

# Rosemount™ 328A

pH Sensors





# 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 Instruction 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.

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### 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.**

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# About This Document

This manual contains instructions for installation and operation of the Rosemount 328A pH Sensors.

The following list provides concerning all revisions of this document.

<b>Rev. Level</b>	<b>Date</b>	<b>Notes</b>
D	04/17	Reformatted to reflect the latest Emerson documentation style Wiring Diagrams, and EC Declaration of conformity.

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# Section 1: Specifications

## 1.1 Specifications

**Table 1-1: Rosemount 328A sensor specifications**

<b>Process Connections</b>	
Standard 12 mm insertion hardware (see Dimensional Drawing)	
<b>Sensitivity</b>	
± 0.02pH	
<b>Temperature/Pressure Rating</b>	
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)	
<b>Cable</b>	
2-conductor, low-noise coax, 15 ft (4.5 m)	
<b>Weight/Shipping Weight</b>	
100 gms/180 gms (.2 lb/1.0 lb)	
<b>Performance</b>	
In typical applications, the sensor will perform continuously for 50 steam sterilization cycles.	
<b>pH Range</b>	
0-13 pH	–
1.67-4.01 pH	96% linearity
4.01-12.0	99% linearity
12.0-13.0 pH	97% linearity
<b>Repeatability</b>	
± 0.05 pH	
<b>Automatic Temperature Compensation</b>	
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.	
<b>Wetted Materials</b>	
Ceramic, silicone and glass	
<b>Recommended Accessories</b>	
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/O/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**

