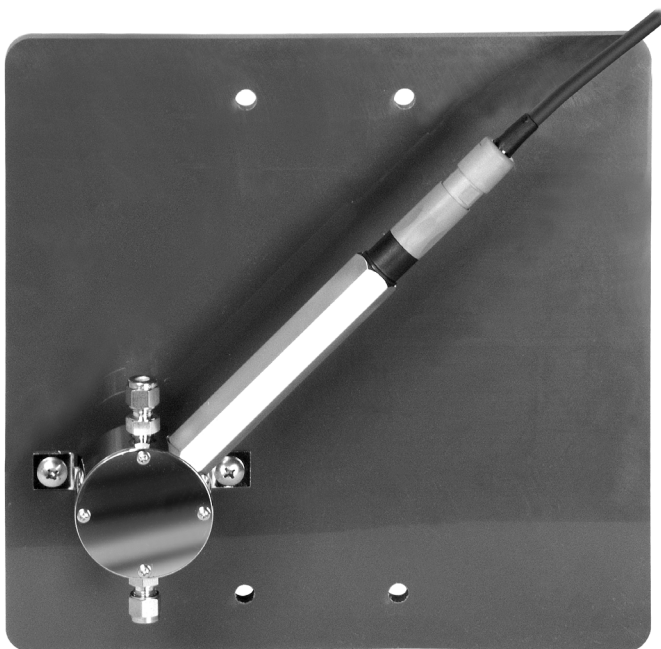


# Compact pH Electrode *PuriSys CPF 201*



Compact electrode for pH measurement in pure and ultrapure water



## Application

- Boiler feed water
- Power plant applications
- Pharmaceutical water for injection (WFI)

## Your benefits

- 316 SS low flow assembly:
  - stable pH reading
  - elimination of flow dependency errors
- Simple, maintenance-free replacement electrode
- Temperature compensation
- TOP 68 quick disconnect, water tight connector
- Patented porous PTFE reference junction
- Easy installation

## Function and system design

### Measuring principle

#### pH measurement

The pH value is used as a unit of measurement for the acidity or alkalinity of a liquid medium. The membrane glass of the electrode supplies an electrochemical potential which is dependent upon the pH value of the medium. This potential is generated by the selective penetration of  $H^+$  ions through the outer layer of the membrane. An electrochemical boundary layer with an electric potential forms at this point. An integrated Ag/AgCl reference system serves as reference electrode.

The transmitter converts the measured voltage into the corresponding pH value using the Nernst equation.

### Important properties PuriSys CPF 201

#### • Reference system

The CPF 201 electrode has a porous Teflon reference junction in a double reference chamber for long life in all high purity water applications.

#### • Temperature compensation

In addition, a Pt 100 or Pt 1000 temperature sensor is embedded in the pH glass bulb stem for quick temperature response.

#### • Easy connection

The electrode is connected via the water-proof plug-in system TOP 68.

