Reference Manual
00809-0100-3328
Rev. AA
February 2019

Rosemount™ 328A

pH Sensors

EMERSON™

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 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

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.

⚠ CAUTION

Special Conditions for Safe Use

1. All pH 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 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.

Contents

Section 1: Specifications

1.1 Specifications

Table 1-1: Rosemount 328A sensor specifications

Process Connections	
Standard 12 mm insertion hardware (see Dimensional Drawing)	
Sensitivity	
± 0.02pH	
Temperature/Pressure Rating	
446 kPa abs at 130°C (50 psig at 266°F)	
584 kPa abs at 80°C (70 psig at 176°F)	
791 kPa abs at 40°C (100 psig at 104°F)	
Cable	
2-conductor, low-noise coax, 15 ft (4.5 m)	
Weight/Shipping Weight	
100 gms/180 gms (.2 lb/1.0 lb)	
Performance	
In typical applications, the sensor will perform continuously for 50 steam sterilization cycles.	
pH Range	
0-13 pH	–
1.67-4.01 pH	96% linearity
4.01-12.0	99% linearity
12.0-13.0 pH	97% linearity
Repeatability	
± 0.05 pH	
Automatic Temperature Compensation	
Temperature compensation is generally not required since most applications operate very near pH 7 (isopotential point). When temperature compensation is required a separate RTD can be used with compatible instruments.	
Wetted Materials	
Ceramic, silicone and glass	
Recommended Accessories	
PN 22924-00	25mm Insertion Mounting Adapter Kit

1.2 Product Certifications

Please see online certificates for further details.

IECEx

Ex ia IIC T4 Ga (-20 °C ≤ Ta ≤ +60 °C)

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

ATEX

II 1 G Ex ia IIC T4 Ga (-20 ˚C ≤ Ta ≤ +60 °C)

Per standards EN 60079-0: 2012+A11:2013, EN 60079-11:2012

FM

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 +60 °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/ABCD/T6 Ta = 60°C; S/II,III/2/EFG/T6 Ta = 60°C

Per standards 3600:1998, 3610:2010, 3611:2004, 3810:2005

CSA

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)

Per standards C22.2 No. 142 – M1987, C22.2 No 157 – M1992, CAN/CSA E60079-0:07, CAN/CSA E60079-11:02, UL 50:11th Ed., UL 508:17th Ed., UL 913: 7th Ed., UL 60079-0: 2005, UL 60079-11: 2002

Section 2: Installation

2.1 Unpacking and Inspection

Inspect the outside of the carton for any damage. If damage is detected, contact the carrier immediately. Inspect the instrument and hardware. Make sure all items in the packing list are present and in good condition. Notify the factory if any part is missing.

2.2 Storage

1. When not in process, immerse electrode's measuring tip in tap water or 5% KCl Solution.
2. For extended storage fill protective boot with tap water or 5% KCl Solution and place over electrode's measuring tip. Store tip down.

Note: Electrode Grade 4 pH Buffer may be used in place of 5% KCl Solution.

2.3 Electrode Preparation

1. Remove electrode from shipping container.
2. Remove protective boot covering electrode's measuring tip (pH glass membrane).
3. Wash away any salt film with clean water.
4. Shake internal solutions down to electrode's measuring tip. Electrode is now ready for sterilization and installation.

⚠ CAUTION

Sensor requires sterilization prior to use.

2.4 Installation Procedure (With Holder Assembly)

Note: A preamplifier is required for all applications using a Rosemount transmitter.

1. Locate kit containing sensor O-rings, (1) O-ring, spacer and lube package.

   Lube small O-rings and position, with spacer, on sensor as illustrated in Figure 2-1.

Note: Do not allow O-ring grease to come in contact with glass electrode bulb.

2. Lube (1) O-ring and install on CAP end of Holder.
3. Locate Bushing kit with wire seal and washer, (2) O-ring, and External retaining ring.

   Lube (2) O-ring and form the wire seal end, work it into groove on Holder (See Figure 2-1).

4. Insert sensor, cable first, into holder from CAP end.
5. Slide the CAP over the sensor and screw tightly into place.

Note: To eliminate twisting the sensor cable, hold the CAP stationary and rotate holder. When CAP is in place, back it off 1/2 turn and pull the electrode into place with cable. Retighten the CAP.