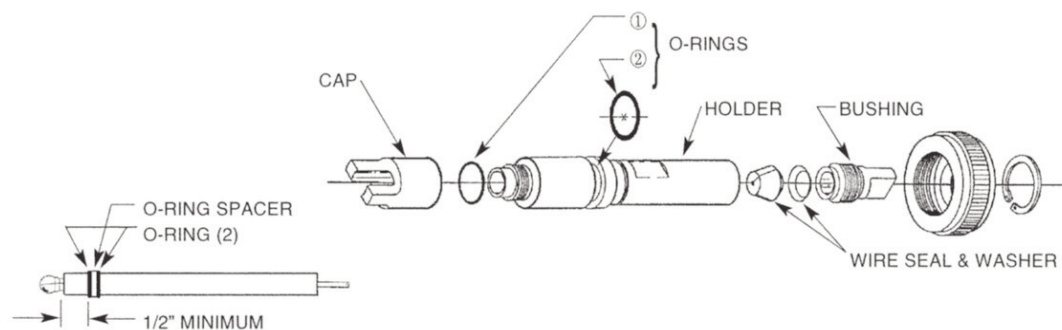
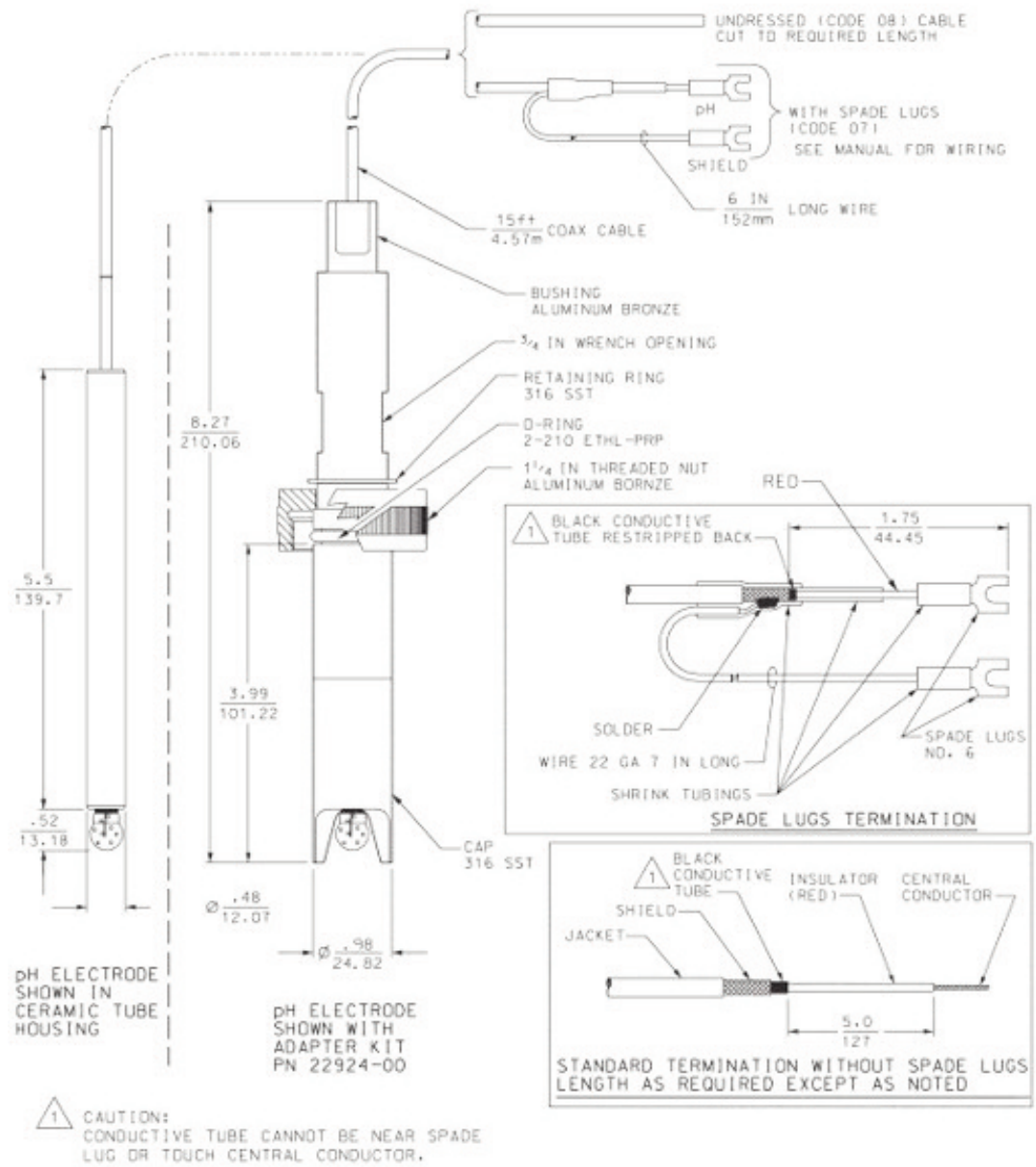


Figure 2-2: Dimensional Drawing for Rosemount 328A and Optional Mounting Adapter Hardware Kit (PN 22924-00)





