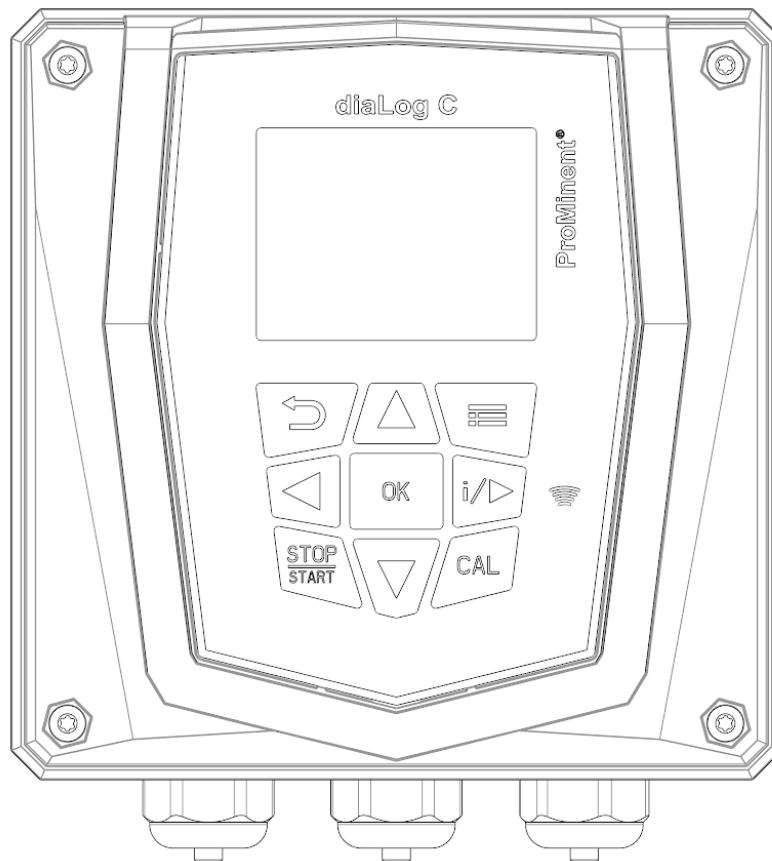


Operating instructions

diaLog C

DULCOMETER

en



Target group: Instructed user

**Please carefully read these operating instructions before use. · Do not discard.
The operator shall be liable for any damage caused by installation or operating errors.
The latest version of the operating instructions are available on our homepage.**

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1 About this document

General information regarding gender equality

This document uses the masculine form in a neutral sense in accordance with grammar rules in order to make the text easier to read. It always refers to women and men equally. We ask female readers for their understanding regarding this simplification in the text.

General information

The document must remain available at the product's place of use at all times.

The local regulations must be observed.

We reserve the right to make changes to the information and figures in this document due to technical developments. This document is not subject to an update service. The current issue can be obtained from the manufacturer.

Reprints, translations and reproductions in any form, including extracts, are only permissible with the written consent of the manufacturer.

Further applicable documentation

In connection with this document, all documents supplied with the product must be observed, in particular (if applicable):

- Documentation for the components installed
- Data sheets
- Part lists
- Technical drawings
- Circuit diagrams/wiring diagrams/flow charts

Requirements for personnel

This document is intended for use by qualified and instructed persons, and qualified electrical technicians.

This document must be read, understood and used by any person who is authorised to work on or with the product.

This document is intended for persons who are responsible for the following activities on the product:

- Transport
- Assembly
- Commissioning
- Operation
- Servicing
- Decommissioning
- Disposal

The activities described require basic mechanical, hydraulic, pneumatic and electrical knowledge as well as knowledge of the associated technical terms. To ensure operational safety, these activities may therefore only be carried out by appropriately specialist personnel. The product can be operated by an instructed person under the supervision of specialist personnel.

Specialist personnel must be familiar with the applicable legal regulations, directives and safety technology standards and must be able to implement them in practice. In addition, specialist personnel must be able to recognise and avoid potential hazards.

All work on the electrical equipment of the product must be carried out by authorised electrical technicians exclusively.

Personnel must be trained and instructed on the product using this document.

1.1 Typographical conventions

Instructions

Instructions that represent an activity and must be executed in a specific order are displayed as a numbered list, e.g:

1. ➤ Step 1
2. ➤ Step 2

Instructions that represent an activity and can be executed in an undefined sequence are displayed as a list with bullet points, e.g:

- Activity 1
- Activity 2

Lists

Lists without a mandatory sequence are shown as a list with bullet points, e.g:

- Activity 1
- Activity 2

Cross-references

Cross-references refer to information (e.g. chapters) within this document.

Layout of figures

Some of the figures in this document are simplified or are approximations of the actual facts.

- The shape, size and number of components may differ from the actual configuration of the product.
- Some of the lines including hoses (fabric hoses, pneumatic hoses, electrical lines) are not shown.

Safety information

Safety information draws attention to dangers to individuals and are structured as follows:



DANGER!

This combination of signal and signal word identifies an imminently dangerous situation which will result in death or serious injury if it is not avoided.



WARNING!

This combination of signal and signal word identifies a possibly dangerous situation that can result in death or serious injuries if it is not avoided.



CAUTION!

This combination of signal and signal word identifies a possibly dangerous situation that can result in moderate or minor injuries if it is not avoided.

Reference to possible material damage



NOTICE!

This signal word identifies a possibly dangerous situation that can result in property damage or harm to the environment if it is not avoided.

Reference to important information



This symbol indicates important information that must be observed to ensure trouble-free and efficient use of the product.

1.2 Warranty and liability

The general terms and conditions of sale and delivery of ProMinent GmbH apply.

2 Safety information

2.1 General safety information

**WARNING!****Unauthorised access!**

Possible consequences: Death or extremely serious injuries

- Secure the device against unauthorised access

**WARNING!****Operating error!**

Possible consequences: Death or extremely serious injuries

- The device must be operated by suitably qualified and competent personnel exclusively
- Also observe the operating instructions for the controller and installation fittings, as well as any other assemblies such as sensors, sample water pump, etc.
- The operator is responsible for the qualification of the personnel

**WARNING!****Live parts!**

Possible consequences: Death or extremely serious injuries

- Before opening the housing, switch off the power supply to the device and secure it against an unintentional restart.
- Switch off the power supply to damaged, defective or manipulated devices and secure them against an unintentional restart.
- The installation of a suitable disconnecting device (emergency stop switch etc.) is the responsibility of the system operator.

**CAUTION!****Electronic faults**

Possible consequences: Damage to property up to and including destruction of the device

- The mains connection cable and data cable must not be laid together with cables that are subject to interference
- Take appropriate interference suppression measures by qualified personnel



NOTICE!

Faultless sensor function / run-in period, damage to the product or its environment

- Correct measuring and metering is only possible if the sensor function is working properly
- Sensor run-in periods must be strictly adhered to
- The run-in periods must be taken into account when planning the commissioning
- Running in the sensor can take an entire working day
- The operating instructions for the sensor must be observed



NOTICE!

Faultless sensor function, damage to the product or its environment

- Correct measuring and metering is only possible if the sensor function is working properly
- The sensor must be checked and calibrated regularly



NOTICE!

Adjustment of control deviations, damage to the product or its environment

- This controller cannot be used in control circuits that require rapid stabilisation (< 30s).

2.2 Intended use



NOTICE!

The controller is designed to measure and control liquid media. The measured variable is labelled on the controller and is absolutely binding. The controller may only be used in accordance with the technical data and specifications listed in these operating instructions and the operating instructions for the individual components (e.g. sensors, installation fittings, calibration devices, metering pumps, etc.). All other uses and conversion are forbidden.



Time constant > 30 seconds

The controller can be used in processes that have a time constant > 30 seconds.



Interference immunity

The device fulfils the interference immunity requirements of EN 61326-1 and is intended for use in industrial electromagnetic environments and in residential areas.

2.3 Network security

The product is suitable for use in networks. It is the responsibility of the user to take suitable security precautions for their own network and all components integrated into it and, in particular, to protect their computer systems and other systems appropriately against unauthorised access by third parties, as well as against viruses, malware and any other harmful elements. In particular, the user is obliged to set up a suitable firewall and, if possible, to use automatically generated passwords of sufficient length, which must be changed at regular intervals, or to take other suitable measures to establish or maintain network security. The operator/user should replace all default passwords with suitable and sufficiently secure passwords during commissioning. Responsibility for network security lies with the system operator. In particular, ProMinent shall not be liable for any consequences resulting from inadequate security precautions and the possible misuse of the user's authorisation features.

2.4 User qualification



WARNING!

Danger of injury with inadequately qualified personnel

The operator of the system / equipment is responsible for ensuring that all qualifications are complied with. If inadequately qualified personnel work on the equipment or loiter in the hazard zone of the equipment, this could result in dangers that could cause serious injuries and material damage.

- Ensure that all work on the equipment is therefore only performed by qualified personnel.
- Keep unqualified personnel away from the hazard zone.

All pertinent accident prevention regulations, as well as all other generally acknowledged safety regulations, must be adhered to.

Training	Definition
Instructed person	An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to them and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.
Trained user	A trained user is a person who fulfils the requirements expected of an instructed person and who has also received additional training specific to the system from the manufacturer or another authorised distribution partner.
Trained, qualified employee	A trained, qualified employee is deemed to be a person who is able to assess the tasks assigned to them and recognise possible hazards based on their training, knowledge and experience, as well as knowledge of the pertinent regulations. A trained, qualified employee must be able to perform the tasks assigned to them independently with the assistance of drawing documentation and parts lists. The assessment of a person's technical training can also be based on several years of work in the relevant field.
Electrical technician	An electrical technician is able to complete work on electrical systems and recognise and avoid possible dangers independently based on their technical training and experience as well as knowledge of the pertinent standards and regulations. An electrical technician must be able to perform the tasks assigned to them independently with the assistance of drawing documentation, parts lists, terminal and circuit diagrams. The electrical technician must be specifically trained for the working environment in which they are employed and be conversant with the relevant standards and regulations.
Service	Service refers to service technicians, who have received proven training and have been authorised by the manufacturer to work on the system.

3 Product description

The DULCOMETER diaLog C controller is our compact all-rounder for analysing water. With its special functions, e.g. Processing of interference variables and switchover of control parameters, it closes the control circuit between DULCOTEST sensors and ProMinent metering pumps. The measurement and control channels of the DULCOMETER diaLog C can be individually configured according to customer requirements. Everything you need for the reliable treatment of industrial and process water, drinking water and swimming pool water.

3.1 Intended use

The following list is a general representation of suitable applications for this product. Please contact your personal point of contact to discuss the use of the product in your individual application.

- Measurement and control of water parameters in treatment plants for industrial and process water
- Monitoring the water parameters of drinking water
- Measurement of pH value and disinfection parameters in the food and beverage industry
- Measurement and control of hygiene parameters in swimming pools
- Monitoring the chlorine dioxide concentration in systems for legionella control and prevention, e.g. in schools, hotels or hospitals
- Measurement of the disinfection parameters of irrigation and sprinkling water in horticulture

3.2 General view

Controller

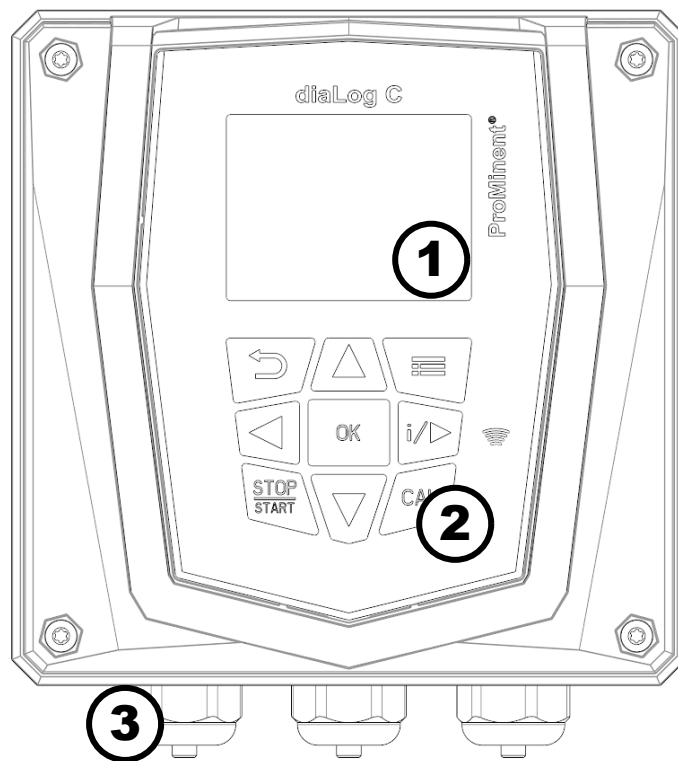


Fig. 1: diaLog C controller

- 1 Screen
- 2 Keys
- 3 Threaded connectors

3.3 Nameplate

The nameplate is located on the side of the controller.

The nameplate contains all essential device information such as the identity code, serial number, electrical connection data and relevant approvals and degrees of protection.

It is used to uniquely identify the device and is required for service, ordering spare parts and technical queries.

The QR code on the type code leads to the ProMinent service page, where further information about the product can be found.



NOTICE!

Illegible nameplate

If necessary, wipe the surface of the device with a damp microfibre cloth.

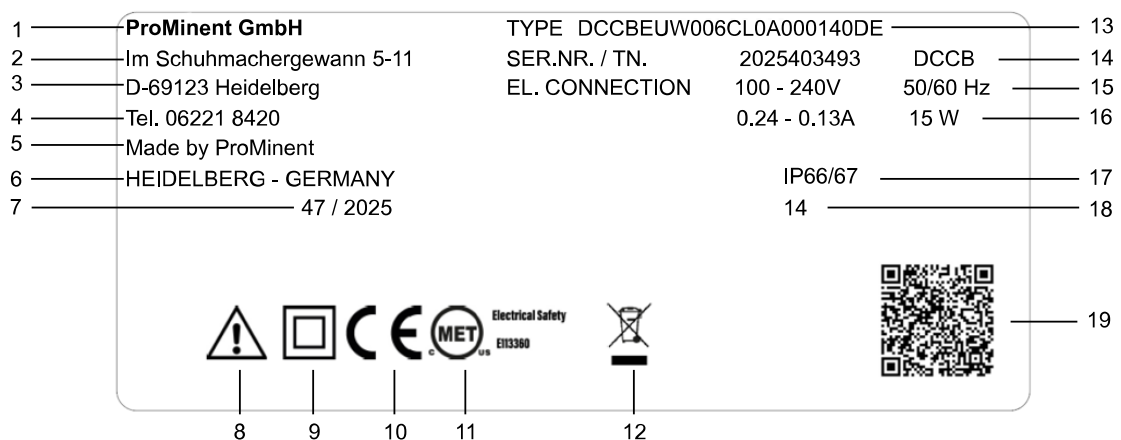


Fig. 2: diaLogC nameplate

- | | | | |
|----|--|----|---|
| 1 | Company name and legal form | 11 | MET mark |
| 2 | Address: Street | 12 | WEEE disposal symbol |
| 3 | Address: Town/city | 13 | Device identification code |
| 4 | Telephone number without country code | 14 | Device serial number |
| 5 | Manufacturer | 15 | Voltage and frequency of the power supply |
| 6 | Place of manufacture: Town/city/country | 16 | Current consumption and power |
| 7 | Date of manufacture: Week/year | 17 | Protection class |
| 8 | Warning sign: Observe the operating instructions | 18 | Approval number |
| 9 | Protection class | 19 | QR code |
| 10 | CE mark | | |

3.4 Identity code

Tab. 1: Identity code diaLog C

CON- STRUC- TION	Product range	
	DCCB	
	Regional design	
	EU	Europe
	Mounting type	
	W	Wall/pipe mounting IP66/67
	S	Control panel installation IP54
	Design	
	00	With ProMinent logo RAL5003
	Operating voltage	
	6	100 - 240 V, 50/60 Hz
	Measured variable	
	CL	Amperometric sensors (mA)
	PR	pH/ORP
	DM	Digit. sensor
	Connection of the measured variables	
	0	Internal to terminal
	Communication interface 1	
	0	Without
	Communication interface 2	
	0	Without
	Data logger	
	1	With data logger
	Software extension	
	0	None
	Certifications	
01	CE	
14	CE + UKCA	
Certificates		
0	None	
1	Calibration certificate	
Language		
DE	Deutsch	
EN	English	
BG	Bulgarian	
CS	Czech	

CON-STRUC-TION	Product range												
												DA	Danish
												EL	Greek
												ES	Spanish
												ET	Estonian
												FI	Finnish
												FR	French
												HR	Croatian
												HU	Hungarian
												IT	Italian
												JA	Japanese
												KO	Korean
												LT	Lithuanian
												LV	Latvian
												NL	Dutch
												PL	Polish
												PT	Portuguese
												RO	Romanian
												SK	Slovakian
												SL	Slovenian
												SR	Serbian
												SV	Swedish
												TH	Thai
												ZH	Chinese

3.5 Function

The product is a controller platform from ProMinent. The term *controller* is used throughout the rest of this document to refer to the product. The controller has been developed for the continuous measurement and control of liquid analysis parameters. For water treatment processes in environmental technology and industry. The controller can work together with conventional analogue sensors and actuators.