6. Lube wire seal. Install with washer according to Figure 2-1. Seal is split to facilitate installation when sensor cable is equipped with spade lugs.
7. Slide the Bushing over cable and screw it into Holder as tightly as possible by hand.
8. Slip 1-1/4 in. Threaded Nut over cable to O-ring (2). Lock in place with External retaining ring.

Note: Sensor does not include preamplifier.

Figure 2-1: Installation

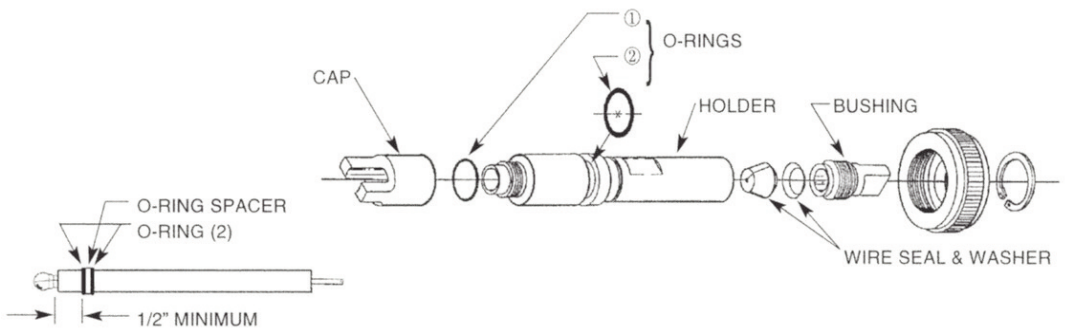
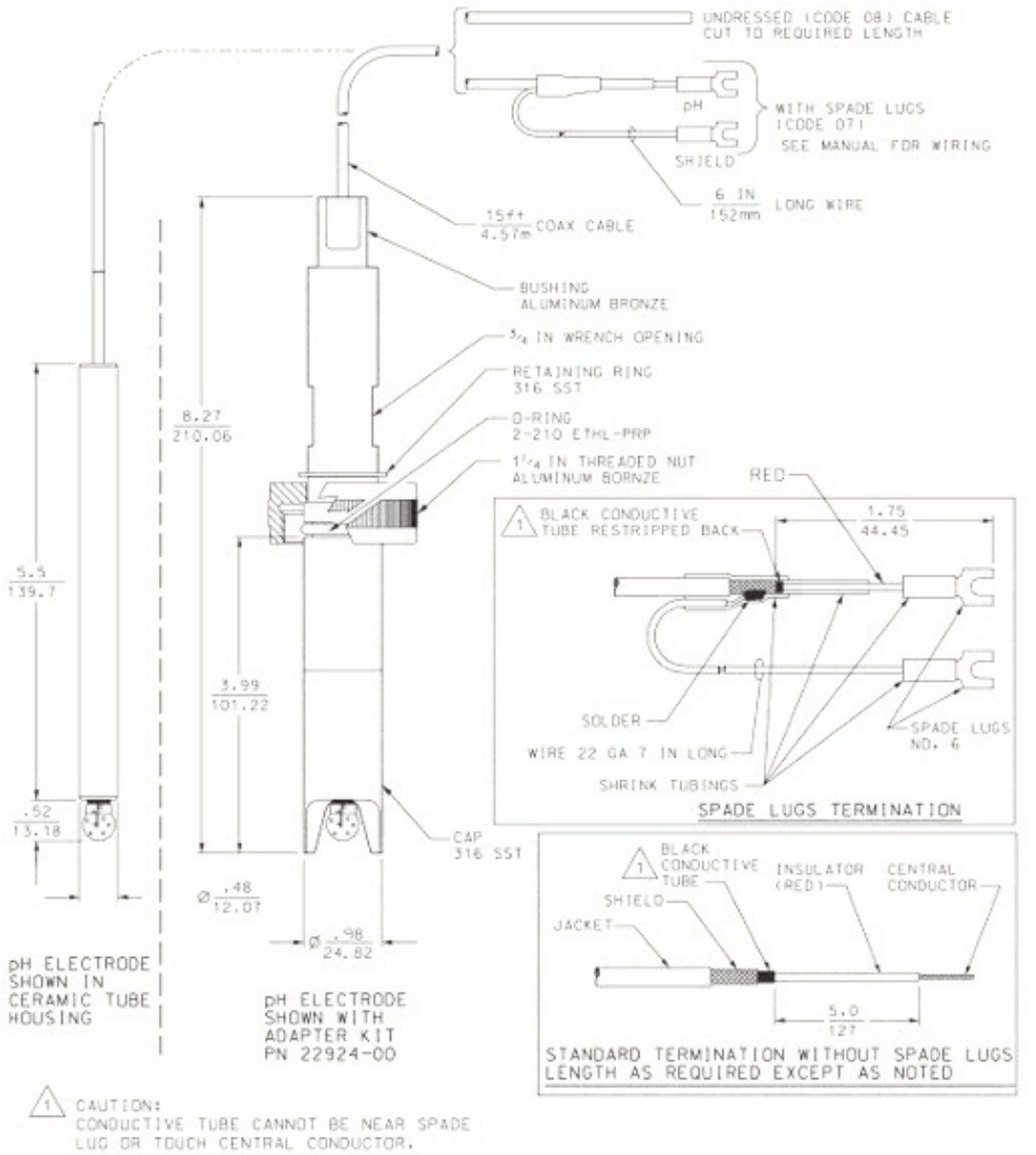


