

# Rosemount™ 6888A

In Situ Oxygen Analyzer



## Safety instructions

### **⚠ WARNING**

#### **Follow installation guidelines.**

Failure to follow these installation guidelines could result in death or serious injury. If this equipment is used in a manner not specified by the manufacturer, then the protection it provides against hazards may be impaired.

Follow all warnings, cautions, and instructions marked on and supplied with the product.

Install equipment as specified in this document.

Ensure that only qualified personnel perform the installation, operation, and maintenance of the product.

Inform and educate your personnel in the proper installation, operation, and maintenance of the product.

Follow appropriate local and national codes.

If you do not understand any of the instructions, contact your Emerson representative for clarification.

### **⚠ WARNING**

#### **Explosions**

Do not open when an explosive atmosphere may be present.

### **⚠ WARNING**

#### **Electrical shock**

Do not open while energized.

### **⚠ WARNING**

Connect all devices to the proper electrical and pressure sources.

### **⚠ WARNING**

#### **Physical access**

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

### **⚠ CAUTION**

For the standard housing probe and direct replacement probe, only use supply cables and certified cable glands rated >105 °C.

For the autocalibration housing, only use supply cables and certified cable glands rated >85 °C.

### **NOTICE**

Use only factory documented components for repair. Tampering or unauthorized substitution of parts and procedures can affect the performance and cause unsafe operation of your process.

## NOTICE

The Field Communicator must be upgraded to System Software 2.0 with graphic license for operation with the Rosemount 6888A Analyzer. The AMS software must be upgraded to AMS 8.0 or above. Contact Emerson's Global Service Center (GSC) at +1-800-833-8314 to upgrade the Field Communicator software to System Software 2.0 with graphic license.

### Symbols



Earth (ground) terminal



Protective conductor terminal



Risk of electrical shock



Refer to reference manual.



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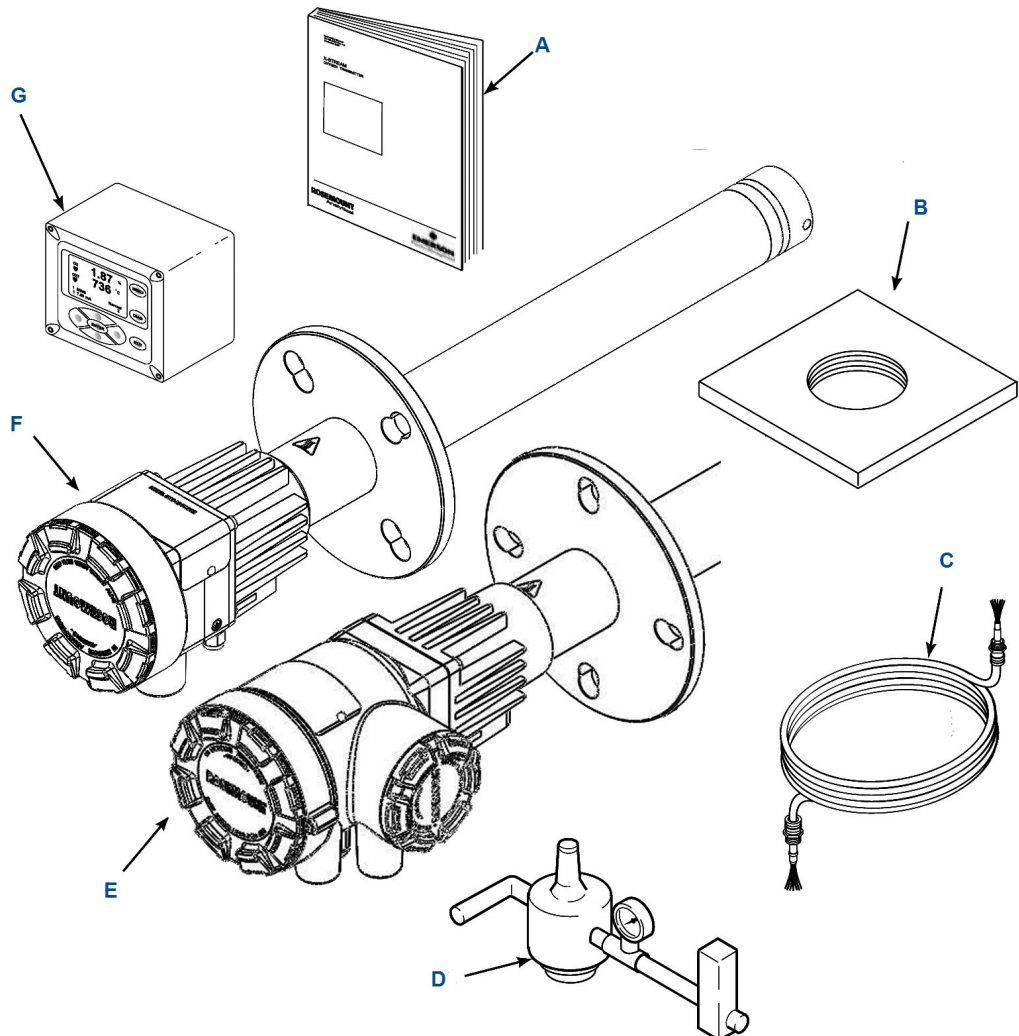
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# 1 Description and specifications

## 1.1 Component checklist

A typical Rosemount 6888A In Situ Oxygen Analyzer should contain the items shown in [Figure 1-1](#). A complete Oxygen Analyzer system includes some or all of the equipment shown. However, this manual describes the Rosemount 6888A Analyzer only.

Figure 1-1: Typical System Package



- A. Quick start guide
- B. Optional mounting or adapter plate
- C. Optional traditional architecture cable
- D. Optional reference and calibration gas accessories
- E. 6888A integral autocal housing
- F. 6888A probe with standard terminations/electronics housing
- G. Optional 6888 Xi Advanced Electronics

## 1.2 Technical support hotline

For assistance with technical problems, please call the Customer Support Center (CSC).

- 1-RAI-AND-U (1-855-724 2638)



- 1-440-914-1261

In addition to the CSC, you may also contact Field Watch. Field Watch coordinates Emerson's field service throughout the US and abroad.

- 1-800-654-RSMT (1-800-654-7768)

You can also email Emerson or look at the Gas Analysis web page.

- Email: [Gas.CSC@Emerson.com](mailto:Gas.CSC@Emerson.com)
- Web page: [www.Emerson.com/RosemountGasAnalysis](http://www.Emerson.com/RosemountGasAnalysis)

## 1.3 System overview

The 6888 is Rosemount's latest combustion flue gas oxygen analyzer. This product is intended for measuring the flue gases resulting from any combustion process. It uses the same heated sensing technology as the O<sub>2</sub> sensors found in most automobiles. Contact Rosemount's technical support group at 800-433-6076 for any applications other than measuring combustion flue (exhaust) gases.

This product uses an *in-situ* sensor, i.e., the sensor is placed at the end of a probe, and the probe extends directly into the flue gas duct or stack at a given length. The sensor is like a thermocouple, generating its own millivolt signal based on the differences between a reference gas (ambient or instrument air - always 20.95% O<sub>2</sub>) and the flue gases being measured. There are several different arrangements of probes, electronics, and features that are explained below and in the wiring diagrams.

An optional Rosemount 6888Xi with HART<sup>®</sup> communication provides a convenient operator interface for setup, calibration, and diagnostics. HART communication is still present when using the Rosemount 6888Xi.

## 1.4 System configurations

### 1.4.1 Analyzer probe

The Rosemount 6888 probe has the electronics in the blue housing that controls the heater temperature and also amplifies the raw O<sub>2</sub> millivolt signal to a linear 4-20 mA. The 4-20 mA signal lines can be run directly to the control room and also power the analyzer electronics. As with most other Rosemount analyzers, measuring pressure, temperature, and flow setup is conducted through HART communications via a 475 handheld communicator or via Asset Management Solutions (AMS).

### 1.4.2 Standard housing analyzer probe plus Rosemount 6888Xi Electronics

The Rosemount 6888Xi Electronics serve as a local operator interface unit with a back-lit display and keypad. It is capable of two channels, serving two

Rosemount 6888 probes. The Rosemount 6888Xi also carries these optional advanced features:

- Fully automatic calibration. Requires Xi O<sub>2</sub> Cal Autocalibration system
- Loss of flame contact for powering down the heater in the event of a flame-out condition in a furnace.
- Heaterless operation at process temperatures above 550 °C (1022 °F). This feature will also permit operation above the heater setpoint of 736 °C (1357 °F). Sensing cell life will be shortened by operation above 800 °C (1472 °F), however.
- Plugged diffuser diagnostic operates by measuring the return-to-process rate after calibration gas has been stopped. This feature also includes auto gas switching when the reading settles out versus waiting for configured gas flow time to expire.
- Stoichiometer - If a furnace goes into a reducing condition (zero % O<sub>2</sub>), this feature will determine how far.
- Programmable reference - Permits more accurate readings at near-ambient O<sub>2</sub> levels (20.95% O<sub>2</sub>).
- A *cal check* capability. New calibration values are not automatically stored after a calibration. An accept/reject calibration feature can be enabled or disabled so that the technician or operator can decide to accept or reject a potentially large change in calibration values.
- Tolerance check that will alarm if the wrong test gases are being used or if a bottle runs out in the middle of a calibration. Take care to ensure gas 1 and gas 2 calibration gases are properly configured if the tolerance check feature is enabled.

