



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services

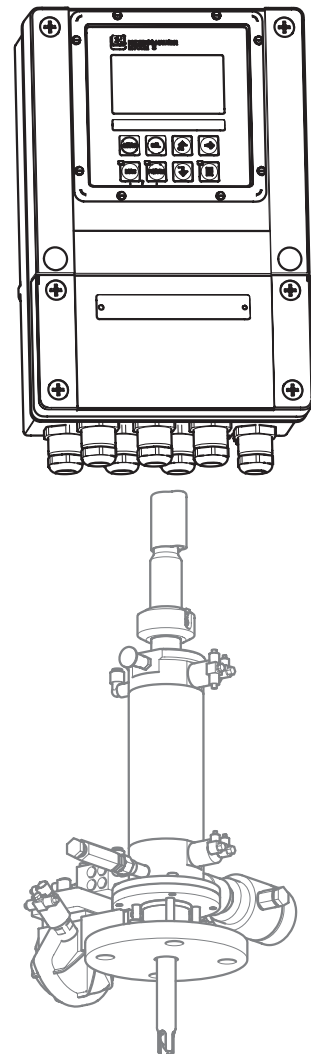
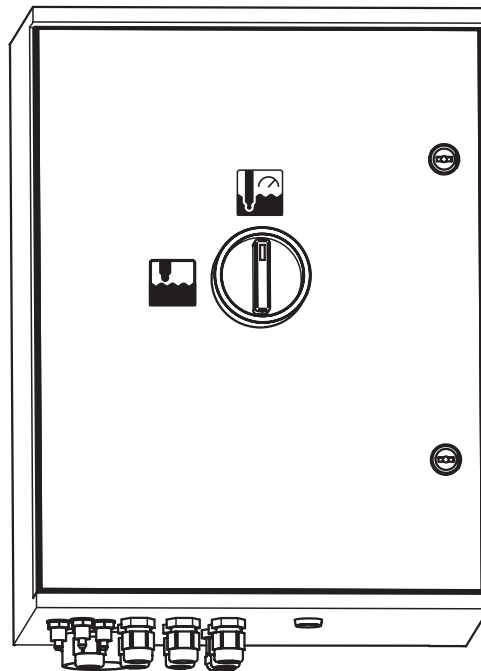


Solutions

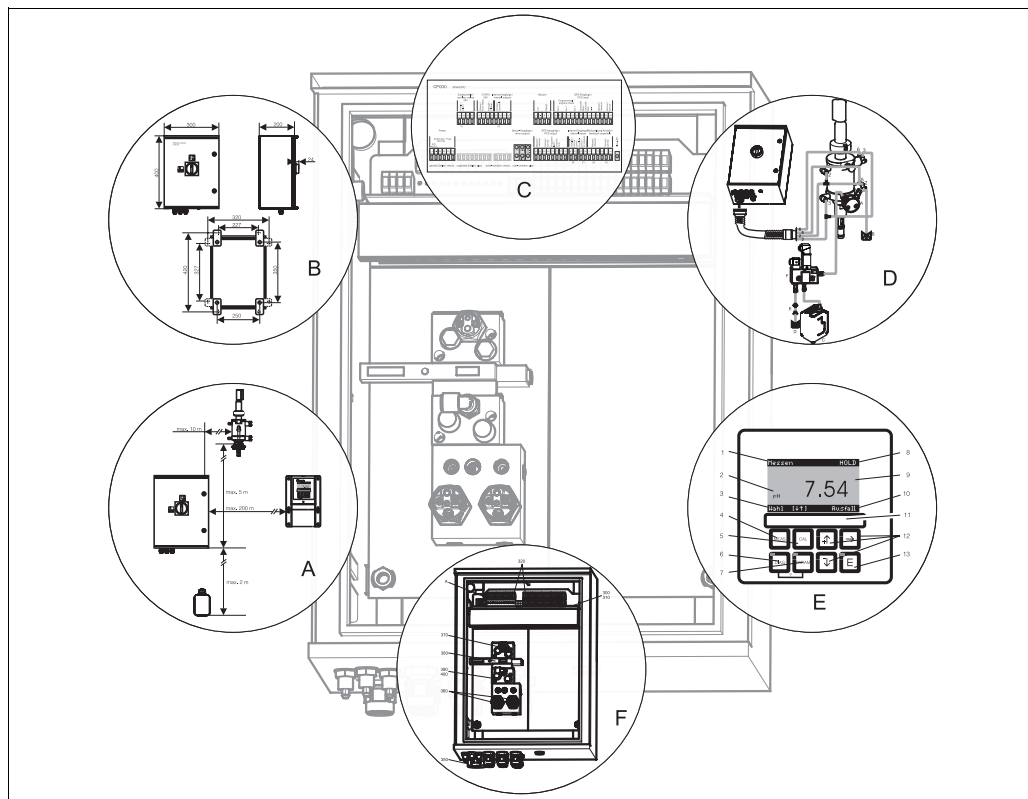
Operating Instructions

Topclean S CPC30

Automation of pH/Redox Measurements



Brief overview



C07-CPC30xxx-16-12-00-de-001.eps

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F

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1 Safety instructions

1.1 Designated use

Topclean S CPC30 is a fully automatic measuring and cleaning system for pH and redox measurements.

The system is supplied complete with power supply cables and bottle hose.

The Ex version of the Topclean S CPC30 allows operation even in explosive atmospheres.

The manufacturer is not liable for damage caused by improper or non-designated use.

1.2 Installation, commissioning, operation

Note the following points:

- If the system is used improperly or other than for its designated use, it may pose a hazard, e.g. due to improper connection.
- Installation, electrical connection, commissioning, operation and maintenance of the measuring system must therefore be carried out exclusively by trained specialists authorised by the system operator.
- Technical personnel must have read and understood these operating instructions and must adhere to them.
- Always follow the regulations in your country pertaining to the opening and repairing of electrical instruments.

1.3 Operational safety



Warning!

If the device is used for any application other than those described in these Operating Instructions, it may lead to unsafe and improper functioning of the measuring system and is therefore not permitted.

The instruments have been designed and tested according to the state of the art and left the factory in perfect functioning order. The instruments meet all the prevailing regulations and EC directives – see "Technical data".

However, always pay attention to the following points:

- Measuring systems used in Ex areas have a separate document (XA 236C/07/a3) which forms a component part of these Operating Instructions. Always follow the installation regulations and the – partly deviating – connection data in the Ex documentation as well. You can find the following symbols on the front page of the additional Ex documentation (depending on approval and test centre (Ex) Europe, <Ex> USA, Ex Canada).
- The measuring device complies with the general safety requirements in accordance with EN 61010, the EMC requirements of EN 61326, and NAMUR Recommendation NE 21, 1998.
- The manufacturer reserves the right to change the technical data in line with technical progress at any time. You can obtain information on the current version of these Operating Instructions and possible additions from your sales centre.

Fail-safety

This instrument has been checked for electromagnetic compatibility in industrial use according to applicable European directives. It is protected against electromagnetic interference by appropriate design measures.



Warning!
Protection against interference as specified above is valid only for an instrument connected according to the instructions in these Operating Instructions.

1.4 Return

If the devices have to be repaired, please return them cleaned to the sales centre responsible (copy second last page of these Operating Instructions). For returns please use the original packaging. Please enclose a completed copy of the "Declaration of contamination" with the packaging and transportation documents.
No repair without completed "Declaration of contamination".

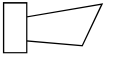
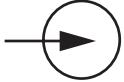
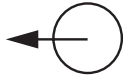
1.5 Safety symbols

To avoid damage to persons and property, always pay attention to the safety instructions in these Operating Instructions. The following symbols are used to provide you with important information:

General safety instructions

Symbol	Meaning
	Warning! This symbol alerts you to hazards which could cause serious injuries as well as damage to the instrument if ignored.
	Caution! This symbol alerts you to possible faults which could arise from incorrect operation. They could cause damage to the instrument if ignored.
	Note! This symbol indicates important items of information.

Electrical symbols

Symbol	Meaning
	DC voltage A terminal at which DC voltage is applied or through which DC flows.
	AC voltage A terminal at which (sine-form) AC voltage is applied or through which AC flows.
	Ground connection A grounded terminal, which, from the user's point of view, is already grounded using a grounding system.
	Protective earth terminal A terminal which must be grounded before other connections may be set up.
	Equipotential connection A connection which must be connected to the grounding system of the equipment. This can be, for example, a potential matching line of a star-shaped grounding system, depending on national or company practice.
	Protective insulation The equipment is protected with an additional insulation.
	Alarm relay
	Input
	Output

2.1.2 Product structure

Basic equipment:

Control unit CPG30, transmitter Mycom S with 6 relays and DAT module, CYR10 injector, multihose (5 m / 16.41 ft), 1 empty bottle, bottle hose (2 m / 6.56 ft), communication/power supply cable Mycom S – CPG30 (5 m / 16.41 ft)

Certificates									
A									Basic equipment: non-Ex
G									With ATEX approval II (1) 2G EEx em ib[ia] IIC T4
S									With CSA approval Cl. I, Div. 2, Sensor IS Cl. I Div. 1
O									With FM approval Cl. I, Div. 2, with NI input and output circuits, sensor IS Cl. I Div. 1
P									With FM approval Cl. I, Div. 2, with NI input and output circuits
T									With TIIS approval
Control for external valves									
0									Basic equipment: no additional valves controllable
1									Control for 1 external valve, non-Ex
2									Control for 1 external valve, Ex
Measurement inputs Mycom S									
1									1 measuring circuit for glass electrodes, pH/redox and temperature
2									1 measuring circuit for glass electrodes/ISFET sensors, pH/redox and temperature
5									1 measuring circuit for digital pH sensors (Memosens) and temperature
Measurement output Mycom S									
A									2 current outputs 0/4 ... 20 mA, passive (Ex and non-Ex)
B									2 current outputs 0/4 ... 20 mA, active (non-Ex)
C									HART with 2 current outputs 0/4 ... 20 mA, passive
D									HART with 2 current outputs 0/4 ... 20 mA, active
E									PROFIBUS-PA, without current outputs
Power supply									
0									230 V AC
1									100 ... 115 V AC (jumper in CPG30, universal power supply unit in CPM153)
8									24 V AC / DC
Language versions									
A									E / D
B									E / F
C									E / I
D									E / ES
E									E / NL
F									E / J
Cable connection									
0									Cable glands M 20 x 1.5
1									Cable glands NPT 1/2"
3									Cable glands M 20 x 1,5, PROFIBUS-PA M12 plug
4									Cable glands NPT 1/2", PROFIBUS-PA M12 plug
Length of multihose									
0									5 m
8									10 m
Additional equipment									
0									Without additional equipment
Configuration									
A									Factory settings
CPC30-									Complete order code

2.2 Scope of delivery

The scope of delivery of the cleaning and calibration system Topclean S comprises:

- 1 Transmitter Mycom S CPM153
- 1 Control unit CPG30
- 1 Multihose
- 1 Bottle for cleaning fluid
- 1 Communications/power supply cable CPG30 / Mycom S CPM153,
- 1 Pressure reduction valve with manometer
- 1 Instrument identification card
- Accessories (s. chap. 9)
- 1 Operating Instructions 235C/07/en
- Ex versions:
 - 1 Safety instructions for electrical equipment in hazardous areas, XA 236C/07/a3
- Versions with HART communication:
 - 1 Operating instructions Field communication with HART, BA 301C/07/en
- Versions with PROFIBUS interface:
 - 1 Operating instructions Field communication with PROFIBUS PA/DP, BA 268C/07/en

2.3 Certificates and approvals

Declaration of Conformity

The product complies with the legal demands of the harmonised European standards.
Endress+Hauser certifies the compliance with the standards by using the **CE** sign.

3 Installation

3.1 Incoming acceptance, transport, storage

- Make sure the packaging is undamaged!
Inform the supplier about damage to the packaging.
Keep the damaged packaging until the matter has been settled.
- Make sure the contents are undamaged!
Inform the supplier about damage to the delivery contents.
Keep the damaged products until the matter has been settled.
- Check that the scope of delivery is complete and agrees with your order and the shipping documents.
- The packaging material used to store or to transport the product must provide shock protection and humidity protection. The original packaging offers the best protection.
Also, keep to the approved ambient conditions (see "Technical data").
- If you have any questions, please contact your supplier or your sales centre responsible (see back page of these Operating Instructions).

3.2 Installation conditions



Note!

Always install the transmitter and the control unit so that the cable entries point downwards.
The components can be installed using the following methods:

Device	Wall mounting	Post/ pipe installation	Panel mounting
Control unit CPG30	Mounting kit contained in scope of delivery. See fig. 6.	not applicable	not applicable
Mycom S CPM153, covered	Required: 2 screws dia. 6 mm 2 rawl plugs dia. 8 mm	Mounting kit contained in scope of delivery. See fig. 9.	Mounting kit contained in scope of delivery. See fig. 9.
Mycom S CPM153, outdoors	If installed outdoors, weather protection cover CYY101 required (see Accessories).	Weather protection cover CYY101 and 2x round post fixtures required (see Accessories).	not usual

Notes on installation

- The transmitter CPM153 is normally used as a field device.
- The transmitter CPM153 can be fixed to a vertical or horizontal pipe using the supplied mounting kit. For outdoor installation, a weather protection cover CYY101 is required. It can be fitted to the field device using all kinds of fixtures (refer to "Accessories").

3.2.1 Installation dimensions

You can find the dimensions and lengths of the devices in the figures of the installation instructions on page 13 ff.

The maximum horizontal and vertical installation distances are shown in the figure below.

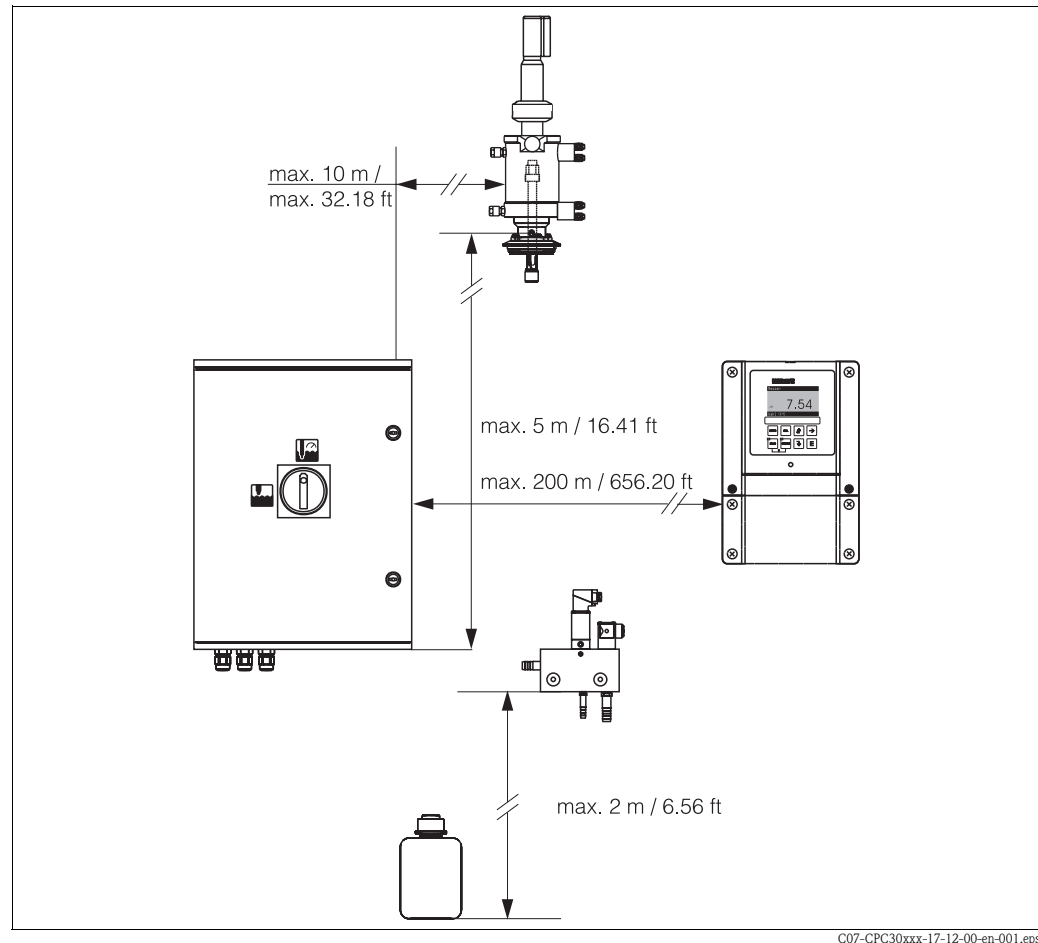


fig. 3: Maximum horizontal and vertical installation distances

3.2.2 Assembly mounting

- Glass electrode: Install the assembly at an angle of at least 15° from the horizontal (page 12 ff.).
- ISFET sensor: When using an ISFET sensor there are, in principle, no restrictions to the installation. An installation angle between 0° and 180° is, however, recommended.

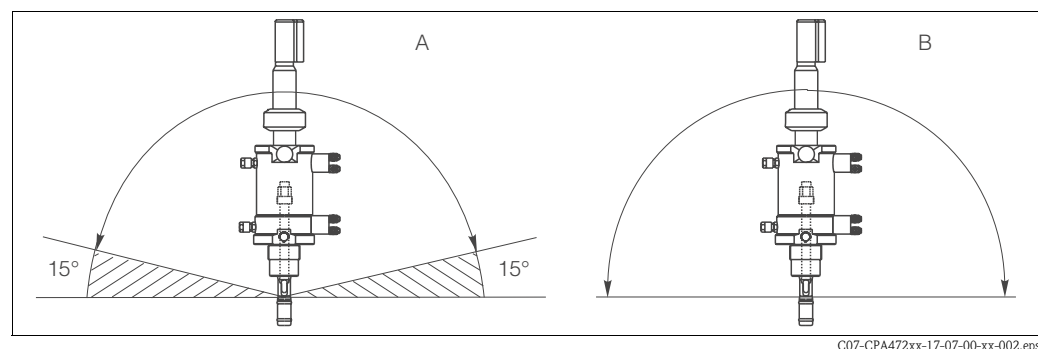


fig. 4: Installation angle

- A Glass electrodes: installation angle at least 15° from the horizontal
- B ISFET sensors: recommended 0 ... 180°, upside-down installation possible

3.3 Installation instructions

3.3.1 Measuring system

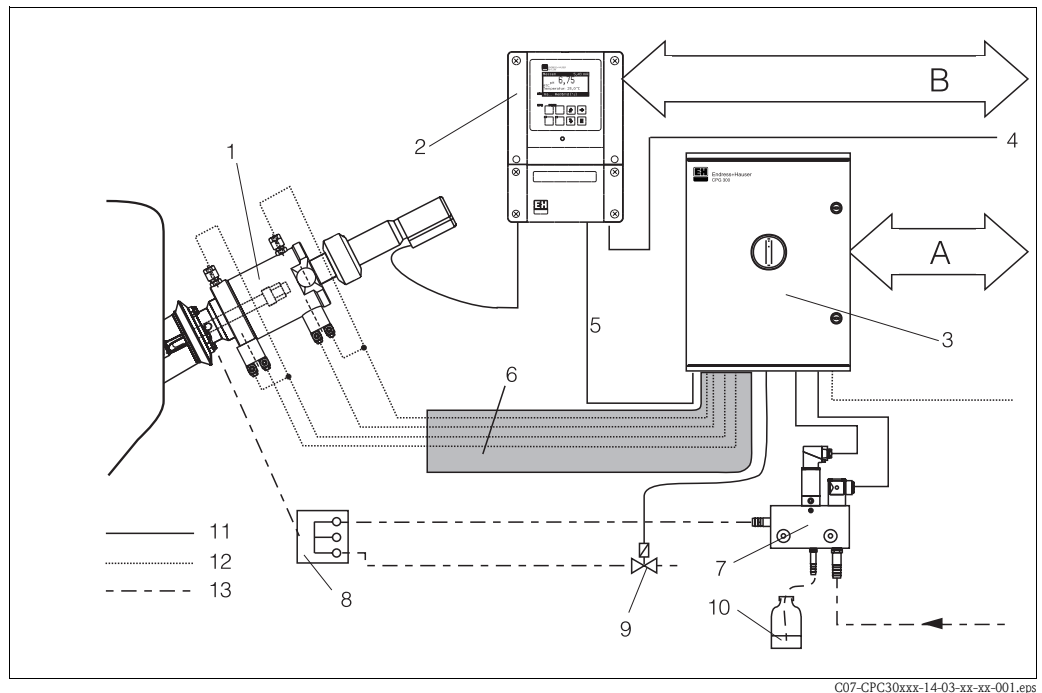


fig. 5: Fully automatic measuring system (example)

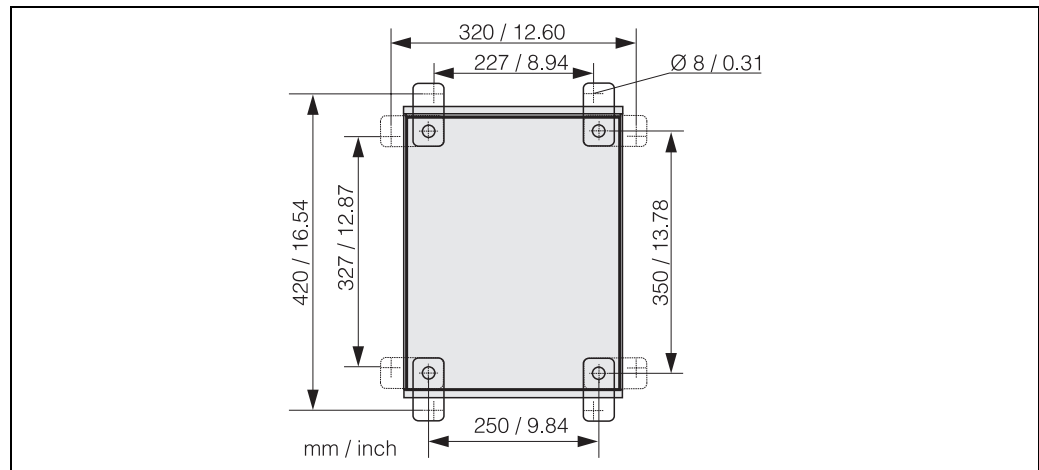
- | | | | |
|---|---|----|------------------------------|
| A | Message and control signals: assembly position, programme status, assembly movement, programme stop | | |
| B | Hold input, six relay contacts, 2 current outputs 0/4 ... 20 mA | | |
| 1 | Cleanfit P assembly | 8 | CPR40 rinse block (optional) |
| 2 | Mycom S CPM153 transmitter | 9 | Additional valve |
| 3 | CPG30 control unit | 10 | Cleaner |
| 4 | Power supply for Mycom S CPM153 | 11 | Electric line |
| 5 | Communication / power cable | 12 | Compressed air |
| 6 | Multi hose | 13 | Liquids, cleaning mixture |
| 7 | CYR injector | | |

3.3.2 Wall mounting



Caution!

- Check that the temperature does not exceed the maximum permitted operating temperature range (–20° ... +60°C). Install the devices in a shady location. Avoid direct sunlight.
- Always mount the devices horizontally so that the cable entries and hose connections point downwards.

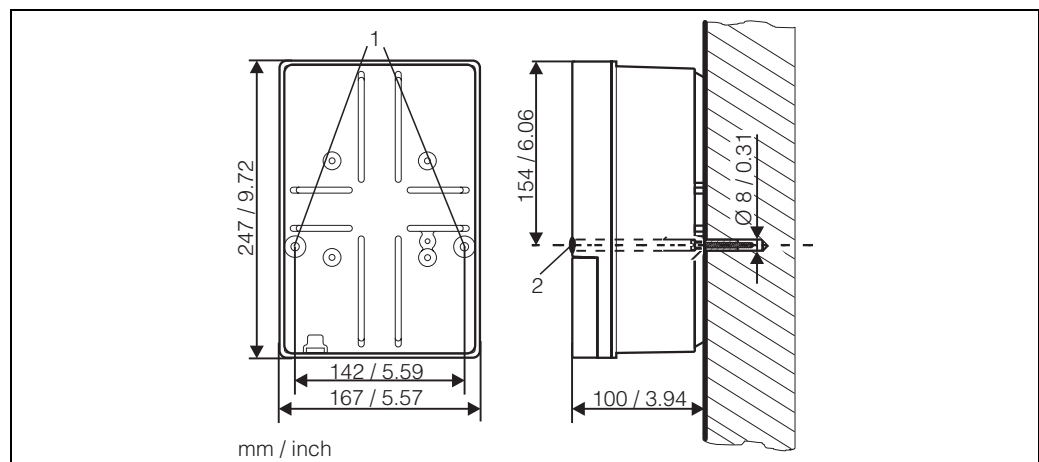
CPG30 control unit

C07-CPG300xx-06-12-00-en-001.eps

fig. 6: Mounting the control unit CPG30 using wall mounting kit (contained in scope of delivery)

To mount the CPG30 control unit at the wall, proceed as follows:

1. Prepare drill holes acc. to fig. 6.
2. Screw the elements of the supplied wall fixing kit to the back panel of the housing (screws contained in the scope of delivery).
3. Fix the housing to the wall.

Mycom S CPM153 transmitter

C07-CPM153xx-11-00-08-en-001.eps

fig. 7: Dimensions for wall mounting: Fixing screw: Ø 6 mm / 0.24", Wall plug: Ø 8 mm / 0.31"

1: Fixing drillholes

2: Plastic caps

1. Prepare drill holes acc. to fig. 7.
2. Push the two fixing screws from the front through the appropriate fixing bores in the housing (1).
 - Fixing screws (M6): max. Ø 6.5 mm / 0.26"
 - Screw head: max. Ø 10.5 mm / 0.41"
3. Mount the transmitter housing on the wall as shown.
4. Cover the drill holes with the plastic caps (2).

3.3.3 Post mounting and panel mounting

Transmitter Mycom S CPM153

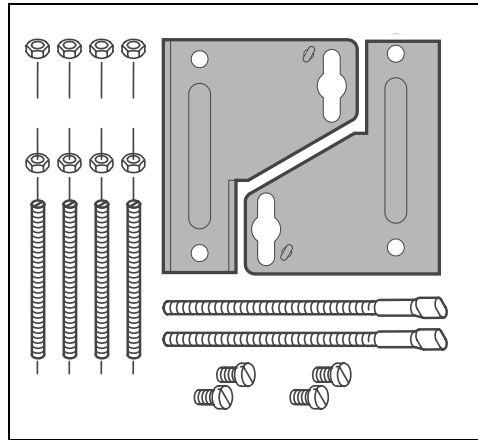


fig. 8: Mounting kit Mycom S CPM153

Mount the parts of the mounting kit (see accompanying figure) at the back of the housing as depicted in fig. 9.

Required mounting cutout for panel mounting:
161 x 241 mm / 6.34" x 9.49".

Installation depth: approx. 134 mm / 5.28".

Maximum pipe diameter: 70 mm / 2.76".

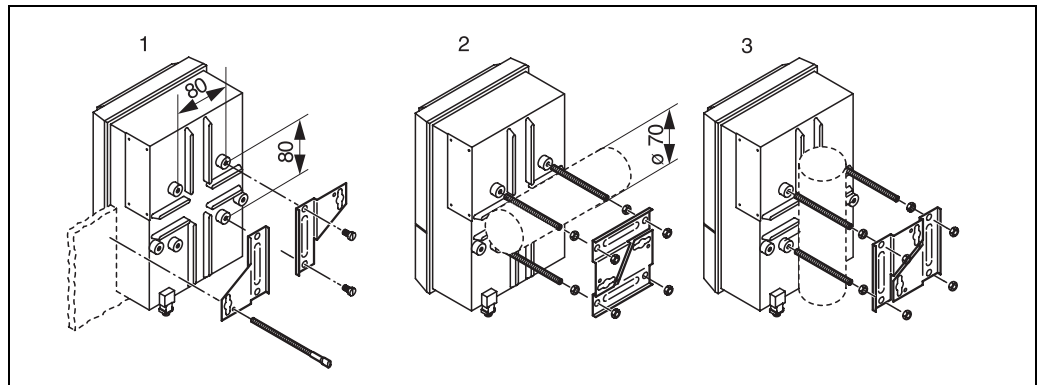


fig. 9: Panel mounting (1) and post mounting horizontal (2) and vertical (3) for Mycom S CPM153



Caution!

For outdoor use, the weather protection cover CYY101 is required (see fig. 10 and accessories).

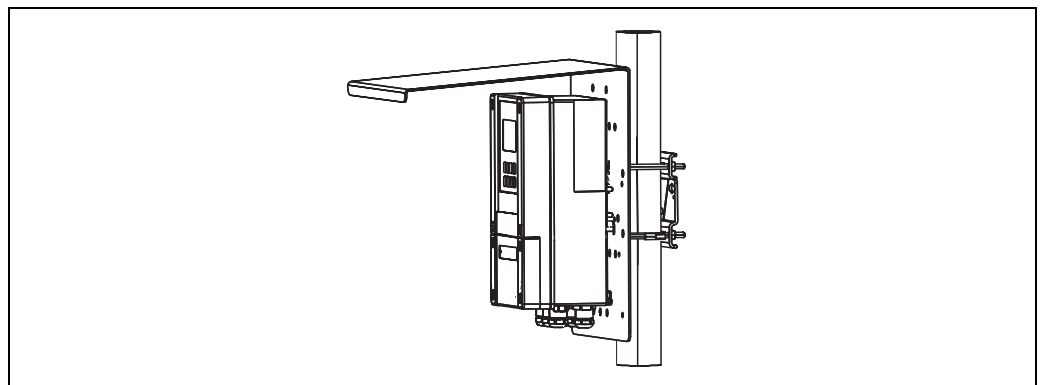


fig. 10: Post mounting for CPM153 with weather protection cover CYY101.

C07-CPM153xx-11-00-01-xx-001.eps

3.4 Installation check

Installation	Remarks
Are the measuring point number and the labelling correct?	Visual inspection
Process environment/conditions	Remarks
Is the transmitter protected against rainfall and direct sunlight?	For outdoor use, the CYY101 weather protection cover is required (see "Accessories").
Is the control unit protected against rainfall and direct sunlight?	Avoid direct sunlight.

4 Wiring and pneumatic connection of Topclean S

Connection of the Topclean S system is carried out in several steps:

1. Connecting required electric lines
2. Connecting optional electric lines
3. Connecting hoses for liquids and compressed air

4.1 Connection of required electric lines

4.1.1 Power supply and communication line of Mycom and CPG30

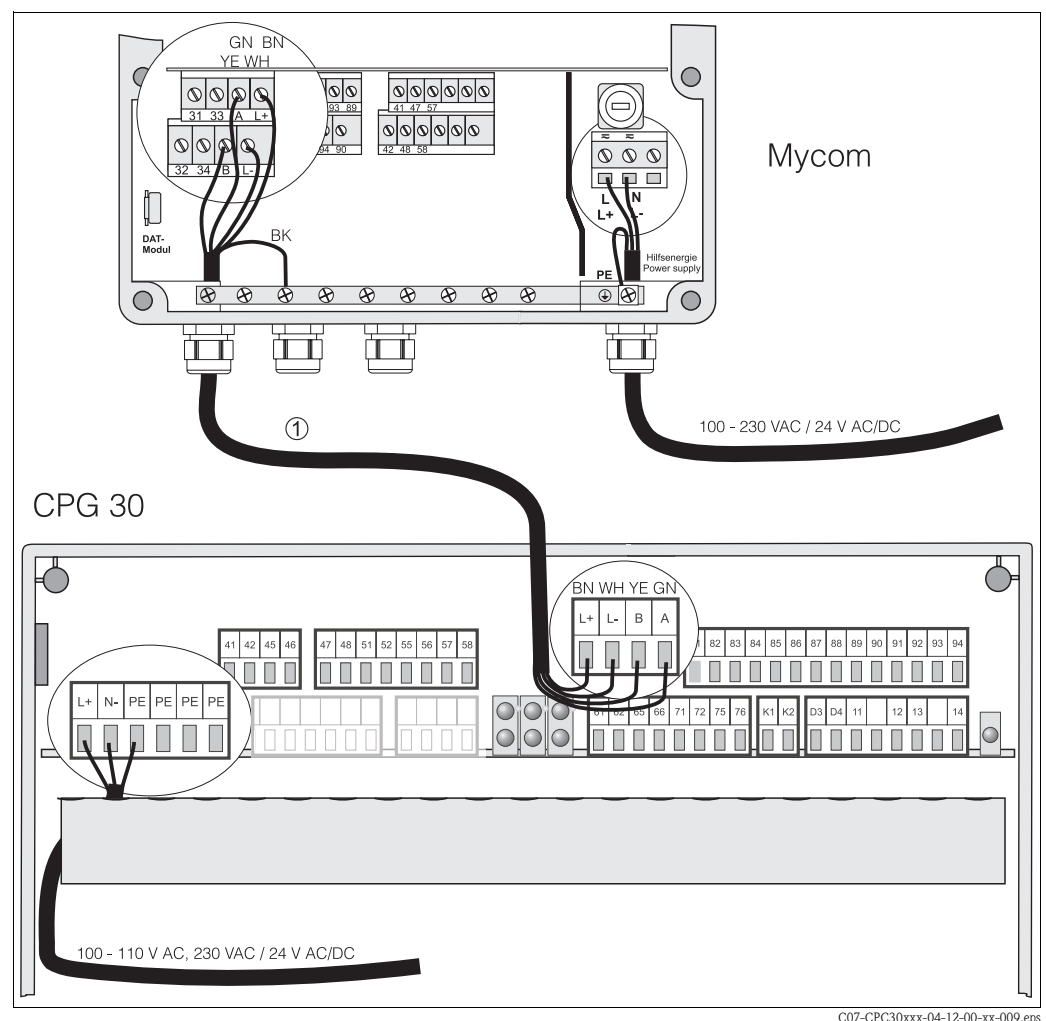


fig. 11: Power supply and communication cable

C07-CPG30xxx-04-12-00-xx-009.eps

To connect power supply for Mycom S CPM153

1. Insert the power cable through the right-hand Pg cable gland into the Mycom housing.
2. Connect the yellow-green wire to the PE terminal.
3. Connect the two other wires to the "L" and "N" terminals in the lower right-hand housing section.

To connect power supply for CPG30 control unit (non-Ex)

1. Insert the power cable through a suitable Pg cable gland into the CPG30 housing.
2. Connect the yellow-green wire to the PE terminal.
3. Connect the two other wires to the "L+" and "N" terminals (lower terminal block, left).



Note!

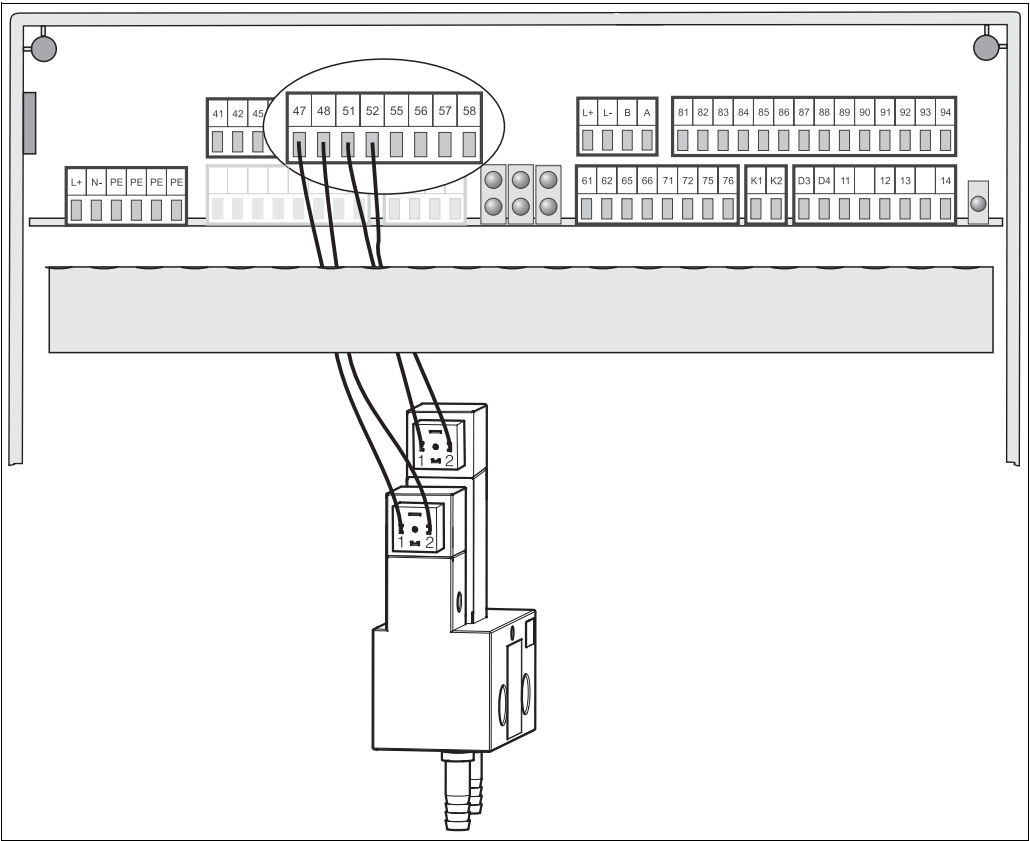
In the Ex version, the CPG30 is powered via the communication/power supply cable of the Mycom S CPM153 (see XA 236C/07/en).

To connect the communication line between Mycom and CPG30

1. Insert the end of the communication cable with the black screen wire through a suitable Pg cable gland of the Mycom S CPM153.
2. Insert the other cable end through a Pg cable gland of CPG30.
3. Connect the wires as follows:

Wire	Mycom terminal	CPG30 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 rail	n.c.

4.1.2 CYR10 injector



C07-CPC30xxx-04-12-00-xx-010.eps

fig. 12: Connection of CYR10 injector

1. Insert the cables of the CYR10 through a suitable Pg cable gland.
2. Connect the wires as follows:

Wire	CYR10 connection	CPG30 terminal
Positive wire for motive water	Connection 1 of small connector (in front)	Terminal 47
Negative wire for motive water	Connection 2 of small connector (in front)	Terminals 48
Positive wire for cleaning agent	Connection 1 of long connector (in the back)	Terminal 51
Negative wire for cleaning agent	Connection 2 of long connector (in the back)	Terminal 52

4.1.3 Analogue pH glass electrodes and ISFET sensors

Cable types

You require a screened special cable to connect analogue pH/redox electrodes and ISFET sensors. You can use the following multicore and preterminated cable types:

- CPK1 for electrodes with standard plug-in head GSA and without Pt 100
- CPK9 for electrodes with TOP 68 plug-in heads (ESA / ESS) and Pt 100
- CPK12 for ISFET pH sensors and pH/redox glass electrodes with TOP 68 plug-in heads (ESB) and Pt 100 / Pt 1000

Electrode connection with PML (symmetrical) or without PML (unsymmetrical)

You can connect the sensor with PML (symmetrically) or without PML (unsymmetrically), note the following differences

With PML (symmetrical)

 Caution!

With a connection with PML, the line to the potential matching pin (PML) must be connected to the potential matching terminal of the instrument. The PML must always be in contact with the medium, i.e. immersed in the buffer solution during calibration.

Benefits of connection with PML

Measurement is easier under difficult ambient conditions (e.g. strongly flowing or high-impedance media or partially soiled diaphragm). Monitoring of the reference electrode by the SC system (see page 73) is possible.

Without PML (unsymmetrical)

If the instrument input is without PML, pH measuring chains connected to assemblies can be connected without an additional potential matching pin. If necessary, connect the brown wire to terminal PE.

Disadvantages of connection without PML

The measuring chain reference system has a heavier load, meaning that measuring errors in limiting operating conditions are possible (see symmetrically high-resistance instrument input). Monitoring of the reference electrode by the SC system (see page 73) is not possible.

 Note!

Do not connect the PML, otherwise there can be shunt excitations.



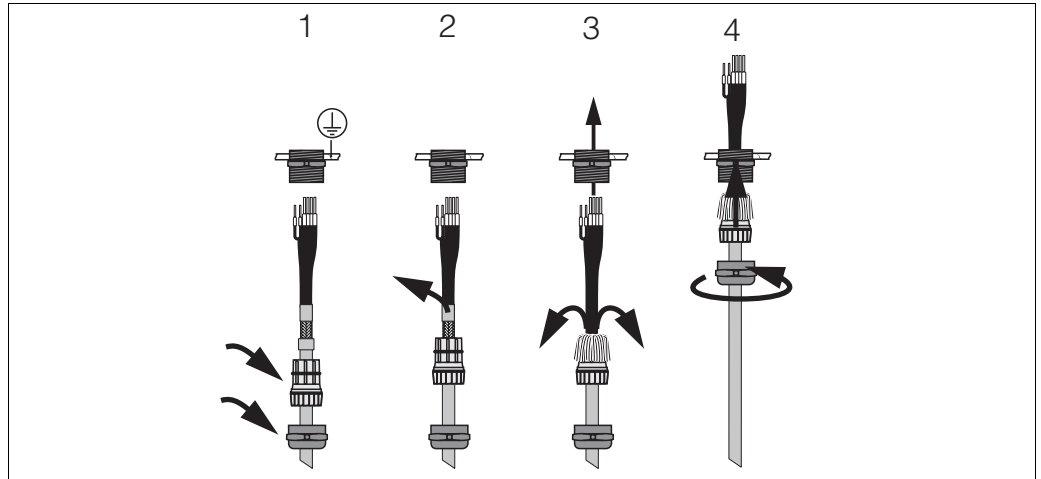
Note!

The instrument is preset for measurement with PML (potential matching line). For measurement without PML, the setting must be changed accordingly (see page 56, "Select connection type").

Connecting the sensor



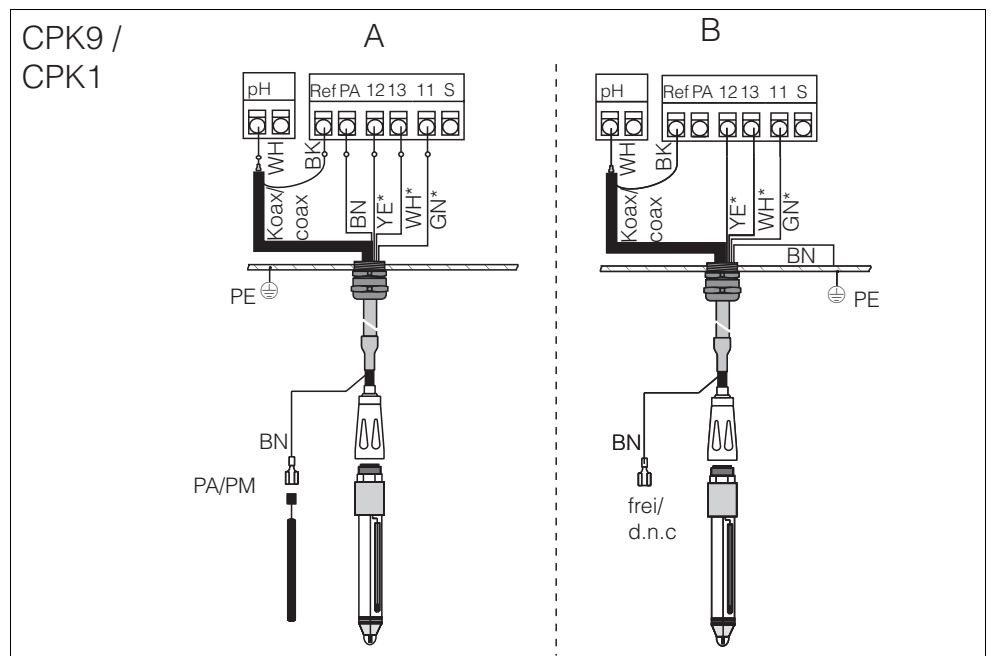
Caution!
Danger of inaccuracy.
Always protect plugs and terminals against humidity.



C07-CPM153xx-00-06-08-xx-002.eps

fig. 13: Outer screen connection for CPK1 to CPK12 with metal cable gland.
The screen contact is within the cable gland.

1. Push the cable gland and the clamping ring over the cable.
2. Remove the inner insulation.
3. Loosen the outer screen from the cable and fold it back over the cable gland to establish contact.
4. Insert the sensor cable through the cable gland of Mycom S CPM153 and tighten the gland.
5. If you are using a glass electrode, connect the wires as follows:

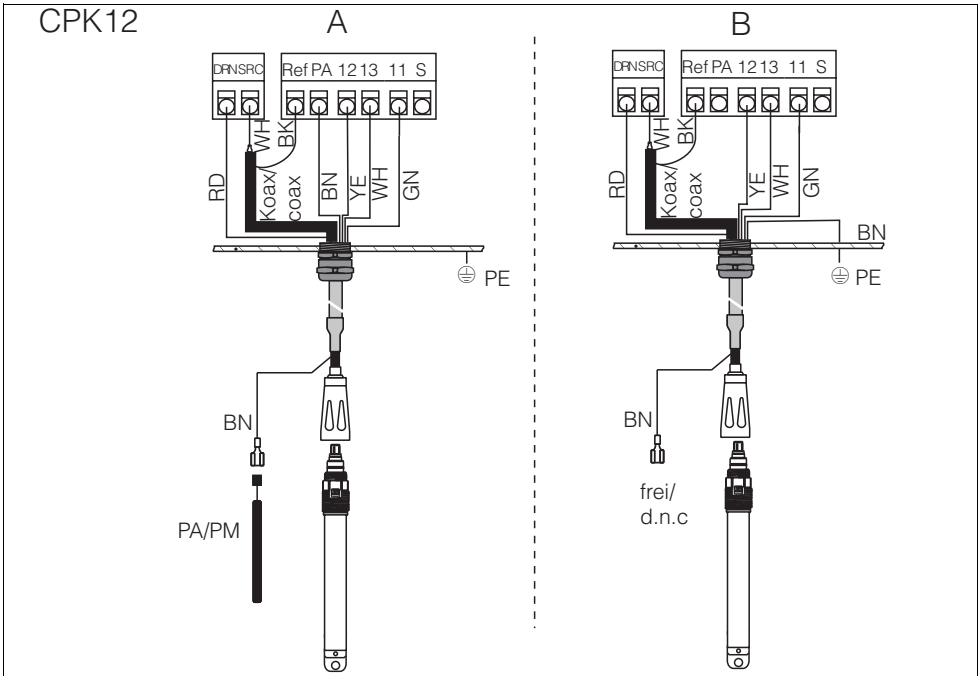


C07-CPC300xx-04-06-00-xx-013.eps

fig. 14: Electrode connection
A = symmetrical connection
B = unsymmetrical connection
* not applicable for CPK1 for electrodes without Pt 100

Wire	Mycom terminal
Black coax wire	Terminal Ref
White coax wire	Terminal pH
White (WH)	Terminal 13
Yellow (YE)	Terminal 12
Green (GN)	Terminal 11
Brown (BN)	■ Connection with PML (A): terminal PA Make sure that the potential matching pin is always in contact with medium. ■ Connection without PML (B): PE rail
Outer screen	Grounded via metal cable gland

6. If you are using an ISFET sensor, connect the wires as follows:



C07-CPC300xx-04-06-00-xx-014.eps

fig. 15: ISFET sensor connection
A = symmetrical connection
B = unsymmetrical connection

Wire	Mycom terminal
Red (RD)	Terminal DRN
Black coax wire	Terminal Ref
White coax wire	Terminal SRC
White (WH)	Terminal 13
Yellow (YE)	Terminal 12
Green (GN)	Terminal 11

Wire	Mycom terminal
Brown (BN)	■ Connection with PML (A): PA terminal Make sure that the potential matching pin is always in contact with medium. ■ Connection without PML (B): PE rail
Outer screen	Grounded via metal cable gland

Cable extension

If a cable extension is necessary, use

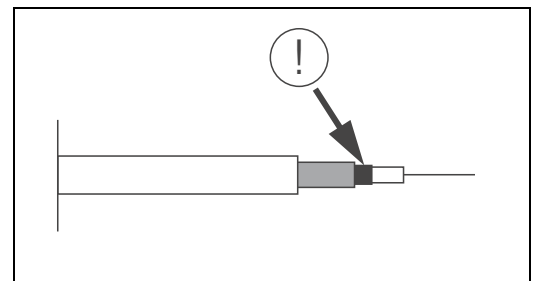
- junction box VBM

and the following types of non-terminated measuring cables:

- for CPK1, CPK9: Cable CYK71
- for CPK12: Cable CYK12

Note!

Remove the black plastic semi-conductor layer (arrow) from the inner coaxial cable. Each cable type has such a layer.



