction to reach a minimum value
	Lift: control direction to reach a maximum value
Algorithm	Select the controller type (P, PI or PID)
Xp	The proportional range of the PID control compared to the bottom of the scale for the device

Sub-Menus 3A1, 3A2, 3A3 and 3A4	
Parameter	Description
Y alarm	If the PID control remains at 100% for alarm time Y, an alarm is triggered.
Imp. length	The total period for which the PID calculation is performed.
Tn	Integral time
Tv	Derivative time
Max Perc.	Maximum percentage of PID control

Tab. 41: Explanation of Parameters for Impulse Length

11.1.2 Relays 3 and 4

Relays 3 and 4 can be set either for a measurement displayed in the Relay 1 menu or it is also possible to set the cleaning and alarm mode.

11.1.2.1 Cleaning the Measuring Cell (Wash)

With relay 3, you can activate probe cleaning. Set the following parameters:

Sub-Menu 3A3	
Parameter	Description
Time	Value in minutes and seconds for cleaning the probe.
Delay	Value in minutes and seconds to wait for the stability of the measurement.
Wait	Wait time in minutes and seconds for the next cleaning action.

Tab. 42: Settings for Probe Cleaning

11.1.2.2 Alarms

You can use relays 3 and 4 as an alarm. First select for which relay (1 or 2) the alarm events are to be determined. By selecting "Yes" or "No", you then specify for each alarm event whether the alarm is to be output.



To block the outputs, see "Block" under 11.3 "Alarm Settings (3C)" on page 35.

Sub-Menu 3A3 / 3A4	
Alarm	Description
R1/R2 OverRng	Chemical measurement out of range of relay 1/2
R1/R2 OFA	Maximum dosing time expired
R1/R2 Persist.	Chemical measure blocked (frozen)
Reed Alarm	Alarm for reed sensor activation
Temp. Alarm	Alarm for probe disconnected
Y alarm	PID control remains at 100% for alarm time Y

Tab. 43: Alarm Events

11.1.3 SSR1 and SSR2

The SSR1 and SSR2 outputs are two solid state relays used as frequency outputs.

The outputs SSR1 and SSR2 can be set for any type of measurement or for temperature as follows:

Sub-Menu 3A5 / 3A6	
Parameter	Description
Setpoint	Chemical value that must be maintained during the process
Type	Lower: control direction to reach a minimum value
	Lift: control direction to reach a maximum value
Algorithm	Select the controller type (P, PI or PID)
Xp	The proportional range of the PID control compared to the bottom of the scale for the device.
Tn	Integral time
Tv	Derivative time
Imp. freq.	Chemical value that must be maintained during the process
Pulse Width	Maximum width of the pulse
Max Perc.	Maximum percentage of PID control
Y alarm	If the PID control remains at 100% for alarm time Y, an alarm is triggered.

Tab. 44: Explanation of Parameters for Outputs SSR1 and SSR2

11.2 Current Output (3B)

11.2.1 Output mA1 and mA2

The mA1 and mA2 outputs are two current outputs in mA (milliamps), in active configuration with the range 4 – 20 mA.

The mA1 and mA2 outputs can be set to any type of measurement or temperature as follows:

- PID off
- PID on
- Mirror (only for mA)

PID Off

Sub-Menu 3B1 / 3B2	
Parameter	Description
Start	Measurement assigned to the 4 mA value
End	Measurement assigned to the 20 mA value
Keep	Freezes the actual value in the case of a hold alarm

Sub-Menu 3B1 / 3B2	
Parameter	Description
Namur Alr	Sets the current value to 3.6 mA or to 22 mA for an alarm
Type	4–20 mA or 0–20 mA type of current output

Tab. 45: Explanation of Parameters (PID Off)

PID On

Sub-Menu 3B1 / 3B2	
Parameter	Description
Setpoint	Chemical value that must be maintained during the process
Type	Lower: control direction to reach a minimum value
	Lift: control direction to reach a maximum value
Algorithm	Select the controller type (P, PI or PID)
Xp	The proportional range of the PID control compared to the bottom of the scale for the device.
Integ. Time	Set the integral time The longer the time set, the more the system mediates the measurement fluctuations.
Deriv. Time	Set the derivative time. The longer the time set, the more the system is ready for deviations from the measurement.
Type	4 – 20 mA or 0 – 20 mA
Y alarm	If the PID control remains at 100% for alarm time Y, an alarm is triggered.
Keep	Freeze the 4 – 20 mA input
Namur Alr	Set the namur output function

Tab. 46: Explanation of Parameters (PID On)

Mirror (Output Inversion)

Sub-Menu 3C1/3C3	
Parameter	Description
K Factor	Set the conversion factor between the input current and the output current.
Type	4–20 mA or 0–20 mA type of current output

Tab. 47: Explanation of Parameters (Output Inversion)

Sub-Menu 3C	
Parameter	Description
Reed Logic	Set the sensor logic: ■ NO (normally open) ■ NC (normally closed)
Reed Delay	Set the delay time for alarm activation to change the REED status.
Switch OFF	Set a visual alarm if the power supply is interrupted.
Block	Block the device in the event of an alarm. The outputs are automatically set to the programmed alarm state.
Alarm Temp.	Set a visual alarm or block the device if the temperature probe is broken or disconnected.
Service	Activate or deactivate the service alarm.
Service Date	Specify a time and date to display the service notification.

Tab. 48: Alarm Settings (3C)

11.3 Alarm Settings (3C)

You can configure the alarm settings as follows:

12 Archive



Fig. 24: Menu 4 Archive

Menu 4 **Archive** enables you to:

- Activate, configure and reset the data logger.
- View, configure and reset the alarm log.

12.1 Data Logger (4A)

You have the following options here:

Sub-Menu		Description
4A1	Data Logger	Activate/deactivate the data logger
4A2	Period	Set the logging interval in minutes
4A3	Mode	Set the logging mode to circular or linear
4A4	DataLogs Reset	Reset the data logger to the default settings

Tab. 49: Data Logger Settings in Menu 4 Archive

12.2 Alarms (4B)

You can configure the following settings here:

Sub-Menu		Description
4B1	View Log	Display all registered alarms, starting with the most recent.
4B2	Reset Log	Reset log to clear all alarm events
4B3	Reset OFA	Clear the overfeed alarm and reset the counter
4B4	Reset Holding	Reset measurement persistence alarm and reset the counter
4B5	Reset Service	Clear the service alarm and reset the counter
4B6	Reset RL3	Reset RL3 if used as an alarm
4B7	Reset RL4	Reset RL4 if used as an alarm
4B8	Reset Y Alarm	Reset Y alarm

Sub-Menu		Description
4B9	Hold alarm	Switch on or off

Tab. 50: Alarm Settings in Menu 4 Archive

13 Manual Control

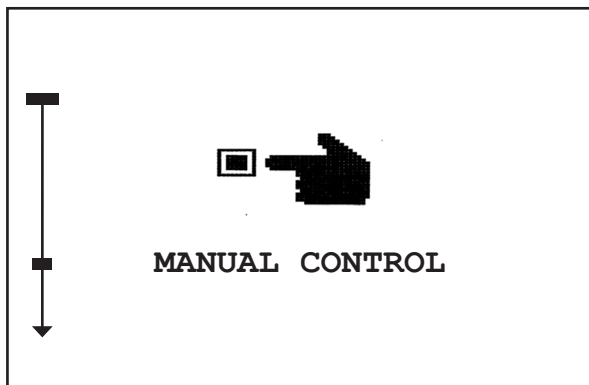


Fig. 25: Menu 5 Manual Control

Menu 5 **Manual Control** enables the following options:

Sub-Menu		Description
5A	Analog inputs	View real-time data of the measurements; for digital measurements only the communication errors
5B	Digital inputs	Test the digital input
5C	Analog outputs	Simulate the two current outputs separately
5D	Relay outputs	Simulate the closing of each relay and simulate the pulse hours of the frequency outputs
5E	Download User Manual	Display the QR code for the operating instructions
5F	Start-up time	Set a start-up time to start the controls (relays, mA, etc.) on power-up only after this freely programmable time has elapsed.

Tab. 51: Options in Menu 5 Manual Control

14 WiFi

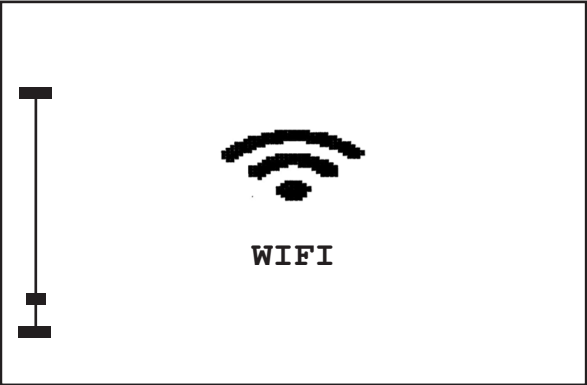


Fig. 26: Menu 6 WiFi

Menu 6 **WiFi** allows you to configure the WLAN settings:

Sub-Menu		Description
6A	Wifi	Activate or deactivate the internal WLAN module
6B	Reset Wifi	Reset the WiFi connection
6C	Restore Default	Reload the default parameters
6D	Wifi Info	Display the QR code to obtain information about the IP of the internal WLAN device.

Tab. 52: Settings in Menu 6 WiFi

15 Using the Web Application

The device contains a built-in web server that is located in the control panel. This allows the user to program and manage the device through a web browser, which can be done locally on a PC, notebook, tablet or smartphone.

