

Automation of pH/Redox Measurements TopClean S CPC 30

Automatic Measuring and Cleaning System
in Ex and Non-Ex areas



Applications

The automatic pH/redox measuring and cleaning system TopClean S CPC 30 combines a very high degree of safety, highly precise measurement results and very low maintenance requirements. It is the optimum choice for heavily polluted and aggressive media as well as for high-accuracy measurement tasks, for e.g.

- € Food industry
- € Pharmaceutical industry
- € Process industry
- € Water treatment
- € Ex applications

Your benefits

- € Very high degree of safety:
 - System status messages with feedback to the control desk
 - In-process electrode cleaning, no electrode removal necessary
 - Automatic cleaning on detection of electrode fouling
- € High availability:
 - Long electrode life due to measuring cycle
 - Offline configuration:
Very simple set-up on PC
 - DAT module: very simple copying of set-up to other devices
- € Short amortisation times:
 - Low procurement price
 - Low maintenance costs through automatic cleaning of electrode
 - Low installation effort through modular design
- € Approved for Ex applications
- € Communication via PROFIBUS-PA and HART

Quality made by
Endress+Hauser



ISO 9001

Endress + Hauser

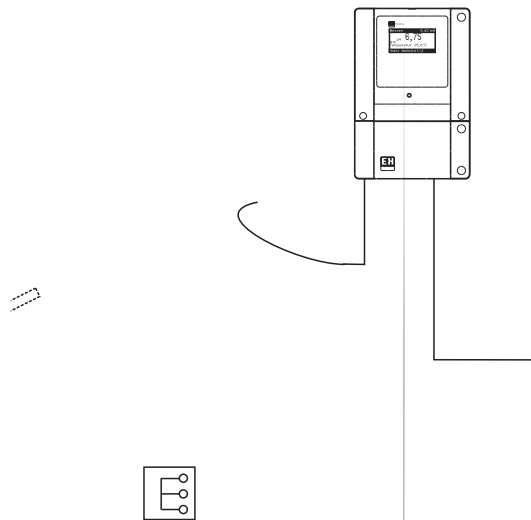
The Power of Know How



Measuring system

A complete measuring system consists of the following components:

- TopClean S CPC 30
- Pneumatically driven retractable assembly (e.g. CleanFit or ProbFit series) with pneumatic or inductive limit switches
- pH/redox electrode
- Electrode cable
- Cleaning agent with hoses
- RinseRinse block (for media which are controlled by additional valves)
- Hoses for injector CYR 10 / retractable assembly



Complete measuring system in non-Ex area

1: Retractable assembly CleanFit CPA 475 with pH / redox electrode

2: Transmitter Mycom S CPM 153

3: Control unit CPG 30

4: Power supply for Mycom S CPM 153

5: Power supply / control cable

6: Multihose

7: Injector CYR 10

8: RinseRinse block CPR 40 (optional)

A: Message and control signals: assembly position, program status, move assembly, program stop

B: Hold input, six relay contacts, two current outputs 0/4 ... 20 mA

Customer supplies:

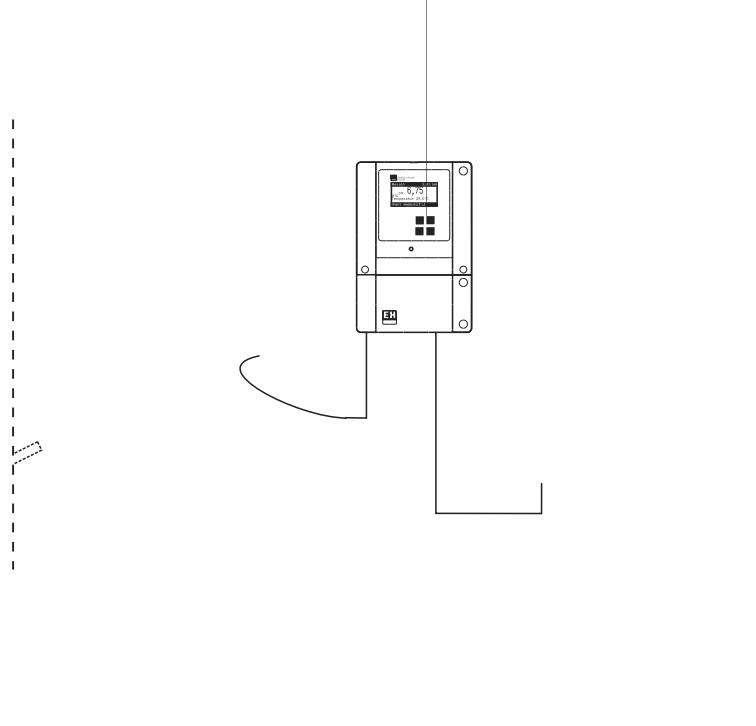
9: Additional valve

10: Cleaning solution

11: Electrical wiring

12: Compressed air

13: Liquids / cleaning mixture



Complete measuring system in Ex area

1: Retractable assembly CleanFit CPA 475 with pH / redox electrode

2: Transmitter Mycom S CPM 153

3: Control unit CPG 30

4: Power supply for Mycom S CPM 153

5: Power supply / control cable

6: Multihose

7: Injector CYR 10

8: Rinse block CPR 40 (optional)

A: Message and control signals: assembly position, program status, move assembly, program stop

B: Hold input, six relay contacts, two current outputs 0/4 ... 20 mA

Customer supplies:

9: Additional valve

10: Cleaning solution

11: Electrical wiring

12: Compressed air

13: Liquids / cleaning mixture

Operating modes

For configuration, 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.

You can choose between the following functions:

- *Automatic:* Freely programmeable weekly programme, separately for every week day with freely selectable interval lengths.
- *Cleaning:* Selection of cleaning programmes.
- *User programme:* Selection and configuration of customer-specific cleaning programme
- *Power failure programme:* In the event of a failure of the power supply or the communication, the system is automatically cleaned.
- *External control:* Programmes can be started via an external process control system.