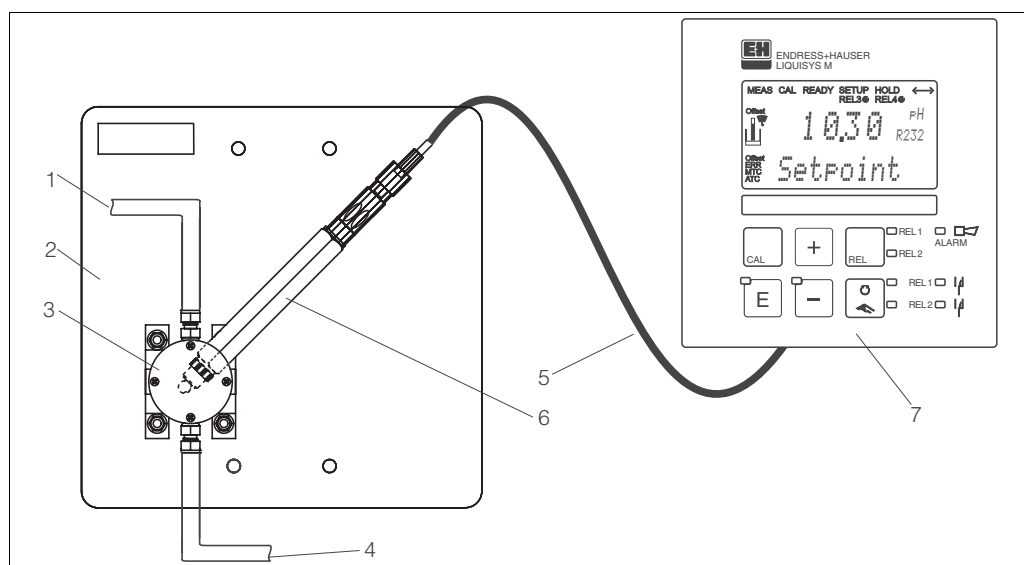
#### • Flow assembly

The flow cell has been designed to dissipate static electrical charges inherent in flowing water with low conductivity. The flow assembly design minimizes trapped particles and contaminants.

### Measuring system

The complete measuring system comprises:

- PuriSys CPF 201 electrode with stainless steel body
- PuriSys CPF 201 stainless steel flow assembly with compression fitting on inlet and outlet
- CPK 9 measuring cable (not included in scope of delivery)
- Transmitter, e.g. Liquisys M CPM 223, Mycom S CPM 153 (not included in scope of delivery)



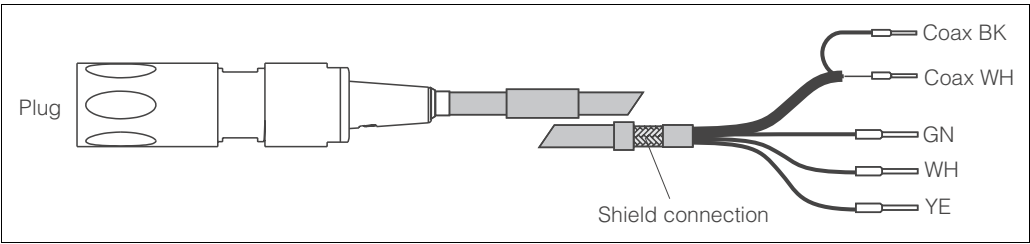
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#### Measuring system example

- 1 Outlet
- 2 PVC mounting plate for electrical isolation
- 3 PuriSys CPF 201 flow assembly
- 4 Inlet
- 5 CPK 9 measuring cable
- 6 PuriSys CPF 201 electrode
- 7 Liquisys M CPM 223 transmitter

Input

|                      |                                                                                                                                            |                                            |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Measured values      | pH value<br>Temperature                                                                                                                    |                                            |
| Measuring range      | pH value<br>Temperature                                                                                                                    | 0 ... 14 pH<br>2 ... 75 °C / 36 ... 167 °F |
| Response time        | $t_{90} < 10\text{ s}$                                                                                                                     |                                            |
| Cable specifications | The CPF 201 electrode is connected to the measuring transmitter using the CPK 9 measuring cable (version without potential matching line). |                                            |



CPK 9 measuring cable

|                                |  |         |                |                          |           |                               |           |                               |           |
|--------------------------------|--|---------|----------------|--------------------------|-----------|-------------------------------|-----------|-------------------------------|-----------|
| Wiring of CPK 9 to transmitter |  | Cable   |                |                          |           | Transmitter                   |           |                               |           |
|                                |  | CPK 9   |                | Liquisys M CPM 223 / 253 |           | Mycom S CPM 153               |           |                               |           |
|                                |  | Pin     | Function       | Terminal                 | Function  | Terminal                      | Function  | Terminal                      | Function  |
|                                |  | Coax BK | Reference      | Ref                      | Reference | Ref                           | Reference | Ref                           | Reference |
|                                |  | Coax WH | pH             | pH                       | pH        | pH                            | pH        | pH                            | pH        |
|                                |  | GN      | Temp. (Pt 100) | 11                       | TC        | 11                            | TC        | 11                            | TC        |
|                                |  | WH      | Temp. (Pt 100) | 12                       | TC common | 13                            | TC common | 13                            | TC common |
|                                |  | YE      | Temp. (Pt 100) | 13                       | TC        | 12                            | TC        | 12                            | TC        |
|                                |  | Shield  | EMC protection | S                        | Shield    | Shield connection / Pg thread | Shield    | Shield connection / Pg thread | Shield    |

## Installation

### Calibration

When installing a new CPF 201 electrode, perform a two-point calibration using pH 4 and 7 buffer solutions to establish that the electrode and the transmitter are functional together. To do so, refer to the operating instructions of the transmitter.

