

NEOMERIS CONTROL PH Multifunction Controller

Version 1.05

Manual

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This manual relates to the following control unit / version:

Devide type	NEOMERIS CONTROL PH
Device category	Multifunction Controler

Device ersion	1.05
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Build:20201109-145029-4025035NSt

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1 Important safety information



- As a basic requirement, staff must be familiar with the basic **meaning** of safety notes and safety instructions to ensure safe handling and fault-free operation of this system.
- The operating manual contains important instructions for safely operating the system. Please read the complete operating instructions carefully prior to working with the device.
- Ensure that the operating instructions are accessible to all users at all times.
- Always include these operating instructions when handing the device to third parties.
- Everyone working on the system needs to observe this operation manual, in particular the section on safety notes. This applies to the company responsible for installation as well as to the system owner.

1.1 Hazards during system handling

This system has been built according to the state of the art and to accepted technical safety rules. Nevertheless, its use may pose a hazard to life and limb of the user or of third parties and may also cause damage to the system and other property. Only use the system

- for its intended purpose and
- if all of its safety equipment is in perfect working order.

Immediately remove any faults that may impact safety. This is the responsibility of the owner themselves or of a company commissioned by the owner.

1.2 Duties of the owner

The owner is obligated to ensure that all people working on the system

- are familiar with the basic occupational safety and accident prevention regulations and have been instructed in the handling of the system,
- have read and understood the section on safety and the warnings described in this operation manual and confirmed this with their signature, and
- have their performance in terms of safety checked regularly.

The owner themselves are responsible for complying with this obligation.

1.3 Duties of the staff

Everyone commissioned to perform work on the system or who performs work on it independently, is obligated to do the following prior to starting any work:

- Read the section on safety and the warnings described in this operation manual and confirm with their signature that they have understood this.
- Observe the basic occupational safety and accident prevention regulations.

1.4 Staff qualifications

Installing and starting up the system requires basic electrical and process knowledge as well as knowledge of the associated technical terms. This is why only specialists or trained staff under the direction and supervision of a specialist are allowed to install and start up the system.

- Clearly define the responsibilities of staff concerning installation, start-up, operation, maintenance, and repair of the system.
- A specialist is someone who, based on their qualified training, knowledge and experience of their knowledge of relevant regulations, is able to assess the tasks they have to perform, to recognise potential hazards, and to take adequate protective measures. A specialist is required to comply with the relevant technical rules.
- Staff in training may only work on the system whilst under the supervision of experienced staff.

1.5 Warnings in this manual

This manual includes warnings preceding prompts for action where there may be a hazard of bodily harm or material damage. The structure of warnings is as follows:



- The signal word "**HAZARD**" is used to indicate an imminent danger. Failing to avoid it will result in serious injury or even death.



- The signal word "**WARNING**" is used to indicate a potential danger. Failing to avoid it may result in serious injury, harmful health effects, or even death.



- The signal word "**CAUTION**" is used to indicate a potentially dangerous situation. Failing to avoid it may result in moderate or mild bodily harm or material damage.



- The signal word "**NOTE**" is used to indicate important information about intended use. Failing to comply with this information may impair or disrupt the machine's operation or its surroundings.

2 Notes and instructions to be observed

2.1 General notes

- Observe the regulations for accident prevention as well as the safety regulations for operating electrical devices and systems, and for environmental protection in the country of use and at the installation site.
- Observe the country-specific and location-dependent regulations for installation and start-up.
- Make sure to protect the device against moisture and humidity. Keep the device away from splashing water and condensation by any means.
- Make no changes and manipulations to the device beyond the handling described in this manual, or else the warranty will expire.

2.2 During installation



- Always disconnect the relevant system component from the mains before installing or connecting and/or disconnecting the device to the mains. Secure the system against unauthorised re-start.
- Only connect the device to a mains voltage as specified on the rating plate.
- Follow the specifications and the ambient parameters.
- The device needs a fault-free and stable supply voltage. If necessary, use a line filter to keep interference voltage, which may get into the line from, e.g., solenoid valves or large motors, away from the control system.
- Never lay the connection lines parallel to the mains cable.

2.3 During operation

- Place the system in a location that allows easy access to the operating and control elements at any time. Floor, ceiling, and walls need to be flat and clean.
- Ensure that the control outputs stay below the maximum admissible rating.
- In case of malfunctions switch the device off immediately and notify the service personnel. Never attempt to repair the device. This will cause the warranty to expire. Only authorised qualified service personnel are allowed to perform repairs.

2.4 During cleaning

- Use only a dry, lint-free cloth.

2.5 During disposal

- Follow local guidelines in your country when disposing of the device.

2.6 Safeguards

- Ensure that all of the system's safeguards have been fitted properly and are in working condition prior to switching it on.
- Never remove safeguards prior to switching off the machine and without securing it against re-start.
- The owner needs to provide the operating staff with the required personal protective equipment (PPE), and the operating staff have to use it when working on the system.
- The owner or a company commissioned by them needs to check all the existing safeguards regularly.

2.7 Informal safety measures by the owner

- Always keep the operating manual near the machine's site of use.
- In addition to the operating manual, provide and observe generally applicable and local regulations on accident prevention and environmental protection.
- Always make sure that all of the safety and hazard notes on the system and the labels on operating and control elements are legible.

2.8 Safety measures during normal operation

- Never operate the system if not all of the safeguards are fully functional.
- Prior to switching on the machine ensure that it poses no danger to anyone during start-up.
- Check the system at least once every shift for visible external damage to the safeguards.

2.9 Hazards from electrical energy

- Only authorised electrical experts are allowed to perform work on electrical supplies.
- Regularly check the electrical equipment of the system. Immediately remove loose connections and braided cables.
- Always keep the system closed. Only authorised staff are allowed access to the system.
- Involve a second individual, who may actuate the main circuit breaker in an emergency, if tasks need to be performed on live parts.

2.10 Hazards from hydraulic energy

- Depressurise the sections of the system and the pressure lines to be opened before starting any repair work.
- Regularly inspect fittings and piping.

2.11 Intended use

Only use the device for measuring, controlling, and regulating blowdown systems in open cooling circuits and in humidifiers.

Any other use or any use beyond the intended purpose is considered unintended. The manufacturer/supplier assumes no liability for damage resulting from such use.

Intended use also includes:

- Observing all of the instructions provided in this operation manual and
- Adhering to the specified inspections and maintenance intervals.

2.12 Unconventional use

The statements as per Item 2.11 apply.

Any other use as well as any use outside of the specifications is considered unintended.

2.13 Structural modifications to the controller / system

- Modifications, extensions, or remodelling to/off the controller / system require the consent of the manufacturer / supplier.
- Any remodelling measures require the written consent of the manufacturer / supplier.
- Immediately replace system parts that are not in perfect condition and only use original spare parts.
- Externally sourced parts lack the guarantee that they have been designed and manufactured in line with function, wear, and safety requirements.

2.14 Warranty and liability

Bodily harm and material damage as well as damage to the system itself are excluded from warranty and liability claims if they can be traced back to one or more of the following causes:

- Incorrect use of the system.
- Improper installation, start-up, operation, and maintenance of the system.
- Operation of the system with defective or improperly attached or non-functioning safety devices and safeguards.
- Failure to observe the notes in the operation manual with regard to transport, storage, installation, start-up, operation, and maintenance of the system.
- Unauthorised structural modifications to the system.
- Unauthorised changes to the control parameters.
- Poor monitoring of system parts prone to wear and tear.
- Improperly executed repair work.
- Failure to keep, or incompletely kept, maintenance logs.
- Disaster situations caused by foreign objects or force majeure.

Our General Terms and Conditions apply.

2.15 Copyright

The manufacturer / supplier retains the copyright to this operation manual. This operation manual is only intended for the owner and their staff.

It contains regulations and notes exempt from any of the following, neither fully nor partially:

- Duplication,
- Distribution, or
- any other form of communication.

Contraventions may be prosecuted.

3 Delivery scope

The controller is supplied with the cable glands specified below and a user manual.

3.1 Unpacking and checking the delivery

**NOTE**

Check the system for transport damage after unpacking it.

In order to secure your claims in case of transport damage, please note the following:

1. Immediately inspect goods for damage!
2. Ensure claims against third parties: Call on shipping companies, railway operators, postal services, lorry companies, other carriers, hauliers, stockists, customs and port authorities to inspect the damage together! Have them accept their liability in writing, specifically:
 - a. In case of visible external damage - prior to accepting the goods.
 - b. In case of invisible external damage - promptly following detection (stop unpacking) but no later than within the following time limits:
 - I. Postal services: 24 hours
 - II. Hauliers: 6 days after acceptance
 - III. Shipping companies: 3 days after unloading
 - IV. Other carriers: 1 week after delivery
3. Promptly involve the claims agent named on the insurance document or policy.

**NOTE**

Should you realise that parts are defective or missing, please contact your supplier within 7 days.

3.2 Component list

The control unit consists of the following components in the given quantity. Quantity numbers putted in parantheses are sub components, that are already included in other components.