4 Storage and transport

4.1 Transport after delivery

To avoid damage, the product must be transported in its original packaging in dry conditions with the necessary care. For more information see *Process and operating conditions*.

The product may only be transported using a suitable means of transport (trolley, transport trolley, pallet truck, forklift).

If in doubt, please contact the manufacturer.

4.2 Inspection after transport

The product must be carefully unpacked immediately after delivery and checked for damage, completeness and correctness of the delivery.

If the packaging or contents are damaged, the device must not be commissioned. In this case, report the damage immediately to ProMinent GmbH or the responsible supplier.

In the event of transport damage, the damaged packaging must be retained. Photograph any damage and note it on the delivery note so that claims for compensation can be made against the transport company if necessary.

4.3 Scope of delivery



Scope of delivery may vary

The scope of delivery depends on the identification code.

Tab. 2: Scope of delivery

	Product	Part number	Number
Controller	DULCOMETER diaLog C	Identity code	1
	Set of cable glands		1
	Operating instructions	990731	1

4.4 Storage



NOTICE!

If the maximum storage period of 5 years is exceeded, damage to the product cannot be ruled out.

In this case, please return the sensor to the manufacturer for inspection or overhaul.

Otherwise, the function and measuring accuracy of the sensor are no longer guaranteed.

To avoid damage to the product, observe the following:

- Store the product in its original packaging
- Secure the product against movement
- Do not expose the product to extreme vibrations and shock loads
- Store in a dry and dust-free place
- Observe storage temperature
- Store indoors, protected from the weather
- Store away from aggressive and corrosive substances

For more details on the storage conditions, see chapter "Technical data".

4.5 Transport

The unpacked product must be transported in dry conditions with the necessary care. The product may only be transported using a suitable means of transport (trolley, transport trolley, pallet truck, forklift).

5 Assembly

5.1 Safety information



NOTICE!

Property damage

The hinge between the front and rear sections of the housing can only withstand low mechanical loads. Hold the upper part of the controller housing firmly when working on the controller.



NOTICE!

Property damage

- It is only permissible to perform the installation (electrical) after assembly (mechanical)
- Ensure easy accessibility for operation
- Secure and low-vibration mounting
- Avoid direct sunlight
- The permissible ambient temperature of the connected sensors and other components must be taken into account ↪ *Chapter 10 'Technical data' on page 71.*

5.2 Installation at the installation site



- *Mount the device in a favourable reading and operating position (preferably at eye level).*
- *Leave enough free space for the cables.*

5.2.1 Wall mounting

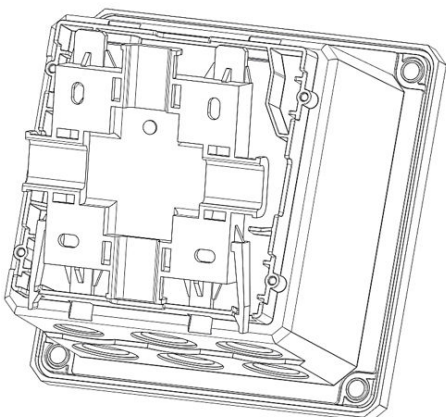
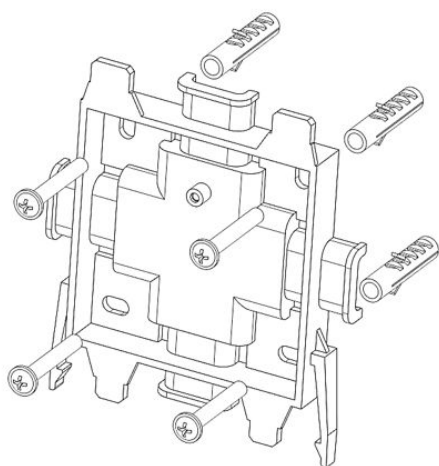


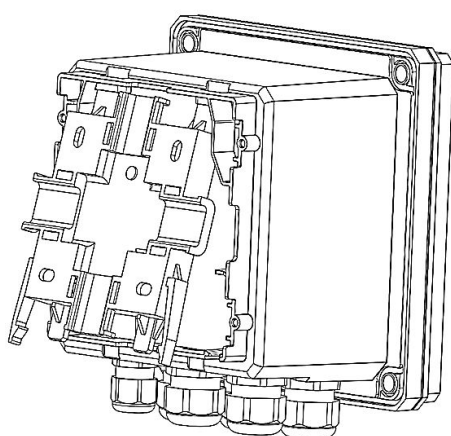
Fig. 3: Removing the surface mount bracket

1. ➤ Pull the two snap hooks outwards and push upwards
⇒ The surface mount bracket snaps down slightly.
2. ➤ Press the surface mount bracket down from the housing and fold the surface mount bracket away.
3. ➤ Mark out four drill holes, using the surface mount bracket as a drilling template.
4. ➤ Drill the holes: Ø 8 mm, depth = 50 mm.



5. ➔ Screw on the surface mount bracket with washers.

Fig. 4: Attaching the surface mount bracket



6. ➔ Hang the housing on the bottom of the surface mount bracket.
7. ➔ Press the housing lightly against the surface mount bracket from above.
8. ➔ Hook the DULCOMETER diaLog C controller into the top of the wall/tube retaining bracket and press lightly against the bottom of the wall/tube retaining bracket. Then press upwards until the DULCOMETER diaLog C controller audibly engages

Fig. 5: Fitting the surface mount bracket

5.2.2 Control panel installation

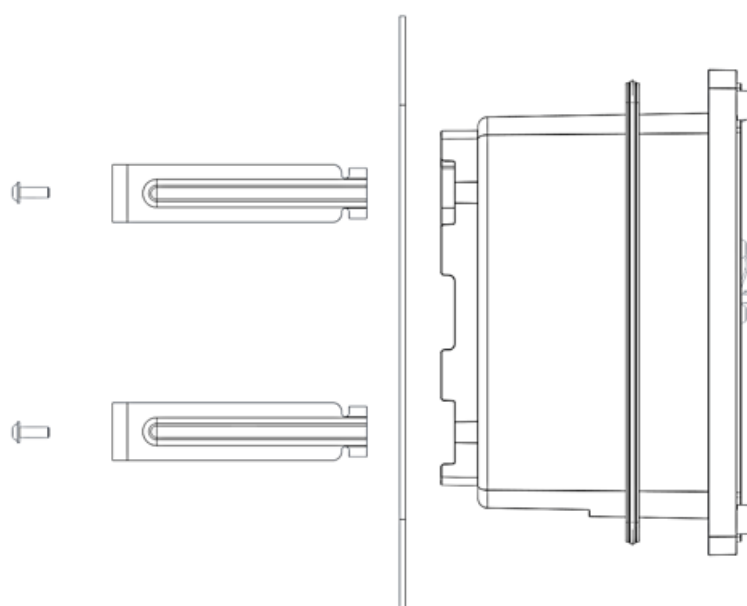


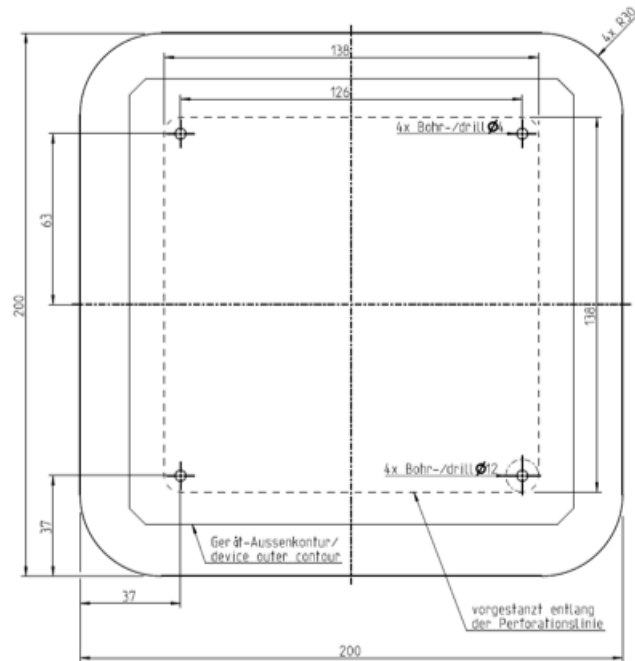
Fig. 6: Installation kit DCCb control panel installation (optional)

Dimensional deviation

- Photocopying the punching template may result in dimensional deviations.
- Use the dimensions and draw them on the control panel.

Material thickness of the control panel

- The material thickness of the control panel must be at least 2 mm to ensure secure fastening.



NOTICE!

The drawing is not to scale and is not subject to change within these operating instructions. The drawing is for information only.

There is a 4 mm wide projection on the circumference of the housing as a stop for the control panel, with an additional circumferential groove to accommodate a sealing cord. When mounting the control panel, the entire front of the housing protrudes approx. 35 mm from the control panel. It is mounted from the outside in a control panel cut-out provided for this purpose. The device is attached to the control panel from the inside using the mounting material.

1. ➤ Use the dimensions of the drilling template to mark the exact position of the device on the control panel.
2. ➤ Mark and drill the corners (drill diameter 12 to 13 mm).
3. ➤ Use a punching tool or jigsaw to make the cut-out according to the punching template drawing.
4. ➤ Deburr the cut edges and check that the sealing surfaces for the sealing cord are flat.



NOTICE!

Otherwise the sealing function is not guaranteed.

5. ➤ Press the sealing cord evenly into the circumferential groove of the device.
6. ➤ Insert the device into the control panel and secure it from behind using the retaining brackets and PT self-tapping screws.
 - ⇒ The device protrudes approx. 35 mm from the front of the control panel.

5.3 Electrical connection



WARNING!

Live parts!

Possible consequences: Death or extremely serious injuries

- Before opening the housing, switch off the power supply to the device and secure it against an unintentional restart.
- Switch off the power supply to damaged, defective or manipulated devices and secure them against an unintentional restart.
- The installation of a suitable disconnecting device (emergency stop switch etc.) is the responsibility of the system operator.



WARNING!

Live parts!

Possible consequences: Death or extremely serious injuries

- Before opening the housing, switch off the power supply to the device and secure it against an unintentional restart.
- Switch off the power supply to damaged, defective or manipulated devices and secure them against an unintentional restart.
- The installation of a suitable disconnecting device (emergency stop switch etc.) is the responsibility of the system operator.



NOTICE!

Fault

The signal leads of the controller must not be laid together with cables that are subject to interference. These faults can cause the controller to malfunction.

5.3.1 Specifications

- **User qualification, electrical installation:** Electrical technician ↪ *Chapter 2.4 'User qualification' on page 12*



WARNING!

Low voltage cable

Possible consequences: Death or extremely serious injuries.

The low-voltage cables used must have a temperature resistance of ≥ 70 °C and must not be flammable.

Details ↗ *Chapter 10 'Technical data' on page 71*

Moisture at the contact points:

- It is essential to take suitable design and technical measures to protect connectors, cables and terminals from moisture. Moisture at the contact points can impair the function of the device.

Live parts!

- Measure: Before carrying out assembly work, ensure that the device is free of electrical energy.
- Check the devices at regular intervals and disconnect any damaged, defective or manipulated devices from the electrical supply.
- The operator must install a suitable disconnecting device (e.g. IEC 60947-2 or IEC 60947-3).
- When switching off the device, the operator must ensure that the complete process remains safe.
- For the safety of the personnel and the devices, the operator should install a residual current circuit breaker (RCD) or other suitable measure.

Pollution degree 3

- When using the device in an area with pollution degree 3, the housing may only be opened (e.g. for installation or maintenance) under the following conditions:
- Ambient temperature from 5 °C to 40 °C.
- Maximum relative humidity 80% at temperatures up to 31 °C, with linear decrease to 50% relative humidity at 40 °C.

Residual current devices (RCD)

- An electrical disconnecting device and residual current devices (RCD) must be provided and installed by the operator in a suitable manner and must be easily accessible.

Electrical disconnecting device

- The device does not contain a disconnecting switch. There must be a switch or circuit breaker in the building installation. This switch must be suitably positioned, easily accessible to the user and labelled as a disconnecting device for the device.

Alarm/output relay (XR1)

- The alarm/output relay (XR1) must be fused on site with max. 5 A.

Signalling and control lines

- Signalling and control lines must be laid separately from lines carrying mains voltage, otherwise interference may occur.



NOTICE!

Nearby power cables

You must ensure that no lines touch a neighbouring circuit in the event of a fault.

- Solution: Strip the outer sheath of the cable as short as possible.
- Secure the wires with cable ties.

5.3.2 Conductor cross-sections and cable end sleeves

Tab. 3: Connectable conductors - terminal type 1 (XP1, XR1)

Component	Value
Stripping length (without cable end sleeve)	10 mm
Single core	min. 0.75 mm ² , max. 4 mm ² ; or min. AWG 18, max. AWG 12
Finely stranded	min. 0.75 mm ² , max. 2.5 mm ² ; or min. AWG 18, max. AWG 14
With cable end sleeve with collar:	min. 0.75 mm ² , max. 1.5 mm ² ; or min. AWG 18, max. AWG 16
With cable end sleeve:	min. 0.75 mm ² , max. 2.5 mm ² ; or min. AWG 18, max. AWG 14

Tab. 4: Connectable conductors - terminal type 2 (XBAM1, XA1, XA2, XK1, XK2, XA3)

Component	Value
Stripping length (without cable end sleeve)	10 mm
Single core	min. 0.2 mm ² , max. 1.5 mm ² ; or min. AWG 24, max. AWG 14
Finely stranded	min. 0.2 mm ² , max. 1.5 mm ² ; or min. AWG 24, max. AWG 14
With cable end sleeve with collar:	min. 0.25 mm ² , max. 0.75 mm ² ; or min. AWG 24, max. AWG 20
With cable end sleeve:	min. 0.25 mm ² , max. 1.5 mm ² ; or min. AWG 24, max. AWG 16

5.3.3 Fitting cable glands

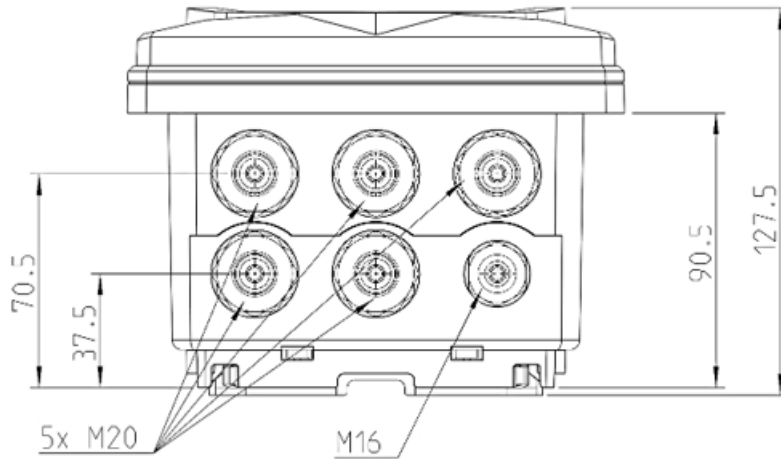


Fig. 7: diaLog C Threaded connectors

Threaded connector	Specification	Tightening torques
Union nut M16		3.0 Nm
Union nut M20		6.0 Nm

Included in the scope of delivery of the device is a set of cable glands with plugs, screw plugs and sealing rings in various sizes. These cable glands with union nuts are to be fitted by you as required and tightened with the tightening torques.

If you require more threaded connectors, you can order a set of cable glands with screw plugs, plugs and sealing rings in various sizes.

The device is tested for high-voltage resistance at the factory and securely packaged for transport. Make sure that no metal parts or other contaminants get into the device during installation, because this will impair the safe operation of the device.

ESD-sensitive components


Observe the basic principles of ESD protection during all work.

Close all open cable penetrations with cable glands or screw plugs and tighten these threaded connections.

Provide strain relief for the cables.

Seals and terminal diagram:

- Select the correct seals for the cable glands of the controller. Seal open holes with blanking plugs. This is the only way to ensure adequate sealing.
- Moisture in the controller can lead to malfunctions.
- Observe the instructions on the enclosed terminal diagrams.

1. ➤ Loosen the housing screws.
2. ➤ Pull the upper part of the housing forwards and insert it into the lower part of the housing in the park position.
3. ➤ Install the threaded connectors:
 - Fit the required number of cable glands with locknuts.
 - Seal the remaining holes with screw plugs.
 - Tighten the threaded connectors to the specified torque,  *Table on page 26.*
4. ➤ Insert the cable into the controller.
5. ➤ Connect the cable according to the terminal diagram
6. ➤ Tighten the clamping nut of the threaded connectors so that the threaded connectors are tight.
7. ➤ Attach the upper housing section to the lower housing section.
8. ➤ Tighten the housing screws hand-tight.
9. ➤



NOTICE!

Degree of protection IP 67 (surface mounting/pipe mounting) or IP 54 (control panel installation) (pollution degree 2/macro environment) is only achieved if the installation is correct.

Check the fit of the seals.