A web-based application refers to a program that is accessed over an HTTP network connection rather than existing within a device's memory. A web-based application runs in a web browser.

A device with Wifi connectivity is required to access the web-based application. Windows, Android and iOS-based devices are supported.

15.1 Connecting to the Web Application

To connect to the web application, proceed as follows:

1. Activate the WLAN connection and connect your device (PC, notebook, smartphone or other) to the system's WLAN network (default name SSID-xxxx).



The default password for the WLAN connection is 1234567890. This information can be called up via the Wifi Info menu (see section 14 "WiFi" on page 38).

2. Open an Internet browser on your device and call up the following IP address: <https://192.168.4.1/>
3. Wait until the authentication web page has loaded.
4. On the authentication page, enter the user name and password and press the login button. The factory default user name/password is admin/0000.

15.2 Dashboard

The dashboard shows the actual values for most of the controller's parameters.

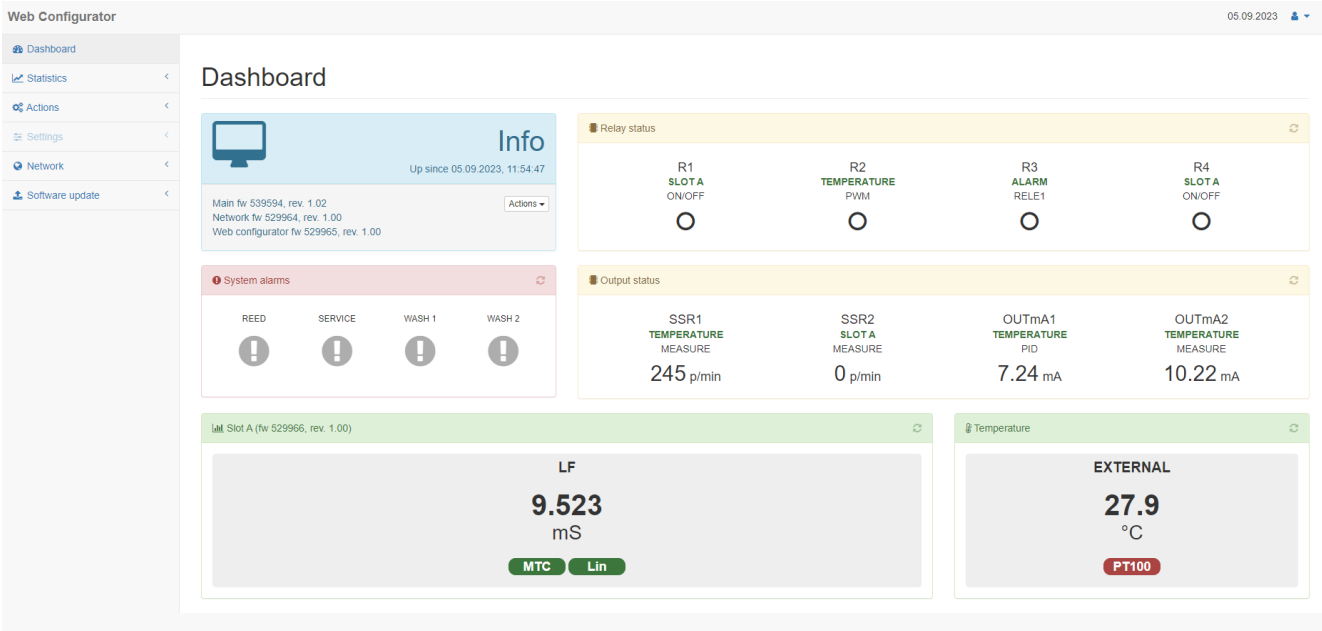


Fig. 27: Dashboard

Screen Area	Description
Settings (top right)	Open the drop-down menu to set the date and time of the device or to change the password for the web configurator.
Info (Information)	Displays the operating time of the device, the firmware version and the revision of the main components of the device. The "Actions" drop-down menu contains the following functions: ■ Refresh ■ Auto refresh ■ Use as Control Panel: is used to activate/deactivate temporary and manual relays of the device. Please note that for the time that "Use as control panel" is active, the buttons on the device are inactive.
Relay status	Displays the status of each relay and the type of measurement currently assigned.
System alarms	Indicates whether alarms have been triggered on the device.
Output status	Contains information about the device's SSR and OUTmA outputs, such as the currently assigned function for each and its actual values.
Measurements and temperature (lower area)	Visualisation of the values for the main measurements installed on the device: Slot A and temperature.

Tab. 53: Explanation of Screen Areas on the Dashboard

15.3 Statistics

Under **Statistics**, you can find three menus, which are described in the following sub-sections.

15.3.1 General

The **General** menu summarises the counters for switching on the device, counters for each of the relays and counters for service.

You can find buttons to reset the statistics and to download this information as a *.csv file.

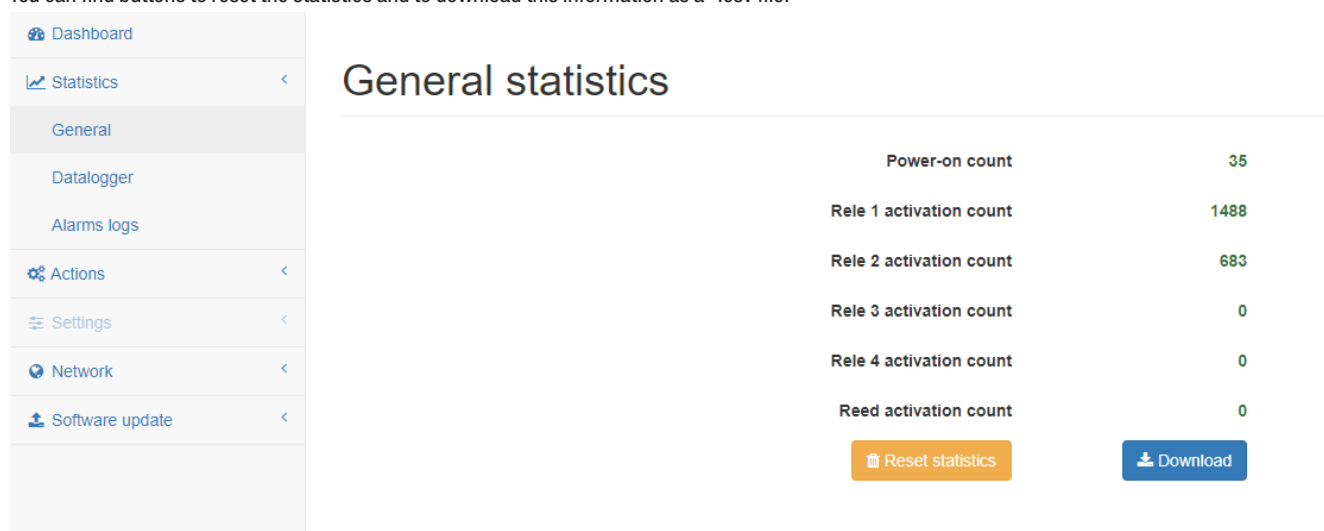


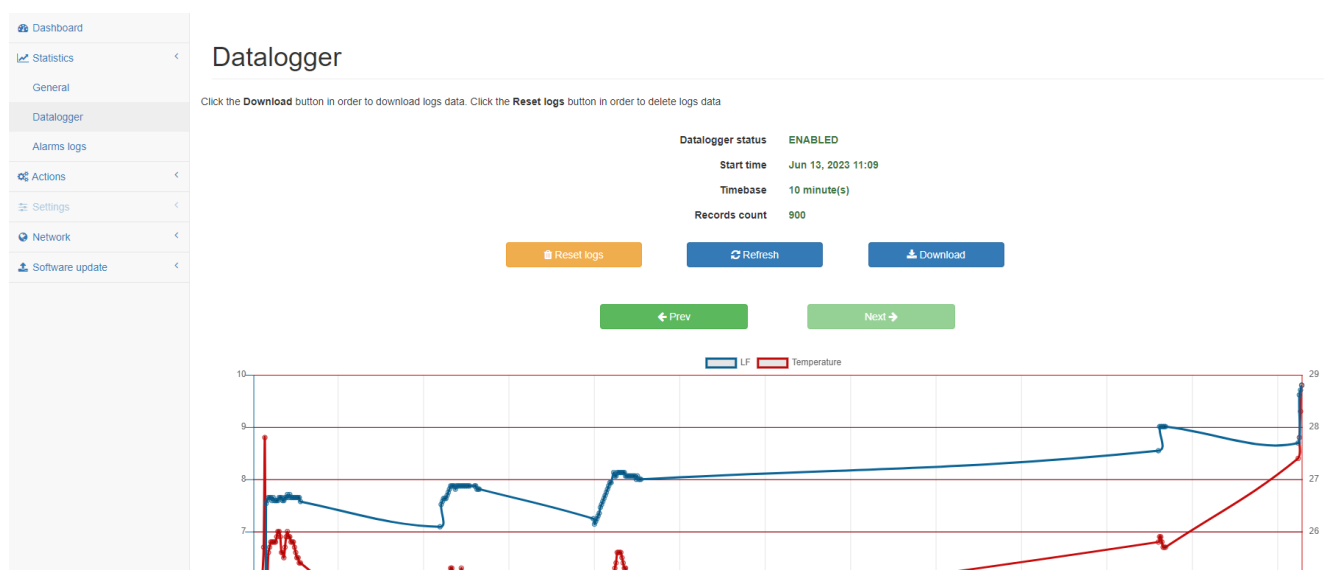
Fig. 28: General Statistics

15.3.2 Data Logger

The **Datalogger** menu provides a graphical representation of the values measured by the sensors connected to the device over a certain period of time. The page contains the **Reset logs**, **Refresh** and **Download** buttons, which allow you to reset the logs, refresh the data or download the logs as a file.

