ORP Electrode
CeraGel CPS 72

ORP electrode for process technology, hygienic and sterile applications, with double junction reference system and integrated bridge electrolyte

Areas of application
- Hygienic and sterile applications (sterilizable, autoclavable)
  - Fermenters
  - Biotechnology
  - Pharmaceutical industry
  - Food industry
- Process technology and monitoring of processes with:
  - quickly changing pH values
  - high proportion of electrode poisons such as H₂S
- Used in hazardous areas, FM and ATEX approved (with appropriate transmitter)

Benefits at a glance
- Suitable for CIP / SIP cleaning and autoclavable maintaining high accuracy
- Completely free of acrylamide
- Long-term stable electrode with double junction reference system
  - protected reference head
  - extremely long diffusion path for electrode poisons
  - short response time due to ceramic diaphragm
- Integrated bridge electrolyte
  - effective and stable contact between diaphragm and reference lead
  - insensitive to temperature and pressure changes
- Rugged TOP 68 plug-in system for reliable transfer of measured data
**Function and system design**

**Measuring principle**

**ORP measurement**

The ORP potential is a unit of measurement for the state of equilibrium between oxidizing and reducing components of a medium. ORP potential is measured similarly to the pH value. A platinum or gold electrode is used instead of pH-sensitive membrane glass. Analog to the pH measurement, an integrated Ag/AgCl reference system is used as a reference electrode.

**pH measurement**

The pH value is used as a unit of measurement for the acidity of 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 a reference electrode.

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

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**Important CPS 71 properties**

- **Short response time**
  The double junction reference system enables short response times as the electrolyte has stable contact with the diaphragm and the ceramic diaphragm allows sufficiently fast diffusion of the medium.

- **Insensitive to temperature and pressure changes**
  Thanks to the composition of its integrated bridge electrolyte, the CPS 72 is insensitive to temperature and pressure variation.

- **Sterilizable**
  The electrode is sterilizable and autoclavable (maximum 275°F / 135°C)

- **Easy connection**
  The electrode is connected via a GSA plug-in head or via the water-proof TOP 68 plug-in system (NEMA 6P / IP 68)

**Measuring system**

A complete measuring system consists of:

- CPS 72 ORP electrode
- Transmitter, e.g. Liquisys M CPM 223/253
- CPK 9 special measuring cable
- Immersion, flow or retractable electrode holder assembly, e.g. CleanFit CPA 475

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*Measuring system for ORP*

1. CPS 72 ORP electrode
2. CleanFit H CPA 475 holder
3. Special measuring cable
4. Liquisys M CPM 253 transmitter
Input

<table>
<thead>
<tr>
<th>Measured variables</th>
<th>ORP potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>-1500 to +1500 mV</td>
</tr>
</tbody>
</table>

Caution!
Please note the process operating conditions

Installation

Installation instructions

Do not install the electrode overhead. The inclination angle must be at least 15° from the horizontal. A small inclination angle is not permitted as such an inclination results in an air cushion forming in the glass sphere. This might interrupt the contact of the ORP measuring element and the reference.

![Electrode installation; installation angle minimum 15° from the horizontal](image)

NOTE!
Make sure to follow the installation instructions in the operating manual for the holder assembly used.

Environment

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>Caution! Danger of frost damage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Do not use the electrode at temperatures below 5°F / -15°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>32° to 122°F (0 to 50°C)</td>
</tr>
<tr>
<td>Ingress protection</td>
<td>NEMA 6 (IP 67) with GSA plug-in head</td>
</tr>
<tr>
<td></td>
<td>NEMA 6P (IP 68) with TOP 68 plug-in head (3.28 ft / 1 m water column, 122°F / 50°C up to 168 hours)</td>
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</tbody>
</table>

Process

<table>
<thead>
<tr>
<th>Process temperature</th>
<th>32° to 275°F (0 to 135°C)</th>
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</thead>
<tbody>
<tr>
<td>Process pressure</td>
<td>0 to 145 psi (0 to 10 bar)</td>
</tr>
<tr>
<td>Conductivity</td>
<td>Minimum 10 µS/cm</td>
</tr>
</tbody>
</table>

Caution!
*Danger of damage to the electrode*
Never use the electrode in applications outside the given specifications.
Mechanical construction

CPS 72 dimensions

CPS 72 with GSA plug-in head
1  GSA plug-in head, Pg 13.5
2  Ag/AgCl metal lead
3  Bridge electrolyte
4  Diaphragm
5  Platinum ring electrode

CPS 72 with TOP 68 ESA plug-in head
1  GSA plug-in head, Pg 13.5
2  Ag/AgCl metal lead
3  Bridge electrolyte
4  Diaphragm
5  Platinum ring electrode

Weight
Approximately 0.2 lb (0.1 kg)

Material
Electrode shaft: Process glass
ORP measuring element Platinum
Metal lead Ag/AgCl
Diaphragm Ceramic diaphragm, sterilizable

Process connection
Pg 13.5

Plug-in head types
ESA  Threaded plug-in head Pg 13.5, TOP 68, 232 psi (16 bar), can be used in hazardous areas
GSA  Threaded plug-in head Pg 13.5

Electrolytes
Advanced Gel, 3 mol/l KCl, AgCl free
Bridge electrolyte

Certificates and approvals

Hazardous approvals CPS 72 (ESA)
FM approved Class I, Division 2, in combination with the MyPro CPM 431 and Mycom S CPM 153 transmitters
ATEX II 1G EEX ia IIC T4/T6

TÜV certificate TOP 68 plug-in head
Pressure resistance 232 psi (16 bar), minimum triple safety overpressure
# Ordering information