Other functions

Quick setup

This function configures the measuring point quickly and simply with the necessary basic settings, so that you can begin measuring immediately.

SCC (= Sensor Condition Check)

This function monitors the state of the electrodes or the degree of electrode ageing. The status is displayed in the messages »good«, »medium« or »bad«. The electrode status is updated after each calibration. The »bad« message outputs an error message (maintenance requirement).

SCS (= Sensor Check System)

The Sensor Check System informs you of deviations in pH glass resistance or the difference between the reference resistance and the normal range. It means that an incorrect measurement may be made due to blocking or damage to the pH electrode. Automatic cleaning can be triggered by such a signal.

PCS (= Process Check System)

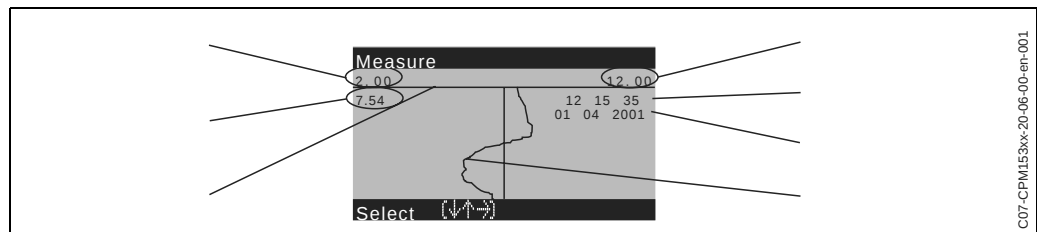
This function checks the measuring signal for deviations. If the measuring signal does not change over a specific period (1 hr, 2 hr, 4 hr), an alarm is triggered. This may be caused by soiling, blocking or similar.

Logbooks

There are several logbooks available: The last 30 entries are saved to an error logbook, an operation logbook and a calibration logbook. You can retrieve the entries by specifying a date and time.

Data logger

You can record two freely selectable parameters using the integrated data loggers and then view the results graphically in real time. You can retrieve the last 500 measured values using date and time. In this way, you can graphically display the process flow. This is a quick way of checking the process and provides a good possibility of optimising pH control.



Example for data logger (for Parameter 1, pH is selected here)

- | | |
|--|---|
| 1: Minimum display range (selectable to -2 pH) | 4: Maximum display range (selectable to +16 pH) |
| 2: The measured value which is found on the scroll bar (3) | 5: Time when this measured value was recorded |
| 3: Scroll bar | 6: Date of this measured value |
| | 7: Measured value curve |

Simple to control

The follow control functions are used in the CPC 30 :

- Limit value contact
 - Two-point controller with hysteresis for simple temperature control, for example
- PID controller
 - for one and two-sided processes
 - with freely adjustable P, I and D components
 - Includes configurable range-dependent gain (kinked curve)
 - Distinction between batch and flow (in-line) processes.

- Manipulated variable output

The manipulated variable can be output as a binary signal via relays or as a continuous signal

Calibration

Accurate calibration

The instrument allows all field-tested calibration possibilities:

- Buffer self-recognition at manual calibration
The buffer tables, e.g. to DIN, Endress+Hauser, Merck and Riedel de Haën/ Ingold, are saved in the instrument. Further buffer tables can also be programmed. During calibration, the instrument automatically recognises the buffer value.
- Manual calibration
When calibrating manually, you can conduct either a two-point calibration (zero point and slope) or a single-point calibration, i.e. zero point calibration of the pH electrode.
- Numeric calibration (data input)
The electrode data (zero point and slope) are entered using the keypad.
- Calibration logbook
The data of the last 30 calibrations are saved to a list with date and time.

Accurate measurement

- Medium temperature compensation (alpha value compensation)
This allows high-accuracy measurement over wide temperature ranges. In this type of compensation, the temperature influence on the medium is self-compensated.
- Isothermic intersection compensation
This allows high-accuracy measurement even at temperature fluctuations. Compensates the deviation between electrode zero point and isothermic intersection point.

Input

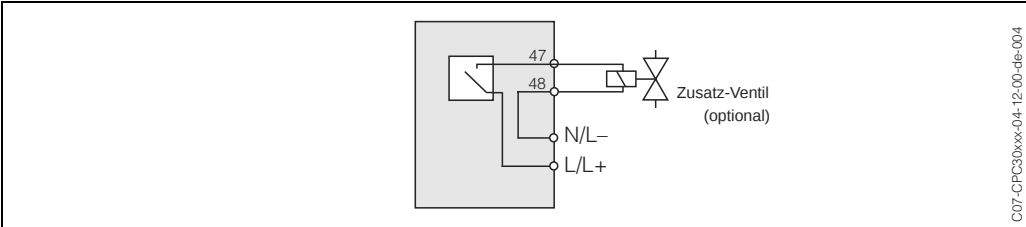


Note!