Rinse the electrode thoroughly with ultra-pure water to remove all traces of the buffer solutions prior to inserting the electrode into the flow assembly.

Since the pH variation in ultra-pure water is very small, routine one-point calibration of the CPF 201 electrode is performed by comparative sample measurement according to the ASTM test method. When performing sample measurements take note of the following:

- The sample chamber and the sample line must avoid exposure of the ultra-pure water to the atmosphere.
  - Ultra-pure water is highly unbuffered and the slightest amount of contamination can change the pH value significantly. Specifically, ultra-pure water rapidly absorbs CO<sub>2</sub> gas from the atmosphere which lowers the pH value of the sample.
  - The sample may contain volatile substances that will rapidly dissipate when exposed to the atmosphere.
- The sample to be measured should be at the same temperature as the medium stream because ultra-pure water has a significant temperature coefficient.
- To obtain repeatable measurement results, the flow rate of the sample chamber must be stabilised. Also, the pressure must be stable.

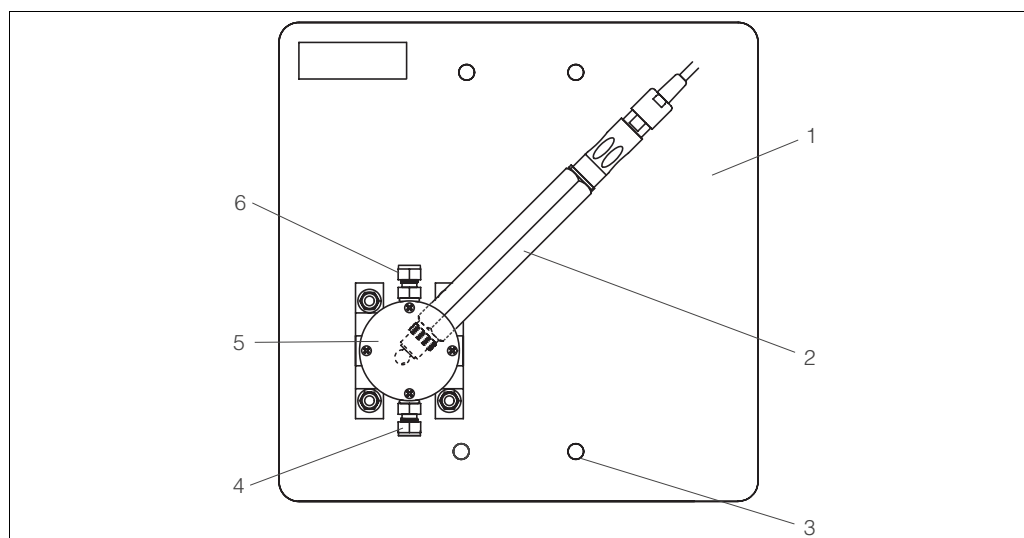
### Installation instructions

The electrode is threaded into the flow assembly and hand-tightened.

When mounting the flow assembly, make sure that the inlet and outlet ports are vertical with the inlet on the bottom. In this fashion, the electrode mounting hole will be at the top right. This will ensure that bubbles in the water stream will not collect and interfere with the measurements.

The supplied PVC mounting plate for electrical isolation ensures a noiseless pH reading.

To mount the PVC mounting plate on posts or pipes, use the mounting brackets included in the package.



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*Installation in the flow cell*

1 PVC mounting plate

2 CPF 201 electrode

3 Mounting holes (brackets for post mounting included in scope of delivery)

4 Inlet port

5 Flow assembly

6 Outlet port

# Environment

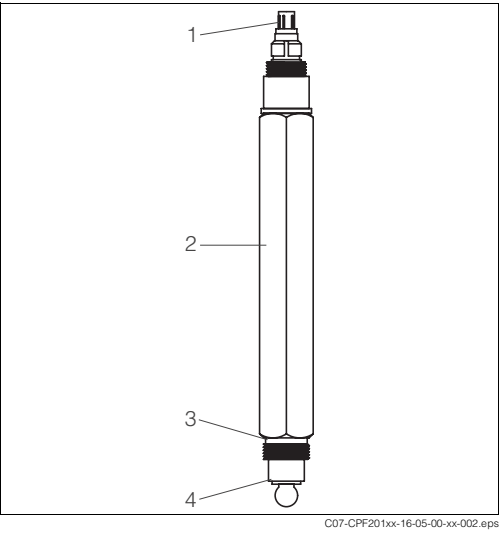
|                    |                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------|
| Ingress protection | IP 68 (1m / 3.28 ft water column, 50 °C / 122 °F, 168 h) / NEMA 6 (TOP 68 plug-in system) |
|--------------------|-------------------------------------------------------------------------------------------|