C07-CPC300xx-04-12-00-xx-007.eps

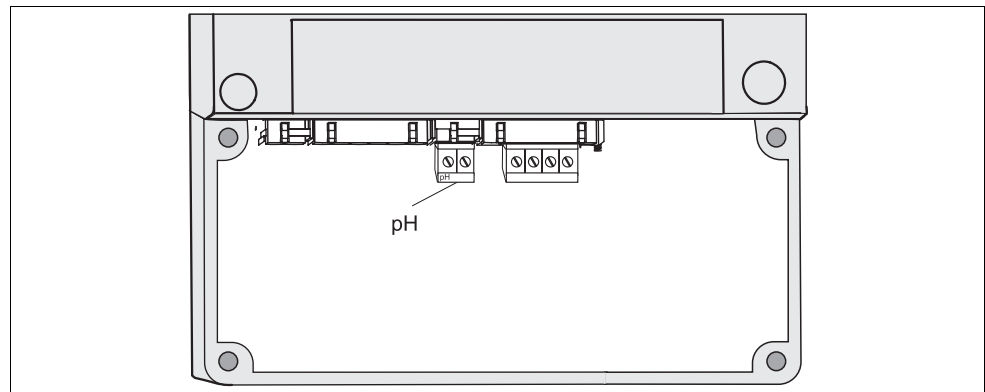
fig. 16: Design of coaxial line

Changing the pH input from glass electrode to ISFET sensor

The Topclean S version glass/ISFET (CPC30-xx2xxxxxxx) is factory set for measurement with glass electrodes.

To adapt the electrical connection for ISFET sensors, please proceed as follows:

1. Open the lower housing section of the CPM153.
2. If a glass electrode is connected, remove the wires of the electrode cable.
3. Remove the "pH" terminal located at the housing cover and replace it by the included terminal "DRN" / "SRC".



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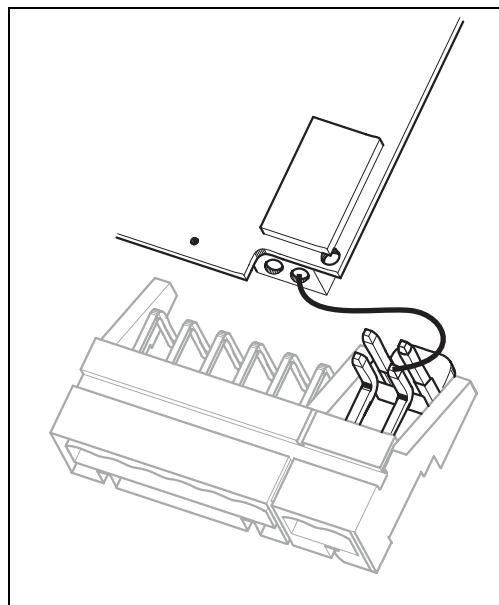
fig. 17: pH terminal at the housing cover

4. Open the housing cover of the CPM153.
5. On the right side of the housing cover, pull off both ends of the red cable to the pH input (see fig. 18).
6. Pin up the jumpers included as shown in fig. 19.
7. Connect the sensor cable according to the wire assignment for ISFET sensors.
8. Change the setting "electrode type" in the First start up menu (p. 51) to "ISFET".



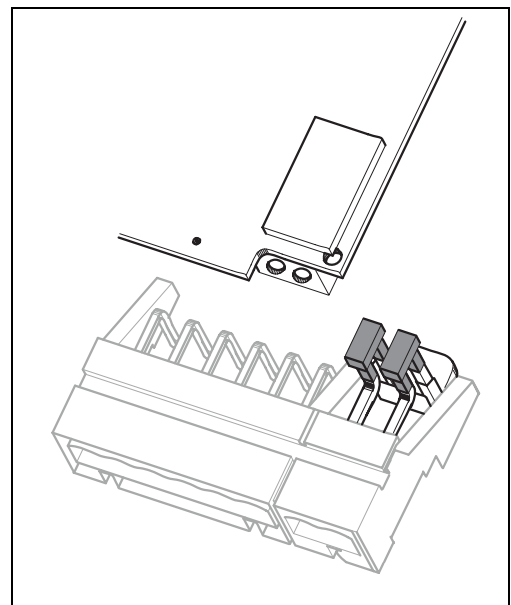
Note!

Please switch from ISFET sensor to glass electrode correspondingly.



C07-CPM153xx-04-06-06-xx-002.eps

fig. 18: pH input module and pH terminal set in housing cover with cable (red) for connection of pH / redox glass electrodes.



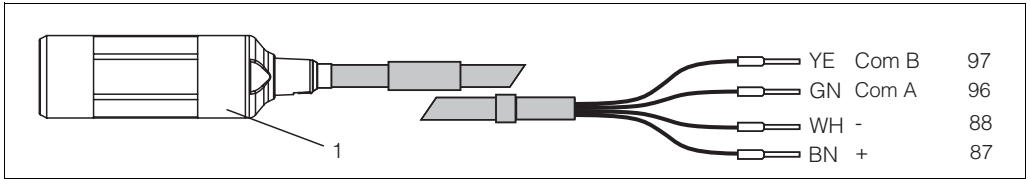
C07-CPM153xx-04-06-06-xx-003.eps

fig. 19: pH input module and pH terminal set in housing cover with jumpers for connection of ISFET sensors

4.1.4 Digital pH sensors with Memosens technology

Measuring cable

To connect digital sensors with Memosens technology to Mycom S CPM153, you require the CYK10 Memosens data cable with 2x2 wires, twisted pair, screen and PVC sheath.

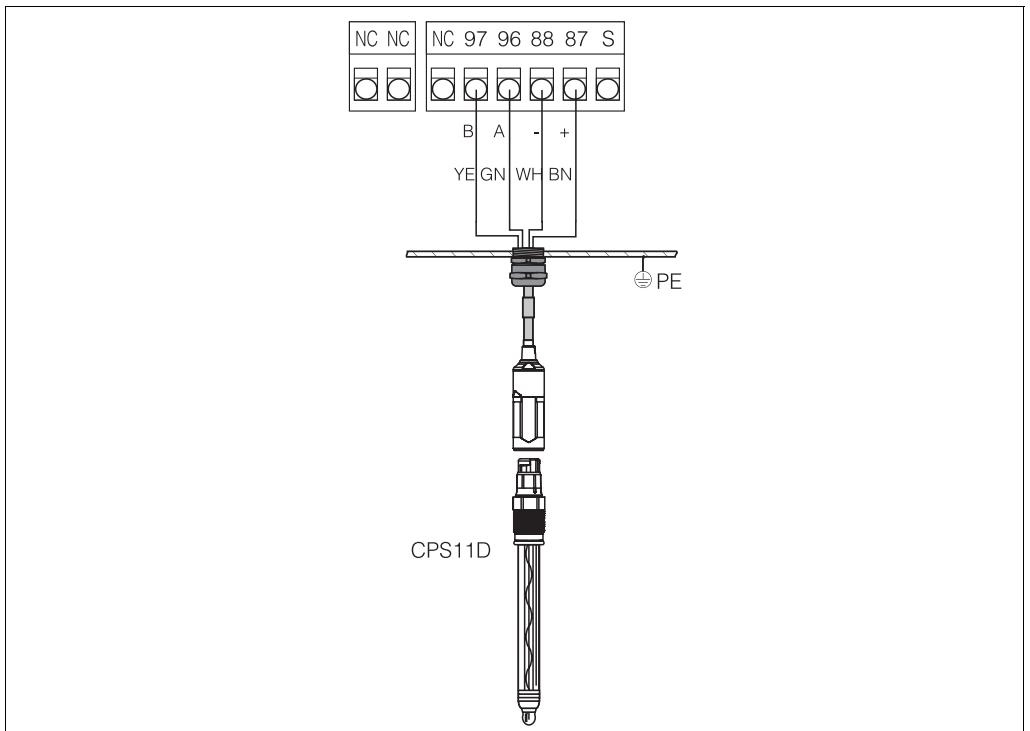


C07-CPM2x3xx-04-06-00-xx-003.eps

fig. 20: Design of CYK10 Memosens data cable

1 Coupling with integrated electronics for connection to the sensor

Connecting the sensor



C07-CPM153xx-04-06-00-xx-015.eps

fig. 21: CPS11D connection with CYK10

Connect the wires as follows:

Wire	Mycom terminal
Yellow (YE)	Terminal 97
Green (GN)	Terminal 96
White (WH)	Terminal 88
Brown (BN)	Terminal 87
Screen	Grounded via metal cable gland

4.2 Connecting optional electric lines

4.2.1 Mycom current outputs and relays

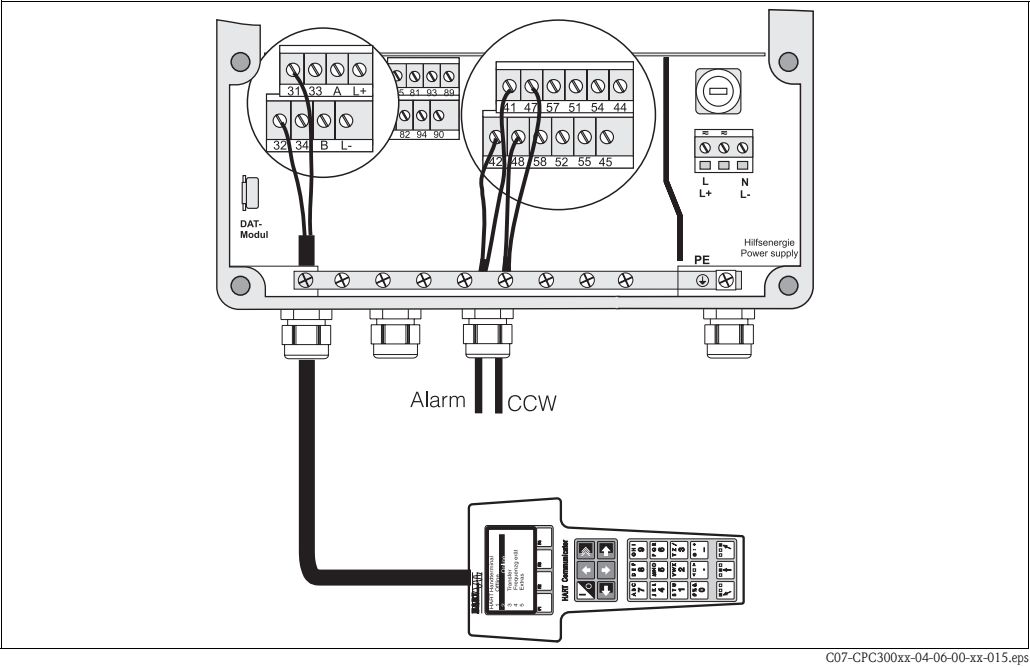


fig. 22: Connection of current outputs (example: HART to output 1) and relays (example: alarm and Chemoclean water)

To connect current outputs

If you want to output measured values to external evaluation devices or a PCS or you are using HART communication, you can connect these devices to the current outputs 1 and 2 of Mycom S. In addition, you can output an actuating variable via current output 2.

- 1. Connect the device to current output 1 as follows:

Wire	Mycom terminal
Positive wire	Terminal 31
Negative wire	Terminal 32

- 2. Connect the device to current output 2 as follows:

Wire	Mycom terminal
Positive wire	Terminal 33
Negative wire	Terminal 34

To connect Mycom relays

Mycom S CPM153 has one alarm contact and five additional contacts. Via these five contacts, you can control controller, limit contactor, water and cleaning agent supply for the Chemoclean function. To configure the additional contacts, select "Setup 1 > Relays", see page 61.

1. Connect the alarm contact to terminals "41" and "42".
2. Connect the additional contacts as follows:

Relay	CPG30 terminal
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

The function assignment (controller, limit contactor, etc.) to each relay depends on your configuration.

When using the NAMUR assignment, for example, functions of the alarm relay and the first two additional relays are preset (see NAMUR assignment below). Without NAMUR assignment, you can assign any function to all five additional relays.



Note!

- You can assign up to three relays to the controller.
- You can switch the contact type "Active open" / "Active closed" via software.

NAMUR assignment

If you are using the NAMUR assignment (acc. to recommendations of the association for process control engineering of the chemical and pharmaceutical industry), the contacts are set to the relays as follows:

Relays	NAMUR on	Terminal
ALARM	Failure	41 42
RELAY 1	Maintenance required	47 48
RELAY 2	Function check	57 58

Function check assignment

Function check acc. to NAMUR is active when:

- The sensor is calibrated
- The assembly is in service position.
- Mycom is configured.
- A Topclean cleaning programme is running.
- A Chemoclean programme is running.
- An error occurs which triggers the function check (assignment see error list page 125).

4.2.2 External inputs (PCS to CPG30) and outputs (CPG30 to PCS)



- Note!
- External inputs and outputs require external power supply. You can use the 15 V auxiliary power supply of Mycom to provide the power (terminals 85/86).
 - The voltage must lie between 10 ... 40 V.
 - The maximum switching voltage for the optocoupler is 30 V.

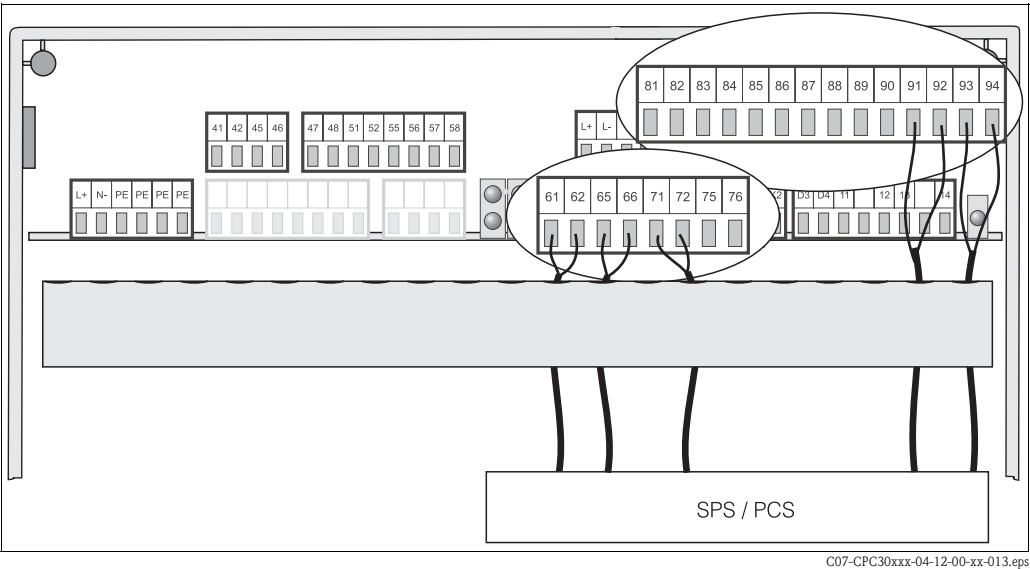


fig. 23: Connection of external control of assembly position and cleaning programmes

To connect external inputs

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

Control	CPG30 terminal
Position "Measurement"	Terminals 91 and 92
Position "Service"	Terminals 93 and 94

2. If you want to control cleaning programmes of Topclean S via an external PCS, connect the binary contacts of CPG30:

Contact	CPG30 terminal
Contact 0	Terminals 81 and 82
Contact 1	Terminals 83 and 84
Contact 2	Terminals 85 and 86

- For binary coding of the cleaning programmes, see page 91.
3. If you want to stop cleaning programmes via an external PCS, connect the automatic stop control to terminals "87" and "88".
The running programme is finished and no new programme is started as long as a signal is applied to terminals 87/88.
The Clean Int. programme is interrupted immediately.

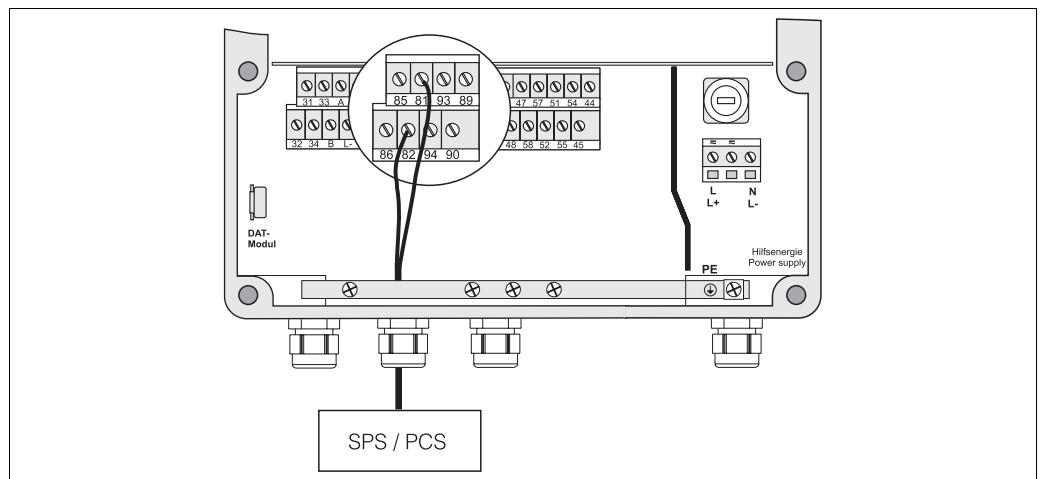
To connect external outputs of CPG30 to a PCS

1. If you want to feed back the assembly position to an external PCS, connect the outputs of CPG30 as follows:

Feedback	CPG30 terminal
Feedback "Assembly in measurement position"	Terminals 61 and 62
Feedback "Assembly in service position"	Terminals 65 and 66

2. If you want to feed back the status of cleaning programmes to an external PCS, connect the feedback "Programme running" to terminals "71" and "72".

4.2.3 External inputs PCS to Mycom



C07-CPG300xx-04-06-00-xx-017.eps

fig. 24: Connection of external hold for Mycom

If you want to activate the hold function for Mycom S CPM153 via an external PCS, connect this input to Mycom terminals 81 and 82.

4.2.4 External valve for sealing water, steam, etc. to CPG30

If you are using a Topclean with control for external valves (see nameplate, version CPC30-x1/2/3/xxxxxx), you can select the functions "sealing water", "sterilisation" in the Topclean S cleaning or user programmes.
To assign the valve, select "Setup 2 > Topclean > Config. Topclean". See page 88 ff.

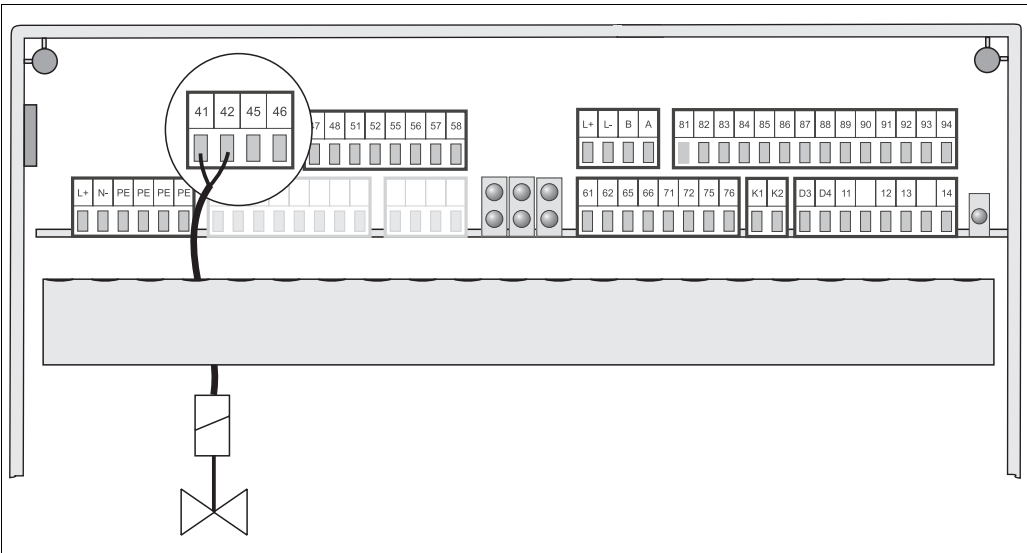


- Note!
- The external valve is an ordering option. For retrofitting, contact your sales centre.
 - The Ex version of Topclean S has a pneumatically controlled valve (see XA236C).
 - When using an external valve, you must use the CPR40 rinse block for supply of pressurised media.

What is sealing water?

In processes with fibrous or adhesive media, assemblies with ball valves are used to block the medium, e.g. Cleanfit CPA473 or CPA474. To keep the rinse chamber free of medium, the sealing water valve opens automatically before the assembly emerges from the process. The counterpressure in the rinsing chamber caused by the sealing water prevents the ingress of medium into the chamber. The sealing water pressure must be greater than the pressure of the medium. Pumping of sealing water is started one second before the assembly moves to service position.

To connect the external valve



C07-CPC30xxx-04-12-00-xx-021.eps

fig. 25: Connection of external valve

Connect the external valves as follows:

Valve control	Terminal CPG30 non Ex
Positive wire	Terminal 41
Negative wire	Terminal 42

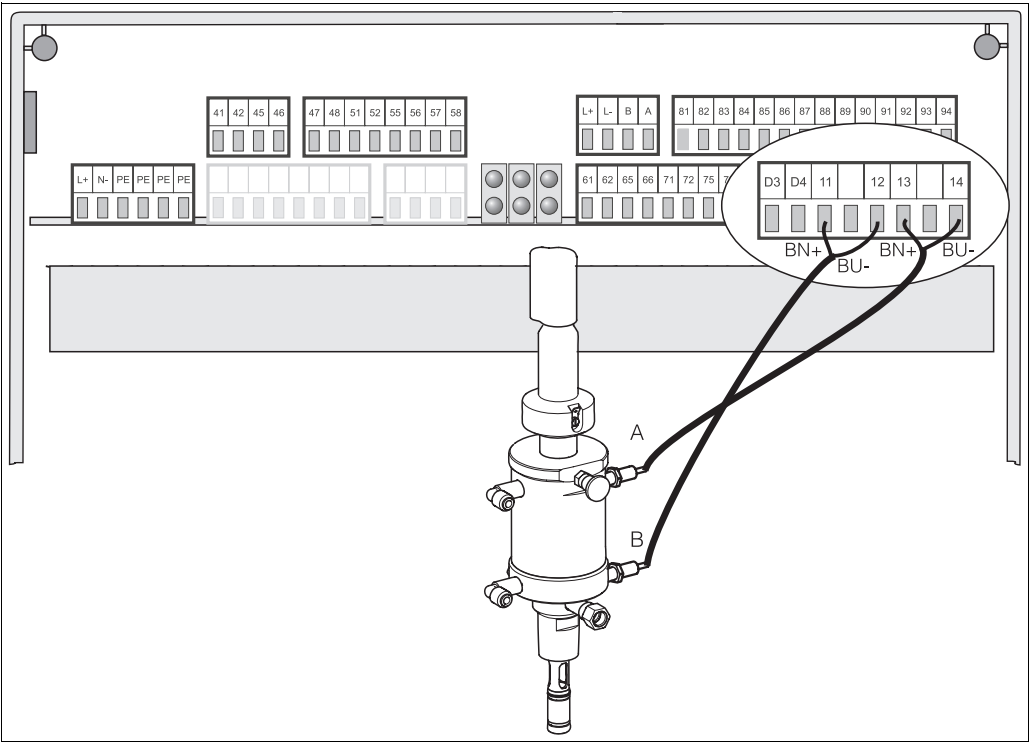


Caution!
Make sure to use the matching supply voltage for your external valve.

4.2.5 Inductive limit position switches

By default, Topclean S is supplied with pneumatic limit position switches for feedback of assembly position. If you are using inductive limit position switches, connect them as described below.

To connect limit position switches of CPA471, 472 or 475



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fig. 26: Connection of inductive limit position switches for assemblies CPA471, 472, 475

A = Feedback "Service"

B = Feedback "Measure"

- 1. If you are using a CPA471, 472 or 475 with inductive limit position switches for assembly position feedback, remove the wires of the pneumatic switches from terminals 11 ... 14.
- 2. Connect the upper limit position switch (A) for feedback "Service" as follows:

Wire	CPG30 terminal
Brown (BN)	Terminal 13 (+)
Blue (BU)	Terminal 14 (-)

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

Wire	CPG30 terminal
Brown (BN)	Terminal 11 (+)
Blue (BU)	Terminal 12 (-)

To connect limit position switches of CPA473, 474

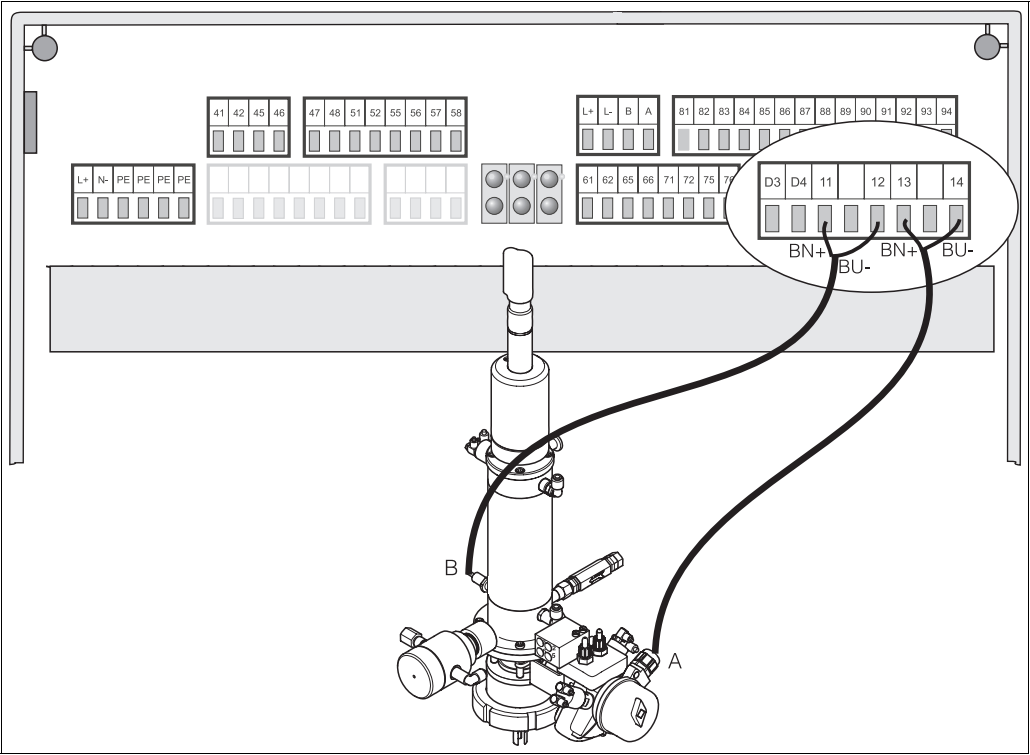


fig. 27: Connection of inductive limit position switches of the assemblies CPA473, 474
A = Feedback "Service",
B = Feedback "Measure"

- 1. If you are using a CPA473, 474 assembly with inductive limit position switches for assembly position feedback, remove the wires of the pneumatic switches from terminals 11 ... 14.
- 2. Connect the limit position switch next to the ball valve (A) for feedback "Service" as follows:

Wire	CPG30 terminal
Brown (BN)	Terminal 13 (+)
Blue (BU)	Terminal 14 (-)

- 3. Connect the limit position switch opposite the ball valve (B) for feedback "Measure" as follows:

Wire	CPG30 terminal
Brown (BN)	Terminal 11 (+)
Blue (BU)	Terminal 12 (-)

4.3 Topclean S hosing

4.3.1 Compressed air

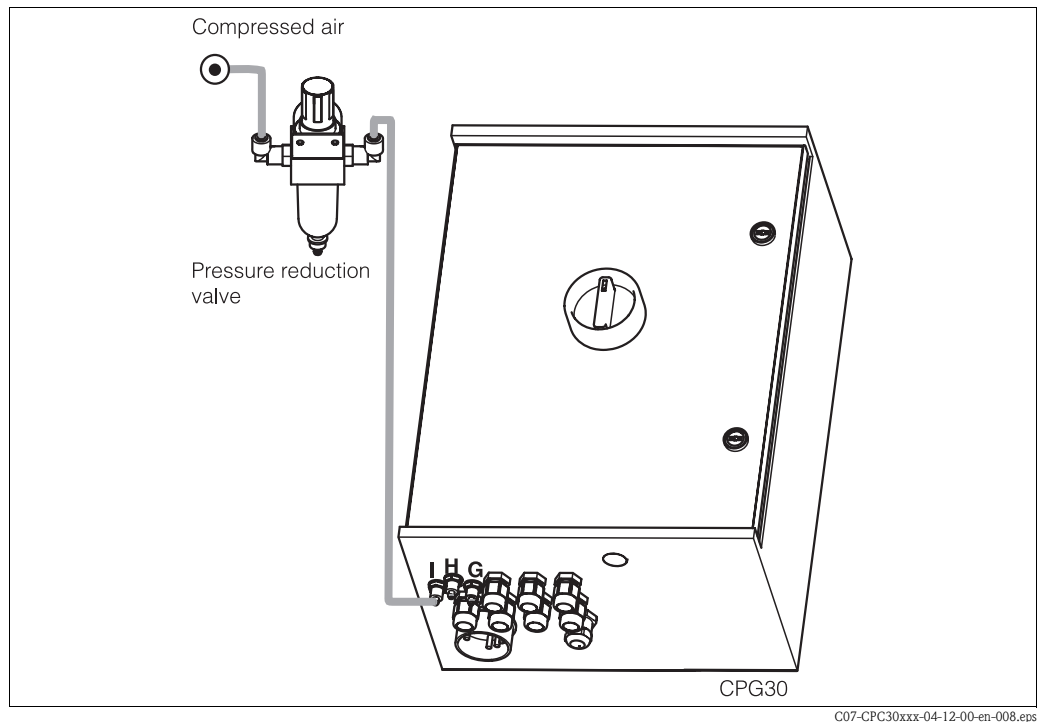


fig. 28: Connection of compressed air, rinse water, buffer and cleaning agent to CPG30

Note!

- The compressed air line and a T-piece must be provided by the operator.
- The air must be filtered (0.5 µm), free of oil and condensate. The minimum line diameter is 10 mm / 0.39".

1. Screw the manometer into the thread of the pressure reduction valve. It regulates the air pressure (optimum 5 bar / 72.5 psi).
2. Connect the compressed air supply to the pressure reduction valve.



Caution!

Observe the installation direction of the pressure reduction valve. The flow direction is indicated by arrows on the top of the rectangular valve block.

3. Connect the compressed air line from the reduction valve outlet to the connection I. Apply a pressure of 4 to 6 bar / 43.5 to 87 psi. Tighten the cable glands **by hand** (approx. 0.5 Nm).



Note!

When using an Ex version of Topclean S, connect the compressed air lines for the CYR10 injector to the connections "G" and "H" (for connection diagrams, see XA 236C).

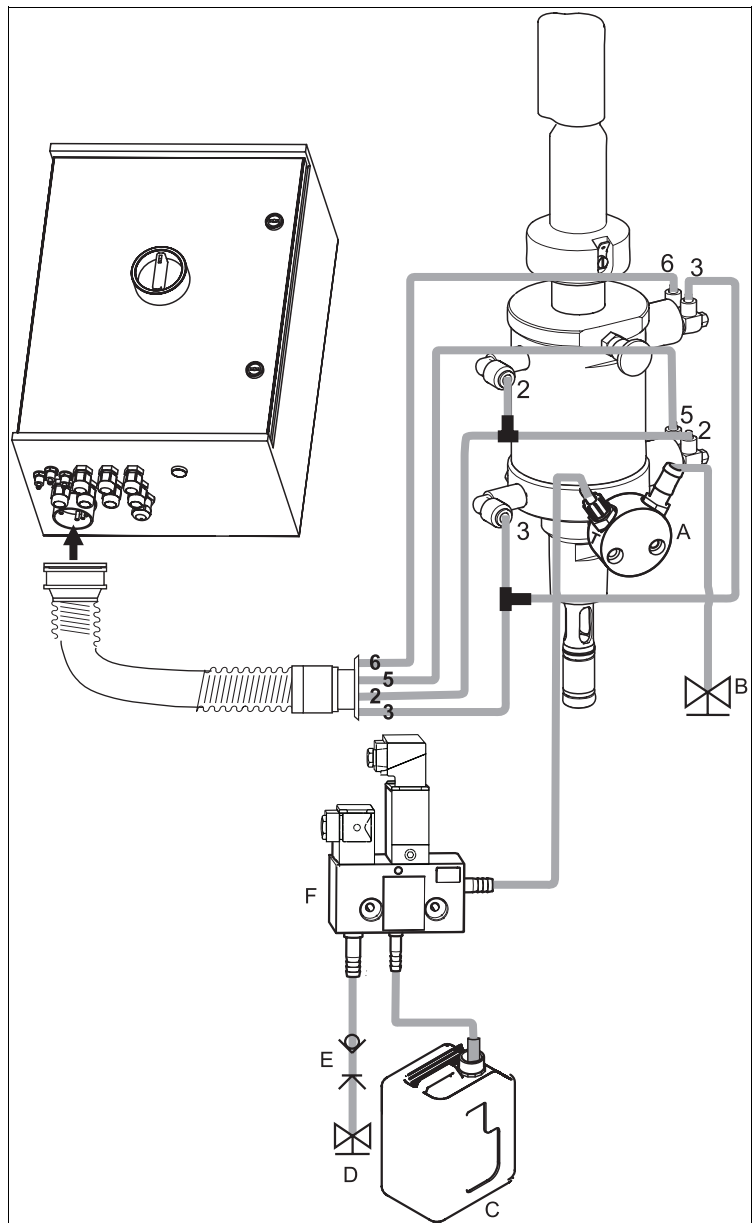
4.3.2 CPA471 / 472 / 475 assemblies with pneumatic limit position switches

1. Screw the multihose onto the bayonet lock, ensuring it is strain relieved and free of kinks.
2. Connect **hose no. 5** for the position feedback "Measure" from the Topclean multihose to connection 2 (= output) of the assembly's **lower** limit position switch, see fig. 30.
3. Connect **hose no. 2** for position "Measure" via a T-piece from the multihose to the **upper** elbow plug and to connection 1 (= input) of the assembly's **lower** limit position switch.
4. Connect **hose no. 6** for position feedback "Service" from the multihose to connection 2 (= output) of the assembly's **upper** limit position switch.
5. Connect **hose no. 3** for position "Service" via a T-piece from the multihose to the **lower** elbow plug and to connection 1 (= input) of the assembly's **upper** limit position switch.
6. Connect the motive water line (D) via a pipe disconnecter (E) to the G3/8 connection of CYR10.
7. Connect the line for conveyance of cleaning agent (C) to the G¼ connection of CYR10.
8. Connect the line from CYR10 to the assembly as follows:
 - If you are not using the CPR40 rinse block (A), connect the line to the rinse water inlet of the assembly.
 - If you are using the CPR40 rinse block (A), connect the line to the "T" connection of CPR40.
9. If you are using an external valve, connect the line for steam, additional cleaning agents or sealing water (B) to the other connection of CPR40.

 Note!

The maximum hose length is 10 m / 32.81 ft:

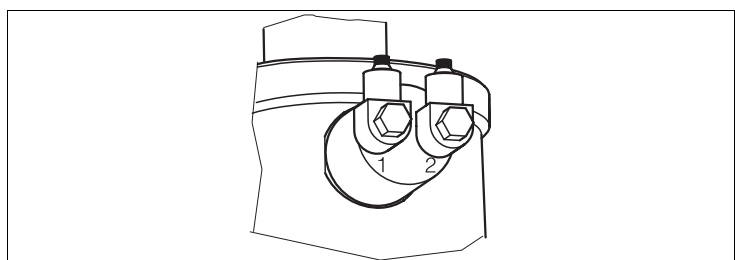
- Maximum discharge height: 5 m / 16.41 ft
- Max. horizontal discharge width: 10 m / 32.81 ft
- Pressure resistance of internal components: up to 7 bar / 101.5 psi
- Maximum suction height of buffer/cleaning agent: 2 m / 6.56 ft



C07-CPC300xx-04-12-00-xx-024.eps

fig. 29: Connection of CPA471 / 472 / 475 assemblies with pneumatic limit position switches

- A CPR40 rinse block, required for Topclean versions with external valve control for conveyance of hot, aggressive or pressurised media
 B Pressurised steam, water, cleaning agent
 C Cleaner
 D Motive water 2 ... 7 bar / 29 ... 101.5 psi
 E Pipe disconnecter (customer supplied)
 F CYR10



C07-CPC300xx-04-012-00-xx-027.eps

fig. 30: Pneumatic limit position switch

- 1 Input
 2 Output

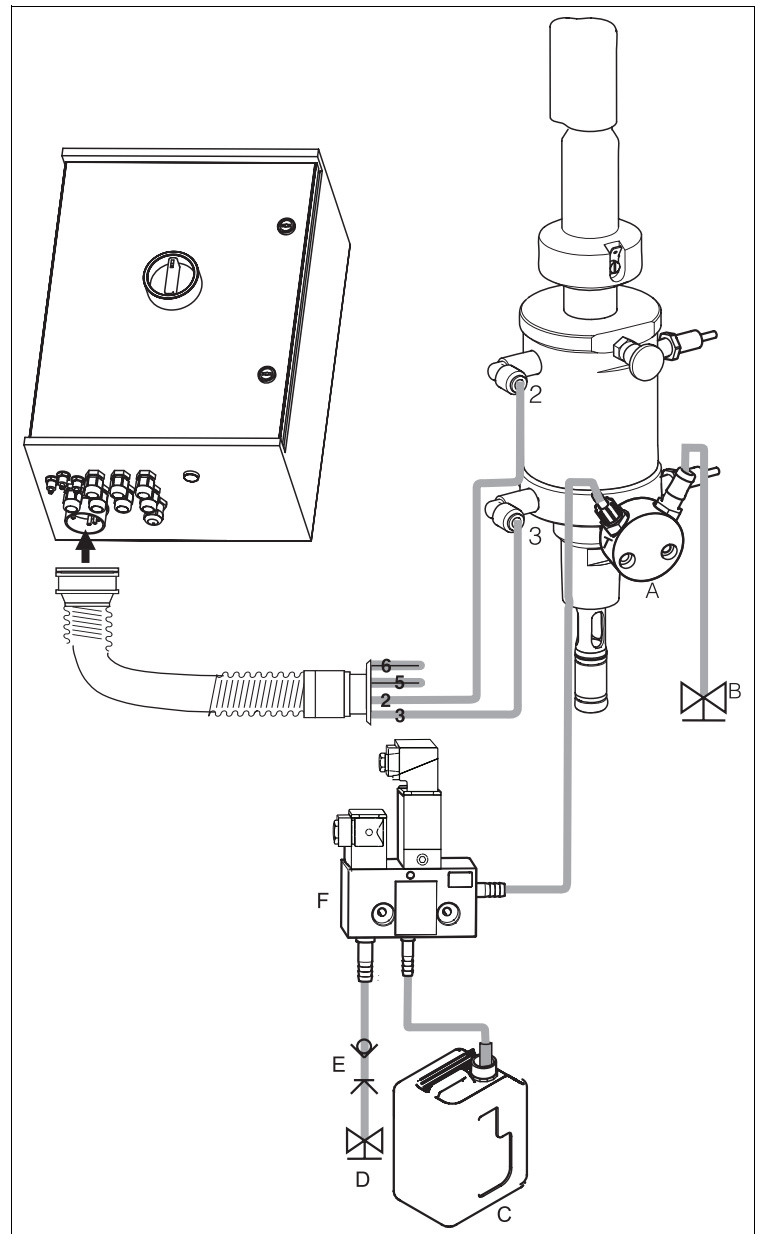
4.3.3 CPA471 / 472 / 475 assemblies with inductive limit position switches

1. Screw the multihose onto the bayonet lock, ensuring it is strain relieved and free of kinks.
2. Fold hoses no. 5 and 6 back into the multihose.
3. Connect **hose no. 2** for position "Measure" from the multihose to the **upper** elbow plug of the assembly.
4. Connect **hose no. 3** for the position "Service" from the multihose to the **lower** elbow plug of the assembly.
5. Connect the motive water line (D) via a pipe disconnecter (E) to the G3/8 connection of CYR10.
6. Connect the line for conveyance of cleaning agent (C) to the G $\frac{1}{4}$ connection of CYR10.
7. Connect the line from CYR10 to the assembly as follows:
 - If you are not using the CPR40 rinse block (A), connect the line to the rinse water inlet of the assembly.
 - If you are using the CPR40 rinse block (A), connect the line to the "T" connection of CPR40.
8. If you are using an external valve, connect the line for steam, additional cleaning agents or sealing water (B) to the other connection of CPR40.

Note!

The maximum hose length is 10 m / 32.81 ft:

- Maximum discharge height: 5 m / 16.41 ft
- Max. horizontal discharge width: 10 m / 32.81 ft
- Pressure resistance of internal components: up to 7 bar / 101.5 psi
- Maximum suction height of buffer/cleaning agent: 2 m / 6.56 ft



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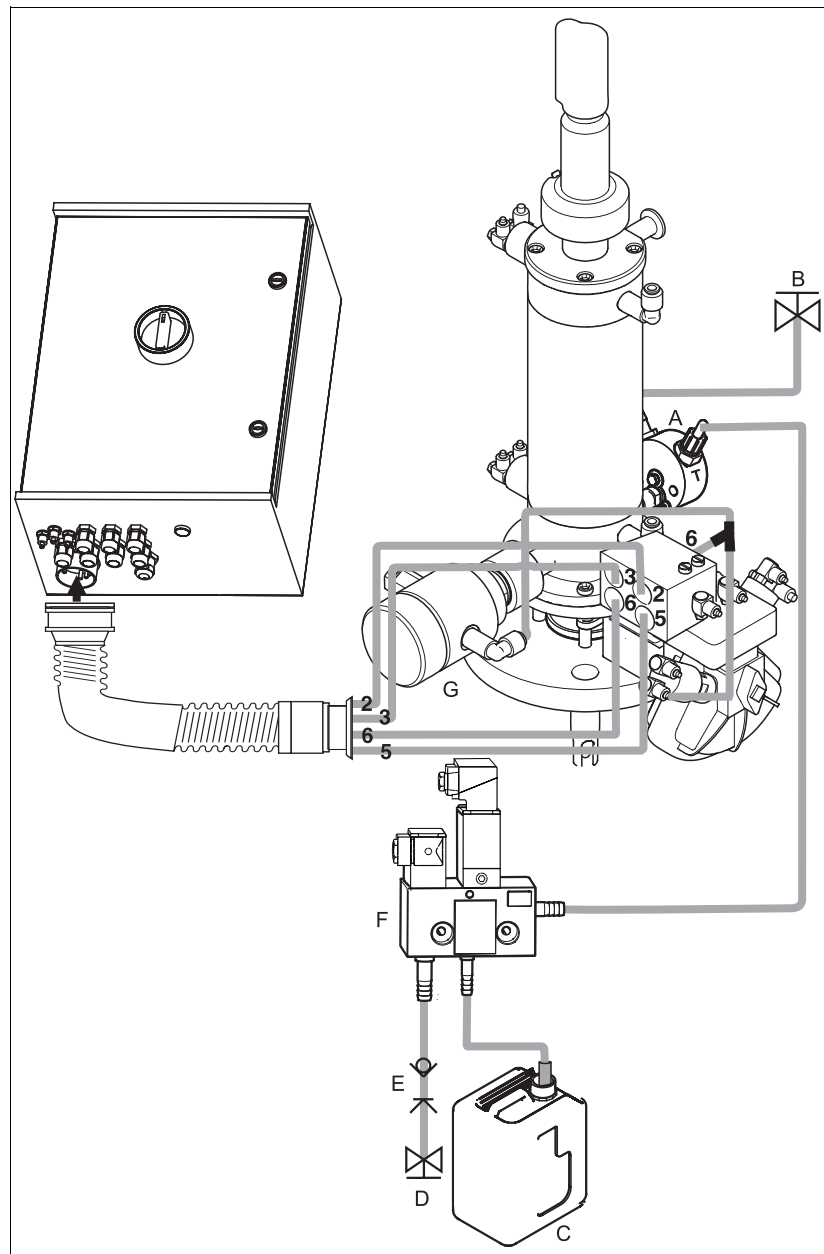
fig. 31: Connection of CPA471 / 472 / 475 assemblies with inductive limit position switches

- A CPR40 rinse block, required for Topclean versions with external valve control for conveyance of hot, aggressive or pressurised media
 B Pressurised steam, water, cleaning agent
 C Cleaner
 D Motive water 2 ... 7 bar / 29 ... 101.5 psi
 E Pipe disconnecter (customer supplied)
 F CYR10

4.3.4 CPA473 / 474 assemblies with pneumatic limit switches

The assembly is delivered completely hoses up. All you have to do is connect compressed air for pneumatic operation of the ball valve and outputs for pneumatic feedback signals to the pneumatic terminal block.

1. Screw the multihose onto the bayonet lock, ensuring it is strain relieved and free of kinks.
2. Connect **hose no. 5** for position feedback "Measure" from the multihose to output "5" of the assembly's pneumatic connection block.
3. Connect **hose no. 2** for position "Measure" from the multihose to input "2" of the assembly's pneumatic connection block.
4. Connect **hose no. 6** for position feedback "Service" from the multihose to output "6" of the assembly's pneumatic connection block.
5. Connect **hose no. 3** for position "Service" from the multihose to input "3" of the assembly's pneumatic connection block.
6. Connect the motive water line (D) via a pipe disconnecter (E) to the G3/8 connection of CYR10.
7. Connect the line for conveyance of cleaning agent (C) to the G $\frac{1}{4}$ connection of CYR10.
8. Connect the line from CYR10 to the assembly as follows:
 - If you are not using the CPR40 rinse block (A), connect the line to the rinse water inlet of the assembly.
 - If you are using the CPR40 rinse block (A), connect the line to the "T" connection of CPR40.
9. If you are using an external valve, connect the line for steam, additional cleaning agents or sealing water (B) to the other connection of CPR40.
10. If you are using a pneumatic outlet safety seal (G):
 - Cut the compressed air hose from the connection block input "6" to the corresponding limit position switch on the ball valve drive.
 - Connect each end of the cut hose to the supplied Y-piece.
 - Connect the third connection of the Y-piece to the compressed air connection of the outlet safety seal.



C07-CPC30xxx-12-04-00-xx-026.eps

fig. 32: Connection of CPA473 / 474 assemblies with pneumatic limit position switches

- A CPR40 rinse block, required for Topclean versions with external valve control for conveyance of hot, aggressive or pressurised media
- B Pressurised steam, water, cleaning agent
- C Cleaner
- D Motive water 2 ... 7 bar / 29 ... 101.5 psi
- E Pipe disconnecter (customer supplied)
- F CYR10
- G Outlet safety seal (optional)

Note!

