Rosemount™ 3900/3900VP
General Purpose pH/ORP Sensor
Essential Instructions
Read this page before proceeding!

Emerson designs, manufactures, and tests its products to meet many national and international standards. Because these sensors are sophisticated technical products, you MUST properly install, use, and maintain them to ensure they continue to operate within their normal specifications. The following instructions MUST be adhered to and integrated into your safety program when installing, using, and maintaining Rosemount Analytical products. Failure to follow the proper instructions may cause any one of the following situations to occur: loss of life; personal injury; property damage; damage to this sensor; and warranty invalidation.

• Read all instructions prior to installing, operating, and servicing the product.
• If you do not understand any of the instructions, contact your Emerson representative for clarification.
• Follow all warnings, cautions, and instructions marked on and supplied with the product.
• Inform and educate your personnel in the proper installation, operation, and maintenance of the product.
• Install your equipment as specified in the Installation Instructions of the appropriate Reference Manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
• To ensure proper performance, use qualified personnel to install, operate, update, program, and maintain the product.
• When replacement parts are required, ensure that qualified people use replacement parts specified by Emerson. Unauthorized parts and procedures can affect the product’s performance, place the safe operation of your process at risk, and VOID YOUR WARRANTY. Third-party substitutions may result in fire, electrical hazards, or improper operation.
• Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.

The information contained in this document is subject to change without notice.

CAUTION
SPECIAL CONDITIONS FOR SAFE USE

1. All pH/ORP sensors have a plastic enclosure which must only be cleaned with a damp cloth to avoid the danger due to a build up of an electrostatic charge.
2. All pH/ORP sensor models are intended to be in contact with the process fluid and may not meet the 500V r.m.s. a.c. test to earth.

This must be taken into consideration at installation.

CAUTION
SENSOR/PROCESS APPLICATION COMPATIBILITY

The wetted sensor materials may not be compatible with process composition and operating conditions. Application compatibility is entirely the responsibility of the user.

WARNING

Before removing the sensor, be absolutely certain that the process pressure is reduced to 0 psig and the process temperature is lowered to a safe level!

CAUTION

The solution used during calibration is an acid and should be handled with care. Follow the directions of the acid manufacturer. Wear the proper protective equipment. Do not let the solution come in contact with skin or clothing. If contact with skin is made, immediately rinse with clean water.
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Section 1: Specifications

1.1 Specifications

Measurements and Ranges: pH: 0-14 / ORP: -1500 to +1500 mV

Percent Linearity Over pH Range:

<table>
<thead>
<tr>
<th>Range</th>
<th>Linearity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7</td>
<td>97%</td>
</tr>
<tr>
<td>1-7</td>
<td>98%</td>
</tr>
<tr>
<td>4-7</td>
<td>98%</td>
</tr>
<tr>
<td>7-10</td>
<td>99%</td>
</tr>
<tr>
<td>7-12</td>
<td>97%</td>
</tr>
<tr>
<td>7-13</td>
<td>96%</td>
</tr>
<tr>
<td>7-14</td>
<td>95%</td>
</tr>
</tbody>
</table>

Materials of construction:

Sensor Body: Ryton -- polyphenylene sulfide (PPS)

O-ring: EPDM

pH Electrode: Glass

ORP Electrode: Glass, platinum

Solution Ground: Stainless Steel

Reference Junction: PTFE (Teflon)

Maximum Pressure: 790 kPa [abs] (100 psig) at 212 °F (100 °C)

CRN rating: 60 psig up to 212 °F (100 °C).

Operating Temperature: 14 °F to 212 °F (-10 °C to 100 °C)

Automatic temperature compensation 14 °F to 212 °F (-10 °C to 100 °C)

Conductivity: Responds to changes in pH at a minimum conductivity of 0.1 µS/cm when used with the low flow cell panel. The sample flow rate must be controlled to 2 gph (7.6L/hr).