Figure 2-2: Dimensional Drawing for Rosemount 328A and Optional Mounting Adapter Hardware Kit (PN 22924-00)



Section 3: Wiring

3.1 Wiring for Rosemount 328A

For other wiring diagrams not shown below, please refer to the Liquid Transmitter Wiring Diagrams.

Figure 3-1: Rosemount 328A Sensor Wiring to Rosemount 1056/56 Transmitters

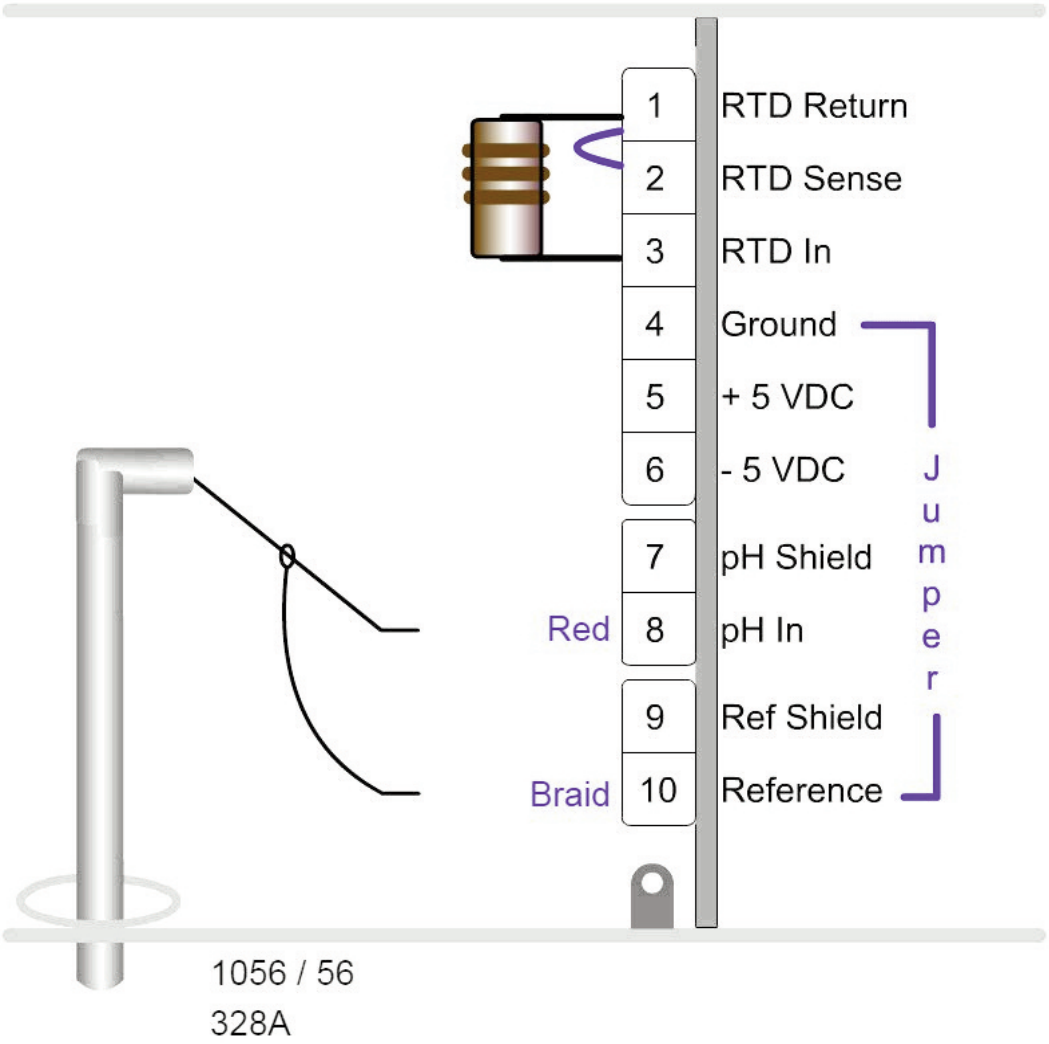


Figure 3-2: Rosemount 328A Sensor Wiring to Rosemount 1057 Transmitter