The maximum hose length is 10 m / 32.81 ft:

- Maximum discharge height: 5 m / 16.41 ft
- Max. horizontal discharge width: 10 m / 32.81 ft
- Pressure resistance of internal components: up to 7 bar / 101.5 psi
- Maximum suction height of buffer/cleaning agent: 2 m / 6.56 ft

4.3.5 CPA473 / 474 assemblies with inductive limit switches

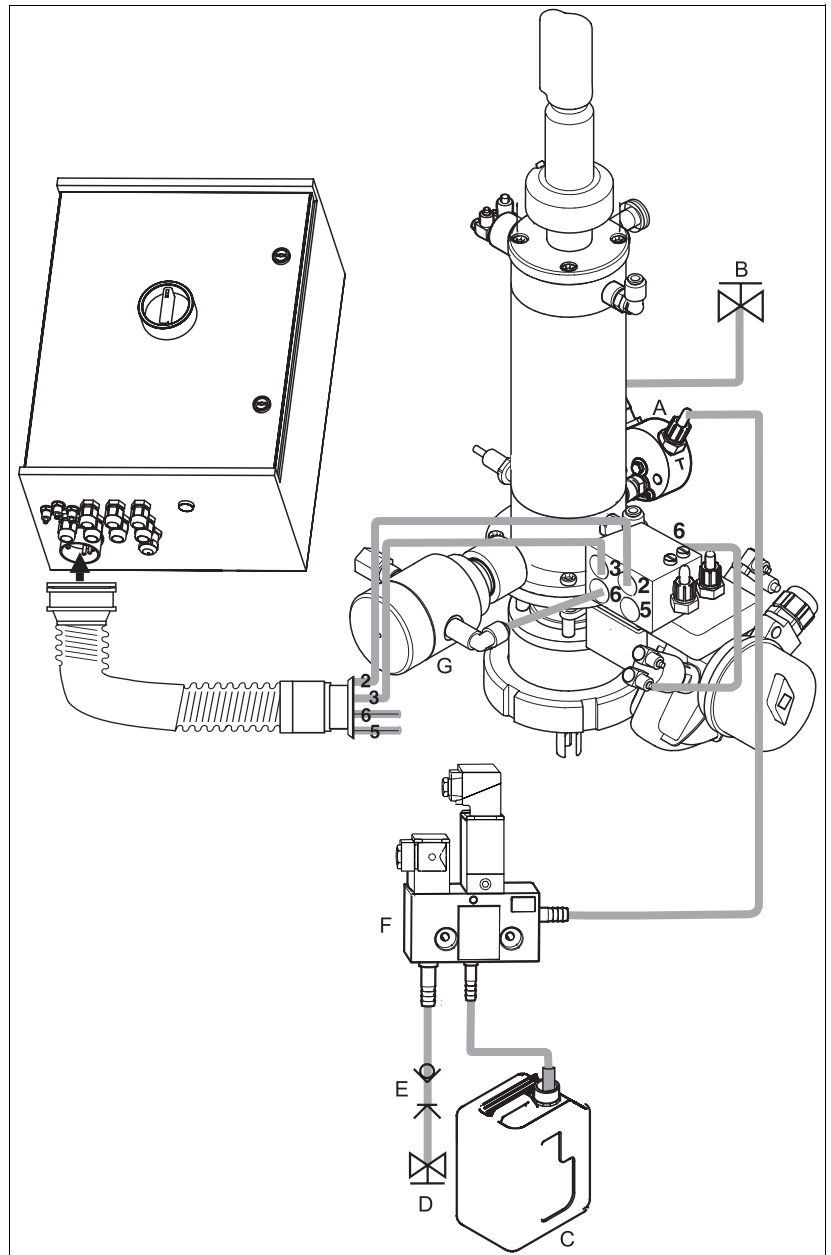
The assembly is delivered completely hoses up. All you have to do is connect compressed air for pneumatic operation of the ball valve to the pneumatic terminal block.

1. Screw the multihose onto the bayonet lock, ensuring it is strain relieved and free of kinks.
2. Fold hoses no. 5 and 6 back into the multihose.
3. Connect **hose no. 2** for position "Measure" from the multihose to input "2" of the assembly's pneumatic connection block.
4. Connect **hose no. 3** for position "Service" from the multihose to input "3" of the assembly's pneumatic connection block.
5. Connect the motive water line (D) via a pipe disconnecter (E) to the G3/8 connection of CYR10.
6. Connect the line for conveyance of cleaning agent (C) to the G1/4 connection of CYR10.
7. Connect the line from CYR10 to the assembly as follows:
 - If you are not using the CPR40 rinse block (A), connect the line to the rinse water inlet of the assembly.
 - If you are using the CPR40 rinse block (A), connect the line to the "T" connection of CPR40.
8. If you are using an external valve, connect the line for steam, additional cleaning agents or sealing water (B) to the other connection of CPR40.
9. If you are using a pneumatic outlet safety seal (G):
 - Connect the connection 2 (= outlet) of the limit position switch on the ball valve drive to input "6" of the assembly's pneumatic connection block.
 - Connect output "6" of the assembly's pneumatic connection block to the compressed hose connection of the outlet safety seal.

Note!

The maximum hose length is 10 m / 32.81 ft:

- Maximum discharge height: 5 m / 16.41 ft
- Max. horizontal discharge width: 10 m / 32.81 ft
- Pressure resistance of internal components: up to 7 bar / 101.5 psi
- Maximum suction height of buffer/cleaning agent: 2 m / 6.56 ft



C07-CPC30xxx-12-04-00-xx-019.eps

fig. 33: Connection of CPA473 / 474 assemblies with inductive limit position switches

- A CPR40 rinse block, required for Topclean versions with external valve control for conveyance of hot, aggressive or pressurised media
- B Pressurised steam, water, cleaning agent
- C Cleaner
- D Motive water 2 ... 7 bar / 29 ... 101.5 psi
- E Pipe disconnecter (customer supplied)
- F CYR10
- G Outlet safety seal (optional)

4.4 Connection diagram Non-Ex

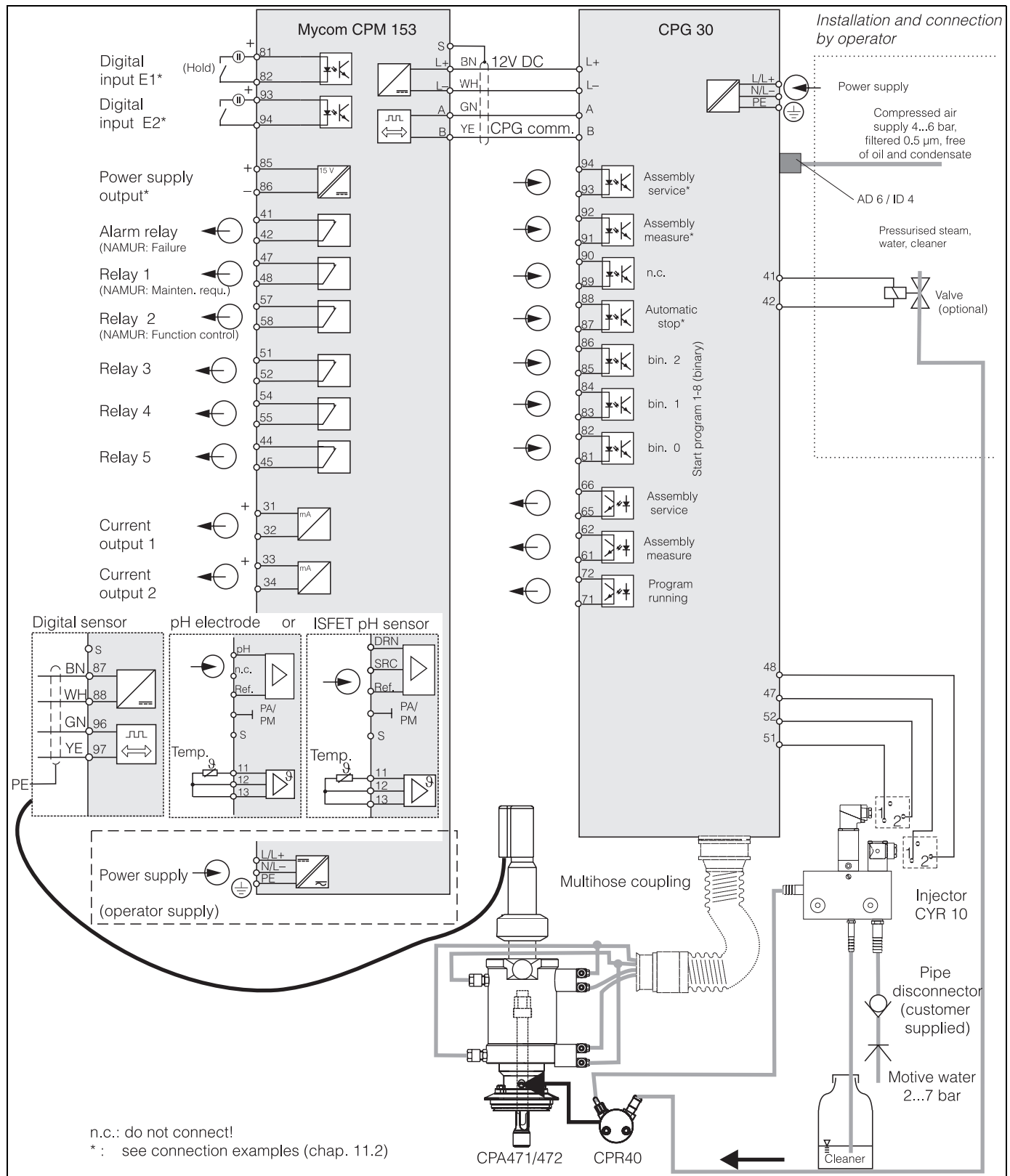
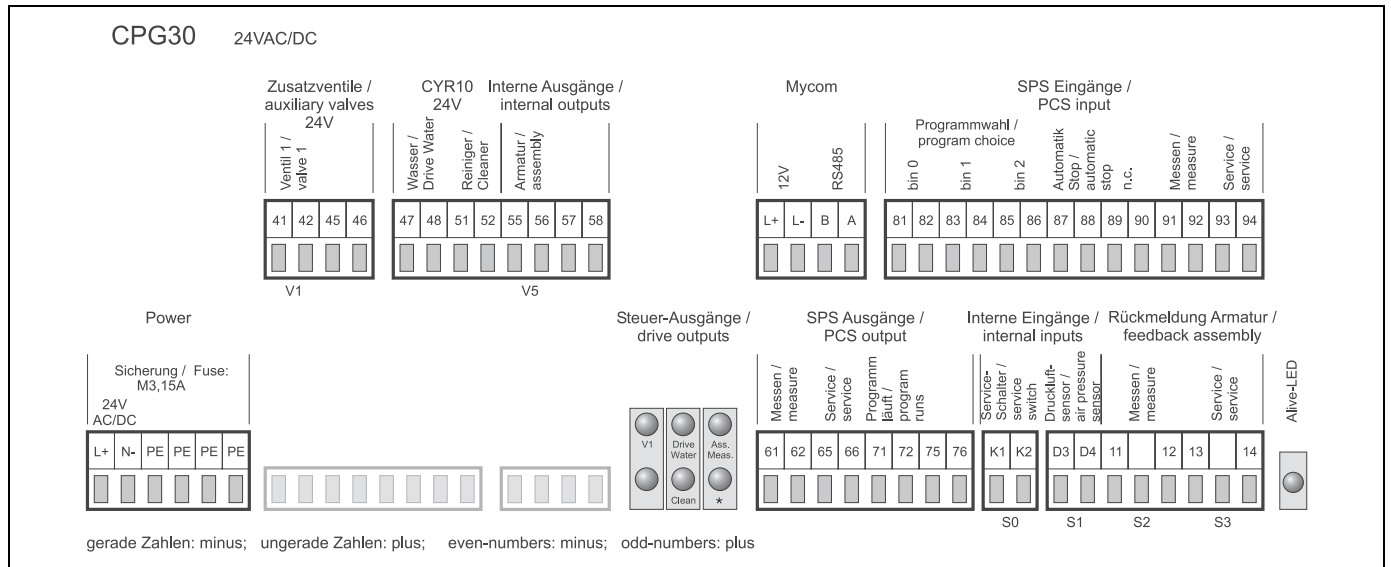


fig. 34: Electrical connection for Topclean S in the non-Ex area



Note!
 Size proportions are not considered.

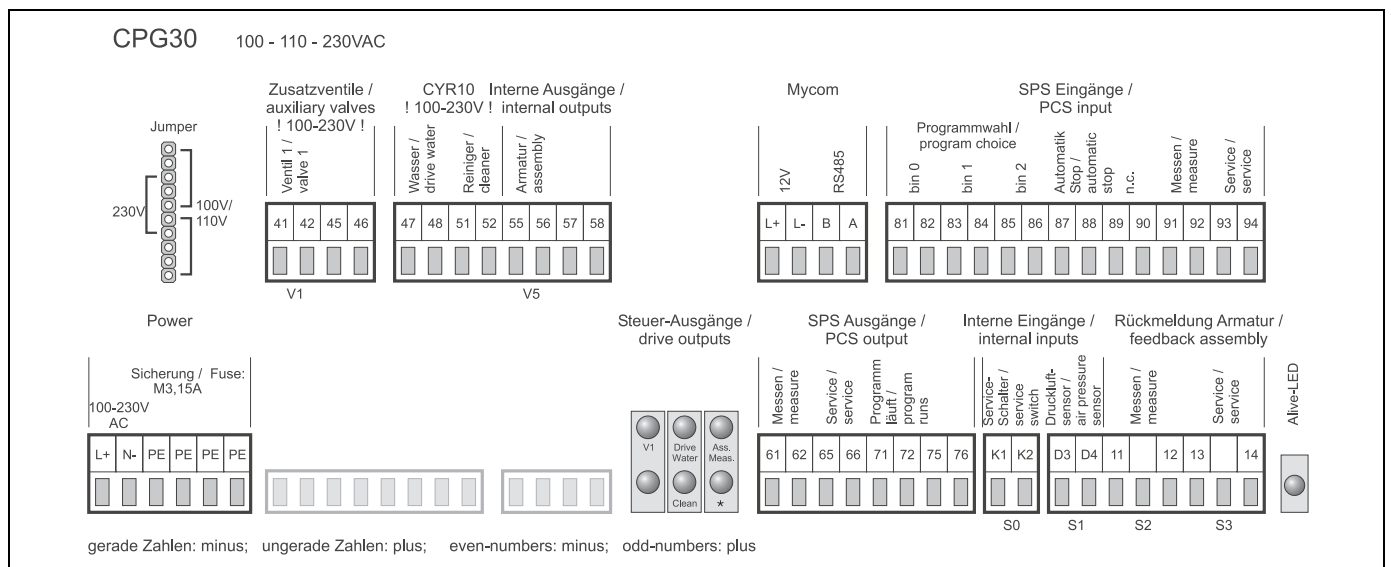
4.5 Connection compartment sticker CPG30



C07-CPG30xxx-18-12-00-xx-001.eps

fig. 35: Connection compartment stickers for CPG30, 24 VAC/DC

* With Ex versions, the LED lights when the assembly is in service position.



C07-CPG30xxx-18-12-00-xx-002.eps

fig. 36: Connection compartment stickers for CPG30, 100 / 110 / 230 VAC/DC

* With Ex versions, the LED lights when the assembly is in service position.

4.6 Connection compartment sticker Mycom

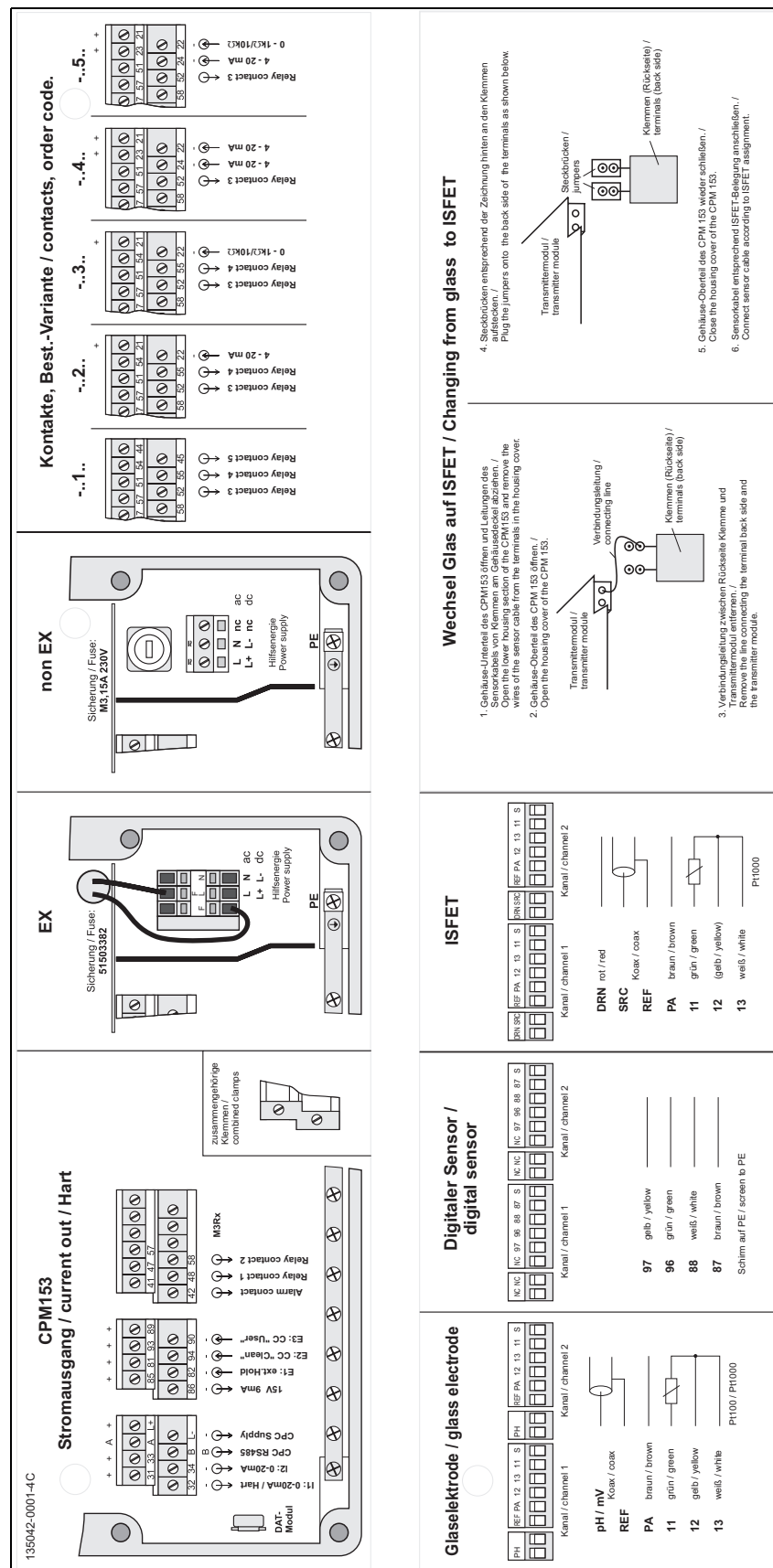


fig. 37: Connection compartment sticker (in the connection compartment of the transmitter)

DRN = Drain

SCR = Source

REF = Reference

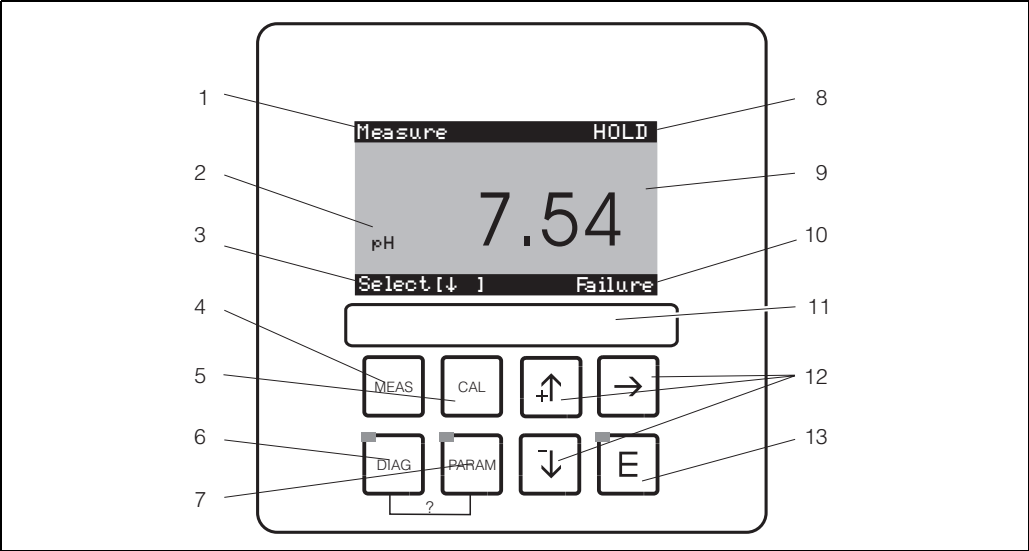
4.7 Post connection check

Instrument status and specifications	Remarks
Is the measuring instrument or the cable damaged externally?	Visual inspection
Electrical connection	Remarks
Does the supply voltage match the specifications on the nameplate?	CPM153: 100 V ... 230 V AC long-range 24 V AC / DC CPG30: 100/110/230 V AC recodeable 24 V AC / DC
Do the cables used fulfil the required specifications?	Use an original E+H cable for electrode and sensor connection, see "Accessories".
Are the installed 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 power supply and signal cable correctly connected?	
Are all the screw terminals properly tightened?	
For connection with potential matching (PML): Is the PML connected to the measuring medium or the buffer solution?	 Note! During calibration, insert the PML into the buffer solution.
For connection without potential matching (PML): Is the potential matching line grounded?	
Are all the cable entries installed, tightened and sealed? Cable run with "water sag"?	"Water sag": cable circuit hanging down so that water can drip off.
Are all the housing covers installed and tightened?	Check seals for damage.
Is the multihose placed sheltered?	Use protection pipe if necessary.

5 Operation

5.1 Display and operating elements

5.1.1 Display reading/symbols



C07-CPM153xx-19-06-00-en-002.eps

- Mycom S CPM153 user interface*
- 1: Current menu; hand symbol: sign for manual operation
 - 2: Current parameter
 - 3: Navigation bar: Arrow keys for scrolling, "E" for browsing, note for Cancel
 - 4: "MEAS" (Operation) key
 - 5: "CAL" (Calibration) key
 - 6: "DIAG" (Diagnosis menu) key
 - 7: "PARAM" (Parameter entry menu) key
 - ? = Press DIAG and PARAM simultaneously to open the help pages
 - 8: HOLD display, if HOLD active; OFFSET, if an offset has been edited in pH or redox mode
 - 9: Current main measured value
 - 10: "Failure" display, "Warning", if the NAMUR contacts respond
 - 11: Labelling strip
 - 12: Arrow keys for scrolling and editing
 - 13: ENTER key

5.1.2 Key assignment



"PARAM" brings you to the Configuration menu of the Topclean S CPC30.

Note!

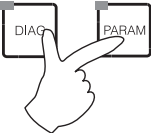
"PARAM" allows you to return to the previous "return field" from any point in the menu. These are marked in bold in the menu overview (s. chap. 11.1).



LED: This is the send LED for the service adapter "Optoscope" (see "Accessories").

"DIAG" brings you to the instrument diagnosis menu.

LED: This is the receive LED for the service adapter "Optoscope" (see "Accessories").



Help:

Press the "DIAG" and "PARAM" keys simultaneously to open the help page.



"MEAS" switches to Operation. This displays the measured values. Use the arrow keys to scroll through the different measuring menus.



Note!

Press "MEAS" to exit any of the "PARAM", "DIAG", "CAL" menus without terminating the settings / calibration.

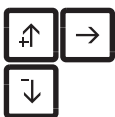


"CAL" switches to the calibration menu of the electrodes.



"E" (Enter) moves you one step forward in a menu or confirms a selection you made.

LED (status display):
green: everything OK.
red: an error has occurred.



- You can scroll through the menu options with the arrow keys, and then highlight your selection (if there is a choice offered)
or
- Increment or decrement numbers by one step with "+" / "-".
Move to the next digit 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 page 46).

5.1.3 Operation of the service switch

The service switch is located on the door of the CPG30 housing. There are two possible switch positions:



Service / Off:

(horizontal switch setting)

- The electrode 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 programme should be launched or the electrode should be moved into the process without cleaning.

Only those programmes are offered which have already been edited.

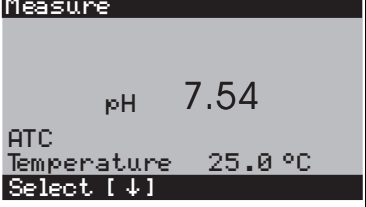
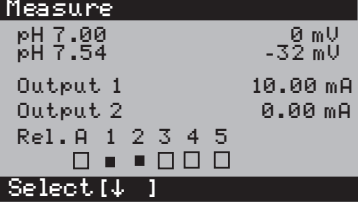
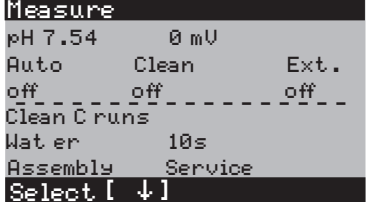


Note!

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

5.1.4 Measuring menus

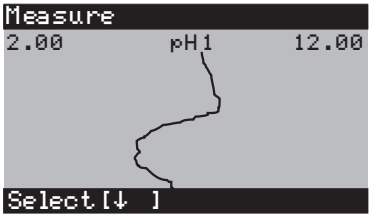
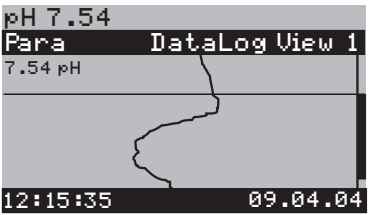
You can choose between different measuring menus. Use the arrow keys to scroll between the different menus. Switch between the measured value characteristic and the data log using the ENTER key .

					
The current measured value is displayed.		If you have activated the data log, you can see the current measured value characteristic here (record mode). If you have activated both data logs, press the arrow key to switch to the view of the second measured value characteristic.		In this display you can see the measured value, the kind of temperature compensation and the related temperature.	
					
In this measuring menu, you can see the current and voltage values and the contact states of the relay at a glance. Active relay =  (with function) Inactive relay = 		In this display you can see the measuring value, the status of automatic, cleaning and external control as well as the the status of a running cleaning programme.			

5.1.5 Data log

- The CPM153 offers two data logs. With these data logs, you can record
- one parameter with 500 sequential measuring points
 - two parameters each with 500 sequential measuring points.

To be able to use the function, activate the data log in the "PARAM" menu ➡ "Set up 2" ➡ "Data log" (see page 72). The function is active immediately.
You can view the measured values by scrolling through the different measuring menus (see above).
– The current measured values are recorded in Record mode.
– In the "PARAM" menu ➡ "Set up 2" ➡ "Data log" ➡ "DataLog display 1/2" you can display saved data with date and time.

	
Record mode	Scroll mode

5.1.6 Operation access authorisation

To protect the transmitter against an unintended or undesired change in the configuration and calibration data, functions can be protected using four-digit access codes.

Access authorisation has the following levels:

Read-only level (accessible without a code):

The complete menu can be viewed. The configuration cannot be altered. No calibration is possible.

Service code

Operator level (can be protected by the service code):

This code permits calibration.

Use this code to operate the temperature compensation item. The test 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 entered maintenance code, contact your Endress+Hauser service for a universally valid maintenance code.

Specialist code

Specialist level (can be protected by the specialist 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 entered specialist code, contact your Endress+Hauser service for a universally valid specialist code.

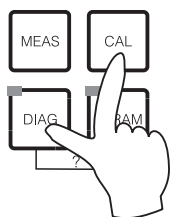
To activate the codes (= functions locked) see the item "PARAM" ➡ "Set up 1" ➡ "Access codes" (see page 58). Enter your desired code here. If the code is activated, you can only edit the protected areas with the rights mentioned above.



Note!

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

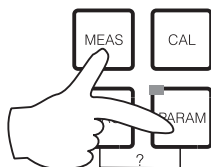
Locking the operation



Pressing and simultaneously locks the in-field operation of the instrument.

At the code prompt, the code appears as "9999".

Unlocking the operation



Press and simultaneously to unlock the operation.

5.1.7 Description of the menu editor types

At parameter setting, the functions can be selected in two different modes, depending on the setting type.

Editor type E1

Editor type 1 (E1)

for functions which can be directly selected from the display. The editing row shows "Edit".

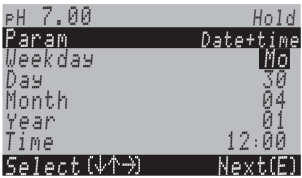


- A selection can be highlighted with the arrow keys and .
- Confirm the selection by pressing .

Editor type E2

Editor type 2 (E2)

for settings which have to be defined more precisely, e.g. day, time. The editing row shows "Select".



- Use the arrow keys and to highlight a selection (e.g. "Mo").
- Activate the selected option with the right arrow key . The highlighted option flashes.
- "Toggle": i.e. scroll through the selection (e.g. the weekdays) with the arrow keys and .
- Confirm the selection by pressing .
- After making your selection and confirming it by pressing (no flashing display), you can exit the item by pressing .

5.1.8 Factory settings

All factory settings are active when the instrument is switched on for the first time. The table below lists all main settings. For all further factory settings, refer to the description of the function groups (from page 56), there the factory setting is printed in **bold**).

Parameter		One-circuit instrument
Select operating mode		pH
Select electrode type		Glass electrode 7.0
Select connection type		Solution ground (with PML)
Select temperature display		°C
Select temperature compensation		ATC K1
Temperature measurement		off
Select temperature sensor		Pt 100
Contact functions		NAMUR
Select current output 1		pH/Redox K1
Select current output 2		Temperature K1
Hold		PARAM, CAL: Active after entry of service or specialist code DIAG: active after entry of service or specialist code for functions that require a code.
Current output 1:	0/4 mA value:	pH 2 / -1500 mV / 0.0% / 0.0 °C pH 12 / +1500 mV / 100.0% / 100.0 °C
	20 mA value:	
Current output 2:	0/4 mA value:	Temperature 0.0 °C 100.0 °C
	20 mA value:	

5.2 Replaceable memory

The DAT module is a memory device (EEPROM) which is plugged into the connection compartment of the transmitter. Using the DAT module you can

- save the complete settings, the logbooks and the data log of a transmitter and
- copy the complete settings to other CPM153 transmitters with identical hardware functionality.

This considerably reduces the effort to install or service several measuring points.

6 Commissioning

6.1 Special features for measurement with digital sensors with Memosens technology



Note!

Digital sensors with Memosens technology can only be used in combination with the appropriate Topclean S version (CPC30-xx5xxxxxx).

You can retrofit an existing Topclean S for Memosens technology (see page 134).

Commissioning

Digital sensors with Memosens technology save calibration data. Therefore, commissioning of these sensors differs from the commissioning of standard electrodes. Proceed as follows:

1. Install the transmitter and the assembly.
2. Connect the transmitter and the sensor cable.
3. Configure the transmitter according to your specific requirements (see »Description of functions« on page 56).
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 transferred to the transmitter.
6. The measured value is displayed.

Data storage

Digital sensors are able to store the following data:

- Manufacturing data
 - Serial number
 - Order code
 - Date of manufacture
- Calibration data
 - Calibration date
 - Calibrated slope at 25 °C / 77 °F
 - Calibrated zero point at 25 °C / 77 °F
 - Temperature offset
 - Serial number of the transmitter used for the last sensor calibration
 - Buffer values of the last calibration
 - Change in slope compared to preceding calibration
 - Change in zero point compared to preceding calibration
- Application data
 - Temperature application range
 - pH application range
 - Operating hours at temperatures above 80 °C / 176 °F and 100 °C / 212 °F
 - Operating hours at very low and very high pH values (Nernst voltage below -300 mV, above +300 mV)
 - Number of sterilisations

To display these sensor data, select  ➡ Ext. sensor data.

6.2 Special features for measurement with ISFET sensors

Switch-on behaviour

A closed control loop is created once the measuring system is switched on. During this time (approx. 5–8 minutes), the measured value adjusts to the real value. This settling behaviour occurs each 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 only intense direct illumination impinges on the measured value. For this reason, avoid direct exposure to sunlight during calibration. Normal ambient light does not affect measurement.

6.3 Installation and function check control



Warning!

Before power-up, make sure there is no danger to the measuring point. Uncontrolled actuated pumps, valves or similar could lead to damage to instruments.



Caution!

- Before switching on, check all the connections again for correctness.
- Make sure that the pH or redox electrode and the temperature sensor are in the medium or in a buffer solution, otherwise no plausible measured value can be displayed.
- Make also sure that the connection check has been carried out (s. chap. 4.7).

6.4 Switching on the device

Before first start-up, make sure you understand how to operate the device. You should make particular reference to Chapters 1 ("Safety instructions") and 6 ("Operation").

We recommend the following procedure for commissioning:

1. Connect Mycom S CPM153 to the power supply.
2. Switch the service switch to "OFF" or to the Service position .
3. Wait for initialisation of CPM153 and CPG30.
Function of the green "Alive LED":
 - Frequency 2/sec: communication is running
 - Frequency 1/sec: communication is loading
 - LED lights up constantly: no communication
 If the LED does not light up, check the power supply at terminals L+/L– (setpoint: 12 volts).
4. First commissioning only:
Execute the menu "First start up", chap. 6.5, page 51.
5. Switch the service switch to the Measuring position  or to "ON".
6. Set the following parameters:
 - Select a function for the additional valve (page 93).
 - Configure the times of the "Clean" programme (page 54).
7. Start the "Clean" programme and check the entire system for leaks.
Programme start:
"PARAM" ➡ Specialist ➡ Manual operation ➡ Topclean ➡ Status messages (Enter) ➡ "Start programme" ➡ "Clean"
8. Now configure the complete system via the menu.

6.4.1 First commissioning

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



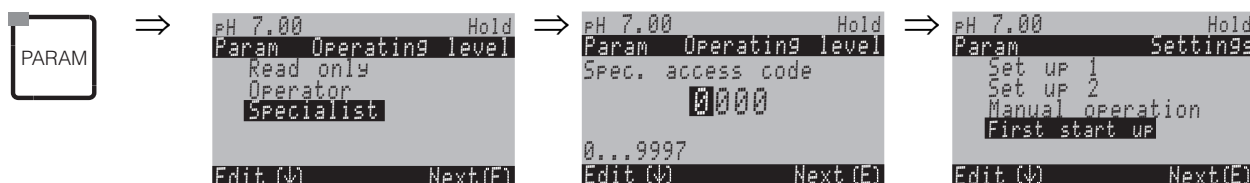
Note!

- You must completely run through the First start up menu. If you do not, the instrument will not be operational. If you interrupt First start up, it will start again the next time you switch on the instrument until **all** menu options have been processed and completed.
- If you have activated the specialist code, you have to enter it for all parameter settings. By default (0000), the specialist code is not requested.

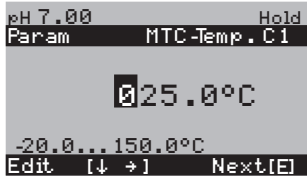
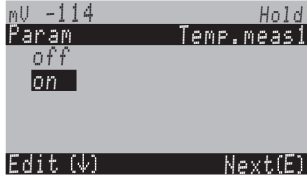
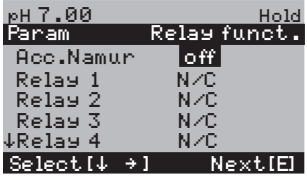
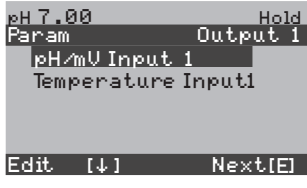
6.5 First start up

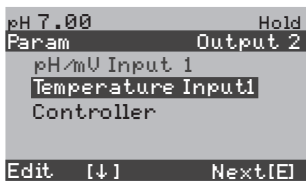
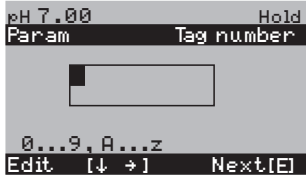
In the First start up menu, configure the most important transmitter functions. The First start up is started automatically when starting the instrument for the first time. You can open the First start up at any time from the menu structure.

To enter the menu, proceed as follows:



Display	CHOICE (default = bold)	INFO
	E D	Select language Depending on ordered language version: Language version variants: -A: English / German -B: English / French -C: English / Italian -D: English / Spanish -E: English / Dutch -F: English / Japanese
		Contrast setting as necessary You can increase and reduce the contrast with the +/- keys.
	Mo 01 04 01 12:00	Date and time entry Enter the complete date and time here.
	pH Redox mV Redox %	Operating mode selection Note! ■ If the operating mode changes, all the user settings are automatically reset! ■ For digital sensors with Memosens technology, only the pH operating mode is available. ■ Here it is sensible to use the DAT module to save your settings.
	Glass el. 7.0 Glass el.4.6 Antimony ISFET	Select electrode type (only pH) Note! ■ In the event of a change from glass or antimony electrode to ISFET, the temperature sensor is reset to Pt 1000 as a default. Conversely, Pt 100 is selected. ■ The Topclean S version glass / ISFET (CPC30-xx2xxxxxx) is factory set for measurement with glass electrodes. ■ For digital sensors with Memosens technology, only the electrode type Glass el. 7.0 is available.

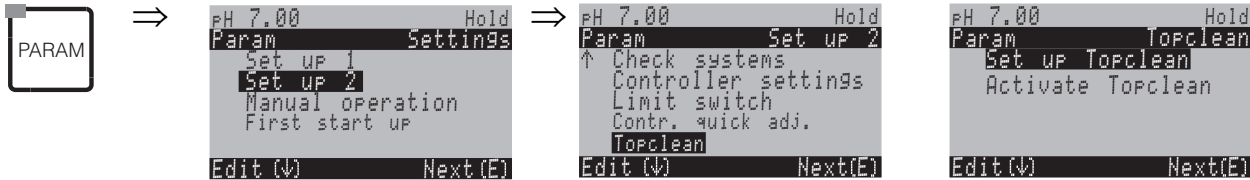
Display	CHOICE (default = bold)	INFO
	solution ground no solution ground	Select connection type solution ground = with potential matching (PML) no solution ground = without PML  Note! The connection type selection is not displayed for digital sensors with Memosens technology. With digital data transmission there is no need for symmetrical high-impedance connections.
	°C °F	Select temperature display
	ATC MTC MTC+Temp	Select temperature compensation ATC = automatic temperature compensation MTC = manual temp. comp. (with fixed temperature, entered in the following field) MTC+Temp. = as MTC. The display, however, shows the value which the temperature sensor measures in the medium.
	025.0 °C	Temperature value (only with pH and selection of MTC or MTC+Temp. in the previous field)
	off on	Temperature measurement (Redox only)
	NAMUR Relay 1 off Relay 2 N/C Relay 3 N/C Relay 4 N/C Relay 5 N/C	Contact functions You can assign the function of up to 5 relays here. The relays 1 and 2 will be assigned to an activated NAMUR function and will not be available for other functions (compare page 27). Selection: N/C / Controller / Limit / CCW / CCC N/C: no function Controller: Controller control using relay 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 on page 98).
	pH/mV K1 Temperature K1	Select current output 1 parameter Selection of the parameter which shall be output on the current output.

Display	CHOICE (default = bold)	INFO
 pH 7.00 Hold Param Output 2 pH/mV Input 1 Temperature Input1 Controller Edit [↓] Next[E]	pH/mV K1 Temperature K1 Controller	Select current output 2 parameter Selection of the parameter which shall be output at the current output. Controller: Control of a controlling actuator via the current output (see also Controller menu page 74).
 pH 7.00 Hold Param Tag number [] 0...9, A...z Edit [↓ →] Next[E]	(0...9; A...Z)	Enter your customer specific instrument number. 32 digit tag number. This is saved in the DAT module which is obtainable as an option.
 pH 7.00 Hold Param Start up restart end Edit [↓] Next[E]	end restart	Exit First start up? restart = Run through the First start up again. end = Save the settings and exit First start up.

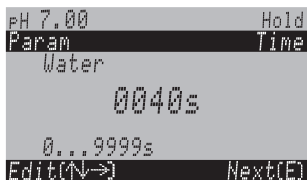
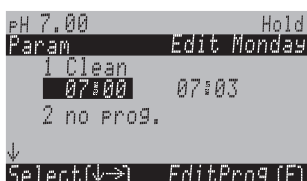
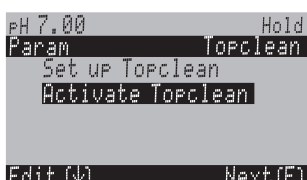
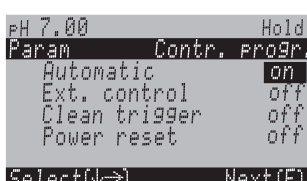
6.5.1 Configuring Clean programme (via automatic function)

The following example shows how to configure the cleaning programme Clean for your Topclean. For a description of all cleaning functions and cleaning programmes, see page 88 ff.

To enter the menu, select:



Display	Action
	The current status of the cleaning functions is displayed. Press [E] to continue.
	Select "Automatic" and confirm by pressing [E] .
	Select a day that you want to edit e.g. Monday and press [E] .
	Select "Edit day" and confirm by pressing [E] .
	Press [→] . The option "no prog." is activated. Press [↓] to select the "Clean" programme. Press [E] .
	Press [↑] and [E] to edit Clean.

Display	Action
	Use the arrow keys to select the programme step that you want to edit, e.g. water. To edit the programme step, press E .
	Use the arrow keys to set the required water conveyance interval. Press E to return to the list of programme steps.
	If necessary, edit other programme steps. The overall programme time is calculated automatically. When you are finished with the configuration, press PARAM .
	Press ↓ and → and use the arrow keys to set the start time of Clean, e.g. 07:00 a.m.. Confirm by pressing E . The end time is calculated automatically.  Note! To test the automatic function, allow the system a lead time of min. 10 minutes when entering the start time.
	When the configuration is finished and you want to start Clean via the automatic function, you must activate this function. To do so, press PARAM until you reach the first Topclean selection. Select "Activate Topclean" and confirm by pressing E .
	Select the status of "Automatic". Press → and ↓ to set Automatic to "on". Confirm by pressing E . The automatic function is now activated. The selected cleaning programmes will be started on the selected weekday at the set time based on the time and date entered in "Setup 1 → Display" (see page 57).
	Press MEAS to return to operation.

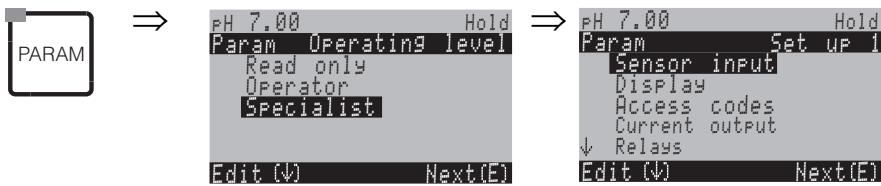
6.6 Description of functions

6.6.1 Set up 1 – Sensor input

In this menu, you can change the measured value acquisition settings, such as the operating mode, the measuring principle or the electrode type.

Apart from the signal attenuation, you have already made all menu settings at the first commissioning in First start up (see page 51). You can change the selected values in this menu.

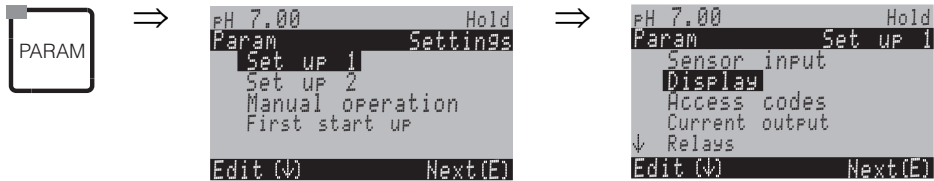
To access the parameter setting menu, you have to enter your specialist code (see page 45, page 58). Proceed as follows:

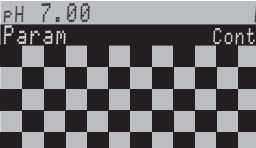


CHOICE (default = bold)		INFO
	pH Redox mV Redox %	Operating mode selection If the operating mode changes, the user settings are automatically reset.
	Glass el. 7.0 Glass el. 4.6 Antimony ISFET	Select electrode type 1 (pH only) Note! ■ When changing from glass or antimony electrode to ISFET, the temperature sensor is reset to Pt 1000 as a default. Conversely, Pt 100 is selected. ■ The Topclean S version glass / ISFET (CPC30-xx2xxxxxxx) is factory set for measurement with glass electrodes. ■ For digital sensors with Memosens technology, only the electrode type Glass el. 7.0 is available.
	solution ground no solution ground	Select connection type solution ground = with potential matching (PML) no solution ground = without PML Note! For further information, see page 20.
	pH/redox: 00 s Temperature: 00 s (00...30s)	Set measured value attenuation The mean value over the set time is displayed. There is no attenuation for the 00s value.

6.6.2 Set up 1 – Display

To enter the menu, proceed as follows:

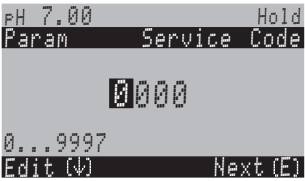


CHOICE (default = bold)		INFO
 	E D	Select language Depending on ordered language version: Language version variants: -A: English / German -B: English / French -C: English / Italian -D: English / Spanish -E: English / Dutch -F: English / Japanese
		Contrast setting as necessary You can increase and reduce the contrast with the +/- keys.
	Weekday: Su Day: 01 Month: 04 Year: 01 Time: 08:00	Date and time entry Enter the complete date and time here. These data are used as basis for all log books and the cleaning programmes.
	pH 00.00 pH 00.0	Select no. of decimal places (only for pH measuring type)
	°C °F	Select temperature unit
	00000000 (0...9; A...Z)	Enter your customer specific instrument number. 32 digit tag number. The number is saved in the DAT module which is obtainable as an option.

6.6.3 Set up 1 – Access codes

To enter the menu, proceed as follows:



CHOICE (default = bold)		INFO
	0000 (0 ... 9997)	Enter service code In the range 0000 ... 9997, the code can be freely selected. 0000 = no security locking.
	0000 (0 ... 9997)	Enter specialist code In the range 0000 ... 9997, the code can be freely selected. 0000 = no security locking.



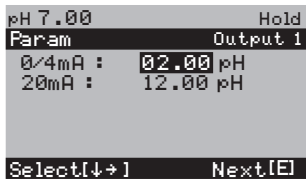
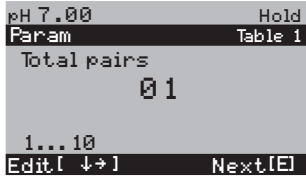
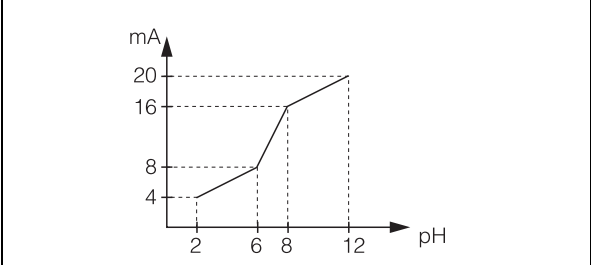
Note!
Danger of misuse.
Make sure that the codes you enter and the universal code (see page 45) are protected against misuse by unauthorised persons. Note down the codes and keep them in a place where unauthorised persons do not have access.

6.6.4 Set up 1 – Current outputs

The transmitter is always equipped with two current outputs.
To enter the menu, proceed as follows:

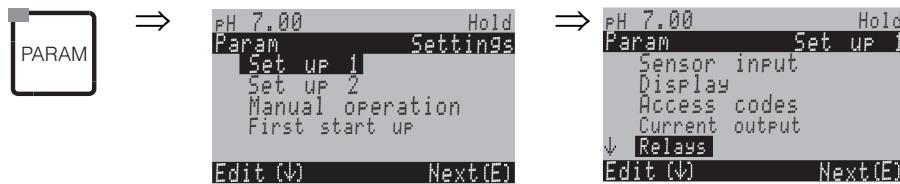


CHOICE (default = bold)	INFO
	Current output 1 Current output 2 Select a current output for which the settings apply.
Current output 1 (or 2):	
pH 7.00 Hold Param Output 2 pH/mV Input 1 Temperature Input1 Controller Edit (↓) Next(E)	pH/Redox Temperature Controller (current output 2 only) Selecting parameters which should be output at the current output. Selection possibilities related to the instrument variant and the selected output. Current output 1 (terminals 31+, 32-): – pH/redox – Temperature Current output 2 (terminals 33+, 34-): – pH/redox – Temperature – Controller: Control of a controlling actuator via the current output (see also Controller menu page 74). Note! Danger of data loss. If you change the assignment for the current output from "controller" to a different function after you have configured the controllers, the complete controller settings (see page 74) are reset to the default values.
Caution! The configuration is changed.	Note in display (for changed setting): Cancel by pressing "PARAM" Continue (= confirm change) by pressing "E"
0 ... 20 mA 4 ... 20 mA	Current range selection Note! If you change the current range after editing the table, the table will be reset.
!!Caution!! Current output 0...20 mA and error current = 2.4 mA is dangerous.	Note in display: Error current lies within the measuring current range. When the current range is "0 ... 20 mA" and "Min" is selected under Alarm in (see page 65). Recommended combinations: Current range 0...20 mA and error current max (22 mA) or Current range 4...20 mA and error current min (2.4 mA)
Linear Table	Characteristic selection Linear: The characteristic is linear from the lower to the upper value. Table: When 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 behaviour can achieve a higher level of accuracy.