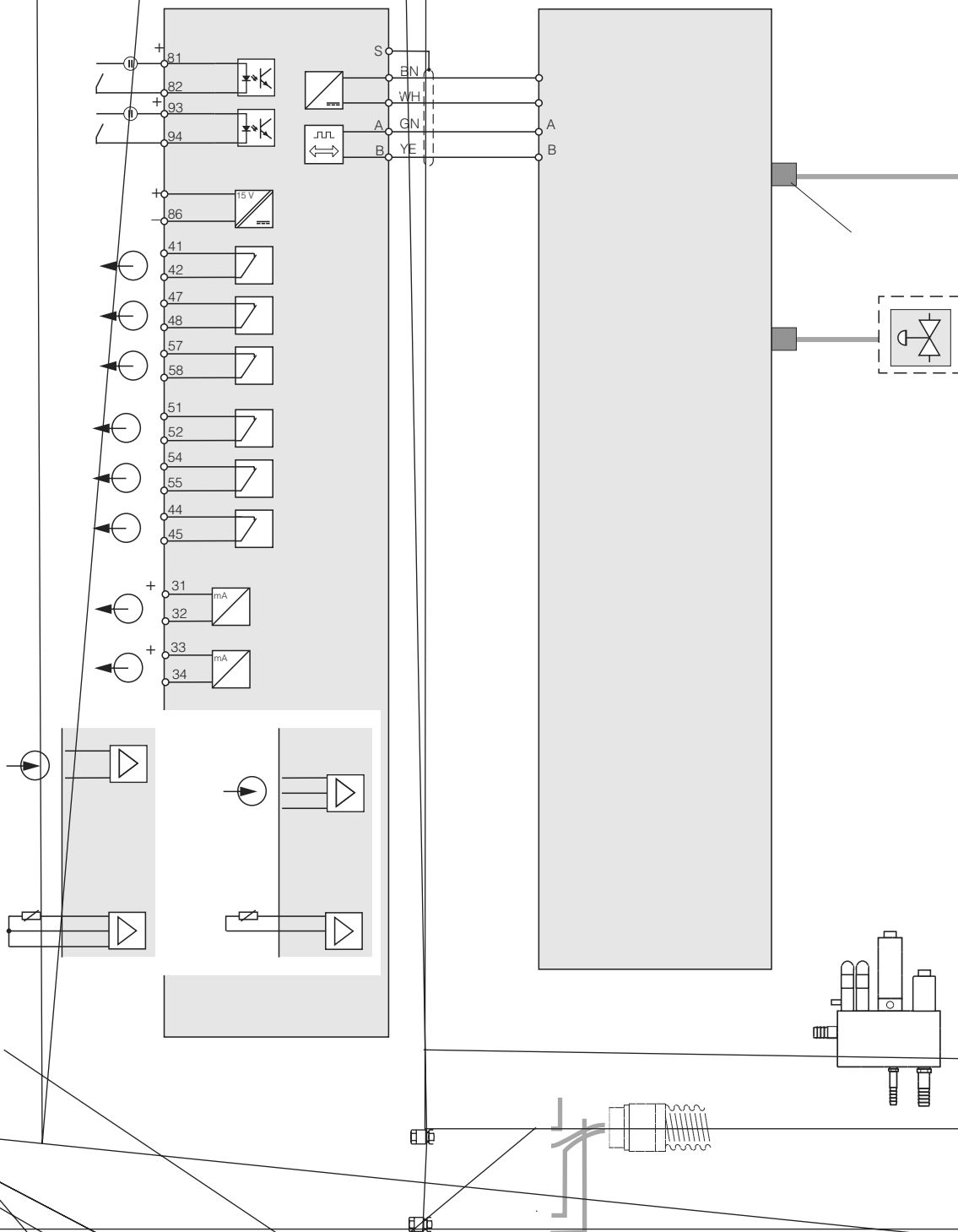
The limit values for Ex version are specified separately, marked with  and displayed in *italics*.

Output

Output signal	pH, redox, temperature	
Current outputs (terminals 31/32, 33/34)	Current range	0 / 4 ... 20 mA
	Error current	2.4 mA or 22 mA
	Measured error ¹	max. 0.2 % of current range end value
	Output distribution, settable	pH: $\Delta 1.8 \dots 18$ pH Redox: $\Delta 300 \dots 3000$ mV Temperature: $\Delta 17 \dots 170$ K
	Active current output (only non-Ex): Load	max. 600 Ω
	Passive current output: Input voltage range	6 ... 30 V
	 <i>Intrinsically safe current circuits for connection with intrinsically safe electric circuits with type of protection EEx ib IIC.</i>	
	Maximum input voltage U_i	DC 30 V
	Maximum input current I_i	100 mA
	Maximum input power P_i	750 mW
	Maximum inner capacity C_i	negligible
	Maximum inner inductivity L_i	negligible
Auxiliary voltage output (for digital inputs E1-E3)	Voltage	15 V DC
	Output current	max. 9 mA
	 <i>Intrinsically safe current output circuit with type of protection EEx ib IIC.</i>	
	Maximum output voltage U_o	DC 15,8 V
	Maximum output current I_o	71 mA
	Maximum output P_o	1.13 W
	Maximum outer capacity C_o	50 nF
	Maximum outer inductivity L_o	100 μ H
Interface to CPG 30	Power supply:	
	Output voltage	11.5 ... 18 V
	Output current	max. 60 mA
	Communication (only internal)	RS 485
	 <i>Intrinsically safe current output circuit with type of protection EEx ib IIC.</i>	
Limit value and alarm functions	Setpoint adjustments	pH $-2.00 \dots 16.00$
	Hysteresis for switch contacts	pH: 0.1 ... 18 Redox absolute: 10 ... 100 mV Redox relative: 1 ... 3000%
	Error delay	0 ... 6000 s

Relay contacts	The NC/NO 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
	Life span	≥ 5 million switching cycles
	With the maximum settable frequency in PFM	120 min ⁻¹
	With the maximum settable period length in PWM	1 ... 999.9s
	With PWM minimum switch-on period	0.4 s
	 Intrinsically safe relay contact circuits for connection with intrinsically safe electric circuits with type of protection EEx ia IIC or EEx ib IIC.	
	Maximum input voltage U_i	DC 30 V
	Maximum input current I_i	100 mA
	Maximum input power P_i	3 W
	Maximum inner capacity C_i	1.1 nF
	Maximum inner inductivity L_i	24 μH
¹ : acc. to IEC 746-1, under nominal operating conditions		
Galvanic isolation	At the same potential are:	
	• Current output 1 and the auxiliary energy supply output (term. 85/86) • Current output 2, connection to interface CPG 30 and the resistance input (term. 21/22)	
The remaining circuits are galvanically isolated from each other.		
CPG 30:	Output voltage	30 V
Digital outputs	Output current	100 mA
	Output power	750 mW
Control for an external valve and CYR 10 (non-Ex)	Switched mains voltage:	
	Max. current	$I_{\max} = 3 \text{ A}$
	Max. power	$P_{\max} = 750 \text{ VA}$
		
