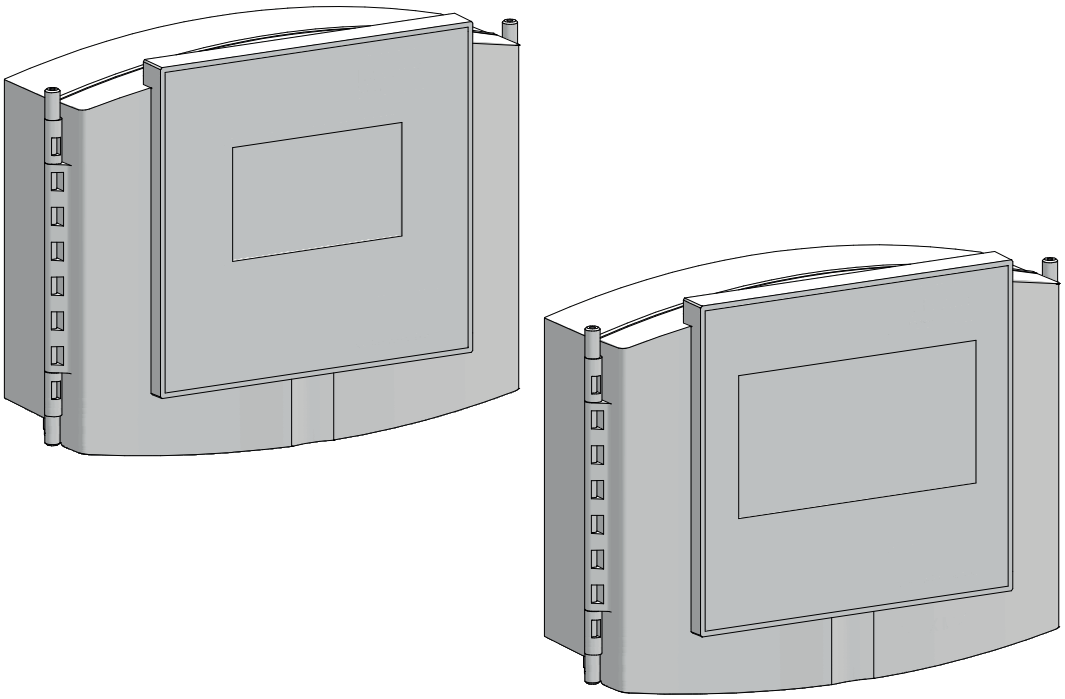
Multi-Channel Controller

TOPAX® MC

Operating instructions



Read the operating manual!
The user is responsible for installation and operation related mistakes!

Original operating instructions

BA-46020-02-V06

Dosing Conveying Control | Liquids Gases Systems

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1 Notes for the Reader

This operating manual contains information and behaviour rules for the safe and designated operation of the **TOPAX® MC** multi-channel controller.

Observe the following principles:

- Read the entire operating manual prior to starting-up the device.
- Ensure that everyone who works with or on the device has read the operating manual and follows it.
- Maintain the operating manual throughout the service life of the device.
- Pass the operating manual on to any subsequent owner of the device.

1.1 General non-discrimination

This operating manual uses 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 the signal words

Different signal words in combination with warning signs are used in this operating manual. 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 the signal words

1.3 Explanation of the warning signs

Warning signs represent the type and source of a danger:

Warning sign	Type of danger
	General danger
	Danger from electrical voltage
	Danger from poisonous substances
	Danger of damage to machine or functional influences

Tab. 2: Explanation of the 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.

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 und 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 this operating manual, 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 this operating manual, 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

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 which is not consistent with these operating instructions, particularly safety instructions, handling instructions and chapter 3 “Intended use” on page 7.
- Information on usage and environment (section 6 “Technical data” on page 13) 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.

3.2 Intended purpose

The controller monitors the current measured values during water treatment and controls the dosing systems connected for water treatment. In this way, the controller ensures constant water parameters in various applications and can be deployed universally. One of its main applications is maintaining the quality of water in swimming pools and industrial installations by evaluating the measurements of the chlorine value, the pH value, the Redox value, the total chlorine, the conductivity and the control of chlorinators, for example, among other things.

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 start-up

- Commissioning with damaged or obsolete sensors
- Commissioning without the establishment of all protective measures, fastenings etc.

3.3.3 Incorrect operation

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

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:

- **TOPAX® MC** Multi-channel controller
- Operating instructions
- Mounting set
- Sensors (optional)
- Cable connection from the device to the sensors (optional)

4.2 Functions of the device

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

4.3 Main view

The main menu view will appear upon the start of the device or 5 minutes after the last input. The main view shows the current values from up to four sensors and further information.

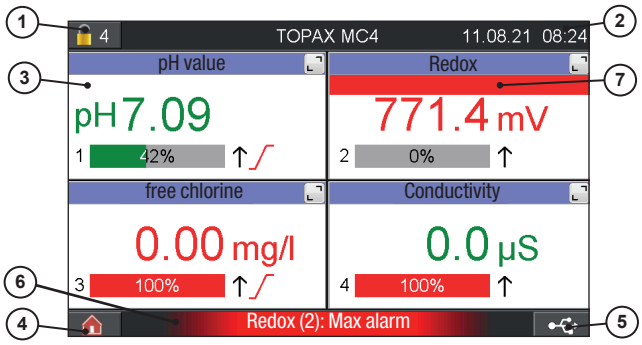


Fig. 1: Main view with three sensors

Item	Function
1	Login / password settings
2	Date/time
3	Measured values
4	Main menu
5	File Browser
6	Status row for messages
7	Alarm flashes

Tab. 4: Position numbers main view with three sensors

4.4 multi-channel controller TOPAX® MC rating plate

There is information on the equipment about safety or the product's way of functioning. The information must stay legible for the duration of the service life of the product.

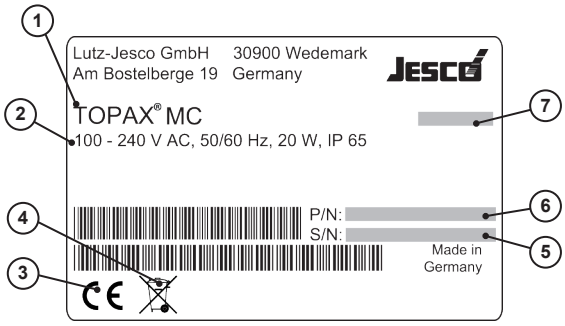


Fig. 2: Multi-channel controller **TOPAX® MC**rating plate

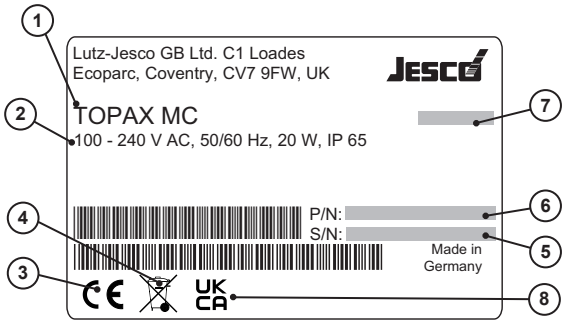


Fig. 3: Multi-channel controller **TOPAX® MC**rating plate for the UK

Item	Description
1	Product name
2	Technical specifications
3	Label showing conformity with applicable European directives
4	WEEE label
5	Serial number
6	Part number
7	Month/year of manufacture
8	Label showing conformity with applicable UK directives

Tab. 5: Position numbers rating plate multi-channel controller **TOPAX® MC**

5 Function

5.1 Functional diagram of a two-channel controller

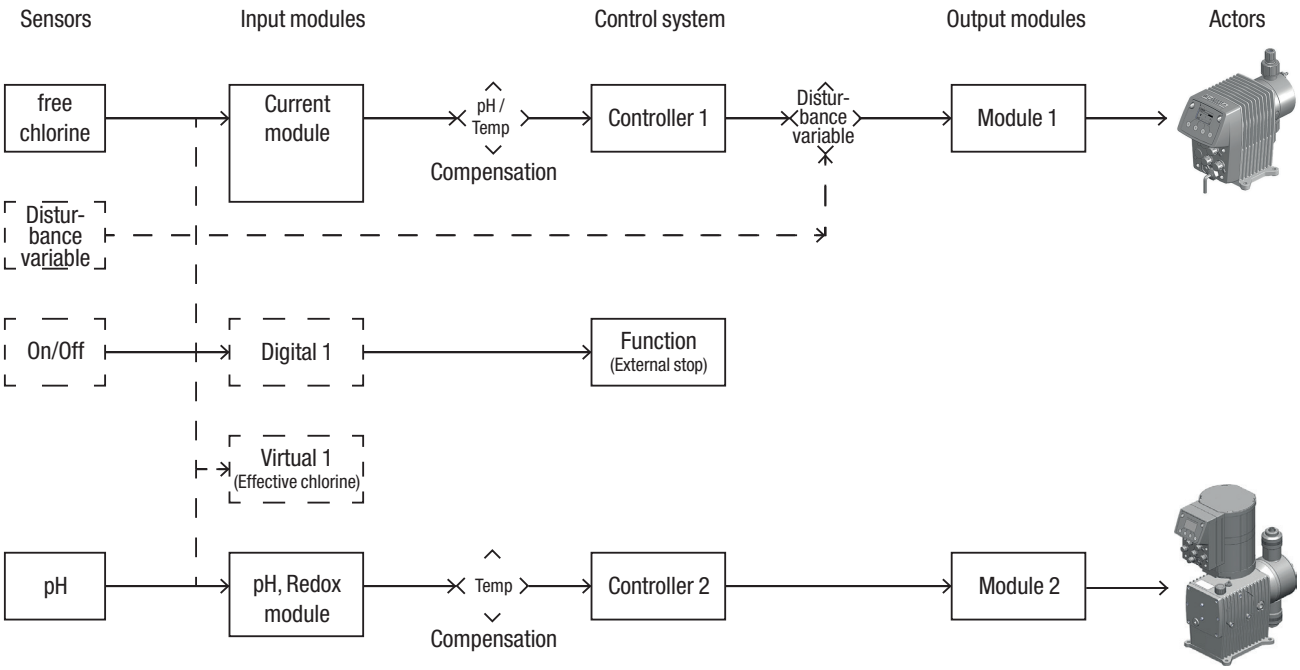


Fig. 4: Functional diagram of a two-channel controller

Gap	Field	Description
Sensors	**1.** Free chlorine **2.** Disturbance variable **3.** pH value	**1.** Measuring the free chlorine **2.** The disturbance variable is a variable flow volume which can be taken into account. **3.** Measuring the pH value
Input modules	**1.** Current module **2.** Digital 1 **3.** Virtual 1 **4.** pH Redox module	**1.** Module for 4 – 20 mA signals and sensors with 24 V voltage supply. **2.** Digital input for the external control of a function (here: external stop) **3.** Parameter calculated (here effective chlorine) **4.** Module for pH and Redox single-rod measuring cells
Control system	**1.** Controller 1 **2.** Controller 2	**1.** Controlling the free chlorine inc. pH/temperature compensation and disturbance variable **2.** Controlling the pH value inc. temperature compensation
Output modules	**1.** Module 1 **2.** Module 2	**1.** Module on slot 1 to connect an actor (here: MAGDOS LD) **2.** Module on slot 2 to connect an actor (here: MEMDOS LP)

Tab. 6: Explanation of functional diagram of a two-channel controller

5.2 Controller explanation

5.2.1 Definitions

Term	Definition
actual value (X)	The actual value of X of the measurement for the respective sensor is constantly indicated.
Setpoint (W)	Setpoint W of a control system defines the level at which the controller should settle the process and keep it constant.

Tab. 7: Definitions

Term	Definition
Control deviation (X-W)	Control deviation X-W occurs if the actual value X of the measurand differs from setpoint W. Control variable Y results from the control deviation and the control parameters set.
Control variable Y	Control variable Y of a control system defines the value which the controller transmits to the final control element depending on the parameters set and control deviation X-W (between 0 % and 100 %).

Tab. 7: Definitions

5.2.2 Proportional controller (P controller)

5.2.2.1 Proportional range Xp

(proportional effect or amplification of the controller)

The proportional range Xp (p-range) of a proportional controller indicates the amount by which the measurand X must deviate from the setpoint W, so that the control variable Y = 100%. If the control deviation is less, the control variable is reduced proportionally.

Control variable Y of a P-controller is affected proportionally only by the control deviation (X – W).

The **TOPAX® MC** specifies the P range (which was previously specified in %) in the relevant unit of the measurand directly, and is the deviation from the setpoint as of which the output is 100 %.

In this way, the control deviation is specified directly, since the input electronics also have no fixed final value. Conversion is no longer necessary.

Example:

Setpoint = 0.8 mg/l

Xp value = 0.5 mg/l

Setpoint - Xp value = actual value at which control variable Y reaches 100 %

0.8 mg/l - 0.5 mg/l = 0.3 mg/l

With an actual value of 0.3 mg/l, control variable Y is 100 %.

The following table shows the previous specification of the Xp value in the TOPAX® DX as % with the relevant measuring range and the relevant setting in the **TOPAX® MC** as a fixed value with the associated unit specification. The table is intended to make the old settings easier to convert in the event of a refit. Please note that only two decimal points are displayed in the TOPAX® MC controller.

Disinfection (free chlorine, chlorine dioxide etc.)						
Setpoint [mg/l]	Xp value in [%] TOPAX® DX (1 mg/l)	Xp value in [%] TOPAX® DX (2 mg/l)	Xp value in [mg/l] TOPAX® MC	Control variable Y 100 % with actual value in [mg/l]	Control variable Y 50 % with actual value in [mg/l]	Control variable Y 10 % with actual value in [mg/l]
0.5	10.0	5.0	0.10	0.40	0.450	0.490
0.5	15.0	7.5	0.15	0.35	0.425	0.485
0.5	20.0	10.0	0.20	0.30	0.400	0.480
0.5	25.0	12.5	0.25	0.25	0.375	0.475
0.5	30.0	15.0	0.30	0.20	0.350	0.470
0.5	40.0	20.0	0.40	0.10	0.300	0.460
0.5	50.0	25.0	0.50	0.00	0.250	0.450

Tab. 8: Xp value disinfection

pH value						
Setpoint [pH]	Direction	Xp value in [%] TOPAX® DX (0 – 14 pH)	Xp value in [pH] TOPAX® MC	Control variable Y 100 % with actual value in [pH]	Control variable Y 50 % with actual value in [pH]	Control variable Y 10 % with actual value in [pH]
7.0	boosting	5.0	0.70	6.30	6.65	6.93
7.0	boosting	10.0	1.40	5.60	6.30	6.86
7.0	boosting	15.0	2.10	4.90	5.95	6.79
7.0	boosting	20.0	2.80	4.20	5.60	6.72
7.0	boosting	25.0	3.50	3.50	5.25	6.65
7.4	boosting	5.0	0.70	6.70	7.05	7.33
7.4	boosting	10.0	1.40	6.00	6.70	7.26
7.4	dropping	25.0	3.50	10.90	9.15	7.75

Tab. 9: Xp value pH value

5.2.3 Proportional-integral-derivative controller (PIPI, PID controller)

5.2.3.1 Reset time Tn

(integral effect of PI controller)

The integral time of a PI or PID controller is called the reset time Tn. The integral time is the time required by the control variable Y with a constant nominal/actual deviation to achieve the same change in output signal as produced immediately by the P proportion immediately after the change in the nominal/actual deviation.

5.2.3.2 Example of proportional range and reset time

Xp = 1,0 mg/l (P-range)

Tn = 3 min

(sudden change of the actual value by 0.10 mg/l)

After a sudden deviation of the actual value from the setpoint of around (X-W) 0.10 mg/l, the control variable Y immediately changes to 10 %.

Because of the integral behaviour, the control variable continues to increase for as long as the X-to-W deviation remains, in order to achieve a control variable increase of a further 10 % after Tn = 3 minutes, (resulting in 20%).

This means that the value increases by an additional 10 % every 3 min. This increase takes place in a linear fashion for the entire period of time until Y = 100 % has been reached.

Control variable	Setpoint
X (actual value)	0.20 mg/l
Setpoint (W)	0.30 mg/l
X-W	0.10 mg/l
Xp (P-range)	1.0
I	3 minutes
Y (immediate power output of the controller)	10 % through Xp
Y (output power of the controller after 3 minutes)	20 % through Tn
Y (output power of the controller after 6 minutes)	30 % through Tn

Tab. 10: Example of proportional range and reset time

5.2.3.3 Derivative time Tv

(differential effect of PID controller)

With the differential function, a correction factor is entered in the controlled system when the control variable begins to differ from the setpoint. The control variable depends on the speed at which the setpoint/actual deviation takes place (i.e. not the actual deviation). The duration of the correction is determined by the derivative time Tv. If the control variable does not change, i.e. the speed of change is "0", the correction factor and the time constants Tv caused by the differential proportion drop to "0" (even if the actual value consistently deviates from the setpoint). The fact that the regulation leads the actual value to match with the default one is caused mainly by the integrals portion of the automatic controller. The differential proportion often improves the controller result because it acts against the trend to deviate.

5.2.4 Calculation of setable values

In order for the controller to keep actual values of free chlorine and Ph close to the setpoints within tight limits, e.g. for bathing, the controller must be adjusted to the controlled system. This is achieved using control parameters Xp for the proportional range (**P**), Tn for the reset time of the integral range (**I**) and the derivative time Tv for the differential range (**D**).

These settings can be determined by recording the step response of the controlled system. To do this the actuator must be changed suddenly by hand from "CLOSED" (0 %) to "OPEN" (100 %) or for example from 30% to 50%.

The following formula can be used for calculating reference values:

$$Xp \sim 0.83 \cdot \Delta X / \Delta t \cdot Tu$$

$$Tn \sim 3.3 \cdot Tu$$

Variable	Description
Yh	Setting range (e.g. valve fully open or 100 % dosing pump supply)
Xmax	maximum value of the controller variable at 100 % dosing rate
ΔX / Δt	Gradient of the measured curve (see Fig. 6)
to	Time of control variable Y change
Tu	lag time (s)

Tab. 11: Calculation of setable values

In order to meter chlorine gas, you need accounting for the speed of the chlorine gas valve. The value of Xp is computed for a drive speed from 0 % through 100 % in 60 seconds. A slower operation would show the same trend as a bigger proportional range Xp. In order to adjust this, the Xp value must be first reduced at slower operation and vice versa.

The following formula can be used:

$$Xp\ new = Xp \cdot 60\ s / Ty$$

Ty = Motor regulation time

As these are approximate values, changing the Xp value may after a certain time improve the control variable. If the control responds too slowly or too fast, a smaller Xp and a smaller Tn would result in a faster control behaviour and a larger Xp and/or Tn would result in slower behaviour.

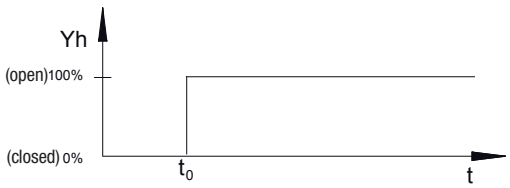


Fig. 5: State of the control variable, e.g. opening of a valve or dosing rate of a pump.

Here below, a diagram shows for the controlled variable X over the time t:

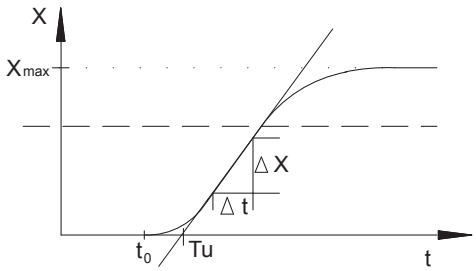


Fig. 6: Step response of a controller to a change in control variable Y.(X = actual value; e.g. disinfection or pH value)

The control parameters can be automatically calculated to the respective state in the TOPAX® MC.

The settings are optimized better during operation, in order to take a representative load into consideration for the control. Dimensioning by means of trial and error (empirical setting) has proven itself when doing this.

This is a practical method that requires little calculation and auxiliary equipment, performed in accordance with the most well-known setting rules from Ziegler/Nichols, the empirical formula procedure.

Adjusting using the oscillation method:

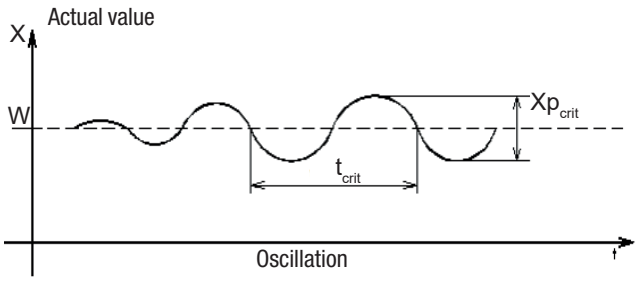


Fig. 7: Adjusting using the oscillation method:

The procedure is very good for systems that can be made to oscillate.

Adjustment through trial and error:

Start with a non-critical setting (large Xp, Tn = 0, Tv = 0) and slowly reduce the proportionality factor Xp. Then gradually add the integral proportion, increase it in stages and keep trying until the result approximately corresponds to control with little oscillation.