Bezeichnung	Komp.-Id	Anz.	Art / Verwendung	Verwendungshinweis
Gesamtes System	Base	1	Grundsystem	
Kabel 10 Polig, kein 3V3	Buskabel	1	Verbindungskabel	Flachbandkabel
CPU / Display	CPU-Platine/-Einheit	(1)	CPU-Platine/-Einheit	
Gehäuse	Gehäuse	(1)	Gehäuse	
Kabelverschraubung	M12	(1)	Kabelverschraubung	M12
Kabelverschraubung	M25, 3x7mm	(1)	Kabelverschraubung	M25, 3x7mm
Kabelverschraubung	M25, 6x4mm	(1)	Kabelverschraubung	M25, 3x7mm
Kabelverschraubung	M25, 6x4mm	(1)	Kabelverschraubung	M25, 6x4mm
Trägerplatte für Platine	Steckplatte	(1)	Trägerplatte	
Versorgungsplatine	eB0	(1)	Versorgungs-Brick	Montage auf Trägerplatte/-gehäuse
Relaise Platine	eB1	1	E/A-Brick	Montage auf Trägerplatte/-gehäuse
pH/Temp Platine	eB2	1	E/A-Brick	Montage auf Trägerplatte/-gehäuse

3.3 Sensors and Accessories

For proper operation the following additional components might be required (e.g. sensors, cable sets etc.).

Identifier	NEOMERIS pH combination electrode with glass shaft HT
Type / Usage	pH sensor, 0...14pH
Quant.	0/1
Details / Picture	High-temperature gel and 3x zirconium oxide diaphragm, with Variopin Pg13.5 plug-in head and integrated PT100. pH 0-14, -5 to 130°C (controller measures up to 99°C), installation length 120mm
Adaption	
Item Number	890598
Identifier	NEOMERIS pH combination electrode with glass shaft
Type / Usage	pH sensor, 0...12pH
Quant.	0/1
Details / Picture	Ceramic diaphragm, with salt reserve, screw head Pg13.5 without integrated PT100. pH 0-12, 0 to 60 ° C, installation length 120mm
Adaption	
Item Number	890599
Identifier	NEOMERIS pH combination electrode with plastic shaft made of PPO
Type / Usage	pH sensor, 0...12pH
Quant.	0/1
Details / Picture	Ceramic diaphragm, solid electrolyte, with salt reserve, screw head Pg13.5 without integrated PT100. pH 0-12, 0 to 60 ° C, installation length 120mm
Adaption	
Item Number	890600
Identifier	Connection cable for pH electrodes
Type / Usage	for pH electrode 890599 + 890600
Quant.	0/1

Details / Picture	Rotatable cable socket (sensor side) to BNC plug (device side)
Adaption	
Item Number	890616
Identifier	Probe cable with cable socket pH
Type / Usage	for pH electrode 890598
Quant.	0/1
Details / Picture	Variopin connector system (sensor side) to BNC connector/PT100 (device side)
Adaption	
Item Number	890617

4 Specifications

4.1 General characteristics

4.1.1 Housing

The control unit is placed in the following housing:

Type	Bocard 160 high, gray/light gray
Producer	Bopla GmbH
Size / Dimensions	199mm x 179mm x 106,5mm (WxDxH)
Protection Class	IP65
Material	ABS
Weight	approx. 750g

4.1.2 Operation panel/User-Interface

The control unit has the following display and operating components:

Display Type	Graphic Display
Display Size	2.8 Inch
Display Resolution	128x64 Pixel, monochrome
Backlight	colored backlight (RGB-LED)
Operation Elements	4 foil keys
Options	

4.1.3 Power Supply (injected from external)

The control unit requires the following electrical supply from external:

Description	Main Supply form external
Information	
Voltage	100 ... 240V AC
max. Current	5A AC
Inactive Current	30mA AC
Frequency	50 ... 60Hz
Remark	external Fuse: max. 10A

4.1.4 Power Supply (provided to external)

The control unit provides the following electrical supply (for example to the sensor / actuator supply):

Description	Supply sourcing 230V AC for externals
-------------	--

Information	
Voltage	like incoming main supply
max. Current	5A AC
max. Power	nom. 1100VA
Remark	reduced wit inductive load
Description	Supply sourcing 24V DC for externals
Information	
Voltage	24V DC
max. Current	600mA DC
max. Power	15W
Remark	

4.1.5 Digital Inputs

The control unit has the following digital inputs / switch inputs:

Identifier	non available
Information	
Type	Digital-Inputs
Low Volt.	< 5V
High Volt.	> 15V
Input Current	< 5mA @ 24V
Component	-
Remark	

4.1.6 Digital Outputs

The control unit has the following digital outputs / switching outputs:

Identifier	Alarm Output
Information	Alarm Output
Type	Relay, change over contact, isolated
max. Switching Volt.	250V AC
max. Switching Cur.	5A AC, Contact 6A
max. Perm. Current	3A AC
nom. Cycles	see datasheet
Component	FTR, LYCA024V
Remark	
Identifier	Output for limit 1
Information	Output for limit 1
Type	Relay, change over contact, isolated
max. Switching Volt.	250V AC
max. Switching Cur.	5A AC, Contact 6A
max. Perm. Current	3A AC
nom. Cycles	see datasheet
Component	FTR, LYCA024V
Remark	
Identifier	Output for limit 2

Information	Output for limit 2
Type	Relay, change over contact, isolated
max. Switching Volt.	250V AC
max. Switching Cur.	5A AC, Contact 6A
max. Perm. Current	3A AC
nom. Cycles	see datasheet
Component	FTR, LYCA024V
Remark	-
Identifier	unused
Information	unused
Type	Relay, change over contact, isolated
max. Switching Volt.	250V AC
max. Switching Cur.	5A AC, Contact 6A
max. Perm. Current	3A AC
nom. Cycles	see datasheet
Component	FTR, LYCA024V
Remark	-
Identifier	unused
Information	unused
Type	Relay, change over contact, isolated
max. Switching Volt.	250V AC
max. Switching Cur.	5A AC, Contact 6A
max. Perm. Current	3A AC
nom. Cycles	see datasheet
Component	FTR, LYCA024V
Remark	-
Identifier	unused
Information	unused
Type	Relay, change over contact, isolated
max. Switching Volt.	250V AC
max. Switching Cur.	5A AC, Contact 6A
max. Perm. Current	3A AC
nom. Cycles	see datasheet
Component	FTR, LYCA024V
Remark	-

4.1.7 Analog Inputs

The control unit has the following analogue inputs / measuring inputs:

Identifier	Temperature sensor
Information	Temperature input, PT100, 0...99°C
Type	Temperature input, PT100, 0...99°C
Range	0 ... 99°C
Input Resistance	-
Resolution	0.1%
Accuracy	2%
Linearity	1%
Filter	Tau = 1s
Linearization	-
Model / Type	PT100

Remark	-
Identifier	pH Sensor
Information	
Type	pH valie input, 2 wire, single-rod measuring cell
Range	0 ... 7 ... 14 pH (420mV ... 0V ... 420mV)
Input Resistance	> 1000 MOhm
Resolution	0.1 pH
Accuracy	0.2 pH
Linearity	0.1 pH
Filter	
Linearization	
Model / Type	
Remark	
Identifier	unused
Information	
Type	Current Input
Range	0 ... 20mA, 2/3-wire
Input Resistance	175 Ohm
Resolution	10Bit
Accuracy	0.5%
Linearity	0.2%
Filter	-
Linearization	-
Model / Type	-
Remark	-

4.1.8 Analog Outputs

The control unit has the following analog outputs:

Identifier	Current output for pH
Information	
Type	Current Output
Range	0 ... 20mA
Input Resistance	> 12V (under Load = 600 Ohm)
max. Current	25mA
Filter	1st order, fcut off = approx. 2Hz
Component	-
Remark	

4.1.9 Pulse and Counting Inputs

The control unit has the following pulse inputs / counter inputs:

Identifier	unused
Information	
Type	Impuls/Digital input, universal 2/3 wire
Threshold	0.6 / 1V

Input Circuit	n-switching
Sensitivity	rising slope
Gate Time (Frequ.Mode)	10ms ... 65s
Resolution (Per.Mode)	1 ... 50ms
Filter	hardware, 1st order, fcut off = approx. 1.5kHz
Component	-
Remark	-

4.1.10 Environmental Conditions

The control unit works under the following environmental conditions or requires them for correct operation:

Ambient Temp. Operation	rel. humidity	Vibration	Shock Load	Ambient Temp, Storage
0 ... 40°C	15 .. 80% (n. condens)	-	-	-10 ... 50°C