Process Connections:

Front facing: 3/4 inch and 1 inch MNPT

Rear facing: 1 inch MNPT

Weight/Shipping Weight: 1 lb./2 lb. (0.45 kg/0.9 kg)

Integral Cable: 32 ft (10m) cable with integral preamp; 15 ft (4.7m) cable without preamp

VP8 Cable: Use 24281-XX, 2.5 ft (0.8m) to 100 ft (31m) (see accessories)

NOTICE

The Rosemount 3900/3900VP Sensor responds to changes in pH at a minimum conductivity of 0.1 µS/cm in deionized water. Sample flow rate must be controlled to 2 gph (7.6L/hr). The offset is approximately -0.2 pH after 3 months at ambient temperature.
1.2 Product Certifications

IECEx

3900/3900VP without preamp (pH and ORP) – Ex ia IIC T4 Ga (-20 °C ≤ Ta ≤ +60 °C)
3900/3900VP with SMART preamp (pH only) – Ex ia IIC T4 Ga (-20 °C ≤ Ta ≤ +60 °C)

Per standards IEC60079-0: 2011, IEC 60079-11: 2011

ATEX

3900/3900VP without preamp (pH and ORP) – II 1 G Ex ia IIC T4 Ga (-20 °C ≤ Ta ≤ +60 °C)
3900/3900VP with SMART preamp (pH only) – II 1 G Ex ia IIC T4 Ga (-20 °C ≤ Ta ≤ +60 °C)


FM

3900/3900VP with SMART preamp (pH only), with standard preamp (ORP only), and without preamp (pH and ORP):

Intrinsically Safe for use in Class I, II, and III, Division 1, Groups A, B, C, D, E, F, and G; Temperature Class T6 Ta = -20 °C to +60 °C

Intrinsically Safe for use in Class I, Zone 0, AEx ia IIC T6 Ta = -20 °C to +600 °C

Nonincendive for use in Class I, Division 2, Groups A, B, C, and D; Temperature Class T6 Ta = -20 °C to +60 °C

Suitable for use in Class II and III, Division 2, Groups E, F, and G; Temperature Class T6 Ta = -20 °C to +60 °C Hazardous (Classified) Locations

IS/I,II,III/1/ABCDEFG/T6 Ta = 60 °C - 1400332; Entity; I/0/AEx ia IIC/T6 Ta = 60 °C - 1400332; Entity;

NI/I/2/ABCDEFG/T6 Ta = 60 °C - 1400332; S/II,III/2/ABCDEFG/T6 Ta = 60 °C


CSA

3900/3900VP with SMART preamp (pH only) – Intrinsically Safe:

Class I, Division 1, Groups ABCD; Class II, Division 1, Groups EFG; Class III; Class I, Division 2, Groups ABCD; Ambient temperature rating -20 °C to +60 °C; Ex ia IIC; T6

3900/3900VP without preamp (pH and ORP) – Intrinsically Safe and Non-Incendive:

Class I, Division 1, Groups ABCD; Class II, Division 1, Groups EFG; Class III; Class I, Division 2, Groups ABCD; Ex ia IIC; T6; Ambient temperature rating -20 °C to +60 °C; (Simple Apparatus)

1.3 Ordering Information

The Rosemount 3900/3900VP General Purpose pH/ORP sensors feature a chemically resistant Ryton plastic body, along with a built-in solution ground for advanced diagnostics and a Pt-100 RTD for temperature compensation. These sensors are available with either an integral cable connection or Variopol (VP8) connector. Variopol cables sold separately (see Accessories).

Table 1-1: Rosemount 3900 pH/ORP Sensor ordering information

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>3900</td>
<td>pH/ORP Sensor</td>
</tr>
</tbody>
</table>

Preamplifier Option

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Preamplifier (1)</td>
</tr>
<tr>
<td>02</td>
<td>No preamplifier (2)</td>
</tr>
</tbody>
</table>

Measuring Electrode

<table>
<thead>
<tr>
<th>Electrode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>General Purpose Low Resistivity (GPLR) pH glass</td>
</tr>
<tr>
<td>12</td>
<td>Platinum ORP</td>
</tr>
</tbody>
</table>

Typical Model Number: 3900-01-10

1. Preamplifier is SMART with -10 option and a standard preamplifier if with -12 option. Comes with 32 ft. (10 m) of integral cable.
2. Comes standard with 15 ft. (4.7 m) of integral cable.