5.2.5 Controller parameters

For Disinfection, pH value, combined chlorine and conductivity inputs the following settings may be programmed:

Controller	Xp value	Tn value	pH value
P	0.01 – 99999	-	
PI	0.01 – 99999	1 – 200 min	
PD	0.01 – 99999		1 – 1200 s
PID	0.01 – 99999	1 – 200 min	1 – 1200 s

Tab. 12: Controller parameters

All control parameters which are pre-set in the as-delivered state must be checked and adapted on-site.

5.2.6 Control direction

The control direction can be set for each controller. Possible options:

- Value boost: Display "up" arrow
- Lower pH value: Display "down" arrow
- 2-side regulation: only pH value

The upper relay of the output module (X.1, terminals 3 and 4) is used for 1-sided control, irrespective of raising or lowering, the upper relay (X.1, terminals 3 and 4) is used for raising for 2-sided control, and the lower relay (X.2, terminals 1 and 2) is used for lowering.

ATTENTION: 2 setpoints must be entered with 2-sided control. These must be selected as close together as possible, e.g. with pH = 0.05, unless the process requires greater values.

5.2.7 Basic load dosing

Basic load dosing can be configured outside of the control range. This dosing takes place even if the PID automatic controller output is 0%. If a basic load is configured, this value is shown in blue on the display screen in the Y display. The Y display for automatic control is shown in green. In the status display, this condition is indicated by a "+" after the Y display. Note that this basic load is always effective and that a certain percentage of the actuator is always open irrespective of the control even though the controller does not require dosing. The basic load can be adjusted separately for each output up to a maximum of 20% of the control range.

6 Technical data

TOPAX® MC			
Dimensions	Housing (W x H x D)	mm	302 x 240 x 107
	Screen diagonal		5" or 7” depending on version
Voltage supply			100 – 240 V AC, 50/60 Hz
Power consumption		W	max. 20
Analogue outputs for remote transmission			4 x 0/4 – 20 mA, working resistance max. 500 Ω
Disturbance variable input		mA	0/4 – 20
Alarm relay (two-way contact)			250 V AC, 10 A (ohmic resistive load)
Interfaces			Ethernet TCP/IP or RS485 Modbus RTU (optional)
Protection class			IP65
Ambient temperature		°C	-5 to +45 (no exposure to direct sunlight)
Control characteristic			P, PI, PID or PD behaviour, control direction selectable with disturbance variable feed forward, 2-side control selectable

Tab. 6: Technical data multi-channel controller **TOPAX® MC**

6.1 Measuring inputs

All measuring inputs consist of an input for temperature measurement via Pt100 and a second input for the measurement of a further water parameter. On some measuring inputs, this input will measure a number of different parameters.

Measuring inputs (depending on version)			
Number of measuring inputs			up to 4*
Bromine	Diaphragm-covered measuring cell	mg/l	0 – 5 (dependant on the measuring cell)
Free chlorine	Amperometric 3-electrode measuring cell with potentiostat (DMZ3.1)	mg/l	0 – 2 or 0 – 15 (dependant on the input module and the measuring cell transconductance)
	CS120 excess chlorine measuring cell	mg/l	0 – 10 (dependant on the measuring cell transconductance)
	Diaphragm-covered measuring cell	mg/l	0 – 20 (dependant on the measuring cell)
Chlorine dioxide	Amperometric 3-electrode measuring cell with potentiostat (DMZ3.1)	mg/l	0 – 2 or 0 – 15 (dependant on the input module and the measuring cell transconductance)
	CS120 excess chlorine measuring cell	mg/l	0 – 10 (dependant on the measuring cell transconductance)
	Diaphragm-covered measuring cell	mg/l	0 – 20 (dependant on the measuring cell)
Total chlorine	Diaphragm-covered measuring cell	mg/l	0 – 10 (dependant on the measuring cell)
Ozone	Diaphragm-covered measuring cell	mg/l	0 – 2 (dependant on the measuring cell)
pH value	pH single-rod measuring cell	pH	0 – 14 (dependant on the single-rod measuring chain)
Redox value	Redox single-rod measuring cell	mV	-1000 to +1000 (dependant on the single-rod measuring chain)
Chlorite	Diaphragm-covered measuring cell	mg/l	0 – 2 (dependant on the measuring cell)
Hydrogen peroxide	Diaphragm-covered measuring cell	mg/l	0 – 200 (dependant on the measuring cell)
Conductivity	Conductive conductivity measuring cell inc. temperature sensor Pt100 (c = 1)	mS/cm	0 – 2, 0 – 20, 0 – 100 (dependant on the configuration, corresponds to approx. 0 – 1 % or 0 – 5 % salt content)
Temperature	Pt100	°C	-10 to +90

Tab. 7: **TOPAX® MC** multi-channel controller measuring inputs

* An additional temperature sensor can be connected per sensor input.

6.2 Output modules

Output modules (depending on version)		
Servomotor relay		2 x 230 V AC, 5 A (ohmic load)
	kΩ	Potentiometer feedback: 1 – 10
Servomotor 20 mA		Constant 0/4 – 20 mA output
		Servomotor with 20 mA feedback
Relays		2 x 230 V AC, 5 A (ohmic load)
Relay high current		2 x 230 V AC, 8 A (ohmic load)
Optocoupler		2 x 80 V DC, 5 mA
Digital universal		selectable: 2 x 230 V AC, 5 A (ohmic load) relays or 2 x 80 V DC, 5 mA optocouplers

Tab. 8: Multi-channel controller **TOPAX® MC** output modules

7 Dimensions

All dimensions in mm

7.1 Outside dimensions

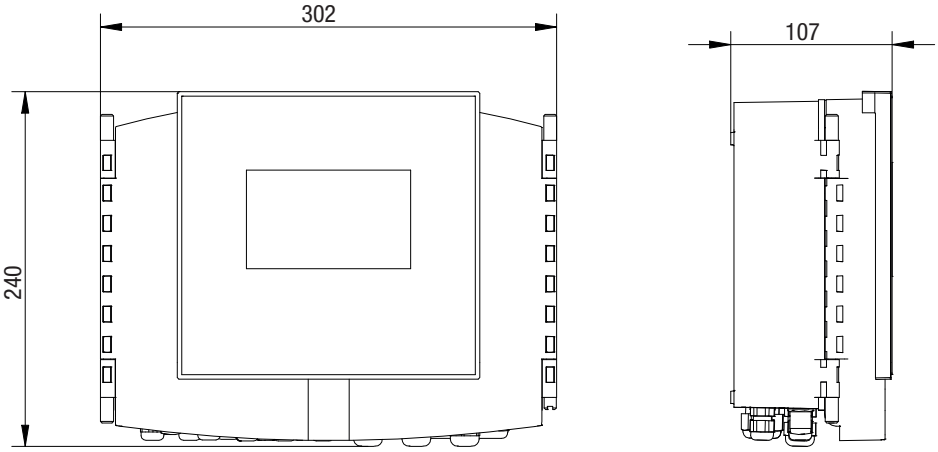


Fig. 8: Outside dimensions TOPAX® MC with 5" display

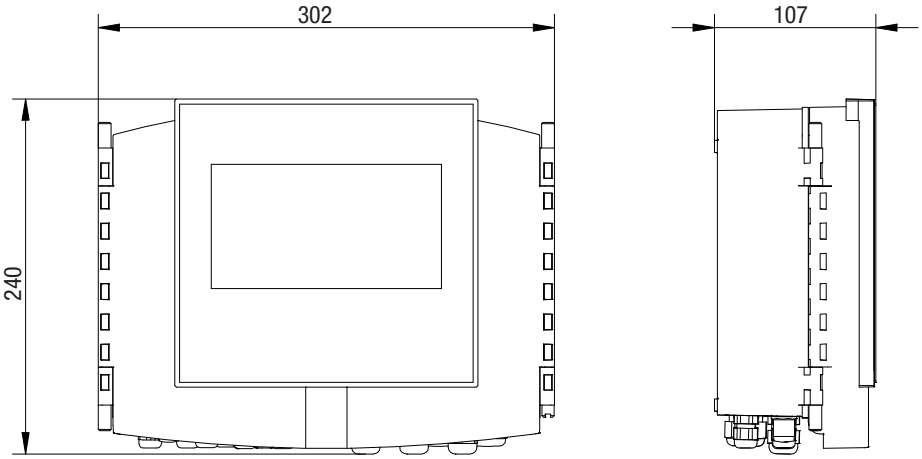


Fig. 9: Outside dimensions TOPAX® MC with 7" display

7.2 Drillhole dimensions

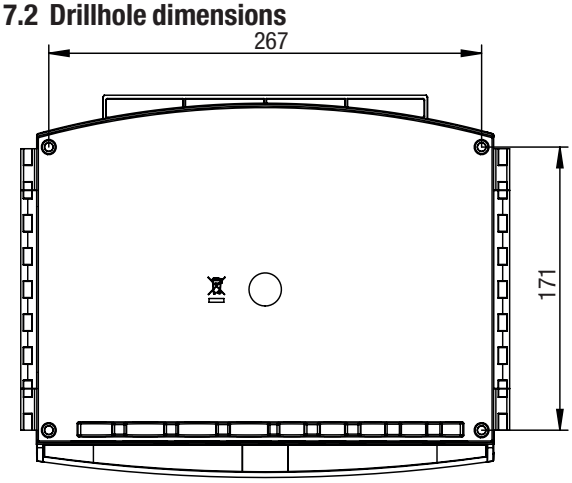


Fig. 10: Drillhole dimensions

8 Installation

8.1 Principles

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

- The display is easily accessible and is visible.
- Plan to leave free space for the installation of the cable underneath the device. You must be able to install the cable without kinking or damage.
- 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 influence.
- Electrical, magnetic and electromagnetic fields affect signal transmission and can destroy electronic components.
- Compliance with the permissible ambient temperatures (see section 6 “Technical data” on page 13).

8.2 Installation on the wall

Resources required:

- Assembly kit
- Drill
- Slotted screwdriver

Perform the following work steps:

1. Drill the four drillholes for wall mounting. The exact dimensions are stated in section 7 “Dimensions” on page 15.
2. Unscrew the screw on the right-hand side of the device and pull out the rod.
   - You can now open the device.
3. Open the device and use the screws for wall mounting. Ensure that the device is secured to the wall.
4. Close the device again using the rod.

✓ **The device is fitted on the wall.**

8.3 Electrical installation

The voltage supply to your device can now be performed via a normal Schuko plug or a control cabinet. Perform the specifications of this section for devices without a pre-fitted Schuko plug.

Pre-conditions for actions:

- ✓ The device was installed in accordance with section 8.2 “Installation on the wall” on page 16.
- ✓ A voltage supply with 100 – 240 V AC (50/60 Hz) is available.
- ✓ The voltage supply is deactivated before the start and secured against reactivation.
- ✓ The housing is open.

Resources required:

- Schuko plug
- Wire end sleeves 0.75 – 2.5 mm²

DANGER

Mortal danger from electric shock!

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

- ⇨ Ensure that all work on the electrical installation is performed by a qualified electrician.
- ⇨ Ensure that all work on the electrical installation is performed in a de-energised state.
- ⇨ Ensure that the power supply is secured with a fault current protective circuit.
- ⇨ Replace damaged cables or components without delay.

Perform the following work steps:

1. Fit wire end sleeve to the cable ends if the supply cable does not have them.
2. Open the device housing.
3. Lead the supply cable through a cable screw connection to the underside of the device.
4. Turn the cable screw connection union nut until the line is fixed in the screw connection so that the screw connection performs strain relief. Ensure that the feed cable is installed loosely.
5. Connect the voltage supply to the clamps 44 – 52. Observe the division into protective earth (PE, green-yellow*), neutral conductor (N, blue*) and the phase (L, brown*) on the circuit board.

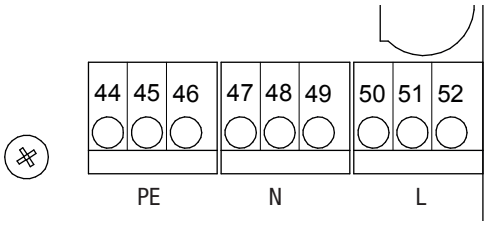


Fig. 11: Connecting the voltage supply

*Applies to wire colours of cables from the manufacturer (no liability is assumed for cables from other manufacturers) and exclusively for European plugs.

✓ **Electrically installation**

Only 3 of 9 clamps are required for connection of the voltage supply. You can use the free clamps to supply further devices with voltage. The contact load rating amounts to max. 4A.

8.4 Terminal connection

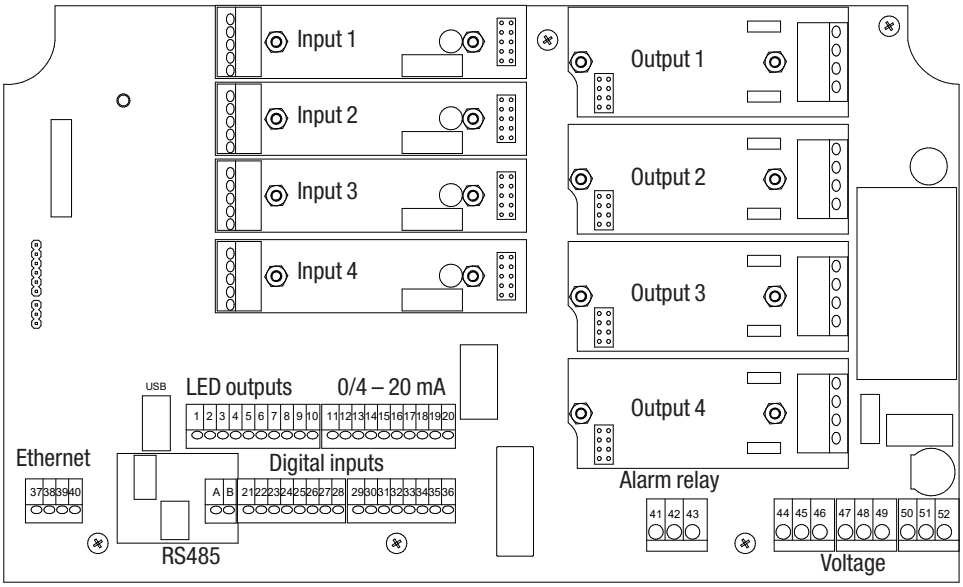


Fig. 12: Overview terminal connection

Terminal	Function		Description
1	LED output 1 (red)	+	5 V with 220 Ω series resistance for LEDs of the water sampling stations
2	LED-output 1 (green)	+	
3	LED output 2 (red)	+	
4	LED-output 2 (green)	+	
5	LED output 3 (red)	+	
6	LED-output 3 (green)	+	
7	LED output 4 (red)	+	
8	LED-output 4 (green)	+	
9 – 10	LED output GND	-	Ground for the LEDs
11	Disturbance variable input	+	0/4 – 20 mA
12		-	
13	Analogue output 1	+	0/4 – 20 mA, working resistance max. 500 Ω
14		-	
15	Analogue output 2	+	
16		-	
17	Analogue output 3	+	
18		-	
19	Analogue output 4	+	
20		-	
21 – 36	Digital inputs 1 – 8	+ (odd numbers) - (even numbers)	Function configurable
37 – 40	Ethernet connection		
41 – 43	Alarm relay		Clamps 41 + 42 normal on Clamps 42 + 43 normal off
44 – 46	Connection supply voltage		Protective earth (PE)
47 – 49			Neutral line (N)
50 – 52			Phase (L)

Tab. 13: Terminal connection

8.5 Connecting sensors

DANGER

Mortal danger from electric shock!

Live parts can inflict fatal injuries.

⇨ Disconnect from the external electricity supply before opening the controller.

⇨ Safeguard the **TOPAX® MC** controller from reactivation.

Up to four input modules can be connected to the device. A water parameter and the temperature can be measured with every module.

Pre-conditions for actions:

✓ The voltage supply has been disconnected and protected against re-connection.

✓ The housing is open.

Resources required:

🛠 Sensors

🛠 Suction connection

Perform the following work steps:

1. Lead the cable through one of the cable screw connections on the underside into the interior of the housing.
2. Connect the wires onto the clamp block of the input modules. Comply with the terminal plans in the following sections.

✓ **Sensor connection completed.**

PLEASE NOTE

Electrical influencing of the measurement results

Incorrect installation of the electrical cables can influence the measurement results. As a result, the control of connected devices can be faulty.

⇨ Do not route the connecting cable parallel to the mains and control connections, and always with a clearance of at least 15 cm. Lay connection junctions at an angle of 90°.

8.5.1 pH Redox module input circuit board

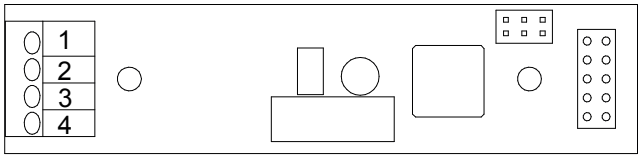


Fig. 13: pH Redox module input circuit board

Terminal	Function	Sensors
1	Temperature input	Resistance thermometer TE110/Pt100
2	Temperature input	

Tab. 14: Terminal connection of the pH Redox module input circuit board

Terminal	Function	Sensors
3	- (wire with Ø 1.5 mm)	pH single-rod measuring chain PE110/Redox single-rod measuring chain ME110
4	+ (wire with Ø 2 mm)	

Tab. 14: Terminal connection of the pH Redox module input circuit board

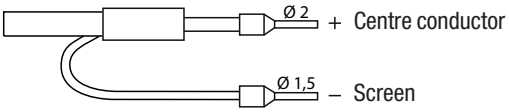


Fig. 14: Connect the cable from the pH or Redox single-rod measuring chain correctly

8.5.2 Input circuit board potentiostat module and high-resolution potentiostat module

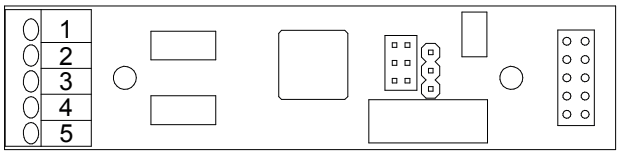


Fig. 15: Input circuit board potentiostat and HD potentiostat

Terminal	Function	Sensors
1	Temperature input	Resistance thermometer TE110/Pt100
2	Temperature input	
3	Measuring electrode	3 electrode potentiostat
4	Counter electrode	
5	Reference electrode	

Tab. 15: Terminal connection of the potentiostat module input circuit board

8.5.3 Current module input circuit board

A number of sensors require an operating voltage for their measurement. These sensors are connected to the current module and supplied with 24 V.

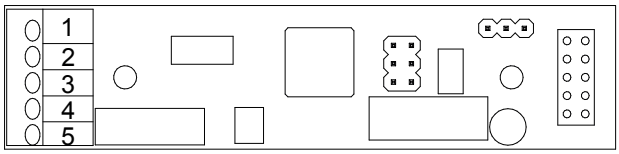


Fig. 16: Current module input circuit board

Terminal		Function	Sensors
1		Temperature input	Resistance thermometer TE110/Pt100
2		Temperature input	
3	-	-	Excess chlorine measuring cell CS120/conductivity measuring cell
4	+	for CS120**	
	-	for 0/4 – 20 mA	Total chlorine measuring cell GCM/diaphragm-covered measuring cell Cl 4.1/ diaphragm-covered measuring cell CD 4 MA*
5	+	24 V DC output	

Tab. 16: Terminal connection of the current module input circuit board

* Requires 24 V supply module

**red: +; blue, purple: -

8.5.4 Conductive input circuit board to the conductivity module

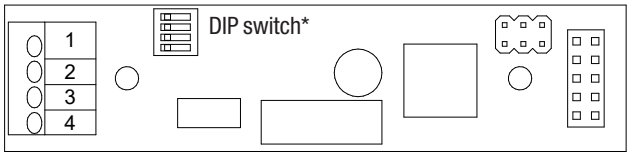


Fig. 17: Conductive input circuit board to the conductivity module

* The switch position on the DIP switch is marked with a small “ON”.