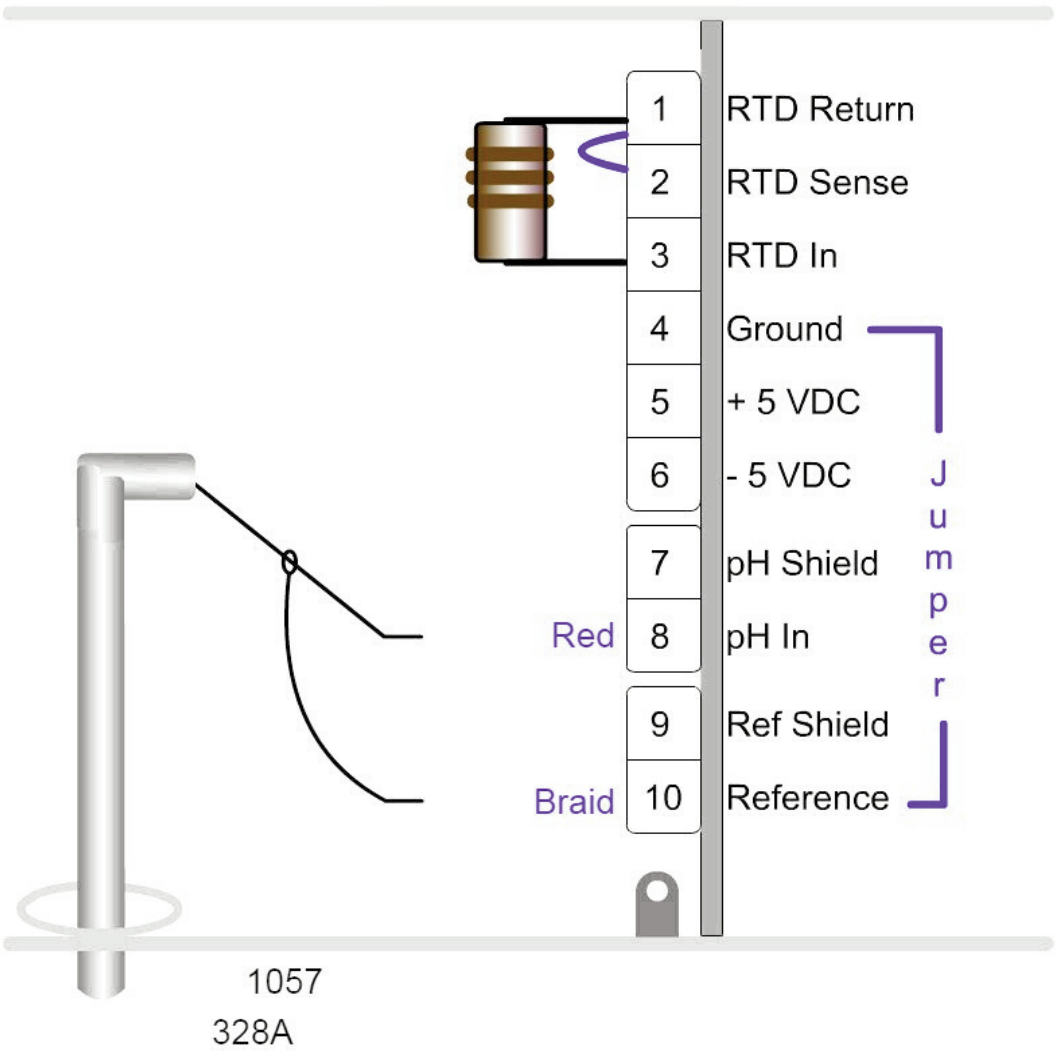


Figure 3-3: Rosemount 328A Sensor Wiring to Rosemount 1066 Transmitter

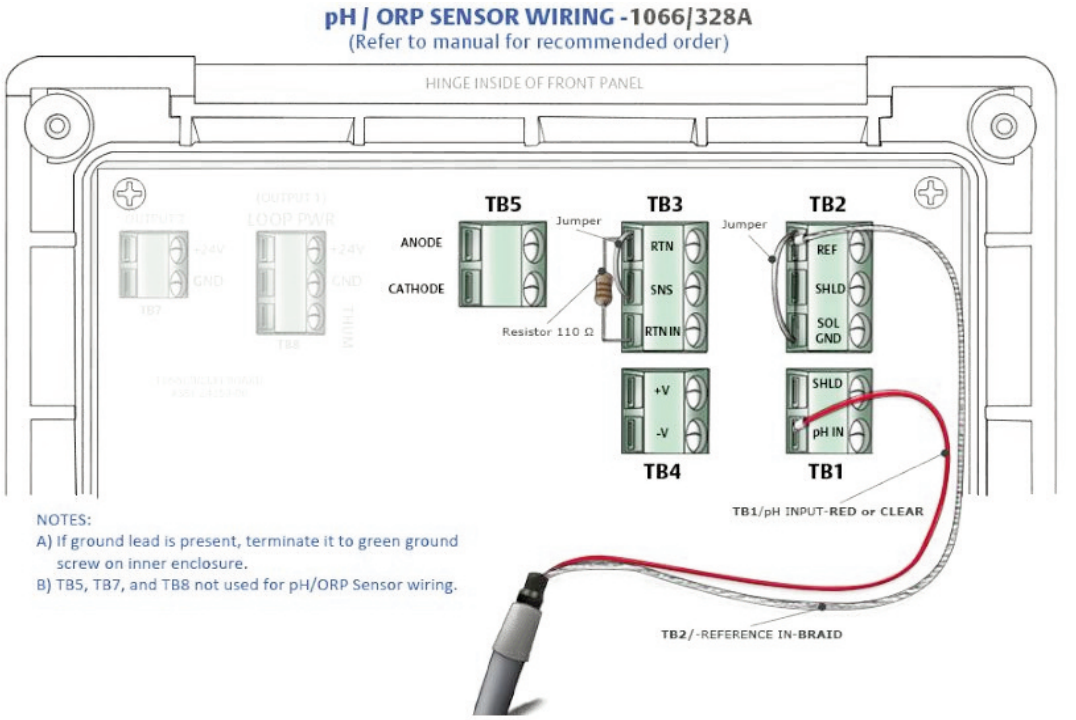
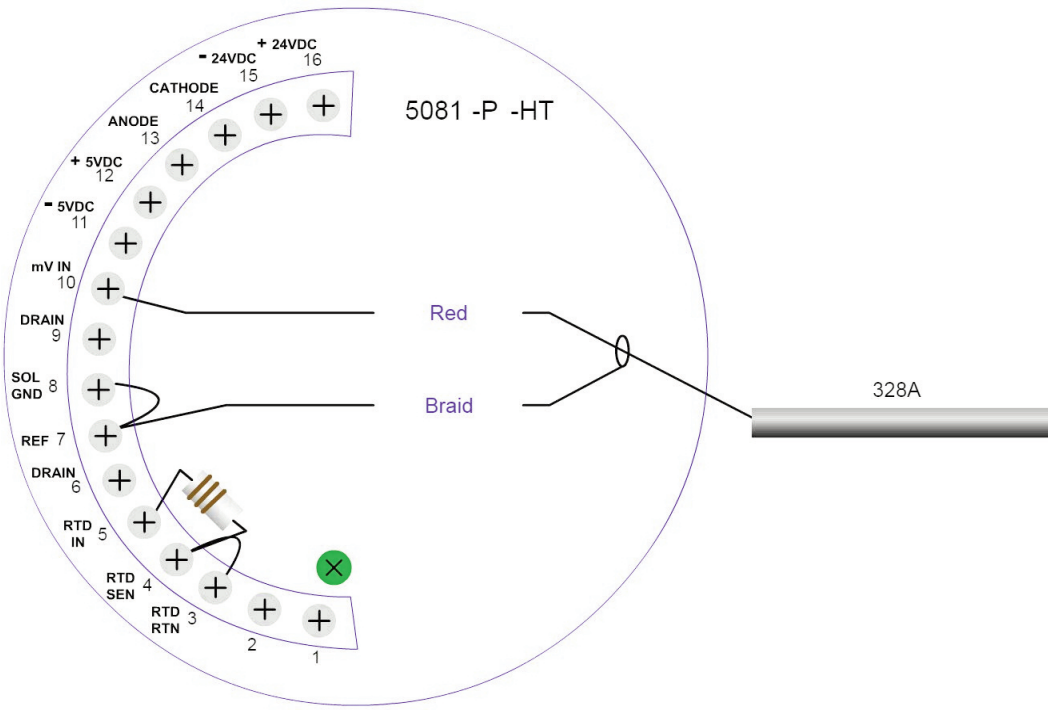