5.3.4 Terminal diagram

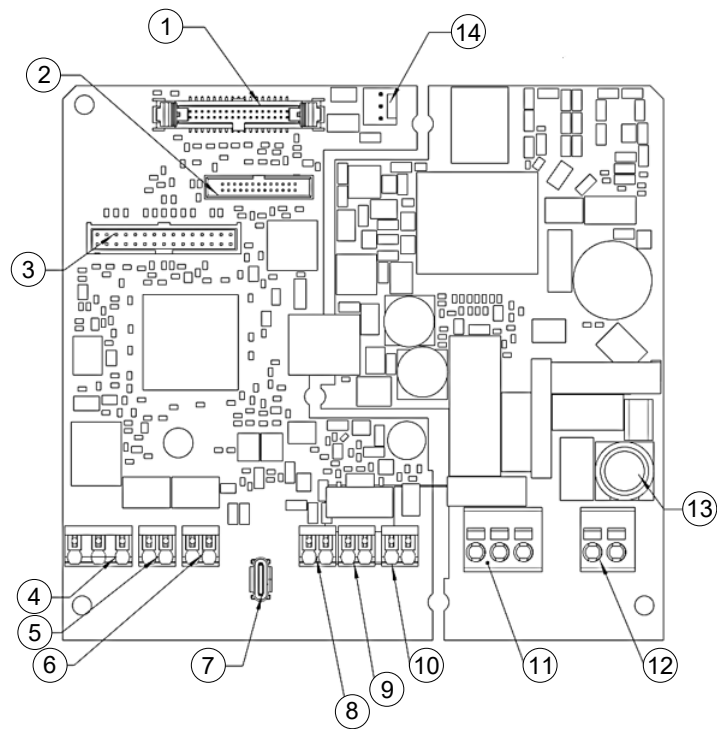


Fig. 8: Terminal diagram diaLog C

- | | | | |
|---|----------------------------------|----|------------------------------|
| 1 | Display / keyboard HMI | 8 | Digital input 1 - XK1 / DI1 |
| 2 | COM communication connection | 9 | Digital input 2 - XK2 / DI2 |
| 3 | MEAS measuring module connection | 10 | Analogue output 1 - XA3 / MA |
| 4 | XBAM1 / BAM | 11 | F-Relay - XR1 / REL1 |
| 5 | Digital output 1 - XA1 / DO1 | 12 | Power relay - XP1 / PWR |
| 6 | Digital output 2 - XA2 / DO2 | 13 | Fuse |
| 7 | XUSB1 / USB-C | 14 | Fan, 3-pole |

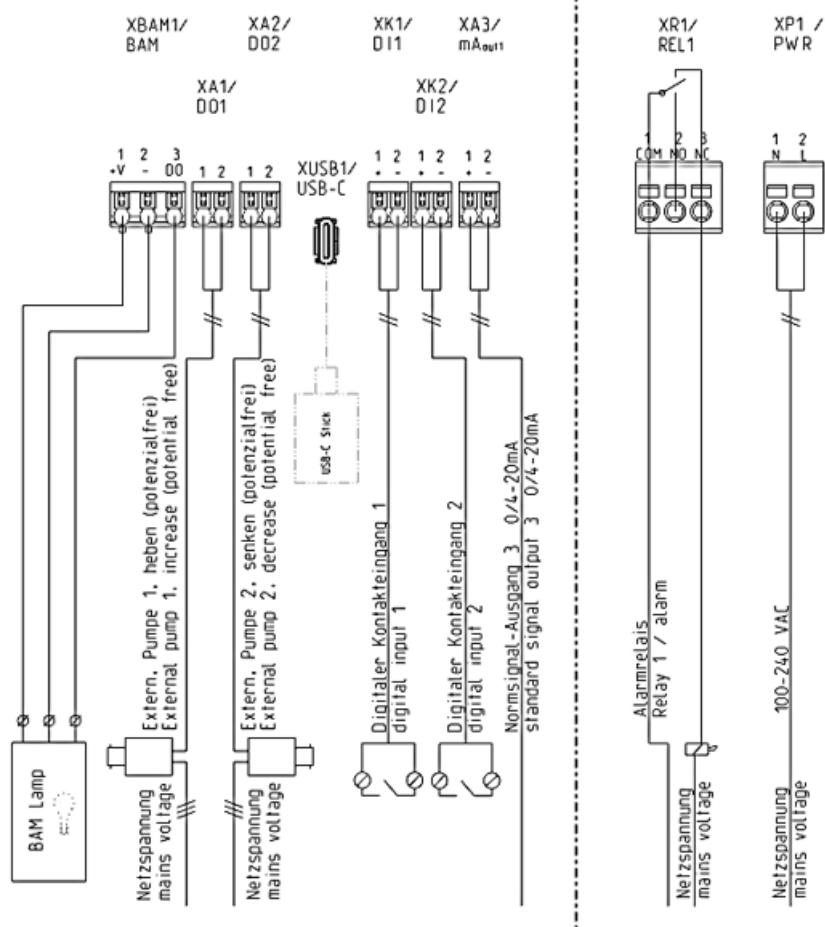


Fig. 9: Example connection

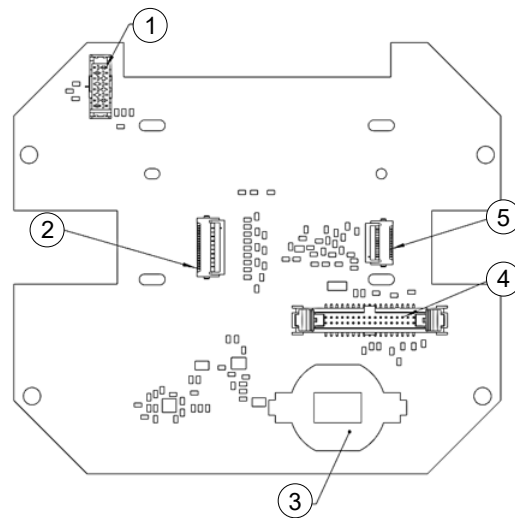


Fig. 10: Terminal diagram diaLog C

- 1 BLE connection
- 2 Keyboard connection
- 3 Battery
- 4 Processor module connection
- 5 Display connection

5.3.4.1 mV module terminal diagram

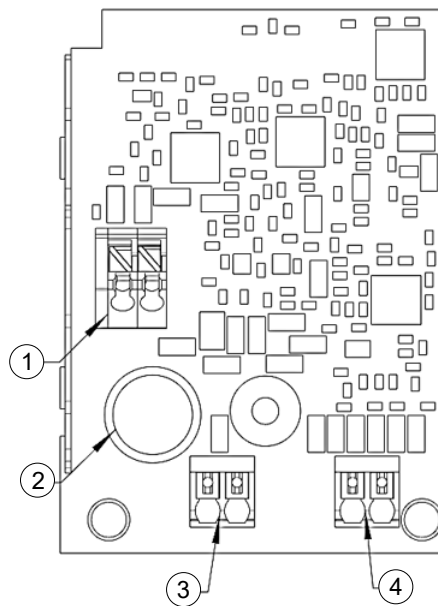


Fig. 11: Terminal diagram for mV module

- 1 ph/ORP connection - XE2
- 2 XE1 / shield clamp
- 3 Occupancy variant: jumper/ potential plug - XE3
- 4 XE4 / temp

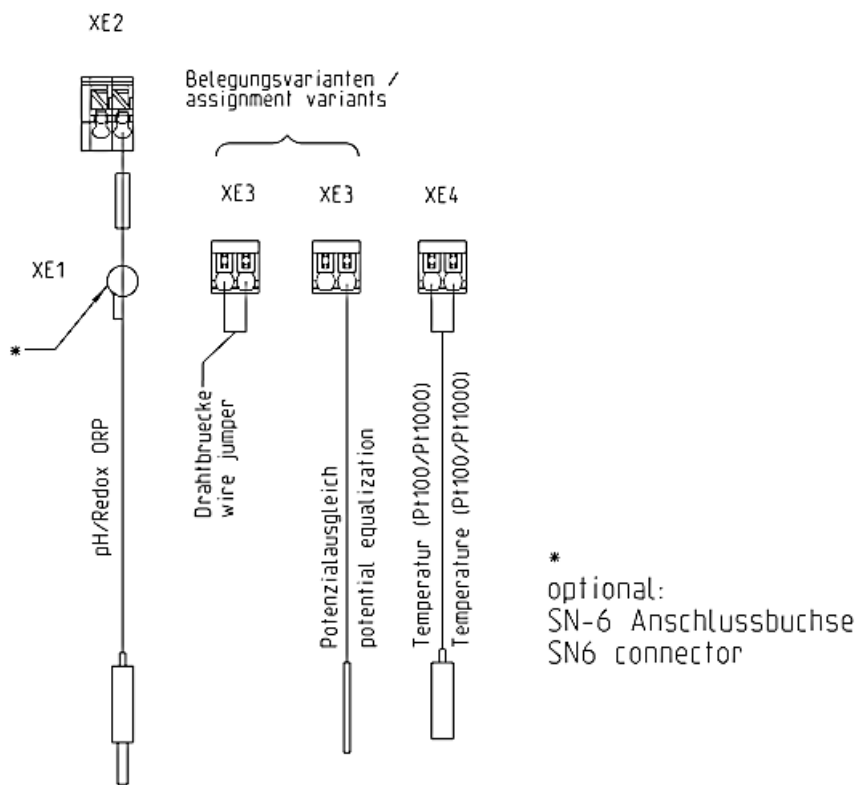


Fig. 12: Connection example - ph/ORP

6 Operation

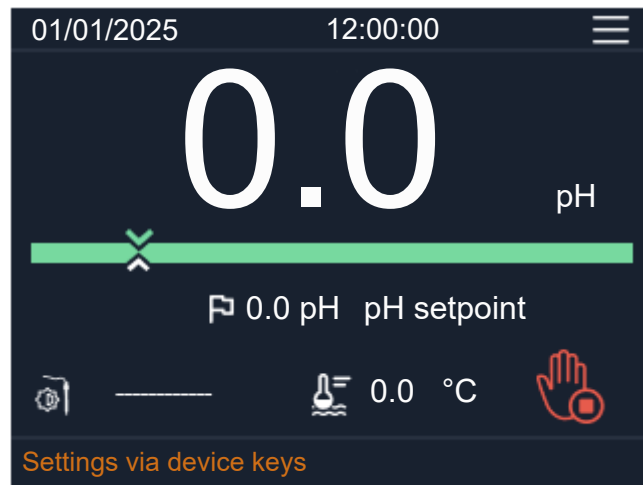
The controller is equipped with a display and several operating buttons.

The display shows measured values, operating statuses and menu structures.

The device is operated exclusively using the buttons on the device.

6.1 User interface

Display



The controller has a screen which displays the current measured values, menu items and status messages.

Keys

Key	Function
▲ / ▼	Scrolling through menu items or changing values
◀ / ▶	Switch between menu levels or change values
STOP/START	Stops and starts the controller
	Opens the menu
OK	Confirm a selection or input
←	Back to the previous menu level
CAL	Calibrate

6.2 Menu navigation

The menu system is divided into main menus and sub-menus.

Each menu contains specific functions that can be clearly addressed using numerical sequences.

Menu	Designation	Function
1	Calibration	
	Calibration setup	👉 'Calibration setup' on page 34

Menu	Designation	Function
	Start calibration	↳ <i>'Start calibration' on page 34</i>
2	Measured value configuration	
	Measured variable	↳ <i>Chapter 6.3.1 'Measured variables' on page 52</i>
3	Control	
	Parameter set	↳ <i>Chapter 6.2.3.1 'Parameter set 1 & 2' on page 36</i>
	Interference variable	↳ <i>Chapter 6.2.3.2 'Interference variable' on page 42</i>
	Control variable output	↳ <i>Chapter 6.2.3.3 'Control variable output' on page 44</i>
	Parameter switching	↳ <i>Chapter 6.2.3.4 'Parameter switching' on page 44</i>
	Sample water error	↳ <i>Chapter 6.2.3.5 'Sample water error' on page 44</i>
	Pause	↳ <i>Chapter 6.2.3.6 'Pause' on page 44</i>
	Hold	↳ <i>Chapter 6.2.3.7 'Hold' on page 44</i>
	Level pump 1 & 2	↳ <i>Chapter 6.2.3.8 'Level pump 1 & 2' on page 45</i>
4	Special functions	
	Guided commissioning	↳ <i>'Guided commissioning' on page 45</i>
	Calibration timer	↳ <i>'Calibration timer' on page 45</i>
	Cleaning cycle timer	↳ <i>'Cleaning cycle timer' on page 46</i>
	Timer	↳ <i>'Timer' on page 46</i>
5	Diagnostics	
	Factory settings	↳ <i>'Factory settings' on page 47</i>
	Simulation	↳ <i>'Simulation' on page 48</i>
	Device information	↳ <i>'Device information' on page 48</i>
	Log books	↳ <i>'Log books' on page 48</i>
	Configuration overview	↳ <i>'Configuration overview' on page 49</i>
	Runtime counter	↳ <i>'Runtime counter' on page 49</i>
6	Settings	
	Language	↳ <i>'Language' on page 49</i>
	Units	↳ <i>'Units' on page 49</i>
	System settings	↳ <i>'System settings' on page 50</i>
	Device configuration	↳ <i>'Device configuration' on page 50</i>
	Authorisations	↳ <i>'Authorisations' on page 50</i>
	Restart behaviour	↳ <i>'Restart behaviour' on page 51</i>
	Restart device	↳ <i>'Restart device' on page 51</i>

6.2.1 Calibration

The result of the last calibration can be read out here.

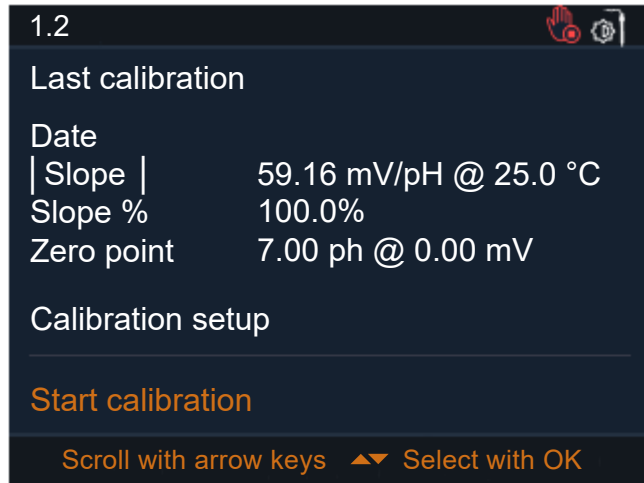


Fig. 13: diaLogC menu: Calibration

Calibration setup

The type of calibration can be set here.

Start calibration

The calibration process can be started here.

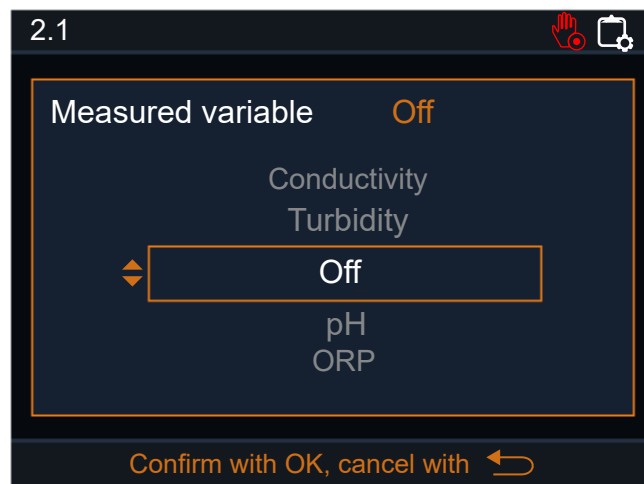
6.2.2 Measured value configuration

Measured variable



Depending on the sensor, only certain measured variables are available.

Ensure that a suitable sensor is used for the desired measured variable.



All parameters relating to the measured value, its display and processing are defined in the 'Measured value configuration' menu.

The following measured variables are available:

- pH
- ORP
- Temperature
- Conductivity

- Chlorine
- Turbidity



The available setting options depend on the connected measured variable and the sensor type used.

For more details on the respective measured variables and the associated settings, see [Chapter 6.3 'Measured variables and settings'](#) on page 51.

6.2.3 Control

All settings relating to the control action of the device are implemented in the "Control" menu. Here, it is possible to define controller parameters, control operating states and specify special functions for faults, maintenance or external components.

The available sub-menus are

- Parameter set 1 & 2
- Interference variable
- Control variable output
- Parameter switching
- Sample water error
- Pause
- Hold
- Level pump 1 & 2



NOTICE!

Possible data loss

If you change the measured variable in the *[Measurement]* menu, all settings in the *[Measurement]* and *[Control]* menus are reset to the factory settings (default values). You must then implement the settings in the *[Measurement]* and *[Control]* menus again. The system operator is responsible for the correct setting of the controller.



Prerequisites for setting the [Control]:

The following settings are required to set the [Control]: If you have not yet implemented the settings, do so now.

- *Specify the measured variable and all necessary settings in the [Measurement] menu.*
- *Specify the actuators intended for the control task: Information on the electrical connections and settings can be found in the menus.*

6.2.3.1 Parameter set 1 & 2

Direction of action of the [control], 2-way or 1-way

You can differentiate between the [Control] on the basis of various characteristics.

Function: 2-way [control] works in two possible directions (raise AND lower measured value).

Application: During a neutralisation process in an industrial waste water treatment plant, acidic or alkaline waste water is produced alternately. Before the water can be discharged into the sewage system, the pH value must be adjusted to a value between pH 6.8 and pH 7.5, for example. A 2-way controller with two metering pumps for metering acid and alkali is used here. The pH value can be both lowered and raised in order to reach the required target value range.

