



Level



Pressure



Flow



Temperature

Liquid
Analysis

Registration

Systems
Components

Services



Solutions

Technical Information

Liquisys M CPM223/253

pH/ORP Measurement

Transmitter for analog and digital glass and ISFET sensors



The modular design of the Liquisys M CPM223/253 allows easy adaptation of the transmitter to a variety of customer requirements. Starting with the basic version for "measurement and alarm generation", the transmitter can be equipped with additional software and hardware modules for special applications. These modules can also be retrofitted as required.

Application

- Effluent treatment
- Neutralization
- Detoxication (electroplating)
- Water treatment
- Water monitoring

Your benefits

- Memosens technology
- Field or panel-mounted housing
- Universal application
- Simple handling
 - Logically arranged menu structure
 - Large two-line display
 - Ultrasimple two-point calibration
- Safe operation
 - Overvoltage (lightning) protection
 - Direct access for manual contact control
 - Calibration plausibility check
 - User-defined alarm configuration

The basic unit can be extended with:

- Additional 2 or 4 contacts for use as:
 - Limit contacts (also for temperature)
 - P(ID) controller
 - Timer for simple rinse processes
 - Complete cleaning with Chemoclean
 - Current input
- Plus package:
 - User defined current output characteristics
 - Automatic cleaning trigger on alarm or limit violation
 - Sensor Check System for pH glass and reference
 - Live check of sensor
 - Special neutralization controller
- HART® or PROFIBUS-PA/-DP
- 2nd current output for temperature, pH/ORP or continuous controller

Function and system design

Features of the basic version

pH and ORP value measurement

This is selected via the menu. During measurement, the value measured can be displayed in the other measuring mode (e.g. pH - mV or ORP % - ORP mV). The temperature is displayed at the same time or, if desired, not shown at all.

Calibration

pH electrodes are normally calibrated with the same pH values. Therefore the transmitter presents the settings from the **previous** calibration as defaults for the next calibration. If the buffer solutions are interchanged by accident (e.g. pH 4 buffer first, then pH 7 buffer instead of pH 7 first and then pH 4) the **plausibility check** ensures that the calibration is accepted anyway.

Configuration

Different alarms are required depending on application and operator. Therefore the transmitter permits independent **configuration of the alarm contact and error current** for each individual error. Unnecessary or undesirable alarms can be suppressed in this manner. **Up to four contacts** can be used as limit contacts (also for temperature) to implement a P(ID) controller or for cleaning functions.

Direct **manual operation of the contacts** (bypassing the menu) provides quick access to limit, control or cleaning contacts, permitting speedy correction of deviations.

Additional functions of the plus package

Current output

In order to output wide measuring ranges while still achieving a high resolution in specific ranges, the **current output** can be configured as required via a table. This permits **bilinear** or **quasi-logarithmic** curves, etc.

Sensor-Check-System (SCS)

The sensor check system alerts to deviations of the pH glass impedance or reference impedance from the normal range, thus indicating possible failure due to pH electrode blocking or damage. In addition, the SCS detects glass breakage of glass electrodes and leakages of ISFET sensors.

Live-check

The live check issues an alarm when the sensor signal does not change over a defined period of time. This may be caused by blocking, passivation, separation from the process, etc.

Neutralization controller

A special control response that cannot be handled adequately by a P(ID) controller is required to neutralize solutions. For this reason, the transmitter provides a special neutralization controller function by combining two P(ID) controllers.

Current input

The current input of the transmitter allows two different applications: controller shut-down in case of lower flow rate violation or total failure in the main flow as well as feedforward control. Both functions are also combinable.

Explosion proof versions for zone 2

Application of transmitter and sensor in hazardous Field housing CPM253 with power supply 24 V area zone 2

Application of transmitter as related electrical equipment in non-hazardous area or in simple pressurized apparatus; application of sensor in hazardous area zone 2

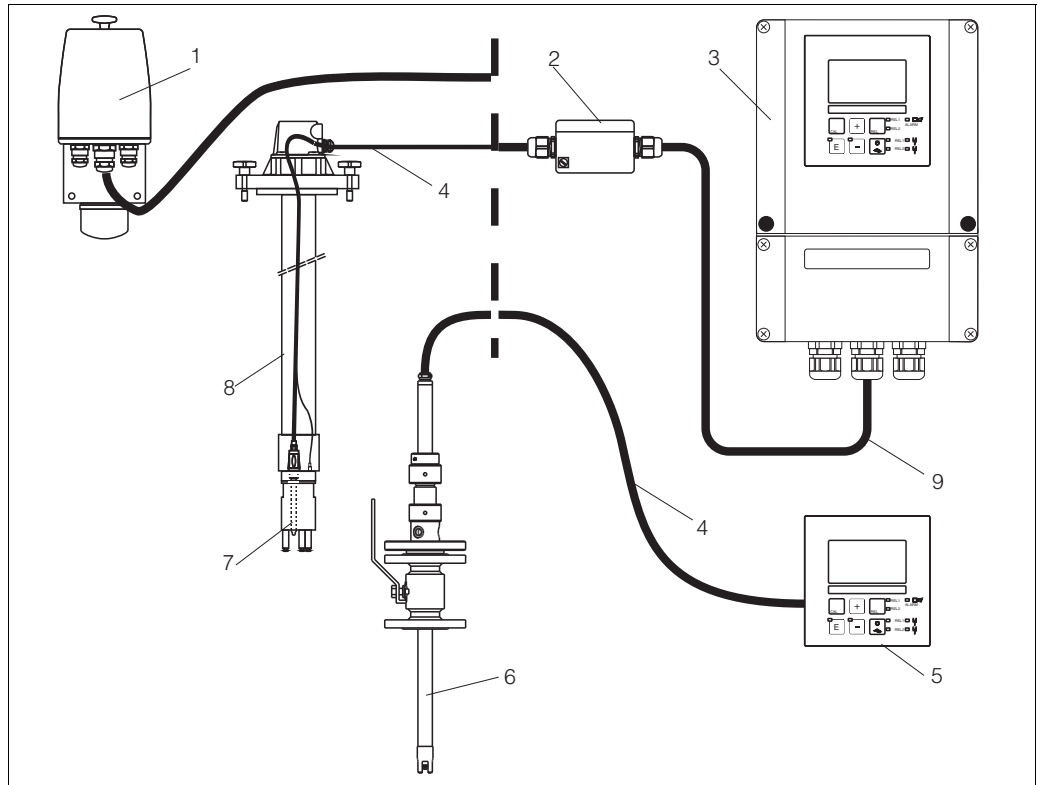
Field housing CPM253 with power supply 230 V or
Panel mounted housing CPM223 with power supply 230 V or 24 V

Measuring system

A complete measuring systems comprises:

- The transmitter Liquisys M CPM223 or CPM253
- A pH/ORP electrode with or without an integrated temperature sensor
- An immersible, flow or retractable assembly
- A measuring cable(e.g. CPK9)

Options: extension cable, junction box VBA or VBM



Complete measuring system Liquisys M CPM223/253

- | | | | |
|---|---------------------------|---|--|
| 1 | Flow assembly CPA250 | 6 | Retractable assembly Cleanfit W CPA450 |
| 2 | Junction box VBA | 7 | Electrode, e.g. Orbisint CPS11 |
| 3 | Liquisys M CPM253 | 8 | Immersion assembly CPA111 |
| 4 | Measuring cable e.g. CPK9 | 9 | Extension cable |
| 5 | Liquisys M CPM223 | | |