With the buttons **Prev** and **Next**, you can scroll through the graph of recorded data.

Fig. 29: Data Logger



15.3.3 Alarm Logs

Under **Alarms Logs**, you can view and reset the alarm logs.

15.4 Actions

Under **Actions**, you can find the options for loading and saving the settings and for restarting the system.

15.4.1 Load Settings

Under **Load settings**, you can load the current settings from the device or the settings from an external file.

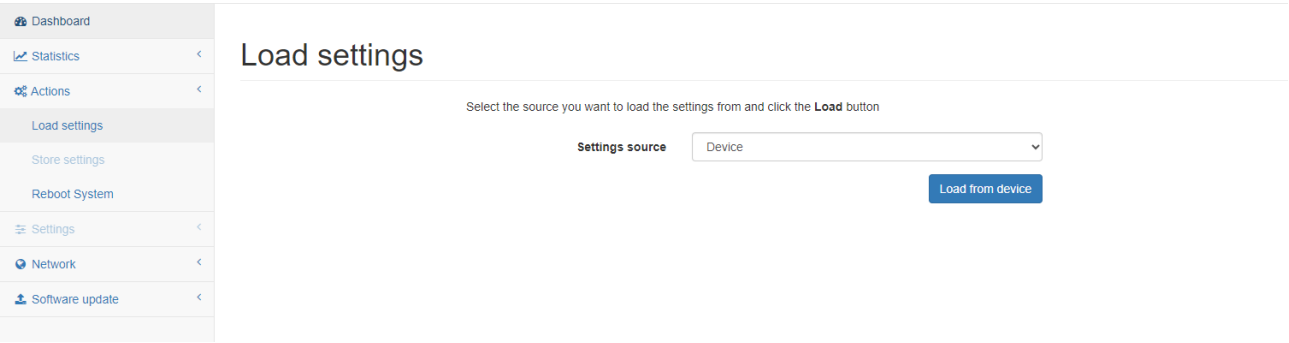


Fig. 30: Load Settings

When you load the settings from the device, the **Settings** menu on the left becomes active and you can modify the device settings.

15.4.2 Store Settings

Under **Store settings**, you can transfer modified settings back to the device or save them as an external file.

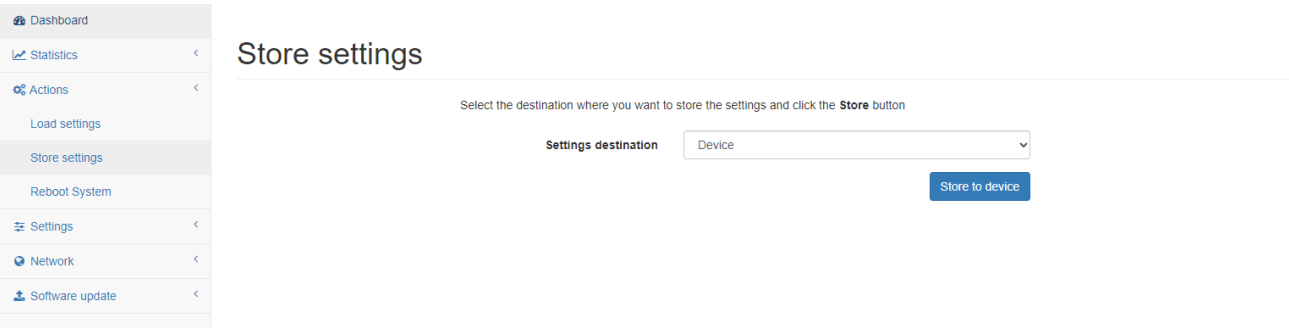


Fig. 31: Store Settings

15.4.3 Reboot System

Under **Reboot System**, you can perform a remote reboot of the system.

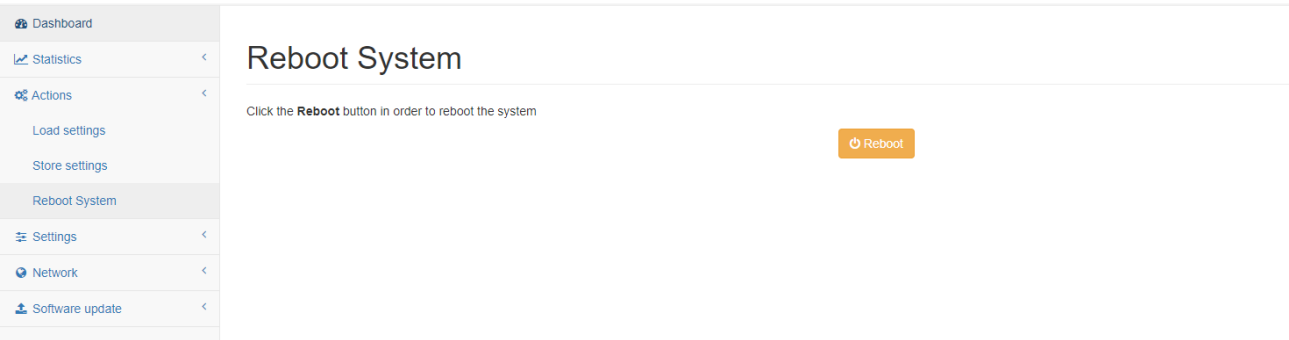


Fig. 32: Reboot System

15.5 Settings

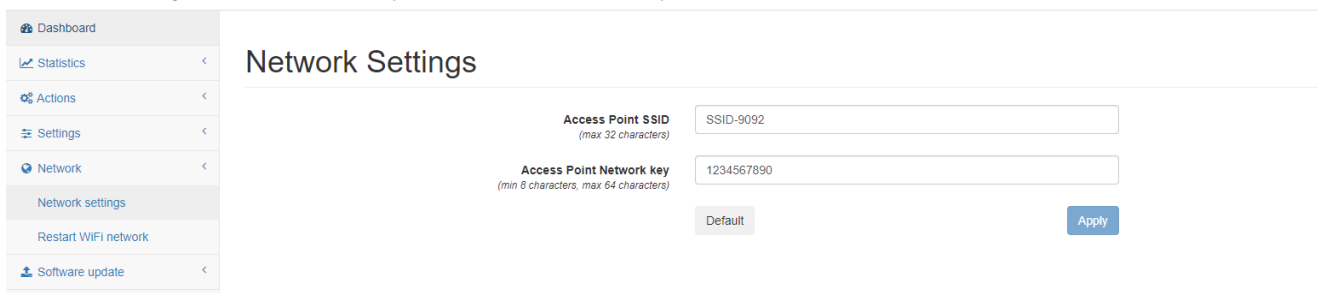
Under **Settings**, you can adjust the settings loaded from the device.

15.6 Network

Under **Network**, you can manage the network settings.

15.6.1 Network Settings

You can view, change or reset the name and password of the WLAN access point here.



The screenshot shows the 'Network Settings' page. On the left is a sidebar menu with options: Dashboard, Statistics, Actions, Settings, Network, Network settings, Restart WiFi network, and Software update. The main content area is titled 'Network Settings' and contains two input fields: 'Access Point SSID' (with a hint '(max 32 characters)') containing 'SSID-9092', and 'Access Point Network key' (with a hint '(min 8 characters, max 64 characters)') containing '1234567890'. Below these fields are two buttons: 'Default' and 'Apply'.

Fig. 33: Network Settings

15.6.2 Restart WiFi Network

Under **Restart WIFI network**, you can restart the WLAN network.

15.7 Software Update

Under **Software update**, you can update the different types of firmware used by the device:

- Main firmware
- Slot firmware
- Network firmware
- Web Configurator: here you can update the web application.

16 Alarm Table

Note: The alarm messages displayed in the table depend on the measurement selected.

General

Number	Alarm	Message	Status
1	None	No entry	
3	External reed input active	Reed	Alarm with device block (*)
4	Temperature sensor broken or disconnected	Alarm Temp Fault	Alarm with device block (*)
6	No power supply registered	Switch off	Visual alarm
7	Service timer expired	Service	Visual alarm
8	Timer for relay 1 reduced by 70%	OFA1 R1	Pre-alarm
9	Timer for relay 2 reduced by 100%	OFA2 R1	Alarm with device block (*)
10	Chemical measurement outside working range	Overrange R1	Alarm with device block (*)
11	Permanent measurement to a fixed value	Hold R1	Alarm with device block (*)
12	Timer for relay 2 reduced by 70%	OFA1 R2	Pre-alarm
13	Timer for relay 2 reduced by 100%	OFA2 R2	Alarm with device block (*)
14	Chemical measurement outside working range	Overrange R2	Alarm with device block (*)
15	Permanent measurement to a fixed value	Hold R2	Alarm with device block (*)
16	Measurement A defective or disconnected	Measure A Error	Alarm with measurement error block

Tab. 54: Alarm Table (General)

Conductivity

Number	Alarm	Message	Status
17	Probe in the air	Probe in the air	Alarm with device block
18	Probe short circuited	Shorted probe	Alarm with device block

Tab. 55: Alarm Table (Conductivity)

mA Input

Number	Alarm	Message	Status
17	Output 18 V too low	Fault V from mA	Alarm with device block
18	Input current higher than 22 mA	Overrange mA input	Alarm with device block (***)
19	Input current less than 3.6 mA	Underrange mA input	Alarm with device block (***)

Tab. 56: Alarm Table (mA Input)

*All alarms with a block function are valid if the menu item Alarm -> Block is set to "YES".

