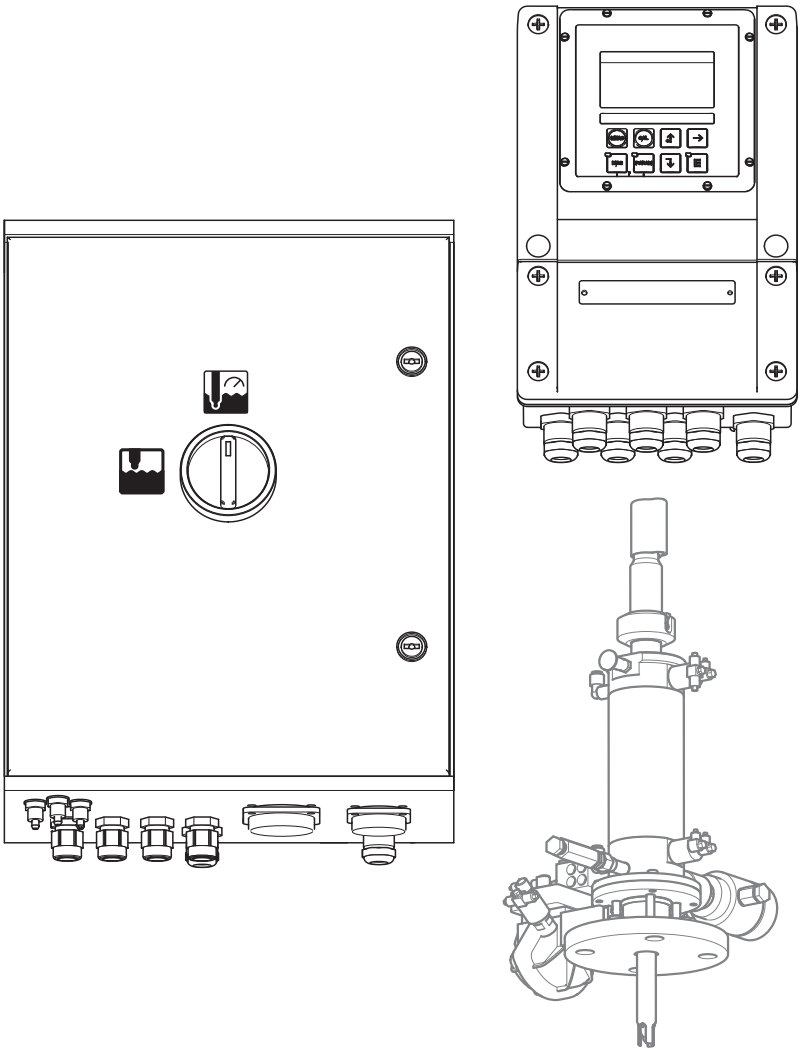
Operating Instructions
Topcal S CPC310
Automation of pH/ORP measurements



Endress+Hauser
People for Process Automation

Document information

The structure, signal words and safety colors of the signs comply with the specifications of ANSI Z535.6 ("Product safety information in product manuals, instructions and other collateral materials").

Safety message structure	Meaning
⚠ DANGER **Causes (/consequences)** Possible consequences if ignored ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation **will** result in a fatal or serious injury.
⚠ WARNING **Causes (/consequences)** Possible consequences if ignored ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation **can** result in a fatal or serious injury.
⚠ CAUTION **Causes (/consequences)** Possible consequences if ignored ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries.
NOTICE **Cause/situation** Possible consequences if ignored ▶ Action/note	This symbol alerts you to situations that can result in damage to property and equipment.

Symbols

- Additional information, tip
- Permitted or recommended
- Forbidden or not recommended

Table of Contents

1 Basic safety instructions

1.1 Requirements for personnel

- Installation, commissioning, operation and maintenance of the measuring system must be carried out exclusively by specially trained technical personnel.
- The technical personnel must be authorized to perform the tasks by the owner-operator.
- The electrical connection may only be established by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must follow the instructions they contain.
- Faults at the measuring point may only be rectified by authorized and properly trained personnel.

Repairs not described in the Operating Instructions provided may only be carried out directly at the manufacturer's or by the Service Organization.

1.2 Designated use

Topcal S CPC310 is a fully automated measuring, cleaning and calibration system for pH and ORP measurement.
The system is supplied complete with power supply cables and bottle hoses. The hazardous area version (Ex version) of Topcal S CPC310 allows operation even in explosive atmospheres.

If the device is used for any purpose other than that described, this poses a threat to the safety of people and the entire measuring system and is thus not permitted.
The manufacturer does not accept liability for damage caused by improper or non-designated use.

1.3 Occupational safety

As the user, you are responsible for observing the following safety regulations:
- Explosion protection guidelines (only devices approved for use in explosion hazardous areas)
- Installation guidelines
- Local standards and regulations

1.4 Operational safety

- Prior to commissioning the entire measuring point, check that all connections are correct. Make sure that electric cables and hose connections are not damaged.
- Do not commission damaged products. Protect them against unintentional startup. Label and identify the damaged product as defective.
- If the faults cannot be eliminated, take the products out of service and protect them against unintentional startup.

1.5 Product safety

The product is designed to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate.
The applicable regulations and European Directives have been taken into account.

2 Incoming acceptance and product identification

2.1 Incoming acceptance

- Make sure the packaging is not damaged!
- Inform your supplier of any damage to the packaging. Please keep the damaged packaging until any issues have been resolved.
- Make sure the contents are undamaged!
- Inform your supplier of any damage to the contents. Please keep the damaged goods until any issues have been resolved.
- Make sure the delivery is correct and nothing is missing. Check the delivery against the delivery papers and your order.
- Pack the product for storage and transportation in such a way as to protect it reliably against impact and moisture. The original packaging offers the best protection. Also, keep to the approved environment (see "Technical data").
- If you have any queries, contact your supplier or local Sales Office.

2.2 Product identification

2.2.1 Nameplate

You can find the following information on the nameplate:
- Manufacturer details
- Order code
- Extended order code
- Serial number
- Operating conditions
- Safety warning symbols

Compare the order code indicated on the nameplate against your order.

2.2.2 Identifying the product

The order code and serial number of your device can be found in the following locations:
- On the nameplate
- In the delivery papers

To establish the version of your product, enter the order code from the nameplate into the search field at the following address:
www.products.endress.com/order-ident

2.3 Scope of delivery

The scope of delivery of the system comprises:
- 1 Mycom S CPM153 transmitter
- 1 CPG310 control unit
- 1 rinsing block with securing clamps for assembly
- 4 multihoses
- 2 technical buffer solutions pH 4.00 and 7.00
- 3 double-membrane pumps for conveying cleaner and buffer with canisters
- 1 communication/power supply cable CPG310 / Mycom S CPM153
- 3 level probes, complete with CPG310 cable to canisters
- 1 pressure reduction valve with pressure gauge
- 1 water filter
- 1 device identification card
- 1 operating manual BA00404C/07/EN
- For hazardous area version: Safety Instructions XA00404C/07/A3
- Accessories where applicable

2.4 Certificates and approvals

Declaration of conformity
The product meets the statutory requirements of the harmonized European standards. The manufacturer confirms the product complies with the standards by affixing to it the CE mark.

3 Installation

3.1 Measuring system

A complete measuring system comprises the following components:
- Topcal S CPC310 including
  - CPG310 control unit
  - Mycom S CPM153 transmitter
  - Rinsing block
  - Pumps to convey buffer solutions and cleaners
- Pneumatically driven retractable assembly (e.g. Cleanfit series) with pneumatic or inductive limit switches
- pH/ORP sensor
- Measuring cables
- Buffer solutions and cleaning agent

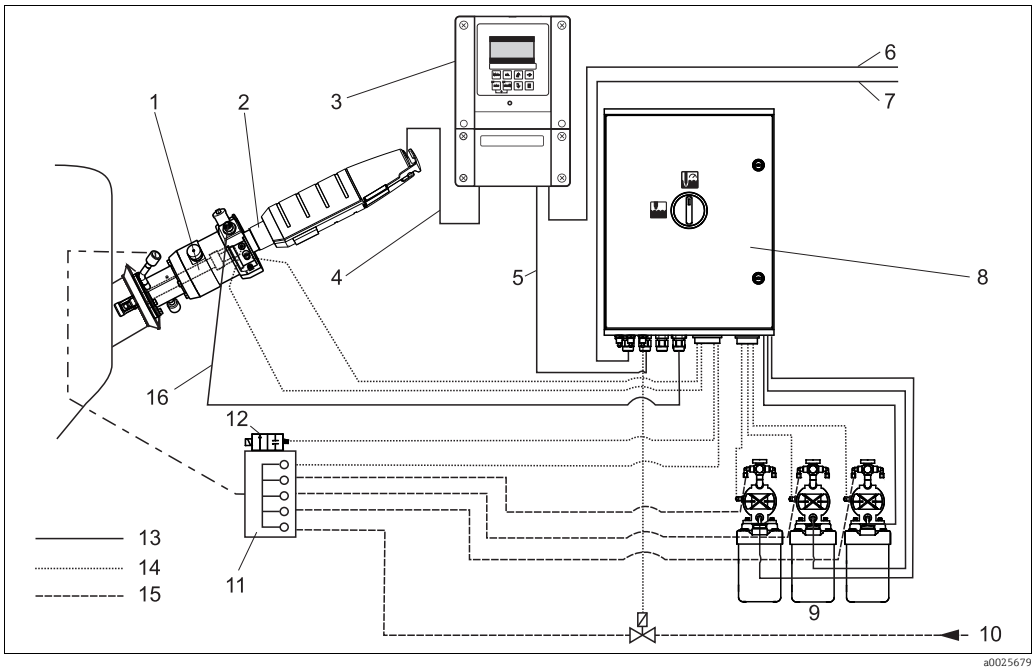


Fig. 1: Complete measuring system (non-hazardous area)

1	*pH/ORP sensor*	*9*	*Unit for conveying cleaning and buffer solutions*
2	*Cleanfit assembly CPA875*	*10*	*Superheated steam/water/cleaning agent (optional)*
3	*Mycom S CPM153 transmitter*	*11*	*Rinsing block*
4	*pH measuring cable*	*12*	*Rinse water valve*
5	*Communication/power supply cable*	*13*	*Electric cable*
6	*Power supply for Mycom S CPM153*	*14*	*Compressed air line*
7	*Power supply for CPG310 control unit*	*15*	*Media (cleaner, buffer, superheated steam etc.)*
8	*CPG310 control unit*	*16*	*Signal cable (limit position switch feedback signal)*

3.2 Installation conditions

3.2.1 Types of mounting

You can choose from the following types of mounting for the individual components:

Device	Wall mounting	Post/pipe mounting	Panel mounting
CPG310 control unit	Mounting kit contained in scope of delivery.	not applicable	not applicable
Mycom S CPM153, protected	Required: 2 screws Ø 6 mm (0.24") 2 wall plugs Ø 8 mm (0.31")	Mounting kit contained in scope of delivery.	Mounting kit contained in scope of delivery.
Mycom S CPM153, for field installation	If installed outdoors, weather protection cover CYY102-A required (see Accessories).	Weather protection cover CYY102-A and 2x round post fixtures required (see Accessories).	Not usual

3.2.2 Spacing

The graphic below illustrates the maximum distances between the system components.

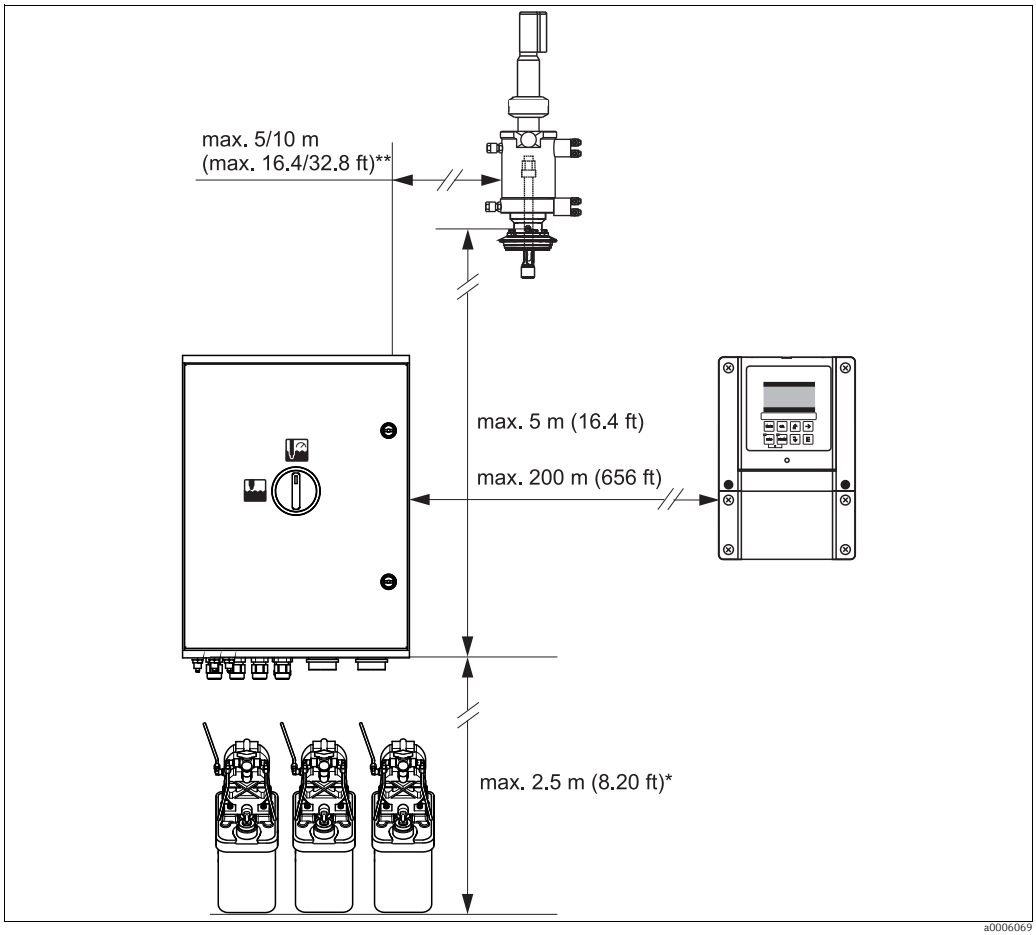


Fig. 2: Maximum spacing for Topcal S CPC310 system components

* *when using the multihoses supplied as standard*
** *depending on the multihose version ordered*

3.2.3 Assembly installation

A Glass electrode: Installation angle of at least 15° to the horizontal
B ISFET sensor Tophit: No restrictions, 0 to 180° recommended

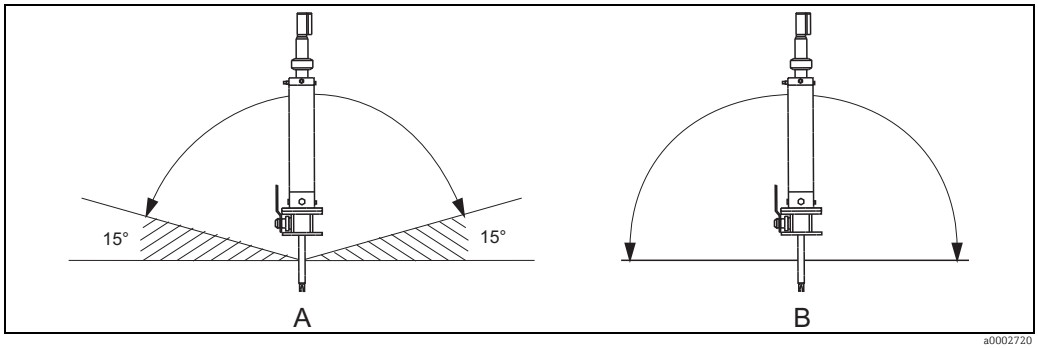


Fig. 3: Permitted orientation depending on the sensor used

3.2.4 Dimensions

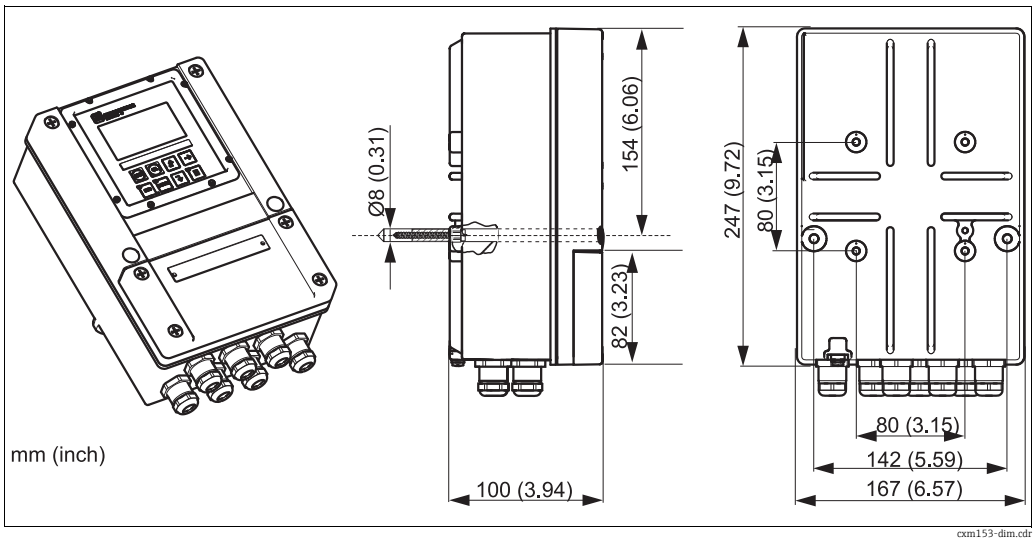


Fig. 4: Dimensions of Mycom S

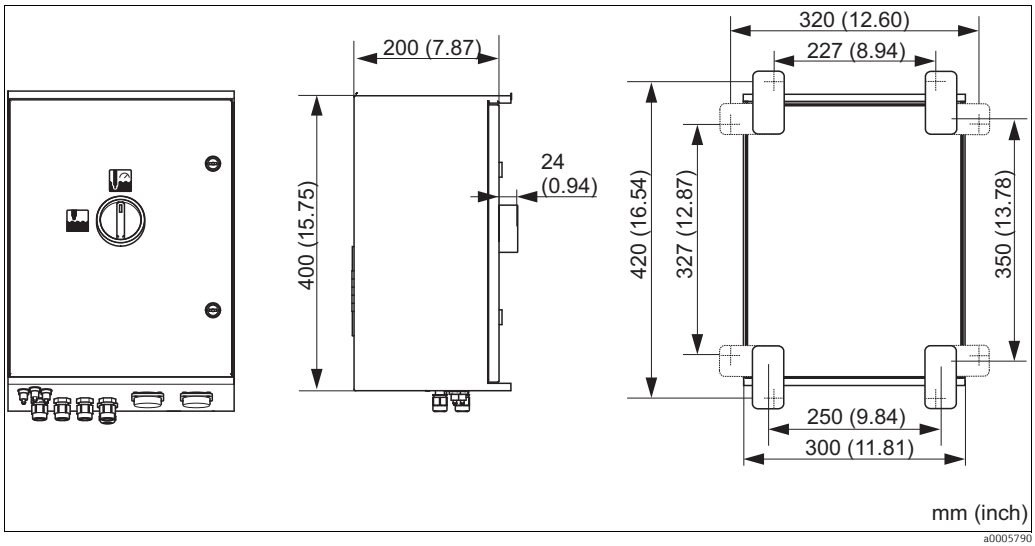


Fig. 5: Dimensions of CPG310 control unit

3.3 Installation

3.3.1 Securing the rinsing block on the assembly

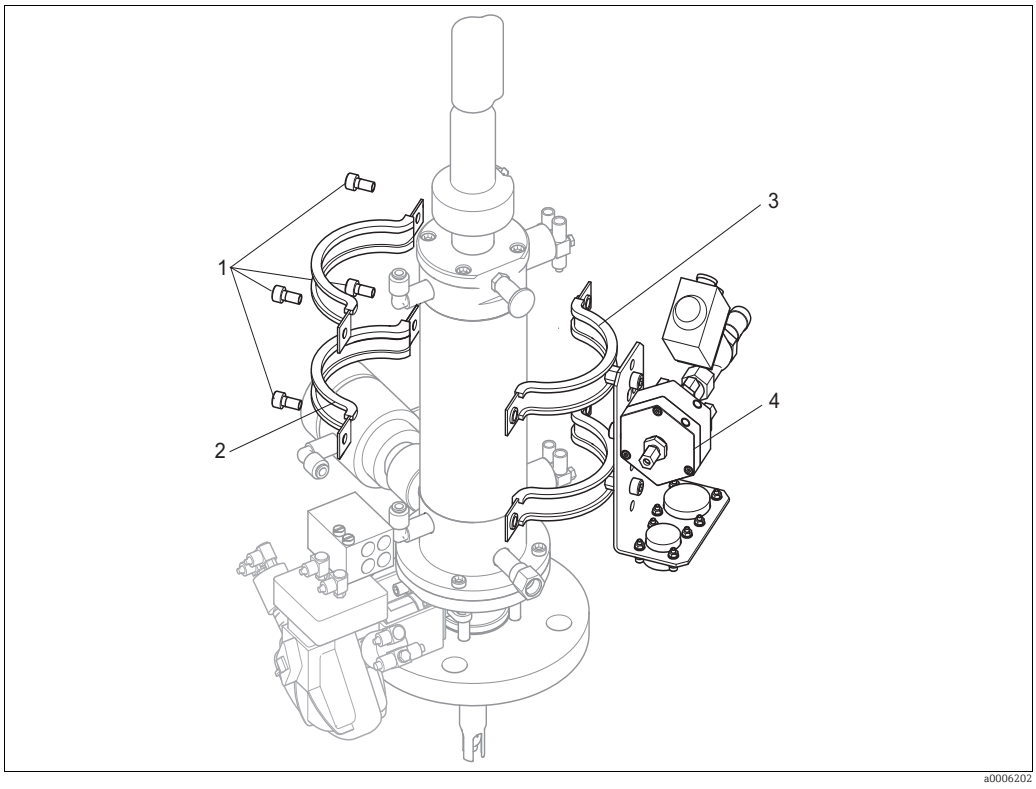


Fig. 6: Mounting the rinsing block on the assembly (example CPA473)

Proceed as follows to mount the rinsing block:

1. Fit the securing clamps along with the rinsing block (3 and 4) on the assembly cylinder.
2. Fit the counterclamps (2) on the assembly cylinder from the other side.
3. Connect the clamps with the screws (1) supplied.

3.3.2 Installation instructions

- The Mycom S transmitter is normally used as a field device. It can also be installed as a panel-mounted device.
- Mycom S is suitable for wall mounting with securing screws and for post mounting to cylindrical pipes.
- Always install the transmitter horizontally in such a way that the cable entries are always pointing downwards.

3.3.3 Wall mounting

NOTICE

Climatic influences (rain, snow, direct sunlight etc.)

Function impairment and even total measuring system failure

- ▶ Make sure the maximum permitted ambient temperature range of -20 to +60 °C (-4 to 140 °F) is observed. Avoid direct sunlight.
- ▶ Always mount the wall-mount housing in such a way that the cable entries point downwards.

Control unit

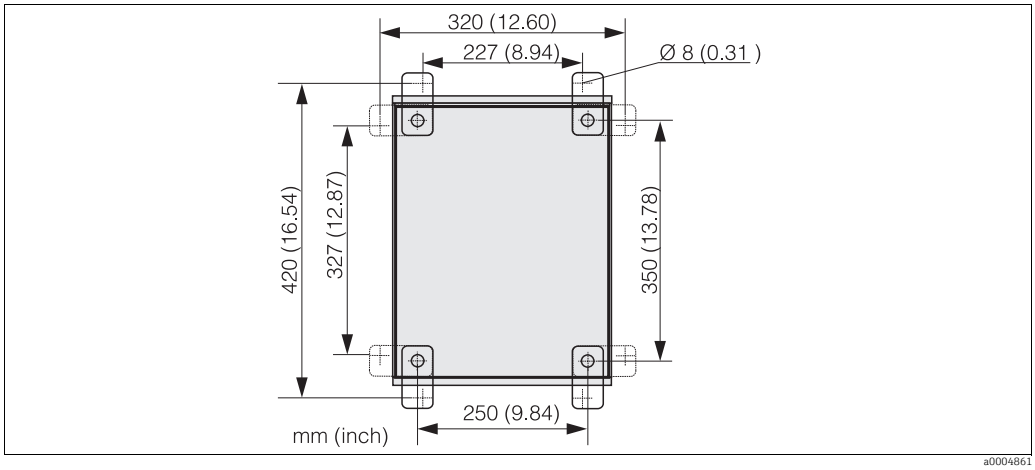


Fig. 7: Dimensions for wall mounting with wall securing kit (part of scope of delivery)

Proceed as follows to wall-mount the unit:

1. Please note that the maximum suction height for buffer and cleaner is 2.5 m (8.2 ft.) when using the standard multihoses supplied. Bore the holes as per the graphic above.
2. Screw the elements of the wall securing set supplied to the rear wall of the housing.
3. Secure the housing to the wall without any inclination.

Transmitter

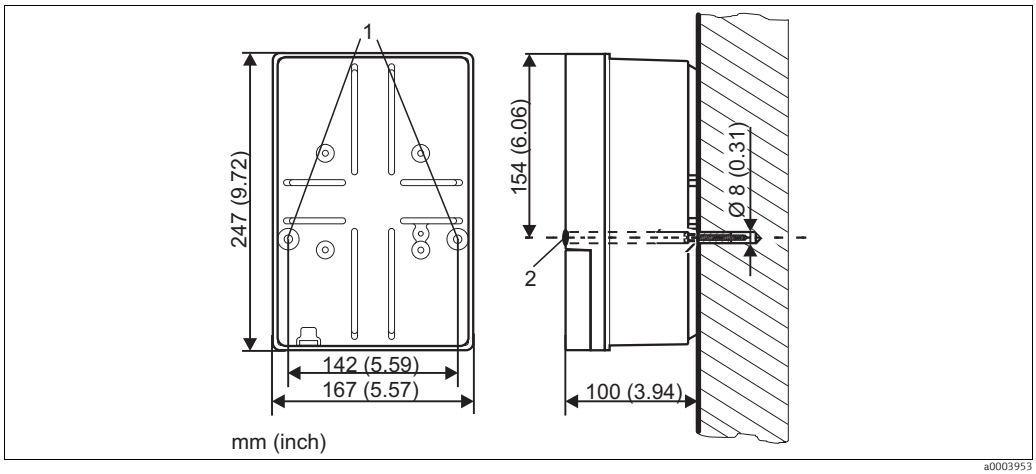


Fig. 8: Dimensions for wall mounting, securing screw: Ø 6 mm (0.24"), wall plug: Ø 8 mm (0.31")

1 Mounting bore holes
2 Plastic caps

Proceed as follows to wall-mount the unit:

1. Bore the holes as per Fig. 8.
2. Push the two securing screws through the mounting bore holes from the front (item 1).
3. Mount the transmitter housing on the wall as shown.
4. Cover the bore holes with the plastic caps (item 2).

3.3.4 Post mounting and panel mounting

You need a special mounting kit to secure the transmitter to horizontal and vertical posts or pipes (max. Ø 70 mm (2.76")) and for panel mounting.

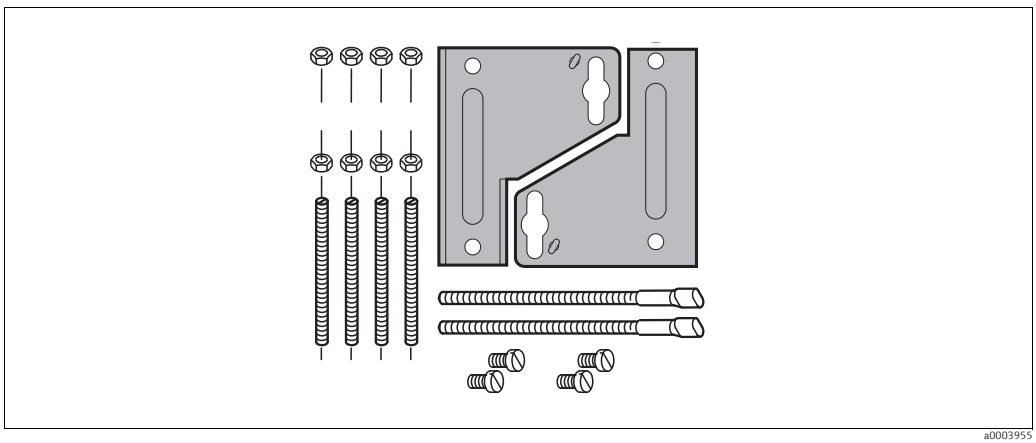


Fig. 9: Mounting kit

Panel mounting
Proceed as follows to panel-mount the transmitter:

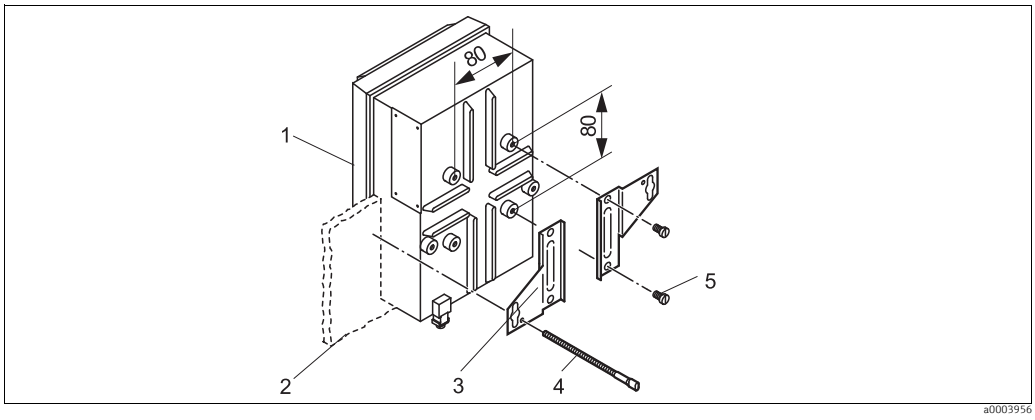


Fig. 10: Panel mounting

1. Make the necessary mounting cutout, measuring 161 x 241 mm (6.34" x 9.49"). The installation depth is 134 mm (5.28").
2. Unscrew the top housing section (item 1).
3. Secure the securing plates (item 3) to the transmitter housing base using the securing screws (item 5) in accordance with Fig. 10.
4. Secure the transmitter to the panel (item 2) using the clamping screws (item 4).
5. Place the flat seal (see "Accessories" section) on the housing base.
6. Screw the top housing section back on.

Post mounting
For post mounting the transmitter, proceed as follows:

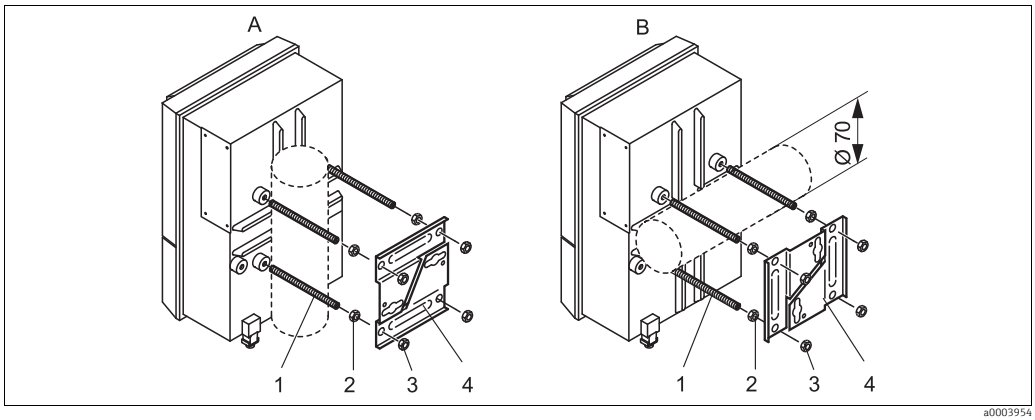


Fig. 11: Post mounting

A Vertical mounting
B Horizontal mounting

1. Screw the four securing screws (item 1) into the threaded openings on the transmitter.
2. Counter every securing screw with a nut (item 2).
3. Set the transmitter to the desired position on the post or pipe.
4. Push the securing plates (item 4) onto the securing screws in accordance with Abb. 11.
5. Screw a nut (item 3) onto each securing screw and tighten it so that the transmitter is securely fastened to the post or pipe.

You can also secure the field device to a square universal post in conjunction with the weather protection cover. These can be acquired as accessories, see "Accessories" section.

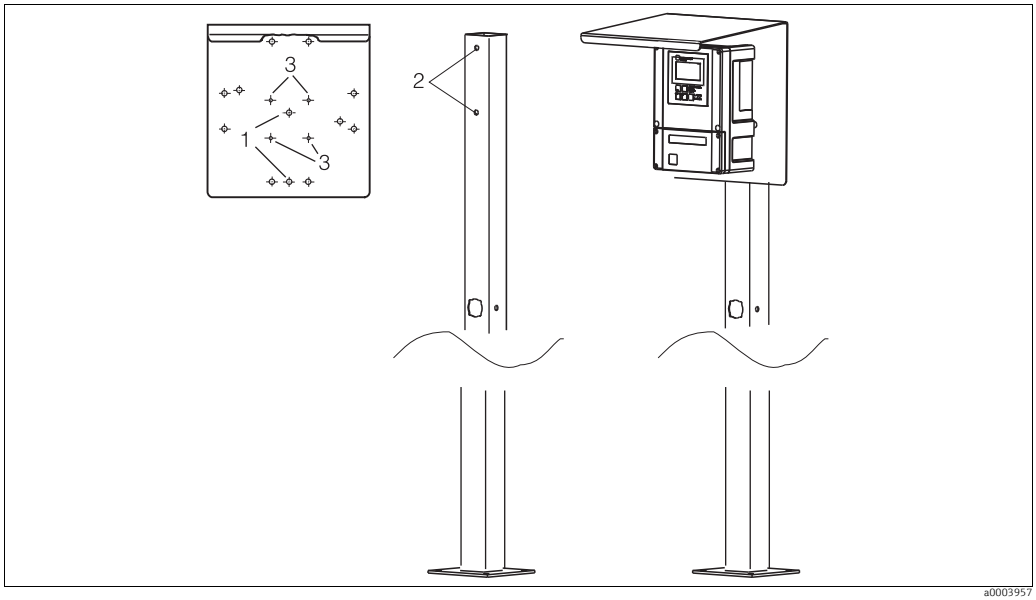


Fig. 12: Mounting field device with universal posts and weather protection cover

Proceed as follows to mount the weather protection cover:

1. Screw the weather protection cover with 2 screws (bores 1) to the upright post (bores 2).
2. Secure the field device to the weather protection cover. To do so, use the bores (3).

3.4 Post-installation check

- After installation, check the transmitter and control unit for damage.
- Check whether the transmitter and control unit are protected against moisture and direct sunlight.

4 Electrical connection

⚠ WARNING

The device is live!

Improper connection can cause injury or death

- ▶ The electrical connection may only be established by an electrical technician.
- ▶ The electrical technician must have read and understood these Operating Instructions and must follow the instructions they contain.
- ▶ **Prior** to starting the connection work, make sure that voltage is not applied to any cable.

4.1 Wiring

4.1.1 Overview

Note the following points:

- Connect unused signal wires from input and output lines to the internal PE rail of the transmitter.
- The current/resistance input may only be connected with a shielded cable, whereby the shield must be connected to the PE rail of the transmitter.
- Make sure that the grounding in the connection compartment cover is connected to the PE rail in the housing via the PE line.

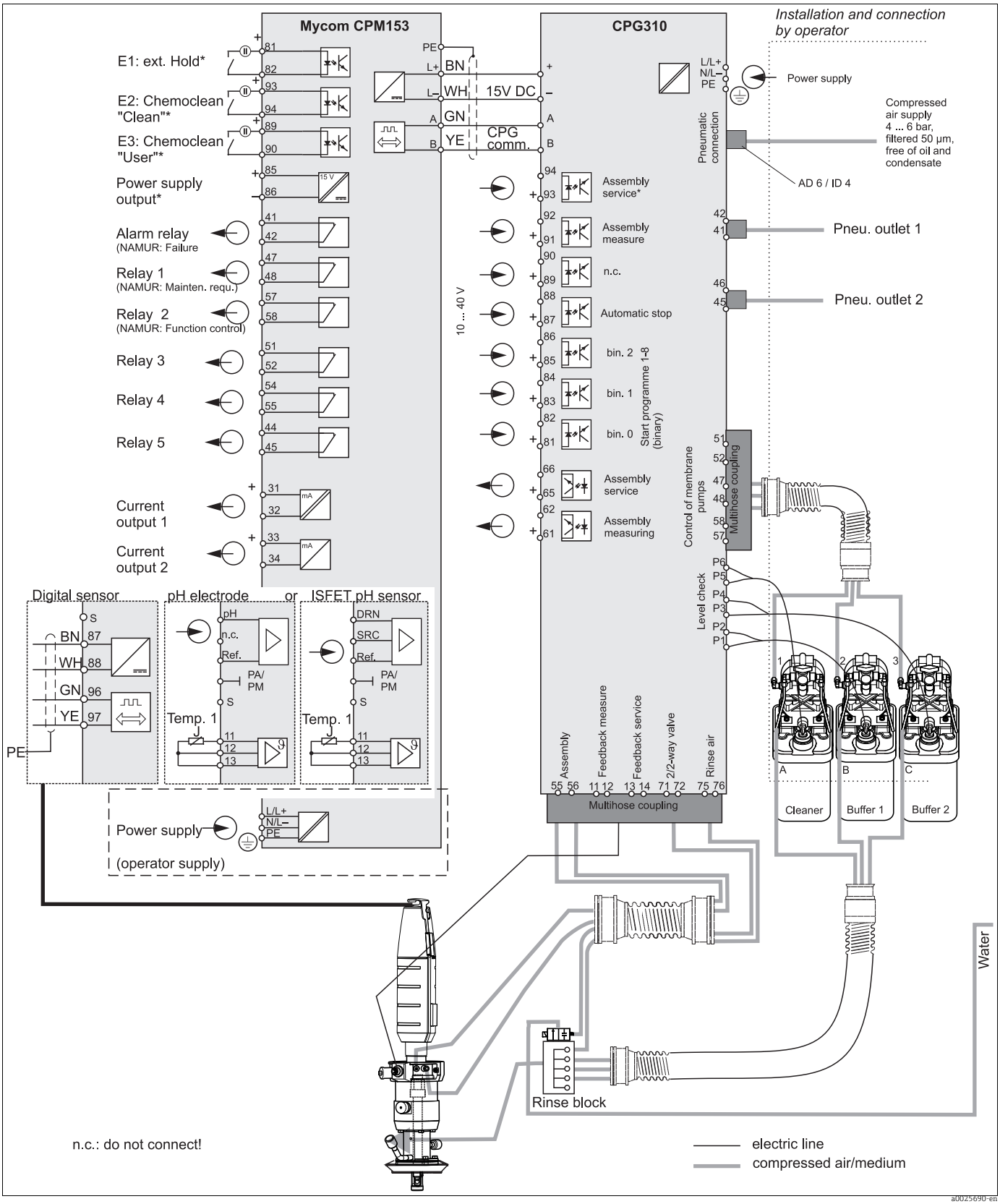


Fig. 13: Connecting in the non-hazardous area

4.1.2 Connection compartment sticker for CPG310 control unit

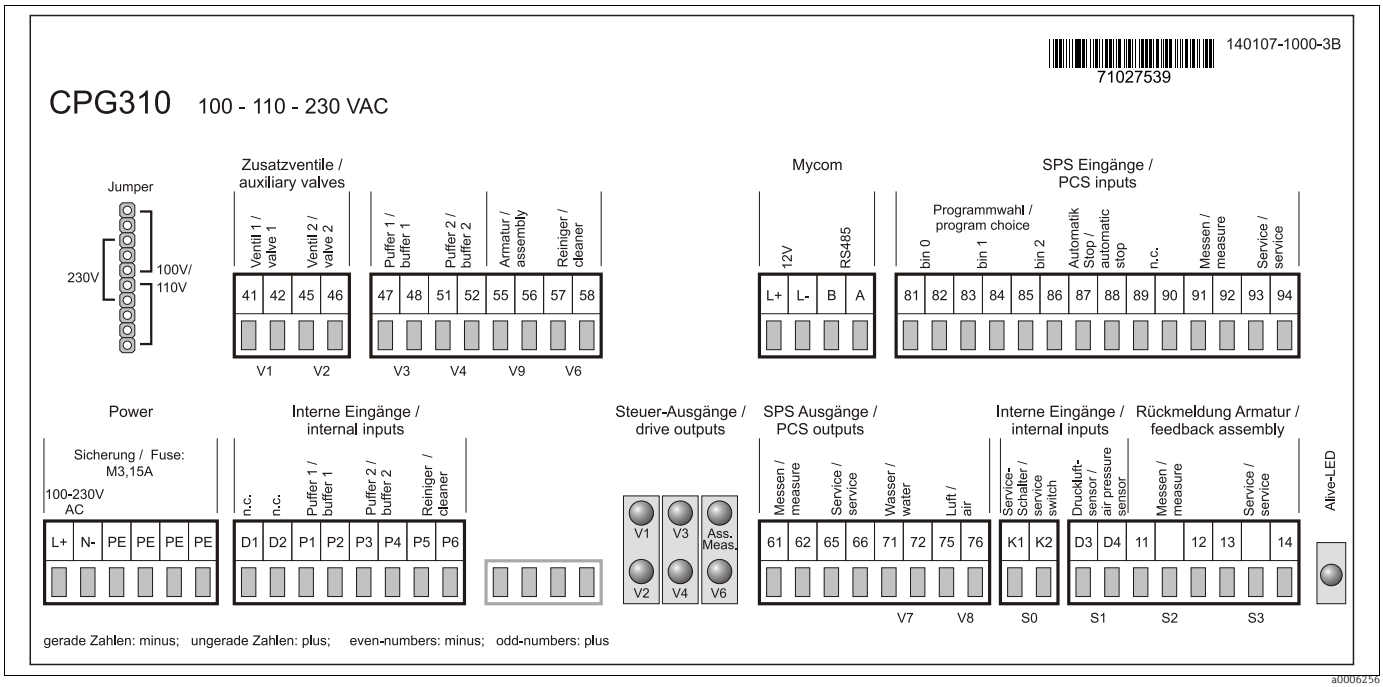


Fig. 14: Connection compartment sticker for CPG310, 100 /110/ 230 V AC

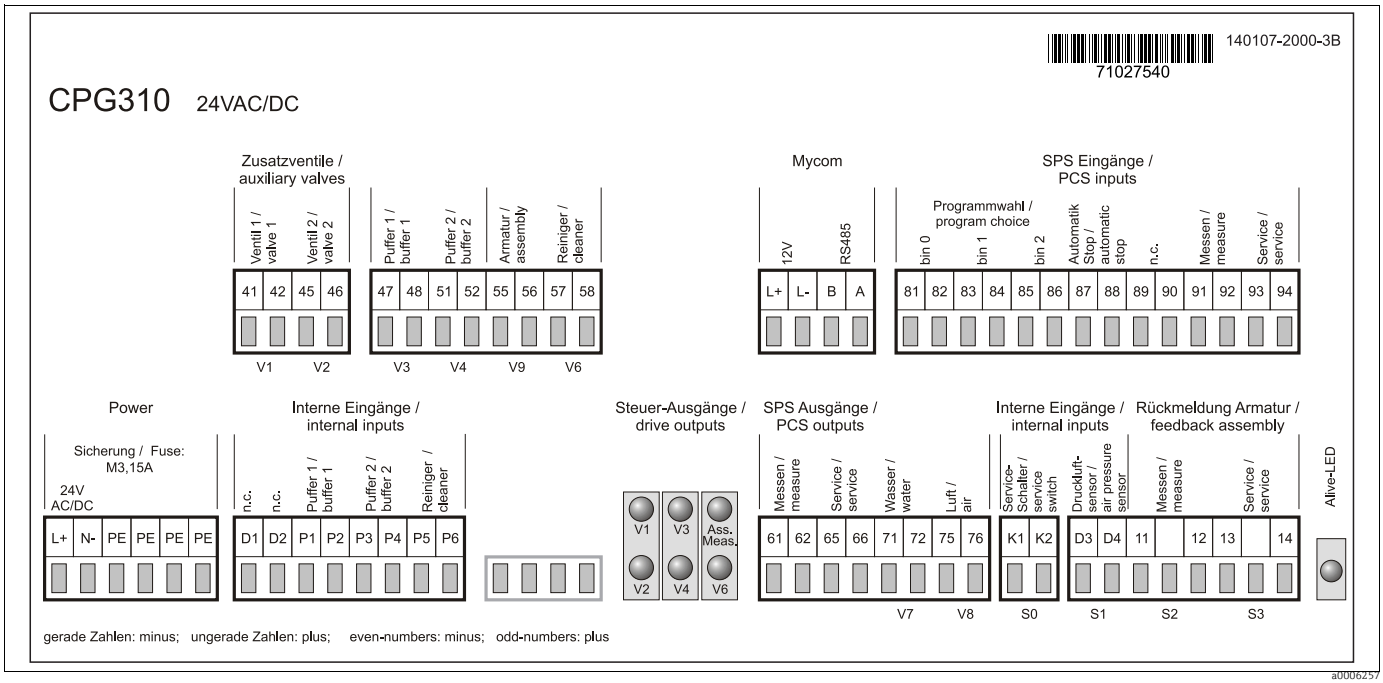


Fig. 15: Connection compartment sticker for CPG310, 24 V AC/DC

4.1.3 Connection compartment sticker, Mycom S CPM153

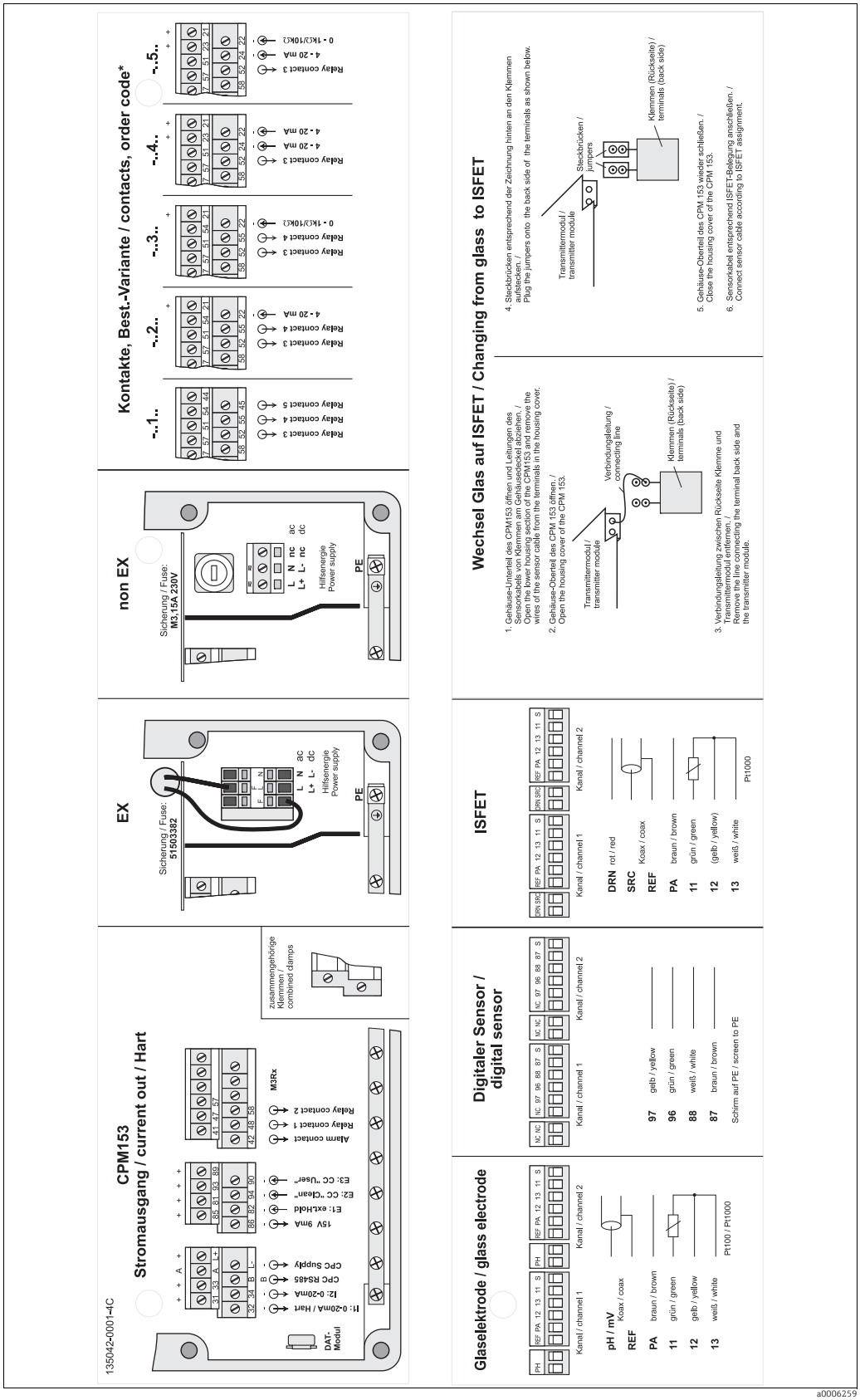
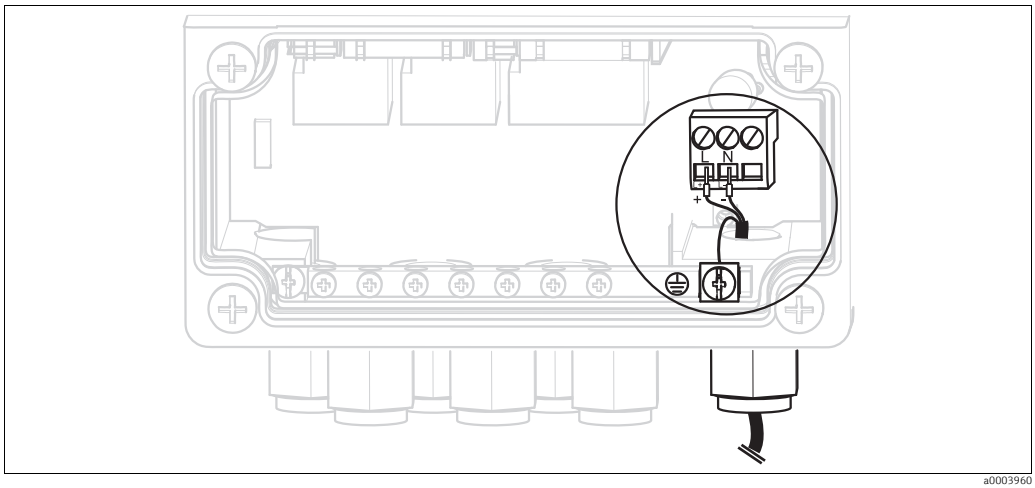


Fig. 16: Connection compartment sticker, Mycom S CPM153

DRN Drain
SRC Source
REF Reference
** only order version -..1.. is applicable*

4.1.4 Power supply and communication connection between transmitter and control unit



Connecting the power supply for Mycom S

Mycom S power supply:

1. Guide the power cable through the right Pg cable gland and into the Mycom housing.
2. Connect the green/yellow core to the PE terminal.
3. Connect the two other cable cores to terminals "L" and "N".

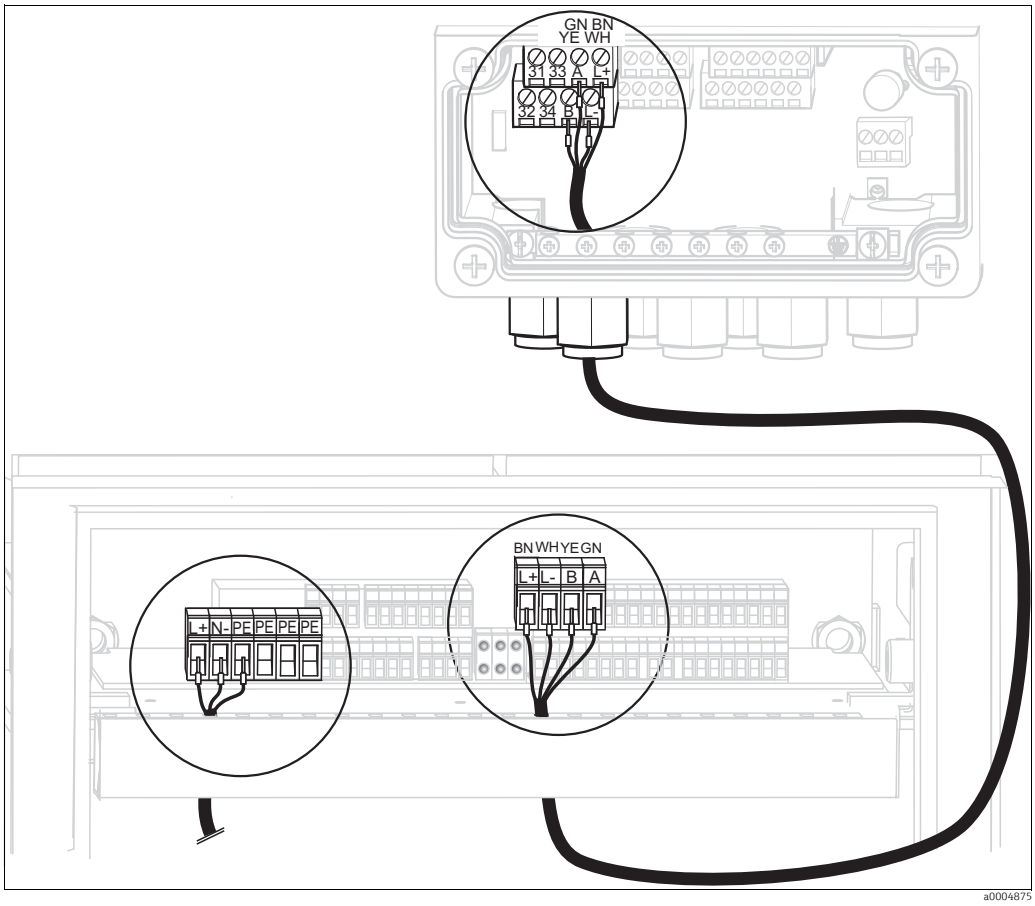


Fig. 17: Connecting power supply for control unit and communication connection

Control unit power supply

1. Guide the voltage cable through a suitable Pg gland and into the control unit housing.
2. Connect the green/yellow core to the PE terminal.
3. Connect the two other cable cores to terminals "L+" and "N-" (bottom terminal block, left).

Communication connection between Mycom and control unit

1. Guide the end of the communication cable with the black shield wire through a suitable Pg gland on the Mycom.
2. Guide the other end of the communication cable through a Pg gland on the control unit.
3. Connect the cable cores as follows:

Cable core	Mycom terminal	Control unit terminal
Yellow (YE)	Terminal B	Terminal B
Green (GN)	Terminal A	Terminal A
White (WH)	Terminal L-	Terminal L-
Brown (BN)	Terminal L+	Terminal L+
Black (BK)	PE grounding rail	n.c.

4.1.5 Level probes for buffer and cleaner

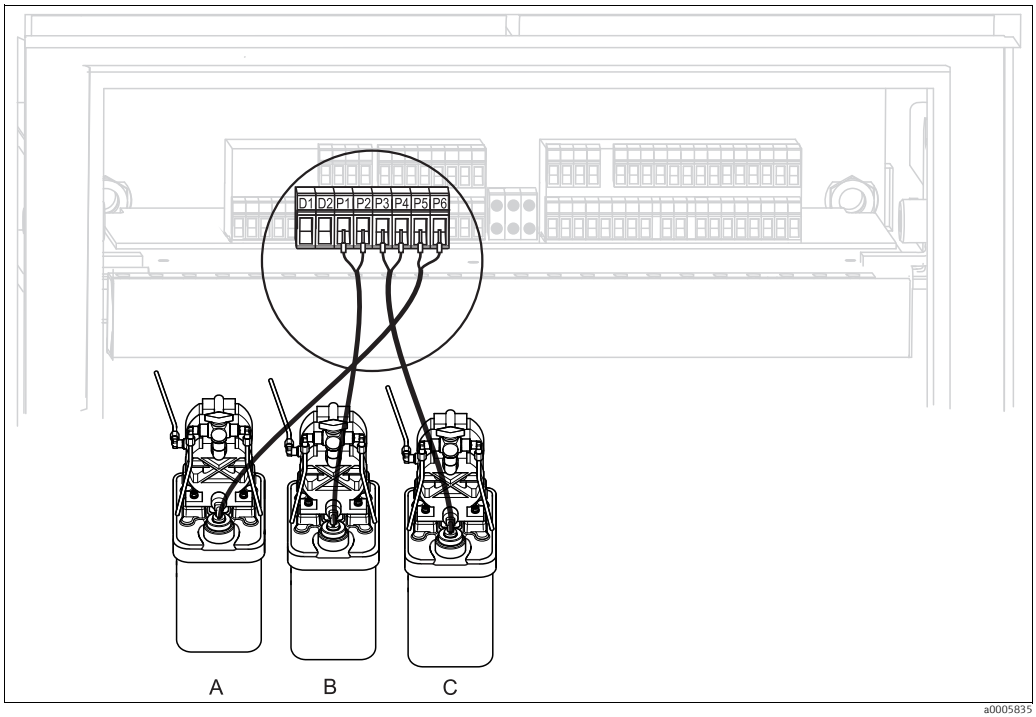


Fig. 18: Connecting level probes for buffer and cleaner

A Cleaner
B Buffer 1
C Buffer 2

1. Guide the cables of the level probes for the buffer and cleaner through the three-way Pg gland behind the multihose connection (see Fig. 19).