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Input

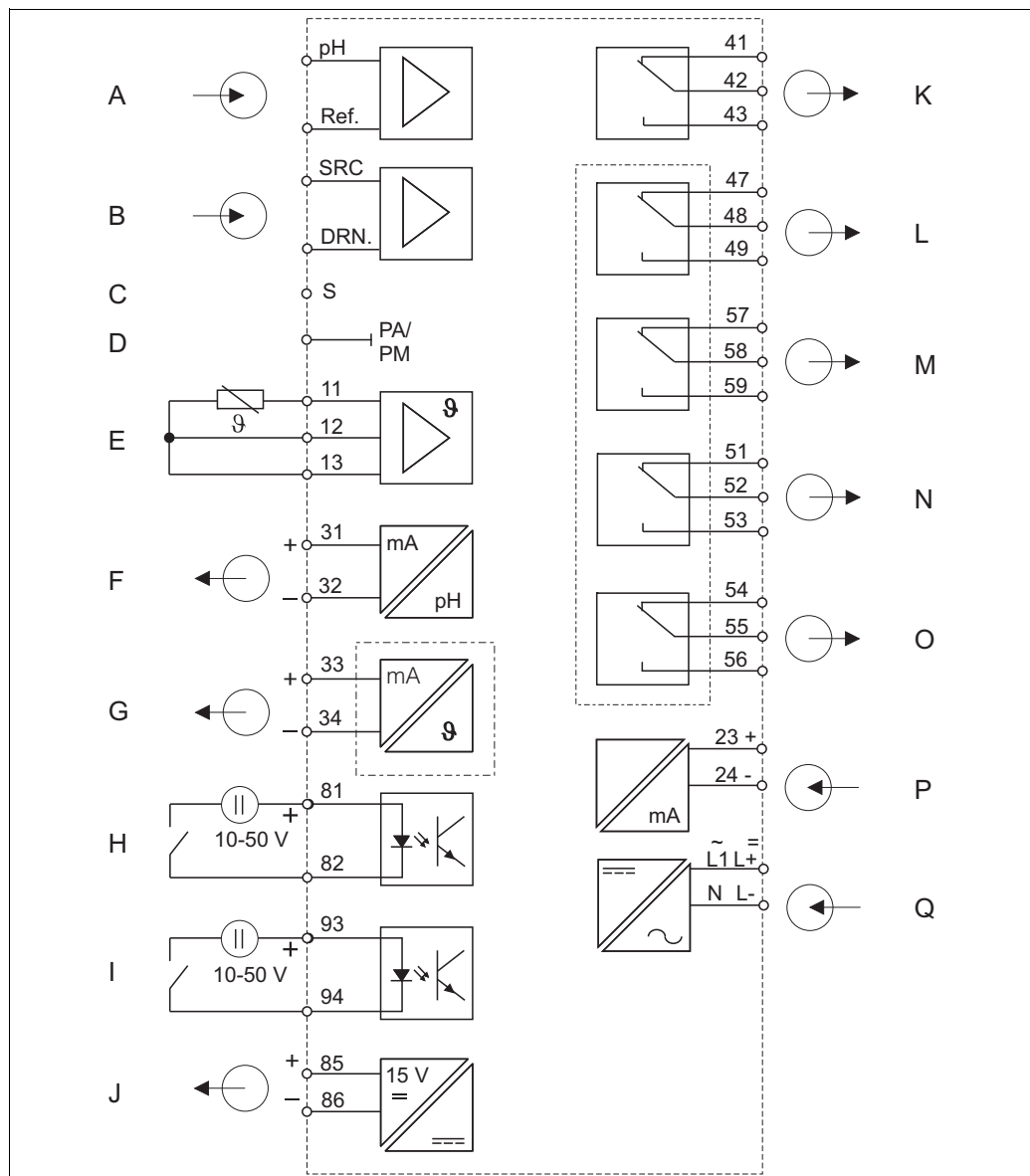
Measured variables	pH (analog or digital sensors) ORP Temperature	
Measuring range	pH: ORP: Temperature: Pt 100 Pt 1000 (versions IS / PS) NTC 30K (versions IS / PS)	-2 to 16 -1500 to +1500 mV / 0 to 100 % -50 to +150 °C (-58 to +302 °F) -50 to +150 °C (-58 to +302 °F) -20 to +100 °C (-4 to +212 °F)
Input resistance	> 10 ¹² Ω (for nominal operating conditions) for standard sensors	
Cable specification	Length of cable (analog): Length of cable (digital):	max. 50 m (164 ft) max. 100 m (328 ft)
Binary inputs	Voltage: Power consumption:	10 to 50 V max. 10 mA
Current input	4 to 20 mA, galvanically separated Load: 260 Ω at 20 mA (voltage drop 5.2 V)	

Output

Current range	0/4 to 20 mA, galvanically separated, active	
Error current	2.4 or 22 mA	
Load	maximum 500 Ω	
Output range	pH: ORP: absolute: relative: Temperature:	adjustable, min. Δ 1 pH adjustable, min. Δ 50 mV fixed, 0 to 100 % adjustable, Δ 10 to Δ 100 % of upper range value
Resolution	max. 700 digits/mA	
Min. distance for 0 / 4 to 20 mA signal	10% of measuring range	
Isolation voltage	max. 350 V _{RMS} /500 V DC	
Overvoltage protection	according to EN 61000-4-5	
Auxiliary voltage output	Output voltage: Output current:	15 V \pm 0.6 max. 10 mA
Contact outputs	Switching current with ohmic load ($\cos \varphi = 1$): Switching current with inductive load ($\cos \varphi = 0.4$): Switching voltage: Switching power with ohmic load ($\cos \varphi = 1$): Switching power with inductive load ($\cos \varphi = 0.4$):	max. 2 A max. 2 A max. 250 V AC, 30 V DC max. 500 VA AC, 60 W DC max. 500 VA AC, 60 W DC
Limit contactor	Pickup/dropout delay:	0 to 2000 s
Controller	Function (adjustable): Controller response: Control gain K_p : Integral action time T_n : Derivative action time T_v : Period for pulse length controller: Frequency for pulse frequency controller: Basic load:	pulse length/pulse frequency controller PID 0.01 to 20.00 0.0 to 999.9 min 0.0 to 999.9 min 0.5 to 999.9 s 60 to 180 min ⁻¹ 0 to 40% of max. set value
Alarm	Function (selectable): Alarm threshold adjustment range: Alarm delay:	latching / momentary contact pH / temperature: complete measuring range 0 to 2000 s 0 to 2000 min