Terminal	Function	Sensors	Wire colour M12 connection cable
1	Temperature input	Conductivity measuring (conductive), k=1	black (BK)
2	Temperature input		blue (BU)
3	Conductivity measurement input		brown (BN)
4	Conductivity measurement input		white (WH)

Tab. 17: Terminal connection of the conductive input circuit board to the conductivity module

DIP switch	0 – 2000 µS/cm	0 – 20 mS/cm	0 – 100 mS/cm
1	OFF	ON	ON
2	OFF	ON	ON
3	OFF	OFF	ON
4	OFF	OFF	ON

Tab. 18: Selecting the measuring range

8.5.5 Connection examples of the sensors

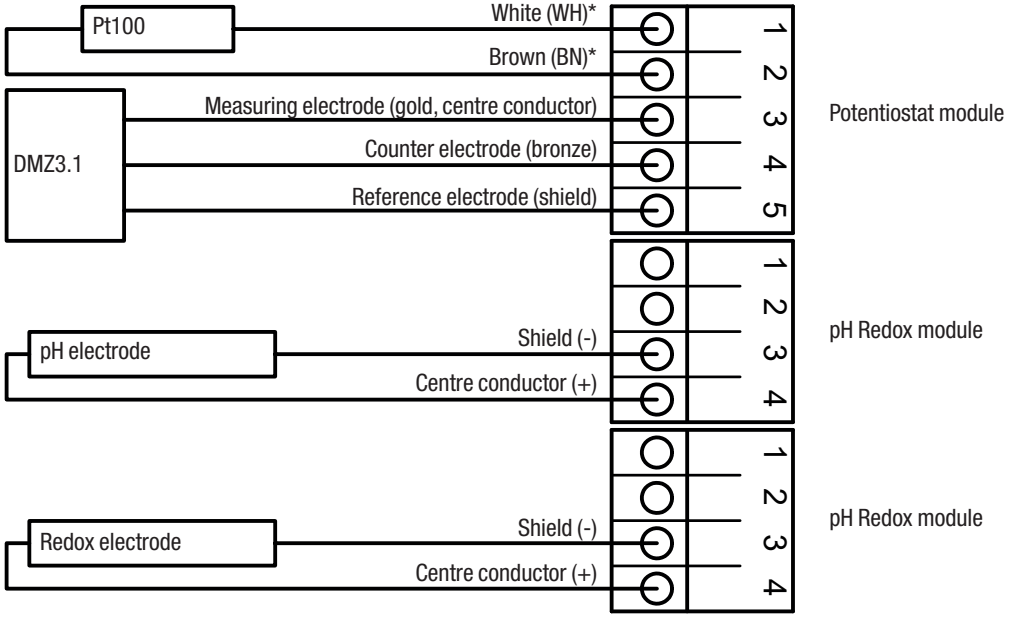


Fig. 18: Measurement of temperature, free chlorine with DMZ3.1, pH value and Redox value

* Applies to cables and sensors from Lutz-Jesco GmbH. No liability is accepted for cables from other manufacturers.

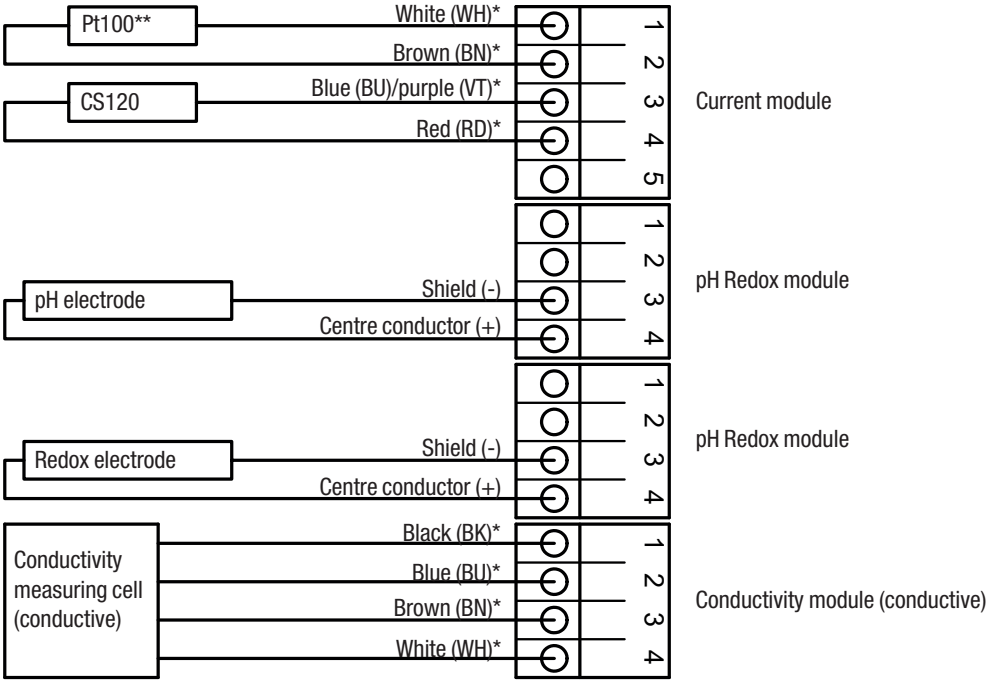


Fig. 19: Measurement of temperature, free chlorine with CS120, pH value, Redox value and conductive conductivity

* Applies to cables and sensors from Lutz-Jesco GmbH. No liability is accepted for cables from other manufacturers.

** Optional: this configuration also includes a temperature sensor in the conductivity electrode.

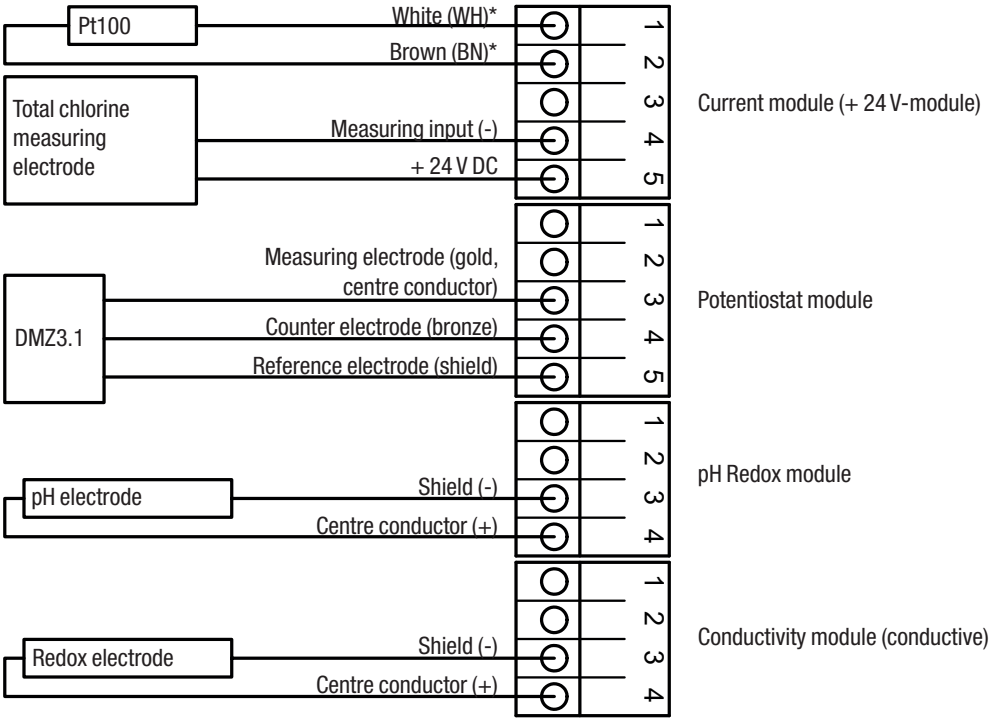


Fig. 20: Measurement of temperature, total chlorine, free chlorine with DMZ3.1, pH value and Redox value

* Applies to cables and sensors from Lutz-Jesco GmbH. No liability is accepted for cables from other manufacturers.

8.6 Connecting the actors

Depending on the equipment of the device, you have various possibilities of actuating actors such as dosing pumps or regulation valves.

> The output circuit boards can be freely assigned to the slots.

8.6.1 Alarm relay

The alarm relay on the main board forwards alarms. The output is potential-free.

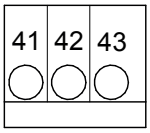


Fig. 21: Alarm relay

Terminal	Function	Description
41 + 42	normal on	The relay works on these clamps as an opener.
42 + 43	normal off	The relay works on these clamps as a closer.

Tab. 19: Terminal connection of the alarm relay

8.6.2 Output circuit board with relay

The output is potential-free.

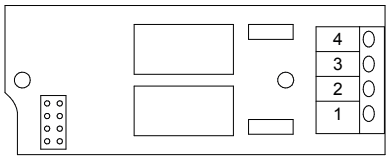


Fig. 22: Output circuit board with relay

Terminal	Function	Description
1	Relay X.2	Second digital output
2		
3	Relay X.1	First digital output
4		

Tab. 20: Clamp connection of the output circuit board with relay

Actors	Configuration
MAGDOS dosing pumps	On/Off
MEMDOS dosing pumps	On/Off
MEMDOS SMART dosing pumps	On/Off
Peristaltic pumps	Pulse length

Tab. 21: Actors and relay configuration

8.6.3 Output circuit board (optocoupler)

Fig. 23: Output circuit board with optocoupler

Terminal		Function	Description
1	+	Optocoupler x 2	Second digital output
2	-		
3	+	Optocoupler x 1	First digital output
4	-		

Tab. 22: Clamp connection of the output circuit board with optocoupler

Actors	Configuration
MAGDOS dosing pumps	Pulse frequency
MEMDOS dosing pumps	
MEMDOS SMART dosing pumps	

Tab. 23: Actors and configuration optocoupler

8.6.4 Servomotor relay output circuit board

This output is suitable for connecting a servomotor with or without feedback via a potentiometer from 1 – 10 kΩ. The output is potential-free.

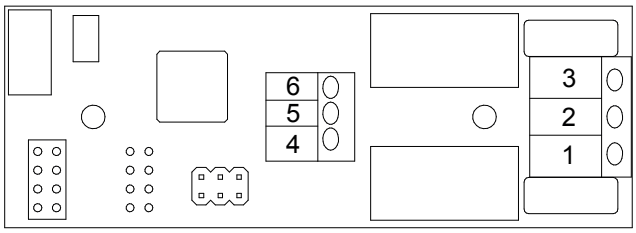
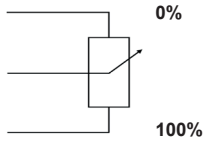


Fig. 24: Servomotor relay output circuit board

Terminal	Function	Description
1	Opening the regulation valve	Relay output to the regulation valve
2	Voltage*	Relay input
3	Closing the regulation valve	Relay output to the regulation valve
4		Feedback via potentiometer
5		
6		

Tab. 24: Clamp connection of the output circuit board with servomotor relay

* With a regulation valve with 230 V, L and N can be disconnected from the terminal strip of the voltage supply.

Actors	Configuration
Chlorine gas control valve C 7700	Servomotor with potentiometer/ servomotor without potentiometer

Tab. 25: Actors and configuration servomotor relay

8.6.5 Output circuit board with servomotor 20 mA

The output connects a servomotor with or without feedback.

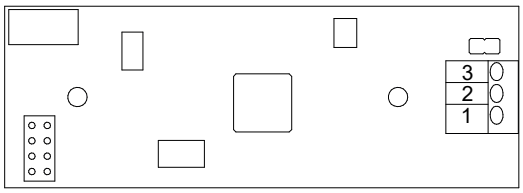


Fig. 25: Output circuit board with servomotor 20 mA

Terminal	Function	Description
1	-	GND
2	Input (feedback)	4 – 20 mA
3	Output	4 – 20 mA

Tab. 26: Clamp connection of the output circuit board with servomotor 20mA

Actors	Configuration
Chlorine gas control valve C 7700	Servomotor with 20 mA/ continuous output (20 mA)
EASYZON chlorine dioxide system	Continuous output (20 mA)
MAGDOS dosing pumps	
MEMDOS dosing pumps	
MEMDOS SMART dosing pumps	

Tab. 27: Actors and configuration servomotor 20 mA

8.6.6 Output circuit board with relay high current

The output is potential-free.

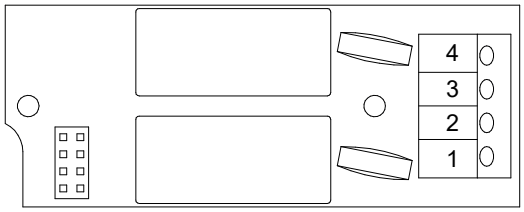


Fig. 26: Output circuit board with relay high current

Terminal	Function	Description
1	Relay X.2	Second digital output max. 8 A (ohmic resistive load)
2		
3	Relay X.1	First digital output max. 8 A (ohmic resistive load)
4		

Tab. 28: Clamp connection of the output circuit board with relay

PLEASE NOTE

Damage to the device!

The mains supply terminals at the TOPAX® MC input (terminals 44 – 52) may be operated with a maximum continual load of 6 A.

⇨ With higher electrical loads, the relays on the output circuit board must be connected with a separate cable and provided with fuse protection!

Actors	Configuration
MAGDOS dosing pumps	On/Off
MEMDOS dosing pumps	On/Off
MEMDOS SMART dosing pumps	On/Off
MINIDOS/MIDIDOS dosing pumps	On/Off
Peristaltic pumps	Pulse length

Tab. 29: Actuators and the configuration thereof with a high current relay circuit board

8.6.7 Digital universal output module

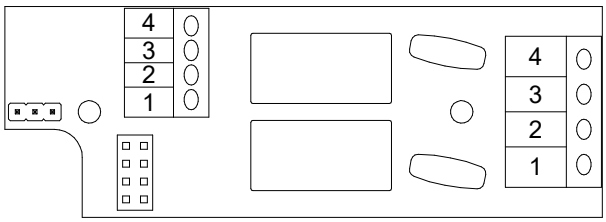


Fig. 27: Digital universal output module

The output module digital universal can be operated either as 2x opto-coupler or as 2x relay. The selection is made via the jumper.

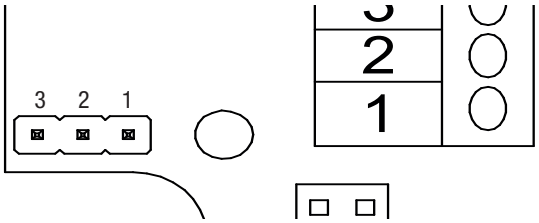


Fig. 28: Jumper

Jumper	Function	Clamps
1	Relay outputs	small
2		
3*	Optocoupler outputs	big

Tab. 30: Terminal connection

* Pin 3 is not available on all boards. If only pins 1 and 2 are present, the relay is active when the jumper is set to 1-2. The optocoupler outputs are always active.

To ensure safety, the universal modules are always set to relay output on the factory side. If the optocouplers are required, the module must be adapted accordingly.

Optocoupler output function (jumper 1/2)

Terminal	Function	Description
1 small, left	Optocoupler x 2	Second digital output
2 small, left		
3 small, left	Optocoupler x 1	First digital output
4 small, left		

Tab. 31: Optocoupler output function (jumper 1/2)

Actors	Configuration
MAGDOS dosing pumps	Pulse frequency
MEMDOS dosing pumps	
MEMDOS SMART dosing pumps	

Tab. 32: Actors and configuration optocoupler output

Relay output function (jumper 2/3)

Terminal	Function	Description
1 big, right	Relay X.2	Second digital output
2 big, right		
3 big, right	Relay X.1	First digital output
4 big, right		

Tab. 33: Relay output function (jumper 2/3)

Actors	Configuration
MAGDOS dosing pumps	On/Off
MEMDOS dosing pumps	On/Off
MEMDOS SMART dosing pumps	On/Off
Peristaltic pumps	Pulse length

Tab. 34: Actors and configuration relay output

8.6.8 Connection examples actuators

MAGDOS LD, LK, LP, MEMDOS LP, MEMDOS SMART LD, LK, LP:

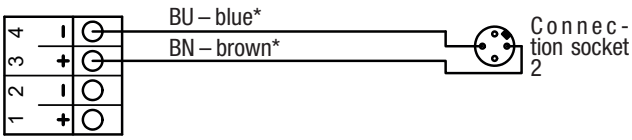


Fig. 29: MAGDOS LD, LK, LP, MEMDOS LP, MEMDOS SMART LD, LK, LP on TOPAX® MC (output module, optocoupler, pulse frequency)

MAGDOS LA, LP, MEMDOS LA, LP, MEMDOS SMART LP:

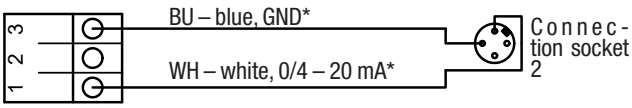


Fig. 30: MAGDOS LA, LP, MEMDOS LA, LP, MEMDOS SMART LP on TOPAX® MC (output module servomotor 20mA, continuous control output)

Peristaltic pump 2.7 l/h:

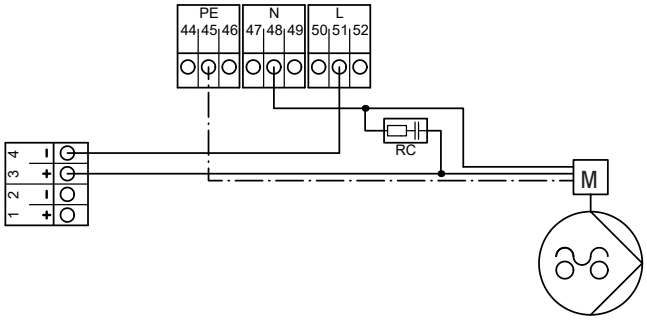


Fig. 31: Peristaltic pump 2.7 l/h (output module relay/relay high current, pulse length)

* Applies to cables from Lutz-Jesco GmbH. No liability is accepted for cables from other manufacturers.

Chlorine gas regulation valve C 7700, 4 – 20 mA (from year of manufacture 05/2017):

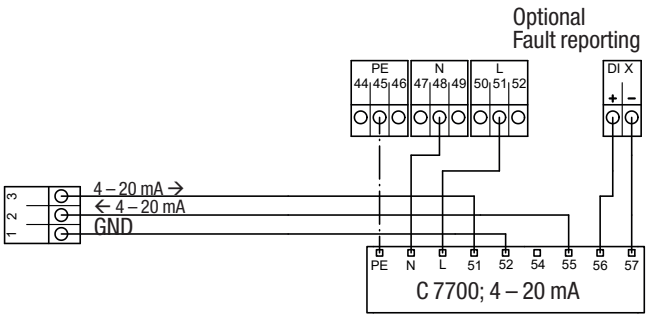


Fig. 32: Chlorine gas regulation valve C 7700 (output module servomotor 20 mA, with feedback)

Chlorine gas regulation valve C 7700, relay 3-P-S (from year of manufacture 05/2017):

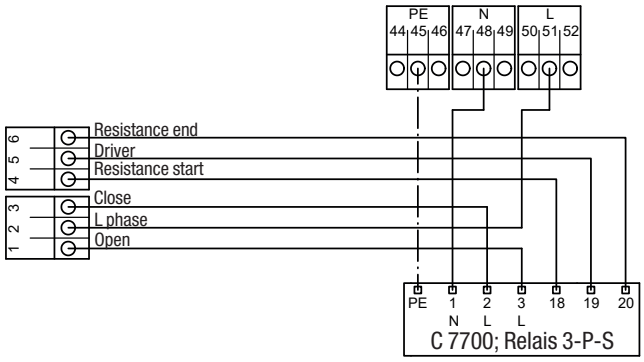


Fig. 33: Chlorine gas regulation valve C 7700 (output module servomotor relay, with feedback)

8.6.9 Testing the outputs

You can use manual mode to test the correct connection of an actor.

Take the alarm chain into account before conducting the test and inform any connection points or interrupt the alarm chain for the period of the test.

Test the connected actors

Pre-conditions for actions:

✓ The actors have been connected in accordance with section 8.6 “Connecting the actors” on page 21.

✓ The device housing cover is closed.

✓ The voltage supply has been established and the device has been switched on.

Perform the following work steps:

1. In Menu 2, navigate to “Manual mode” (see section 11.5 “Manual mode” on page 38).
   ▶ You will now see all the outputs.
2. Select the output to which you have connected the actor and which you wish to test.
3. Now enter a value between 0 % and 100 % and select “On”.
   ▶ The actor is tested.
4. Check whether the actor reacts in the required way.
5. Stop the actor test either by setting it back to “Off” or by setting a timer, so that the test is stopped automatically after the time has elapsed.

✓ **Actor has been tested.**

8.7 Analogue inputs and outputs

One analogue input and four analogue outputs are available.

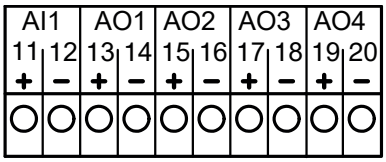


Fig. 34: Wiring diagram analogue input 11/12 and analogue outputs 13 – 20

Connection example analogue input

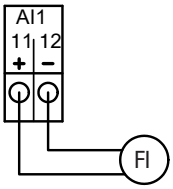


Fig. 35: Flow disturbance variable 4 – 20 mA

Connection examples analogue outputs

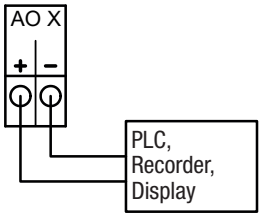


Fig. 36: Measurement outputs – measurement output/recorder outputs 4 – 20 mA, freely-configurable

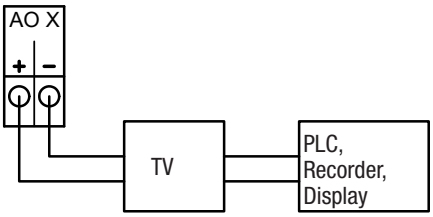


Fig. 37: Measurement outputs – isolating amplifier for analogue inputs and outputs

The 0/4 – 20 mA inputs and outputs on the mainboard are not galvanically isolated. Install an isolating amplifier for standard signals.

Testing the analogue outputs

You can also test the connection of terminals 13 to 20.

Pre-conditions for actions:

✓ The device housing cover is closed.