Table 1-2: Rosemount 3900VP pH/ORP Sensor with Variopol cable connection ordering information

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>3900VP</td>
<td>pH/ORP Sensor</td>
</tr>
</tbody>
</table>

Preamplifier Option

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
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<tr>
<td>01</td>
<td>Preamplifier (1)</td>
</tr>
<tr>
<td>02</td>
<td>No preamplifier</td>
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</tbody>
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Measuring Electrode

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<tr>
<th>Electrode</th>
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<tr>
<td>10</td>
<td>General Purpose Low Resistivity (GPLR) pH glass</td>
</tr>
<tr>
<td>12</td>
<td>Platinum ORP</td>
</tr>
</tbody>
</table>

Typical Model Number: 3900VP-01-10

1. Preamplifier is SMART with -10 option and a standard preamplifier if with -12 option.
Section 2: Installation

2.1 Storage

1. It is recommended that electrodes be stored in their original shipping containers until needed.
2. Do not store at temperatures below 14 °F (-10 °C).
3. Electrodes should be stored with a protective cap containing KCl solution (PN 9210342).
4. For overnight storage, immerse the sensor in tap water or 4 pH buffer solution.
5. pH glass electrodes slowly deteriorate in storage. There is no specific expiration date. However, the calibration procedure described below should be followed to determine that the sensor calibrates properly.

2.2 Electrode Preparation

1. Remove electrode from shipping container.
2. Remove the protective boot covering the electrode bulb.
3. Rinse away salt film with clean water; then shake the electrode so that the internal solution fills the bulb, thus removing any air trapped there.

2.3 Sensor Installation

1. Wrap the sensor threads with six or seven turns of Teflon tape to prevent leakage.
2. Do not over tighten the sensor into its receptacle.
3. Hand tighten the sensor, and then tighten one or two turns with a wrench.

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Figure 2-1 Sensor Orientation
Figure 2-2 Rosemount 3900/3900VP Sensor Dimensions

Figure 2-3 Typical flow through insertion installation using PN 2002011 Pipe Tee

<table>
<thead>
<tr>
<th>Pressure/Temperature Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>psig (kPa [abs])</td>
</tr>
<tr>
<td>150 (1136)</td>
</tr>
<tr>
<td>128 (984)</td>
</tr>
<tr>
<td>102 (805)</td>
</tr>
<tr>
<td>80 (653)</td>
</tr>
<tr>
<td>57 (494)</td>
</tr>
<tr>
<td>48 (432)</td>
</tr>
</tbody>
</table>

Note: Sensor must be installed at least 10° above the horizon.

Figure 2-4 Low Flow Cell PN 24091-00/24091-02

Inlet and outlet connections are stainless steel and take 1/4-inch OD tubing. Flow cell is polycarbonate with 1/4-inch FNPT fittings.

Wetted Materials:
Body and Nut: Polyester/Polycarbonate Fittings: 316 SST Seals: Silicone

Flow Cell Ratings:
Temperature: 32˚ to 158˚F (0 to 70˚C) Max. Pressure: 90 PSIG (721 kPa [abs]) Flow rate: 2 to 5 GPH (7.6 to 18.9 LPH)

Sensor Threaded Connection:
24091-00: 1 inch NPT Adapter 24091-02: 3/4 inch NPT Adapter"
The jet spray cleaner eliminates routine, manual sensor maintenance by cleaning the sensor with water or compressed air. Flow through the cleaner can be controlled by a solenoid valve.

Note: The jet spray cleaner can be used with handrail mounting assembly (PN 11275-01, not shown) or can be mounted through conduit as shown below.

Jet Spray Cleaner with pH sensor

Note: Sensor must be installed at least 10° above the horizon)

**Figure 2-6 Low Flow Panel PN SQP10077-LQD**

<table>
<thead>
<tr>
<th>Low Flow Panel Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet flow</td>
</tr>
<tr>
<td>Inlet pressure</td>
</tr>
<tr>
<td>Temperature</td>
</tr>
</tbody>
</table>

*The minimum inlet pressure is required to open a check valve, which prevents the flow cell from draining if sample flow is lost. Removing the check valve lowers the inlet pressure requirement to a few feet of water head.
2.3.1 Wiring

For additional wiring information on this product, including sensor combinations not shown here, please refer to the Liquid Transmitter Wiring Diagrams.