# Process

|                     |                                                                                                                  |
|---------------------|------------------------------------------------------------------------------------------------------------------|
| Process temperature | max. 75 °C / 167 °F                                                                                              |
| Process pressure    | max. 3.45 bar / 50 psi                                                                                           |
| Medium conductivity | < 100 µS/cm                                                                                                      |
| Drift               | < 0.02 pH/week at 0.5 µS/cm at 25 °C / 77 °F                                                                     |
| Flow rate           | 50 ... 250 ml/min<br>Optimum: 150 ml/min<br>The flow rate must be stable to obtain accurate measurement results. |

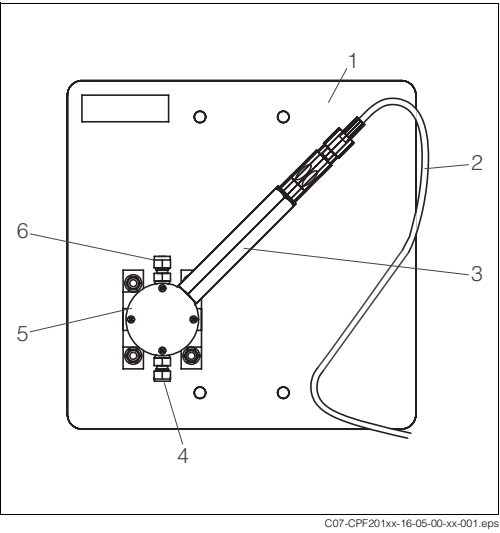
# Mechanical construction

## Design, dimensions



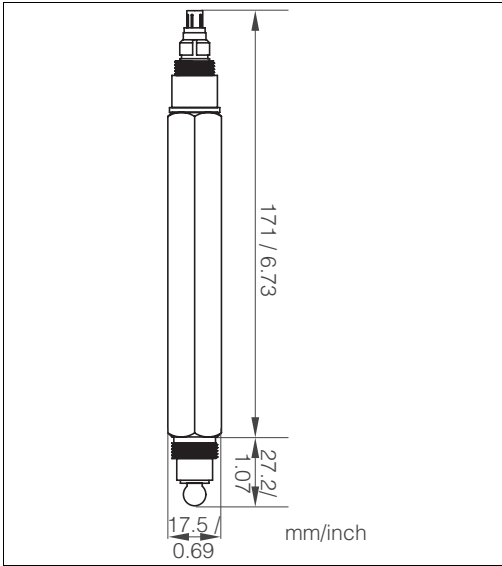
CPF 201 electrode design

- 1 TOP 68 connector
- 2 Stainless steel body
- 3 O-ring
- 4 Teflon reference junction and pH glass bulb



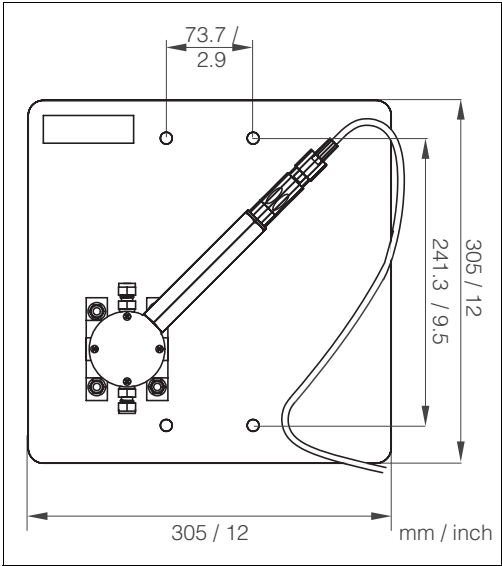
CPF 201 on-line unit design

- 1 PVC mounting plate
- 2 CPK 9 measuring cable
- 3 CPF 201 electrode
- 4 Inlet port
- 5 Flow cell
- 6 Outlet port