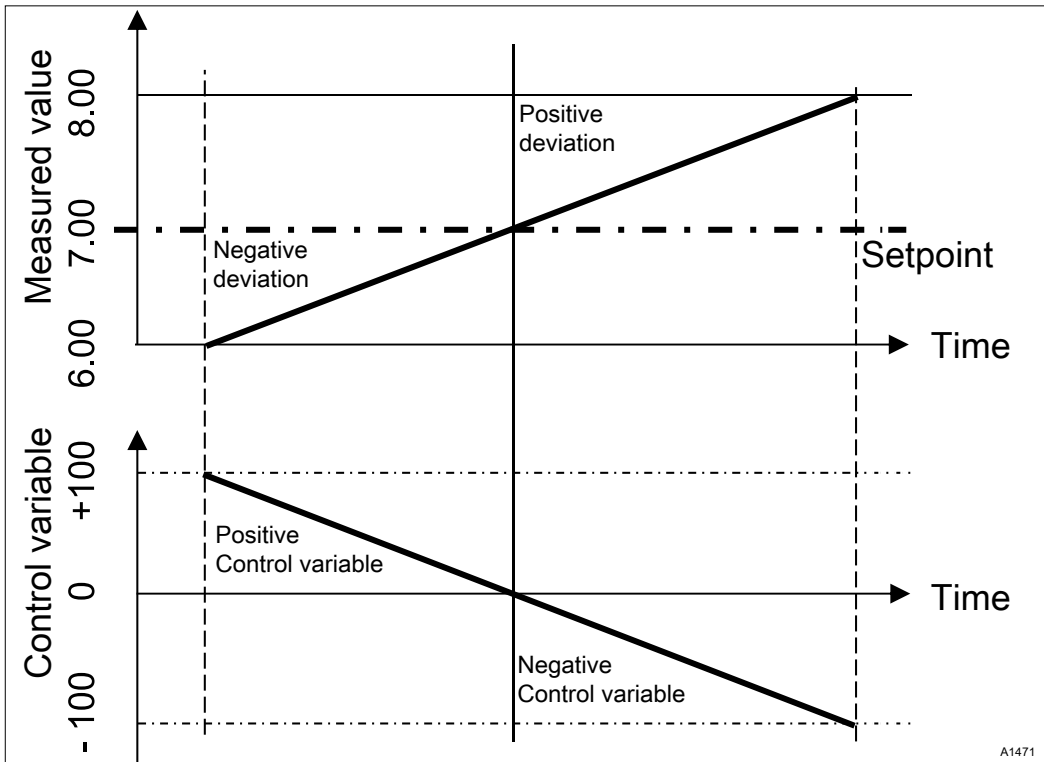
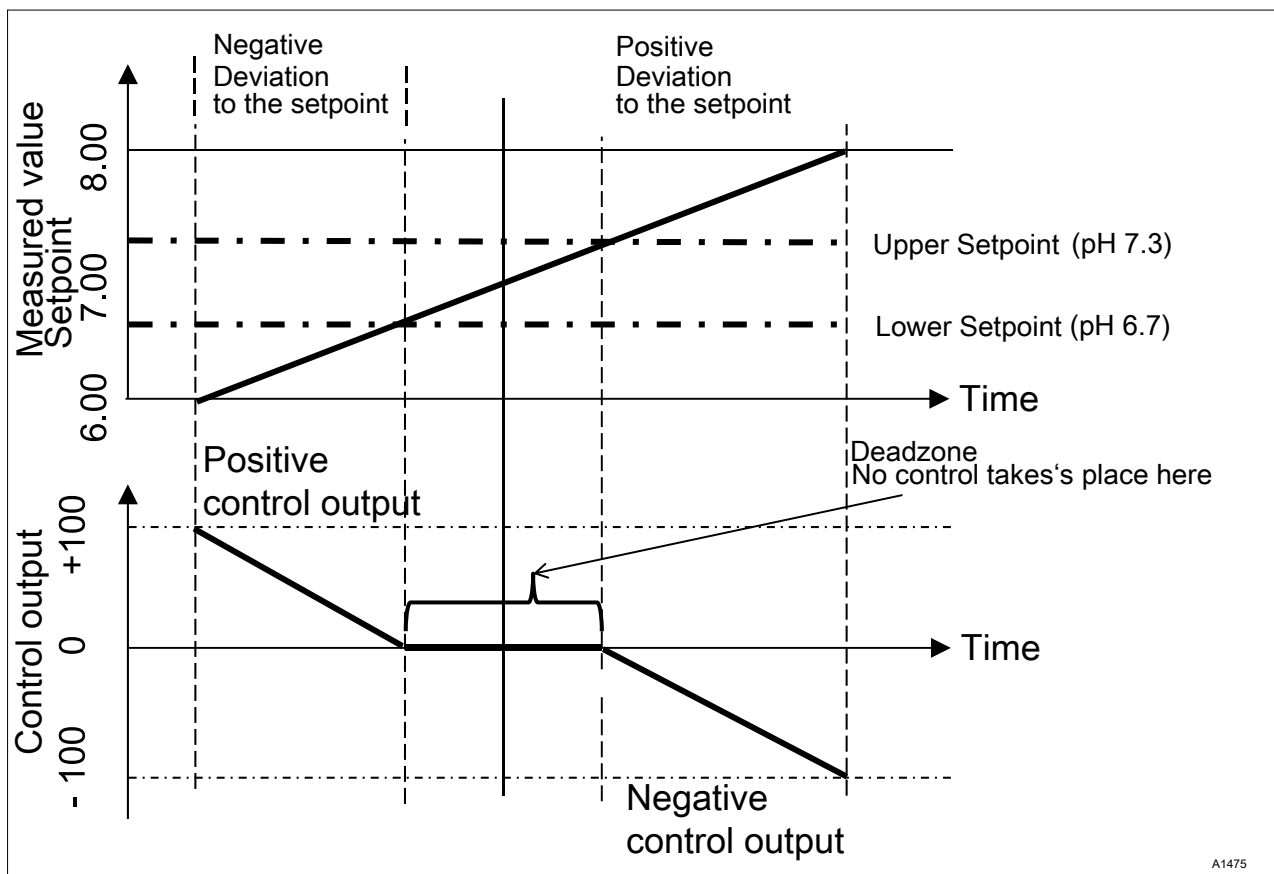


Fig. 14: Control type PID two-way. Control action without neutral zone



A1475

Fig. 15: Control type PID two-way, with neutral zone

Function: 1-way [control] only works in one of two possible directions (raise OR lower measured value).

Application: This applies, for example, to a disinfection process in which chlorine is to be added to water. The incoming water has a chlorine concentration of 0 ppm and should be adjusted to 0.5 ppm by metering sodium hypochlorite. The addition of sodium hypochlorite raises the measured value.

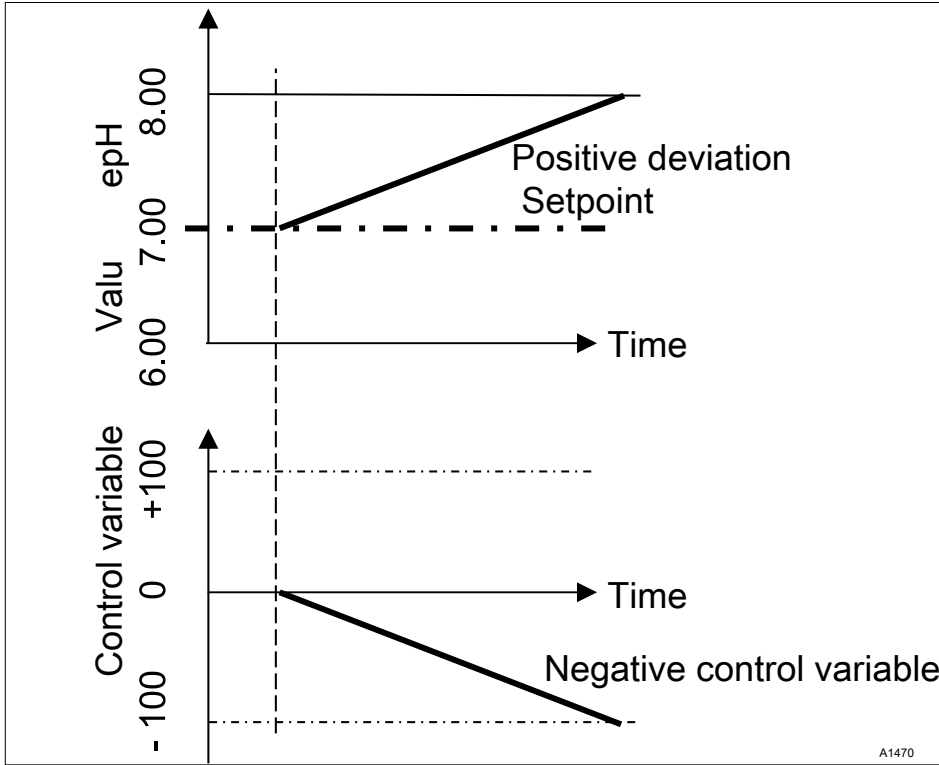


Fig. 16: Control type PID one-way, direction pH reducer

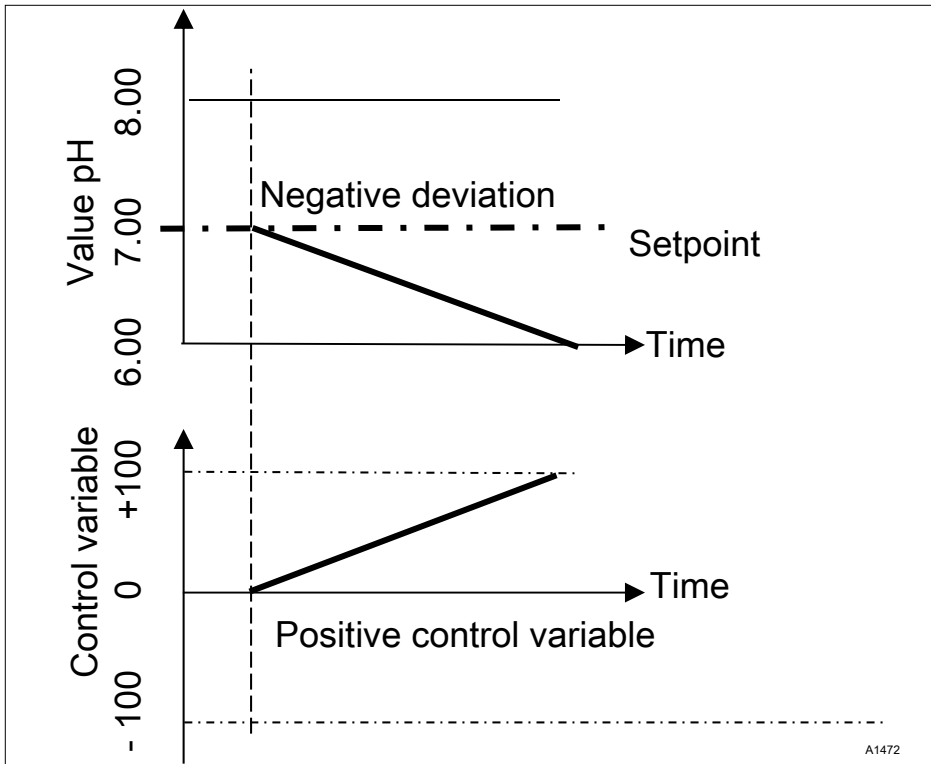


Fig. 17: Control type PID one-way, direction pH increaser

Overview of control types

The type of control can be set in this menu.

Adjustable control modes:

- Manual
- P controller
- P 2-way control
- PID controller
- PID 2-way control
- Two-point control

For more details on the control types, see ↗ *Chapter 6.2.3.1.1 'Control types' on page 39.*

Overview of adjustable parameters

Various parameters can be set depending on the control type.

Adjustable parameters for control:

- Manual control value
- Direction of action
- System response
- Setpoint
- XP
- Ti
- Td
- Min time on
- Min. time off
- Basic load
- Max. control value limit
- Control time regulation
- Delay after restart
- Delay after stop

For more details on the adjustable parameters, see ↗ *Chapter 6.2.3.1.2 'Adjustable parameters' on page 40.*

6.2.3.1.1 Control types

Manual

With this setting, the control variable [%] is specified directly by the user, without automatic control.

P controller

This type of controller is used with an integrating control section (e.g. *[batch neutralisation]*). If the control deviation becomes smaller, the control of the actuator also becomes smaller (proportional relationship). When the setpoint is almost reached, the control output is almost 0%. However, the setpoint is never reached exactly. This results in a permanent control deviation. Overshoots can occur when large changes are being equalised. An direction of action (raise/lower) must be selected.

P 2-way control

Proportional control with two directions (e.g. raise/lower); for bidirectional actuators.

The control action is the same as the P controller.

PID controller	<p>This controller type has the characteristics of a PI controller. Thanks to the differentiating control component $[D]$, it also offers a certain degree of foresight and can react to changes that occur in the future. It is used when measurement peaks occur during the measurement process and these need to be quickly corrected. An direction of action (raise/lower) must be selected.</p>
PID 2-way control	<p>PID control for two directions; suitable for controls with bidirectional actuators.</p> <p>The control action corresponds to the PID controller</p>
Two-point control	<p>On/off control; the control variable is only switched on or off completely.</p>
6.2.3.1.2 Adjustable parameters	
Manual control value	<p>Selection depending on the set control type.</p> <p>Direct specification of control value (0% to 100%).</p>
Direction of action	<p>The direction of action "raise" or "lower" is selected here.</p>
System response	<p>Here you can select whether the controller should work with a neutral zone (= area in which no control takes place).</p>
Setpoint	<p>The setpoint specifies the value to be used for control. The controller attempts to keep the deviation between the setpoint and actual value (measured value) as close to '0' as possible.</p>
XP	<p>The xp value is the gain factor of the controller. The xp value refers to the measuring range end value of a controller and is specified as an absolute value. At pH e.g. xp=1.5.</p> <p>The measuring range of the sensor is selected for measured variables such as chlorine. The measuring range of the sensor then corresponds to the measuring range end value.</p> <p>For pH, the measuring range end value is 15.45. The default xp value is 1.54 (corresponds to ± 1.54 pH). The xp value indicates that with a deviation of ± 1.54 pH from the setpoint, the control variable is $\pm 100\%$. The smaller the xp value, the 'more aggressively' the control reacts, but the control also enters the overload range more easily.</p>

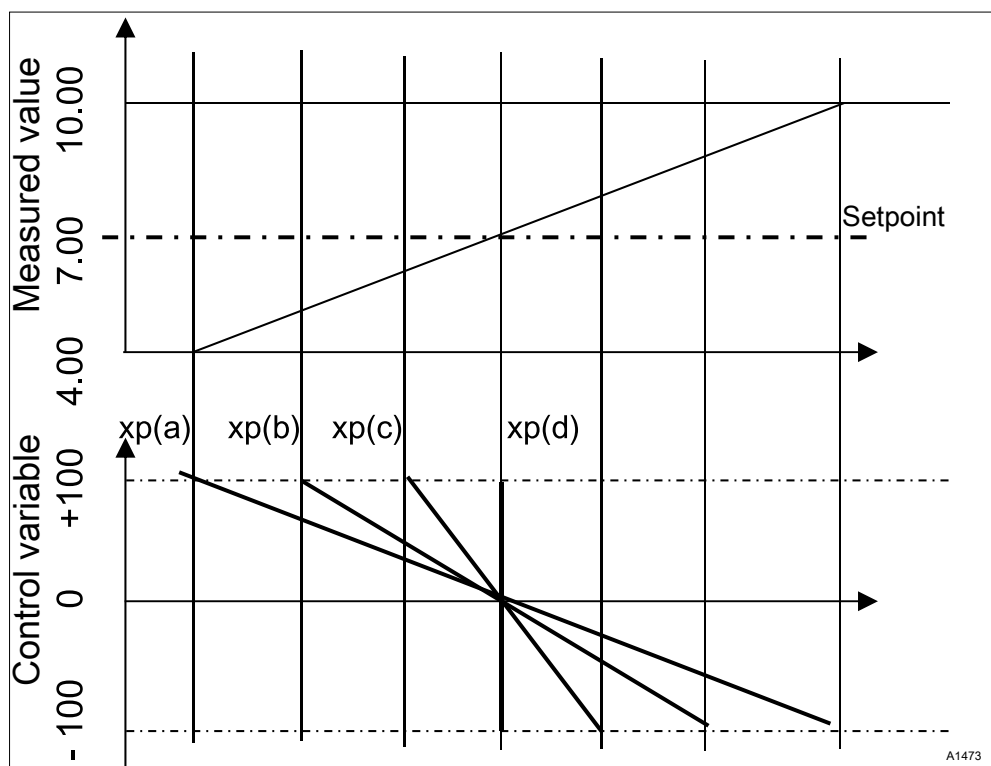


Fig. 18: The smaller the x_p value, the more "aggressively" the control reacts.