Switched mains voltage to control the additional external valve		
Control for external valve (Ex)	pneumatic	
Control for CYR 10Z (Ex)	Switched voltage:	12 V
	Max. current	$I_{\max} = 3 \text{ mA}$
	Max. power	$P_{\max} = 10 \text{ mW}$

Ex area



Contacts CPM 153

In the transmitter Mycom S CPM 153, there are six relays available which you can configure using the software.

The **ChemoClean**[®] spray cleaning system with the injector CYR 10 automatically cleans the electrode. It is controlled by two contacts.

The NC/NO contact type can be switched by software.



Note!

- If you use NAMUR contacts (acc. to recommendations of the community of interest process control engineering of the chemical and pharmaceutical industry), the contacts are set to the relays as follows:
 - Failure to "ALARM"
 - Maintenance required to "RELAY 1" and
 - Function control to "RELAY 2".
- You can assign up to three relays to the controller, dependent on the instrument version.

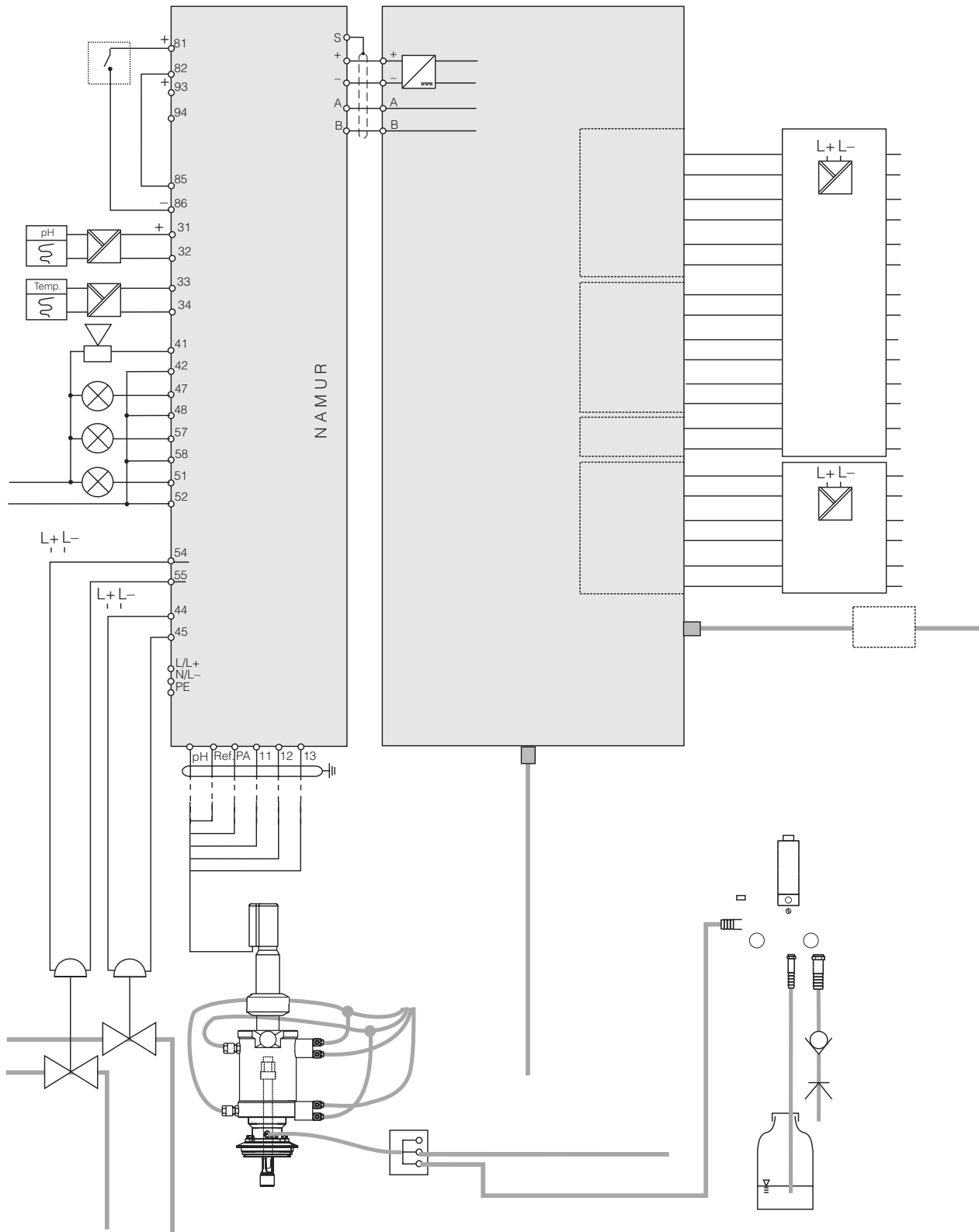
Selection by software	NAMUR on	NAMUR off
ALARM 	Alarm	Alarm
RELAY 1 	Warning when maintenance required	Controller or ChemoClean
RELAY 2 	Function control	Controller or ChemoClean

Electrical connection data

Mycom S CPM 153:

Contacts CPM 153

In the measuring transmitter CPM 153, there are six relays available which you can configure using the software as shown by the following table.