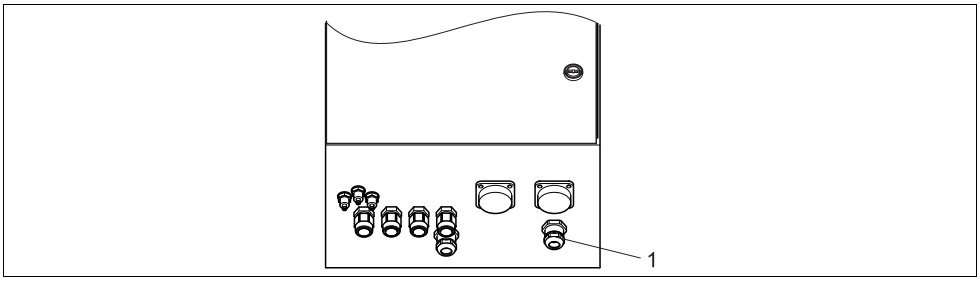


Fig. 19: Guiding the level probe cable

1 Three-way Pg gland

2. Connect the cable cores as follows: Polarity does not matter here:

Cable core	Control unit terminal
Level probe, buffer 1	Terminal P1 and P2
Level probe, buffer 2	Terminal P3 and P4
Level probe, cleaner	Terminal P5 and P6

4.1.6 Analog sensors

Measuring cables

You require shielded special measuring cables to connect pH and ORP sensors to the transmitter. You can use the following multicore and preterminated cable types:

Sensor type	Cable	Extension
Electrode without temperature sensor	CPK1	VBA / VBM box + CYK71 cable
Electrode with temperature sensor Pt 100 and TOP68 plug-in head	CPK9	VBA / VBM box + CYK71 cable
ISFET sensor with temperature sensor Pt 100 / Pt 1000 and TOP68 plug-in head	CPK12	VBA / VBM box + CYK12 cable
pH individual electrode with separate reference electrode and separate temperature sensor	CPK2	VBA / VBM box + PMK cable

For further information on the cables and junction boxes, please refer to the "Accessories" section.

Preparing cables

NOTICE

Danger of incorrect measurement.

▶ Always protect connectors, terminals and cables against moisture.

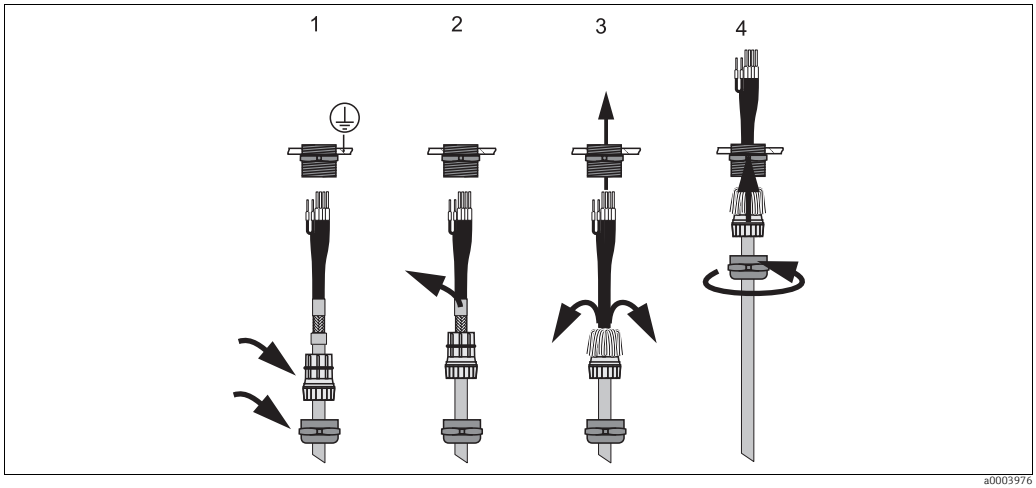


Fig. 20: Outer shield connection with metal cable gland

1. Slide the cable gland and the clamping ring over the cable.
2. Remove the inner insulation.
3. Remove the outer shield from the cable and fold it back over the clamping ring.
4. Guide the sensor cable through the cable opening of the device and screw the gland closed. The shield contact is automatic here.

pH/ORP glass electrodes
Connect the cable cores in the device as follows:

Connection with PML (symmetrical)

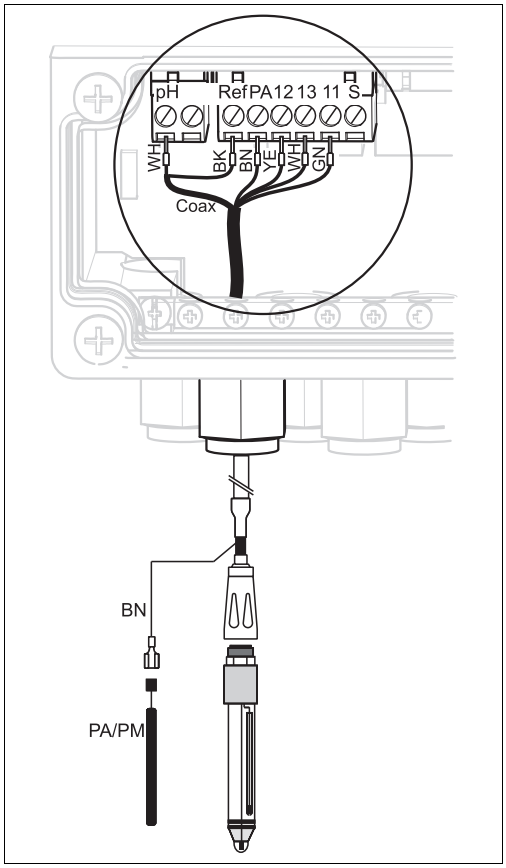


Fig. 21: Connecting pH glass electrode with PML

Connection without PML (unsymmetrical)

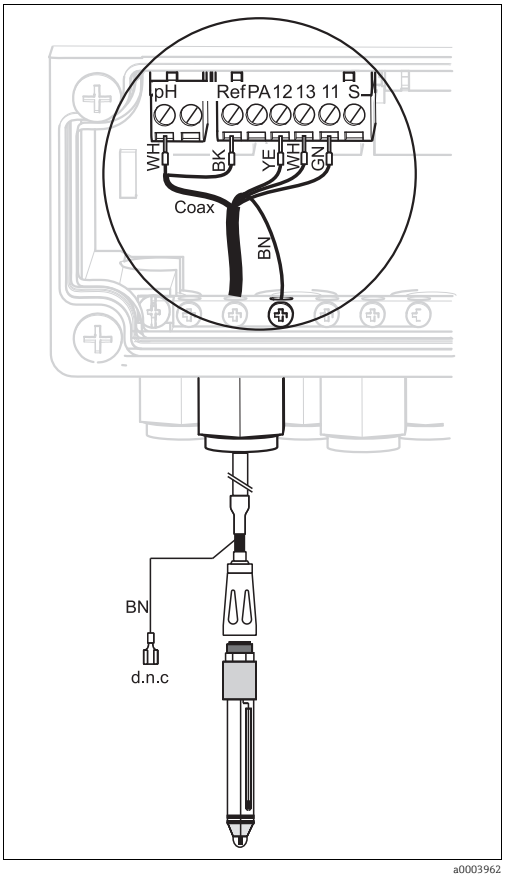


Fig. 22: Connecting pH glass electrode without PML
d.n.c do not connect

Note the following points:
- The yellow (YE), white (WH) and green (GN) cable cores are not applicable when using CPK1.
- The outer shield of the cable is grounded via the metal gland.

ISFET sensors
Connect the cable cores in the device as follows:

Connection with PML (symmetrical)

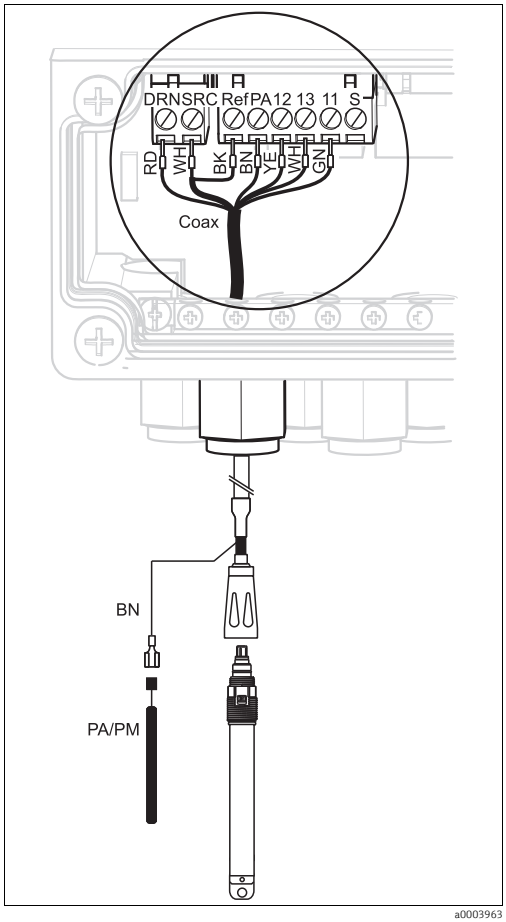


Fig. 23: Connecting ISFET sensors with PML

Connection without PML (unsymmetrical)

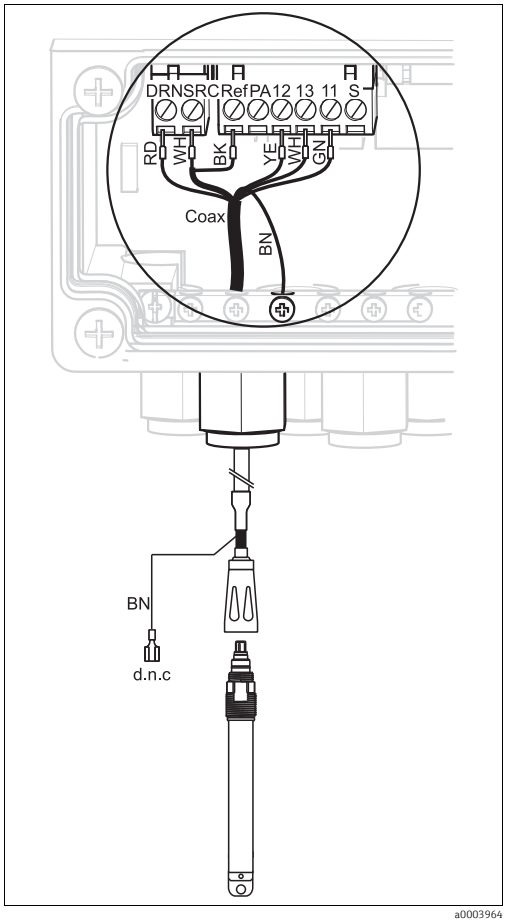


Fig. 24: Connecting ISFET sensors without PML
d.n.c do not connect

Note the following points:
- The outer shield is grounded via the metal gland.

Changing the pH input from glass electrode to ISFET sensor

In the glass/ISFET version (CPC310-xx2xxxxxxx), Topcal S is supplied for measurement with glass electrodes by default.

Proceed as follows to change the connection:

1. Open the device housing base.
2. If a glass electrode is connected, disconnect the wires of the sensor cable.
3. Remove the "pH" terminal on the housing cover (see Fig. 25) from the device and replace it with the "DRN/SRC" terminal supplied.

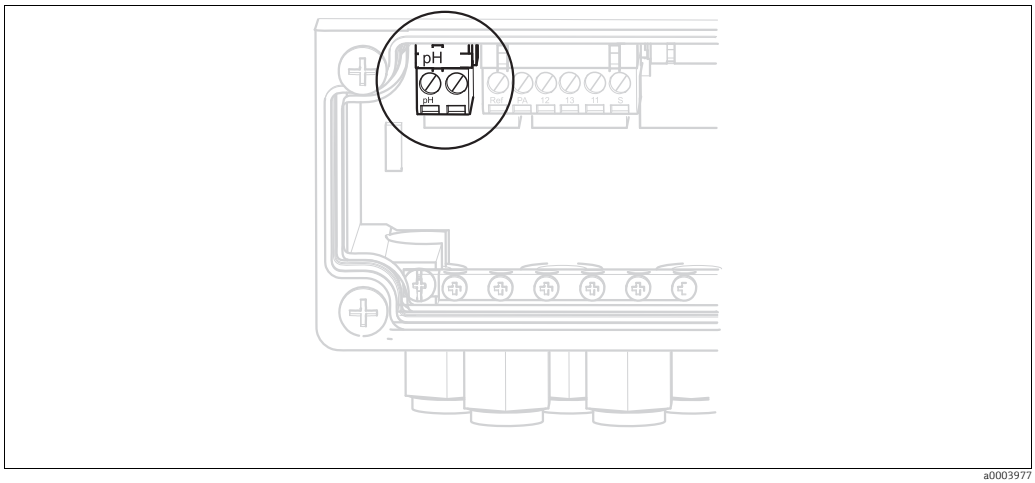


Fig. 25: pH terminal on housing cover

4. Open the top housing section of the device.
5. On the right-hand side of the housing cover, disconnect the red cable to the pH input at both ends (see Fig. 26).
6. Pin up the jumpers supplied as illustrated in Abb. 27.
7. Connect the sensor cable in accordance with the ISFET assignment.
8. In the First start up, change the electrode type to "ISFET".

Proceed accordingly to switch from ISFET sensors to glass electrodes.

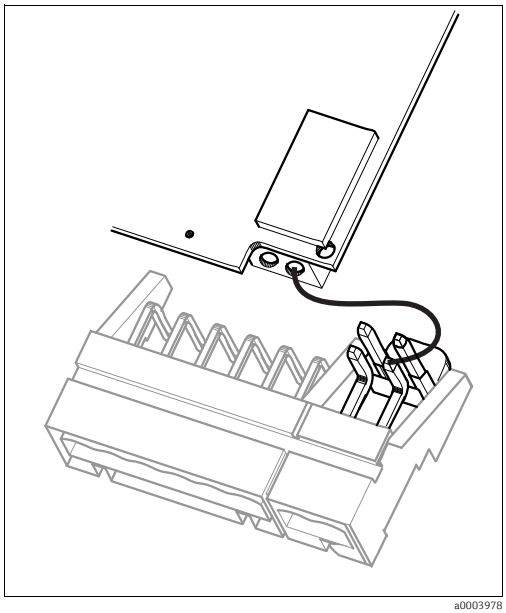


Fig. 26: pH input module in the housing cover with cable (red) for connecting glass electrodes

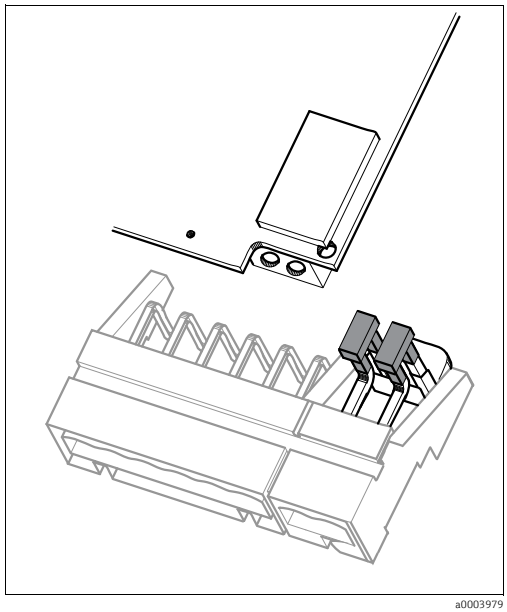


Fig. 27: pH input module in the housing cover with jumper for connecting ISFET sensors

4.1.7 Digital sensors with Memosens technology

Measuring cables

You require the Memosens CYK10 data cable to connect digital sensors:

Sensor type	Cable	Extension
Digital sensors with temperature sensor	CYK10	RM junction box + CYK81 cable

Preparing cables

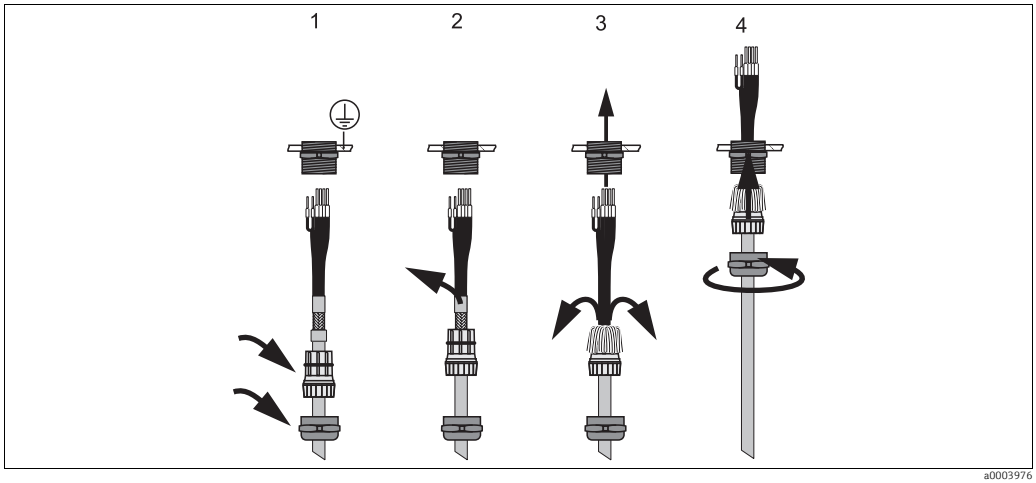


Fig. 28: Outer shield connection with metal cable gland

1. Slide the cable gland and the clamping ring over the cable.
2. Remove the inner insulation.
3. Remove the outer shield from the cable and fold it back over the clamping ring.
4. Guide the sensor cable through the cable opening of the device and screw the gland closed. The shield contact is automatic here.

Connecting digital sensors
Connect the cable cores in the device as follows:

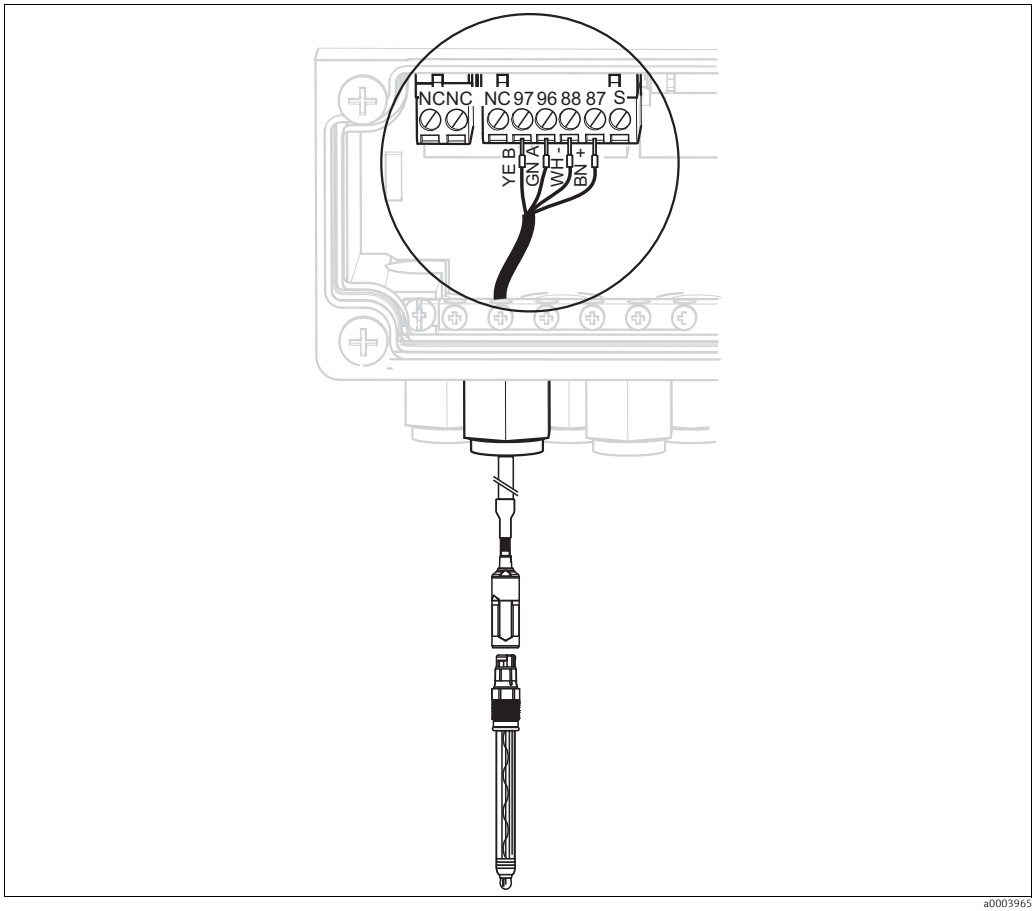


Fig. 29: Connecting digital sensors with Memosens technology

The outer shield of the cable is grounded via the metal gland.

4.1.8 Current outputs

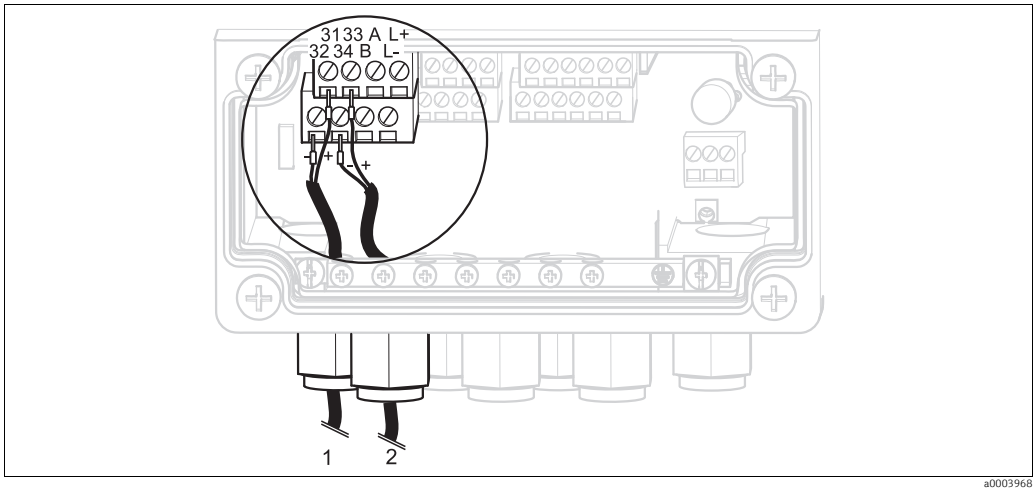


Fig. 30: Connecting current outputs

If you want to output the measured value to external switching units or a PLC, connect these devices to current outputs 1 and 2 of the transmitter.
You can also output a controller actuating variable via current output 2.

Current output coding

With device versions CPM153-AxA/Bxx (2 current outputs) and CPM153-AxC/Dxx (2 current outputs with HART), the current outputs can be operated as active or passive outputs. Jumpers on the controller module M3CH allow recoding.
For non-Ex devices, these modules may be recoded to active outputs.

Passive current outputs must be powered with external voltage.

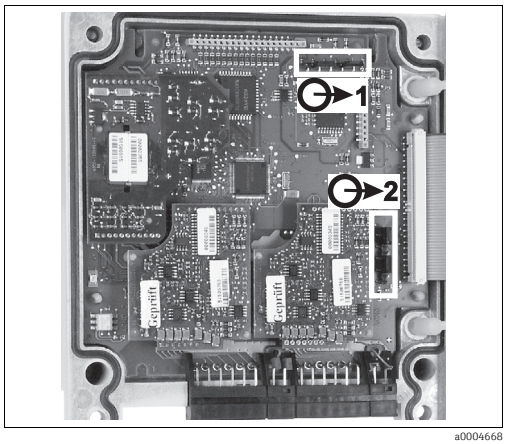


Fig. 31: Coding of the current outputs (interior view of the top housing section)

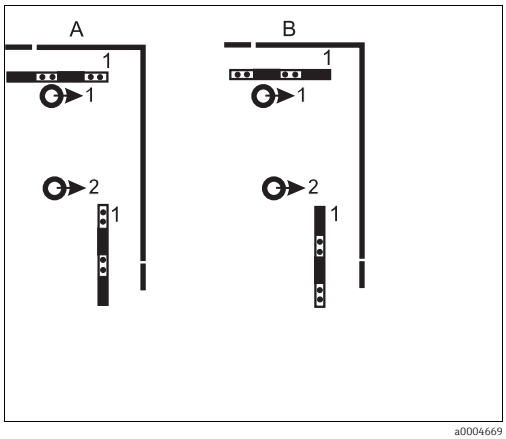


Fig. 32: Current output coding

A Coding for passive output
B Coding for active output

4.1.9 Mycom relays

Mycom S CPM153 has one fault-signaling contact and five additional contacts.
You can use the additional contacts to control controllers, limit contactors and the supply of Chemoclean water and Chemoclean cleaner. The additional contacts are configured via the "Set up 1 > Relays" menu.

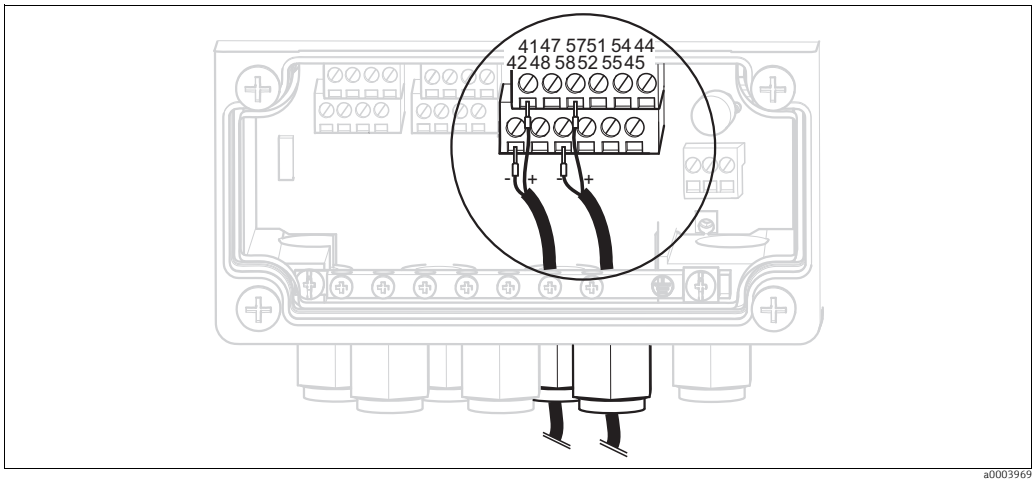


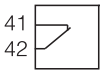
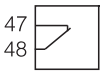
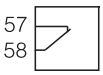
Fig. 33: Relay connection

Connect the relays as follows:

Relay	Mycom S terminal
Alarm	Terminals 41 and 42
Relay 1	Terminals 47 and 48
Relay 2	Terminals 57 and 58
Relay 3	Terminals 51 and 52
Relay 4	Terminals 54 and 55
Relay 5	Terminals 44 and 45

Please note the following when assigning functions to the relays:
- The assignment of functions to the individual relays is essentially user-configurable. When using the NAMUR assignment, however, the functions are preset for the alarm relay and for the first two relays (see NAMUR assignment below).
- The NC/NO contact type can be switched by software.
- You can assign up to three relays to the controller.

NAMUR assignment
When using the NAMUR assignment (based on the recommendations of the interest group for process control technology in the chemical and pharmaceutical industry), the functions are set for the relays as follows:

Relay	NAMUR assignment ON	Terminal
ALARM	Failure	
RELAY 1	Maintenance required	
RELAY 2	Function check	

Function check assignment
The function check as per NAMUR is active if:
- Calibration is active.
- The assembly is in the Service position.
- Mycom is configured.
- A Topcal cleaning and calibration program is running.
- A Chemoclean program is running.
- An error occurs which triggers the function check (for assignment, see the "System errors" section).

4.1.10 External inputs (PLC to CPG310) and outputs (CPG310 to PLC)

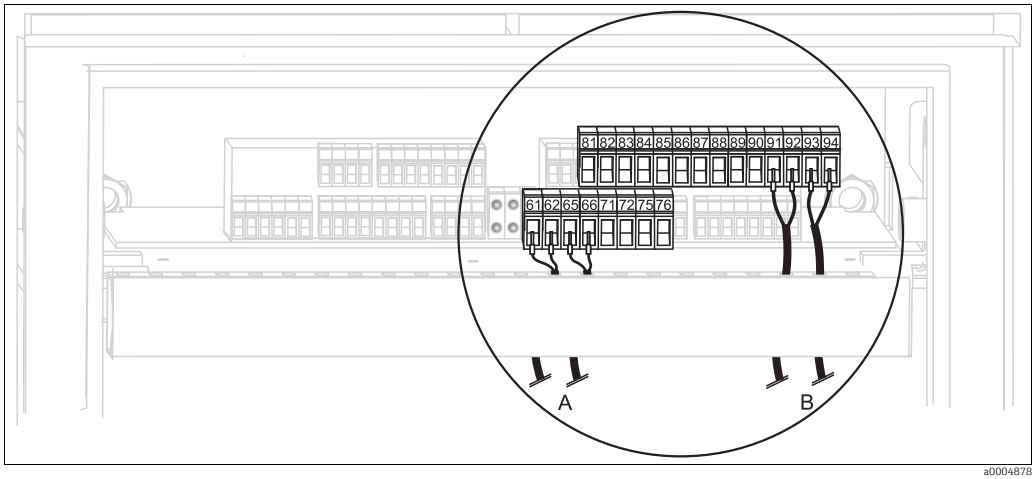


Fig. 34: Connecting external inputs and outputs, e.g. external assembly position control and assembly feedback signal

A External outputs
B External inputs

External inputs

1. If you want to control the assembly position via an external PLC, connect the control as follows:

Control	Control unit terminal
"Measure" position	Terminals 91 and 92
"Service" position	Terminals 93 and 94

2. If you want to control the cleaning and calibration programs of Topcal S via an external PLC, connect the binary contacts of the control unit.
   See the "Set up 2 - Topcal S" section for the coding for the individual calibration and cleaning programs.

Contact	Control unit terminal
Contact 0	Terminals 81 and 82
Contact 1	Terminals 83 and 84
Contact 2	Terminals 85 and 86

3. If you want to stop program cycles via an external PLC, connect the control for the automatic stop system to terminals "87" and "88".
   The running program is then finished and no new program is started as long as a signal is applied to terminals 87/88.
   The "Interval" program is stopped immediately.

External outputs

1. If you want to relay the position of the assembly to an external PLC, connect the outputs of the control unit as follows:

Feedback	Control unit terminal
"Assembly in Measuring Position" feedback signal	Terminals 61 and 62
"Assembly in Service Position" feedback signal	Terminals 65 and 66

4.1.11 External inputs (PLC to Mycom)

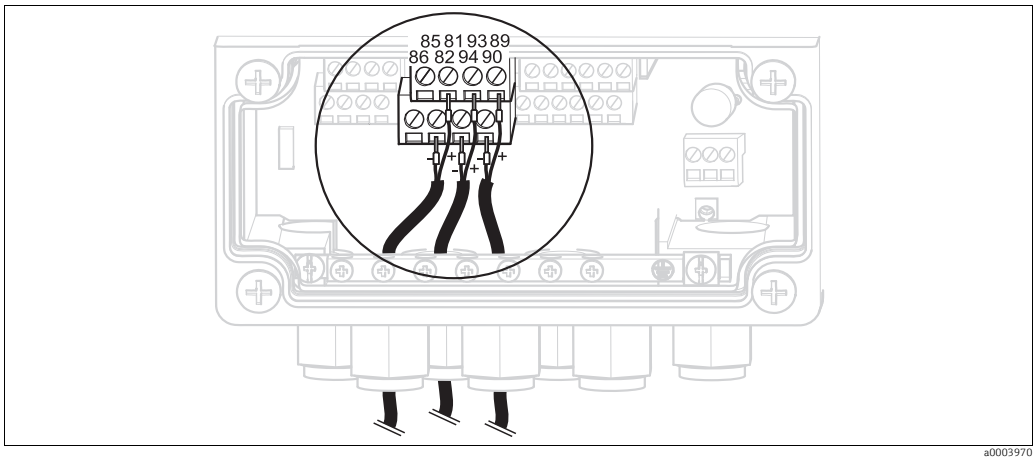


Fig. 35: Connecting external inputs

If you want to activate the hold function for Mycom via an external PLC, connect the input to terminals 81 and 82 of the device (power supply is required).

4.1.12 Inductive limit position switches

The system is supplied by default with pneumatic limit position switches for feedback of the assembly position. If you are using inductive limit position switches, connect them as described in the following instructions.

Inductive limit position switches of Cleanfit CPA471, CPA472, CPA475 assemblies

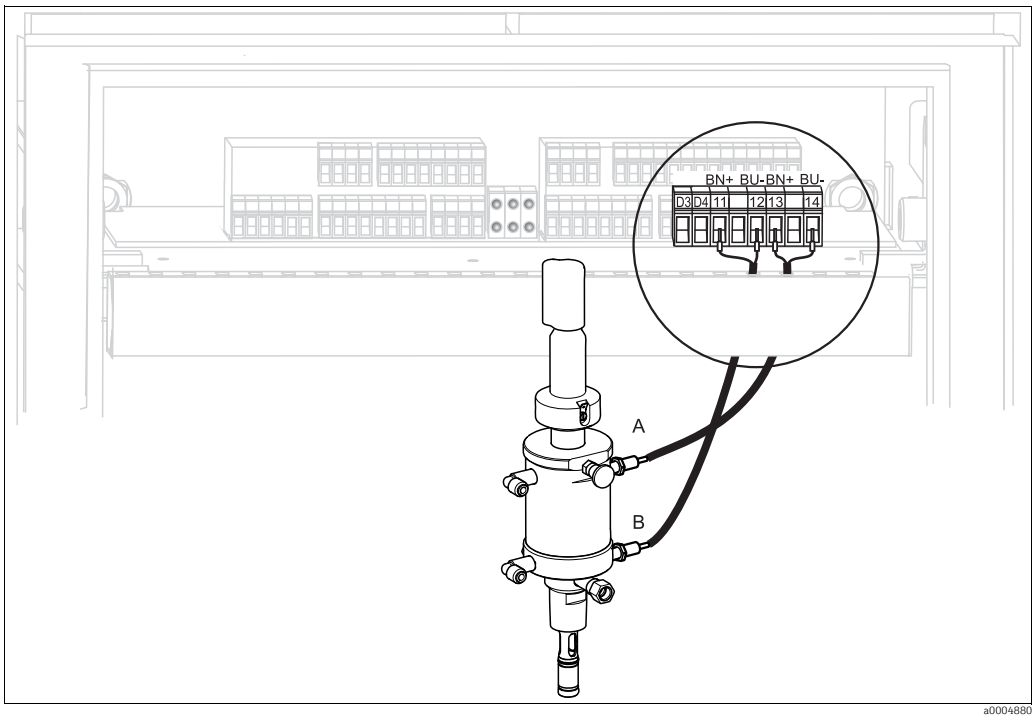


Fig. 36: Connecting inductive limit position switches of CPA471, CPA472, CPA475 assemblies

A "Service" feedback signal
B "Measure" feedback signal

1. If you are using a CPA471, CPA472 or CPA475 assembly with inductive limit position switches for assembly position feedback, remove the wires from terminals 11 to 14.
2. Connect the upper limit position switch (A) for the "Service" feedback signal:

Wire	Control unit terminal
Brown (BN)	Terminal 13 (+)
Blue (BU)	Terminal 14 (-)

3. Connect the lower limit position switch (B) for the "Measure" feedback signal:

Wire	Control unit terminal
Brown (BN)	Terminal 11 (+)
Blue (BU)	Terminal 12 (-)

Inductive limit position switches of CPA473, CPA474 assemblies

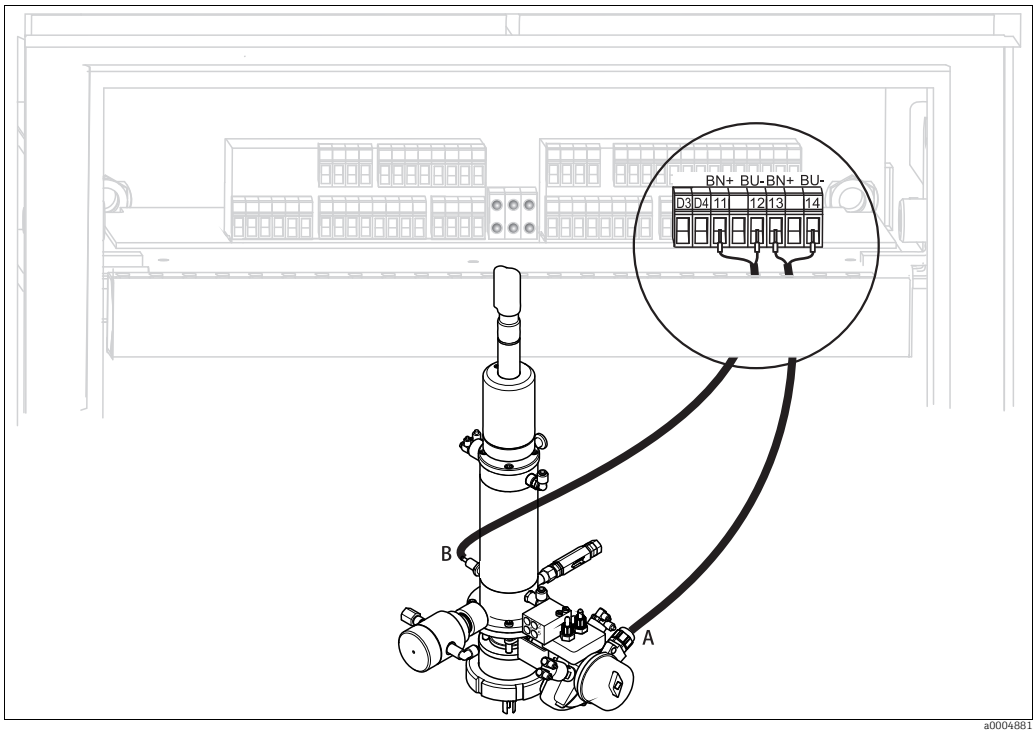


Fig. 37: Connecting inductive limit position switches of CPA473, CPA474 assemblies

A "Service" feedback signal
B "Measure" feedback signal

1. If you are using a CPA473 or CPA474 assembly with inductive limit position switches for assembly position feedback, remove the wires from terminals 11 to 14.
2. Connect the limit position switch (A), located beside the ball valve, for the "Service" feedback signal:

Wire	Control unit terminal
Brown (BN)	Terminal 13 (+)
Blue (BU)	Terminal 14 (-)

3. Connect the limit position switch (B), located opposite the ball valve, for the "Measure" feedback signal:

Wire	Control unit terminal
Brown (BN)	Terminal 11 (+)
Blue (BU)	Terminal 12 (-)

Inductive limit position switches of CPA871, CPA875 assemblies

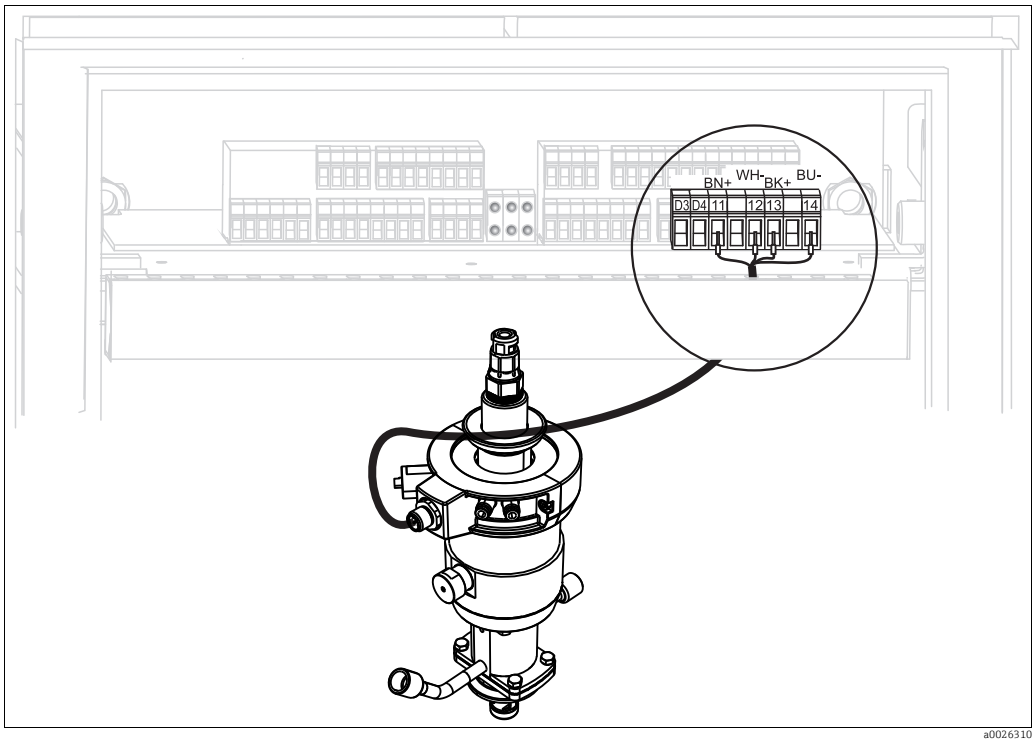


Fig. 38: Connecting inductive limit position switches of CPA871, CPA875 assemblies

1. If you are using a CPA871 or CPA875 assembly, remove the wires from terminals 11 to 14.
2. Connect the plug side of the connecting cable to the assembly.
3. Connect the four wires of the connecting cable to CPG30 as follows:

Wire	Control unit terminal
Brown (BN)	Terminal 11 (+)
White (WH)	Terminal 12 (-)
Black (BK)	Terminal 13 (+)
Blue (BU)	Terminal 14 (-)

Checking the jumper

Check that the jumper is in the correct position on the CPC30 board.

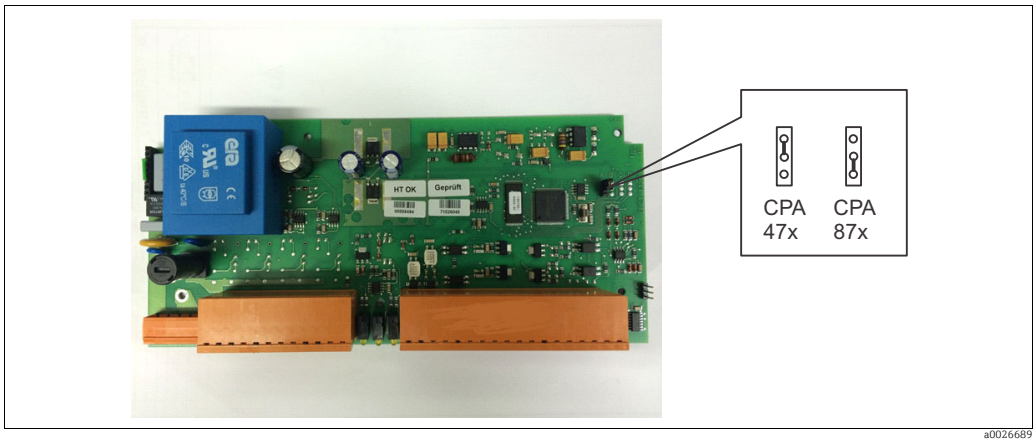


Fig. 39: Position of jumper

4.2 Post-connection check

After the electrical connection, carry out the following checks:

Device status and specifications	Remarks
Are the transmitter and cables damaged on the outside?	Visual inspection

Electrical connection	Remarks
Does the supply voltage match the specifications on the nameplate?	100 to 230 V wide area 24 V AC / DC
Do the cables used fulfill the required specifications?	Use a genuine Endress+Hauser cable to connect the sensor, see "Accessories" section.
Are the mounted cables strain relieved?	
Is the cable type route completely isolated?	Along the whole cable length, run the power supply and signal line cables separately to avoid any mutual influence. Cable channels are best.
No loops and cross-overs in the cable run?	
Are the signal lines correctly connected in accordance with the wiring diagram?	
Are all the screw terminals tightened?	
Are all the cable entries installed, tightened and sealed? Cable run with "water sag"?	"Water trap": cable loops downwards so that water can drip off.
Are the PE distributor rails grounded (if present)?	Grounding at place of installation
Are all the housing covers installed and tightened?	Check seals for damage.

5 Medium connection

5.1 Compressed air line and additional valves

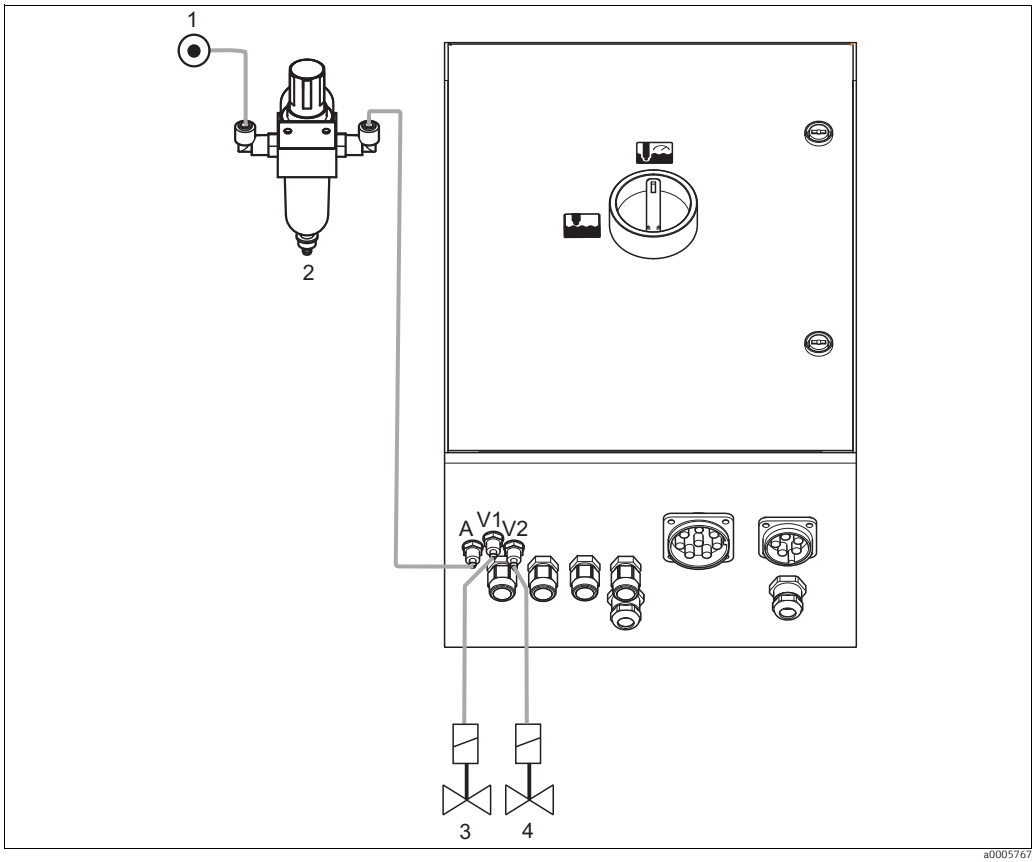


Fig. 40: Connecting compressed air supply and controlling additional valves

1 Compressed air
2 Pressure reduction valve
3 Additional valve 1
4 Additional valve 2

Compressed air supply

Note the following points when connecting:
- The compressed air line must be provided by the customer.
- Pay attention to the installation direction of the pressure reduction valve. You can identify the flow direction from the arrows at the top of the square block of the valve.
- The optimum air pressure is 5 bar (73 psi).
- The air must be filtered (50 µm) and free from oil and condensate. The line diameter must be at least 10 mm (0.39").

Connect the output side of the pressure reduction valve to connection A.

Additional valves

Connect the additional valves as follows:

Valve number	Function
V1	Control of additional valve 1 for back pressure water etc.
V2	Control of additional valve 2 for back pressure water etc.

You can use the additional valves for "back pressure water" for example.
The valves are assigned in "Set up 2 > Topcal > Config. Topcal".
Activate the back pressure water in "Set up 2 > Topcal > Activate Topcal".

What is back pressure water?
In processes where the medium is fibrous or tends to form buildup, assemblies with a ball valve for shutting off the medium are used e.g. Cleanfit P CPA473 or CPA474. To keep the rinse chamber free of medium, the back pressure water valve opens automatically before the assembly moves out of the process. The counterpressure in the rinse chamber caused by the back pressure water prevents the ingress of medium into the chamber. The back pressure water pressure must then be greater than the pressure of the medium. The time the back pressure water runs before and after the assembly is moved can be set individually.

5.2 Water pipe and rinse chamber

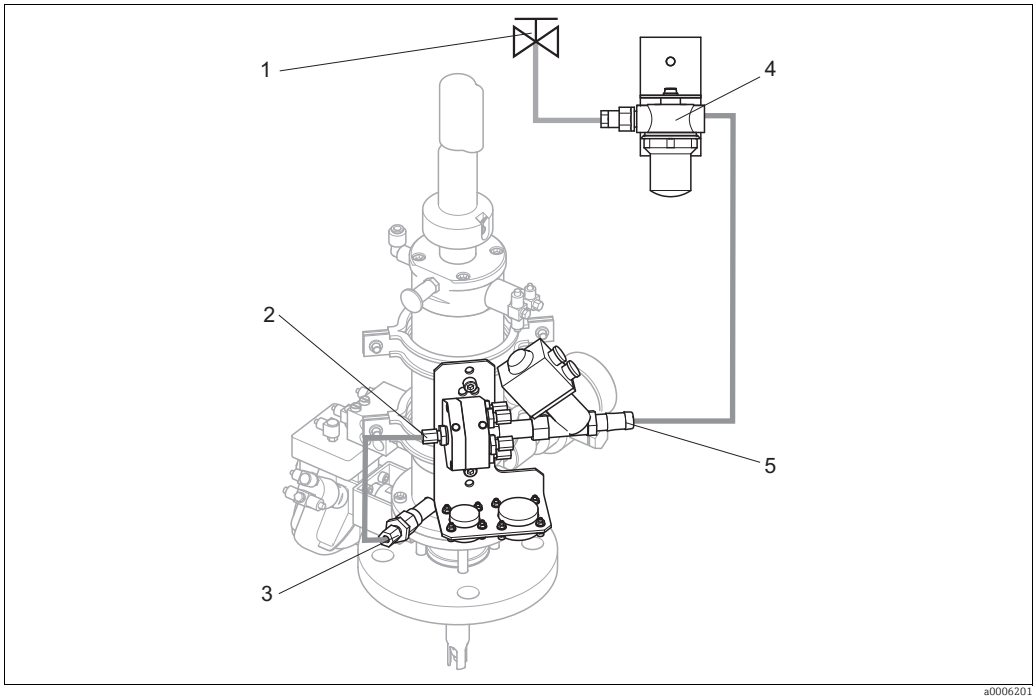


Fig. 41: Connecting rinsing block to rinse chamber and water connection

1 Rinse water
2 Rinsing block rinse chamber connection
3 Assembly rinse chamber connection
4 Water filter
5 Water connection

Connecting the rinse chamber

Connect the rinse chamber connection on the rinsing block (2) to the rinse connection of the assembly (3).

Connecting rinse water

Note the following points when connecting the water:
- The rinse water pipe must be provided by the customer.
- The connecting pipes to the water filter and the rinse chamber connection of the rinsing block must have a diameter of ID 12 mm (0.47").
- The water pressure must be 3 to 6 bar (43.5 to 87 psi).

Proceed as follows to connect the water:

1. Rinse the pipe thoroughly.
2. Connect the rinse water (1) to the water filter (4) supplied. The water filter filters particles up to 100 µm in size out of the water.
3. Connect the outlet of the water filter to the water connection of the rinsing block (5).

5.3 Multihoses

The delivery contains four multihoses. Please observe the table below to connect the hoses correctly.

Hose	Function
 **M1** Diameter Pg 29; length: 5 (16 ft) or 10 m (33 ft)	Compressed air to: ▪ Move the assembly ▪ Provide position feedback signal ▪ Control the 2/2-way valve for rinse water ▪ Purge air
 **M2** Diameter Pg 21; length: 2.5 m (8.2 ft)	Compressed air to control ▪ Vacuum pump for cleaner ▪ Vacuum pump for buffer 1 ▪ Vacuum pump for buffer 2
 **M3** Diameter Pg 21; length: 5 (16 ft) or 10 m (33 ft)	Transportation of ▪ Cleaner ▪ Buffer 1 ▪ Buffer 2
 **M4** Diameter Pg 21; length: 1.5 m (4.9 ft)	Venting of ▪ Vacuum pump for cleaner ▪ Vacuum pump for buffer 1 ▪ Vacuum pump for buffer 2

5.3.1 Connecting multihoses

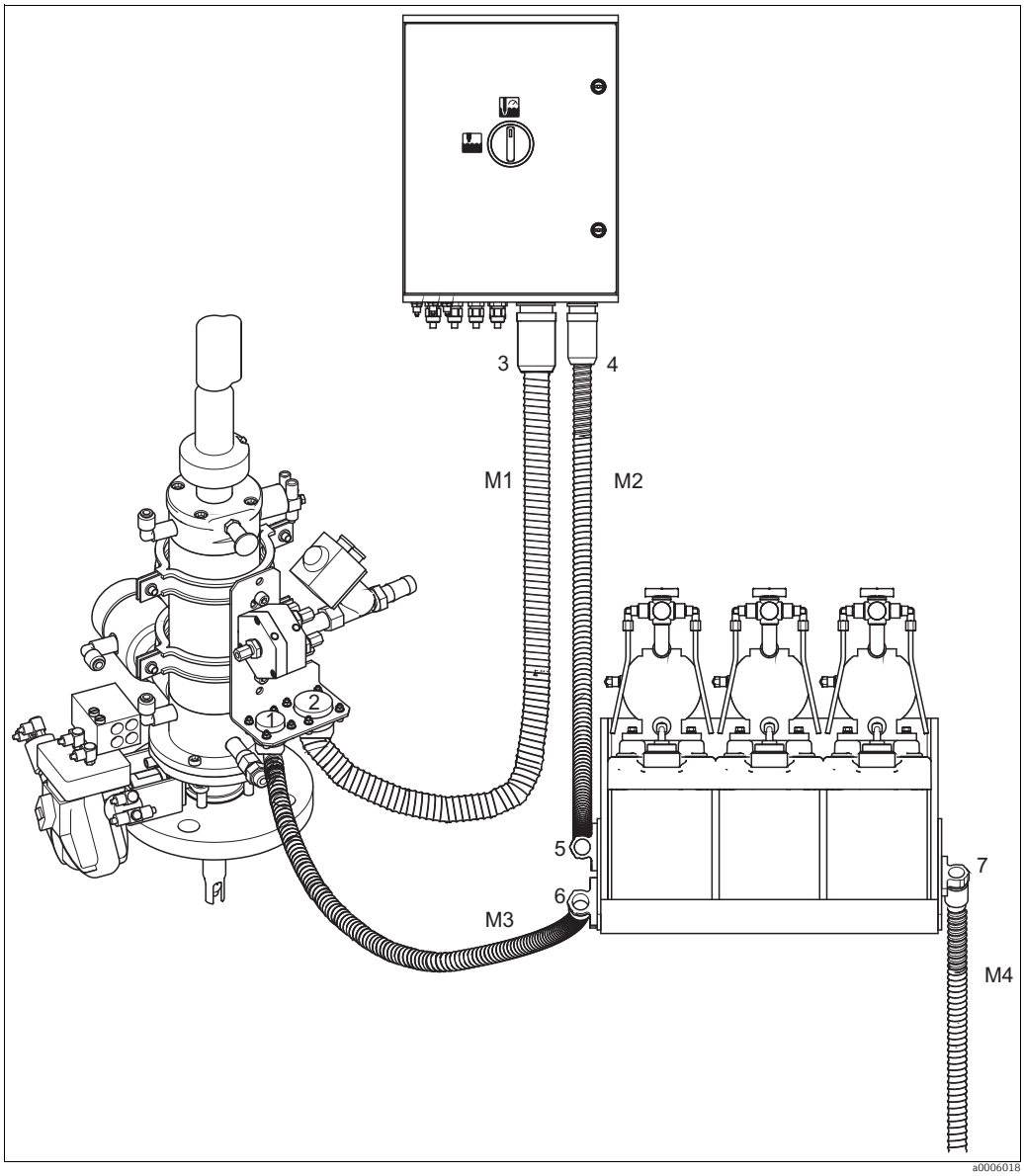


Fig. 42: Connecting multihoses

Connect the multihoses, ensuring they are strain relieved and free of any kinks.