**The alarm triggered on interruption of the temperature sensor blocks the device if the parameter "Alarm Temp." in sub-menu 3C5 is set to "Hold".

***The alarm blocks the device if the parameters "Switch OFF" and "Block" in the sub-menus 3C3 and 3C4 are set to a value other than "NO".



Backlight: In the event of an alarm, the device switches on the red backlight.

Resetting the alarms: Press the **OK** button during an alarm to display the alarm menu. You can reset the alarms in that menu (see 12.2 "Alarms (4B)" on page 36).

Note: The alarms are saved every 15 minutes. If the device is switched off, the alarms displayed in the last 14 minutes are lost.

17 Troubleshooting

17.1 Resetting the Device to the Default Parameters

To load all the default parameters of the device and also remove the password, proceed as follows:

1. Disconnect the device from the power supply.
2. Press and hold the  and  buttons simultaneously and switch on the device.
 - ▶ On start-up, the device displays a hidden menu.
3. Select "YES" to reset the device to the default parameters.
 - ▶ The device starts up.

✓ **Device reset to the default parameters.**

17.2 General Troubleshooting



For more information about alarms, see the log in the **Archive** menu under **Alarms**.

Problem	Possible Cause
The display shows the symbol 	■ See 7.5.2.1 "Connecting a pH/Redox Probe (TOPAX L PH/RD)" on page 18 ■ See 7.5.2.2 "Connecting a Conductivity Probe (TOPAX L LF)" on page 18 ■ See 7.5.2.3 "Connecting a 0/4 – 20 mA Sensor (TOPAX L MA)" on page 18 ■ See 7.5.2.4 "Connecting an Amperometric Copper-Platinum Chlorine Sensor (TOPAX L CH/CD)" on page 19
Calibration error	■ Contaminated buffer solutions (old) ■ Sensor damaged or old ■ Sensor cable damaged ■ Measuring input of the device damaged
Data memory error	■ Internal memory defective
Password error	■ Error value
Temperature measurement error ---.- °C	■ Temperature probe broken or disconnected
Chemical measurement error ---.- °C	■ Sensor not calibrated ■ Sensor not connected correctly ■ Temperature compensation incorrectly set or deactivated ■ The sensor or the cable is defective ■ Input of electrical measurement damaged ■ The sensor cable exceeds the maximum length
Measurement not stable	■ Sensors or cables are installed too close to equipment causing electrical interference ■ Sensor installed for flow with hydraulic turbulence ■ Average measurement set too low ■ Sensor cable too long
The Calibration or Setup menu cannot be displayed	■ User has no access to these menus for security reasons
The display is switched off	■ Incorrect power supply to the device ■ The LCD contrast is not set correctly ■ The fuse has blown ■ Hardware error

Problem	Possible Cause
The display shows "Diagnosis" in the upper-right corner	Switch the device off and then on again. If the problem persists, contact the manufacturer.
"Probe in air" alarm (*only for conductivity measurement)	■ Cable damaged or connected incorrectly ■ Liquid missing
"Shorted Probe" alarm (*only for conductivity measurement)	■ Cable damaged ■ Foreign body in contact with the electrodes
Output 18 V too low (*only for measuring an mA input)	■ Cable damaged

Tab. 57: General Troubleshooting

18 Modbus Profile

18.1 Alarm Status Register

Address	Read Command	Register Type	Description	Min.	Max.	Data Type
1000	Read Input Register [Function 04]	Alarm Status Register	5 V Fault	0	1	Unsigned 16 bit
1001			Reed Status	0	1	Unsigned 16 bit
1002			Service	0	1	Unsigned 16 bit
1003			Power Line Interruption	0	1	Unsigned 16 bit
1004			Temp Probe Fault	0	1	Unsigned 16 bit
1005			Relay 1 Overrange	0	1	Unsigned 16 bit
1006			Relay 2 Overrange	0	1	Unsigned 16 bit
1007			Relay 3 Overrange	0	1	Unsigned 16 bit
1008			Relay 4 Overrange	0	1	Unsigned 16 bit
1009			Relay 1 OFA 1	0	1	Unsigned 16 bit
1010			Relay 2 OFA 1	0	1	Unsigned 16 bit
1011			Relay 3 OFA 1	0	1	Unsigned 16 bit
1012			Relay 4 OFA 1	0	1	Unsigned 16 bit
1013			Relay 1 OFA 2	0	1	Unsigned 16 bit
1014			Relay 2 OFA 2	0	1	Unsigned 16 bit
1015			Relay 3 OFA 2	0	1	Unsigned 16 bit
1016			Relay 4 OFA 2	0	1	Unsigned 16 bit
1017			Relay 1 Hold Alarm	0	1	Unsigned 16 bit
1018			Relay 2 Hold Alarm	0	1	Unsigned 16 bit
1019			Relay 3 Hold Alarm	0	1	Unsigned 16 bit
1020			Relay 4 Hold Alarm	0	1	Unsigned 16 bit
1021			Relay 1 Y Alarm	0	1	Unsigned 16 bit
1022			Relay 2 Y Alarm	0	1	Unsigned 16 bit
1023			Relay 3 Y Alarm	0	1	Unsigned 16 bit
1024			Relay 4 Y Alarm	0	1	Unsigned 16 bit
1025			SSR 1 Y Alarm	0	1	Unsigned 16 bit
1026			SSR 2 Y Alarm	0	1	Unsigned 16 bit
1027			mA 1 Y Alarm	0	1	Unsigned 16 bit
1028			mA 2 Y Alarm	0	1	Unsigned 16 bit
1099			Logic or All Alarms	0	1	Unsigned 16 bit

Tab. 58: Alarm Status Register

18.2 Output Register

Address	Read Command	Register Type	Description				
1100	Read Input Register [Function 04]	Output Register	Status RELAY 1	Value	Description	Data Type	
				0	OFF	Unsigned 16 bit	
				1	ON		
1101			Status RELAY 2	Value	Description	Data Type	
				0	OFF	Unsigned 16 bit	
				1	ON		
1102			Status RELAY 3	Value	Description	Data Type	
				0	OFF	Unsigned 16 bit	
				1	ON		
1103			Status RELAY 4	Value	Description	Data Type	
				0	OFF	Unsigned 16 bit	
				1	ON		
1104			Status SSR 1	Value	Description	Data Type	Notes
				Min.	Max.	Unsigned 16 bit	Pulse/minute
				0	400		
1105			Status SSR 2	Value	Description	Data Type	Notes
				Min.	Max.	Unsigned 16 bit	Pulse/minute
				0	400		
1106			Status mA 1	Value	Description	Data Type	Notes
				Min.	Max.	Unsigned 16 bit	No. Decimals = 2
				360 (mA)	2200 (mA)		
1107			Status mA 2	Value	Description	Data Type	Notes
				Min.	Max.	Unsigned 16 bit	No. Decimals = 2
				360 (mA)	2200 (mA)		

Tab. 59: Output Register

18.3 Type of Input Module

Address SLOT A	Read Command	Register Type	Description	Value	Module Type	Data Type
1500	Read Input Register [Function 04]	Measurement	Module Type	0	NONE	Unsigned 16 bit
				1	INPUT_mA	
				2	PH_ORP	
				3	EC_COND	
				4	TURBIDITY	
				5	FLOW	
				6	DIGITAL OXYGEN	
				7	DIGITAL SUSP. SOLID	
				8	DIGITAL TURBIDITY-LT	
				9	DIGITAL TURBIDITY-TN	
				10	AMPEROMETRIC	

Tab. 60: Type of Input Module

18.4 Input Measurement (Temperature)

Address	Read Command	Register Type	Description	Min.	Max.	Data Type	Notes
1108	Read Input Register [Function 04]	Temperature Measurement	Temp. Unit of Measurement	0 (°C)	1 (°F)	Unsigned 16 bit	
1109			Temp. Measurement	-500 (°C) -580 (°F)	1500 (°C) 3020 (°F)	Unsigned 16 bit	No. Decimals = 1

Tab. 61: Input Measurement (Temperature)

18.5 Input Measurement (pH/Redox)

Address SLOT A	Read Command	Register Type	Description	Value	Unit	Data Type
1501	Read Input Register [Function 04]	Measurement	Measurement Unit	0	pH	Unsigned 16 bit
				1	mV	

Address SLOT A	Read Command	Register Type	Description	Min.	Max.	Data Type
1502	Read Input Register [Function 04]	Measurement	Main Measurement L	0 (pH)	1400 (pH)	Signed 32 bit
1503			Main measurement H	-2000 (mV)	+2000 (mV)	
1504			Dec. Main Measurement	3	3	Unsigned 16 bit

Address SLOT A	Read Command	Register Type	Description	Min.	Max.	Data Type
1505	Read Input Register [Function 04]	Calibrations	Calibration Type	0 (None) 1 (One Point) 2 (Two Point)		Unsigned 16 bit
1506			Point 1 L	-99999	99999	Signed 32 bit
1507			Point 1 H			
1508			Dec. Point 1	0	4	Unsigned 16 bit
1509			Point 2 L	-99999	99999	Signed 32 bit
1510			Point 2 H			
1511			Dec. Point 2	0	4	Unsigned 16 bit
1512			Gain L	0	99999	Signed 32 bit
1513			Gain H			
1514			Dec. Gain	0	4	Unsigned 16 bit
1515			Offset L	-99999	99999	Signed 32 bit
1516			Offset H			
1517			Dec. Offset	0	4	Unsigned 16 bit
1518			Adjustment L	-99999	99999	Signed 32 bit
1519			Adjustment H			
1520			Dec. Adjustment	0	4	Unsigned 16 bit
1521			Calibration Day	1	31	Unsigned 16 bit
1522			Calibration Month	1	12	Unsigned 16 bit
1523			Calibration Year	0	99	Unsigned 16 bit
1524		Advanced Function	Temp. Compensation	0 (OTC) 1 (MTC) 2 (ATC)		Unsigned 16 bit
1525			Filter	0 (Low) 1 (Medium) 2 (High)		Unsigned 16 bit