CHOICE (default = bold)	INFO
Linear:	
	0/4 mA: 02.00 pH / 000.0 °C / -0500 mV 20 mA: 12.00 pH / 100.0 °C / 0500 mV Entry of the upper and lower measured value limits The maximum range of the measured value is -2 ... +16 pH. The minimum distance from the upper to the lower measured value limit is 2 pH units. (Exmp.: 0/4 mA: pH 7 and 20 mA: pH 9)
	Linear characteristic active. Note in display: The linear characteristic is activated after confirmation by pressing "E". Cancel by pressing "PARAM".
Table:	
	01 (1 ... 10) Entry of the number of support points (value pairs)
	pH/Redox/°C/: 000.0 mA: 04.00 Value pair entry pH/Redox/°C - mA (number of required value pairs = number of support points entered in the previous field). Example of value pairs with 4 support points:  C07-CPM153xx-05-06-00-xx-002.eps <i>fig. 38: Example of entering a characteristic using a table</i>
OK Delete pair(s)	Selection: Are the value pairs OK or do you want to delete pairs?
pH/Redox/°C/: 000.0 mA: 04.00	Delete: Select the rows to be deleted, delete them with  and confirm this with .
Table valid	Note in display (no entry) Table status. If invalid, then back to previous field.
Table active	Note in display: The table is active after confirmation by pressing . Cancel by pressing "PARAM".

6.6.5 Set up 1 – Relays

To enter the menu, proceed as follows:



CHOICE (default = bold)		INFO
pH 7.00 Hold Param Relay funct. Acc.Namur off Relay 1 N/C Relay 2 N/C Relay 3 N/C ↓ Relay 4 N/C Select [↓ →] Next [E]	NAMUR: off Relay 1: N/C Relay 2: N/C Relay 3: N/C Relay 4: N/C Relay 5: N/C	Contact functions You can assign the function of up to 5 relays here. The relays 1 and 2 will be assigned to an activated NAMUR function and will not be available for other functions (compare with page 27). Selection: N/C / Controller / Limit / CCW / CCC N/C: no function Controller: Controller control using relay 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 on page 98). The limit value/controller contacts are configured in the menu "PARAM" ⇒ "Set up 2" ⇒ "Controller settings". Note! ■ Danger of data loss. If you change the relay allocation after configuring the controller and the number of relays available to the controller is reduced, the complete controller settings (see page 74) are reset to the default values. ■ If you change the relay assignment for the controller, you must use the controller menu (see page 74) to reassign all the functions selected there to a relay. 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, providing the number of assigned relays is not reduced!). ■ You can only activate the NAMUR, when the required relays 1 and 2 are free (see page 27).
	Active open Active closed	Selection acc. to NAMUR: (only, if NAMUR is activated) Assignment of NAMUR contacts as "Active open" contact (= normally closed contact, opens when relay active) or "Active closed" contact (= normally open contact, closes when relay active). If the NAMUR function is enabled, the alarm, relay 1 and relay 2 contacts are given the following functions: ■ "Failure" = Fault signalling 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 cycle.
	Active open Active closed	Selection of controller contacts as "Active open" contact or "Active closed" contact (only, if controller is selected)
	Active open Active closed	Selection of limit values as "Active open" or "Active closed" contact (only, if limit values are selected)

CHOICE (default = bold)		INFO
	Active on Active pulse	Contact type: Fault signalling contact (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 is always an "Active closed" contact	Note in display (only, when CCC and CCW are selected in field "Contact functions") With the Chemoclean function, the valves of the CYR10 injector are effected with an "Active closed" contact.

6.6.6 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. This temperature is used via the temperature input in the Mycom S CPM153 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, which is used to adjust the slope of the electrode to the medium temperature.

MTC+Temp.: The pH value is corrected with the manually entered temperature (see MTC). The display, however, shows the value that the temperature sensor measures in the medium.

Medium temperature compensation

Tables for Medium 1...3:

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 reference value 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 (field "Value pair entry"). As a reference temperature (Field "Reference temperature entry") select the temperature, at which the reference value of the process is defined (e.g. ambient temperature in the laboratory).

To enter the menu, proceed as follows:



CHOICE (default = bold)		INFO
	Temp. comp. sensor Temp. comp. process	Selection for temperature compensation Temp. comp. sensor = automatic (ATC) or manual (MTC) temperature compensation. Temp. comp. process (only for pH) = compensation of the medium temperature using customer-specific tables (see below).
Temperature compensation sensor:		
	ATC C1 MTC MTC+Temp.	Select temperature compensation ATC = automatic temperature compensation with a temperature sensor circuit MTC = manual temp. comp. (with fixed temperature, entered in the following field) MTC+Temp. = as MTC. The display, however, shows the value of the temperature sensor connected to the temperature input of the transmitter.
	025.0 °C (0 ... 100.0 °C)	MTC temperature (only pH, MTC) Temperature entry for manual compensation
	off on	Select temperature measurement (only redox) The reference temperature can be adapted according to customer specifics in the field "Reference temperature" (last field of this menu).
	Pt 100 Pt 1000 NTC 30 none	Select temperature sensor Note! This selection is not available for digital sensors with Memosens technology.
	Adjust temp. reading (-20.0 ... 150.0 °C)	Enter actual temperature for temperature calibration The value currently measured by the temperature sensor can be changed/adapted. The temperature difference is stored internally as an offset value.
	0.0 °C (-5.0 ... 5.0 °C)	Edit offset The offset value obtained from the previous field can be edited or reset here.

Endress+Hauser

6.6.7 Set up 1 – Alarm

The CPM153 continuously monitors the most important functions. If an error occurs, an error message is set, which can trigger one of the following actions:

- The fault signalling contact is activated.
- Current output 1 and 2 output the set error current (2.4 or 22 mA).
Exception: If current output 2 has been configured for the continuous controller function (see page 59), it does not output an error current.
- Chemoclean cleaning is started.

In the list of error messages on page 125 you can see how the error numbers are assigned according to the factory settings. 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.

To enter the menu, proceed as follows:.



CHOICE (default = bold)		INFO
	Min (2.4 mA) Max (22 mA) off	Select error current Set the error current at which an error message is active.
	!!Caution!! Current output 0...20 mA and error current = 2.4 mA is dangerous.	Note in display: Error current is in the measuring current range if, in field "Current range selection" (page 59), the current range is "0 ... 20 mA" and "Min" is selected under Alarm in the previous field. Recommended combinations: Current range 0...20 mA and error current max (22 mA) or current range 4...20 mA and error current min (2.4 mA)
	0000 s (0 ... 2000 s or min)	Alarm delay entry Delay between error occurrence and alarm trigger.
	No. E025 A on I on CC on	Error/contact assignment Each error can be assigned individually: No. = Error number E025 (only display) A = Assignment to the alarm relay (activate/deactivate) This error triggers an alarm. I = This error triggers an error current CC = Chemoclean®. This error triggers cleaning.
	Function: off Time: 0002s (2...9999s)	Dosage time alert Function: Switch on/off the function "Alarm when dosing time exceeded". Time: Input of the maximum allowed dosing time . After this time has elapsed, an error is output.

6.6.8 Set up 1 – Hold

Hold function = "Freezing the outputs"

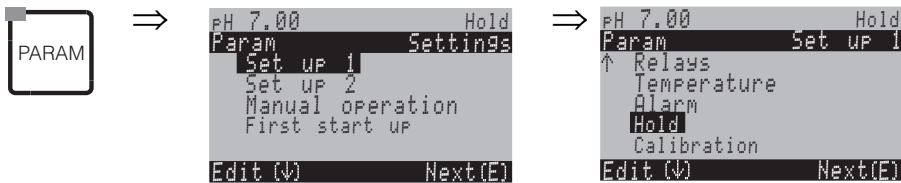
The current outputs can be "frozen" for each menu. This means that the value which you define in this menu is output. With hold, "Hold" appears in the display.
The hold function can also be activated externally via the hold input (see wiring diagram on page 38, digital input E1). The on-site hold has a higher priority than an external hold.



Note!

- Hold is active when the assembly moves into the maintenance position.
- When hold is active, no new automatic programmes are started.
They can be started externally or via local operation as required.
- You can deactivate the Topclean S as hold source
(PARAM ➡ Setup 1 ➡ Hold ➡ CPC off).
- If current output 2 is configured for the controller, it complies with the controller hold (see last field of this menu).

To enter the menu, proceed as follows:

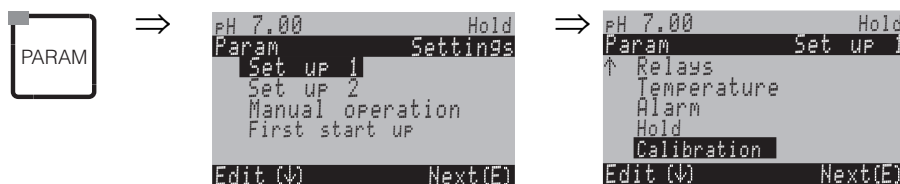


CHOICE (default = bold)		INFO
	CAL on DIAG off PARAM off CPC on	Selection: automatic hold active when: CAL = Calibration DIAG = Service/Diagnosis PARAM = Parameter entry menu CPC on: If the assembly is in service position, Hold is active.
	last fixed Min (0/4 mA) Max (22 mA)	Selection of current for hold Last = The current value is "frozen". Fixed = The value set in the field below is output in a hold. Min / Max = The minimum and maximum current value is output.
	000% (0 ... 100%)	Enter hold current (only for fixed) Number settable from 0% = 0/4 mA to 100% = 20 mA
	010 s (0 ... 999 s)	Enter hold delay time The hold remains active for the given hold delay time after leaving the CAL, PARAM, DIAG menus. During the hold delay time, the "Hold" indicator flashes in the display.
	Freeze y (actuating variable): on off	Controller hold Freeze actuating variable (dosing) : On: During an active hold, the last set value 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. Note! If the set value is output via an actuator drive with feedback, the actuator remains active. It also reacts in the hold should the position suddenly change.

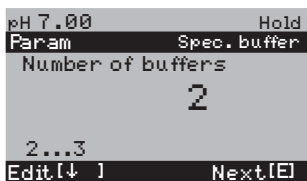
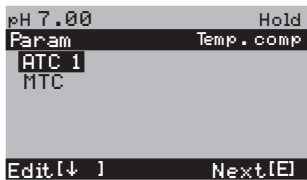
6.6.9 Set up 1 – Calibration

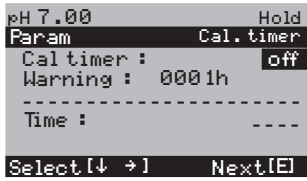
Operating mode pH

To enter the menu, proceed as follows:



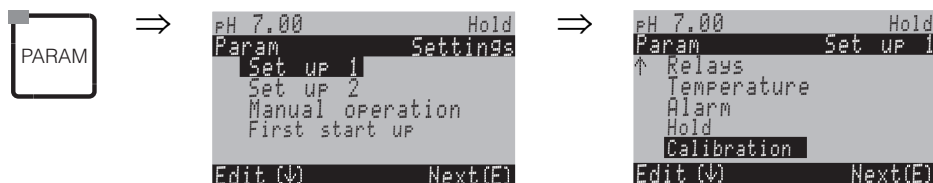
CHOICE (default = bold)		INFO
pH 7.00 Hold Param Calibration Offset Manual calibration Spec. buffer table Cal. settings ↓Calibration timer Edit[↓] Next[E]	Offset Manual calibration Special buffer table Cal. settings Calibration timer	Calibration menu selection Offset: Entry of a fixed value by which the pH value is displaced. Manual calibration: Initial settings for the functions of the CAL key. Special buffer table: Edit tables for special buffer. Cal. settings: General calibration settings Calibration timer: Clock for calibration
Offset:		
pH 7.00 Hold Param Offset Act. PV 1 07.00 pH Offset 1: 00.00 pH Select[↓→] Next[E]	Act. PV 1/2: 07.00 pH Offset 1/2: 00.00 pH	Enter offset value for pH value Act. PV: Current measured value (primary value) with offset Offset: pH value difference When you enter the measuring mode while an offset is active, "OFFSET" will be shown on the right top of the display.
Manual calibration:		
pH 7.00 Hold Param Cal. buffer Enter spec. buffer Manual buffer Buffer table Auto. buffer recogn. Edit[↓] Next[E]	Enter spec. buffer Manual buffer Buffer table Auto. buffer recognition	Calibration parameters Sets the calibration type undertaken when the "CAL" key 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 transmitter Mycom S automatically recognises the used buffer values. Note! The automatic buffer recognition only functions if glass electrodes are connected to the transmitter. In case you are using an ISFET sensor, please calibrate with a different calibration function.
	DIN 19267 Ingold E+H NBS / DIN 19266 Special buffer	Select buffer type (buffer table, auto. buffer recognition only) Special buffer = The special buffer tables defined in the option "Special buffer table" are used. Note! You can find the buffer tables for the offered buffers in the Appendix (see page 170).

CHOICE (default = bold)		INFO
	Buffer 2.0 Buffer 4.01 Buffer 6.98 Buffer 9.18 Buffer 10.90 Buffer 2.0 Buffer 4.01 Buffer 9.18 Buffer 10.90	Buffer 1 Enter pH value for buffer 1 of the two-point calibration (buffer table only)
	 Buffer 2.0 Buffer 4.01 Buffer 9.18 Buffer 10.90	Buffer 2 Enter pH value for buffer 2 of the two-point calibration (buffer table only)
Special buffer table:		
	2 (2 ... 3)	Enter the number of buffers You can save min. 2 and max. 3 special buffers in a table.  Note! The following four fields must be run through individually for each buffer.
	1 (1 ... 3)	Edit buffer Select a buffer table for editing.
	10 (2 ... 10)	Entry of the number of support points (value pairs) Value pair: pH and temperature
	°C: 000.0 005.0 ...	pH: 04.00 04.05 ...
	OK Delete pair(s)	Selection: Are the value pairs OK or do you want to delete any of them?
	°C: 000.0 005.0 ...	pH: 04.00 04.05 ...
	Valid table	Note in display: The table is active after confirmation by pressing  . Cancel by pressing "PARAM".
Cal. settings:		
	MTC ATC 1 ATC 2	Select the temperature compensation for the calibration ATC = automatic temp. comp. MTC = manual temp. comp.  Note! The setting is only active during calibration. In measurement mode, the setting selected in the "Temperature" menu is valid.
	25.00 mV/pH (5.00 ... 57.00 mV/pH)	Entry of slope deviation for the alarm function If the entered slope deviation is exceeded, an alarm (error no. E032) can be triggered (error activation see page 65). Ex.: The electrode has a slope of 59 mV/pH at 25 °C / 77 °F. You enter a slope deviation value of 5 mV/pH. Then, an alarm can be triggered at measured slopes <53 mV/pH or >64 mV/pH.

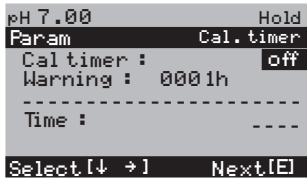
CHOICE (default = bold)		INFO
	pH 1.30 (0.05 ... 2.00 pH)	Entry of pH value zero point deviation for the alarm function If the zero point deviation from the reference zero point exceeds the value entered here, an alarm (error no. 033) can be triggered (error activation see page 65). Ex.: The electrode has a zero point of 7.00 pH (for electrodes with inner buffer of 7 pH). You enter a zero point deviation value of 0.05 pH. Then, an alarm can be triggered at measured zero points <6.95 pH or >7.05 pH.
	off on	SCC (Sensor Condition Check) This function monitors the electrode status or the degree of electrode ageing. 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).  Note! This function is only available for glass electrodes. If you are using a glass electrode and an ISFET sensor, you can use the SCC function without restriction. However, the SCC function only monitors the glass electrode.
	Function1/2: off on Uis 1/2: 00.00 pH (0...16 pH)	Isothermic compensation Activate the isotherm compensation and insert the isotherm intersection point (Uis). Function off: for Endress+Hauser electrodes Function on: Only if the isotherm intersection point $\neq$ zero point of the electrode. The bigger the difference between isotherm intersection point and zero point, the bigger the measured error at temperature fluctuations. Uis: Enter the intersection point at which the isotherms of the electrode meet.  Note! When you activate the isothermic compensation, the electrode has to be calibrated before measuring.
	threshold length 02 mV 010s	Stability The calibration is only considered as stable, if the deviation of the mV value does not exceed the given threshold for the set period of time (length) during calibration. This function allows you to adjust calibration accuracy and timing individually to your process.  Note! If your process requires extremely accurate calibration, reduce the threshold value and increase the period (length) to make sure that the pH value does not drift.
Calibration timer:		
	Cal-Timer: on Warning: 0001h Time: 0001:00	Calibration timer If no calibration is performed in the set time, an error message appears (E115). Cal Timer: on = activate Warning: Enter the time within which a calibration must take place. Time: Displays the remaining time until an error message appears (count down).

Operating mode Redox

To enter the menu, proceed as follows:



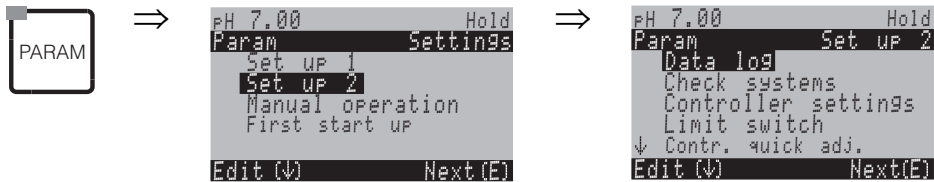
CHOICE (default = bold)		INFO
650 mV Hold Param Calibration Offset Manual calibration Cal. settings Calibration timer Edit[↓↑] Next[E]	Offset Manual calibration Cal. settings Calibration timer	Calibration menu selection Offset: Entry of a fixed value by which the mV value is displaced. Manual calibration: Initial settings for the function of the CAL key. Cal. settings: General calibration settings Calibration timer: Clock for calibration
Offset:		
650 mV Hold Param Offset Act. PV 1: 0650 mV Offset 1: 0000 mV Select[↓→] Next[E]	Act. PV 1/2: 0650 mV Offset 1/2: 0000 mV	Enter Offset value for redox value Act. PV: current measured value (primary value) Offset: redox value difference in mV When you enter the measuring mode while an offset is active, "OFFSET" will be shown on the right top of the display.
Manual calibration:		
650 mV Hold Param Cal. buffer Enter data abs. Calibration abs. Edit[↓] Next[E]	For redox abs. Enter data abs. Calibration abs.	Calibration parameter Sets the calibration type undertaken when the "CAL" key is pressed: Enter data abs.: Enter the electrode offset in mV. Calibration abs.: The electrode offset is calculated from the difference between the current measured value and the known buffer value.
650 mV Hold Param Cal. buffer Enter data abs. Enter data rel. Calibration abs. Calibration rel. Edit[↓] Next[E]	For: Redox %: Enter data abs. Enter data rel. Calibration abs. Calibration rel.	Enter data abs.: Enter the electrode offset in mV. Enter data rel.: Entry of two % calibration points to which mV values are assigned. Calibration abs.: The electrode offset is calculated from the difference between the current measured value and the known buffer value. Calibration rel.: Use of a non-toxic sample and an unchanged sample as buffer.
Cal. settings:		
650 mV Hold Param Zeropoint 1 120 mV 1... 1500mV Edit[↓ →] Next[E]	0120 mV (1 ... 1500 mV)	Entry of offset deviation of the mV value for the alarm function If the offset deviates from the reference offset by the value entered here, an alarm can be triggered.

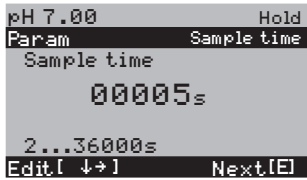
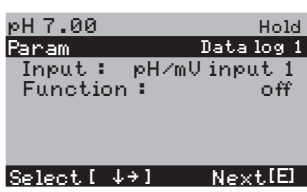
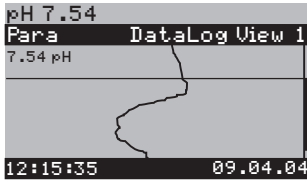
CHOICE (default = bold)		INFO
	off on	SCC (Sensor Condition Check) This function monitors the electrode status or the degree of electrode ageing. Possible status messages: "Electrode OK", "Low wear" or "Replace electrode". The electrode status is updated after each calibration. When the "Replace electrode" message appears, an error message may be displayed (E040, E041).
	threshold length 02 mV 010s	Stability The calibration is only considered as stable, if the deviation of the mV value does not exceed the given threshold for the set period of time (length) during calibration. This function allows you to adjust calibration accuracy and timing individually to your process.  Note! If your process requires extremely accurate calibration, reduce the threshold value and increase the period (length) to make sure that the pH value does not drift.
Calibration timer:		
		Cal timer: on Warning: 0001h Time: 0001:00 Calibration timer If no calibration is performed in the set time, an error message appears (E115). Cal timer: on = activate Warning: Enter the time within which a calibration must take place. Time: Display of the remaining time until an error message appears.

6.6.10 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 to you reach the Record mode of the data log. Pressing the "Enter" 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 configure the data log, proceed as follows:



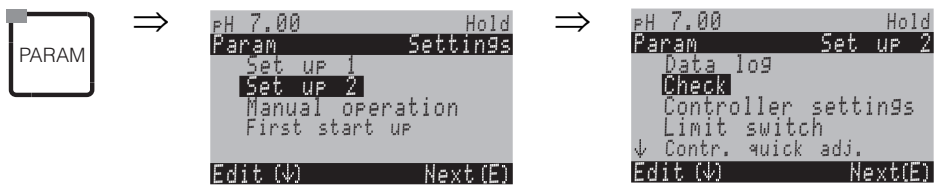
CHOICE (default = bold)		INFO
	Sample time Data log 1 Data log 2 DataLog display 1 DataLog display 2	Data log settings Using the data log you can record - one parameter with 500 sequential measuring points - two parameters each with 500 sequential measuring points.
Sample time:		
	00005s (2 ... 36000 s)	Enter sample time Enter the time interval after which the next measured value is recorded in the data log.
Data log 1 (or 2):		
	Input: pH/mV K1 Function: on	Selection Select the measured variable to be recorded (pH/mV , temp.). Activate recording by setting "Function" to "on".  Note! The data log starts recording the measured value when you return to operation.
	Min: -02.00 Max: 16.00 (-2...16pH/ -1500...1500mV)	Set recording range Values outside the defined range are not recorded.
DataLog display 1 (or 2)		
		View of recorded data

6.6.11 Set up 2 – Check systems

The function group "Check systems" offers two monitoring functions:

- SCS (Sensor Check System) detects glass breakage and electrode blockage and outputs a corresponding message.
- PCS (Process Check System) checks the measuring signal for deviations and triggers an alarm in case of a constant signal.

To enter the menu, proceed as follows:



CHOICE (default = bold)		INFO
	Glass sensor: off Ref. sensor: off	Select SCS (= Sensor Check System) mode: Glass sensor: Recognition of glass breakage (off; Ref. =Reference electr.; Glass=electrode; G+R= Electr.+Reference electrode) Ref. sensor: Blockage recognition (off, light, medium, heavy, very heavy blockage) Note! In a connection without PML (unsymmetrical) only the glass electrode can be monitored.
	PCS input: off	PCS (= Process Check System) time If the measuring signal does not change during the entered time by ±0,02 pH / ±5mV / ±0,25%, an alarm is signalled with error message E152. Settable times: off, 1h, 2h, 4h. Note! An active PCS alarm signal is deleted automatically as soon as the sensor signal changes.

6.6.12 Set up 2 – Controller settings

Requirements for controller settings:

You have carried out the following settings **which are necessary for controller configuration** either in the First start up, page 51 or on the appropriate menu page.

- Set the number of relays available to the controller (field "Contact functions", page 52 or page 61).
- Define current output **2** as continuous controller (when controlling the actuator via a 20 mA interface, field "Select current output parameter", page 53 or page 59).

If you have not yet made the settings, please do this **before** configuring the controller.



Note!

- Danger of data loss.
 - If you assign the relays which are used by the controller with another function (field "Contact functions", page 61), the **complete** controller settings are reset to the default values.
 - If you change the function of current output **2** from "controller" to another function, the **complete** controller settings are reset to the default values.
- If you change the relay assignment for the controller in field "Contact functions" (page 61), you must use the controller menu to reassign all the functions selected there to a relay.

Example:

 - Relays 4 and 5 are assigned to the controller.
 - You change the controller assignment to relays 5 and 6 (number of relays remains 2).
 - No data loss, providing the number of assigned relays is not reduced!
- Relays 3, 4 and 5 are located on the additional plug-in card. If you want/have to remove this card from the device, check whether you have used one of these relays for the controller function. If so, change the controller settings before removing the second card, so that the controller works with the basic device equipment (relays 1 and 2). Otherwise, you cannot use the controller function as long as the additional card is not plugged into the device.

Definition of terms

Actuators:	Valves, gate valves, pumps and similar
Acid/base:	The terms "acid" and "base" used in the menu are used here relating to the direction of action. Acid = Dosing medium which lowers the pH value. Base = Dosing medium which raises the pH value. Example: A fluid (pH value 14) needs to be brought to the reference value of pH 12 with a base (pH value 9). In the "Dosing" menu, choose "Acid" as the addition of this dosing medium will lower the pH value of the fluid.
Process:	The control or the process (to simplify matters this will, from henceforth, be referred to as the "process") can be differentiated on account of their different features:
Direction of action, one or two-sided:	One-sided control only works in one of two directions. This can be, for example, a neutralisation process in which a dosing medium is used (acid or base). With a two-sided process, control can generally work in two-directions (use of acid and base). This means that you can both increase and decrease the value of the actuating variable (here = pH value). To implement this, the set reference value of your process must lie between the pH values of the two dosing media.
P controller	Used for simple linear control purposes with small system deviations. Where major changes are to be controlled, overshooting may occur. In addition, a lasting control deviation is to be expected.
PI controller	Used for control systems where overshooting is to be avoided and no lasting control deviation should occur.
PD controller	Used for processes that require quick changes and where peaks are to be corrected.

PID controller

Used for processes where a P, PI or PD controller does not control sufficiently.

Configuration options of the PID controller

- Change control gain K_p (P influence).
- Set integral action time T_n (I influence).
- Set derivative action time T_v (D influence).

Laplace transformation

The Laplace transformation is an integral transformation that transforms a given function $f(t)$ from the time domain into the spectral domain yielding a function $f(s)$.

Due to its differentiation principle, the Laplace transformation is useful to solve differential equations. The differential equation is transformed into the spectral domain, the resulting algebraic equation is solved and the solution is re-transformed into the time domain.

Batch or inline process arrangement:

With active control, batch and inline processes differ in their relationship to the medium flow: Pure batch process: the batch container is filled with the medium. During the subsequent batch process, no additional medium is fed in. The change in pH value is determined only by the controller. To be able to compensate for possible so-called "overshoots", use a two-sided controller. For as long as the actual value is within the neutral zone, no additional dosing agent is added.

Pure inline process: Here, the control works with the medium flowing past. The pH value of the medium in the inflow may be subject to strong deviations for which the controller should compensate. The volume of medium which has already flowed past can no longer be influenced by the controller. For as long as the actual value corresponds to the set point, the set value has a constant value.

In practice, the most common option is the semi-batch process. Depending on the ratio of inflow to tank size, this process shows the behaviour of an inline or a batch process.

The Mycom controller takes this differing behaviour into account. The difference for these settings is the internal handling of the integral part of the PI or PID controller.

Controlling the actuators

The CPM153 has four different methods for controlling the actuators (see above).

1. PWM (Pulse-width modulation, "pulse-length controller")

Pulse-width-modulated outputs are intended to control solenoid valves, for example. With PWM, the internal, continuous actuating variable is output to a relay as a rhythmic signal.

The larger the calculated actuating variable, the longer the corresponding contact remains picked up (i.e. the longer the switch-on period t_{ON} ; see fig. 39). You can set the period length freely between 1 and 999.9 seconds. The minimum switch-on period is 0.4 seconds.

For a two-sided process, you can combine PWM with a second controlling method as follows:

- a PWM relay
- a PFM relay
- a three-point step controller

A single PWM relay can only output one actuating variable for a solenoid valve.

To avoid pulses which are too short, enter a minimum switch-on period. Pulses which are too short are not given to the relay/or the actuators. This benefits the actuator.

2. PFM (PFM; "pulse-frequency controller")

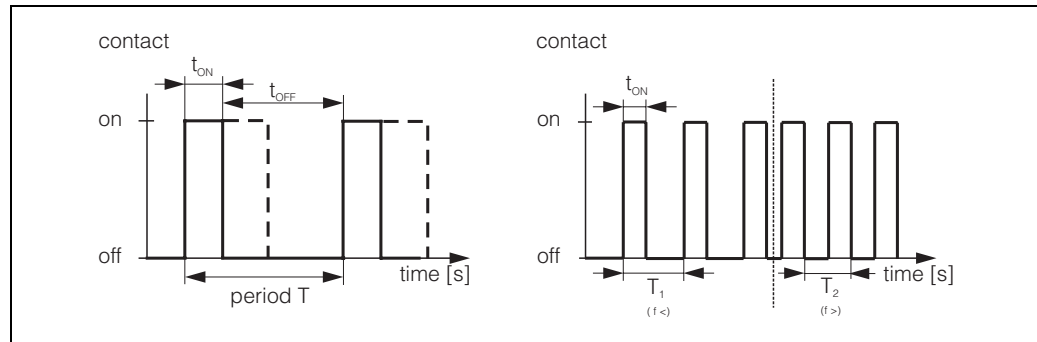
Pulse-frequency-modulated outputs are intended to control magnetic dosing pumps, for example. As with PWM, PFM is output as a rhythmic signal by the relay.

The greater the calculated actuating variable, the higher the frequency of the related contact. The maximum settable frequency $1/T$ is 120 min^{-1} . The switch-on period t_{ON} is a constant factor of the entered frequency (see fig. 39).

For 100 % dosing, the ratio of switch-on period and switch-off period is 50 : 50.

Here, you can combine PFM with a second controlling method for a two-sided process as follows:

- a PFM relays
- a PWM relay
- a three-point step controller



C07-CPM153xx-05-06-00-en-004.eps

fig. 39: Left: pulse-width modulation (PWM)
Right: pulse-frequency modulation (PFM)

3. Three-point step controller ("3-point step")

With the Mycom S, this type of control is only possible for one process side (acid or base). With two-sided processes, either PWM or PFM must be used for the other process side.

The three-point step controller can only be selected if an analogue input for the position feedback of the valve or the actuator is available.

This type of actuator controller is intended for actuator drives (e.g. motor-driven valves, etc.) where a motor must be controlled directly. For this, two relays are required: one "+relay" which, by picking-up, opens the valve and one "-relay" which closes the valve. To set an actuating variable of, for example, 40% (valve 40% open), Mycom S requires the input of the time that the "+relay" must be picked up to completely open a completely closed valve (= "motor run time").



Note!

- If using a driven valve, gate valve or similar, you must determine the motor run time, before beginning with the menu settings.
- When commissioning your system, you need to fully open and close the valve so that Mycom S can adjust the position feedback.

4. Analogue (via current output 2, 20 mA)

The current output can be used to output the analogue actuating variable for one or two-sided processes and cannot be combined with the method described above.

- With one-sided processes, the actuating variable range 0% ... 100% (or -100% ... 0%) is represented on the selected current range (0 ... 20 mA or 4 ... 20 mA). The output current is proportional to the actuating variable.
- With a two-sided process, the complete actuating variable range from -100% ... +100% is represented on the given current range. A actuating variable of 0% leads to a current of 10 mA (at 0 ... 20 mA) or 12 mA (at 4 .. 20 mA) (see fig. 40).



Note!
With a two-sided process, make sure that the actuator is able to use this method (also known as "split range").

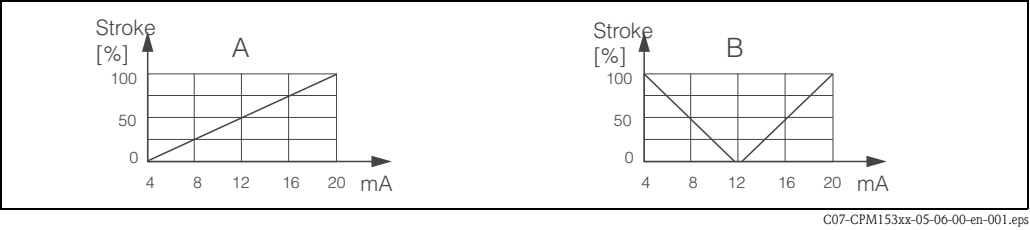


fig. 40: A: Stroke diagram for a control valve
B: Stroke diagram for two contrarotating control valves ("split range")

You can refer to the following selection aids to find the required hardware equipment level for your process. This selection is not complete. If you wish to use additional functions such as NAMUR or Chemoclean, please check to see if you require additional relays (NAMUR: Alarm relay + 2 relays; Chemoclean: 2 relays).

Selection aid for online processes				Required hardware equipment for control			
Process	Path	Dosing actuators		Circuits	Relay	Current inputs	Current outputs
1-sided control	not looking-ahead	1 PWM		1	1	–	–
		1 PFM		1	1	–	–
		1 3-point step		1	2	1	–
		analogue		1	–	–	1

Selection aid for online processes				Required hardware equipment for control			
Process	Path	Dosing actuators		Circuits	Relay	Current inputs	Current outputs
2-sided control	not looking-ahead	2 PWM		1	2	–	–
		2 PFM		1	2	–	–
		1 3-point step + 1 PWM or PFM		1	3	1	–
		analogue		1	–	–	1

Selection aid for batch processes					
Process	Dosing actuators	Required hardware equipment for control			
		Circuits	Relay	Current inputs	Current outputs
1-sided control	1 PWM	1	1	–	–
	1 PFM	1	1	–	–
	1 3-point step	1	2	1	–
	analogue	1	–	–	1
2-sided control	2 PWM	1	2	–	–
	2 PFM	1	2	–	–
	1 3-point step + PWM or PFM	1	3	1	1
	analogue	1	–	–	1

PWM = pulse length proportional
PFM = pulse frequency proportional
3-point step = three-point step controller

The controller in the CPM153:

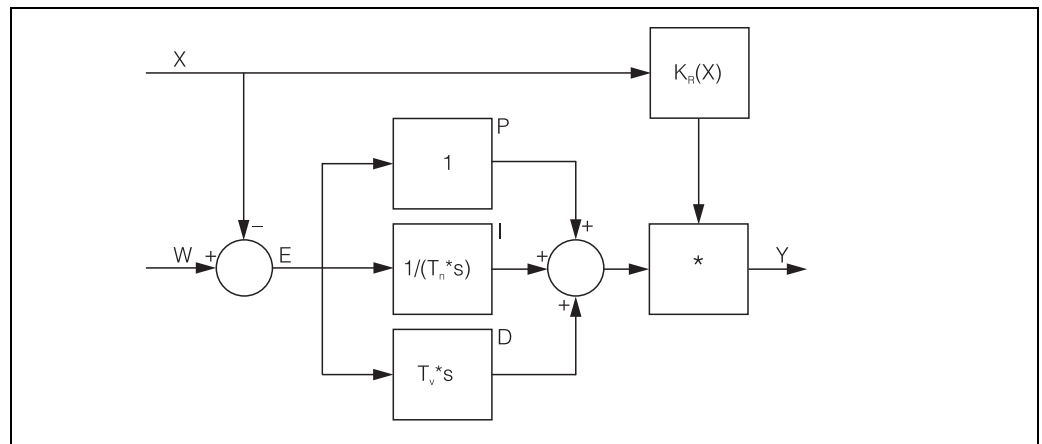
The CPM153 contains a PID controller which is specially adapted to the pH neutralisation process. It has the following features:

- Separate configuration of both process sides
- Simple adaptation to batch or inline processes
- Switching option between constant and range-dependent modulation gain.

Relating to the effect on the gain factor, a difference is made between two standard implementations:

- The factor $K_R(X)$ is the total gain (see fig. 41. This is implemented in the CPM153).
- The gain factor $K_P(X)$ is the purely proportional gain.

The following diagram shows the schematic structure of the CPM153 controller. To simplify the diagram, the Laplace transform of subfunctions is given.



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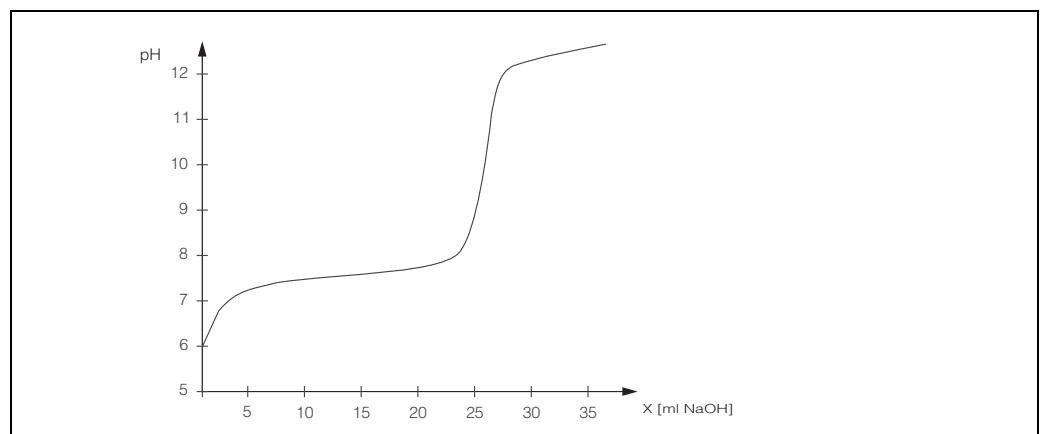
fig. 41: Schematic diagram of the CPM153controller with $K_R(X)$ as the total gain

X	Actual value
W	Set point
E	Control difference
Y	Set value
K_R	Modulation gain (total gain)
T_n	Integral action time (I component)
T_v	Derivative action time (D component)

Range-dependent modulation gain

The majority of pH neutralisation processes are strongly non-linear (Example: titration curve). If you add a strong base in portions to a fixed volume of a weak acid, the change in pH value is, at the beginning, relatively small, larger in the area of the so-called equivalence point and then ever smaller.

In the following diagram, such a titration curve is represented for a weak acid with a strong base (y axis: pH value, x axis: added volume units of a strong base).



C07-CPM153xx-05-06-00-xx-xx-008.eps

fig. 42: Schematic titration curve of a weak acid with a strong base.

For difficult neutralisations, the CPM153 controller gives you the option of partially compensating for the non-linearity by entering an inverse characteristic $Y(X)$.

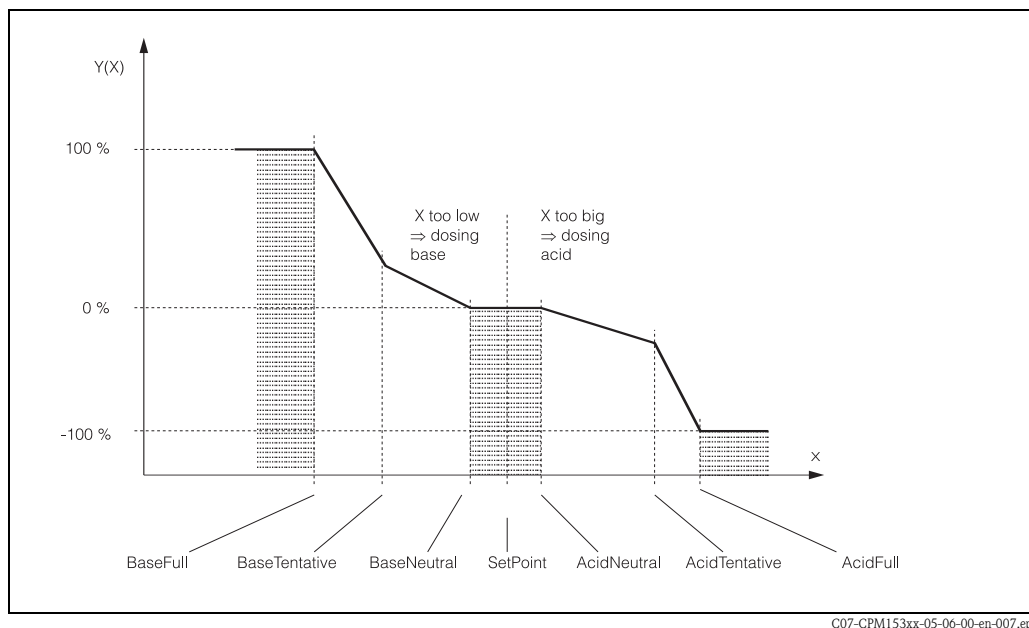


fig. 43: Diagram to describe the most important corner points for control

With this characteristic, a reference set value is given to the controller for each pH value. Mycom S internally converts this characteristic into $K_r(X)$ (modulation gain). The modulation gain is only identical to the characteristic in case of a pure P controller. If a PI or PID controller is used, the modulation gain deviates from the shown characteristic accordingly.

Neutral zone:

If the actual value (X) is within the neutral zone, dosing takes place as follows:

- Dosing does not take place for the Batch process type.
- Dosing does also not take place for the Inline process type without an I component ($T_n=0$).
- If the controller is configured as a PI or PID controller for the Inline type, it depends on the pH value history if dosing takes place or not.

Points of the characteristic:

For constant control gain ("linear characteristic"), you require:

- Set point W ,
- Neutral zone
 - Two-sided: "Start of the neutral zone" and "End of neutral zone"
 - One-sided: only one of the two points

For range-dependent modulation gain ("segmented curve"), you require two-sided control of all the points.

A point usually consists of two coordinates: an x coordinate (here = pH value) and a y coordinate (here = set value). You only need to enter the y coordinates for the optimisation points. For the other points, the CPM153 sets the y coordinates itself.

However, you cannot change the sequence of these defined points. It is, for example, not possible to enter a larger pH value for the "Start of the neutral zone" than for the set point.

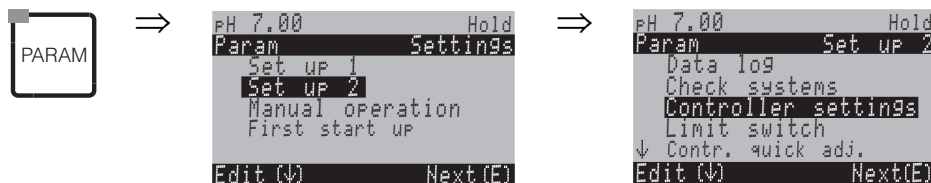
Configuring the CPM153

Configure the relays in the following sequence:

1. Actuators
2. Characteristic

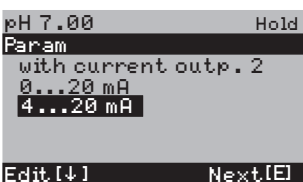
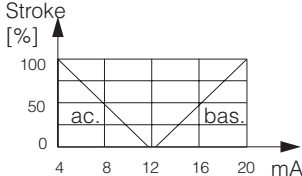
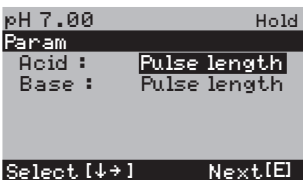
In the user settings (see below) you switch directly to a controller simulation and you can check the settings made and change them if necessary.

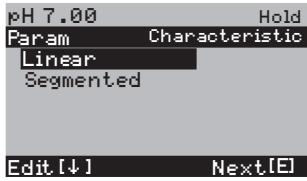
To enter the menu, proceed as follows:



CHOICE (default = bold)		INFO
	off on	Selection of controller settings Note! You must activate the controller settings after you have configured the controller in this menu branch.
	batch 1-s. base batch 1-s. acid batch 2-sided inline 1-s. base inline 1-s. acid inline 2-sided	Select the process type, which describes your process. 1-s. = One-sided: control using either acid or base. Two-sided: control using acid and base. You can only select this function if you have defined two controllers (in the "Contacts" menu and/or via the current output).
	Type Characteristic	Select external hardware For correct operation, you must completely configure these submenus. Type: here, you can select and configure the methods which the controller uses to output the set values. Characteristic: here, you enter the controller parameters (neutral zone, set point, etc.). With this selection, you can also reach the "active measuring menu" (see page 84).
Type: With selection "one-sided":		
	Pulse length Pulse-frequency 3-point step controller Current output	Select control type

pH 7.00 Hold
Param Control signal
1 output
2 outputs
Edit [↓] Next [E]

CHOICE (default = bold)	INFO		
1 output:			
	via current output 2: 0 ... 20 mA 4 ... 20 mA	Current output Selection of the current range, which should 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 ... 20 mA, the neutral position is at 10 mA, for 4 ... 20 mA at 12 mA.	
	100 % acid 0/4 mA 20 mA	Current output 2 Assign the current value, corresponding to 100 % of the 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 below, fig. 44) in the "split range" method.	
		 C07-CPM153xx-05-06-00-en-005.eps	
fig. 44: Two-sided control over one current output			
2 outputs:			
	Acid: Base:	I length I length	Dosing Dosing can be carried out using: PWM (= pulse length proportional), PFM (= pulse frequency proportional) or 1x Three-PS (= three-point step controller)
	+Relay -Relay Motor run time Xsd	n.c. n.c. 060.0s 04.0%	Acid dosing: Relay selection (for three-point step controller) Description see above
	Relay: max. pulse frequency	n.c. 120/min.	Acid dosing: Relay selection (for pulse frequency) Description see above
	Relay: Period: t _E min:	n.c. 000.0 s 000.0 s	Acid dosing: Relay selection (for pulse length) Description see above
	+Relay -Relay Motor run time Xsd	n.c. n.c. 060.0s 04.0%	Base dosing: Relay selection (for three-point step controller) Description see above
	Relay: max. pulse frequency	n.c. 1/min.	Base dosing: Relay selection (for pulse frequency) Description see above
	Relay: Period: t _E min:	n.c. 000.0 s 000.0 s	Base dosing: Relay selection (for pulse length) Description see above

CHOICE (default = bold)		INFO
Characteristic:		
	Linear Segmented	Characteristic type selection Linear: corresponds to a constant control gain. Segmented: corresponds to a range-dependent control gain.
	Start neut. 06.50pH End neutra 07.50pH Control po. 07.00pH K _R 1 01.00pH K _R 2 01.00pH	Values for linear curve (constant control gain) Start neut. (Start neutral zone) End neutra. (End neutral zone) Control point: the value which should be set. K_R 1 (only with base dosing): modulation gain for base dosing K_R 2 (only with acid dosing): modulation gain for acid dosing
	Start neut 06.50pH End neutra 07.50pH Control po. 07.00pH O.pnt. X1 05.00pH O. pnt.Y1 00.20pH O.pnt. X2 09.00pH O. pnt.Y2 -00.20pH Control po.1 02.00pH Control po. 2 12.00pH	Values for segmented curve (range-dependent control gain) Start. neut. (Start neutral zone) End neutra (End neutral zone) Control po. (control point): the value which should be set. O.pnt 1 and 2 (optimisation point): entry with x and y coordinates Control po. 1 (control point): The dosing is 100 % base for measured values < control point. Control po. 2 (control point): The dosing is 100 % acid for measured values > control point.
	Slow process Standard process Fast process User settings	Select process character (linear characteristic only) If you have no experience in setting parameters, these defaults slow /standard / fast process are intended as an aid to adapt the controller behaviour to the process. Select a default and use the "controller simulation" (see below) to check if these settings are suitable for your process. Enter all characteristic values yourself with the user settings.
	K _R 1 = K _R 2 = Tn 1 = Tn 2 = Tv 1 = Tv 2 =	Characteristic values for user settings: (K _R 1 and K _R 2 only with linear characteristic; index 1 only for base dosing, index 2 only for acid dosing) K_R 1: modulation gain for base dosing K_R 2: modulation gain for acid dosing Tn: integral action time Tv: derivative action time
	Simulation off on	Selection controller simulation 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 to simulate the controller behaviour. off: Press "E" to leave the controller simulation.
	Function: Set: act.: y:	Active Measuring menu 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, optimisation points, control points) change accordingly. Actual: 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.

**Note!**

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

1. Set the values for the controller parameters (field "Characteristic values for user settings")
2. Deflect process.
Field "Controller simulation": 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 field "Characteristic values for user settings". During this time, the controller continues to run in the background. If you have made your settings, press the "Enter" key again to return to field "Selection controller simulation". There, you can continue or exit the simulation.

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

6.6.13 Set up 2 – Limit switch

The transmitter CPM153 has several possibilities for assigning a relay contact. The limit contactor can be assigned to a switch-on and switch-off point, as well as a pickup and dropout delay. In addition, an error message can be generated when an alarm threshold is set. You can trigger cleaning in connection with this error message (see Error/Contact Assignment, page 65). These functions can be used for both, pH/redox and temperature measurement.

The contact states of any relay or fault signalling contact are illustrated in fig. 45:

With increasing measured values, switch-on point > switch-off point (maximum function):

- The relay contact closes after the switch-on point t_1 is exceeded and the pickup delay ($t_2 - t_1$) expires.
- When the alarm threshold t_3 is reached and the alarm delay ($t_4 - t_3$) has expired, the fault signalling contact switches.
- With falling measured values, the fault signalling contact reopens when the alarm threshold is undershot at t_5 . The corresponding error message is deleted.
- The relay contact opens again after the switch-off point is reached at t_6 and the dropout delay has elapsed ($t_7 - t_6$).