Connect the multihoses as follows:

Hose number	Topcal housing connection	Assembly connection	Canister tray connection
M1	Pg 29 bayonet lock (3)	Pg 29 bayonet lock (2)	
M2	Pg 21 bayonet lock (4)		Top clamp (5)
M3		Pg 21 bayonet lock (1)	Bottom clamp (6)
M4			Individual clamp (7)

5.4 Assemblies

5.4.1 Cleanfit CPA471/472/475

With pneumatic limit position switches

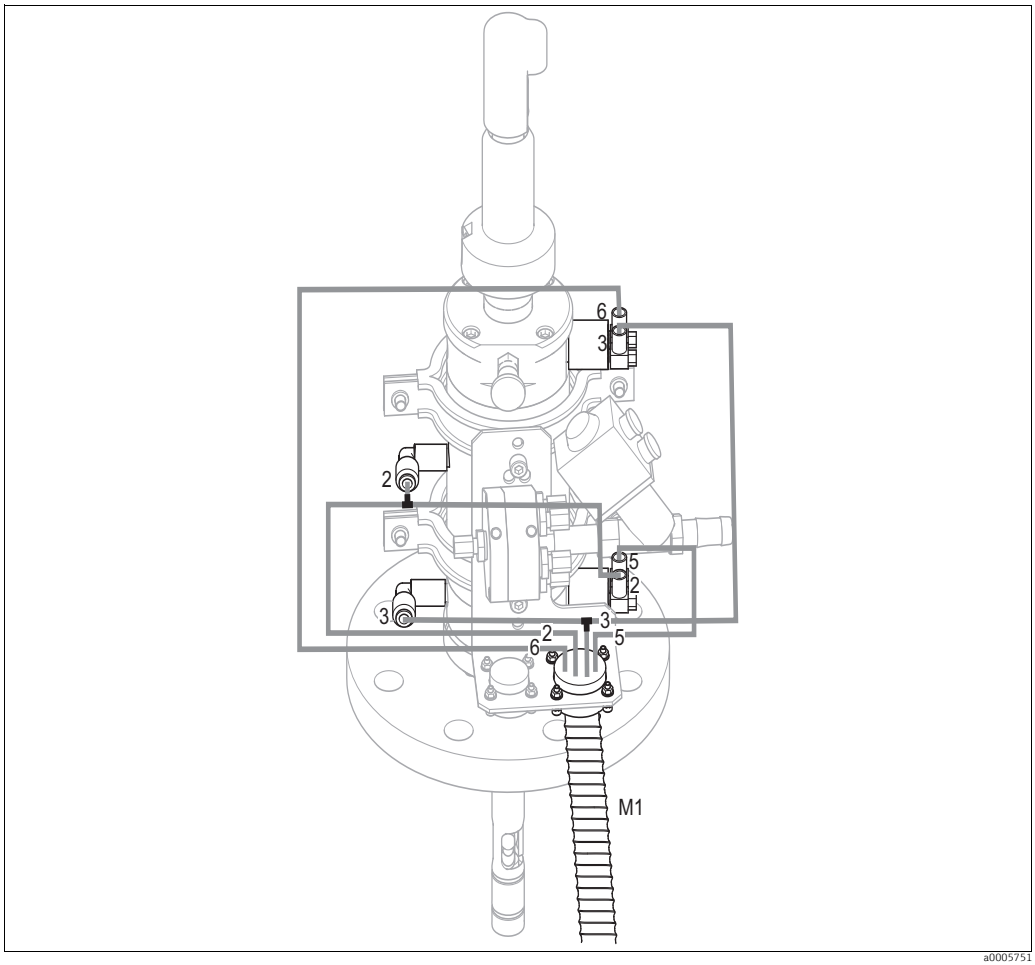


Fig. 43: Connecting CPA471, CPA472, CPA475 compressed air control with pneumatic limit position switches

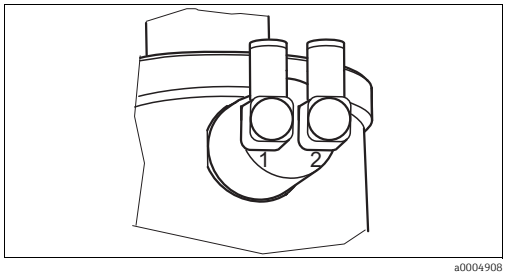


Fig. 44: Pneumatic limit position switch

1 Input
2 Output

Connecting pneumatic assembly control system

Connect the connections for moving the assembly and for position feedback as follows:

Hose number	Function	Assembly connection
5	"Measure" position feedback signal	Lower limit position switch - output (=2)
2	Move into "Measuring" position	Lower limit position switch - input (=1) and upper G¼ coupling (via T-section)
6	"Service" position feedback signal	Upper limit position switch - output (=2)
3	Move into "Service" position	Upper limit position switch - input (=1) and lower G¼ coupling (via T-section)

With inductive limit position switches

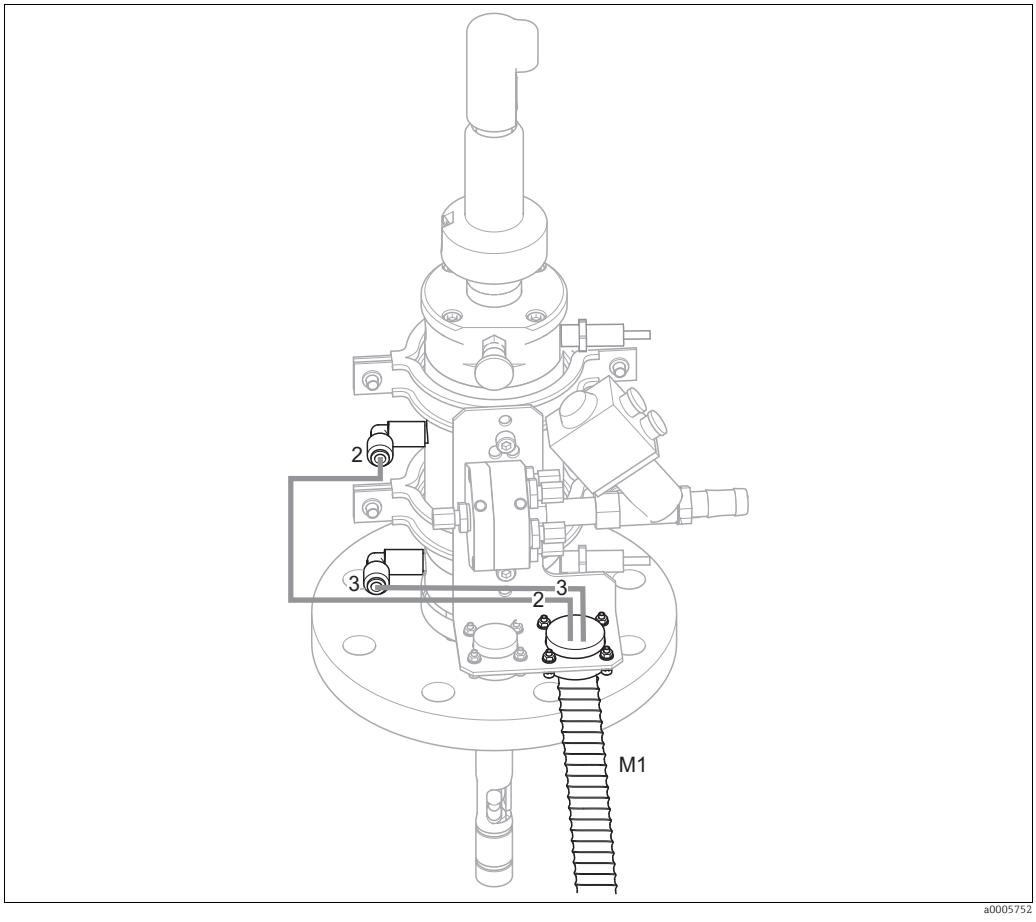


Fig. 45: Connecting CPA471, CPA472, CPA475 compressed air control with inductive limit position switches

Connecting pneumatic assembly control system

Connect the connections for moving the assembly as follows:

Hose number	Function	Assembly connection
2	Move into "Measuring" position	Upper G¼ coupling
3	Move into "Service" position	Lower G¼ coupling

5.4.2 Cleanfit CPA473/474

With pneumatic limit position switches

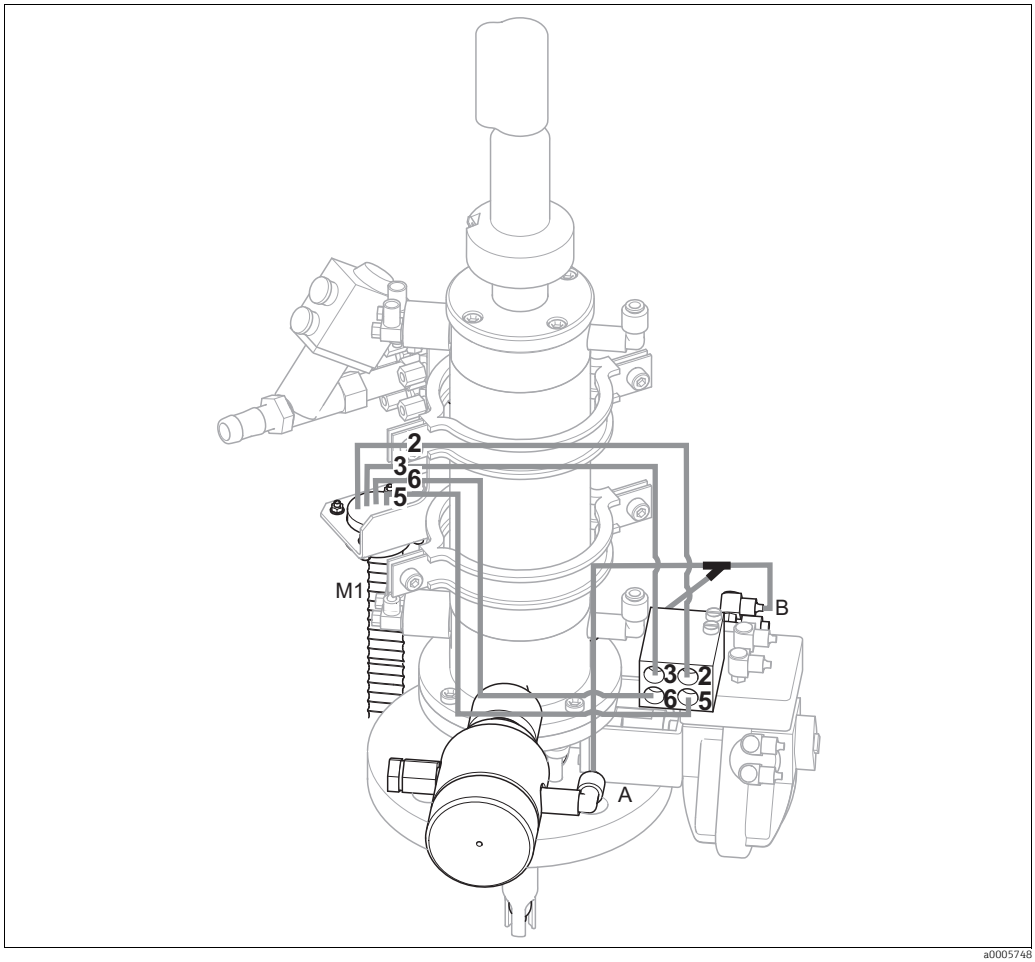


Fig. 46: Connecting compressed air for controlling CPA473, CPA474 assemblies

The assembly is delivered with the hoses already connected. All you have to do is connect the compressed air for pneumatic operation of the ball valve and the outputs for pneumatic feedback from the multihose M1 to the pneumatic connection block:

Hose number	Function	Pneumatic connection block
5	"Measure" position feedback signal	Connection no. 5
2	Move into "Measuring" position	Connection no. 2
6	"Service" position feedback signal	Connection no. 6
3	Move into "Service" position	Connection no. 3

If you are using a pneumatic outlet safety seal:
- Cut the compressed air pipe from the pneumatic connection block, input 6, to the corresponding limit position switch on the ball valve drive (B).
- Connect each end of the cut hose to the Y-piece supplied.
- Connect the third connection of the Y-piece to the compressed air connection of the outlet safety seal (A).

With inductive limit position switches

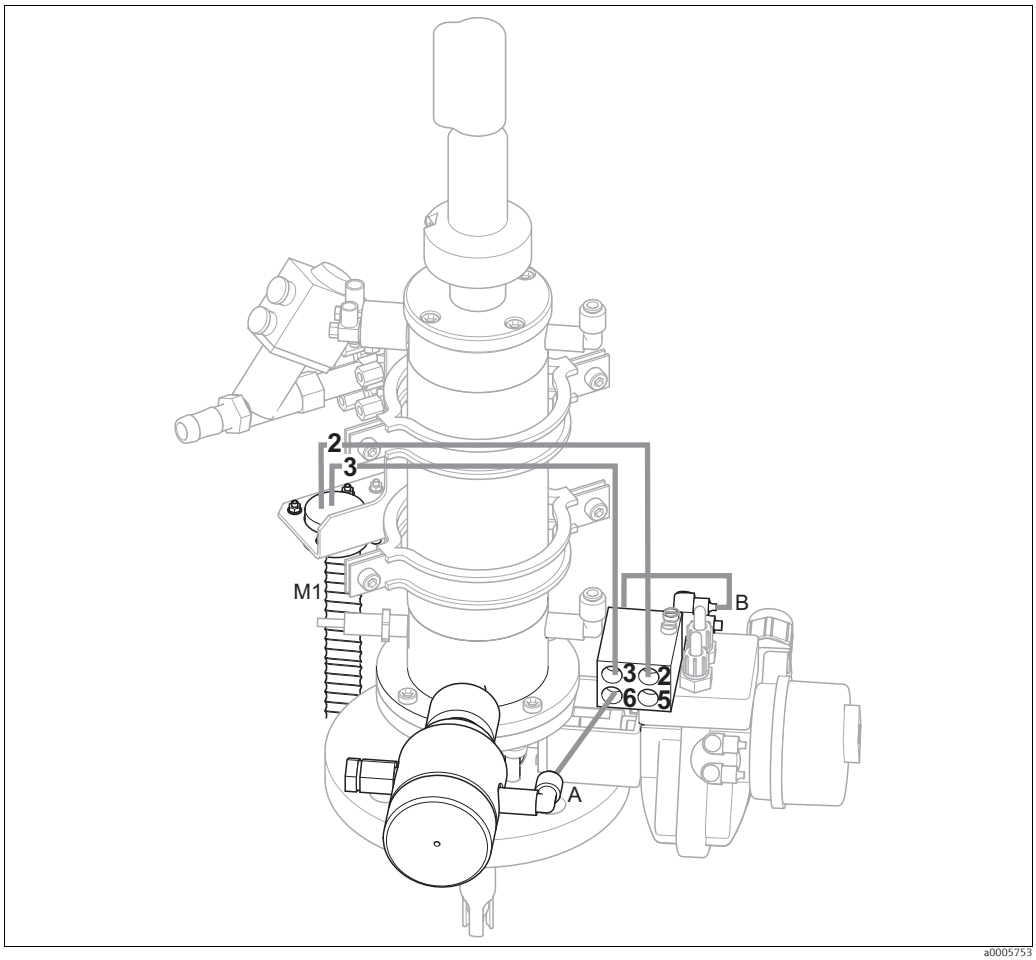


Fig. 47: Connecting CPA473, CPA474 compressed air control system with inductive limit position switches

Pneumatic assembly control

The assembly is delivered with the hoses already connected. All you have to do is connect the compressed air for pneumatic operation of the ball valve:

Hose number	Function	Pneumatic connection block
2	Move into "Measuring" position	Connection no. 2
3	Move into "Service" position	Connection no. 3

If you are using a pneumatic outlet safety seal:

- Connect the pneumatic limit position switch (B) (marked "2" (= output)) of the ball valve to **input 6** of the pneumatic connection block.
- Connect **output 6** of the pneumatic connection block to the compressed air connection of the outlet safety seal (A).

5.4.3 Cleanfit CPA871/875

The CPA871 and CPA875 assemblies are always equipped with inductive limit position switches.

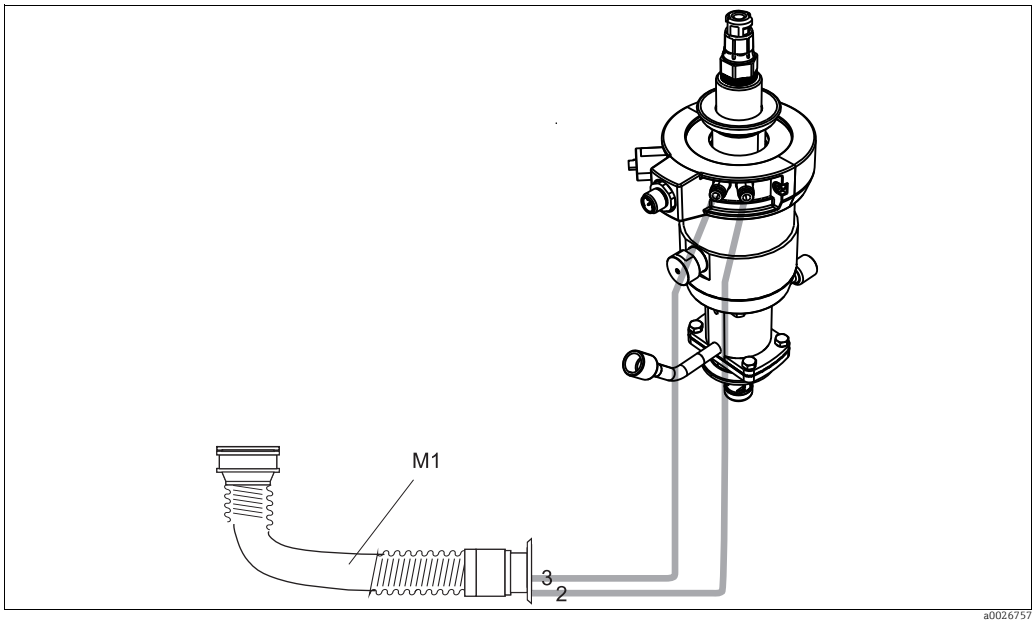


Fig. 48: Connecting CPA871 and CPA875 assemblies

1. Connect the multihose to the bayonet lock ensuring it is strain relieved and free of any kinks.
2. Connect **hose no. 2** for the "Measure" position from the multihose to the assembly connection marked "IN".
3. Connect **hose no. 3** for the "Service" position from the multihose to the assembly connection marked "OUT".

5.5 Pumps

5.5.1 Compressed air control

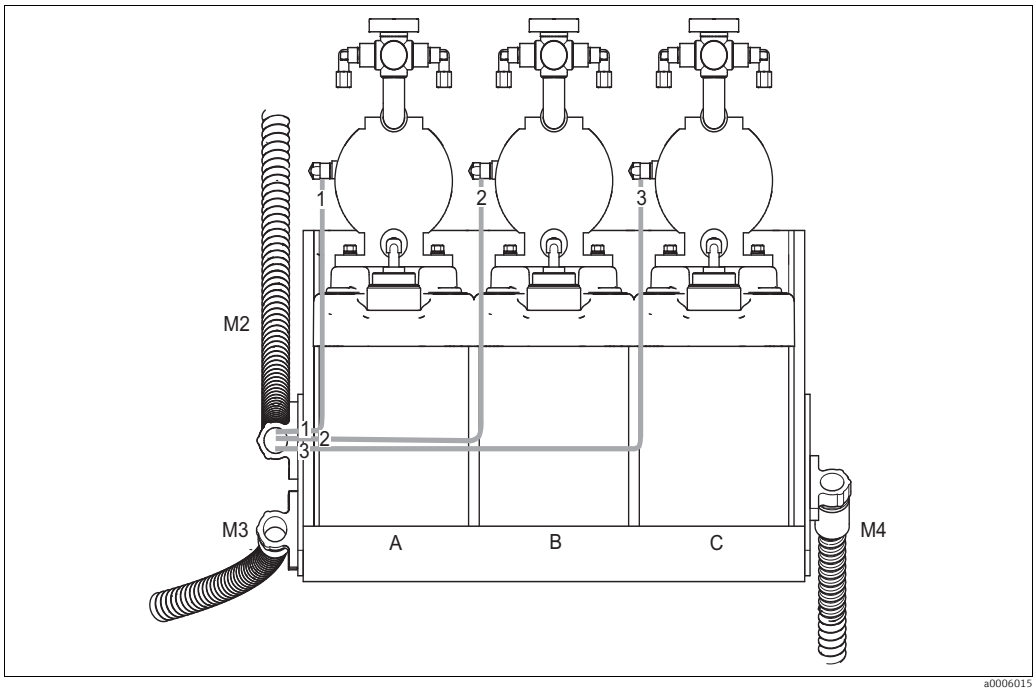


Fig. 49: Compressed air control of vacuum pumps

A Cleaner
B Buffer 1
C Buffer 2

Connect the individual hoses as follows for compressed air control of the vacuum pumps:

Multihose	Hose number	Vacuum pump connection
M2	1	Cleaner compressed air connection
M2	2	Buffer 1 compressed air connection
M2	3	Buffer 2 compressed air connection

5.5.2 Buffer and cleaner

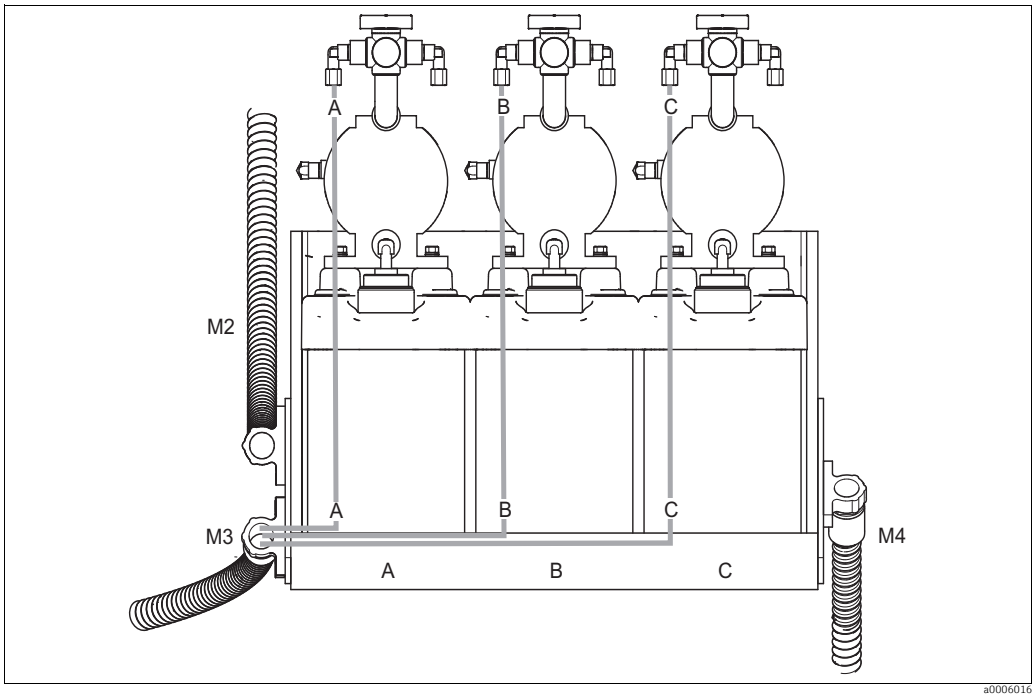


Fig. 50: Medium connection of vacuum pumps

A Cleaner
B Buffer 1
C Buffer 2

Connect the individual hoses as follows for transporting buffer and cleaner:

Multihose	Hose number	Vacuum pump connection
M3	A	Cleaner medium connection
M3	B	Buffer 1 medium connection
M3	C	Buffer 2 medium connection

5.5.3 Venting

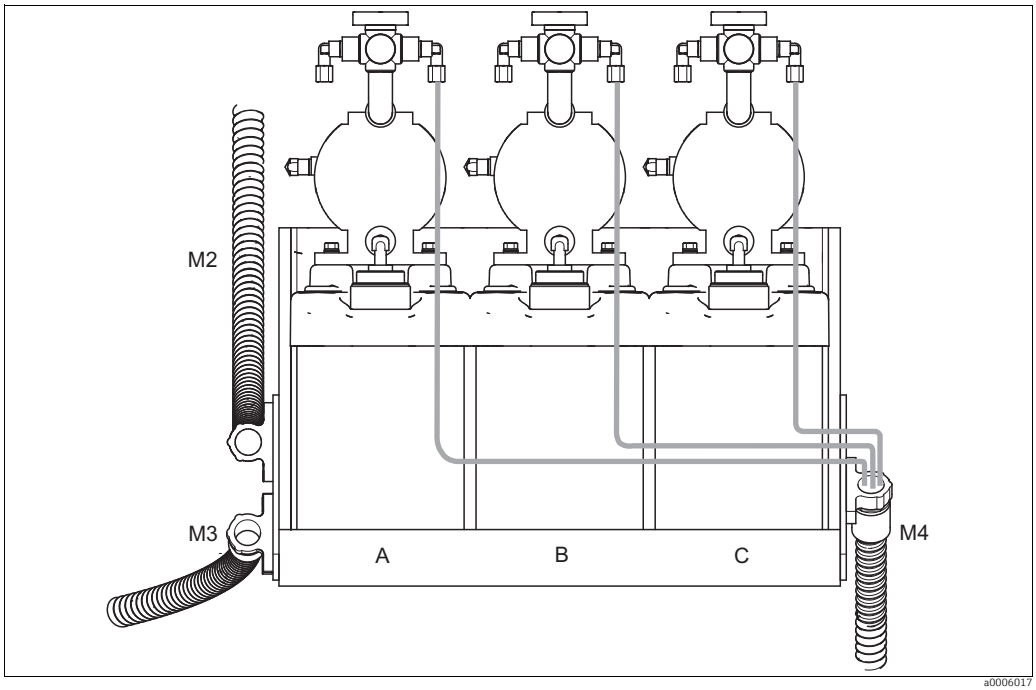


Fig. 51: Venting of vacuum pumps

A Cleaner
B Buffer 1
C Buffer 2

To vent the vacuum pumps, connect the individual hoses of multihose M4 to the vent connections of the three vacuum pumps. No specific order need be followed.

5.6 Post-connection check

Device status and specifications	Remarks
Are all the hoses firmly mounted and leaktight?	Visual inspection
Are the multihoses routed in such a way that they are protected?	Use protection pipes if necessary.

6 Operation

6.1 Display and operating elements

6.1.1 Display

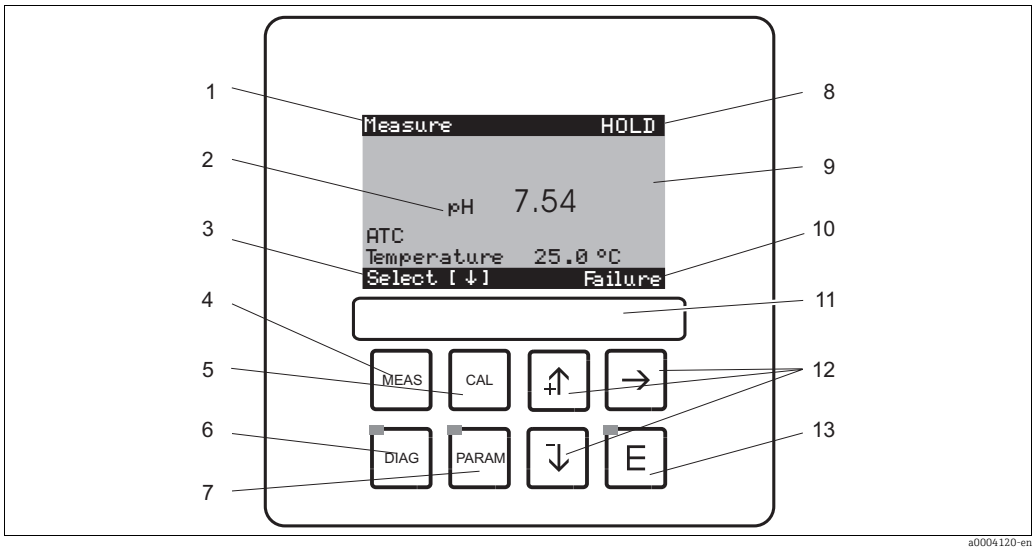
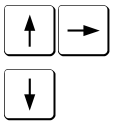


Fig. 52: Operating elements

1 Current menu
2 Current parameter
3 Navigation row: arrows for scrolling; E for browsing; note for Cancel
4 MEAS Measuring mode key
5 CAL Calibration key
6 DIAG Diagnosis menu key
7 PARAM Parameter entry menu key
8 HOLD displayed, if HOLD active
9 Current main measured value
10 "Failure", "Warning" displayed if the NAMUR contacts respond
11 Labeling field
12 Arrow keys for selecting and entering
13 E Enter key

6.1.2 Function of the keys

PARAM	"PARAM" takes you to the configuration menu. PARAM" allows you to return to the previous "return field" from any point in the menu. These are marked in bold in the overview of the menu.
DIAG	"DIAG" takes you to the device diagnosis menu.
MEAS	"MEAS" switches to Measuring mode. This displays the measured values. Use the arrow keys to scroll through the various measured value readings. Press "MEAS" to exit any of the "PARAM", "DIAG", "CAL" menus without terminating the settings / calibration.
CAL	"CAL" switches to the calibration menu of the sensors.

E	"Enter" moves you one step forward in a menu or confirms a selection you made. LED lit Green: everything OK. Red: an error has occurred.
	▪ You can scroll through the items with the arrow keys, and then highlight your selection (if there is a choice offered). ▪ Increase/decrease numbers by one level with "+" / "-". Go to the next number with the "right arrow" (editor type 1) or ▪ "Activate" with the "right arrow" and scroll through the selection with "+" / "-" (editor type 2) (for information on editor types, see the "Menu editor types" section

6.1.3 Service switch

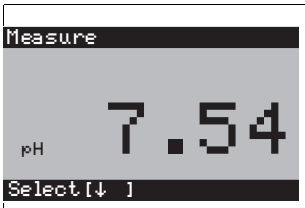
The service switch is located on the housing front of the control unit. There are two possible switch positions:

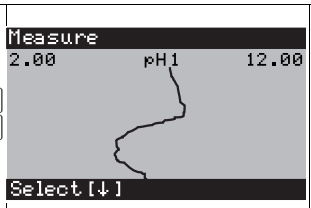
	**Service/Off:** (horizontal switch setting) ▪ The sensor moves into the rinse chamber. ▪ "Hold" is active for the outputs.
	**Measure/On:** (vertical switch setting) After moving from the service position, a query appears asking whether a program should be launched or the sensor should be moved into the process without cleaning. Only those programs are offered which have already been edited.

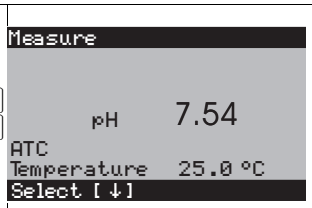
The service switch always has priority (Emergency Stop function). This means that any program running is interrupted as soon as you operate the service switch.

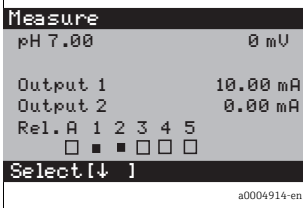
6.1.4 Measuring menus

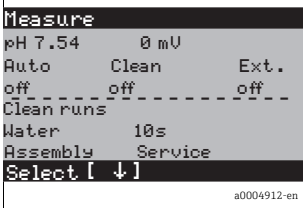
You can choose between different measuring menus. Use the arrow keys to scroll between the different menus. Switch between the current measured value characteristic and the data logger using the Enter key [E].

<table>
<tr>
<td> 

a0004131-en</td>
<td></td>
<td> 

a0004132-en</td>
<td></td>
<td> 

a0004913-en</td>
<td></td>
</tr>
<tr>
<td>The current measured value is displayed.</td>
<td></td>
<td>If you have activated the data logger, you can see the current measured value characteristic here (Record mode).
If you have activated both data loggers, press the arrow key to switch to the view of the second measured value characteristic.</td>
<td></td>
<td>In this display you can see the measured value, the kind of temperature compensation and the related temperature.</td>
<td></td>
</tr>
<tr>
<td> 

a0004914-en</td>
<td></td>
<td> 

a0004912-en</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In this display, you can see the current and voltage values and the contact states of the relay at a glance.
Active relay = ■ (with function)</td>
<td></td>
<td>In this display, you can see the measured value, the status of automatic, cleaning, external control and the status of a cleaning program that is running.</td>
<td></td>
<td></td>
<td></td>
</tr>
</table>

6.1.5 Operation access authorization

Access codes

Functions can be protected by four-digit access codes to protect the transmitter against unintentional and undesired changes to the configuration and the calibration data. All the functions are freely accessible provided no codes have been defined.

Access authorization has the following levels.

- **Display level** (can be accessed without a code)
  The complete menu can be viewed. The configuration cannot be altered. No calibration is possible. On this level, only the control parameters for new processes can be changed in the "DIAG" menu branch.
- **Maintenance level** (can be protected by the service code)
  This code permits calibration.
  The temperature compensation menu item can be used with this code.
  The factory functions and the internal data can be viewed.
  Factory setting: Code = 0000, i.e. the levels are not protected.
  In case you have mislaid/forgotten the supplied service code, contact your service office for a universally valid service code.
- **Specialist level** (can be protected by the specialist access code)
  All menus can be accessed and changed.
  Factory setting: Code = 0000, i.e. the levels are not protected.
  In case you have mislaid/forgotten the supplied specialist code, contact your service office for a universally valid specialist code.

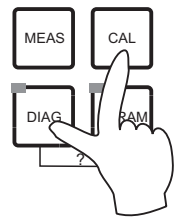
To activate the codes (= functions locked) see the item "PARAM > Setup 1 > Access codes". Enter your desired codes here. If the code is activated, you can only edit the protected areas with the rights mentioned above.

Note the following points:

- Note down the selected code as well as the universal code and keep it in a place where unauthorized persons do not have access to it.
- If you reset the code to "0000", all the levels are freely accessible again for editing. The codes can only be reset in the "Specialist" menu.

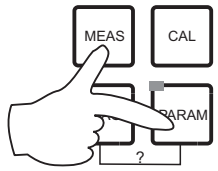
Locking configuration via the key pad

Locking operation



Press the CAL and DIAG keys simultaneously to lock in-field configuration of the device.
At the code prompt, the code appears as "9999". Only the settings in the "PARAM" menu can be seen.

Unlocking operation

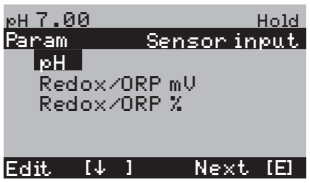


Press the MEAS and PARAM keys simultaneously to unlock operation.

6.1.6 Menu editor types

Depending on the type of setting, the functions for device configuration can be selected in two different ways.

Editor type E1

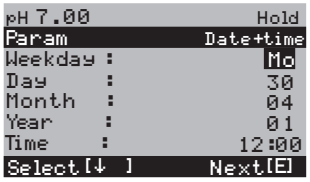


a0004154-en

For functions that can be selected directly from a specified range of options. "Edit" is displayed on the editing line.

- A selection can be highlighted with the arrow keys.
- Confirm the option selected by pressing E (=Enter).

Editor type E2



a0004155-en

For settings that have to be defined more specifically, e.g. weekday, time. "Select" is displayed on the editing line.

- Use the arrow keys ↑ and ↓ to highlight an option (e.g. "Mo").
- Activate the selected option with the right arrow key →. The highlighted option flashes.
- Scroll through the option (e.g. weekday) using the arrow keys ↑ and ↓.
- Confirm the option selected by pressing E (=Enter).
- After making your selection and confirming it by pressing E (no flashing display), you can exit the item by pressing E.

7 Commissioning

7.1 Special features when commissioning digital sensors

pH sensors with Memosens technology save the calibration data. For this reason, commissioning these sensors is different to commissioning standard electrodes.
Proceed as follows:

1. Install the transmitter and the assembly.
2. Connect the transmitter and the sensor cable.
3. Configure the transmitter for your specific requirements (see "System configuration" section).
4. Connect the factory-calibrated sensor with Memosens technology and immerse it in the medium or buffer.
5. The saved sensor-specific calibration data are automatically transmitted to the transmitter.
6. The measured value is displayed.
   Normally, you can accept this value without calibrating the sensor.
   Calibration is only necessary in the following instances:
   – When strict accuracy requirements must be met
   – When the sensor has been in storage for over 3 months
7. Check the measured value transfer to the process control system or the signal processing unit.

7.2 Special features when commissioning ISFET sensors

Switch-on behavior
A closed control loop is created once the measuring system is switched on. During this time (approx. 5 to 8 minutes), the measured value adjusts to the real value. This settling behavior occurs every time the liquid film between the pH-sensitive semiconductor and the reference lead is interrupted (e.g. caused by dry storage or intensive cleaning with compressed air). The settling time in question depends on how long the interruption lasts.

Sensitivity to light
Like all semiconductor elements, the ISFET chip is sensitive to light (measured value fluctuations). However, this only affects the measured value if the sensor is directly exposed to sunlight. For this reason, avoid direct sunlight when calibrating. Normal ambient light does not affect measurement.

7.3 Function check

⚠ WARNING
Incorrect connection, incorrect supply voltage
Safety hazards for staff and device malfunctions
- ▶ Check that all connections have been established correctly as per the wiring diagram.
- ▶ Make sure that the supply voltage matches the voltage indicated on the nameplate.

NOTICE
If pumps, valves or similar are actuated in an uncontrolled manner, this could damage devices.
- ▶ Make sure no danger is posed for the measuring point.

7.4 Switching on

Before first start-up, make sure you understand how to operate the device. Please refer in particular to the "Safety instructions" and "Operation" sections.

We recommend the following procedure for commissioning:

1. Connect Mycom S CPM153 to the power supply.
2. Switch the service switch "OFF" or switch it to the Service position  .
3. Wait for initialization of CPM153 and the control unit.
   Function of the green "Alive LED":
   – Frequency of approx. 2 pulses per second: communication is active.
   – Frequency of approx. 1 pulse per second: establishing communication.
   – LED lit constantly: no communication..
   If the LED does not light up, check the power supply for terminal L+/L– (12 to 15 V DC).
4. Only initial commissioning:
   Run the "First start up" (see "First start up" section).
5. Switch the service switch to the Measure position  or "On".
6. Configure parameters: select a function for the additional valves (optional).
7. Start the "User 3" quick-test program and check the entire system for leaks.
   Program start:
   "PARAM > Specialist > Manual operation > Topcal > Status messages (Enter) > Start program > User 3".
8. Now configure the complete system via the menu.

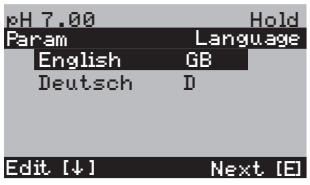
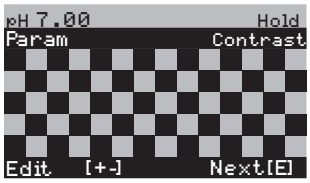
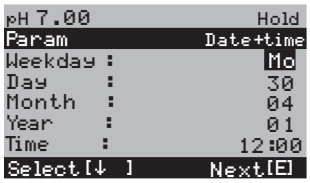
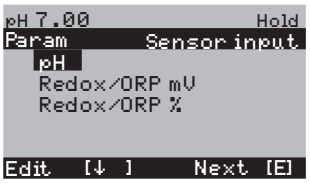
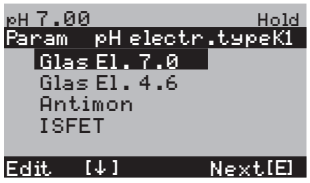
First commissioning
On first switch-on, the device starts automatically with the First start up menu. This asks you about the most important device settings. After you close the menu, the device is ready for use and measurement in its standard configuration.

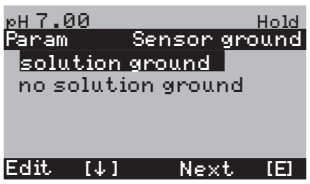
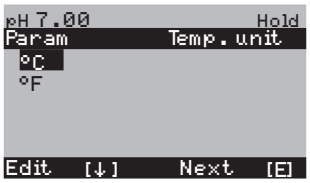
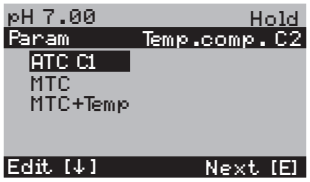
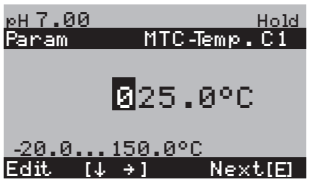
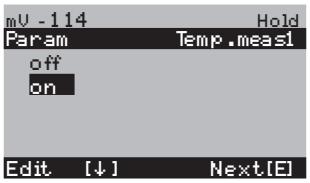
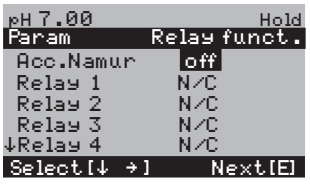
Note the following points:
- You must completely run through the First start up menu. If you do not, the device will not be operational. If you interrupt the First start up, it will start again at the next power-up until **all** the items have been processed and completed.
- You have to enter the specialist access code (factory setting 0000) to configure.

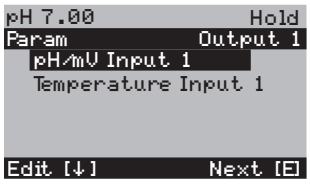
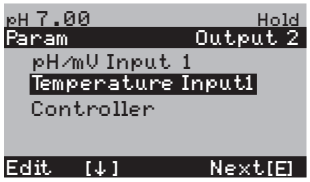
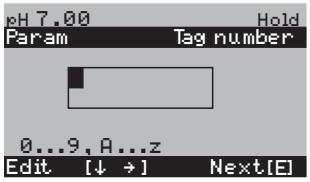
7.5 First start up

The First start up menu allows you to configure the most important functions of the transmitter. It is started automatically during initial commissioning and can be called any time via the menu structure.

To enter the menu, select:
PARAM > Specialist > Spec. access code: 0000 > First start up

Function	Options	Info
Language 	Selection ▪ English ▪ Language ordered **Factory setting** English	"Language ordered" refers to the language that you chose for your device via the order code ("Language version"). All the other settings remain if the other language is selected.
Contrast 		Contrast setting where applicable You can increase or reduce the contrast of the display with the arrow keys ↑ and ↓.
Date + time 	Weekday Day Month Year Time	Enter the complete date and time here. These data are used for the logbooks and the automatic cleaning system.
Operating mode 	Selection ▪ pH ▪ Redox/ORP: mV ▪ Redox/ORP: % **Factory setting** pH	Note the following points: ▪ If the operating mode changes, all the user settings are automatically reset. If you want to save your settings, use a DAT module. ▪ The Redox/ORP:% mode is not available for ORP sensors with Memosens technology whose SW version is ≤ 2.01.00.
Electrode type K1 	Selection ▪ Glass el. 7.0 ▪ Glass el. 4.6 ▪ Antimony ▪ ISFET **Factory setting** Glass 7.0	Specify the sensor that is used (only pH). Note the following points: ▪ The type of electrode does not have to be selected for digital sensors. ▪ The temperature sensor defaults to Pt 1000 when you change from a glass or antimony electrode to ISFET. Pt 100 is selected when the situation is the reverse. ▪ The glass/ISFET version of Mycom S is factory set for measurement with glass electrodes.

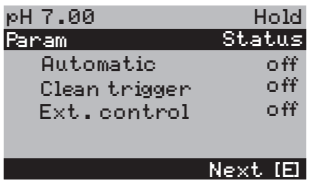
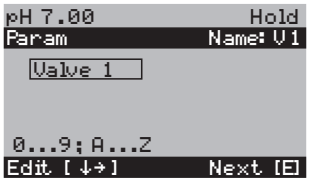
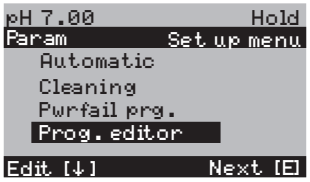
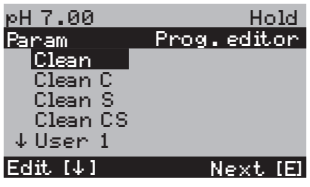
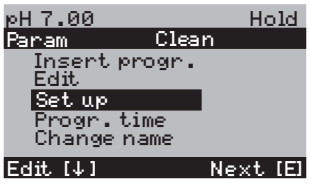
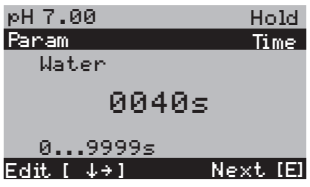
Function	Options	Info
Type of connection 	Selection ▪ Solution ground ▪ No solution ground **Factory setting** Solution ground	Specify whether you are measuring with solution ground (symmetrically, with PML) or no solution ground (unsymmetrically, without PML). Note the following points: ▪ The type of connection does not have to be selected for digital sensors with Memosens technology. With digital data transmission there is no need for symmetrical high-impedance connections.
Temperature unit 	Selection ▪ ℃ ▪ ℉ **Factory setting** ℃	
Temperature compensation, temp.sensor input 1 	Selection ▪ ATC C1 ▪ MTC ▪ MTC+Temp **Factory setting** ATC C1	Only for pH measurement: **ATC:** Automatic temperature compensation using temperature sensor **MTC:** Temperature compensation with manual input **MTC+Temp:** Temperature compensation with temperature entered manually. The temperature measured with a temperature sensor is displayed, however
MTC temperature, temp. sensor input 1 	-20.0 to 150.0 ℃ **Factory setting** 25.0 ℃	Only available with pH and MTC or MTC+Temp selected in the previous field.
Temperature measurement 	Selection ▪ Off ▪ On **Factory setting** On	Only available with ORP measurement.
Contact functions 	Activation and subsequent entry ▪ NAMUR – On – Off ▪ Relay 1-5 – N/C – Controller – Limit – CCW – CCC **Factory setting** NAMUR: off Relay 1-5: N/C	You can specify the function of the five relays here. When you switch on NAMUR, relays 1 and 2 are assigned and are not available for other functions (see "Namur assignment" section"). **Controller:** Relay contact for controller output **Limit:** Limit contactor function **CCW:** Chemoclean Water. Water supply for the ChemoClean function. **CCC:** Chemoclean Cleaner. Cleaner supply for the ChemoClean function. (Together, CCC and CCW form the "ChemoClean" function. You can find information on ChemoClean in the "Set up 2 - Chemoclean" section.)

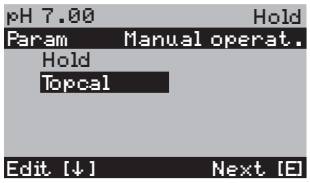
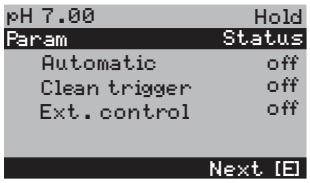
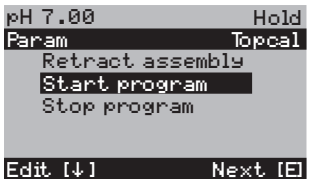
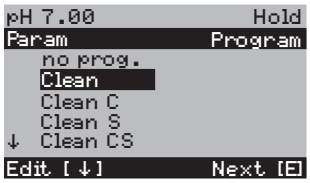
Function	Options	Info
Output 1, output variable 	Selection ▪ pH/mV input 1 ▪ Temperature input 1 **Factory setting** pH/mV input 1	Select the measured value to be output at current output 1.
Output 2, output variable 	Selection ▪ pH/mV input 1 ▪ Temperature input 1 ▪ Continuous controller **Factory setting** Temperature input 1	Select the measured value to be output at current output 2. **Continuous controller:** The controller actuating variable is output via the current output (see also Controller menu). Danger of data loss. If you change the assignment for the current output from "continuous controller" to a different function after you have configured the controllers, the complete controller configuration is reset to default values.
Tag number 	0 to 9; A to Z	Enter your client-specific device number here (32-digit tag number). This is saved in the DAT module which is obtainable as an option.
Exit First start up 	Selection ▪ End ▪ Restart **Factory setting** End	Specify whether you want to save the settings and exit the First start up menu or run through the menu again to make corrections.

7.5.1 Configuring the Clean program

The following example illustrates how to configure the Clean cleaning program for your Topcal. A description of all the cleaning functions and cleaning and calibration programs is provided in the "Set up 2 - Topcal S" section.

To enter the menu, select:
PARAM > Specialist > Set up 2 > Topcal > Config. Topcal

Display	User input
	The current status of the cleaning functions is displayed. Press E to continue.
	Press E to continue.
	Select "Prog. editor" and press E to confirm.
	Select "Clean" and press E to confirm.
	Select "Setup" to configure the program steps. Press E to confirm.
	Use the arrows to select the program step you wish to change, e.g. water. Press E to edit.
	Use the arrows to set the required conveying time for water. Press E to return to the list of program steps.

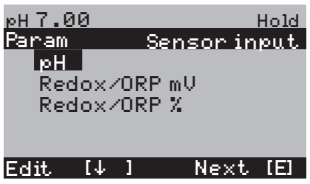
Display	User input
	Where necessary, change the other program steps. The program time is calculated automatically. Once you have finished the configuration, press MEAS to return to the measuring mode.
	To start the program, press PARAM and select "Manual operation > Topcal". Press E to confirm.
	The current status of the cleaning functions is displayed. Press E to continue.
	Select "Start program". Press E to confirm.
	Select "Clean". Press E to confirm. The program is started.

7.6 Device configuration

7.6.1 Set up 1 - Sensor input

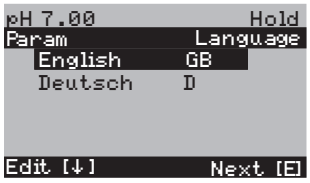
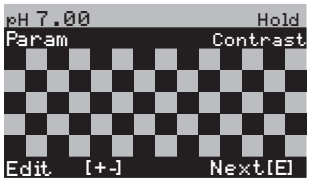
In this item, you change the settings for measured value acquisition, such as the operating mode, the measuring principle, the electrode type etc.
Apart from measured value damping, you have already made all the settings for this menu at the first commissioning with the First start up menu. You can change the selected values in this menu.

You have to enter your specialist access code to access the parameter setting menu.
To enter the menu, select: "PARAM > Specialist > Set up 1 > Sensor input".

Function	Options	Info
Operating mode 	Selection ▪ pH ▪ Redox/ORP: mV ▪ Redox/ORP: % **Factory setting** pH	Note the following points: ▪ If the operating mode changes, all the user settings are automatically reset. If you want to save your settings, use the DAT module. ▪ The Redox/ORP:% mode is not available for ORP sensors with Memosens technology whose SW version is ≤ 2.01.00.
Electrode type K1	Selection ▪ Glass el. 7.0 ▪ Glass el. 4.6 ▪ Antimony ▪ ISFET **Factory setting** Glass 7.0	Specify the sensor that is used (only pH). Note the following points: ▪ The type of electrode does not have to be selected for digital sensors. ▪ The temperature sensor defaults to Pt 1000 when you change from a glass or antimony electrode to ISFET. Pt 100 is selected when the situation is the reverse. ▪ The glass/ISFET version of Topcal S is factory set for measurement with glass electrodes.
Type of connection	Selection ▪ Solution ground ▪ No solution ground **Factory setting** Solution ground	Specify whether you are measuring with solution ground (symmetrically, with PML) or no solution ground (unsymmetrically, without PML). Note the following points: ▪ The type of connection does not have to be selected for digital sensors with Memosens technology. With digital data transmission there is no need for symmetrical high-impedance connections.
Measured value damping	Activation and subsequent entry ▪ pH/ORP 00 to 30 s ▪ Temperature 00 to 30 s Factory setting 00 s	The mean value over the set time is displayed. 00s = no attenuation

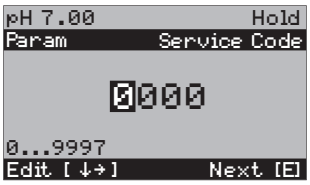
7.6.2 Set up 1 - Display

To enter the menu, select:
"PARAM > Specialist > Set up 1 > Display"

Function	Options	Info
Language 	Selection ▪ English ▪ Language ordered **Factory setting** English	"Language ordered" refers to the language that you chose for your device via the order code ("Language version"). All the other settings remain if the other language is selected.
Contrast 		Contrast setting where applicable You can increase or reduce the contrast of the display with the arrow keys ↑ and ↓.
Date + time	Weekday Day Month Year Time	Enter the complete date and time here. These data are used for the logbooks and the automatic cleaning system.
Display format	Selection ▪ pH00.00 ▪ pH00.0 **Factory setting** pH00.00	Only available for pH operating mode: Specify whether the measured values are to be displayed to one or two decimal places.
Temperature unit	Selection ▪ °C ▪ °F **Factory setting** °C	
Tag number	0 to 9; A to Z	Enter your client-specific device number here (32-digit tag number). This is saved in the DAT module which is obtainable as an option.

7.6.3 Set up 1 - Access codes

To enter the menu, select:
"PARAM > Specialist > Set up 1 > Access codes"

Function	Options	Info
Service code 	0000 to 9997 **Factory setting** 0000	Enter the service code. This code allows access to the calibration menu and the temperature compensation menu item. 0000 = No security locking
Specialist code	0000 to 9997 **Factory setting** 0000	Enter the specialist code. This code allows access to all the menu items. 0000 = No security locking

NOTICE

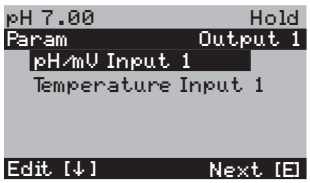
Danger of misuse

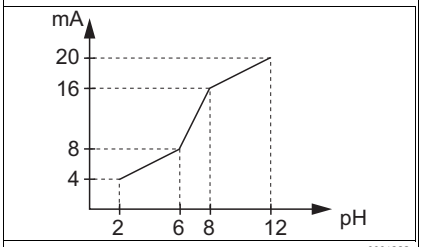
- ▶ Make sure that the codes you enter and the universal codes are protected against misuse by unauthorized persons.
- ▶ Note down the codes and keep them in a place where unauthorized persons do not have access (see also "Access authorization - Operation" section).

7.6.4 Set up 1 - Current outputs

The transmitter is equipped with two current outputs.

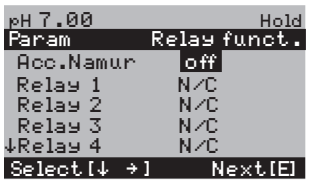
To enter the menu, select:
PARAM > Specialist > Set up 1 > Current output

Function	Options	Info
Current output	Selection ▪ Output 1 ▪ Output 2	Select the current output that you want to configure.
Output 1 (or 2)		
Output variable 	Selection ▪ pH/mV input 1 ▪ Temperature input 1 ▪ Continuous controller (only current output 2) **Factory setting** Output 1: pH/mV input 1 Output 2: Temperature input 1	Select the measured value to be output at current output 2. **Continuous controller:** The controller actuating variable is output via the current output (see also Controller menu). Danger of data loss. If you change the assignment for the current output from "continuous controller" to a different function after you have configured the controllers, the complete controller configuration is reset to default values.
Note	!!Caution!! The configuration is changed.	Notice on the display if the setting of the current outputs is changed. Press E to confirm the change. Press PARAM to cancel the change.
Current range	Selection ▪ 0 to 20 mA ▪ 4 to 20 mA **Factory setting** 4 to 20 mA	Select the current range for the current outputs.
Note	!!Caution!! Current output 0-20 mA and error current = 2.4 mA is critical.	Error current is in the measured current range if "0 to 20 mA" is selected for current range and "Min" is selected under Alarm in the "Alarm output" field (see Set up 1 - Alarm). Recommended combinations: ▪ Current range 0 to 20 mA and error current max (22 mA) ▪ Current range 4 to 20 mA and error current min (2.4 mA)
Characteristic	Selection ▪ Linear ▪ Table **Factory setting** Linear	**Linear:** The characteristic curve is linear from the lower to the upper value. **Table:** If you do not want the current output characteristic to be linear, you can enter a customer-specific sequence of up to 10 value pairs in a table. Exact adaptation to the non-linear medium behavior can achieve a higher level of accuracy.