## 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

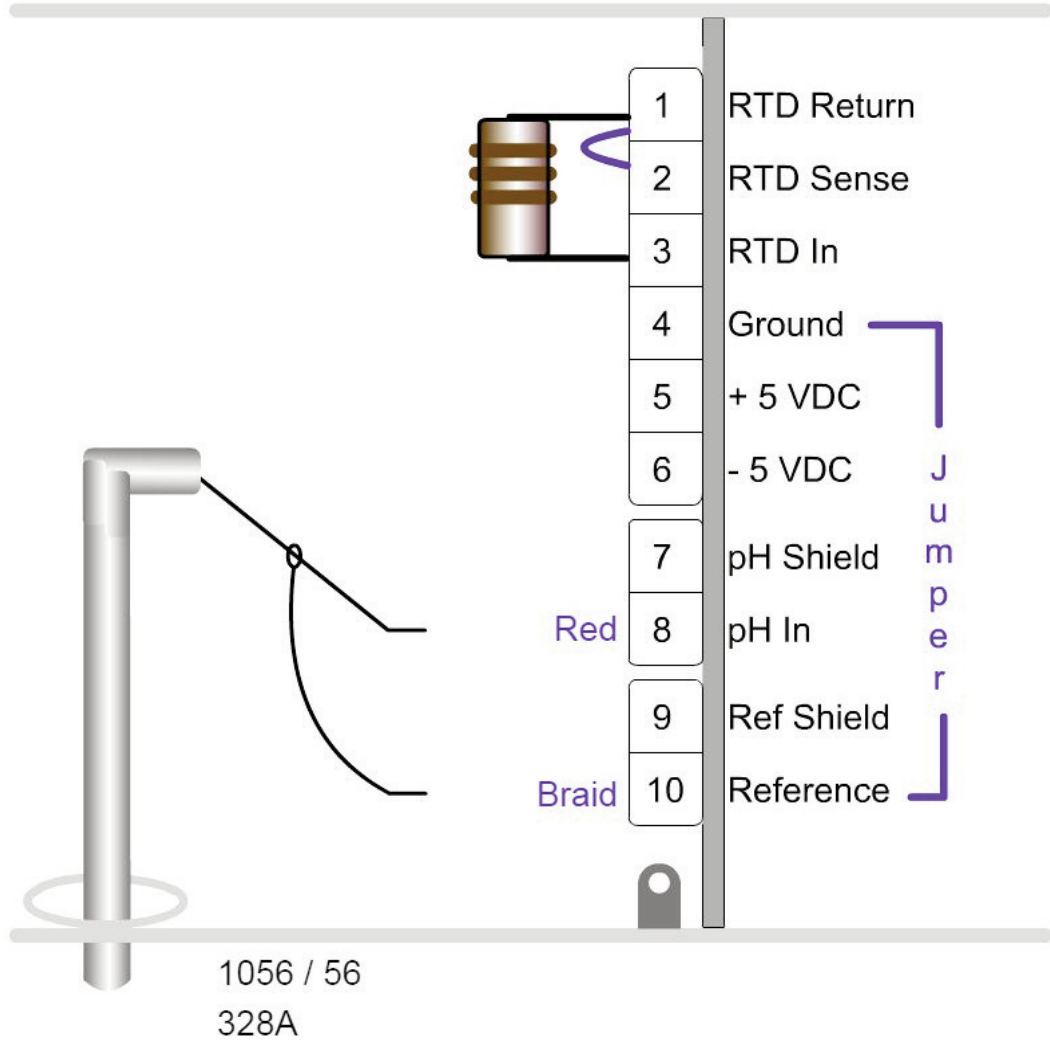


Figure 3-2: Rosemount 328A Sensor Wiring to Rosemount 1057 Transmitter

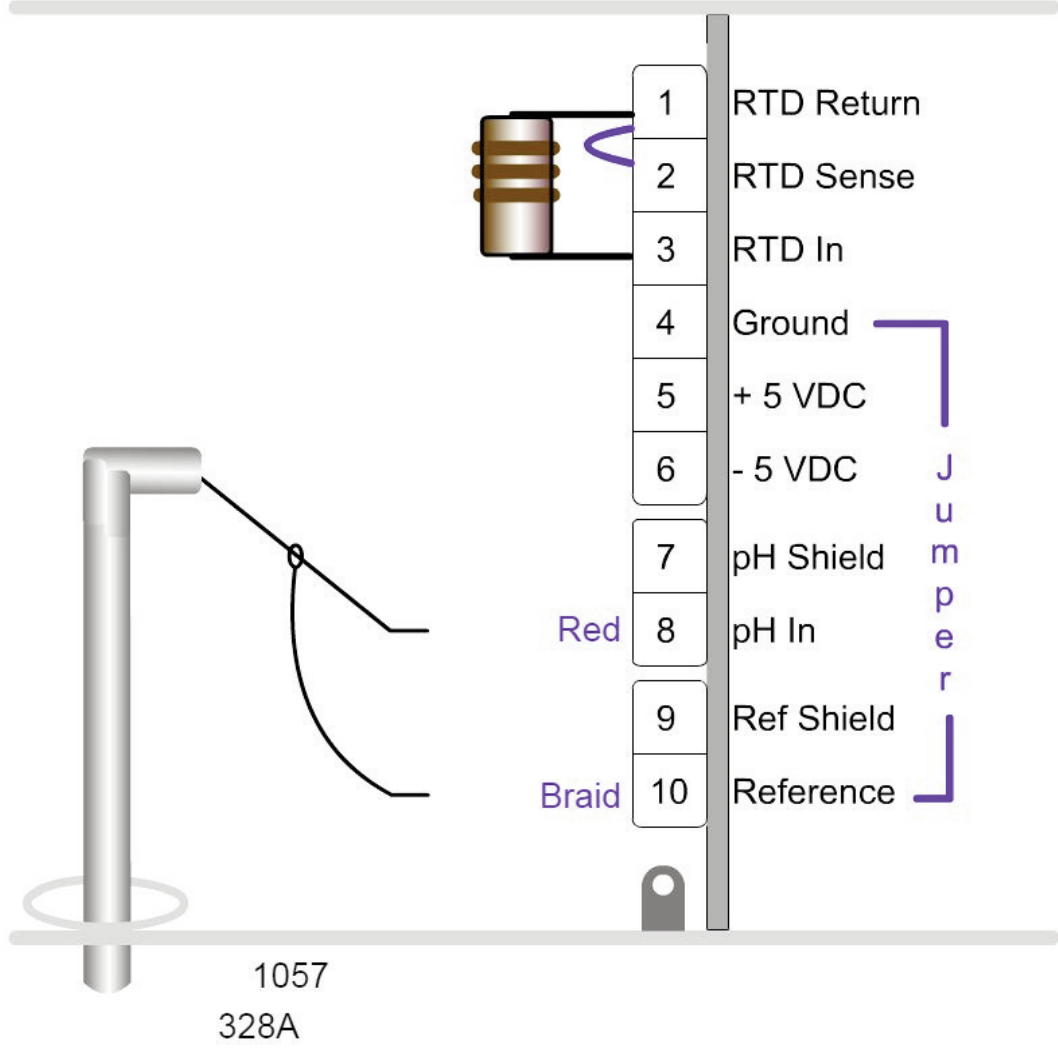


Figure 3-3: Rosemount 328A Sensor Wiring to Rosemount 1066 Transmitter

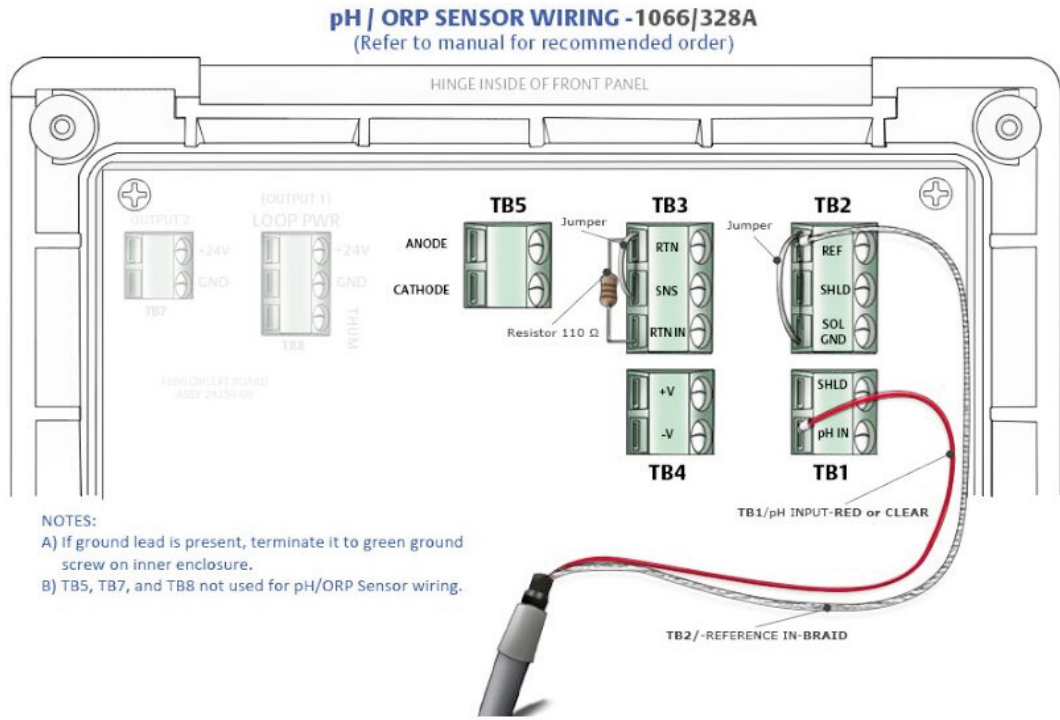