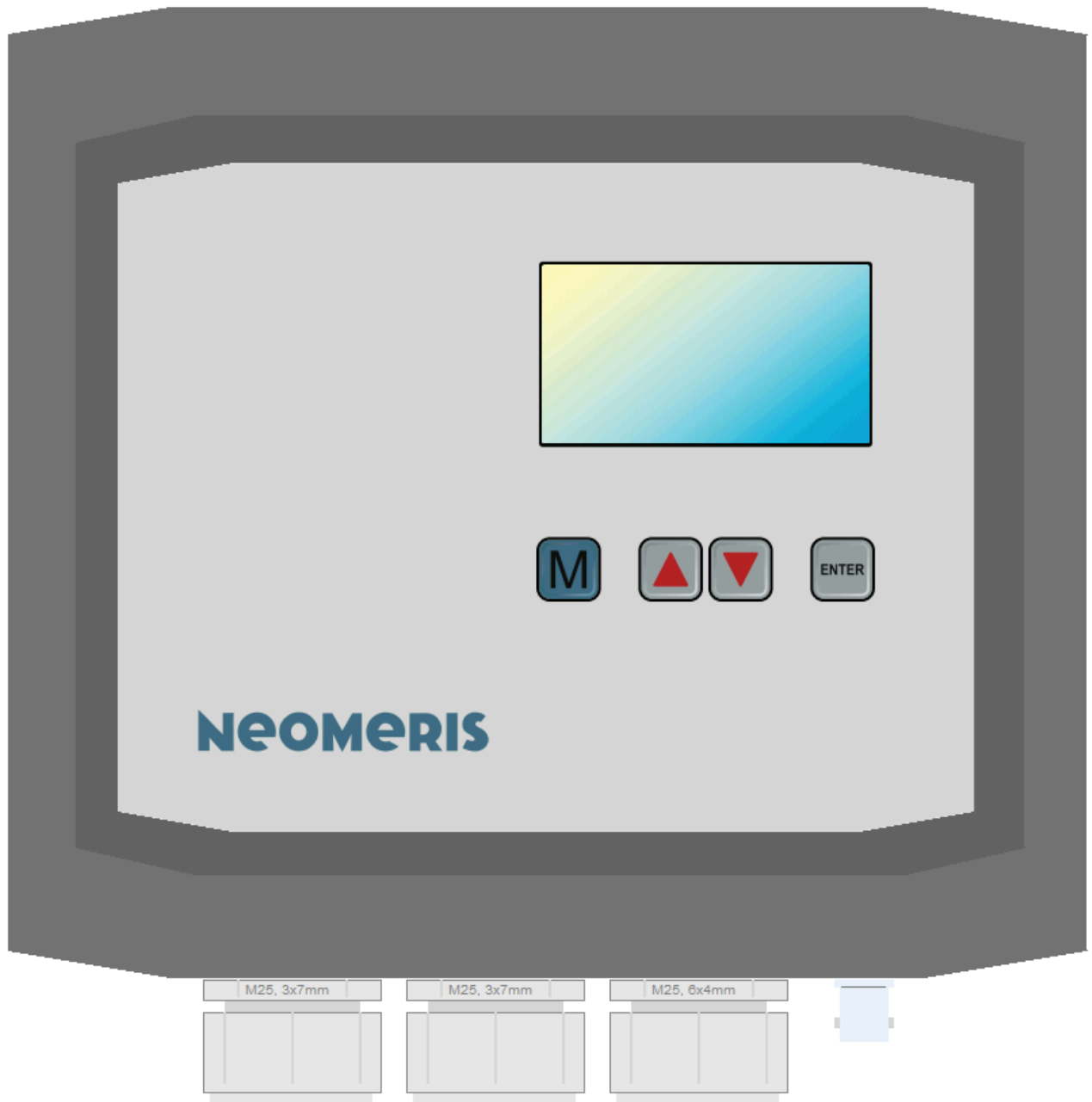
4.2 Standards and Regulations

The control unit complies with the following standards / specifications / qualifications:

Type	Standard	Specification
EC Declaration of Conformity	CE-Mark	conform
EMC Directive	EMV 2014/30/EG	conform
Low Voltage Directive	2014/35/EG	conform
Standard	EN 61000-6-2	applied
Standard	EN 61000-6-4	applied
Standard	EN ISO 12100-1	applied
Standard	EN ISO 12100-2	applied

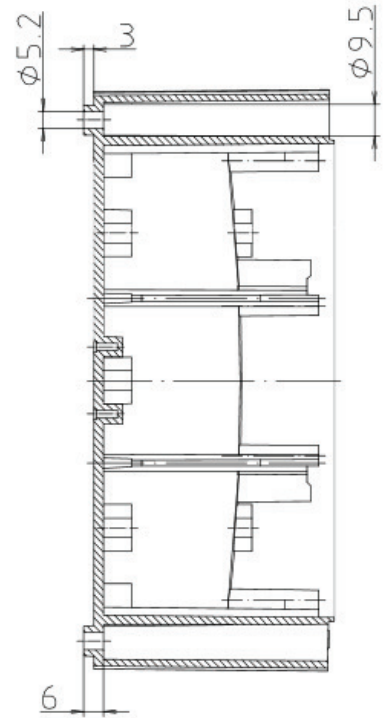
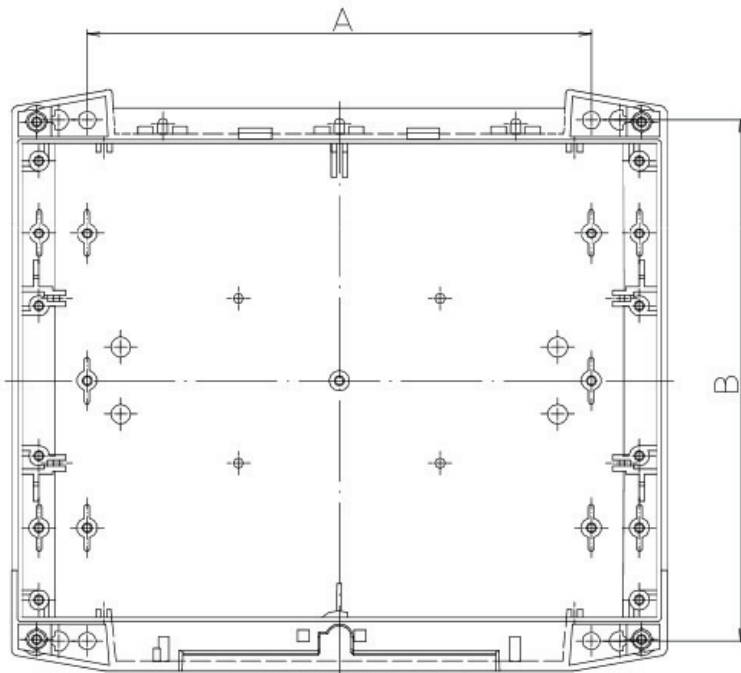
4.3 Views and dimensional drawings

4.3.1 Front film layout



4.3.2 Housing Bottom and Drill Pattern

For mounting use the following pattern (measurements see marked line below)



	A	B
● BCD 160	150	155
BCD 200	180	180
BCD 250	215	210

5 Installation

5.1 Preparing for installation

NOTE

For setup and installation, please refer to the existing plans and drawings as in chapter 4 "Specifications."



We recommend interconnecting alerts with the control room. Ignoring or failing to acknowledge the fault over a longer period of time may lead to severe damage to the system or even a complete production downtime.

5.1.1 Setup location



Ensure that the setup location is frost-free and sufficiently ventilated, well lit and clean.

Condensation in the controller may ruin it!

5.1.2 Setup area



Ensure that the wall space is flat. Place the controller in a well-lit and easily accessible place so that operating and display elements are easily visible and accessible.

Do not place the controller on surfaces with high vibration (e.g., cooling tower walls). This may damage the electronic system!

5.1.3 Power supply

Ideally, connect the controller to a power supply with a 6A (10A max.) fuse. We recommend protecting the in-house mains installation from lightning. In any case, it is necessary to protect the power supply from lightning.

5.1.4 Cabling

NOTE

It is not admissible to use the same cable for measuring lines (or control signals) and mains supply, even if there is a sufficient number of unused wires!

NOTE

Hazard of damage or disruptions from electro-magnetic fields!

- Installing the device or the connection lines parallel to the mains cable or near strong electro-magnetic fields may damage the device or cause disruptions during measurement.

- It is imperative to ensure that the measuring and control lines are installed at a maximum distance to power cables. This will prevent undesirable irradiation. Keep connection lines as short as possible.
- Lay connection lines well away from the mains cable.
- Connect the device to the protective earth (in case of 230/115V AC).
- Shield the device from strong electro-magnetic fields.

5.2 Installation process



The IP 65 protection class is only guaranteed if lid and cable screw connections are closed.

5.2.1 Installing the controller

Proceed as follows for attaching the controller on a vertical surface:

- Drill four holes according to the drill pattern.
- Fully open the housing.
- Insert top screws into the top gap between housing and wall and tighten almost all the way.
- Insert bottom screws into the bottom gap between housing and wall and tighten them, plus the top screws, all the way.
- Close housing lid.

5.2.2 Installation of measuring probes



The measuring fitting / probe must be installed in such a way that it is not possible for the dirt to dry out on the electrode surfaces, even when the system is switched off.

5.3 Cabling



Injury hazard from live installation!

If you fail to switch off the power supply prior to installation, you risk injuring yourself, ruining the product, or damaging system components.

Observe the following prior to working on the electrical equipment and prior to commencing conversions, maintenance, servicing, and similar tasks:

1. Switch off the main switch of the master system and secure it against re-start (e.g. by locking it).
2. Attach a clearly visible sign prohibiting anyone from switching on the machine, including the following information:
 - a. Do not switch on! Work is being performed!"

- b. Working location
 - c. Date
 - d. Name of party responsible
3. For connection purposes, exclusively use tested lines with sufficient line cross-sections.

A qualified electrician complying with VDE and EVU installation guidelines and company standards is required for performing electrical installations.

Notes on terminal assignment can be found in chapter 5.4.4.