Figure 3-4: Rosemount 328A Sensor Wiring to Rosemount 5081 Transmitter



Section 4: Maintenance

4.1 Maintenance

Performance of electrode will decrease with age and use. Sluggishness, offsets, noisiness, and erratic reading may indicate that electrode needs cleaning and soaking.

1. To remove oil deposits, clean electrode measuring tip with mild, non-abrasive, detergent.
2. To remove scale deposits, soak electrode's measuring tip for 20-30 minutes in 10% hydrochloric acid.
3. Shake internal solution down to electrode's measuring tip.
4. If electrode liquid junction appears to be clogged or dried out, soak junction portion in 80°C 5% KCl solution for one (1) hour. Leave electrode in solution while cooling.

⚠ WARNING

Handle sensor with care to avoid glass electrode breakage and exposure to sensor fill solution. KCl sensor fill solution may cause skin and/or eye irritation. Flush with water for a minimum of 15 minutes for eye exposure. Wash with soap and water for skin exposure.

EC Declaration of Conformity

Note: Please see website for most recent Declaration.

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EU Declaration of Conformity

No: RAD 1119 Rev. B

pH/ORP Sensors

We,

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317-9685
USA

declare under our sole responsibility that the product,

Rosemount™ Sensor Models:
328A, 385, 385+ -04, 385+ -02/03, 385+-03-12, 389-01, 389-01-10/11-50, 389-01-10/11-54, 389-01-12-50, 389-01-12-54, 389-01-12-55, 389-02, 389VP, 389VP-70, 396, 396P-01-10/13-50, 396P-01-10/13-54, 396P-01-12-50, 396P-01-12-54, 396P-01-12-55, 396P-01-55, 396VP, 396VP-70, 396R, 396RVP, 396RVP-70, 396P-02, 396PVP, 396PVP-70, 397, 398, 398VP, 398R, 398RVP, 398RVP-70, 3200HP, 3300HT, 3300HT VP, 3300HTVP-70, 3400HT, 3400HT VP, 3400HTVP-70, 3500P-01, 3500P-01-12, 3500P-02, 3500VP-01, 3500VP-01-12, 3500VP-02, 3800, 3800VP, 3900-01, 3900-02, 3900VP-01, 3900VP-02

manufactured by,

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317-9685
USA

to which this declaration relates, 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)	Vice President of Global Quality (function)
Chris LaPoint (name)	1-Feb-19; Shakopee, MN USA (date of issue & place)

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EU Declaration of Conformity

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ATEX Directive (2014/34/EU)

Baseefa10ATEX0156X– Intrinsically Safe

Equipment Group II, Category 1 G Ex ia IIC T4 Ga (-20°C ≤ Ta ≤ +60°C)
(exceptions noted below)