Figure 2-7: Rosemount 3900/3900VP with Preamplifier to Rosemount 56/1056/1057/1066 Transmitter Wiring

Figure 2-8: Rosemount 3900/3900VP with Preamplifier to Rosemount 56/1056/1057/1066 Transmitter, Junction Box without Preamplifier (PN 23550-00) Wiring
Figure 2-9: Rosemount 3900/3900VP without Preamplifier to Rosemount 56/1056/1057/1066
Transmitter Wiring

Figure 2-10: Rosemount 3900/3900VP without Preamplifier to Rosemount 56/1056/1057/1066
Transmitter, Junction Box with Preamplifier (PN 23555-00) Wiring
Figure 2-11: Rosemount 3900/3900VP with Preamplifier to Rosemount 5081 Transmitter Wiring

Figure 2-12: Rosemount 3900/3900VP with Preamplifier to Rosemount 5081 Transmitter, Junction Box without Preamplifier (PN 23550-00) Wiring
Figure 2-13: Rosemount 3900/3900VP without Preamplifier to Rosemount 5081 Transmitter Wiring

Figure 2-14: Rosemount 3900/3900VP without Preamplifier to Rosemount 5081 Transmitter, Junction Box with Preamplifier (PN 23555-00) Wiring
Section 3: Calibration and Maintenance

3.1 pH Two Point Buffer Calibration

Select two stable buffer solutions, preferably pH 4.0 and 7.0 (pH buffers other than pH 4.0 and pH 7.0 can be used as long as the pH values are at least two pH units apart).

NOTICE

A pH 7 buffer solution reads a mV value of approx. zero, and pH buffers read approximately ±59.1 mV for each pH unit above or below pH 7. Check the pH buffer manufacturer specifications for millivolt values at various temperatures since it may affect the actual value of the buffer solution mV/pH value.

1. Immerse sensor in the first buffer solution. Allow sensor to equilibrate to the buffer temperature (to avoid errors due to temperature differences between the buffer solution and sensor temperature) and wait for reading to stabilize. Value of buffer can now be acknowledged by transmitter.

2. Once the first buffer has been acknowledged by the transmitter, rinse the buffer solution off the sensor with distilled or deionized water.

3. Repeat the steps 1 and 2 using the second buffer solution.

4. The theoretical slope value, according to the Nernst equation for calculating pH, is approximately 59.1 mV/pH. Over time the sensor will age, both in the process and in storage, which will result in reduced slope values. To ensure accurate readings, it is recommended that the electrode be replaced when the slope value falls below 47 to 49 mV/pH.

3.2 Recommended pH Sensor Standardization

For maximum accuracy, the sensor can be standardized on-line or with a process grab sample after a buffer calibration has been performed and the sensor has been conditioned to the process. Standardization accounts for the sensor junction potential and other interferences. Standardization will not change the sensor's slope, but will simply adjust the transmitter's reading to match that of the known process pH.

3.3 pH Electrode Maintenance

Electrodes should respond rapidly. Sluggishness, offsets, and erratic readings are indicators that the electrodes may need cleaning or replacement.

1. To remove oil deposit, clean the electrode with a mild non-abrasive detergent.

2. To remove scale deposits, soak electrodes for 1 to 5 minutes in a 5% hydrochloric acid solution.

3. Temperature effect on life expectancy: If glass electrode life expectancy is 100% at 77 °F (25 °C), then it will be approximately 25% at 176 °F (80 °C), and approximately 10% at 212 °F (100°C).
3.4 ORP Calibration

1. After making an electrical connection between the sensor and the instrument, obtain a standard solution of saturated quinhydrone PN R508-80Z (475mV). This can also be made quite simply by adding a few crystals of quinhydrone to either pH 4 or pH 7 buffer. Quinhydrone is only slightly soluble; therefore only a few crystals will be required.

2. Immerse the sensor in the standard solution. Allow 1-2 minutes for the ORP sensor to stabilize.

3. Standardize the instrument to the solution value shown in the Table 3-1 below. The resulting potentials, measured with a clean platinum electrode and saturated KCl/AgCl reference electrode, should be within +/- 20 millivolts of the value shown in the table below. Solution temperature must be noted to ensure accurate interpretation of results. The ORP value of saturated quinhydrone solution is not stable over long periods of time. Therefore, these standards should be made up fresh each time they are used.