Tab. 62: Input Measurement (pH/Redox)

18.6 Input Measurement (Conductivity)

Address SLOT A	Read Command	Register Type	Description	Value	Unit	Data Type	Note
1501	Read Input Register [Function 04]	Measurement	Measurement Unit	0	uS	Unsigned 16 bit	
				1	mS		
				2	kOhm		
				3	MOhm		
				4	ppm		
				5	ppb		

Address SLOT A	Read Command	Register Type	Description	Min	Max	Data Type	Note
1502	Read Input Register [Function 04]	Measurement	Main Measure- ment L	0	99999	Signed 32 bit	
1503			Main measure- ment H				
1504			Dec. Main Measurement	3	3	Unsigned 16 bit	
1505		Calibrations	Calibration Type	0 (None)		Unsigned 16 bit	
				1 (One Point)			
				2 (Two Points)			
1506			Point 1 L	0	99999	Signed 32 bit	
1507			Point 1 H				
1508			Dec. Point 1	0	4	Unsigned 16 bit	
1509			Point 2 L	0	99999	Signed 32 bit	
1510			Point 2 H				
1511			Dec. Point 2	0	4	Unsigned 16 bit	
1512			Gain L	0	99999	Unsigned 32 bit	
1513			Gain H				
1514			Dec. Gain	0	4	Unsigned 16 bit	
1515			Offset L	-99999	99999	Signed 32 bit	
1516			Adjust H				
1517			Dec. Offset	0	4	Unsigned 16 bit	
1518			Adjust L	-99999	99999	Signed 32 bit	

Address SLOT A	Read Command	Register Type	Description	Min	Max	Data Type	Note	
1519	Read Input Register [Function 04]]	Calibrations	Adjust H	-99999	99999			
1520			Dec. Adjustment	0	4	Unsigned 16 bit		
1521			Day Calibration	1	31	Unsigned 16 bit		
1522			Calibration Month	1	12	Unsigned 16 bit		
1523			Calibration Year	0	99	Unsigned 16 bit		
1524		Advanced Function	Temp. Compensation	0 (OTC) 1 (MTC) 2 (ATC)		Unsigned 16 bit	No. Decimals = 1	
1525			Filter	0 (Low) 1 (Medium) 2 (High)		Unsigned 16 bit		
1526			TDS	3	20	Unsigned 16 bit		
1527			Compensation Type	0 (Pure H2O) 1 (Lin 25 °C) 2 (Lin 20 °C)		Unsigned 16 bit		
1528			Linear Coefficient	1	1000	Unsigned 16 bit		%/°C No. Decimals = 2
1529			Type of Cell Constant	0 (Standard) 1 (Custom)		Unsigned 16 bit		
1530			Standard Cell Constant	0 (0.01) 1 (0.10) 2 (0.20) 3 (1.00) 4 (10.0)		Unsigned 16 bit		cm-1
1531			Cell Constant L	5		Unsigned 32 bit		
1532			Cell Constant H	20000				
1533			Dec. Point of Cell Constant	0	4	Unsigned 16 bit		
1534		Status Register	Shorted Probe	0	1	Unsigned 16 bit		
1535			Probe in Air	0	1	Unsigned 16 bit		

Tab. 63: Input Measurement (Conductivity)

18.7 Input Measurement (mA Input)

Address SLOT A	Read Command	Register Type	Description	Value	Unit	Data Type
1501	Read Input Register [Function 04]	Measurement	Measurement Unit	0	ppm	Unsigned 16 bit
				1	ppb	
				2	mg/l	
				3	mA	
				4	Custom	
				5	NTU	

Address SLOT A	Read Com- mand	Register Type	Description	Min	Max	Data Type
1502	Read Input Register [Function 04]	Measurement	Main Measurement L	-99999	99999	Signed 32 bit
1503			Main measurement H			
1504			Dec. Main Measurement	3	3	Unsigned 16 bit
1505	Read Input Register [Function 04]	Calibrations	Calibration Type	0 (None) 1 (One Point) 2 (Two Points)		Unsigned 16 bit
1506			Point 1 L	-99999	99999	Signed 32 bit
1507			Point 1 H			
1508			Dec. Point 1	0	4	Unsigned 16 bit
1509			Point 2 L	-99999	99999	Signed 32 bit
1510			Point 2 H			
1511			Dec. Point 2	0	4	Unsigned 16 bit
1512			Gain L	0	99999	Unsigned 32 bit
1513			Gain H			
1514			Dec. Gain	4	4	Unsigned 16 bit
1515			Offset L	-99999	99999	Signed 32 bit
1516			Adjust H			
1517			Dec. Offset	0	4	Unsigned 16 bit
1518			Adjust L	-99999	99999	Signed 32 bit
1519			Adjust H			
1520			Dec. Adjustment	0	4	Unsigned 16 bit
1521			Day Calibration	1	31	Unsigned 16 bit
1522			Calibration Month	1	12	Unsigned 16 bit
1523			Calibration Year	0	99	Unsigned 16 bit

Address SLOT A	Read Com- mand	Register Type	Description	Min	Max	Data Type
1524	Read Input Register [Function 04]	Advanced Function	Custom Unit of Measure- ment L	0x2020	0x7A7A	Unsigned 32 bit
1525			Custom Unit of Measure- ment H	0x2020	0x7A7A	
1526			Main Measurement Name	0 (CI2) 1 (PAA) 2 (H2O2) 3 (O3) 4 (Custom) 5 (O2) 6 (Turb)		Unsigned 16 bit
1527			Custom Name of Measurement L	0x2020	0x7A7A	
1528			Custom Name of Measurement H	0x2020	0x7A7A	Unsigned 32 bit
1529			Filter	0 (Low) 1 (Medium) 2 (High)		Unsigned 16 bit
1530			Sensor Type	0 (0 – 20 mA)	1 (4 – 20 mA)	Unsigned 16 bit
1531			Min. Range L	-99999	99999	Signed 32 bit
1532			Min. Range H			
1533			Min. Dec. Range	0	4	Unsigned 16 bit
1534			Max. Range L	-99999	99999	Signed 32 bit
1535			Max. Range H			
1536			Max. Dec. Range	0	4	Unsigned 16 bit
1537			Overcurrent Alarm	0 (OFF) 1 (ON)		Unsigned 16 bit
1538			Undercurrent Alarm	0 (OFF) 1 (ON)		Unsigned 16 bit
1539		Status Register	Input mA > 22 mA	0	1	Unsigned 16 bit
1540			Fault +18 V	0	1	Unsigned 16 bit

Tab. 64: Input Measurement (mA Input)

18.8 Configuration Relay 1 Output

Address	Read Command	Description	Value	Description	Data Type	Notes
3000	Read Input Register [Function 04]	Link Function Relay	0	OFF	Unsigned 16 bit	
			1	TEMPERATURE		
			2	MEASUREMENT SLOT A		
3001		Type Function Relay	0	ON_OFF	Unsigned 16 bit	if LINK = OFF Return error
			1	Timed		
			2	Pulse length		

18.8.1 Relay 1 Link Function (Temperature Measurement)

Address	Read Command	Write Command	Description	°C		°F		Data Type
				Min.	Max.	Min.	Max.	
3100	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	-500	1500	580	3020	Signed 32 bit
3101			Setpoint H					
3102			Setpoint Dec.	1	1	0	0	Unsigned 16 bit
3103		Write Multiple Registers [Function 16] Length = 1	Type	0 (High)	1 (Low)	0 (High)	1 (Low)	Unsigned 16 bit

18.8.2 Relay 1 Link Function (pH/Redox Measurement)

Address	Read Command	Write Command	Description	pH		mV		Data Type
				Min.	Max.	Min.	Max.	
3100	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	0	1400	-2000	2000	Signed 32 bit
3101			Setpoint H					
3102			Setpoint Dec.	2	2	0	0	Unsigned 16 bit
3103		Write Multiple Registers [Function 16] Length = 1	Type	0 (Acid)	1 (Alka)	0 (High)	1 (Low)	Unsigned 16 bit

18.8.3 Relay 1 Link Function (Conductivity Measurement)

Address	Read Command	Write Command	Description	Min.	Max.	Data Type
3100	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	0	99999	Signed 32 bit
3101			Setpoint H			
3102			Setpoint Dec.	0	4	Unsigned 16 bit
3103		Write Multiple Registers [Function 16] Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit

18.8.4 Relay 1 Link Function (mA Input Measurement)

Address	Read Command	Write Command	Description	Min.	Max.	Data Type
3100	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	-99999	99999	Signed 32 bit
3101			Setpoint H			
3102			Setpoint Dec.	0	4	Unsigned 16 bit
3103		Write Multiple Registers [Function 16] Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit

18.9 Configuration Relay 2 Output

Address	Read Command	Description	Value	Description	Data Type	Notes
3002	Read Input Register [Function 04]	Link Function Relay	0	OFF	Unsigned 16 bit	
			1	TEMPERATURE		
			2	MEASUREMENT SLOT A		
3003		Type Function Relay	0	ON_OFF	Unsigned 16 bit	if LINK = OFF Return error
			1	Timed		
			2	Pulse length		