## CPS 72 product structure

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>Electrode type</td>
<td>2</td>
<td>Measuring surface</td>
</tr>
<tr>
<td>0</td>
<td>Standard sensor</td>
<td>PB</td>
<td>Platinum</td>
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<tr>
<td>3</td>
<td>Shaft length</td>
<td>4</td>
<td>Plug-in head</td>
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<tr>
<td>2</td>
<td>4.72&quot; (120 mm)</td>
<td>4</td>
<td>ESA Plug-in head, Pg 13.5, TOP 68, 232 psi / 16 bar, hazardous areas</td>
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<tr>
<td>4</td>
<td>8.86&quot; (225 mm)</td>
<td>GSA Plug-in head, Pg 13.5, DIN coax, nonhazardous areas</td>
<td></td>
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<tr>
<td>5</td>
<td>14.2&quot; (360 mm)</td>
<td>SME Plug-in head, Pg 13.5, SMEK connection</td>
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<tr>
<td>6</td>
<td>16.7&quot; (425 mm)</td>
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## Accessories

### Electrode holder assemblies

- **CleanFit W CPA 450**: manually operated retractable assembly for pH electrodes, for installation of 120 mm electrodes in tanks and pipes. Refer to TI 183C.
- **CleanFit P CPA 471**: compact retractable stainless steel assembly for electrode installation in tanks and pipes, manual or pneumatic operation. Refer to TI 217C.
- **CleanFit P CPA 472**: compact retractable plastic assembly for electrode installation in tanks and pipes, manual or pneumatic operation. Refer to TI 223C.
- **CleanFit P CPA 473**: retractable stainless steel process assembly, with ball valve for safe and reliable separation of the process from the environment. Refer to TI 344C.
- **CleanFit P CPA 474**: retractable plastic process assembly, with ball valve for safe and reliable separation of the process from the environment. Refer to TI 345C.
CleanFit H CPA 475: retractable holder assembly for installation in tanks and pipes under sterile conditions, manual or pneumatic operation. Refer to TI 240C/24/ae.
UniFit H CPA 442: stainless steel process holder for the food industry, biotechnology and pharmaceutical industry, with 3-A certificate and EHEDG certificates. Refer to TI 306C/24/ae.
DipFit W CPA 111: plastic immersion and installaiton assembly, for open and closed tanks. Refer to TI 112C/24/ae.

FlowFit P CPA 240: flow assembly for pH/ORP electrodes for demanding processes. Refer to TI 179C/24/ae.

**pH buffer solutions**

<table>
<thead>
<tr>
<th>pH Value</th>
<th>Volume</th>
<th>Order No.</th>
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<tbody>
<tr>
<td>+225 mV, pH 7, 3 oz (100 ml)</td>
<td></td>
<td>CPY 3-0</td>
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<tr>
<td>+468 mV, pH 0, 3 oz (100 ml)</td>
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<td>CPY 3-1</td>
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</table>
Measuring cables

**CPK1 pH/ORP Measuring Cable**
For pH/ORP electrodes with GSA plug-in head. Refer to TI 118C for technical and ordering information.

**CPK9 pH/ORP Measuring Cable**
For electrodes with built-in Pt 100 with TOP 68 plug-in head. Refer to TI 118C for technical and ordering information.

**CPK12 pH/ORP Measuring Cable**
For pH/ORP glass and ISFET PEEK electrodes. Refer to TI 118C for technical and ordering information.

Supplemental documentation

**Transmitters**
- Liquisys M CPM 223/253 Technical Information, TI 194C/24/ae
- Mycom S CPM 153 Technical Information, TI 233C/24/ae
- MyPro CPM 431 Technical Information, TI 173C/24/ae

**Holder assemblies**
- CleanFit P CPA 450 Technical Information, TI 183C/24/ae
- CleanFit P CPA 471 Technical Information, TI 217C/24/ae
- CleanFit P CPA 472 Technical Information, TI 223C/24/ae
- CleanFit P CPA 473 Technical Information, TI 344C/24/ae
- CleanFit P CPA 474 Technical Information, TI 345C/24/ae
- CleanFit H CPA 475 Technical Information, TI 240C/24/ae
- UniFit H CPA 442 Technical Information, TI 306C/24/ae
- DipFit W CPA 111 Technical Information, TI 112C/24/ae
- FlowFit W CPA 240 Technical Information, TI 179CC/24/ae

**Measuring cables**
- CPK 1 - 12 Technical Information, TI 118C/07/en
For application and selection assistance,
in the U.S. call 888-ENDRESS

For total support of your installed base, 24 hours
a day, in the U.S. call 800-642-8737

Visit us on our web site, www.us.endress.com

<table>
<thead>
<tr>
<th>United States</th>
<th>Canada</th>
<th>Mexico</th>
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<tbody>
<tr>
<td>Endress+Hauser, Inc.</td>
<td>Endress+Hauser Canada Ltd.</td>
<td>Endress+Hauser</td>
</tr>
<tr>
<td>2350 Endress Place</td>
<td>1440 Graham’s Lane</td>
<td>Paseo del Pedregal No. 610</td>
</tr>
<tr>
<td>Greenwood, IN 46143</td>
<td>Unit 1, Burlington</td>
<td>Col. Jardines del Pedregal</td>
</tr>
<tr>
<td>Phone: (317) 535-7138</td>
<td>ON, L7S 1W3</td>
<td>01900, Mexico D.F.</td>
</tr>
<tr>
<td>FAX: (317) 535-8498</td>
<td>Phone: (905) 681-9292</td>
<td>Mexico</td>
</tr>
<tr>
<td></td>
<td>800-668-3199</td>
<td>Phone: (525) 568-2405</td>
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<tr>
<td></td>
<td>FAX: (905) 681-9444</td>
<td>FAX: (525) 568-7459</td>
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