### 1.4.3 Analyzer probe and Rosemount 6888Xi with flame safety interlock

A flame safety interlock by Emerson is available for heater power disconnect whenever there is a loss of the process flame or a heater runaway condition (heater over-temperature) in the O<sub>2</sub> probe. This input is internally powered by the Rosemount 6888Xi and is actuated via a dry contact output from your flame scanner. A closed contact indicates a flame is present. An open contact indicates a loss of flame. This feature is also available with the integral autocal housing.

### 1.4.4 Analyzer probe with integral autocalibration, Rosemount 6888Xi, and HART<sup>®</sup> communications

This probe contains gas-switching solenoids so that the Rosemount 6888Xi electronics can control the introduction of calibration gases. Calibrations can be initiated via a calibration recommended diagnostic, time since last calibration, manually via external dry contact, HART communications, or from the Rosemount 6888Xi local operator interface keypad. The integral autocal feature can only be implemented when the probe is used with a Rosemount 6888Xi.

### 1.4.5 Analyzer probe with integral autocalibration and FOUNDATION™ Fieldbus (FF) communications

This probe contains gas-switching solenoids that can control the introduction of calibration gases for calibration. Calibrations can be initiated automatically via a calibration recommended diagnostic, time since last calibration, manually via the optional Rosemount 6888Xi keypad, FF communications via the 475 communicator, or AMS console. Unlike the HART analyzer electronics, the FF version can execute automatic calibrations either with or without the optional Rosemount 6888Xi electronics. Likewise, advanced features can be implemented either with or without the optional Rosemount 6888Xi.

### 1.4.6 Direct replacement (DR) probe with traditional architecture Rosemount 6888Xi electronics

Here there are no electronics inside the probe head, so the raw sensor signals for the heater thermocouple and zirconium oxide O<sub>2</sub> sensor are sent to a remote Rosemount 6888Xi Electronics. The Rosemount 6888 traditional architecture electronics will also directly apply power to the probe heater in order to maintain the correct sensor temperature. This arrangement calls for a 7-conductor cable to carry this power and the sensor signals. Maximum length for the cable is 200 feet. This probe will also operate on previous Westinghouse/Rosemount electronics (World Class and Oxymitter), as well as many competitive electronics.

### 1.4.7 Wireless capability

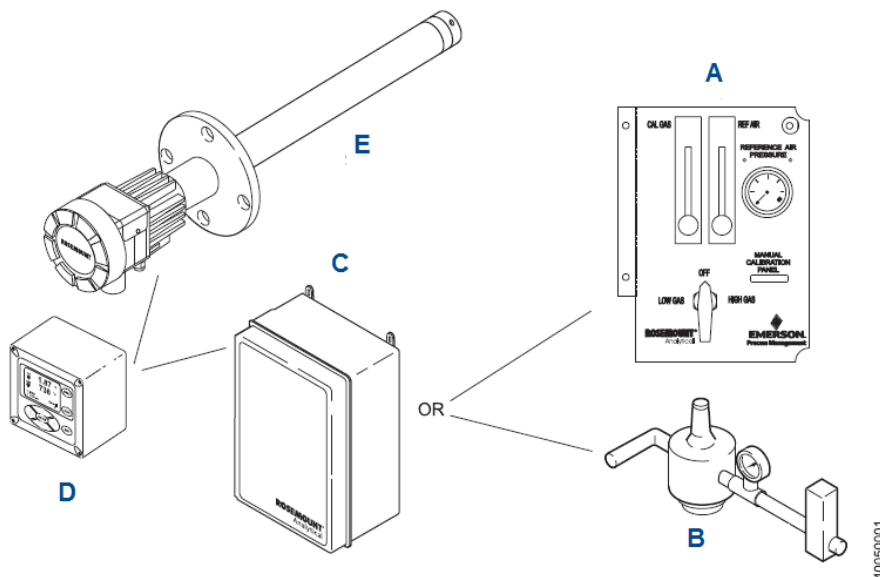
Both the analyzer electronics in the head of the probe and the Rosemount 6888Xi Electronics communicate over HART communications and can implement wireless communications via Emerson Wireless 775 THUM™ Adapter.

### 1.4.8 Automatic calibration

Calibrations consist of introducing bottled gases of known value into the probe so that the electronics can make automatic adjustments to the O<sub>2</sub> readings to match the bottled gas value.

Emerson recommends 0.4% O<sub>2</sub> and 8% O<sub>2</sub> (balance nitrogen) gases. Never use nitrogen or instrument air as calibration gases. Flowmeters (for calibration gases) and regulators and flowmeters (for reference air) are available as loose components, mounted into an optional manual calibration switching panel or a fully automatic calibration system (Figure 1-2) where calibration solenoids are switched from the Rosemount 6888Xi Advanced Electronics. See the [Rosemount SPS 4001B Single Probe Autocalibration Sequencer](#) or [Rosemount IMPS 4000 Intelligent Multiprobe Test Gas Sequencer](#) manuals for additional details.

**Figure 1-2: Rosemount 6888A with Rosemount 6888Xi Advanced Electronics and Autocalibration Sequencer**



- A. Manual calibration switching panel
- B. Reference air set
- C. Rosemount SPS 4001B or Rosemount IMPS 4000
- D. Rosemount 6888Xi Advanced Electronics
- E. Rosemount 6888A Analyzer

## 1.4.9 Communication options

A customer-supplied 375/475 Field Communicator and/or the optional Rosemount 6888Xi Advanced Electronics accomplish Rosemount 6888A communications. Graphic displays are available via the optional Rosemount OxyBalance Display and Averaging System.

### Data communications

You can configure and diagnostically troubleshoot the Rosemount 6888A in one of two ways:

1. Using the optional Rosemount 6888Xi Advanced Electronics allows local communication with the electronics. The Rosemount 6888Xi also offers the following optional advanced features:
  - Fully automatic calibration.
  - Optional flame safety interface (single probe version only).
  - High temperature operation [above 700 °C (1292 °F) standard temperature].
  - Stoichiometer feature provides the ability to indicate O<sub>2</sub> efficiency when the combustion process goes into reducing conditions (0% O<sub>2</sub>).

- Programmable reference provides enhanced accuracy when measuring at or near O<sub>2</sub> level (20.95% O<sub>2</sub>).
  - Plugged diffuser diagnostic to detect fouled diffuser.
2. Using the HART interface, the Rosemount's 6888A's 4-20 mA output line transmits an analog signal proportional to the oxygen level. The HART output is superimposed on the 4-20 mA output line. This information can be accessed through the following:
    - Rosemount 375/475 Field Communicator: The handheld communicator requires device description (DD) software specific to the Rosemount 6888A. The DD software is supplied with many 375/475 units, but can also be programmed into existing units at most Emerson service offices. See [Configuration, start-up, and operation](#) for additional information.
    - Personal computer (PC): The use of a personal communicator requires AMS software available from Emerson.
    - Delta V and Ovation Distributed Control System (DCS) with AMS-inside capability.
  3. The Rosemount 6888A can also transmit HART information wirelessly via a wireless THUM Adapter. The THUM Adapter threads into the Rosemount 6888A conduit port and converts the 4-20 mA signal to a wireless protocol. All other HART information is also transmitted.

In addition to the wireless THUM Adapter, a hard wire connection of the 4-20 mA signal to the DCS may be used at the same time. More detailed information regarding the application of the THUM Adapter is available in Product Data Sheet *00813-0100-4075*.

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**Note**

The 375 field communicator must be upgraded to System Software 2.0 with Graphic License for operation with the Rosemount 6888A Analyzer. The AMS software must be upgraded to AMS 8.0 or above. Contact Emerson's Global Service Center (GSC) at 1-800-833-8314 to upgrade the 375 field communicator software to System Software 2.0 with Graphic License.

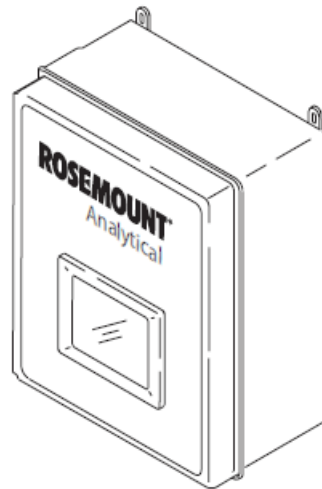
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## Optional Rosemount OxyBalance Display and Averaging System

The optional Rosemount OxyBalance Display and Averaging System receives up to eight 4-20 mA signals from individual probes, trends individual outputs, and calculates four programmable averages as additional 4-20 mA outputs. For more information, call Rosemount at 1-800-433-6076.

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**Figure 1-3: Rosemount OxyBalance System**



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## 1.5 Probe options

### 1.5.1 Diffusion elements

The Rosemount 6888A is available with one of three diffusion elements fitted to the process end. The basic diffusers provide for a constant outer probe tube diameter the full length of the probe. When the Rosemount 6888A is used with an abrasive shield, the diffuser body has a larger diameter with grooves to accept packing material to seal out fly ash. The snubber and ceramic diffusers may also be fitted with a flash arrestor to reduce the possibility of the probe igniting from flammable gases within the process.

