

# Model 223 pH / ORP Transmitter

## Features

- 96 X 96 mm Panel Mount Enclosure Takes Up Less Panel Space
- Simple Calibration with Automatic Buffer Recognition
- “Sensor Check” pH Glass Electrode and Reference Cell Diagnostics
- “Live Check” Continuously Monitors Sensor Performance
- Automatic Sensor Cleaning
- Up To Four Alarm Contacts Including Temperature
- Dedicated Fault Alarm
- NAMUR Fault Current Alarm
- PID Controller
- 2<sup>nd</sup> Current Output for Temperature



## Applications

- Water & Wastewater Treatment
- Coagulation & Flocculation
- Acid / Caustic Neutralization

## Description

The Model 223 pH / ORP Transmitter is ideal for use where economy and reliability are the prime considerations. The basic transmitter is available with either a 115 VAC or 24 Volt AC/DC power supply, linear isolated current output and one alarm. Features include the addition of a second output for temperature and up to four alarms which may be configured for on-off control functions, alarm limits, timer for cleaning or PID control functions. The PS version adds the diagnostic functions Sensor Check and Live Check as well as a non-linear programmable current output. Sensor Check provides pH glass electrode and reference cell diagnostics and Live Check signals an alarm when the sensor signal does not change over a defined period. The PS version features an acid, caustic neutralization control function that combines direct and reverse P(ID) controllers having a single set point.

| Base Transmitter (PR)   | Plus Package (PS)   |
|---|---|
| Measurement, display and calibration of the process variable (PV) and temperature.<br>Isolated current output (Code 0)<br>Temperature output (Code 1)<br>One alarm (Code 05) <ul style="list-style-type: none"> <li>• On – Off</li> </ul> Dedicated fault alarm (Standard)<br>NAMUR fault current (Standard) <ul style="list-style-type: none"> <li>• 2.4 or 22.0 mA</li> </ul> | Sensor Check pH glass and reference diagnostics.<br><br>Live Check sensor signal monitoring and alarm.<br><br>Programmable non-linear current output. |
| <b>Code 10</b><br>Two Alarm Contacts for PV and Temperature <ul style="list-style-type: none"> <li>• On – Off</li> <li>• Timer for cleaning</li> <li>• P(ID) Controller</li> </ul>  | <b>Additional Features</b><br>Neutralization controller<br><br>Automatic Cleaning initiated by an internal alarm or limit violation                   |
| <b>Code 16</b><br>Four Alarm Contacts for PV and Temperature <ul style="list-style-type: none"> <li>• On – Off</li> <li>• Timer for cleaning</li> <li>• P(ID) Controller</li> </ul>   | <b>Additional Features</b><br>Cleaning initiated externally or automatically by an internal alarm or limit violation                                  |

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## Specifications

| pH Measurement                                |  |
|---|--|
| Measuring Range                               | 0 to 14 pH   |
| Resolution                                    | 0.01 pH  |
| Repeatability                                 | 0.03 pH  |
| Deviation, Output / Input                     | 0.1 pH   |
| Zero  | Glass; 5.0 to 9.0 pH (nominal 7.0 pH)<br>Antimony; 1.0 to 3.0 pH (nominal 1.0 pH)  |
| Slope   | Glass; 38.0 to 65.0 mV/pH<br>Antimony; 25.0 to 65.0 mV/pH<br>(nominal 59.16 mV/pH) |
| Input Impedance                               | $> 1 \times 10^{12}$ Ohms  |
| Reference Temperature                         | 25°C (77°F)  |
| Maximum Cable Length<br>Sensor to Transmitter | 50 meters<br>(164 feet)  |

| ORP (REDOX) Measurement |                                   |
|-------------------------|-----------------------------------|
| Measuring Range         | -1500 mV to +1500 mV or 0 to 100% |
| Resolution              | 1.0 mV / 0.1%                     |
| Repeatability           | 0.2% of Measuring Range           |
| Signal Input            | $> 1 \times 10^{12}$ Ohm          |