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CPF 201 electrode dimensions



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CPF 201 on-line unit dimensions

|                           |                                                   |                                |
|---------------------------|---------------------------------------------------|--------------------------------|
| <b>Weight</b>             | Electrode:                                        | approx. 213 g                  |
|                           | Complete on-line unit<br>incl. mounting brackets: | approx. 2275 g                 |
| <b>Materials</b>          | Electrode shaft                                   | stainless steel SS 316, Viton® |
|                           | Reference junction                                | Teflon®                        |
|                           | Glass bulb                                        | pH membrane glass              |
|                           | Reference system                                  | KCl/AgCl                       |
|                           | Flow assembly                                     | stainless steel SS 316, Viton® |
|                           | Inlet / outlet ports                              | stainless steel SS 316         |
| <b>Process connection</b> | OD 6 mm stainless steel compression fitting       |                                |
|                           | 1/4" stainless steel compression fitting          |                                |
| <b>Temperature sensor</b> | Pt 100 RTD, Pt 1000 RTD                           |                                |
| <b>Cable connection</b>   | TOP 68 plug-in system                             |                                |

## Certificates and approvals

|                    |                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Test report</b> | Design according to ASTM standard D 5128, "Standard Test Method for On-Line pH Measurement of Water of Low Conductivity" |
|--------------------|--------------------------------------------------------------------------------------------------------------------------|

## Ordering information

|                   |                                           |                                    |  |  |
|-------------------|-------------------------------------------|------------------------------------|--|--|
| Product structure | Process adaption                          |                                    |  |  |
|                   | A                                         | Compression fitting, OD 6 mm, 316L |  |  |
|                   | B                                         | Compression fitting, ¼", 316L      |  |  |
|                   | C                                         | Replacement electrode              |  |  |
|                   | Electrode type / temperature compensation |                                    |  |  |
|                   | 1                                         | Integrated Pt 100                  |  |  |
|                   | 2                                         | Integrated Pt 1000                 |  |  |
|                   | Cable connection                          |                                    |  |  |
|                   | A                                         | TOP 68, no cable                   |  |  |
|                   | CPF 201-                                  |                                    |  |  |

### Scope of delivery

The scope of delivery includes:

- 1 CPF 201 electrode
- 1 flow assembly
- 1 PVC mounting plate incl. mounting brackets
- Technical Information TI 366C/07/en

## Accessories

### Measuring cable

- ☐ Measuring cable CPK 9 (version without PM)  
for electrodes with TOP 68 plug-in head  
ordering by product structure, see Technical Information TI 118C/07/en

### Buffer solutions

Technical buffer solutions, accuracy 0.02 pH, acc. to NIST/DIN

- ☐ pH 4.0 red, 100 ml (0.026 US gal.), order no. CPY 2-0  
☐ pH 4.0 red, 1000 ml (0.264 US gal.), order no. CPY 2-1  
☐ pH 7.0 green, 100 ml (0.026 US gal.), order no. CPY 2-2  
☐ pH 7.0 green, 1000 ml (0.264 US gal.), order no. CPY 2-3

Technical buffer solutions for single use, accuracy 0.02 pH, acc. to NIST/DIN

- ☐ pH 4.0 20 x 20 ml (0.005 US gal.), order no. CPY 2-D  
☐ pH 7.0 20 x 20 ml (0.005 US gal.), order no. CPY 2-E

### O-rings

- ☐ O-ring set for electrode, TOP 68 plug and flow assembly lid;  
order no. 51512789

### Flow assembly lid

- ☐ Flow assembly lid including seal and screws;  
order no. 51512795

### Compression fittings

- ☐ Compression fitting 1/4";  
order no. 51512793  
☐ Compression fitting OD 6 mm;  
order no. 51512792

### Mounting plate

- ☐ PVC mounting plate incl. screws and mounting brackets;  
order no. 51512788

## Documentation

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### Transmitter

- ☐ Liquisys M CPM 223/253, Technical Information TI 194C/07/en; order no. 51500277
  - ☐ Mycom S CPM 153, Technical Information TI 233C/07/en; order no. 51503788
- 

### Measuring cable

- ☐ CPK 1-12, Technical Information TI 118C/07/en; order no. 50068526



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