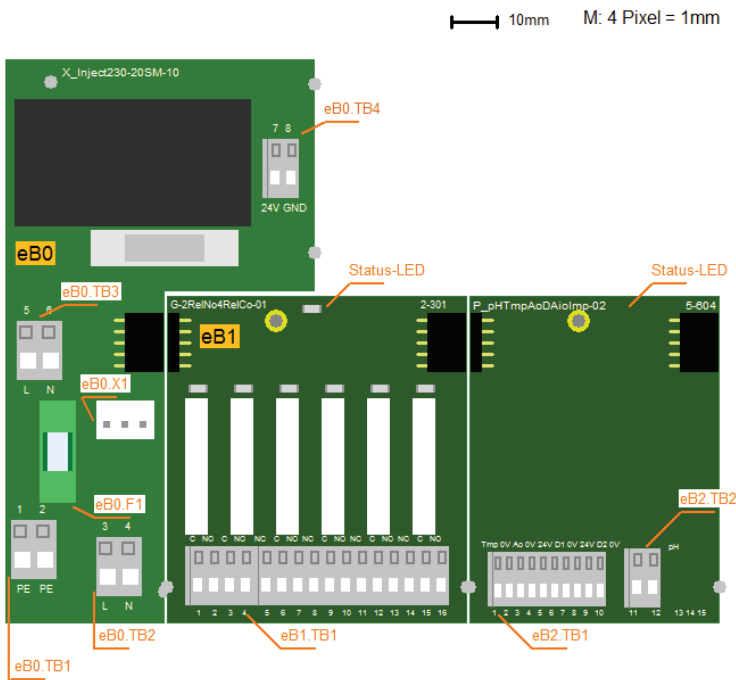
To connect the cables, please proceed as follows:

- Pass the cable through one of the cable glands on the underside of the housing into the housing interior.
- Fix the respective cable gland and connect the required wires to the desired terminals.
- To do this, insert the conductors into the rectangular cable entry funnels on the terminal block. Make sure that the wires are fully and firmly seated in the terminals.
- To release the connection, insert a screwdriver without lateral force into the square opening to open the clamping point. Pull out the conductor with the clamping point open.

5.4 Terminal connection

5.4.1 Component Inside view (below)

The following diagram indicates the major operation, configuration and adaption elements.



5.4.2 Connectors (X) – overview

ID	Model / Type	Grid	Type	Num. Clamps	Wire	el. Spec
Box.X1	BNC	-	BNC-Connector	-	-	-
eB0.X1	MTA-156	3.96mm	Print Connector	3	-	275V / 6A AC

5.4.3 Terminal block (TB) – overview

ID	Model / Type	Grid	Type	Num. Clamps	Wire	el. Spec
eB0.TB1	Wago250	5mm	Cage Terminal	2	up to 1.5mm ²	PE
eB0.TB2	Wago250	5mm	Cage Terminal	2	up to 1.5mm ²	250V, 8A
eB0.TB3	Wago250	5mm	Cage Terminal	2	up to 1.5mm ²	250V, 8A
eB0.TB4	Wago250	3.5mm	Cage Terminal	2	up to 1.5mm ²	24V, 2A
eB1.TB1	Wago250	3.5mm	Cage Terminal	16	up to 1.5mm ²	250V/8A AC, 24V/2A DC
eB2.TB1	Wago250	2.5mm	Cage Terminal	10	up to 0.5mm ² or 0,8mm	signal level
eB2.TB2	Wago250	2.5mm	Cage Terminal	2	up to 1.5mm ²	signal level

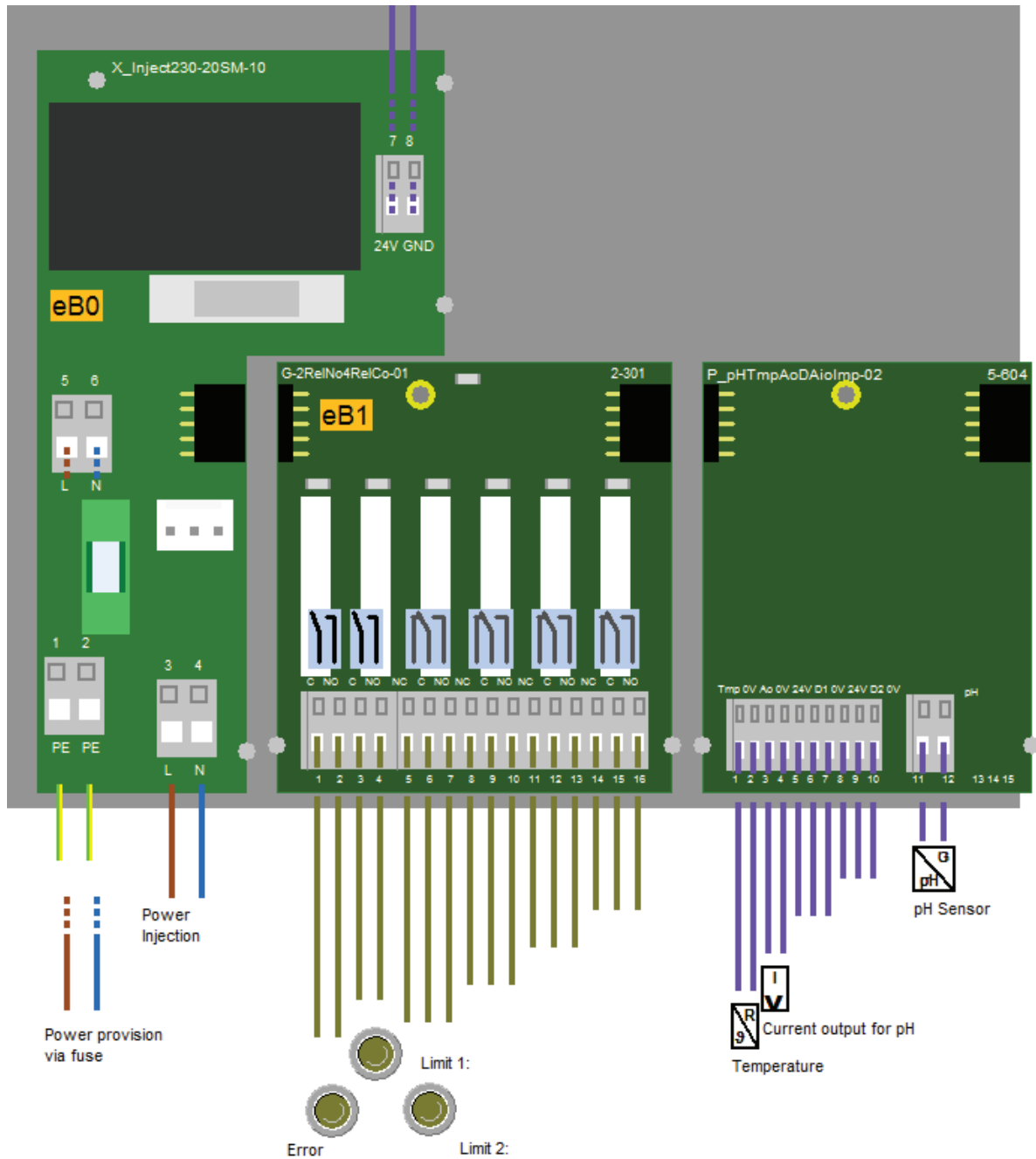
5.4.4 Terminal assignments

Te block	Te no.	Te id.	Type / Usage	Function
eB0.TB1	1	PE	Protective Earth	-
eB0.TB1	2	PE	Protective Earth	-
eB0.TB2	3	L	Phase, Supply	-
eB0.TB2	4	N	Neutral, Supply	-
eB0.TB3	5	L	Phase, Consumer	-
eB0.TB3	6	N	Neutral, Consumer	-
eB0.TB4	7	+24V	Supply sourcing 24V DC for externals	-
eB0.TB4	8	GND	Ground	-
eB1.TB1	1	NO	Relay, normally open contact, isolated	Alarm Output
eB1.TB1	2	C	Relay, change over contact, isolated	Alarm Output
eB1.TB1	3	NO	Relay, normally open contact, isolated	Output for limit 1
eB1.TB1	4	C	Relay, change over contact, isolated	Output for limit 1
eB1.TB1	5	NC	Relay, normally close contact, isolated	Output for limit 2
eB1.TB1	6	C	Relay, change over contact, isolated	Output for limit 2
eB1.TB1	7	NO	Relay, normally open contact, isolated	Output for limit 2
eB1.TB1	8	NC	Relay, normally close contact, isolated	unused
eB1.TB1	9	C	Relay, change over contact, isolated	unused
eB1.TB1	10	NO	Relay, normally open contact, isolated	unused
eB1.TB1	11	NC	Relay, normally close contact, isolated	unused
eB1.TB1	12	C	Relay, change over contact, isolated	unused
eB1.TB1	13	NO	Relay, normally open contact, isolated	unused
eB1.TB1	14	NC	Relay, normally close contact, isolated	unused
eB1.TB1	15	C	Relay, change over contact, isolated	unused
eB1.TB1	16	NO	Relay, normally open contact, isolated	unused

eB2.TB1	1	Tmp	Input Temperature Sensor	Temperature sensor
eB2.TB1	2	0V	Ground	Temperature sensor
eB2.TB1	3	Out	Current Output	Current output for pH
eB2.TB1	4	0V	Ground	Current output for pH
eB2.TB1	5	24V	Sensor Supply +24V	unused
eB2.TB1	6	IN	Input	unused
eB2.TB1	7	0V	Ground	unused
eB2.TB1	8	V+	Sensor Supply +24V	unused
eB2.TB1	9	In	Input	unused
eB2.TB1	10	0V	Ground	unused
eB2.TB2	11	pH In-	Ground	pH Sensor
eB2.TB2	12	pH In+	pH Input	pH Sensor

5.5 Input-/Output Schema

The following diagram shows the adaption of the control unit. To avoid overlapping, some wires are displayed interrupted and dashed.