4. Remove the sensor from the buffer, rinse, and install in the process.

Table 3-1 ORP of Saturated Quinhydrone Solution (millivolts)

<table>
<thead>
<tr>
<th>Temperature °C</th>
<th>pH 4 Solution</th>
<th>pH 7 Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>mV Potential</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>268</td>
<td>264</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>260</td>
</tr>
<tr>
<td></td>
<td>94</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

3.5 ORP Electrode Maintenance

Electrodes should respond rapidly. Sluggishness, offsets, and erratic readings are indicators that the electrodes may need cleaning or replacement.

1. To remove oil deposit, clean the electrode with a mild non-abrasive detergent.

2. To remove scale deposits, soak electrodes for 1 to 5 minutes in a 5% hydrochloric acid solution.

3. ORP (metallic) electrodes should be polished with moistened baking soda.
Section 4: Accessories

Table 4-1 Accessories Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>24281-00</td>
<td>15 ft. cable with mating VP8 connector</td>
</tr>
<tr>
<td>24281-01</td>
<td>25 ft. cable with mating VP8 connector</td>
</tr>
<tr>
<td>24281-02</td>
<td>2.5 ft. cable with mating VP8 connector</td>
</tr>
<tr>
<td>24281-03</td>
<td>50 ft. cable with mating VP8 connector</td>
</tr>
<tr>
<td>24281-04</td>
<td>100 ft. cable with mating VP8 connector</td>
</tr>
<tr>
<td>24281-05</td>
<td>4 ft. cable with mating VP8 connector</td>
</tr>
<tr>
<td>24281-06</td>
<td>10 ft. cable with mating VP8 connector</td>
</tr>
<tr>
<td>24281-07</td>
<td>20 ft. cable with mating VP8 connector</td>
</tr>
<tr>
<td>24281-08</td>
<td>30 ft. cable with mating VP8 connector</td>
</tr>
<tr>
<td>12707-00</td>
<td>Jet Spray Cleaner</td>
</tr>
<tr>
<td>23242-02</td>
<td>Insertion Mounting Adapter, 1.5&quot; MNPT Process Connection, 1&quot; x 3/4&quot; FPT Sensor Adapter/Union Thread</td>
</tr>
<tr>
<td>24091-00</td>
<td>Low flow cell, 1&quot; NPT Adapter</td>
</tr>
<tr>
<td>24091-02</td>
<td>Low flow cell, 3/4&quot; NPT Adapter</td>
</tr>
<tr>
<td>23555-00</td>
<td>Weatherproof Junction Box, with Preamplifier</td>
</tr>
<tr>
<td>2002011</td>
<td>CPVC In-Line Tee, 1.5&quot; Size, 1.0&quot; Threaded Process Connection</td>
</tr>
<tr>
<td>11275-01</td>
<td>Handrail Mounting Assembly</td>
</tr>
<tr>
<td>9210012</td>
<td>pH 4.01 Buffer Solution, 16 oz</td>
</tr>
<tr>
<td>9210013</td>
<td>pH 6.86 Buffer Solution, 16 oz</td>
</tr>
<tr>
<td>9210014</td>
<td>pH 9.18 Buffer Solution, 16 oz</td>
</tr>
<tr>
<td>9200273</td>
<td>Conductor Extension Cable, Shielded and Unprepped (for use with Remote Junction Box)</td>
</tr>
<tr>
<td>SQP10077-LQD</td>
<td>Low Flow Control Panel</td>
</tr>
</tbody>
</table>
Reference Manual
00809-0100-3900

EC Declaration of Conformity
February 2019

Note: Please see website for most recent Declaration.

EU Declaration of Conformity
No: RAD 1119 Rev. B

We,

Rosemount Inc.
5200 Market Boulevard
Chanhassen, MN 55317-9685
USA

declare under our sole responsibility that the product,

Rosemount\textsuperscript{TM} Sensor Models:
328A, 385, 385+ 04, 385+ 02, 385+ 03, 328R 01, 389 01, 389 01 10/11 54,
389 01 12 50, 389 01 12 54, 389 01 12 58, 389 02, 390VP, 390VP 70, 396, 390P 01 10/11 80,
390P 01 10/11 84, 390P 01 12 30, 390P 01 12 34, 390P 01 12 58, 390P 01 11 58, 390VP,
390VP 70, 390VP, 390VP 51, 390VP 70, 390VP 11, 396VP, 396VP 70, 397, 398, 398VP,
396R, 396RVP, 396RVP 70, 330HT, 330HT VP, 330HTVP 70, 340HT VP, 340HT VP 70, 340HT VP 11, 340HT VP 12, 340HT VP 01 12, 340HT VP 02, 340HT VP 01 12, 340HT VP 02,
3400, 3400VP, 3400VP 11, 3400VP 02, 3400VP 01 12, 3400VP 02