✓ The voltage supply has been established and the device has been switched on.

Perform the following work steps:

1. In Menu 2, navigate to > Outputs > Analogue.
2. Press “Test signal”.
3. Set an mA value for each analogue output to be tested.
4. Press "Start”.

✓ **Analogue outputs tested.**

8.8 Digital inputs

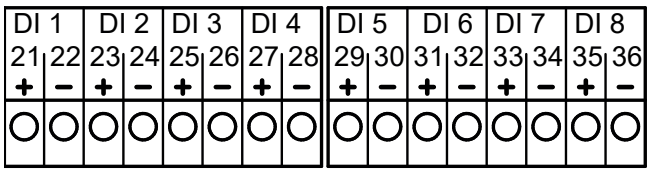


Fig. 38: Wiring diagram digital inputs, freely-configurable

You can use up to 8 digital inputs to evaluate switching statuses and to detect them as alarm message which are to be documented in the logbook.

Further information about the settings of the digital inputs can be found in section 10.1.6 “Digital inputs” on page 32.

Connection examples

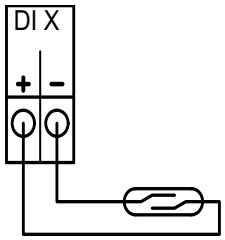


Fig. 39: Suction line, level control – 1 levels, 1 cable

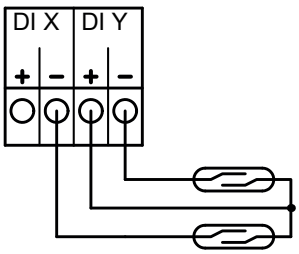


Fig. 40: Suction line, level control – 2 levels, 1 cable

8.9 RC protection for relay

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 would like 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. Should it prove impossible to perform point 2, clamp the interference suppression element parallel to the relay output.

✓ **RC protection for relay connected.**

8.10 Connecting Ethernet

You can use the Ethernet connection for the following actions:

- Reading/writing via Modbus TCP/IP protocol* (PLC or Computer)
- Access via web browser
- Access via TFTP server

The device is fitted with a network input in the form or a 4-pole and D-coded M12x1 socket. Lutz-Jesco GmbH offers different lengths of special twisted-pair network cables to make the typical Ethernet RJ-45 plug connection. If you use third-party cables, choose a Category 5 cable with an impedance of 100 Ω or above.

Pin	Assignments	Wire colours
1	TX-	yellow
2	TX+	orange
3	RX-	white
4	RX+	blue
-	Screen	-

Tab. 35: Ethernet connection socket

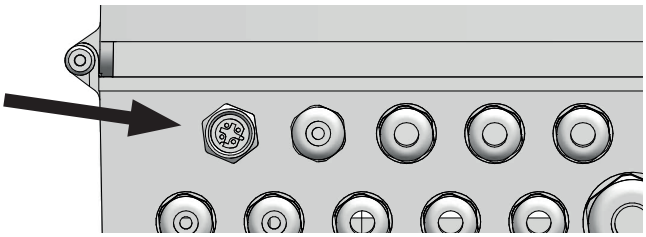


Fig. 41: Ethernet connection

Installing a wired network

During installation, comply with the following points:

- The Ethernet is cabled in a star topology. The maximum cable length is 100 m
- Only use screened cables and connectors
- Only use CAT5 cables or better

The list of Modbus commands can be found in section 14 “Modbus addresses TOPAX® MC” on page 52.

8.11 RS485 interface

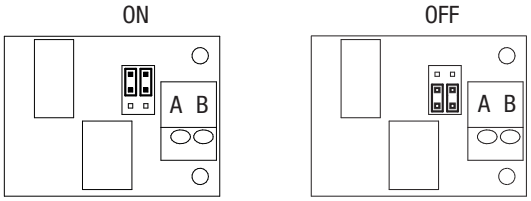


Fig. 42: Jumper position on RS485

When using multiple devices on a data line you, must activate a 120 Ω resistance on the last device. You can activate the resistance by setting the jumper to “ON” as shown in Fig. 42 “Jumper position on RS485” on page 25.

Your device can have an optional RS485 interface. Using a second data cable you can connect up to 14 devices with a PC or a PLC. Modbus RTU protocol serves as a protocol for data transfer. You can use the addresses 1 to 14. The addresses 0 and 15 are reserved for internal purposes and are not supported.

RS485 Modbus settings:

- Baud rate: 9600
- Word length: 8 Bit
- Stop bit: 1 Bit
- Parity: None
- You can read out a maximum of 40 addresses at once.

The list of Modbus commands can be found in section 14 “Modbus addresses TOPAX® MC” on page 52.

Perform the following work steps:

1. Open the device housing.
2. Connect a two-wire cable to terminals A and B of the RS485 module.
3. Connect the device with your network.

✓ **Device connected with network.**

9 First steps

9.1 Menu structure of TOPAX® MC

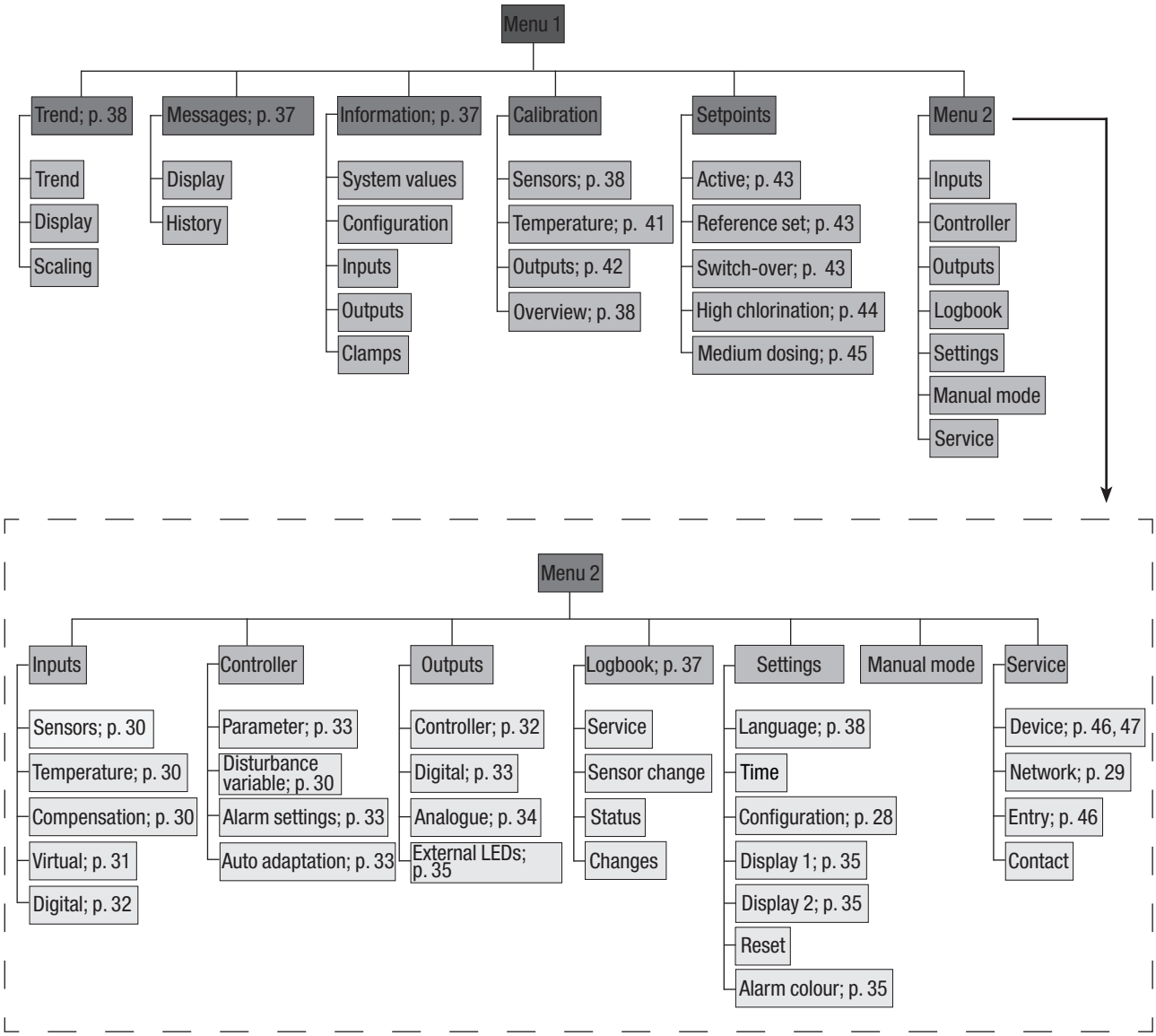


Fig. 43: Menu structure of TOPAX®

9.2 Functions of the controllers

Outputs						Controller functions	Behaviour
Relay high current	Relays	Optocoupler	Digital universal	Servomotor relay	Servomotor 20 mA		
x	x		x			On/Off	■ The output switches if a value is exceeded. ■ Hysteresis can be set from 0,1 – 50 %
	x	x	x			Pulse frequency 2-sides pulse frequency	■ Relay: 10 – 100 pulses per minute ■ Optocoupler: 10 – 350 pulses per minute ■ The pulse frequency is dependant on the control deviation and the set control parameters. ■ With a control output power of Y = 25 % and a maximum pulse frequency of 100 pulses/min., the controller would output 25 pulses/min.
x	x		x			Pulse length 2-sides pulse length	■ 0 – 3600 seconds cycle duration ■ Relay output (e. g. for solenoid valve) ■ Depending on the control deviation and the defined control parameters, the relay pulls in or drops out for the set cycle duration. If the cycle lasts 30 seconds and the controller output power is 40 % the relay applies for example for 12 seconds, followed by 18 seconds of non-application.
				x		Servomotor with a feedback potentiometer	■ A feedback potentiometer can be connected (1 – 10 kΩ) for servomotors with position feedback. ■ Compensate the feedback potentiometer. During compensation, the servomotor is first started and then stopped automatically.
				x		Servomotor without a feedback potentiometer	■ For servomotors without feedback. ■ Measure and set the runtime of the servomotor.
					x	Continuous output	■ Continuous control output from 0/4 – 20 mA for the actuation of constant actors.
					x	Servomotor with 20 mA feedback	■ Servomotors which are controlled via 0/4 – 20 mA and have a 0/4 – 20 mA position feedback.

Tab. 36: Functions of the individual controllers

Function of the pulse length

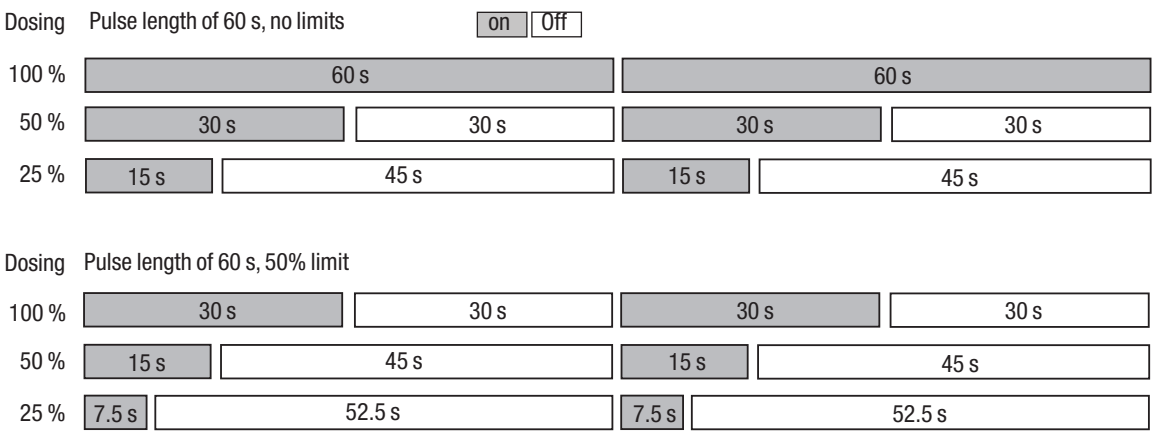


Fig. 44: Function of the pulse length e.g. for peristaltic pumps

Function of the pulse frequency

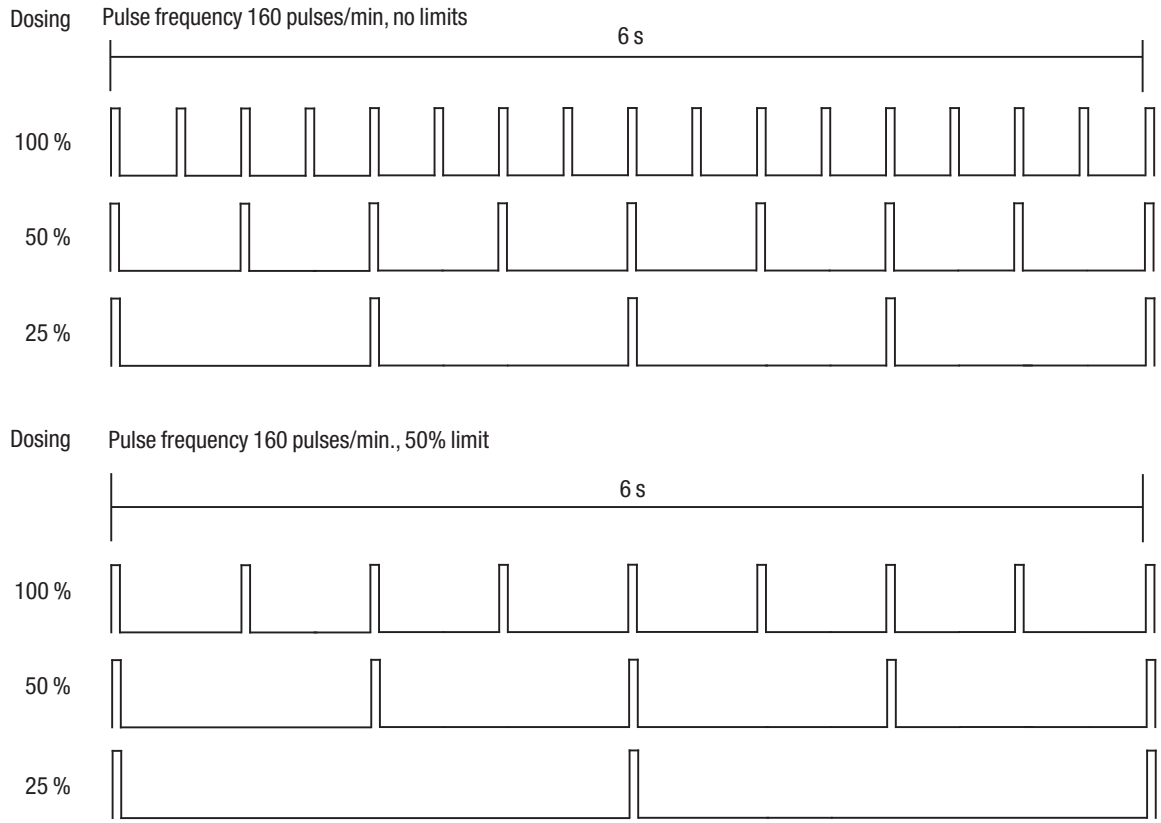


Fig. 45: Function of the pulse frequency e.g. for MAGDOS pumps

PLEASE NOTE

Influencing the measurement results

The measurement results of the high-impedance sensor inputs can be negatively influenced during the first 24 hours due to heat development inside the housing of the **TOPAX® MC** controller.

⇨ Activate the **TOPAX® MC** controller 24 hours before start-up.

⇨ Factor in the influence of heat development, and do not perform the calibration of the measurement results until 24 hours after activating the **TOPAX® MC** controller.

You need to make a number of basic settings before operating the device. This section leads you through initial commissioning.

Pre-conditions for actions:

✓ The device has been installed in accordance with section 8 “Installation” on page 16.

Configuration assistant

With initial commissioning, a configuration wizard will lead you through the basic settings: Your preferred language, the measured values, controller assignments and switch outputs. With the exception of the language, the values configured here can only be set in the configuration assistant. The finer settings are made in the sub-menus.

Perform the following work steps:

1. Set the preferred language and press on the arrow.
2. **Measured values:** Determine the desired measured value for the installed input modules. Press the right-hand arrow.
3. **Controller:** You can assign inputs for up to four controllers in this tab. Select a sensor, a virtual input or a timer. Set the centre row of the control function (Tab. 36 “Functions of the individual controllers” on page 27) and press the right-hand arrow. Controllers 1 to 4 must be assigned to the output modules 1 to 4 in a fixed fashion.
4. **Digital outputs:** You can assign a function to output modules in this tab. Only the output modules which are still free are displayed. Press the right-hand arrow. The flocculation, alarm output, limit value control and medium dosing functions are available. Please note that medium dosing can only be assigned to the second digital outputs of an output module.
5. Confirm the security query with “Yes” to save the configuration.

✓ **The configuration assistant has been ended.**

Start the configuration assistant manually in Menu 2 > Settings > Configuration > “Configuration assistant”.

9.3 Password protection

The password protection of your device has been deactivated at the factory. You can provide your device with password protection against access to specific functions in three levels. The level that is currently set will be displayed in the top left-hand corner next to the lock icon.

- **1. Level:** Only simple settings are accessible here. This level is suitable for daily operation.
- **2. Level:** The configuration of the inputs and outputs and the adjustment of the sensors are accessible here. This level is required for device configuration and should only be operated by experienced users.
- **3. Level:** The service menu is accessible here. This level is mainly required for maintenance work such as changing the sensor, performing software updates or network settings. Here, you can also activate the password protection for individual levels.

> The following passwords are factory-set:
> 1. Level: 0001
> 2. Level: 0002
> 3. Level: 0003

Configuring the password protection

Perform the following work steps:

1. Press the lock icon in the left-hand upper corner to configure the password protection.
2. **Password active:** Select whether the password protection should be deactivated or activated and the levels to which the password protection applies. Deactivation of the password protection and activation of the password protection for individual levels is only possible if you have logged into level 3.

> Password protection must be activated to unlock the following steps.

3. Select one of the three password levels into which you wish to log on.
4. **Login:** Login with the password for the password level previously selected.
5. **Change password:** You can edit the password of the level in which you are logged in.

✓ **Password protection configured.**

> The characters are displayed as asterisks during password entry. If the password is to be displayed when typing, navigate to Settings > Display 2 and set a checkmark next to “Clear text password”.

> If you forget the password and have the relevant authorization, you can request a master password and use it to reset the passwords.

9.4 Network settings

You may need to perform settings in order to be able to use the device in a network.

Further information about using the device in a network can be found in section 11.8 “Access via network” on page 45.

Perform the following work steps:

1. In Menu 2, navigate to the “Network” tab under “Service”.
2. Working in the “Network” tab, configure the interface and state the following information.
3. **IP address:** Give the device a unique IP address through which it can be reached in the network. If this IP address is already being used by another device, errors can result.
4. **Subnetmask** Enter the subnetmask.
5. **Gateway:** Enter the gateway.
6. **DNS server:** Enter the DNS server.
7. **TFTP server:** “On” = Access via TFTP protocol activated on the device memory. “OFF” = Access via TFTP protocol de-activated on the device memory.
8. **Modbus RTU address:** Enter a number between 1 and 14 in the device if your device is fitted with a RS485 network connection.

✓ **Network settings performed.**

10 Configuration

The device is set up variably and can be individually adapted to meet your requirements. As such, it is necessary to adjust the configuration of the inputs and outputs to the sensors and actors used.

The following section leads you through the device configuration.

10.1 Inputs

You can connect up to four sensors (depending on model) for various water parameters and the temperature to the device. You can also use up to eight digital inputs (depending on the version).

10.1.1 Sensor inputs

The sensors in the device must be configured individually to enable precise and error-free measurement of the water parameters. You can perform various settings.

Perform the following work steps:

1. In Menu 2, navigate to the “Sensors” tab under “Inputs”.
2. In the “Sensors” tab, configure every connected sensor and state the following information.
3. **Input:** Select the input module of the sensor which you wish to configure.
4. **Signal:** Enter the type of the sensor signal. Depending on the input module, the signal type has been specified or you can select a signal type.
5. **Measurement:** Here, you can check which water parameters are measured. This setting can only be changed in the configuration assistant.
6. **Unit:** Select the appropriate unit.
7. **Measuring range:** If an input field is available, enter the measuring range of the sensor.
8. **Min-alarm:** Activate or deactivate the minimum alarm and state a value under which the alarm will be triggered.
9. **Max-alarm:** Activate or deactivate the maximum alarm and state a value over which the alarm will be triggered.
10. **Delay:** Set a time delay for the “minimum and maximum alarm”.

✓ **Configuration of the sensors completed.**

10.1.2 Temperature inputs

You can connect up to four temperature sensors (depending on the version) to the device. This enables you to measure the temperatures at various positions.

Perform the following work steps:

1. In Menu 2, navigate to the “Temperature” tab under “Inputs”.
2. In the “Temperature” tab, configure every connected temperature sensor and state the following information.
3. **Measurement:** Chose between “On” and “Off”.
4. **Min-alarm:** Activate or deactivate the minimum alarm and state a temperature under which the alarm will be triggered.
5. **Max-alarm:** Activate or deactivate the maximum alarm and state a temperature over which the alarm will be triggered.