#### **⚠ WARNING**

##### **FLAME AND EXPLOSION**

The diffusers fitted with flash arrestors have been tested to provide a measure of protection in preventing ignition of flammable gases. They are not intended to provide flame proof or explosion proof protection for the Rosemount 6888A.

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## Snubber diffusion assembly

The standard snubber diffusion assembly (Figure 1-4) is satisfactory for most applications; however, the snubber diffuser should not be used in flue gas temperatures above 400 °C (752 °F).

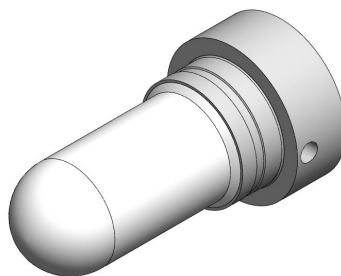
Figure 1-4: Snubber Diffusion Assembly



## Ceramic diffusion assembly

The ceramic diffusion assembly (Figure 1-5) is the traditional design for the probe. Used for over 25 years, the ceramic diffusion assembly provides a greater filter surface area.

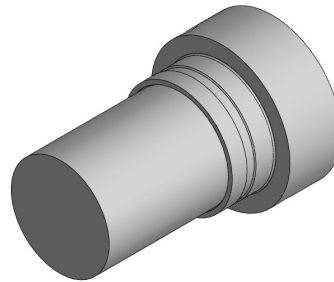
Figure 1-5: Ceramic Diffusion Assembly



## Cup-type diffusion assembly

The cup-type diffusion assembly (Figure 1-6) is typically used in high temperature applications where frequent diffusion element plugging is a problem. The cup-type diffusion assembly is available with a 40 micron, sintered, Hastelloy element.

**Figure 1-6: Hastelloy Cup-Type Diffusion Assembly**



## 1.6 Ordering information

### 1.6.1 Rosemount 6888A In Situ Oxygen Analyzer for general purpose locations

The Rosemount 6888A In Situ Oxygen Analyzer is a solution for optimizing any industrial or large commercial boiler, fired heater, or kiln. The Rosemount 6888A, as part of an oxygen trim system, improves plant energy efficiency, and lowers energy costs. It not only meets application requirements but also is simple to install, commission, and operate. The sensor, diffusers, and accessories for the Rosemount 6888A were developed to provide the greatest performance and longevity even in the harshest of process conditions.



- World-class performance and outstanding accuracy:  $\pm 0.75\%$  of reading or  $\pm 0.05\% \text{ O}_2$
- Digital communications: HART® 5 and FOUNDATION™ Fieldbus
- Resilient sensing cells provide protection to sulfur and other poisoning agents present in flue gas

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment.

**Table 1-1: Rosemount 6888A In Situ Oxygen Analyzer for General Purpose Locations**

Model	Sensor type
6888A	In Situ Oxygen Analyzer
Measurement	
1OXY <sup>(1)</sup>	Oxygen - standard sensing cell
2OXY <sup>(2)</sup>	Oxygen - acid resistant sensing cell



**Table 1-1: Rosemount 6888A In Situ Oxygen Analyzer for General Purpose Locations (continued)**

Model	Sensor type
<b>Probe length and type/shield</b>	
1	18-in. (457 mm) standard probe tube
2 <sup>(3)</sup>	18-in. (457 mm) probe with abrasive shield accessory package (mounting hardware included)
3	18-in. (457 mm) abrasion-resistant probe tube
4	3 ft (0.91 m) standard probe tube
5 <sup>(3)</sup>	3 ft (0.91 m) probe with abrasive shield accessory package (mounting hardware included)
6	3 ft (0.91 m) abrasion-resistant probe tube
7	6 ft (1.83 m) standard tube
8 <sup>(3)</sup>	6 ft (1.83 m) probe with abrasive shield accessory package (mounting hardware included)
9	6 ft (1.83 m) abrasion-resistant probe tube
A <sup>(3)</sup>	9 ft (2.74 m) probe with abrasion-resistant probe body
AA	9 ft (2.74 m) probe with abrasive shield accessory package (mounting hardware included)
B <sup>(3)</sup>	12 ft (3.66 m) probe with abrasion-resistant probe body
BA	12 ft (3.66 m) probe with abrasive shield accessory package (mounting hardware included)
<b>Diffuser</b>	
1	Snubber diffuser for service to 400 °C (750 °F)
1A	Snubber diffuser for service to 400 °C (750 °F) with dust seal for use with abrasive shield
1F	Snubber diffuser for service to 400 °C (750 °F) with flashback arrestor
2	Ceramic diffuser for service to 825 °C (1517 °F)
2A	Ceramic diffuser for service to 825 °C (1517 °F) with dust seal for use with abrasive shield
2F	Ceramic diffuser for service to 825 °C (1517 °F) with flashback arrestor
3	Hastelloy diffuser for service to 705 °C (1300 °F)
3A	Hastelloy diffuser for service to 705 °C (1300 °F) with dust seal for use with abrasive shield
<b>Housing &amp; electronics</b>	
1HT	Standard housing, digital probe, HART protocol
2HT	Integral autocalibration housing, digital probe, HART protocol

**Table 1-1: Rosemount 6888A In Situ Oxygen Analyzer for General Purpose Locations (continued)**

Model	Sensor type
4FF	Integral autocalibration housing, digital probe, FOUNDATION Fieldbus protocol
5DR	Standard housing, direct replacement probe, traditional architecture
6DRY	Standard housing, direct replacement probe, with cold junction for YEW electronics
Mounting plate	
00	No additional mounting hardware
04	New installation - square weld plate, ANSI: 6 x 6 in. (152.4 x 152.4 mm), 2.5 in. (63.5 mm) clearance hole, 4.75 in. (120.65 mm) bolt circle, 5/8-11 studs
05	New installation - square weld plate, DIN 6 x 6 in. (152.4 x 152.4 mm), 2.5 in. (63.5 mm) clearance hole, 4.75 in. (120.65 mm) bolt circle, 5/8-11 studs
06	New installation - variable insertion mount, abrasion-resistant probe only
07	New installation - variable insertion mount, mounted to existing OXT/WC abrasive shield mount; abrasion resistant probe only
08	Adapter plate for existing ANSI 3 in. (76.2 mm) 150# flange
09	Adapter plate for existing ANSI 4 in. (101.6 mm) 150# flange
10	Adapter plate for existing ANSI 6 in. (152.4 mm) 150# flange
11	Adapter plate for existing ANSI 3 in. (76.2 mm) 300# flange
12	Adapter plate for existing ANSI 4 in. (101.6 mm) 300# flange
99	Special adapter -provide existing flange dimensions, including thru-hole diameter
Manual calibration accessories	
00	None
01	Calibration and reference gas flowmeters and reference air filter regulator, provided loose
02	Calibration and reference gas flowmeters and reference air filter regulator, mounted in a panel
Enable: Stoichiometer indicator for reducing conditions <sup>(4)</sup>	
0	No
1	Yes
Enable: Programmable reference function <sup>(4)</sup>	
0	No
1	Yes

**Table 1-1: Rosemount 6888A In Situ Oxygen Analyzer for General Purpose Locations (continued)**

Model	Sensor type
<b>Enable: Extended temperature function<sup>(4)</sup></b>	
0	No
1	Yes
<b>Enable: Diffuser warning<sup>(4)</sup></b>	
0	No
1	Yes

- (1) Standard sensing cell includes catalytic protection beads which protect the sensor from sulfur and other poisoning agents.
- (2) Acid-resistant sensing cell includes additional catalytic protection beads compared to standard sensing to protect the sensor from sulfur and other poisoning agents.
- (3) Abrasive shield tube ordered separately
- (4) FOUNDATION Fieldbus versions only (for HART versions, order this feature with Rosemount Xi Electronics).

## 1.6.2 Rosemount 6888 Xi Remote Analyzer for general purpose locations

The Rosemount 6888 Xi provides an instant view of pertinent information on a user-friendly display and interface, which effortlessly connects with a PLC or DCS via HART®/4-20 mA. It creates a centralized infrastructure for remote autocalibration devices, diagnostic tools, alarm relay(s), and advanced application features. The Rosemount 6888Xi can be configured to receive up to two channels for digital inputs or one channel for supporting traditional architectures.

**Table 1-2:**



- Easy to use operator interface and design
- Plugged diffuser diagnostic measures response time and detects a plugged diffuser or empty gas bottle
- Stoichiometer provides an oxygen reading during reducing conditions, indicating extent of O<sub>2</sub> deficiency

**Additional information**

Specifications can be found on page 13. Drawings are provided on page 19.

Specification and selection of product materials, options, or components must be made by the purchaser or the equipment.