manufactured by,

Rosemount Inc.
5200 Market Boulevard
Chanhassen, MN 55317-9685
USA

is in conformity with the provisions of the European Union Directives, including the latest amendments, as shown in the attached schedule.

Assumption of conformity is based on the application of the harmonized standards and, when applicable or required, a European Union notified body certification, as shown in the attached schedule.

[Signature]
(Agreed to)
Chris LaPoint
(name)
1-Feb-19, Shakopee, MN USA
(date of issue & place)

E C Declaration of Conformity
Page 1 of 3
EU Declaration of Conformity
No: RAD 1119 Rev. B

ATEX Directive (2014/34/EU)
Baseplate0ATEX015X- Intrinsically Safe
Equipment Group II, Category 1 G Ex ia IIC T4 Ga (-20°C ≤ Ta ≤ +60°C)
(exceptions noted below)

Model 325 A Steam sterilizable pH/ORP sensor with integral cable
Model 325-04 pH/ORP sensor with integral cable
Model 326-02 ORP sensor with integral cable & Smart preamplifier
Model 325-06 ORP sensor with integral cable & preamplifier T4 (-20°C ≤ Ta ≤ +60°C), T5 (-20°C ≤ Ta ≤ +60°C)
Model 325-01 pH sensor with integral cable & Smart preamplifier
Model 329-01-0011.50 pH sensor with integral cable & preamplifier T4 (-20°C ≤ Ta ≤ +60°C) or T5 (-20°C ≤ Ta ≤ +60°C)
Model 329-01-0011.54 pH sensor with integral cable & preamplifier T4 (-20°C ≤ Ta ≤ +60°C) or T5 (-20°C ≤ Ta ≤ +60°C)
Model 325-12 ORP sensor with integral cable & preamplifier T4 (-20°C ≤ Ta ≤ +60°C) or T5 (-20°C ≤ Ta ≤ +60°C)
Model 325-12.50 ORP sensor with integral cable & preamplifier T4 (-20°C ≤ Ta ≤ +60°C) or T5 (-20°C ≤ Ta ≤ +60°C)
Model 359-01-12.55 ORP sensor with integral cable & preamplifier T4 (-20°C ≤ Ta ≤ +60°C) or T5 (-20°C ≤ Ta ≤ +60°C)
Model 359-01-2 ORP sensor with integral cable & preamplifier T4 (-20°C ≤ Ta ≤ +60°C) or T5 (-20°C ≤ Ta ≤ +60°C)
Model 359VF-70 pH sensor with Viatopole connector & Smart preamplifier
Model 359VF pH/ORP sensor with Viatopole connector
Model 366-01-10/13.50 polypropylene pH sensor with integral cable & preamp T4 (-20°C ≤ Ta ≤ +38°C) or T5 (-20°C ≤ Ta ≤ +38°C)
Model 366-01-10/13.54 polypropylene pH sensor with integral cable & preamp T4 (-20°C ≤ Ta ≤ +38°C) or T5 (-20°C ≤ Ta ≤ +38°C)
Model 366-01-11.25 ORP sensor with integral cable & preamp T4 (-20°C ≤ Ta ≤ +38°C) or T5 (-20°C ≤ Ta ≤ +38°C)
Model 366-01-11.50 ORP sensor with integral cable & preamp T4 (-20°C ≤ Ta ≤ +38°C) or T5 (-20°C ≤ Ta ≤ +38°C)
Model 366-01-33 pH sensor with integral cable & Smart preamp
Model 366VF pH sensor with Viatopole connector
Model 366VF-70 PVA/Glass sensors with Viatopole connector & Smart preamplifier
Model 366VF-01-12.55 pH sensor with Viatopole connector & Smart preamplifier
Model 366VF-01-11.50 ORP sensor with Viatopole connector & Smart preamplifier
Model 366VF-01-10/13.50 polypropylene ORP sensor with Viatopole connector & Smart preamplifier
Model 366VF-01-10/13.54 polypropylene ORP sensor with Viatopole connector & Smart preamplifier
Model 366VF-01-10/13.50 polypropylene ORP sensor with Viatopole connector & Smart preamplifier
Model 366VF-01-12.55 ORP sensor with Viatopole connector & Smart preamplifier
Model 366VF-01-12.50 ORP sensor with Viatopole connector & Smart preamplifier
Model 366VF-01-10/13.50 polypropylene ORP sensor with Viatopole connector & Smart preamplifier
EU Declaration of Conformity
No: RAD 1119 Rev. B