- Ti** The time $[Ti]$ is the reset time of the I-controller (integral controller) in seconds. The time $[Ti]$ defines the time integration of the control deviation to the control variable. The smaller the time $[Ti]$, the stronger the effect on the control variable. An infinitely long time $[Ti]$ results in pure proportional control.
- Td** The time $[Td]$ is the derivative time of the D controller (differentiating controller). The D-controller reacts to the rate of change of the measured value.
- Basic load** $[Basic\ load]$ is the additive basic load. The basic load is intended to compensate for a constant demand for a feed chemical to maintain the setpoint value.
- The basic load can be set in the range -100% to +100%.
- The basic load is added to the control variable determined by the controller and is effective for both control directions. If the control variable calculated by the controller is e.g.
- $y = -10\%$ and the basic load $+3\%$, then the resulting control variable = $Y = -10\% + (+3\%) = -7\%$
 - $y = 10\%$ and the basic load $+3\%$, then the resulting control variable = $Y = 10\% + (+3\%) = 13\%$
 - $y = 0\%$ and the basic load $+3\%$, then the resulting control variable = $Y = 0\% + (+3\%) = 3\%$
- Max. control value limit** The output of the control value can be limited here.
- In general, the output control value of the controller can be from -100% to 100% (with 2-way control).

Control time regulation

The *[control time]* is intended to prevent over-metering as a result of a malfunction.

During the *[control time]*, the control variable is compared with an adjustable *[threshold]* (= control variable threshold). Depending on the control direction, you can set different *[control times]* *[Control time □ top]* for raising and *[Control time □ bottom]* for lowering.

The thresholds depend on the concentration of the feed chemical. If the threshold is exceeded, time recording begins *[(control time)]*.

If the control variable falls below the threshold again during the *[control time]*, the time is reset to '0' s.

However, if the control variable remains exceeded for longer than the *[control time]* allows, control stops immediately. This function (control stops) resets itself automatically when the temperature falls below the threshold again.

Delay after restart

A time can be set here that the controller should wait after a restart before starting control

Delay after stop

A time can be set here that the controller should wait after a STOP before starting control

6.2.3.2 Interference variable

The stable control of continuous processes by means of interference variable regulation.

6.2.3.2.1 Additive and multiplicative interference variable regulation

In addition to the information of the actual measured variable, e.g. the chlorine concentration, the interference variable is a further source of information for the controller, which makes it easier for the controller to achieve stable control in continuous processes. In continuous processes, the two parameters mentioned often change over a wide range. If one parameter variable is not known, it is not possible to achieve stable control of the other parameter variable. If interference variable processing is active, interference variable processing is signalled on the continuous display of the controller under *[NAME OF THE INTERFERENCE VARIABLE]* and *[UNIT]* with the letter *[Q]*. Depending on the configuration, an interference variable can be effective for one or both measurement channels

The signal source of the interference variable can be fed to the controller via an analogue signal or a pulse frequency of a flow meter.

These options are included in the basic version of the controller with the measured variables VA and AA:

- Interference variable pulse frequency,
- Interference variable mA,
- pH compensation for chlorine.

Application example of additive interference variable

If the addition of a chemical is largely dependent on the flow (proportional dependence), then a control variable component proportional to the interference variable (flow) can be added to the control variable of the setpoint controller (setpoint control, i.e. the comparison, setpoint: actual value). It is also possible to switch off setpoint control completely and only realise flow-proportional metering. The measurement of the main measured value can be used together with the limit values as a monitoring function.

Application example:

You wish to chlorinate drinking water. The desired setpoint value is 0.3 mg/l (ppm) chlorine. The volumetric flow rate of the drinking water is recorded with a flow meter. The chlorine is continuously measured using a CLE3 chlorine sensor. The volumetric flow rate changes in a wide flow range from 0 to 250 m³/h. The chlorine concentration of 0.3 mg/l is achieved via the proportionality between the water flow rate and the amount of chlorine added. The correct design of the metering pump according to the chlorine concentration is a prerequisite. If the demand for chlorine were to increase due to a higher flow rate or greater consumption (higher temperature, more germs), then a positive portion of the control of the setpoint would be added to the flow-proportional control variable. Contrastingly, if too much chlorine is metered due to excessive proportionality, a negative control variable would be output and added to the flow-proportional control variable and the resultant control variable would decrease.

6.2.3.2.2 Multiplicative interference variable

With the multiplicative interference variable, you can influence the control variable of the setpoint controller proportionally to the interference variable over the entire control range. A proportionality factor of 0.00 = 0% and 1.00 = 100%, including all intermediate values.

Tab. 5: Interference variable

Parameter	Default setting	Possible values	Minimum value	Maximum value	Remark
Function	Off	On / Off			Switches the interference variable function on or off
Signal source	Frequency DI 2	Frequency DI 2 / mA input			Determines which signal source the interference signal comes from
Effect	Additive	Additive / multiplicative			Determines the effect of the interference variable
Nominal value	10 Hz	1 to 500 Hz	1 Hz	500 Hz	Defines the maximum frequency of the contact water meter at maximum flow rate

6.2.3.3 Control variable output

The control variable output defines the maximum control variable to be output. This is useful if, for example, an actuator is too large and should not be opened fully to the 100% open position.

6.2.3.4 Parameter switching

Two parameter sets are available for the controller. The second parameter set is activated if digital input 2 is set for *[control. parameter switching]*. In this case, *[parameter set 2]* can be configured in the menu.

When connecting the actuator, you must ensure that the actuator that raises the measured value is connected to the corresponding *[Raise measured value]* output and the actuator that lowers the measured value is connected to the *[Lower measured value]* output.

Example:

A medium with an actual value of pH 3 is to be brought to the setpoint of pH 7 with the aid of a sodium hydroxide solution (pH >14). To do this, you need to connect the actuator to the *[Raise measured value]* control output.

The following settings can be selected here:

- Condition: Actively closed / Actively open
- Pick-up delay
- Drop-out delay

6.2.3.5 Sample water error

Here, flow monitoring can be set on digital input 1 or 2.

The following settings can be selected here:

- Condition: Actively closed / Actively open
- Pick-up delay
- Drop-out delay

6.2.3.6 Pause

Here, the controller can be paused externally on digital input 1 or 2.

The controller then stops until it is enabled again.

The following settings can be selected here:

- Condition: Actively closed / Actively open
- Pick-up delay
- Drop-out delay

6.2.3.7 Hold

Here, the controller can be set to Hold externally on digital input 1 or 2.

As long as the controller is set to Hold, the control value is held by the controller.

The following settings can be selected here:

- Condition: Actively closed / Actively open
- Pick-up delay
- Drop-out delay

6.2.3.8 Level pump 1 & 2

Level switches that monitor the level in the input tanks can be connected to digital inputs 1 and 2.

If one of the level switches is triggered, control switches to STOP

The following settings can be selected here:

- Condition: Actively closed / Actively open
- Pick-up delay
- Drop-out delay

6.2.4 Special functions

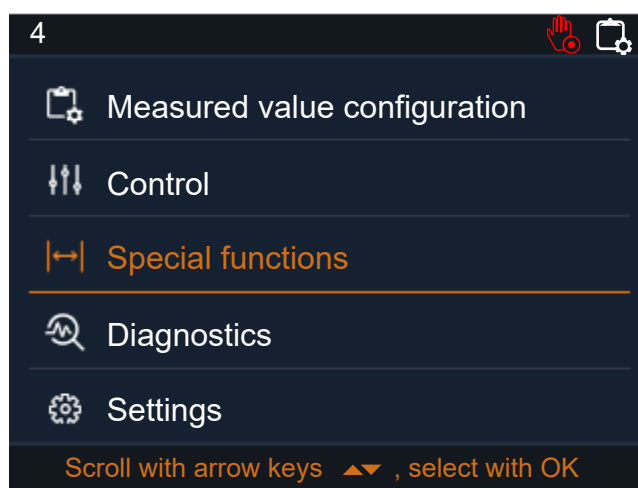


Fig. 19: diaLogC menu: Special functions

Guided commissioning

Guided commissioning supports the user when setting up the device and the connected sensor for the first time. All relevant settings are queried step by step, e.g:

- Selection of sensor type and measured variable
- Definition of measuring ranges, units and setpoints
- Activation of control or switching outputs
- Check of signal and communication parameters

Calibration timer

The calibration timer serves as a reminder for regular calibrations of the sensor. A time interval can be set here (e.g. in days, weeks or months), after which the device displays a reminder or warning message. Options:

- Activate/deactivate timer
- Set interval
- Select reminder type (display, signal, message via interface)

This function supports reliable and standard-compliant maintenance of the measuring point.

Cleaning cycle timer

The cycle timer enables automatic or time-controlled cleaning of the sensor or the measuring chamber.

The following parameters can be set in this menu item:

- Cleaning interval: Period between two cleaning processes
- Cleaning duration: Duration of the cleaning phase
- Start time: Time of first cleaning or manual start
- Output control: Selection of the switching output that activates cleaning

This function helps to ensure consistent measurement quality and reduces manual cleaning work.

Timer

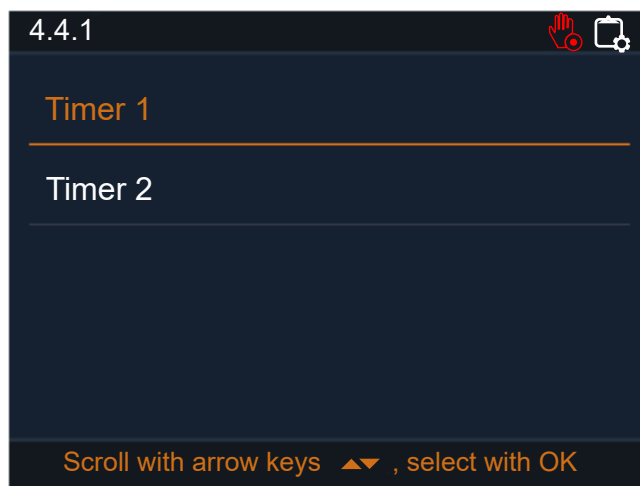


Fig. 20: diaLogC menu: Timer

The general timer allows time-controlled switching of certain functions or outputs. It can be used, for example, to:

- Activate measurements at specific times
- Switch outputs (e.g. pumps, valves)
- Trigger periodic processes

Adjustable parameters:

- Start and stop time
- Days of the week or time pattern
- Link with sensor or system functions

The timer can be used individually or in combination with other functions (e.g. cleaning or control)

6.2.5 Diagnostics

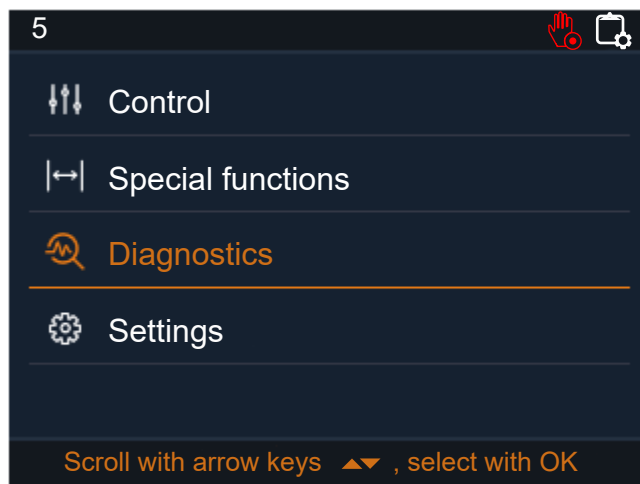


Fig. 21: diaLogC menu: Diagnostics

The 'Diagnostics' menu summarises all functions that are used to check the device status, analyse errors and perform system maintenance. These functions support the user in quickly identifying faults and monitoring device performance over the entire operating time.

Factory settings

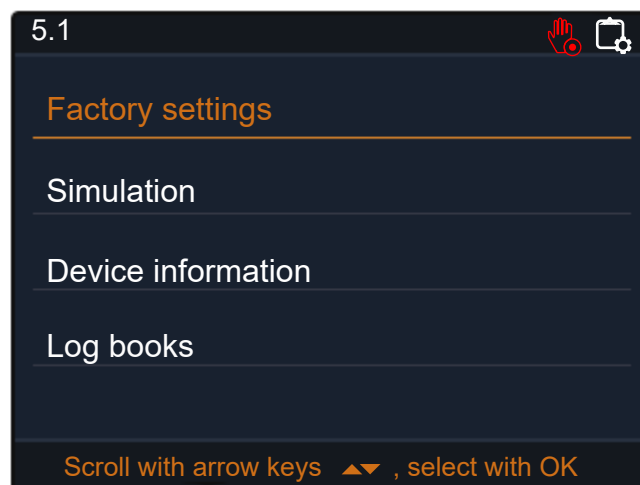


Fig. 22: diaLogC menu: Factory settings



NOTICE!

Before resetting, the current configuration should be backed up or documented so that it can be restored later.

This menu item can be used to reset all device settings to the factory settings. All user-defined parameters (e.g. sensor, control and display settings) are deleted and replaced with the default values.

Simulation

Device information

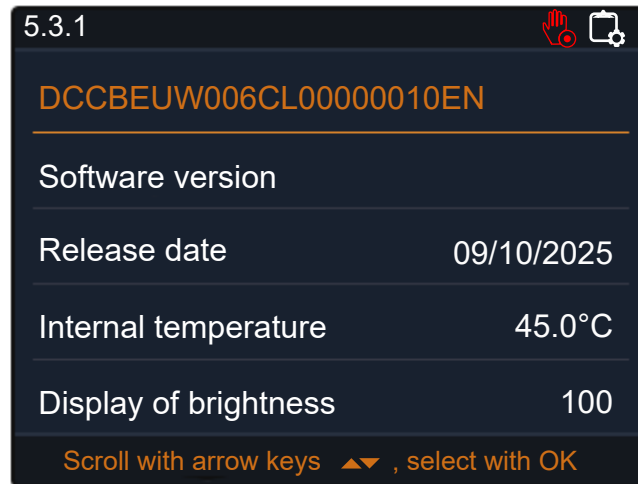


Fig. 23: diaLogC menu: Device information

All device-related data is displayed under 'Device information'. This information is particularly relevant for service purposes or support enquiries.

This includes:

- Identity code
- Software version
- Release date
- Internal temperature
- Display of brightness
- Hardware revision

Log books

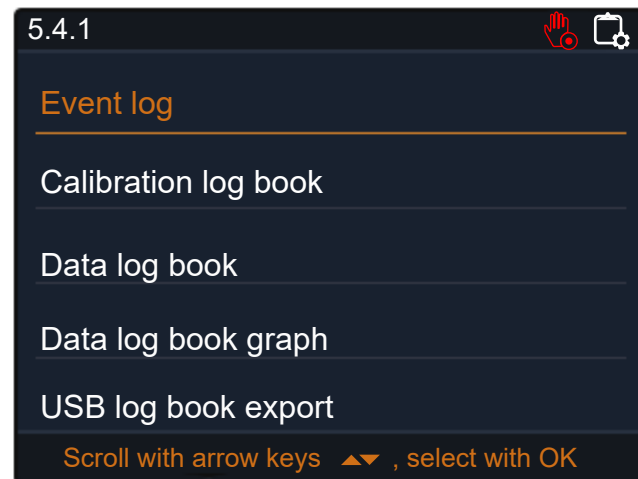


Fig. 24: diaLogC menu: Device information

Events and system messages are automatically recorded in the "Logbooks" menu. The logbook is used to track operating states, faults and maintenance activities.

Displayed information:

- Timestamp of the event
- Event type (e.g. warning, error, info)

- Description of the message
- Sensor or output affected, if applicable

Functions:

- Event log
- Calibration log book
- Data logbook
- Data log book graph

Configuration overview

Changes to the device configuration are entered here

Runtime counter

The runtime counter displays the operating times and cycle information of the device and any connected sensors. This enables targeted maintenance planning and service life monitoring.

6.2.6 Settings

Language

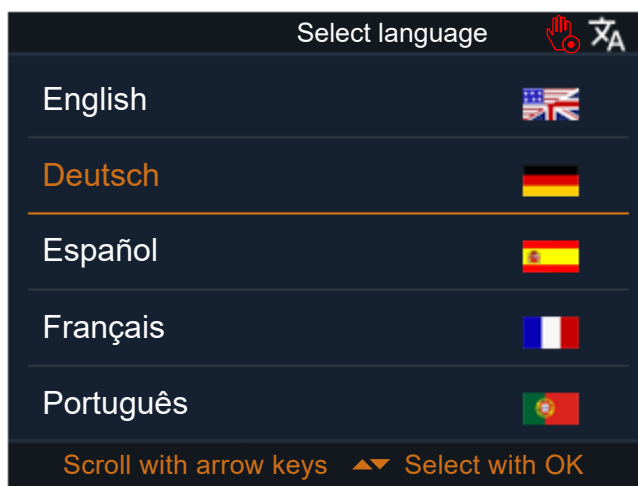


Fig. 25: diaLogC menu: Language

The display language of the device is selected in this menu item. All texts, menu items and messages are automatically displayed in the selected language after selection.

Units

The units of the measured variables for display and calculation are defined here. The available units depend on the connected sensors and measured variables.