5.6 Configuration/Jumper

This chapter contains general information about configuring the hardware.

ID	Type / Usage	used Jumper	Selections	Effect
Temperature sensor	Temperature measurement	-	-	If no temperature sensor is connected, a 110 ohm resistor must be connected to terminal 1 and 2 of the eB2.TB1 terminal block.

6 Functional description

This chapter describes the structure and details of the control functions and their parameters.

6.1 System overview/-structure

- pH Measuring Device pH 128 (System), pH_128
 - pH-measurement (pHMeasuring),
 - pH (MpHExt), pH-measurement
 - Analog Outp. (MUniAnalOutpH), Current output for pH
 - Limit 1: (MDigOut), Output for limit 1
 - Limit 2: (MDigOut), Output for limit 2
 - Temperature (MTemperatureExt), Temperature measurement
 - Alarmmanager (MAlarmManagerOut), Displays alarms and warning
 - Error (MDigOut), Error if alarm or warning
 - Protocol (MProtocolSdcCsv), Logging of data elements
 - Protocol show (MProtShowCsv), Displays logged data
 - Logging protocol (MProtRecordCsv), Logs data in a csv file

6.2 Module: System

6.2.1 Info:

pH Measuring Device pH 128

6.2.2 Comment:

pH value measuring device with optional temperature compensation and current output.
Two potential free relay outputs can be configured via various thresholds.

6.2.3 Internal elements of module:

6.2.3.1 Parameters

»DLS autom. (Sel.)	Automatic daylight saving times switching		
	Default: On		
	0	Off	-
	1	On	-

6.3 Module: pHMeasuring

6.3.1 Info:

pH value measurement

6.3.2 Comment:

pH value measuring with temperature compensation and additional evaluations
Depending on the incoming pH value, relays are activated via switching limits.

6.3.3 Internal elements of module:

6.3.3.1 Parameters

»Scroll Time (Num.)	Time interval between view calls in display
	Range: 0 ... 999 s Default: 10 s
»Standard page (Num.)	Number of the page to be displayed fixed. If 0 then the is scrolling is active.
	Range: 0 ... 99 Default: 0

6.4 Module: MTemperatureExt

6.4.1 Info:

Temperature sensor

6.4.2 Comment:

This temperature ist used for the temperature compensation of the pH value.

6.4.3 Internal elements of module:

6.4.3.1 Parameters

»Min(Warn.) (Num.)	Warning low limit
	Range: 0.0 ... 99.9 °C Default: 2.0 °C
»Min(Alarm) (Num.)	Alarm low limit
	Range: 0.0 ... 99.9 °C Default: 2.0 °C
»Max(Warn.) (Num.)	Warning high limit
	Range: 0.0 ... 99.9 °C Default: 85.0 °C
»Max(Alarm) (Num.)	Alarm high limit
	Range: 0.0 ... 99.9 °C Default: 85.0 °C
»Hysther.(Warn.) (Num.)	Hysteresis, used as +/- from threshold
	Range: 0.0 ... 99.9 °C Default: 5.0 °C
»Hysther.(Alarm) (Num.)	Hysteresis, used as +/- from threshold
	Range: 0.0 ... 99.9 °C Default: 5.0 °C
»Prio Warn. (Num.)	Set warning priority
	Range: 0 ... 99 Default: 50
»Prio Alarm (Num.)	Set alarm priority
	Range: 0 ... 99 Default: 20
»Delay Warn. (Num.)	Delay of warning triggering
	Range: 0 ... 999 s Default: 2 s
»Delay Alarm (Num.)	Delay of alarm triggering
	Range: 0 ... 999 s Default: 2 s

»Reac. Sys. (Sel.)	Reaction of the system to an alarm-type message	
	Default: Continue	
	0	No shutdown
	1	Shutdown with permanent retries
	2	Shutdown with defined number of retries
3	Durable shutdown	

6.4.3.2 Analog input (AI)

»Temperature	Measured temperature from sensor
	Input range: 0.0 ... 99.9 °C

6.5 Module: MAlarmManagerOut

6.5.1 Info:

Alarmmanager

6.5.2 Comment:

Alarms and alerts are controlled by preset limits.

To pass alarms and warnings, this device contains an associated relay. (Relay 1)

In terms of the limits of operation, alarm and warning each have a hysteresis, which can be set in the menu.

Specified are a lower limit and an upper limit:

If the value falls below the minimum limit (plus hysteresis) or the upper limit (plus hysteresis), the relay is switched.

-> A message screen with the current fault is shown on the display. This screen can be acknowledged at any time.

The relay is no longer energized as soon as the value returns to the set standard range.

Warning and alarm each have their own limit settings.

6.5.3 Internal elements of module:

This module contains no elements.

6.6 Module: MpHExt

6.6.1 Info:

pH sensor with threshold evaluation

6.6.2 Comment:

The pH is calculated on the basis of incoming voltage and is compensated based on the prevailing temperature.

For controlling existing relays, two switching limits are available. (Relay 2 and Relay 3)

Switching limits:

Each switching limit has a lower limit and an upper limit.

As soon as the lower limit is reached, the relay is not energized.

If the upper limit is exceeded, the relay is energized.

Switch Limit 1: (Relay 2) (over the limit-> energized / below the limit-> not energized)

Switch Limit 2: (Relay 3) (over the limit->energized / below the limit-> not energized)

6.6.3 Internal elements of module:

6.6.3.1 Parameters

Lower Limit 1 (Num.)	Lower limit 1
	Range: 0.0 ... 14.0 pH Default: 1.7 pH
Upper Limit 1 (Num.)	Upper limit 1
	Range: 0.0 ... 14.0 pH Default: 13.3 pH
Lower Limit 2 (Num.)	Lower limit 2
	Range: 0.0 ... 14.0 pH Default: 0.0 pH
Upper Limit 2 (Num.)	Alarm high limit
	Range: 0.0 ... 14.0 pH Default: 14.0 pH
» Min value (warn) (Num.)	Warning low limit
	Range: 0.0 ... 14.0 pH Default: 1.0 pH
» Min value (alarm) (Num.)	Alarm low limit
	Range: 0.0 ... 14.0 pH Default: 1.0 pH
» Max Value(Warn) (Num.)	Warning high limit
	Range: 0.0 ... 14.0 pH Default: 14.0 pH
» Max Value(Alarm) (Num.)	Alarm high limit

	Range: 0.0 ... 14.0 pH Default: 14.0 pH		
»Hyst. Warning (Num.)	Hysteresis, used as +/- from threshold		
	Range: 0.0 ... 14.0 pH Default: 0.7 pH		
»Hysteresis Alarm (Num.)	Hysteresis, used as +/- from threshold		
	Range: 0.0 ... 14.0 pH Default: 0.7 pH		
»Prio Warn. (Num.)	Set warning priority		
	Range: 0 ... 99 Default: 50		
»Prio Alarm (Num.)	Set alarm priority		
	Range: 0 ... 99 Default: 20		
»Delay Warn. (Num.)	Delay of warning triggering		
	Range: 0 ... 999 s Default: 1 s		
»Delay Alarm (Num.)	Delay of alarm triggering		
	Range: 0 ... 999 s Default: 1 s		
»Reac. Sys. (Sel.)	Reaction of the system to an alarm-type message		
	Default: Continue		
	0	Continue	No shutdown
	1	Shutdown	Shutdown with permanent retries
	2	Cycl.shutdown	Shutdown with defined number of retries
3	Dur. shutdown	Durable shutdown	

6.6.3.2 Analog input (AI)

»pH Sensor	Measured pH from the sensor
	Input range: 0.0 ... 14.0 pH

6.7 Module: MUniAnalOutpH

6.7.1 Info:

Analog Outp.

6.7.2 Comment:

The current output is calculated based on the incoming pH value.

The range can be selected from: 0-20mA or 4-20mA.

Furthermore, an upper limit and a lower limit for the pH value can be specified.

Example for calculating the current output based on the setting of limit values:

1st example:

Lower limit = 5pH / output = 4mA

Upper limit = 9pH / output = 20mA

If a mA range of 4-20mA is selected, the outgoing current does not fall below this 4mA.

Not even if the pH falls below five.

2nd example:

Lower limit = 0pH / output = 4mA

Upper limit = 14pH / output = 20mA

6.7.3 Internal elements of module:

6.7.3.1 Parameters

»Range (Sel.)	Range of current		
	Default: 4..20 mA		
	0	0..20 mA	-
	1	4..20 mA	-
»Upper Limit (Num.)	Maximum possible pH value		
	Range: 0.0 ... 14.0 pH Default: 14.0 pH		
»Lower Limit (Num.)	Minimum possible pH value		
	Range: 0.0 ... 14.0 pH Default: 1.0 pH		

6.7.3.2 Analog output (AO)

»Current output for pH	Analog Outp.
	Output range: 0.00 ... 20.00 mA

7 Operation

7.1 Operating and Display Elements

The user interfaces is arranged as follows:



7.2 Navigation and Programming

7.2.1 General information


Use keyboard and display for programming the control system.