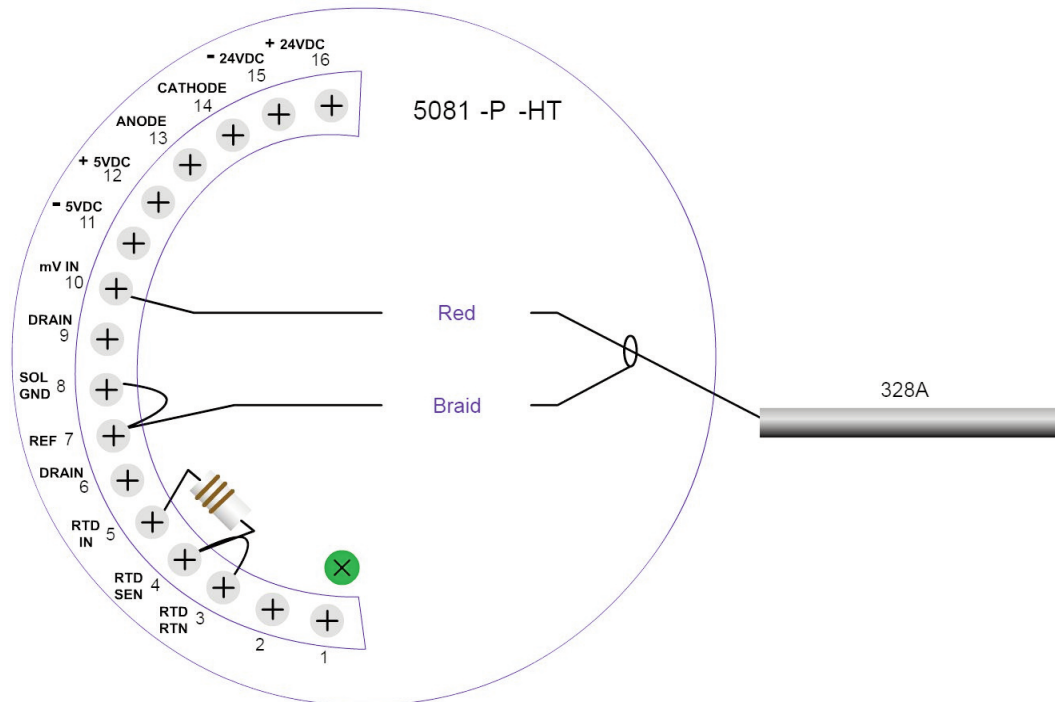


Figure 3-4: Rosemount 328A Sensor Wiring to Rosemount 5081 Transmitter







## 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.



### EU Declaration of Conformity



(No. 1700911)

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pH/ORP Sensors

This declaration is issued under the sole responsibility of the manufacturer:  
Rosemount Inc., 8200 Market Blvd., Chanhassen, MN 55317 USA

The 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**

to which this declaration relates, are in conformity with relevant Union harmonization legislation:  
(2014/34/EU) ATEX Directive