| Temperature Measurement |                            |
|-------------------------|----------------------------|
| Temperature Sensor      | Pt 100                     |
| Measuring Range         | -20 to 150°C (-4 to 302°F) |
| Resolution              | 0.1°C                      |
| Repeatability           | 0.2% of Measuring Range    |

| Digital Inputs 1 and 2 |               |
|------------------------|---------------|
| Voltage                | 10 to 50 V    |
| Power Consumption      | Maximum 10 mA |

| Current Output          |                                     |
|-------------------------|-------------------------------------|
| Range                   | Selectable 0 to 20 mA or 4 to 20 mA |
| NAMUR Fault Current     | 2.4 or 22.0 mA                      |
| Maximum Load            | 500 Ohms                            |
| Output Scale Expansion  | 10% to 100%                         |
| Output Isolation        | Max. 350V <sub>rms</sub> / 500Vdc   |
| Over Voltage Protection | EN 61005:1995                       |

| Auxiliary Voltage Output |           |
|--------------------------|-----------|
| Output Voltage           | 15 V      |
| Output Current           | Max. 10mA |

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## Specifications

| <b>Alarms</b>                  |                          |
|--------------------------------|--------------------------|
| Programmable                   | pH, ORP, Temperature     |
| Alarm Delay                    | 0 to 2000 sec            |
| Contacts                       | Dry, SPDT, NO / NC       |
| Resistive Load, Current Rating | 2.0 Amps                 |
| Inductive Load, Current Rating | 2.0 Amps                 |
| Voltage Rating                 | 250 VAC, 30 VDC          |
| Resistive Load, Power Rating   | 1250 VA AC, 150 Watts DC |
| Inductive Load, Power Rating   | 500 VA AC, 90 Watts DC   |

| <b>Controller</b>                        |                                  |
|--|----------------------------------|
| Pulse Length                             | Solenoid Valves                  |
| Pulse Frequency                          | Solenoid Operated Metering Pumps |
| Control Functions                        | P, PI, PD, PID                   |
| Proportional Gain (P)                    | 0.01 to 20.00                    |
| Integral (I)                             | 0.0 to 999.0 min                 |
| Derivative (D)                           | 0.0 to 999.0 min                 |
| Period for Pulse Length Controller       | 0.5 to 999.9 sec                 |
| Frequency for Pulse Frequency Controller | 60 to 180 min <sup>-1</sup>      |

| <b>Physical Specifications</b> |  |
|--------------------------------|--|
| Dimensions (H X W X L)         | 96 X 96 X 145 mm (3.8 X 3.8 X 5.7 in.) |
| Mounting Depth                 | 165 mm (6.5 in.)                       |
| Weight                         | 0.7kg (1.54 lb.)                       |
| Housing                        | Polycarbonate                          |
| Front Panel                    | Polyester, UV resistant                |

| <b>Operating Conditions</b> |                                    |
|-----------------------------|------------------------------------|
| Temperature                 | -10 to 55°C                        |
| Storage and Transport       | -25 to 65°C                        |
| Relative Humidity           | 10 to 95%, non-condensing          |
| Enclosure Rating            | IP54 (front panel), IP30 (housing) |
| EMI / RFI                   | EN 61326-1:1997                    |

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## Ordering Information

| Model                  | Description                            |
|------------------------|--|
| M-223-PR               | pH / ORP Transmitter                   |
| M-223-PS               | pH / ORP Transmitter with Plus Package |
| Code                   | Description                            |
| 1                      | 115 VAC, 50/60 Hz Power                |
| 8                      | 24 VAC or VDC Power                    |
| Code                   | Description                            |
| 0                      | pH / ORP Current Output                |
| 1                      | pH / ORP and Temperature Output        |
| Code                   | Description                            |
| 05                     | One Alarm                              |
| 10                     | Two Alarms                             |
| 16                     | Four Alarms                            |
| <b>M-223-PR-1-1-10</b> | <b>Order Number Example</b>            |

## Outline and Mounting Dimensions