With falling measured values, switch-on point < switch-off point (minimum function):

- The relay contact closes after the measured values have fallen below the switch-on point t_1 and the pickup delay has expired ($t_2 - t_1$).
- When the alarm threshold t_3 is reached and the alarm delay ($t_4 - t_3$) has expired, the fault signalling contact switches.
- With increasing measured values, the fault signalling contact reopens when the alarm threshold t_5 is exceeded. The corresponding error message is deleted.
- The relay contact opens again after the switch-off point has been reached at t_6 and the dropout delay has elapsed ($t_7 - t_6$).

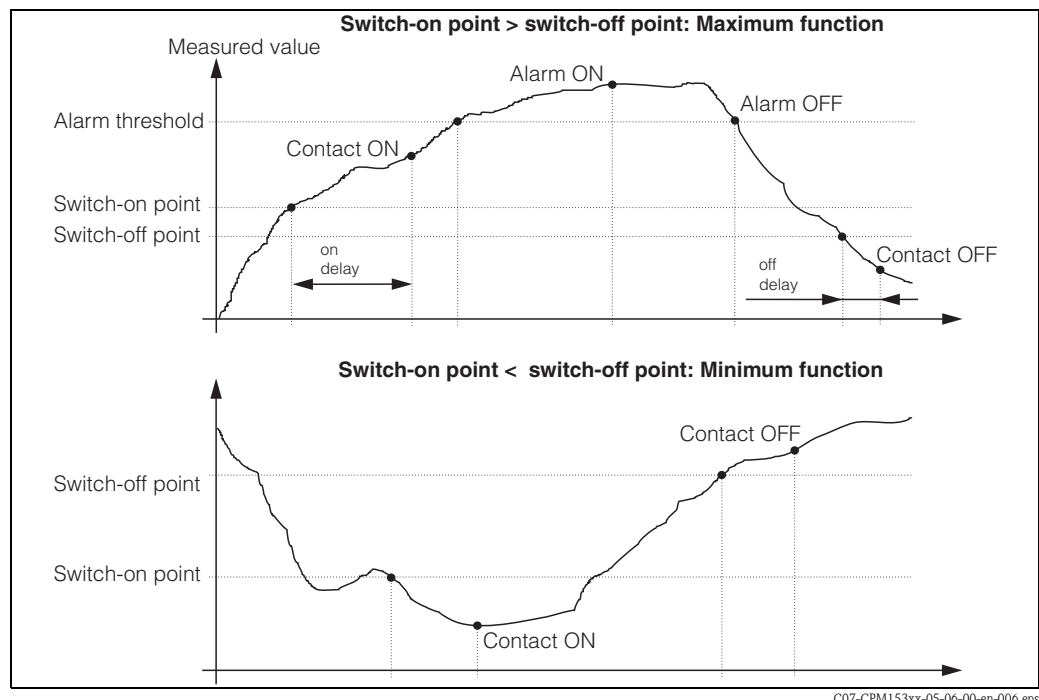


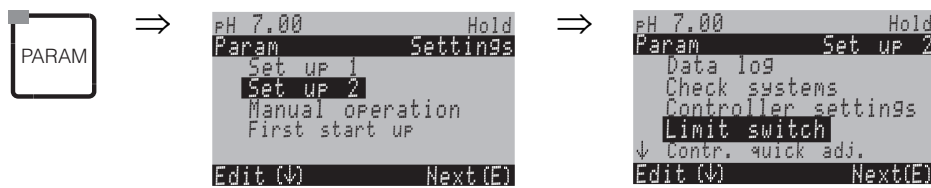
fig. 45: Diagram of the relationship between switch-on and switch-off points and on and off delay



Note!

If the pickup and dropout delays are set to 0 s, the switch-on and switch-off points are the switching points of the contacts.

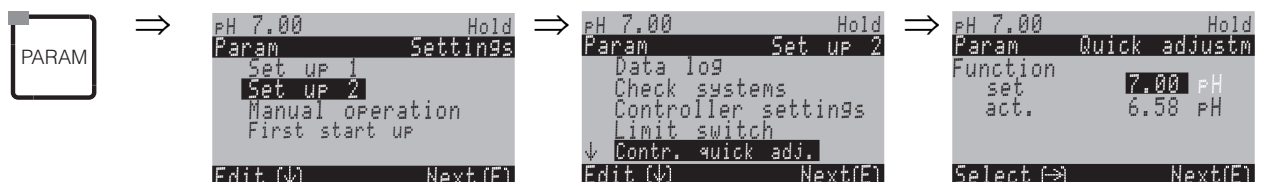
To enter the menu, proceed as follows:



CHOICE (default = bold)		INFO
pH 7.00 Hold Param Selection Limit switch 1 Limit switch 2 Limit switch 3 Limit switch 4 Limit switch 5 Edit [↓] Next [E]		Selection of the limit switch which you wish to configure. There are five limit switches available.
Limit switch 1 / 2 / 3 / 4 / 5:		
pH 7.00 Hold Param Configuration Function: off Assign pH/mV Input 1 On value: 16.00 pH Off value: 16.00 pH Select [↔] Next [E]		Limit switch configuration: Function: Activation of function as limit switch. Assignment: Selection of the measured value to which the limit value (pH/redox, temperature) is assigned. On point: Entry of the value at which the limit value function is activated. Off point: Entry of the value at which the limit value function is deactivated. (Settable range: pH -2.00 ... 16.00 / -1500 mV ... +1500 mV / 0 ... 100% / -50 ... +150°C)
On delay Off delay Alarm limit		Limit switch configuration: On delay: Entry of the switch-on delay (range 0 ... 2000 s). Off delay: Entry of the switch-off delay (range 0 ... 2000 s). Alarm limit: Entry of the value (alarm threshold) at which the fault signalling contact switches.

6.6.14 Set up 2 - Controller quick adjustment

In this menu, you can adjust the controller setpoint.
To enter the menu, proceed as follows:



6.6.15 Set up 2 – Topclean S

The cleaning processes and cleaning control are set in this menu:

Setting up the programme

Select the appropriate cleaning programme for your measuring point from the stored programmes in the instrument. You can freely adapt the cleaning programmes to your requirements or deactivate them as necessary (e.g. the programme steps water, cleaner, additional valve control, number of repeats and step sequence). In addition, it is possible to configure specially adapted user programmes.

Control of cleaning programmes

You can choose between the following control types:

- Automatic: Weekly programme that automatically starts the selected cleaning programme at every week day. You can freely select between the cleaning programmes.
- Cleaning: Selection of the cleaning programme that is started in the event of an SCS alarm (see »Set up 2 – Check systems« on page 73) or an error message that has been configured accordingly.
- Power failure programme: Selection of the cleaning programme that is automatically started after a failure of the power supply or the communication between CPG30 and Mycom S.
- External control: Programmes can be started via an external process control system. The start is triggered by a 3-bit signal. For the binary coding of individual programmes, see the table on page 91.

To configure an externally controlled programme, select it in the automatic control types and set the desired values for water, cleaning agent, etc.

For electrical connection of the binary coding, see the section »External inputs (PCS to CPG30) and outputs (CPG30 to PCS)« on page 28.

Activating the control types

To activate a control type for cleaning programmes, select "PARAM ► Setup 2 ► Topclean ► Activate Topclean" and set the desired control type to "on".

Programme editor

User programme: You can configure your specific cleaning programme in the programme editor.

Selecting the programme

You have a choice of six cleaning programmes in total (see function overview).

■ Clean:

This programme is permanently assigned to one function. The cleaning times or repeat cycles are freely adjustable. You can select and configure this programme within all control types. Note that the cleaning times, repeat cycles, etc. of the programme are used for all control types. The settings are also taken over for the Clean Int. programme.

You can start this programme manually (see »Manual operation« on page 102).

■ Clean S:

This programme is only available when you are using a Topclean S version with control for an external valve. It is permanently assigned to one function. The cleaning times or repeat cycles are freely adjustable. You can select and configure this programme within all control types. Note that the cleaning times, repeat cycles, etc. of the programme are used for all control types.

You can also start the programme manually (see »Manual operation« on page 102).

■ Programmes User 1/2/3:

The user programmes allow you to define the programme sequence freely. A simple way of programming is to copy predefined programmes to user programmes and adapt them.

To configure these programmes, enter the programme editor and proceed as follows:

1. Edit the programme.
2. Configure the programme.
3. Release the programme.

After having released the programme, you can select it within all control types or start it manually.

■ Clean Int:

This programme for interval cleaning is permanently assigned to one function. Cleaning times and repeat cycles are freely adjustable.

You can select and configure Clean Int. only within the "Automatic" control type.

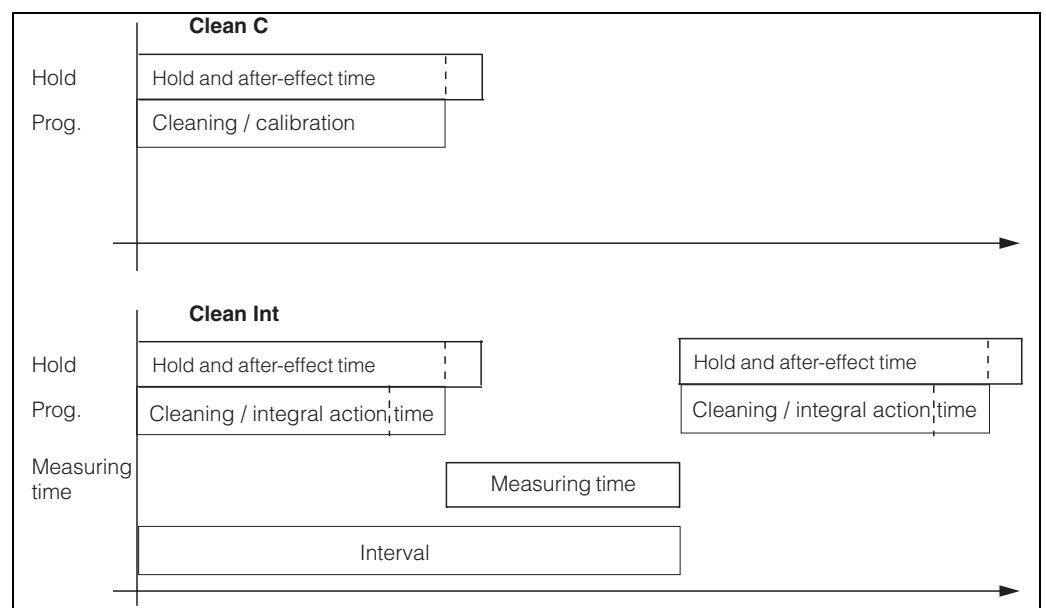
Note that the cleaning times, repeat cycles, etc. that you set here are taken over for all weekdays and for the Clean programme.

Interval cleaning allows you to define cleaning intervals for a given period of time (max. 1 day).

In practical life, two different operating modes are used, interval measuring and interval cleaning:

- In case of interval cleaning, the sensor is mainly in measuring position. It is cleaned at specified intervals.
- In case of interval measuring, the sensor is mainly in service position (aggressive media). It is moved into the process into measuring position at specified intervals. If the sensor remains in service position for a long time, i.e. you have defined a long integral action time, set the "Air" to 0 sec to prevent the sensor from drying in.

Examples for programme sequences



C07-CP300xx-05-06-00-en-008.eps

fig. 46: Example for the programme sequence of "Clean C" and "Clean Int".

- Clean Int runs from 08:00 ... 12:00 at an interval (programme time + measuring time + integral action time) of 10 minutes.
This means cleaning is started every 10 minutes: 08:00, 08:10, etc.
The last cycle is started at 11:50.
- Clean Int runs from 08:00 ... 11:00 at an interval of 50 minutes.
This means cleaning is started every 50 minutes: 08:00, 08:50, 09:40.
The last cycle is started at 09:40. The cycle due at 10:30 cannot be started because it would be finished after the set end time at 11:20.

Aborting the programme

A programme (Clean, Clean S) is completed once it is started (safety concept). During this time, no other programmes can be started.

The service switch at the front door of the CPG30 is of highest priority. Switching to "Service" interrupts even running programmes.

The programme Clean Int. can be interrupted by a steady signal at the digital input "Automatic stop". For this, the assembly must be in "Measure" position. When the signal at the binary input is stopped, the Clean Int. programme is continued.



Note!

- Refer to the appendix for a wiring example of an external cleaning trigger (see page 169).
- You can select the control for an external additional valve for your device under Order Code item **"External valve control"**.
- The "Sterilisation" and "Sealing water" functions are **only** released on devices fitted with a control function for additional external valves.
- You can use the additional external valve as required in the freely definable user programmes; for example, for superheated steam, a second cleaner, cooling air, organic cleaner etc.

Function overview of cleaning and calibration programmes

Function → Programme ↓	Cleaning	Sterilisa- tion*	Sealing water*	Control via binary contacts		
				bin. 0	bin. 1	bin. 2
				Term. 81/82	Term. 83/84	Term. 85/86
Clean (= cleaning)	✓	–	Control for 1 valve required	1	0	0
Clean S (= cleaning + ste- rilisation)	✓	Control for 1 valve required	–	0	0	1
Clean Int (= cleaning inter- val)	✓	–	Control for 1 valve required	Programme cannot be started externally.		
User 1 (selectable)	✓	An additional external valve can be used as required, e.g. for superheated steam, organic clea- ner, 2nd cleaner, cooling air. Device control for 1 valve is required.		1	0	1
User 2 (selectable)	✓			0	1	1
User 3 (selectable)	✓			1	1	1



Note!

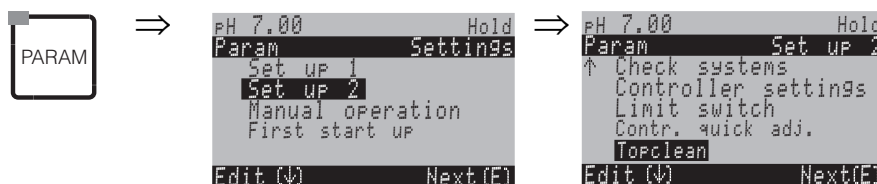
- "1" = Apply a voltage of 10 ... 40 V (duration approx. 400 mS) to contacts bin 0 ... bin 2 (terminals 81 ... 86). For non-Ex instruments this auxiliary energy can be taken from the 15 V auxiliary power supply of the Mycom S CPM153.
- "0" = 0 V
- *The functions "sterilisation" and "sealing water" are **only** available for device versions with external valve control.

Programme flows

Standard programmes						Optional programmes
Clean			Clean Int.		Clean S	User 1 - User 3
01	Assembly Service		01	Assembly Service	01 Assembly Service	01
02	Water	30s	02	Water	30s 02 Steam 1200s	02
03	Cleaner	15x	03	Cleaner	15x 03 Wait 600s	03
04	Wait	30s	04	Wait	30s 04 Repeat steril. 0x	04
05	Water	30s	05	Water	30s 05 Assembly Meas.	05
06	Air	20s	06	Air	20s 06 _____	06
07	Repeat clean.	0x	07	Repeat clean.	0x 07 Prog. time: _____	07
08	Assembly Meas.		08	Assembly Meas.	08	08
09	_____		09	_____	09	09
10	Prog. time: _____		10	Prog. time: _____	10	10
11			11	Meas. time 10s	11	11
12			12	Integral action time 10s	12	12
13			13	_____	13	13
14			14	Interval 230s	14	14
15			15		15	15
16			16		16	16
17			17		17	17
18			18		18	18 (up to 25 programme steps possible)
19			19		19	19

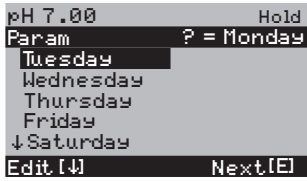
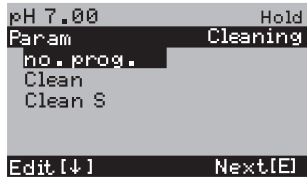
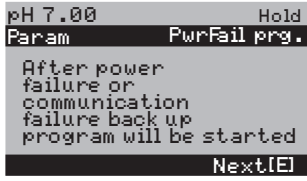
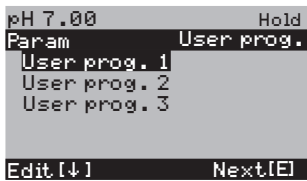
Configuration menu for Topclean cleaning programmes

To enter the menu, proceed as follows:

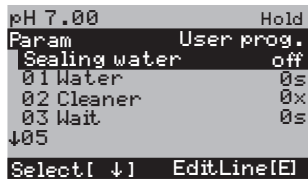
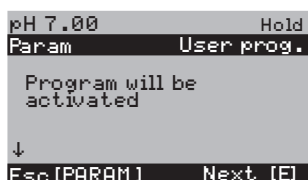
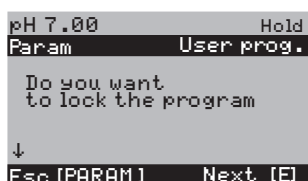
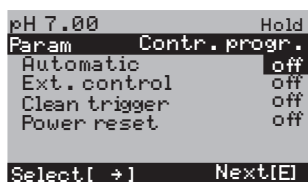


CHOICE (default = bold)		INFO
		Selection Setup = Create/edit a Topclean S programme. Activate = Switch on/off Topclean S functions.
Set up Topclean:		
	Automatic off Cleaning off Ext. Control off	Note in display: Displays the current system status Note! The following three fields can only be edited if all the functions are switched off here and the external valve control option is available.
	Valve V1 — Valve V2 —	Assignment of additional valves (if available) You can assign various functions to the additional valves: Sterilisation, sealing water or user-defined (user programme). Sealing water: If you have activated the sealing water function, you can use it with every assembly move (see user programme, page 95). Note! - Two valves are displayed, but you can only edit the first valve. - If you change the function of the additional valves, sterilisation or sealing water is no longer available in the set programmes accordingly. - If you have changed the valve functions, you have to check the assignment in the user programmes.
	Valve 1 (0...9; A...Z)	Enter valve name 1 Enter 8 character name for valve 1. Note! This field is only displayed if you have assigned the "User" function to valve 1 in the previous field.
	Automatic Cleaning Power failure programme User programme	Select function of the cleaning system

CHOICE (default = bold)		INFO
Automatic:		
PH 7.00 Param Monday Tuesday Wednesday Thursday ↓Friday Edit [↓] Hold Automatic 1 2 0 0 0 Next[E]	Monday Tuesday Sunday 1 2 ... 0	Weekday selection menu Select cleaning day. The number of cleaning triggers for the day is shown after each day.
	Edit day? Copy day?	Select day function Edit day: You can edit the function for this day. Copy day: The selected day is copied to the day selected in the following menu.
Edit day:		
PH 7.00 Param 1 Clean 18:22 2 Clean S 05:00 ↓3 Clean Int. Select [↓→] EditProg[E] Hold Edit Monday 18:23 05:10	01 Clean 18:22 18:23 02 Clean S: 05:00 05:10 03 Clean Int.: 18:22 18:54 04 no progr.	View/edit day programme You can see the complete daily programme or "No Progr.". You can overwrite the option and also the already set programmes by making a new selection. The start and finish times are always displayed. Example: Clean 18:22 (start time) 18:23 (finish time) User prog.: use of a programme you created (see Programme Editor, p. 95) Note! You can set up to 10 programme starts per day.
	01 Water 02 Cleaner 03 Water 04 Rep. cleaning _____ Prog. time: 0 s 30 s 30 s 0x 60 s	Select programme blocks The times for individual programme steps can be adjusted here. To select a block for editing, press "E". Rep. cleaning: Number of repeats The overall programme time is automatically calculated from the individual steps and displayed. Note! Leave this selection by pressing "PARAM".
	Sealing water on	Sealing water: Switch on or off Note! You can insert this programme step in the first line of the day programme only. You can select this function only if the valve has been defined in the field "Assignment of additional valves" (page 93).
	0010 s (0 ... 9999 s)	Air / superheated steam / wait / water: Enter the time during which the valve remains open to allow the conveyance of air, superheated steam, etc.
	Repeat x number of times 00 (0 ... 10)	Repeat cleaning How often should the previous step (cleaner or water) be repeated?

CHOICE (default = bold)		INFO
Copy day:		
 pH 7.00 Hold Param ? = Monday Tuesday Wednesday Thursday Friday ↓ Saturday Edit [↓] Next [E]	Tuesday Wednesday ... Sunday	? = Monday Select day, to which you want to copy Monday (example).  Note! ■ Danger of data loss. When copying one day to another, the cleaning programmes of the target day are overwritten. ■ Leave this selection by pressing "PARAM".
Cleaning:		
 pH 7.00 Hold Param Cleaning no. progr. Clean Clean S Edit [↓] Next [E]	no progr. Clean Clean S	Select a programme to be started in the case of soiling or blocking of the electrode.
Power failure programme:		
 pH 7.00 Hold Param Pwrfail prg. After power failure or communication failure back up program will be started Next [E]		Note in display (no entry)
	Clean Clean S	Select a programme which will be launched if the power supply or the communication fails.
User programme: (Programme editor)		
 pH 7.00 Hold Param User prog. User prog. 1 User prog. 2 User prog. 3 Edit [↓] Next [E]	User prog. 1 User prog. 2 User prog. 3	Select user programme With Topclean S, you have three user programmes available. (With Chemoclean there is one user programme available.)
	Edit Insert programme Configure Enable Disable Rename	Select edit function Insert programme: An installed programme (e.g. Clean) can be inserted into the user programme.  Note! ■ After a programme is disabled, it can be reenabled at any time. ■ Leave this item by pressing "PARAM". ■ If you edited a programme for the first time, you have to configure it at least once so that you can enable/disable it.

Endress+Hauser

CHOICE (default = bold)		INFO	
Configure:			
	Sealing water 01 Water 02 Cleaner 03 Wait ... off	Configuring the selected programme blocks Select the line which you want to configure. Sealing water: If you activate the sealing water function in this programme, sealing water will be delivered to the rinse chamber of the assembly with every assembly move. Sealing water transport starts one second before moving the assembly to the maintenance position. When the assembly has reached the service position, sealing water transport stops automatically after one second. Wait: Enter waiting time. back to: Enter number of repeating the programme loop. Air: Enter the duration of air flow.	
Enable programme:			
	Programme is enabled	Note in display (no entry): The created/edited programme is enabled.	
	User prog. (0...9; A...Z)	Change name 9-character name for your user programme, freely selectable.	
Disable programme			
	Do you want to disable the programme?	Query Pressing  (= Continue) disables the programme. Pressing "PARAM" (= Cancel) takes you back without disabling the programme.	
	The programme was disabled.	Note in display (no entry)	
Rename programme:			
	User prog. (0...9; A...Z)	Change name 9-character name for your user programme, freely selectable.	
Activate Topclean S:			
	Automatic Cleaning Power failure progr. User programme	off off off off	Select control levels Activation of functions for Topclean S, through which a programme is started.
	Automatic Cleaning Power failure progr. User programme	off off off off	Note in display (no entry): System status

6.6.16 Set up 2 – Chemoclean

Chemoclean[®] is used in a manual system (without Topclean S) to automatically clean pH/redox electrodes in suspended or flow assemblies with a spray system. Water and cleaner is conveyed to the electrode by means of an injector (e.g. CYR 10).

Use with Topclean S

Chemoclean[®] is a standard function in the Mycom S and can be used in conjunction with the Topclean S. The two contacts in the Mycom S can be started

- externally, via a binary input in the Mycom S either
- in a weekly pattern (Automatic)
- in manual operation.

The two contacts can be flexibly adapted to individual cleaning sequences with a user-defined programme.

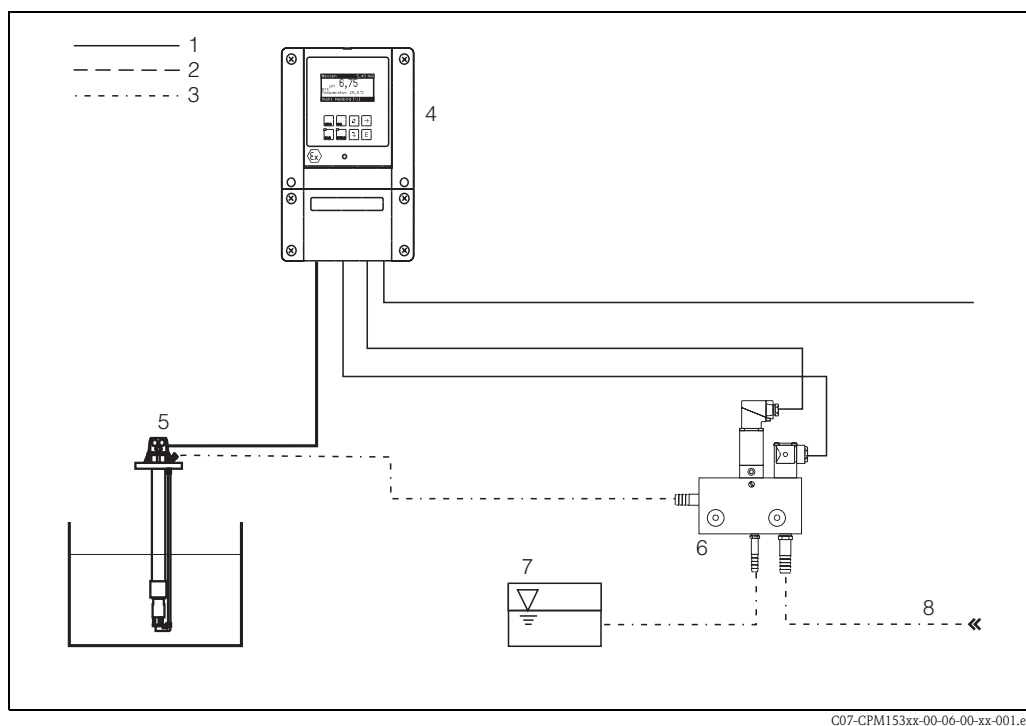


fig. 47: Depiction of the Chemoclean function in combination with Mycom S CPM153

- 1: Electric line
- 2: Compressed air
- 3: Water/cleaning fluid
- 4: CPM153 transmitter
- 5: Immersion assembly
- 6: Injector CYR10
- 7: Cleaning fluid
- 8: Motive water

Operation:

1. Activate the Chemoclean® function in the menu "Set up 1" ➡ "Relays" (see page 61) and connect the appropriate contacts to the injector (see connection example on page 151).
2. Configure the cleaning processes in the Chemoclean menu. Here, you can adapt the automatic or event-controlled cleaning to the process conditions. One or more of the following controls are possible:
 - Automatic (see below): any number of cleanings can be started on each weekday
 - External control: a start can be triggered via the digital input. For this, activate external control in field "Select Control Levels": Ext. control "on"
 - Cleaning: Cleaning is carried out when an SCS alarm occurs (see also "Set up 2" ➡ "Check systems")
 - Power failure: cleaning is started after a power failure.
3. When a cleaning programme is started, hold is automatically activated.

Manual operation:

Rapid on-site cleaning can be carried out with the menu:

"PARAM" ➡ "Manual operation" ➡ "Chemoclean" ➡ press E 2 x ("Start cleaning")

Automatic:

"PARAM" ➡ "Set up 2" ➡ "Chemoclean":

Each day can be programmed individually. The following programmes are available

- "Clean": Cleaning trigger by entering the start time
- "Clean Int": Cleaning is carried out at intervals with a defined spacing (see fig. 48). This programme cannot be started directly via the binary inputs.
- "User": User-defined cleaning programme (create in Programme Editor; see page 95).

Programme sequences (cleaning example)

Monday:

2 x cleaning (at 11:00 and at 18:00) with 120 s. water, of which 60 s additionally with cleaner.
Clean every 30 mins. between 18:20 and 24:00 (= 1800 s.) with 120 s water, of which 60 s additionally with cleaner.

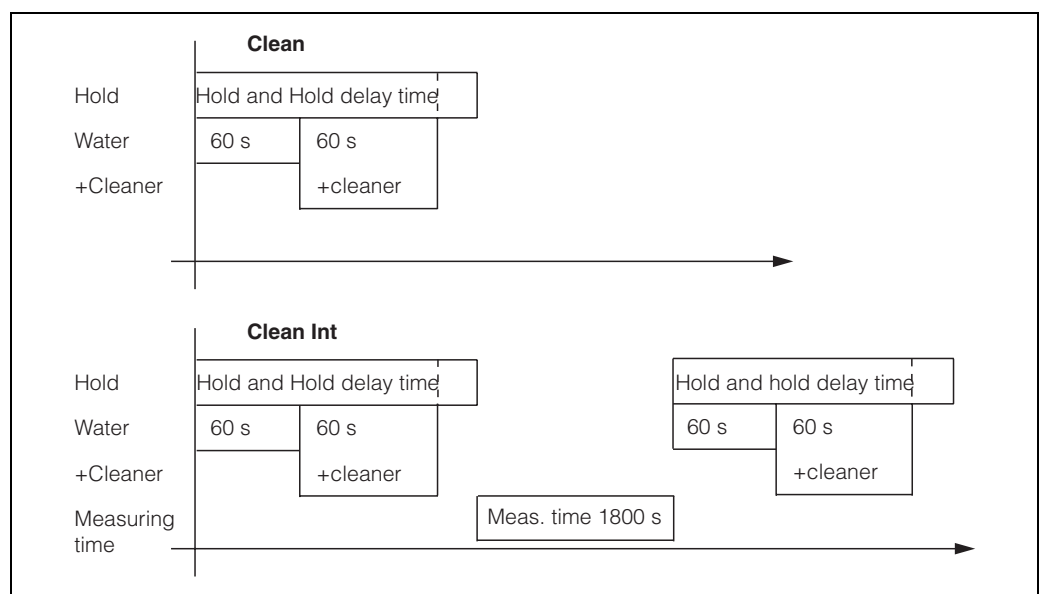


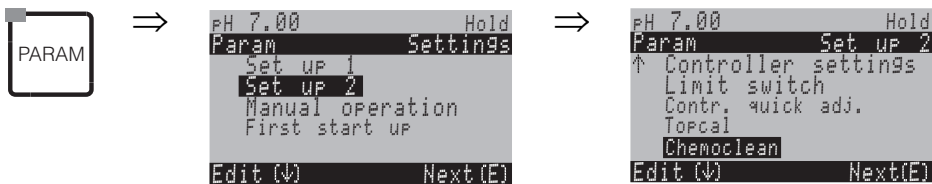
fig. 48: Graphic representation of the above cleaning example

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

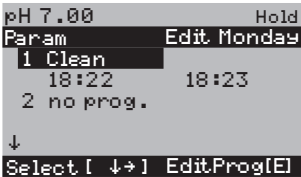
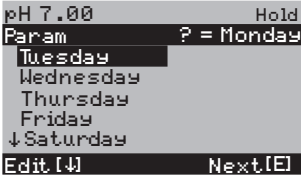
Field "Edit day"	Field "Select programme blocks" (with "Clean")	Field "Select programme blocks" (with "Clean Int")
Clean	01 Water 60 s	01 Water 60 s
11:00 11:02	02 +Cleaner 60s	02 +Cleaner 60s
Clean	03 Water 0s	03 Water 0s
18:00 18:02	04 Rep. Clean. 0x	Meas. time 1800s
Clean Int		
18:20 24:00		

In this way, each day can be programmed (or copied) individually.

To enter the menu, proceed as follows:



CHOICE (default = bold)		INFO
	Automatic Cleaning trigger off Ext. Control off	Select control levels Select the function which will trigger Chemoclean cleaning.
	Automatic Cleaning trigger off Ext. Control off	Note in display (no entry): Displays the current system status.
	Automatic User prog.	Select the configuration menu Automatic: Select only with "weekly programme on" User programme: Here you create customer-specific programmes using the Programme Editor (see Programme Editor, p. 95).
Automatic:		
	Monday 0 Tuesday 0 Sunday 0	Weekday selection menu Select cleaning day. The number of cleaning triggers for the day is shown after each day.
	Edit day? Copy day?	Select day function Edit day: You edit the cleaning sequence for this day. Copy day: The day selected in the previous field is copied to the day selected in the field below.

CHOICE (default = bold)		INFO
Edit day:		
	Clean 18:22 18:23 no progr.	View/edit day programme You can see the complete daily programme or "No progr.". You can overwrite the option and also already set programmes by making a new selection. The start and finish times are always displayed. Example: Clean 18:22 (start time) 18:23 (finish time) User prog.: use of a programme you created (see programme editor, p. 95)
	01 Water 0 s 02 +Cleaner 30 s 03 Water 30 s 04 Rep. cleaning 0x	Select programme blocks The times for individual programme steps can be adjusted here. Select a block for editing by pressing [E]. +cleaner: Cleaner is conveyed in addition to water. Rep. cleaning: Number of repetitions of the previous steps 01 ... 03  Note! ■ If you change a programme block, the change is effective for all other cleaning sequences. ■ Leave this selection by pressing "PARAM".
	0010 s (0 ... 9999 s)	Water / cleaner: Enter the time during which the valve remains open to allow the conveyance of water or cleaner.
	Repeat x number of times 00 (0 ... 10)	Repeat cleaning How often should the previous step (cleaner or water) be repeated?
Copy day:		
	Tuesday Wednesday ... Sunday	? = Monday Select day, to which you want to copy Monday (example).  Note! Danger of data loss. When copying one day to another, the cleaning programmes of the target day are overwritten.

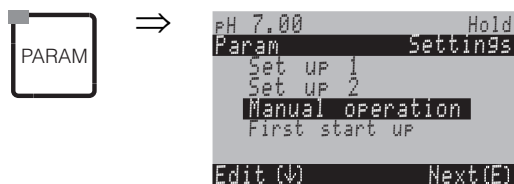


Note!

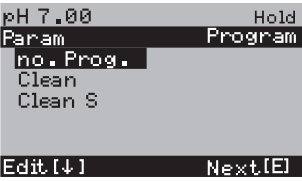
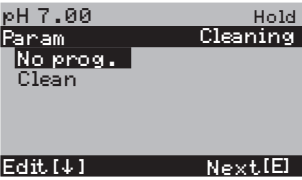
User prog.: To edit the user programmes, refer to the **programme editor** on page 95.

6.6.17 Manual operation

To enter the menu, proceed as follows:

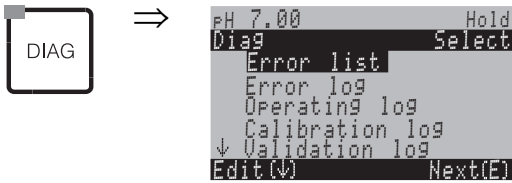


CHOICE (default = bold)		INFO
	HOLD Topclean S Chemoclean	Select manual operation Note! ■ Leave the manual operation menu by pressing "PARAM", "DIAG" or "MEAS". ■ The settings are only active in this menu. Nothing is saved when you leave.
HOLD:		
	HOLD off HOLD on	Manual operation Activate / deactivate hold The "HOLD" function freezes the current outputs as soon as cleaning/calibration is undertaken. When you activate the hold, a stylised hand is shown in the left top of the display as a sign for manual operation. Note! If the controller function lies on current output 2, it behaves as defined in "controller hold" (see page 66).
Topclean S:		
	Automatic Cleaning trigger Ext. control	off off off Note in display (no entry): System status
	Retract assembly Start prog. Stop prog.	Selection You can move the assembly manually or start/stop a programme.
Retract assembly:		
	Ass. service Ass. measuring	Select position into which the assembly should move.
	Automatic Cleaning trigger Ext. control	off off off Note in display (no entry): System status

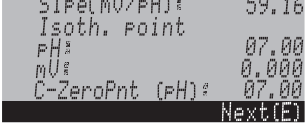
CHOICE (default = bold)		INFO
Start programme:		
	no prog. Clean Clean S ...	Select programme If a programme is already running and you start another one, this is only started after the previous programme has finished.
	Automatic off Cleaning trigger off Ext. control off Clean running Water 10 s Cleaner 2x	Note in display (no entry): System status: Displays the running programme with the remaining time for water, cleaner, etc.
Stop programme:		
	Automatic off Cleaning trigger off Ext. control off	Note in display (no entry): System status The running programme is stopped.
Chemoclean:		
	Automatic off Cleaning trigger off Ext. control off	Note in display (no entry): System status
	No prog. Clean	Chemoclean cleaning No prog.: Here, each external programme start is suppressed. Clean: Here, you can start the Clean programme.  Note! Leave this menu item by pressing "PARAM".

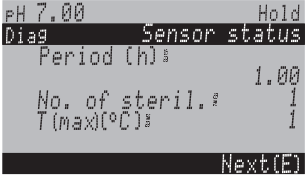
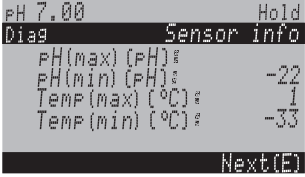
6.6.18 Diagnosis

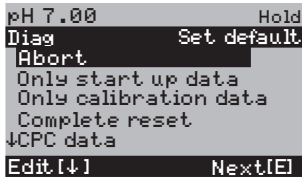
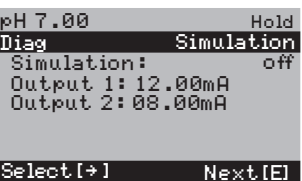
To enter the menu, proceed as follows:

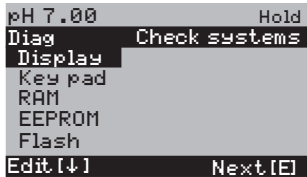
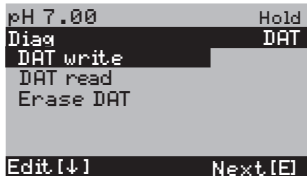


CHOICE (default = bold)		INFO
	Error list Error log Operating log Calibration log Ext. sensor data (digital sensors with Memosens technology only) Service	Error list: Displays the currently active errors. (Complete error list with description see page 125) Error log: Lists the last 30 signalled errors with date and time. Operating log (service code necessary): Lists the last 30 registered operating steps with date and time. Calibration log: Lists the last 30 calibrations with date and time. You can use the right arrow key to obtain further details on the calibration. Ext. sensor data: Lists the data stored in the digital sensor, e.g. sensor identification, calibration data, operating hours, etc. Note! - Use the arrow keys to scroll through the lists. - Leave the lists by pressing [E].
Calibration log		
	1 Enter spec. buffer Zero point Slope El. condit. <date> <time>	Enter spec. buffer: Used calibration method. Zero point: Zero point calculated during calibration. Slope: Slope calculated during calibration. Electrode condition: State of the electrode. <date> <time>: Calibration date and time
If you are using a digital sensor with Memosens technology, the following data are displayed when you press :		
	SN Sensor change date <date> <time>	SN: Serial number of the calibrated sensor. Sensor change date: Date and time when the sensor was changed.
Ext. sensor data (digital sensors with Memosens technology only): When you select "Ext. sensor data", the transmitter indicates that the sensor data are read from the sensor. When reading is finished, the display automatically switches to the next menu point. If it does not switch automatically, you can display former sensor data by pressing [E] or return to measuring mode by pressing .		
	Identification Calib. data Comp. temperature Sensor status Sensor info	Display of all data stored in the digital sensor Note! External sensor data can only be displayed for digital sensors with Memosens technology.

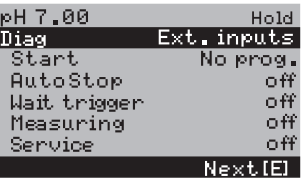
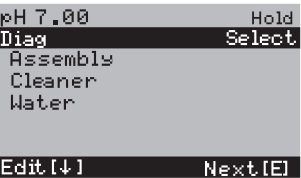
CHOICE (default = bold)	INFO
Identification	
	ID: Module ID of the digital sensor. SW ID: Software ID of the digital sensor. HW version: Hardware version of the digital sensor. SW version: Software version of the digital sensor.
	Check date SAP SN Check date: Date of the sensor's factory inspection. SAP: SAP number of the sensor. SN: Serial number of sensor electronics.
Calibration data	
	Slope [mV/pH] Isoth. point – pH – mV C-ZeroPnt [pH] Slope: Slope of the digital sensor. Isoth. point: mV and pH components of the isothermic intersection point. Chain zero point: Chain zero point of the digital sensor.
	Method No. of cal. Snlc Calibration date Method: Calibration method used for the digital sensor. You can select the calibration method in "Setup 1 > Calibration". No. of cal.: Number of calibrations carried out for the sensor. Snlc: Serial number of the transmitter used for the last sensor calibration. Calibration date: Date of the last sensor calibration.
	Buffer 1 Buffer 2 D. slp [mV/pH] D. zropnt [pH] Buffer 1: pH value of the first buffer used for the last sensor calibration. Buffer 2: pH value of the second buffer used for the last sensor calibration. D. slp: Change in slope compared to the preceding calibration. D. zropnt: Change in chain zero point compared to the preceding calibration.
Temperature compensation	
	1 pnt delta [°C] Snlc Cal. date 1 pnt. delta: Calibrated temperature offset. Snlc: Serial number of the transmitter used for the last temperature calibration. Calibration date: Date of the last temperature calibration.

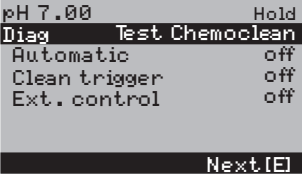
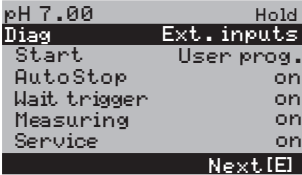
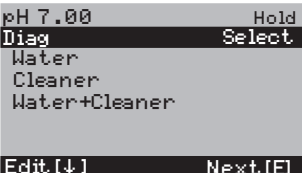
CHOICE (default = bold)	INFO
Sensor status	
	Period (h) No. of steril. T (max) [°C] Period: Total operating hours of the sensor. No. of steril.: Number of sterilisations applied to the sensor: T > 135 °C / 275 °F, min. 20 minutes T (max): Maximum temperature under which the sensor was operated.  Note! During sterilisations (T > 135 °C / 275 °F) the transmitter goes into hold and the display shows "SIP" (Sterilisation in place). Operating time (h) – over 80 °C – over 100 °C – <- 300 mV – > 300 mV 1. use Ri GSCS [Ohm]: Operating hours of the sensor under the following conditions: – At temperatures over 80 °C / 176 °F – At temperatures over 100 °C / 212 °F – At pH values below -300 mV (= pH 12 @ 25 °C / 77 °F) – At pH values over +300 mV (= pH 2 @ 25 °C / 77 °F) 1. use: Date when the sensor was connected to a transmitter for the first time. Ri GSCS: Current glass membrane impedance.
Sensor info:	
	pH (max) [pH] pH (min) [pH] Temp (max) [°C] Temp (min) [°C] pH (max): Maximum pH value of the specified sensor application range. pH (min): Minimum pH value of the specified sensor application range. Temp (max): Maximum temperature of the specified sensor application range. Temp (min): Minimum temperature of the specified sensor application range. Order code OVSN Check date Order code: Order code of the sensor. OVSN: Overall serial number of the sensor. Check date: Date of the sensor's factory inspection.
Service:	
	Factory reset Simulation Instrument check DAT download Set up 2 Instrument version Topclean S Chemoclean Reset count Select service diagnosis Factory reset: Various data groups can be reset to the factory settings. Simulation: The transmitter behaviour can be simulated after entering various parameters. Instrument check: The instrument functions (display, keys, etc.) can be tested individually. Reset: Device reset ("soft reset"). DAT download: Copy data into/out of the DAT module. Set up 2: Instrument reset (= "soft reset"), ISFET values and SCS values Instrument version: Device internal data e.g. serial number can be queried. Topclean S: Inspecting programmes, inputs, mechanics. Chemoclean (only, if the complete Chemoclean function is activated): Inspecting programmes, inputs, mechanics. Reset count: Reset counter, write access.

CHOICE (default = bold)	INFO
Factory reset:	
	Abort Only start up data Only calibration data Complete reset CPC data Service data Operation log Error log Calibration log Set default Here you can select the data which you wish to reset to the factory settings.  Note! Danger of data loss. Selecting a point and confirming with "Enter" deletes all the settings you made in this area! Selecting "Abort" leaves this field without changing the values. Calibration data: All saved data for calibrations such as zero point, slope, and offset Start up data: The remaining data to be set Complete reset: Calibration data + setting data CPC data: Topclean configuration data, e.g. configuration of cleaning and calibration programmes Service data: All data + logbooks + reset counters Service data / logs: These functions are for authorised service personnel only. The service code is required.
Service data / logs:	
	0000 Service code entry required  Note! For service access code, contact the Endress+Hauser service. Incorrect service code entered. Note in display: Incorrect service code entry (back to the previous field)
Simulations:	
	Simulation: off Output 1: 12.00 mA Output 2: 04.00 mA Adapt simulation (current outputs) Simulation off: The frozen values from the last measurement are used for the simulation. Simulation on: The current values for the outputs can be changed (Output 1, Output 2)
	Simulation: off pH/mV: pH 07.00 Temperature: 025.00°C Adapt simulation (measured value/temperature) Simulation off: The frozen values from the last measurement are used for the simulation. Simulation on: The values (measured value/temperature) can be changed.
	Simulation: off Alarm relay: off Relay 1: off Relay 2: off ... Adapt simulation (contacts) Simulation off: The last statuses are frozen and used for the simulation. Simulation on: The contacts can either be opened (on) or closed (off).  Note! If you return to measurement mode with the simulation switched on, "Simul" and "Hold" flash in the display.

CHOICE (default = bold)		INFO
Instrument check		
	Display Keypad RAM EEPROM Flash	Select 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 OK" message if there are no errors.  Note! Leave this item by pressing "PARAM".
DAT download (only available when DAT module is plugged in):		
	DAT write DAT read Erase DAT	DAT selection DAT write: You can save both the configuration and the logs of your transmitter to the DAT module. DAT read: Copy the configuration saved on the DAT module into the EEPROM of the transmitter. Erase DAT: Delete all data on the DAT module.  Note! After the "Read from DAT" copying procedure, a reset is triggered automatically and the device is configured with the copied values. (See below for reset).
DAT write:		
	!!Caution!! All data on the DAT module will be deleted.	Note in display For safety reasons, you are asked if you really want to overwrite the existing data.
	in progress	Data are written to the DAT module
DAT read:		
	!!Caution!! All data in Mycom S will be deleted.	Note in display For safety reasons, you are asked if you really want to overwrite the existing data of Mycom S.
	in progress	Copy The data from the DAT module are copied to the EEPROM of the transmitter.  Note! After the "Read from DAT" copying procedure, a reset is triggered automatically (similar to a soft reset on a computer, see below).
Erase DAT:		
	!!Caution!! All data on the DAT module will be deleted.	Note in display For safety reasons, you are asked if you really want to delete the existing data.
	in progress	Erase The data are deleted from the DAT module.

CHOICE (default = bold)		INFO
Set up 2		
	Reset ISFET SCS reading	Select function ISFET is only available, if function is activated.
Reset:		
		Reset You can restart the Mycom S with this function (similar to the soft reset of your computer). You can use this function if the Mycom S does not react as expected. Note! This reset does not change saved data.
ISFET:		
	Ref. K1: 0000 mV Leak. curr. K1: 0.00 µA	View current ISFET sensor data Leak. curr. = Leakage current
SCS reading:		
	Glass 1: — MΩ Reference 1: — kΩ Glass 2: — MΩ Reference 2: — kΩ	View current Sensor Check System (SCS) values
Instrument version:		
	SW version: 1.20-01 HW version: 1 Serial no.: 12345678 Card ID: M3Cxxx ----	Controller data for Mycom S CPM153 Displays controller data and the hardware version.
	SW version: ---- HW version: 1.00 Serial no.: 12345678 Card ID: M3G-xx Non-Ex	Basic module (motherboard) data
	SW version: 1.22 HW version: 1.11 Serial no.: 12345678 Card ID: MKPx Ex	Transmitter 1 data Displays transmitter data (1).

CHOICE (default = bold)		INFO	
	SW version: ---- HW version: 1.00 Serial no.: 12345678 Card ID: M3D-xx Ex	Relay data	
	12345678901234	Serial number for Mycom S 14 digit number consisting of 0 ... 9 and A ... Z (read-only)	
	CPM153-A2B00A010	Order code 15 digit number consisting of 0 ... 9 and A ... Z	
	SW version: 1.2 HW version: 1 Serial no.: 12345678 ID: A1B SW ID: D1C Check date: 01.01.00	Sensor data  Note! These data are only displayed for digital sensors with Memosens technology	
	SW version: 1.2 HW version: 1 Serial no.: 12345678 Card ID: A1B	Data for CPC30	
	12345678901234	Serial number for CPG30 14 digit number consisting of 0 ... 9 and A ... Z (read-only)	
	CPC30-A2B00A010	Order code for Topclean S CPC30 15 digit number consisting of 0 ... 9 and A ... Z	
Topclean S:			
	Automatic. off Cleaning trigger off Ext. control off	Note in display (no entry): System status	
	Ext. inputs Hardware	Topclean S diagnosis	
External inputs:			
	Start Auto stop Wait trigger Measuring Service	no prog. off off off off	Note in display (no entry): Status of the external digital inputs.
Hardware:			
	Assembly Cleaner ... Sealing water	Selection hardware Select a function to be tested.	