Function	Options	Info
Linear		
Measured value limits	Activation and subsequent entry ▪ 0/4 mA -02.00 to 16.00 pH -50 to 150 °C -0500 to 0500 mV ▪ 20 mA -02.00 to 16.00 pH -50 to 150 °C -0500 mV to 0500 mV **Factory setting** 0/4 mA: 02.00 pH / 000.0 °C / -0500 mV 20 mA: 12.00 pH / 100.0 °C / 0500 mV	Enter the upper and lower measured value limit. The minimum distance between the upper and lower measured value limit is 2 pH units (e.g.: 0/4 mA: pH 7 and 20 mA: pH 9)
Note	Linear characteristic curve active.	The linear characteristic curve is activated once E is pressed by way of confirmation. Cancel with PARAM.
Table		
Total pairs	01 to 10	Specify the number of table points (value pairs) for your table.
Pairs	Activation and subsequent entry ▪ pH/ORP/temperature -02.00 to 16.00 pH -0500 to 0500 mV -50 to 150 °C ▪ mA 0.00 to 20.00 mA	Enter the necessary value pairs. The number of value pairs corresponds to the value entered in the previous field. Example of value pairs with four support points:  a0004223
Confirm	Selection ▪ OK ▪ Delete pair(s) **Factory setting** OK	Are the value pairs OK or do you want to delete elements? **Delete:** In the screen that follows, select the row to be deleted, delete with → and press E to confirm.
Table status information	Table valid	Table status. If invalid, then back to the previous field.
Activate	Table active	The table is active once E is pressed by way of confirmation. Cancel with PARAM.

7.6.5 Set up 1 - Relays

To enter the menu, select:
PARAM > Specialist > Set up 1 > Relays

Function	Options	Info
Contact functions 	Activation and subsequent entry ▪ NAMUR – On – Off ▪ Relay 1-5 – N/C – Controller – Limit – CCW – CCC **Factory setting** NAMUR: off Relay 1-5: N/C	You can specify the function of the five relays here. When you switch on NAMUR, relays 1 and 2 are assigned and are not available for other functions (see "Namur assignment" section"). **Controller:** Relay contact for controller output The controller relays are configured in the "PARAM > Set up 2 > Controller settings" menu. **Limit:** Limit contactor function The limit contacts are configured in the "PARAM > Set up 2 > Limit switch" menu. **CCW:** Chemoclean Water. Water supply for the ChemoClean function. **CCC:** Chemoclean Cleaner. Cleaner supply for the ChemoClean function. (Together, CCC and CCW form the "ChemoClean" function. You can find information on ChemoClean in the "Set up 2 - Chemoclean" section.) Note the following points: ▪ Danger of data loss. If the controller is already completely configured for output via relays and you reduce the number of relays assigned to the controller, then the complete controller configuration is reset to the default values. ▪ If you change the relay assignment for the controllers here, you must use the Controller menu to reassign a relay to all the functions selected there. Example: Relays 4 and 5 are assigned to the controller and you change the controller assignment to relays 5 and 6 (number of relays remains 2) (no data loss, provided that the number of assigned relays is not reduced!). ▪ You can only activate NAMUR if the required relays 1 and 2 (cf.) are free.

Function	Options	Info
Namur contacts	Selection ▪ Active open ▪ Active closed **Factory setting** Active closed	Only available if NAMUR is activated: Select the assignment of the NAMUR contacts as an NC contact (contact open if relay is active) or an NO contact (contact closed if relay is active). If the NAMUR function is enabled, the Alarm, Relay 1 and Relay 2 contacts are given the following functions: ▪ "Failure" = Fault-signaling contact (terminals 41/42): Failure alarms are active if the measuring system is not working correctly or if process parameters have reached a critical value. ▪ "Maintenance required" = Relay 1 (terminals 47/48): Warning messages become active when the measuring system is working correctly but requires maintenance or a process parameter has reached a value which requires intervention. ▪ "Function check" = Relay 2 (terminals 57/58): This contact is active during calibration, maintenance, configuration and during the automatic cleaning/ calibration cycle.
Controller contacts	Selection ▪ Active open ▪ Active closed **Factory setting** Active closed	Only available if the controller has been selected as a relay function: Select the assignment of the controller contacts as "Active open" or "Active closed".
Limit contacts	Selection ▪ Active open ▪ Active closed **Factory setting** Active closed	Only available if the limit switch has been selected as a relay function: Select the assignment of the limit contacts as "Active open" or "Active closed".
Contact type: Fault signalling contact	Selection ▪ Active on ▪ Active pulse **Factory setting** Active on	Only when NAMUR function = off **Active on:** active for as long as an error is present. **Active pulse:** active for 1 second when an alarm signal occurs.
Chemoclean notice	Chemoclean is always an "Active closed" contact.	Only available if the full Chemoclean function (CCC and CCW) is selected in the first field of the contact configuration: With the Chemoclean function, the valves of the CYR10 injector are actuated with an "Active closed" contact.

7.6.6 Set up 1 - Temperature

The pH value requires temperature compensation for two reasons:

1. Temperature effect of the electrode:
   The electrode slope is dependent on the temperature. Therefore this effect must be compensated for temperature changes (Temperature compensation, see below).
2. Temperature effect of the medium:
   The medium pH value is also temperature dependent. For high-accuracy measurements, the pH value related to temperature can be entered in table form (Medium temperature compensation, see below).

Temperature compensation

- ATC: Automatic temperature compensation: The medium temperature is measured with a temperature sensor. Via the temperature input in the Mycom S CPM153, this temperature is used to adjust the electrode slope to the medium temperature.
- MTC: Manual temperature compensation: This is advisable in processes which run at a constant temperature. Here, you enter the temperature value manually to adjust the electrode slope to the medium temperature.
- MTC+Temp.: The pH value is corrected with the temperature manually entered. On the display however, the value which appears is what the temperature sensor measures in the medium.

Medium temperature compensation

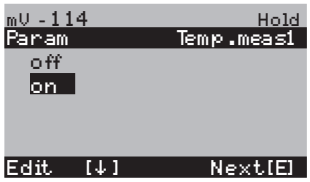
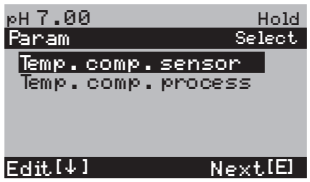
For medium temperature compensation, tables can be created in the CPM153 for three different media. Before starting the process, the most suitable table for the active medium can be selected.

Procedure:

- Take a sample from the process. The pH value should be as near as possible to the set point of the process.
- In the laboratory, heat the sample to at least the process temperature.
- During cooling, record the value pairs for pH and temperature at those temperatures at which you later wish to take measurements (e.g. process temperature and ambient temperature in the laboratory).
- Enter these recorded value pairs in the table ("Enter value pairs" field). As a reference temperature ("Enter reference temperature" field) select the temperature at which the set point of the process is defined (e.g. ambient temperature in the laboratory).

Temperature compensation menu

To enter the menu, select:
"PARAM > Specialist > Set up 1 > Temperature"

Function	Options	Info
Temperature measurement 	Selection ▪ Off ▪ On **Factory setting** On	Only available with ORP measurement
Select temperature compensation 	Selection ▪ Temp. comp. sensor ▪ Temp. comp. process (only for pH operating mode) **Factory setting** Temp. comp. sensor	Only available with pH measurement Select the necessary temperature compensation. **Temp. comp. sensor:** Automatic (ATC) or manual (MTC) temperature compensation **Temp. comp. process:** Compensation of the medium temperature using customer-specific tables (see below)
Temperature compensation sensor		
Temperature compensation	Selection ▪ ATC C1 ▪ MTC ▪ MTC+Temp **Factory setting** ATC C1	Only for pH measurement: **ATC:** Automatic temperature compensation using temperature sensor **MTC:** Temperature compensation with manual input **MTC+Temp:** Temperature compensation with temperature entered manually. The temperature measured with a temperature sensor is displayed, however The type of temperature compensation selected here is active during measuring operation. For the calibration, you must configure the desired compensation in the "Calibration" menu.
MTC temperature	-20.0 to 150.0 °C **Factory setting** 25.0 °C	Only available with pH and MTC or MTC+Temp selected in the previous field
Temperature sensor	Selection ▪ Pt100 ▪ Pt1000 ▪ NTC 30K **Factory setting** Pt100	Select the temperature sensor that matches your sensor
Adjust temp. reading	-5.00 to +5.00 °C **Factory setting** 0.00 °C	You can change/adjust the value currently measured with the temperature sensor. The temperature difference is stored internally as an offset value.
Offset value	-5.0 to +5.0 °C	You can edit or reset the offset value resulting from the previous field here.
Temperature compensation process		
Select medium compensation	Selection ▪ Select temp. table ▪ Edit table ▪ Reference temperature **Factory setting** Select temp. table	**Select temp. table:** You activate an existing table. **Edit table:** You create a specific table to suit your requirements. **Reference temperature:** You enter a temperature to which your measured values refer.

Function	Options	Info
Select temp. table		
Medium	Selection ▪ Medium 1 ▪ Medium 2 ▪ Medium 3 ▪ Off **Factory setting** Off	Select a medium. **Off:** No medium compensation
Edit table		
Medium for compensation curve	Selection ▪ Medium 1 ▪ Medium 2 ▪ Medium 3 **Factory setting** Medium 1	Select a medium. You can enter compensation curves in the form of tables for three different media.
Number of points	02 to 10 **Factory setting** 02	Specify the number of table points (value pairs) for the table.
Pairs	Activation and subsequent entry ▪ °C -20 to 150 °C ▪ pH -2.00 to 16.00 pH	Enter the temperature and the related pH/ ORP values of your medium (number of required value pairs = number of table points specified in the previous field).
Confirm	Selection ▪ OK ▪ Delete element(s)	Are the value pairs OK or do you want to delete elements? **Delete:** In the screen that follows, select the row to be deleted, delete with → and press E to confirm.
Table status information	Table valid	The table is active once E is pressed by way of confirmation. Cancel with PARAM.
Reference temperature		
Reference temperature	-20 to 150 °C **Factory setting** 25 °C	Enter the temperature to which the medium temperature shall be compensated. Here, enter the temperature at which the pH set point of the process is defined, (e.g. the ambient temperature in the laboratory).

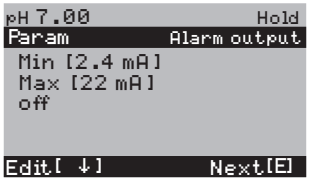
7.6.7 Set up 1 - Alarm

The transmitter continuously monitors the most important functions. When an error occurs, an error message is set that can trigger one of the following actions:
- The fault-signaling contact is made active.
- Current output 1 and 2 output the set error current (2.4 or 22 mA). Exception: If you selected the "Continuous controller" function for current output 2 (see "Set up 1 - Current output" section), this output does not output an error current.
- Chemoclean cleaning is started.

In the list of error messages in the Troubleshooting section, you can see how the error numbers are assigned according to the factory settings. However, in the "ALARM" menu, you have the option of outputting the error messages individually to the alarm relay, the current output or as a cleaning trigger.

Alarm menu

To enter the menu, select:
"PARAM > Specialist > Set up 1 > Alarm"

Function	Options	Info
Error current 	Selection ▪ Min (2.4 mA) ▪ Max (22 mA) ▪ Off **Factory setting** Max (22 mA)	Set the error current at which an error message is active.
Note	Current output 0 to 20 mA and error current = 2.4 mA is critical.	The error current is in the measured current range if the current range selected is "0 to 20 mA" and "Min" was selected in the previous field. Recommended combinations: ▪ Current range 0 to 20 mA and error current max (22 mA) ▪ Current range 4 to 20 mA and error current min (2.4 mA)
Alarm delay	0 to 2000 s **Factory setting** 0 s	Specify the delay time from when the error occurs to when the alarm is triggered.
Error/contact assignment	Activation and subsequent entry ▪ R (alarm relay) – On – Off ▪ I (error current) – On – Off ▪ CC (Chemoclean) – On – Off	The function the error triggers can be individually assigned to each error: **R:** Assignment to alarm relay. An activated error triggers an alarm. **I:** This error triggers an error current. **CC:** Chemoclean. This error triggers cleaning.
Dosage time alert	Activation and subsequent entry ▪ Function – On – Off ▪ Time 2 to 9999 s **Factory setting** Function: off Time: 2 s	Activate or deactivate the alarm if the dosage time is overshot. **Time:** Enter the maximum dosing time permitted. After this time has elapsed, an alarm is output.

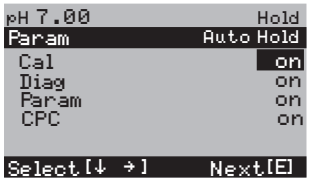
7.6.8 Set up 1 - Hold

The current outputs can be "frozen" for each menu. This means that the value which you define in this menu is output. With hold, "Hold" appears in the display. This function can also be activated externally via the Hold input (see the "Connecting external inputs" section). The on-site hold has a higher priority than an external hold.

Note the following points:
- If Topcal S is activated as the hold source, hold is active as soon as the assembly goes to the Service position.
- If a hold is active, no new automatic programs are started. They can be started externally or via local operation where necessary.
- You can deactivate Topcal S as the hold source (PARAM > Set up 1 > Hold > CPC off).
- If current output 2 is configured for the controller, it complies with the controller hold (see the last field in the table).

Hold menu

To enter the menu, select:
"PARAM > Specialist > Set up 1 > Hold"

Function	Options	Info
Activate hold 	Activation and subsequent selection ▪ CAL – On – Off ▪ DIAG – On – Off ▪ PARAM – On – Off ▪ CPC – On – Off **Factory setting** On	Specify the menus for which the automatic hold should be activated. **CAL:** Calibration **DIAG:** Service/diagnosis **PARAM:** Configuration menu **CPC on:** Hold is active if the assembly is in the Service position.
Hold current	Selection ▪ Last ▪ Fixed ▪ Min (0/4 mA) ▪ Max (22 mA) **Factory setting** Last	Specify which current value should be output in the event of a hold. **Last:**= The current value is "frozen". **Fixed:**= The value set in the next field is output in a hold. **Min / Max:** The minimum and maximum current value is output.
Fixed current	0 to 100% **Factory setting** 0 %	Only available if "Fixed" was selected in the previous field: Specify the hold current. The number can be set between 0 % = 0/4 mA and 100 % = 20 mA
Holdtime	0 to 999 s **Factory setting** 010 s	The hold remains active for the given holdtime after leaving the CAL, PARAM, DIAG menus. During the hold delay time, the "Hold" indicator flashes in the display.

Function	Options	Info
Controller hold	Selection Freeze actuating variable? ▪ On ▪ Off **Factory setting** Off	Specify whether the actuating variable (dosing) should be frozen during a hold. **On:** During an active hold, the last actuating variable is output. **Off:** During a hold, no dosing takes place. PWM or PFM relays remain in the dropped-out state. An actuator drive is controlled until it is closed. If the set value is output via an actuating variable with feedback, the actuator remains active. It also reacts in the hold should the position suddenly change.

7.6.9 Set up 1 - Calibration

pH operating mode

To enter the menu, select:
"PARAM > Specialist > Set up 1 > Calibration"

Function	Options	Info
Calibration	Selection ▪ Offset ▪ Manual calibration ▪ Special buffer table ▪ Cal. settings ▪ Calibration timer ▪ Autocal. Topcal **Factory setting** Offset	Select the initial settings for the calibration. **Offset:** Enter a fixed value by which the pH value is shifted. **Manual calibration:** Make initial settings for the function of the CAL key. **Special buffer table:** Edit tables for the special buffer. **Cal settings:** General calibration settings **Calibration timer:** Timer for calibration intervals **Autocal. Topcal:** Make initial settings for the Topcal S type of calibration.
Offset		
Enter the offset	Activation and subsequent entry ▪ Act. PV 1/2 -2.00 to 16.00 pH ▪ Offset 1/2 -2.00 to 2.00 pH **Factory setting** Offset: 0.00 pH	**Act. PV:** The current measured value (primary value) is displayed with an offset and can be edited. **Offset:** The pH value difference between the measured value and the displayed value is displayed and can be edited. If you start operation with a set offset value, "OFFSET" is shown on the top right of the display.
Manual calibration		
Calibration parameter	Selection ▪ Enter spec. buffer ▪ Manual buffer ▪ Buffer table ▪ Auto. buffer recognition **Factory setting** Buffer table	Specify the type of calibration with which calibration takes place when the "CAL" button is pressed. **Enter spec. buffer:** Entry of zero point and sensor slope. **Manual buffer:** During calibration, enter the buffer value. **Buffer table:** If the same buffer values are always used, you can select this function. **Auto. buffer recognition:** The Mycom S transmitter automatically recognizes the buffer values used.
Buffer type	Selection ▪ DIN 19267 ▪ E+H ▪ NBS / DIN 19266 ▪ Merck+Riedel ▪ Special buffer **Factory setting** E+H	Only available for "Buffer table" and "Auto. buffer recognition": Select the buffer type for onsite calibration. **Spec. buffer table:** The tables for special buffers, which are to be defined in the "Special buffer table" option, are used. You can find the buffer tables for the buffers on offer in the Appendix.
Buffer 1	Selection ▪ Buffer 2.0 ▪ Buffer 4.01 ▪ Buffer 6.98 ▪ Buffer 9.18 ▪ Buffer 10.90 (option depends on the buffer type) **Factory setting** Buffer 6.98	Only available for buffer table: Select the pH value for buffer 1 of the two-point calibration.

Function	Options	Info
Buffer 2	Selection ▪ Buffer 2.0 ▪ Buffer 4.01 ▪ Buffer 9.18 ▪ Buffer 10.90 (option depends on the buffer type) **Factory setting** Buffer 4.01	Only available for buffer table: Select the pH value for buffer 2 of the two-point calibration.
Special buffer		
Number of buffers	2 to 3 **Factory setting** 2	Enter the desired number of buffers. A minimum of 2 and a maximum of 3 user-specific buffers can be saved with a table. You must individually run through the following four fields for each buffer.
Select buffer	1 to 3 **Factory setting** 1	Select one of the buffer tables for editing.
Total pairs	2 to 10 **Factory setting** 10	Specify the desired number of table points (value pairs) for the buffer table. Pair: pH and temperature
Pairs	Activation and subsequent entry ▪ °C -20 to 150 °C ▪ pH -2.00 to 16.00 pH	Enter the temperature and the related pH values of your medium (number of required value pairs = number of table points specified in the previous field).
Confirm	Selection ▪ OK ▪ Delete element(s)	Are the value pairs OK or do you want to delete elements? **Delete:** In the screen that follows, select the row to be deleted, delete with → and press E to confirm.
Note	Table valid	The table is active once E is pressed by way of confirmation. Cancel with HAHAM.
Cal. settings		
Temperature compensation	Selection ▪ ATC ▪ MTC	Select the temperature compensation for the calibration. The setting is only active during calibration. During operation, the setting you selected in the "Temperature" menu applies.
Slope	5.00 to 57.00 mV/pH **Factory setting** 25.00 mV/pH	If the slope entered is undershot, an alarm (error no. 032 / E035) can be triggered (for error activation, see "Set up 1 - Alarm" section). Example: The specified slope of the electrode is 59 mV/pH at 25 °C. You enter 55 mV/pH as the slope here. Then an alarm can be triggered if the slope measured < 55 mV/pH. The upper limit value for the slope is programmed into the device. An alarm is triggered if a slope of 65 mV/pH is overshot.

Function	Options	Info
Zero point	0.05 to 2.00 pH **Factory setting** 1.30 pH	If the zero point deviates from the reference zero point by the value entered here, an alarm (Error No. 033) can be triggered (for error activation, see "Set up 1 - Alarm" section). Example: The specified zero point of the electrode is 7.00 pH (for electrode with pH 7 internal buffer). Enter 0.05 pH as the zero point deviation. Then an alarm can be triggered if the measured zero point is < 6.95 pH or > 7.05 pH.
SCC (Sensor Condition Check)	Selection ▪ On ▪ Off **Factory setting** Off	This function monitors the electrode status or the degree of electrode aging. Possible status messages: "Electrode OK", "Low wear" or "Replace electrode". The electrode status is updated after each calibration. When the "Replace electrode" message appears, an error message may be displayed (E040, E041). This function is only available for glass electrodes. If you combine a glass electrode and an ISFET sensor, you can use the SCC function without restriction. However, the function only monitors the glass electrode.
Isothermic compensation	Activation and subsequent entry ▪ Function – On – Off ▪ Uis 0.00 to 16.00 pH Factory setting Function: off Uis: 0.00 pH	Here, you activate the isothermic compensation and enter the isothermic intersection point (Uis). **Function off:** For E+H electrodes. **Function on:** Only if the isothermic intersection point ≠ zero point of the electrode. The bigger the difference between the isothermic intersection point and the zero point, the greater the measuring error in the event of temperature variations. **Uis:** Enter the intersection point at which the isotherms of the electrode meet. When you activate the isothermic compensation the electrode has to be calibrated before measuring.
Stability criteria	Activation and subsequent entry ▪ Threshold 01 to 10 mV ▪ Length 03 to 70 s **Factory setting** Threshold: 02 mV Length: 20 s	During calibration, the mV value may change during the given period ("duration") at maximum by the stated amount ("threshold"), so that the calibration is considered as stable. Therefore you can adjust accuracy and timing individually to your process.
Calibration timer		
Calibration timer	Activation and subsequent entry ▪ CAL timer – On – Off ▪ Warning 0001 to 9999 h Factory setting CAL timer: off Warning: 0001 h	If no calibration is undertaken in the set time, an error message appears (E115). **CAL timer on:** Activate the timer **Warning:** Enter the time within which the next calibration must take place. **Time:** Displays the remaining time until an error message appears (count down).

Function	Options	Info
Autocal. Topcal		
Calibration parameter	Selection ▪ Buffer table ▪ Auto. buffer recognition **Factory setting** Buffer table	Specify the type of calibration for automatic calibration. **Buffer table:** If the same buffer values are always used, you can select this function. **Auto. buffer recognition:** The Mycom S transmitter automatically recognizes the buffer values used. Automatic buffer recognition only works if glass electrodes are connected to both measuring circuits. If you are using an ISFET sensor, please calibrate with another calibration function.
Buffer type	Selection ▪ DIN 19267 ▪ E+H ▪ NBS / DIN 19266 ▪ Merck+Riedel ▪ Special buffer **Factory setting** E+H	Select a buffer type where the pH values specified are fixed. **Spec. buffer table:** The tables for special buffers, which are to be defined in the "Special buffer table" option, are used. You can find the buffer tables for the buffers on offer in the Appendix.
Buffer 1	Selection ▪ Buffer 2.0 ▪ Buffer 4.01 ▪ Buffer 6.98 ▪ Buffer 9.18 ▪ Buffer 10.90 (option depends on the buffer type) **Factory setting** Buffer 6.98	Select the pH value for buffer 1 of the two-point calibration.
Buffer 2	Selection ▪ Buffer 2.0 ▪ Buffer 4.01 ▪ Buffer 9.18 ▪ Buffer 10.90 (option depends on the buffer type) **Factory setting** Buffer 4.01	Select the pH value for buffer 2 of the two-point calibration.

ORP operating mode

To enter the menu, select:
"PARAM > Specialist > Set up 1 > Calibration"

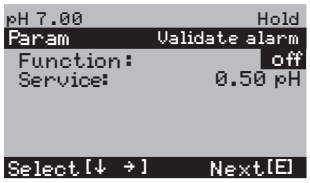
Function	Options	Info
Calibration	Selection ▪ Offset ▪ Manual calibration ▪ Cal. settings ▪ Calibration timer ▪ Autocal. Topcal **Factory setting** Offset	Select the initial settings for the calibration. **Offset:** Enter a fixed value by which the mV value is shifted. **Manual calibration:** Make initial settings for the function of the CAL key. **Cal settings:** General calibration settings **Calibration timer:** Timer for calibration intervals **Autocal. Topcal:** Make initial settings for the Topcal S type of calibration.
Offset		
Enter the offset	Activation and subsequent entry ▪ Act. PV 1/2 0000 to 1500 mV ▪ Offset 1/2 0000 to 1500 mV **Factory setting** Offset: 0000 mV	**Act. PV:** The current measured value (primary value) is displayed with an offset and can be edited. **Offset:** The mV value difference between the measured value and the displayed value is displayed and can be edited. If you start operation with a set offset value, "OFFSET" is shown on the top right of the display.
Manual calibration		
Calibration parameter	Selection ▪ Enter data abs. ▪ Calibration abs. ▪ Enter data rel. (only Redox/ ORP: % operating mode) ▪ Calibration rel. (only Redox/ ORP: % operating mode) **Factory setting** Enter data abs.	Specify the type of calibration with which calibration takes place when the "CAL" button is pressed. **Data entry abs.:** Enter the electrode offset in mV. **Calibration abs.:** Use a redox buffer **Enter data rel.:** Entry of two % calibration points to each of which one mV value is assigned. **Calibration rel.:** Use of a detoxified and unchanged sample as the buffer.
Cal. settings		
Zero point	1 to 1500 mV **Factory setting** Function: off Maintenance: 10.50 pH Failure: 11.00 pH	If the zero point deviates from the reference zero point by the value entered here, an alarm (Error No. 033) can be triggered (for error activation, see "Set up 1 - Alarm" section).
SCC (Sensor Condition Check)	Selection ▪ On ▪ Off **Factory setting** Off	This function monitors the electrode status or the degree of electrode aging. Possible status messages: "Electrode OK", "Low wear" or "Replace electrode". The electrode status is updated after each calibration. When the "Replace electrode" message appears, an error message may be displayed (E040, E041). This function is only available for glass electrodes. If you combine a glass electrode and an ISFET sensor, you can use the SCC function without restriction. However, the function only monitors the glass electrode.

Function	Options	Info
Stability criteria	Activation and subsequent entry ▪ Threshold 01 to 10 mV ▪ Length 03 to 70 s **Factory setting** Threshold: 02 mV Length: 10 s	During calibration, the mV value may change during the given period ("duration") at maximum by the stated amount ("threshold"), so that the calibration is considered as stable. Therefore you can adjust accuracy and timing individually to your process.
Calibration timer		
Calibration timer	Activation and subsequent entry ▪ CAL timer – On – Off ▪ Warning 0001 to 9999 h Factory setting CAL timer: off Warning: 0001 h	If no calibration is undertaken in the set time, an error message appears (E115). **CAL timer on:** Activate the timer **Warning:** Enter the time within which the next calibration must take place. **Time:** Displays the remaining time until an error message appears (count down).
Autocal. Topcal		
Calibration solution	-1500 to 1500 mV **Factory setting** 450 mV	Specify the calibration solution for automatic Topcal calibration.

7.6.10 Set up 1 - Topcal validation function

If you are using a pH electrode, you can use the validation function to check whether there is a deviation between the target and actual value of your measurement and whether calibration is necessary. Various buffers (P1, P2) are pumped into the rinse chamber of the retractable assembly for this purpose. The pH value measured here is compared with the specified pH value of the buffer. Any deviation computed is saved in the validation logbook.

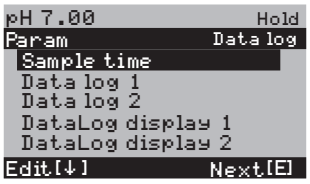
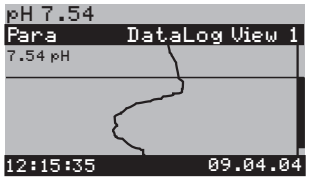
To enter the menu, select:
"PARAM > Specialist > Set up 1 > Val. fct. Topcal"

Function	Options	Info
Validate alarm 	Activation and subsequent selection ▪ Function – On – Off ▪ Maintenance 0.00 to 5.00 pH **Factory setting** Function: off Maintenance: 0.50 pH	Select the deviation between the actual and target pH value that should trigger an alarm.
Validation program	Activation and subsequent selection ▪ Template – Val. P1 – Val. P2 – Val. P1/P2 – Val+Cal ▪ Trgt. – User prog. 1 – User prog. 2 – User prog. 3 – No prog.	Select a template for the validation. Select a user program as the target. The corresponding user program is then overwritten by the validation program.

7.6.11 Set up 2 - Data log

The data log records two freely selectable parameters with their date and time. You can start it using the measuring menus: Use the arrow keys to scroll through the measuring menus until you reach the Record mode of the data log. Pressing the key brings you to the Scroll mode of the data log. Here you can open the saved measured values with their date and time.

To enter the menu, select:
"PARAM > Specialist > Set up 2 > Data log"

Function	Options	Info
Data log 	Selection ▪ Sample time ▪ Data log 1 ▪ Data log 2 ▪ DataLog display 1 ▪ DataLog display 2 **Factory setting** Sample time	Using the data log you can record ▪ one parameter with 500 sequential measuring points ▪ two parameters each with 500 sequential measuring points.
Sample time		
Enter the sample time	2 to 36000 s **Factory setting** 00005 s	Enter the time interval after which the next measured value is recorded in the data logger.
Data log		
Data log 1 (or 2)	Activation and subsequent entry ▪ Input – pH/mV input 1 – Temp ▪ Function – On – Off **Factory setting** Input: pH/mV input 1 Function: off	Select the measured value to be recorded and activate the function with "On".
Recording range	Activation and subsequent entry ▪ Min -2.00 to 16.00 pH -1500 to 1500 mV -50 to 150 °C ▪ Max -2.00 to 16 pH -1500 to 1500 mV -50 to 150 °C **Factory setting** Min: 2.00 pH Max. 12.00 pH	Specify the recording range. Values outside the range defined here are not recorded.
DataLog display		
		View of recorded data You can call up the data recorded in the past with the date and time.

7.6.12 Set up 2 - Check systems

SCS electrode monitoring
The Sensor Check System monitors the pH and reference electrode for incorrect measurement and complete failure.

SCS identifies the following reasons for incorrect measurement:
- Electrode glass breakage
- Fine short circuits in the pH measuring circuit, also e.g. moisture or dirt bridges at terminal points
- Contamination or clogging of the reference electrode
- Leak current for ISFET sensor

The following three monitoring methods are used:
- Monitoring the pH electrode for high resistance (alarm if a minimum impedance is undershot, approx. 500 kΩ).
  This function cannot be selected for antimony and ISFET electrodes.
- Monitoring of impedance of the reference electrode (alarm if set threshold value overshot).
  This function can only be selected for symmetrically high-resistance measurement.
- Monitoring of leak current for ISFET sensors (early warning E168 at I_{LEAK} > 200 nA, error E008 at I_{LEAK} > 400 nA).

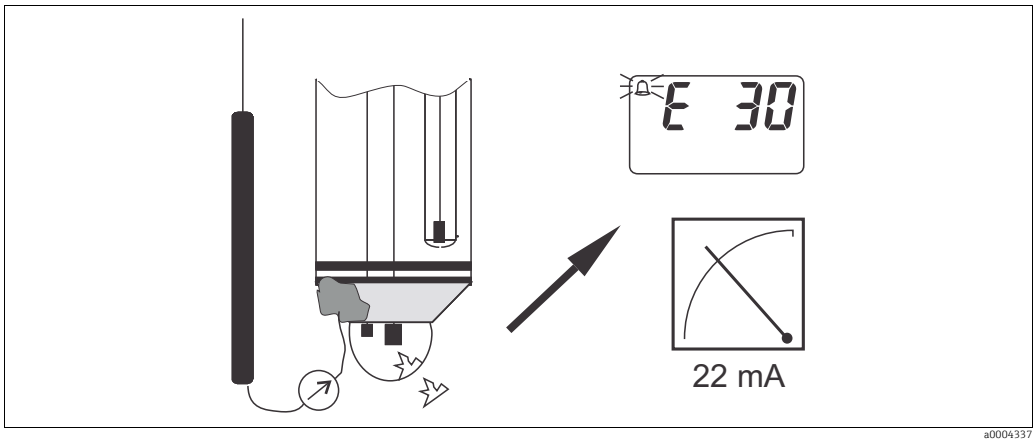


Fig. 53: SCS alarm

NOTICE
Incorrect handling triggers false alarm
▶ Do not remove standard electrodes from the process without a hold! Since SCS is measured against PML, no contact between the inner conductor and PML would otherwise trigger an alarm. In the case of digital sensors, SCS is not measured against PML.

PCS alarm (Process Check System)

The PCS monitors the measuring signal for changes. If the measuring signal does not change by more than 0.5% (of full scale value of the selected measuring range) during the time entered, an alarm (E152) is triggered. The reason for such sensor behavior can be contamination, cable rupture or similar.

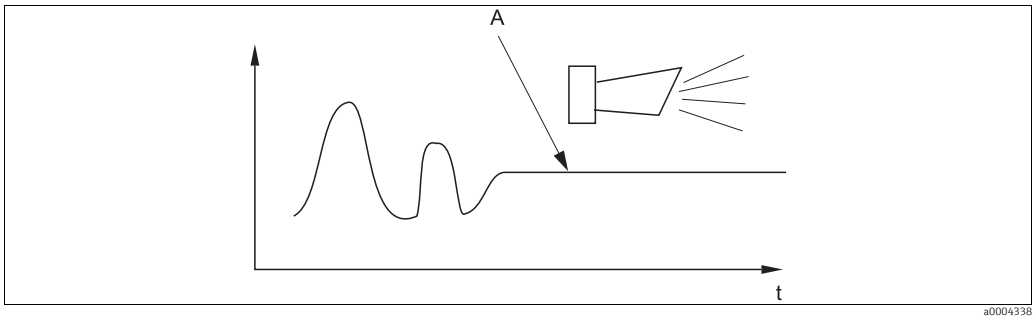


Fig. 54: PCS alarm (live check)

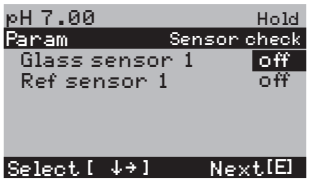
A Constant measuring signal = alarm triggered after PCS alarm time has elapsed

Note the following points:

- The electrode must be symmetrically connected (with PML) to monitor the reference.
- Any PCS alarm pending is automatically deleted as soon as the sensor signal changes.
- Due to its semiconductor component, the ISFET sensor is sensitive to light and responds with measured value fluctuations. For this reason, avoid direct sunlight when calibrating and operating. Normal ambient light does not affect measurement.

Check menu

To enter the menu, select:
"PARAM > Specialist > Set up 2 > Check"

Function	Options	Info
SCS (Sensor Check System) 	Activation and subsequent entry ▪ SCS – On – Off ▪ Ref sensor – Off – light – medium – heavy – very heavy blockage **Factory setting** Glass sensor 1: Off Ref. sensor 1: Off	Select the check mode. **SCS:** Glass breakage detection **Ref. sensor:** Blockage detection
PCS (Process Check System)	Activation and subsequent entry ▪ PCS input – Off – 1 h – 2 h – 4 h **Factory setting** Off	If the measuring signal does not change during the entered time by ±0.02 pH / ±5mV / ±0.25%, an alarm is signaled with error message E152. Note! An active PCS alarm signal will be deleted automatically as soon as the sensor signal changes.

7.6.13 Set up 2 - Controller settings

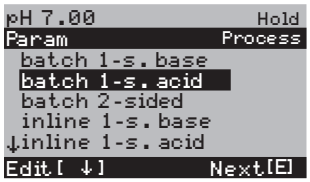
The following sections describe the controller configuration of the transmitter.

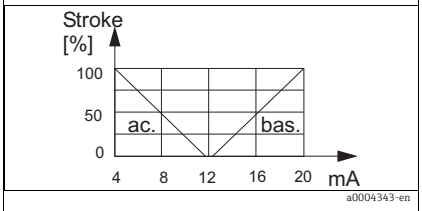
Transmitter configuration
Please configure the transmitter relays in the following order:

1. Actuators
2. Sensory mechanism
3. Characteristic

In the user settings (see below) you switch directly to a controller simulation and can check the settings made and change them if necessary.

To enter the menu, select:
PARAM > Specialist > Set up 2 > Controller settings"

Function	Options	Info
Process 	Selection ▪ Batch 1-s. base ▪ Batch 1-s. acid ▪ Batch 2-sided ▪ Inline 1-s. base ▪ Inline 1-s. acid ▪ Inline 2-sided **Factory setting** Batch 1-s. base	Select the process type that describes your process. **One-sided:** Control using acid or base. **Two-sided:** Control using acid and base. You can only select this function if you have defined two controllers (in the "Relays" menu and/or via the current output 2).
External hardware	Selection ▪ Actuators ▪ Characteristic **Factory setting** Characteristic	For correct operation, you must completely configure these submenus. **Type:** Here, you can select and configure the method which the controller uses to output the actuating variable. **Characteristic:** Here, you enter the controller parameters (neutral zone, set point, etc.). With this selection, you can also reach the "active measuring menu".
Type for "1-sided"		
Control type	Selection ▪ Pulse length ▪ Pulse frequency ▪ Current output (only if the "Continuous controller" option is selected for current output 2)	Select the type of control for your process.
Pulse length		
Actuator	Activation and subsequent entry ▪ Relay: n. c., Rel. x ▪ Period 001.0 to 999.9 s ▪ Min. off time 000.4 to 100.0 s **Factory setting** Relay: n.c. Period: 010.0 s Min. off time: 000.4 s	Select the settings for the actuator. **Relay:** Select the relay; you can choose from the relays that you assigned to the controller in "Set up 1 - Relays". **Period:** Period length T in seconds **Min. off time:** Minimum switch-on time; shorter pulses are not forwarded to the relay and therefore conserve the actuator.
Pulse frequency		

Function	Options	Info
Actuator	Activation and subsequent entry ▪ Relay: n. c., Rel. x ▪ Max. frequency 060 to 120 min^{-1} **Factory setting** Relay: n.c. Max. frequency: 120 min^{-1}	Select the settings for the actuator. **Relay:** Select the relay; you can choose from the relays that you assigned to the controller in "Set up 1 - Relays". **Max. pulse frequency:** Enter the maximum pulse frequency; pulses with a higher frequency are not forwarded to the relay.
Current output		
Current range	Selection ▪ 0 to 20 mA ▪ 4 to 20 mA **Factory setting** 4 to 20 mA	Select the current range to be output at the current output.
Current value	Selection ▪ 20 mA ▪ 0/4 mA **Factory setting** 0/4 mA	Assign the current value that corresponds to 100 % dosing medium provision.
Type for "2-sided"		
Control signal (only possible if you selected the continuous controller under current output 2)	Selection ▪ 1 output ▪ 2 outputs **Factory setting** 2 outputs	**1 output:** For control using the current output in the "split range" method. Control logics are required which can control two valves/pumps via one current input. **2 outputs:** The valves are controlled by relays.
1 output		
Current range	Selection ▪ 0 to 20 mA ▪ 4 to 20 mA **Factory setting** 4 to 20 mA	Select the current range to be output at current output 2. The neutral position (= current value which the controller outputs when it is not dosing) is in the middle of the selected range. For 0 to 20 mA, the neutral position is at 10 mA, for 4 to 20 mA at 12 mA.
Current value	Selection ▪ 20 mA ▪ 0/4 mA **Factory setting** 0/4 mA	Assign the current value that corresponds to 100 % of acid dosing. Note! From the current value selection for the dosing of 100 % acid, you can derive the current ranges for acid/base dosing (see Fig. 55) in the "Split range" method.  *Fig. 55: Two-sided control via one current output*

Function	Options	Info
2 outputs		
Control type	Activation and subsequent entry ▪ Acid – Pulse length – Pulse frequency ▪ Alkali – Pulse length – Pulse frequency **Factory setting** Acid: Pulse length Base: Pulse length	Select the type of control for your process.
For acid/base dosing in each case: Actuator (only for pulse length)	Activation and subsequent entry ▪ Relay: n. c., Rel. x ▪ Period 001.0 to 999.9 s ▪ Min. off time 000.4 to 100.0 s **Factory setting** Relay: n.c. Period: 010.0 s Min. off time: 000.4 s	Select the settings for the actuator. **Relay:** Select the relay; you can choose from the relays that you assigned to the controller in "Set up 1 - Relays". **Period:** Period length T in seconds **Min. off time:** Minimum switch-on time; shorter pulses are not forwarded to the relay and therefore conserve the actuator.
For acid/base dosing in each case: Actuator (only for pulse frequency)	Activation and subsequent entry ▪ Relay: n. c., Rel. x ▪ Max. frequency 060 to 120 min^{-1} **Factory setting** Relay: n.c. Max. frequency: 120 min^{-1}	Select the settings for the actuator. **Relay:** Select the relay; you can choose from the relays that you assigned to the controller in "Set up 1 - Relays". **Max. pulse frequency:** Enter the maximum pulse frequency; pulses with a higher frequency are not forwarded to the relay.
Characteristic		
Characteristic type	Selection ▪ Linear ▪ Segmented	Select the characteristic type. **Linear characteristic:** Corresponds to a constant control gain. **Segmented characteristic:** Corresponds to a range-dependent control gain.
Linear characteristic		
Settings	Activation and subsequent entry ▪ Start neutral zone -2.00 to 7.00 pH ▪ End neutral zone 7.00 to 16.00 pH ▪ Control point -2.00 to 16.00 pH (depends on start neutral and end neutral zone) ▪ K_R 1 00.00 to 99.99 ▪ K_R 2 00.00 to 99.99 **Factory setting** Start neutral: 6.50 pH End neutral: 7.50 pH Control point: 7.00 pH K_R 1: 01.00 K_R 2: 01.00	Select the settings for linear control gain. **Control point:** The value that is to be set. **Start neutral:** Start neutral zone **End neutral:** End neutral zone **K_R 1** (only with base dosing): gain for base dosing **K_R 2** (only with acid dosing): gain for acid dosing

Function	Options	Info
Process speed	Selection ▪ Fast process ▪ Standard process ▪ Slow process ▪ User settings **Factory setting** Fast process	Select the speed of the process. If you have no experience in setting control parameters, these defaults fast/standard/ slow process are intended as an aid to adapting the controller behavior to the process. Select a default and use the "controller simulation" (see below) to check if these settings are relevant for your process. Enter all the characteristic values yourself with the user settings.
Values for user settings (only if "User settings" is selected for the process speed)	Activation and subsequent entry ▪ K_R 1 00.00 to 99.99 ▪ K_R 2 00.00 to 99.99 ▪ Tn 1 000.0 to 999.9 ▪ Tn 2 000.0 to 999.9 ▪ Tv 1 000.0 to 999.9 ▪ Tv 2 000.0 to 999.9 **Factory setting** K_R 1: 01.00 K_R 2: 01.00 Tn 1: 000.0 Tn 2: 000.0 Tv 1: 000.0 Tv 2: 000.0	Enter the characteristic values for the user settings. (Index 1 only for base dosing, index 2 only for acid dosing) **K_R 1**: Gain for base dosing **K_R 2**: Gain for acid dosing **Tn:** Integral action time **Tv:** Derivative action time
Controller simulation	Selection ▪ On ▪ Off **Factory setting** Off	Here, you can switch a configuration loop on or off. The hold is removed with an active controller simulation. **Simulation on:** The characteristic values entered in the previous field are used in the next field for simulating the controller behavior. **Off:** Press E to leave the controller simulation.
Simulation on	Activation and subsequent entry ▪ Function – automatic – manual ▪ Set -2.00 to 16 pH ▪ Act. ▪ y -100 to 100 % (only if function = manual)	**Function:** Here, you set whether a set value calculated by the controller ("auto"), or a set value y entered by the user ("manual") is to be output. **Set:** Displays the current set point. If necessary, you can change the set point. The other points (start/end of neutral zone, optimization points, control points) change accordingly. **Act:** Displays the current actual/measured value. **y:** With the "auto" function: Displays the set value determined by the controller. With the "manual" function, you can enter a set value here. Values < 0 % mean a dosing of acid, values > 0 % mean a dosing of base.

Function	Options	Info
Segmented curve		
Settings	Activation and subsequent entry ▪ Start neutral zone -2.00 to 7.00 pH ▪ End neutral zone 7.00 to 16.00 pH ▪ Control point -2.00 to 16.00 pH (depends on start neutral and end neutral zone) ▪ Opt. pt. X1 2.00 to 7.00 pH (depends on start neutral zone) ▪ Opt. pt. Y1 00.00 to 99.99 ▪ Opt. pt. X2 7.00 to 16.00 pH (depends on end neutral zone) ▪ Opt. pt. Y2 00.00 to 99.99 ▪ Ctrl.pnt.1 2.00 to 7.00 pH (depends on opt. pt. X1) ▪ Ctrl.pnt. 2 7.00 to 16.00 pH (depends on opt. pt. X2) **Factory setting** Start neutral: 6.50 pH End neutral: 7.50 pH Control point: 7.00 pH Opt. pt X1: 05.00 pH Opt. pt Y1: 0.20 Opt. pt X2: 09.00 pH Opt. pt Y2: -0.20 Control point 1: 02.00 pH Control point 2: 12.00 pH	Enter the characteristic values for range-dependent control gain. **Control point:** The value that is to be set. **Start neutral:** Start neutral zone **End neutral:** End neutral zone **Optimization point 1 and 2:** Entry with x and y coordinates **Control point 1:** For measured values < control point 1, the dosing is 100% base. **Control point 2:** For measured values > control point 2, the dosing is 100% acid.
Parameter	Activation and subsequent entry ▪ Tn 1 000.0 to 999.9 ▪ Tn 2 000.0 to 999.9 ▪ Tv 1 000.0 to 999.9 ▪ Tv 2 000.0 to 999.9 **Factory setting** Tn 1: 000.0 Tn 2: 000.0 Tv 1: 000.0 Tv 2: 000.0	Enter the parameters for the segmented curve. (Index 1 only for base dosing, index 2 only for acid dosing) **Tn:** Integral action time **Tv:** Derivative action time
Controller simulation	Selection ▪ On ▪ Off **Factory setting** Off	Here, you can switch a configuration loop on or off. The hold is removed with an active controller simulation. **Simulation on:** The characteristic values entered in the previous field are used in the next field for simulating the controller behavior. **Off:** Press E to leave the controller simulation.

Function	Options	Info
Simulation on	Activation and subsequent entry ▪ Function – automatic – manual ▪ Set -2.00 to 16 pH ▪ Act. ▪ y -100 to 100 % (only if function = manual)	**Function:** Here, you set whether a set value calculated by the controller ("auto"), or a set value y entered by the user ("manual") is to be output. **Set:** Displays the current set point. If necessary, you can change the set point. The other points (start/end of neutral zone, optimization points, control points) change accordingly. **Act:** Displays the current actual/measured value. **y:** With the "auto" function: Displays the set value determined by the controller. With the "manual" function, you can enter a set value here. Values < 0 % mean a dosing of acid, values > 0 % mean a dosing of base.

To best adapt the controller parameters to the process, we recommend the following:

1. Set values for the controller parameters ("Settings for user" field for linear curve or "Parameter" field for segmented curve).
2. Deflect the process.
   "Simulation" field: Set function to "Manual" and enter a set value. Using the actual value, you can observe how the process is deflected.
3. Switch the function to "auto". Now you can observe how the controller returns the actual value to the set point.
4. If you want to set other parameters, press the "Enter" key and you will return to the "Characteristic value for user settings" field. During this time, the controller continues to run in the background.
5. Press the "Enter" key to return to the "Select controller simulation" field, where you can continue or exit the simulation.

Always exit controller simulation with "Simulation off" in the "Select simulation" field. Otherwise, the simulation will continue to run in the background.

7.6.14 Set up 2 - Limit switch

The transmitter has several possibilities for assigning a relay contact.
Switch-on and switch-off points and pickup and dropout delays can be assigned to the limit contactor. In addition, you can configure an alarm threshold to output an error message and to start a cleaning function in conjunction with this.
These functions can be used for both the primary value and for temperature measurement.

Please refer to Abb. 56 for a clear illustration of the relay contact states.

- When the measured values increase (maximum function), the relay contact is closed as of t_2 after the switch-on point (t_1) has been overshot and the pickup delay has elapsed (t_2 - t_1).
  The alarm contact switches if the alarm threshold (t_3) is reached and the alarm delay (t_4 - t_3) has also elapsed.
- When the measured values decrease, the alarm contact is reset when the alarm threshold (t_5) is undershot as is the relay contact (t_7) after the dropout delay (t_7 - t_6).
- If the pickup and dropout delays are set to 0 s, the switch-on and switch-off points are also switch points of the contacts.

Settings can also be made for a minimum function in the same way as for a maximum function.

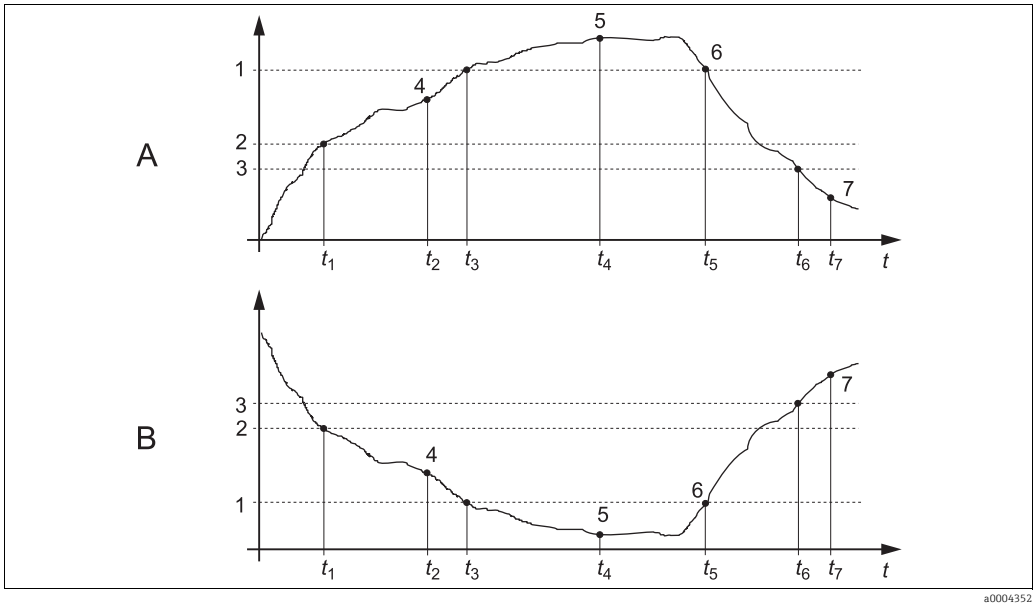


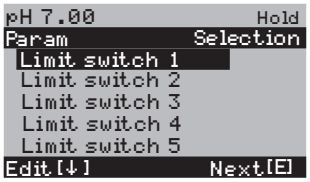
Fig. 56: Illustration of the alarm and limit value functions

A Switch-on point > switch-off point: Max. function
B Switch-on point < switch-off point: Min. function

1 Alarm threshold
2 Switch-on point
3 Switch-off point
4 Contact ON
5 Alarm ON
6 Alarm OFF
7 Contact OFF

Limit switch menu

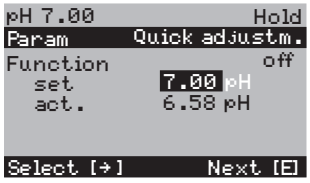
To enter the menu, select:
"PARAM > Specialist > Set up 2 > Limit switch"

Function	Options	Info
Limit switch 	Selection ▪ Limit switch 1 ▪ Limit switch 2 ▪ Limit switch 3 ▪ Limit switch 4 ▪ Limit switch 5	Select the limit switch that you want to configure. There are five limit contactors available.
Limit switch 1 to 5	Activation and subsequent entry ▪ Function – On – Off ▪ Assign – pH/mV input 1 – Temperature input 1 ▪ On-value: -2.00 to 16.00 pH -1500 to 1500 mV -3000 to 3000% -50 to 150 °C ▪ Off-value -2.00 to 16.00 pH -1500 to 1500 mV -3000 to 3000% -50 to 150 °C **Factory setting** Function: off Assign: pH/mV input On-value: 16.00 pH Off-value: 16.00 pH	Configure the limit switch. **Function:** Activate the function as a limit switch **Assign:** Select the measured value for which the limit value should apply. **On-value:** Entry of the value at which the limit value function is activated. **Off-value:** Entry of the value at which the limit value function is deactivated.
Limit switch configuration	Activation and subsequent entry ▪ On delay 0 to 2000 s ▪ Off delay 0 to 2000 s ▪ Alarm limit -2.00 to 16.00 pH -1500 to 1500 mV -3000 to 3000% -50 to 150 °C **Factory setting** On delay: 0 s Off delay: 0 s Alarm limit: 16.00 pH	Configure the delays and the alarm limit for the limit switch. **On delay:** Entry of the switch-on delay **Off delay:** Entry of the switch-off delay **Alarm limit:** Entry of the value at which the fault signalling contact switches.

7.6.15 Set up 2 - Controller quick adjustment

In this menu, you can make a quick adjustment to the controller set point:

To enter the menu, select:
"PARAM > Specialist > Set up 2 > Contr. quick adj."

Function	Options	Info
Controller quick adjustment 	Activation and subsequent entry ▪ Set point -1.64 to 15.64 pH	Enter the set point for the controller function.

7.6.16 Set up 2 - Topcal

Use this menu item to configure the cleaning and calibration cycles and how cleaning and calibration are triggered.

Configuration of the programs

The following cleaning and calibration programs are available in Topcal S:
- Clean: Predefined program for cleaning the sensor
- Clean S: Predefined program for cleaning and sterilizing the sensor
- Clean C: Predefined program for cleaning and calibrating the sensor
- Clean CS: Predefined program for cleaning, calibrating and sterilizing the sensor
- User 3: Predefined program with short program times to verify the system quickly
- User 1/2: Free program slots without predefined program steps

The predefined programs aim to make programming easy. You can, however, configure all the programs as you wish to adapt them optimally to your needs and requirements.
To configure the programs, select "PARAM > Set up 2 > Topcal > Config. Topcal > Prog. editor".

In the programs, you can use external additional valves as required, e.g. for superheated steam, a second cleaner, cooling air, organic cleaners etc. You control the additional valves with the "Valve x open", "Valve x closed" program steps.

Control of cleaning and calibration programs

You can choose from the following ways to control cleaning and calibration programs:
- Automatic:
  Weekly program that automatically starts the selected cleaning program for every weekday. You can freely select the programs for every weekday.
- Cleaning:
  Select the cleaning program that is started in the event of an SCS alarm (see "Set up 2 - Check systems" section) or an error message that has been configured accordingly (see "Set up 1 - Alarm" section).
- Power failure program:
  Select the cleaning program that is automatically started after a power supply, air supply or communication failure.
- Ext. control:
  The cleaning and calibration programs can be started via a process control system. The program is started by a 3-bit signal. Please refer to the table in the "Function overview of the cleaning and calibration programs" section for the binary encoding of the individual programs. Please refer also to the "Connecting the external inputs and outputs to the control unit" section for the electrical connection of the binary encoding for an external program start.

  The appendix contains a wiring example for external control of the cleaning programs.

Activating the control types

To activate a control mode for the cleaning and calibration programs, switch on the desired function. To do so, select "PARAM > Set up 2 > Topcal > Activate Topcal".

Interval cleaning and calibration

With the interval program, you can start any cleaning or calibration program in a set timeframe (max. 1 day) at defined intervals. The program sequence is illustrated in Fig. 57.

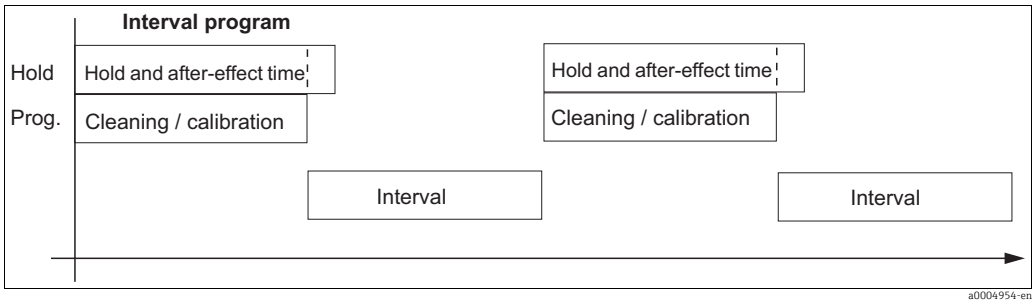


Fig. 57: Interval program sequence

Select the program and the interval between individual program starts under "PARAM > Set up 2 > Topcal > Config. Topcal > Interv. prog.".
This program for interval cleaning is only available with the "Automatic" control type.

In practice, two different operating modes are used - interval measuring and interval cleaning:

- In the case of interval cleaning, the sensor is mainly in the process. The sensor is cleaned at the specified intervals.
  Configuration example for interval cleaning
  1. Select "PARAM > Set up 2 > Topcal > Config. Topcal > Interv. prog.".
  2. Select the "Clean" program along with its factory settings as the interval program.
  3. Enter "10800 s" as the interval time.

  The sensor measures for 3 hours and is then taken out of the process and cleaned. It is then put back into the process for another 3 hours.
- In the case of interval measuring, the sensor is mainly in the service position (aggressive media). It is then moved into the process for measuring at the specified intervals.
  Configuration example for interval measurement
  1. Edit the "Clean" program. For this purpose, select "Set up 2 > Topcal > Config. Topcal > Prog. editor".
  2. Select the "Clean" program.
  3. Select "Edit".
     – Enter "Assembly measuring" as the first program step.
     – Enter "Wait" as the second program step.
     – Delete the last program step "Assembly measuring".
  4. Press PARAM to return to the higher-level program group.
  5. Select "Setup".
     Set a time of 180 seconds for the second program step "Wait".
  6. Press PARAM to go back until you can select "Interv. program".
     – Select "Clean" for the program.
     – Select "10800 s" for the interval time.