Example units

- Temperature: °C / °F
- Pressure: bar / psi / Pa
- Flow rate: l/min / m³/h
- Turbidity: NTU / FNU / FTU

System settings

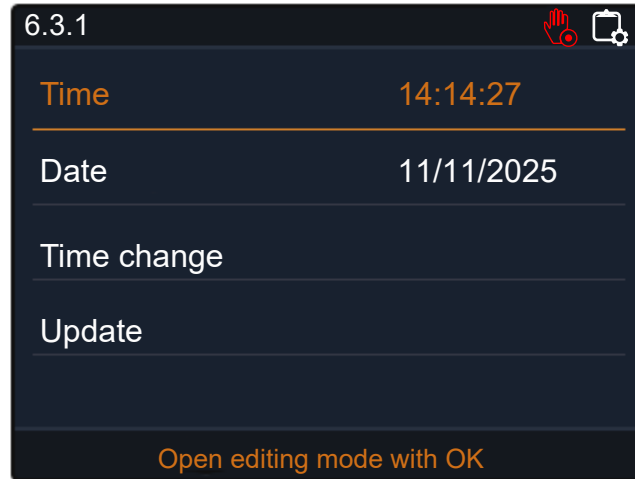


Fig. 26: diaLogC menu: System settings

General device properties and operating parameters that influence the behaviour of the controller are defined under 'System settings'.

Setting options

- Time
- Date
- Time change
- Update

For more information on updating, see [Chapter 8.2.1 'Update controller' on page 68](#).

Device configuration

Device configurations created can be saved or loaded to USB here

Authorisations

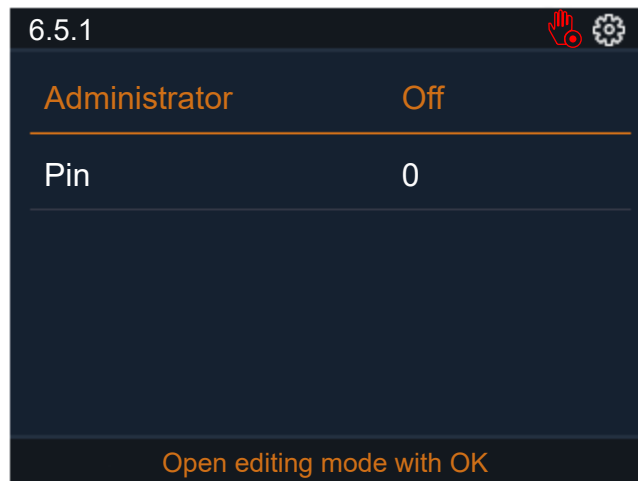


Fig. 27: diaLogC menu: Authorisations

User administration is controlled in the 'Authorisations' menu. Various user roles and access rights can be defined here to ensure that only authorised persons can perform certain functions.

Restart behaviour

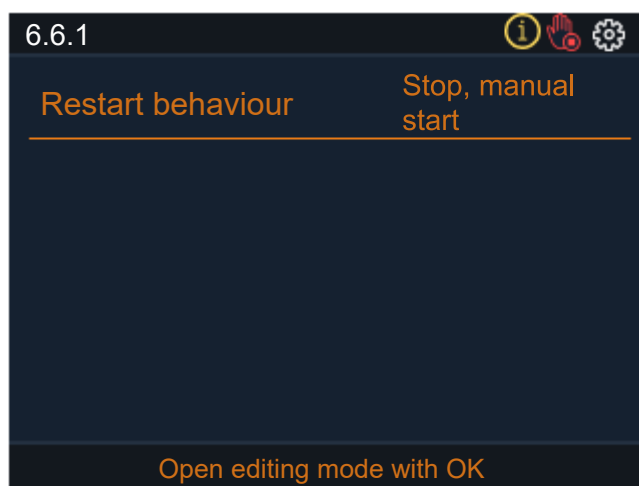


Fig. 28: diaLogC menu: Authorisations

The behaviour of the device after a voltage drop or restart is defined in this menu item. The restart behaviour determines the operating status in which the device starts after the supply voltage is restored.

The following behaviour can be set:

- Stop, manual start
- Last state

Restart device



NOTICE!

The device is temporarily unavailable during the restart. Ongoing measurements or controls are interrupted.

The device can be restarted in a controlled manner via this menu item. The restart is required after certain configuration changes or software updates, for example.

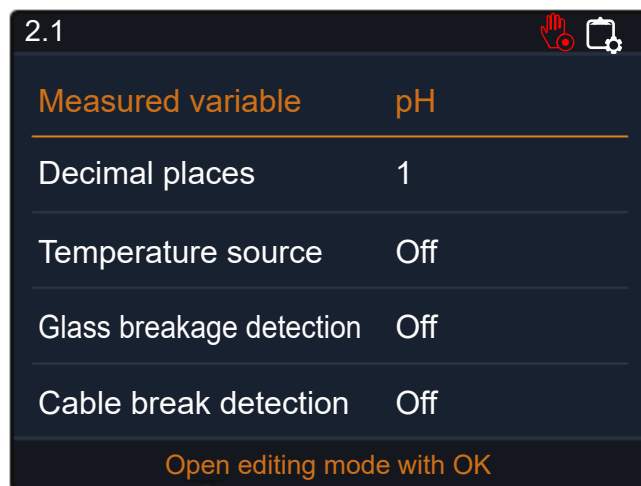
6.3 Measured variables and settings

This chapter describes the available measured variables and their adjustable functions. Specific parameters and options can be selected for each measured variable in order to customise the measurement to the respective application.

For a list of compatible sensors and measured variables, see [Chapter 10.2 'Compatibility overview' on page 72](#)

6.3.1 Measured variables

6.3.1.1 pH [mV]

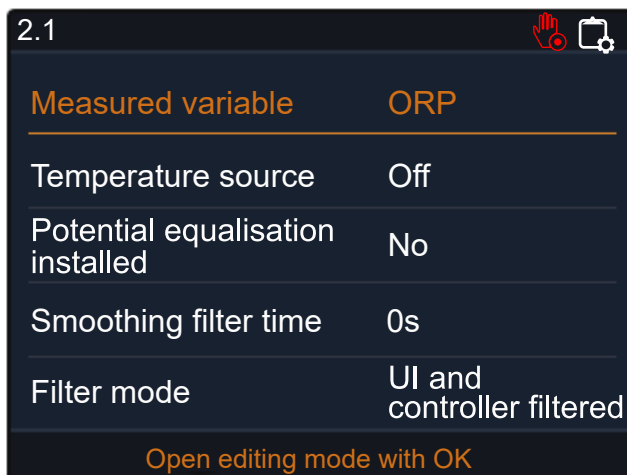


The pH sensor for the measured variable pH [mV] is connected using a coaxial cable via which the mV signal is transmitted to the controller. This measurement can be used if the cable length is less than 10 metres.

Available settings for pH:

- Decimal places
- Temperature source
- Glass breakage detection
- Cable break detection
- Temperature compensation
- Potential equalisation installed
- Smoothing filter time
- Filter mode
- Limit values

6.3.1.2 ORP [mV], ORP [mA]



If the measured variable '*ORP [mV]*' or '*ORP [mA]*' is selected, the process temperature can only be measured for information or recording purposes.

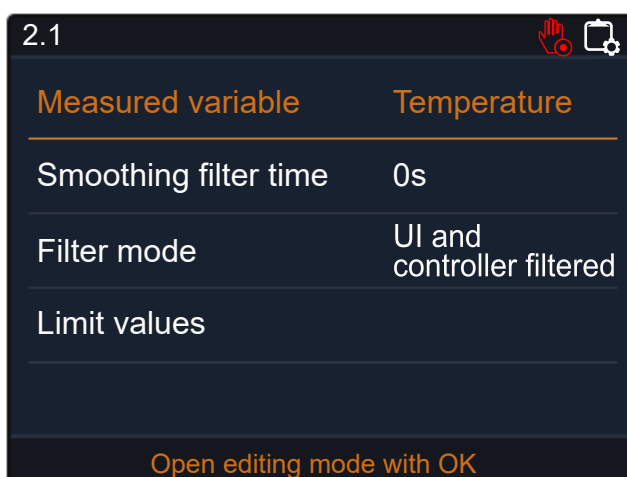
For the measured variable '*ORP [mV]*', the measuring range is fixed in the range -1500 mV to + 1500 mV.

For the measured variable '*ORP [mA]*', the measuring range depends on the RH-V1 transmitter and is 0 to +1000 mV.

Available settings for ORP:

- Temperature source
- Potential equalisation installed
- Smoothing filter time
- Filter mode
- Limit values

6.3.1.3 Temperature

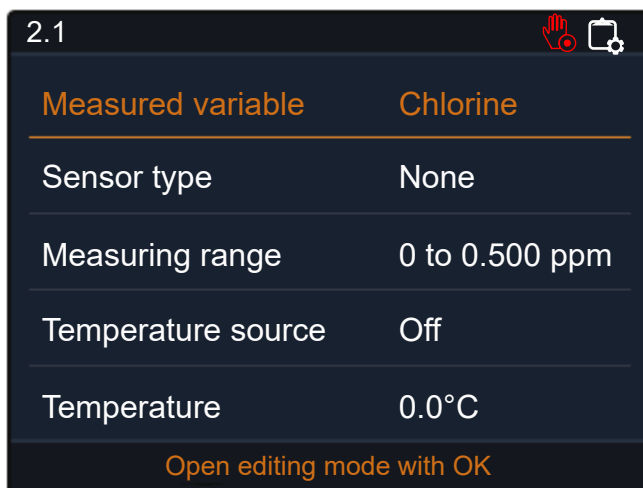


In the case of amperometric measured variables, the temperature influence on the measurement is automatically compensated for in the sensor. A separate temperature measurement may only be used to display and output the temperature values via an mA output. Separate temperature compensation is only necessary with a chlorine dioxide sensor type CDP.

Available settings for temperature:

- Smoothing filter time
- Filter mode
- Limit values

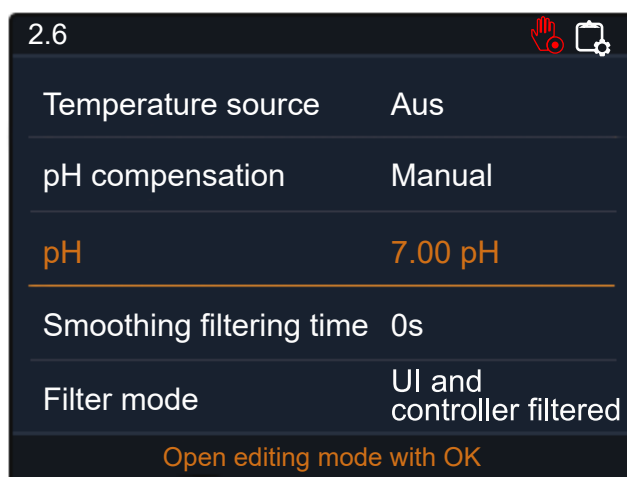
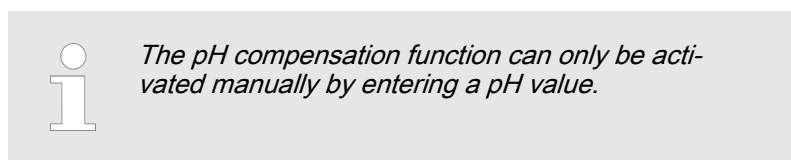
6.3.1.4 Chlorine



The measured variables chlorine, bromine, chlorine dioxide, chlorite, dissolved oxygen and ozone are always measured via an mA signal because the transmitter is located in the sensor.

Temperature compensation takes place automatically in the sensor (exception: CDP, chlorine dioxide sensor). For further information, please refer to the operating instructions for the sensor used.

Measurement of chlorine with pH compensation



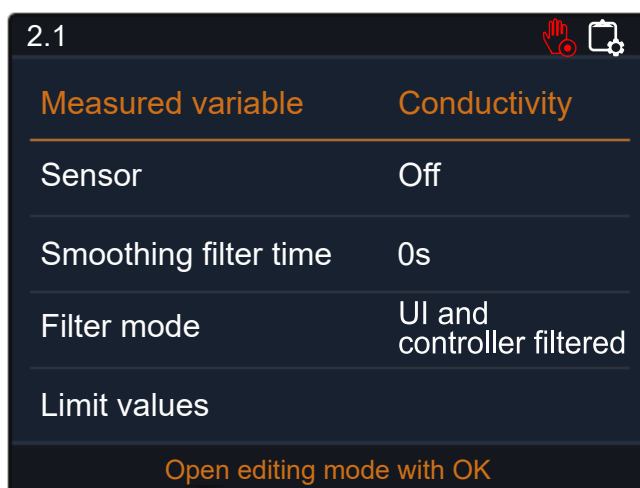
Chlorine for disinfecting water is available in various forms, e.g. as liquid sodium hypochlorite, as dissolved calcium hypochlorite or as chlorine gas. All these forms can be measured with chlorine sensors. After adding chlorine to water, the chlorine splits into two parts depending on the pH value:

- 1. Into hypochlorous acid (also known as hydrogen hypochlorite, HOCl) - a strongly oxidising disinfectant that destroys most organisms in a very short time.
- 2. Into the hypochlorite anion (OCl-) – with a weak sterilising effect, which takes a long time to kill organisms.

Available settings for chlorine:

- Sensor type
- Measuring range
- Temperature source
- Temperature
- ph compensation
- Smoothing filter time
- Filter mode
- Limit values

6.3.1.5 Conductivity [mA]



The use of a transmitter is a prerequisite for the measured variable conductivity [mA], e.g. a DMTa conductivity transmitter. A conductivity sensor cannot be connected directly to the controller.

Measuring range:

- Select the measuring range according to the measuring range of the transmitter used. An incorrect measuring range leads to an incorrect measurement.

Temperature:

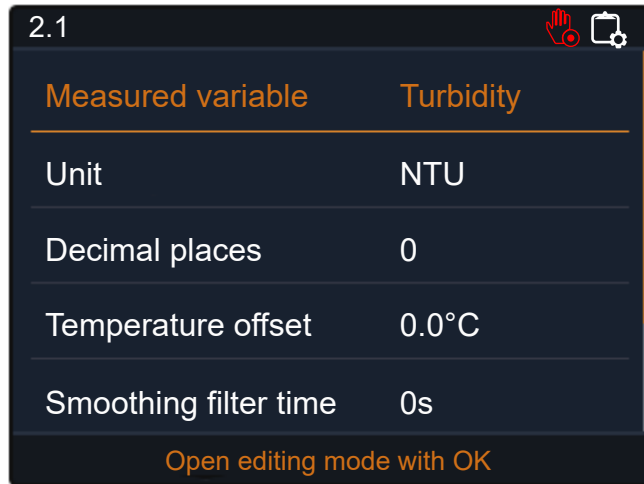
- The temperature measurement is only used for information or recording purposes, but not for temperature compensation. Temperature compensation is carried out in the transmitter.

Available settings for conductivity:

- Sensor type
- Smoothing filter time

- Filter mode
- Limit values

6.3.1.6 Turbidity

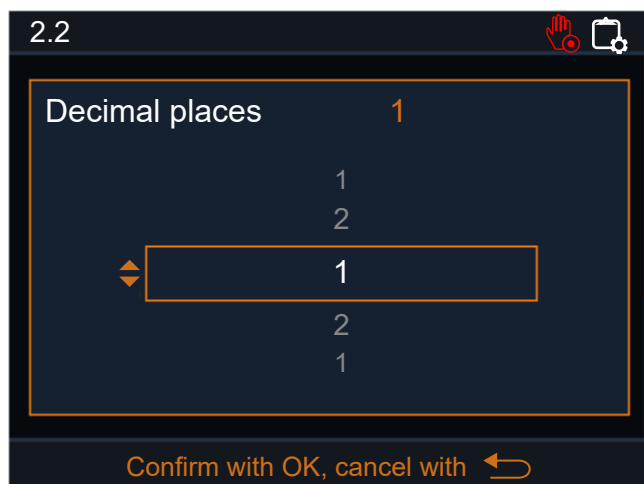


Available settings for conductivity:

- Unit
- Decimal places
- Temperature offset
- Smoothing filter time
- Filter mode
- Limit values

6.3.2 Settings

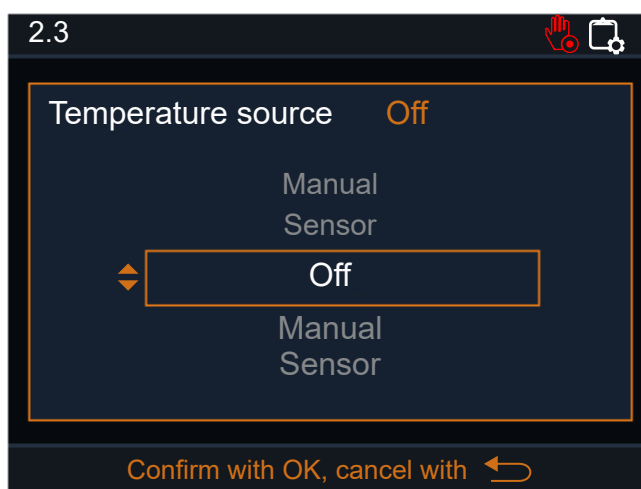
6.3.2.1 Decimal places



The function shows the pH value in the display with one or two decimal places. It makes sense to adjust the display to one decimal place if the change in the 1/100 value is not important or is unstable.