✓ **Configuration of the temperature sensors completed.**

10.1.3 Compensation of cross sensitivities

The water parameters which you measure with the sensors can be influenced by cross-sensitivity (e. g. with the temperature or the pH value) in accordance with their design. The device can compensate these interferences automatically.

Perform the following work steps:

1. In Menu 2, navigate to the “Compensation” tab under “Inputs”.
2. Working in the “Compensation” tab, configure every sensor connected for which the measured value is to be compensated and state the following information
3. **Temperature:** If it is possible to compensate for the influence of the temperature, you can select a fixed reference value or one of the four temperature inputs.
4. **pH value:** The influence of the pH value on the measuring signal can be compensated. You can select a set reference value or a sensor input to do this.

✓ **Configuration of the compensation completed.**

10.1.4 Disturbance variable

You can connect the measurement of a disturbance variable (e.g. a flow volume) to an analogue 4 – 20 mA input. The disturbance variable can then be taken into account with a factor (0.1 to 10) during the calculation of the control variable Y. The control variable Y will be multiplied with the disturbance variable during the calculation.

Example: If the factor = 2 and the disturbance variable amounts to 42 %, the controller can be set to a maximum of the control variable Y = 84 %. If the factor = 0.5 and the disturbance variable amounts to 42 %, the controller can be set to a maximum of the control variable Y = 21 %.

Perform the following work steps:

1. In Menu 2, navigate to the “Disturbance variable” tab under “Controller” and enter the following information.
2. **Disturbance variable:** Set the disturbance variable to an input signal of 4 – 20 mA or 0 – 20 mA. You can also deactivate the disturbance variable.
3. **Unit:** As a rule, the disturbance variable is the measurement of a flow. Select the desired unit.
4. **Measuring range:** Enter the measuring range.

✓ **Configuration of the disturbance variable input completed.**

10.1.5 Virtual inputs

You can calculate a new value from multiple measurements or reference values using a virtual input. You can assign the new virtual value to a controller in the configuration assistant.

In this way, you can calculate the bound chlorine as the difference between the total chlorine and the free chlorine, for example, and use it as the basis for controlling your actuators.

It is also possible to calculate and display the proportion of effective chlorine (hypochlorous acid) from the free chlorine value. The dissociation curve of chlorine is mathematically stored for this purpose.

10.1.5.1 Difference

You can calculate the difference between two measured values or the difference between a measured value and a fixed reference value.

Perform the following work steps:

1. In Menu 2, navigate to the "Virtual" tab under "Inputs".
2. State the following information.
3. **Calculation:** Select "difference".
4. Select a sensor.
5. Select a second sensor or a reference value. The second sensor must output the same measured value as the first. You will need to enter the reference value manually.
6. **Min-alarm:** Activate or deactivate the minimum alarm and state a difference value under which the alarm will be triggered.
7. **Max-alarm:** Activate or deactivate the maximum alarm and state a difference value over which the alarm will be triggered.
8. **Delay:** Set a time delay for the minimum and maximum alarm.

✓ **Configuration of the difference completed.**

10.1.5.2 Combined chlorine

Bound chlorine is calculated from the difference between the total chlorine and the free chlorine:

Bound chlorine = total chlorine – free chlorine

At least one total chlorine measurement is required to calculate bound chlorine. Ideally, total chlorine measuring cells and free chlorine measuring cells with the same quality are used, e.g. as diaphragm covered measuring cells. The free chlorine value can also be entered manually as a one-off reference value measurement, or an appropriate sensor input can be selected.

Perform the following work steps:

1. In Menu 2, navigate to the "Virtual" tab under "Inputs".
2. Working in the "Virtual" tab, configure the desired calculation of the bound chlorine and state the following information.
3. **Calculation:** Select "bound chlorine" to calculate the bound chlorine.
4. **Total chlorine:** Select the sensor which measures the total chlorine.
5. **Free chlorine:** Select the sensor which measures the free chlorine. If no sensor is present, you can enter a reference value measured once which can be used for the calculation.
6. **Min-alarm:** Activate or deactivate the minimum alarm and state a value under which the alarm will be triggered.
7. **Max-alarm:** Activate or deactivate the maximum alarm and state a value over which the alarm will be triggered.
8. **Delay:** Set a time delay for the minimum and maximum alarm.

✓ **Configuration of the bound chlorine completed.**

10.1.5.3 Effective chlorine

The disinfectant effect of the free chlorine is dependant on the pH value of the process water. This connection is illustrated by the dissociation curve (see Fig. 46 "Dissociation curve of free chlorine" on page 31) Free chlorine is the sum total of Cl_2, HClO and ClO. Effective chlorine is the proportion of free chlorine which is actually effectively available for disinfection after dissociation as hypochlorous acid (HClO) depending on the pH value and the temperature. The concentration of the effective chlorine can be calculated after measuring the free chlorine, the pH value and the temperature.

The display of the effective chlorine in the **TOPAX® MC** helps to evaluate the disinfectant effect, and define the correct setpoint for the water to be treated. The lower the effective chlorine, the higher the setpoint for the free chlorine within the permissible chlorine range. When the pH value is being set, make sure that pH values < pH 3.5 are avoided, since otherwise chlorine gas can be released from the water. With pH values > pH 9, on the one hand it can be expected that disinfection will not be ensured, and on the other hand that the measuring signal of the free chlorine measurement will be too low.

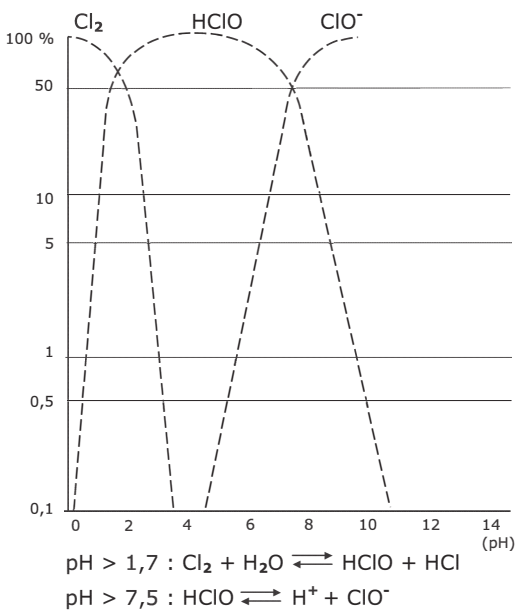


Fig. 46: Dissociation curve of free chlorine

Perform the following work steps:

1. In Menu 2, navigate to the "Virtual" tab under "Inputs".
2. Working in the "Virtual" tab, configure the desired calculation of the effective chlorine and state the following information.
3. **Calculation:** Select "effective chlorine" to calculate the effective chlorine.

4. **Free chlorine:** Select the sensor which measures the free chlorine.
5. **pH value:** Select the sensor which measures the pH value. If no sensor is present, you can enter a reference value measured once which can be used for the calculation.
6. **Temperature:** A temperature value is required to calculate the effective chlorine. Select the temperature input which can be used for the calculation. If no temperature sensor is present, you can set a reference value measured once which can be used for the calculation.
7. **Min-alarm:** Activate or deactivate the minimum alarm and state a value under which the alarm will be triggered.
8. **Max-alarm:** Activate or deactivate the maximum alarm and state a value over which the alarm will be triggered.
9. **Delay:** Set a time delay for the “minimum and maximum alarm”.

✓ **Configuration of the calculation of the effective chlorine completed.**

10.1.6 Digital inputs

You can use up to 8 digital inputs to evaluate switching statuses and to detect them as alarm message which are to be documented in the logbook.

Perform the following work steps:

1. In Menu 2, navigate to the “Digital” tab under “Inputs”.
2. In the “Digital” tab, configure the inputs and state the following information.
3. **Action:** Choose between “OK = open” (N.O., working contact) or “OK = contact” (N.C., break contact).
4. **Function:** Select a function from Tab. 37 “Functions digital inputs” on page 32 depending on the desired reaction of the device to the input.

✓ **Configuration of the digital inputs completed.**

Function	Reaction
Off	The switching of the contact has no influence on the measurement or control.
Setpoint changeover	You can use the contact to switch between reference sets.
Measuring water shortage	All controller outputs will be switched off.
External stop	All controller outputs will be switched off.
Filter cleaning	All controller outputs will be switched off whilst the filters are being flushed.
Pre-alarm 1 – 4	Only display as an alarm message. Nothing is switched off.*
Main alarm 1 – 4	The appendant controller output is switched off. The other outputs remain unaffected.**
Medium dosing	An additional medium will be dosed.
Others	You can assign an individual name to this digital input. The name is displayed in the alarm messages during switching the contacts.

Tab. 37: Functions digital inputs

* The configuration can be changed in the Controller/alarm action menu

** Configuration to further outputs can be performed in the Controller/alarm action menu.

10.2 Outputs

Depending on the equipment, you can connect a range of actors to the device and actuate them. Make sure that you actuate the actor with the correct signal type and select an appropriate output module with the configuration. An alarm relay, four analogue outputs and external LEDs (e.g. for water sampling stations) are always available.

10.2.1 Controller outputs

You can configure and use up to four controllers.

Pre-conditions for actions:

✓ You have used the configuration assistant to assign an input and a control function to a controller (see section “Configuration assistant” on page 28).

Perform the following work steps:

1. In Menu 2, navigate to the “Controller” tab under “Outputs”.
2. Working in the “Controller” tab, configure the controller output and state the following information.
3. **Y-alarm:** Activate the Y alarm. The Y alarm is a safety cut-out. If the controller output power amounts to more than 95 % (e.g. through a malfunction) over the set time, the Y alarm will be triggered and the corresponding controller output will be set to 0 %. You can set a time between 0 and 200 minutes.
4. **Pulse frequency/pulse length/hysteresis:** Depending on the controller function, you can set the maximum pulse frequency that your pump (or actuator) can process. In the case of pulse length, the duration can be set here to 100% of the pulse. In the case of the "On/Off" controller function, a hysteresis between activation and shutdown must be entered here depending on the measured value. A larger hysteresis protects the actuators, but the control then also works less accurately.
5. **Basic load:** Depending on the controller function, you can set a base load which is always active independently of the control variable. With a base load of 10 %, the actor is always actuated with a minimum of 10 %.
6. **Limit:** Depending on the controller function, you can set a limit of between 5 – 100 %. State the value at which the actor should be actuated as maximum.
7. Further settings are dependant on the function of the controller. Further information is available in Tab. 36 “Functions of the individual controllers” on page 27.

✓ **Configuration of the controller outputs completed.**

10.2.2 Actuation via a timer

The output can be used for direct actuation via a timer. This is required e.g. to run the flocculant pump or the peristaltic pumps over a certain time.

Pre-conditions for actions:

✓ You have assigned the "Timer switch" input to a controller using the configuration wizard as described in the chapter 9 “First steps” on page 26.

Perform the following work steps:

1. In the Menu 2 > “Outputs”, configure the output (see section 10.2 “Outputs” on page 32).
2. Navigate to the menu > “setpoints”. Here, you can set the desired set control output directly from 0 to 100 %.
3. **Reference set:** Here, you can set various control outputs and via the timers in the “Switching” tab, you can determine when the control output should be changed. The checkmark must be set against “Switch setpoints automatically”. Further information pertaining to switching is found in section 11.7 “Setpoints and reference sets” on page 43.

✓ **Actuation configured via a timer.**

10.2.3 Controller parameters

> Section 5 “Function” on page 9 contains basic information about the controllers. Please read this section carefully before carrying out the following settings.

You can configure the behaviour of the individual controller channels. Explanations of the various functions can be found in Tab. 36 “Functions of the individual controllers” on page 27.

Perform the following work steps:

1. In Menu 2, navigate to the “Parameter” tab under “Controller”.
2. Working in the “Parameter” tab, configure every control channel and state the following information.
3. **Control direction:** Configure the direction of control. If a switch is to be made between a 1- and a 2-side control, this must be set in the configuration assistant.
4. **Function:** Set the desired controller function. Possible: P-, PI-, PD- and PID-controller.
5. **Xp, Tn, and Tv:** You can configure these parameters depending on the control function that has been set (further information about the calculation is provided in section 5.2 “Controller explanation” on page 9).
6. **Disturbance variable and factor disturbance variable:** If you have activated a disturbance variable (see chapter 10.1.4 “Disturbance variable” on page 30), you can configure the influence of this disturbance variable on the selected controller channel. You can switch the influence on or off and set a factor between 0.1 and 20.

✓ **Configuration of the controller parameters completed.**

10.2.4 Alarm settings

Under “Alarm action”, you can determine which alarms stop the controller for every controller individually.

Perform the following work steps:

1. In Menu 2, navigate to the “Alarm action” tab under “Controller”.
2. **Controller:** Under “Controller”, select the controller to be configured.
3. **Input:** The input assigned to the controller is displayed
4. **The controller stops at:** Select the error messages for the controller is to be stopped by pressing on “Controller stops at” and setting the required checkmark.

✓ **Alarm action set.**

10.2.5 Auto adaptation

Auto adaptation is an auxiliary function with which control parameters (Xp (P), and Tn (I)) can be determined automatically. From a starting value of 0.3 mg/l, the controller will run a program which automatically reduces and increases the chlorine value, measuring the times until the measurement answer is received and determining the step response. If the auto adaptation, which lasts up to three hours, is completed successfully the decision will be taken as to whether to accept the new parameters. When doing this, it is important for the conditions during the auto adaptation to correspond to the realistic conditions during operation. The auto adaptation may need to be repeated, or optimisation carried out manually by the operating personnel.

Perform the following work steps:

1. In Menu 2, navigate to the “Auto adaptation” tab under “Controller”.
2. Under “Disinfection”, select the controller to be configured.
3. Under “pH”, select the controller to be configured.
4. Press "Start”.

✓ **Auto adaptation started.**

Once the controller has completed auto adaptation, a table will be displayed with the measured values and the values which are currently set. You can now decide whether you wish to accept the new values.

10.2.6 Digital output signals

You can use digital output signals via the outputs of the alarm relay, an optocoupler circuit board or a relay circuit board. The following sections describe the configurations that you can perform.

10.2.6.1 Alarm relay as an alarm output.

You can use the alarm relay (terminals 41 – 43) on the main board as an output for alarm messages.

Perform the following work steps:

1. In Menu 2, navigate to the “Digital” tab under “Outputs”.
2. Working under “Digital output”, select the “alarm relay” output.
3. Configure the alarm relay by entering the following data.

4. **In the event of an alarm:** "Relay on" = The alarm relay is activated in the event of an alarm. "Relay off" = The alarm relay is generally active. If there is an alarm, the relay is switched off.
5. **Latching:** “On “= the alarm output is active until all alarms have been manually confirmed. “Off” = the output will be deactivated automatically if the alarms are no longer active.
6. **Output triggers upon:** Select which alarms should trigger the alarm relay. The relay switches as soon as one of the selected alarms is active.
7. **Alarm delay:** Determine the earliest point (in seconds) at which the relay should switch after activation of the alarm.

✓ **Configuration of the alarm relay completed.**

10.2.6.2 Further alarm outputs

In addition to the alarm relay, you can use the unused outputs of the optocoupler circuit board or relay circuit boards for further alarm messages.

Pre-conditions for actions:

✓ You have used the configuration assistant to assign the “alarm output” function to a free output (see section “Configuration assistant” on page 28).

Perform the following work steps:

1. In Menu 2, navigate to the “Digital” tab under “Outputs”.
2. Working under “Digital output” select the desired output.
   ▶ The free outputs will be displayed which you have configured as an “alarm output” in the configuration assistant. Example: “Relay 1.2”. The first digit stands for the number of the output circuit board (1.X) and the second digit stands for the number of the output on the circuit board (X.2).
3. Working under the “Function” display, check whether the function with “alarm output” is displayed.
4. Configure the alarm output by entering the following data.
5. **Latching:** “On “= the alarm output is active until all alarms have been manually confirmed. “Off” = the output will be deactivated automatically if the alarms are no longer active.
6. **Output triggers upon:** Select from the list of all possible alarms those which should trigger the output. The output switches as soon as one of the selected alarms is active.
7. **Alarm delay:** Determine the earliest point (in seconds) at which the output should switch after activation of the alarm.

✓ **Configuration of the alarm output completed.**

10.2.6.3 Limit value control

The limit value control is an output which switches when determined limit values are exceeded or undercut. This function is used to control ECO or Night mode in a swimming pool with reduced operation. If there are no or just a few swimmers in the swimming pool, energy and dosing media can be saved. The limit value control monitors the maintenance of the parameters. In Germany, the values of DIN 19643 apply. As such, “DIN contact“ is a widespread name for this function.

You can use unused outputs from optocoupler circuit boards or relay circuit boards as a limit value control (including “DIN contact”). An output for limit value control switches if all measured values are located within the defined limits.

Pre-conditions for actions:

✓ You have used the configuration assistant to assign the “limit value control” function to a free output (see section “Configuration assistant” on page 28).

Perform the following work steps:

1. In Menu 2, navigate to the “Digital” tab under “Outputs”.
2. Working under “Digital output” select the desired output.
   ▶ The free outputs will be displayed which you have configured as “limit value control” in the configuration assistant. Example: “Relay 1.2”. The first digit stands for the number of the output circuit board (X.1) and the second digit stands for the number of the output on the circuit board (X.2).
3. Working in the “Function” display, check whether the function with a “limit value control” is displayed.
4. Configure the limit value control by entering the following data.
5. **Action:** Choose between “normal opened” (N.O., make contact) or “normal closed” (N.C., break contact).
6. **Delay:** The contact switches only if all water parameters are continually over the set lag time within the limits set. The lag time can be set between 0 and 10.
7. **Parameter:** Set the measured values in which the water parameters must be located so that the output switches. Press the minimum or maximum value that you wish to change.

✓ **Configuration of the limit value control completed.**

10.2.7 Analogue output signals

The basic configuration of the device includes up to four analogue 4 – 20 mA outputs. You can use the outputs to transmit the measured values to a control room or a PLC (programmable logic controller). Some actuators such as dosing pumps can be controlled directly via this output.

Perform the following work steps:

1. In Menu 2, navigate to the “Analogue” tab under “Outputs”.
2. Working under “Analogue”, select the desired output.
3. Configure the analogue output by entering the following data.
4. **20 mA type:** You can choose between the following signal types: 4 – 20 mA, 0 – 20 mA, 20 – 4 mA or 20 – 0 mA.
5. **Testsignal:** You can test the configuration of the analogue outputs. Check the actuation on the external device.

6. **Output:** Determine what should be outputted on the selected output. You can choose between the measurement and temperature values or outputs (controller outputs).
7. **Minimum:** Determine a minimum value. The minimum value indicates for which measured value the signal is the weakest.
8. **Maximum:** Determine a maximum value. The maximum value indicates for which measured value the signal is the weakest.

> The values for "minimum" and "maximum" serve the scaling of the analogue output signal. Example: Sensor 1 has a measuring range of 0 – 10 mg/l. 4 – 20 mA was selected as the 20 mA type. If the complete sensor measuring range is to be covered by the analogue signal, 0 mg/l should be selected for "Minimum" and 10 mg/l for "Maximum". At 0 mg/l, a 4 mA signal will be issued; at 10 mg/l a 20 mA signal will be issued.

✓ **Configuration of the analogue outputs completed.**

10.2.8 Actuation of the LEDs for the water sampling stations

Some water sampling stations have multiple LEDs which display whether a water parameter is in the desired range. You can configure the actuation of the LEDs.

Perform the following work steps:

1. In Menu 2, navigate to the "External LEDs" tab under "Outputs".
2. Working under "LED", select the desired LED.
3. Configure the LED by entering the following data.
4. **Function:** Select the reaction criteria for the LED. Selection of "Sample water shortage" standardly results in a green LED. If the digital contact "Sample water shortage" is active, it will illuminate red. Further options are the measured values of the sensor inputs 1 – 4.
5. **Minimum and maximum:** If you have decided to use a measured value, you must establish a minimum and a maximum value. The LED will illuminate red if the minimum value is undercut or the maximum value exceeded.
   It illuminates green between the values. It will illuminate in orange if there is a simultaneous shortage of sample water.
6. **Testsignal:** You can test the configuration of the LEDs.

✓ **Configuration of the external LED outputs completed.**

10.3 Overviews

In the main view, the device displays various items of information pertaining to the installed input modules. You can define individually which information is to be displayed. You can choose from the following information:

- Deviation display
- Alarm flashes
- Water Sampling Station 1 – 4
- External stop 1 – 4
- Filter flushing 1 – 4
- Clear text password

Perform the following work steps:

1. In Menu 2, navigate to the "Display 2" tab under "Settings".
2. Under "Function", set checkmarks next to the information which is to be displayed in the main view.