Performance characteristics

Measured value resolution	pH: 0.01 Redox: 1 mV / 1% Temperature: 0.1 K
Measurement deviation¹ display	pH: max. 0.2% of measuring range Redox: 1 mV Temperature: max. 0.5 K
Measured error¹	max. 0.2% of current range end value
Repeatability¹	max. 0.1% of measuring range

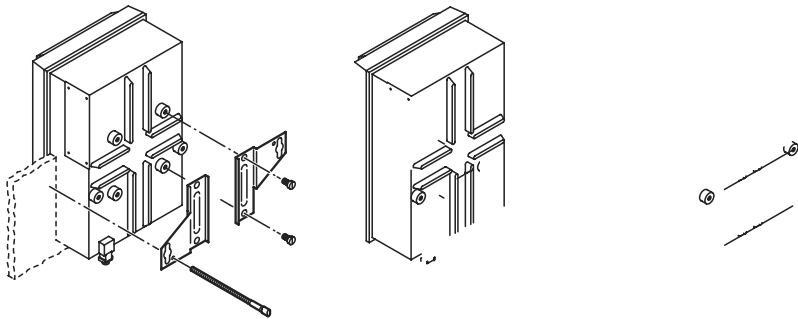
¹: acc. to IEC 746-1, under nominal operating conditions

Installation conditions

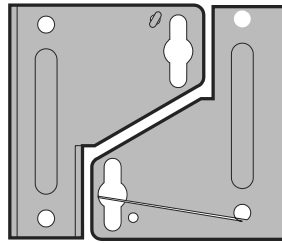
- Installation instructions**
- Always install the transmitter and the control unit so that the cable entries always point downwards.
- The components can be installed using the following methods:

Device	Wall mounting	Post/ pipe installation	Panel mounting
Control unit CPG 30	Mounting kit contained in scope of supply. Refer to figure below.	not applicable	not applicable
CPM 153, covered	Required: 2 screws ø 6 mm 2 rawl plugs ø 8 mm	Mounting kit contained in scope of supply. Refer to figure below.	Mounting kit contained in scope of supply. Refer to figure below.
CPM 153, outdoors	If installed outdoors, weather protection cover CYY102-A required	Weather protection cover CYY102-A and two round post fixtures required	not usual

- The transmitter CPM 153 is normally installed as a panel-mounted unit.
- The transmitter CPM 153 can be fixed to a vertical or horizontal pipe using the supplied mounting kit. For outdoor installation, a weather protection cover CYY 101 is required. It can be fitted to the field unit using all kinds of fixtures (refer to "Accessories").



Panel mounting ① and post mounting ② for CPM 153



Mounting the transmitter in panels or on posts CPM 153 using supplied mounting kit (see left).

If you want to mount the device on the front of an air-tight panel, you must also use a flat seal (see "Accessories").

Required installation cutout for panel mounting:

$161^{+0.5} \times 241^{+0.5}$ mm.

The installation depth is

approx. 134 mm.

The maximum pipe diameter is

60 mm.

For outdoor use, the weather protection cover CYY 101 is required. This is available as an accessory.

Water and compressed air connections

Water	4 ... 6 bar, filtered 100 µm, max. 56°C
Compressed air	4 ... 6 bar, filtered 0.5 µm, free from oil and condensate
Screw unions	bulkhead gland AD 6 / ID 4

Injector CYR 10:

max. suction height concentrated cleaner	3 m
Motive water volume	min. 2 l/min. max. 10 l/min.
Motive water pressure	2 ... 12 bar

Ambient conditions

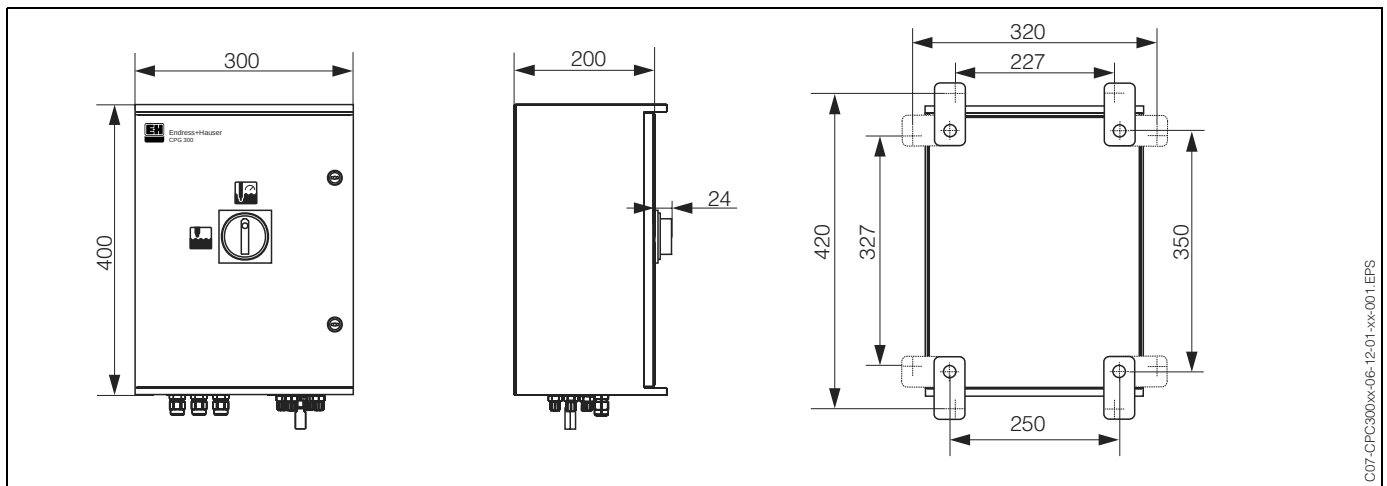
Ambient temperature	-10 ... +55°C (Ex: -10 ... +50°C)	
Ambient temperature limit	-20 ... +60°C (Ex: -10 ... +50°C)	
Storage and transport temperature	-30 ... +80°C	
Relative humidity	10 ... 95%, non-condensing	
Ingress protection	CPM 153: IP 65	CPG 30: IP 54
Electromagnetic compatibility	Interference emission and interference immunity to EN 61326: 1997 / A1:1998	
Safety requirements	Complies with general safety requirements acc. to EN 61010. Complies with NAMUR Recommendations NE 21.	