Incorrect programming may lead to a failure of crucial controller functions!

7.2.2 Key functions



Press the  key to open the main menu.




Use the  $\langle \uparrow \rangle$ and  $\langle \downarrow \rangle$ keys to change parameters.



Press  $\langle \text{Enter} \rangle$ to confirm your entry.

If you are entering parameters, pressing <Enter> will cause the cursor to move one position further right. If you are changing parameters, use the arrow keys to select the requested digit and then press <Enter> to confirm. Select all the parameters to apply the values.



The  <M> (or <ESC>) key is used to return from a sub-menu or to cancel an entry.

7.2.1 Automatic reset

If no keys have been pressed for 5 minutes, the system will automatically quit the menu view and return to the main display.

7.2.2 Passwords

The device has 3 password levels with the following factory settings:

- User password: 1111
- Technician password: 2222
- Operator password: 3333

We recommend changing and noting down passwords immediately after start-up.

7.2.3 Setup of Parameters and Values

Any parameters / values that can be set are accessible through the control menu. Editing dialogs are used to change the individual parameters. These dialogs can be modified with the \uparrow/\downarrow -keys. After entering the changes, they can be confirmed with the **Enter**-key.

Example of an editing dialog:



7.3 Configuration of modules / functions

If this menu exists, it is possible to disable unneeded / wanted modules / functions. This is done in a configuration menu.

In this menu all disconnectable modules / functions are listed.

NOTE

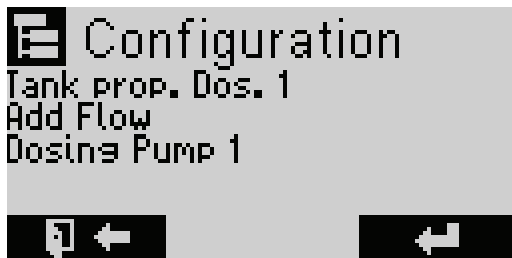
The following shown masks contains exemplary elements/channels, which are currently not existing in this present control unit.

It is possible that several configuration menus exist.

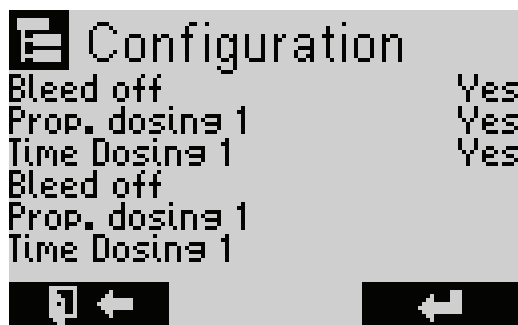
There could be a configuration menu in the main menu which shuts off all modules.

Similarly, a configuration menu could occur in the module itself, which disables only a certain function of the module.

Sample of a selection mask:



The module/function to be activated/deactivated is selected using the \uparrow/\downarrow -buttons and set to either "yes" or "no" for the module / function to be activated.



NOTE

It is strongly recommended to restart the device after saving the changes made in order to avoid unwanted behavior when changing the configuration menus.

7.4 Type of contact or inversion

It is possible to invert the type of contact (NC / NO) of the connected sensors or buttons / switches.

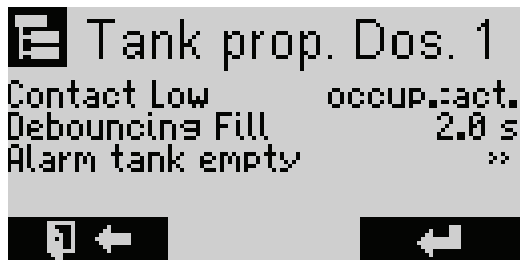


NOTE

The following shown masks contains exemplary elements/channels, which are currently not existing in this present control unit.

The contact type is usually a sub-item in a menu that indicates a function of the controller. In the picture below you can see that the contact type is part of the tank menu.

Sample of a selection mask:



Example tank level:

Our tank has a Normally Open (NO) contact as a water level sensor at the top of the tank. This means that if the contact type is set to NO, the tank will be reported as full as soon as the water reaches the sensor.

If we want to use the same sensor to indicate that the tank is empty, we have to set the type of contact to NC.

Because if we do not, the device will report as soon as the sensor touches the water that the tank is empty. But we need the opposite.

Therefore, we invert the signal by setting the contact type to normally closed.

Now it is shown that the tank is empty as soon as the sensor no longer touches water.

The contact type is usually set in the settings menu of the respective sensor.

7.5 Calibration

To compensate for measurement errors due to deviations in sensors and measuring amplifiers, the analog inputs and outputs can be calibrated using reference measurements. In this case, the value of a lower and an upper known reference variable is "assigned" (learned) and interpolated linearly between these points (if necessary, there is an additional compensation / linearization).



NOTE

The following shown masks contains exemplary elements/channels, which are currently not existing in this present control unit.

Further Notes:

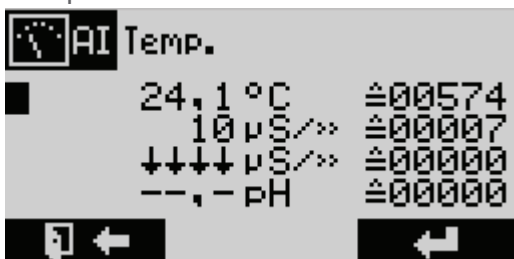
- When calibrating a temperature depending value (i.e. conductivity, pH-Value) a correct temperature measurement (of the associated sensor) must be possible. Therefore, prior to LF calibration, perform a temperature calibration.
- For the temperature compensation to work, the temperature sensor must capture the current process water temperatures and should not fluctuate.
- Assigning/teaching the lower and upper calibration points can be independent.
- The calibration overview can also be used for the pure representation of the logical measured values as well as the converter value.

7.5.1 Analog Input

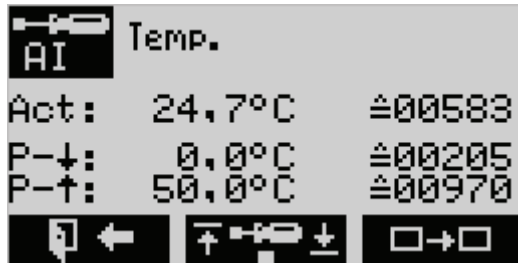


After calling up the calibration menu ("Calibration AI"), an overview mask of all analogue inputs is displayed. In addition to the input designation, the current measured value ("log.") and the converter raw value ("phys.") are displayed.

Sample of a selection mask:

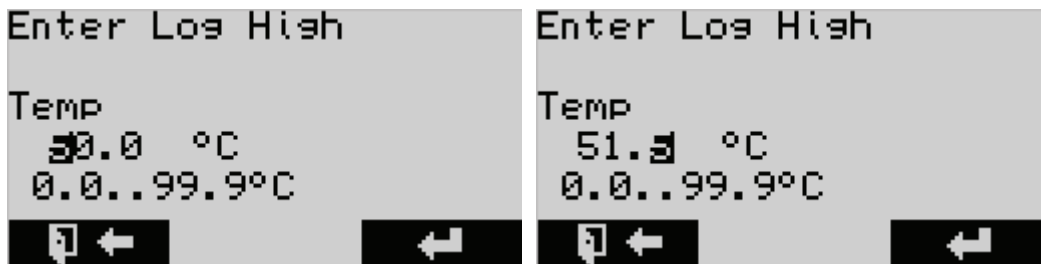


The input to be calibrated is selected with the aid of the ↑/↓-keys and branched to the following calibration mask. Here, the current measured value as well as the lower and upper calibration point are displayed as logical as well as converter raw value.



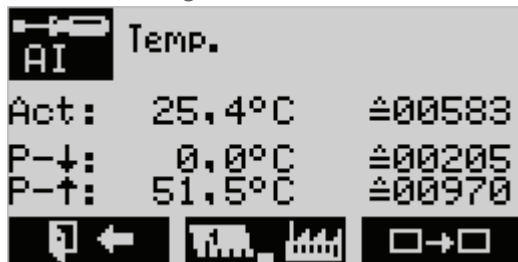
The current assignment appears:

The current temperature Act: 24.7 °C is assigned to a converter value of 00583. Press the **↑** key to enter the upper point. (Press **↓** to enter the lower point.)



Change the value with the keys **↑** or **↓**, with **Enter** a digit is moved to the right. After entering the value, exit the mask with **Enter**.

The new assignment Act: 25.4 °C to the converter value 00583 is displayed.



Calibration takes place in the following steps:

1. Specifying a reference value to the sensor. In this case, the value must be able to settle for a sufficiently long time (until the converter value no longer changes).
2. Press the **↑/↓**-key to adjust the upper / lower calibration point.
3. Measure the real measured value applied to the sensor (with an external reference measuring device) and enter it (numerical editing).
4. Press the **Enter**-key to accept the new calibration point - the **M** key is used to cancel the adjustment.

7.5.2 Analog Output

Similar to the input calibration, the output calibration takes place.

In the channel list it is possible to force the output value via the **↑/↓**-keys while inside the calibration.

7.6 Diagnostics

The hardware diagnostics allow the direct manipulation or representation of the outputs and inputs of the control unit.