**Table 1-3: Rosemount 6888 Xi Remote Analyzer for General Purpose Locations**

<b>Model</b>	<b>Product description</b>
6888 Xi	Remote analyzer
<b>Measurement<sup>(1)</sup></b>	
1OXY	Single digital input (HART)
2OXY	Single digital input (HART) and flame safety interlock for heater
3OXY	Two digital inputs (HART)
4OXY	Single traditional architecture input
<b>Mounting</b>	
00	No hardware
01	Panel mount kit with gasket
02	2 in. pipe/wall mount kit
<b>Cable<sup>(2)</sup></b>	
00	No cable
10	20 ft (6 m) cable, use with traditional architecture probe only
11	40 ft (12 m) cable, use with traditional architecture probe only
12	60 ft (18 m) cable, use with traditional architecture probe only
13	80 ft (24 m) cable, use with traditional architecture probe only
14	100 ft (30 m) cable, use with traditional architecture probe only
15	150 ft (45 m) cable, use with traditional architecture probe only
<b>Enable: Stochiometer indicator for reducing conditions</b>	
00	No
01	Single channel
02	Dual channel
<b>Enable: Programmable reference function</b>	
00	No
01	Single channel
02	Dual channel
<b>Enable: Extended temperature function</b>	
00	No
01	Single channel
02	Dual channel
<b>Enable: Plugged diffuser diagnostics</b>	
00	No
01	Single channel

**Table 1-3: Rosemount 6888 Xi Remote Analyzer for General Purpose Locations (continued)**

02	Dual channel
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- (1) Compatible with oxygen probes utilizing a 120 V heater only.  
 (2) Cables are not rated for use in hazardous locations and must be installed in accordance with local and national codes.

## 1.7 Analyzer/direct replacement probe specifications


**Table 1-4: Measurement Specifications**

Net O <sub>2</sub> range	Variable 0 - 10% to 0 - 50% (Xi electronics off 0 - 50% O <sub>2</sub> range)
Accuracy in oxidizing condition	±0.75% of reading or 0.05% O <sub>2</sub> , whichever is greater
Lowest detectable limit	0.02% O <sub>2</sub>
Process temperature effect	Less than 0.05% O <sub>2</sub> from 100 to 700 °C (212 to 1292 °F)
System speed of response to calibration gas	Initial response in less than 3 seconds, T <sub>∞</sub> in less than 8 seconds. Response to process gas changes vary depending on velocity and particulate loading of the diffuser.
Calibration validity	Presentation of calibration gases matches the bottle value to within ±0.02% O <sub>2</sub> .
Accuracy in reducing conditions (requires stoichiometer feature)	±10% of reading or 0.1% O <sub>2</sub> , whichever is greater
System response in reducing conditions (requires stoichiometer feature)	Going from oxidizing to reducing -T90 in 120 seconds Going from reducing to oxidizing -T90 in 30 seconds

**Table 1-5: Environmental specifications**

Analyzer probe	Process-wetted materials are 316L or 304 stainless.
Process temperature limits	0 to 705 °C (32 to 1300 °F) 550 to 825 °C (1022 to 1517 °F) with Xi <i>heaterless operation</i> feature <sup>(1)</sup>
Analyzer electronics housing	Low copper aluminum Type 4X/IP66 with reference air exhaust port piped to clean, dry area Ambient temperature limits -40 to 70 °C (-40 to 158 °F), analyzer -40 to 85 °C (-40 to 185 °F) as measured by electronics -40 to 90 °C (-40 to 194 °F), DR probe
Probe electronics ambient temperature limits	-40 to 70 °C (-40 to 158 °F)
Temperature limit as measured inside probe electronics	-40 to 85 °C (-40 to 185 °F)

**Table 1-5: Environmental specifications (continued)**

DR probe, no electronics inside, ambient temperature limits	-40 to 90 °C (-40 to 194 °F)
<b>Optional Xi electronics</b>	
Materials	NEMA 4X, polycarbonate material
General purpose certifications	
Xi ambient temperature limits	-20 to 50 °C (-4 to 122 °F)
Xi temperature limits as measured inside the electronics housing	-20 to 70 °C (-4 to 158 °F)

(1) *Reduced cell life can be expected if operated continuously at temperatures above 705 °C (1300 °F). Optional bypass and jacket accessories permit operation to 1050 °C (1922 °F).*

**Table 1-6: Installation specifications - probe**

Probe mounting flange	Vertical or horizontal - 2 in. 150# (121 m (4.75 in.) bolt circle)  <b>Note</b> Flanges are flat-faced and for mounting only. Flanges are not pressure-rated. A 2.5-in. diameter hole in the process is required.  Spool piece PN 3D39761G02 is available to offset probe electronics housing from hot duct work. Many adapter flanges are available to mate to existing flanges.
<b>Probe lengths and approximate shipping weights</b>	
457 mm (18 in.) package	7.3 kg (16 lb)
0.91 m (3 ft) package	9.5 kg (21 lb)
1.83 m (6 ft) package	12.2 kg (27 lb)
2.74 m (9 ft) package	15.0 kg (33 lb)
3.66 m (12 ft) package	17.7 kg (39 lb)
Reference air (optional)	2 scfh (1 L/min), clean, dry, instrument-quality air (20.95% O <sub>2</sub> ), regulated to 5 psi (34 kPa)
Calibration	Semi-automatic or automatic
Calibration gases	0.4% O <sub>2</sub> and 8% O <sub>2</sub> , balance N <sub>2</sub> recommended. Instrument air may be used as a high cal gas but is not recommended. 100% nitrogen cannot be used as the low cal gas.
Calibration gas line	91 m (300 ft) maximum length
Calibration gas flow	5 scfh (2.5 L/min)

**Table 1-6: Installation specifications - probe (continued)**



Heater electrical power	120/140 Vac $\pm$ 10%, 50/60 Hz, 260/1020 VA max, 1/2-in. - 14 NPT conduit ports
Traditional architecture cable	61 m (200 ft) maximum length
Power consumption of probe heater	776 VA maximum during warm-up
4-20 mA/HART loop power	12-30 Vdc (loop power from control room or Rosemount 6888Xi)

**Table 1-7: Installation specifications: Rosemount 6888 Xi with analyzer probe**

Electrical power of optional Xi electronics	120/240 V $\pm$ 10%, 50/60 Hz
Power consumption of Xi	10 watts maximum
Xi alarm relays	2 provided - 2 amps, 30 Vdc
Xi optional loss of flame contact	Removes heater power
Electrical noise	Meets EN 61326, Class A
Traditional architecture cable	61 m (200 ft) maximum length
Analyzer electrical 4-20 mA power	12 - 42 Vdc (loop-powered from the control room or from the Xi box)

**Table 1-8: Installation Specifications for Traditional Architecture Rosemount 6888Xi for use with DR or other Probe**

Electrical power for Xi	120/240 V $\pm$ 10%, 50/60 Hz
Power consumption of Xi	12 VA maximum or 1020 VA maximum with traditional architecture, 120 V probes 450 VA maximum with traditional architecture 44 V probes
Alarm relay outputs	Two provided - 2 amperes, 30 Vdc, Form-C
Optional loss of flame input	Internally powered input to remove heater power actuated via dry contact output from probe of flame device.

Emerson has satisfied all obligations coming from the European legislation to harmonize the product requirements in Europe.  





## 2 Install

### **⚠ WARNING**

Failure to follow safety instructions could result in serious injury or death.

Before installing this equipment, read the Essential instructions at the front of this Reference Manual.

### **⚠ WARNING**

#### **ELECTRIC SHOCK**

Failure to install covers and ground leads could result in serious injury or death.

Install all protective equipment covers and safety ground leads after installation.

### **⚠ WARNING**

#### **Hazardous areas**

The Rosemount 6888A Analyzer can be installed in general purpose areas only. Do not install the analyzer in hazardous areas or in the vicinity of flammable liquids.

### **⚠ CAUTION**

#### **Equipment damage**

If using external loop power, ensure that the power supply is safety extra low voltage (SELV) type.

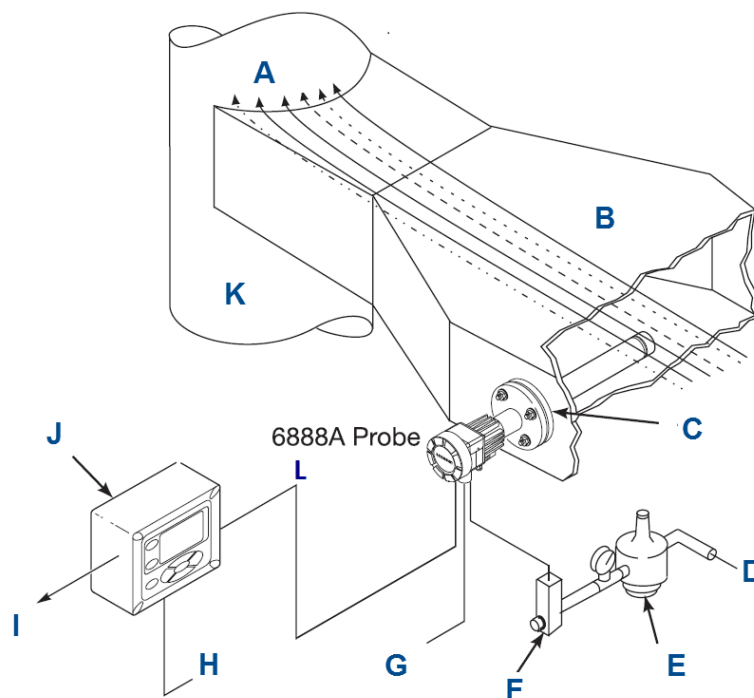
## 2.1 System considerations

### NOTICE

Plug all unused ports on the Rosemount 6888A probe housing with suitable fittings.

A typical system installation for a Rosemount 6888A with integral electronics is shown in Figure 2-1.