CHOICE (default = bold)		INFO
	Assembly ↑ service End function Topclean S ready	Note in display (no entry): Valve status
Chemoclean (only if the complete Chemoclean function is activated):		
	Automatic. off Cleaning off Ext. control off	Note in display (no entry): System status
	With E running programme is aborted.	Note in display (no entry): To be able to carry out the diagnosis, you must abort the currently running programme by pressing the "Enter" key.
	Ext. inputs Hardware	Selection Chemoclean diagnosis
Ext. Inputs:		
	Start Userprog AutoStop on Wait-Trigger on Measuring on Service on	Info field: status of external digital inputs
Hardware:		
	Water Cleaner Water and cleaner	Selection hardware Select a function which shall be tested.
	Automatic. off Cleaning off Ext. Control off	Note in display (no entry): System status
Reset count:		
	0	Reset count (only triggered by watchdog) Can be reset via Set Default ➡ service data.
	0	Write count Displays the number of write accesses to EEPROM.

6.6.19 Calibration



Note!
The defaults for on-site calibration are made in the menu
"PARAM" ➡ "Set up 1" ➡ "Calibration" (see page 67 for pH / page 70 for Redox).

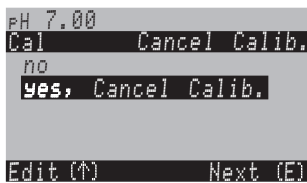
The calibration can be protected with the maintenance and the specialist codes (compare with page 58).

Procedure:

- 1. Switch the service switch to "Service" (vertical) or move the assembly to service position. Otherwise, calibration is not possible.
- 2. Remove electrode.
- 3. Clean electrode before calibration.



- Note!
- For measurements with PML (potential matching), the PM line must 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 instrument switches automatically to Hold (factory setting) whenever it is calibrated.
 - Cancel calibration by pressing the "MEAS" key.

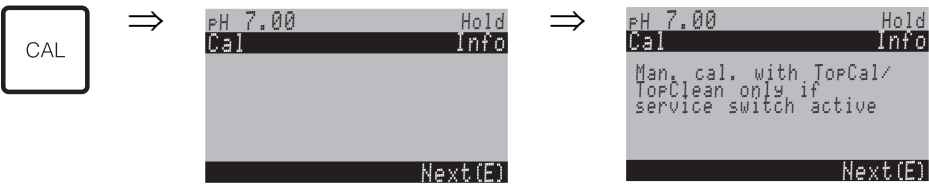


- If you confirm this with "yes, cancel cal.", you return to the measurement mode.
- If you select "no", calibration is continued.

The following section describes the calibration procedures for:

pH calibration	➡	"Manual data entry" (see page 113)
	➡	"Manual calibration with buffer" (see page 114)
	➡	"Calibration with fixed buffer" (see page 114)
	➡	"Calibration with automatic buffer recognition" (see page 114)
Redox absolute calibration	➡	"Absolute data entry" (see page 115)
	➡	"Absolute calibration" (see page 116)
Redox relative calibration	➡	"Absolute data entry" (see page 116)
	➡	"Relative data entry" (see page 118)
	➡	"Absolute calibration" (see page 117)
	➡	"Relative calibration" (see page 118)

To enter the menu, proceed as follows:



pH calibration

"Manual data entry"

The numeric values for electrode zero point and slope are entered numerically and by hand.

CHOICE (default = bold)	INFO
Calibration with "Enter spec. buffer"	Note in display Display of the type of on-site calibration selected in the calibration settings.
025.0 °C (-20.0 ... +150.0 °C)	Entry of temperature, (only if "Calibrate with MTC" is selected)
07.00 (pH -2.00 ... +16.00) ISFET: act.value (-500 ... +500mV)	Entry of the electrode zero point Confirm by pressing [E] .
59.16 mV/pH (5.00 ... 99.00 mV/pH)	Entry of the electrode slope Confirm by pressing [E] .
Accept Cancel Repeat calibration	End of calibration Accept: Pressing [E] accepts the new calibration data. Cancel: The data are not accepted and the calibration is not repeated. Repeat calibration: The data are rejected and a new calibration is started.
Waiting for sensor response	Communication to the sensor (digital sensors with Memosens technology only) Mycom S transmits calibration data to the sensor.
Data saved Data NOT saved	Note in display (digital sensors with Memosens technology only) Displays if calibration data were successfully saved to the sensor. If data saving failed, recalibrate the sensor.
Electrode submersed?	Note in display: Is the electrode back in the medium, so that measurement can take place?

pH calibration

"Calibration with manual 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 from page 67 onwards, 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 recognises the used buffer. Select the buffer types (e.g. E+H) in the Calibration menu.

CHOICE (default = bold)	INFO
Calibration with manual buffer	Note in display Display of the type of on-site calibration selected in the calibration settings.
025.0 °C (-20.0 ... +150.0 °C)	Enter temperature (only when "Calibration with MTC" is selected) Confirm by pressing  .
025.0 °C (-20.0 ... +150.0 °C)	Enter buffer temperature (only when "Calibration with MTC" is selected) Confirm by pressing  .
Immerse pH electrode in buffer 1	Handling instructions Immerse the electrode in buffer 1. Confirm by pressing  .
Temperature 1: 25.0 °C 07.00 (pH -2.00 ... +16.00)	Enter pH value of buffer 1
Time: 10 s MTC pH 1: 7.00 mV 1: 0 °C: 25.0	Checks the stability of the calibration (buffer 1) Wait until the pH measurement is stable: Time does not count down, pH value no longer flashes, Confirm by pressing  .
	 Note! You can set the criteria for the stability check under  > Setup 1 > Calibration > Cal. settings".
Invalid calibration value	Note in display: If an error occurred (e.g. incorrect buffer used), this message is displayed.
Immerse pH electrode in buffer 2	Handling instructions Immerse the electrode in buffer 2. Confirm by pressing  .
Temperature 1: 25.0 °C 07.00 (pH -2.00 ... +16.00)	Enter pH value of buffer 2
Time: 10 s MTC pH 1: 7.00 mV 1: 0 °C: 25.0	Checks the stability of the calibration (buffer 2) Wait until the pH measurement is stable: Time does not count down, pH value no longer flashes, Confirm by pressing  .
Invalid calibration value	Note in display: If an error occurred (e.g. incorrect buffer used), this message is displayed.
Zero point 07.00 Good Slope 59.00 Good	Note in display: Info on electrode. Information on the zero point, slope and calibration quality.

CHOICE (default = bold)	INFO
Electrode status good	Note in display: Electrode status: There are three status messages for the electrode status: "good", "OK.", "bad". If the status "bad" is displayed, electrode replacement is recommended to ensure the quality of the pH measurement.
Accept Cancel Repeat calibration	End of calibration Accept: Pressing  accepts the new calibration data. Cancel: The data are not accepted, the calibration is not repeated. Repeat calibration: The data are rejected and a new calibration is started.
Waiting for sensor response	Communication to the sensor (digital sensors with Memosens technology only) Mycom S transmits calibration data to the sensor.
Data saved Data NOT saved	Note in display (digital sensors with Memosens technology only) Displays if calibration data were successfully saved to the sensor. If data saving failed, recalibrate the sensor.
Electrode submersed?	Note in display: Is the electrode back in the medium, so that measurement can take place?

Calibration redox absolute

"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.

CHOICE (default = bold)	INFO
Calibration with abs. data entry	Note in display Display of the type of on-site calibration selected in the calibration settings.
0000 mV (-1500 ... +1500 mV)	Entry of offset value Enter the mV value for the electrode offset (electrode offset = deviation of the measured value display from buffer solution mV value). Confirm by pressing  . The entered value is effective immediately. The maximum offset is 400 mV.
Offset too high / too low	Note in display: Error message if the entered offset leaves the maximum range.
Accept Cancel Repeat calibration	End of calibration Accept: Pressing  accepts the new calibration data. Cancel: The data are not accepted, the calibration is not repeated. Repeat calibration: The data are rejected and a new calibration is started.
Electrode in medium?	Note in display: Is the electrode back in the medium, so that measurement can take place?

Calibration redox absolute

"Calibration absolute"

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.

CHOICE (default = bold)	INFO
Calibration with abs. calibration	Note in display Display of the type of on-site calibration selected in the calibration settings.
Immerse Electrode in buffer	Handling instructions Immerse the electrode in the buffer. Confirm by pressing  .
0225 mV (-1500 ... +1500 mV)	Enter buffer Enter the buffer mV value.
Time: 10 s mV 1: 225	Checks the stability of the calibration Wait until the measurement is stable: Time does not count down, mV value no longer flashes, Confirm by pressing  .
	 Note! You can set the criteria for the stability check under  > Setup 1 > Calibration > Cal. settings".
Invalid calibration value	Note in display: Error message if the offset is too large.
Offset 0005 Good mV	Note in display: Info on electrode. Data on the offset and calibration quality.
Accept Cancel Repeat calibration	End of calibration Accept: Pressing  accepts the new calibration data. Cancel: The data are not accepted, the calibration is not repeated. Repeat calibration: The data are rejected and a new calibration is started.
Electrode submersed?	Note in display: Is the electrode back in the medium, so that measurement can take place?

Calibration redox relative

"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.

CHOICE (default = bold)	INFO
Calibration with abs. data entry	Note in display Display of the type of on-site calibration selected in the calibration settings.
0000 mV (-1500 ... +1500 mV)	Entry of offset value Enter the mV value for the electrode offset (electrode offset = deviation of the measured value display from buffer solution mV value) Confirm by pressing  . The entered value is effective immediately. The maximum offset is 400 mV.
Offset too high / too low	Note in display: Error message if the entered offset leaves the maximum range.

CHOICE (default = bold)	INFO
Accept Cancel Repeat calibration	End of calibration Accept: Pressing  accepts the new calibration data. Cancel: The data are not accepted, the calibration is not repeated. Repeat calibration: The data are rejected and a new calibration is started.
Electrode submersed?	Note in display: Is the electrode back in the medium, so that measurement can take place?

Calibration redox relative

"Calibration absolute"

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.

CHOICE (default = bold)	INFO
Calibration with abs. calibration	Note in display Display of the type of on-site calibration selected in the calibration settings.
Immerse electrode in buffer	Handling instructions Immerse the electrode in the buffer. Confirm by pressing  .
0225 mV (-1500 ... +1500 mV)	Enter buffer Enter the buffer mV value.
Time: 10 s mV 1: 225	Checks the stability of the calibration Wait until the measurement is stable: Time does not count down, mV value no longer flashes, Confirm by pressing  .  Note! You can set the criteria for the stability check under  > Setup 1 > Calibration > Cal. settings".
Invalid calibration value	Note in display: Error message if the offset is too large.
Offset 0005 Good mV	Note in display: Info on electrode Information on the offset and calibration quality.
Accept Cancel Repeat calibration	End of calibration Accept: Pressing  accepts the new calibration data. Cancel: The data are not accepted, the calibration is not repeated. Repeat calibration: The data are rejected and a new calibration is started.
Electrode submersed?	Note in display: Is the electrode back in the medium, so that measurement can take place?

Calibration redox relative

"Data entry relative"

Entry of two % calibration points to which one mV value is assigned.

CHOICE (default = bold)	INFO
Calibration with rel. data entry	Note in display Display of the type of on-site calibration selected in the calibration settings.
1. (0...30%): 20 % 1. Voltage 0600 mV 2. (70...100%) 80 % 2. Voltage -0600 mV	Enter calibration points In this field, create two measured value pairs (pair 1 and pair 2). Measured value pair 1 in the range 0...30%: assign, for example, the voltage 0600 mV to the percentage value 20 %. Measured value pair 2 in the range 70...100%: assign, for example, the voltage -0600 mV to the percentage value 80 %. The settings made become effective immediately after confirmation with .
Offset too high / too low	Note in display: Error message if the entered offset leaves the maximum range.
Accept Cancel Repeat calibration	End of calibration Accept: Pressing accepts the new calibration data. Cancel: The data are not accepted, the calibration is not repeated. Repeat calibration: The data are rejected and a new calibration is started.
Electrode submersed?	Note in display: Is the electrode back in the medium, so that measurement can take place?

Calibration redox relative

"Calibration relative"

For calibration, two vessels are filled with a sample of the medium. The contents of the first vessel are detoxified and used as buffer 1.

The contents of the second vessel are left unchanged and used as buffer 2.

CHOICE (default = bold)	INFO
Calibration with rel. calibration	Note in display Display of the type of on-site calibration selected in the calibration settings.
Immerse electrode in buffer 1	Handling instructions Immerse the electrode in buffer 1 / 2 (detoxified sample, see above). Confirm by pressing .
20 % (0 ... 30 %)	Enter buffer Enter the relative redox value of buffer 1 / 2 (detoxified sample) in percent.
Time: 10 s mV 1: 225	Checks the stability of the calibration Wait until the measurement is stable: Time does not count down, mV value no longer flashes, Confirm by pressing . Note! You can set the criteria for the stability check under > Setup 1 > Calibration > Cal. settings".
Invalid calibration value	Note in display: Error message if the offset is too large.
Accept Cancel Repeat calibration	End of calibration Accept: Pressing accepts the new calibration data. Cancel: The data are not accepted, the calibration is not repeated. Repeat calibration: The data are rejected and a new calibration is started.
Electrode submersed?	Note in display: Is the electrode back in the medium, so that measurement can take place?

7 Maintenance

Maintenance of a measuring point with Topclean S comprises:

- Compliance with safety instructions concerning:
 - Personal safety see below
 - System and process see below
- Cleaning and monitoring of the sensor chap. 7.1
- Sensor calibration chap. 7.2
- Maintenance of cables and connections chap. 7.3
- Maintenance of assembly chap. 7.4
- Maintenance of the Topclean S control unit CPG30 chap. 7.5

The transmitter CPM153 does not contain wear parts and is maintenance free.
Measuring point maintenance comprises:

- Cleaning the assembly and electrode
- Inspecting cables and connections,
- Calibration (see page 112).

Personal safety instructions



Warning!

- If you have to remove the electrode, assembly or parts of the assembly during maintenance, pay attention to the process-side hazards caused by pressure, temperature and contamination. Wear protective equipment appropriate to the possible dangers.
- The CPG30 and the retractable assembly work with compressed air and motive water. Switch off the air and water inflow before working on screw unions, valves or pressure switches.
- The non-Ex versions of the CPM153 and CPG30 work primarily with mains voltage. De-energise the devices before you open them. Check that there is no voltage and secure the switch(es) against switch-on. These measures are not necessary with the 24 VDC/AC version.
- If work is required under mains voltage, this may only be carried out by an electrician, a second person must be present for safety reasons.
- Switch contacts may be powered by separate circuits. Also de-energise these circuits before you work on the terminals.

Safety instructions for system and process



Caution!

- Remember that any maintenance work on the device, cabling, assembly or sensors may have impacts on process control or the process itself.
- All measures which influence current outputs, relay contacts or communication should be discussed with a superior beforehand.

7.1 Sensor cleaning and inspection

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

7.1.1 External cleaning of the sensor



Warning!

- Protect hands, eyes and clothing from aggressive cleaning agents.
- Take the necessary protection measures if the sensor is taken directly out of a toxic or an aggressive process.
- Switch the service switch to "Maintenance" to keep the assembly safely in the maintenance position.

The selection of cleaning agent depends on the type of soiling. The most frequent soiling and the associated cleaning agents are listed in the table below: "

Type of soiling	Cleaning agent
Caution! Danger of sensor destruction. No acetone may be used to clean an ISFET pH sensor, otherwise the material may be damaged.	
Greases and oils	Substances containing tensides (alkaline) or water-soluble organic solvents (e.g. alcohol)
Warning! Danger of caustic burns! Protect your hands, eyes and clothing when you use the following cleaning agents.	
Calciferous deposits, metal hydroxide deposits, heavy biological deposits	3% HCl
Sulphide deposits	Mixture of hydrochloric acid (3%) and thiocarbamide (commercially available)
Protein deposits	Mixture of hydrochloric acid (0.1 molar) and pepsin (commercially available)
Fibres, suspended substances	Water under pressure, poss. with surface-active agents
Light biological deposits	Water under pressure



Note!

- Only clean redox electrodes mechanically. Chemical cleaning applies a potential to the electrode that takes several hours to decay. This potential causes measuring errors.
- After cleaning with compressed air, it takes about 5–8 mins until ISFET sensors have re-established the control loop and the measured value has adjusted to the real value.

7.1.2 Inspecting the sensor

Check for air bubbles in the pH electrode:

Air bubbles indicate incorrect installation. Therefore check the installation position:

- Permitted: 15° to 165° to the horizontal.
- Horizontal installation or upside-down installation are not permitted (except when using an ISFET pH sensor).

Check for 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-coloured reference system is reduced and therefore defective. The cause is a current flowing through the reference element.

Possible causes for the current flow:

- Incorrect operating mode of the measuring instrument (PML pin connected, but operating mode without solution ground ("without PML") selected. See functional description, field "Select connection type" on p. 56.
- Shunt in measuring cable (e. g. through humidity) between reference line and grounded screen or PM line.
- Measuring instrument defective (shunt in reference input or entire input amplifier downstream of PE).

Removing diaphragm blockages:

Blocked reference system diaphragms can be mechanically cleaned (only sensors with ceramic diaphragms, does not apply to teflon diaphragms or open ring electrodes):

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

7.1.3 Maintenance of digital sensors

To maintain digital sensors with Memosens technology, proceed as follows:

1. If an error occurs or the sensor must be replaced according to the maintenance schedule, take a new or pre-calibrated sensor from the laboratory. In the laboratory, sensors are calibrated under optimum ambient conditions which guarantees a higher calibration quality.
2. Remove the soiled sensor and install the new sensor.
3. The sensor-specific data are automatically transmitted to the transmitter. A release code is not required.
4. Measurement continues.
5. Take the used sensor back to the laboratory. There, you can regenerate it for reuse without measuring point down time.
 - Clean the sensor. Use the cleaning agents indicated above.
 - Inspect the sensor for damages.
 - If the sensor is not permanently damaged, calibrate it for reuse.

7.2 Manual calibration

When you perform a calibration, consider the operating mode of the pH input. With preselection "with solution ground" (= connection with PML), the PM lines of the CPM153 must also be immersed in the calibration solution.



Note!

The assembly must be moved into the service position with the service switch, before calibrating.

7.3 Maintenance of cables, connections and power supply lines

Weekly checks (recommended timeframe):

Check the tightness of:

- Compressed air hoses and connections
- Motive water hoses and connections
- Hose and connection of cleaner bottle
- Multihose connections of the CPG30 and assembly

Monthly checks (recommended timeframe):

- Check sensor plug-in head for tightness and humidity (if the assembly is located in a humid environment or outdoors).
- Check the sensor cable and particularly the outer insulation for breaks. Sensor cables which have become damp on the inside must be replaced. Only drying is not sufficient!
- Check cable glands for tightness.

Six-monthly checks (recommended timeframe):

- CPM153: Retighten the terminals in the instrument.
- Also check if the interior and the PCBs are clean, dry and free from corrosion.
 - If not: check the seals and screw unions for leaks and breaks.
- Check sensor plug-in head for tightness and humidity (if the assembly is located in a dry environment; if it is located in a humid environment or outdoors, monthly checks are recommended).

7.4 Maintenance of the process assembly

Weekly checks (recommended timeframe):

- Check the upper section of the assembly for compressed air tightness and mechanical damage.
- Check the process connection for tightness against the process and mechanical damage.
- Check the compressed air lines and connections for tightness and mechanical damage.

Annual checks (recommended timeframe):

- External cleaning if necessary. To replace seals, the assembly must be clean, dry and, if necessary, decontaminated.
- With inductive feedback: test and, if necessary, set switching distance
- Replacement of the seals not in contact with the medium (recommended: as necessary, at least once a year)
- Replacement of seals in contact with the medium (at least once a year, no further recommendations possible, as extremely dependent on process, material and level of assembly use)
- End test after completion of maintenance work:
 - Does the assembly move to measuring and service position?
 - Are maintenance and measuring feedback signals available? (Check using the CPM153 status messages)
 - Are 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 or in the special documentation "Cleanfit retractable assemblies" (SD096C/07/a2).

7.5 Maintenance of the control unit CPG30

Weekly checks (recommended timeframe):

- Check the inside of the compressed air connections for tightness:
 - Pneumatic valves
 - Pressure switch.
- Check the multihose connections of the CPG30 and assembly for tightness.

Annual checks (recommended timeframe):

- Retighten the terminals in the cabinet.
- Also check that the interior and the PCBs are clean, dry and free of corrosion.
 - If not: check the seals and screw unions for leaks and breaks.

7.6 Maintenance of the CYR10 injector

Weekly checks (recommended timeframe):

- Check the hydraulic connections (motive water, cleaner, output) for tightness.
- Check level of cleaning solution. Top up if necessary.
- Check and if necessary clean the dirt trap in the motive water line.

Annual checks (recommended timeframe):

- Check that the electrical connections (valve blocks) are secure.
- Check that the valve body is secure.
- Renew the water valve seal (wear parts set, see page 140).
- Renew the cleaner check valve (wear parts set, see page 140).

8 Troubleshooting

Troubleshooting relates to:

- measures which can be carried out without opening the instrument
- instrument defects which require the replacement of components.

8.1 Troubleshooting instructions

In this chapter, you will find diagnosis information and information on eliminating errors which occur:

- | | | |
|---|---|--------------------------------------|
| chap. 8.1.1, p. 125: Error number list | ⇒ | list of all occurring error numbers. |
| chap. 8.1.2, p. 129: Process-specific errors | ⇒ | e.g. temperature value is incorrect |
| chap. 8.1.3, p. 131: Instrument-specific errors | ⇒ | e.g. display is dark |

Before starting the repair work, please note the following safety instructions:



Warning!

Danger to life.

- De-energise the instrument before you open it. Check that there is no voltage and secure the switch(es) against switch-on.
- If work is required under voltage, this may only be carried out by an electrician, a second person must be present for safety reasons.
- Switch contacts may be powered by separate circuits. Also de-energise these circuits before you work on the terminals.



Caution!

Danger to components through electrostatic discharge (ESD).

- Electronic components are sensitive to electrostatic discharge. Take protective measures, e.g. remove the charge from your person by touching the PE or wear a wrist strap for permanent grounding.
Highly dangerous: Plastic floors at low air humidity and clothing made of synthetic materials.
- For your own safety, always use genuine spare parts. Only genuine spare parts ensure correct functioning, accuracy and reliability after corrective maintenance.

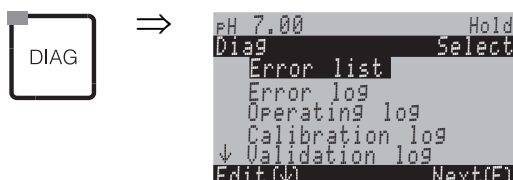
8.1.1 Error number list: Trouble-shooting and configuration

In the following error list, you can find a description of all error numbers.

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 enter the error list, proceed as follows:



Note!

The second column shows the assignment acc. to NAMUR work sheet NA64 (failure, maintenance, function control). The NAMUR error with the highest priority is shown in the status field of the display.

Error no.	NAMUR class	Error message	Possible causes / measures	Alarm contact		Error current		Automatic cleaning start	
				Fact	User	Fact	User	Fact	User
E001	Failure	Memory defective	Switch instrument off and on. If necessary corrective maintenance at factory.	yes		no		–	–
E002	Failure	Data error in EEPROM		yes		no		–	–
E 003	Failure	Invalid configuration	Repeat download.						
E004	Failure	Invalid hardware code	The new software cannot recognise the module.						
E005	Failure	Unknown CPG code	Topclean S is not recognised. Topclean S is not compatible to Mycom S software.	yes		no		–	–
E006	Failure	Transmitter 1 defective	Test with new transmitter	yes		no		–	–
E007	Failure	Transmitter 2 defective		yes		no		–	–
E 008	Failure	SCS message sensor 1	Impedance of pH glass membrane too low: check pH sensor; replace it, if necessary For ISFET sensors: leak current > 400 nA. Replace sensor.	yes		no		no	
E 010	Failure	Temperature sensor 1 defective	Check temperature sensor and connections. ISFET: Check selection in field "Select temperature sensor".	yes		no		no	
E012	Failure	CPG communication failure	Check Topclean S connecting cable.	yes		no		no	
E013	Failure	Assembly has not reached service position	Check assembly position and feedback signals, Compressed air present? Check pneumatic lines to the assembly. Assembly blocked mechanically? For non-Ex: External power supply 24 V/220V (not supply from Mycom) present? Possibly, microfuse is blown.	yes		no		no	
E014	Failure	Assembly has not reached measuring position		yes		no		no	
E017	Failure	Data error in CPC30 EEPROM	Switch instrument off and on. If necessary corrective maintenance at factory.	yes		no		–	–

Error no.	NAMUR class	Error message	Possible causes / measures	Alarm contact		Error current		Automatic cleaning start	
				Fact	User	Fact	User	Fact	User
E024	Failure	CPG programme interrupted	Control input 87/88 switched: Ext. control criteria.	yes		no		no	
E027	Failure	Compressed air failure	Pressure below permitted minimum connection not correct, test: termin. D3/D4 pressure > 2 bar, contact closed: 0 V; pressure < 2 bar, contact open: 3.2 V.	yes		no		no	
E029	Failure	Sensor self test error	Error detected during sensor self test. Check sensor. If necessary, replace it.	yes		no		–	
E 030	Failure	SCS fault reference electrode 1	Reference impedance too high: Check reference element and, if necessary replace reference or combination electrode For ISFET sensor: leak current > 400 nA. Replace sensor.	yes		no		–	–
E 032	Failure	Outside set slope range for sensor 1	Sensor aged or defective; Reference aged, defective or diaphragm blocked; Buffer solutions too old or contaminated; PML not in the buffer solutions	yes		no		–	–
E 033	Failure	Outside set zero point for sensor 1		yes		no		–	–
E 034	Failure	Outside set offset range for sensor 1		yes		no		–	–
E040	Maintenance	SCC / electrode status of sensor 1 bad	Check sensor, replace if necessary; maybe clean, (glass membrane blocked or run dry; diaphragm blocked).	yes		no		–	
E043	Maintenance	Buffer difference channel 1 too small	Wrong buffers used; Buffer entry incorrect; automatic buffer recognition defective.	yes		no		–	
E044	Maintenance	Meas. value channel 1 unstable	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 if necessary.	yes		no		–	
E053	Failure	Failure three-point step controller	reserved	yes		no		no	
E054	Maintenance	Dosage time alarm	Dosage time exceeded at total dosage. Dosage interrupted, dosing agent empty or process too inconsistent.	yes		no		no	
E055	Failure	Display range of main parameter 1 undershot	Measuring line broken, sensor in air or air cushion in assembly, Potential matching missing in symmetrical measurement, static charging in media with lowest conductivity	yes		no		no	
E057	Failure	Display range of main parameter 1 exceeded		yes		no		no	
E059	Failure	Temperature range 1 undershot	Temperature sensor defective; Sensor line interrupted or short-circuited; Wrong sensor type selected	yes		no		no	
E061	Failure	Temperature range 1 exceeded		yes		no		no	

Error no.	NAMUR class	Error message	Possible causes / measures	Alarm contact		Error current		Automatic cleaning start	
				Fact	User	Fact	User	Fact	User
E063	Maintenance	Current limit 0/4 mA output 1	Measured value outside specified current range: Check measured value for plausibility, if necessary adjust current output assignment 0/4 mA and/or 20 mA.	yes		no		no	
E064	Maintenance	Current limit 20 mA output 1		yes		no		no	
E065	Maintenance	Current limit 0/4 mA output 2		yes		no		no	
E066	Maintenance	Current limit 20 mA output 2		yes		no		no	
E067	Maintenance	Reference value exceeded controller LS 1	Dosing devices defective; chemical supply empty; measured value incorrect -> check for plausibility and function; incorrect control direction set; incorrect contact assigned; incorrect control function assigned	yes		no		no	
E068	Maintenance	Reference value exceeded controller LS 2		yes		no		no	
E069	Maintenance	Reference value exceeded controller LS 3		yes		no		no	
E070	Maintenance	Reference value exceeded controller LS 4		yes		no		no	
E071	Maintenance	Reference value exceeded controller LS 5		yes		no		no	
E073	Failure	Temperature 1, table value undershot	Check temperature value for plausibility. If necessary, adjust or extend table.	yes		no		no	
E074	Failure	Temperature 2, table value undershot		yes		no		no	
E075	Failure	Temperature 1, table value exceeded		yes		no		no	
E076	Failure	Temperature 2, table value exceeded		yes		no		no	
E080	Maintenance	Range for current output 1 too small	Increase measuring range span for current output assignment	no		no		no	
E081	Maintenance	Range for current output 2 too small		no		no		no	
E090	Function check	CPG service switch active	Check on CPG if service was actually carried out.	no		no		no	
E094	Failure	Incompatible sensor version	Digital sensor and transmitter are not compatible. Maybe, Ex version of sensor is used with non-Ex version of transmitter or vice versa	no		no		no	
E100	Function check	Current simulation active	Check if functions were consciously selected.	no		no		no	
E101	Function check	Service function active		no		no		no	
E106	Function check	Download active	Wait for download to end.	no		no		no	
E116	Failure	Download error	Repeat download.	no		no		no	
E117	Failure	DAT memory module data error	Check with other DAT memory module; when writing to DAT: repeat write process	yes		no		no	
E127	Failure	Sensor power fail	Sensor communication present but sensor has to little current. Check whether Memosens connection is correctly inserted and locked.	no		no		no	

Error no.	NAMUR class	Error message	Possible causes / measures	Alarm contact		Error current		Automatic cleaning start	
				Fact	User	Fact	User	Fact	User
E146	Failure	no sensor	Digital sensor is not correctly plugged in or connected. The transmitter goes into hold. Hold is removed after the sensor has been correctly plugged in or wired and transmits measured values.	no		no		no	
E152	Maintenance	PCS Channel 1 alarm	pH sensor defective or totally soiled; measured water flow in bypass interrupted; air cushion in assembly; measuring line interrupted.	no		no		no	
E 156	Function check	Calibration timer run out	Time for calibration!	no		no		no	
E164	Failure	Dynamic range of pH convertor 1 exceeded	Check cable / sensor.	yes		no		—	
E166	Failure	Dynamic range of reference convertor 1 exceeded		yes		no		—	
E168	Maintenance	SCS message ISFET sensor 1	Leak current > 200 nA. Early warning. Work can be continued until error E008/E009 occurs.	no		no		—	
E171	Maintenance	Current input 1 undershot	Check process variables at transmitter. Change range assignment if required.	no		no		—	
E172	Maintenance	Current input 1 exceeded		no		no		—	
E173	Maintenance	Current input 2 undershot		no		no		—	
E174	Maintenance	Current input 2 exceeded		no		no		—	
E175	Maintenance	SCS glass warning	Check digital sensor for glass breakage or hairline cracks; check medium temperature. Measurement can continue until the error occurs.						
E177	Maintenance	SCS reference electrode warning	Check digital sensor for contamination and damage; clean the sensor. Measurement can continue until the error occurs.						
E179	Failure	Data error sensor	Digital sensor does not deliver measured values. Sensor not correctly plugged in or wired?	no		no		no	

8.1.2 Process-specific errors

Error	Possible cause	Remedial action	Equipment needed, spare parts
Instrument unconfigurable, Display for code prompt is 9999	Instrument hardware is locked via key-pad (Keys "CAL" + "DIAG" simultaneously = security locking)	Press "MEAS" and "PARAM" simultaneously to unlock.	
Measuring chain zero point not settable	Reference system poisoned Diaphragm blocked Measuring line broken Unsymmetrical sensor voltage too high Potential matching (PA/PM) Mycom $\leftrightarrow$ Incorrect medium	Test with new electrode. Clean diaphragm or grind ceramic diaphragm. pH input on instrument short-circuit $\Rightarrow$ Display pH7 Clean diaphragm or test with different electrode. asymm.: no PM or PM on PE symm.: PM connection needed	pH/mV electrode HCl 3%, file (ceramic diaphragm only, only file in one direction) Reterminate or use new cable HCl 3%, file (ceramic diaphragm only, only file in one direction) Connection s. chap. 4.1.3
No calibration possible, as sensor settling time is too long	ISFET sensors only: 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 min. Do not use compressed air to clean the ISFET sensor.	
No calibration possible as measuring chain slope not adjustable/slope too small	Connection not at high impedance (humidity, dirt) Instrument input defective Electrode aged	Test cable, connector and junction boxes. Directly test instrument. Replace electrode.	pH simulator pH simulator pH electrode
No calibration possible as measuring chain slope not adjustable/no slope	Hairline crack in glass membrane Connection not at high impedance (humidity, dirt) Semi-conductor layer in measuring cable not removed	Replace electrode. Test cable, connector and junction boxes. Check inner coaxial cable, remove black layer.	pH electrode pH simulator, see also Chap. 7.3.2 See page 23.
No or slow display change	Electrode soiled Electrode aged Electrode defective (reference lead) Inner buffer missing Problem with diaphragm or missing electrolyte	Clean electrode. Replace electrode. Replace electrode. Electrodes with liquid KCl only (CPS41, CPS441): Check KCl supply (0.8 bar above medium pressure).	s. chap. 7.1 New electrode New electrode KCl (CPY4-x)
Permanent, incorrect measured value	Electrode not immersing or protective cap not removed Air cushion in assembly Earth fault at or in the instrument Shunt due to moisture in cable or plug Hairline crack in glass membrane Instrument in impermissible operating status (no response on pressing key)	Check installation position, remove protective cap. Check assembly and installation position. Test measurement in insulated vessel, possibly with buffer solution. Check cable with plug for high impedance. Replace if necessary. Replace electrode. Switch instrument off and on.	Plastic vessel, buffer solutions. Behaviour when instrument is connected to process? pH electrode EMC problem: If repeated, check grounding and wire routing
Incorrect temperature reading	Incorrect sensor connection Measuring cable defective Incorrect sensor type selected Sensor defective	Check connections using wiring diagram. Check cable. Set sensor type on instrument. Check sensor.	Wiring diagram see page 38 Ohmmeter Check temperature sensor with Ohmmeter.

Error	Possible cause	Remedial action	Equipment needed, spare parts
pH value in process incorrect	No / incorrect temperature compensation Conductivity of medium too low Flow rate too high Potential in medium Device unsymmetrical and PML connected Electrode soiled or with deposits	ATC: Activate function MTC: Set process temperature Select pH electrode with liquid KCl. Reduce flow rate or measure in a bypass. Possibly earth with / at PM pin (connect PM to PE). Possibly earth with / at PM pin (connect PM to PE) Clean electrode (see Chap. 8.8.1).	e.g. Ceraliquid CPS41, Purisys CPF201 Problem mainly occurs in plastic lines Highly polluted media: Use spray cleaning.
Measured values fluctuate	Interference in measuring cable Faults in signal output line Interference potential in medium No potential matching (PA/PM) With symmetrical measurement	Connect cable screening as per wiring diagram. Check line installation, possibly route line separately. Symmetrical measurement (with PML) Connect PM pin in assembly to device terminal PA/PM.	Wiring diagram see page 38 Possibly earth medium by connecting PM to PE
Controller / limit contact does not work	Controller switched off Controller in "Manual / Off" mode Pick-up delay setting too long "Hold" function active – "Auto hold" during calibration – "Hold" input activated – Manual "hold" active using keypad – "Hold" active during configuration	Activate controller s. chap. 6.6. Select "Auto" or "Manual on" mode. Switch off or shorten pickup delay period. Determine cause of hold and eliminate if not desired.	Keypad / PARAM / manual operation / contacts "Hold" is indicated in display when active
Controller / limit contact work continuously	Contact in "Manual/on" mode Dropout delay setting too long Control circuit interrupted	Set controller to "Manual/off" or "Auto". Shorten dropout delay period. Check measured value, current output or relay contacts, actuators, chemical supply.	
No pH/mV current output signal	Line open or short-circuited Output defective	Disconnect both (!) lines and measure directly on instrument. Replace controller module	mA meter 0–20 mA DC See spare parts list in chap. 8.3
Fixed current output signal	Current simulation active Processor system inactive "Hold" is active.	Switch off simulation. Switch instrument off and on. "Hold" status see display.	See DIAG / Service / Simulation EMC problem: If repeated, check installation
Current output signal incorrect or different than expected	Incorrect current assignment Incorrect signal assignment Total load in current circuit too high (> 500 ohms)	Check current assignment: Check whether you selected 0–20 mA or 4–20 mA. Any current output can be assigned to any measured value (pH1 or 2, Temp. 1 or 2, Delta pH) Disconnect output and measure current directly on instrument.	Check under "PARAM" / current output. mA Meter for 0–20 mA DC
Data cannot be saved	No DAT memory module available		DAT available as accessory, s. chap. 9
CPG30 does not work (non-Ex version)	No supply voltage	Check connection.	
	Fuse defective	Check, if necessary, replace.	
	Switch to "Maintenance"	Turn switch to "Measure".	
CPG30 does not work (Ex version)	Power supply from CPM153 defective.	Measure, CPG30 terminals L+/L–	DVM 20 V DC

Error	Possible cause	Remedial action	Equipment needed, spare parts
No cleaner conveyance	– Tank empty – Line blocked	Check error messages. Test functions in manual operation.	Indicator LEDs CPG30 (see fig. 35 / fig. 36, page 39): V1: Additional valve 1 active Meas: Assembly in measurement mode Alive: LED flashes irregularly, if function o.k. Pressure switch feedback (Pos.No. 440, p. 136) type "active open": no pressure = closed with pressure = open.
Assembly stays in "Service" position	– No compressed air – Switch to "Maintenance" – Incorrect position feedback signal	Check error messages Test functions in manual operation. Disconnect pressure switch and check with Ohmmeter.	
Assembly stays in "Measurement" position	– No compressed air – Switch to "Measurement" – Incorrect position feedback signal		
Assembly permanently proceeds	Pneumatic hoses to assembly connected in a wrong way	Check pneumatic hoses.	
Assembly proceeds several times without correct feedback	– Pneumatic connections interchanged – Feedback not correctly connected – Feedback switch is wrongly adjusted – Assembly has been proceeded manually. Feedback signal is, therefore, undefined.	– fig. 29, page 34 or fig. 32, page 36 and fig. 53, page 139: Hose 2 "measuring" to valve 5 in front, hose 3 "service" to valve 5 in the back. – fig. 29, page 34 or fig. 32, page 36 and fig. 53, page 139: Hose 5 "measuring" feedback (terminals. 11/12), hose 6 "service" feedback (terminals 13/14) – Feedback switch under pressure: opened: Kl. 11/12-13/14 = 14 V closed: Kl. 11/12-13/14 = 0 V – Position change via menu manual operation	

8.1.3 Instrument-specific error

Error	Possible cause	Tests and / or remedial action	Equipment, spare parts, personnel
Display dark, no LEDs active	- No mains voltage - Supply voltage incorrect or too low - Connection defective - Instrument fuse defective (non-Ex) - Instrument fuse defective (Ex) - Power unit defective - Central module defective (if all 6 LEDs on the power unit M3G are lit) - Ribbon cable loose or defective	Check whether mains voltage is applied. Compare actual mains voltage with nameplate rating. Terminal not picked-up; insulation clamped. Replace fuse after comparing mains voltage and nameplate rating. Replace fuse. Replace power unit, pay attention to variant. Replace central module. Pay attention to variant. Check ribbon cable.	Electrician / e.g. multimeter Electrician / suitable fuse; see fig. 49 (p. 135) Use Ex fuse; electrician required On-site diagnosis: all 6 red LEDs on the M3G module must be lit On-site diagnosis by responsible service (test module required) Cable soldered onto the site of the M3G module
Display dark, but LED active	Central module defective (Module: M3Cx-x)	Replace central module M3Cx-x.	On-site diagnosis by responsible service (test module required)
Display functioning, but no change in display and/or instrument cannot be operated	- Instrument or module in instrument not correctly installed - Operating system in impermissible state	Check module connections. Switch instrument off and on.	See device view on page 135 Possibly EMC problem: if problem persists, have installation checked by responsible service

Error	Possible cause	Tests and / or remedial action	Equipment, spare parts, personnel
Instrument gets hot	Incorrect mains voltage or too high Power unit defective	Compare mains voltage and nameplate rating. 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: MKP2), please carry out tests and measures first as described in chap. 8.1.2	Test measuring inputs: – Connect pH, Ref and PA directly on the instrument with wire jumpers: Display must be pH 7. – Resistance 100 Ω of Terminals 11 to 12+13. Display must be 0 °C.	If test negative: Replace module MKP2, bushing using the device view on page 135
Current output, Current value incorrect	Calibration incorrect: – Load too high – Shunt / short-circuit to frame in current circuit Incorrect operating mode	Test with integrated current simulation, connect mA meter directly to current output. Check whether 0–20 mA or 4–20 mA is selected.	If simulation value incorrect: new module M3Cx-x required. If simulation value correct: check current circuit for load and shunts
No current output signal	Jumper incorrectly set Current output stage defective (Module: M3CH-x) Instrument with PROFIBUS® interface	Change coding. Test with integrated current simulation, connect mA meter directly to current output. PROFIBUS® instruments do not have a current output.	See chap. 8.4.2 If test negative: Replace module M3CH-x (Check variants, see spare parts list in chap. 8.3) For information, see "DIAG" / internal data

8.2 Response of outputs to errors

8.2.1 Current output behaviour

If an error occurs in the system, an error current is output at the current output. You can adjust the value of this error current in the Alarm menu (see page 65).

If you have configured the controller for functioning with current output 2, this output does not output an error current if an error occurs.

8.2.2 Response of contacts to errors

You can set each individual error message to trigger or not to trigger an alarm (see table on page 125, editing errors on page 65). In "NAMUR" mode, failure messages always trigger an alarm.

Behaviour with standard setting

Instrument status	Alarm relay	Limit value / Controller
Normal operation	picked-up (Fail-safe behaviour)	Corresponding to configuration and operating status
Alarm	Dropped out	
Voltage-free	Dropped out	Dropped out
Hold	Picked-up	Corresponding to configuration and operating status.

Behaviour with NAMUR setting

Instrument status	Alarm relay	Maintenance relay	Function check	Limit value/Controller
Normal operation	Picked-up (Fail-safe behaviour)	Picked up	Picked up	Corresponding to configuration and operating status
Failure	Dropped out	Picked up	Picked up	Corresponding to configuration and operating status
Maintenance required	Picked up	Dropped out	Picked up	Corresponding to configuration and operating status
Function check	Picked up	Picked up	Dropped out	Corresponding to configuration and operating status
Voltage-free	Dropped out	Dropped out	Dropped out	Dropped out
Hold				Corresponding to configuration and operating status

8.2.3 Response of contacts to power failure

In the "Set up 1" menu ➡ "Relays", you can define the contacts as "Active open" or "Active closed" contacts (see page 61). In case of a power failure, the contacts will act according to the setting you make.

8.2.4 Assembly behaviour

Problem	Behaviour CPM153	Behaviour CPG30	Assembly behaviour
CPM153 voltage failure during measurement	No function		
CPM153 voltage failure during maintenance	No function		
CPG30 voltage failure during measurement	Error message E012	All valves closed	Can be pushed out of the process.
CPG30 voltage failure during maintenance	Error message E012	All valves closed	Stays in service position
Air failure during measurement	Error message		Can be pushed out of the process.
Air failure during maintenance	Error message E027		Stays in service position
Air failure during autoclean	Error message E027		Stays in service position

8.3 CPM153 spare parts

For your own safety, always use genuine spare parts. Only genuine spare parts ensure correct functioning, accuracy and reliability after corrective maintenance. You receive all spare parts in the form of service kits with a unique code, optimally adapted packaging including ESD protection for modules and a set of instructions.

CPM153: Module /spare parts list

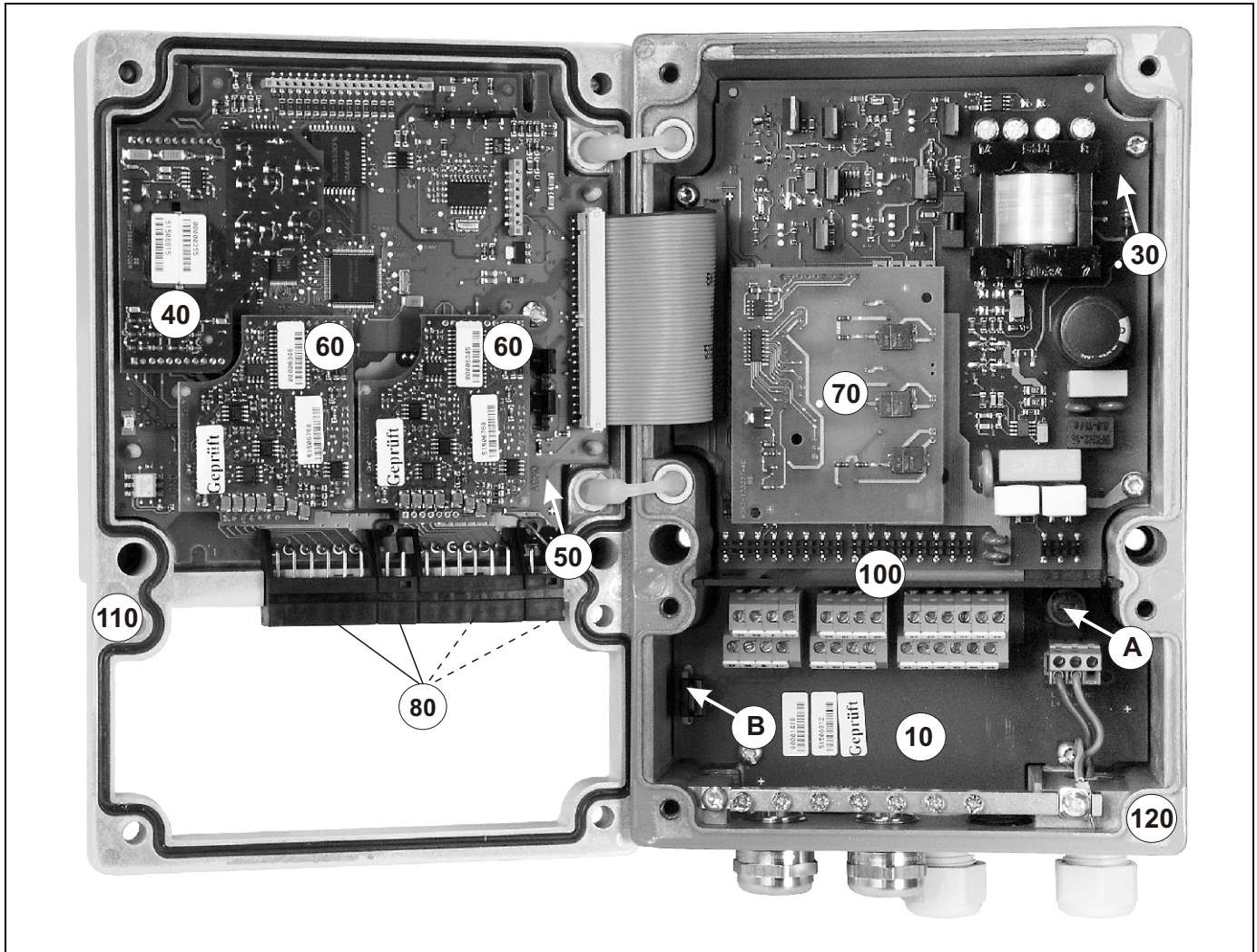
The table below shows the order codes of spare part kits. The position numbers relate to fig. 49.