Model 328A Steam sterilizable pH sensor with integral cable
Model 385 Retractable pH/ORP sensor with integral cable
Model 385+ -04 pH/ORP sensor with integral cable
Model 385+ -02/03 pH/ORP sensor with integral cable & Smart preamplifier
Model 385+ -03-12 ORP sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C), T5 (-20°C ≤ Ta ≤ +40°C)
Model 389-01 pH sensor with integral cable & Smart preamplifier
Model 389-01-10/11-50 pH sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C) or T5 (-20°C ≤ Ta ≤ +40°C)
Model 389-01-10/11-54 pH sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C) or T5 (-20°C ≤ Ta ≤ +40°C)
Model 389-01-12-50 ORP sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C)
Model 389-01-12-54 ORP sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C)
Model 389-01-12-55 ORP sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C)
Model 389-02 pH/ORP sensor with integral cable
Model 389VP-70 pH sensor with Variopole connector & Smart preamplifier
Model 389VP pH/ORP sensor with Variopole connector
Model 396 TUpH sensor with integral cable
Model 396P-01-10/13-50 polypropylene pH sensor with integral cable & preamp: T4 (-20°C ≤ Ta ≤ 80°C) or T5 (-20°C ≤ Ta ≤ 40°C)
Model 396P-01-10/13-54 polypropylene pH sensor with integral cable & preamp: T4 (-20°C ≤ Ta ≤ 80°C) or T5 (-20°C ≤ Ta ≤ 40°C)
Model 396P-01-12-50 ORP sensor with integral cable & preamp: T4 (-20°C ≤ Ta ≤ +80°C)
Model 396P-01-12-54 ORP sensor with integral cable & preamp: T4 (-20°C ≤ Ta ≤ +80°C)
Model 396P-01-12-55 ORP sensor with integral cable & preamp: T4 (-20°C ≤ Ta ≤ +80°C)
Model 396P-01-55 pH sensor with integral cable & Smart preamp
Model 396VP TUpH sensor with Variopole connector
Model 396VP-70 TUpH sensor with Variopole connector & Smart preamplifier
Model 396R TUpH Retractable pH/ORP sensor with integral cable
Model 396RVP TUpH Retractable pH/ORP sensor with Variopole connector
Model 396RVP-70 TUpH Retractable pH sensor with Variopole connector & Smart preamplifier
Model 396P-02 TUpH Polypropylene pH/ORP sensor with integral cable
Model 396PVP TUpH Polypropylene pH/ORP sensor with Variopole connector
Model 396PVP-70 TUpH Polypropylene pH sensor with Variopole connector & Smart preamplifier
Model 397 TUpH sensor with integral cable
Model 398 TUpH pH/ORP sensor with integral cable
Model 398VP TUpH pH/ORP sensor with Variopole connector
Model 398R TUpH Retractable pH/ORP sensor with integral cable
Model 398RVP TUpH Retractable pH/ORP sensor with Variopole connector
Model 398RVP-70 TUpH Retractable pH sensor with Variopole connector & Smart preamplifier
Model 3200HP Flowing junction pH sensor with Variopole connector
Model 3300HT Insertion/submersion pH sensor with integral cable
Model 3300HTVP Insertion/submersion pH sensor with Variopole connector

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Model 3300HTVP-70 Insertion/submersion pH sensor with Variopole connector & Smart preamplifier
Model 3400HT Retractable pH sensor with integral cable
Model 3400HTVP Retractable pH sensor with Variopole connector
Model 3400HTVP-70 Retractable pH sensor with Variopole connector & Smart preamplifier
Model 3500P-01 High performance pH sensor with integral cable & Smart preamplifier
Model 3500P-01-12 PerpH-X ORP sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C)
Model 3500P-02 High performance pH sensor with integral cable
Model 3500VP-01 High performance pH sensor with Variopole connector & Smart preamplifier
Model 3500VP-01-12 PerpH-X ORP sensor with Variopole connector & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C)
Model 3500VP-02 High performance pH sensor with Variopole connector
Model 3800 Steam sterilizable pH sensor with single pole Eurocap connector
CE marking was first affixed to this product in 2011
Model 3800VP Steam sterilizable pH sensor with Variopole connector
Model 3900-01 pH/ORP sensor with integral cable & Smart preamplifier
Model 3900-02 pH/ORP sensor with integral cable
Model 3900VP-01 pH sensor with Variopole connector & Smart preamplifier
Model 3900VP-02 pH/ORP sensor with Variopole connector

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 sensor must be suitably terminated and provide a degree of protection of at least IP20.
All pH/ORP sensor models are intended to be in contact with the process fluid and may not meet the 500V r.m.s test to earth. This must
be taken into consideration at installation.

Harmonized Standards:
EN 60079-0:2012+A11:2013
EN 60079-11:2012

ATEX Notified Body for EC Type Examination Certificate & Quality Assurance
SGS FIMKO OY [Notified Body Number: 0598]
P.O. Box 30 (Särkiniementie 3)
00211 HELSINKI
Finland

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表格 1: 含有 China RoHS 管控物质超过最大浓度限值的部件型号列

Table 1: List of Model Parts with China RoHS Concentration above MCVs

部件名称 Part Name	有害物质 / Hazardous Substances					
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr +6)	多溴联苯 Polybrominated biphenyls (PBB)	多溴联苯醚 Polybrominated diphenyl ethers (PBDE)
电子组件 Electronics Assembly	X	O	O	O	O	O
传感器组件 Sensor Assembly	X	O	O	O	O	O