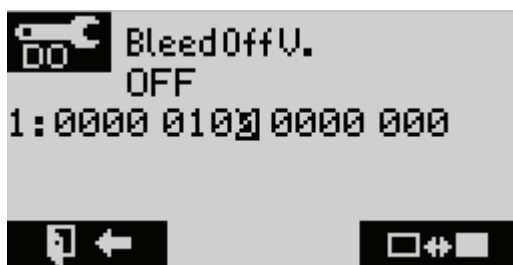


NOTE

The following shown masks contains exemplary elements/channels, which are currently not existing in this present control unit.

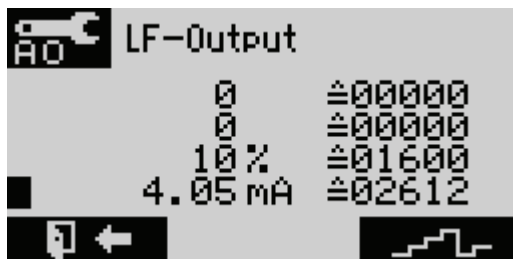
Using the \uparrow/\downarrow -keys, you can use a cursor to select one of the digital inputs or outputs whose name and status are displayed in verbal form. The manipulation (off / on) is done via the **Enter**-key. This feature gives the technician the opportunity to test the hardware

Example of a digital output:



The analogue outputs can be selected with the \uparrow/\downarrow -keys, as with the digital inputs or outputs. Manipulation is possible via the **Enter**-key.

Example of an analog output:



All values that are changed in the hardware diagnostics reset the control unit when exiting the menu.

Some menus can not be changed and only show actual values. For example, the CNT menu which shows the values of the pulse input.

7.7 Alarm Handling and Messages

The control unit has an alarm manager. The operating errors are detected by the control unit and displayed as a text message. The messages of the alarm manager can be reached via the menu of the control unit.



Current Alarms, Warnings and Infos can be selected and acknowledged (depending on the desired software setting).

The display changes its backlight depending on the message:

Green: there are no messages.

Blue: information is available.

Yellow: there are warnings.

Red: there are alarms

The numbers indicate the number of Info / Warnings / Alarms. If more than one message is present, the messages can be selected with the \uparrow or \downarrow keys and, if necessary, acknowledged with Enter. Each message must be selected separately.

7.8 Firmware-Update

See chapter [8.4](#)

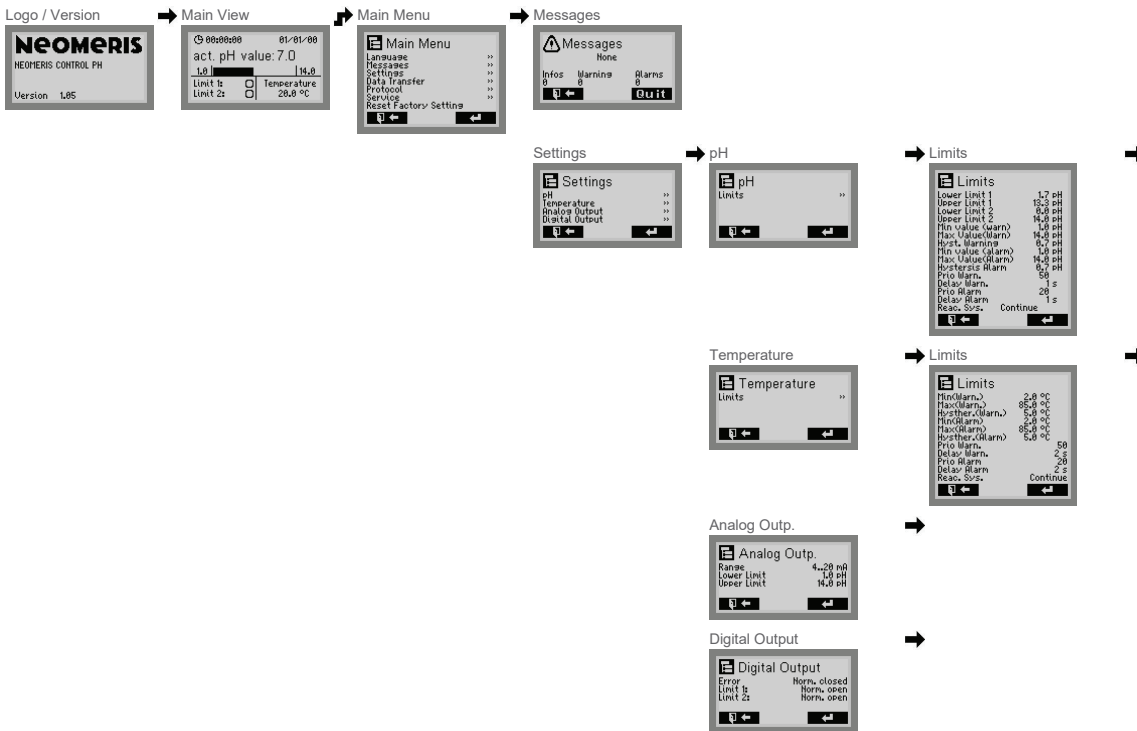
7.9 Factory settings

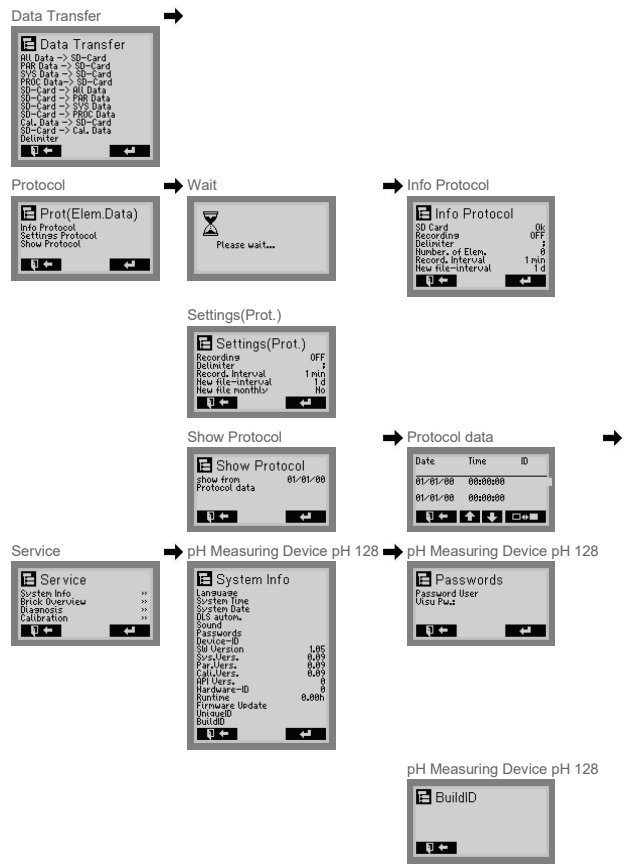
During the boot process / switching on a number of special functions are available. In order to enable these functions, keep the required keys pressed while powering up the device.



Reset (factory settings): Keep  and  pressed down.
Switch the device off and then switch it back on.

7.10 HMI-overview





Master

```
Master Uers-> 0
Reinit BUS: Init, runs
Node : (Not oper.)
No error
Success, init. 0
Fail, init. 0
Brick->
```

Brick Overview

```
Brick Overview
Brick-Numb. 1 0
Transjal. 0
PU Uers. 0
Prot. Uers. 0
State 0
←Master
```

Diagnosis

```
Diagnosis
Diagnosis DI
Diagnosis DO
Diagnosis RI
Diagnosis RO
Diagnosis CH1
```

Calibration

```
Calibration
calib-R
calib-R0
```

Factory Settings

```
Factory Settings
Do you want to reset
to factory settings?
```

8 Anhang

8.1 Übersicht der Parameter

8.1.1.1 Parameters

»DLS autom. (Sel.) pH Measuring Device pH 128	Automatic daylight saving times switching	
	Default: On	
	0	Off -
	1	On -
»Scroll Time (Num.) pH Measuring Device pH 128, pH-measurement	Time interval between view calls in display	
	Range: 0 ... 999 s Default: 10 s	
»Standard page (Num.) pH Measuring Device pH 128, pH-measurement	Number of the page to be displayed fixed. If 0 then the is scrolling is active.	
	Range: 0 ... 99 Default: 0	
Lower Limit 1 (Num.) pH Measuring Device pH 128, pH-measurement, pH	Lower limit 1	
	Range: 0.0 ... 14.0 pH Default: 1.7 pH	
Upper Limit 1 (Num.) pH Measuring Device pH 128, pH-measurement, pH	Upper limit 1	
	Range: 0.0 ... 14.0 pH Default: 13.3 pH	
Lower Limit 2 (Num.) pH Measuring Device pH 128, pH-measurement, pH	Lower limit 2	
	Range: 0.0 ... 14.0 pH Default: 0.0 pH	
Upper Limit 2 (Num.) pH Measuring Device pH 128, pH-measurement, pH	Alarm high limit	
	Range: 0.0 ... 14.0 pH Default: 14.0 pH	
»Min value (warn) (Num.) pH Measuring Device pH 128, pH-measurement, pH	Warning low limit	
	Range: 0.0 ... 14.0 pH Default: 1.0 pH	
»Min value (alarm) (Num.) pH Measuring Device pH 128, pH-measurement, pH	Alarm low limit	
	Range: 0.0 ... 14.0 pH Default: 1.0 pH	
»Max Value(Warn) (Num.) pH Measuring Device pH 128, pH-measurement, pH	Warning high limit	
	Range: 0.0 ... 14.0 pH Default: 14.0 pH	
»Max Value(Alarm) (Num.) pH Measuring Device pH 128, pH-measurement, pH	Alarm high limit	
	Range: 0.0 ... 14.0 pH Default: 14.0 pH	
	Hysteresis, used as +/- from threshold	