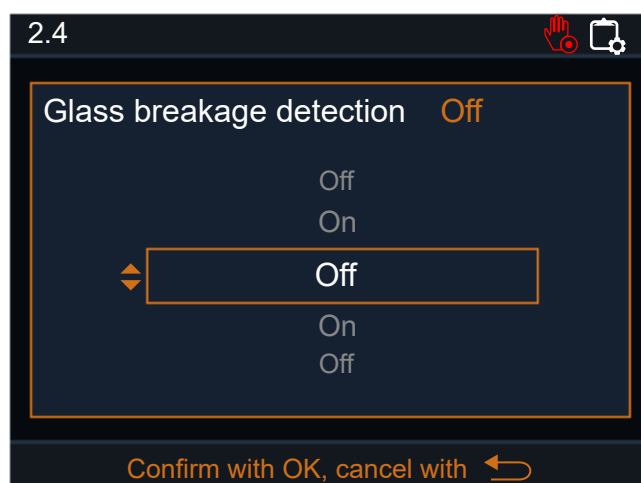
Factory setting: 2 decimal places

6.3.2.2 Temperature source



Here you can specify whether the temperature is recorded by a sensor or entered manually.

6.3.2.3 Glass breakage detection



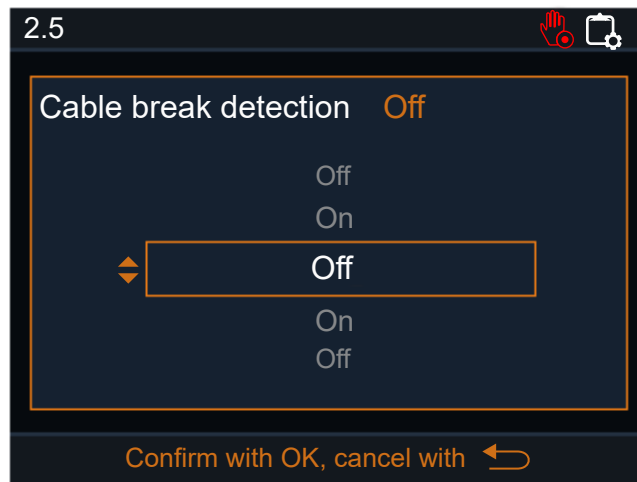
Switches the glass break detection of the pH sensor *[ON]* or *[OFF]*. The factory setting is *[OFF]*. With the *[ON]* setting, the controller displays an error message if an error is detected.

In the event of glass breakage, the internal resistance of the sensor drops sharply. This status is detected and an error message is issued.

At media temperatures > 50 °C, the internal resistance of the sensor also decreases and glass breakage is incorrectly detected.

The *[glass breakage detection]* function works up to a sensor cable length of approx. 2 metres. External influences, such as the medium to be measured, can also influence the glass breakage detection and lead to a misinterpretation. In these cases, the glass breakage detection must be switched off to avoid misinterpretation.

6.3.2.4 Cable break detection



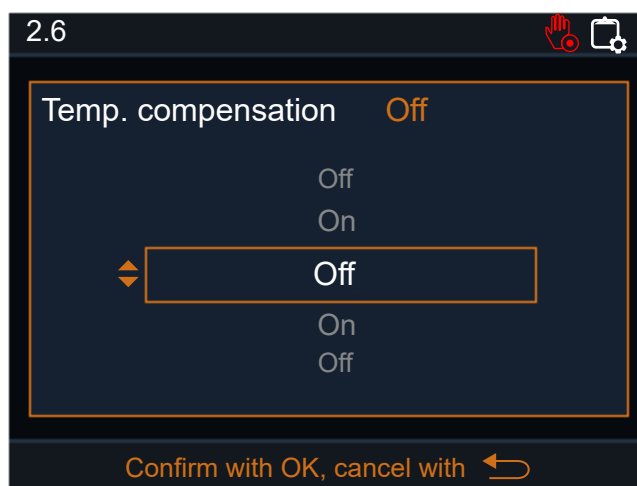
Switches the cable break detection of the coaxial cable *[ON]* or *[OFF]*. The factory setting is *[OFF]*. With the *[ON]* setting, the controller displays an alarm message if an error is detected.

In the event of a cable break or if no sensor is connected, the resistance of an open cable end is measured. This resistance is very high. This status is detected and an error message is issued.

At media temperatures < 10 °C, depending on the sensor type, the resistance may fall below the trigger threshold and a cable break may be incorrectly detected.

The *[cable break detection]* function works up to a sensor cable length of approx. 2 metres. External influences, such as the medium to be measured, can also influence the cable break detection and lead to a misinterpretation. In these cases, the cable break detection must be switched off to avoid misinterpretation.

6.3.2.5 Temperature compensation

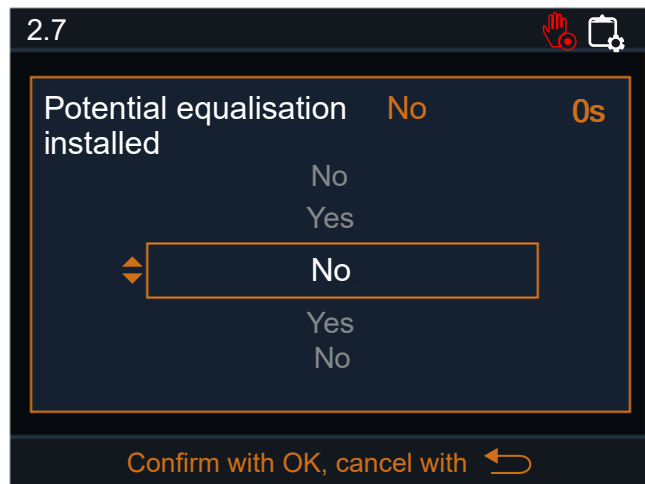


This function is used to compensate for the effect of temperature on the measurement. This is only necessary for pH measurement and when measuring chlorine dioxide with a CDP sensor.

Temperature: *[OFF]* / *[ON]*

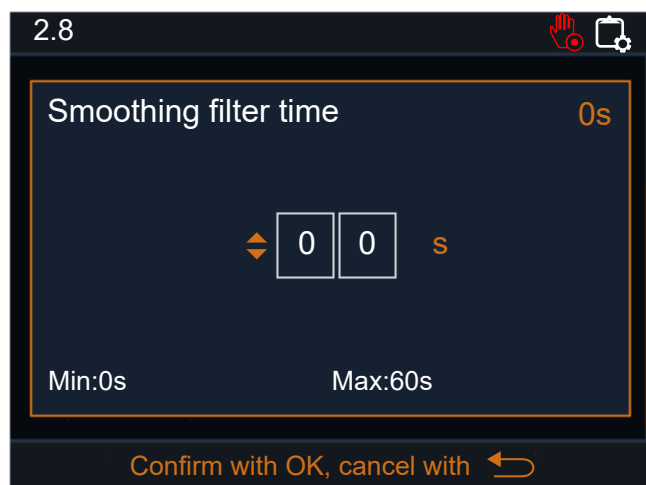
- *[OFF]* switches the process temperature setting off
- *[ON]* uses a measured process temperature. Automatic measurement of the temperature via the temperature sensor, e.g. Pt1000.

6.3.2.6 Potential equalisation installed



Refers to the electrical earthing or the reference point of the measurement. Used to avoid interference voltages or measurement errors due to different potentials.

6.3.2.7 Smoothing filter time

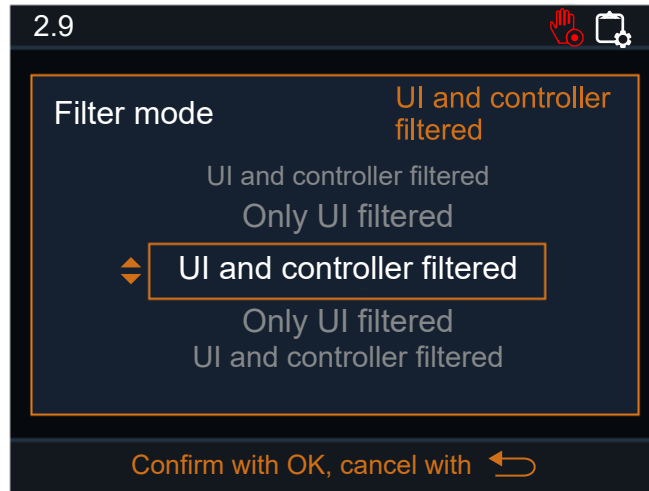


A time for smoothing the display value can be entered here.

This has no effect on the control if "UI filtered only" is set in filter mode.

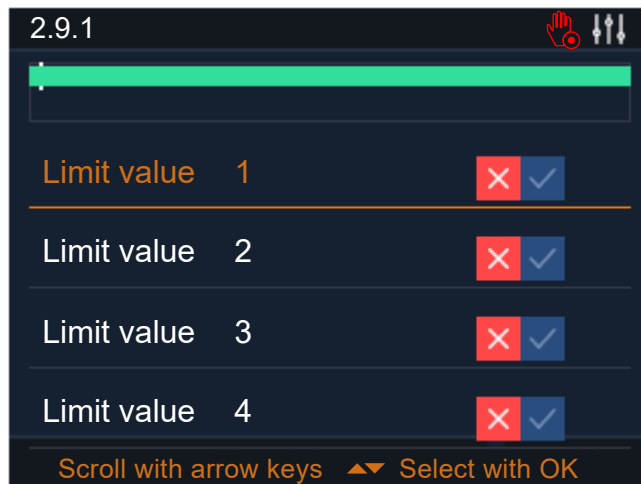
Only the display can be stabilised here for rapidly changing values.

6.3.2.8 Filter mode



Here you can select whether the set smoothing should only affect the display or the display and controller.

6.3.2.9 Limit values



The limit values are not related to the control setpoint.

The limit values are constantly compared with the measured value.

The limit values are values that can be set within the measuring range of a measured variable. For the measuring channel, a limit value [1] can be defined for overshooting, i.e. the measured value is greater than the limit value, and a limit value [2] for undershooting, i.e. the measured value is less than the limit value. As there are only two limit value relays available in the controller, it is possible to select a limit value 'range'. A lower and an upper limit are defined as the limit value 'range'. If the measured value is above or below the 'range', the limit value has been violated.

If the limit is exceeded for longer than the [control time limit values (Δt on)], an error message, which can be quit, is triggered and the alarm relay drops out. If [control] is additionally set to [OFF], the control process stops.

[Undershooting] means that the limit value criterion is violated when it is undershot.

[Overshooting] means that the limit value criterion is violated when it is overshoot.

The controller has the option of defining a *[hysteresis limit value]*.

The *[hysteresis]* acts in the direction of cancelling the limit violation, i.e. if the *[upper limit value 1]* of e.g. pH 7.5 was exceeded with a set hysteresis limit value of e.g. pH 0.20, the criterion for a limit violation is cancelled when the value falls below pH 7.3. The hysteresis behaviour for *[limit value undershooting]* works in the same way (the hysteresis value is added to the limit value here). This makes it possible to dispense with an external holding relay.

If the limit is exceeded for longer than the *[delay time limit values (Δt_{on})]*, an error message, which can be quit, is triggered and the alarm relay drops out. If the *[control]* is additionally set to *[OFF]*, the control process stops.

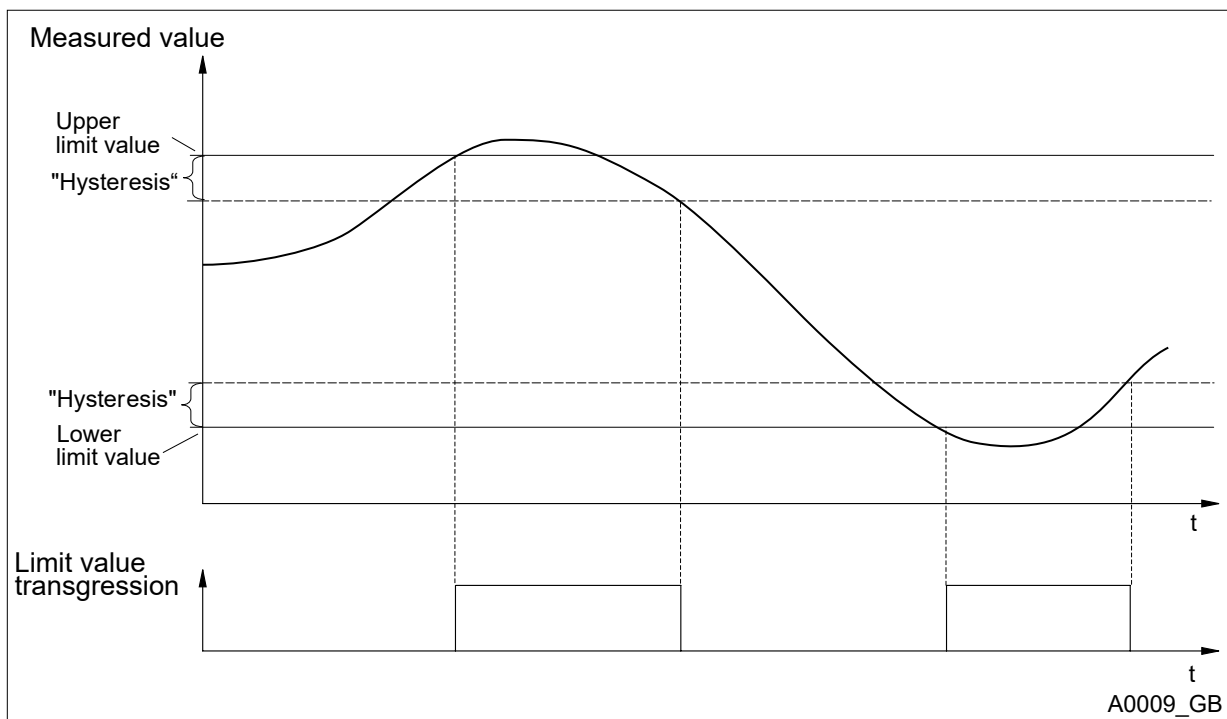


Fig. 29: Hysteresis

If the relays are defined as limit value relays, they switch in addition to the alarm relay in the event of a limit violation.

Different pick-up delays (Δt_{on}) and drop-out delays (Δt_{off}) can be set for the limit value relays for *[limit value 1]* and *[limit value 2]*. These prevent the limit value relays from switching back and forth if the limit value is only briefly exceeded (damping function).

If no limit value relays are available, limit values can still be entered. The controller shows the reactions described in the event of a limit violation

Limit value relay as actuator

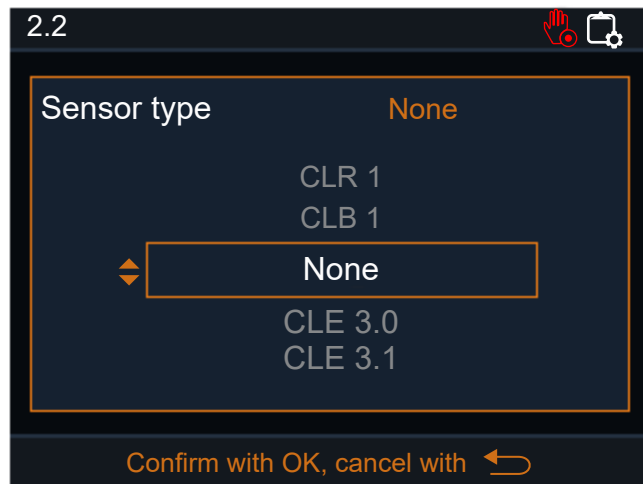
If the relays are defined as actuators, they react like control outputs. Example: In the event of an activated pause or an alarm, an activated limit value relay drops out.

Existing limit value error with alarm

You can manually reset an existing limit value error with alarm, e.g. to enable a controlled restart of a system so that the limit value situation can be exited.

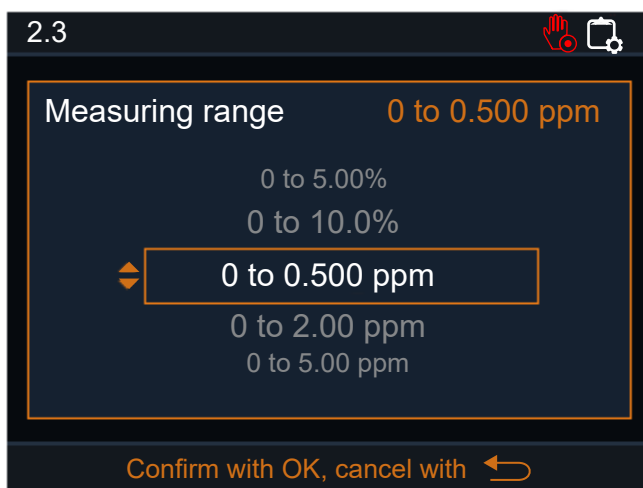
If an alarm is pending, you can call up the *[system messages]* menu from the continuous display by pressing the **OK** button. You can select the relevant alarm and reset it using the **OK** button. Resetting cancels the limit value error/alarm. The limit value criterion check restarts according to the set delay times. Metering is started if necessary.