  Every three hours, the sensor is moved into the process to measure for three minutes.

Aborting the program

Once a program has been started (Clean, Clean C, Clean S, Clean CS), it goes through the entire cycle (safety concept). No other programs can be started during this time.
The service switch on the front door of the control unit is of highest priority. If you move the switch to the "Service" position, you can even interrupt running programs.
The interval program can be interrupted by a steady signal at the "Automatic stop" digital input. For this, the assembly must be in the "Measure" position. When the signal at the aforementioned input has stopped, the interval program is continued.

Control of cleaning and calibration programs via binary contacts

Program	bin. 0	bin. 1	bin. 2
	Term. 81/82	Term. 83/84	Term. 85/86
Clean (cleaning)	1	0	0
Clean C (cleaning + calibration)	0	1	0
Clean S (cleaning + sterilization)	0	0	1
Clean CS (cleaning + calibration + sterilization)	1	1	0
User 1 (user definable)	1	0	1
User 2 (user definable)	0	1	1
User 3 (user definable)	1	1	1

- "1" = Voltage of 10 to 40 V (duration approx. 400 mS) applied at contacts bin 0 to bin 2 (terminals 81 to 86). For non-Ex devices, this auxiliary energy can be taken from the 15 V auxiliary voltage output of Mycom S CPM153.
- "0" = 0 V

Standard program sequences

Clean			Clean C			Clean S			Clean CS			User 3 (quick test)		
01	Assembly service		01	Assembly service		01	Assembly service		01	Assembly service		01	Assembly service	
02	Water	60 s	02	Water	60 s	02	Valve 1	open	02	Water	60 s	02	Water	10 s
03	Cleaner	3 s	03	Cleaner	3 s	03	Wait	1200 s	03	Cleaner	3 s	03	Compressed air	10 s
04	Wait	120 s	04	Wait	120 s	04	Valve 1	closed	04	Wait	120 s	04	Cleaner	2 s
05	Water	60 s	05	Water	60 s	05	Wait	600 s	05	Water	60 s	05	Wait	5 s
06	Compressed air	20 s	06	Compressed air	20 s	06	Repeat steril.	0x	06	Compressed air	20 s	06	Pump buffer 1	2 s
07	Rep. cleaning	1x	07	Rep. cleaning	1x	07	Assembly meas.		07	Repeat clean.	1x	07	Wait	5 s
08	Assembly meas.		08	Pump buffer 1	3 s	08			08	Pump buffer 1	3 s	08	Pump buffer 2	2 s
09			09	Wait	300 s	09			09	Wait	300 s	09	Wait	5 s
10			10	Cal. buffer 1		10			10	Cal. buffer 1		10	Valve 1	open
11			11	Water	60 s	11			11	Water	60 s	11	Wait	5 s
12			12	Compressed air	20 s	12			12	Compressed air	20 s	12	Valve 1	closed
13			13	Pump buffer 2	3 s	13			13	Pump buffer 2	3 s	13	Wait	5 s
14			14	Wait	300 s	14			14	Wait	300 s	14	Valve 2	open
15			15	Cal. buffer 2		15			15	Cal. buffer 2		15	Wait	5 s
16			16	Water	60 s	16			16	Water	60 s	16	Valve 2	closed
17			17	Compressed air	20 s	17			17	Compressed air	120 s	17	Wait	5 s
18			18	Assembly meas.		18			18	Valve 1	open	18	Compressed air	15 s
19			19			19			19	Wait	1200 s	19	Assembly meas.	
20			20			20			20	Valve 1	closed			
21			21			21			21	Wait	600 s			
22			22			22			22	Repeat steril.	0x			
23			23			23			23	Assembly meas.				
24			24			24			24					
25			25			25			25					
26			26			26			26					
27			27			27			27					
28			28			28			28					

Optional program sequences

User 1 - User2*	Val. P1			Val. P2			Val. P1/2			Val+Cal.		
01	01	Assembly service		01	Assembly service		01	Assembly service		01	Assembly service	
02	02	Water	60 s	02	Water	60 s	02	Water	60 s	02	Water	60 s
03	03	Cleaner	3 s	03	Cleaner	3 s	03	Cleaner	3 s	03	Cleaner	3 s
04	04	Wait	120 s	04	Wait	120 s	04	Wait	120 s	04	Wait	120 s
05	05	Water	60 s	05	Water	60 s	05	Water	60 s	05	Water	60 s
06	06	Compressed air	20 s	06	Compressed air	20 s	06	Compressed air	20 s	06	Compressed air	20 s
07	07	Back to 2	1x	07	Back to 2	1x	07	Back to 2	1x	07	Back to 2	1x
08	08	Pump buffer 1	3 s	08	Pump buffer 2	3 s	08	Pump buffer 1	3 s	08	Pump buffer 1	3 s
09	09	Wait	60 s	09	Wait	60 s	09	Wait	60 s	09	Wait	60 s
10	10	Val. buffer 1		10	Val. buffer 2		10	Val. buffer 1		10	Val. buffer 1	
11	11	Water	60 s	11	Water	60 s	11	Water	60 s	11	Cal. buffer 1	
12	12	Compressed air	20 s	12	Compressed air	20 s	12	Compressed air	20 s	12	Water	60 s
13	13	Assembly meas.		13	Assembly meas.		13	Pump buffer 2	3 s	13	Compressed air	20 s
14	14			14			14	Wait	60 s	14	Pump buffer 2	3 s
15	15			15			15	Val. buffer 2		15	Wait	60 s
16	16			16			16	Water	60 s	16	Val. buffer 2	
17	17			17			17	Compressed air	20 s	17	Cal. buffer 2	
18	18			18			18	Assembly meas.		18	Water	60 s
19	19			19			19			19	Compressed air	20 s
20	20			20			20			20	Assembly meas.	
21 (up to 28 program steps possible)	21			21			21			21		
22	22			22			22			22		

* In the case of ORP measurement, the "RedoxCal" program is provided instead of the "User 1" program (see the following page).

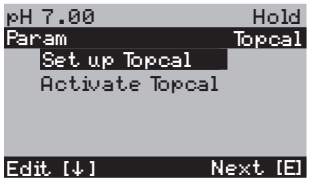
Programs for the redox/ORP operating mode

You cannot calibrate with the Clean C and Clean CS calibration programs in the redox/ORP operating mode. Instead, you can use the "Redox Cal." program in the User program 1.

RedoxCal		
01	Assembly service	
02	Water	60 s
03	Cleaner	3 s
04	Wait	120 s
05	Water	60 s
06	Compressed air	20 s
07	Back to 2	1x
08	Pump buffer 1	3 s
09	Wait	60 s
10	Cal. buffer 1	15 s
11	Water	60 s
12	Compressed air	20 s
13	Assembly meas.	
14		
15	(up to 28 program steps possible)	

Configuration menu

To enter the menu, select:
"PARAM > Specialist > Set up 2 > Topcal"

Function	Options	Info
Select function 	Selection ▪ Config. Topcal ▪ Activate Topcal **Factory setting** Config. Topcal	**Set up:** Create or edit a Topcal program. **Activate:** Switch Topcal functions on or off.
Configuration		
Note	Automatic: off Clean trigger: off Ext. control: off	Current system status
Valve name V1 (or V2)	0 to 9; A to Z **Factory setting** Valve 1 (or 2)	You can enter names (max. eight characters) for the additional valves. These names are automatically adopted with the program steps.
Function of the cleaning system	Selection ▪ Automatic ▪ Interval program ▪ Cleaning ▪ Power failure program ▪ Prog. editor **Factory setting** Automatic	Select **Prog. editor** to adapt the cleaning or calibration programs to your needs or select a control type to which you want to assign a program. **Automatic:** Weekly program that starts the selected cleaning or calibration program at the set times. **Interval program:** Program that starts at defined intervals. **Cleaning:** Program that is started if the sensor is dirty or clogged (SCS). **Power failure program:** Program that is automatically started after a power supply or communication failure. **Prog. editor:** Adapt the cleaning and calibration programs to your needs and preferences.
Program editor		
Select program	Selection ▪ Clean ▪ Clean C ▪ Clean S ▪ Clean CS ▪ User 1 ▪ User 2 ▪ User 3 **Factory setting** Clean	Select the program that you want to edit.
Select the editing function	Selection ▪ Insert progr. ▪ Edit ▪ Set up ▪ Prog.time ▪ Change name **Factory setting** Insert program	Select the desired editing function. **Insert progr.:** You can insert a predefined program into the selected program. **Edit:** You can add or delete program steps. **Set up:** You can set the times and repeat cycles of the selected program. **Prog. time:** The total duration of the selected program is displayed. **Change name:** You can give the selected program any name of your choice.

Function	Options	Info
Insert program		
Select a program	Selection ▪ No prg. ▪ Clean ▪ Clean S ▪ Clean C ▪ Clean CS ▪ User 1 ▪ User 2 ▪ User 3 **Factory setting** No prg.	Select the program that should be copied into the selected program.
Edit		
Select rows	Selection ▪ 01 ▪ 02 ... **Factory setting** 01	Select the row you want to edit.
Edit the row	Selection ▪ Edit ▪ Delete ▪ Move to ▪ Insert	Select the editing function for the selected row. **Edit:** The function for the selected item is changed, e.g. "Water" changed to "Cleaner". **Delete:** The selected function is deleted (you are not asked to confirm that you really want to delete) **Move to:** The selected function is moved to another position. **Insert:** A new item is inserted ahead of the selected item. In the case of **Insert/Edit**, all the possible program steps are displayed, e.g. Valve 1 open, Valve 1 closed, Water, Cleaner etc..
Setup		
Change program steps	Selection ▪ Water 0 s ▪ Cleaner 0 s ▪ Wait 0 s ...	Select the program step that you want to change.
Enter values	0 to 9999 s 0x (depending on the selected program step)	Enter the desired value for the selected program step. **Cleaner / buffer 1, 2:** Specify how long the cleaner/buffer should be pumped. The minimum pump time is 3 seconds. **Wait:** Specify how long the system should remain in its current state. **Back to:** Specify how often a loop should be repeated. **Air:** Specify how long compressed air should flow.
Prog.time		
Prog.time	0 to 9999 s	The total duration of the selected program is displayed. The display cannot be edited.
Change name		
Change name	0 to 9; A to Z	You can enter any name for the selected program.

Function	Options	Info
Automatic		
Select the day	Selection ▪ Monday ▪ Wednesday ▪ Thursday ▪ Friday ▪ Saturday ▪ Sunday **Factory setting** Monday	Select the day that you want to edit.
Select the editing function for the day	Selection ▪ Edit day ▪ Copy day **Factory setting** Edit day	**Edit day:** You edit the cleaning cycle for the selected day. **Copy day:** The day selected in the previous field is copied to the day you select in the following field.
Edit day		
Select programs	Activation and subsequent entry ▪ Clean 18:22 18:23 ▪ Interval 18:24 18:54 ▪ No progr. **Factory setting** No prog.	Select the cleaning programs for the day and enter the times for the start of cleaning. If you select the interval program, also enter the time when cleaning should finish. The start and finish times are always displayed. Example: **Clean** 18:22 (start time) 18:23 (finish time) 10 program starts are possible per day.
Copy day		
Select day	Selection ▪ Tuesday ▪ Wednesday ▪ Thursday ▪ Friday ▪ Saturday ▪ Sunday **Factory setting** Tuesday	Select the day to which you want to copy the day previously selected (e.g. Monday). Danger of data loss. When one day is copied to another, the cleaning programs of the target day are overwritten.
Interval program		
Select program Enter interval	Activation and subsequent entry ▪ Program – Clean – Clean C – Clean S – Clean CS – User 1 – User 2 – User 3 ▪ Interval 0 to 36000 s **Factory setting** Program: Clean Interval: 3600 s	**Program:** Select the program that should be started at the defined intervals. **Interval:** Enter the time that should elapse between the end of one program cycle and the start of the next program cycle. Enter an interval of at least 10 minutes here so that the program cycles can be ended and started correctly.
Change name	0 to 9; A to Z	You can enter any name for the interval program.

Function	Options	Info
Cleaning		
Select program	Selection ▪ No progr. ▪ Clean ▪ Clean C ▪ Clean CS ▪ Clean S ▪ User prog. **Factory setting** No progr.	Select the program that should be started if the electrode is fouled or clogged.
Power failure program		
Note	The selected program is started after a network communication or air supply failure.	
Select program	Selection ▪ No progr. ▪ Clean ▪ Clean C ▪ Clean CS ▪ Clean S ▪ User prog. **Factory setting** Clean	Select the program that should be started if the network communication or air supply fails.
Activate Topcal		
Activate control programs	Activation and subsequent selection ▪ Automatic – On – Off ▪ Ext. control – On – Off ▪ Clean trigger – On – Off ▪ Power reset – On – Off	Activate the control programs via which a program should be started.
Activate back pressure water	Activation and subsequent selection ▪ Function – On – Off ▪ Relay – Water – Valve 1 – Valve 2 ▪ Length: 01 to 30 s **Factory setting** Function: on Relay: water Length: 05 s	Specify whether and when back pressure water should be pumped. Back pressure water is pumped into the rinse chamber before and after the assembly is moved. This is useful in processes with media that are fibrous or tend to form buildup as the counterpressure in the rinse chamber caused by the back pressure water prevents the ingress of medium into the chamber. **Function:** If you activate the function, back pressure water is pumped into the assembly rinse chamber every time the assembly is moved. **Relay:** Specify the valve via which the assembly water should be pumped. ▪ Water: Via the water connection on the rinsing block ▪ Valve 1, Valve 2: Via additional valve 1 or 2 **Length:** Specify how long back pressure water should be pumped before and after the assembly is moved.

7.6.17 Set up 2 - Chemoclean

Chemoclean is a system to automatically clean sensors. Water and cleaner are pumped to the sensor via the injector (e.g. CYR10) via two contacts.

Use with Topcal S
Chemoclean is a standard Mycom S function and can also be used in conjunction with Topcal S. The two contacts in Mycom S can be started as follows:
- Externally, via a binary input in Mycom S
- In a weekly pattern (automatic)
- Via manual operation

The two contacts can be flexibly adapted to individual cleaning cycles via a user-defined program (user program).

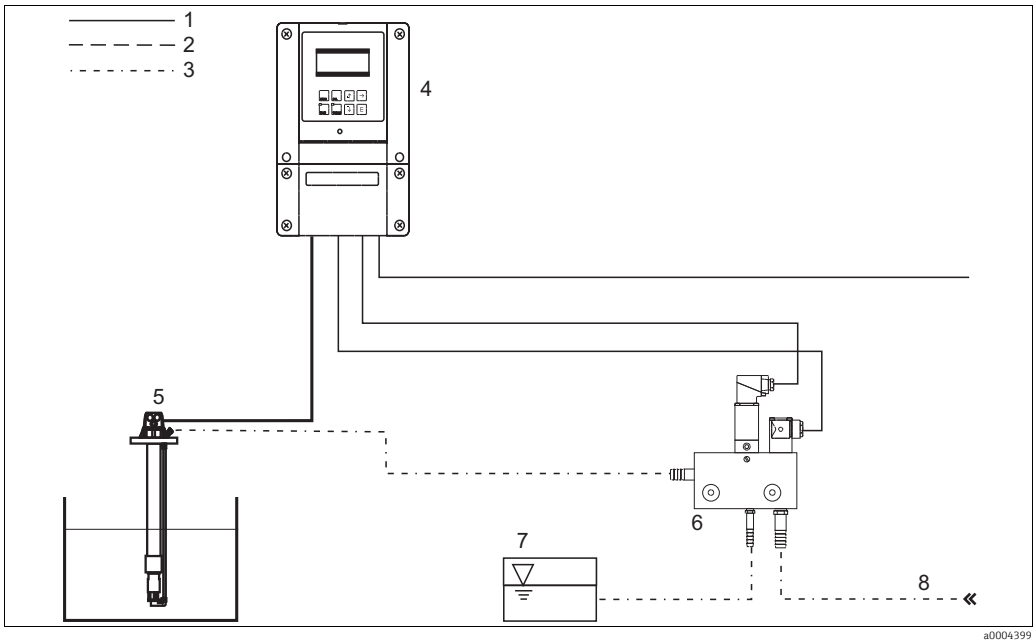


Fig. 58: Chemoclean cleaning

1	*Electric cable*	*5*	*Immersion assembly*
2	*Compressed air*	*6*	*CYR10 injector*
3	*Water/cleaning liquid*	*7*	*Cleaning liquid*
4	*Mycom S transmitter*	*8*	*Motive water*

Operation

1. Switch the Chemoclean function on in the "Set up 1 - Relays" menu. Make sure that the corresponding contacts are connected to the injector (see connection examples in the appendix).
2. The cleaning cycles are configured in the "Set up 2 - Chemoclean" menu. Here, the automatic or event-controlled cleaning can be adapted to the process conditions. One or more of the following controls are possible:
   – Weekly program (see below): any number of cleaning cycles can be started on each weekday.
   – External control: a start can be triggered via the digital inputs. For this, external control must be activated in the "Select contr. progr." field (Ext. control "On").
   – Power failure: cleaning is started after a power failure.

Manual operation
Rapid onsite cleaning can be performed via manual operation. For this, select "PARAM > Manual operation > Chemoclean". Press E twice ("Start cleaning").

Automatic:
Each day can be programmed individually. For this, select "PARAM > Set up 2 > Chemoclean > Automatic":

The following programs are available:
- Clean: Cleaning is triggered by entering the start time.
- Interval program: Cleaning is carried out at intervals with a defined spacing. This program cannot be started directly via the binary inputs.
- User: User-defined cleaning programs (create in Program Editor).

Program sequences
Monday: 2 x cleaning (at 11:00 and at 18:00) with water for 120 s, of which 60 s are additionally with cleaner. Between 18:20 and 24:00, clean every 30 min. (= 1800 s) with water for 120 s, of which 60 s are additionally with cleaner.

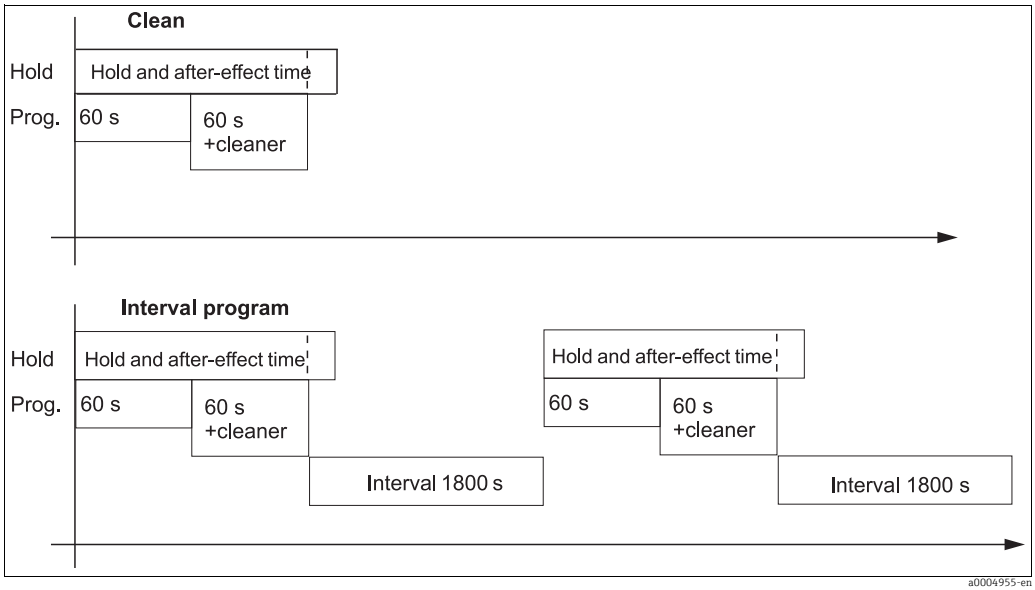


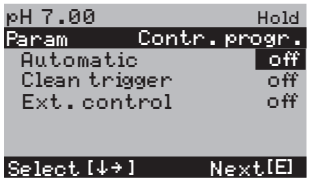
Fig. 59: Graphic representation of the above cleaning example

Required settings according to the example (bold: to be entered by the user):

"Automatic > Weekday > Edit day" field		**"Edit prog. > Clean > Setup" field**		**"Interval program" field**	
Clean		01 Water	**60 s**	Program	**Clean**
11:00	11:02	02 +Cleaner	**60 s**	Interval	**1800 s**
Clean		03 Water	**0 s**		
18:00	18:02	04 Repeat clean	**0 x**		
Interval program					
18:20	23:59				

Chemoclean menu

To enter the menu, select:
"PARAM > Specialist > Set up 2 > Chemoclean"

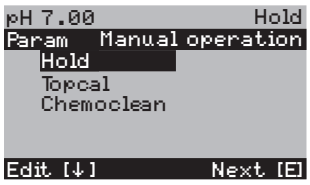
Function	Options	Info
Control programs 	Activation and subsequent entry ▪ Automatic – On – Off ▪ Clean trigger – On – Off ▪ Ext. control – On – Off **Factory setting** Automatic: off Clean trigger: off Ext. control: off	Select the function which will trigger Chemoclean cleaning.
Note	Automatic: off Clean trigger: off Ext. control: off	Current system status
Configuration menu	Selection ▪ Automatic ▪ Interval program ▪ Prog. editor **Factory setting** Automatic	Select the configuration menu. **Automatic:** You can select cleaning programs for every weekday here. **Interval program:** Program that starts at defined intervals. **Prog. editor:** You can adapt the cleaning programs to your needs and preferences here.
Edit the program		
Select program	Selection ▪ Clean ▪ User prog.	Select the program that you want to edit.
Select the editing function	Selection ▪ Insert program ▪ Edit ▪ Set up ▪ Prog.time ▪ Change name **Factory setting** Insert program	Select the desired editing function. **Insert progr.:** You can insert a predefined program into the selected program. **Edit:** You can add, change or delete program steps. **Set up:** You can set the times and repeat cycles of the selected program. **Prog. time:** The total duration of the selected program is displayed. **Change name:** You can give the selected program any name of your choice.
Insert program		
Select a program	Selection ▪ No prg. ▪ Clean ▪ User **Factory setting** No prg.	Select the program that should be copied into the user program.
Edit		
Select rows	Selection ▪ 01 ▪ 02 ... **Factory setting** 01	Select the row you want to edit.

Function	Options	Info
Edit the row	Selection ▪ Edit ▪ Delete ▪ Move to ▪ Insert	Select the editing function for the selected row. **Edit:** The function for the selected item is changed, e.g. "Water" changed to "W.+Cleaner". **Delete:** The selected function is deleted (you are not asked to confirm that you really want to delete) **Move to:** The selected function is moved to another position. **Insert:** A new item is inserted ahead of the selected item.
Set up		
Change program steps	Selection ▪ Water 0 s ▪ W.+clean. 0 s ...	Select the program step that you want to change.
Enter values	0 to 9999 s 0x (depending on the selected program step)	Enter the desired value for the selected program step. **Cleaner/water:** Specify how long the cleaner/water should be pumped. **Wait:** Specify how long the system should remain in its current state. **Back to:** Specify how often a loop should be repeated.
Program time		
Prog.time	0 to 9999 s	The total duration of the selected program is displayed. The display cannot be edited.
Change name		
Change name	0 to 9; A to Z	Enter a new name for the user program.
Automatic		
Select the day	Selection ▪ Monday ▪ Wednesday ▪ Thursday ▪ Friday ▪ Saturday ▪ Sunday **Factory setting** Monday	Select the day that you want to edit.
Select the editing function for the day	Selection ▪ Edit day ▪ Copy day **Factory setting** Edit day	**Edit day:** You edit the cleaning cycle for the selected day. **Copy day:** The day selected in the previous field is copied to the day you select in the following field.
Edit day		
Select programs	Activation and subsequent entry ▪ No progr. ▪ Clean 18:22 18:23 ▪ Interval 18:24 18:54 **Factory setting** No prog.	Select the cleaning programs for the day and enter the times for the start of cleaning. If you use the interval program, also enter the time when cleaning should finish. The start and finish times are always displayed. Example: **Clean** 18:22 (start time) 18:23 (finish time)

Function	Options	Info
Copy day		
Select day	Selection ▪ Tuesday ▪ Wednesday ▪ Thursday ... **Factory setting** Tuesday	Select the day to which you want to copy the day previously selected (e.g. Monday). Danger of data loss. When one day is copied to another, the cleaning programs of the target day are overwritten.
Interval program		
Select program Enter interval	Activation and subsequent entry ▪ Program – Clean – User prog. ▪ Interval 0 to 36000 s **Factory setting** Program: Clean Interval: 3600 s	**Program:** Select the program that should be started at the defined intervals. **Interval:** Enter the time that should elapse between the end of one program cycle and the start of the next program cycle.
Change name	0 to 9; A to Z	You can enter any name for the interval program.

7.6.18 Manual operation

To enter the menu, select:
"PARAM > Specialist > Manual operation"

Function	Options	Info
Manual operation 	Selection ▪ Hold ▪ Topcal ▪ Chemoclean	You can activate a manual hold, start the Chemoclean program or start the Topcal program. The settings you make here are only active in this menu. Nothing is saved when you leave. You leave the manual operation menu with PARAM, DIAG or MEAS.
Hold		
Activate hold	Selection ▪ Hold on ▪ Hold off **Factory setting** Hold off	Activate/deactivate the HOLD. The "HOLD" function freezes the current outputs as soon cleaning/calibration is undertaken. If the controller function is on current output 2, it behaves as defined in "controller hold" (see also "Set up 1 - Hold" section).
Topcal		
Note	Automatic off Cleaning trigger off Ext. control off	Displays the status of the system.
Select function	Selection ▪ Retract assembly ▪ Start program ▪ Stop program	You can move the assembly manually or start/stop a program.
Retract assembly		
Ass. position	Selection ▪ Assembly service ▪ Assembly meas.	Select the position into which the assembly should move.

Function	Options	Info
Note	Automatic off Cleaning trigger off Ext. control off	Displays the status of the system.
Start program		
Select program	Selection ▪ No prog. ▪ Clean ▪ Clean C ▪ Clean S ▪ Clean CS ▪ Userprog. 1 to 3	Select the program that you want to start. If a program is already running, the new program is not started until the program running has finished.
Note	Automatic off Cleaning trigger off Ext. control off Clean running Water 10s Cleaner 3s	The status of the system is displayed. The program currently running is displayed with the time remaining for water, cleaner etc.
Stop program		
Note	Automatic off Cleaning trigger off Ext. control off	The current program is stopped. The status of the system is displayed.
Chemoclean		
Note	Automatic: off Clean trigger: off Ext. control: off	System status
Chemoclean cleaning	Selection ▪ No prg. ▪ Clean **Factory setting** No prg.	**No prg.:** Here, each external program start is suppressed. **Clean:** Here, you can start the Clean program. Leave this item by pressing .

7.7 Diagnosis

To enter the menu, press DIAG.

Function	Options	Info
Diagnosis 	Selection ▪ Error list ▪ Error log ▪ Operating log ▪ Calibration log ▪ Validate log ▪ Ext. sensor data (only for digital sensors with Memosens technology) ▪ Service	**Error list:** Displays the current active errors. (For a complete error list and a description, see the "Troubleshooting" section). **Error log:** Lists the 30 errors last reported with the date and time. **Operating log:** Lists the 30 operating steps last recorded with the date and time. **Calibration log:** Lists the last 30 calibrations performed with the date and time. **Validate log:** Lists the last 30 Topcal validations. **Ext. sensor data:** Lists the data saved in the sensor, e.g. sensor identification, calibration data, hours of operation etc. Note the following points: ▪ Use the arrow keys to scroll through the lists. ▪ Leave the lists by pressing E.
Calibration log		
Calibration data	▪ 1 Enter spec. buffer ▪ Zero point ▪ Slope ▪ El. condit. ▪ <Date> <time>	**1 Enter spec. buffer:** Displays the calibration method used. **Zero point:** Displays the zero point calculated during calibration. **Slope:** Displays the slope calculated during calibration. **Electrode condition:** Displays the electrode condition. **<Date> <time>:** Displays the date and time of the calibration.
If you are using a digital sensor with Memosens functionality, the following data are displayed when you press →:		
	▪ SNR ▪ Sensor change date ▪ <Date> <time>	Displays the serial number of the calibrated sensor and the date and time of the sensor change.
Ext. sensor data (only for sensors with Memosens technology) The transmitter indicates that data are being read from the sensor. When reading is finished, the display automatically switches to the next menu point. If the system does not switch automatically, you can call up the data last read out by pressing E or return to measuring operation by pressing MEAS.		
Data of the digital sensor	Selection ▪ Identification ▪ Calibration data ▪ Comp. temperature ▪ Sensor status ▪ Sensor info	Select the data which are stored the digital sensor and are to be displayed.
Identification		
Manufacturer data	▪ ID ▪ SW ID ▪ HW version ▪ SW version	**ID:** Displays the module ID of the sensor. **SW ID:** Displays the software ID of the sensor. **HW version:** Displays the hardware version of the digital sensor. **SW version:** Displays the software version of the digital sensor.

Function	Options	Info
	▪ Check date ▪ SAP ▪ SN	**Check date:** Displays the date of the sensor's factory inspection. **SAP:** Displays the SAP number of the sensor. **SN:** Displays the serial number of the sensor electronics.
Calibration data		
	pH: ▪ Slope ▪ Isoth. point. – pH – mV ▪ C-ZeroPnt ORP: ▪ Offset ▪ Buffer ▪ D. lst. Cl.	**Slope:** Displays the slope of the sensor. **Isoth. point:** Displays the mV and pH components of the isothermic intersection point. **C-zero pnt:** Displays the chain zero point of the digital sensor. **Offset:** Displays the calibrated ORP offset. **Buffer:** Displays the value of the buffer. **D.lst. cal.:** Displays the difference to the last calibration.
	▪ Method ▪ No. of cal. ▪ Snlc ▪ Calibration date	**Method:** Displays the method that was used to calibrate the digital sensor. Select the calibration method in the "Set up 1 > Calibration" menu. **No. of cal.:** Displays the number of calibrations carried out with the digital sensor. **Snlc:** Displays the serial number of the transmitter with which the last calibration was performed. **Calibration date:** Displays the date of the last calibration of the digital sensor.
	▪ Buffer 1 ▪ Buffer 2 ▪ D. slp ▪ D. zropnt	Only available for digital pH sensors. **Buffer 1:** Displays the pH value of the first buffer that was used in the last calibration. **Buffer 2:** Displays the pH value of the second buffer that was used in the last calibration. **D. slp:** Displays the change in the slope compared to the preceding calibration. **D. zropnt:** Displays the change in the chain zero point compared to the preceding calibration.
Temperature compensation		
Temperature offset	▪ Offset ▪ Snlc ▪ Calibration date	**Offset:** Displays the calibrated temperature offset. **Snlc:** Displays the serial number of the transmitter with which the last temperature calibration was performed. **Cal. date:** Displays the date of the last temperature calibration
Sensor status		
	▪ Period ▪ No. of steril. ▪ T (max)	**Period:** Displays the total hours of operation of the sensor. **No. of steril.:** Displays the number of sterilizations performed on the sensor: T > 121 °C (250 °F), at least 20 min. **T (max):** Displays the maximum temperature at which the sensor was operated. During a sterilization (T > 135 °C (275 °F)) the transmitter goes to Hold and the display shows "SIP" (Sterilization in place).

Function	Options	Info
	Time of operation (h) ▪ Over 80 °C ▪ Over 100 °C ▪ <- 300 mV (only pH) ▪ > 300 mV (only pH)	Operating hours of the sensor under the following conditions: ▪ Operating hours of the sensor at temperatures over 80 °C (176 °F) ▪ Operating hours of the sensor at temperatures over 100 °C (212 °F) ▪ Operating hours of the sensor at a pH value below -300 mV (= pH 12 @ 25 °C (77 °F)) ▪ Operating hours of the sensor at a pH value over +300 mV (= pH 2 @ 25 °C (77 °F))
	▪ 1st use ▪ Ri GSCS (only pH)	**1st use:** Displays when the sensor was connected to a transmitter for the first time. **Ri GSCS:** Displays the current membrane resistance.
Sensor info		
Range of application	▪ Max. rng. ▪ Min. rng. ▪ Max. temp. ▪ Min. temp.	**Max. rng.:** Maximum measured value in the sensor application range **Min. rng.:** Minimum measured value in the sensor application range **Max. temp.:** Maximum temperature in the sensor application range **Min. temp.:** Minimum temperature in the sensor application range
Order data	▪ Order code ▪ OVSN ▪ Check date	**Order code:** Order code of the sensor **OVSN:** Overall serial number of the sensor **Check date:** Displays the date of the sensor's factory inspection.
Service		
Service diagnosis	Selection ▪ Factory reset ▪ Simulation ▪ Instrument check ▪ DAT download ▪ Set up 2 ▪ Instrument version ▪ Topcal ▪ Chemoclean ▪ Reset count	**Factory reset:** Different data groups can be reset to the factory settings. **Simulation:** The transmitter behavior can be simulated after entering various parameters. **Instrument check:** The device functions (display, keys, etc.) can be tested individually. **DAT download:** Copy data from/into the DAT module. **Set up 2:** ISFET values and SCS values **Instrument version:** Device-internal data e.g. serial number can be queried. **Topcal S:** Test programs, inputs, hardware. **Chemoclean** (only if the complete ChemoClean function is activated): test programs, inputs, hardware. **Reset count:** Counter for the number of resets, write access

Function	Options	Info
Factory reset		
Set default	Selection ▪ Abort ▪ Start up data ▪ Calibration data ▪ Complete reset ▪ CPC data ▪ Service data ▪ Operating log ▪ Error log ▪ Calibration log	Here you can select the data which you wish to reset to the factory settings. Danger of data loss. Selecting a point and confirming with E deletes the settings you made in this area! Selecting "Abort" leaves this field without changing the values. **Calibration data:** All data saved for calibrations such as zero point, slope, and offset **Startup data:** The remaining data to be set **Complete reset:** Calibration data + startup data **CPC data:** Topcal configuration, e.g. cycles of cleaning and calibration programs **Service data:** All data + logs + reset counters Service data / logbooks: These functions are only for authorized service personnel. The service code is required. You can request the service code from Endress+Hauser.
Simulation		
Simulation of current outputs	Activation and subsequent entry ▪ Simulation – On – Off ▪ Output 1 0.0 to 22.0 mA ▪ Output 2 0.0 to 22.0 mA **Factory setting** Simulation: off Output 1: 0.0 mA Output 2: 0.0 mA	Adjust the simulation of the current outputs. **Simulation off:** The frozen values from the last measurement are used for simulation. **Simulation on:** The current values for the outputs can be changed for the simulation (output 1, output 2).
Simulation of measured value, temperature	Activation and subsequent entry ▪ Simulation – On – Off ▪ pH/mV 1 -2.00 to 16.00 pH ▪ Temperature -50 to +150 °C **Factory setting** Simulation: off pH/mV 1: 7.00 pH Temperature: 25.0 °C	Adjust the simulation of the measured values and the temperature. **Simulation off:** The frozen values from the last measurement are used for simulation. **Simulation on:** The values can be changed for the simulation.

Function	Options	Info
Simulation of relays	Activation and subsequent entry ▪ Simulation – On – Off ▪ Alarm relay – On – Off ▪ Relay 1 – On – Off ▪ Relay 2 – On – Off **Factory setting** Simulation: off Alarm relay: off Relay 1/2: off	Adjust the simulation of the relays. **Simulation off:** The last states are frozen and used for simulation. **Simulation on:** The contacts (= relays) can either be opened (on) or closed (off). If you return to the measurement mode with the simulation switched on, "Simul" and "Hold" flash in the display.
Instrument check		
Select test	Selection ▪ Display ▪ Keypad ▪ RAM ▪ EEPROM ▪ Flash	You can check the function of the transmitter with the device check. **Display:** All the fields are queried alternately. Defective cells become visible. **Keypad:** All the keys must be pressed one after the other. If the system is functioning perfectly, the appropriate symbols appear in the display. **RAM:** "RAM O.K" message if there are no errors. **EEPROM:** "EEPROM O.K" message if there are no errors. **Flash** (memory): "Flash O.K." message if there are no errors.
DAT download (only available when DAT module is plugged in)		
DAT operation	Selection ▪ DAT write ▪ DAT read ▪ Erase DAT	Select the desired DAT process **DAT write:** You save the both the configuration and the logbooks of your transmitter to the DAT module. A security message appears, stating that all the data on the DAT will be overwritten. After confirming, the process of backing up to the DAT memory module is started. **DAT read:** You copy the configuration that is saved on the DAT memory module to the EEPROM in the transmitter. A security message appears, stating that all the data in the transmitter will be overwritten. After confirming, the process of copying from the DAT memory module is started. **Erase DAT:** You delete all the data on the DAT memory module. A security message appears, stating that all the data on the DAT will be erased. The data are erased once the message is confirmed.

Function	Options	Info
Set up 2		
Select Set up 2	Selection ▪ Reset ▪ ISFET (only with ISFET sensors) ▪ SCS reading	Display the sensor data. **ISFET:** Displays the current ISFET sensor data ▪ Reference [mV] ▪ Leak current [µA] **SCS reading:** Displays the current values of the sensor check system SCS ▪ Impedance of glass electrode [MΩ] ▪ Impedance of reference electrode [kΩ]
Instrument version		
Controller	▪ SW version 1.20-xx ▪ HW version 1.00 ▪ Serial no. 12345678 ▪ Card ID M3Cxxx	You can call up the controller data here. The software version refers to the current device overall software.
Motherboard	▪ SW version - - - - ▪ HW version 1.00 ▪ Serial no. 12345678 ▪ Card ID M3G-xx ▪ Non-Ex	You can call up the motherboard data here.
Connector PCB	▪ SW version - - - - ▪ HW version 1.04 ▪ Serial no. 12345678 ▪ Card ID M3K-xx	You can call up the connector PCB data here.
Transmitter	▪ SW version 1.22 ▪ HW version 1.11 ▪ Serial no. 12345678 ▪ Card ID MKPx ▪ Ex	You can call up the transmitter module data here.
Relay	▪ SW version - - - - ▪ HW version 1.00 ▪ Serial no. 12345678 ▪ Card ID M3R-xx ▪ Ex	You can call up the relay module data here.

Function	Options	Info
Sensor	▪ SW version 1.20 ▪ HW version 1.00 ▪ Serial no. 12345678 ▪ ID A1B ▪ SW ID D1C ▪ Check date xx.xx.xx	You can call up the sensor data here if you are using digital sensors with Memosens technology.
Serial number for Mycom S	123A567890Z234	You can call up the serial number of the device here; 14-digit number with digits 0 to 9 and A to Z.
Order code for Mycom S	CPM153-A2B00A010	You can call up the order code of the device here; 15-digit code with digits 0 to 9 and A to Z.
CPC data	▪ SW version 1.20 ▪ HW version 1.00 ▪ Serial no. 12345678 ▪ Card ID CPGxxx	You can call up the control unit data here.
Serial number for CPG310	12345678901234	You can call up the serial number of the control unit here; 14-digit number with digits 0 to 9 and A to Z.
Order code for Topcal S	CPC310-A011B0A000A	You can call up the order code of the device here; 15-digit code with digits 0 to 9 and A to Z.
Topcal S		
Note	Automatic off Cleaning trigger off Ext. control off	Displays the status of the system.
Component for diagnosis	Selection ▪ Ext. inputs ▪ Hardware	Select the system component whose status you want to check or change.
Ext. inputs		
Note	Start no prog. AutoStop off Wait trigger off Measuring off Service off	The status of the external digital inputs is displayed.
Hardware		
Valve test	Selection ▪ Assembly ▪ Cleaner ▪ Water ▪ Buffer 1 ▪ Buffer 2 ▪ Compressed air ▪ Valve 1 ▪ Valve 2	Select the component to be tested.
Note	Assembly ↑ Service End function Topcal S ready	The component selected previously is tested.

Function	Options	Info
Chemoclean		
Note	Automatic: off Clean trigger: off Ext. control: off	The status of the system is displayed.
Note	With E running program is aborted.	If a Chemoclean program is currently running, you must abort the program with E to be able to perform the diagnosis.
Chemoclean diagnosis	Selection ▪ Ext. inputs ▪ Hardware	**Ext. inputs:** The status of the external digital inputs is displayed. **Hardware:** Select a function to be tested: ▪ Water ▪ Cleaner ▪ Water and cleaner
Reset count		
Reset count	0	The number of resets is displayed here. The reset counter is only triggered by the watchdog. You can reset it via "Set default > Service data".
Write count	0	The number of write accesses to the EEPROM is displayed here.

7.8 Calibration

Calibration is required:
- After replacing the electrode
- After periods of downtime (note: a pH glass electrode should never be stored dry!)
- At suitable intervals, depending on the individual process. The necessary interval can range from several times a day to once a quarter. At the start, calibrate more frequently and record the results in the operations log. The data of the last 30 calibrations are also stored in the calibration log. Gradually extend the intervals depending on the deviations that are discovered during the calibration.

The calibration can be protected with the maintenance and the specialist codes. No calibration can be carried out at the display level (see the "Set up 1 - Access codes" section for this purpose).

Procedure

1. If you have not yet configured any initial settings for onsite calibration, please do so in the "Set up 1 > Calibration" menu.
2. Set the service switch to "Service" (vertical) or move the assembly into the Service position
3. Remove the sensor.
4. Clean the sensor before calibration.

Note the following points:
- For measurements with PM (potential matching), the PA line must also be immersed in the buffer solution.
- If automatic temperature compensation is selected for calibration (ATC), the corresponding temperature sensor must also be immersed in the buffer solution.
- The device switches automatically to Hold (factory setting) whenever it is calibrated.
- Press MEAS to cancel the calibration. In the dialog field that follows, select "Yes, cancel cal.".

The following section describes the calibration procedures for:

pH calibration
- "Manual data entry"
- "Manual calibration with buffer"
- "Calibration with fixed buffer"
- "Calibration with automatic buffer recognition"

Redox absolute calibration
- "Absolute data entry"
- "Absolute calibration"

Redox relative calibration
- "Absolute data entry"
- "Relative data entry"
- "Absolute calibration"
- "Relative calibration"

7.8.1 pH calibration

Manual data entry

The values for sensor zero point and slope are entered manually.
Press CAL to start the calibration.

Function	Options	Info
Note	Calibration with data entry	The type of onsite calibration selected in the calibration settings is displayed.
Temperature	-20.0 to 150.0 °C **Factory setting** 25.0 °C	Specify the temperature at which calibration takes place (only for "Calibration with MTC"). Press E to confirm.
Zero point	-2.00 to 16.00 pH **Factory setting** 7.00 pH	Enter the zero point of the electrode. Press E
Slope	5.00 to 99.00 mV / pH **Factory setting** 59.16 mV/pH	Enter the slope of the electrode. Press E
Calibration	Selection ▪ Accept ▪ Cancel ▪ Repeat calibration	End of calibration **Accept:** When you confirm with E, the new calibration data are accepted. **Cancel:** The data are not accepted. Calibration is not repeated. **Repeat calibration:** The data are rejected and calibration is repeated.
Sensor communication	Waiting for sensor response ...	(digital sensors with Memosens technology only) The transmitter transmits calibration data to the sensor.
Note	▪ Data saved ▪ Data not saved	(digital sensors with Memosens technology only) Indicates whether the calibration data could be saved in the sensor. Calibrate the sensor again if the process of saving the data failed.
Note	Electrode submersed?	Ensure that the electrode is in the medium again so measuring can take place.

Manual calibration with buffer, calibration with buffer table, calibration with automatic buffer recognition

- Manual buffer:
  The buffer pH value is entered manually. The display then shows the current measured value.
- Buffer table:
  In the Calibration menu, you can set two buffer solutions or define them yourself. The selected pH value and buffer type are displayed.
- Automatic buffer recognition:
  The device automatically recognizes the buffer used. Preselect the buffer types (e.g. E+H) in the Calibration menu.

Press CAL to start the calibration.

Function	Options	Info
Note	Calibration with manual buffer, (with buffer table/ automatic buffer recognition)	The type of onsite calibration selected in the calibration settings is displayed.
Temperature	-20.0 to 150.0 °C **Factory setting** 25.0 °C	Specify the temperature at which calibration takes place (only for "Calibration with MTC"). Press E to confirm.
Buffer temperature	-20.0 to 150.0 °C **Factory setting** 25.0 °C	Enter the buffer temperature (only for "Cal with MTC"). Press E to confirm.
Handling instructions	Immerse: pH electrode in buffer 1	Immerse the electrode in buffer 1. Press E to confirm.
Buffer pH value	-2.00 to 16.00 pH **Factory setting** 7.00 pH	Only for "Manual buffer". Enter the pH value of buffer 1. Press E to confirm.
Stability check	▪ Time: 10 s ▪ pH 1: 7.00 ▪ mV 1: 0 ▪ °C: 25.0	Wait until the pH measurement is stable: Time does not count down. pH value no longer flashes. mV value no longer flashes. Once these values are stable, confirm with E. Specify the criteria for the stability check in the "Set up 1 > Calibration > Cal settings" menu.
The three previous steps are carried out for buffer 2.		
Calibration value notice	Invalid calibration value	If an error occurs, (e.g. incorrect buffer used), this message is displayed.
Zero point, slope notice	▪ Zero point: 7.00 Good ▪ Slope: 59.00 Good	Information on the zero point, slope and quality of the calibration is displayed here.
Electrode condition notice	Electrode condition: good	There are three status messages for the electrode status: "good", "OK.", "bad". If the status is displayed "bad", electrode replacement is recommended to ensure the quality of the pH measurement.
Calibration	Selection ▪ Accept ▪ Cancel ▪ Repeat calibration	End of calibration **Accept:** When you confirm with E, the new calibration data are accepted. **Cancel:** The data are not accepted. Calibration is not repeated. **Repeat calibration:** The data are rejected and calibration is repeated.
Sensor communication	Waiting for sensor response ...	(digital sensors with Memosens technology only) The transmitter transmits calibration data to the sensor.
Note	▪ Data saved ▪ Data not saved	(digital sensors with Memosens technology only) Indicates whether the calibration data could be saved in the sensor. Calibrate the sensor again if the process of saving the data failed.
Note	Electrode submersed?	Ensure that the electrode is in the medium again so measuring can take place.

7.8.2 Redox calibration

Absolute data entry

The transmitter has a calibrated mV display range. One absolute mV value is set with a single buffer solution (adaptation of the measuring chain offset). A buffer solution preferably with 225 or 475 mV is used.
Press CAL to start the calibration.

Function	Options	Info
Note	Calibration with abs. data entry	The type of onsite calibration selected in the calibration settings is displayed.
Offset	-1500 to +1500 mV **Factory setting** 0000 mV	Enter the mV value for the electrode offset (electrode offset = deviation of the measured value display from the indicated buffer solution mV value). Press E to confirm. The entered value is effective immediately. The maximum offset is 400 mV.
Note	Offset too high	Error message if the entered offset leaves the maximum range.
Calibration	Selection ▪ Accept ▪ Cancel ▪ Repeat calibration	End of calibration **Accept:** When you confirm with E, the new calibration data are accepted. **Cancel:** The data are not accepted. Calibration is not repeated. **Repeat calibration:** The data are rejected and calibration is repeated.
Sensor communication	Waiting for sensor response ...	(digital sensors with Memosens technology only) The transmitter transmits calibration data to the sensor.
Note	▪ Data saved ▪ Data not saved	(digital sensors with Memosens technology only) Indicates whether the calibration data could be saved in the sensor. Calibrate the sensor again if the process of saving the data failed.
Note	Electrode submersed?	Ensure that the electrode is in the medium again so measuring can take place.

Absolute calibration

The transmitter has a calibrated mV display range. One absolute mV value is set with a single buffer solution (adaptation of the measuring chain offset). A buffer solution preferably with 225 or 475 mV is used.
Press CAL to start the calibration.

Function	Options	Info
Note	Calibration with abs. calibration	The type of onsite calibration selected in the calibration settings is displayed.
Handling instructions	Immerse: Electrode in buffer	Immerse the electrode into the buffer. Press E to confirm.
Buffer mV value	-1500 to 1500 mV **Factory setting** 0225 mV	Enter the buffer mV value. Press E to confirm.
Stability check	▪ Time: 10 s ▪ mV 1: 0	Wait until the measurement is stable: Time does not count down. mV value no longer flashes. Once these values are stable, confirm with E. Specify the criteria for the stability check in the "Set up 1 > Calibration > Cal settings" menu.
Calibration value notice	Invalid calibration value	If an error occurs, (e.g. incorrect buffer used), this message is displayed.
Offset notice	Offset: 0005 mV Good	Information on the offset and quality of the calibration is displayed here.
Calibration	Selection ▪ Accept ▪ Cancel ▪ Repeat calibration	End of calibration **Accept:** When you confirm with E, the new calibration data are accepted. **Cancel:** The data are not accepted. Calibration is not repeated. **Repeat calibration:** The data are rejected and calibration is repeated.
Sensor communication	Waiting for sensor response ...	(digital sensors with Memosens technology only) The transmitter transmits calibration data to the sensor.
Note	▪ Data saved ▪ Data not saved	(digital sensors with Memosens technology only) Indicates whether the calibration data could be saved in the sensor. Calibrate the sensor again if the process of saving the data failed.
Note	Electrode submersed?	Ensure that the electrode is in the medium again so measuring can take place.

Relative data input (only for redox relative)

Entry of two % calibration points to which one mV value is assigned.
Press CAL to start the calibration.

Function	Options	Info
Note	Calibration with rel. data entry	The type of onsite calibration selected in the calibration settings is displayed.
Calibration points	Activation and subsequent entry ▪ 0 to 30% ▪ Voltage -1500 to +1500 mV ▪ 70 to 100% ▪ Voltage -1500 to +1500 mV **Factory setting** 20 % Voltage: 0600 mV 80 % Voltage: -600 mV	In this field, create two measured value pairs (pair 1 and pair 2). Measured value pair 1 in the range 0 to 30 %: assign, for example, the voltage 0600 mV to the percentage value 20 %. Measured value pair 2 in the range 70 to 100 %: assign, for example, the voltage – 0600 mV to the percentage value 80 %. The settings made are effective immediately after confirming with E.
Note	Offset too high	Error message if the entered offset leaves the maximum range.
Calibration	Selection ▪ Accept ▪ Cancel ▪ Repeat calibration	End of calibration **Accept:** When you confirm with E, the new calibration data are accepted. **Cancel:** The data are not accepted. Calibration is not repeated. **Repeat calibration:** The data are rejected and calibration is repeated.
Sensor communication	Waiting for sensor response …	(digital sensors with Memosens technology only) The transmitter transmits calibration data to the sensor.
Note	▪ Data saved ▪ Data not saved	(digital sensors with Memosens technology only) Indicates whether the calibration data could be saved in the sensor. Calibrate the sensor again if the process of saving the data failed.
Note	Electrode submersed?	Ensure that the electrode is in the medium again so measuring can take place.

Relative calibration (only for redox relative)

For calibration, two tanks are filled with a sample of the medium. The contents of the first tank are detoxified and called calibration solution 1.
The contents of the second tank are left unchanged and are called calibration solution 2.
Press CAL to start the calibration.

Function	Options	Info
Note	Calibration with rel. calibration	The type of onsite calibration selected in the calibration settings is displayed.
Handling instructions	Immerse: Electrode in buffer	Immerse the electrode in the detoxified sample. Press E to confirm.
% value buffer	0 to 30% **Factory setting** 20 %	Enter the relative redox value of the detoxified sample. Press E to confirm.
Stability check	▪ Time: 10 s ▪ mV 1: 0	Wait until the measurement is stable: Time does not count down. mV value no longer flashes. Once these values are stable, confirm with E. Specify the criteria for the stability check in the "Set up 1 > Calibration > Cal settings" menu.
Handling instructions	Immerse: Electrode in buffer	Immerse the electrode in the unaltered sample. Press E
% value buffer	70 to 100% **Factory setting** 80 %	Enter the relative redox value of the unaltered sample. Press E to confirm.
Stability check	▪ Time: 10 s ▪ mV 1: 0	Wait until the measurement is stable: Time does not count down. mV value no longer flashes. Once these values are stable, confirm with E. Specify the criteria for the stability check in the "Set up 1 > Calibration > Cal settings" menu.
Calibration value notice	Invalid calibration value	If an error occurs, (e.g. offset too large), this message is displayed.
Offset notice	Offset: 0005 mV Good	Information on the offset and quality of the calibration is displayed here.
Calibration	Selection ▪ Accept ▪ Cancel ▪ Repeat calibration	End of calibration **Accept:** When you confirm with E, the new calibration data are accepted. **Cancel:** The data are not accepted. Calibration is not repeated. **Repeat calibration:** The data are rejected and calibration is repeated.
Sensor communication	Waiting for sensor response ...	(digital sensors with Memosens technology only) The transmitter transmits calibration data to the sensor.
Note	▪ Data saved ▪ Data not saved	(digital sensors with Memosens technology only) Indicates whether the calibration data could be saved in the sensor. Calibrate the sensor again if the process of saving the data failed.
Note	Electrode submersed?	Ensure that the electrode is in the medium again so measuring can take place.

8 Diagnostics and troubleshooting

8.1 Troubleshooting instructions

The transmitter constantly monitors its functions itself. If an error occurs which the device recognizes, this is indicated on the display. The error number is under the unit displayed for the main measured value. If more than one error occurs, you can call these up with the MINUS key.
Refer to the "System error messages" table for the possible error numbers and remedial measures.
Should a malfunction occur without any transmitter error message, please refer to the "Process-related errors" or the "Device-related errors" tables to locate and rectify the error. These tables provide you with additional information on any spare parts required.

8.2 System error messages

In the following error list, you can find a description of all the error numbers occurring. For each error number there is also information on whether the factory setting (= Fact.) of this error triggers:
- an alarm
- an error current
- cleaning

To open the error list, select DIAG > error list.

- The errors are processed in the Alarm menu.
- The second column shows the assignment according to NAMUR work sheet NA64 (failure, maintenance or function check).