Process conditions

Temperature range media conveyed	max. 60°C
Pressure of media conveyed	Aggressive or hot media which are conveyed via additional valves (optional) must not be conveyed by the injector CYR 10 of the CPC 30 system. Use the rinse block CPR 40 for that.

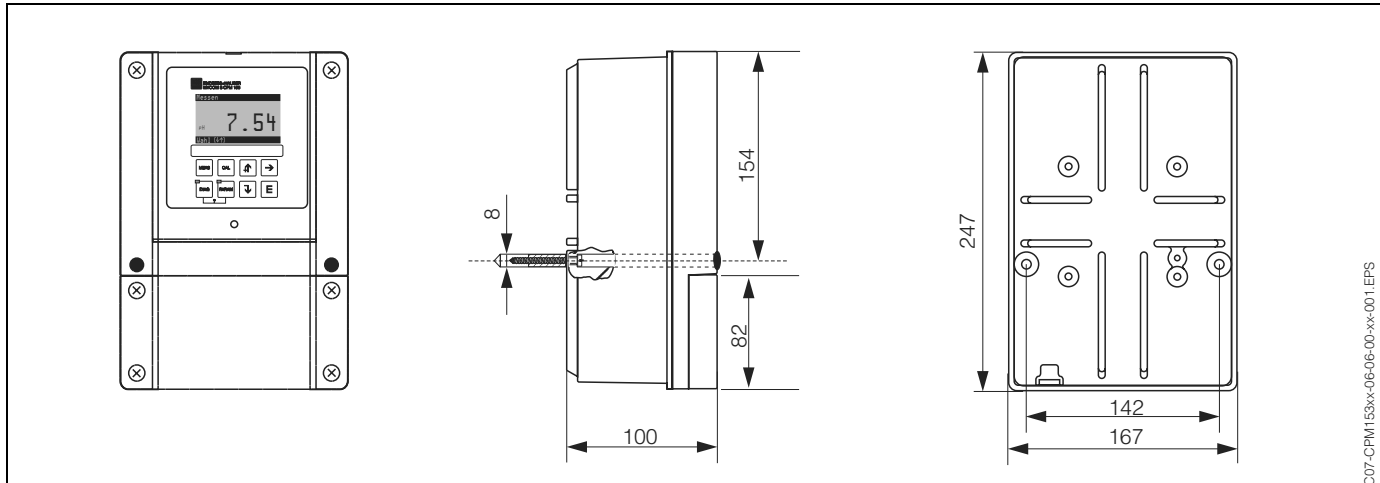
Mechanical construction

Design / dimensions



Dimensions of control unit CPG 30

C07-CPC30xx-06-12-01-xx-001.EPS



Dimensions of transmitter CPM 153

C07-CPM153xx-06-06-00-xx-xx-001.EPS

Weight	CPG 30: approx. 20 kg		CPM 153: max. 6 kg
Materials	CPM 153	Housing	GD-AISI 12 (Mg content 0.05%), plastic-coated
		Front	Polyester, UV-resistant
	CPG 30	Housing	Ex and non-Ex: Polyester GF
	Injector CYR 10	Housing	PVC (in contact with medium)

Display and operating interface

You can set up the complete measuring point with using the operating panel on the transmitter CPM 153 or using the offline set-up function in the PC tool.

If you are using several devices, you can copy the entire set-up of one device to another device using the DAT module.