Pos No.	Kit name	Contents / use	Order code
A	Fuse	Fuse, 5 x 20 mm, medium slow, 250 V / 3,15A	50008351
B	DAT module	DAT module	51507175
10	Terminal module Standard+HART	Module M3K / non-Ex	51507084
10	Terminal module PROFIBUS	Module M3K / non-Ex	51510998
30	Power supply 100 ... 230 VAC non-Ex	Module M3G, power unit + 3 relay	51507087
30	Power supply 24 VAC/DC non-Ex	Module M3G, power unit + 3 relay	51507089
50	CPM153 delivered until 11/30/2004: Controller module pH, 2 x current output	Module M3CH-S2 / Non-Ex	51510994
50	CPM153 delivered until 11/30/2004: Controller module pH, 2 x current + HART	Module M3CH-H2 / Non-Ex	51510993
50	CPM153 delivered until 11/30/2004: Controller module pH, PROFIBUS-PA	Module M3CH-PA / non-Ex	51510995
50	CPM153 delivered from 12/01/2004 (from serial no. 6Cxxxx05G08): Controller module pH, 2 x current output		51517384
50	CPM153 delivered from 12/01/2004 (from serial no. 6Cxxxx05G08): Controller module pH, 2 x current output + HART		51517386
50	CPM153 delivered from 12/01/2004 (from serial no. 6Cxxxx05G08): Controller module pH, PROFIBUS-PA		51517388
60	pH input module glass + ISFET	Module MKP2 / Ex and non-Ex	51507096
60	pH input module Memosens	Module MKD / Ex and non-Ex	51514966
70	Relay module 3 additional relays	Module M3R-3 / Ex and non-Ex	51507097
80	Terminal set for pH input glass, 2 pairs	Six-pin terminal + two-pin terminal, 2 pieces each	51507100
80	Terminal set for pH input ISFET, 2 pairs	Six-pin terminal + two-pin terminal, 2 pieces each	51507858
90	Jumper set	Five sets of all three jumper types	51507102
100	Partition plate for connection compartment	Five partition plates	51507103
110	Front cover non-Ex	Upper section with keypad sheet, connection compartment cover, hinge, nameplate	51507104
120	Back cover non-Ex	For one and two-circuit instruments, cpl.	51507106
130	PROFIBUS M12 plug with cables	For installation in Pg installation place	51510930

8.4 CPM153 Installation and removal of parts

Please observe the safety instructions in chap. 8.3.

8.4.1 Device view CPM153



C07-CPC300xx-09-06-00-xx-003.pdf

fig. 49: Interior view of the transmitter Mycom S

Remarks:

A The figure shows the non-Ex fuse.

B Slot for DAT memory module

8.4.2 Codings

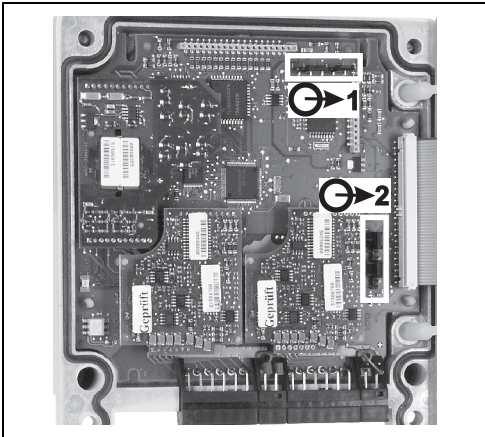
Current outputs active or passive:

In the device versions CPM153-xxxA/-xxxB (2 current outputs) the current outputs can be operated as either active or passive. Jumpers on the controller module M3CH allow recoding.

For **non-Ex** instruments, these modules may be recoded to active outputs.

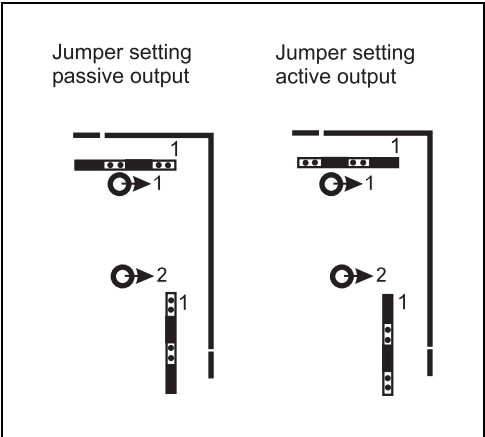


Warning!
Ex instruments must **not** be recoded. Doing so will cause loss of intrinsic safety!



C07-CPM153xx-09-06-00-xx-001.eps

fig. 50: Coding of the current outputs
(Interior view of the CPM153 housing upper section)



C07-CPM153xx-09-06-00-en-002.eps

fig. 51: Active/passive coding of the current outputs

8.5 CPG30 Spare parts

For your own safety, always use genuine spare parts. Only genuine spare parts ensure correct functioning, accuracy and reliability after corrective maintenance. You receive all spare parts in the form of service kits with a unique code, optimally adapted packaging including ESD protection for modules and a set of instructions.

Spare parts CPG30

The table below shows the order codes of spare part kits. The position numbers relate to fig. 52.

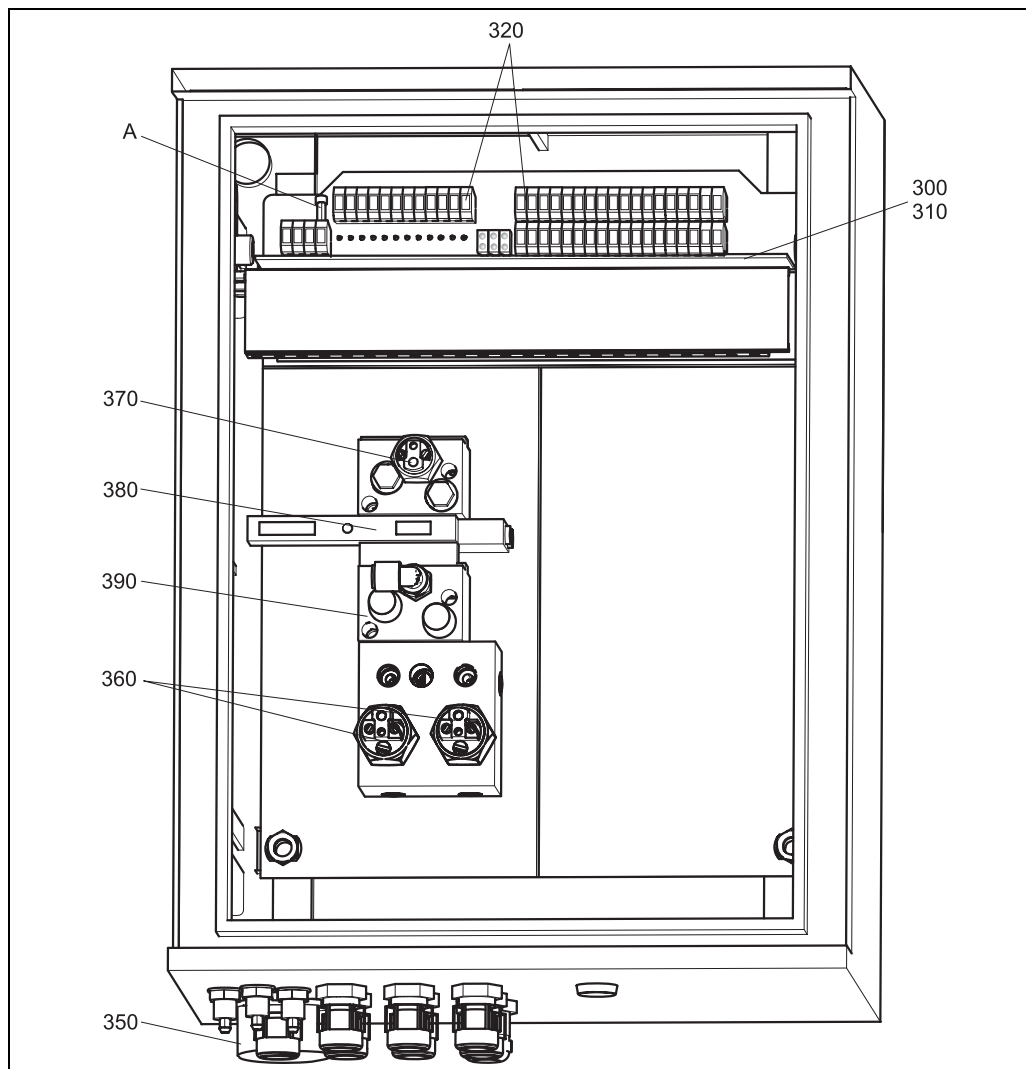
Pos No.	Kit name	Contents / use	Order number
300	Electronics module CPG30 110/230 VAC non-Ex	tested, complete module; with the 110/230 VAC version, the voltage can be selected with jumpers.	51507109
310	Electronics module CPG30 24 VDC/AC non-Ex		51507110
320	Terminal strip set Ex and non-Ex	all required plug-in terminal strips	51507436
350	Multihose connection	pneumatic multiplug in housing installation version.	51507446
360	Assembly feedback pressure switch	pressure switch, active closed contact	51507447
370	Pneumatic pressure switch	pressure switch	51507448

Pos No.	Kit name	Contents / use	Order number
380	Single non-Ex valve	electrically-operated valve (coil)	51507449
390	Pneumatics module CPG30 (non-Ex) with 1 valve	module with basic section, valve, pressure switch, mufflers	51508252
	Multihose CPC30 5 m	5 hoses in protective hose with pneumatic multiplug	51507461
	Multihose CPC30 10 m		51508786
	Kit of pneumatic / hydraulic small parts	hoses ID 4/ 6 mm, hose adapters, 4/6 adapter , T-sections, hose connections, Schott connections, non-return valves, screws, spring	51507459

8.6 CPG30 Installation and removal of parts

Please observe the safety instructions in chap. 8.5.

8.6.1 Device view CPG30



C07-CPG30xxx-10-12-08-xx-001.eps

fig. 52: Complete view of CPG30 housing

A Fuse

8.7 Detailed plans of CPG30

You can follow the signals using the detailed plans and check the internal wiring.

8.7.1 Terminal wiring diagram CPG30

Please refer to chap. 4.4 and chap. 4.6.

8.7.2 Pneumatics and hydraulics CPG30 non-Ex

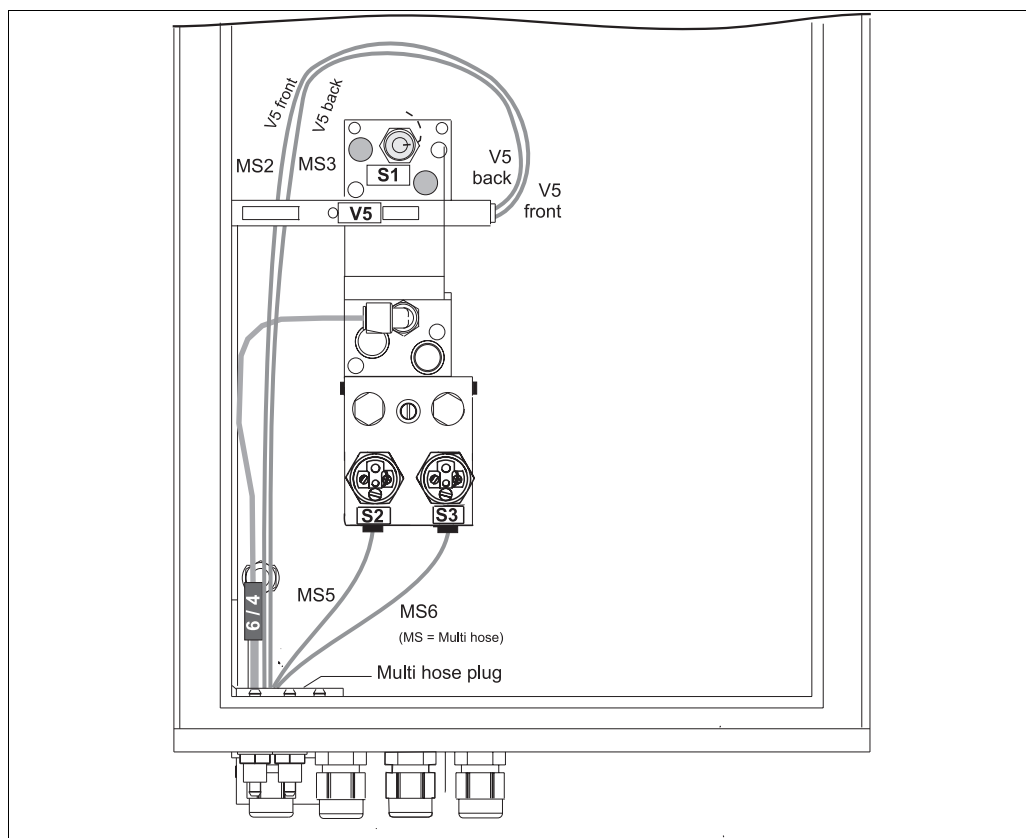


fig. 53: Pneumatics and hydraulics plans for CPG30 non-Ex

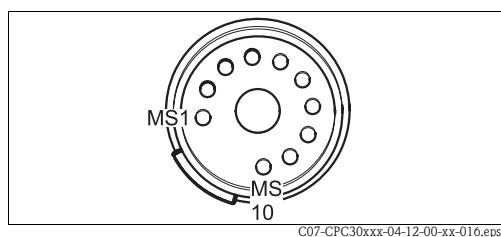
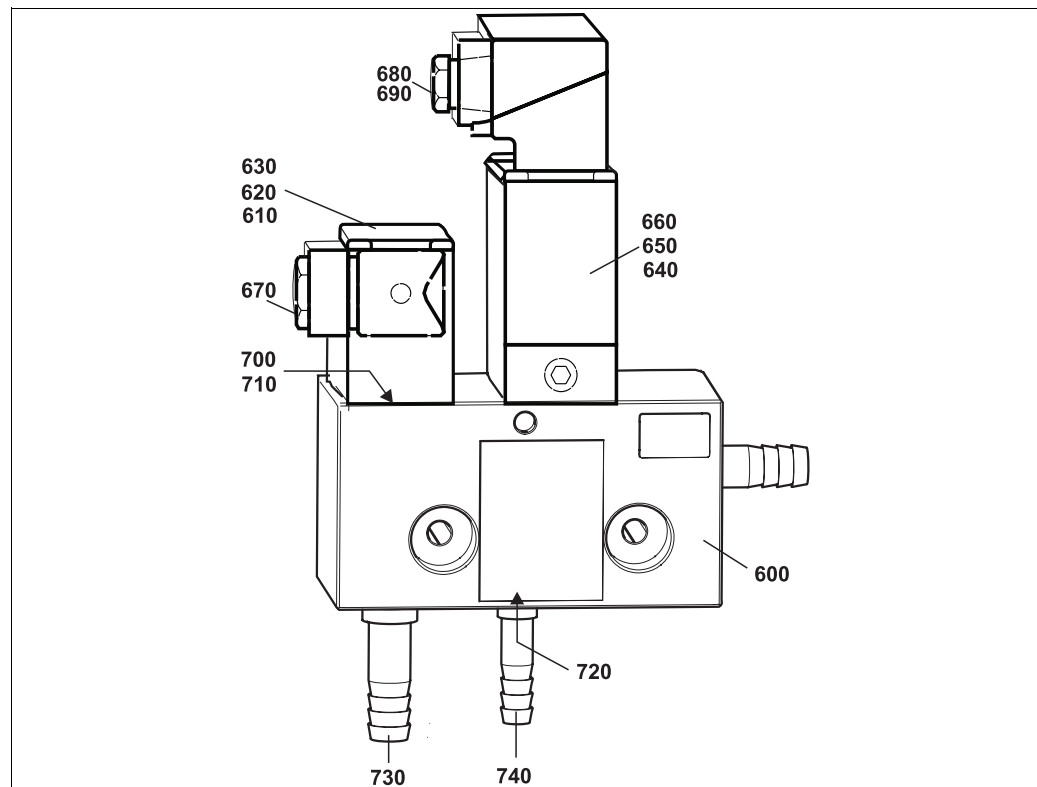


fig. 54: Multihose connection (from below)

Multihose connection	Valves (electrically controlled)	Pressure switch	Signal / use
1			Free
2	V5 rear		Assembly in measuring position
3	V5 front		Assembly in service position
4			Free
5		S2	"Measurement" feedback (not used with inductive feedback)
6		S3	"Service" feedback (not used with inductive feedback)
7-10			Free
		S1	Compressed air monitoring

8.7.3 CYR10 injector



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fig. 55: Spare parts CYR10 injector

Spare parts CYR10

Pos. no.	Kit name	Content / use	Order number
600	Complete PVC valve block	Basic section with check valve	50069347
610	Motive water valve 230 V AC	Valve body without connection plug	50069349
620	Motive water valve 110 V AC	Valve body without connection plug	50069350
630	Motive water valve 24 V DC	Valve body without connection plug	50069351
640	Cleaning agent valve 230 V AC	Valve complete without connection plug	50069352
650	Cleaning agent valve 110 V AC	Valve complete without connection plug	50069353
660	Cleaning agent valve 24 V DC	Valve complete without connection plug	50069354
670	Connection plug for water valve	Four-pin plug with seal	50072992
680	Connection plug for cleaning agent valve 110 / 230 V AC	Plug with integrated interference suppression	50069345
690	Connection plug for cleaning agent valve 24 V DC		50069346
700	Wear part set, water valve 110 / 230 V AC	Membrane seal and guide, armature, spring, screws	50086190

Pos. no.	Kit name	Content / use	Order number
710	Wear part set, water valve 24 V DC		50086191
720	Wear part set, internal check valve	Valve body, ball, seals	50086192
730	Pressure hose nozzle D 16 G ¾ for motive water		50072990
740	Pressure hose nozzle D 12 G ¼ for cleaner		50072991

8.8 Replacing the device fuses



Warning!

Danger to personnel.

Before replacing the fuse, make sure the device is voltage-free.

Fuse CPM153:

- Position of the fuse holder: "A" in fig. 49.
- Use only a 5 x 20 mm fine-wire fuse with 3.15 A, medium slow-blow. All other fuses are not permitted.

Fuse CPG30

- Position of the fuse holder: "A" in fig. 52.
- Use only a 5 x 20 mm fine-wire fuse with 3.15 A, medium slow-blow. All other fuses are not permitted.

8.9 Disposal

The Mycom S CPM153 transmitter contains electronic components and PCBs and therefore must be disposed of as electronic refuse. Please keep to the local regulations.

Apart from the mechanical components, the CPG30 also contains electronic components. For disposal purposes, separate the device into electronics, plastic (housing) and metal rubbish.

The assembly may be contaminated by the medium. Therefore, when disposing of it, the plant disposal or safety officer must be consulted.

9 Accessories

Offline configuration with Parawin

The Parawin tool provides you with a graphic PC operating programme for configuration of your measuring point at the PC using a simple and self-explanatory menu structure. Write the configuration to the DAT module using the RS232 interface on the PC. The module can then be plugged into the transmitter. You can switch the language via software.

The offline configuration system consists of a DAT module, the software and a DAT interface (RS 232). Required operating system: Windows NT/95/98/2000.

Order No.: 51507133 (Mycom S only)

Order No.: 51507563 (Topcal S, Topclean S / Mycom S)

DAT module

The DAT module is a memory device (EEPROM) which can be easily plugged into the connection compartment of the transmitter. Using the DAT module, you can

- save complete settings, logbooks and the data logs of the CPM153 and
- copy the complete settings to other CPM153 measuring transmitters which have identical hardware functionality.

This considerably reduces the effort to install or service several measuring points.

Order No.: 51507175

Assemblies

Type	Properties	Applications
Cleanfit CPA471/ 472/473/474/ 475	Retractable assembly for manual or pneumatic operation. Cleaning and calibrating the electrode is possible under process conditions. CPA475: 3A approval, EHEDG. Technical Information: CPA471: TI 217C/07/en, Order No.: 51502596 CPA472: TI 223C/07/en, Order No.: 51502645 CPA473: TI 344C/07/en, Order No.: 51510923 CPA474: TI 345C/07/en, Order No.: 51510925 CPA475: TI 240C/07/en, Order No.: 51505599	■ Process systems in general (471, 472, 473, 474) ■ Food, pharmaceutical applications (475) ■ Biotechnology (475)

pH/redox electrodes

Type	Properties	Applications
Orbisint CPS11/11D/ 12/13	Universally applicable, very easy to clean and insensitive to soiling due to PTFE diaphragm, pressures up to 6 bar, conductivity > 50 µS/cm Technical Information TI 028C/07/en, 50054649 and TI 367C07/en, 51513586	■ General process engineering ■ Industrial wastewater ■ Detoxification (cyanide, chrome) ■ Neutralisation
Ceraliquid CPS41/42/43	Electrodes with ceramic diaphragms and KCl liquid electrolyte, use with counterpressure, explosion-proof up to 8 bar Technical Information TI 079C/07/en, 50059346	■ General process engineering ■ Ultra-pure water ■ Boiler feed water ■ Detoxification (cyanide)
Ceragel CPS71/71D/ 72	Gel electrode with double-chamber reference system. Long-term stability, short response time, very long diffusion path for electrode poison, resistant to alternating temperature and pressure cycles Technical Information TI 245C/07/en, 51505837 and TI 374C/07/en, 51513591	■ General process engineering ■ Food processing ■ Water treatment
Orbipore CPS91	Electrodes with double-chamber reference system and open aperture Technical Information TI 375C/07/en, 51513127	■ Chemical processes ■ Heavily soiled media

Type	Properties	Applications
Tophit CPS471	Rupture-proof pH sensor based on ISFET technology. Short response time, very high resistance to alternating temperature cycles, sterilisable, almost no acid or alkaline errors Technical Information TI 283C/07/en, 51506685	■ General process engineering ■ Food, pharmaceutical applications ■ Water treatment ■ Biotechnology
Tophit CPS441	Sterilisable ISFET sensor for media with low conductivity, with liquid KCL electrolyte Technical Information TI 352C/07/en, 51506565	■ General process engineering ■ Ultra-pure water ■ Boiler feed water
Tophit CPS491	ISFET sensor with open aperture Technical Information TI 377C/07/en, 51513174	■ Chemical processes ■ Heavily soiled media

Rinse block

CPR40 rinse block for the transport of cleaning agents for use with retractable assemblies.
Technical Information TI 342C/07/en, Order No. 51510059

Spray cleaning system

CYR10 / CYR20 Chemoclean spray cleaning system for the transport of cleaning agents or acids for use with retractable assemblies.
Technical Information TI 046C/07/en, Order No. 50014223

Connection accessories

- CPK1: For pH/redox electrodes without temperature sensor, with GSA plug-in head. Extension with cable CYK71 possible, see table "Measuring cables sold by the metre".
- CPK9: For pH/redox electrodes with integrated temperature sensor and TOP68 plug-in head (version ESA, ESS). Extension with cable CYK71 possible, see table "Measuring cables sold by the metre".
- CPK12: For ISFET pH sensors and pH/redox electrodes with integrated temperature sensor and TOP68 plug-in head. Extension with cable CYK12 possible, see table "Measuring cables sold by the metre".
- CYK10: Memosens data cable for digital pH sensors with Memosens technology. Extension with cable CYK81 possible, see table "Measuring cables sold by the metre".
- Junction box VBM: Junction box for extending measuring cable connection between electrode and transmitter. Two screw unions for e.g. combination electrode. Material: aluminium cast, ingress protection IP 65.
- Junction box VBA: Junction box for extending measuring cable connection between electrode and transmitter. Four screw unions for e.g. separate reference electrode. Material: aluminium cast, ingress protection IP 65.
- Junction box RM: Junction box for extending measuring cable connection between digital sensor with Memosens technology and transmitter, 2 cable glands Pg 13.5, ingress protection IP 65. Order no.: 51500832

Technical Information for all cable types and junction boxes: TI 118C/07/en,
Order no.: 50068526

Measuring cables sold by the metre

Cable	Description	Order number
CYK71	Measuring cable, consisting of a coaxial cable and 4 pilot wires	50085333
	Measuring cable for Ex applications	50085673
CYK12	Measuring cable, coax and 5 pilot wires, black	51506598
	Measuring cable for Ex applications, blue	51506616
CYK81	Measuring cable for extension of sensor cables (e.g. Memosens), 2 x 2 wires, twisted pair with screen and PVC sheath	51502543

Buffer solutions

Type	Characteristic value / contents	Applications
CPY2	pH 4.0, red, contents: 5000 ml; Order No.: CPY2-A pH 7.0, green, contents: 5000 ml; Order No.: CPY2-B pH 4.0 20x20 ml (for single use), Order No.: CPY2-D pH 7.0 20x20 ml (for single use), Order No.: CPY2-E	pH calibration (reference temperature 25 °C / 77 °F)
CPY3	+225 mV, pH 7.0, contents 5000 ml; Order No.: CPY3-6 +475 mV, pH 0.0, contents: 5000 ml; Order No.: CPY3-7	Redox calibration (measured at 25 °C / 77 °F with PtAg or AgCl measuring chain)

Flat gasket

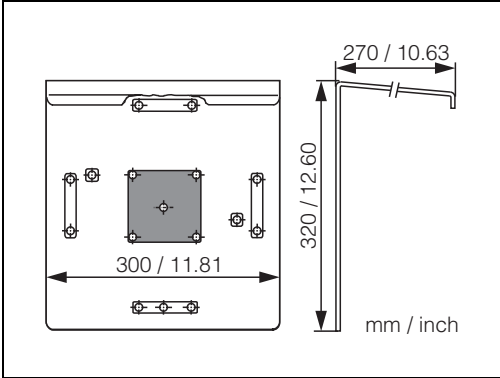
Flat gasket for sealing the front panel mounting of the CPM153.
Order No.: 50064975

Weather protection cover CYY101

Required for installing the transmitter outdoors.

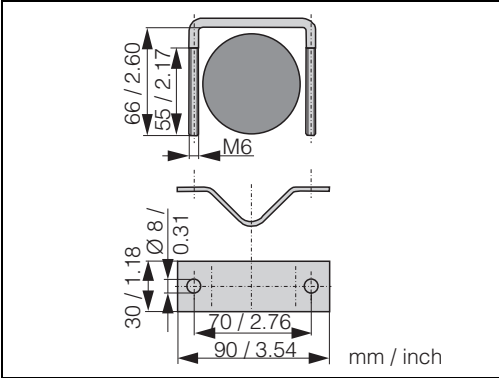
Round post fixture for weather protection cover

To fix the weather protection cover to vertical or horizontal posts with diameters of up to 60 mm / 2.36". Order No.: 50062121



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fig. 56: Weather protection cover CYY101



C07-CPM153xx-00-00-00-en-002.eps

fig. 57: Round post fixture for CYY101

Technical Information TI 092C/07/en, Order No. 50061228

Housing CYC300

Housing for Topclean S CPC30, with rack for cleaner solutions. Operating panel with alarm LED and lock for programme start and assembly drive. For Ex and Non-Ex applications.

Material: plastic or stainless steel.

- Plastic version: Window for Mycom S and Memograph S
- Stainless steel version without Memograph S: Window for Mycom S
- Stainless steel version with Memograph S: Window for Memograph S

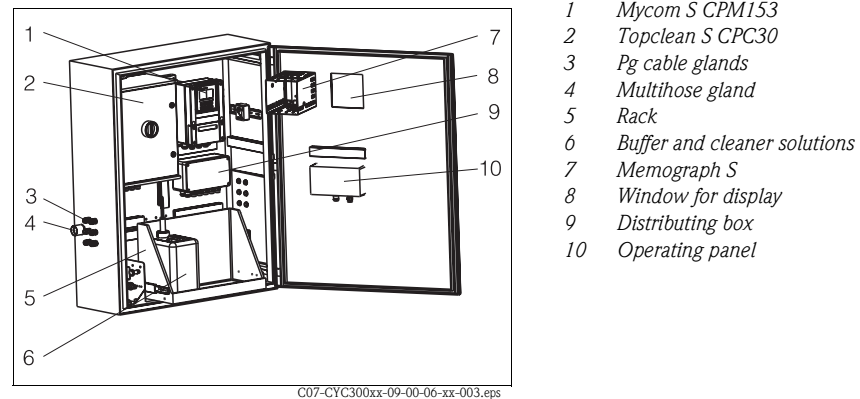


fig. 58: Housing CYC300, plastic version

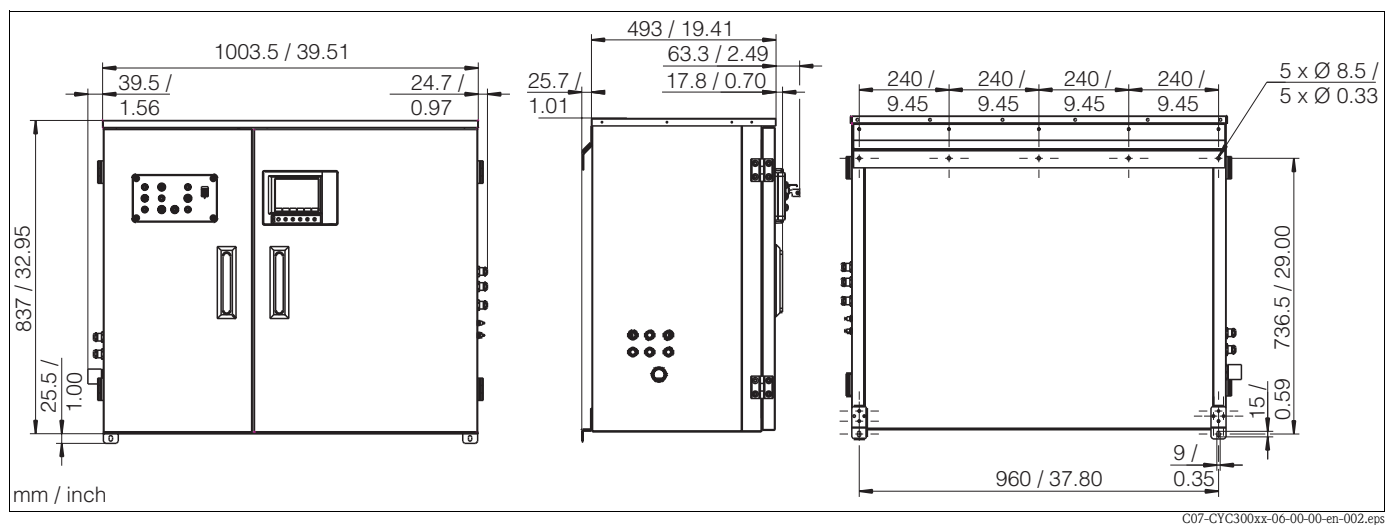


fig. 59: Dimensions of housing CYC300, stainless steel version

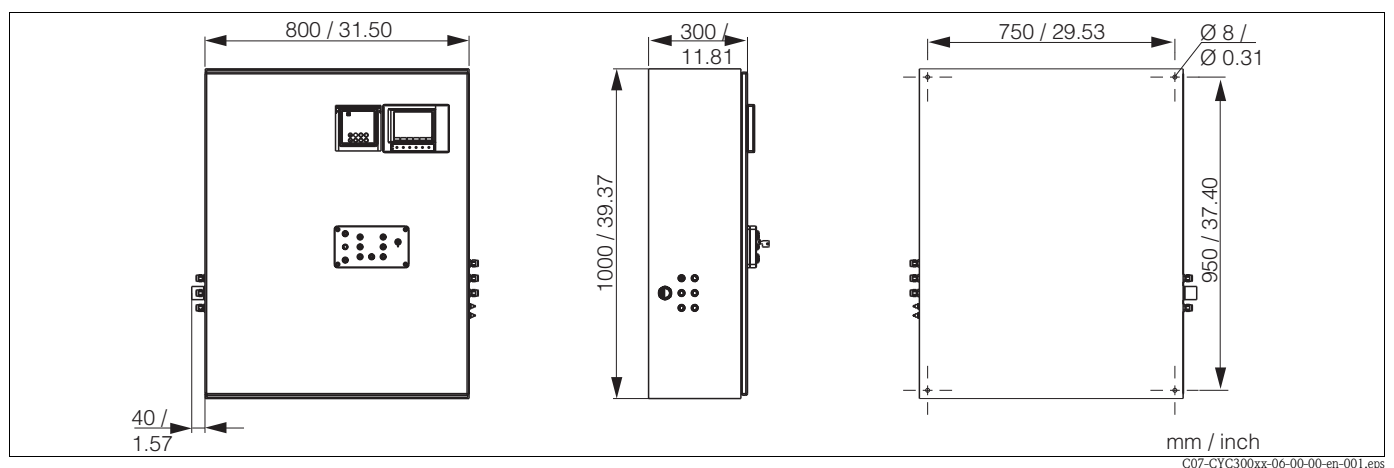


fig. 60: Dimensions of housing CYC300, plastic version

Product structure
Housing CYC300

Certificates									
	A	no approval							
	G	with ATEX approval II (1) 2G EEx em ib[ia] IIC							
	O	with FM approval Cl. I, Div. 2, with NI input and output circuits, sensor IS Cl. I Div. 1							
	P	with FM approval Cl. I, Div. 2, with NI input and output circuits							
	S	with CSA approval Cl. I, Div. 2, with NI input and output circuits, sensor IS Cl. I Div. 1							
	T	with TIIS approval							
Power supply									
	1	230 V AC							
	2	110-115 V AC							
	3	24 V AC / DC							
Materials									
	A	Plastic							
	B	Stainless steel 1.4301 (AISI 304)							
Heating									
	1	no electrical heating							
	2	with electrical heating							
Data recording									
	A	no Memograph S							
	B	with Memograph S							
Allocation									
	1	empty housing, CPC30 not mounted							
	2	order item of associated CPC							
Options									
	1	Basic version							
CYC300-									complete order code

Operating panel for CPC30 Operating panel with alarm LED and key switch used to start programmes and move the assembly
Order no. 51512891

Wiring

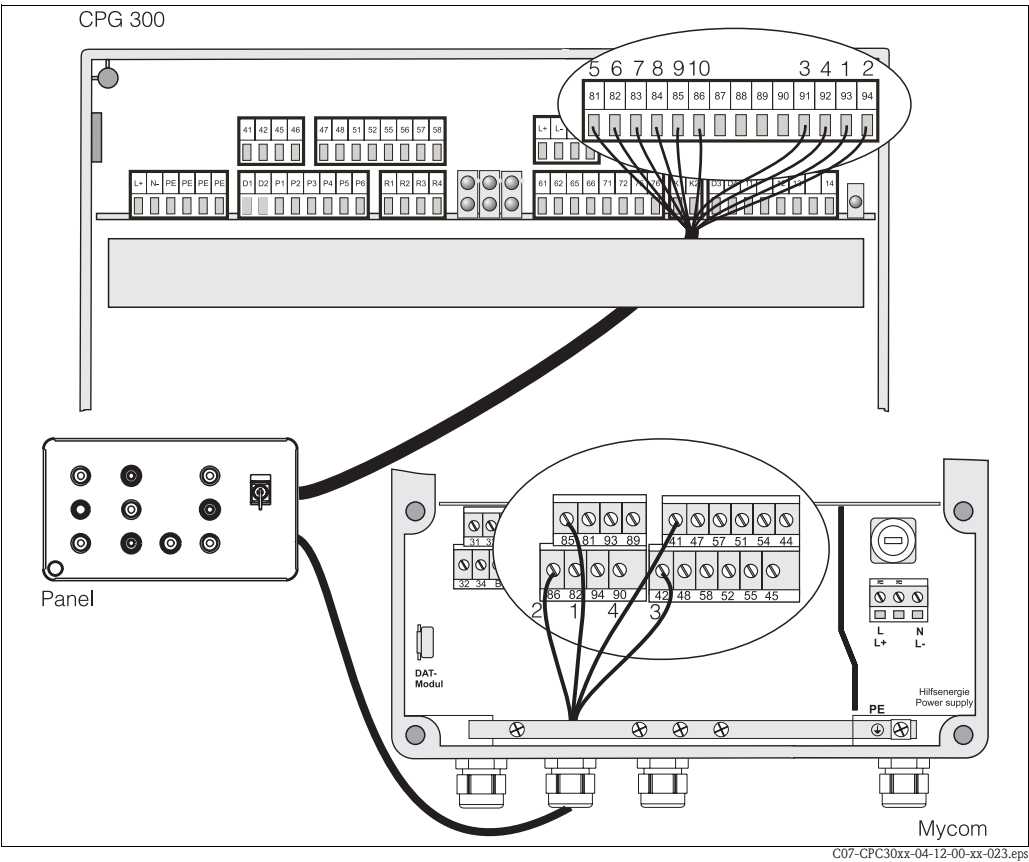


fig. 61: Wiring of the operating panel

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

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

2. Connect the supplied twelve-wire cable to CPG30 as follows:

Wire	CPG30 terminal
1	Terminal 93
2	Terminal 94
3	Terminal 91
4	Terminal 92
5	Terminal 81
6	Terminal 82

Wire	CPG30 terminal
7	Terminal 83
8	Terminal 84
9	Terminal 85
10	Terminal 86
11 + 12	not connected

10 Technical data

10.1 Input

Mycom S CPM153:

Measured variables	pH, redox, temperature	
pH (glass / ISFET)	Measuring range	−2.00 ... +16.00
	Measured value resolution	pH 0.01
	Zero point offset range	pH −2 ... +16
	Range of automatic temperature compensation	−50 ... +150 °C / −58 ... +302 °F
	Reference temperature	25 °C / 77 °F (settable with medium temperature compensation)
	Slope adjustment	5 ... 99 mV / pH
	Input resistance under nominal operating conditions	$> 1 \cdot 10^{12} \Omega$
	Input current under nominal operating conditions	$< 1.6 \cdot 10^{-12} \text{ A}$
Redox	Measuring range	−1500 ... +1500 mV −300 ... +300%
	Measured value resolution	0.1 mV
	Zero point offset range	+200 ... −200 mV
	Assignment with % display	adjustable, Δ for 100% = Δ 150 ... Δ 2000 mV
	Electrode offset	$\pm 120 \text{ mV}$
	Input resistance under nominal operating conditions	$> 1 \cdot 10^{12} \Omega$
	Input current under nominal operating conditions	$< 1.6 \cdot 10^{-12} \text{ A}$
Temperature	Temperature sensor	Pt 100 (three-wire circuit) Pt 1000 NTC 30k
	Measuring range (can also be displayed in °F)	−50 ... +150 °C / −58 ... +302 °F (NTC: −20 ... 100 °C / −4 ... +212 °F)
	Measured value resolution	0.1 K
	Temperature offset	$\pm 5 \text{ K}$
Digital inputs	Input voltage	10 ... 40 V
	Internal resistance	$R_i = 5 \text{ k}\Omega$

CPG30:

Digital inputs	Input voltage	10 .. 40 V
	Internal resistance	$R_i = 5 \text{ k}\Omega$

10.2 Output

Mycom S CPM153:

Output signal	pH, redox, temperature	
Current outputs	Current range	0 / 4 ... 20 mA
	Error current	2.4 mA or 22 mA
	Measured error ¹	max. 0.2% of current range maximum
	Output distribution, adjustable	pH: pH 1.8 ... 18 Redox: 300 ... 3000 mV Temperature: 17 ... 170 °C / 63 ... 338 °F
	Active current output (only non-Ex): Load	max. 600 Ω
	Passive current output: Supply voltage range	6 ... 30 V
¹ : acc. to IEC 746-1, under nominal operating conditions		
Auxiliary voltage output (for digital inputs E1-E3)	Voltage	15 V DC
	Output current	max. 50 mA
Interface to CPG30	Power supply: Output voltage	11.5 ... 18 V
	Output current	max. 60 mA
	Communication	RS 485
Limit value and alarm functions	Setpoint adjustments	pH -2.00 ... 16.00
	Hysteresis for switch contacts	pH: 0.1 ... 18 Redox absolute: 10 ... 100 mV Redox relative: 1 ... 3000%
	Alarm delay	0 ... 6000 s

Controller	Function (selectable):	Pulse-length controller (PWM) Pulse-frequency controller (PFM) Three-point step controller (3-PS) Analogue (via current output)
	Controller behaviour	P / PI / PID
	Control gain K_R	0.01 ... 20.00
	Integral action time T_n	0.0 ... 999.9 min
	Derivative action time T_v	0.0 ... 999.9 min
	Maximum settable frequency with PFM	120 min ⁻¹
	Maximum settable period with PWM	0.5 ... 999.9 s
	Minimum switch-on period with PWM	0.4 s

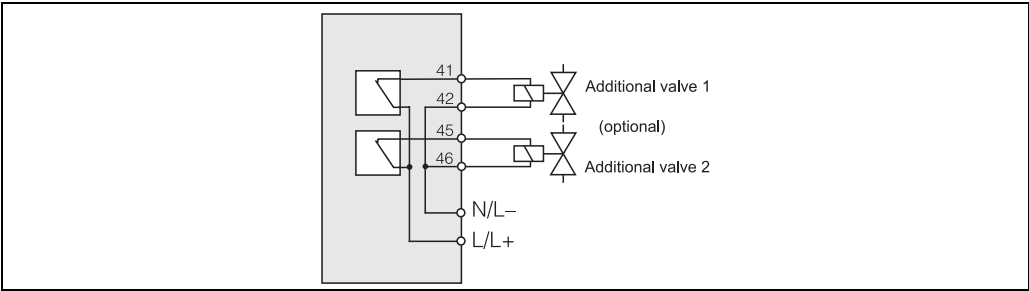
Relay contacts	The active open/active closed contact type can be set by software.	
	Switching voltage	max. 250 V AC / 125 V DC
	Switching current	max. 3 A
	Switching power	max. 750 VA
	Lifespan	≥ 5 million switching cycles

Galvanic isolation	At the same potential are:	
	■ Current output 1 and the power supply ■ Current output 2 and the CPC30.	
	The remaining circuits are galvanically isolated from each other.	

CPG30:

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

Control for external valves	⚠Caution!	
	Device damage possible. Each output has its own fuse.	
	Switched power supply:	
	Max. switching current	$I_{max} = 3\text{ A}$
	Max. switching power	$P_{max} = 750\text{ VA}$



C07-CPC300xx-04-12-00-en-004.eps

fig. 62: Switched power supply to control additional external valves

Electrical
connection data**Mycom S CPM153:**

Power supply	100 ... 230 V AC +10/–15% 24 V AC/DC +20/–15%
Frequency	47 ... 64 Hz
Power consumption	max. 10 VA
Separation voltage between galvanically isolated circuits	276 V _{rms}
Terminals, max. cable cross-section	3 x 2.5 mm ²

CPG30:

Power supply	100 / 110 / 230 VAC +10/–15% 24 V AC/DC +20/–15%
Frequency	47 ... 64 Hz
Power consumption	max. 12 VA
Separation voltage between galvanically isolated circuits	276 V _{rms}
Terminals, max. cable cross-section	3 x 2.5 mm ²

**Warning!**

Please observe the partly deviating data for Ex instruments. They are listed in the additional Safety instructions for electrical equipment in hazardous areas XA 233C/07/en and XA 236C/07/en.

10.3 Accuracy

Measured value resolution	pH: 0.01 Redox: 1 mV / 1% Temperature: 0.1 K
Measurement deviation ¹ display	pH: max. 0.2% of measuring range Redox: max. 1 mV Temperature: max. 0.5 K
Measurement deviation ¹ output	max. 0.2% of current range end value
Repeatability ¹	max. 0.1% of measuring range

¹: acc. to IEC 746-1, under nominal operating conditions

10.4 Ambient conditions

Ambient temperature	0 ... +55 °C / 32 ... 131 °F	
Ambient temperature limit	-20 ... +60 °C / -4 ... +140 °F	
Storage and transport temperature	-30 ... +80 °C / -22 ... +176 °F	
Relative humidity	10 ... 95%, non-condensing	
Ingress protection	CPM153: IP 65	CPG30: IP 54
Electromagnetic compatibility	Interference emission to EN 61326: 1997 / A1:1998; Class B resource (Housing sector) Interference immunity to EN 61326: 1997 / A1:1998; Appendix A (Industrial sector)	
Safety requirements	Complies with general safety requirements acc. to EN 61010. Complies with NAMUR Recommendations NE 21.	

10.5 Process conditions

Temperature range cleaning agent	0 ... +50 °C / 32 ... 122 °F
Additional media	Aggressive or hot media must be conveyed via the additional valve (optional). They must not be conveyed by the CYR30 injector. Use the rinse block CPR40 for that.