Intrinsically Safe, Examination Certificate: Baseefa10ATEX0156X

Provisions of the directive fulfilled by the equipment:  
Equipment Group II, Category I 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 TU pH 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 TU pH sensor with Variopole connector  
Model 396VP-70 TU pH sensor with Variopole connector & Smart preamplifier  
Model 396R TU pH Retractable pH/ORP sensor with integral cable  
Model 396RVP TU pH Retractable pH/ORP sensor with Variopole connector  
Model 396RVP-70 TU pH Retractable pH sensor with Variopole connector & Smart preamplifier  
Model 396P-02 TU pH Polypropylene pH/ORP sensor with integral cable  
Model 396PVP TU pH Polypropylene pH/ORP sensor with Variopole connector  
Model 396PVP-70 TU pH Polypropylene pH sensor with Variopole connector & Smart preamplifier  
Model 397 TU pH sensor with integral cable  
Model 398 TU pH pH/ORP sensor with integral cable  
Model 398VP TU pH pH/ORP sensor with Variopole connector  
Model 398R TU pH Retractable pH/ORP sensor with integral cable  
Model 398RVP TU pH Retractable pH/ORP sensor with Variopole connector  
Model 398RVP-70 TU pH 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  
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

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 build up 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.

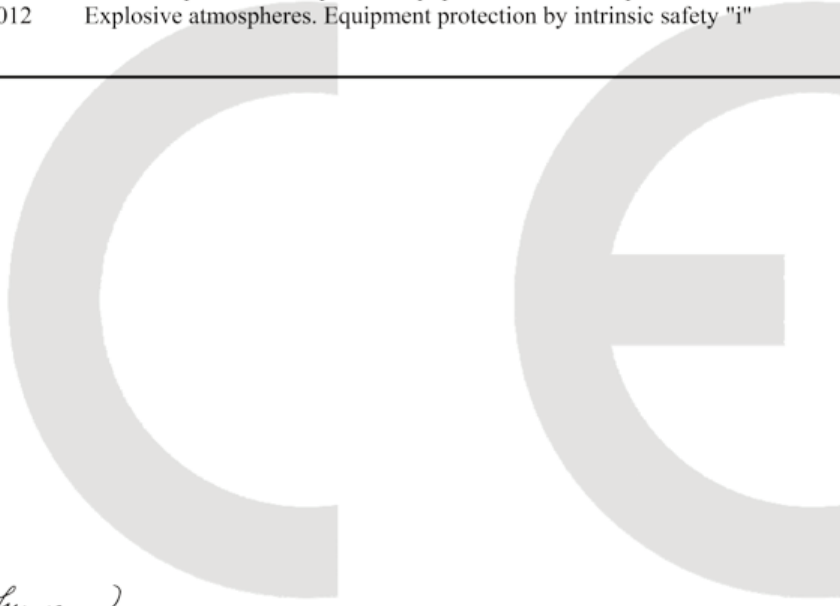
ATEX Notified Body for EC Type Examination Certificate & Quality Assurance:

SGS Baseefa[Notified Body Number:1180], Rockhead Business Park, Staden Lane, Buxton SK17 9RZ UNITED KINGDOM

Assumption of conformity is based on the application of the harmonized standards:

EN 60079-0:2012+A11:2013 Explosive atmospheres. Equipment. General requirements

EN 60079-11:2012 Explosive atmospheres. Equipment protection by intrinsic safety "i"



*Kim Freeman*

(Signature)

Kim Freeman  
(Name printed)