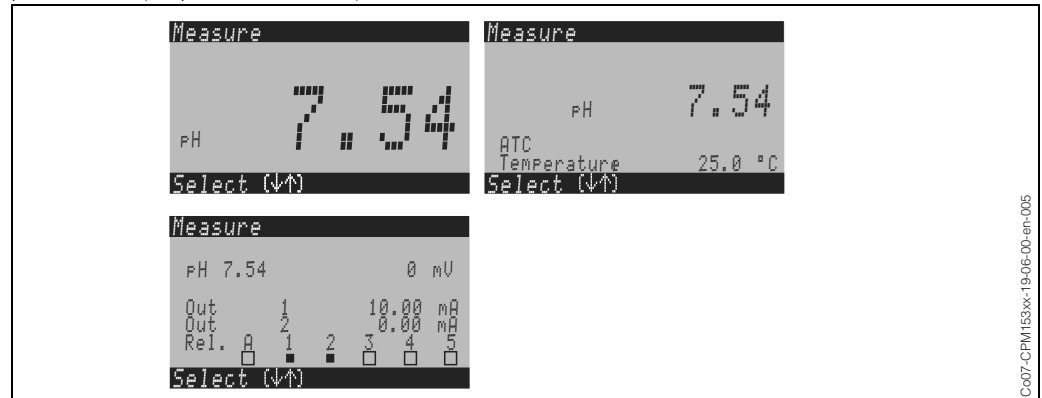
Display elements Mycom S CPM 153

Backlit LC display with dot matrix, 128 x 64 dots

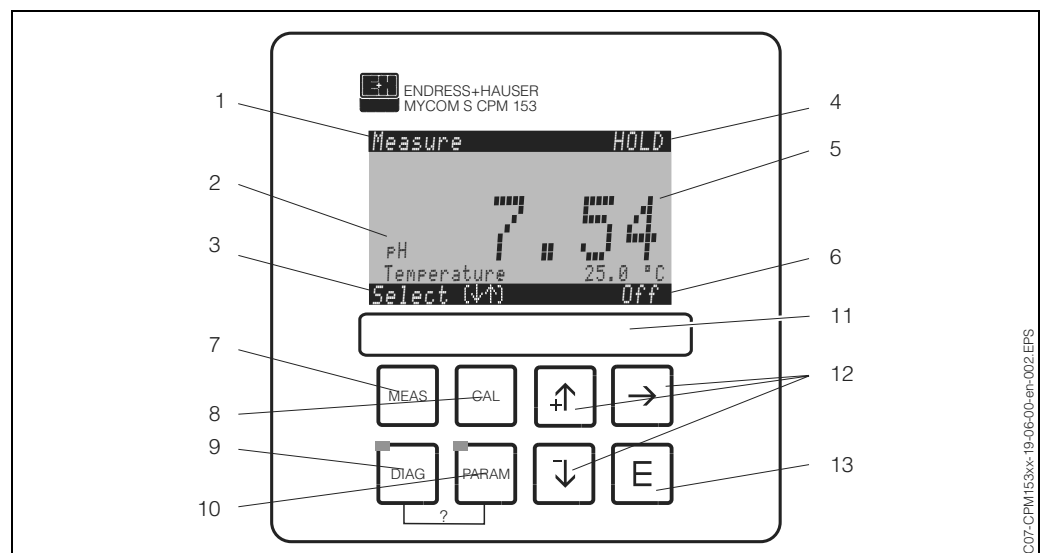
Display possibilities:

One circuit instrument:

pH/redox value, temperature, current outputs 1 and 2, contact states, status CPG 30, control parameters (setpoint, set values)



C07-CPM153xx-19-06-00-en-005



C07-CPM153xx-19-06-00-en-002 EPS

Backlit dot matrix display, display example

1: Current measured variable

2: Current menu option

3: Measured variable

4: Select: arrow keys for scrolling through the menu/through the measuring menus, »E« to browse down

5: "Meas" (Measuring mode) key

6: "Cal" (Calibration) key

7: "Diag" (Diagnosis menu) key

8: "Param" (Parameter entry menu) key

9: ENTER key

10: Scroll keys

11: Labelling strip

12: Display of measured value

?: Press DIAG and PARAM together to open the Help page

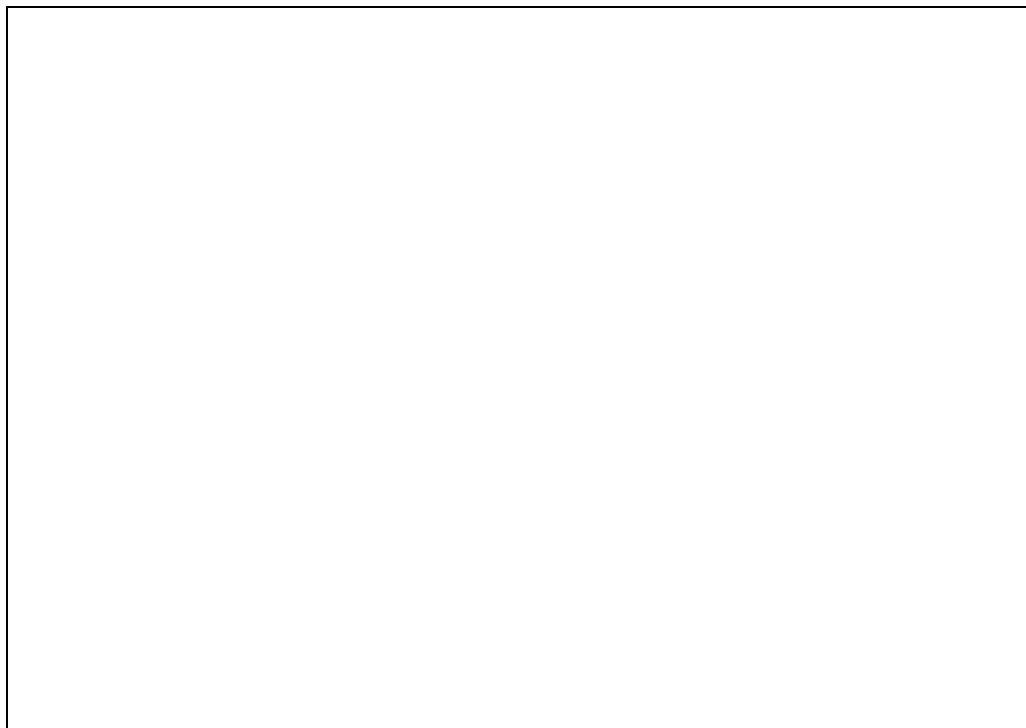
Operating elements Mycom S CPM 153

There are 4 main menus available for instrument operation:

- Measurement ("MEAS")
- Configuration ("PARAM")
- Calibration ("CAL") and
- Diagnostics ("DIAG").

Press the "MEAS", "PARAM", "CAL" and "DIAG" keys to switch to the appropriate selection menu. Here, the possible options are displayed in plain text and selected elements are displayed in reverse video. Selections are made using the arrow keys, which are also used to edit the numeric values.

Offline configuration user interface using Parawin (Accessories)



The PC tool Parawin provides you with a tool for configuring your measuring point on a PC using a simple and self-explanatory menu structure (an example window can be seen above). Write the configuration to the DAT module using the RS232 interface on the PC. The data can then be transferred to the transmitter.

Certificates and approvals

CE symbol

The TopClean S system complies with the statutory requirements of the harmonised EC directives. Endress+Hauser confirms the successful testing of the system by affixing the **CE** symbol.