Power supply

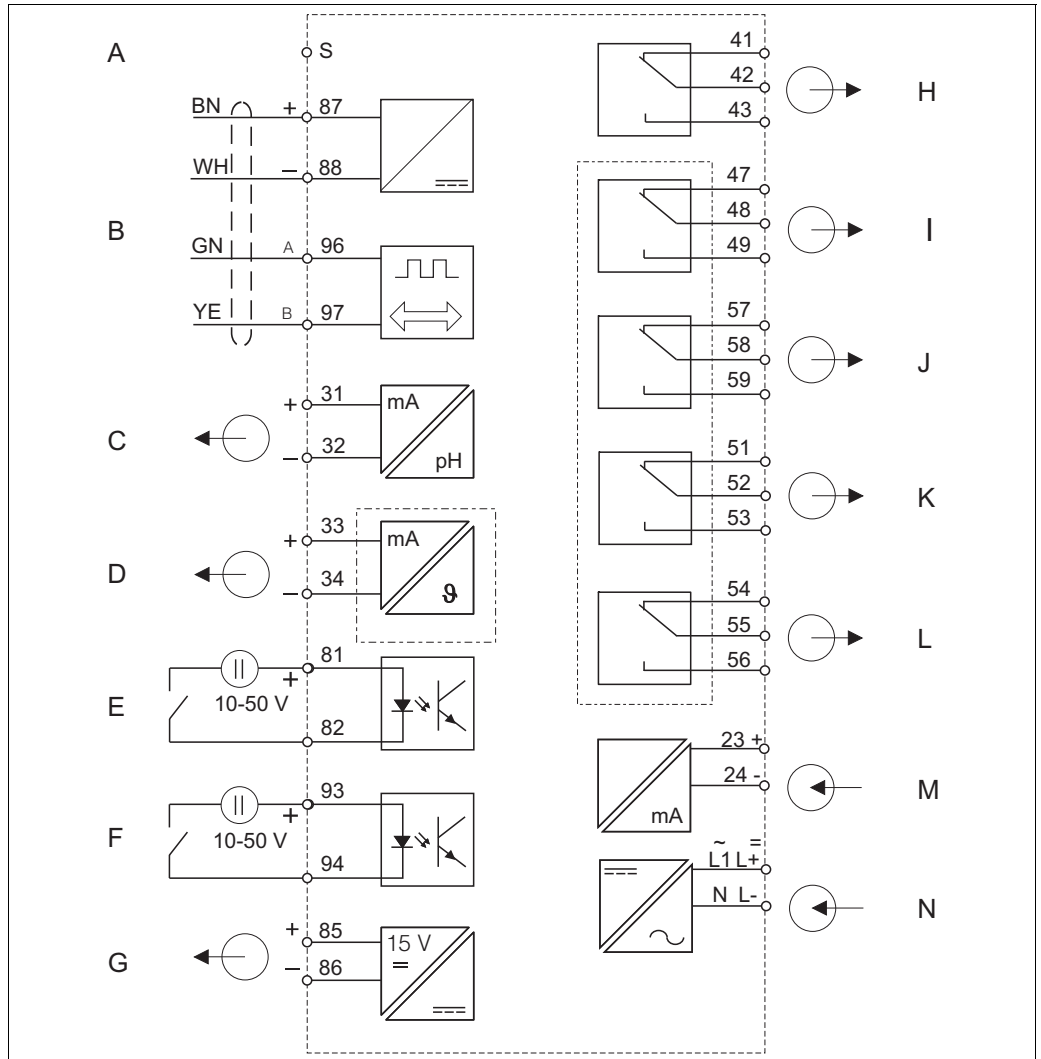
Electrical connection of analog sensors



Electrical connection Liquisys M

A	Standard sensor	J	Auxiliary voltage output
B	ISFET sensor	K	Alarm (contact position currentless)
C	Outer screen connection for glass electrodes	L	Relay 1 (contact position currentless)
D	Potential matching	M	Relay 2 (contact position currentless)
E	Temperature sensor	N	Relay 3 (contact position currentless)
F	Signal output 1 pH/ORP	O	Relay 4 (contact position currentless)
G	Signal output 2 temperature, pH/ORP or controller P	P	Current input 4 to 20 mA
H	Binary input 1 (Hold)	Q	Power supply
I	Binary input 2 (Chemoclean)		

Electrical connection of digital sensors with Memosens technology



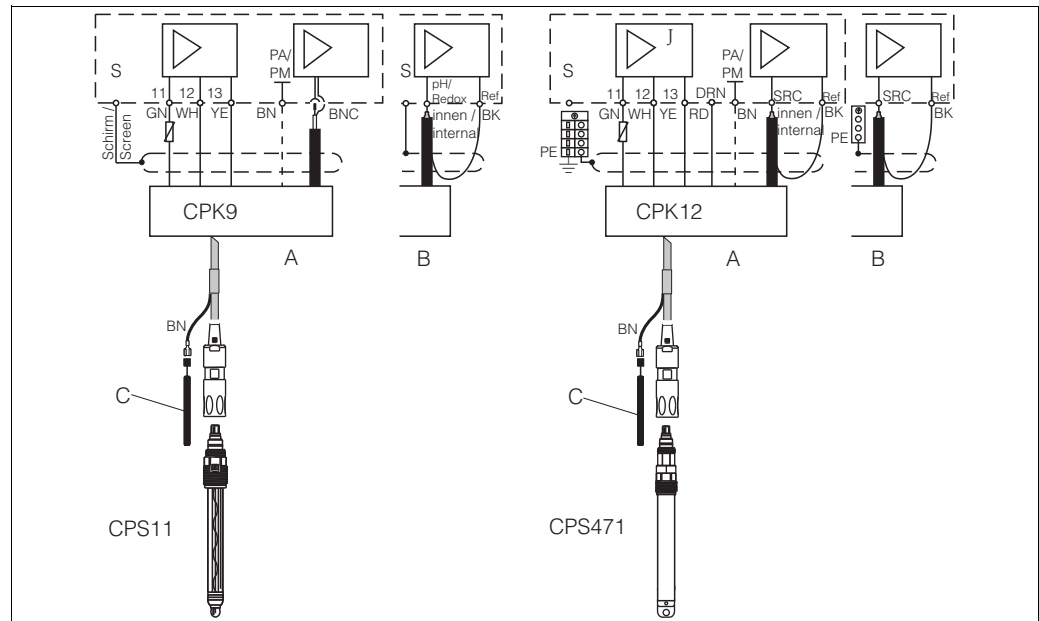
Transmitter electrical connection with Memosens technology

- | | |
|--|---|
| <p>A Screen</p> <p>B Sensor</p> <p>C Signal output 1 pH/redox</p> <p>D Signal output 2 temperature, pH/redox or controller</p> <p>E Binary input 1 (Hold)</p> <p>F Binary input 2 (Chemoclean)</p> <p>G Auxiliary voltage output</p> | <p>H Alarm (contact position currentless)</p> <p>I Relay 1 (contact position currentless)</p> <p>J Relay 2 (contact position currentless)</p> <p>K Relay 3 (contact position currentless)</p> <p>L Relay 4 (contact position currentless)</p> <p>M Current input 4 to 20 mA</p> <p>N Power supply</p> |
|--|---|

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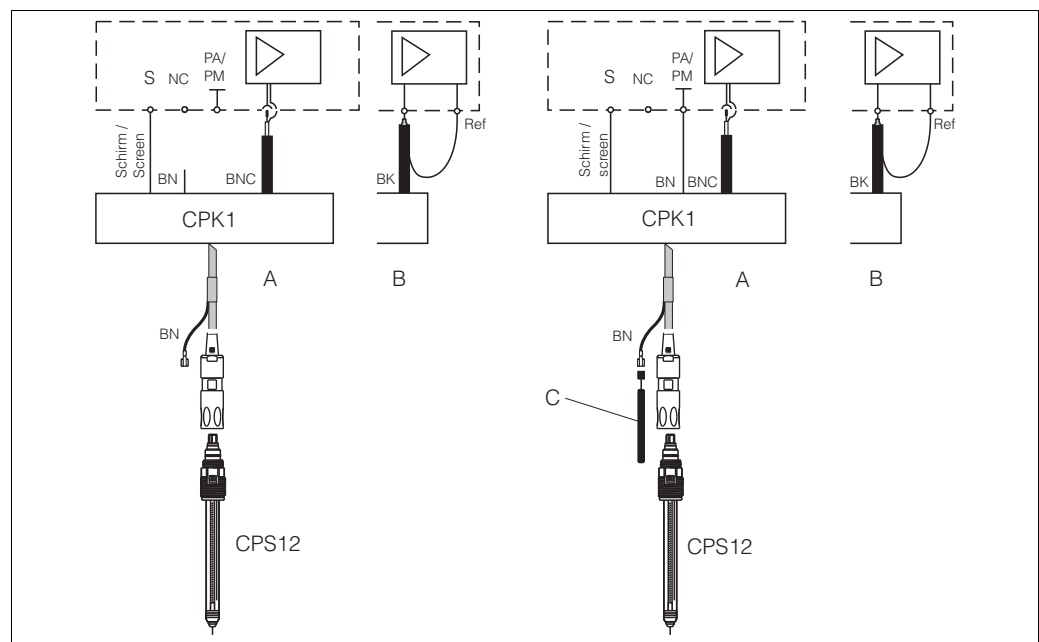
Connection of sensor

The pH and ORP electrodes are connected using special terminated and shielded multicore cables. The measuring cable can be extended with a junction box and an extension cable. Termination instructions are supplied with the measuring cable.