18.9.1 Relay 2 Link Function (Temperature Measurement)

Address	Read Command	Write Command	Description	°C		°F		Data Type
				Min.	Max.	Min.	Max.	
3200	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	-500	1500	-580	3020	Signed 32 bit
3201			Setpoint H					
3202			Setpoint Dec.	1	1	0	0	Unsigned 16 bit
3203		Write Multiple Registers [Function 16] Length = 1	Type	0 (High)	1 (Low)	0 (High)	1 (Low)	Unsigned 16 bit

18.9.2 Relay 2 Link Function (pH/Redox Measurement)

Address	Read Command	Write Command	Description	pH		mV		Data Type
				Min.	Max.	Min.	Max.	
3200	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	0	1400	-2000	2000	Signed 32 bit
3201			Setpoint H					
3202			Setpoint Dec.	2	2	0	0	Unsigned 16 bit
3203		Write Multiple Registers [Function 16] Length = 1	Type	0 (Acid)	1 (Alka)	0 (High)	1 (Low)	Unsigned 16 bit

18.9.3 Relay 2 Link Function (Conductivity Measurement)

Address	Read Command	Write Command	Description	Min.	Max.	Data Type
3200	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	0	99999	Signed 32 bit
3201			Setpoint H			
3202			Setpoint Dec.	0	4	Unsigned 16 bit
3203		Write Multiple Registers [Function 16] Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit

18.9.4 Relay 2 Link Function (mA Input Measurement)

Address	Read Command	Write Command	Description	Min.	Max.	Data Type
3200	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	-99999	99999	Signed 32 bit
3201			Setpoint H			
3202			Setpoint Dec.	0	4	Unsigned 16 bit
3203		Write Multiple Registers [Function 16] Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit

18.10 Configuration Relay 3 Output

Address	Read Command	Description	Value	Description	Data Type	Notes				
3004		Link Function Relay	0	OFF	Unsigned 16 bit					
			1	TEMP.						
			2	MEASURE- MENT SLOT A						
			4	ALARM						
3005	Read Input Register [Function 04]	Type Function Relay	TEMPERATURE		MEASUREMENT SLOT A		ALARM		Data Type	Notes
			0	ON_OFF	0	ON_OFF	0	Relay1	Unsigned 16 bit	if LINK = OFF Return error
			1	Timed	1	Timed	1	Relay 2		
			2	Pulse length	2	Pulse length				
					3	Sensor cleaning				

18.10.1 Relay 3 Link Function (Temperature Measurement)

Address	Read Command	Write Command	Description	°C		°F		Data Type
				Min.	Max.	Min.	Max.	
3300	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	-500	1500	-580	3020	Signed 32 bit
3301			Setpoint H					
3302			Setpoint Dec.	1	1	0	0	Unsigned 16 bit
3303		Write Multiple Registers [Function 16] Length = 1	Type	0 (High)	1 (Low)	0 (High)	1 (Low)	Unsigned 16 bit

18.10.2 Relay 3 Link Function (pH/Redox Measurement)

Address	Read Command	Write Command	Description	pH		mV		Data Type
				Min.	Max.	Min.	Max.	
3300	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	0	1400	-2000	2000	Signed 32 bit
3301			Setpoint H					
3302			Setpoint Dec.	2	2	0	0	Unsigned 16 bit
3303		Write Multiple Registers [Function 16] Length = 1	Type	0 (Acid)	1 (Alka)	0 (High)	1 (Low)	Unsigned 16 bit

18.10.3 Relay 3 Link Function (Conductivity Measurement)

Address	Read Command	Write Command	Description	Min.	Max.	Data Type
3300	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	0	99999	Signed 32 bit
3301			Setpoint H			
3302			Setpoint Dec.	0	4	Unsigned 16 bit
3303		Write Multiple Registers [Function 16] Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit

18.10.4 Relay 3 Link Function (mA Input Measurement)

Address	Read Command	Write Command	Description	Min.	Max.	Data Type
3200	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	-99999	99999	Signed 32 bit
3201			Setpoint H			
3202			Setpoint Dec.	0	4	Unsigned 16 bit
3203		Write Multiple Registers [Function 16] Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit

18.10.5 Relay 3 Link Function (Cleaning the Sensor for Measurement A)

Address	Read Command	Write Command	Description	Min.	Max.	Data Type
3333	Read Input Register [Function 04]	Cleaning Time L	0	3659	Unsigned 32 bit	Seconds
3334		Cleaning Time H				
3335		Stabilisation Delay L	0	3659	Unsigned 32 bit	Seconds
3336		Stabilisation Delay H				
3337		Wait for New Cleaning L	0	5999	Unsigned 32 bit	Minutes
3338		Wait for Next Cleaning H				

18.11 Configuration Relay 4 Output

Ad- dress	Read Com- mand	Description	Value	Description	Data Type	Notes				
3006		Link Function Relay	0	OFF	Un- signed16 bit					
			1	TEMP.						
			2	MEASUREMENT SLOT A						
			4	ALARM						
3007	Read Input Register [Function 04]	Type Function Relay	TEMPERATURE		MEASUREMENT SLOT A		ALARM		Data Type	Notes
			0	ON_OFF	0	ON_OFF	0	Relay1	Unsigned 16 bit	if LINK = OFF Return error
			1	Timed	1	Timed	1	Relay 2		
			2	Pulse length	2	Pulse length				

18.11.1 Relay 4 Link Function (Temperature Measurement)

Address	Read Command	Write Command	Description	°C		°F		Data Type
				Min.	Max.	Min.	Max.	
3400	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	-500	1500	-580	3020	Signed 32 bit
3401			Setpoint H					
3402			Setpoint Dec.	1	1	0	0	Unsigned 16 bit
3403		Write Multiple Registers [Function 16] Length = 1	Type	0 (High)	1 (Low)	0 (High)	1 (Low)	Unsigned 16 bit

18.11.2 Relay 4 Link Function (pH/Redox Measurement)

Address	Read Command	Write Command	Description	pH		mV		Data Type
				Min.	Max.	Min.	Max.	
3400	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	0	1400	-2000	2000	Signed 32 bit
3401			Setpoint H					
3402			Setpoint Dec.	2	2	0	0	Unsigned 16 bit
3403		Write Multiple Registers [Function 16] Length = 1	Type	0 (Acid)	1 (Alka)	0 (High)	1 (Low)	Unsigned 16 bit

18.11.3 Relay 4 Link Function (Conductivity Measurement)

Address	Read Command	Write Command	Description	Min.	Max.	Data Type
3400	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	0	99999	Signed 32 bit
3401			Setpoint H			
3402			Setpoint Dec.	0	4	Unsigned 16 bit
3403		Write Multiple Registers [Function 16] Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit

18.11.4 Relay 4 Link Function (mA Input Measurement)

Address	Read Command	Write Command	Description	Min.	Max.	Data Type
3400	Read Input Register [Function 04]	Write Multiple Registers [Function 16] Length = 3	Setpoint L	-99999	99999	Signed 32 bit
3401			Setpoint H			
3402			Setpoint Dec.	0	4	Unsigned 16 bit
3403		Write Multiple Registers [Function 16] Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit

18.12 Configuration SSR1 Output

Address	Read Command	Write Command	Value	Description	Data Type	Notes
3008	Read Input Register [Function 04]	Link Function SSR	0	OFF	Unsigned 16 bit	
			1	TEMPERATURE		
			2	MEASUREMENT SLOT A		

18.12.1 SSR1 Link Function (Temperature Measurement)

Address	Read Command	Write Multiple Registers [Function 16]	Description	°C		°F		Data Type	Notes
				Min.	Max.	Min.	Max.		
3500	Read Input Register [Function 04]	Length = 3	Setpoint L	-500	1500	-580	3020	Signed 32 bit	
3501			Setpoint H						
3502			Setpoint Dec.	1	1	1	1	Unsigned 16 bit	
3503		Length = 1	Type	0 (High)	1 (Low)	0 (High)	1 (Low)	Unsigned 16 bit	
3504		Length = 1	Max. Pulses	20	400	20	400	Unsigned 16 bit	Pulse/ minute
3505		Length = 1	Max. Pulses	1	100	1	100	Unsigned 16 bit	Pulse/ minute

18.12.2 SSR1 Link Function (pH/Redox Measurement)

Address	Read Command	Write Multiple Registers [Function 16]	Description	pH		mV		Data Type	Notes
				Min.	Max.	Min.	Max.		
3500	Read Input Register [Function 04]	Length = 3	Setpoint L	0	1400	-2000	2000	Signed 32 bit	
3501			Setpoint H						
3502			Setpoint Dec.	2	2	0	0	Unsigned 16 bit	
3503		Length = 1	Type	0 (Acid)	1 (Alka)	0 (High)	1 (Low)	Unsigned 16 bit	
3504		Length = 1	Max. Pulses	20	400	20	400	Unsigned 16 bit	Pulse/ minute
3505		Length = 1	Max. Pulses	1	100	1	100	Unsigned 16 bit	Pulse/ minute

18.12.3 SSR1 Link Function (Conductivity Measurement)

Address	Read Command	Write Multiple Registers [Function 16]	Description	Min.	Max.	Data Type	Notes
3500	Read Input Register [Function 04]	Length = 3	Setpoint L	0	99999	Signed 32 bit	
3501			Setpoint H				
3502			Setpoint Dec.	0	4	Unsigned 16 bit	
3503		Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit	
3504		Length = 1	Max. Pulses	20	400	Unsigned 16 bit	Pulse/minute
3505		Length = 1	Max. Pulses	1	100	Unsigned 16 bit	Pulse/minute