Ex approvals

- ATEX II (1) 2G EEx em ib[ia] IIC T4
- FM NI Class I, Division 2, Groups A, B, C, D; sensor IS Class I Division 1, Groups A, B, C, D
FM DIP Class II, III, Division 1, Groups E, F, G; sensor IS Class I Division 1, Groups A, B, C, D
- FM NI Class I, Division 2, Groups A, B, C, D
FM DIP Class II, III, Division 1, Groups E, F, G
- CSA Class I, Division 2; sensor IS Class I Division 1
- TIIS
- EC system approval

Ordering information

**Product structure for the
complete system
TopClean S CPC 30**

Scope of delivery of basic equipment:
Control unit CPG 30, transmitter Mycom S CPM 153 with 6 relays and DAT module, injector CYR 10, multihose (5 m), hose clip, power supply cable CPM 153 – CPC (5 m)

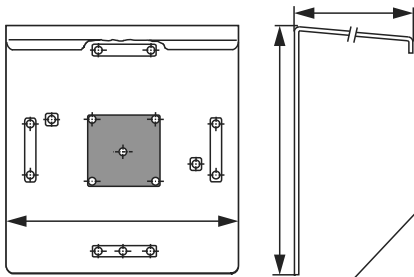
Approvals

- A Basic equipment: non-Ex
 - G With ATEX approval II (1) 2G EEx em ib[ia] IIC T4
 - 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
-

Connection accessories

- *CPK 1*: Version with pilot wire and additional outer screen, sheathed in PVC, $\varnothing$ 7.2 mm. Extension with cable CYK 71 possible. Order No.: of CYK 71: 50085333
- *CPK 9*: For pH/redox electrodes with integrated temperature sensor and TOP68 plug-in head (version ESA, ESS). Extension with cable CYK 71 possible.
- *CPK 12*: For IsFET pH sensors and pH/redox electrodes with integrated temperature sensor and TOP68 plug-in head. Extension with cable CYK 12 possible.
- *Junction box VBE*: For Ex area Zone 0. Order No.: 50003993
- *Junction box VBM*: Junction box for extending measuring cable connection between electrode and transmitter. Two screw unions for e.g. combination electrode. Material: aluminium casting, ingress protection IP 65. Order No. 50003987
- *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 casting, ingress protection IP 65. Order No. 50003987

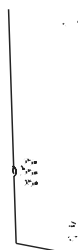
Rinse connection adapter	Rinse connection adapter CPR 40 for the transport of cleaning agents for use with retractable assemblies.
Spray cleaning system	CYR 10 / CYR 20 ChemoClean Spray Cleaning System for the transport of cleaning agents for use with retractable assemblies.
Weather protection cover CYY 101	For installing the transmitter outdoors, the weather protection cover CYY 101 is recommended. Order No.: CYY101-A
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. Order No.: 50062121



Weather protection cover CYY 101

Housing CYC 300

Housing for TopClean S CPC 30, with rack for buffer and cleaner solutions. Operating panel with alarm LED and lock for programme start and assembly drive. Window for Mycom S or MemoGraph S. For Ex and Non-Ex applications. Material: plastic or stainless steel.



- 1 Mycom S CPM 153
 - 2 TopClean S CPC 30
 - 3 Pg cable glands
 - 4 Multihose gland
 - 5 Rack
 - 6 Buffer and cleaner solutions
 - 7 MemoGraph S
 - 8 Programme control unit
 - 9 Operating panel
- (Order operating panel separately:
Order No.: 51512891)

Housing CYC 300

Dimensions housing CYC 300, stainless steel version

Dimensions of housing CYC 300, plastic version

Product structure
Housing CYC 300

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
	G								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, CPC 30 not mounted
	2								order item of associated CPC
Options									
	1								Basic version
CYC 300-									complete order code

Supplementary documentation

**Supplementary
documentation**

- ☐ Operating Instructions TopClean S CPC 30, BA 235C/07/en, Order No. 51504339
- ☐ Operating Instructions PROFIBUS-PA, BA 298C/07/en, Order No. 51507116
- ☐ Operating Instructions HART, BA 301C/07/en, Order No. 51507114
- ☐ Ex Safety Instructions, XA 236C/07/a3, Order No. 51506729
- ☐ Technical Information Mycom S CPM 153, TI 233C/07/en, Order No. 51503788
- ☐ Technical Information CleanFit CPA 471, TI 217C/07/en, Order No. 51502595
- ☐ Technical Information CleanFit CPA 472, TI 223C/07/en, Order No. 51502644
- ☐ Technical Information CleanFit CPA 473, TI 344C/07/en, Order No. 51510923
- ☐ Technical Information CleanFit CPA 474, TI 345C/07/en, Order No. 51510925
- ☐ Technical Information CleanFit CPA 475, TI 240C/07/en, Order No. 51505598
- ☐ Technical Information OrbiSint CPS 11/12/13, TI 028C/07/en, Order No. 50052557
- ☐ Technical Information CeraLiquid CPS 41/42/43, TI 079C/07/en, Order No. 50058726
- ☐ Technical Information CeraGel CPS 71, TI 245C/07/en, Order No. 51505837
- ☐ Technical Information OrbiPore CPS 91, TI 375C/07/en, Order No. 51513127
- ☐ Technical Information TopHit CPS 471, TI 283C/07/en, Order No. 51506687
- ☐ Technical Information CPK 1-12, TI 118C/07/en, Order No. 50068525
- ☐ Technical Information CPR 40, TI 342C/07/en, Order No. 51510059
- ☐ Technical Information CYR 10 / 20, TI 046C/07/en, Order No. 50014223

Subject to modification

Endress+Hauser
GmbH+Co.
Instruments International
P.O. Box 2222
D-79574 Weil am Rhein
Germany

Tel. (07621) 975-02
Tx 773926
Fax (07621) 975 345
e-mail: info@ii.endress.com

Internet:
www.endress.com