本表格系依据 SJ/T11364 的规定而制作。

This table is proposed in accordance with the provision of SJ/T11364

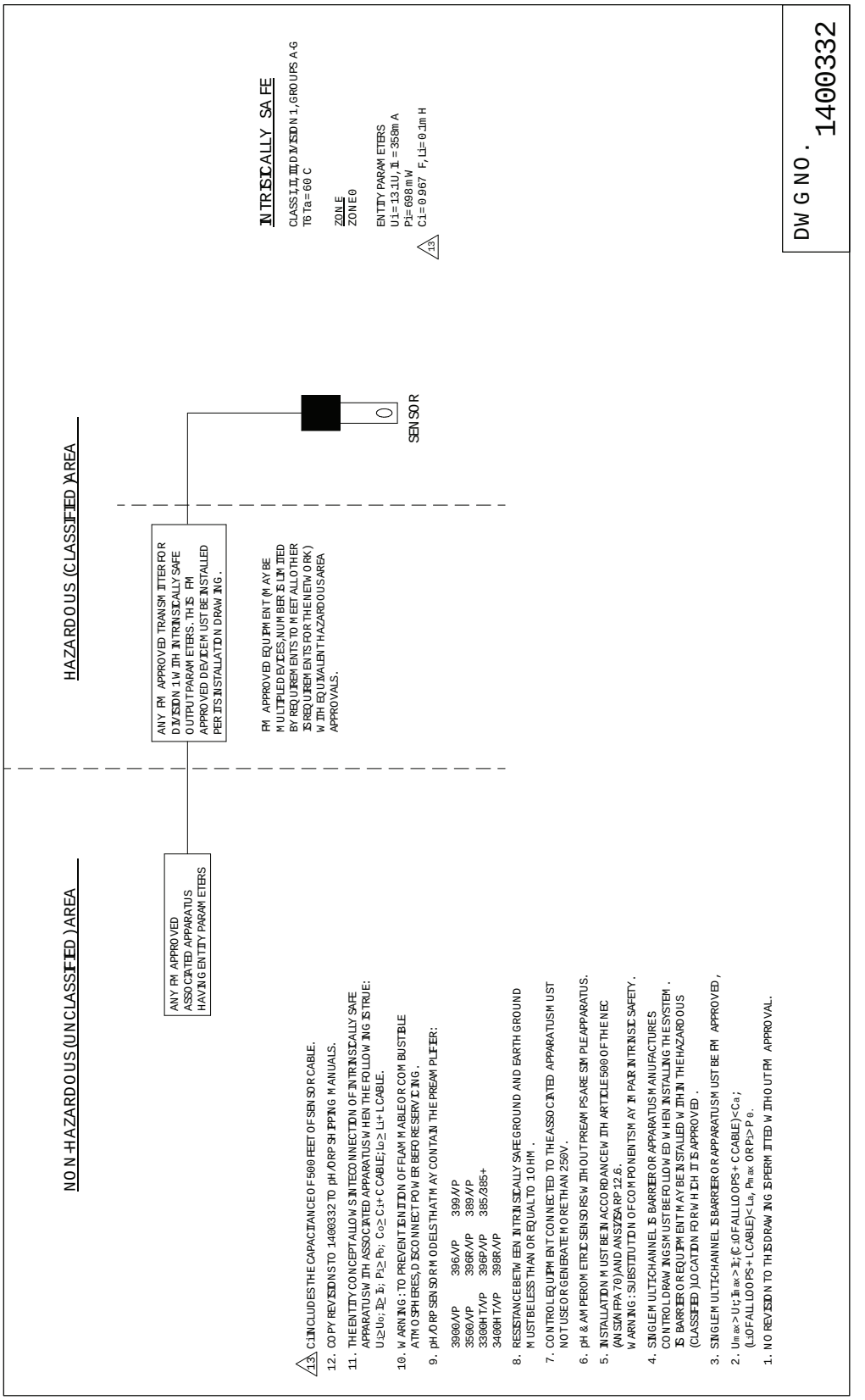
O: 意为该部件的所有均质材料中该有害物质的含量均低于 GB/T 26572 所规定的限量要求。

O: Indicate that said hazardous substance in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

X: 意为在该部件所使用的所有均质材料里，至少有一类均质材料中该有害物质的含量高于 GB/T 26572 所规定的限量要求。

X: Indicate that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.

Intrinsically Safe Sensor Installation Drawing - FM



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Rev. AA
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