18.12.4 SSR1 Link Function (mA Input Measurement)

Address	Read Command	Write Multiple Registers [Function 16]	Description	Min.	Max.	Data Type	Notes
3500	Read Input Register [Function 04]	Length = 3	Setpoint L	-99999	99999	Signed 32 bit	
3501			Setpoint H				
3502			Setpoint Dec.	0	4	Unsigned 16 bit	
3503		Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit	
3504		Length = 1	Max. Pulses	20	400	Unsigned 16 bit	Pulse/minute
3505		Length = 1	Max. Pulses	1	100	Unsigned 16 bit	Pulse/minute

18.13 Configuration SSR2 Output

Address	Read Command	Write Command	Value	Description	Data Type	Notes
3010	Read Input Register [Function 04]	Link Function SSR	0	OFF	Unsigned 16 bit	
			1	TEMPERATURE		
			2	MEASUREMENT SLOT A		

18.13.1 SSR2 Link Function (Temperature Measurement)

Address	Read Command	Write Multiple Registers [Function 16]	Description	°C		°F		Data Type	Notes
				Min.	Max.	Min.	Max.		
3600	Read Input Register [Function 04]	Length = 3	Setpoint L	-500	1500	-580	3020	Signed 32 bit	
3601			Setpoint H						
3602			Setpoint Dec.	1	1	1	1	Unsigned 16 bit	
3603		Length = 1	Type	0 (High)	1 (Low)	0 (High)	1 (Low)	Unsigned 16 bit	
3604		Length = 1	Max. Pulses	20	400	20	400	Unsigned 16 bit	Pulse/minute
3605		Length = 1	Max. Pulses	1	100	1	100	Unsigned 16 bit	Pulse/minute

18.13.2 SSR2 Link Function (pH/Redox Measurement)

Address	Read Command	Write Multiple Registers [Function 16]	Description	pH		mV		Data Type	Notes
				Min.	Max.	Min.	Max.		
3600	Read Input Register [Function 04]	Length = 3	Setpoint L	0	1400	-2000	2000	Signed 32 bit	
3601			Setpoint H						
3602			Setpoint Dec.	2	2	0	0	Unsigned 16 bit	
3603		Length = 1	Type	0 (Acid)	1 (Alka)	0 (High)	1 (Low)	Unsigned 16 bit	
3604		Length = 1	Max. Pulses	20	400	20	400	Unsigned 16 bit	Pulse/minute
3605		Length = 1	Max. Pulses	1	100	1	100	Unsigned 16 bit	Pulse/minute

18.13.3 SSR2 Link Function (Conductivity Measurement)

Address	Read Command	Write Multiple Registers [Function 16]	Description	Min.	Max.	Data Type	Notes
3600	Read Input Register [Function 04]	Length = 3	Setpoint L	0	99999	Signed 32 bit	
3601			Setpoint H				
3602			Setpoint Dec.	0	4	Unsigned 16 bit	
3603		Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit	
3604		Length = 1	Max. Pulses	20	400	Unsigned 16 bit	Pulse/minute
3605		Length = 1	Max. Pulses	1	100	Unsigned 16 bit	Pulse/minute

18.13.4 SSR2 Link Function (mA Input Measurement)

Address	Read Command	Write Multiple Registers [Function 16]	Description	Min.	Max.	Data Type	Notes
3600	Read Input Register [Function 04]	Length = 3	Setpoint L	-99999	99999	Signed 32 bit	
3601			Setpoint H				
3602			Setpoint Dec.	0	4	Unsigned 16 bit	
3603		Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit	
3604		Length = 1	Max. Pulses	20	400	Unsigned 16 bit	Pulse/minute
3605		Length = 1	Max. Pulses	1	100	Unsigned 16 bit	Pulse/minute

18.14 Configuration mA1 Output

Address	Read Command	Description	Value	Description	Data Type
3012	Read Input Register [Function 04]	Link Function mA	0	OFF	Unsigned 16 bit
			1	TEMPERATURE	
			2	MEASUREMENT SLOT A	
3013		Type Function mA	0	Repeater [PID Off]	Unsigned 16 bit
			1	PID On	

18.14.1 mA1 Link Function (Temperature Measurement)

18.14.1.1 Type Function Repeater

Address	Read Command	Write Multiple Registers [Function 16]	Description	°C		°F		Data Type
				Min.	Max.	Min.	Max.	
3700	Read Input Register [Function 04]	Length = 3	Start mA L	-500	1500	-580	3020	Signed 32 bit
3701			Start mA H					
3702			Decimal Start mA	1	1	1	1	Unsigned 16 bit
3703		Length = 3	End mA L	-500	1500	-580	3020	Signed 32 bit
3704			End mA H					
3705			Decimal End mA	1	1	1	1	Unsigned 16 bit

18.14.1.2 Type Function PID

Address	Read Command	Write Multiple Registers [Function 16]	Description	°C		°F		Data Type
				Min.	Max.	Min.	Max.	
3708	Read Input Register [Function 04]	Length = 3	Setpoint L	-500	1500	-580	3020	Signed 32 bit
3709			Setpoint H					
3710			Setpoint Dec.	1	1	1	1	Unsigned 16 bit
3711		Length = 1	Type	0 (High)	1 (Low)	0 (High)	1 (Low)	Unsigned 32 bit

18.14.2 mA1 Link Function (pH/Redox Measurement)

18.14.2.1 Type Function Repeater

Address	Read Command	Write Multiple Registers [Function 16]	Description	pH		mV		Data Type
				Min.	Max.	Min.	Max.	
3700	Read Input Register [Function 04]	Length = 3	Start mA L	0	1400	-2000	2000	Signed 32 bit
3701			Start mA H					
3702			Decimal Start mA	2	2	0	0	Unsigned 16 bit
3703		Length = 3	End mA L	0	1400	-2000	2000	Signed 32 bit
3704			End mA H					
3705			Decimal End mA	2	2	0	0	Unsigned 16 bit

18.14.2.2 Type Function PID

Address	Read Command	Write Multiple Registers [Function 16]	Description	pH		mV		Data Type
				Min.	Max.	Min.	Max.	
3708	Read Input Register [Function 04]	Length = 3	Setpoint L	0	1400	-2000	2000	Signed 32 bit
3709			Setpoint H					
3710			Setpoint Dec.	2	2	0	0	Unsigned 16 bit
3711		Length = 1	Type	0 (Acid)	1 (Alka)	0 (High)	1 (Low)	Unsigned 16 bit

18.14.3 mA1 Link Function (Conductivity Measurement)

18.14.3.1 Type Function Repeater

Address	Read Command	Write Multiple Registers [Function 16]	Description	Min.	Max.	Data Type
3700	Read Input Register [Function 04]	Length = 3	Start mA L	0	99999	Signed 32 bit
3701			Start mA H			
3702			Decimal Start mA	0	4	Unsigned 16 bit
3703		Length = 3	End mA L	0	99999	Signed 32 bit
3704			End mA H			
3705			Decimal End mA	0	4	Unsigned 16 bit

18.14.3.2 Type Function PID

Address	Read Command	Write Multiple Registers [Function 16]	Description	Min.	Max.	Data Type
3708	Read Input Register [Function 04]	Length = 3	Setpoint L	0	999999	Signed 32 bit
3709			Setpoint H			
3710			Setpoint Dec.	0	4	Unsigned 16 bit
3711		Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit

18.14.4 mA1 Link Function (mA Input Measurement)

18.14.4.1 Type Function Repeater

Address	Read Command	Write Multiple Registers [Function 16]	Description	Min.	Max.	Data Type
3700	Read Input Register [Function 04]	Length = 3	Start mA L	-99999	99999	Signed 32 bit
3701			Start mA H			
3702			Decimal Start mA	0	4	Unsigned 16 bit
3703		Length = 3	End mA L	-99999	99999	Signed 32 bit
3704			End mA H			
3705			Decimal End mA	0	4	Unsigned 16 bit

18.14.4.2 Type Function PID

Address	Read Command	Write Multiple Registers [Function 16]	Description	Min.	Max.	Data Type
3708	Read Input Register [Function 04]	Length = 3	Setpoint L	-99999	999999	Signed 32 bit
3709			Setpoint H			
3710			Setpoint Dec.	0	4	Unsigned 16 bit
3711		Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit

18.15 Configuration mA2 Output

Address	Read Command	Description	Value	Description	Data Type
3014	Read Input Register [Function 04]	Link Function mA	0	OFF	Unsigned 16 bit
			1	TEMPERATURE	
			2	MEASUREMENT SLOT A	
3015		Type Function mA	0	Repeater [PID Off]	Unsigned 16 bit
			1	PID On	

18.15.1 mA2 Link Function (Temperature Measurement)

18.15.1.1 Type Function Repeater

Address	Read Command	Write Multiple Registers [Function 16]	Description	°C		°F		Data Type
				Min.	Max.	Min.	Max.	
3800	Read Input Register [Function 04]	Length = 3	Start mA L	-500	1500	-580	3020	Signed 32 bit
3801			Start mA H					
3802			Decimal Start mA	1	1	1	1	Unsigned 16 bit
3803		Length = 3	End mA L	-500	1500	-580	3020	Signed 32 bit
3804			End mA H					
3805			Decimal End mA	1	1	1	1	Unsigned 16 bit