10.6 Mechanical data

Design / dimensions

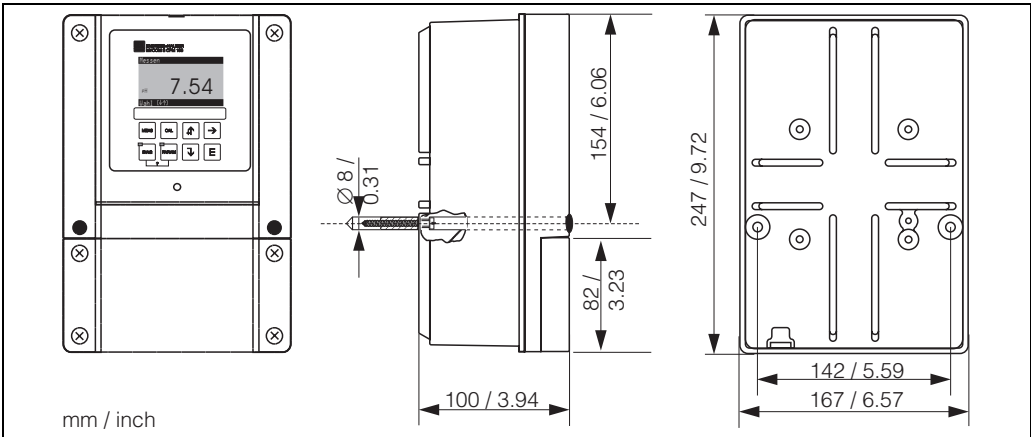
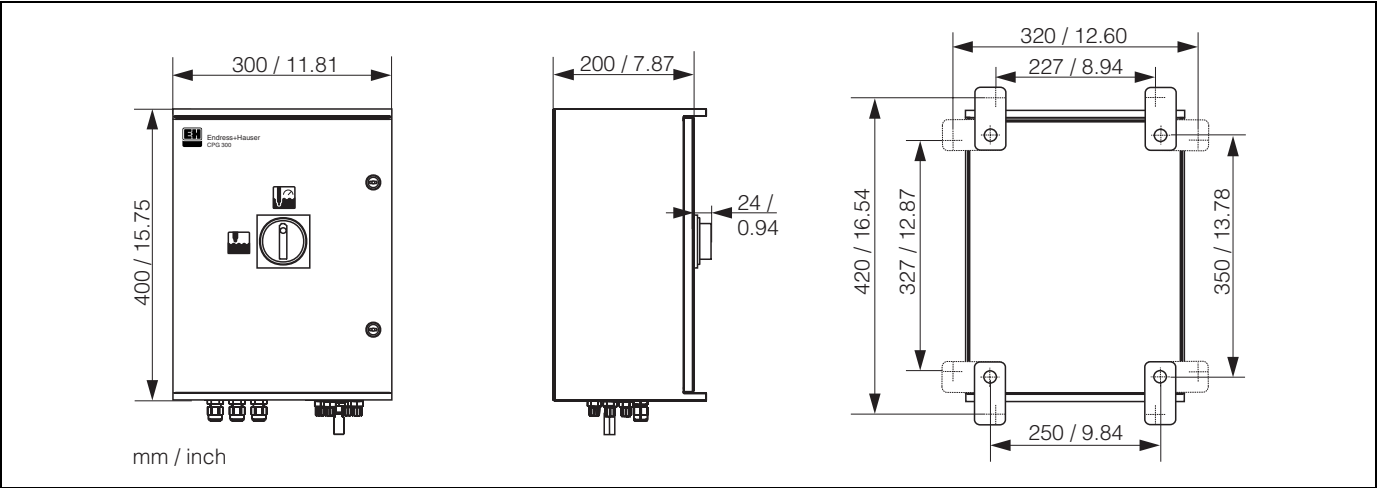


fig. 63: Dimensions of CPM153 transmitter

C07-CPM153xx-06-00-en-001.eps



C07-CPC300xx-06-12-01-en-001.eps

fig. 64: Dimensions of control unit CPG30

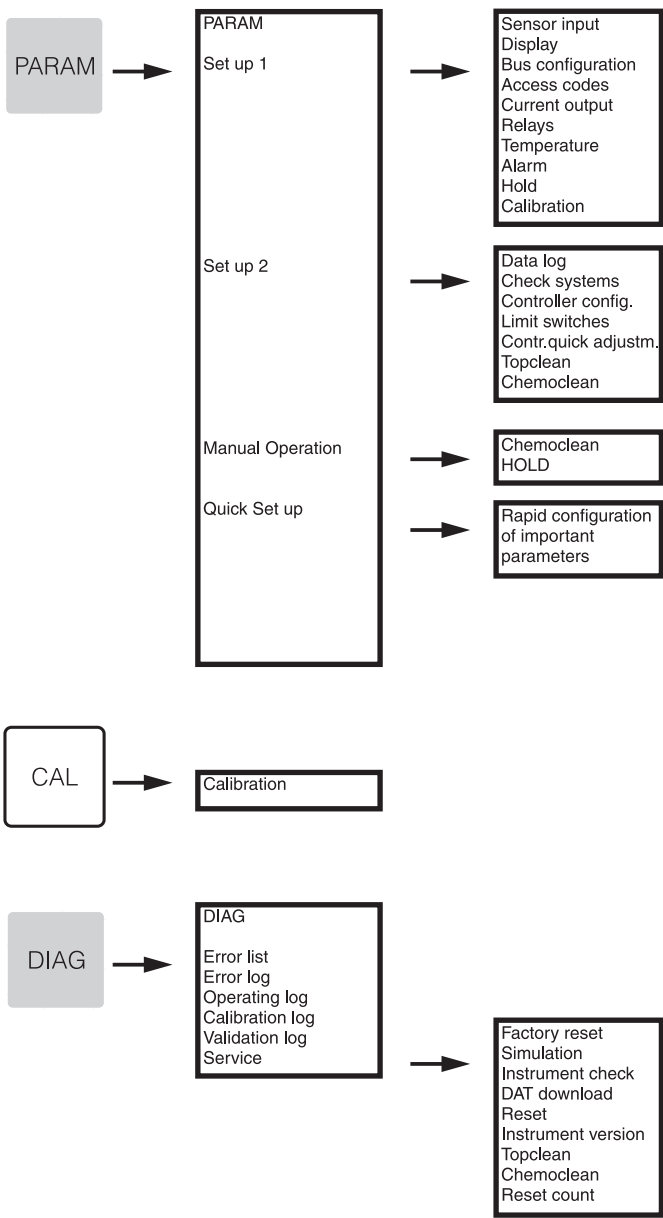
Bottle dimensions 5 litre / 1.320 US.gal bottles (19 x 25 x 15 cm / 0.75 x 0.98 x 0.59 inches)
Required installation height: 35 cm / 1.38"

Weight	CPG30: approx. 20 kg / 44.1 lb. CPM153: max. 6 kg / 13.2 lb.		
Materials	Mycom S	Housing	GD-AlSi 12 (Mg content 0.05%), plastic-coated
		Front	Polyester, UV-resistant
	CPG30	Housing	Ex and non-Ex: Polyester GF
		Hoses	PU, PTFE (in contact with medium)
	Bottle		HDPE

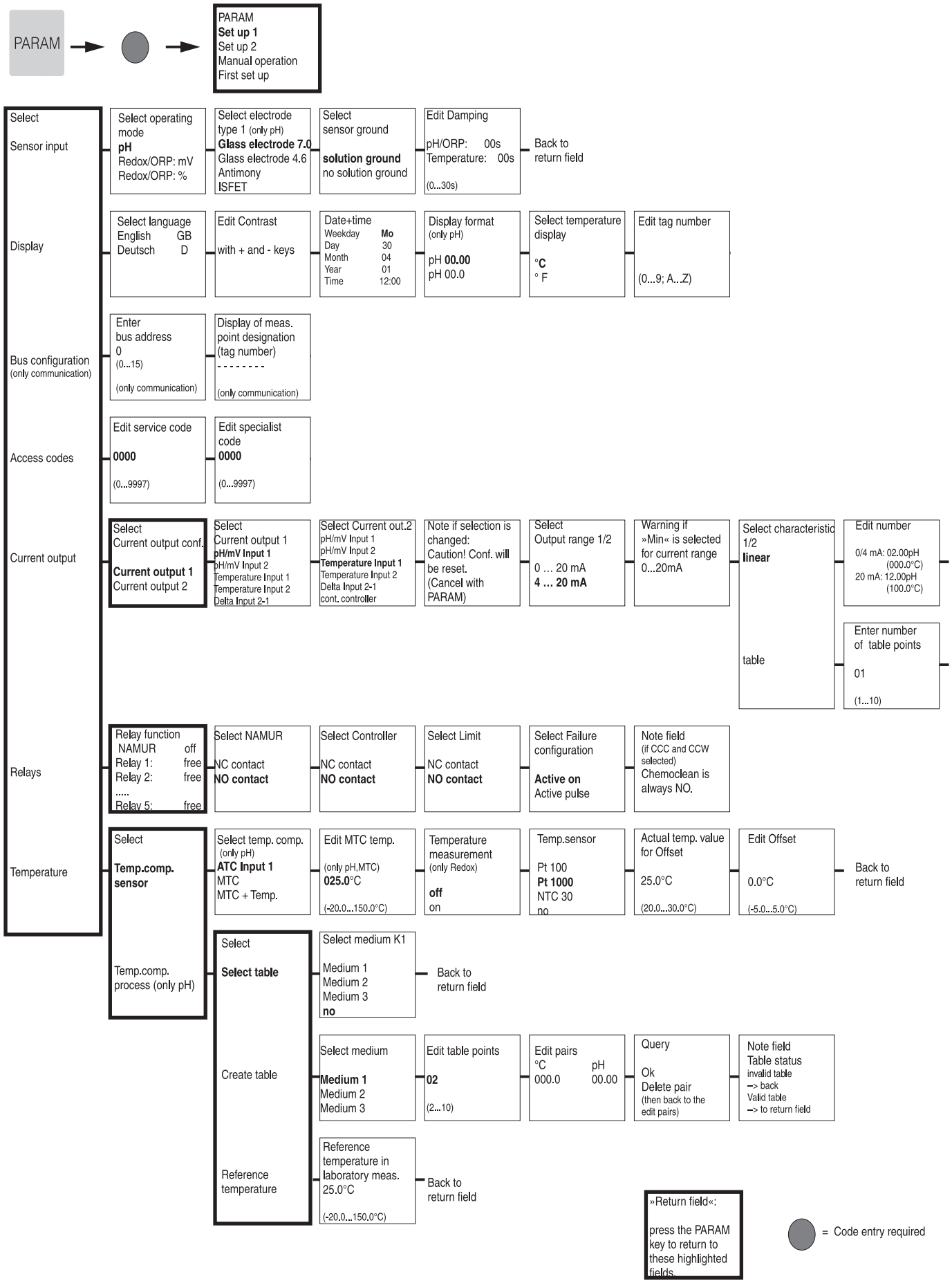
11 Appendix

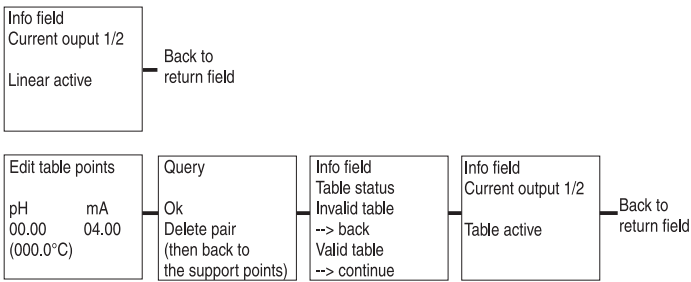
11.1 Operating matrix

The basic structure of the operating menu is shown below.



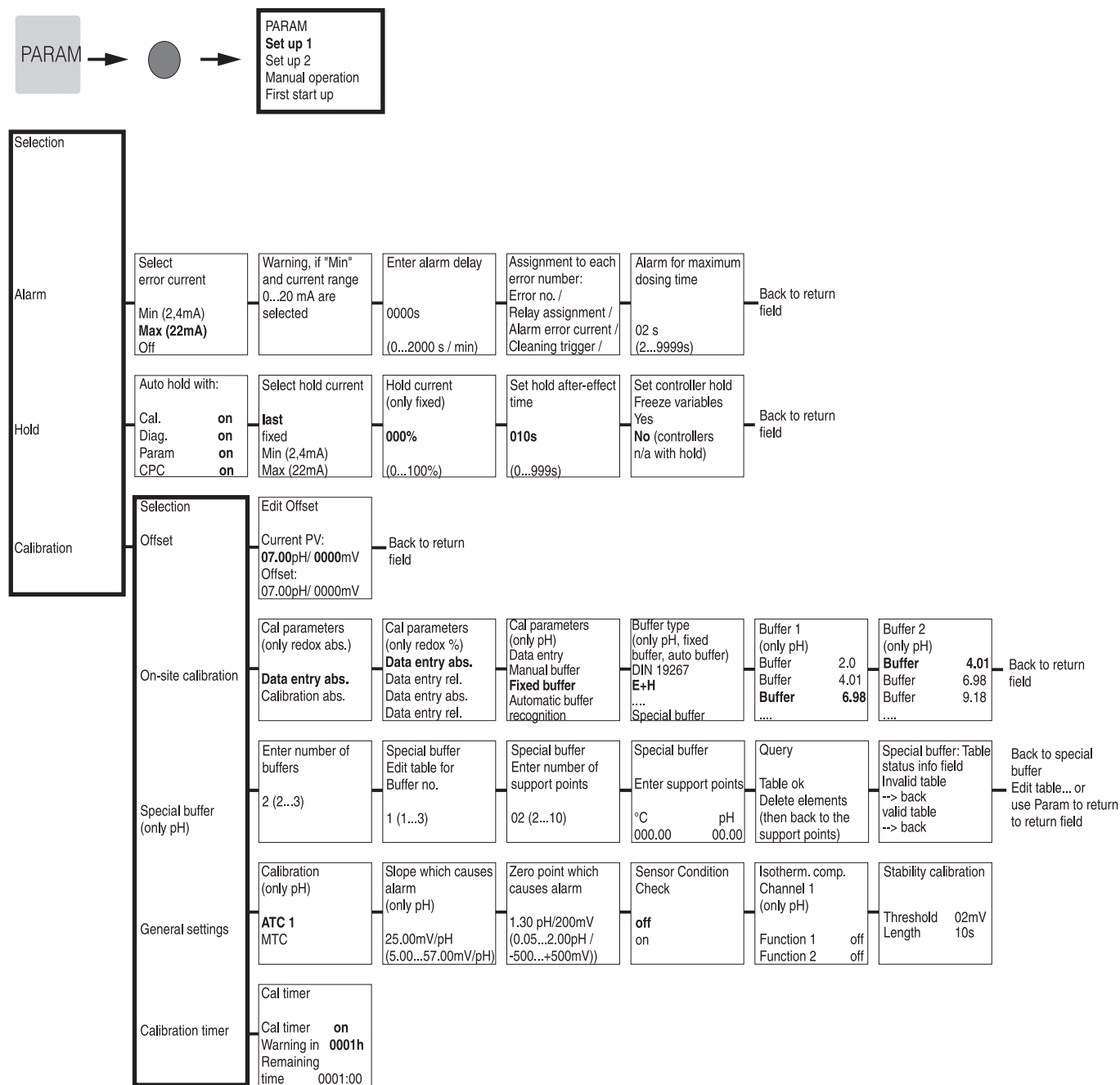
C07-CPC30xxx-19-06-08-en-005.eps





»Return field«:
press the PARAM
key to return to
these highlighted
fields..

 = Code entry required

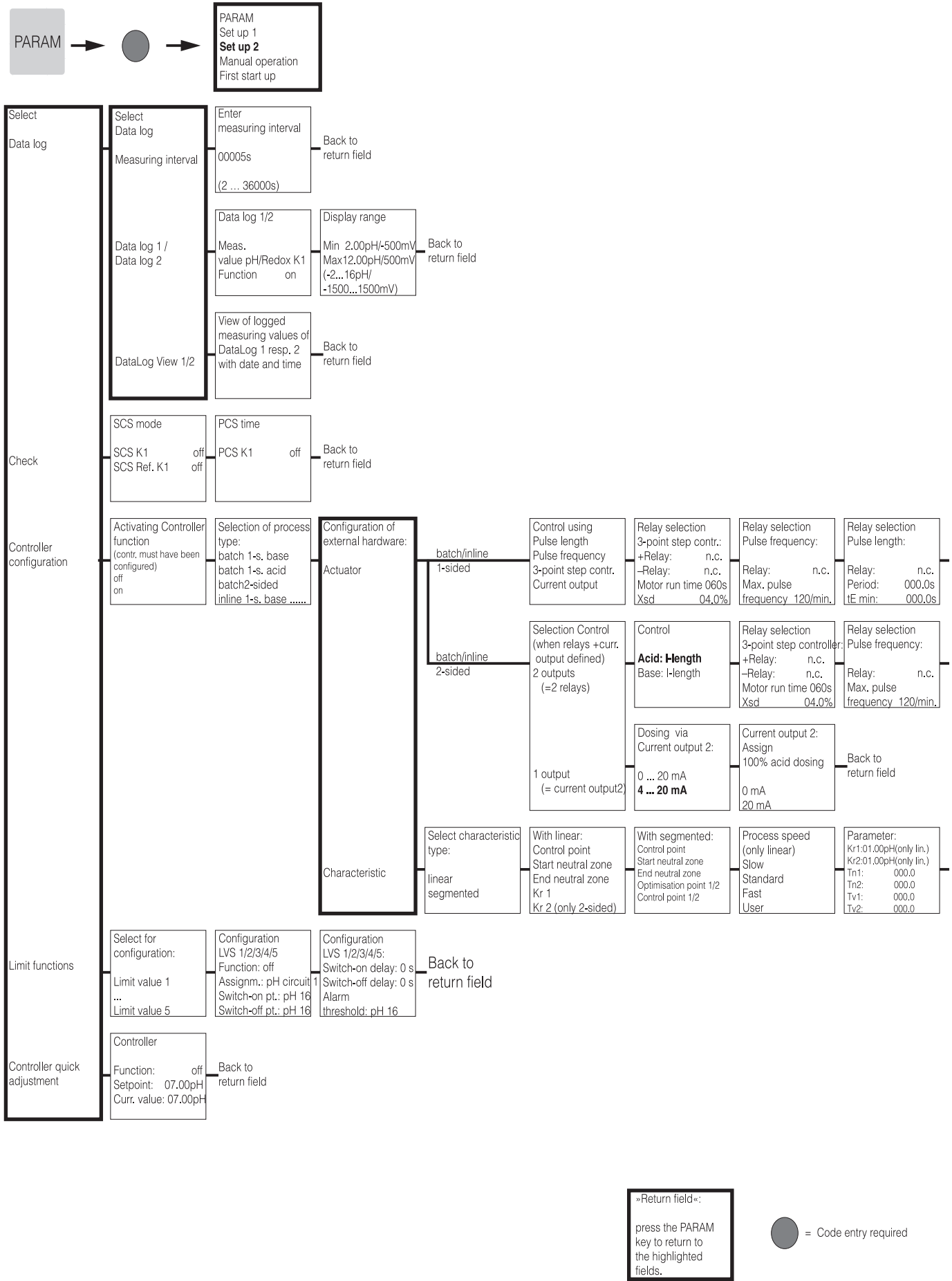


"Return field"

Press the PARAM key to return to these highlighted fields

● = Code entry required

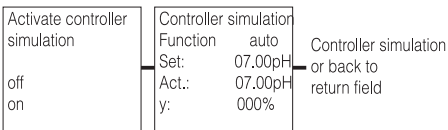
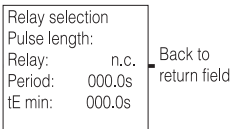
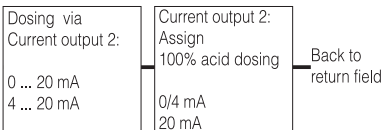
C07-CPC30xxx-19-06-08-en-008.eps



»Return field«:

press the PARAM key to return to the highlighted fields.

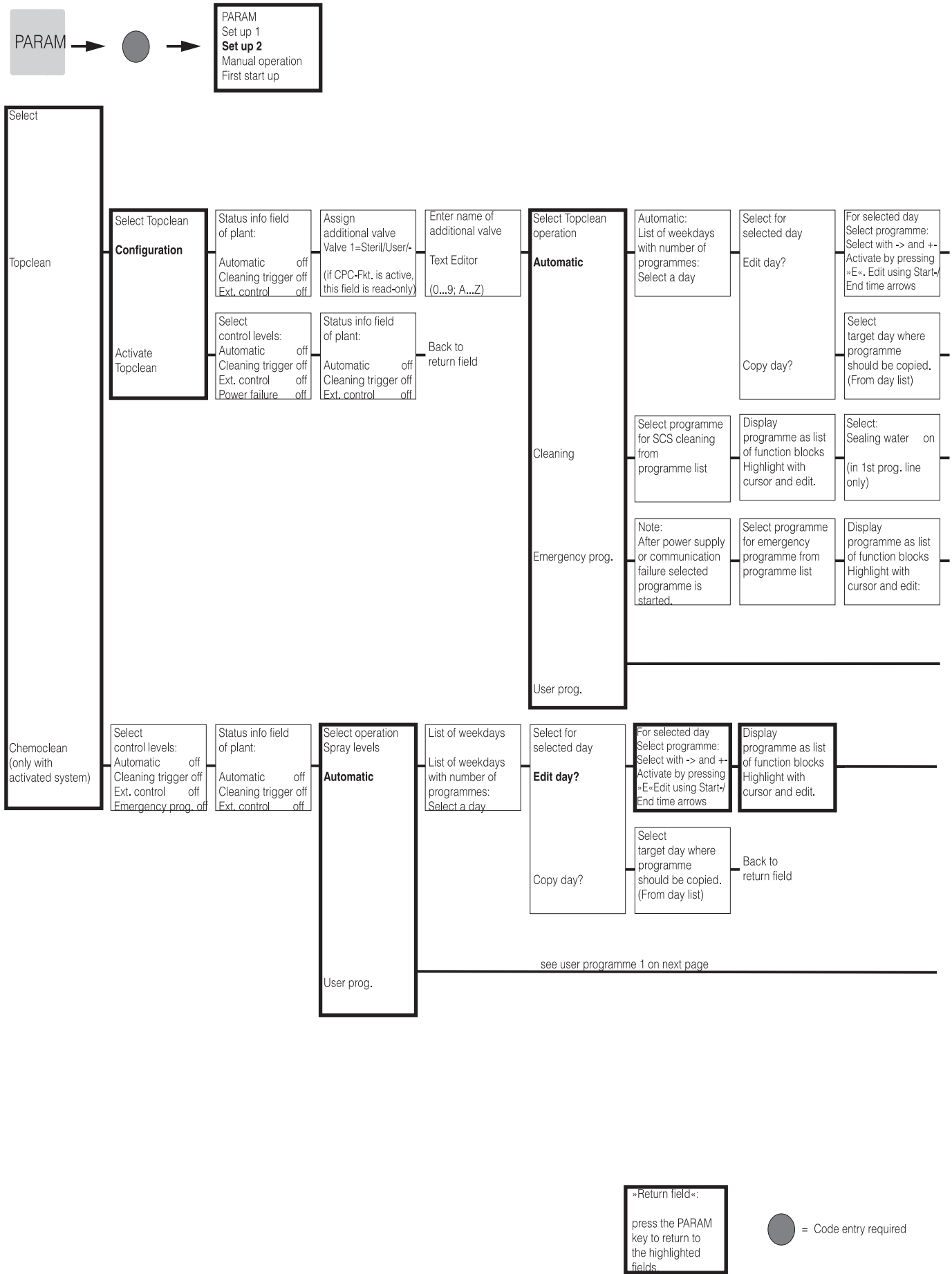
= Code entry required

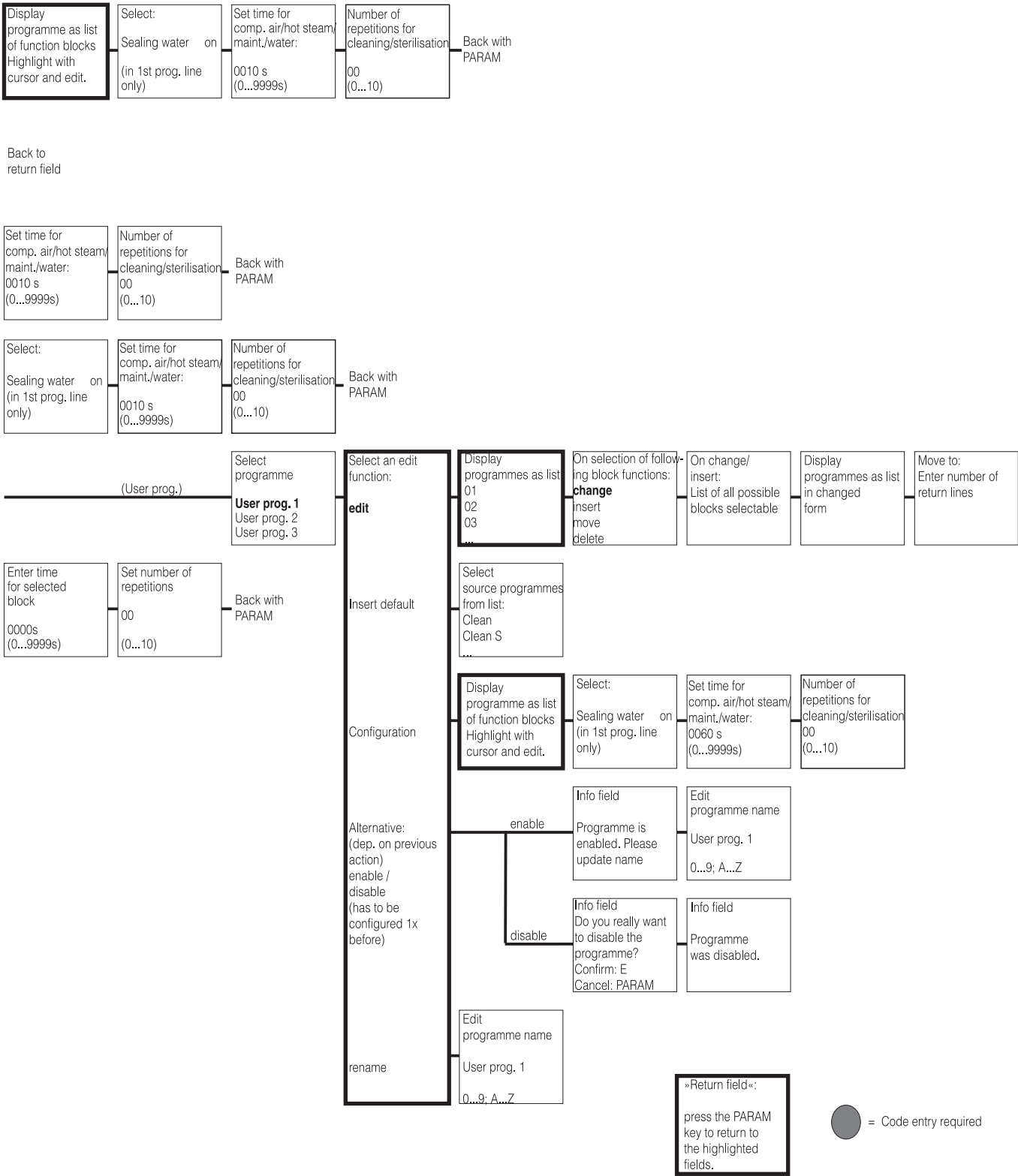


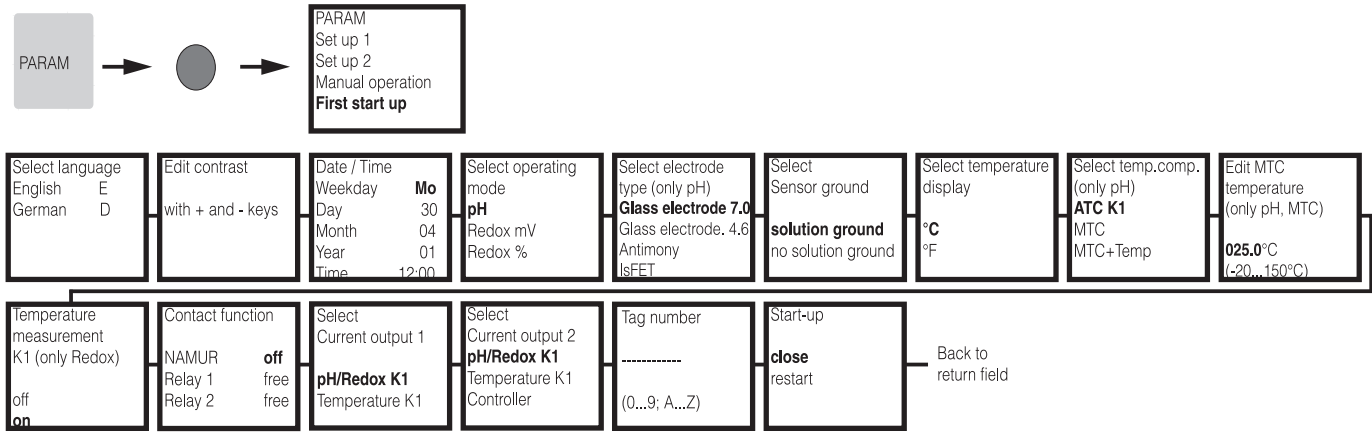
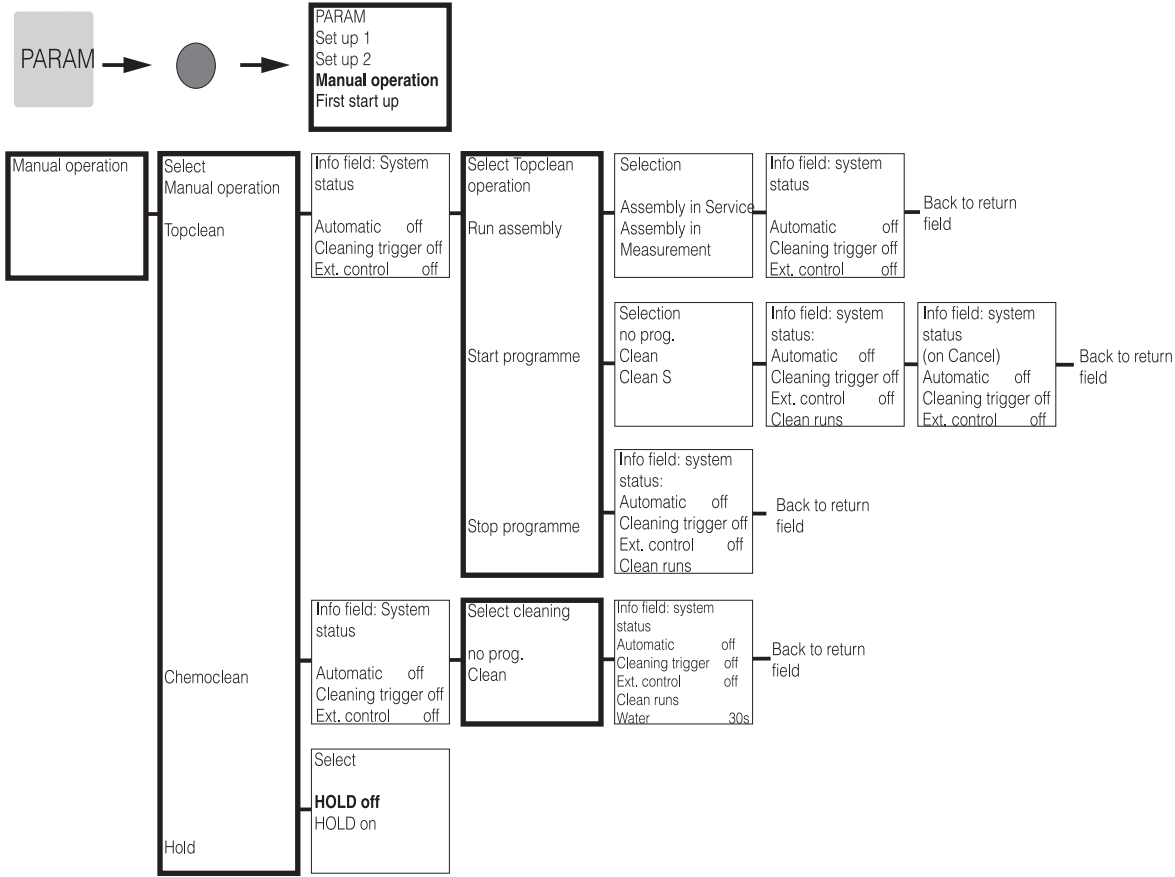
»Return field«:
press the PARAM
key to return to
the highlighted
fields.



= Code entry required

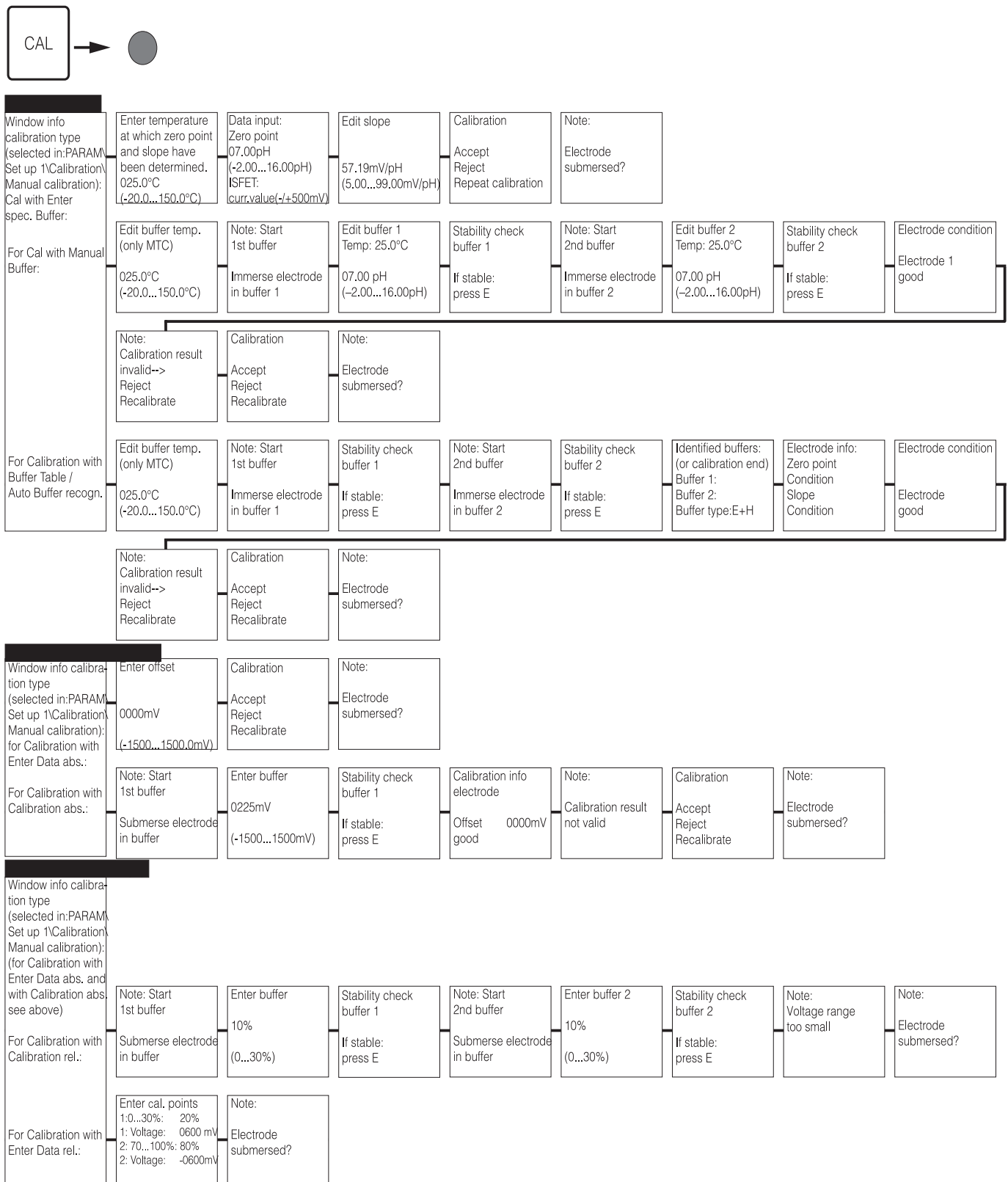






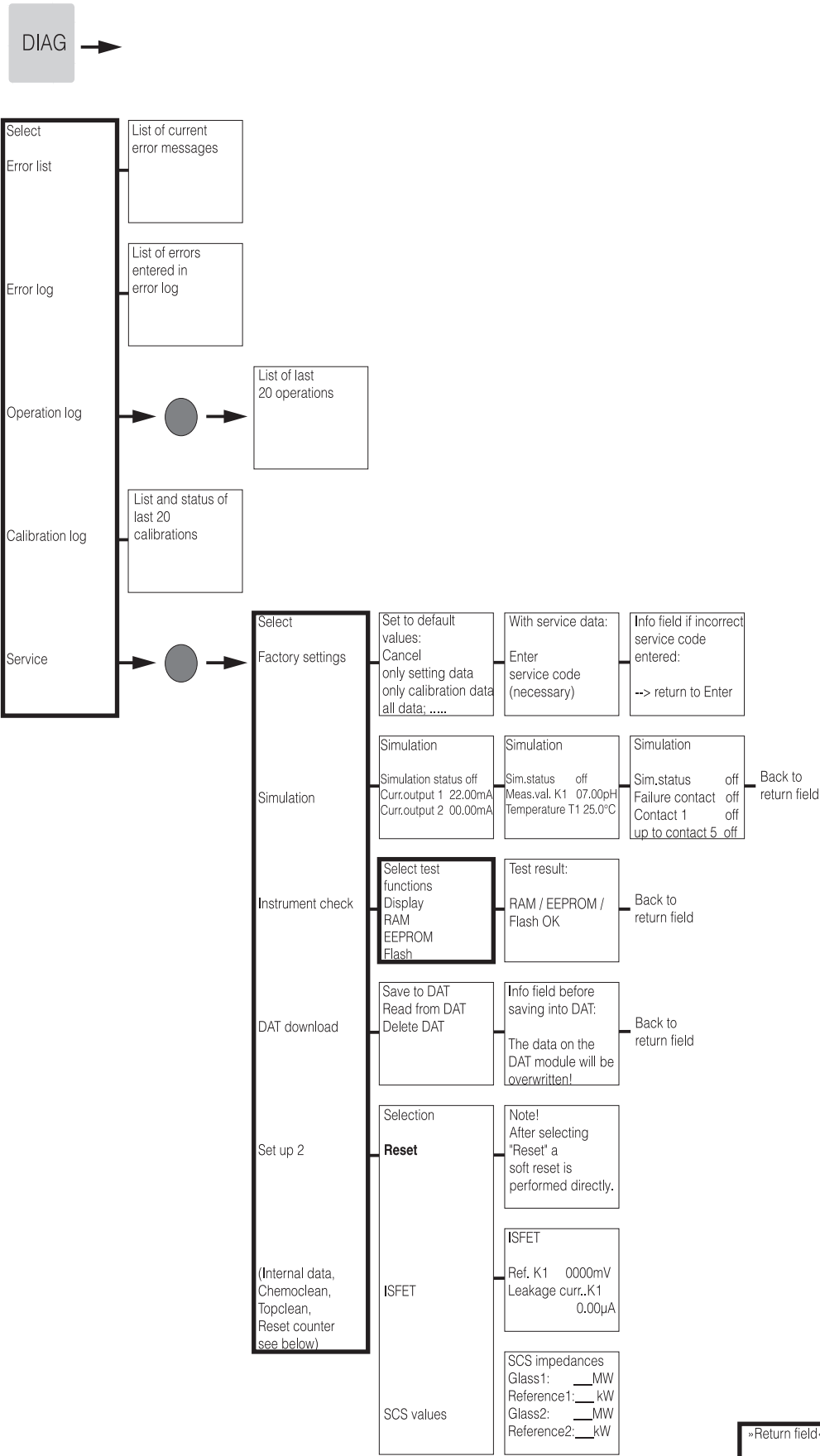
"Return field"
Press the PARAM
key to return to
these highlighted
fields.

= Code entry required



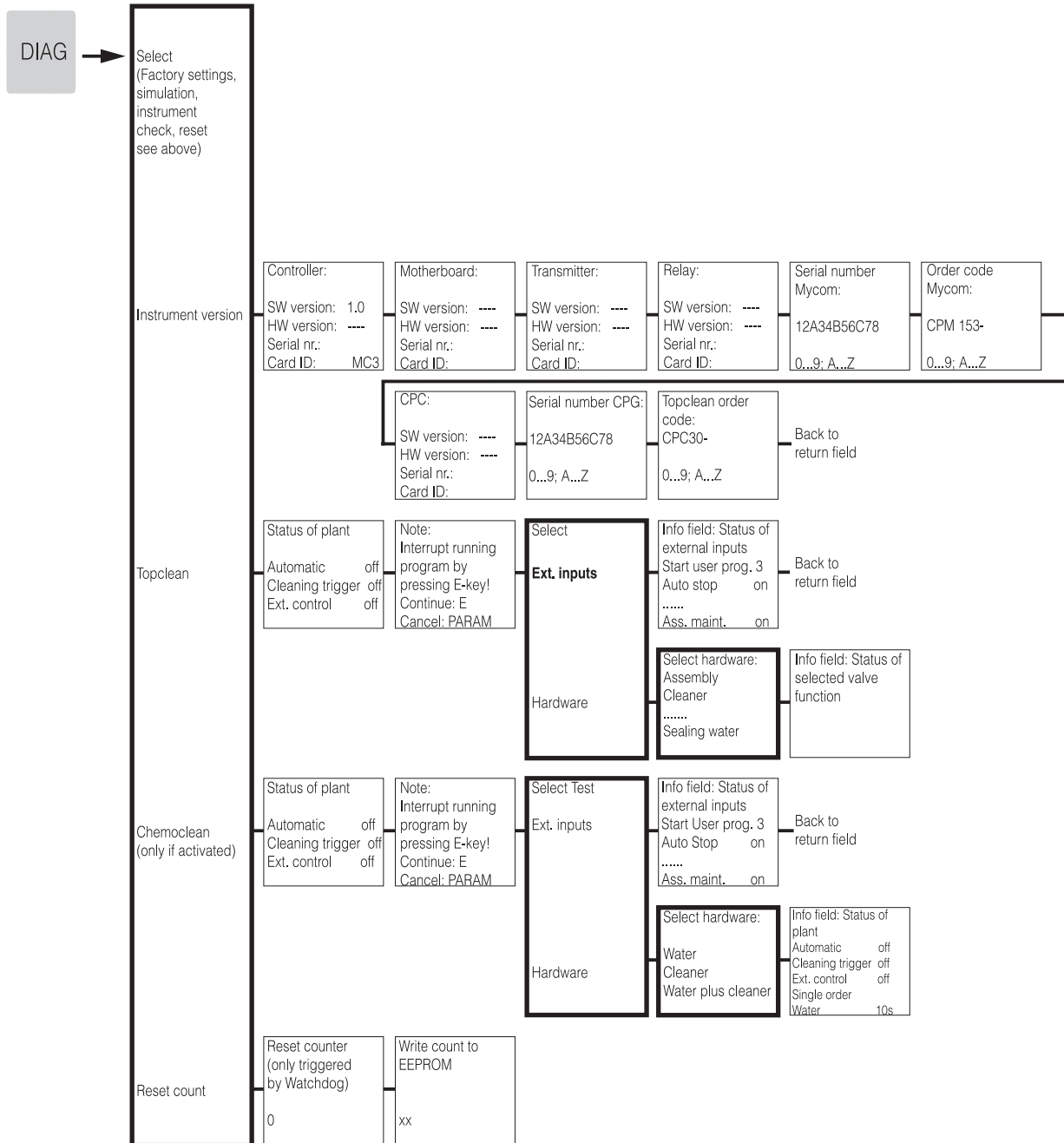
If you press the MEAS key, a message will appear asking if you want to abort the calibration.

● = Code entry required



»Return field«:
press the PARAM key to return to the highlighted fields.

● = Code entry required



»Return field«:

press the PARAM key to return to the highlighted fields.

● = Code entry required

C07-CPC30xxx-19-06-08-en-013.eps

11.2 Connection example

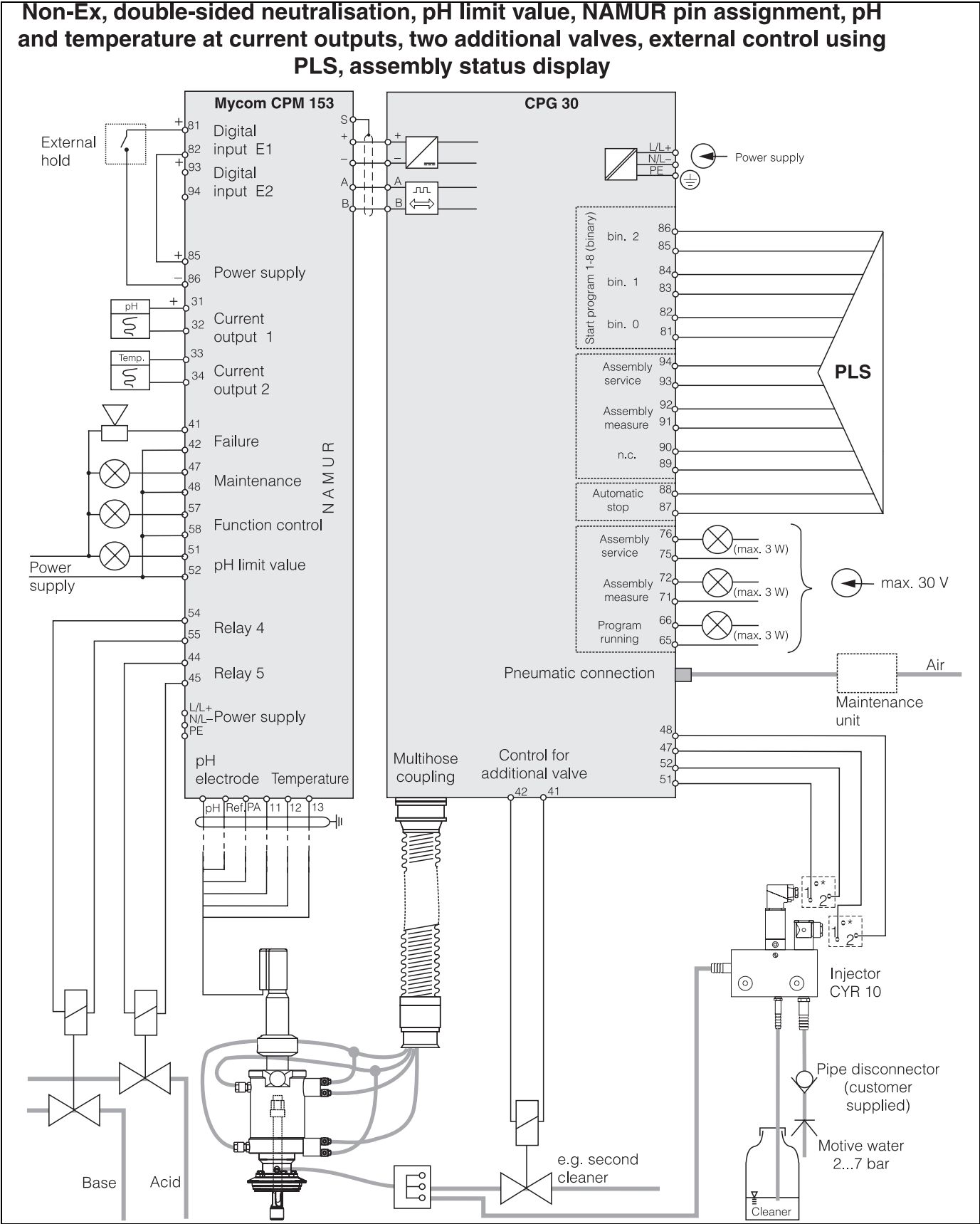
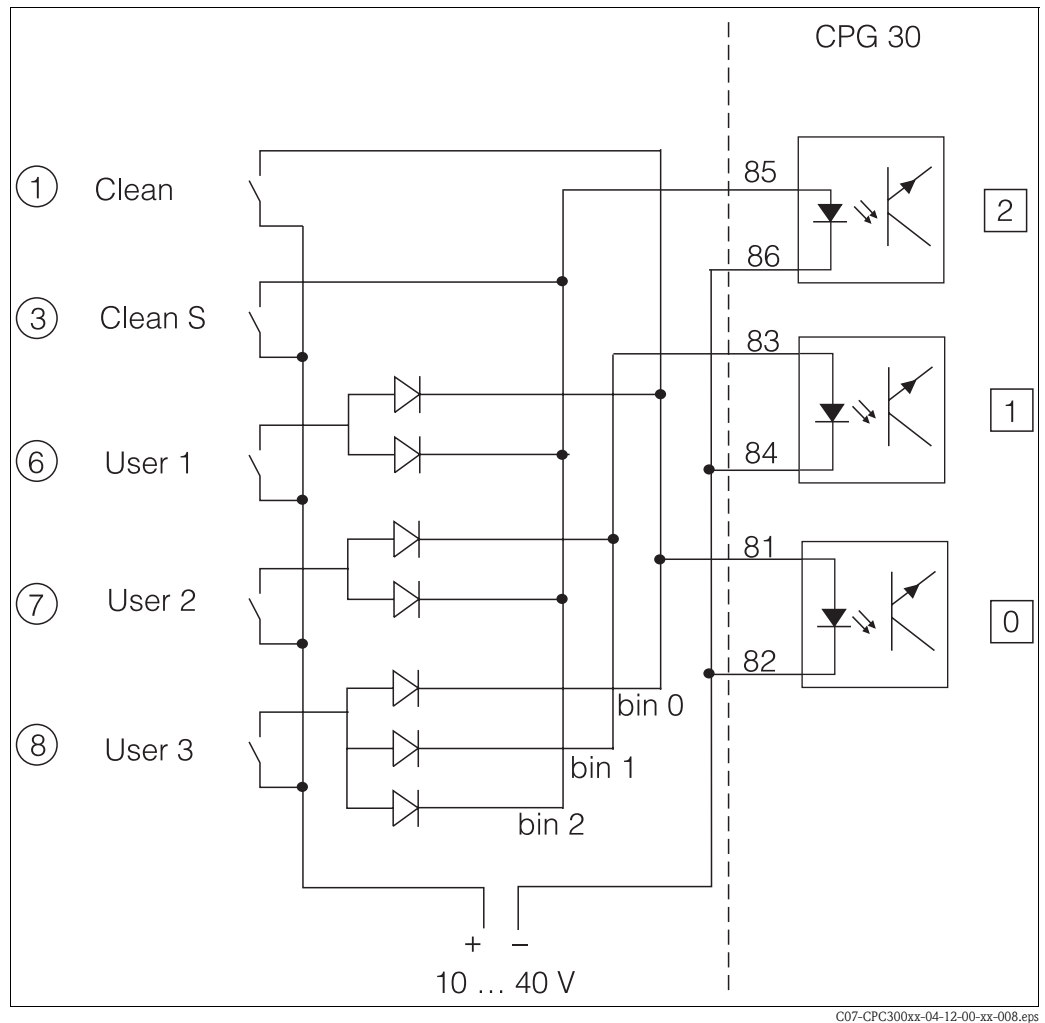


fig. 65: Connection example



Note!
Size proportions are not considered.

11.3 Wiring example for external cleaning trigger



C07-CPC300xx-04-12-00-xx-008.eps

fig. 66: Wiring diagram for the external control of the cleaning programmes

1 to 8: Buttons to start the cleaning programmes

81 to 86: Terminals for programme start

0 / 1 / 2: binary inputs of the control unit CPG30

10 ... 40 V for e.g. taken from auxiliary power supply of Mycom S CPM153, terminals 85/85 (15 V)

Diodes 1N4007

3 mA per optocoupler input

11.4 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	6,97	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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Declaration of contamination

Dear customer,

Because of legal determinations and for the safety of our employees and operating equipment, we need this "Declaration of contamination" with your signature before your order can be handled. Please, include the completely filled in declaration with the device and the shipping documents in any case. Add also safety sheets and / or specific handling instructions if necessary.

Type of device / sensor:	_____	Serial no.:	_____
Medium / concentration:	_____	Temperature:	_____ Pressure: _____
Cleaned with:	_____	Conductivity:	_____ Viscosity: _____

Warning hints for medium used (mark the appropriate hints)



☐
radioactive



☐
explosive



☐
caustic



☐
poisonous



☐
harmful to
health



☐
biologically
hazardous



☐
inflammable



☐
safe

Reason for return

Company data

Company:	_____	Contact person:	_____
	_____		_____
	_____	Department:	_____
Address:	_____	Phone:	_____
	_____	Fax / e-mail:	_____
	_____	Your order no.:	_____

I hereby certify that the returned equipment has been cleaned and decontaminated acc. to good industrial practices and is in compliance with all regulations. This equipment poses no health or safety risks due to contamination.

(Place, date)

(Company stamp and legally binding signature)

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