Error no.	NAMUR class	Error message	Possible causes/measures	Alarm contact		Error current		Autom. cleaning start	
				Fact.	User	Fact.	User	Fact.	User
E001	Failure	Memory error	Switch device off and on. Where necessary, perform "Set default" under "Diagnosis > Service".	yes		no		–	–
E002	Failure	Data error in EEPROM	If necessary corrective maintenance at factory.	yes		no		–	–
E003	Failure	Invalid configuration	Repeat download.	yes		no		–	
E004	Failure	Incompatible hardware	Module does not match device configuration (e.g. non-Ex module in a device approved for use in explosion hazardous areas).	yes		no		–	
E005	Failure	Unknown CPG ID	Control unit is not recognized. Control unit is not compatible with Mycom S software.	yes		no		–	–
E007	Failure	Error transmitter	Test with a new transmitter	yes		no		–	–
E008	Failure	Glass breakage electrode 1	Impedance of pH glass membrane too low: Check pH sensor, renew if necessary. For ISFET sensor: Leak current > 400 nA. Replace sensor.	yes		no		no	
E010	Failure	Error temperature sensor	Check temperature sensor, sensor type and wiring; where necessary, check transmitter with temperature simulator. ISFET: Check the correct temperature sensor has been selected.	yes		no		no	
E012	Failure	Communication error CPC	Check Topcal S connecting cable.	yes		no		no	

Error no.	NAMUR class	Error message	Possible causes/measures	Alarm contact		Error current		Autom. cleaning start	
				Fact.	User	Fact.	User	Fact.	User
E013	Failure	Assembly did not reach service position	Check assembly position and feedback signals, compressed air present?	yes		no		no	
E014	Failure	Assembly did not reach measuring position	Check the pneumatic hoses to the assembly, assembly mechanically blocked? External power supply 24 V /220 V (not supply from Mycom) present? Microfuse may be blown.	yes		no		no	
E017	Failure	Error CPC EEPROM	Switch device off and on. Where necessary, perform "Set default" under "Diagnosis > Service". If necessary corrective maintenance at factory.	yes		no		–	–
E024	Failure	CPC program aborted	Control input 87/88 switched: Check ext. control criteria.	yes		no		no	
E027	Failure	Error air supply	Pressure below permitted minimum Connected incorrectly, test: term. D3/D4, Pressure > 2 bar, contact closed: 0 V; Pressure < 2 bar, contact open: 3.2 V	yes		no		no	
E029	Failure	Self-test failure sensor	Error detected during digital sensor self test. Check sensor, replace where necessary.	yes		no		–	
E030	Failure	SCS error reference	Reference impedance too high: check reference element, replace reference or combination electrode where necessary. For ISFET sensor: Leak current > 400 nA	yes		no		–	–
E032	Failure	Slope error sensor 1	Sensor aged or defective; Reference aged, defective or diaphragm blocked;	yes		no		–	–
E033	Failure	Zero point error sensor 1	Buffer solutions too old or contaminated; PML not in the buffer solutions	yes		no		–	–
E034	Failure	Offset error sensor 1		yes		no		–	–
E040	Maintenance	SCC condition electrode 1 bad	Check sensor, replace if necessary; clean where required (deposit buildup on glass membrane or glass membrane run dry; diaphragm blocked)	yes		no		–	
E043	Maintenance	Distance of buffers input 1 too small	Wrong buffers used; buffer entry incorrect; automatic buffer recognition defective	yes		no		–	
E044	Maintenance	Input 1 not stable	PML missing; sensor too old; sensor sometimes dry; cable or plug defective.	yes		no		–	
E045	Failure	Calibration aborted	Repeat calibration and renew buffer solution; replace electrode where necessary.	yes		no		–	
E053	Failure	Actuator failure		yes		no		–	–
E054	Maintenance	Dose time alarm	Dosage time exceeded at total dosage. Dosage interrupted, dosing agent empty or process too inconsistent.	yes		no		–	–
E055	Failure	Under range pH/mV input 1	Measuring line broken; sensor in air or air cushion in assembly,	yes		no		no	
E057	Failure	Over range pH/mV input 1	Potential matching missing in symmetrical measurement; static charging in media with lowest conductivity.	yes		no		no	
E059	Failure	Under range temperature input 1	Temperature sensor defective; Sensor line interrupted or short-circuited;	yes		no		no	
E061	Failure	Over range temperature input 1	Wrong sensor type selected.	yes		no		no	

Error no.	NAMUR class	Error message	Possible causes/measures	Alarm contact		Error current		Autom. cleaning start	
				Fact.	User	Fact.	User	Fact.	User
E063	Maintenance	0/4 mA limit output 1	Measured value outside specified current range:	yes		no		no	
E064	Maintenance	20 mA limit output 1	Check plausibility of measured value;	yes		no		no	
E065	Maintenance	0/4 mA limit output 2	Where necessary, adjust current output assignment for 0/4 mA and/or 20 mA	yes		no		no	
E066	Maintenance	20 mA limit output 2		yes		no		no	
E067	Maintenance	Set point exceeded controller / GWG 1	Dosing devices defective; chemical supply empty;	yes		no		no	
E068	Maintenance	Set point exceeded controller / GWG 2	Measured value incorrect -> check plausibility and function;	yes		no		no	
E069	Maintenance	Set point exceeded controller / GWG 3	Incorrect control direction set; Incorrect relay assigned;	yes		no		no	
E070	Maintenance	Set point exceeded controller / GWG 4	Incorrect control function assigned.	yes		no		no	
E071	Maintenance	Set point exceeded controller / GWG 5		yes		no		no	
E073	Failure	Temperature 1 outside table	Check plausibility of temperature value; adjust or extend table where necessary.	yes		no		no	
E074	Failure	Temperature 2 outside table		yes		no		no	
E075	Failure	Temperature 1 outside table		yes		no		no	
E076	Failure	Temperature 2 outside table		yes		no		no	
E080	Maintenance	Current output range 1 too small	Increase measuring range span for current output assignment.	yes		no		no	
E081	Maintenance	Current output range 2 too small		yes		no		no	
E090	Function check	CPG service switch on	Check on CPG if service was actually carried out.	yes		no		no	
E095	Failure	Incompatible hardware sensor	Digital sensor not compatible with transmitter; It may be that the Ex-version of the sensor is combined with the non-Ex version of the transmitter or vice versa.	yes		no		no	
E100	Function check	Current output simulation on	Check if functions are intentionally selected.	yes		no		no	
E101	Function check	Service function on		yes		no		no	
E106	Function check	Download active	Wait for download to finish.	yes		no		no	
E116	Failure	Download error	Repeat download.	yes		no		no	
E117	Failure	DAT memory module data error	Check with other DAT memory module; when writing to DAT: repeat write process.	yes		no		—	—
E127	Failure	Sensor power fail	Sensor communication established but sensor does not have enough power. Check whether the Memosens connection is correctly inserted and locked.	yes		no		—	

Error no.	NAMUR class	Error message	Possible causes/measures	Alarm contact		Error current		Autom. cleaning start	
				Fact.	User	Fact.	User	Fact.	User
E147	Failure	Sensor communication error	Digital sensor is not correctly plugged in or wired. The transmitter goes into hold. The hold is disabled if the sensor is correctly plugged in or wired and transmits measured values.	no		no		no	
E152	Maintenance	PCS Alarm	Sensor defective or totally contaminated; water flow in bypass interrupted; Air cushion in assembly; measuring line interrupted; Dosing element defective, chemicals empty.	yes		no		no	
E156	Function check	Calibration timed out	Time for calibration!	yes		no		no	
E164	Failure	pH input range 1 over range	Check cable and sensor.	yes		no		–	
E166	Failure	Ref input range 1 over range		yes		no		–	
E168	Maintenance	SCS message ISFET sensor	Leak current > 200 nA. Early warning. Work can be continued until error E008/E009 occurs.	yes		no		–	
E171	Maintenance	Current input 1 under range	Measure input signal. Permitted: 4 to 20 mA	yes		no		–	
E172	Maintenance	Current/resistor input 1 over range		yes		no		–	
E173	Maintenance	Current input 2 under range	Check process variables at transmitter. Change range assignment if required.	yes		no		–	
E174	Maintenance	Current input 2 over range		yes		no		–	
E175	Maintenance	SCS glass critical sensor	Inspect digital sensor for glass breakage and hairline cracks; check medium temperature. Measurement can continue until the error occurs.	yes		no		–	
E177	Maintenance	SCS reference critical sensor	Inspect digital sensor for contamination and damage; clean sensor. Measurement can continue until the error occurs.	yes		no		–	
E180	Failure	Data error sensor	Digital sensor does not deliver measured values. Sensor possibly incorrectly plugged in or connected; or sensor defective → replace sensor	no		no		no	

8.3 Process-specific errors

Use the following table to locate and rectify any errors occurring.

Error	Possible cause	Tests and / or remedial action	Equipment needed, spare parts
Device cannot be operated, display value 9999	Operation is locked via keypad ("CAL" + "DIAG" keys pressed simultaneously = security locking)	Press "MEAS" and "PARAM" simultaneously to unlock.	
Measuring chain zero-point cannot be adjusted	Reference system contaminated	Test with new sensor	pH/ORP sensor
	Diaphragm clogged	Clean or grind diaphragm	HCl 3 %, file (only for ceramic diaphragm, only file in one direction)
	Measuring line open	pH input on device short-circuit ⇒ display pH 7	
	Sensor asymmetry voltage too high	Clean diaphragm or test with another sensor	HCl 3 %, file (only for ceramic diaphragm, only file in one direction)
	Potential matching (PA/PM) transmitter ⇔ incorrect medium	Asymm.: no PM or PM at PE Symm.: PM connection mandatory	See the "Connecting analog sensors" section
No calibration possible as sensor settling time is too long	For ISFET sensors: liquid film between semiconductor and reference lead is interrupted due to drying or cleaning with compressed air.	Make sure that the liquid film is established or that the buffer remains in the rinse chamber for more than 6 minutes	
No or slow display change	Sensor contaminated	Clean sensor	See "Cleaning pH/redox electrodes" section.
	Sensor aging	Replace sensor	New sensor
	Sensor defective (reference lead)	Replace sensor	New sensor
	Problem with diaphragm or missing electrolyte	Check KCl supply (0.8 bar above medium pressure)	KCl (CPY4-x)
Measuring chain slope not adjustable/slope too small	Connection not at high impedance (moisture, dirt)	Check cable, plug connector and junction boxes.	pH simulator, insulation, see "Checking the connecting lines and boxes" section
	Device input defective	Check device directly	pH simulator
	Sensor aging	Replace sensor	pH sensor
Measuring chain slope not adjustable/no slope	Hairline crack in glass membrane	Replace sensor	pH sensor
	Connection not at high impedance (moisture, dirt)	Check cable, plug connector and junction boxes.	pH simulator, insulation, see "Checking the connecting lines and boxes" section
	Semiconductor layer in measuring cable not removed	Check inner coaxial cable, remove black layer	
Permanent, incorrect measured value	Sensor not immersing or protection cap not removed	Check installation position, remove protection cap.	
	Air cushion in assembly	Check assembly and orientation	
	Ground fault at or in the device	Perform test measurement in insulated vessel, possibly with buffer solution.	Plastic vessel, buffer solutions. Behavior when device is connected to process?
	Hairline crack in glass membrane	Replace sensor	pH sensor
	Device in impermissible operating status (no response on pressing key)	Switch device off and on.	EMC problem: if this persists, check the grounding, screens and line routing or have checked by Endress+Hauser Service.
Incorrect temperature reading	Incorrect temperature sensor connection	Check connections using wiring diagram.	Wiring diagram "Electrical connection" section
	Measuring cable defective	Check cables for interruptions/short-circuit/shunt.	Ohmmeter
	Incorrect sensor type	Set type of temperature sensor at the device (Set up 1 > Temperature)	Glass electrode: Pt 100 ISFET: Pt 1000
	Temperature sensor defective	Check sensor	

Error	Possible cause	Tests and / or remedial action	Equipment needed, spare parts
pH value in process incorrect	No / incorrect temperature compensation	ATC: activate function MTC: set process temperature	
	Conductivity of medium too low	Select pH sensor with liquid KCl	e.g. Ceraliquid CPS41, Purisys CPF201
	Flow rate too high	Reduce flow rate or measure in a bypass.	
	Potential in medium	Possibly ground with or at PM pin (connect PM to PE).	Problem occurs particularly in plastic lines.
	Device unsymmetrical and PM connected	Remove PML connection to PM terminal; where necessary ground with/at PM pin (connect PM to PE)	
	Sensor contaminated or build-up on sensor	Clean sensor (see "Cleaning pH/ORP sensors" section)	For heavily contaminated media: Use spray cleaning.
Measured values fluctuate	Interference in measuring cable	Connect cable as per wiring diagram.	See "Electrical connection" section.
	Interference on signal output line	Check line routing, lay line separately if necessary.	Signal output and measuring input lines
	Interference potential in medium	Measure symmetrically (with PML).	Poss. ground medium with PM/PE connection.
	No potential matching (PA/PM) for symmetrical input	Connect PM pin in assembly to device terminal PA/PM.	
Controller/limit contact does not work	Controller switched off	Activate controller.	See "Set up 1 > Relays" section.
	Controller in “Manual / Off” mode	Select "Auto" or "Manual on" mode.	Key pad, PARAM > Manual operation > Relays
	Pick-up delay setting too long	Switch off or shorten pickup delay time.	See "Set up 2 - Limit switch" section.
	"Hold" function active “Auto hold” for calibration, “Hold” input activated, Manual "hold" active using keypad "Hold" active during configuration	Determine cause of hold and eliminate if not desired.	"Hold" is indicated on display when active.
Controller / limit contact work continuously	Controller in operating mode "Manual/on"	Set controller to "Manual/off" or "Auto".	Key pad > Manual operation > Relays
	Dropout delay set too long	Reduce dropout delay time.	See "Set up 2 - Limit switch" section.
	Control circuit interrupted	Check measured value, current output or relay contacts, adjusters, chemical supply.	
No current output signal	Line open or short-circuited	Disconnect both (!!!) lines and measure directly at the device.	mA meter 0–20 mA DC
	Output defective	Replace controller module.	
	Current outputs encoded as passive and no additional power unit connected	Recode current outputs to active (see "Wiring - Current output" section) or connect power unit.	
	Jumpers for current outputs missing	Pin up jumpers as per the desired encoding (see "Wiring - Current outputs" section).	
Fixed current output signal	Current simulation active	Switch off simulation.	Check under " Service > Simulation".
	Processor system inactive	Switch device off and on.	EMC problem: if it persists, check the installation.
	"Hold" is active	Hold status, see display.	
Incorrect current output signal	Incorrect current assignment	Check current assignment: 0–20 mA or 4–20 mA?	See "Set up 1 - Current outputs" section.
	Incorrect signal assignment	Every current output can be assigned to every measured value (pH or temp).	Check under " Current output"
	Overall burden in the current loop too high (> 500 Ω)	Disconnect output and measure directly at the device.	mA Meter for 0–20 mA DC

Error	Possible cause	Tests and / or remedial action	Equipment needed, spare parts
Data cannot be saved	No DAT memory module present		DAT available as accessory, see the "Accessories" section.
CPG310 control unit not working	No supply voltage	Check connection	
	Fuse defective	Check fuse and replace where necessary	
	Switch to "Service"	Turn switch to "Measure"	
No buffer and cleaner conveyance	Tank empty	Check error messages Test functions in manual mode	Control LEDs CPG310: V1: additional valve 1 active V2: additional valve 2 active MEAS: assembly in measurement mode Alive: LED flashes irregularly if function OK Pressure switch feedback (see item number 440 in "Spare parts" section), "normally closed contact" type ("NC"): no pressure = closed with pressure = open
	Line blocked		
	Suction length longer than 2 m	Reduce suction length to maximum 2 m	
	Pump defective	Check error messages Test functions in manual mode	
	Multihose defective		
Compressed air or rinse water not being pumped	Pressure drop in the pipe	Check pipe	
	Line blocked		
Assembly remains in the "Service" position	No compressed air	Check error messages Test functions in manual mode Disconnect pressure switch and check with ohmmeter	Control LEDs CPG: V1: additional valve 1 active V2: additional valve 2 active MEAS: assembly in measurement mode Alive: LED flashes irregularly if function OK Pressure switch feedback (see item number 440 in "Spare parts" section), "normally closed contact" type ("NC"): no pressure = closed with pressure = open
	Switch to "Service"		
	Incorrect position feedback signal		
Assembly remains in the "Measure" position	No compressed air		
	Switch to "Measure"		
	Incorrect position feedback signal		
Assembly permanently retracts	Pneumatic hoses to assembly connected incorrectly.	Check pneumatic hoses.	
Assembly retracts several times without correct feedback	Pneumatic connections interchanged	See "Pneumatics and hydraulics, CPG" section. ▪ Hose 2 "Measure" to valve 5 in front ▪ Hose 3 "Service" to valve 5 at rear	
	Feedback not correctly connected	See "Pneumatics and hydraulics, CPG" section. ▪ Hose 5 "Measure" feedback (terminal 11/12) ▪ Hose 6 "Service" feedback (terminal 13/14)	
	Feedback switch is wrongly adjusted	Feedback switch under pressure ▪ Opened: terminal 11/12-13/14 = 14 V ▪ Closed: terminal 11/12-13/14 = 0 V	
	Assembly has been proceeded manually. Feedback signal is therefore undefined.	Position change via Manual Operation menu	

8.4 Device-specific errors

The following table helps you during the diagnosis and points to any spare parts required.

Depending on the degree of difficulty and the measuring equipment present, diagnosis is carried out by:
- Trained operator personnel
- The user's trained electrical technicians
- Company responsible for system installation/operation
- Endress+Hauser Service

Information on the exact spare part designations and on how to install these parts can be found in the "Spare parts" section.

Error	Possible cause	Tests and / or remedial action	Execution, tools, spare parts
Display dark, no light-emitting diode active	No line voltage	Check whether line voltage is present.	Electrician / e.g. multimeter
	Incorrect supply voltage or too low	Compare actual line voltage and nameplate data.	User (data for energy supply company or multimeter)
	Connection defective	Terminal not tightened; Insulation jammed; Wrong terminals used.	Electrical technician
	Device fuse defective	Compare line voltage and the nameplate data and replace fuse.	Electrical technician/suitable fuse; See "Spare parts" section.
	Power unit defective	Replace power unit, note version.	Local diagnosis: All 6 LEDs on the M3G module must be lit.
	Central module defective (if all 6 LEDs on the M3G power unit are lit)	Replace central module, note version.	Onsite diagnosis by Endress+Hauser Service, test module necessary
	Ribbon cable loose or defective	Check ribbon cable, renew if necessary.	Cable soldered onto M3G module side.
Display dark, light-emitting diode active	Central module defective (module: M3Cx-x)	Replace central module M3Cx-x. Pay attention to version.	Onsite diagnosis by Endress+Hauser Service, test module necessary
Display is on but – No change in display and/or – Device cannot be operated	Device or module in device not correctly installed	Check module connections	Perform using the device view in the "Spare parts" section.
	Operating system in impermissible state	Switch device off and on.	Poss. EMC problem: if this persists, check the installation or have checked by Endress+Hauser Service.
Device gets hots	Voltage wrong/too high	Compare line voltage and nameplate data.	User, electrical technician
	Power unit defective	Replace power unit.	All 6 red LEDs on the M3G module must be lit.
Incorrect measured pH / mV value and / or measured temperature value	Transmitter module defective (module: MKxx), please first carry out tests and take measures as per the "Process errors without messages" section.	Test measuring inputs: – Connect pH, ref and PM directly at the device with wire jumpers = display pH 7 – Resistance 100 Ω at terminals 11 / 12 + 13 = display 0 °C	If test negative: replace module (note version). Perform using the device view in the "Spare parts" section. Display approx. pH 7, value depends on the zero point error in the last calibration.
Current output, current value incorrect	Adjustment not correct	Check with installed current simulation, connect mA meter directly to current output.	If simulation value incorrect: adjustment in factory or new module M3Cx-x required. If simulation value correct: check current loop for load and shunts.
	Load too high		
	Shunt / short-circuit to frame in current circuit		
	Incorrect mode of operation	Check whether 0–20 mA or 4–20 mA is selected.	
No current output signal	Current output stage defective (M3CH-x module)	Check with installed current simulation, connect mA meter directly to current output.	If test negative: Replace central module M3CH-x (pay attention to version).
	Device with PROFIBUS interface	PROFIBUS devices do not have a current output	Info see " Instrument version".

8.5 Response of outputs to errors

8.5.1 Current output behavior

If an error occurs in the system, an error current is output at the current output. You can set the value of this error current in the Alarm menu (see "Set up 1 - Alarm" section). If you have configured controllers to function via a current output, this output does not output an error current if an error occurs.

8.5.2 Response of contacts to errors

You can set each individual error message to trigger or not to trigger an alarm (see "System error messages" section, processing of errors in the "Set up 1 - Alarm" section). Failure messages always generate an alarm (as per NAMUR).

Behavior with standard setting

Instrument status	Alarm relay	Limit value / Controller
Normal operation	Picked-up (fail-safe behavior)	Appropriate configuration and operating status
Alarm	Dropped out	
Voltage-free	Dropped out	Dropped out

Behavior with NAMUR setting (contacts configured as normally closed contacts)

Instrument status	Alarm relay	Maintenance relay	Function check	Limit value / Controller
Normal operation	Picked up (fail-safe behavior)	Picked up	Picked up	Appropriate configuration and operating status
Failure	Dropped out	Picked up	Picked up	Appropriate configuration and operating status
Maintenance required	Picked up	Dropped out	Picked up	Appropriate configuration and operating status
Function check	Picked up	Picked up	Dropped out	Appropriate configuration and operating status
Voltage-free	Dropped out	Dropped out	Dropped out	Dropped out

8.5.3 Response of contacts to power failure

In the "Set up 1 > Relays" menu, you can define the contacts as NC contacts or NO contacts (see "Set up 1 - Relays" section). In the case of a power failure, the contacts will act according to the setting you make.

8.5.4 Assembly behavior

Problem	CPM153 behavior	CPG behavior	Assembly behavior
CPM153 voltage failure during measurement	No function		
CPM153 voltage failure during maintenance	No function		
CPG voltage failure during measurement	Error message E012	All valves closed	Can be pushed out of the process
CPG voltage failure during maintenance	Error message E012	All valves closed	Stays in service position
Air failure during measurement	Error message E027		Can be pushed out of the process
Air failure during maintenance	Error message E027		Stays in service position
Air failure during automatic cleaning	Error message E027		Stays in service position
Buffer 1 / 2 empty	Error message E051/E052		
Cleaner empty	Error message E050		

9 Maintenance

⚠ WARNING

Process pressure and temperature, contamination, electrical voltage

Risk of serious or fatal injury!

- ▶ If the sensor has to be removed during maintenance work, avoid hazards posed by pressure, temperature and contamination.
- ▶ Make sure the device is de-energized before you open it.
- ▶ Switch contacts may be powered by separate circuits. Also de-energise these circuits before you work on the terminals.

Take all the necessary measures in time to guarantee the operational safety and reliability of the entire measuring point.
Measuring point maintenance comprises:

- Calibration
- Cleaning the controller, assembly and sensor
- Cable and connection check

When carrying out all work on the device, please observe any possible effects on the process control or the process itself.

NOTICE

Electrostatic discharge (ESD)

Risk of damaging the electronic components

- ▶ Take personal protective measures to avoid ESD, such as discharging beforehand at PE or permanent grounding with a wrist strap.
- ▶ For your own safety, always use genuine spare parts. With genuine spare parts, the function, accuracy and reliability are also guaranteed after repair.

9.1 Maintenance of the entire measuring point

9.1.1 Cleaning the transmitter

Clean the front of the housing with commercially available cleaning agents.

In accordance with DIN 42 115, the front is resistant to:

- Isopropyl alcohol
- Diluted acids (max. 3%)
- Diluted alkalis (max. 5%)
- Ester
- Hydrocarbons
- Ketones
- Household cleaners

NOTICE

Forbidden cleaning agents

Danger of damaging the housing surface or housing seal

- ▶ Never use concentrated mineral acids or bases to clean the device.
- ▶ Never use organic cleaners such as benzyl alcohol, methanol, methylene chloride, xylene or concentrated glycerol cleaner.
- ▶ Never use high-pressure steam for cleaning.

9.1.2 Cleaning the sensors

Sensor cleaning is integrated in the Topcal S system. Usually, additional or external cleaning of the sensor is therefore unnecessary. However, before inspecting the sensor, advance external cleaning may be necessary.

⚠ CAUTION

Cleaning not deactivated during calibration or maintenance activities

Risk of injury from medium or cleaner

- ▶ Switch the service switch to "Service" to keep the assembly safely in the Service position.
- ▶ Switch off any connected cleaning system before removing a sensor from the medium.
- ▶ If you want to check the cleaning function and therefore do not switch off cleaning, wear protective clothing, goggles and gloves, or take other suitable measures, to protect yourself.

Please clean fouling on the pH glass electrodes as follows:

- Oily and greasy deposits:
  Clean with hot water or temperature-controlled detergent (grease dissolvers, such as alcohol, acetone, washing-up liquid where applicable).

⚠ CAUTION

Risk of injury from cleaning agents

- ▶ Make sure to protect your hands, eyes and clothing when you use the following cleaning agents.

- Calciferous and metal hydroxide deposits:
  Dissolve deposits with diluted hydrochloric acid (3 %) and then rinse carefully with plenty of clear water.
- Sulfide deposits (from flue gas desulfurization or sewage treatment plants):
  Use mixture of hydrochloric acid (3 %) and thiocarbamide (usual commercial) and then rinse carefully with plenty of clear water.
- Protein deposits (e.g. food industry):
  Use mixture of hydrochloric acid (0.5 %) and pepsin (usual commercial) and then rinse carefully with plenty of clear water.
- Fibers, suspended substances:
  Water under pressure, possibly with surface-active agents
- Light biological deposits:
  Water under pressure

Redox electrodes:

Carefully clean the metal pins or surfaces mechanically.

After mechanical cleaning, the redox sensor can require several hours conditioning time. For this reason, check the calibration after a day.

ISFET sensors

- Never use acetone to clean ISFET sensors as this can damage the material.
- After cleaning with compressed air, ISFET sensors need approx. 5-8 minutes until the closed-control loop is reestablished and the measured value is adjusted to the real value.

In certain circumstances, you can clean blocked diaphragms mechanically (does not apply to ISFET sensors, Teflon diaphragms and open ring junction electrodes):

- Use a small key file.
- Only file in one direction.

Air bubbles in the electrode:
- Air bubbles can indicate incorrect mounting. For this reason check the orientation.
- The range from 15° to 165° to the horizontal is allowed (with the exception of ISFET sensors).
- Not permitted: horizontal installation or installation with the plug-in head pointing downwards.

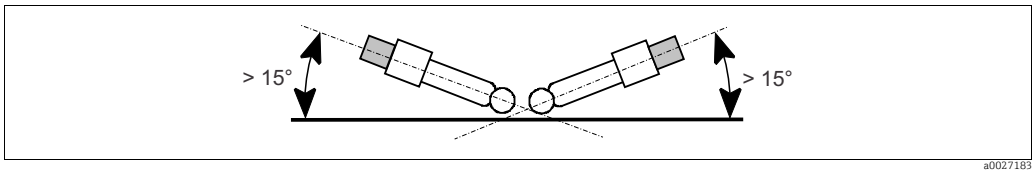


Fig. 60: Permitted angle of installation for glass electrodes

Reference system reduction
The inner metal lead of the reference system (Ag/AgCl) of a combination electrode or a separate reference electrode is usually light-brown and matt. A silver-colored reference system is reduced and therefore defective. The cause is a current flowing through the reference element. Possible causes:
- Incorrect measuring device operating mode selected (PML pin connected, but operating mode without solution ground ("without PML")). See the function description under "Selecting the type of connection".
- Shunt in measuring cable (e.g. due to humidity) between reference line and grounded screen or PA line.
- Measuring device defective (shunt in reference input or entire input amplifier downstream of PE).

9.1.3 Maintenance of digital sensors

Proceed as follows to maintain the digital sensors with Memosens functionality:

1. If an error occurs or the sensor has to be replaced according to the maintenance schedule, take a new or precalibrated sensor from the lab.
   In the lab, a sensor is calibrated under optimum external conditions to ensure a higher quality of measurement.
2. Remove the contaminated sensor and insert the new sensor.
3. A calibration is necessary if you are using a sensor which was not precalibrated.
4. The sensor data are automatically taken by the transmitter. No release code is required.
5. Measurement is continued.
6. Take the used sensor back to the lab. Here you can possibly make the sensor ready for use again without the measuring point having to suffer downtime.
   - Clean the sensor. For this purpose, use the cleaning agent indicated for the sensor.
   - Inspect the sensor for cracks or other damage.
   - Regenerate the sensor if it is not damaged. Store it for 24 hours in a 3M KCl solution.
   - Recalibrate the sensor for the next use.

9.1.4 Liquid KCl supply

- The KCl must be free of bubbles. In the case of an unpressurized version, check whether the cotton thread is present in the hose.
- In the event of counterpressure, check whether the pressure in the KCl tank is min. 0.8 bar (12 psi) above the medium pressure.
- The KCl consumption should be low but noticeable. Approx. 1 to 10 ml/day is typical.
- The opening for sensors with a KCl top-up opening at the glass shaft must be clear.

9.1.5 Manual calibration

Sensor calibration is integrated in the Topcal S system. Additional or external cleaning of the sensor is therefore unnecessary.
If you are using analog sensors and want to perform a calibration outside the assembly (e.g. for test purposes), pay attention to the operating mode of the pH input. In the "with PML" (=symmetrical connection) operating mode, the PM line of CPM153 must also be immersed in the calibration solution.

The assembly must be moved into the Service position with the service switch before manual calibration is performed.

9.1.6 Assembly

Please refer to the corresponding assembly Operating Instructions for information on maintaining and troubleshooting the assembly. Here you can find a description of the procedure for assembly and disassembly, sensor replacement, seal replacement, and information on the material resistance properties, as well as spare parts and accessories.

Weekly checks (recommended timeframe)
- Check the integrity of the upper assembly section with regard to compressed air and check for mechanical damage.
- Check the integrity of the process connection in relation to the process and check for mechanical damage.
- Check the compressed air lines and connections for leaks and mechanical damage.

Annual checks (recommended timeframe)
- Clean the assembly on the outside if required. To replace seals, the assembly must be clean, dry and, if necessary, decontaminated.
- In the event of inductive feedback: check the switching distance and adjust it if necessary.
- Replace the seals not in contact with the medium (recommended: where necessary, at least 1x year).
- Replace the seals in contact with the medium (at least 1x year, no further recommendations possible as primarily depends on the process, material and frequency of assembly use).
- On completion of the maintenance work, carry out the following final test:
  - Does the assembly move into the Measuring and Service position?
  - Are Service and Measure feedback signals available? (Check using the CPM153 status messages)
  - Process connection and compressed air connections tight?
  - Does the meter display plausible values?

Replacement of the sealing elements is dependent on the type of assembly. Instructions for replacement is contained in the appropriate service kit. You can find the necessary service kit in the operating instructions of your assembly.

9.1.7 Cables, connections and supply lines

Weekly checks (recommended timeframe)
Check the integrity of:
- Compressed air hoses and connections
- Pressurized water hoses and connections
- Hoses and connections of buffer and cleaner tanks
- Multihose connections at control unit and assembly

Monthly checks (recommended timeframe)
- If the assembly is located in a humid/wet environment or outdoors and you are using analog sensors, check the sensor plug-in head for leaks or moisture.
- Check that the sensor cables, particularly the external insulation, are in a sound condition. Sensor cables which have become damp on the inside must be replaced. Drying alone is not sufficient!
- Check that the cable connections are tight.

Six-monthly checks (recommended timeframe)
- Check whether the interior and the PCBs in the Mycom S are clean, dry and free of corrosion.
  If not:
  – Clean and dry the interior and PCBs.
  – In the event of corrosion, replace the affected PCBs where necessary.
  – Check the integrity of the seals and couplings are ensure they are in a sound condition.
- Tighten the terminals in Mycom S.
- If the assembly is located in a dry environment and you are using analog sensors, check the sensor plug-in head for leaks or moisture.

9.1.8 Control unit

Weekly checks (recommended timeframe)
- Check the integrity of compressed air connections:
  – Pneumatic valves
  – Pumps
  – Pressure switch
- Check the level of the buffer and cleaning solution and top up if necessary.
- Check the multihose connections on the control unit and assembly for leaks.
- Check the water filter for fouling and clean it where necessary.
- Check the pumps for leaks.

Annual checks (recommended timeframe)
- Check whether the interior and the PCBs of the control unit are clean, dry and free from corrosion.
  If not:
  – Clean and dry the interior and PCBs.
  – In the event of corrosion, replace the PCBs where necessary.
  – Check the integrity of the seals, couplings and pumps and ensure they are in a sound condition.
- Tighten the terminals in the control unit.
- Test the level measurement for the buffer and cleaner canister.

10 Repair

10.1 Spare parts

Please order spare parts from your local Sales Office. For this purpose, use the order numbers listed in the "Spare part kits" section.

You should **always** provide the following additional data when ordering spare parts:
- Device order code
- Serial number
- Software version, if possible

You can take the order code and serial number from the nameplate.
The software version is provided in the device software (see "Operation" section) provided that the device processor system is still working.

10.2 Device view Mycom S

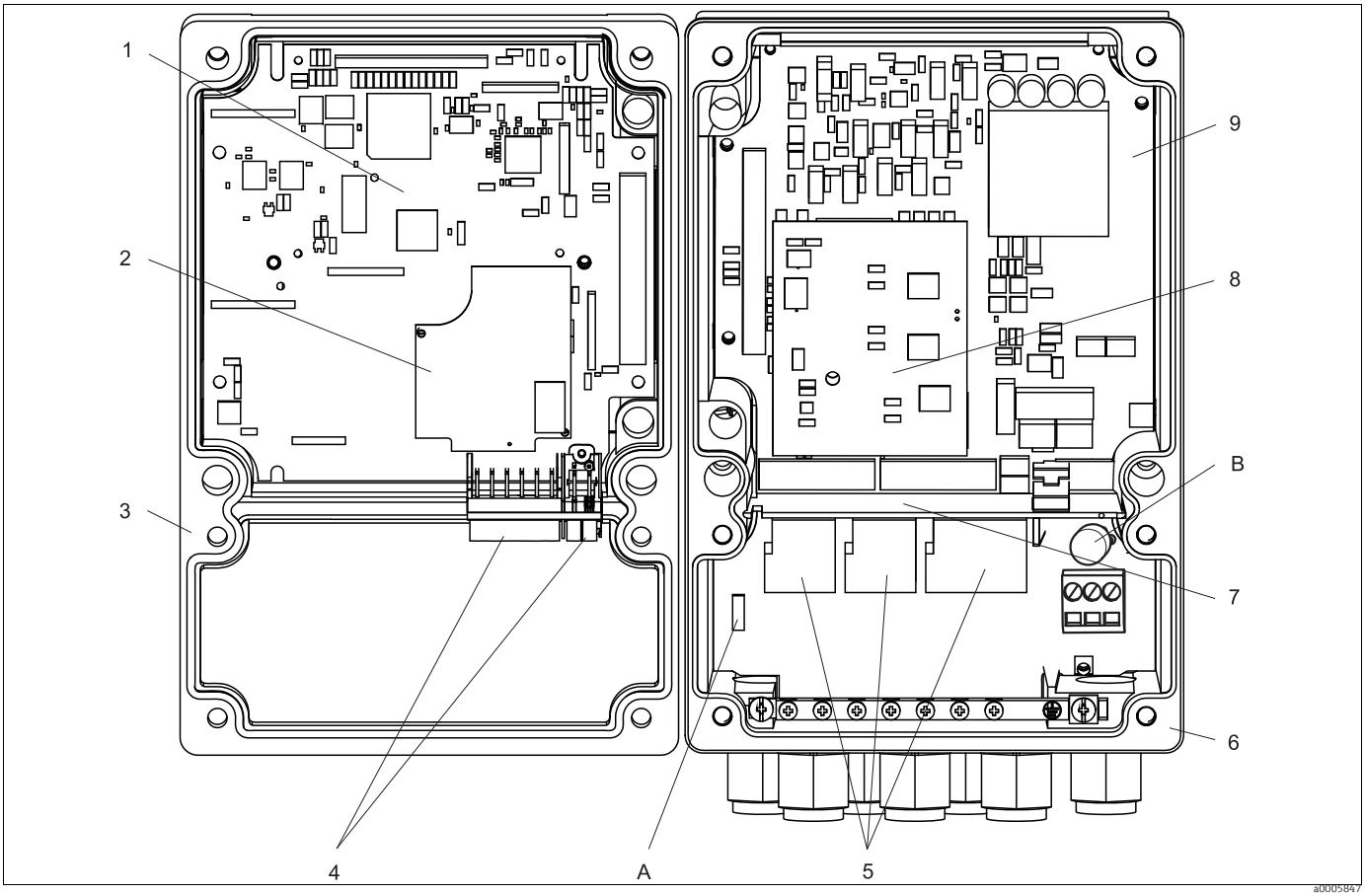


Fig. 61: Interior view

A Slot for DAT module
B Fuse

The interior view contains the components and spare parts of the device. You can take the spare parts and the corresponding order numbers from the following section.

10.3 Mycom S spare parts list

Item No.	Kit description	Contents / Use	Order code
5	Terminal module Standard+HART	Module M3K / non-Ex	51507084
9	Power supply 24 VAC/DC non-Ex	Module M3G, power unit + 3 relay	51507089
1	Controller module pH, 2 x current output	Module M3CH-S2 / non-Ex	51517384
2	pH input module, glass + ISFET	Module MKP2 / Ex and non-Ex	51507096
2	pH input module, Memosens	Module MKD1 / Ex and non-Ex	51514966
8	Relay module with 3 additional relays	Module M3R-3 / Ex and non-Ex	51507097
4	Terminal set for pH input, glass, 2 pair	Six-pin terminal + two-pin terminal, two pieces each	51507100
4	Terminal set for pH input, ISFET, 2 pair	Six-pin terminal + two-pin terminal, two pieces each	51507858
	Jumper set	5 sets of all three jumper types	51507102
7	Partition plate for connection compartment	5 piece, partition plates	51507103
3	Top housing section	Top section with keypad sheet, connection compartment cover, hinge, nameplate/non-Ex	71003923
6	Housing base	For one and two-circuit devices, cpl./non-Ex	51507106

10.4 Control unit device view

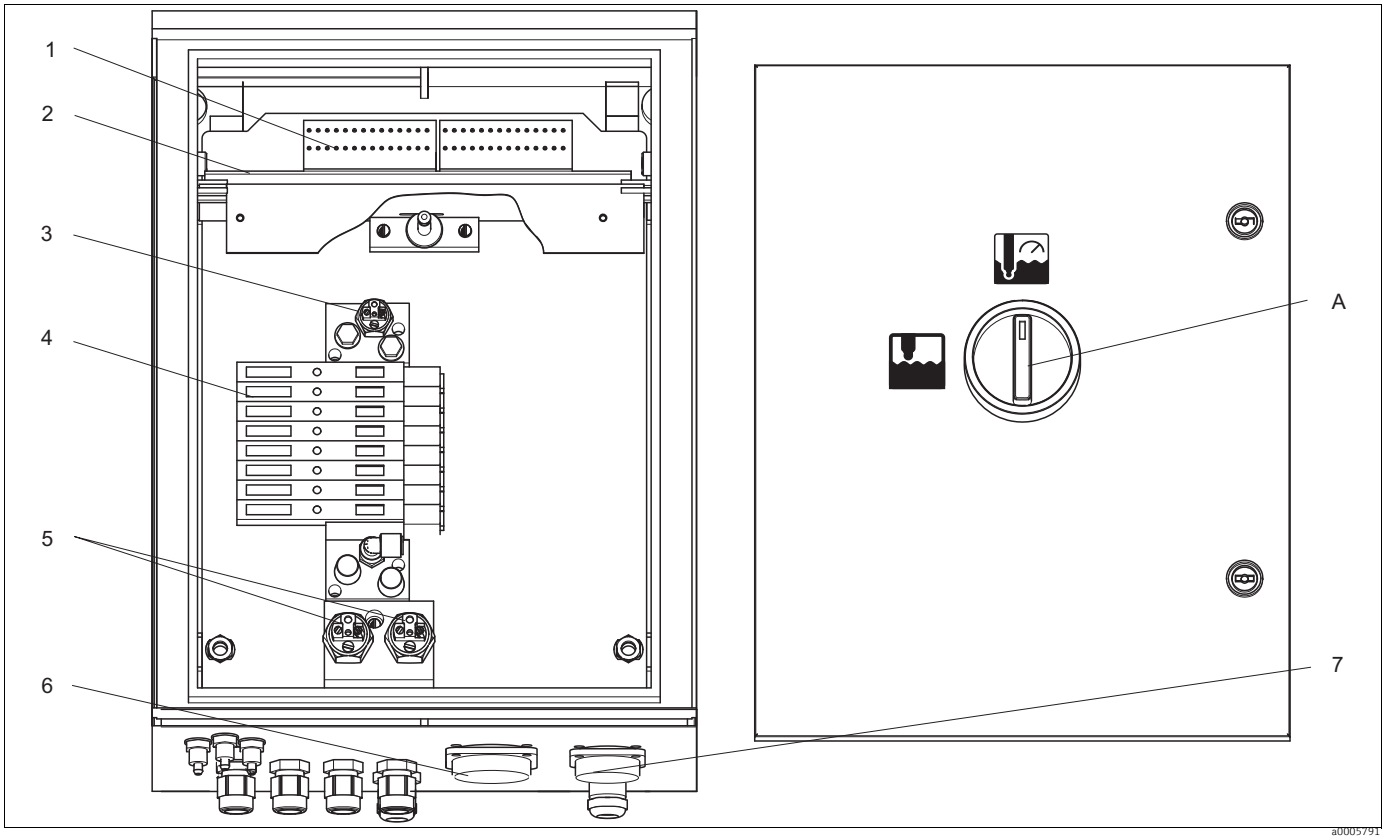


Fig. 62: Interior view

A Service switch

The interior view contains the components and spare parts of the device. You can take the spare parts and the corresponding order numbers from the following section.

10.5 Control unit spare parts list

Item No.	Kit description	Contents / Use	Order code
1	Terminal block set	All requisite terminal blocks/Ex and non-Ex	51507436
2	Electronics module 24 V DC/AC	Tested, complete module/non-Ex	71029974
2	Electronics module 230 V AC	Tested, complete module/non-Ex	71029976
3	Pneumatic pressure switch	Pressure switch/Ex and non-Ex	51507448
4	Pneumatic module, 8 valves	Module complete with 8 solenoid valves / non-Ex	71029973
	Individual valve	Electrically operated valve (coil) / non-Ex	51507449
5	Assembly feedback pressure switch	Pressure switch, NO contact/Ex and non-Ex	51507447
6	Multihose coupling, air MS 8	Quick connection connector and built-in socket, 8-pin MS, (compressed air for assembly) / Ex and non-Ex	71029977
7	Multihose coupling, air MS 5	Quick connection connector and built-in socket, 5-pin MS, (compressed air for pump) / Ex and non-Ex	71029987
	Multihose, air assembly, 5 m (16.4 ft)	Quick connection multihose, MS, 8-way, compressed air for assembly	71029919
	Multihose, air assembly, 10 m (32.8 ft)	Quick connection multihose, MS, 8-way, compressed air for assembly	71029922
	Multihose air for pumps, 2.5 m (8.2 ft)	Quick connection multihose, MS, 5-way, compressed air for pump drive	71029923
	Internal hose system complete	Hoses, hose connector, glands, small ball valves for pumps, seals and insertion nipples and sockets for quick connection/Ex and non-Ex	71029991
	Pressure reduction valve kit	Pressure reduction valve, filter / Ex and non-Ex	51505755
	Water filter kit	Water filter 100 µm / Ex and non-Ex	71031661

10.6 View of canister with vacuum pump and level sensor

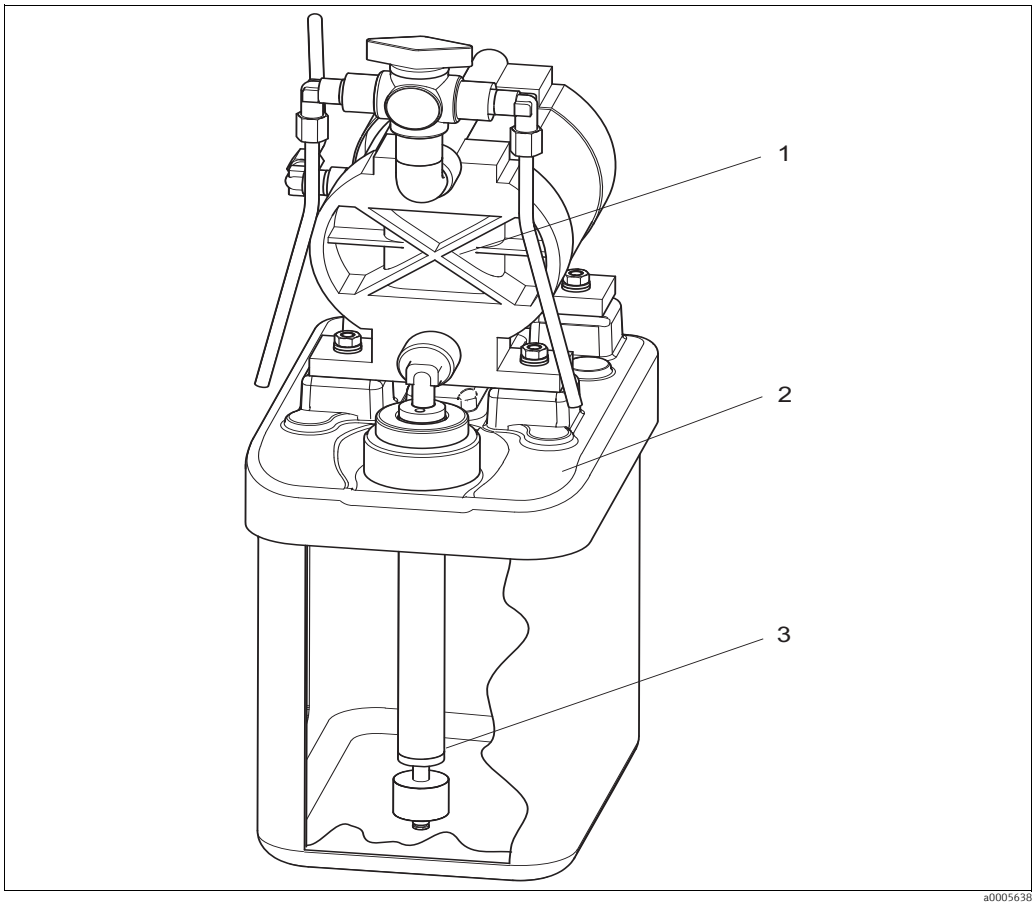


Fig. 63: Buffer and cleaner canister with vacuum pump and level sensor

10.7 Spare parts list for canister with vacuum pump and level probe

Item No.	Kit description	Contents / Use	Order code
1	Double-membrane pump with PVDF membrane	Double-membrane pump, individual, PVDF membrane (option)	71029963
2	Canister with pump and fittings	Canister module complete with vacuum pump, fittings, ball valve, level probe	71029969
3	Level probe with coupling	Level probe, 1 piece, blue, complete with coupling and cable	71029990
	Vent hoses for vacuum pumps, 1.5 m (4.92 ft)	Vent hose system with 3 PVC hoses	71029928

10.8 Pneumatic and hydraulic control unit

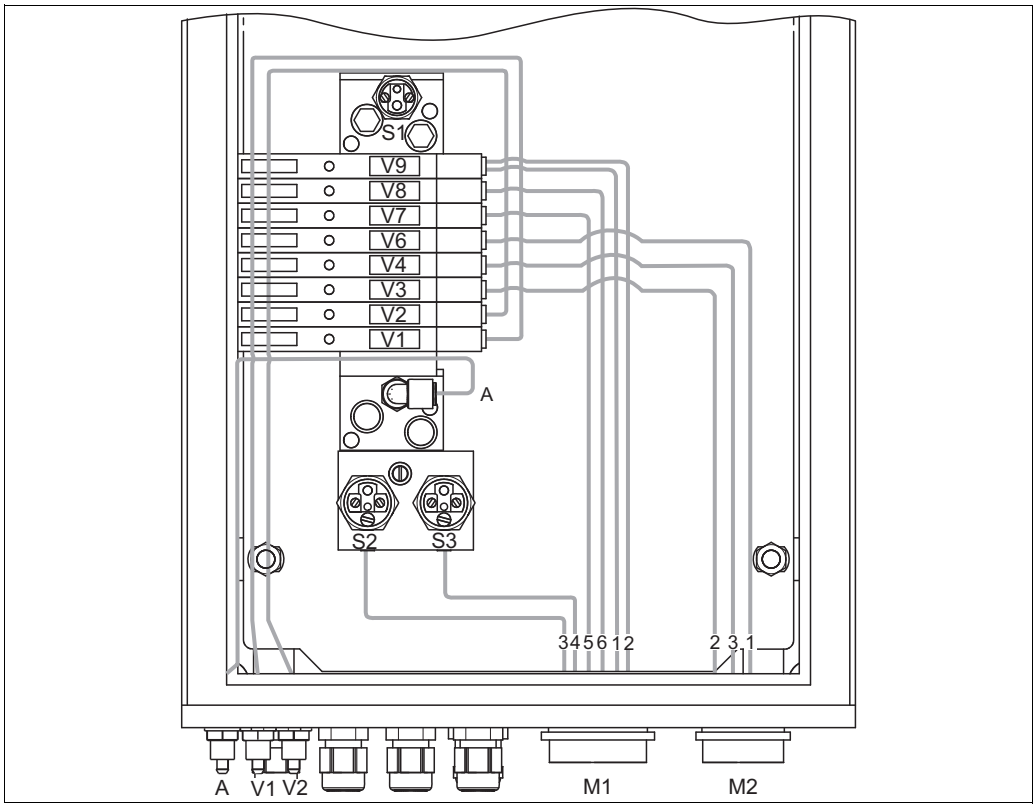


Fig. 64: Pneumatic

A Compressed air supply
V1 Additional valve connection, V1
V2 Additional valve connection, V2
M1 Multihose connector Pg 29
M2 Multihose connector Pg 21
S1-3 Pressure switch
V1-9 Valves

Valves (controlled electrically)	Pressure switch	Multihose connection	Signal / use	Assembly connection
V9 front		M1-2	Assembly "Service"	▪ CPA471/472/475: Upper limit position switch - input (=1); lower G¼ coupling ▪ CPA473/474: Connection number 3
V9 rear		M1-1	Assembly "Measure"	▪ CPA471/472/475: Lower limit position switch - input (=1); upper G¼ coupling ▪ CPA473/474: Connection number 2
	S3	M1-4	"Service" feedback (not used with inductive feedback)	▪ CPA471/472/475: Upper limit position switch - output (=2) ▪ CPA473/474: Connection number 6
	S2	M1-3	"Measurement" feedback (not used with inductive feedback)	▪ CPA471/472/475: Lower limit position switch - output (=2) ▪ CPA473/474: Connection number 5
V8		M1-6	Purge air	
V7		M1-5	Control of 2/2-way valve of the rinsing block for water	
V6		M2-1	Control of vacuum pump for cleaner	
V4		M2-3	Control of vacuum pump for buffer 2	
V3		M2-2	Control of vacuum pump for buffer 1	
V2		None	Additional valve for back pressure water, steam etc.	
V1		None	Additional valve for back pressure water, steam etc.	
	S1	None	Compressed air monitoring	

Multihose connections

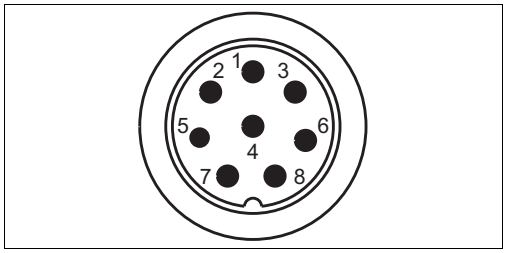


Fig. 65: Multihose connector M1 (Pg 29) on housing

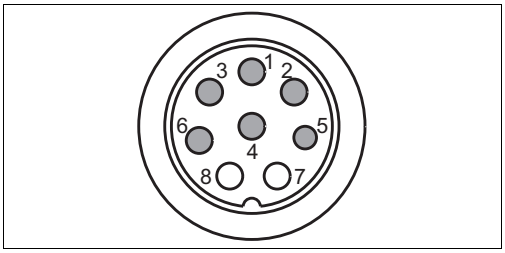


Fig. 66: Multihose socket M1 (Pg 29) on hose

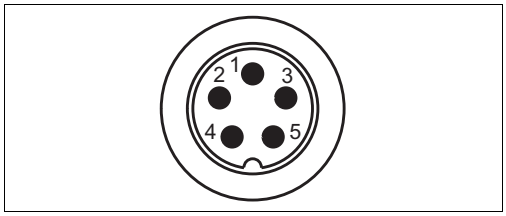


Fig. 67: Multihose connector M2 (Pg 21) on housing

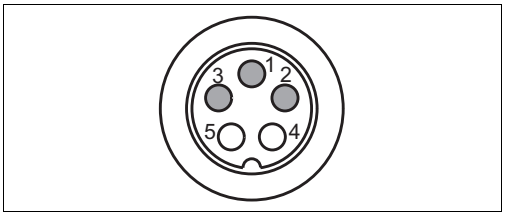


Fig. 68: Multihose socket M2 (Pg 21) on hose

10.9 Rinsing block

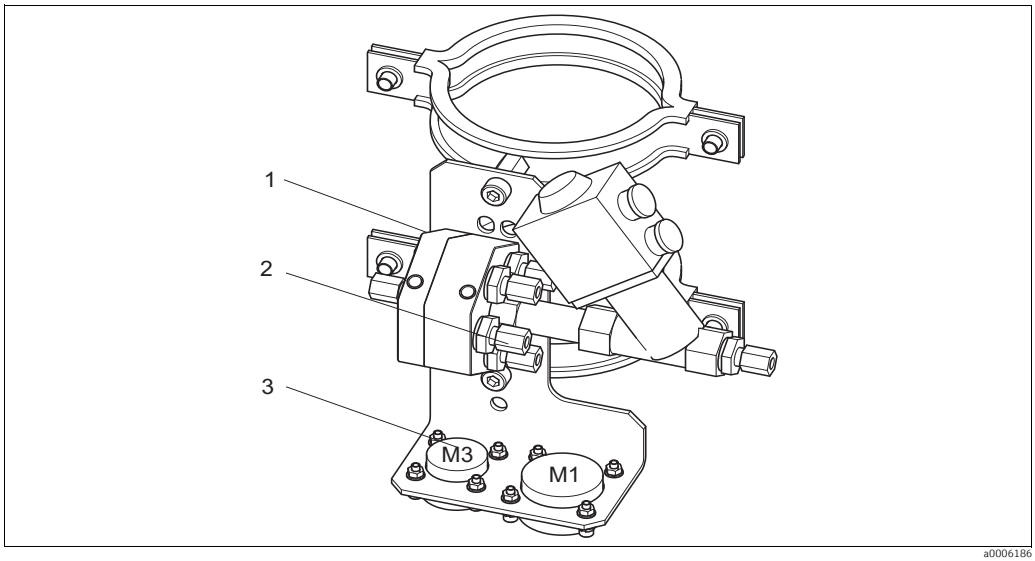


Fig. 69: Rinsing block

Item No.	Kit description	Contents / Use	Order code
1	PVDF rinsing block, G ¼, Viton	Complete PVDF rinsing block, G ¼, Viton seals	71029930
1	Rinsing block PVDF, G ¼, Kalrez	Complete PVDF rinsing block, G ¼, Kalrez seals	71029931
1	PVDF rinsing block, NPT ¼", Viton	Complete PVDF rinsing block, NPT ¼", Viton seals	71029938
1	PVDF rinsing block, NPT ¼", Kalrez	Complete PVDF rinsing block, NPT ¼", Kalrez seals	71029942
1	VA rinsing block, G ¼, Viton	Complete rinsing block, stainless steel 1.4404 (AISI 316L), G ¼, Viton seals	71029943
1	VA rinsing block, G ¼, Kalrez	Complete rinsing block, stainless steel 1.4404 (AISI 316L), G ¼, Kalrez seals	71029946

Item No.	Kit description	Contents / Use	Order code
1	VA rinsing block, NPT ¼", Viton	Complete rinsing block, stainless steel 1.4404 (AISI 316L), NPT ¼", Viton seals	71029948
1	VA rinsing block, NPT ¼", Kalrez	Complete rinsing block, stainless steel 1.4404 (AISI 316L), NPT ¼", Kalrez seals	71029951
2	Rinsing adapter valves PVDF, Viton	Check valves for rinsing adapter, 5-piece, PVDF, Viton seals	71029955
2	Rinsing adapter valves PVDF, Kalrez	Check valves for rinsing adapter, 5-piece, PVDF, Kalrez seals	71029956
2	Rinsing adapter valves, VA, Viton	Check valves for rinsing adapter, 5-piece, stainless steel 1.4404 (AISI 316L), Viton seals	71029958
2	Rinsing adapter valves, VA, Kalrez	Check valves for rinsing adapter, 5-piece, stainless steel 1.4404 (AISI 316L), Kalrez seals	71029960
3	Assembly multihose coupling, Viton	Quick connection, connector and built-in socket, 5-pin, HC4, Viton, media to rinsing block)	71029988
3	Assembly multihose coupling, Kalrez	Quick connection, connector and built-in socket, 5-pin, HC4, Kalrez, media to rinsing block)	71029989
	Multihose, media assembly, 5 m (8.2 ft)	Quick connection multihose, HC4, 5-way, without heating, Hastelloy coupling / cleaner and buffer to rinsing block	71029924
	Multihose, media assembly, 10 m (16.4 ft)	Quick connection multihose, HC4, 5-way, without heating, Hastelloy coupling / cleaner and buffer to rinsing block	71029925
	Multihose, media assembly, 5 m (8.2 ft), heated	Quick connection multihose, HC4, 5-way, with heating, Hastelloy coupling / cleaner and buffer to rinsing block	71029926
	Multihose, media assembly, 10 m (16.4 ft), heated	Quick connection multihose, HC4, 5-way, with heating, Hastelloy coupling / cleaner and buffer to rinsing block	71029927
Assembly connection to rinsing block			
	CPA472/474 rinsing nozzle G ¼, PVDF		51512705
	CPA471/473 rinsing nozzle G 1/8 - G ¼, VA		51503771
	CPA472D, HC4, G ¼: Swagelok rinse connection	Rinse connection for pipe or hose 6 mm, internal (only for rinse chamber with G ¼)	71026794
	CPA472D, titanium, G ¼: Swagelok rinse connection	Rinse connection for pipe or hose 6 mm, internal (only for rinse chamber with G ¼)	71026795
	CPA472D, stainless steel 1.4571 (AISI 316Ti), G ¼: Swagelok rinse connection	Rinse connection for pipe or hose 6 mm, internal (only for rinse chamber with G ¼)	71026796

10.10 Replacing the device fuse

⚠ WARNING

Risk of serious or fatal injury from electric shock!

▶ Make sure the device is de-energized before you open it.

- Position of the fuse holder: "B" in device view.
- Only use a 5 x 20 mm (0.2 x 0.79 in) fine-wire fuse with 3.15 A, medium-blow. All other fuses are not permitted.

10.11 Return

The product must be returned if repairs or a factory calibration are required, or if the wrong product has been ordered or delivered. Legal specifications require Endress+Hauser, as an ISO-certified company, to follow certain procedures when handling products that are in contact with the medium.