Figure 2-1: Typical system installation



- A. Gases
- B. Duct
- C. Adapter plate and flange
- D. Instrument air supply (reference air)
- E. Pressure regulator
- F. Flow meter
- G. Calibration gas
- H. Line voltage
- I. 4 to 20 mA signal
- J. Rosemount Xi Advanced Electronics (optional)
- K. Stack
- L. Traditional architecture cable

A source of instrument air is required at the analyzer for reference air flow [2.0 scfh (1.0 L/min)]. Since the unit is equipped with an in-place calibration feature, you can permanently connect calibration gas bottles to the analyzer.

If the calibration gas bottles will be permanently connected, install a check valve next to the probe calibration fittings. The check valve prevents breathing of the calibration gas line and subsequent flue gas condensation and corrosion. The check valve is in addition to the stop valve on the calibration gas bottles or the solenoid valves in the Rosemount SPS 40001B or Rosemount IMPS 4000.

If the Rosemount 6888Xi Advanced Electronics option is not used, the 4-20 mA signal from the probe will be loop-powered from the DCS. A 375/475 Field Communicator or AMS is required to set up and operate the probe.

The optional Rosemount 6888Xi enhanced interface communicates with the probe analyzer electronics via HART<sup>®</sup> communications riding on to the 4 to 20 mA signal coming from the analyzer. If using the 375/475 Field Communicator, connect it to the 4 to 20 mA signal loop between the Rosemount 6888Xi and the control room or data acquisition system. Connecting the 375/475 Field Communicator between the analyzer and Rosemount 6888Xi will cause communication errors and affect system operation.

#### NOTICE

The analyzer electronics is rated Type 4X and IP66 and is capable of operation at temperatures from -40 to 85 °C (-40 to 185 °F). Retain the packaging in which the Rosemount 6888A arrived from the factory in case any components are to be shipped to another site. This packaging has been designed to protect the product.

## 2.2 Mechanical installation

Most combustion processes run only slightly negative or positive in pressure, so that the probe flange is for mechanical mounting only. The probe is not rated for high pressures. If this is a new installation, Emerson can supply a weld plate for welding to the flue gas duct.

#### ⚠ WARNING

##### Hazardous areas

The analyzer can be installed in general purpose areas only.

Do not install the analyzer in hazardous areas or in the vicinity of flammable liquids.

#### ⚠ WARNING

##### Electric shock

Failure to install covers and ground leads could result in serious injury or death.

Install all protective covers and safety ground leads after installation.

## 2.2.1 Install probe

### **⚠ WARNING**

#### **Electrical shock**

Failure to install covers and ground leads could result in serious injury or death.  
Install all protective covers and ground leads after installation.

---

### **⚠ WARNING**

#### **Hazardous areas**

The analyzer can be installed in general purpose areas only.  
Do not install the analyzer in hazardous areas or in the vicinity of flammable liquids.

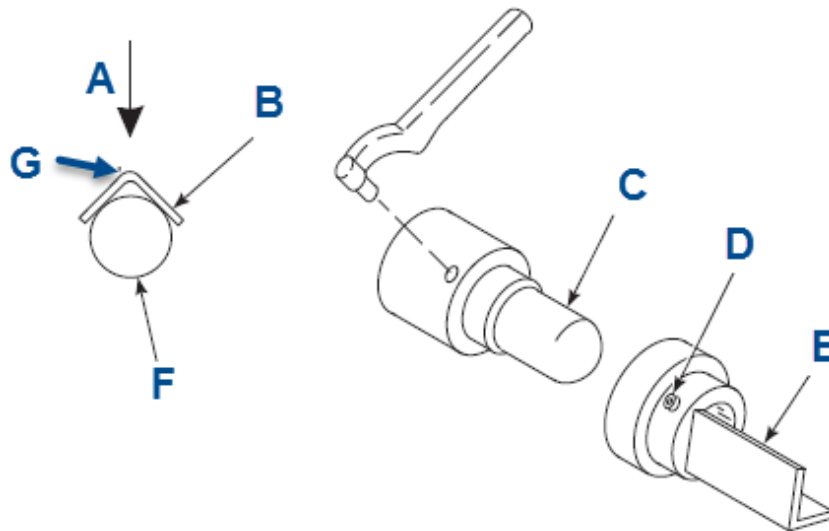
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#### **Procedure**

1. Ensure all components are available to install the probe.  
Refer to the probe installation details in [Figure 2-1](#). If using the optional ceramic or Hastelloy diffusion element, make sure to orient the vee deflector correctly.

2. Before inserting the probe, check the direction of gas flow in the duct. Orient the vee deflector so the apex points upstream toward the flow. See [Figure 2-2](#).

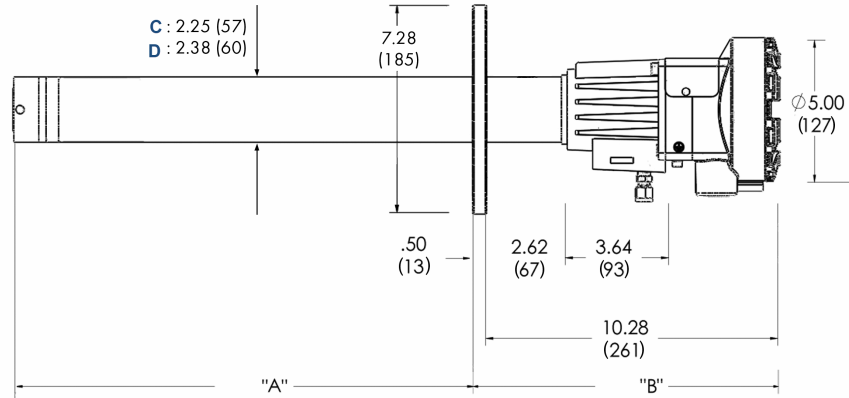
**Figure 2-2: Orienting the optional vee deflector**



- A. Gas flow direction
- B. Vee deflector
- C. Diffusion element
- D. Set screw
- E. Vee deflector
- F. Filter
- G. Apex

3. If using the standard square weld plate or an optional flange mounting plate, weld or bolt the plate onto the duct. The through hole diameter in the stack or duct wall and refractory material must be at least 2.5 in (64 mm).

**Figure 2-3: Rosemount 6888A probe with standard terminations/  
electronic housing**

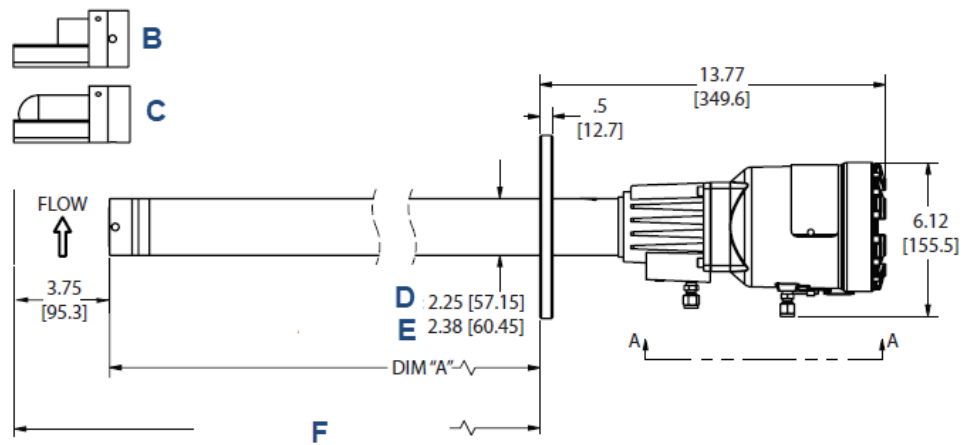


- A. Dimension (see [Table 2-1](#))
- B. Dimension (see [Table 2-1](#))
- C. Standard tube
- D. Abrasion resistant tube

**Note**

All dimensions are in inches with millimeters in parentheses.

**Figure 2-4: Rosemount 6888A integral autocalibration housing**

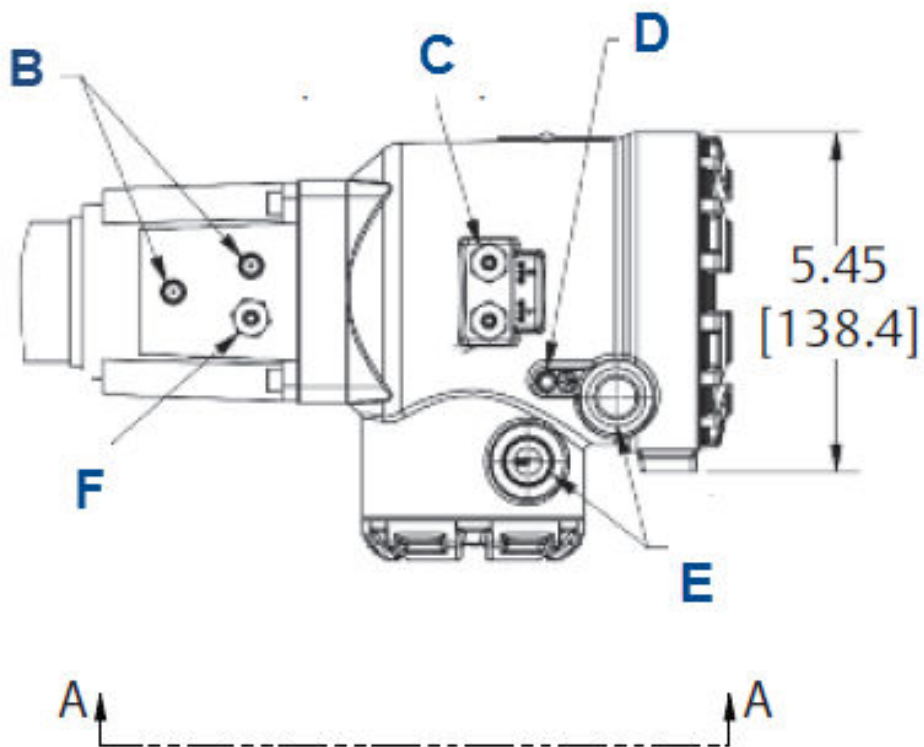


- A. Dimension (see [Table 2-1](#))
- B. Hastelloy diffuser
- C. Ceramic diffuser
- D. Standard tube
- E. Abrasion tube
- F. Minimum removal length

**Note**

All dimensions are in inches with millimeters in parentheses.