18.15.1.2 Type Function PID

Address	Read Command	Write Multiple Registers [Function 16]	Description	°C		°F		Data Type
				Min.	Max.	Min.	Max.	
3808	Read Input Register [Function 04]	Length = 3	Setpoint L	-500	1500	-580	3020	Signed 32 bit
3809			Setpoint H					
3810			Setpoint Dec.	1	1	1	1	Unsigned 16 bit
3811		Length = 1	Type	0 (High)	1 (Low)	0 (High)	1 (Low)	Unsigned 32 bit

18.15.2 mA2 Link Function (pH/Redox Measurement)

18.15.2.1 Type Function Repeater

Address	Read Command	Write Multiple Registers [Function 16]	Description	pH		mV		Data Type
				Min.	Max.	Min.	Max.	
3800	Read Input Register [Function 04]	Length = 3	Start mA L	0	1400	-2000	2000	Signed 32 bit
3801			Start mA H					
3802			Decimal Start mA	2	2	0	0	Unsigned 16 bit
3803		Length = 3	End mA L	0	1400	-2000	2000	Signed 32 bit
3804			End mA H					
3805			Decimal End mA	2	2	0	0	Unsigned 16 bit

18.15.2.2 Type Function PID

Address	Read Command	Write Multiple Registers [Function 16]	Description	pH		mV		Data Type
				Min.	Max.	Min.	Max.	
3808	Read Input Register [Function 04]	Length = 3	Setpoint L	0	1400	-2000	2000	Signed 32 bit
3809			Setpoint H					
3810			Setpoint Dec.	2	2	0	0	Unsigned 16 bit
3811		Length = 1	Type	0 (Acid)	1 (Alka)	0 (High)	1 (Low)	Unsigned 16 bit

18.15.3 mA2 Link Function (Conductivity Measurement)

18.15.3.1 Type Function Repeater

Address	Read Command	Write Multiple Registers [Function 16]	Description	Min.	Max.	Data Type
3800	Read Input Register [Function 04]	Length = 3	Start mA L	0	99999	Signed 32 bit
3801			Start mA H			
3802			Decimal Start mA	0	4	Unsigned 16 bit
3803		Length = 3	End mA L	0	99999	Signed 32 bit
3804			End mA H			
3805			Decimal End mA	0	4	Unsigned 16 bit

18.15.3.2 Type Function PID

Address	Read Command	Write Multiple Registers [Function 16]	Description	Min.	Max.	Data Type
3808	Read Input Register [Function 04]	Length = 3	Setpoint L	0	999999	Signed 32 bit
3809			Setpoint H			
3810			Setpoint Dec.	0	4	Unsigned 16 bit
3811		Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit

18.15.4 mA2 Link Function (mA Input Measurement)

18.15.4.1 Type Function Repeater

Address	Read Command	Write Multiple Registers [Function 16]	Description	Min.	Max.	Data Type
3800	Read Input Register [Function 04]	Length = 3	Start mA L	-99999	99999	Signed 32 bit
3801			Start mA H			
3802			Decimal Start mA	0	4	Unsigned 16 bit
3803		Length = 3	End mA L	-99999	99999	Signed 32 bit
3804			End mA H			
3805			Decimal End mA	0	4	Unsigned 16 bit

18.15.4.2 Type Function PID

Address	Read Command	Write Multiple Registers [Function 16]	Description	Min.	Max.	Data Type
3808	Read Input Register [Function 04]	Length = 3	Setpoint L	0	999999	Signed 32 bit
3809			Setpoint H			
3810			Setpoint Dec.	0	4	Unsigned 16 bit
3811		Length = 1	Type	0 (High)	1 (Low)	Unsigned 16 bit

19 Glossary

Due to the size of the display, some abbreviations are used, which are explained in the following table:

Abbreviation	Explanation
Xp	Proportional range (P)
Tn	Integral time (I)
Tv	Derivative time (D)
Hist.	Hysteresis
OFA	Overfeed alarm
Delay Start	Delay time for relay activation
Relay End	Delay time for relay deactivation
OverRng	Overrange
Namur Alr	NAMUR alarm
OFA (t)	Overrange alarm (time)
Persist.	Measurement persistence alarm (time)

Tab. 65: Glossary

20 EC Declaration of Conformity



(DE) EU-Konformitätserklärung

Hiermit erklären wir, dass das nachfolgend bezeichnete Gerät aufgrund seiner Konzipierung und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den einschlägigen grundlegenden Sicherheits- und Gesundheitsanforderungen der aufgeführten EU-Richtlinien entspricht. Bei einer nicht mit uns abgestimmten Änderung am Gerät verliert diese Erklärung ihre Gültigkeit.

(EN) EU Declaration of Conformity

We hereby certify that the device described in the following complies with the relevant fundamental safety and sanitary requirements and the listed EU regulations due to the concept and design of the version sold by us.

If the device is modified without our consent, this declaration loses its validity.

(FR) Déclaration de conformité UE

Nous déclarons sous notre propre responsabilité que le produit ci-dessous mentionné répond aux exigences essentielles de sécurité et de santé des directives UE énumérées aussi bien sur le plan de sa conception et de son type de construction que du modèle que nous avons mis en circulation.

Cette déclaration perdra sa validité en cas d'une modification effectuée sur le produit sans notre accord explicite.

(ES) Declaración de conformidad UE

Por la presente declaramos que, dados la concepción y los aspectos constructivos del modelo puesto por nosotros en circulación, el aparato mencionado a continuación cumple con los requisitos sanitarios y de seguridad vigentes de las directivas de la U.E. citadas a continuación.

Esta declaración será invalida por cambios en el aparato realizados sin nuestro consentimiento.

(PT) Declaração de conformidade UE

Declaramos pelo presente documento que o equipamento a seguir descrito, devido à sua concepção e ao tipo de construção daí resultante, bem como a versão por nós lançada no mercado, cumpre as exigências básicas aplicáveis de segurança e de saúde das directivas CE indicadas.

A presente declaração perde a sua validade em caso de alteração ao equipamento não autorizada por nós.

Bezeichnung des Gerätes:

Einkanalregler

Description of the unit:

Single-Channel Controller

Désignation du matériel:

Régulateur monocanal

Descripción de la mercancía:

Regulador de un canal

Designação do aparelho:

Regulador de canal único

Typ:

TOPAX L

Type:

EU-Richtlinien:

2014/30/EU LVD

2014/30/EU LVD

EU directives:

2014/35/EU EMC

2014/35/EU EMC

2011/65/EU ROHS und 2015/863/EU zur Änderung des Anhangs II der Richtlinie 2011/65/EU des Europäischen Parlaments und des Rates in Bezug auf Stoffe mit Nutzungseinschränkungen.

2011/65/EU ROHS and 2015/863/EU amending Annex II of Directive 2011/65/EU of the European Parliament and of the Council regarding the list of substances with usage restrictions.

Der Regler samt seiner Teile und seinem Zubehör entspricht den Anforderungen der Richtlinie 2011/65/EU, Anhang II, mit besonderem Hinweis auf die Begrenzung der folgenden Stoffe: Blei (Pb), Quecksilber (Hg), Cadmium (Cd), sechswertiges Chrom (Cr VI), polybromierte Biphenyle (PBB), polybromierte Diphenylether (PBDE), Bis(2-Ethylhexyl)phthalat (DEHP), Benzylbutylphthalat (BBP), Dibutylphthalat (DBP) und Diisobutylphthalat (DIBP).

The controller, incl. its parts and accessories, is built to the requirements of the directive 2011/65/EU, Annex II, with particular reference to the limitation of the following substances: Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent chromium (Cr VI), Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), Bis(2-Ethylhexyl) phthalate (DEHP), Benzyl butyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP).

Harmonisierte Normen:

EN 61010-1: 2010 + A1:2019

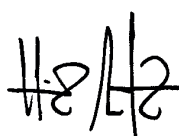
Harmonized standards:

EN 61326-1: 2021

Dokumentationsbevollmächtigter:

Lutz-Jesco GmbH

Authorized person for documentation:



Heinz Lutz
Geschäftsführer / Chief Executive Officer
Lutz-Jesco GmbH
Wedemark, 04.09.2023

Lutz-Jesco GmbH
Am Bostelberge 19
30900 Wedemark
Germany

21 Warranty Claim

Warranty claim

Please copy and send it back with the unit!

If the device breaks down within the period of warranty, please return it in a cleaned condition with the complete warranty claim.

Sender

Company: Phone: Date:

Address:

Contact person:

Manufacturer order no.: Date of delivery:.....

Device type: Serial number:

Nominal capacity / nominal pressure:

Description of fault:.....

.....

.....

.....

.....

.....

.....

Service conditions of the device

Point of use / system designation:.....

.....

.....

Accessories used (suction line etc.):.....

.....

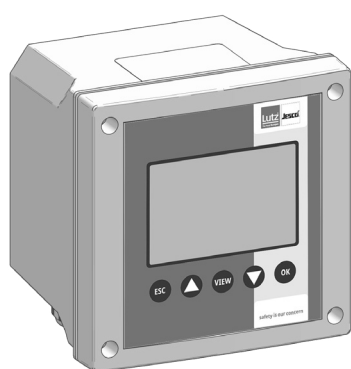
.....

.....

Commissioning (date):

Duty period (approx. operating hours):

Please describe the specific installation and enclose a simple drawing or picture of the chemical feed system, showing materials of construction, diameters, lengths and heights of suction and discharge lines.



Lutz-Jesco GmbH

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Operating instructions
Single-Channel Controller **TOPAX[®] L**