✓ **Main view configured**

10.3.1 Second overview

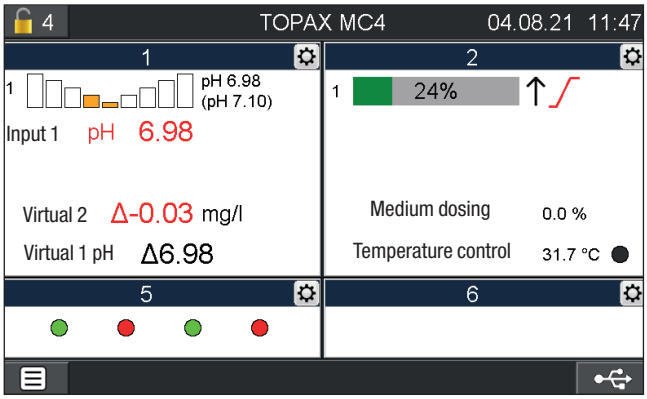


Fig. 47: Individual second overview

You also have the option of activating a second overview.

Perform the following work steps:

1. In Menu 2, navigate to the "Display 1" tab under "Settings".
2. Activate the "2nd overview".
3. **Number of windows:** Select how many individual and freely-configurable windows should be displayed.

✓ **Second overview activated.**

You can configure this second overview individually and adapt it to your needs.

Perform the following work steps:

1. Press the "Main menu" button (bottom left on the display) until the second overview with the individually-settable windows appears.
2. A gear wheel icon is displayed in the top right-hand corner of every window. Press on the icon to configure the selected window and state the following information.
3. **Name:** Give each window an individual name.
4. **Display 1 – 5:** Up to five displays can be configured depending on the size of the window. You can choose between the measured values, the virtual values, the outputs, the setpoints, the disturbance variables, the digital inputs, the external LED outputs and the medium dosing.

✓ **Configuration of the second overview completed.**

10.3.2 Colours of the alarm messages

You can edit the colours of the different messages.

Perform the following work steps:

1. In Menu 2, navigate to the "Alarm colour" tab under "Settings".
2. Under "Alarms", search for the message for which you would like to to change the alarm colour.

3. Press on the row of the alarm and then on “Edit”.
4. Select the desired colour.
5. Confirm your selection with “OK”.

✓ **Alarm colour edited.**

10.4 Save the configuration

You can save your individual configuration and load it later to rectify problems quickly.

> **Recommendation:** Leave the factory-set configuration file unchanged and save your personal configuration in a new file. Given problems with the configuration, this enables you to return to a functioning configuration quickly.

Perform the following work steps:

1. In Menu 2, navigate to the “Configuration” tab under “Settings”.
2. Press “save” and enter an existing file name to overwrite the file or a new name to generate a new configuration file.
3. Press on the green checkmark to confirm the entry.
4. Press "Save”.

✓ **Configuration saved.**

11 Operation

When in operation, the device will display the main view with the current values and the status row with status messages.

Menu 2 of the Information menu provides general information about the multi-channel controller or the water sampling station. These comprise the following categories:

- System values
- Configuration
- Inputs
- Outputs
- Clamps

11.1 Confirming a message

You can view device alarm, error and service messages in the status row. The status row flashes in the colour set for the message type. Inactive messages are displayed white.

You must confirm a message on the device to end the display of inactive messages in the status row. Active messages will still be displayed, even if they have been cleared.

Perform the following work steps:

1. When a message is displayed, press on the status row or go to the "Messages" menu.
2. Select one or more messages and press either "Confirm" or "Confirm all".

▶ The confirmed message is marked with a green tick.

✓ **Message confirmed.**

History

You can follow the course of the messages in a history.

➔ In the main menu, press "messages" and the tab "History".

11.2 Logbook

The messages and service entries are saved in the device on a USB flash drive. You can display the files on the device or connect the USB flash drive to an external device.

The USB flash drive in the device contains the following logbook files:

Log	Format	Description
REPORTS	CSV	Messages
TREND	DAT	Trend data
SERVICE	CSV	Service entries
CHANGES	CSV	Changes to the configuration
SETUP	SET	Configuration
ADJUSTMENT	CSV	Calibration

Tab. 38: Logbook

Log	Format	Description
LANG	LAA	Language files
System Volume Information	DAT	Settings

Tab. 38: Logbook

You can open and analyse CSV files with a suitable programme (e. g. MS Excel). You can also view all CSV files on the device.

All trend data from the USB stick can be displayed on a Windows PC using the TopReader II software.

11.2.1 View and open files

You can display the logbook files on the device.

Perform the following work steps:

1. Press the USB icon in the status row (below right).

▶ The files saved on the USB flash drive will be displayed in a file browser.

2. Open one of the file folders.
3. Select the desired file and press "Open file".

✓ **File opened.**

11.2.2 Opening files externally

You can open the logbook files on an external device once you have removed the USB flash drive.

DANGER

Mortal danger from electric shock!

An the housing of the device is open, you are risk of getting an electric shock from contact with live parts.

⇨ Ensure that the machine has been disconnected from the voltage supply and is not live when conducting work with an open housing.

⇨ Secure the voltage supply against reactivation.

Pre-conditions for actions:

✓ The voltage supply is deactivated before the start and secured against reactivation.

Perform the following work steps:

1. Open the housing.
2. Remove the USB flash drive.

3. Connect the USB flash drive with an external device and open it.
   ▶ You can now access the logbook files.

✓ **Files opened externally.**

11.3 Configure trend display

You can view the trend progression of up to four measured values in the last 24 hours.

Perform the following work steps:

1. In Menu 1, press “Trend”.
   ▶ The device will show the trend.
2. You can configure the display in accordance with your wishes. Press the “Display” tab and activate up to four values which are to be displayed in the trend.
3. You can set the scaling of the individual trend display for every value individually. Press on the “Scaling” tab, select a sensor and define "minimum” and “maximum”.

✓ **Trend display configured.**

11.4 Changing the language

The factory settings provide the following languages: German, English, French, Spanish and Portuguese. Additional language files can be requested from the manufacturer.

The language files are stored in the “logbook” in the LANG directory so that you can switch between different languages. The device monitors whether the language files which are used are currently valid.

Perform the following steps to change the language:

1. In Menu 2, navigate to the “Language” tab under “Settings”.
2. Choose the desired language.
3. Press "Save”.

✓ **Language changed.**

11.5 Manual mode

You can manually control a controller output in the menu item “Manual mode” and set an output capacity between 0 and 100 %. If a controller is in manual mode, this is indicated by a blue Y display in the main view and by a hand icon. Working in the menu item “Manual mode”, you can also switch the automatic switching of the setpoints on or off (see section 11.7 “Setpoints and reference sets” on page 43).

11.6 Calibration

New electrodes or initial start-up requires the renewed calibration of all measuring cells after 1 – 2 days initial running time.

You must first calibrate the sensors before they can detect the correct measured values. All calibration processes in the device are monitored for plausibility (zero point and slope) and the measured values documented. Measured values resulting from an uncalibrated sensor are marked in the main overview. In this case, the measured values are displayed in red. If the sensor input is displayed individually in the main view, the information “Calibration not OK” will also be displayed there. The current calibration and slope are available in the “Calibration” menu in the “Overview” tab.

11.6.1 pH single-rod measuring cell

Calibration of the pH single-rod measuring cell can be performed as a 2-point calibration with 2 buffer solutions or a single point calibration with subsequent input of the slope of the sensor.

The actual voltage of the single-rod measuring cell and the ideal value of the set buffer solution is displayed during calibration.

The response time for a new single-rod measuring chain is a few seconds and is set when the physical reading becomes stable. Older single-rod measuring cells can have a longer reaction time.

To perform the calibration performed here, you will require a buffer solution with a known pH value. Buffer solutions have a restricted storage life and their pH value changes depending on their duration of storage and the storage conditions.

Comply with the manufacturer’s instructions pertaining to the correct storage; use buffer solutions only within the scope of their life period and never submerge a sensor in a buffer solution immediately after removing it from a different buffer solution.

Only electrometric pH value measuring devices using electrodes may be used to perform the control measurement of the automatic pH value measurements. Other pH value measuring procedures such as photometric measurement using Phenol red reagents or test strips (litmus paper) usually display a bigger measured value deviation. This measured value deviation can be taken into account during the calibration of the automatic pH value measurement by selecting the control measurement procedure, so that different display values between manual measurement and automatic measurement can be compared. However, electrometric measurement using electrodes is the more exact measurement.

11.6.1.1 2-point adjustment of the pH value

Pre-conditions for actions:

✓ Two buffer solutions with a difference of min. 2 pH are available.

It is best to select your buffer solutions to include the subsequent setpoint. Standard buffer solutions with pH 6.8 and pH 9.27 are included in the scope of delivery for the sampling stations to perform initial adjustment during commissioning.

✓ The sensor is ready to operate.

Perform the following work steps:

1. In Menu 1, navigate to the “Sensors” tab under “Calibration”.
2. Working under “sensor”, select the sensor that measures the pH value and which you wish to calibrate.

3. Press the “2 points” button.
   ▶ 2-point calibration begins.
4. Shut off the sample water.
5. Unscrew the pH single-rod measuring cell from the water sampling station.
6. Rinse the pH single-rod measuring cell with water and dab it dry. Rubbing can cause electrical discharge on the glass membrane, which results in a delayed display.
7. Hold the dry pH single-rod measuring cell in the first buffer solution. It is not important, which of the two buffer solutions you start with.
8. Enter the pH value of the first buffer solution. This pH value serves as a reference value for the device. The ideal voltage value and the current voltage value is displayed in mV. If these values deviate too greatly from one another, the best value is displayed red. Too great a level of deviation is an indication that the pH single-rod measuring cell needs to be replaced.
9. Wait until the value has stabilised.
10. Confirm the entry with the green checkmark.
11. Repeat points 6 to 10 for the second buffer solution.
12. A window with the actual slope of the sensor will open.

✓ **2-point adjustment of the pH value completed.**

11.6.1.2 1-point adjustment of the pH value

Pre-conditions for actions:

✓ A buffer solution is on hand for calibration.

✓ The slope of the pH single-rod measuring cell was measured in a laboratory beforehand.

Perform the following work steps:

1. In Menu 1, navigate to the “Sensors” tab under “Calibration”.
2. Working under “sensor”, select the sensor that measures the pH value and which you wish to calibrate.
3. Press the “1 points” button.
   ▶ 1-point calibration begins.
4. Shut off the sample water.
5. Unscrew the pH single-rod measuring cell from the water sampling station.
6. Rinse the pH single-rod measuring cell with water and dab it dry. Rubbing can cause electrical discharge on the glass membrane, which results in a delayed display.
7. Hold the pH single-rod measuring cell in the buffer solution and move back and forth for a short time.
8. Enter the pH value of the buffer solution. This pH value serves as a reference value for the device. The ideal voltage value and the current voltage value is displayed in mV. If these values deviate too greatly from one another, the best value is displayed red. Too great a level of deviation is an indication that the pH single-rod measuring cell needs to be replaced.
9. Wait until the value has stabilised.
10. Confirm the entry with the green checkmark.
11. You will be requested to set the slope. Enter the slope.
12. Confirm the entry with the green checkmark.

✓ **1-point adjustment of the pH value completed.**

11.6.2 Redox value

The Redox value is measured using the Redox single-rod measuring cell. The Redox single-rod measuring chain measures the voltage which is present in the water due to oxidizing and reducing substances. You must calibrate the Redox single-rod measuring cell during commissioning.

11.6.2.1 1-point adjustment of the Redox value

Pre-conditions for actions:

✓ A buffer solution is on hand for calibration.

Perform the following work steps:

1. In Menu 1, navigate to the “Sensors” tab under “Calibration”.
2. Working under “sensor”, select the sensor that measures the Redox value and which you wish to calibrate.
3. Press the “1 points” button.
   ▶ 1-point calibration begins.
4. Shut off the sample water.
5. Unscrew the Redox single-rod measuring cell from the water sampling station.
6. Rinse the Redox single-rod measuring cell with water and dab it dry. Abrasion can generate electrical charges.
7. Hold the Redox single-rod measuring cell in the buffer solution and move back and forth for a short time.
8. Enter the voltage value in mV which is recorded on the buffer solution. The voltage value entered and the current measured voltage value are displayed in mV. If these values deviate too greatly from one another, the best value is displayed red. Too great a level of deviation is an indication that the Redox single-rod measuring cell needs to be replaced.
9. Wait until the value has stabilised.
10. Confirm the entry with the green checkmark.

✓ **1-point adjustment of the Redox value completed.**

> ℹ With older sensors, the reaction time can increase or the measured value can differ considerably from the buffer solution value. This indicates that the Redox single-rod measuring cell must be checked and replaced if necessary.

11.6.3 3 electrode potentiostat

You should calibrate a 3-electrode potentiostat or the potentiostatic measuring cells (chlorine sensors) as single-point calibration as a matter of course. You will require a photometrically measured value in accordance with the DPD method as a reference value.

> With operation in a hot water system, electrochemical processes on the measuring electrode can result in a displacement of the zero point. In this case, 2-point calibration is necessary in which you calibrate the zero point using chlorine-free hot water. The second point is determined using the DPD method with chlorinated water as usual.

11.6.3.1 1-point adjustment of a 3-electrode potentiostat

To calibrate chlorine sensors, you will require a photometer with which to measure the reference value using the DPD method.

Pre-conditions for actions:

✓ A measurement device for determining the DPD value is already present.

✓ The sensor is operated with sample water.

Perform the following work steps:

1. In Menu 1, navigate to the “Sensors” tab under “Calibration”.
2. Working under “Sensor”, select the sensor that you wish to calibrate.
3. Press the “1 points” button.
   ▶ 1-point calibration begins.
4. Take sample water in immediate proximity to the measuring cell and confirm with “OK”.
5. Determine the concentration in the sample water using the DPD method.
6. Enter the measured concentration. This serves the device as a reference value with which to permit correct measurement.
7. Confirm the entry with the green checkmark.

✓ **1-point adjustment of a 3-electrode potentiostat completed.**

11.6.3.2 2-point adjustment of a 3-electrode potentiostat

Pre-conditions for actions:

✓ A measurement device for determining the DPD value is already present.

✓ The sensor is operated with sample water.

Perform the following work steps:

1. In Menu 1, navigate to the “Sensors” tab under “Calibration”.
2. Working under “Sensor”, select the sensor that you wish to calibrate.
3. Press the “2 points” button.
   ▶ 2-point calibration begins.
4. You will be asked to set the first reference value; this is the zero point. If the zero point was mal-set by accident, set it by pinching off the measuring electrode and entering a value of zero. Should real 2-point calibration be performed, e.g. due to hot water, you must first perform calibration with chlorine-free and then with chlorinated water. Enter a value for the zero point.
5. Confirm the entry with the green checkmark.
6. Take sample water in immediate proximity to the measuring cell and confirm with “OK”. This means that the current signal at the time of the sample water extraction is saved to rule out signal fluctuation as a measurement error during the DPD ascertainment.
7. Determine the concentration in the sample water using the DPD method.
8. First enter the determined DPD value.
9. Confirm the entry with the green checkmark.

✓ **2-point adjustment of a 3-electrode potentiostat completed.**

11.6.4 Excess chlorine measuring cell CS120

> ***PLEASE NOTE***
>
> **Incorrect calibration**
>
> Failure to perform the calibration in the sequence specified here means that it may be erroneous and result in measurement errors.
>
> ⇨ It is imperative to adhere to the sequence of the work steps.

11.6.4.1 2-Point calibration of the excess chlorine measuring cell CS120 (2-electrode measuring cell)

Pre-conditions for actions:

✓ A measurement device for determining the DPD value is already present.

✓ The sensor is operated with sample water.

Perform the following work steps:

1. In Menu 1, navigate to the “Sensors” tab under “Calibration”.
2. Working under “Sensor”, select the sensor that you wish to calibrate.
3. Press the “2 points” button.
   ▶ 2-point calibration begins.
4. You will be asked to set the first reference value; this is the zero point. If the zero point has been set incorrectly by mistake, it must be reset. To this end, supply the measuring cell with chlorine-free water. Alternatively, the sample water can be switched off until the potential in the measuring cell has been equalised This value can be used as a zero point.
5. Confirm the entry with the green checkmark.
6. Re-connect the measuring cell or turn the sample water back on. Wait until the µA value has increased again.
7. Take sample water in immediate proximity to the measuring cell and confirm with “OK”. This means that the current signal at the time of the sample water extraction is saved to rule out signal fluctuation as a measurement error during the DPD ascertainment.

8. Determine the concentration in the sample water using the DPD method.
9. First enter the determined DPD value.
10. Confirm the entry with the green checkmark.

✓ **The 2-point calibration of the CS120 is complete.**

11.6.5 Conductivity conductive

When calibrating the conductivity measurement, the slope of the conductive measuring electrode is ascertained in combination with the input amplifier of the **TOPAX® MC**. The value (mA) measured with the conductive conductivity measuring cell is assigned to the conductivity (mS/cm or µS/cm), which is then displayed in the main menu. This is performed over two points; the first point corresponds with 0 mA; 0 mS/cm is electrically stipulated and no action is required. The usual approach uses 1-point calibration, but a calibration in the setpoint is also conceivable.

> The unit is always mS/cm or µS/cm. Due to grounds of space, the **TOPAX® MC** partially displays only mS or µS; % salt content is a further possibility. Depending on the composition of the sample water, e.g. NaCl and KCl, the display of % salt content may deviate (the relationship is also not linear). The % salt content display is intended for swimming pools with inline electrolysis. Generally speaking, it can be assumed that 20mS/cm corresponds to about ~1% salt content NaCl.

> Given correct calibration, measurements in the medium and upper measuring range have a deviation of ±1 % of the measuring range final value. The electronic design means that measurements against the zero point have a greater tolerance. This means that the conductivity measurement is suitable for tap water applications but not for ultra pure water applications (e.g. reverse osmosis units).

11.6.5.1 1-point adjustment for the conductivity measurement

For calibration purposes, use only KCL buffer solutions (potassium chloride) for the various measuring ranges in accordance with the following scheme:

Measuring range	buffer solution
0 –2000 µS/cm	1000 µS/cm = 1 mS/cm
0 – 20 mS/cm	12,88 mS/cm
0 – 100 mS/cm	80 mS/cm

Tab. 39: 1-point adjustment for the conductivity measurement

Pre-conditions for actions:

✓ A buffer solution corresponding to the measuring range is on hand and has the printed temperature.

🛠 A clean cloth is available.

Perform the following work steps:

1. In Menu 1, navigate to the “Sensors” tab under “Calibration”.
2. Working under “Sensor”, select the sensor that measures the conductivity and which you wish to calibrate.
3. Press the “1 points” button.
   ▶ 1-point calibration begins.
4. Shut off the sample water.
5. Unscrew the conductivity measuring cell from the corresponding measuring cell housing.
6. Dry the electrode with the cloth to prevent dilution of the buffer solution.
7. Hold the conductivity measuring cell in the buffer solution and move back and forth for a short time.
8. Enter the value which is recorded on the buffer solution. The measured current value and the entered value are both displayed.
9. Wait until the value has stabilised.
10. Confirm the entry with the green checkmark.

✓ **1-point adjustment of the conductivity measurement completed.**

11.6.5.2 Calibrating the conductivity in the setpoint / working point

When you are controlling the conductivity with your **TOPAX® MC**, you can calibrate the conductivity close to the setpoint / working point (±10 %) using a reference measurement.

Pre-conditions for actions:

🛠 The salt content of the sample water is close to the setpoint / working point; the sampling station is in operation.

🛠 A hand-held measuring device is available.

Perform the following work steps:

1. In Menu 1, navigate to the “Sensors” tab under “Calibration”.
2. Working under “Sensor”, select the sensor that measures the conductivity and which you wish to calibrate.
3. Press the “1 points” button.
   ▶ The calibration starts.
4. Remove the sample water from the measuring point.
5. Determine the conductivity with the portable meter.
6. Enter the value ascertained using the measuring device.
7. Confirm the entry with the green checkmark.

✓ **The calibration of the conductivity in the setpoint has been completed.**

11.6.6 Temperature

You can connect a temperature sensor to every input module. You can adjust the temperature sensor by setting a reference value. When setting the reference value, the device will automatically correct the measurement of the temperature sensor by the difference.

11.6.6.1 Adjustment of a temperature sensor

Pre-conditions for actions:

✓ A thermometer is available.

✓ You have activated the measurement of the temperature (see section 10.1.2 “Temperature inputs” on page 30).

Perform the following work steps:

1. In Menu 1, navigate to the “Temperature” tab under “Calibration”.
2. Working under “input”, select the input module for which you wish to set a reference value.
3. Measure the reference temperature with the thermometer provided.
4. Press the “Reference value” button.
5. Enter the reference temperature measured beforehand.
6. Confirm with the green checkmark.

✓ **Adjustment of a temperature sensor completed.**

11.6.7 Servomotor relay

11.6.7.1 Servomotor with position feedback

You can connect servomotors with a position feedback to your device and control them via an output. Before you can control the servomotor exactly, you must first compensate the control via your device and the position of the servomotor.

During compensation, the servomotor is first driven to the end position and then back.

This section only applies to servomotors with a feedback potentiometer.

11.6.7.2 Calibration of an servomotor with position feedback

Pre-conditions for actions:

✓ The servomotor is switched on and has been connected properly.

✓ The output has been configured correctly (see Tab. 36 “Functions of the individual controllers” on page 27).