Figure 2-5: Rosemount 6888A integral autocalibration housing close-up



- A. Dimension (see [Table 2-1](#))
- B. Reference air vents
- C. Calibration gas ¼-in tube fittings 5.0 scfh (2.4 L/min) 20 psig (1.38 barg)
- D. #10 socket head cap screw (external ground)
- E. ½-in. NPT conduit connection (power, signal)
- F. Reference gas ¼-in. tube fitting 2.0 scfh (1.0 L/min) 20 psig (1.38 barg)

**Note**

All dimensions are in inches with millimeters in parentheses.

Table 2-1: Insertion and removal dimensions

Probe length <sup>(1)</sup>	Dimension A insertion depth	Dimension B removal envelope standard housing	Dimension B removal envelope accessory housing
18 in (457 mm) probe	16.1 in (409 mm)	15.77 in (400.6 mm)	19.26 in (489.2 mm)
3 ft (0.91 m) probe	33.52 in (851.4 mm)	46.6 in (1,184 mm)	50.1 in (1,273 mm)
6 ft (1.83 m) probe	68.52 in (1,740.4 mm)	82.6 in (2,098 mm)	86.1 in (2,187 mm)
9 ft (2.74 m) probe	104.52 in (2,654.8 mm)	118.6 in (3,012 mm)	122.1 in (3,101 mm)
12 ft (3.66 m) probe	140.52 in (3,569.2 mm)	154.6 in (3,927 mm)	158.1 in (4,016 mm)

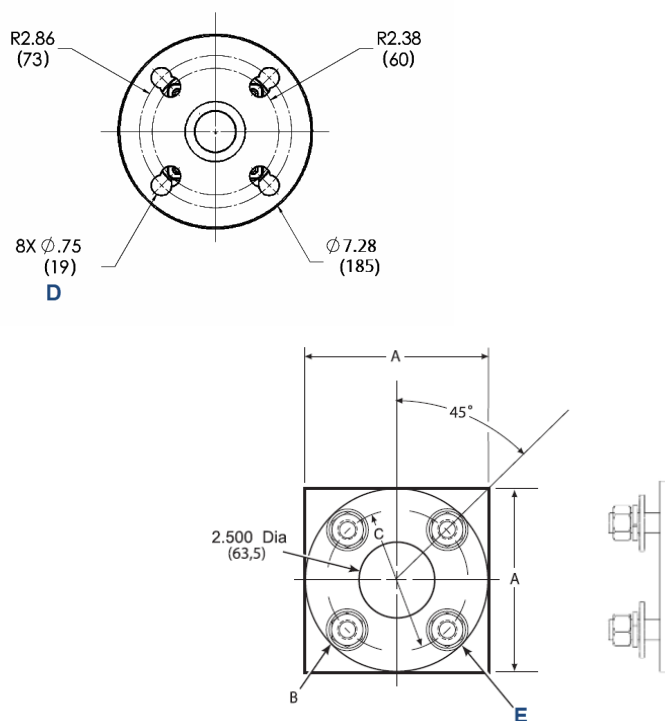
(1) Add 3.8 in (97 mm) to Dimension A and Dimension B for probe with ceramic or Hastelloy diffuser.



The through hole diameter in the stack or duct wall and refractory material must be at least 2.5 in (64 mm).

4. Insert probe through the opening in the mounting flange and bolt the unit to the flange.

**Figure 2-6: Probe installation**



- A. Dimension (see [Table 2-3](#))
- B. Thread dimension (see [Table 2-3](#))
- C. Diameter (see [Table 2-3](#))
- D. Equally spaced
- E. Four studs, lockwashers, and nuts equally spaced on C, diameter B C

**Note**

All dimensions are in inches with millimeters in parentheses.

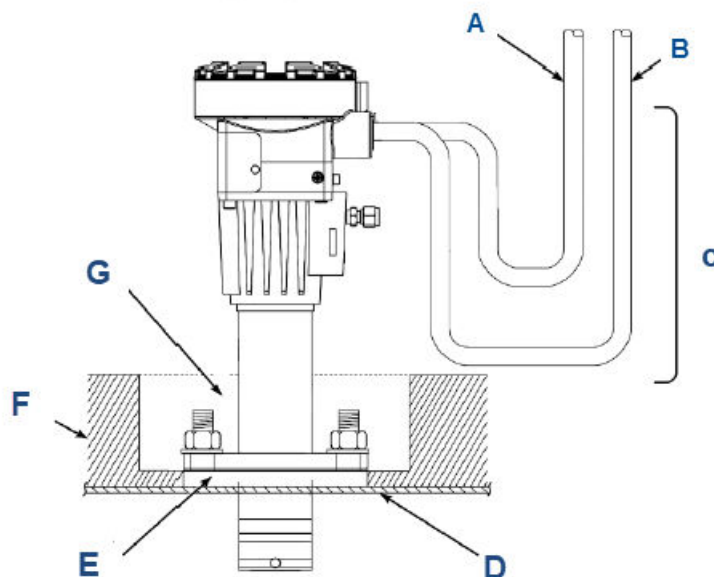
**Table 2-2: Mounting flange**

	ANSI	DIN
Flange diameter	7.28 in (184.9 mm)	
Hole diameter	0.75 in (19.0 mm)	
(4) holes equally spaced on BC	4.75 in (120.6 mm)	5.71 in (145.0 mm)

**Table 2-3: Installation weld plate outline**

Dimension	ANSI	DIN
A	152 in (3,861 mm)	191 in (4,851 mm)
B thread	11 in (279 mm)	M16x2
C diameter	121 in (3,073 mm)	145 in (3,683 mm)

**Figure 2-7: Drip loop and insulation removal**



- A. Line voltage
- B. Logic input/output, 4-20 mA signal
- C. Drip loop
- D. Stack or duct metal wall
- E. Adapter plate
- F. Insulation
- G. **Note**  
Replace insulation after installing analyzer.

**Note**

Standard housing probe shown. Accessory housing is similar. Probe installation may be vertical or horizontal.

## 2.2.2 Variable insertion

The ideal placement of oxygen probes is often difficult to determine. The variable insertion option assists in optimizing the ideal probe location.

### Variable insertion option

The variable insertion option permits a probe to be slid into and out of a flue gas duct at infinitely variable depths. This has several advantages over traditional mountings that fix the probe length with a flange at the time of installation:

- One length of probe can be stocked for any length requirement.
- The flue gas duct where the probe is mounted can be profiled with a single long probe while the flue gas levels are trended within the control system. This information can be used to determine the installation location that is most representative of a particular burner column (in the case of wall-fired furnaces), furnace corner (in the case of tangential-fired furnaces), or firing zone (in the case of a fired process heater).
- Process upsets can be diagnosed by again profiling the duct stratification on-line by sliding probe in and out and recording the O<sub>2</sub> levels at different insertion depths. This provides a good diagnostic for balancing burners and tracking down upset conditions caused by sticking burner sleeve dampers, roping in coal pipes, classifier problems, etc.
- A probe can be slid to the most convenient location for a technician to access for the purposes of conducting a calibration or diagnosing a probe problem.

The variable insertion mount consists of a slip-tube that is mounted to the furnace via a flange or pipe thread. Slide the O<sub>2</sub> probe through this mounting and seal the probe outside diameter to the slip-tube ID via valve packing material. A stop collar is provided for safety to ensure that a probe in a vertical installation does not creep through the packing material due to gravity after installation. The stop collar has separate holes where screws can be inserted to move the probe out of the slip mount if debris builds up on the probe over time. The packing material can be withdrawn with the probe in situations where the buildup on the probe is heavy and cannot pass through the packing material.

### Installation

An installation permitting variable insertion requires some special considerations:

- Removal envelope: There must be enough room for the probe to slide in and out.
- Utilities: Since the probe will be operating continually as its position is adjusted, the electrical wires and pneumatic tubing must be able to travel with the probe.
- Duct pressure: Balanced draft and natural draft furnaces typically run at a slightly negative pressure, so any small leaks in the packing material will draw air into the furnace. When the probe is removed for service, a flow of fresh air into the furnace also results. A positive pressure duct, however, releases hot flue gases when the probe is removed.