»Hyst. Warning (Num.) pH Measuring Device pH 128, pH-measurement, pH	Range: 0.0 ... 14.0 pH Default: 0.7 pH	
»Hysteresis Alarm (Num.) pH Measuring Device pH 128, pH-measurement, pH	Hysteresis, used as +/- from threshold Range: 0.0 ... 14.0 pH Default: 0.7 pH	
»Prio Warn. (Num.) pH Measuring Device pH 128, pH-measurement, pH	Set warning priority Range: 0 ... 99 Default: 50	
»Prio Alarm (Num.) pH Measuring Device pH 128, pH-measurement, pH	Set alarm priority Range: 0 ... 99 Default: 20	
»Delay Warn. (Num.) pH Measuring Device pH 128, pH-measurement, pH	Delay of warning triggering Range: 0 ... 999 s Default: 1 s	
»Delay Alarm (Num.) pH Measuring Device pH 128, pH-measurement, pH	Delay of alarm triggering Range: 0 ... 999 s Default: 1 s	
»Reac. Sys. (Sel.) pH Measuring Device pH 128, pH-measurement, pH	Reaction of the system to an alarm-type message Default: Continue	
	0	Continue No shutdown
	1	Shutdown Shutdown with permanent retries
	2	Cycl.shutdown Shutdown with defined number of retries
	3	Dur. shutdown Durable shutdown
»Range (Sel.) pH Measuring Device pH 128, pH-measurement, pH, Analog Outp.	Range of current Default: 4..20 mA	
	0	0..20 mA -
	1	4..20 mA -
»Upper Limit (Num.) pH Measuring Device pH 128, pH-measurement, pH, Analog Outp.	Maximum possible pH value Range: 0.0 ... 14.0 pH Default: 14.0 pH	
»Lower Limit (Num.) pH Measuring Device pH 128, pH-measurement, pH, Analog Outp.	Minimum possible pH value Range: 0.0 ... 14.0 pH Default: 1.0 pH	
	Kind of contact (n.open/n.closed)	
	Default: Norm. open	

Limit 1: (Sel.) pH Measuring Device pH 128, pH-measurement, pH, Limit 1:	0	Norm. open	-
	1	Norm. closed	-
» Min(Warn.) (Num.) pH Measuring Device pH 128, pH-measurement, Temperature	Warning low limit		
	Range: 0.0 ... 99.9 °C Default: 2.0 °C		
» Min(Alarm) (Num.) pH Measuring Device pH 128, pH-measurement, Temperature	Alarm low limit		
	Range: 0.0 ... 99.9 °C Default: 2.0 °C		
» Max(Warn.) (Num.) pH Measuring Device pH 128, pH-measurement, Temperature	Warning high limit		
	Range: 0.0 ... 99.9 °C Default: 85.0 °C		
» Max(Alarm) (Num.) pH Measuring Device pH 128, pH-measurement, Temperature	Alarm high limit		
	Range: 0.0 ... 99.9 °C Default: 85.0 °C		
» Hysther.(Warn.) (Num.) pH Measuring Device pH 128, pH-measurement, Temperature	Hysteresis, used as +/- from threshold		
	Range: 0.0 ... 99.9 °C Default: 5.0 °C		
» Hysther.(Alarm) (Num.) pH Measuring Device pH 128, pH-measurement, Temperature	Hysteresis, used as +/- from threshold		
	Range: 0.0 ... 99.9 °C Default: 5.0 °C		
» Prio Warn. (Num.) pH Measuring Device pH 128, pH-measurement, Temperature	Set warning priority		
	Range: 0 ... 99 Default: 50		
» Prio Alarm (Num.) pH Measuring Device pH 128, pH-measurement, Temperature	Set alarm priority		
	Range: 0 ... 99 Default: 20		
» Delay Warn. (Num.) pH Measuring Device pH 128, pH-measurement, Temperature	Delay of warning triggering		
	Range: 0 ... 999 s Default: 2 s		
» Delay Alarm (Num.) pH Measuring Device pH 128, pH-measurement, Temperature	Delay of alarm triggering		
	Range: 0 ... 999 s Default: 2 s		
» Reac. Sys. (Sel.) pH Measuring Device pH 128, pH-measurement, Temperature	Reaction of the system to an alarm-type message		
	Default: Continue		
	0	Continue	No shutdown
1	Shutdown	Shutdown with permanent retries	

	2	Cycl.shut-down	Shutdown with defined number of retries
	3	Dur. shut-down	Durable shutdown
Record. Interval (Num.) pH Measuring Device pH 128, Protocol	Time interval at which the records are executed		
	Range: 0 ... 999 min Default: 1 min		
New file-interval (Num.) pH Measuring Device pH 128, Protocol	Time interval between the generation of new files		
	Range: 0 ... 99 d Default: 1 d		
New file monthly (Sel.) pH Measuring Device pH 128, Protocol	New file every month		
	Default: No		
	0	No	-
	1	Yes	-
Recording (Sel.) pH Measuring Device pH 128, Protocol	Recording data		
	Default: OFF		
	0	OFF	Switched Off / Inactive
	1	ON	Switched On / Active
»Delimiter (Sel.) pH Measuring Device pH 128, Protocol	A character to separate the data from each other		
	Default: ;		
	0	TAB	-
	1	,	-
	2	;	-

8.2 Maintenance and Repair

NOTE

To ensure the perfect function of the control unit a regular maintenance is necessary (six-monthly, annual)!

- clean up the sensor, especially the electrodes
- check if the sensors are still water-proof
- calibrate sensor
- exchange battery

8.2.1 Maintenance of the Lithium Battery

The Lithium battery is only used to supply the real time clock (the parameters, settings, calibration will be stored without battery). A used battery has to be replaced by the same type. Therefore, the control unit has to be switched-off before. After changing the battery, the RTC has to be set correct again.

Used batteries have to be disposed of without polluting the environment.

8.2.2 Cleaning Instructions

The surface of the control unit is untreated. Therefore, contaminations with oil or fat should be avoided. However, if the housing becomes soiled, please clean the surface with a commercially available plastic cleaner (never use other solvents).

8.3 Software Update, change Firmware



You can use the device with different software to run a variety of controlling jobs with varied types of behaviour. Ensure that the correct software is installed.

An update can enhance an existing software or giving the control unit a complete new functionality/usage. The update can be done via transfer from a PC (with a cable set or adapter) or by a microSD-card.

8.3.1 Installing firmware using a PC

1. Switch off control unit.
2. Connect the PC with the control unit via a USB-cable.
3. Set (connect) the boot jumper. It can be found on the backside of the CPU board of the control unit.
4. Switch on the control unit. The PC will show a new removable storage with the file "Firmware.bin" inside.
5. Delete the File "Firmware.bin". After this no file on the removable storage will be shown.
6. Copy the software update file (name must be "Cortex.bin") from the PC to the new shown removable storage. Wait, till the copy process is finished.
7. Switch off the control unit.
8. Remove the boot jumper.
9. Switch on the control unit.
10. The control unit starts with the new software. In some cases, some parameter messages have to be confirmed.
11. Settings and parameters can be modified after an update and have to be checked in all cases.

8.3.2 Installing firmware using microSD-Card

1. Switch off control unit.
2. Insert the micorSD-card with the update file (name must be "Cortex.bin") in the main directory of the microSD-card into the microSD-card slot on the backside of the CPU board.
3. Set (connect) the boot jumper. It can be found on the backside of the CPU board.
4. Switch on the control unit. The red led right beside the boot jumper stays lit.
5. Wait, till the green LED beneath the battery stops flashing.
6. Power off the control unit and remove the boot jumper.
7. The control unit starts with the new software. In some cases, some parameter messages have to be confirmed.
8. Settings and parameters can be modified after an update and have to be checked in all cases.

8.4 PC-Software

8.4.1 Obtaining the software and drivers

You will find the suitable software and possibly required drivers at the following web address:

8.4.2 Requirements / Installation

For "installation" on a PC (Windows 7 or higher), the PC software ZIP file associated with the device with the corresponding revision of the previously mentioned web address must be unpacked onto a data carrier of the PC. A software installation in the traditional Windows sense with admin rights is not required.

The connection between PC and controller is made in the standard case by a USB cable (USB-A PC side and USB mini control side).

Furthermore, with Windows 7 and Windows 8, a corresponding driver must be installed, which is available for download with installation instructions on the previously mentioned web address. Starting with Windows 10, no separate driver is required.

Optionally, in addition to the USB connection, communication via Bluetooth, LAN, WLAN or a mobile connection is possible with the help of corresponding pluggable COM modules.

8.4.3 Function of the Visualization / Simulation

The software will be started by using the "vis.bat", "sim.bat" or radMON.exe directly from the installation directory.

With the visualization it is possible to see the actual control status of the connected control unit, record all activities and change/save/restore parameters by remote. With the simulation no connected control unit is required. It will be simulated completely and realistically by the PC software and can be used for demonstration, tests or education purposes.

A detailed instruction manual is available from the previously mentioned web address.

8.4.4 View of the Main Screen