To ensure swift, safe and professional device returns:
Visit our website to obtain information about the return procedure and basic conditions
www.services.endress.com/return-material

10.12 Disposal

Electronic components are used in the product. For this reason, the product must be disposed of as electronic waste.
Observe local regulations.

11 Accessories

11.1 Offline configuration

- Parawin
  Graphic PC program for offline configuration of the measuring point at the PC. You can switch the language via software. Required operating system: Windows NT/95/98/2000.
  Offline configuration consists of:
  ▶ One DAT module
  ▶ DAT interface (RS 232)
  ▶ Software
  Order No.: 51507563 (Topcal S / Mycom S)
- RS232 <-> USB adapter
  Order No.: 71200843
- Additional memory module for saving or copying configuration, data logs and logbooks;
  Order No.: 51507175

11.2 Assemblies

Cleanfit CPA871
- Flexible retractable process assembly for water, wastewater and the chemical industry
- Order according to product structure, www.products.endress.com/cpa871
- Technical Information TI01191C/07/EN

Cleanfit CPA875
- Retractable process assembly for sterile and hygienic applications
- Order according to product structure, www.products.endress.com/cpa875
- Technical Information TI01168C/07/EN

Cleanfit P CPA472, version CPA472-xxxxxx3/4
- Compact plastic retractable assembly for installation in tanks and pipes, for manual or pneumatically remote-controlled operation
- Order according to product structure, www.products.endress.com/cpa472
- Technical Information TI00223C/07/EN

Cleanfit P CPA472D, version CPA472-xxxxxxx3/4/5
- Retractable assembly for pH/ORP measurement in tanks and pipes, manual or pneumatic operation, heavy-duty version made from heavy-duty materials
- Order according to product structure, www.products.endress.com/cpa472d
- Technical Information TI00403C/07/EN

Cleanfit P CPA473
- Stainless steel retractable process assembly with ball valve shutoff for very reliable separation of the process medium from the environment
- Order according to product structure, www.products.endress.com/cpa473
- Technical Information TI00344C/07/EN

Cleanfit P CPA474
- Plastic retractable process assembly with ball valve shutoff for very reliable separation of the process medium from the environment
- Order according to product structure, www.products.endress.com/cpa474
- Technical Information TI00345C/07/EN

11.3 Sensors

11.3.1 Glass electrodes

Orbisint CPS11/CPS11D
- pH electrode for process engineering
- With dirt-repellent PTFE junction
- Order according to product structure, www.products.endress.com/cps11 or www.products.endress.com/cps11d
- Technical Information TI00028C/07/EN

Orbisint CPS12/CPS12D
- ORP electrode for process engineering
- With dirt-repellent PTFE junction
- Order according to product structure, www.products.endress.com/cps12 or www.products.endress.com/cps12d
- Technical Information TI00367C/07/EN

Memosens CPS31D
- pH electrode with Memosens technology for drinking water and swimming pool water
- Gel-filled reference system with ceramic junction
- Order according to product structure, www.products.endress.com/cps31d
- Technical Information TI00030C/07/EN

Ceratex CPS31
- pH electrode for drinking water and swimming pool water
- Gel-filled reference system with ceramic junction
- Order according to product structure, www.products.endress.com/cps31
- Technical Information TI00030C/07/EN

Ceraliquid CPS41/CPS41D
- pH electrode with ceramic junction and KCl liquid electrolyte
- Order according to product structure, www.products.endress.com/cps41 or www.products.endress.com/cps41d
- Technical Information TI00079C/07/EN

Ceraliquid CPS42/CPS42D
- ORP electrode with ceramic junction and KCl liquid electrolyte
- Order according to product structure, www.products.endress.com/cps42 or www.products.endress.com/cps42d
- Technical Information TI00373C/07/EN

Ceragel CPS71/CPS71D
- pH electrode with poison-resistant reference with ion trap
- Order according to product structure, www.products.endress.com/cps71 or www.products.endress.com/cps71d
- Technical Information TI00245C/07/EN

Ceragel CPS72/CPS72D
- ORP electrode with poison-resistant reference with ion trap
- Order according to product structure, www.products.endress.com/cps72 or www.products.endress.com/cps72d
- Technical Information TI00374C/07/EN

Orbipore CPS91/CPS91D
- pH electrode with open aperture diaphragm for media with a high dirt load
- Order according to product structure, www.products.endress.com/cps91 or www.products.endress.com/cps91d
- Technical Information TI00375C/07/EN

Orbipore CPS92/CPS92D
- ORP electrode with open aperture diaphragm for media with a high dirt load
- Order according to product structure, www.products.endress.com/cps92 or www.products.endress.com/cps92d
- Technical Information TI00435C/07/EN

11.3.2 ISFET sensors

Tophit CPS471/CPS471D
- Sterilizable and autoclavable ISFET sensor for food and pharmaceutics, process engineering,
  water treatment and biotechnology
- Order according to product structure, www.products.endress.com/cps471 or www.products.endress.com/cps471d
- Technical Information TI00283C/07/EN

Tophit CPS441/CPS441D
- Sterilizable ISFET sensor for low-conductivity media,
  with liquid KCl electrolyte
- Order according to product structure, www.products.endress.com/cps441 or www.products.endress.com/cps441d
- Technical Information TI00352C/07/EN

Tophit CPS491/CPS491D
- ISFET sensor with open aperture diaphragm for media with high dirt load
- Order according to product structure, www.products.endress.com/cps491 or www.products.endress.com/cps491d
- Technical Information TI00377C/07/EN

11.4 Connection accessories

Special measuring cable CPK1
- For pH/ORP electrodes with GSA plug-in head
- Order as per product structure, see Technical Information (TI118C/07/en)

Special measuring cable CPK9
- For pH/ORP electrodes with TOP68 plug-in head, for high-temperature and high-pressure applications, IP 68
- Order as per product structure, see Technical Information (TI118C/07/en)

Special measuring cable CPK12
- For ISFET sensors and pH/ORP electrodes with TOP68 plug-in head
- Order as per product structure, see Technical Information (TI118C/07/en)

CYK10 Memosens data cable
- For digital sensors with Memosens technology (CPSxxD)
- Order as per product structure, see Technical Information (TI376C/07/en)

CYK81 Memosens data cable extension
- Unterminated cable for extending sensor connection cables
- 2 x 2 cores, twisted with shield and PVC sheath (2 x 2 x 0.5 mm^2 + shield), material sold by the meter
- Minimum length: 10 m
- Order No. 51502543

CYK71 measuring cable
- Unterminated cable for connecting sensors and extending sensor cables
- Material sold by the meter, order numbers:
  - Non-hazardous area version, black: 50085333
  - Hazardous area version, blue: 51506616

Junction box VBM
- For cable extension, with 10 terminal blocks
- IP 65 (≙ NEMA 4X)
- Aluminum material
- Order numbers:
  - Cable entry Pg 13.5: 50003987
  - Cable entry NPT ½": 51500177

VBA junction box
- For cable extension, with 10 high-impedance terminal blocks, cable glands
- Polycarbonate material
- Order No. 50005276

Junction box RM
- For cable extension, Memosens or CUS31/CUS41
- With 2 x Pg 13.5
- IP 65 (≙ NEMA 4X)
- Order No. 51500832

11.5 Mounting accessories

- Flat seal for front-panel airtight panel mounting of Mycom S;
  Order No.: 50064975
- Filter assembly for rinse water
  Order No.: 71031661

Post mounting kit
- To secure the field device to horizontal and vertical posts or pipes
  (Ø max. 60 mm (2.36"))
- Material: stainless steel 1.4301
- Order No. 50086842

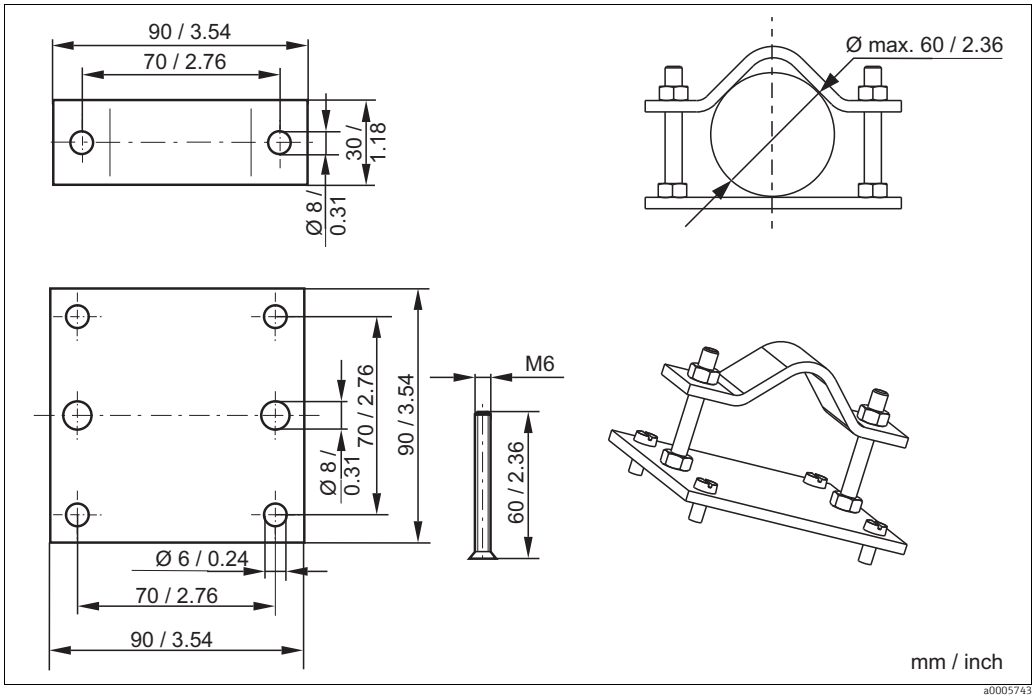


Fig. 70: Mounting kit for securing to pipes and posts

Weather protection cover CYY101 for field devices, essential for outdoor operation
- Material: stainless steel 1.4301 (AISI 304)
- Order No. CYY101-A

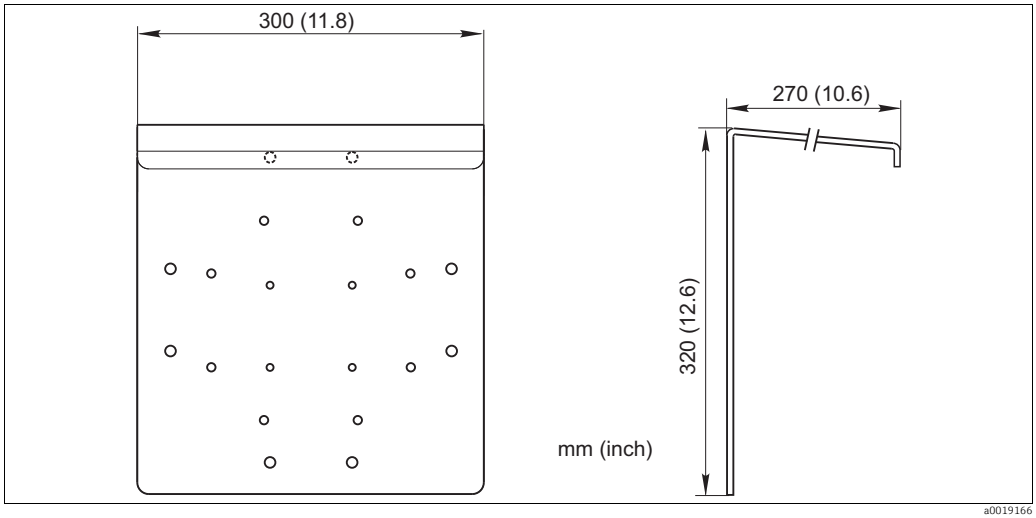


Fig. 71: Weather protection cover for field devices

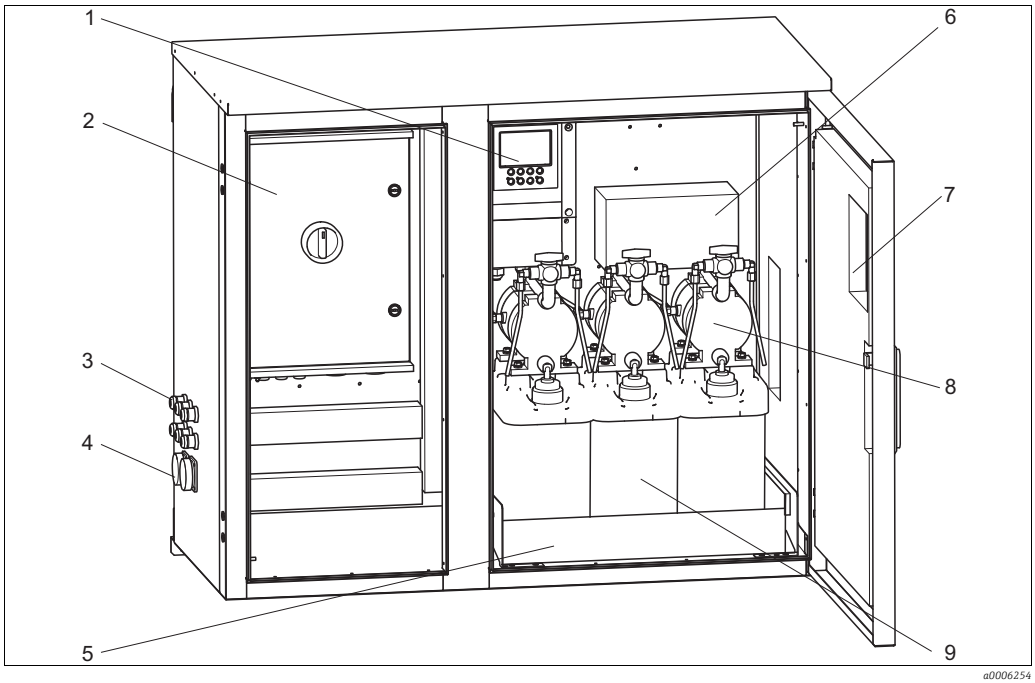
11.6 Buffer solutions

High-quality buffer solutions from Endress+Hauser - CPY20
Solutions which are traced by the DAkkS-accredited Endress+Hauser buffer laboratory (DAkkS = German Accreditation Body) to a primary reference material of the PTB and to standard reference material of the National Institute of Standards and Technology (NIST) in accordance with DIN 19266 are used as secondary reference buffer solutions.
Order according to product structure, www.products.endress.com/cpy20

11.7 CYC310 protective enclosure

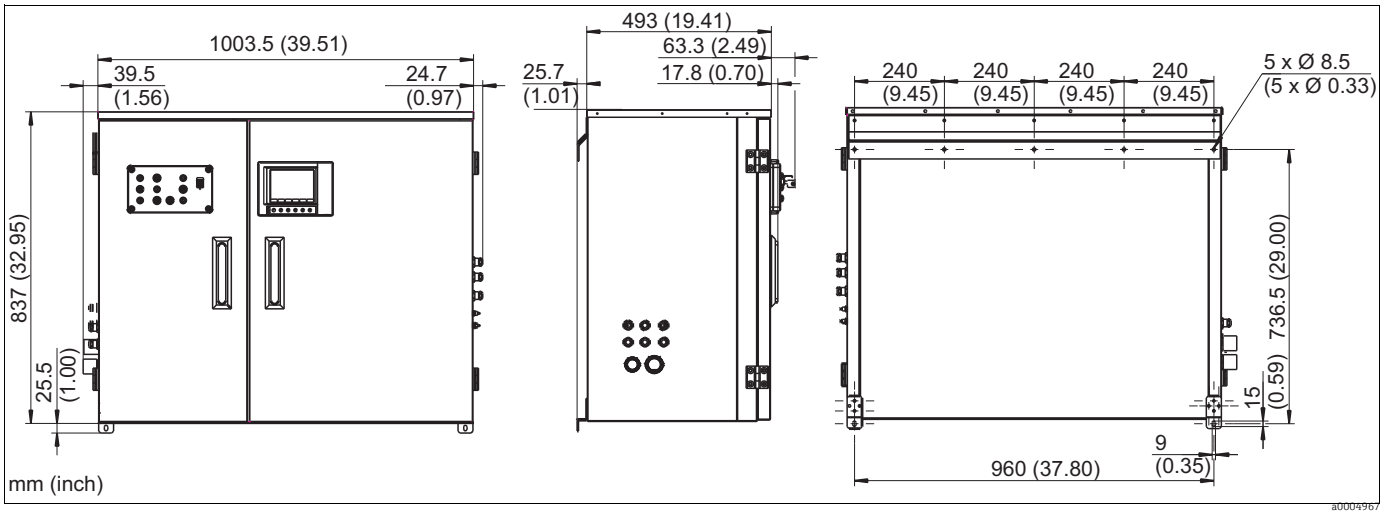
Enclosure for Topcal S CPC310, with removable rack for buffer and cleaner. Operating panel with alarm LED and locking to start the programs and move the assembly. For hazardous and non-hazardous applications.

Material: plastic or stainless steel.
- Plastic version: Viewing window for Mycom S and Memograph S
- Stainless steel version without Memograph: Viewing window for Mycom S
- Stainless steel version with Memograph: Viewing window for Memograph S

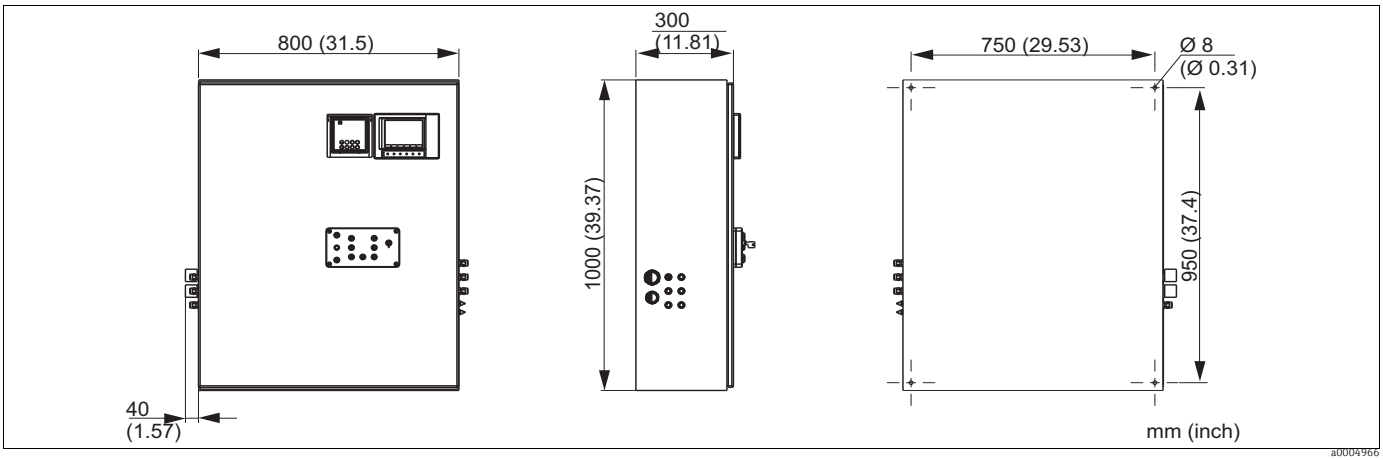


Interior view of CYC310 protective enclosure, stainless steel version

1	*Mycom S CPM153*	*6*	*Junction box*
2	*Control unit*	*7*	*Viewing window for display*
3	*Cable glands*	*8*	*Vacuum pumps for conveying buffer and cleaner*
4	*Multihose connector*	*9*	*Buffer and cleaning solutions*
5	*Rack*		



Dimensions of CYC310 protective enclosure, stainless steel version



Dimensions of CYC310 protective enclosure, plastic version

	Certificates							
	A	Basic features: Non-Ex						
	G	With ATEX approval, ATEX II (1) 2G EEx, em ib[ia] IIC T4						
		Power supply						
		1	230 V AC					
		2	110 to 115 V AC					
		3	24 V AC / DC					
			Materials					
			A	Plastic				
			B	Stainless steel 1.4301				
				Heating				
				1	Without electric heating			
				2	With electrical heating			
					Data logging			
					A	Without Memograph		
					B	With Memograph		
						Assignment		
						1	Empty housing, CPC310 not mounted	
						2	Order item of associated CPC310	
							Options	
							1	Basic version
CYC310-								Complete order code

11.8 Operating panel for CPC310

Operating panel with alarm LED and key switch to start the programs and move the assembly
Order No.: 51512891

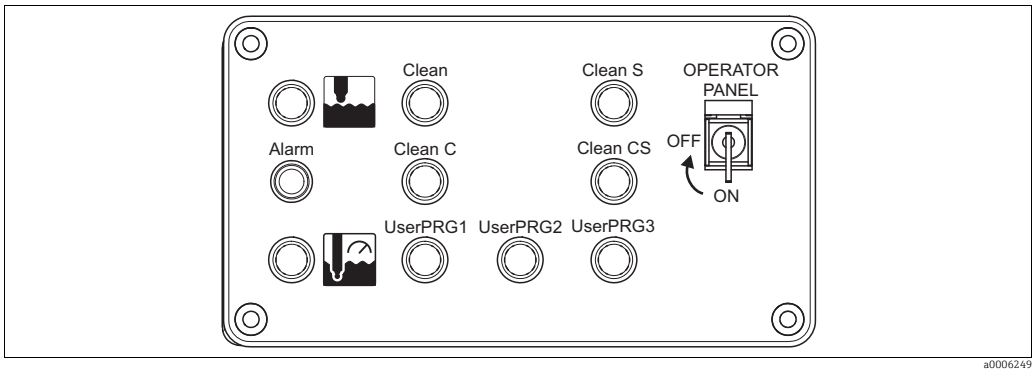


Fig. 72: Operating panel

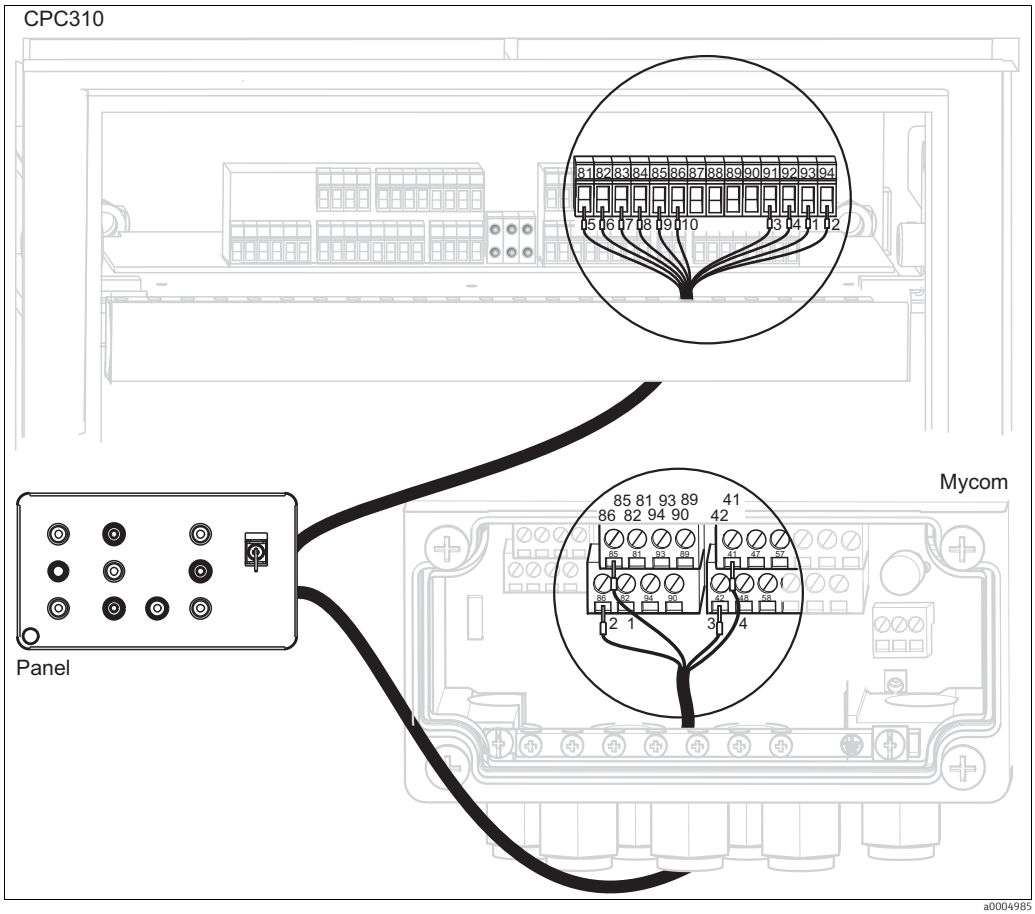


Fig. 73: Operating panel wiring

1. Connect the four-core cable supplied to Mycom S as follows:

Wire	Mycom terminal
1	Terminal 85
2	Terminal 86
3	Terminal 42
4	Terminal 41

2. Connect the twelve-core cable supplied to the control unit as follows:

Wire	Control unit terminal
1	Terminal 93
2	Terminal 94
3	Terminal 91
4	Terminal 92
5	Terminal 81
6	Terminal 82

Wire	Control unit terminal
7	Terminal 83
8	Terminal 84
9	Terminal 85
10	Terminal 86
11 + 12	Do not connect; place cable cores in the cable duct

12 Technical data

12.1 Input

	Mycom S CPM153
Measured variable	pH (analog sensors or sensors with Memosens technology) ORP (analog or digital sensors) Temperature
Measuring range	pH: −2 to 16 pH ORP: −1500 to +1500 mV / -300 to +300 % Temperature: -50 to +200 °C (-58 to +392 °F)
Input impedance	> 10^{12} Ω (at rated operating conditions, analog measured value transmission)
Sensor circuit input current	< 1.6 · 10^{-12} A (at rated operating conditions)
Sensor circuit Ex connection data	Sensor circuit with type of protection EEx ia IIC (optional). This circuit can also be connected to sensors of category 1G (zone 0). Maximum output voltage U_O: 12.6 V DC Maximum output current I_O: 130 mA Maximum output power P_O: 198 mW Maximum external capacitance C_O: 50 nF (with ISFET sensors 150 nF) Maximum external inductance L_O: 100 µH
Sensor circuit cable specification	Cable length (analog): Max. 50 m (164 ft.) Cable length (digital): Max. 100 m (328 ft.)
Current inputs 1 / 2 (passive, optional)	Signal range: 4 to 20 mA Input voltage range: 6 to 30 V Intrinsically safe current inputs for connection of intrinsically safe electric circuits with type of protection EEx ia IIC or EEx ib IIC (optional) Maximum input voltage U_i: 30 V DC Maximum input current I_i: 100 mA Maximum input power P_i: 3 W Maximum internal capacitance C_i: 1.1 nF Maximum internal inductance L_i: 24 µH
Resistance input (active, optional, non-hazardous only)	Resistance ranges (can be switched by software) 0 to 1 kΩ 0 to 10 kΩ
Digital inputs E1-E3	Input voltage: 10 to 50 V Internal resistance: R_i = 5 kΩ Intrinsically safe optoelectronic coupler interfaces for connection of intrinsically safe electric circuits with type of protection EEx ia IIC or EEx ib IIC Maximum input voltage U_i: 30 V DC Maximum internal capacitance C_i: negligible Maximum internal inductance L_i: negligible

CPG310 control unit

Digital inputs

Input voltage: 10 to 40 V
Internal resistance: R_i = 5 kΩ
Minimum switching signal duration: 500 ms

Intrinsically safe optoelectronic coupler interfaces for connection of intrinsically safe electric circuits with type of protection EEx ia IIC or EEx ib IIC
Maximum input voltage U_i: 30 V DC
Maximum internal capacitance C_i: negligible
Maximum internal inductance L_i: negligible

Cable specification for inductive limit position switches

Cable length: Max. 100 m (328 ft.)

12.2 Output

Mycom S CPM153

Output signal

0/4 to 20 mA

Signal on alarm

2.4 or 22 mA in the event of an error

Load of active current output

Max. 600 Ω (depends on operating voltage)

Output distribution

pH: Adjustable, 0 to 18 pH
ORP:
Absolute: Adjustable, 300 to 3000 mV
Relative: Adjustable, 0 to 600 %
Temperature: Adjustable, 17 to 200 °C (62.6 to 392 °F)

Passive current output

Operating voltage range: 6 to 30 V

Ex connection data

Intrinsically safe current circuits for connection of intrinsically safe electric circuits with type of protection EEx ib IIC.
Maximum input voltage U_i: 30 V DC
Maximum input current I_i: 100 mA
Maximum input power P_i: 750 mW
Maximum internal capacitance C_i: negligible
Maximum internal inductance L_i: negligible

Overvoltage protection

As per EN 61000-4-5:1995

Auxiliary voltage output (for digital inputs E1 - E3)

Output voltage: 15 V DC
Output current: Max. 9 mA

Intrinsically safe current output circuit with type of protection EEx ib IIC.

Maximum output voltage U_O: 15.8 V DC
Maximum output current I_O: 71 mA
Maximum output power P_O: 1.13 W
Maximum external capacitance C_O: 50 nF
Maximum external inductance L_O: 100 µH

Interface to CPG30

Power supply:
- Output voltage: 11.5 to 18 V DC
- Output current: Max. 60 mA

Communication: RS 485

Intrinsically safe current output circuit with type of protection EEx ib. IIC.

Contact outputs

Switching voltage:	Max. 250 V AC / 125 V DC
Switching current:	Max. 3 A
Switching power:	Max. 750 VA
Operating life:	≥ 5 million switching cycles

Intrinsically safe relay contact circuits for connection of intrinsically safe electric circuits with type of protection EEx ia IIC or EEx ib IIC.

Maximum input voltage U_i:	30 V DC
Maximum input current I_i:	100 mA
Maximum input power P_i:	3 W
Maximum internal capacitance C_i:	1.1 nF
Maximum internal inductance L_i:	24 µH

Controller

Function (adjustable):	Pulse-length controller (PWM) Pulse-frequency controller (PFM) Three-point stepping controller (3-point step) Analog (via current output)
Controller behavior:	P / PI / PID
Control gain K_R:	0.01 to 20.00
Integral action time T_n:	0.0 to 999.9 min
Derivative action time T_v:	0.0 to 999.9 min
Max. frequency with pulse-frequency controller:	120 min^{-1}
Period length for pulse-length controller:	1 to 999.9 s
Minimum switch-on period for pulse-length controller:	0.4 s

Limit value and alarm functions

Set point settings:	-2.00 to 16.00 pH
Hysteresis for switching contacts:	
pH:	0.1 to 18 pH
ORP absolute:	10 to 100 mV
ORP relative:	1 to 3000%
Alarm delay:	0 to 6000 s

Galvanic isolation

The following are on the same potential:
- Current output 1 and auxiliary voltage
- Current output 2 and resistance input

All other circuits are galvanically isolated from one another.

CPG310 control unit

Digital outputs

Optoelectronic coupler, max. switching voltage: 30 V DC
Max. switching current: 100 mA
Max. switching power: 3 W

Intrinsically safe optoelectronic coupler control outputs for connection of intrinsically safe electric circuits with type of protection EEx ia IIC or EEx ib IIC.

Maximum input voltage U_i:	30 V DC
Maximum input current strength I_i:	100 mA
Maximum input power P_i:	1 W
Maximum internal capacitance C_i:	negligible
Maximum internal inductance L_i:	negligible

Control for external valves

Switched compressed air output:
Max. pressure: Like supply pressure

12.3 Power supply

Electrical connection

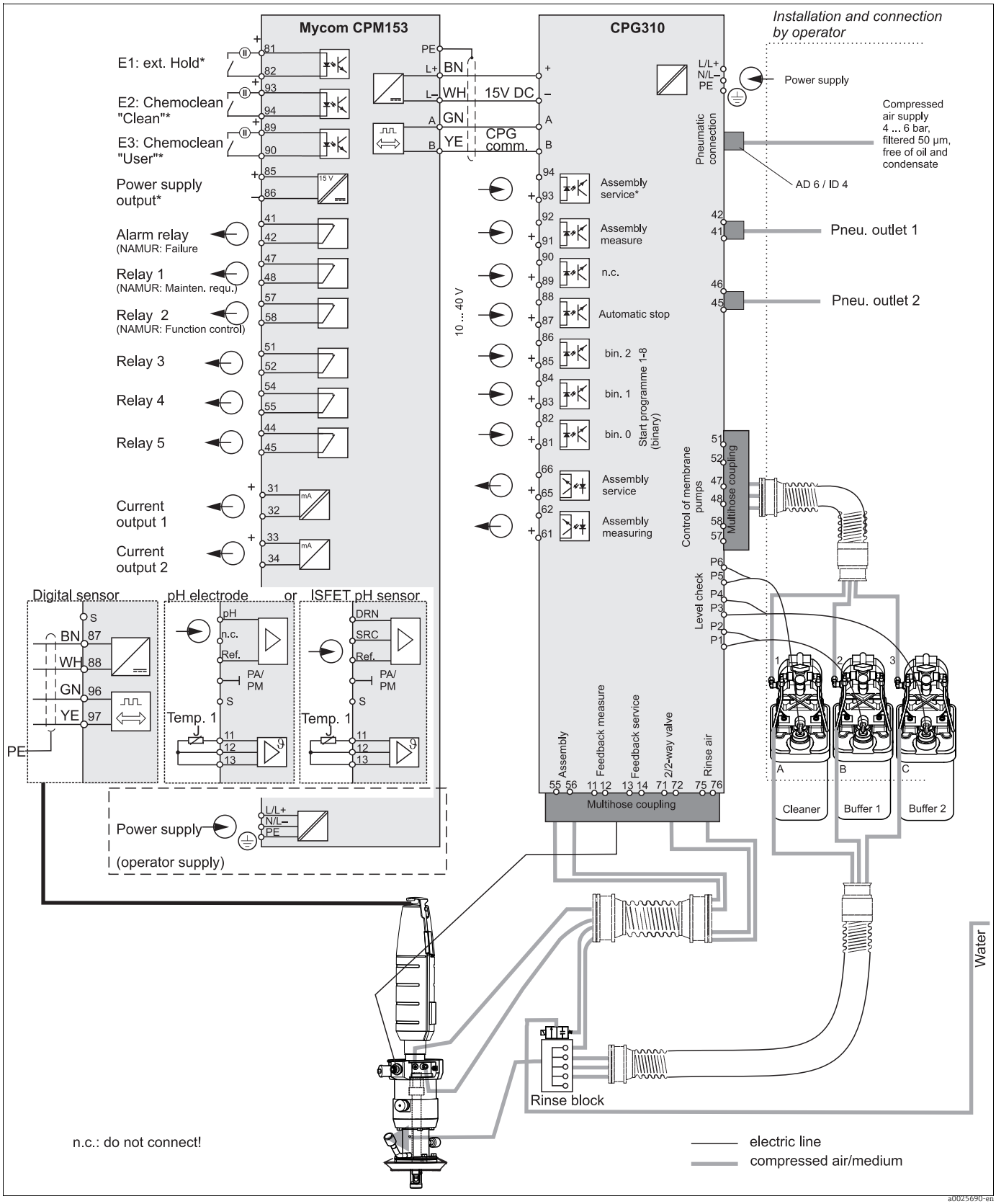


Fig. 74: Connecting in the non-hazardous area

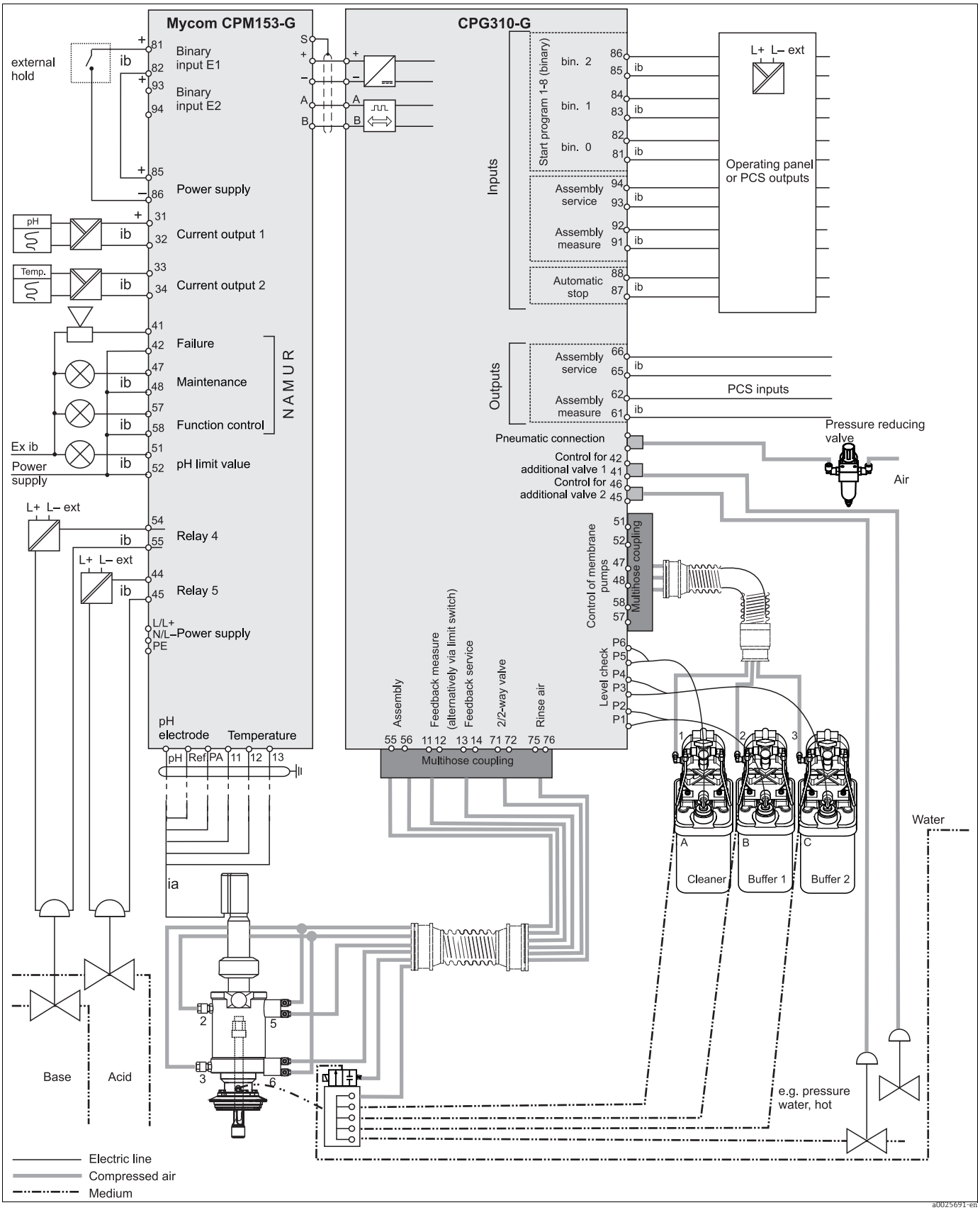


Fig. 75: Connection in the hazardous area

Mycom S CPM153

Supply voltage	Version CPM153-xxxx**0**xxxx Version CPM153-xxxx**8**xxxx	100 to 230 V AC +10/-15 % 24 V AC/DC +20/-15 %
Cable specifications	Max. cable cross-section:	2.5 mm^2 (≙14 AWG)
Power consumption	Max. 10 VA	
Separation voltage between galvanically isolated circuits	276 V_{rms}	

Interface connection data

Mycom S has an alarm contact and five additional contacts.
You can assign functions to the contacts available via the software. The NC/NO contact type can also be switched by software.
You can assign up to three relays to the controllers.

When using the NAMUR assignment (based on the recommendations of the interest group for process control technology in the chemical and pharmaceutical industry), the functions are specified for the relays as follows:

Relay	Assignment NAMUR on	Assignment NAMUR off	Terminal
ALARM	Failure	Alarm	41 42
RELAY 1	Warning if maintenance required	Can be assigned as required	47 48
RELAY 2	Function check	Can be assigned as required	57 58

Frequency

47 to 64 Hz

Ex connection data

Connection data for 12V power supply

Maximum output voltage U_0:	18.5 V
Maximum output current I_0:	100 mA
Maximum output power P_0:	1.53 W
Maximum external capacitance C_0:	150 nF
Maximum external inductance L_0:	150 µH

	CPG310 control unit	
Supply voltage	Version CPC30-xxxx**0**xxxxxxx Version CPC30-xxxx**1**xxxxxxx Version CPC30-xxxx**8**xxxxxxx	230 V AC +10/-15 % 110 to 115 V AC +10/-15 % 24 V AC/DC +20/-15 %
Cable specification	Max. cable cross-section:	2.5 mm^2 (≙14 AWG)
Power consumption	Max. 12 VA	
Separation voltage between galvanically isolated circuits	276 V_{rms}	
Frequency	47 to 64 Hz	
Ex connection data	The hazardous area device versions are powered by the CPM153 transmitter (see the data above).	

12.4 Performance characteristics

Reference temperature	25 °C (77 °F), can be set with medium temperature compensation	
Measured value resolution	pH: ORP: Temperature:	0.01 pH 1 mV / 1% 0.1 K
Maximum measured error[1)]	Display pH: ORP: Temperature Current outputs: Current inputs: Resistance input:	 Max. 0.2 % of measuring range scope Max. 1 mV Max. 0.5 K Max. 0.2 % of current range end value in addition to deviation of display Max. 1 % of measuring range scope Max. 1 % of measuring range scope
Repeatability	Max. 0.1 % of measuring range	
Zero point offset range	pH: ORP:	-2 to +16 pH -200 to +200 mV
Slope adjustment	pH:	5 to 99 mV / pH
Offset	ORP: Temperature:	±120 mV ±5 K
Assignment for ORP relative	Adjustable, Δ for 100% = 150 to 2000 mV	

1) According to IEC 746-1, at rated operating conditions

12.5 Environment

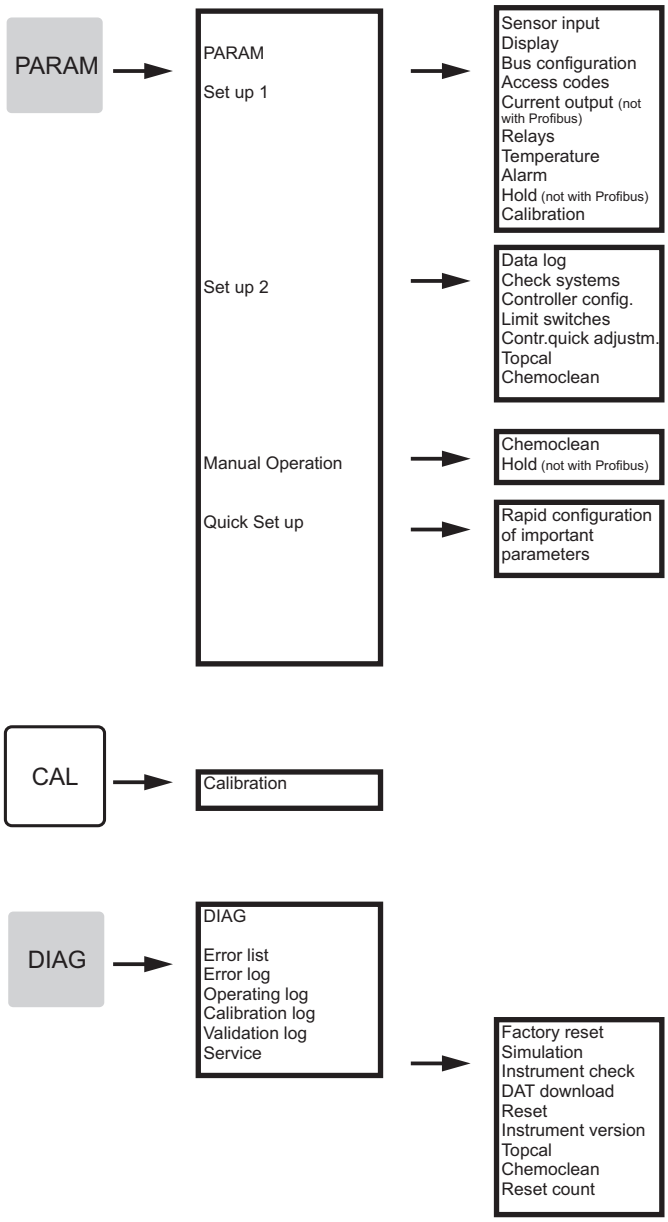
Ambient temperature range	-10 to +55 °C (+14 to +131 °F) -10 to +50 °C (+14 to +122 °F) (Ex)
Ambient temperature limits	–20 to +60 °C (-4 to +140 °F) -10 to +50 °C (+14 to +122 °F) (Ex)
Storage temperature	–30 to +80 °C (-22 to +176 °F)
Electromagnetic compatibility	Interference emission to EN 61326: 1997 / A1:1998; Class B equipment (residential environments) Interference emission to EN 61326: 1997 / A1:1998; Appendix A (industry)
Degree of protection	CPM153: IP 65 CPG310: IP 54
Relative humidity	10 to 95%, non-condensating
Safety requirements	Complies with general safety requirements acc. to EN 61010. Complies with NAMUR Recommendations NE 21: 08/1998.

12.6 Mechanical construction

	Mycom S CPM153	
Dimensions	Length x breadth x depth: Installation depth:	247 mm x 167 mm x 100 mm (9.72" x 6.57" x 3.94") Approx. 134 mm (5.28")
Weight	Max. 6 kg (13.23 lbs)	
Materials	Housing: Front:	GD-AlSi 12 (Mg content 0.05%), plastic-coated Polyester, UV-resistant
	CPG310	
Dimensions	Housing Length x breadth x depth: 5 liter canister Length x breadth x depth: Req. installation height:	 400 mm x 300 mm x 200 mm (15.8" x 11.8" x 7.87") 190 mm x 250 mm x 150 mm (7.48" x 9.84" x 5.91") 350 mm (13.8")
Weight	Approx. 15 kg (33.1 lbs)	
Materials	Housing: Hoses: Level probes: Canister:	Polyester GF PU, PTFE (wetted) Polypropylene HDPE

13 Appendix

13.1 Operating matrix



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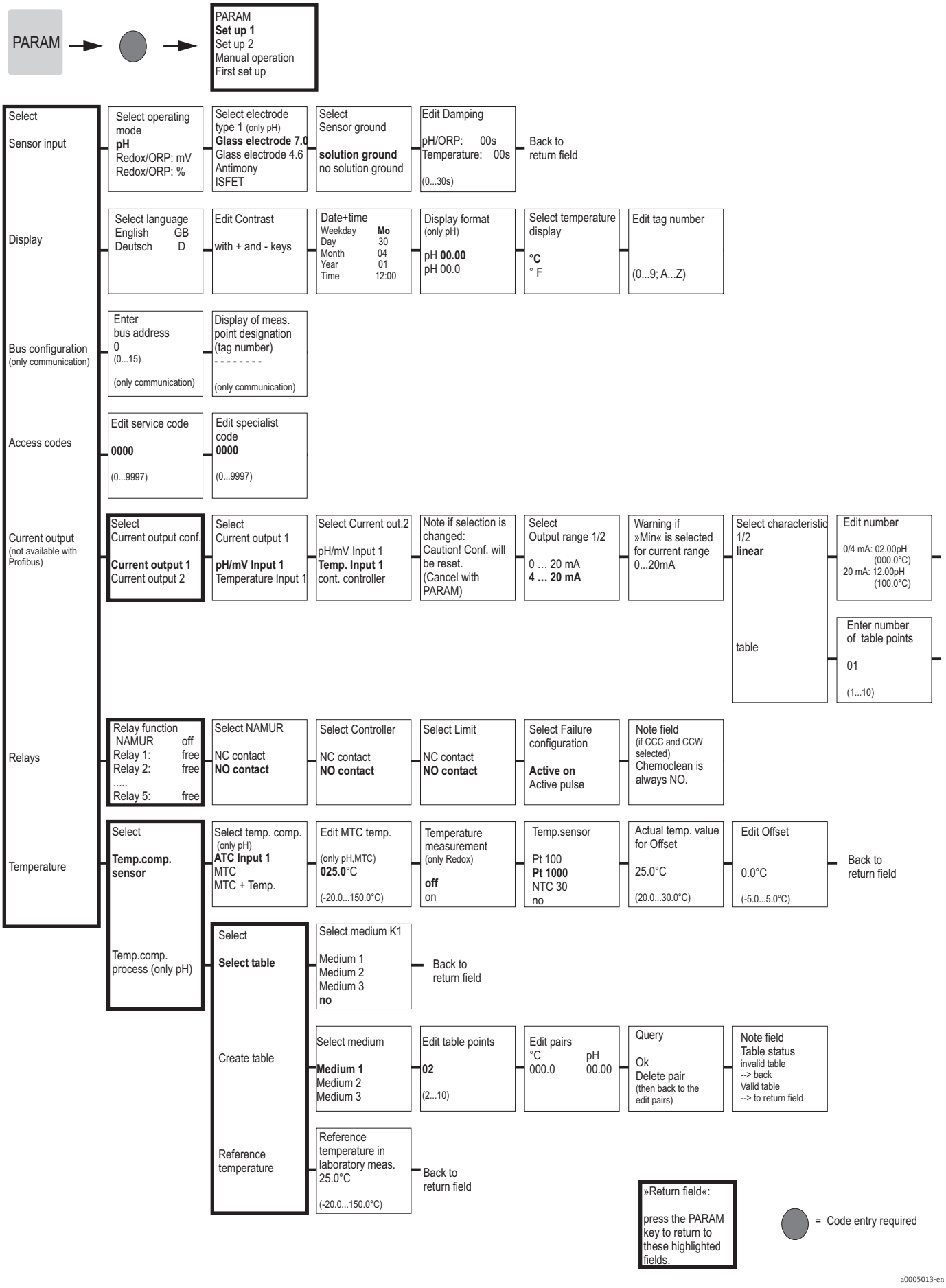
PARAM
PARAM
Set up 1
Set up 2
Manual operation
First set up
Select
Sensor input
Select operating mode
pH
Redox/ORP: mV
Redox/ORP: %
Select electrode type 1 (only pH)
Glass electrode 7.0
Glass electrode 4.6
Antimony
ISFET
Select
Sensor ground
solution ground
no solution ground
Edit Damping
pH/ORP: 00s
Temperature: 00s
(0...30s)
Back to return field
Display
Select language
English GB
Deutsch D
Edit Contrast
with + and - keys
Date+time
Weekday Mo
Day 30
Month 04
Year 01
Time 12:00
Display format
(only pH)
pH 00.00
pH 00.0
Select temperature display
°C
° F
Edit tag number
(0...9; A...Z)
Bus configuration
(only communication)
Enter bus address
0
(0...15)
(only communication)
Display of meas. point designation (tag number)
- - - - - - - -
(only communication)
Access codes
Edit service code
0000
(0...9997)
Edit specialist code
0000
(0...9997)
Current output
(not available with Profibus)
Select Current output conf.
Current output 1
Current output 2
Select Current output 1
pH/mV Input 1
Temperature Input 1
Select Current out.2
pH/mV Input 1
Temp. Input 1
cont. controller
Note if selection is changed: Caution! Conf. will be reset. (Cancel with PARAM)
Select Output range 1/2
0 … 20 mA
4 … 20 mA
Warning if »Min« is selected for current range 0...20mA
Select characteristic 1/2
linear
table
Edit number
0/4 mA: 02.00pH (000.0°C)
20 mA: 12.00pH (100.0°C)
Enter number of table points
01
(1...10)
Relays
Relay function
NAMUR off
Relay 1: free
Relay 2: free
.....
Relay 5: free
Select NAMUR
NC contact
NO contact
Select Controller
NC contact
NO contact
Select Limit
NC contact
NO contact
Select Failure configuration
Active on
Active pulse
Note field
(if CCC and CCW selected)
Chemoclean is always NO.
Temperature
Select
Temp.comp. sensor
Temp.comp. process (only pH)
Select temp. comp.
(only pH)
ATC Input 1
MTC
MTC + Temp.
Edit MTC temp.
(only pH,MTC)
025.0°C
(-20.0...150.0°C)
Temperature measurement
(only Redox)
off
on
Temp.sensor
Pt 100
Pt 1000
NTC 30
no
Actual temp. value for Offset
25.0°C
(20.0...30.0°C)
Edit Offset
0.0°C
(-5.0...5.0°C)
Back to return field
Select
Select table
Create table
Reference temperature
Select medium K1
Medium 1
Medium 2
Medium 3
no
Back to return field
Select medium
Medium 1
Medium 2
Medium 3
Edit table points
02
(2...10)
Edit pairs
°C pH
000.0 00.00
Query
Ok
Delete pair
(then back to the edit pairs)
Note field
Table status
invalid table
--> back
Valid table
--> to return field
Reference temperature in laboratory meas.
25.0°C
(-20.0...150.0°C)
Back to return field
»Return field«:
press the PARAM key to return to these highlighted fields.
= Code entry required
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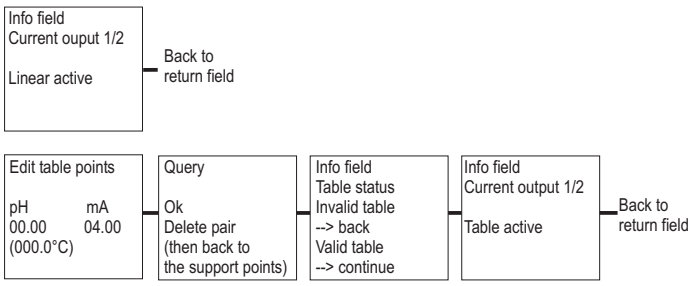
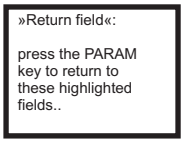
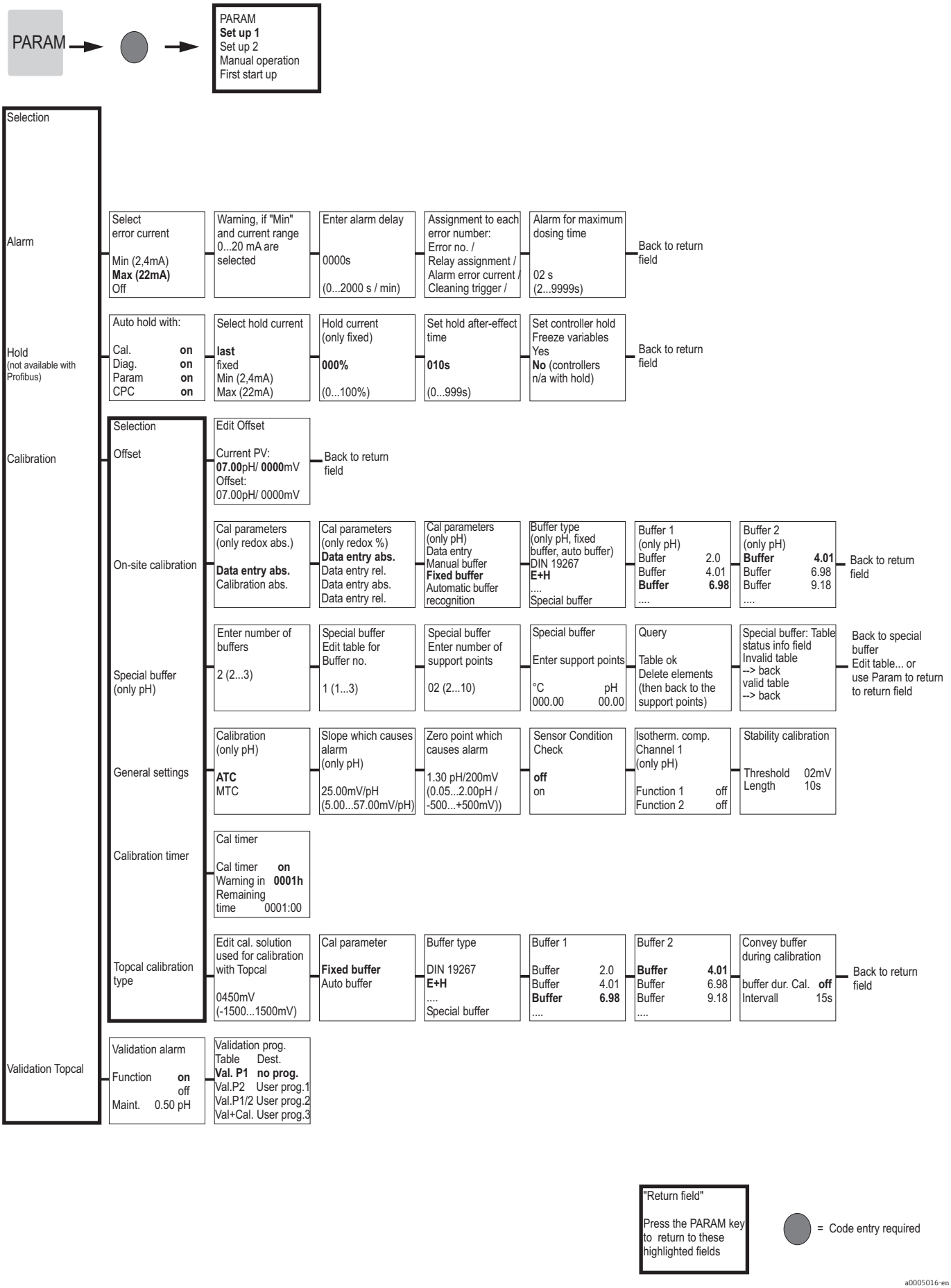
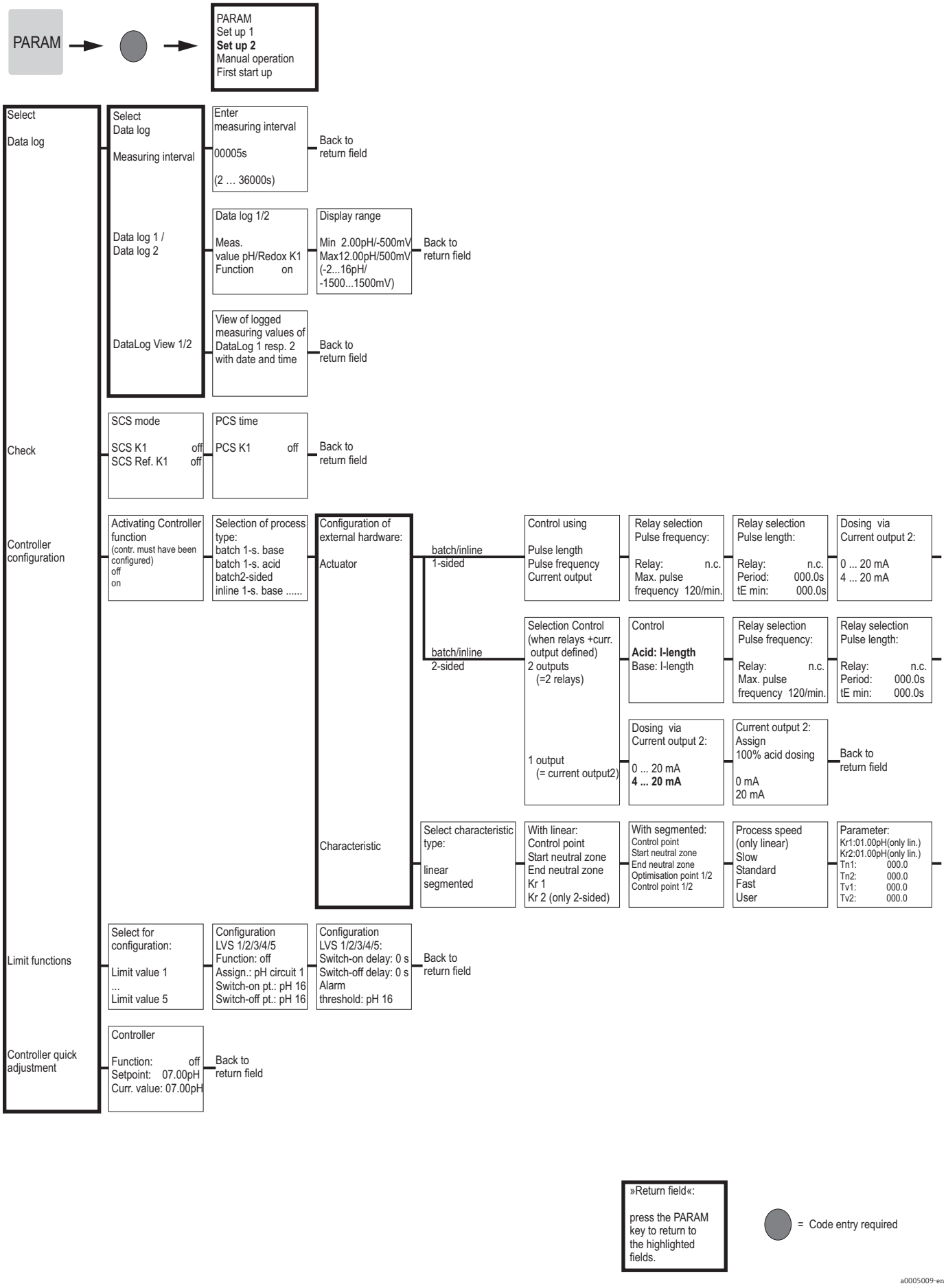