- Be mindful that the slip-support holding the end of the probe inside the furnace will likely be attached to the internal structure that may grow thermally more than the furnace wall where the probe flange is mounted. A probe that is perfectly aligned with the slip-support(s) during initial installation (with the furnace off) may be out of alignment once the furnace heats up.

The variable insertion arrangement is set up for Rosemount 6888A probes with heavy-wall abrasion-resistant probe bodies only. For probe lengths of 9 feet and longer, an outboard slip support must be mounted inside the flue gas duct. The support structure may include angle iron or tube bundles that will be at elevated temperatures during use. Plan for thermal expansion when installing the outboard slip support.

### **⚠ WARNING**

#### **GAS LEAKS**

Some flue gas ducts operate under positive pressure. While the packing material will prevent most flue gases from escaping into the ambient environment, some leakage can be expected. Once the probe is fully extracted from the slip-tube, hot flue gases will freely exit the hole in the slip tube until a replacement probe or core plug is inserted. Observe safety precautions when removing or inserting a probe into a furnace operating at positive pressure.

### **⚠ CAUTION**

This variable insertion mount is intended for use in negative pressure ducts and positive pressure ducts where the flue gas pressure is no more than 1 psi. Emerson offers other systems with isolation valve and pressure balancing for applications where the pressure is up to 50 psi.

## **2.3 Electrical installation**

All wiring must conform to local and national codes. Multiple wiring diagrams are shown in this section. Always refer to the diagrams that apply to your analyzer configuration and disregard all other wiring diagrams.

### **⚠ WARNING**

#### **ELECTRIC SHOCK**

Disconnect and lock out power before connecting the power supply.

Install all protective covers and safety ground leads after installation. Failure to install covers and ground leads could result in serious injury or death.

To meet the safety requirements of IEC 61010-1 (EC requirement) and ensure safe operation of this equipment, connect the main electrical power supply through a circuit breaker (min 10 A) which will disconnect all current-carrying conductors during a fault situation. This circuit breaker should also include a mechanically operated isolating switch. If not, keep another external means of disconnecting the supply from the equipment located close by. Circuit breakers or switches must comply with a recognized standard such as IEC 947.

## NOTICE

To maintain proper earth grounding, ensure a positive connection exists between the analyzer housing and earth. The connecting ground wire must be 14 AWG minimum.

## NOTICE

Line voltage, signal, and relay wiring should be rated for at least 105 °C (221 °F).

### 2.3.1 Wire Rosemount 6888A Analyzer probe only (no Rosemount 6888 Xi Electronics)

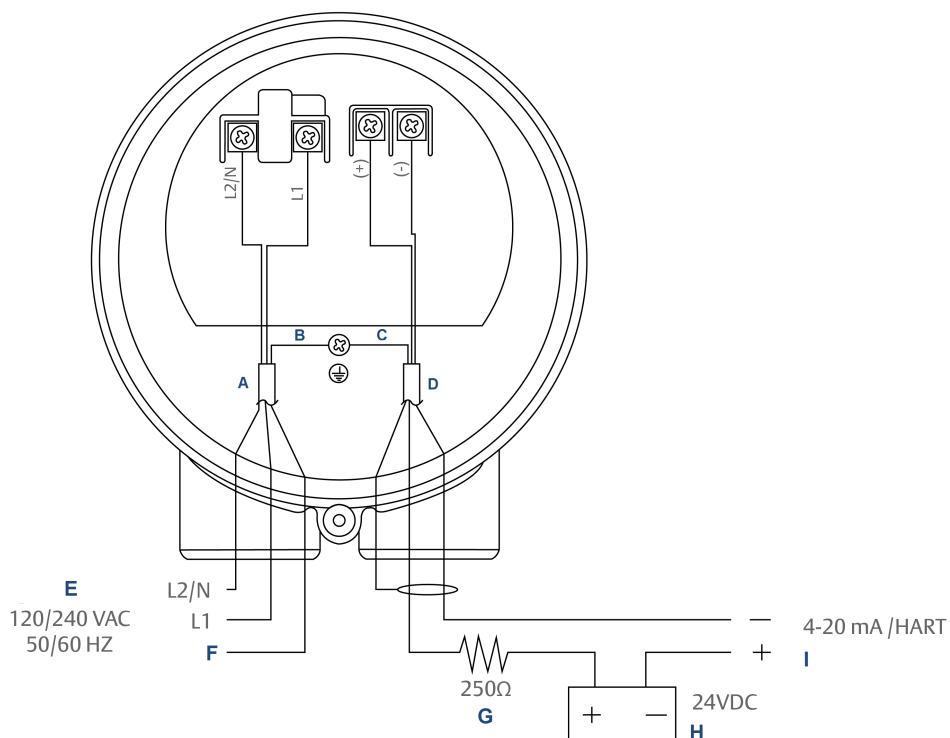
The Rosemount 6888A analyzer probe has electronics in the blue housing that controls the heater temperature and also amplifies the raw O<sub>2</sub> milli-volt signal to a linear 4-20 mA. You can run the 4-20 mA signal lines directly to the control room and also power the analyzer electronics. There is no O<sub>2</sub> display or keypad on the probe, so you must set up the analyzer through HART<sup>®</sup> communications using a hand-held communicator or Asset Management Solutions (AMS) software.

#### Procedure

1. Remove the cover from the probe.

2. Connect the line (**L1** wire) to the **L1** terminal, the neutral (**L2** wire) to the **L2/N** terminal, and the ground wire to the ground lug.  
The analyzer accepts 120/240 Vac  $\pm$ 10 percent line voltage and 50/60 Hz. No setup is required.

**Figure 2-8: Rosemount 6888A standard probe housing**



- A. AC input
- B. Ground
- C. Shield
- D. 4-20 mA HART
- E. AC input
- F. Ground
- G. Resistor
- H. Power supply
- I. Output to DCS

3. Using a shielded twisted wire pair, connect the 4-20 mA signal wires at the analyzer.

**⚠ CAUTION**

**Do not allow bare shield wires to contact the circuit boards. Insulate the shield wires prior to termination. The analyzer electronics are loop-powered, meaning the 4-20 mA signal wires supply 24 VDC from the DCS or an external power supply.**

4. Terminate the shield only at the analyzer electronics housing unless using a Rosemount 6888Xi. When using the Rosemount 6888 Xi Advanced Electronics, terminate the shield at both ends.

**NOTICE**

The 4-20 mA signal represents the O<sub>2</sub> value and also powers the probe-mounted electronics. Superimposed on the 4-20 mA signal is HART information accessible through a Field Communicator or AMS software.

5. Reinstall cover on analyzer.

**Postrequisites**

Follow the instructions in the following sections only if a Rosemount 6888 Xi is included with your system configuration.

## 2.3.2 Wire standard housing analyzer probe plus Rosemount 6888Xi Electronics

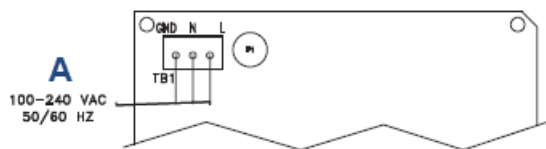
The Rosemount 6888Xi Electronics serve as an operator interface unit with a back-lit display and keypad. It is capable of two channels, serving two Rosemount 6888A probes.

**Procedure**

1. Remove cover screws from the front cover of the Rosemount 6888Xi. Swing down the front cover of the interface box.
2. Pull out the input/output (IO) board on the right side of the card rack inside the Rosemount 6888Xi.

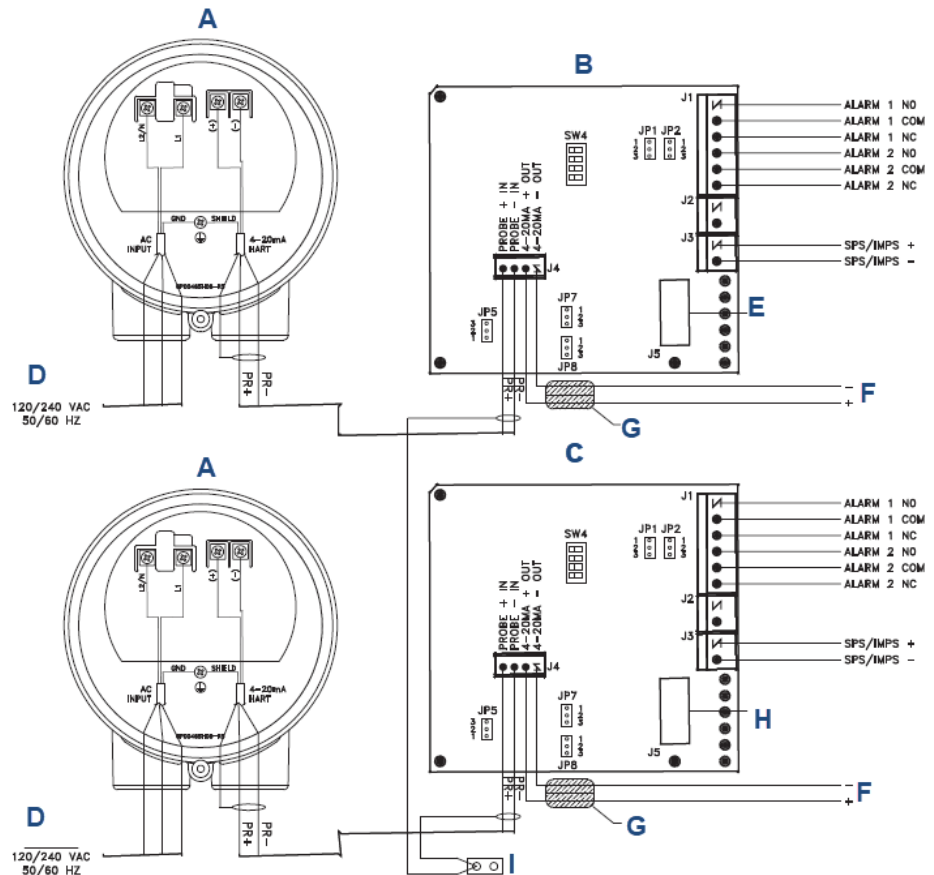
If your system is configured to operate two analyzer probes, there are two IO interface boards.