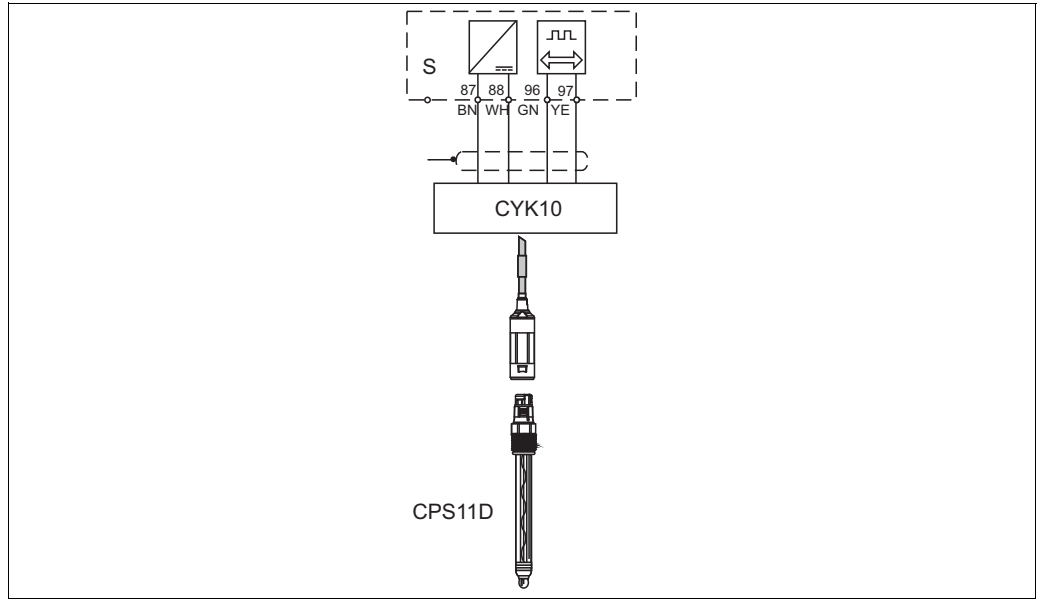
Connection CPS11 with CPK9 and CPS471 with CPK12 to Liquisys M

- A Panel-mounted instrument
- B Field instrument
- C Potential matching PM for symmetrical connection



Unsymmetrical and symmetrical connection of ORP electrodes to Liquisys M

- A Panel-mounted instrument
- B Field instrument
- C Potential matching PM for symmetrical connection



Connection of digital sensor CPS11D with CYK10

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Power supply	Depending on ordered version: 100/115/230 V AC +10/-15 %, 48 to 62 Hz 24 V AC/DC +20/-15 %
Power consumption	max. 7.5 VA
Mains protection	Fine-wire fuse, medium-slow blow 250 V/3.15 A

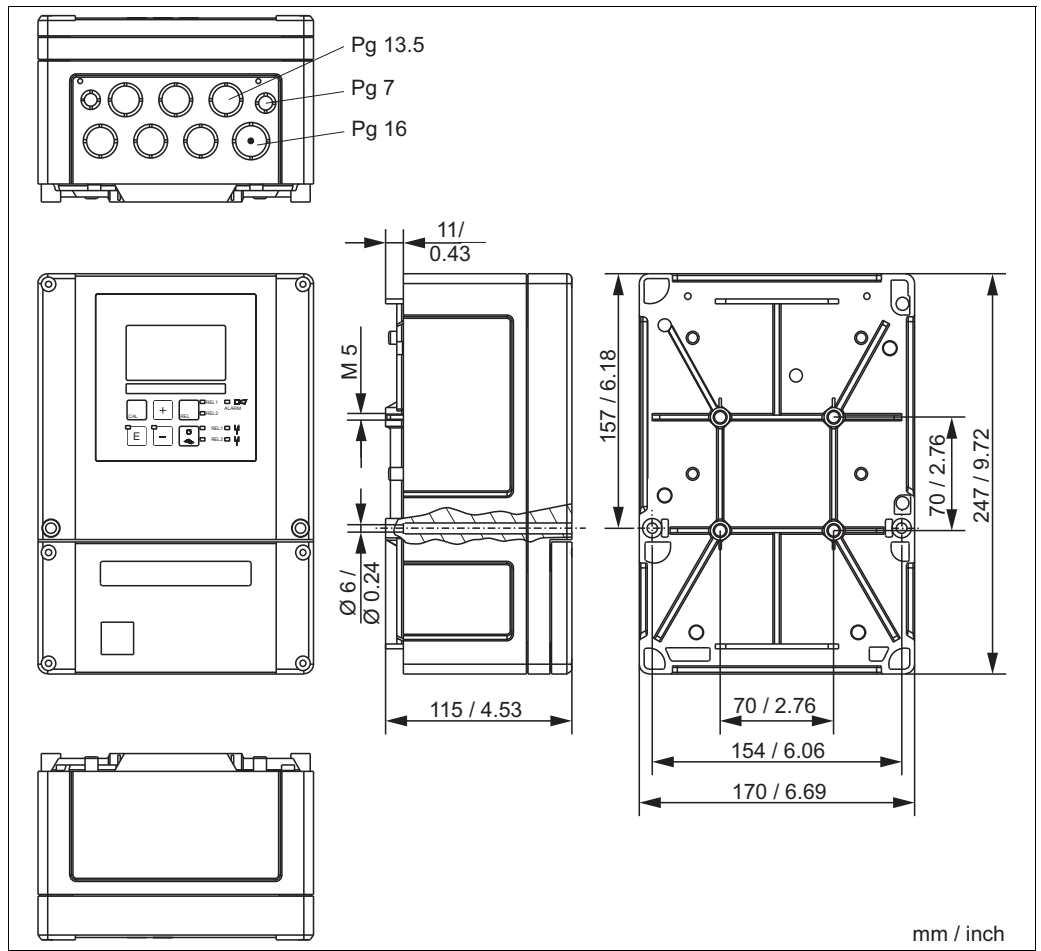
Performance characteristic

Reference temperature	25 °C (77 °F)	
Resolution	pH: ORP: Temperature:	0.01 pH 1 mV/0.1 % 0.1 °C
Deviation of indication¹⁾	Display pH: ORP: Temperature: Signal output pH: ORP: Temperature:	max. 0.5 % of measuring range max. 0.5 % of measuring range max. 1.0 % of measuring range max. 0.75 % of measuring range max. 0.75 % of measuring range max. 1.25 % of measuring range
Repeatability¹⁾	pH: ORP:	max. 0.2 % of measuring range max. 0.2 % of measuring range
Zero point	Glass: Antimon: ISFET:	pH 5.0 to 9.0 (nominal pH 7.00) pH -1.0 to 3.0 (nominal pH 1.00) -500 to +500 mV
Slope	Glass: Antimon: ISFET:	38.00 to 65.00 mV/pH (nominal 59.16 mV/pH) 25.00 to 65.00 mV/pH (nominal 59.16 mV/pH) 38.00 to 65.00 mV/pH (nominal 59.16 mV/pH)
Offset	pH: ORP: Temperature:	±2 pH ±120 mV/±50 % ±5 °C