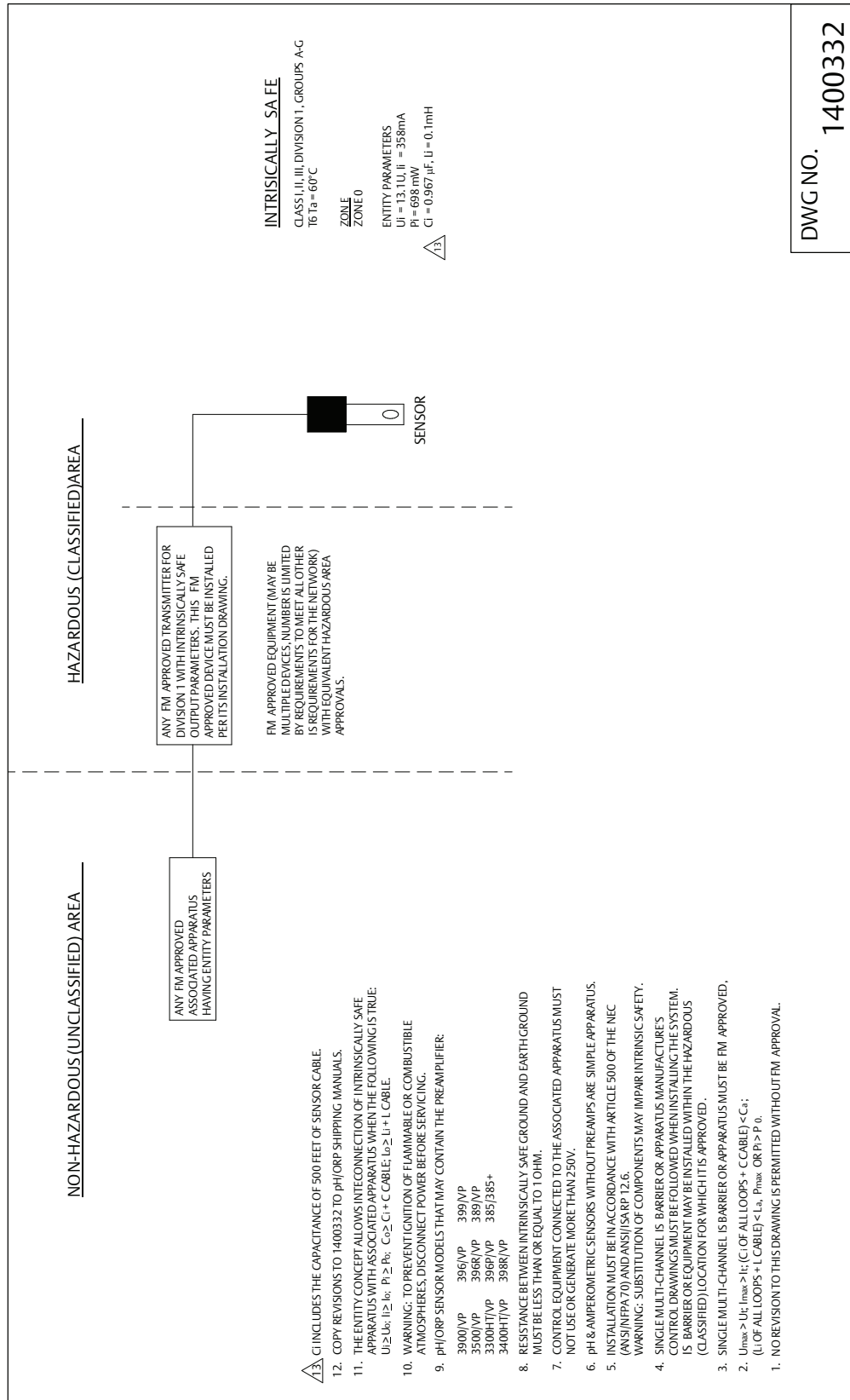
Director of Global Quality

(Function name)

March 23, 2017  
(Date of issue)

CE marking was first affixed to this product in 2011

# Intrinsically Safe Sensor Installation Drawing - FM



DWG NO. 1400332

[www.Emerson.com/RosemountLiquidAnalysis](http://www.Emerson.com/RosemountLiquidAnalysis)



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**Emerson**

8200 Market Blvd.  
Chanhassen, MN 55317,  
USA  
Tel +1 800 999 9307  
Fax +1 952 949 7001

[Liquid.CSC@Emerson.com](mailto:Liquid.CSC@Emerson.com)

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