Perform the following work steps:

1. In Menu 1, navigate to the “Outputs” tab under “Calibration”.
2. Working under “Output”, select the output which is to be adjusted.
3. Press the “Compensation” button.
   ▶ A further window with a progress bar opens; this indicates the position feedback.
4. Press the “Start” button to start the calibration.
   ▶ The motor starts and runs to top speed, then stops. This can take a number of minutes.
5. Completion of the compensation is signalled with “Compensation OK”.

✓ **Calibration of an servomotor with position feedback completed.**

11.6.7.3 Servomotor without position feedback

You can actuate servomotors without a position feedback. To this end, you need to measure how quickly the motor starts and then set the controller accordingly.

Pre-conditions for actions:

✓ The servomotor is switched on and has been connected properly.

✓ The output has been configured correctly (see Tab. 36 “Functions of the individual controllers” on page 27).

Resources required:

🛠 Timer.

Perform the following work steps:

1. In Menu 2, navigate to the “Manual mode” menu item.
2. Activate the manual mode of the output with “On” and set the control output as 0 %.
   ▶ The servomotor now stops completely.
3. Observe the drive and wait until it has stopped completely.
4. Set the output to 100 % and at the same time, start to measure the time for the complete opening of the drive.
   ▶ The servomotor now starts and runs to top speed.
5. Observe the drive and wait until it has stopped completely.
6. Deactivate manual mode with “Off”.
7. In Menu 2, navigate to the “Controller” tab under “Outputs”.
8. Under “Controller”, select the output whose runtime which you have just measured.
9. Working under “Runtime”, enter the time which you have just measured.

✓ **Runtime set!**

11.6.8 Servomotor 20 mA

You can connect servomotors with a 20 mA actuation and a 20 mA feedback to the device. The servomotors must be calibrated with the actuation before commissioning. You can calibrate the 20 mA output signal with ±1 mA.

11.6.8.1 Calibration of an servomotor 20 mA

Pre-conditions for actions:

✓ The servomotor is switched on and has been connected properly.

✓ The output has been configured correctly (see Tab. 36 “Functions of the individual controllers” on page 27).

Perform the following work steps:

1. In Menu 1, navigate to the “Outputs” tab under “Calibration”.
2. Working under “Output”, select the output which is to be adjusted.
3. Press the “Compensation” button.
   ▶ A further window with a progress bar opens; this indicates the position feedback.
4. Press the “Start” button to start the calibration.
   ▶ The motor starts and runs to top speed, then stops. This can take a number of minutes. Completion of the compensation is signalled with “Compensation OK”.

✓ **Calibration of an servomotor 20 mA completed.**

11.6.8.2 Calibrating the 20 mA output

If, whilst performing the previous compensation, you have determined that the output signal does not completely conform with the motor position, you can adjust the output signal. You can adjust both the lower signal range (0/4 mA) and the upper signal range (20 mA) to the motor position.

Perform the following work steps:

1. In Menu 1, navigate to the "Outputs" tab under "Calibration".
2. Working under "Outputs, select the output that you wish to adjust.
3. Press the "1 point" button to calibrate just the upper area or the "2 points" button for the upper and lower areas.
4. A further window will open in which you can set a tolerance. You can change this by maximum -50 to +50 depending on whether you wish to calibrate the upper or lower area. The maximum change corresponds c. to a current of 1 mA.
5. Check the output signal using a multimeter or a servomotor and make sure that the motor is now under exact control.
6. Save the current offset by pressing the "Save" button.

✓ **Calibrating the 20 mA output completed.**

11.7 Setpoints and reference sets

The setpoint 'W' of a control is the required value, whereas the actual value 'X' is the continually measured value of a sensor. You can determine various setpoints which should actuate the device. You have four different sets of setpoints; the controller can switch between them automatically. The reference sets can be used to vary the control at different times of the day or in different operating conditions.

The following section describes the possibilities of controlling using setpoints and their configuration.

11.7.1 Setting the setpoints

You can configure and save the setpoints via the menu item "Setpoints".

Perform the following work steps:

1. In Menu 1, navigate to the "Active" tab under "Setpoints".
2. **Active:** You can view the reference set currently active in the "Active" tab.
   ▶ The individual setpoints are displayed. If you change one of the values, it will immediately be activated as a new setpoint.
3. **Save:** You can save the active setpoints as a reference set. Select a reference set for this and press "Save".
4. **Setpoints 1 – 4:** The possible setpoints for the controller follow in sequence. The following information is displayed from left to right:

   - S1 – S4/V1 – V4 indicates the sensor input or virtual input.

   - O1 – O4 indicates the output. The "timer" indicates that the output is actuated directly.

   - The measured value of this input follows, e. g. free chlorine, pH or the text "No control function" if this controller is inactive.

   An upwards or downwards arrow indicates the control direction. Raise or lower.

   - This is followed by the setpoint. Pressing on the setpoint enables you to change it immediately. If it is a 2-side control, two setpoints must be entered. Both for the control direction "Raise" or "Lower". Changing these setpoints does not have an impact on the savable reference sets. To do so, you must perform step 3.

   - T1-T4 displays the temperature control if it has been configured with an appropriate hysteresis under digital outputs in the configuration assistant.
5. **Capacity:** You can activate or deactivate the flow. This enables you to reduce the flow by between 0 % and 100 %. The value of the flow is multiplied with the output Y. If the output is e.g. 80 % but the flow is only 50 %, this produces an output capacity of: Control variable Y Y = 80 % · 50 % = 40 %.

✓ **Setpoints set.**

11.7.2 Loading reference sets

You can load a reference set.

Perform the following work steps:

1. In Menu 1, navigate to the "Reference set" tab under "Setpoints".
2. Select the desired reference set.
3. Press "Load".
   ▶ The desired reference set is active immediately.

✓ **Reference set loaded.**

11.7.3 Switching between setpoints

The reference sets set in the previous section can be switched manually or automatically. You have two possibilities to activate automatic switching.

- Working in the "Setpoints" menu item, navigate to the "Switching" tab. Set a checkmark against "Switch setpoints automatically".
- Working in the "Manual mode" menu, set a checkmark against "Switch setpoints automatically".

You can use a digital input (see section 11.7.3.1 "Switching via digital inputs" on page 43) and multiple internal timers (see section 11.7.3.2 "Switching via timer" on page 44) for automatic switching. The switching has priority over a digital input. Switching via a timer only occurs if no switching is active via a digital input.

11.7.3.1 Switching via digital inputs

Before you can use a digital input for switching to a particular reference set, you must configure the digital input in accordance with section 10.1.6 "Digital inputs" on page 32.

Switching can be performed in three different forms: externally-controlled switching; switching via an internal timer and the "ECO control" function, which includes the limit value control.

Configure external switchover

In the case of external actuation, switching to the desired reference set is performed as long as the digital input has been activated.

If the digital input is deactivated, the device switches back to the previous reference set.

To configure, working in the “Setpoints” menu item, select the “Switching” tab.

Perform the following work steps:

1. Configure the switching and state the following information.
2. **Automatically switching the reference sets:** Set a checkmark here.
3. **Switch-over:** Select “Digital input”.
4. **Function:** Select the point “External switching”.
5. **Reference set:** Select the reference set to which is to be switched.
6. **Digital input:** The digital input in use is indicated here.

✓ **Configuration of the external switching completed.**

Switching via a timer

During switching via a timer, the desired reference set is active until the set period has been completed. The previous reference set is re-activated after the time has elapsed.

You can also start the timer manually, thereby e.g. triggering shock chlorination.

To configure, working in the “Setpoints” menu item, select the “Switching” tab.

Perform the following work steps:

1. Configure the switching and state the following information.
2. **Automatically switching the reference sets:** Set a checkmark here.
3. **Switch-over:** Select “Digital input”.
4. **Function:** Go to “Timer“.
5. **Reference set:** Select the reference set to which is to be switched.
6. **Digital input:** The digital input in use is indicated here.
7. **Time:** Configure the timer to the desired duration.
8. **“Off” or “Active”:** It will be displayed here whether the timer is currently active. If this is the case, the display will show how long it is still active.
9. **“Start” and “Stop” button:** The timer can be started or stopped manually, e. g. for a shock chlorination.

✓ **Configuration completed.**

Configure switching via ECO control

A limit value control is defined for the "Economy mode”. The limit value control is generally used to reduce the circulation capacity (partial operation).

If all of the measured values are located within the limit values which have been set, the output is closed. If the digital input is also switched for switching to another reference set, “Economy mode” is active and the switch will be made to the desired reference set.

Pre-conditions for actions:

✓ The limit value control is configured as described in section 10.2.6.3 “Limit value control” on page 34.

To configure, working in the “Setpoints” menu item, select the “Switching” tab.

Perform the following work steps:

1. **Automatically switching the reference sets:** Set a checkmark here.
2. **Switch-over:** Select “Switching input”.
3. **Function:** Select “ECO control”.
4. **Reference set:** Select the reference set to which is to be switched.
5. **Digital input:** The digital input in use is indicated here.

✓ **Configuration "Switchover via ECO control” completed.**

11.7.3.2 Switching via timer

Up to ten timers can be configured parallel to the switching via a digital switching input (see section 11.7.3.1 “Switching via digital inputs” on page 43). Times are defined for the point at which the timers should switch to a certain reference set.

To configure, working in the “Setpoints” menu item, select the “Switching” tab.

Perform the following work steps:

1. **Automatically switching the reference sets:** Set a checkmark here.
2. **Switch-over:** Configure up to ten timer switches and state the following information.
3. **Off/Active:** Switch on the timer.
4. **Time:** Configure a time at which the switch-over is to be made. State the hour and minutes.
5. **Monday – Sunday:** Set a checkmark against every weekday on which the timer should be active.
6. **Reference set:** Select the reference set to which is to be switched.

✓ **Configuration "Switchover via timer” completed.**

11.7.4 High chlorination

If higher chlorine values are required for hygiene reasons, high chlorination can be carried out in addition to the normal disinfection measures via a timer. The alarms are switched off during high chlorination.

Perform the following work steps:

1. In Menu 1, navigate to the “High chlorination” tab under “Setpoints”.
2. **Controller:** Select the required controller.
3. Set a setpoint.
4. Set the holding time (hours : minutes).
5. Set the time during which the alarms are to remain switched off.
6. Press "Start”.

▶ The high chlorination begins. The high chlorination has been completed once the current value has fallen to the normal setpoint after the holding time or if the time for alarm suppression has elapsed.

✓ **High chlorination has been performed.**

11.7.5 Medium dosing

You can dose additional media using the medium dosing function. The following options are available to you for controlling:

- On/Off
- Timer switch
- Digital input
- Flow rate

Pre-conditions for actions:

✓ A free output has been selected in Menu 2 under "Settings" / "Configuration assistant". Only the second digital output of an output module can be used for this purpose.

Perform the following work steps:

1. In Menu 1, navigate to the "Medium dosing" tab under "Setpoints".
2. Select the actuation required for your purposes under "Control":

➔ **On/Off:** Configure the "Active" and "Not active" parameters in percent and press Start.

➔ **Timer switch:** Select a timer and set a checkmark against every day of the week on which the timer should be active. Configure the "Active" and "Not active" parameters in percent as well as the starting, running and residual time.

➔ **Digital input:** Select the input for which the medium dosing is intended (see section 10.1.6 "Digital inputs" on page 32) and configure the "Active" and "Not active" parameters in per cent.

➔ **Capacity:** Configure the "maximum" and "minimum" in %, enter the flow rate in l/min for the maximum value and configure a setpoint (Y).

✓ **Medium dosing configured.**

11.8 Access via network

Accessing the device via a network requires that it is connected to an existing Ethernet or RS485 network.

Further information about connection to an existing network is specified in sections 8.10 "Connecting Ethernet" on page 25, 8.11 "RS485 interface" on page 25 and 9.4 "Network settings" on page 29.

> If connection problems are experienced during access via network, check the configuration of your security software.

Modbus

You can access certain data on the device via the Modubus protocol using both Ethernet and the RS485. You need the Modbus protocol e.g. For the connection with a control panel or a PLC. Modbus TCP/IP is supported for Ethernet and Modbus RTU is supported for the RS485 interface.

The Modbus addresses of your device are stated in section 14 "Modbus addresses TOPAX® MC" on page 52.

Web browser (only Ethernet)

You can access the device data using all network devices which are fitted with a web browser. You will require the IP address, subnetmask and possibly the MAC address of the device.

The network settings of your device can be found under Menu 2 > Service > Network.

Open the web browser of your end device and enter the IP address of the device in the address row. The page of the device will open and provide a range of information.

TFTP protocol (only Ethernet)

You can access the device memory via a TFTP client software as long as TFTP is activated in the network settings. You need the device IP address for access.

The network settings of your device can be found under Menu 2 > Service > Network.

12 Maintenance

Products by Lutz-Jesco are manufactured to the highest quality standards and have a long service life. However, some parts are subject to operational wear. This means that regular visual inspections are necessary to ensure a long operating life. Regular maintenance will protect the device from operation interruptions.

DANGER

Mortal danger from electric shock!

Live parts can inflict fatal injuries.

⇨ Before carrying out any maintenance work, always disconnect the device from the power supply.

⇨ Secure the system to prevent it from being switched on by accident.

WARNING

Increased risk of accidents due to insufficient qualification of personnel!

The system and its accessories 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.

12.1 Maintenance intervals

This table gives you an overview of the recommended maintenance work and the intervals at which it must be carried out. The next few sections contain instructions for carrying out this work.

Interval	Maintenance
Monthly	■ Visual check ■ Touchscreen function test ■ Calibrating the measured values
Annually	■ Checking the button cell

Tab. 40: Maintenance intervals

12.2 Keeping logfiles

If you make an entry in the logfiles, the device will issue a reminder when a sensor needs to be replaced.

Perform the following work steps:

1. In Menu 2, navigate to Service > Service entry and select the required sensor under “Service entry”.
2. Enter the serial number in the tab and the manufacturing company of the sensor.
3. Activate the reminder function and enter a date for the next sensor change.

✓ **Logfiles maintained.**

12.3 Updating software

The newest firmware version can be downloaded from www.Lutz-Jesco.com. Copy this *.BIN file onto the device USB flash drive. The file must be saved in the root directory of the USB flashdrive and may not be stored in a sub-folder.

Since settings can become lost during a software update, we recommend saving the current configuration before performing an update (see section 10.4 “Save the configuration” on page 36).

You can update the device software to a newer version.

Perform the following work steps:

1. In Menu 2, navigate to Service > Device.
2. Press “Software update”.
3. Select the *.BIN file with the newer version and press “Load“.

▶ The software is installed. The device will restart automatically during this procedure.

✓ **Update performed**

12.4 Battery/button cell

The device is fitted with a button cell. Check the button cell within the scope of the annual maintenance. The lifetime of the button cell is determined by the device usage and can vary considerably.

You will need to replace the battery more often with devices which are switched off often or over a long period (e.g. over winter).

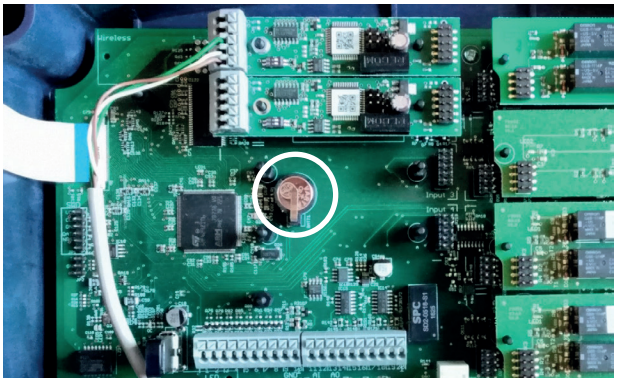


Fig. 48: CR1220 button cell

12.4.1 Checking the charge

You can check the battery charge easily using the device. Replace the battery if the charge amounts to less than 2.9 V.

➔ In Menu 1, navigate to > Information > System values and read off the current charging state of the battery.

12.4.2 Replace the battery

You must remove the two input circuit boards to be able to replace the battery (Fig. 48 “CR1220 button cell” on page 46).

Pre-conditions for actions:

✓ The voltage supply has been disconnected and protected against re-connection.

✓ The housing is open.

Resources required:

🛠 Socket wrench 5.5 mm (M3)

🛠 New battery: CR1220, Ø12,5 mm, 3 V, 35 mAh

Perform the following work steps:

1. Pull all cable connections from the input circuit boards which you need to dismantle.
2. Using the socket wrench, unscrew the retaining nuts from the white protective plate and remove the plate.
3. Using the socket wrench, unscrew the two nuts from the input circuit boards which you need to remove.
4. Working carefully, slide the input circuit boards from their brackets.
   ▶ The battery is now easily accessible.
5. Lever the battery out of its holder without damaging the contact bow.
6. Slide a new battery in the holder.

✓ **The battery has been changed.**

12.5 Replacing the fuse

Your device is fitted with an electrical fuse to protect against short circuits or over-voltage. You can change the fuse if it is defective.

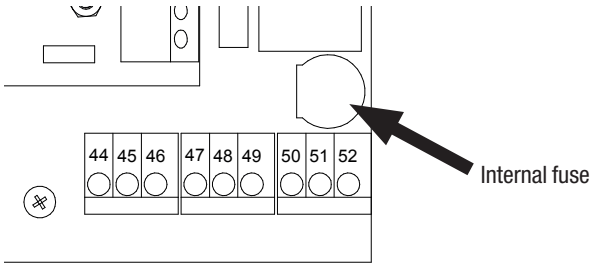


Fig. 49: Position of the fuse

Pre-conditions for actions:

✓ The voltage supply has been disconnected and protected against re-connection.

✓ The housing is open.

Resources required:

🛠 Slotted screwdriver

🛠 New fuse: 5 x 20 mm, 3.15 A, 250 V (delay)

Perform the following work steps:

1. The fuse holder in the form of a bayonet catch is located at the bottom right-hand side, above the clamps for PE, N and L with the marking “Fuse”. Use the slotted screwdriver to press the catch downwards and then turn it leftwards.
2. Remove the fuse.
3. Replace the fuse and fix it in place by turning the catch clockwise.

✓ **Fuse has been replaced.**

12.6 Resetting the settings

> The instructions differentiate between the internal factory settings and the device configuration.
>
> The factory settings contain the basic configuration of the device hardware and cannot be changed.
>
> The configuration file (*.SET) contains the individual device configuration. You can change, save and load the individual settings.

Reset to the factory settings

You can now reset the device to its factory settings. This deletes the configuration. You must then either load a configuration file or perform the configuration manually.

Perform the following work steps:

1. In Menu 2, navigate to Service > Device.
2. Press “factory settings”.
3. Confirm with “Yes”.
   ▶ The configuration will be deleted. You must proceed with the following section.

✓ **All factory default settings will be reset.**

Reset the configuration

The device configuration will be saved in *.SET files. A factory-set configuration file with standard settings is already present. You can change these or save your personal configuration in new files.

Recommendation: Leave the factory-set configuration file unchanged and save your personal configuration in a new file. Given problems with the configuration, this enables you to return to a functioning configuration quickly.

Perform the following work steps:

1. In Menu 2, navigate to Settings > Configuration.
2. Select an existing configuration file.

3. Click “Load” to confirm.
   ▶ The device configuration returns to the saved state.

✓ **Load the old configuration.**

12.7 Finishing maintenance

Perform the following work steps:

1. Make a note of the date and scope of the maintenance performed.
2. In the “Service” menu, navigate to the “Service entry” tab.
3. Enter your company name and notes about the maintenance. Activate the reminder function and enter a date for the next service. Confirm with the “Save” button .
   ▶ Your service action has been saved in the logfiles.
4. To restart the system, proceed in accordance with the instructions in section 9 “First steps” on page 26.

✓ **Maintenance completed.**

13 Troubleshooting TOPAX® MC

See below for information about how to rectify faults on the device or the system. If you cannot eliminate the fault, please consult with the manufacturer on further measures or return the device for repair.

Fault	Possible cause	Remedy
The device loses all settings after it has been disconnected from the network and then reconnected.	The battery is empty.	■ Check that the battery is really empty. To do so, navigate to menu 1 > Information > System values. You can view the battery voltage under "Battery". If the voltage is under 2.9 V, change the battery. ■ Replace the battery (see chapter 12.4 "Battery/button cell" on page 46).
The device is off.	The power supply has been interrupted.	Restore the power supply.
	The device fuse is defective.	Replace the fuse (see chapter 12.5 "Replacing the fuse" on page 47).