6.3.2.10 Sensor type



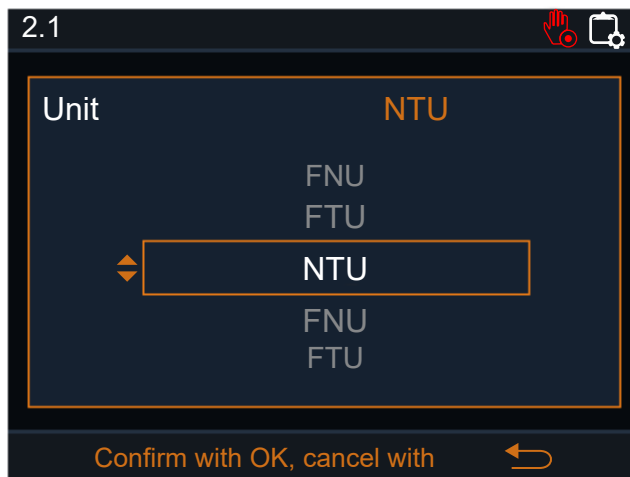
Predefined sensor types are available for certain measured values. A sensor type can be selected here if necessary.

6.3.2.11 Measuring range



Measuring ranges can be selected for the previously selected sensor type if necessary.

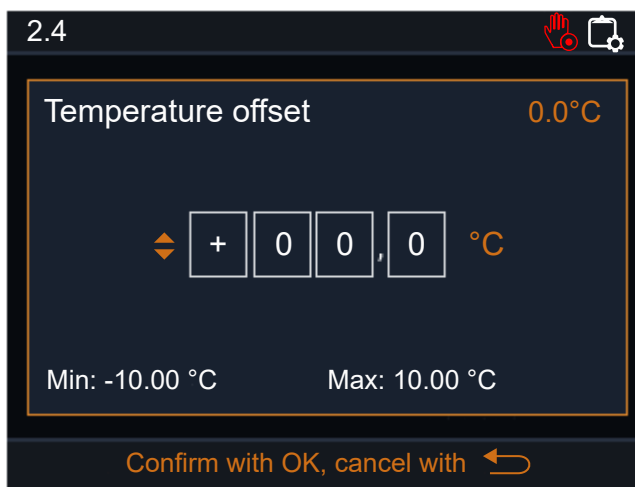
6.3.2.12 Unit



The units of the measured variables for display and calculation are defined here. The available units depend on the connected sensors and measured variables.

Example units	<ul style="list-style-type: none"> ■ Temperature: °C / °F ■ Pressure: bar / psi / Pa ■ Flow rate: l/min / m³/h ■ Turbidity: NTU / FNU / FTU
----------------------	---

6.3.2.13 Temperature offset



The "Temperature offset" setting can be used to adjust the measured temperature value to a reference value. An offset in the range from -10.0 °C to +10.0 °C can be set.

7 Faults

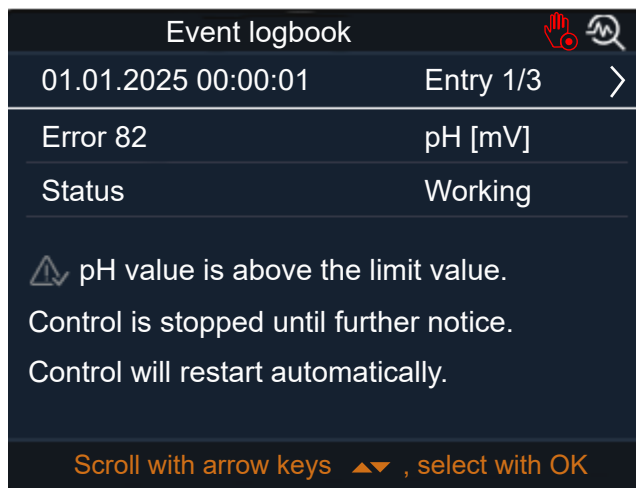
Faults, warnings and errors are displayed on the controller. The corresponding messages can be read out via the display and used for fault diagnosis.

Select the message for further details.



NOTICE!

Troubleshooting must be carried out by qualified specialist personnel.



In addition, faults can be subsequently read out from the fault logbook under *'Diagnostics → Logbooks → Error logbooks'*.

For the exact meaning of the messages and recommended measures, see [Chapter 7.1 'Fault table' on page 64](#).

7.1 Fault table

This is an overview of the possible error displays of the controller. Corrective measures must be carried out by trained specialist personnel. If the specified measure does not rectify the fault, please contact your local service centre.

No.	Error message	Remedy
TXT_Error1	The level in tank 1 is too low	Check liquid level of tank 1
TXT_Error2	The level in tank 2 is too low	Check liquid level of tank 2
TXT_Error3	No sensor recognised, please check connection	Check sensor function and connection
TXT_Error4	The mV input voltage is too low	Check sensor function and connection
TXT_Error5	The mV input voltage is too high	Check sensor function and connection
TXT_Error6	There is a calibration error	Perform calibration again if necessary

No.	Error message	Remedy
TXT_Error7	The temperature is too low	Check the function and connection of the sensor. Check process value.
TXT_Error8	The temperature is too high	Check the function and connection of the sensor. Check process value.
TXT_Error9	The limit value was exceeded	Check the function and connection of the sensor. Check process value. Check the limit value settings.
TXT_Error10	The limit value was exceeded	Check the function and connection of the sensor. Check process value. Check the limit value settings.
TXT_Error11	The limit value was undershot	Check the function and connection of the sensor. Check process value. Check the limit value settings.
TXT_Error12	The limit value was undershot	Check the function and connection of the sensor. Check process value. Check the limit value settings.
TXT_Error13	There is a system error.	Restart the controller.
TXT_Error14	The controller is in the Pause state	Check the input signal of the pause control. Check the process value of the control.
TXT_Error15	The controller is in the Pause Hold state	Check the input signal of the pause control. Check the process value of the control.
TXT_Error16		
TXT_Error17	No sensor recognised, please check connection	Check the function and connection of the sensor. Check process value.
TXT_Error18	Check the mechanical condition of the sensor. Glass breakage is possible.	Check the function and connection of the sensor. Check process value.
TXT_Error19	The wash timer has expired. Maintenance is required.	Carry out maintenance according to the schedule.
TXT_Error20		
TXT_Error21	The supply to the mA input is overloaded	Check the function and connection of the sensor. Check process value.

Faults

No.	Error message	Remedy
TXT_Error22	The mA input is overloaded	Check the function and connection of the sensor. Check process value.
TXT_Error23		
TXT_Error24	The control time was violated	Check the control settings and adjust if necessary. Check process behaviour.
TXT_Error25	There is a sample water error, e.g. no flow	Check flow signal of sample water
TXT_Error26	The mA input current is greater than 20 mA	Check the function and connection of the sensor. Check process value.
TXT_Error27	The mA input current is less than 4 mA	Check the function and connection of the sensor. Check process value.
TXT_Error28	The battery must be replaced.	Contact the service centre responsible for you
TXT_Error29	The time must be checked	Check the time settings on the controller
TXT_Error30	The fan has a fault.	Contact the service centre responsible for you
TXT_Error31	Incorrect correction variable	Check controller settings.
TXT_Error32	The conductivity is too low	Check the function and connection of the sensor. Check process value.
TXT_Error33	The conductivity is too high	Check the function and connection of the sensor. Check process value.
TXT_Error34		
TXT_Error35		
TXT_Error36		
TXT_Error37		
TXT_Error38		
TXT_Error39		
TXT_Error40		
TXT_Error41	The external power supply is faulty	Check the function and connection of the controller. Contact service.
TXT_Error42	The critical internal temperature has been reached	Check the ambient temperature. Contact service.
TXT_Error43		
TXT_Error44		
TXT_Error45		

No.	Error message	Remedy
TXT_Error46		
TXT_Error47		
TXT_Error48		
TXT_Error49	Stopped due to a previous limit violation	Check the controller settings for limit violations.
TXT_Error50	Automatically stopped after switching on. Manual start required.	Start the control manually. ATTENTION: Observe process conditions!
TXT_Error51	The level in a tank is too low	Check tank.

8 Servicing

8.1 General

The purpose of maintenance is to maintain or restore the functions of the product. Maintenance can be subdivided into the following areas:

- Maintenance
- Repair

Maintenance

Maintenance is regular, preventive maintenance. Maintenance serves to prevent damage, failures and malfunctions and thereby ensures the functionality and availability of the product and/or the entire system.

Repair

Repairs are failure-related and/or condition-dependent repair tasks. The purpose of a repair is to restore the functionality and availability of the product and/or the entire system after damage and wear have been detected and after damage-related failures or malfunctions.

8.2 Maintenance

The controller is essentially maintenance-free. If necessary, wipe the surface of the device with a damp microfibre cloth.

Maintenance schedule

Interval	Maintenance work
Every 3 months	Cleaning
	Calibrate

8.2.1 Update controller

The controller software (settings) can be saved to a USB memory device or loaded from a USB memory device here.

The required update package can be downloaded from the official website or obtained directly from ProMinent on request. Save the provided package on a USB-C stick.

1. ► Download the update package and transfer it to a USB-C stick.
2. ► Select the *'Menu'* button on the controller.
3. ► Navigate to *'System settings → Update'*.
 - ⇒ The update package is automatically recognised and displayed by the controller.

4. → Confirm the update according to the display on the controller.

⇒



Do not switch off the controller or remove the USB-C stick during the process.

The update is now transferred to the controller.

After successful installation, the controller may restart automatically.

8.2.2 Repair

8.2.2.1 Remove

The product must be removed from the installation location for repair.

Switch off

→ Switch off the system and safeguard against being switched on again.

Disconnect electrical connections

→ Disconnect all electrical connections to the product.

9 Disposal and environmental protection

9.1 Packaging

The various packaging materials such as timber, cardboard, plastics, etc. must be sorted and disposed of in accordance with the applicable legal regulations.

9.2 Product

The various materials such as metals, plastic, rubber, etc. must be sorted and disposed of in accordance with the applicable legal regulations.

Electrical/electronic components

Electrical and electronic components must be disposed of in accordance with the applicable legal regulations. Corresponding parts within the product must be handled in accordance with the WEEE Directive (2012/19/EU).

Materials and supplies

Material, cleaning agents and other operating materials must be disposed of separately and in accordance with the applicable legal regulations.

10 Technical data

10.1 Measured data and functional data

Tab. 6: Measured data and functional data diaLog C

Measured variable	Measuring range	Resolution	Precision	Sensor / Measurement principle
pH	-1.45 to 15.45 pH	0.01 pH	±0.05 pH or ±0.3% of end val.	Potentiometric (mV)
ORP (ORP)	-1500 - 1500mV	1 mV	±5 mV or ±0.3% of end val.	Potentiometric (mV)
Chlorine Chlorine dioxide Chlorite Bromine Ozone H ₂ O ₂ Peracetic acid O ₂ (dissolved)	Depending on sensor type		Depending on sensor type	Amperometric (mA)
pH ORP Fluoride (with mA converter)	Depending on sensor type		Depending on sensor type	Potentiometric Via mA converter
Hydrogen peroxide (with mA converter)	Depending on sensor type		Depending on sensor type	Amperometric Via mA converter
Conductivity (conductive)	0.001 µS/cm - 100 mS/cm		±1% of the measured value ±1 digit step	Conductive
Conductivity (inductive)	0.1 µS/cm - 2000 mS/cm		±1% of the measured value ±1 digit step	Inductive
Specific electrical resistance	0.001 Ω-cm - 999 MΩ-cm		±1% of the measured value ±1 digit step	Calculated from conductivity
TDS (Total Dissolved Solids)	0 - 9999 ppm (mg/l)		Depending on sensor type	Calculated from conductivity
Salinity (SAL)	0 - 70.0 g/kg		Depending on sensor type	Calculated from conductivity
Temperature (Pt100 / Pt1000)	-20°C - 150°C	0.1°C	Pt100: ±0.4 °C at 20 °C Pt1000: ±0.3 °C at 20 °C	Resistance thermometer
Free chlorine (Sensor CLB2/ CLB3)	0 - 5.00 ppm		Depending on sensor type	Amperometric 0 - 50°C

of end val. = of the end value of the measuring range

10.2 Compatibility overview

Tab. 7: List of compatible measured values and sensors

pH	<ul style="list-style-type: none"> ■ PHES ■ PHEK ■ PHEP/PHEPT ■ PHED ■ PHEN ■ PHER ■ PHER-DJ ■ PHEI ■ PHEX ■ PHEF ■ PHEF-DJ ■ PHEP-H ■ RHES Pt ■ RHES Au ■ RHEK Pt ■ RHEKL Pt ■ RHEP Pt ■ RHEP Au ■ RHEN Pt ■ RHER Pt ■ RHER-DJ ■ RHEIC ■ RHEX
ORP	<ul style="list-style-type: none"> ■ PHES ■ PHEK ■ PHEP/PHEPT ■ PHED ■ PHEN ■ PHER ■ PHER-DJ ■ PHEI ■ PHEX ■ PHEF ■ PHEF-DJ ■ PHEP-H ■ RHES Pt ■ RHES Au ■ RHEK Pt ■ RHEKL Pt ■ RHEP Pt ■ RHEP Au ■ RHEN Pt ■ RHER Pt ■ RHER-DJ ■ RHEIC ■ RHEX

Chlorine	<ul style="list-style-type: none"> ■ CLE 3.0 ■ CLE 3.1 ■ CTE 1 ■ CTE 1 total ■ CTE 2 ■ CTE 2 total ■ CTE 3 ■ CTE 3 total ■ CBR 1 ■ CGE 2 ■ CGE 2 free ■ CGE 3 ■ CGE 3 free ■ CLO 1/2 ■ CLO 3/4 ■ CLR 1 ■ CLB 1
Conductivity	<ul style="list-style-type: none"> ■ LMP001 ■ LMP001-HT ■ LMP01-HT ■ LMP01 ■ LMP01 5m TA ■ LFTK1 3m ■ LFTK1 5m ■ LF1-DE ■ LFT1-DE ■ LFTK1-DE ■ LF1 1/2 " ■ LFT1 1/2 " ■ LFTK1 1/2 " ■ CK1 ■ CKPt1 ■ LM1 ■ LM1 5m TA ■ LMP1 ■ LMP1-HT ■ LMP1 5m TA ■ LF-TEST ■ ICT1 ■ ICT5 ■ ICT2 ■ EH-CLS52
Turbidity	<ul style="list-style-type: none"> ■ LDS

10.3 Ambient temperature

- Ambient temperature -10 to 60 °C (for indoor installation or with protective housing)
At the ambient temperatures, low-voltage cables are required made of copper with a temperature resistance of ≥ 75 °C, min. AWG 18 or min. 0.75 mm² are insulated wires, cables and other electrical conductors which must be flame-retardant. Wires with rated data in accordance with UL 2556 VW-1 or equivalent standards are presumed to meet this requirement.
- Storage temperature -20 to 70°C

10.4 Ambient conditions

- Indoor installation or with protective enclosure
- Max. 90% relative air humidity (non-condensing)

10.5 Maximum operating altitude

- Maximum 2000 metres above sea level

10.6 Electrical connection

- 100 ... 240 V AC \pm 10 %, 50/60 Hz, 15 W, 0.24 - 0.13 A

10.7 Degree of protection

- Wall installation: IP66/IP67 (closed) // IP20 (open)
Useage in wet areas
- Switch cabinet installation: IP54 // IP20 (open)

10.8 Pollution degree

- Surface mounting: Pollution degree 3 (IEC 61010-1 standard)
- Control panel installation: Pollution degree 2 (IEC 61010-1 standard)

10.9 Overvoltage category

- II (DIN VDE 010/IEC Publication 664)

10.10 Fuses

- Mains fuse: 1.6 AT 250 VAC, 5 x 20 mm, H = heavy-duty fuses (high breaking capacity); TN: 732411

10.11 Output relay/alarm relay potential-free

Relay	Function	Protective circuit	Switching power	Load type
XR1- Relay 1	Output relay potential-free (24VDC or 100-240VAC)	Varistor on NO and NC terminal On-site fuse protection of the relay (XR1) with 5 A	Max. 750VA ($\leq 3A$)	Ohmic

10.12 Switching digital output (XA1, XA2)

Switching; load type: ohmic max. 100mA; max. 100Hz

Insulation voltage to the measuring module	500Vpp max.
Switching voltage (safety extra-low voltage)	48V ACpp or DCmax.
Switching current	Max. 100mA
Residual current (open)	Max. 10 μ A
Switching frequency	Max. 100Hz
Max. cable length	30 m (EMC standard 61326)
Relay type	Optomos relay

10.13 Digital input (XK1, XK2)

Static/dynamic signal (frequency ≤ 2 kHz)

Insulation voltage to the measuring module	500Vpp max.
Output voltage digital input	Max. 12V (dielectric strength of the switch)
Short-circuit current digital input (also capacitive discharge current)	Max. 10mA
Max. switching frequency (hardware)	2 kHz
Max. frequency	Software filter specifies maximum frequency
Max. cable length	30 m (EMC standard 61326)
Contact resistance open	>100k Ω
Contact resistance closed	<100 Ω
Switch	Mechanical contact or open collector (potential-free)

10.14 Current output (XA3)

0/4 – 20mA active

Insulation voltage to the measuring module	500Vpp max.
Output voltage	Max. 18V
Load	Max. 500Ω at 22mA fault current
Output current	0/3.8 - 20.5mA; max 22mA
Limit frequency	approx. 3Hz
Max. cable length	30 m (EMC standard 61326)

10.15 BAM (XBAM1)

Output voltage supply XBAM1-1 to XBAM1-2	5V/50mA
Logic level digital output XBAM1-3 to XBAM1-2	5 V
Max. cable length	30 m (EMC standard 61326)

10.16 USB-C (XUSB1)

Output voltage supply USB-C stick	5V/200mA (current limited)
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