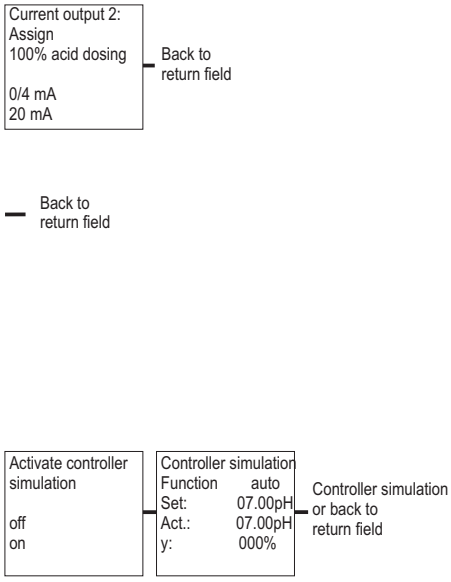


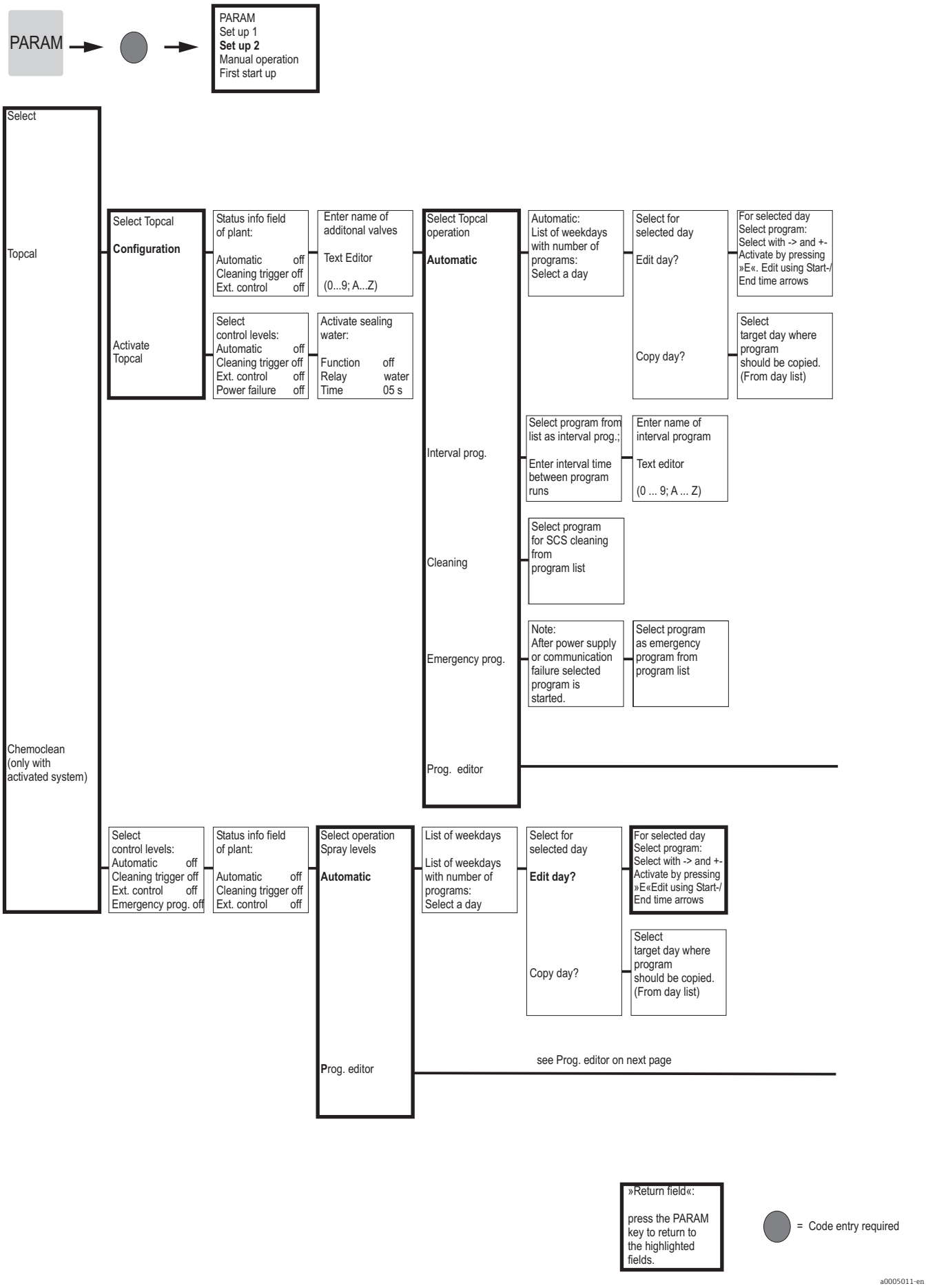
= Code entry required

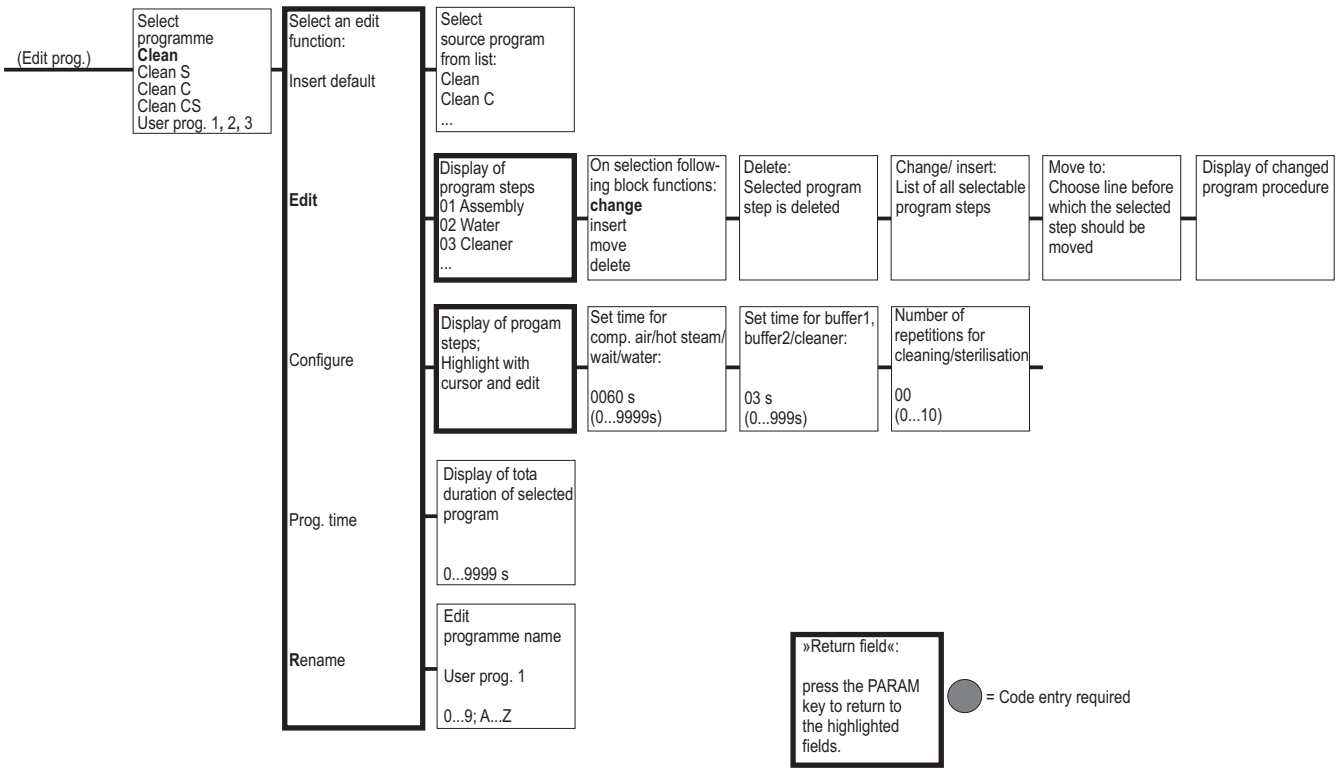
a0005014-en


PARAM
PARAM
Set up 1
Set up 2
Manual operation
First start up
Selection
Alarm
Select error current
Min (2,4mA)
Max (22mA)
Off
Warning, if "Min" and current range 0...20 mA are selected
Enter alarm delay
0000s
(0...2000 s / min)
Assignment to each error number:
Error no. /
Relay assignment /
Alarm error current /
Cleaning trigger /
Alarm for maximum dosing time
02 s
(2...9999s)
Back to return field
Hold
(not available with Profibus)
Auto hold with:
Cal. **on**
Diag. **on**
Param **on**
CPC **on**
Select hold current
last
fixed
Min (2,4mA)
Max (22mA)
Hold current (only fixed)
000%
(0...100%)
Set hold after-effect time
010s
(0...999s)
Set controller hold
Freeze variables
Yes
No (controllers n/a with hold)
Back to return field
Calibration
Selection
Offset
Edit Offset
Current PV:
07.00pH/ **0000**mV
Offset:
07.00pH/ 0000mV
Back to return field
On-site calibration
Cal parameters (only redox abs.)
Data entry abs.
Calibration abs.
Cal parameters (only redox %)
Data entry abs.
Data entry rel.
Data entry abs.
Data entry rel.
Cal parameters (only pH)
Data entry
Manual buffer
Fixed buffer
Automatic buffer recognition
Buffer type (only pH, fixed buffer, auto buffer)
DIN 19267
E+H
....
Special buffer
Buffer 1 (only pH)
Buffer 2.0
Buffer 4.01
Buffer 6.98
....
Buffer 2 (only pH)
Buffer 4.01
Buffer 6.98
Buffer 9.18
....
Back to return field
Special buffer (only pH)
Enter number of buffers
2 (2...3)
Special buffer
Edit table for Buffer no.
1 (1...3)
Special buffer
Enter number of support points
02 (2...10)
Special buffer
Enter support points
°C pH
000.00 00.00
Query
Table ok
Delete elements (then back to the support points)
Special buffer: Table status info field
Invalid table
--> back
valid table
--> back
Back to special buffer
Edit table... or use Param to return to return field
General settings
Calibration (only pH)
ATC
MTC
Slope which causes alarm (only pH)
25.00mV/pH
(5.00...57.00mV/pH)
Zero point which causes alarm
1.30 pH/200mV
(0.05...2.00pH /
-500...+500mV))
Sensor Condition Check
off
on
Isotherm. comp. Channel 1 (only pH)
Function 1 off
Function 2 off
Stability calibration
Threshold 02mV
Length 10s
Calibration timer
Cal timer
Cal timer **on**
Warning in **0001h**
Remaining time 0001:00
Topcal calibration type
Edit cal. solution used for calibration with Topcal
0450mV
(-1500...1500mV)
Cal parameter
Fixed buffer
Auto buffer
Buffer type
DIN 19267
E+H
....
Special buffer
Buffer 1
Buffer 2.0
Buffer 4.01
Buffer 6.98
....
Buffer 2
Buffer 4.01
Buffer 6.98
Buffer 9.18
....
Convey buffer during calibration
buffer dur. Cal. **off**
Intervall 15s
Back to return field
Validation Topcal
Validation alarm
Function **on**
off
Maint. 0.50 pH
Validation prog.
Table Dest.
Val. P1 no prog.
Val.P2 User prog.1
Val.P1/2 User prog.2
Val+Cal. User prog.3
"Return field"
Press the PARAM key to return to these highlighted fields
= Code entry required
a0005016-en

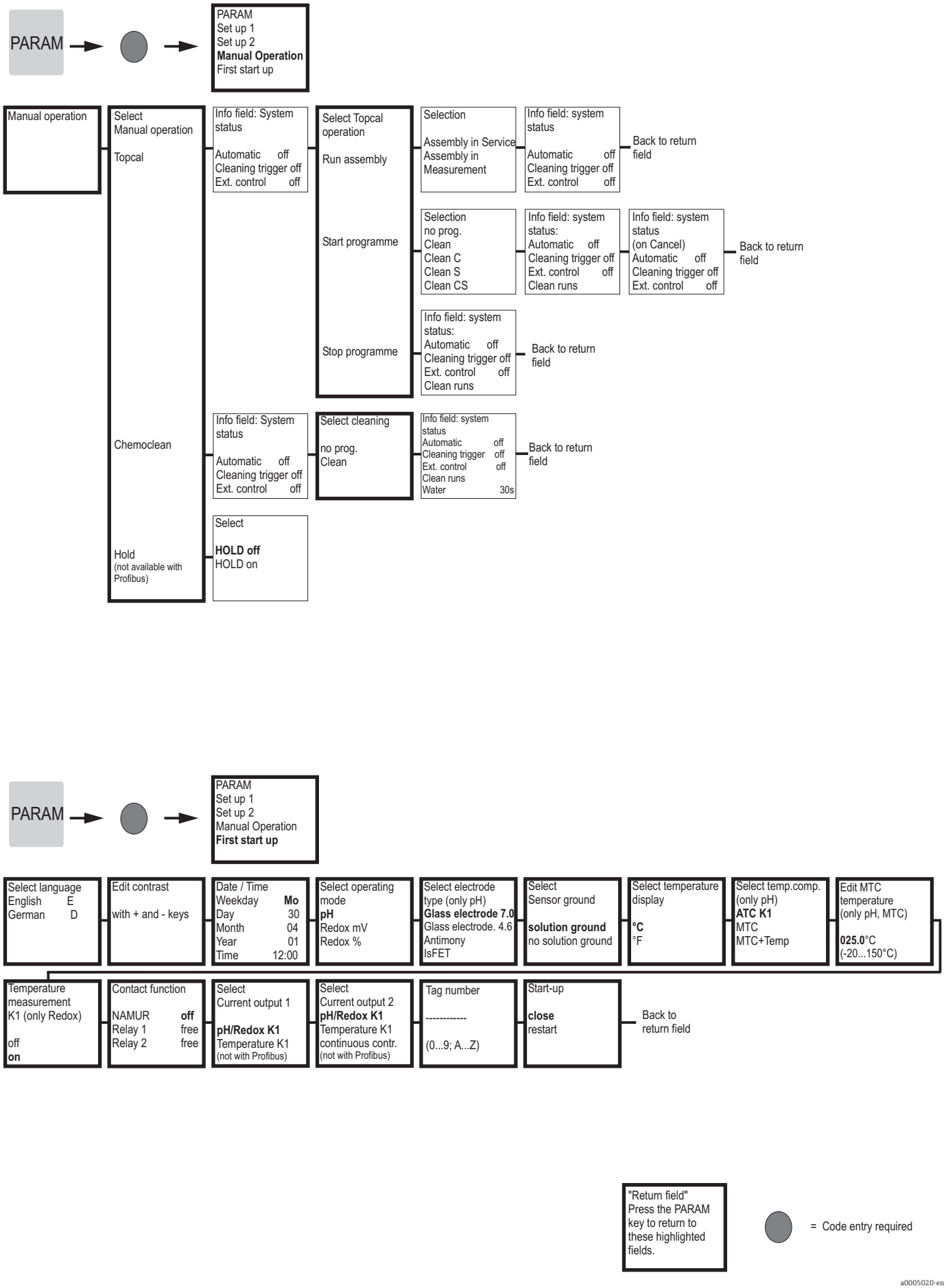

PARAM
PARAM
Set up 1
Set up 2
Manual operation
First start up
Select
Data log
Check
Controller configuration
Limit functions
Controller quick adjustment
Select
Data log
Measuring interval
Data log 1 / Data log 2
DataLog View 1/2
Enter measuring interval
00005s
(2 … 36000s)
Back to return field
Data log 1/2
Meas. value pH/Redox K1
Function on
Display range
Min 2.00pH/-500mV
Max12.00pH/500mV
(-2...16pH/ -1500...1500mV)
View of logged measuring values of DataLog 1 resp. 2 with date and time
SCS mode
SCS K1 off
SCS Ref. K1 off
PCS time
PCS K1 off
Activating Controller function
(contr. must have been configured)
off
on
Selection of process type:
batch 1-s. base
batch 1-s. acid
batch2-sided
inline 1-s. base .....
Configuration of external hardware:
Actuator
Characteristic
batch/inline 1-sided
batch/inline 2-sided
Control using
Pulse length
Pulse frequency
Current output
Selection Control (when relays +curr. output defined)
2 outputs (=2 relays)
1 output (= current output2)
Control
Acid: l-length
Base: l-length
Dosing via Current output 2:
0 ... 20 mA
4 ... 20 mA
Relay selection Pulse frequency:
Relay: n.c.
Max. pulse frequency 120/min.
Relay selection Pulse length:
Relay: n.c.
Period: 000.0s
tE min: 000.0s
Current output 2: Assign
100% acid dosing
0 mA
20 mA
Select characteristic type:
linear
segmented
With linear:
Control point
Start neutral zone
End neutral zone
Kr 1
Kr 2 (only 2-sided)
With segmented:
Control point
Start neutral zone
End neutral zone
Optimisation point 1/2
Control point 1/2
Process speed (only linear)
Slow
Standard
Fast
User
Parameter:
Kr1:01.00pH(only lin.)
Kr2:01.00pH(only lin.)
Tn1: 000.0
Tn2: 000.0
Tv1: 000.0
Tv2: 000.0
Select for configuration:
Limit value 1
...
Limit value 5
Configuration LVS 1/2/3/4/5
Function: off
Assign.: pH circuit 1
Switch-on pt.: pH 16
Switch-off pt.: pH 16
Configuration LVS 1/2/3/4/5:
Switch-on delay: 0 s
Switch-off delay: 0 s
Alarm threshold: pH 16
Controller
Function: off
Setpoint: 07.00pH
Curr. value: 07.00pH
»Return field«:
press the PARAM key to return to the highlighted fields.
= Code entry required
a0005009-en


Current output 2:
Assign
100% acid dosing
0/4 mA
20 mA
Back to return field
Back to return field
Activate controller simulation
off
on
Controller simulation
Function auto
Set: 07.00pH
Act.: 07.00pH
y: 000%
Controller simulation or back to return field
»Return field«: press the PARAM key to return to the highlighted fields.
= Code entry required
a0005010-en

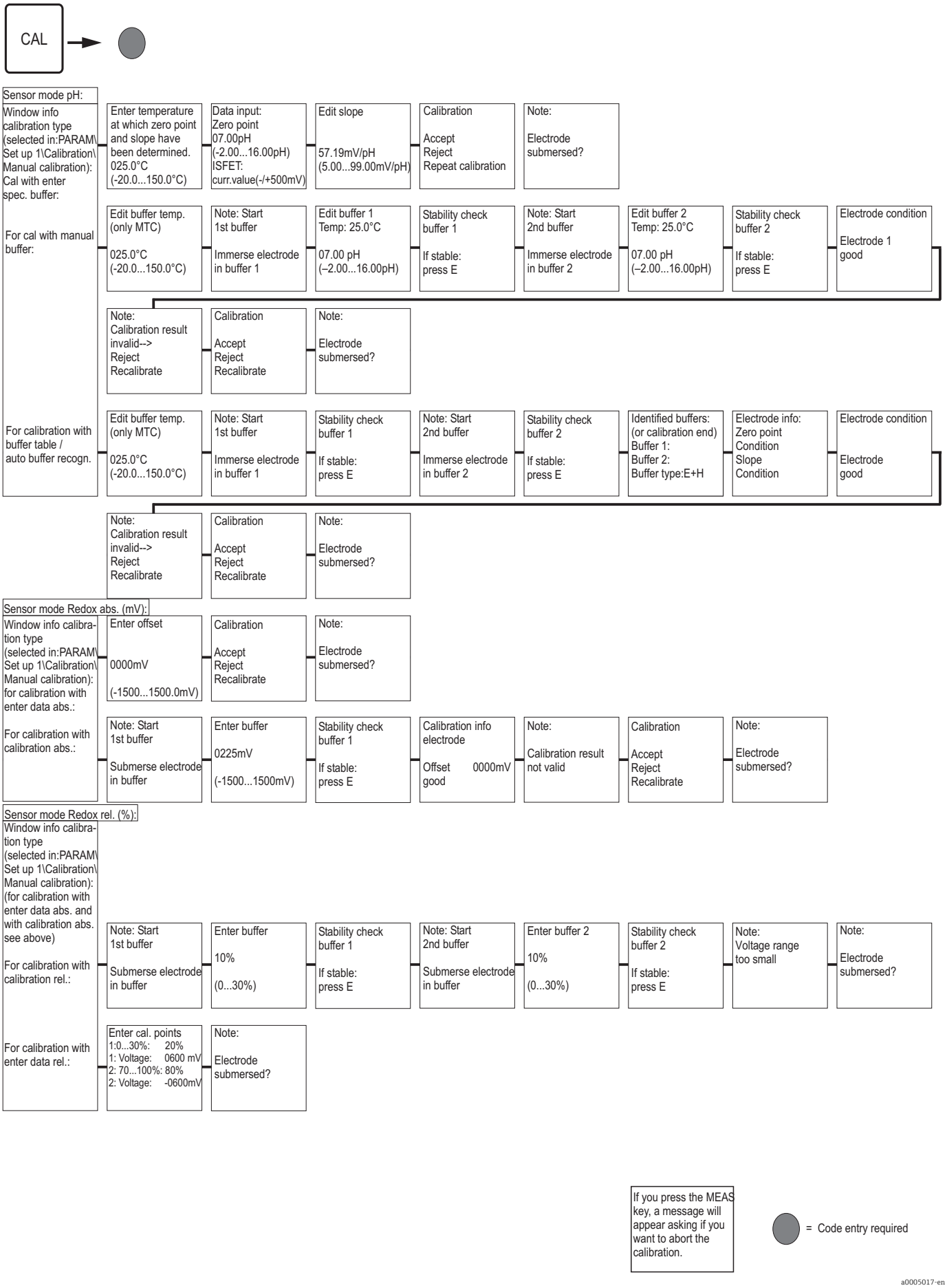

PARAM
PARAM
Set up 1
Set up 2
Manual operation
First start up
Select
Topcal
Chemoclean (only with activated system)
Select Topcal
Configuration
Activate Topcal
Status info field of plant:
Automatic off
Cleaning trigger off
Ext. control off
Enter name of additonal valves
Text Editor
(0...9; A...Z)
Select control levels:
Automatic off
Cleaning trigger off
Ext. control off
Power failure off
Activate sealing water:
Function off
Relay water
Time 05 s
Select Topcal operation
Automatic
Interval prog.
Cleaning
Emergency prog.
Prog. editor
Automatic: List of weekdays with number of programs: Select a day
Select for selected day
Edit day?
Copy day?
For selected day Select program: Select with -> and +- Activate by pressing »E«. Edit using Start-/ End time arrows
Select target day where program should be copied. (From day list)
Select program from list as interval prog.;
Enter interval time between program runs
Enter name of interval program
Text editor
(0 ... 9; A ... Z)
Select program for SCS cleaning from program list
Note: After power supply or communication failure selected program is started.
Select program as emergency program from program list
Select control levels:
Automatic off
Cleaning trigger off
Ext. control off
Emergency prog. off
Status info field of plant:
Automatic off
Cleaning trigger off
Ext. control off
Select operation
Spray levels
Automatic
Prog. editor
List of weekdays
List of weekdays with number of programs: Select a day
Select for selected day
Edit day?
Copy day?
For selected day Select program: Select with -> and +- Activate by pressing »E«Edit using Start-/ End time arrows
Select target day where program should be copied. (From day list)
see Prog. editor on next page
»Return field«:
press the PARAM key to return to the highlighted fields.
= Code entry required
a0005011-en

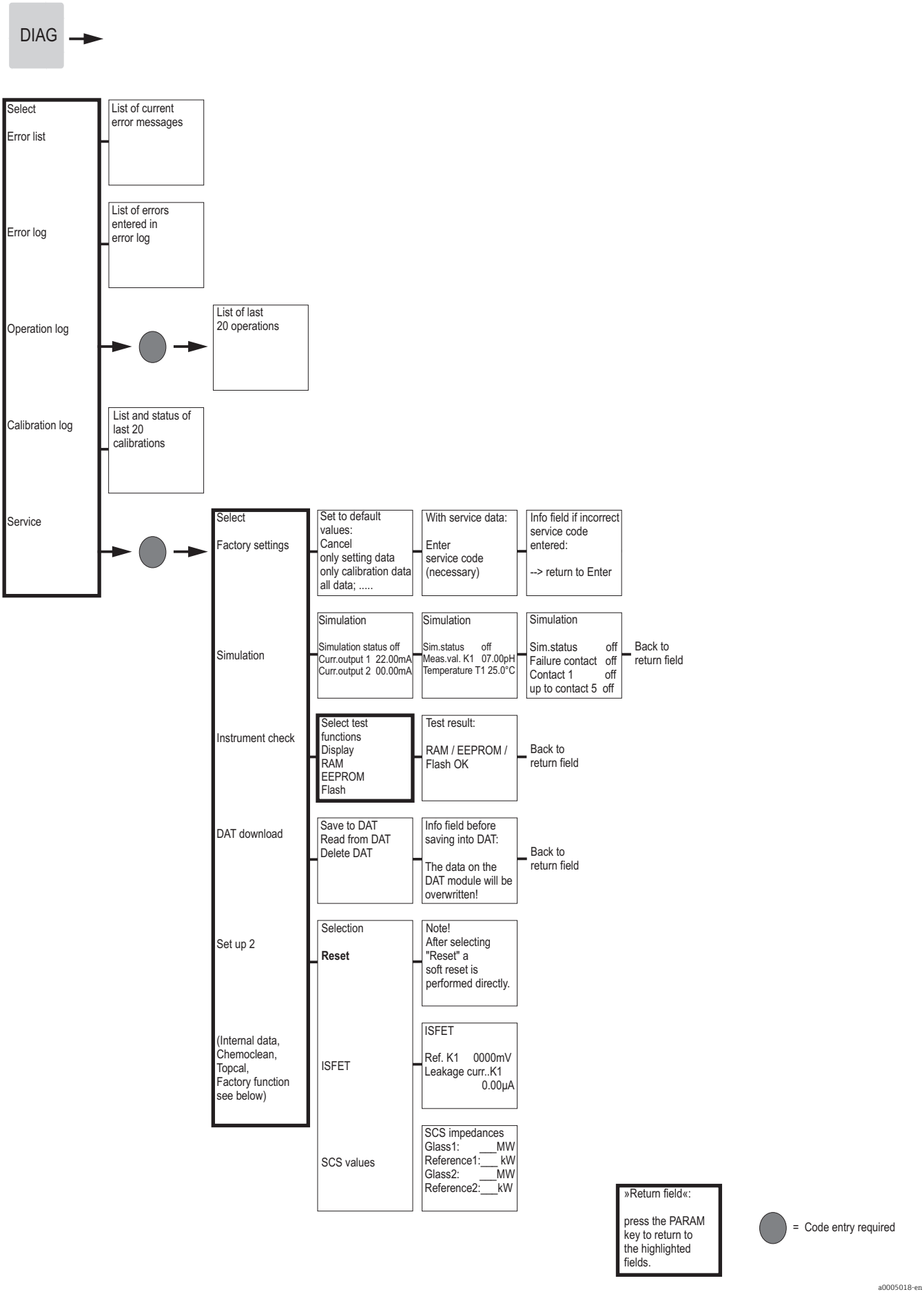

(Edit prog.)
Select programme
Clean
Clean S
Clean C
Clean CS
User prog. 1, 2, 3
Select an edit function:
Insert default
Select source program from list:
Clean
Clean C
...
Edit
Display of program steps
01 Assembly
02 Water
03 Cleaner
...
On selection following block functions:
change
insert
move
delete
Delete: Selected program step is deleted
Change/ insert: List of all selectable program steps
Move to: Choose line before which the selected step should be moved
Display of changed program procedure
Configure
Display of progam steps; Highlight with cursor and edit
Set time for comp. air/hot steam/ wait/water:
0060 s
(0...9999s)
Set time for buffer1, buffer2/cleaner:
03 s
(0...999s)
Number of repetitions for cleaning/sterilisation
00
(0...10)
Prog. time
Display of tota duration of selected program
0...9999 s
Rename
Edit programme name
User prog. 1
0...9; A...Z
»Return field«:
press the PARAM key to return to the highlighted fields.
= Code entry required

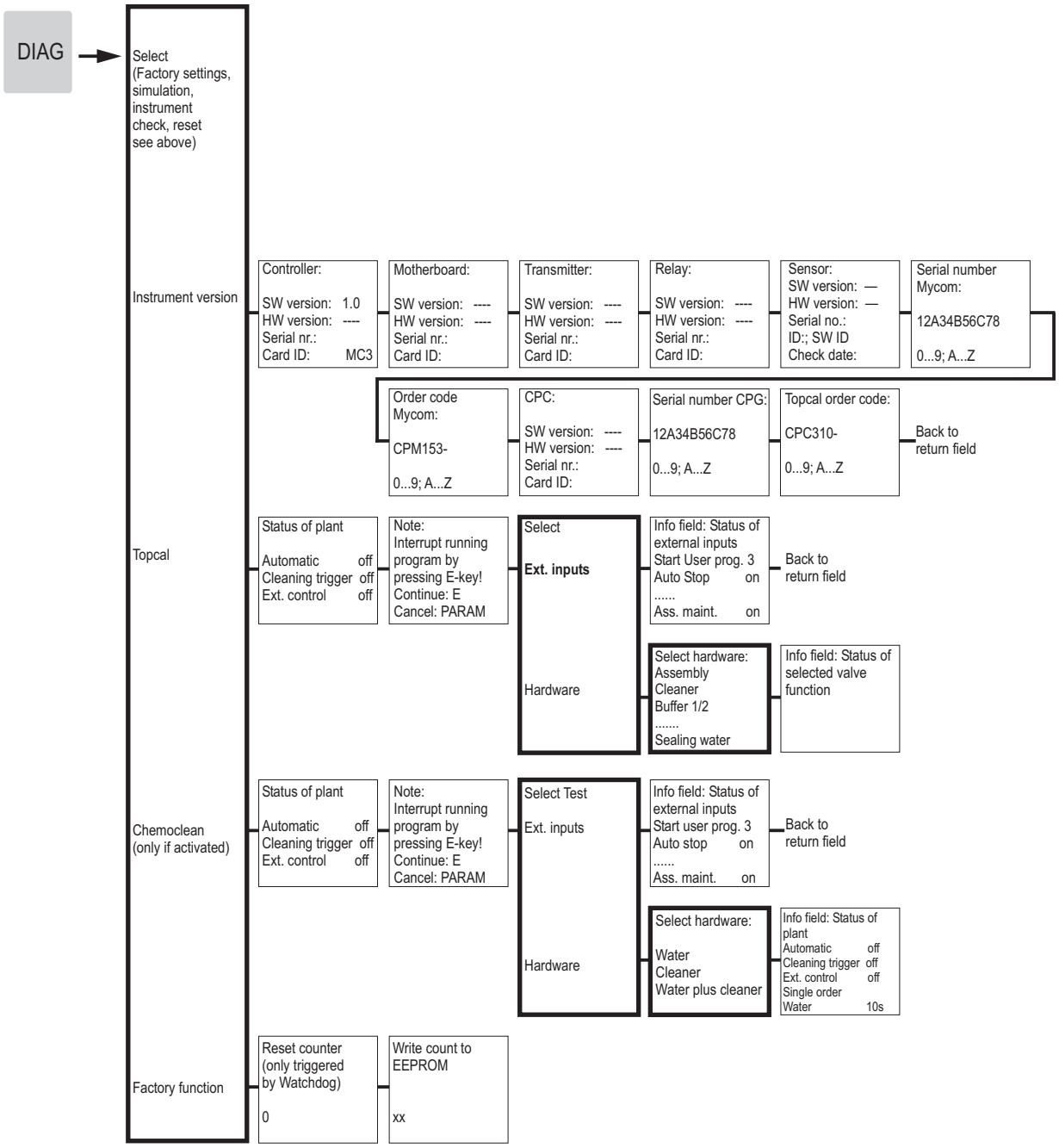
a0005012-en


PARAM
PARAM
Set up 1
Set up 2
Manual Operation
First start up
Manual operation
Select
Manual operation
Topcal
Chemoclean
Hold
(not available with Profibus)
Info field: System status
Automatic off
Cleaning trigger off
Ext. control off
Select Topcal operation
Run assembly
Start programme
Stop programme
Selection
Assembly in Service
Assembly in Measurement
Info field: system status
Automatic off
Cleaning trigger off
Ext. control off
Back to return field
Selection
no prog.
Clean
Clean C
Clean S
Clean CS
Info field: system status:
Automatic off
Cleaning trigger off
Ext. control off
Clean runs
Info field: system status
(on Cancel)
Automatic off
Cleaning trigger off
Ext. control off
Back to return field
Info field: system status:
Automatic off
Cleaning trigger off
Ext. control off
Clean runs
Back to return field
Info field: System status
Automatic off
Cleaning trigger off
Ext. control off
Select cleaning
no prog.
Clean
Info field: system status
Automatic off
Cleaning trigger off
Ext. control off
Clean runs
Water 30s
Back to return field
Select
HOLD off
HOLD on
PARAM
PARAM
Set up 1
Set up 2
Manual Operation
First start up
Select language
English E
German D
Edit contrast
with + and - keys
Date / Time
Weekday Mo
Day 30
Month 04
Year 01
Time 12:00
Select operating mode
pH
Redox mV
Redox %
Select electrode type (only pH)
Glass electrode 7.0
Glass electrode. 4.6
Antimony
IsFET
Select
Sensor ground
solution ground
no solution ground
Select temperature display
°C
°F
Select temp.comp. (only pH)
ATC K1
MTC
MTC+Temp
Edit MTC temperature (only pH, MTC)
025.0°C
(-20...150°C)
Temperature measurement K1 (only Redox)
off
on
Contact function
NAMUR off
Relay 1 free
Relay 2 free
Select
Current output 1
pH/Redox K1
Temperature K1
(not with Profibus)
Select
Current output 2
pH/Redox K1
Temperature K1
continuous contr.
(not with Profibus)
Tag number

(0...9; A...Z)
Start-up
close
restart
Back to return field
"Return field"
Press the PARAM key to return to these highlighted fields.
= Code entry required
a0005020-en


CAL
Sensor mode pH:
Window info calibration type (selected in:PARAM\ Set up 1\Calibration\ Manual calibration): Cal with enter spec. buffer:
Enter temperature at which zero point and slope have been determined. 025.0°C (-20.0...150.0°C)
Data input: Zero point 07.00pH (-2.00...16.00pH) ISFET: curr.value(-/+500mV)
Edit slope 57.19mV/pH (5.00...99.00mV/pH)
Calibration Accept Reject Repeat calibration
Note: Electrode submersed?
For cal with manual buffer:
Edit buffer temp. (only MTC) 025.0°C (-20.0...150.0°C)
Note: Start 1st buffer Immerse electrode in buffer 1
Edit buffer 1 Temp: 25.0°C 07.00 pH (–2.00...16.00pH)
Stability check buffer 1 If stable: press E
Note: Start 2nd buffer Immerse electrode in buffer 2
Edit buffer 2 Temp: 25.0°C 07.00 pH (–2.00...16.00pH)
Stability check buffer 2 If stable: press E
Electrode condition Electrode 1 good
Note: Calibration result invalid--> Reject Recalibrate
Calibration Accept Reject Recalibrate
Note: Electrode submersed?
For calibration with buffer table / auto buffer recogn.
Edit buffer temp. (only MTC) 025.0°C (-20.0...150.0°C)
Note: Start 1st buffer Immerse electrode in buffer 1
Stability check buffer 1 If stable: press E
Note: Start 2nd buffer Immerse electrode in buffer 2
Stability check buffer 2 If stable: press E
Identified buffers: (or calibration end) Buffer 1: Buffer 2: Buffer type:E+H
Electrode info: Zero point Condition Slope Condition
Electrode condition Electrode good
Note: Calibration result invalid--> Reject Recalibrate
Calibration Accept Reject Recalibrate
Note: Electrode submersed?
Sensor mode Redox abs. (mV):
Window info calibration type (selected in:PARAM\ Set up 1\Calibration\ Manual calibration): for calibration with enter data abs.:
Enter offset 0000mV (-1500...1500.0mV)
Calibration Accept Reject Recalibrate
Note: Electrode submersed?
For calibration with calibration abs.:
Note: Start 1st buffer Submerse electrode in buffer
Enter buffer 0225mV (-1500...1500mV)
Stability check buffer 1 If stable: press E
Calibration info electrode Offset 0000mV good
Note: Calibration result not valid
Calibration Accept Reject Recalibrate
Note: Electrode submersed?
Sensor mode Redox rel. (%):
Window info calibration type (selected in:PARAM\ Set up 1\Calibration\ Manual calibration): (for calibration with enter data abs. and with calibration abs. see above)
For calibration with calibration rel.:
Note: Start 1st buffer Submerse electrode in buffer
Enter buffer 10% (0...30%)
Stability check buffer 1 If stable: press E
Note: Start 2nd buffer Submerse electrode in buffer
Enter buffer 2 10% (0...30%)
Stability check buffer 2 If stable: press E
Note: Voltage range too small
Note: Electrode submersed?
For calibration with enter data rel.:
Enter cal. points 1:0...30%: 20% 1: Voltage: 0600 mV 2: 70...100%: 80% 2: Voltage: -0600mV
Note: Electrode submersed?
If you press the MEAS key, a message will appear asking if you want to abort the calibration.
= Code entry required
a0005017-en


DIAG
Select
Error list
List of current error messages
Error log
List of errors entered in error log
Operation log
List of last 20 operations
Calibration log
List and status of last 20 calibrations
Service
Select
Factory settings
Set to default values:
Cancel
only setting data
only calibration data
all data; .....
With service data:
Enter service code (necessary)
Info field if incorrect service code entered:
--> return to Enter
Simulation
Simulation status off
Curr.output 1 22.00mA
Curr.output 2 00.00mA
Simulation
Sim.status off
Meas.val. K1 07.00pH
Temperature T1 25.0°C
Simulation
Sim.status off
Failure contact off
Contact 1 off
up to contact 5 off
Back to return field
Instrument check
Select test functions
Display
RAM
EEPROM
Flash
Test result:
RAM / EEPROM / Flash OK
Back to return field
DAT download
Save to DAT
Read from DAT
Delete DAT
Info field before saving into DAT:
The data on the DAT module will be overwritten!
Back to return field
Set up 2
Selection
Reset
Note!
After selecting "Reset" a soft reset is performed directly.
(Internal data, Chemoclean, Topcal, Factory function see below)
ISFET
ISFET
Ref. K1 0000mV
Leakage curr..K1 0.00µA
SCS values
SCS impedances
Glass1: ___MW
Reference1:___ kW
Glass2: ___MW
Reference2:___kW
»Return field«:
press the PARAM key to return to the highlighted fields.
= Code entry required
a0005018-en


DIAG
Select (Factory settings, simulation, instrument check, reset see above)
Instrument version
Controller: SW version: 1.0 HW version: ---- Serial nr.: Card ID: MC3
Motherboard: SW version: ---- HW version: ---- Serial nr.: Card ID:
Transmitter: SW version: ---- HW version: ---- Serial nr.: Card ID:
Relay: SW version: ---- HW version: ---- Serial nr.: Card ID:
Sensor: SW version: — HW version: — Serial no.: ID:; SW ID Check date:
Serial number Mycom: 12A34B56C78 0...9; A...Z
Order code Mycom: CPM153- 0...9; A...Z
CPC: SW version: ---- HW version: ---- Serial nr.: Card ID:
Serial number CPG: 12A34B56C78 0...9; A...Z
Topcal order code: CPC310- 0...9; A...Z
Back to return field
Topcal
Status of plant Automatic off Cleaning trigger off Ext. control off
Note: Interrupt running program by pressing E-key! Continue: E Cancel: PARAM
Select
Ext. inputs
Hardware
Info field: Status of external inputs Start User prog. 3 Auto Stop on ..... Ass. maint. on
Back to return field
Select hardware: Assembly Cleaner Buffer 1/2 ..... Sealing water
Info field: Status of selected valve function
Chemoclean (only if activated)
Status of plant Automatic off Cleaning trigger off Ext. control off
Note: Interrupt running program by pressing E-key! Continue: E Cancel: PARAM
Select Test
Ext. inputs
Hardware
Info field: Status of external inputs Start user prog. 3 Auto stop on ..... Ass. maint. on
Back to return field
Select hardware: Water Cleaner Water plus cleaner
Info field: Status of plant Automatic off Cleaning trigger off Ext. control off Single order Water 10s
Factory function
Reset counter (only triggered by Watchdog) 0
Write count to EEPROM xx
»Return field«: press the PARAM key to return to the highlighted fields.
= Code entry required
a0005019-en

13.2 Connection examples

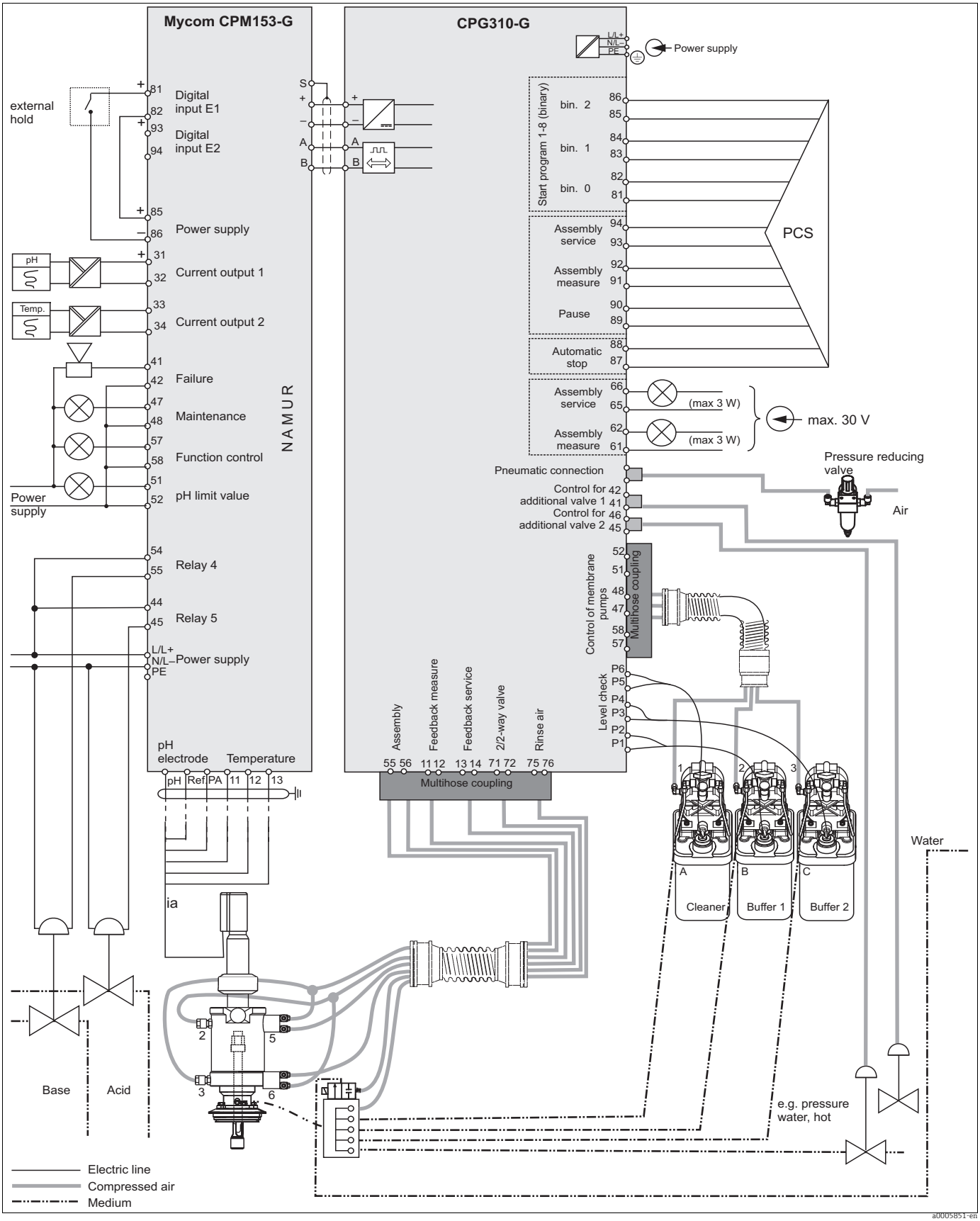


Fig. 76: Connection example, two-sided neutralization, limit value pH, NAMUR contact assignment, pH and temperature at current outputs, 2 additional valves, external control via PCS, assembly status display

13.3 Wiring example for external program start

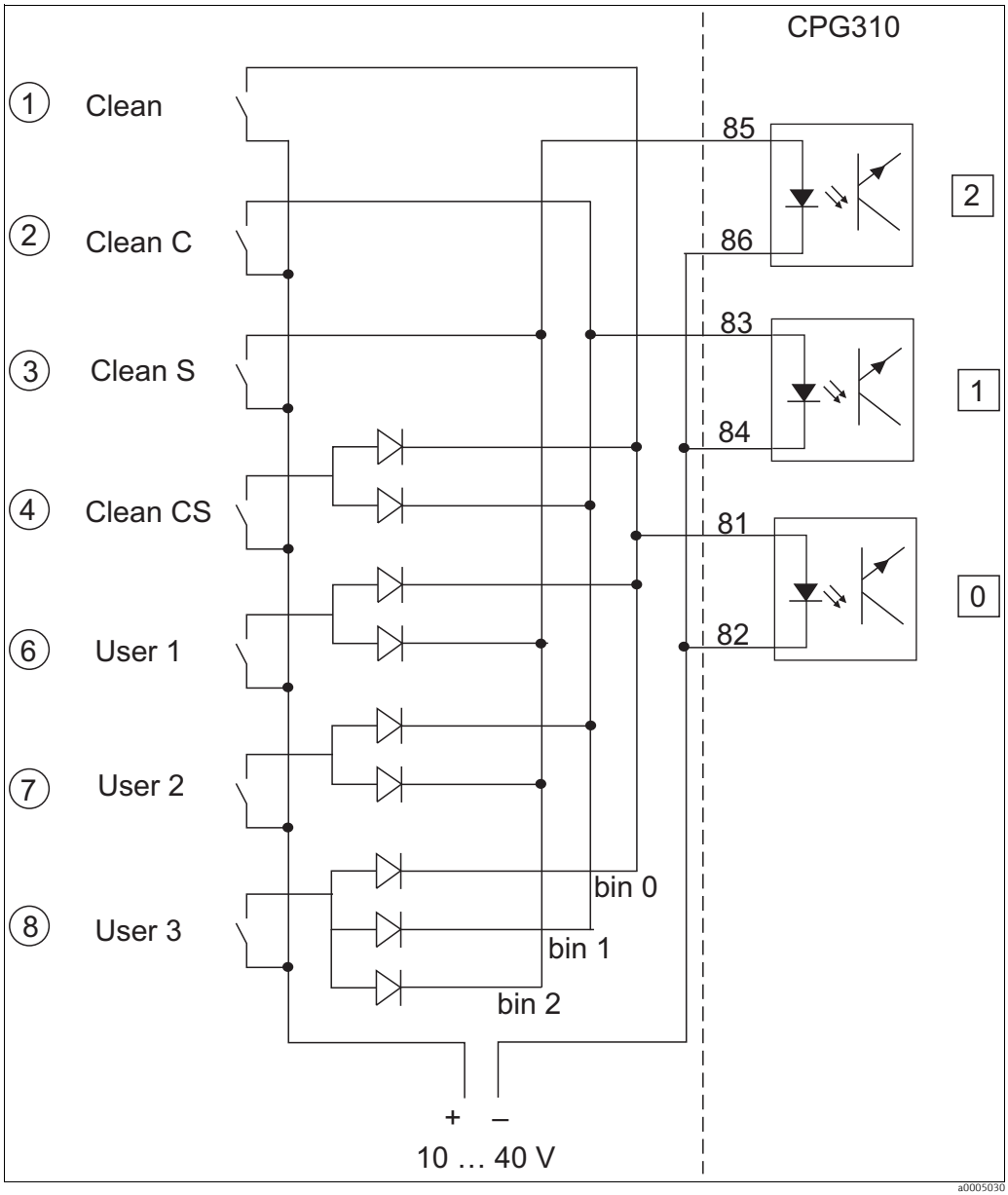


Fig. 77: Power diagram for external control of the cleaning and calibration programs

1-8 Keys to start the cleaning programs
81-86 Terminals for program start
0/1/2 Binary inputs of the CPG310 control unit
10-40V e.g. via power supply input of Mycom S CPM153, terminals 85/86 (15 V)
Diodes 1N4007
3 mA Per optoelectronic coupler input

13.4 Buffer tables

The following buffer tables are stored in Mycom S CPM153.

DIN 19267

°C	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
pH	1,08	1,08	1,09	1,09	1,09	1,09	1,10	1,10	1,10	1,10	1,11	1,11	1,11	1,11	1,11	1,11	1,12	1,12	1,13	1,13
	4,67	4,67	4,66	4,66	4,65	4,65	4,65	4,65	4,66	4,67	4,68	4,69	4,70	4,71	4,72	4,73	4,75	4,77	4,79	4,82
	6,89	6,87	6,84	6,82	6,80	6,79	6,78	6,77	6,76	6,76	6,76	6,76	6,76	6,76	6,76	6,77	6,78	6,79	6,80	6,81
	9,48	9,43	9,37	9,32	9,27	9,23	9,18	9,13	9,09	9,04	9,00	8,96	8,92	8,90	8,88	8,86	8,85	8,83	8,82	8,81
	13,95	13,63	13,37	13,16	12,96	12,75	12,61	12,45	12,29	12,09	11,98	11,79	11,69	11,56	11,43	11,31	11,19	11,09	10,99	10,89

Mettler

°C	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
pH	2,03	2,02	2,01	2,00	2,00	2,00	1,99	1,99	1,98	1,98	1,98	1,98	1,98	1,99	1,99	2,00	2,00	2,00	2,00	2,00
	4,01	4,01	4,00	4,00	4,00	4,01	4,01	4,02	4,03	4,04	4,06	4,08	4,10	4,13	4,16	4,19	4,22	4,26	4,30	4,35
	7,12	7,09	7,06	7,04	7,02	7,00	6,99	6,98	6,97	6,97	6,97	6,98	6,98	6,99	7,00	7,02	7,04	7,06	7,09	7,12
	9,52	9,45	9,38	9,32	9,26	9,21	9,16	9,11	9,06	9,03	8,99	8,96	8,93	8,90	8,88	8,85	8,83	8,81	8,79	8,77

E+H

°C	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
pH	2,01	2,01	2,01	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,01	2,01	2,01	2,01	2,01	2,01
	4,05	4,04	4,02	4,01	4,00	4,01	4,01	4,01	4,01	4,01	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00
	7,13	7,07	7,05	7,02	7,00	6,98	6,98	6,96	6,95	6,95	6,95	6,95	6,96	6,96	6,96	6,96	6,96	6,98	7,00	7,02
	9,46	9,40	9,33	9,28	9,22	9,18	9,14	9,10	9,07	9,04	9,01	8,99	8,96	8,95	8,93	8,91	8,89	8,87	8,85	8,83
	11,45	11,32	11,20	11,10	11,00	10,90	10,81	10,72	10,64	10,56	10,48	10,35	10,23	10,21	10,19	10,12	10,06	10,00	9,93	9,86

NBS/DIN 19266

°C	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
pH	1,67	1,67	1,67	1,67	1,68	1,68	1,69	1,69	1,70	1,70	1,71	1,72	1,73	1,74	1,74	1,76	1,77	1,79	1,80	1,81
	4,01	4,01	4,00	4,00	4,00	4,01	4,01	4,02	4,03	4,04	4,06	4,08	4,10	4,11	4,12	4,14	4,16	4,18	4,20	4,23
	6,98	6,95	6,92	6,90	6,88	6,86	6,85	6,84	6,84	6,83	6,83	6,84	6,84	6,85	6,85	6,86	6,86	6,87	6,88	6,89
	9,46	9,39	9,33	9,27	9,22	9,18	9,14	9,10	9,07	9,04	9,01	8,99	8,96	8,94	8,93	8,91	8,89	8,87	8,85	8,83

Merck + Riedel

°C	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
pH	2,01	2,01	2,01	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,01	2,01	2,01	2,01	2,01	2,01
	4,05	4,04	4,02	4,01	4,00	4,01	4,01	4,01	4,01	4,01	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00
	7,13	7,07	7,05	7,02	7,00	6,98	6,98	6,96	6,95	6,95	6,95	6,95	6,96	6,96	6,96	6,96	6,97	6,98	7,00	7,02
	9,24	9,16	9,11	9,05	9,00	8,95	8,91	8,88	8,85	8,82	8,79	8,76	8,73	8,72	8,70	8,68	8,66	8,65	8,64	8,64
	12,58	12,41	12,26	12,10	12,00	11,88	11,72	11,67	11,54	11,44	11,33	11,19	11,04	10,97	10,90	10,80	10,70	10,59	10,48	10,37

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