1) acc. to IEC 746-1, for nominal operating conditions

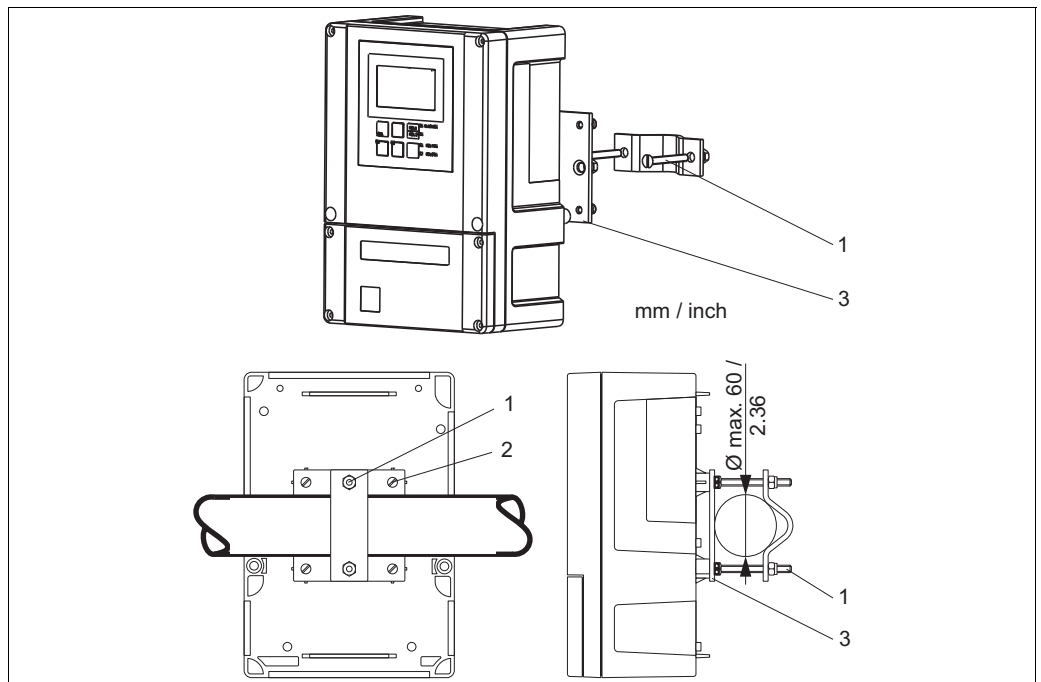
Installation conditions

Installation instructions



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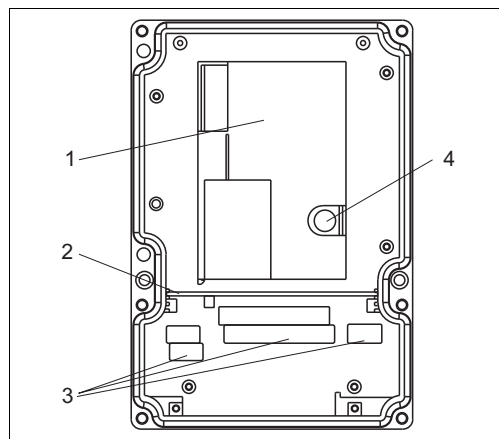
Field instrument



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Mounting on pipes

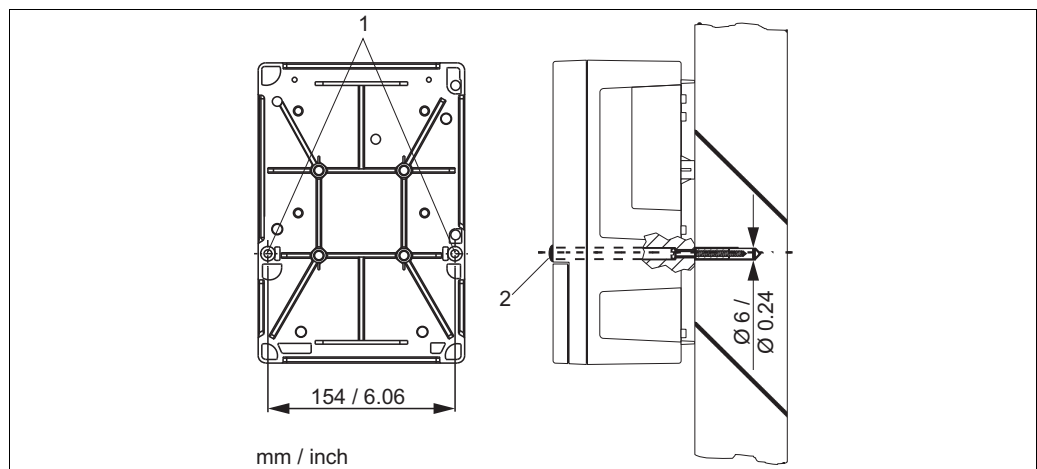
1 - 3 Mounting screws and mounting plate



- 1 Removable electronics box
- 2 Partition plate
- 3 Terminal blocks
- 4 Fuse

View into the field instrument

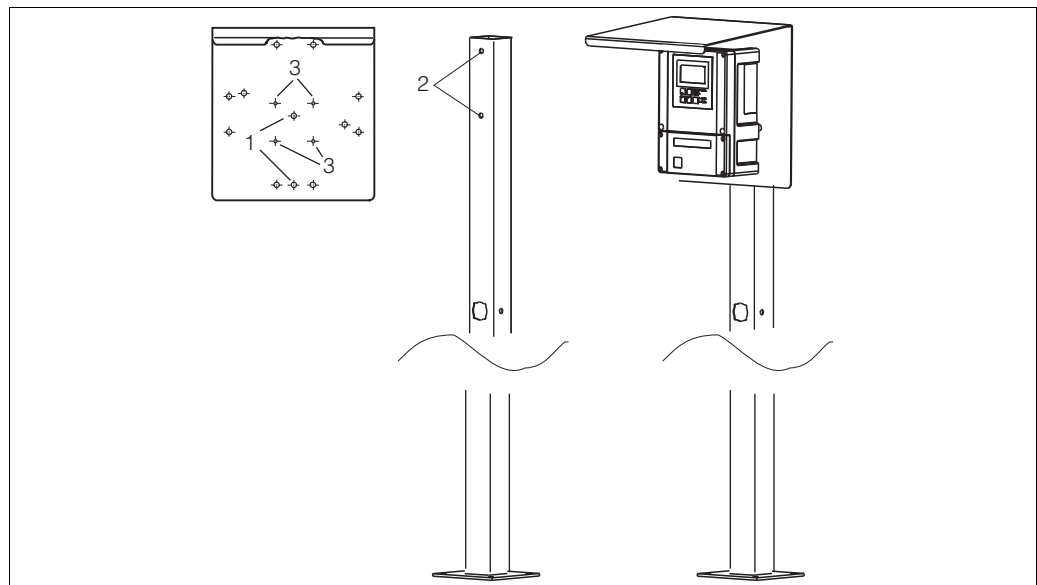
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Wall mounting of the field instrument

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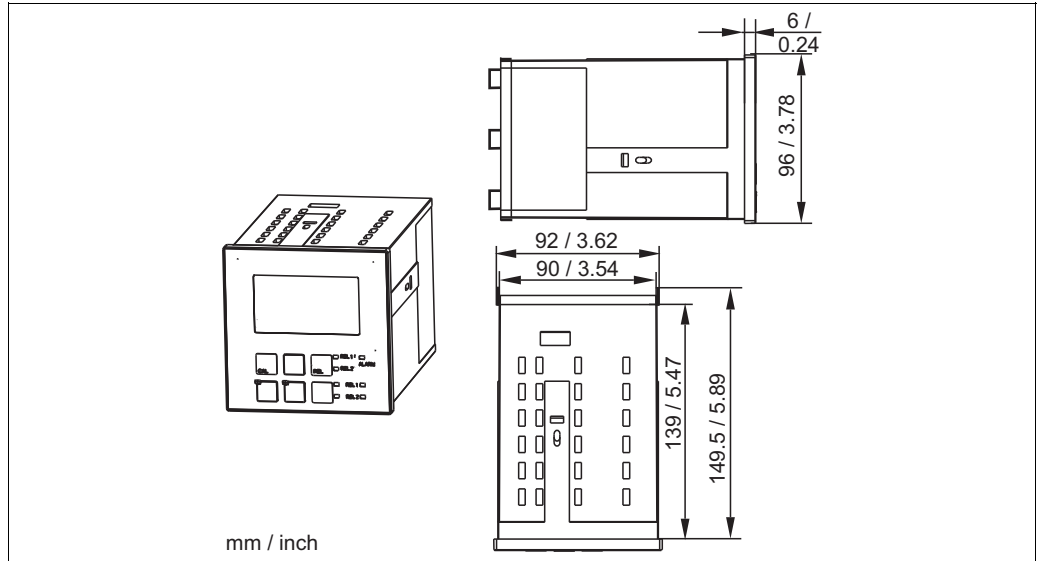
- 1 Mounting holes
- 2 Protecting cap