Tab. 41: Troubleshooting

13.1 Alarms and Messages

Alarm/message	Possible causes	Measures for resolution
Measuring water shortage	Reed switch in the flow control defective	Replace the reed switch.
	Inlet and/or outflow tap closed	Open the inlet and/or outflow tap.
	The sample water inflow is soiled.	Check the visible parts and filter for soiling and clean if necessary.
Sensor error	Sensor not connected correctly	Make sure that the sensor has been connected correctly. See section 8.5 "Connecting sensors" on page 18.
	Cable break in the sensor signal cable	Replace the signal cable.
Max-alarms sensor	Max alarm set incorrectly	Check settings and correct.
	Overdosing due to incorrect setup.	Check the control parameters using the trend course. Increasing the Xp value can remedy this. Reducing the output can also be effective in this regard.
	Overdosing due to incorrect control direction	Check the control parameters for their correctness of lifting and lowering.
	Overdosing due to incorrect measurement	■ Check the measuring cell for single-rod measuring chains with regard to electrolyte supply and cleanliness of the diaphragm. ■ Check the disinfection measuring cells with cleaning balls with regard to the cleanliness of the electrodes ■ Check the constancy and quantity of the sample water flow
	Overdosing after high chlorination	The time until the alarms are active again will increase.
	Fault of sensor 1 – 4	Check the sensor at the corresponding sensor input 1–4. Remedy the fault and replace the sensor if necessary.
	The connection line is defective	Replace the sensor connecting cable.
	Faulty signal on the input electronics	Check the cable routing and sensor for their correct function. Replace the defective parts if necessary.
	Measurement value input defective	Replace the TOPAX® MC input card.
	No dosing/incorrect dosing	Check the actuators for their correct function.

Tab. 42: Troubleshooting **EASYPRO**

Alarm/message	Possible causes	Measures for resolution
Min-alarm sensor	Min-alarm set incorrectly	Check settings and correct.
	Overdosing due to incorrect setup.	Check the control parameters using the trend course. Increasing the Xp value can remedy this. Reducing the output can also be effective in this regard.
	Overdosing due to incorrect control direction	Check the control parameters for their correctness of lifting and lowering.
	Overdosing due to incorrect measurement	■ Check the measuring cell for single-rod measuring chains with regard to electrolyte supply and cleanliness of the diaphragm. ■ Check the disinfection measuring cells with cleaning balls with regard to the cleanliness of the electrodes ■ Check the constancy and quantity of the sample water flow
	Overdosing after high chlorination	Increase the time until the alarms are active again.
	Fault of sensor 1 – 4	Check the sensor at the corresponding sensor input 1–4. Remedy the fault and replace the sensor if necessary.
	The power cable is defective.	Replace the sensor connecting cable.
	Faulty signal on the input electronics	Check the cable routing and sensor for their correct function. Replace defective parts if necessary.
	Measurement value input defective	Replace the TOPAX® MC input card.
	No dosing/incorrect dosing	Check the actuators for their correct function.
Min/max-alarm virtual inputs	see “Min/max-alarms sensors”	
	Max-alarm bound chlorine in the swimming pool	Increase the quantity of the fresh water inflow. Check the filter in the circuit and increase the amount of flocculant/the mixing/the reaction distance if necessary. If the values are exceeded to an extreme extent, check the sensor system for correct functionality and replace large amounts of the pool water if necessary.
Y alarm sensors	Time insufficient to reach setpoint	Increase the time of the Y alarm.
	Dosing capacity too low to reach the setpoint in time	Increase the dosing capacity.
	Dosing defective	Repair the dosing to ensure the setpoints are reached again.
	Defective hoses and actuator lines	Repair the hoses, lines and any leaks.
Min/max-alarm temperature	(Measuring) water temperature too warm or cold	Adjust the heater and bring the temperature into the correspondingly configured temperature band.
	Heater/cooling defective	Repair the heater/cooling.
	The temperature control does not function correctly.	Adjust the hysteresis of the digital output in the configuration assistant.
	The performance of the heater/cooling does not match the process	Adjust the heater/cooling.
External stop	System stopped externally	Clear the system again.
	Incorrect message	Check the setting and if necessary, re-configure in the Inputs/digital menu. Comply with the switch direction.
Filter cleaning	System stopped by filter cleaning	End the filter cleaning.
	Incorrect message	Check the setting and if necessary, re-configure in the Inputs/digital menu. Comply with the switch direction.
Pre-alarms	Packaging is almost empty*	Provide new packaging and prepare for change.
	Incorrect message	Check the setting and if necessary, re-configure in the Inputs/digital menu. Comply with the switch direction.
	Suction line defective	Replace the suction line.

Tab. 42: Troubleshooting **EASYPRO**

Alarm/message	Possible causes	Measures for resolution
Main alarms	Packaging empty*	Replace the packaging.
	Incorrect message	Check the setting and if necessary, re-configure in the Inputs/digital menu. Comply with the switch direction.
	Suction line defective	Replace the suction line.
Digital inputs (others)	Digital (user-configured) input was switched	Remedy any fault.
	Switch direction configured incorrectly	Reconfigure switch direction in the Inputs/digital menu.
Service due	Service due	Perform a service on your product and confirm the message. If necessary, enter a new service appointment with a reminder in the Service menu.
	Incorrectly set message	Acknowledge the message and renew the entry in the Service menu.
Alarm sensor change due	Sensor change due	Replace the corresponding sensor, acknowledge the message and, if necessary, set a new message in the Service menu.
	Incorrectly set message	Acknowledge the message and renew the entry in the Service menu.
Alarm sensor calibration n.o.k.	Calibration of the sensor not o.k.	Check all ambient conditions. Adjust the sensor (see section 11.6 “Calibration” on page 38). If the sensor cannot be adjusted, replace the sensor.
	Input electronics defective	Replace the input electronics.
Alarm temperature calibration n.o.k.	Calibration of the temperature sensor defective	Adjust the temperature in the Adjust > Temperature menu.
	Sensor defective	Replace the temperature sensor.
	No temperature sensor connected	Deactivate temperature measurement in the Inputs > Temperature menu.
Alarm output calibration n.o.k.	An output is not adjusted	Adjust the output in the Calibration > Outputs menu.
	Incorrectly-set control function	Working in the configuration assistant, set the output function, e.g. of the servomotor 20 mA to continuous output 20 mA.
	Actuator defective	Repair or replace the connected actuators.
Report sensor change.	Sensor must be changed/repaired	Change the sensor. If necessary, enter a new appointment with a reminder in the Service menu.
	Incorrectly set message	Acknowledge the message and renew the entry in the Service menu.
Allocation sample water shortage	Incorrect allocation of the digital inputs	The controller expects at least the configuration of a sample water shortage input. This must be re-used for each set controller set in the Controller > Alarm action menu.
Allocation external stop	Incorrect allocation of the digital inputs	The controller expects at least the configuration of one external stop input. This must be re-used for each set controller in the Controller > Alarm action menu.
Allocation low level alert	Incorrect allocation of the digital inputs	The digital inputs for the low level alert do not match the messages checked in the Controller > Alarm action menu. Correct the allocation.
Allocation main alarm	Incorrect allocation of the digital inputs	The digital inputs for the main alarm do not match the checked messages in the Controller > Alarm action menu. Correct the allocation.
Setpoint changeover	The setpoints are switched via a digital input.	-

Tab. 42: Troubleshooting **EASYPRO**

* Depending on the setting in the Controller/alarm function menu, dosing and control can be interrupted or continue until the end has been reached.

14 Modbus addresses TOPAX® MC

With a DOUBLE-WORD, the HIGH-WORD is transferred first! Hexadecimal display is shown by a leading “0x”.

Address	Read	Write	Description	Meaning
Data that are not channel-related.				
4	x		Device type + version	0x0500 + (number of channels -1) A single-channel controller accordingly has the identification: 0x0500.
6 – 8	x		Software Version:	Transfer: ASCII sign e.g. 102 is the software version V1.02
10 – 11	x		Operating hours	
13	x		Hardware version	
1450	X	X	Status high chlorination	0 = Not running 1 = Running
1451	X		Setpoint high chlorination active	0 = Normal setpoint 1 = Setpoint high chlorination
1452	X	X	Setpoint high chlorination	2 decimal points
1453	X	X	Holding time	HIBYTE = Hours LOBYTE = Minutes
1454	X	X	Alarm suppression	HIBYTE = Hours LOBYTE = Minutes
1455	X		Runtime of the holding time	Seconds
1456	X		Runtime of the high chlorination	Seconds
1490	X	X	Status admixture	0 = Stop 1 = Running
1491	X		Output admixture	500 = 50.0 %
1502	X	X	Setpoint temperature control	500 = 50.0 °C
2000 – 2002	x		Serial number	The information consists of a ASCII sign in HIGH-BYTE and one in LOW-BYTE. Serial number: 123456 will thus be transferred as Address 2000: 0x3132 Address 2001: 0x3334 Address 2002: 0x3536 transferred
2003	x		Status of digital inputs	Displays the terminal logic (not the configured software function). The individual bits are assigned directly to the input clamps. Example: 0x01 means that the first digital inputs (clamps 21 + 22) are actuated.
2004	x		Status of digital outputs	The individual bits of the output modules. Example: 0x03 means that the upper relay or the upper optocoupler of the second output module (from the top) is active.

Tab. 43: Modbus addresses

Address	Read	Write	Description	Meaning		
2008 – 2017	x	x	Name of the device	Max. of 20 characters Caution! The evaluation must stop at the first zero (string end). The individual letters are located in the HIGH-BYTE and LOW-BYTE of every address. “GW” thus produces: Address 2008 = 0x4757 Address 2009 = 0x00 The question marks are undefined. In this case, all other addresses send undefined values.		
Input-related data. 20 addresses will be held available for each of the 1 to 4 inputs. The address space for the inputs begins at 2020, 2040, 2060 and 2080.						
2020	x		Medium	■ 1 = pH ■ 2 = Redox ■ 3 = Free chlorine ■ 4 = Total chlorine ■ 5 = Chlorine dioxide ■ 6 = Bromine ■ 7 = Chlorite ■ 8 = Hydrogen peroxide ■ 9 = Ozone ■ 10 = Bromite ■ 11 = Fluoride ■ 12 = Salt content ■ 13 = Conductivity ■ 14 = Current ■ 15 = Temperature ■ 16 = Neutral (0 – 100%) ■ 254 = Free entry ■ 255 = No type		
2021 – 2022	x		Measurement	Number of positions after the decimal point, see unit (4 bytes signed int.).		
2023	x		Unit	**Number**	**Unit**	**decimal places**
				0	mA	2
				1	µA	1
				2	ppm	2
				3	mg/l	2
				4	µS/cm	2
				5	mS/cm	2
				6	%	2
				7	mV	1
				8	pH	2
				9	min	0
				10	s	0
				11	mV/pH	1
				12	Pulses/min.	0
				13	Travelling unit	1
				14	Celsius	1

Tab. 43: Modbus addresses

Address	Read	Write	Description	Meaning	
2024	x		The assigned input of the controller	■ 0 = Sensor 1 ■ 1 = Sensor 2 ■ 2 = Sensor 3 ■ 3 = Sensor 4 ■ 4 = Virtual input 1 ■ 5 = Virtual input 2 ■ 6 = Virtual input 3 ■ 7 = Virtual input 4 ■ 8 = Timer switch	
2025	x		Control output Y (active control)	500 = 50,0 % (2 Byte signed int)	
	x	x	Control output Y (only manual mode)		
2026	x		Control output 2 Y2 (active control)	500 = 50,0 % (2 Byte signed int) Second side if 2-side control is active.	
	x	x	Control output 2 Y2 (only manual mode)		
2027 – 2028	x	x	Setpoint 1	Number of positions after the decimal point, see unit (4 bytes signed int.).	
2029 – 2030	x	x	Setpoint 2	If 2-side control is active (4 byte signed int).	
2031	x	x	Xp	Number of positions after the decimal point, see unit (2 bytes unsigned int.).	
2032	x	x	D	Derivative time in s (2 byte unsigned int).	
2033	x	x	I	Reset time in s (2 byte unsigned int).	
2034	x	x	Minimum and maximum alarm	Write: 0 = clear alarm	Read: Bit 0 = minimum alarm is active Bit 1 = maximum alarm is active
2035	x	x	Y alarm	Write: 0 = clear alarm	Read: Bit 0 = Y alarm is inactive Bit 1 = Y alarm is active
2036	x	x	Manual mode	Bit 0: Manual mode on Bit 1: Lower (with 2-side control)	
Input-related data of the virtual inputs. 20 addresses will be held available for each of the 1 to 4 inputs. The address space for the virtual inputs begins at 2100, 2120, 2140 and 2160.					
2100	x		Calculation	0 = off, no calculation 1 = difference value measurement 2 = bound chlorine 3 = effective chlorine	
2101 – 2102	x		Measurement	Number of positions after the decimal point, see unit (4 bytes signed int.).	

Tab. 43: Modbus addresses

Address	Read	Write	Description	Meaning		
2103	x		Unit	**Number**	**Unit**	**decimal places**
				0	mA	2
				1	µA	1
				2	ppm	2
				3	mg/l	2
				4	µS/cm	2
				5	mS/cm	2
				6	%	2
				7	mV	1
				8	pH	2
				9	min	0
				10	s	0
				11	mV/pH	1
				12	Pulses/min.	0
				13	Travelling unit	1
				14	Celsius	1
2104	x		The assigned input of the controller	■ 0 = Sensor 1 ■ 1 = Sensor 2 ■ 2 = Sensor 3 ■ 3 = Sensor 4 ■ 4 = Virtual input 1 ■ 5 = Virtual input 2 ■ 6 = Virtual input 3 ■ 7 = Virtual input 4 ■ 8 = Timer switch		
2105	x		Control output Y (active control)	500 = 50,0 % (2 Byte signed int)		
	x	x	Control output Y (only manual mode)			
2106	x		Control output 2 Y2 (active control)	500 = 50,0 % (2 Byte signed int) Second side if 2-side control is active.		
	x	x	Control output 2 Y2 (only manual mode)			
2107 – 2108	x	x	Setpoint 1	Number of positions after the decimal point, see unit (4 bytes signed int.)		
2109 – 2110	x	x	Setpoint 2	If 2-side control is active (4 byte signed int)		
2111	x	x	Xp	Number of positions after the decimal point, see unit (2 bytes unsigned int.)		
2112	x	x	D	Derivative time in s (2 byte unsigned int)		
2113	x	x	I	Reset time in s (2 byte unsigned int)		
2114	x	x	Minimum and maximum alarm	Write: 0 = clear alarm	Read: Bit 0 = minimum alarm is active Bit 1 = maximum alarm is active	
2115	x	x	Y alarm	Write: 0 = clear alarm	Read: Bit 0 = Y alarm is inactive Bit 1 = Y alarm is active	
2116	x	x	Manual mode	Bit 0: Manual mode on Bit 1: Lower (with 2-side control)		

Tab. 43: Modbus addresses

Address	Read	Write	Description	Meaning	
Further non channel-related data.					
2220 – 2223	x		Analogue outputs 1 – 4	421 = 4.21 mA (2 byte signed int)	
2225	x		Alarm status 1 If the bit is set, the associated alarm or message is active.	**Message or alarm**	**Bit**
				Sensor error 1	0
				Sensor error 2	1
				Sensor error 3	2
				Sensor error 4	3
				Sensor 1 maximum alarm	4
				Sensor 2 maximum alarm	5
				Sensor 3 maximum alarm	6
				Sensor 4 maximum alarm	7
				Virtual 1 maximum alarm	8
				Virtual 2 maximum alarm	9
				Virtual 3 maximum alarm	10
				Virtual 4 maximum alarm	11
				Sensor 1 minimum alarm	12
				Sensor 2 minimum alarm	13
				Sensor 3 minimum alarm	14
				Sensor 4 minimum alarm	15
2226	x		Alarm status 2 If the bit is set, the associated alarm or message is active.	**Message or alarm**	**Bit**
				Virtual 1 minimum alarm	0
				Virtual 2 minimum alarm	1
				Virtual 3 minimum alarm	2
				Virtual 4 minimum alarm	3
				Controller 1 Y alarm	4
				Controller 2 Y alarm	5
				Controller 3 Y alarm	6
				Controller 4 Y alarm	7
				Temperature 1 maximum alarm	8
				Temperature 2 maximum alarm	9
				Temperature 3 maximum alarm	10
				Temperature 4 maximum alarm	11
				Temperature 1 minimum alarm	12
				Temperature 2 minimum alarm	13
				Temperature 3 minimum alarm	14
				Temperature 4 minimum alarm	15

Tab. 43: Modbus addresses

Address	Read	Write	Description	Meaning	
2227	x		Alarm status 3 If the bit is set, the associated alarm or message is active.	**Message or alarm**	**Bit**
				Setpoint changeover	0
				Measuring water shortage	1
				External stop	2
				Low level alert 1	3
				Low level alert 2	4
				Low level alert 3	5
				Low level alert 4	6
				Main alarm 1	7
				Main alarm 2	8
				Main alarm 3	9
				Main alarm 4	10
				Digital input 1	11
				Digital input 2	12
				Digital input 3	13
				Digital input 4	14
				Digital input 5	15
2228	x		Alarm status 4 If the bit is set, the associated alarm or message is active.	**Message or alarm**	**Bit**
				Digital input 6	0
				Digital input 7	1
				Digital input 8	2
				Sensor 1 calibration not OK	3
				Sensor 2 calibration not OK	4
				Sensor 3 calibration not OK	5
				Sensor 4 calibration not OK	6
				Temperature 1 calibration not OK	7
				Temperature 2 calibration not OK	8
				Temperature 3 calibration not OK	9
				Temperature 4 calibration not OK	10
				Output 1 calibration not OK	11
				Output 2 calibration not OK	12
				Output 3 calibration not OK	13
				Output 4 calibration not OK	14
				Next service due	15
2229	x		Alarm status 5 If the bit is set, the associated alarm or message is active.	**Message or alarm**	**Bit**
				Sensor change sensor 1 due	0
				Sensor change sensor 2 due	1
				Sensor change sensor 3 due	2
				Sensor change sensor 4 due	3
2235	x		Temperature input 1	235 = 23.5 °C With an inactive temperature, the return is -10000 (2 byte signed int)	
2236	x		Temperature input 2		
2237	x		Temperature input 3		
2238	x		Temperature input 4		

Tab. 43: Modbus addresses

15 EU 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 invalidad 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:	Mehrkanalregler
Description of the unit:	Multi-Channel Controller
Désignation du matériel:	Régulateur multi-canaux
Descripción de la mercancía:	Controlador multi canal
Designação do aparelho:	Controlador multi-canal
Typ: **Type:**	Topax MC
EU-Richtlinien: **EU directives:**	2014/30/EU 2014/35/EU 2011/65/EU
	Die Schutzziele der Niederspannungsrichtlinie 2014/35/EU wurden gemäß Anhang I, Nr. 1.5.1 der Maschinenrichtlinie 2006/42/EG eingehalten. The protective aims of the Low Voltage Directive 2014/35/EU were adhered to in accordance with Annex I, No. 1.5.1 of the Machinery Directive 2006/42/EC.
Harmonisierte Normen: **Harmonized standards:**	DIN EN ISO 12100:2011-03 DIN EN 61000-4-2:2009-12 DIN EN 61000-4-3:2006 + A1:2008 + A2:2010 DIN EN 61000-4-4:2012 DIN EN 61000-4-5:2014 DIN EN 61000-4-6:2014-08 DIN EN 61000-4-11:2005-02 DIN EN 61000-6-2:2016-05 DIN EN 61000-6-3:2011-09 DIN EN 55016-2-3:2010 + A1:2010
Dokumentationsbevollmächtigter: **Authorized person for documentation:**	Lutz-Jesco GmbH

Heinz Lutz
Geschäftsführer / Chief Executive Officer
Lutz-Jesco GmbH
Wedemark, 01.03.2019

Lutz-Jesco GmbH
Am Bostelberge 19
30900 Wedemark
Germany

16 UK Conformity Assessed

UK 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 UK 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.

Description of the unit:	Multi-Channel Controller
Type:	TOPAX MC
Directives:	2016 No. 1101, The Electrical Equipment (Safety) Regulations 2016 2016 No. 1091, The Electromagnetical Compatibility Regulations 2016 2012 No. 3032, The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 The protective aims of The Electrical Equipment (Safety) Regulations 2016 were adhered to in accordance with Annexes to the legislation Part 1 No. 1.5.1 of The Supply Machinery (Safety) Regulations.
Harmonized standards:	BS EN 1092-1, BS EN 10216-2, BS EN 10253-2
Authorized person for documentation:	Lutz-Jesco GB Ltd. Unit C1, Loades Ecoparc, Blackhorse Road Exhall, Coventry CV7 9FW Great Britain

Heinz Lutz
Chief Executive Officer
Lutz-Jesco GmbH
Wedemark, 28.07.2022

Lutz-Jesco GmbH
Am Bostelberge 19
30900 Wedemark
Germany

17 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: .....

Address: .....

Contact person: .....

Manufacturer order no.: .....

Device type: .....

Nominal capacity / nominal pressure: .....

Description of fault: .....

Date of delivery: .....

Serial number: .....

Phone: ..... Date: .....

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 photo of the chemical feed system, showing materials of construction, diameters, lengths and heights of suction and discharge lines.

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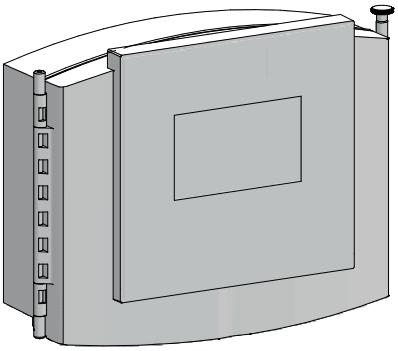

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Operating instructions
Multi-channel controller **TOPAX® MC**