Model 33000TTV-70 In-situ immersion pH sensor with V anispol connector & Smart preamplifier
Model 34000TTV Reusable pH sensor with integral cable
Model 34000TTV-70 Reusable pH sensor with Vanispol connector & Smart preamplifier
Model 33000P-01 High performance pH sensor with integral cable & Smart preamplifier
Model 33000P-01:12 PyroH-X ORP sensor with integral cable & preamplifier T4 (20°C ≤ Ta ≤ +60°C)
Model 33000P-02 High performance pH sensor with integral cable
Model 33000P-01 High performance pH sensor with Vanispol connector & Smart preamplifier
Model 33000P-01:12 PyroH-X ORP sensor with Vanispol connector & preamplifier T4 (20°C ≤ Ta ≤ +60°C)
Model 33000P-01:12 PyroH-X ORP sensor with Vanispol connector & Smart preamplifier
Model 33000P-02:12 PyroH-X ORP sensor with Vanispol connector & Smart preamplifier
Model 33000P-02:12 PyroH-X ORP sensor with Vanispol connector & Smart preamplifier

Special conditions for safe use:
1) All pH/ORP sensor models with a plastic enclosure or exposed plastic parts may provide an electrostatic ignition hazard and must only be cleaned with a damp cloth to avoid the danger of ignition due to a buildup of electrostatic charge.
2) All pH/ORP sensor models with a metallic enclosure may provide a risk of ignition by impact or friction. Care should be taken during installation to protect the sensor from this risk.
3) External connections to the sensors must be suitably terminated and provide a degree of protection at least IP20. All pH/ORP sensor models are intended to be in contact with the process fluid and may not meet the 500V e.m. test to earth. This must be taken into consideration at installation.

Harmonized Standards:
EN 60079-0:2012+A11:2013
EN 60079-1:2012

ATEX Notified Body for EC Type Examination Certificate & Quality Assurance
SGS TÜVÖX [Notified Body Number: 0598]
P.O. Box 30 (Suomenposti 3)
00211 HELSINKI
Finland
### Table 1: List of Model Parts with China RoHS Concentration above MCVs

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Lead (Pb)</th>
<th>Mercury (Hg)</th>
<th>Cadmium (Cd)</th>
<th>Hexavalent Chromium (Cr+6)</th>
<th>Polybrominated Biphenyls (PBB)</th>
<th>Polybrominated Diphenyl Ethers (PBDE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronics</td>
<td>X</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Assembly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor</td>
<td>X</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Assembly</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

This table is prepared in accordance with the provision of SJ/T11364.  
O: Indicates that the concentration of hazardous substances is below the limit requirement of GB/T 26572.  
X: Indicates that the concentration of hazardous substances is above the limit requirement of GB/T 26572.
**Intrinsically Safe Sensor Installation Drawing - FM**

**NON-HAZARDOUS (UNCLASSIFIED) AREA**

- ANY FM APPROVED ASSOCIATED APPARATUS HAVING ENTITY PARAMETERS

**HAZARDOUS (CLASSIFIED) AREA**

- ANY FM APPROVED TRANSMITTER FOR DIVISION 1 WITH INTRINSICALLY SAFE OUTPUT PARAMETERS. THIS FM APPROVED DEVICE MUST BE INSTALLED PER ITS INSTALLATION DRAWING.

- FM APPROVED EQUIPMENT (MAY BE MULTIPLE DEVICES, NUMBER IS LIMITED BY REQUIREMENTS TO MEET ALL OTHER IS REQUIREMENTS FOR THE NETWORK) WITH EQUIVALENT HAZARDOUS AREA APPROVAL.

- WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

- **PH & AMPEROMETRIC SENSORS WITHOUT PREAMPS ARE SIMPLE APPARATUS.**

**INTRINSICALLY SAFE**

- **CLASS I, II, DIVISION 1, GROUPS A-G**
- **T6Ta = 60°C**

- **ENTITY PARAMETERS**
  - \( U_i = 13.1 \text{ V} \)
  - \( I_i = 358 \text{ mA} \)
  - \( P_i = 698 \text{ mW} \)
  - \( C_i = 0.967 \mu \text{ F} \)
  - \( L_i = 0.1 \text{ mH} \)

**REFERENCES**

1. **NO REVISION TO THIS DRAWING IS PERMITTED WITHOUT FM APPROVAL.**
2. **U_{\text{max}} > U_t; I_{\text{max}} > I_t; (C_{i \text{ OF ALL LOOPS}} + C_{\text{CABLE}}) < C_a; (L_{i \text{ OF ALL LOOPS}} + L_{\text{CABLE}}) < L_a, P_{\text{max}} \text{ OR } P_i > P_0.**
3. **SINGLE MULTI-CHANNEL IS BARRIER OR APPARATUS MUST BE FM APPROVED.**
4. **SINGLE MULTI-CHANNEL IS BARRIER OR APPARATUS MANUFACTURE'S CONTROL DRAWINGS MUST BE FOLLOWED WHEN INSTALLING THE SYSTEM.**
5. **BARRIER OR EQUIPMENT MAY BE INSTALLED WITHIN THE HAZARDOUS (CLASSIFIED) LOCATION FOR WHICH IT IS APPROVED.**
6. **INSTALLATION MUST BE IN ACCORDANCE WITH ARTICLE 500 OF THE NEC (ANSI/NFPA 70) AND ANSI/ISA RP 12.6.**
7. **WARNING: TO PREVENT IGNITION OF FLAMMABLE OR COMBUSTIBLE ATMOSPHERES, DISCONNECT POWER BEFORE SERVICING.**
8. **RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN OR EQUAL TO 1 OHM.**
9. **CONTROL EQUIPMENT CONNECTED TO THE ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250V.**
10. **WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.**
11. **PH/OxID METAL SENSORS ARE SIMPLE APPARATUS.**
12. **INSTALLATION MUST BE IN ACCORDANCE WITH ARTICLE 500 OF THE NEC (ANSI/NFPA 70) AND ANSI/ISA RP 12.6.**
13. **WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.**
14. **SINGLE MULTI-CHANNEL IS BARRIER OR APPARATUS MANUFACTURE'S CONTROL DRAWINGS MUST BE FOLLOWED WHEN INSTALLING THE SYSTEM.**
15. **BARRIER OR EQUIPMENT MAY BE INSTALLED WITHIN THE HAZARDOUS (CLASSIFIED) LOCATION FOR WHICH IT IS APPROVED.**
16. **COPY REVISIONS TO 1400332 TO pH/ORP SHIPMENTS.**
17. **Ci INCLUDES THE CAPACITANCE OF 500 FEET OF SENSOR CABLE.**
18. **WARNING: TO PREVENT IGNITION OF FLAMMABLE OR COMBUSTIBLE ATMOSPHERES, DISCONNECT POWER BEFORE SERVICING.**

**List of pH/OxID Sensors**
- 3900/VP
- 3500/VP
- 3300/VP
- 3400HT/VP
- 396/VP
- 396R/VP
- 396P/VP
- 398R/VP
- 399/VP
- 389/VP
- 385/385+

**WARNING:** TO PREVENT IGNITION OF FLAMMABLE OR COMBUSTIBLE ATMOSPHERES, DISCONNECT POWER BEFORE SERVICING.

**COPY REVISIONS TO 1400332 TO pH/ORP SHIPMENTS.**

**Ci INCLUDES THE CAPACITANCE OF 500 FEET OF SENSOR CABLE.**

**WARNING:** TO PREVENT IGNITION OF FLAMMABLE OR COMBUSTIBLE ATMOSPHERES, DISCONNECT POWER BEFORE SERVICING.

**Cl. NO.**

- **1400332**

**February 2019**

**Reference Manual**

- **FM Installation**
- **00809-0100-3000**