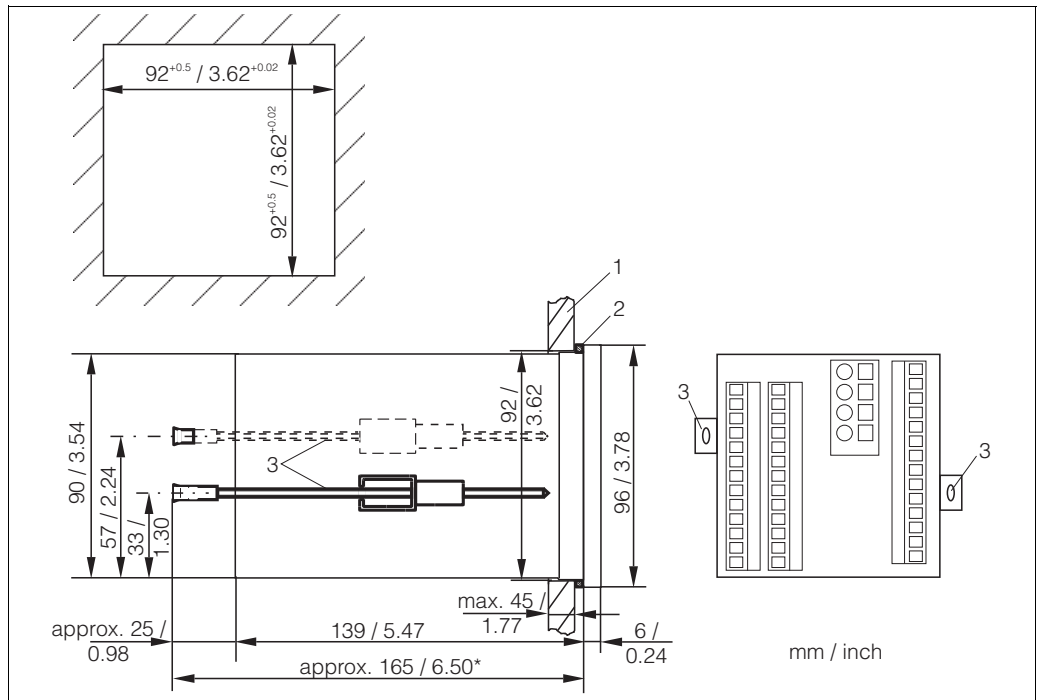
Mounting of the field instrument with mounting post and weather protection cover

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- 1 - 3 Mounting holes



Dimensions panel-mounted instrument



Installation of the panel-mounted instrument

- 1 Wall of control cabinet
- 2 Gasket
- 3 Tensioning screws
- * Required installation depth

Environment

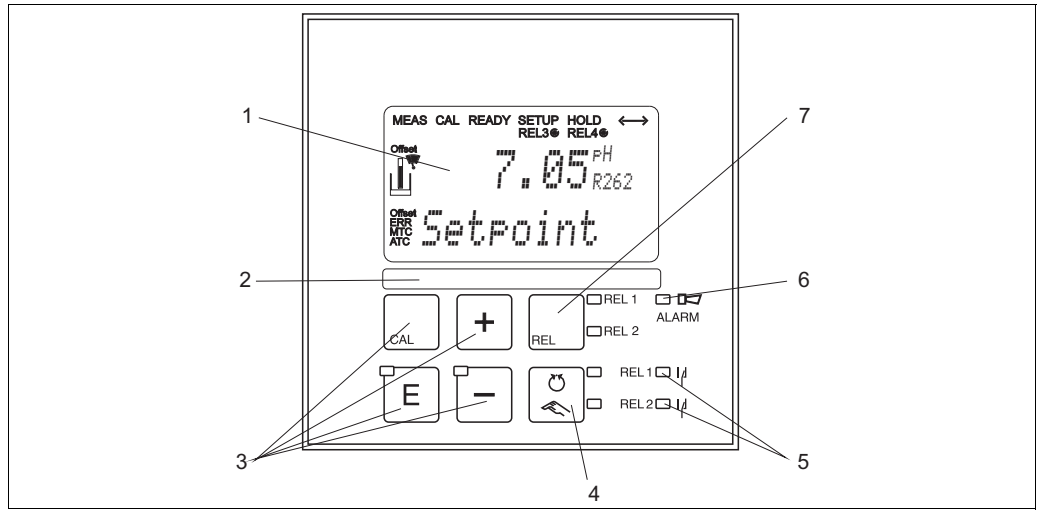
Ambient temperature	-10 to +55 °C (+14 to +131 °F)	
Ambient temperature limit	-20 to +60 °C (-4 to +140 °F)	
Storage and transport temperature	-25 to +65 °C (-13 to +149 °F)	
Electromagnetic compatibility	Interference emission and interference resistance acc. to EN 61326: 1997 / A1: 1998	
Ingress protection	Panel mounted instrument: Field instrument:	IP 54 (front), IP 30 (housing) IP 65
Relative humidity	10 to 95%, non-condensing	

Mechanical construction

Dimensions	Panel mounted instrument: Field instrument:	96 x 96 x 145 mm (3.78 x 3.78 x 5.71 inches) Mounting depth: approx. 165 mm (6.50") 247 x 170 x 115 mm (9.72 x 6.69 x 4.53 inches)
Weight	Panel mounted instrument: Field instrument:	max. 0.7 kg (1.5 lb) max. 2.3 kg (5.1 lb)
Materials	Housing of panel mounted instrument: Field housing: Front membrane:	Polycarbonate ABS PC Fr Polyester, UV-resistant
Terminals	Cross section	2.5 mm ² (14 AWG)

Human interface

Display elements



Operating elements

- 1 LC display for display of measured values, configuration data and current menu field
- 2 Field for user labeling
- 3 4 main control keys for calibration and instrument configuration
- 4 Key for switching between automatic/manual operation
- 5 LED indicators for switched limit outputs
- 6 LED indicator for alarm function
- 7 Display of active contact and key for relay switching in manual mode

The display simultaneously shows the current measured value and the temperature – the essential process data. Brief information texts in the configuration menu provide assistance with parameter configuration.

Instrument control functions

All instrument control functions are arranged in a logical menu structure. Following access code entry, the individual parameters can be easily selected and modified as needed.

Certificates and approvals

CE symbol

Declaration of conformity

The product meets the requirements of the harmonized European standards. It thus complies with the legal requirements of the EC directives.

The manufacturer confirms successful testing of the product by affixing the CE symbol.

Ex approval for zone 2

CPM253-..6...

ATEX II 3G EEx nA[L] IIC T4

CPM253-..4...

ATEX II 3G [EEx nAL] IIC

CPM223-..4...

CPM223-..6...

Ordering information

Product structure

Sensor input; software	
IS	pH (glass/ISFET) / ORP; Plus package
MR	pH (digital sensor); pH (glass/ISFET)/ORP; basic version
MS	pH (digital sensor); pH (glass/ISFET)/ORP; Plus package
PR	pH (glass)/ORP; basic version
PS	pH (glass)/ORP; Plus package
Power supply; approval	
0	230 V AC
1	115 V AC
2	230 V AC; CSA Gen. Purp.
3	115 V AC; CSA Gen. Purp.
4	230 V AC; ATEX II 3G [EEx nAL] IIC
5	100 V AC
6	24 V AC/DC; ATEX II 3G [EEx nAL] IIC for CPM223, EEx nA[L] IIC T4 for CPM253
7	24 V AC; CSA Gen. Purp.
8	24 V AC/DC
Output	
0	1 x 20 mA, pH/ORP
1	2 x 20 mA, pH/ORP + selectable
3	PROFIBUS PA
4	PROFIBUS DP
5	1 x 20 mA, pH/ORP HART
6	2 x 20 mA, pH/ORP HART + selectable
Additional contacts; analogue input	
05	not selected
10	2 x relay (limit/P(ID)/timer)
15	4 x relay (limit/P(ID)/Chemoclean)
16	4 x relay (limit/P(ID)/timer)
20	2 x relay (limit/P(ID)/timer); 20 mA
25	4 x relay (limit/P(ID)/Chemoclean); 20 mA
26	4 x relay (limit/P(ID)/timer); 20 mA
CPM253-	
	complete order code
CPM223-	

Additional functions of the Plus package

- Current output table to cover large areas with varying resolution
- Monitoring of sensor and process for safe operation
- Neutralization controller to keep pH value constant by dosing acid and alkali
- Automatic cleaning function start

Scope of delivery

The delivery of the field instrument includes:

- 1 transmitter CPM253
- 1 plug-in screw terminal
- 1 cable gland Pg 7
- 1 cable gland Pg 16 reduced
- 2 cable glands Pg 13.5
- 1 operating instructions BA 194C/07/en
- versions with HART communication:
 - 1 operating instructions Field Communication with HART, BA 208C/07/en
- versions with PROFIBUS communication:
 - 1 operating instructions Field Communication with PROFIBUS PA/DP, BA 209C/07/en
- versions with explosion protection for hazardous area zone II (ATEX II 3G):
 - Safety instructions for use in explosion-hazardous areas, XA 194C/07/a3

The delivery of the panel mounted instrument includes:

- 1 transmitter CPM223
- 1 set of plug-in screw terminals
- 2 tensioning screws
- 1 BNC-plug (solder-free)
- 1 operating instructions BA 194C/07/en
- versions with HART communication:
 - 1 operating instructions Field Communication with HART, BA 208C/07/en
- versions with PROFIBUS communication:
 - 1 operating instructions Field Communication with PROFIBUS PA/DP, BA 209C/07/en
- versions with explosion protection for hazardous area zone II (ATEX II 3G):
 - Safety instructions for use in explosion-hazardous areas, XA 194C/07/a3

Accessories

Sensors

- Orbisint CPS11/CPS11D
pH electrode for process applications, with PTFE diaphragm;
Ordering acc. to product structure, see Technical Information (TI028C/07/en)
- Orbisint CPS12/CPS12D
ORP electrode for process applications, with PTFE diaphragm;
Ordering acc. to product structure, see Technical Information (TI367C/07/en)
- Ceraliquid CPS41/CPS41D
pH electrode with ceramics diaphragm and liquid KCl electrolyte;
Ordering acc. to product structure, see Technical Information (TI079C/07/en)
- Ceraliquid CPS42/CPS42D
ORP electrode with ceramics diaphragm and liquid KCl electrolyte;
Ordering acc. to product structure, see Technical Information (TI373C/07/en)
- Ceragel CPS71/CPS71D
pH electrode with double chamber reference system and integrated bridge electrolyte;
Ordering acc. to product structure, see Technical Information (TI245C/07/en)
- Ceragel CPS72/CPS72D
ORP electrode with double chamber reference system and integrated bridge electrolyte;
Ordering acc. to product structure, see Technical Information (TI374C/07/en)
- Orbipore CPS91/CPS91D
pH electrode with open aperture for media with high dirt load;
Ordering acc. to product structure, see Technical Information (TI375C/07/en)
- Tophit CPS471
Sterilizable and autoclavable ISFET sensor for food and pharmaceuticals, process technology, water treatment and biotechnology;
Ordering acc. to product structure, see Technical Information (TI283C/07/en)
- Tophit CPS441
Sterilizable ISFET sensor for media with low conductivity, with liquid KCl electrolyte;
Ordering acc. to product structure, see Technical Information (TI352C/07/en)
- Tophit CPS491
ISFET sensor with open aperture for media with high dirt load;
Ordering acc. to product structure, see Technical Information (TI377C/07/en)

Assemblies

- Cleanfit W CPA450
Manual retractable assembly for installing 120 mm sensors in tanks and pipework
Order as per product structure, see Technical Information TI183C/07/en
- Cleanfit W CPA451
Manual retractable assembly made of stainless steel with ball valve shut-off for the pH/ORP electrodes CPF81/82,
Order as per product structure, see Technical Information (TI 343C/07/en)
- Cleanfit P CPA471
Compact stainless steel retractable assembly for installation in tanks and pipes, for manual or pneumatically remote-controlled operation
Order as per product structure, see Technical Information (TI 217C/07/en)
- Cleanfit P CPA472
Compact plastic steel retractable assembly for installation in tanks and pipes, for manual or pneumatically remote-controlled operation
Order as per product structure, see Technical Information (TI 223C/07/en)
- Cleanfit P CPA472D
Retractable assembly for pH/ORP measurement in tanks and pipes, manual or pneumatic operation, heavy-duty version made of highly resistant materials, see Technical Information (TI403C/07/en)
- Cleanfit P CPA473
Process retractable assembly made of stainless steel with ball valve shut-off for particularly safe separation of the process medium from the environment
Order as per product structure, see Technical Information (TI 344C/07/en)
- Cleanfit P CPA474
Process retractable assembly made of plastic with ball valve shut-off for particularly safe separation of the process medium from the environment
Order as per product structure, see Technical Information (TI 345C/07/en)
- Cleanfit H CPA475
Retractable assembly for installation in tanks and pipework under sterile conditions
Order as per product structure, see Technical Information TI240C/07/en

- Dipfit W CPA111
Immersion and installation assembly made of plastic for open and closed tanks
Order as per product structure, see Technical Information (TI 112C/07/en)
- Dipfit P CPA140
Immersion assembly for pH/redox electrodes for demanding processes;
Order as per product structure, see Technical Information (TI178C/07/en)
- Flowfit P CPA240
Flow assembly for pH/ORP, for demanding processes;
Order as per product structure, see Technical Information (TI 179C/07/en)
- Flowfit W CPA250
Flow assembly for pH/ORP measurement
Order as per product structure, see Technical Information (TI 041C/07/en)
- Dipfit W CYA611
Immersion assembly for pH/ORP compact electrode CPF81
Order as per product structure, see Technical Information (TI 166C/07/en)

Connection accessories

- CPK9 special measuring cable
- For sensors with TOP68 plug-in head, for high-temperature and high-pressure applications, IP 68
 - Ordering acc. to product structure, see Technical Information (TI118C/07/en)
- CPK1 special measuring cable
- For pH/ORP electrodes with GSA plug-in head
 - Ordering acc. to product structure, see Technical Information (TI118C/07/en)
- CPK2 special measuring cable
- For pH/ORP electrodes with GSA plug-in head, with three sensor plugs
 - Ordering acc. to product structure, see Technical Information (TI 118C/07/en)
- CPK12 special measuring cable
- For pH/ORP glass electrodes and ISFET sensors with TOP68 plug-in head
 - Ordering acc. to product structure, see Technical Information (TI118C/07/en)
- CYK10 Data cable for digital sensors
- For digital pH sensors with Memosens technology
 - Ordering according to product structure, see below

Certificates	
A	Standard, non Ex
G	ATEX II 1G EEx ia IIC T6/T4
O	FM CLI Div. 1 AEx ia IIC T6/T4
S	CSA IS CLI Ex ia IIC T6/T4
Cable length	
03	Cable length: 3 m / 9.84 ft
05	Cable length: 5 m / 16.41 ft
10	Cable length: 10 m / 32.81 ft
15	Cable length: 15 m / 49.22 ft
20	Cable length: 20 m / 65.62 ft
25	Cable length: 25 m / 82.03 ft
88	... m length
89	... ft length
Ready-made	
1	Wire terminals
CYK10-	complete order code

- CYK81 measuring cable
- Non-terminated measuring cable for extension of sensor cables of e.g. Memosens sensors, CUS31/CUS41
 - 2 wires, twisted pair with shield and PVC-sheath (2 x 2 x 0.5 mm² + shield)
 - Sold by the meter, order no. 51502543

Junction box VBM

- For cable extension
- 10 terminals
- Cable entries: 2 x Pg 13.5 or 2 x NPT ½"
- Material: aluminum
- Ingress protection: IP 65 (≅ NEMA 4X)
- Order numbers:
 - cable entries Pg 13.5: 50003987
 - cable entries NPT ½": 51500177

Junction box VBA

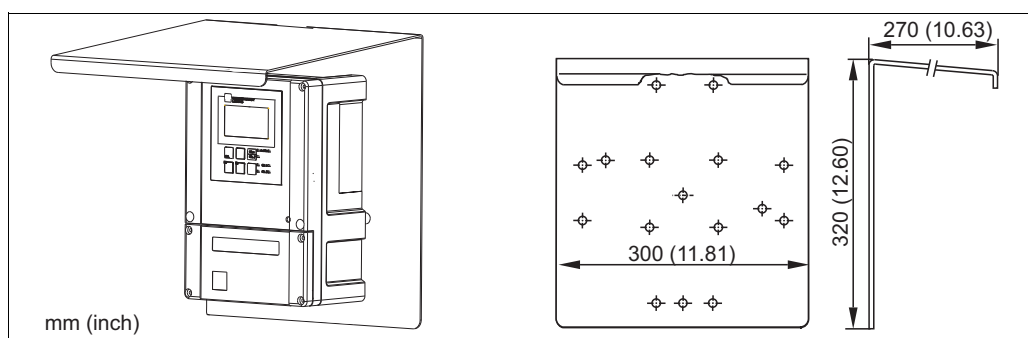
- For cable extension of pH/ORP sensors, with 10 high-impedance terminals, protection class: IP 65 (≅ NEMA 4X)
- Material: polycarbonate
- Order no. 50005276

Junction box RM

- For cable extension (e.g. for Memosens sensors or CUS31/CUS41)
- 5 terminals
- Cable entries: 2 x Pg 13.5
- Material: PC
- Ingress protection: IP 65 (≅ NEMA 4X)
- Order no.: 51500832

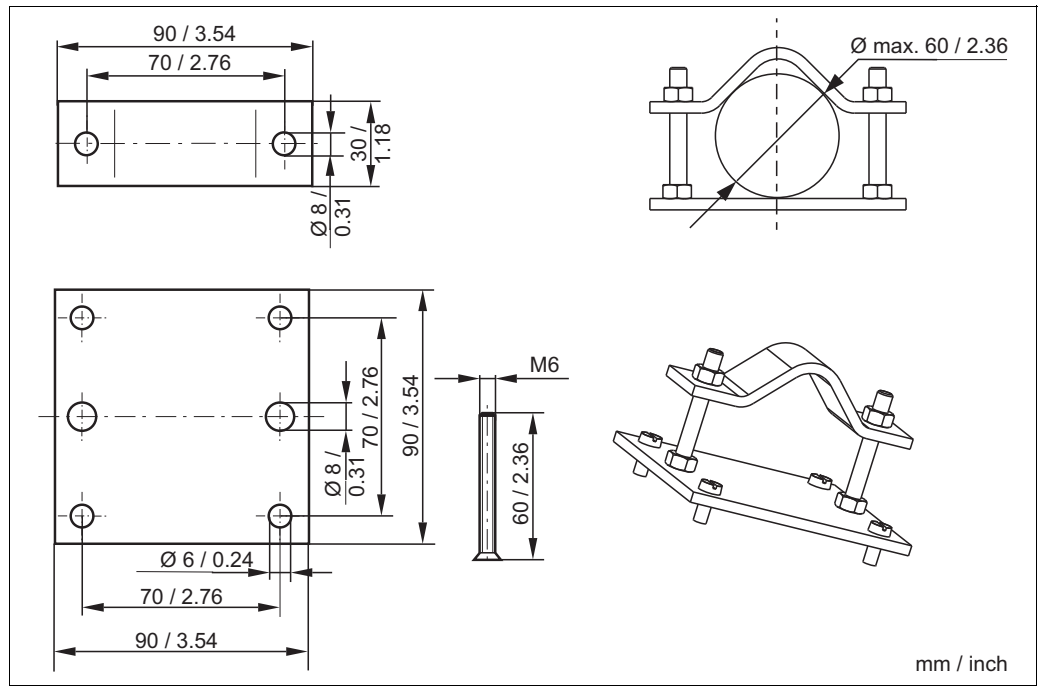
Mounting accessories

- Weather protection cover CYY101 for mounting of field housing, for outdoor installation
material: stainless steel 1.4031 (AISI 304);
order no. CYY101-A



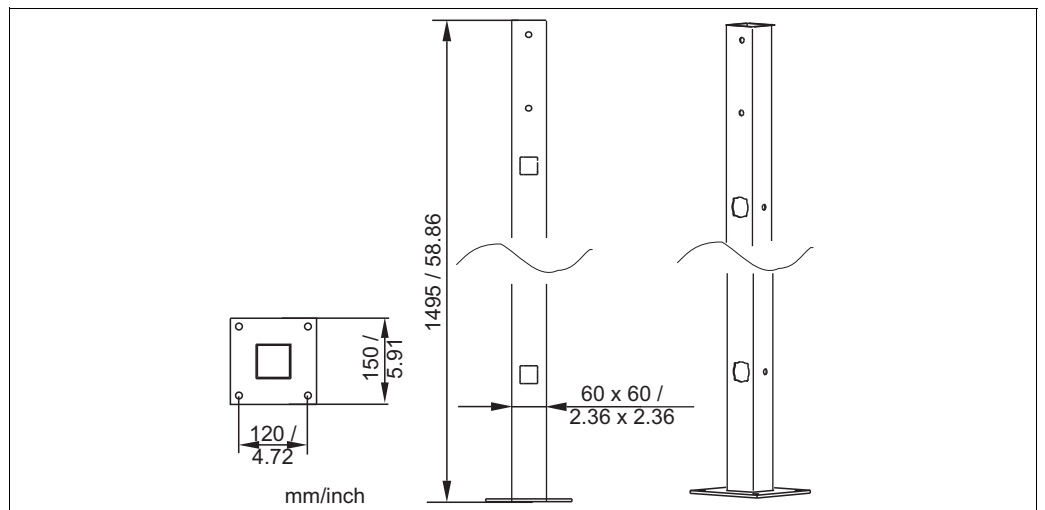
Weather protection cover for field instrument

- Kit for mounting of field housing on horizontal or vertical pipes (Ø max. 60 mm (2.36"))
order no. 50086842



Pipe mounting kit

- Universal upright post CYY102
Square post for mounting of field housing, material: stainless steel 1.4301 (AISI 304);
order no. CYY102-A



Square post

Buffer solutions**High-quality buffer solutions of Endress+Hauser**

The secondary buffer solutions have been referenced to primary reference material of the PTB (German Federal Physico-technical Institute) and to standard reference material of NIST (National Institute of Standards and Technology) according to DIN 19266 by a DKD (German Calibration Service) accredited laboratory.

pH value	
A	pH 2.00 (accuracy ± 0.02 pH)
C	pH 4.00 (accuracy ± 0.02 pH)
E	pH 7.00 (accuracy ± 0.02 pH)
G	pH 9.00 (accuracy ± 0.02 pH)
I	pH 9.20 (accuracy ± 0.02 pH)
K	pH 10.00 (accuracy ± 0.05 pH)
M	pH 12.00 (accuracy ± 0.05 pH)
Quantity	
01	20 x 18 ml (0.68 fl.oz) only buffer solutions pH 4.00 and 7.00
02	250 ml (8.45 fl.oz)
10	1000 ml (0.26 US gal)
50	5000 ml (1.32 US gal) canister for Topcal S
Certificates	
A	Buffer analysis certificate
Version	
1	Standard

CPY20-					complete order code
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Technical buffer solutions for ORP electrodes

- +220 mV, pH 7.0, 100 ml (3.4 fl.oz.); order no. CPY3-0
- +468 mV, pH 0.1, 100 ml (3.4 fl.oz.); order no. CPY3-1

KCl-electrolyte solutions for liquid filled electrodes

- 3.0 mol, T = -10 to 100 °C (14 to 212 °F), 100 ml (3.4 fl.oz.), order no. CPY4-1
- 3.0 mol, T = -10 to 100 °C (14 to 212 °F), 1000 ml (34 fl.oz.), order no. CPY4-2
- 1.5 mol, T = -30 to 100 °C (-22 to 266 °F), 100 ml (3.4 fl.oz.), order no. CPY4-3
- 1.5 mol, T = -30 to 100 °C (-22 to 266 °F), 1000 ml (34 fl.oz.), order no. CPY4-4

Optoscope

- Optoscope
Interface between transmitter and PC / laptop for service purposes.
The Windows software "Scopeware" required for the PC or laptop is supplied with the Optoscope. The Optoscope is supplied in a sturdy plastic case with all the accessories required.
Order no. 51500650

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