**Figure 2-9: Power supply board**



*A. AC input*

Figure 2-10: IO boards



- A. Rosemount 6888A standard probe housing
- B. IO board - channel 1
- C. IO board - channel 2
- D. AC input
- E. Ribbon cable to display board **J2**, Sensor 1
- F. 4-20 mA output
- G. Ferrite clamp
- H. Ribbon cable to display board **J3**, Sensor 2
- I. Shield ground

Table 2-4: Channel 1 jumper settings

Jumpers	Settings
JP1	Pins 2-3
JP2	Pins 2-3
JP3	Pins 1-2, internal power Pins 2-3, external power



**Table 2-4: Channel 1 jumper settings (continued)**

Jumpers	Settings
JP7	Pins 1-2, internal power Pins 2-3, external power
JP8	Pins 1-2, internal power Pins 2-3, external power

**Table 2-5: Channel 1 SW4 switch settings**

Position	Setting
1	Off
2	Off
3	Off
4	Off

**Table 2-6: Channel 2 jumper settings**

Jumper	Setting
JP1	Pins 1-2
JP2	Pins 1-2
JP5	Pins 1-2, internal power Pins 2-3, external power
JP7	Pins 1-2, internal power Pins 2-3, external power
JP8	Pins 1-2, internal power Pins 2-3, external power

**Table 2-7: Channel 2 SW4 switch settings**

Position	Setting
1	Off
2	Off
3	Off
4	Off

**Note**

- a. Except for **JP5**, **JP2**, and **JP8** on the IO board, jumper and switch settings are factory set and are shown for reference only.
- b. IO board 4-20 mA/HART loop power settings:  
JP5: Pins 1-2 internal power Rosemount 6888Xi to Rosemount 6888A Analyzer, pins 2-3 external power Rosemount 6888Xi to Rosemount 6888A Analyzer (requires 2500 resistor across **J4**, PR+ to PR-)

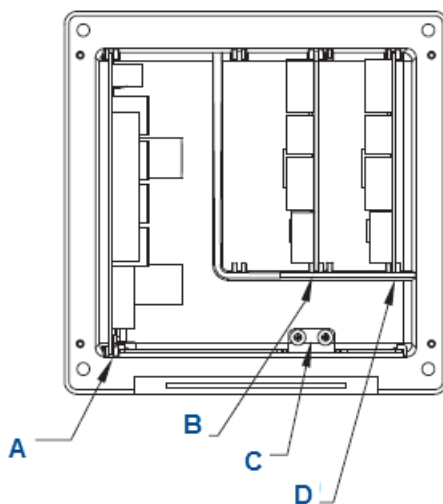
JP7/JP8: Pins 1-2 internal power Rosemount 6888Xi to DCS, pins 2-3 external power Rosemount 6888Xi to DCS.

Compare [Table 2-8](#) to the model number on the probe tag to confirm the features present in this specific probe.

**Table 2-8: Remote type ordering information**

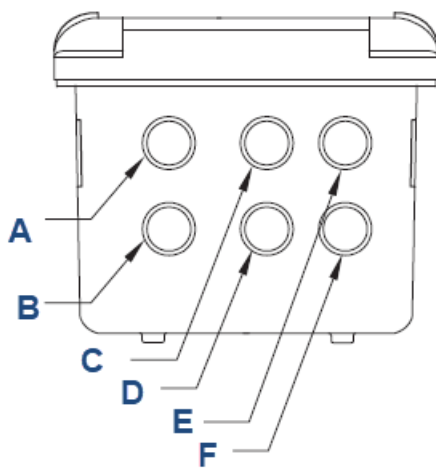
Model code	Description
1OXY	Single channel O <sub>2</sub>
2OXY	Single channel O <sub>2</sub> with flame safety interlocking heater
3OXY	Dual channel O <sub>2</sub>
4OXY	Single channel O <sub>2</sub> traditional architecture for 120 V probes

**Figure 2-11: Rosemount 6888Xi front view**



- A. Power supply board
- B. Channel #2 IO board
- C. Shield ground
- D. Channel #1 IO board

**Figure 2-12: Rosemount 6888Xi bottom view**



- A. AC input to power supply
- B. Plug
- C. Channel #2 alarm relay, Rosemount SPS
- D. Channel #2 4-20 mA/HART output
- E. Channel #1 alarm relay, Rosemount SPS
- F. Channel #1 4-20 mA/HART output

3. Connect the 4-20 mA signal wires at **J4** of the IO board. Attach the supplied ferrite clamp over the 4-20 mA out wires that extend past the shield.

#### NOTICE

Installation of the ferrite clamp over the 4-20 mA out wires is required for the compliance with the European EMC directive.

4. Terminate the shield of the 4-20 mA signal wires at the designated ground terminal of the Rosemount 6888Xi. Do not allow bare shield wires to contact the circuit boards. Insulate the shield wires prior to termination.
5. Connect the signal wires from the Rosemount SPS (if used) to the applicable terminals of **J3**.  
Refer to the [Rosemount SPS 4001B Manual](#) for wiring details.
6. Reinstall the IO board in the card rack of the Rosemount 6888Xi.
7. If your system is configured for two channel operation, repeat [Step 2](#) through [Step 6](#) to connect the other probe's signal wires.
8. Remove the probe's connector from the power supply board located on the left side of the card rack inside the Rosemount 6888Xi.
9. Connect the line, or **L1**, wire to the **L1** terminal and the neutral, or **L2**, wire to the **N** terminal.
10. Reinstall the power supply connector in the power supply board.

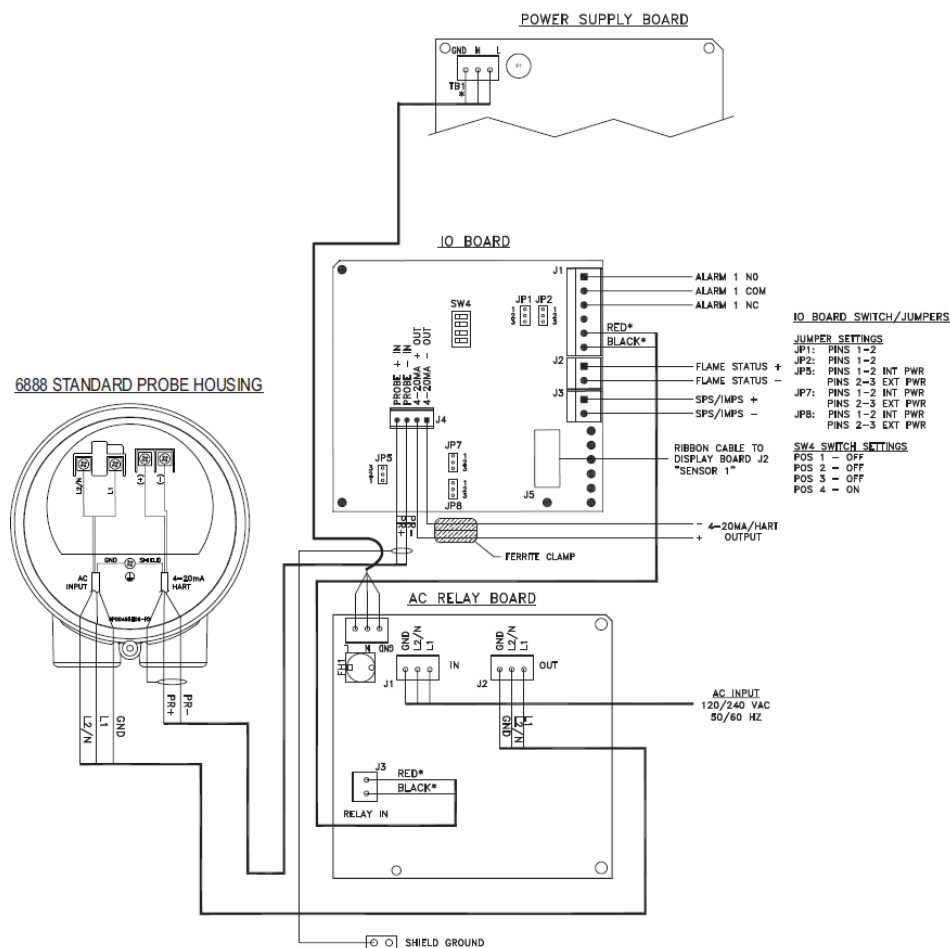
## 2.3.3 Analyzer probe with single-channel Xi and flame safety interlock

A flame safety interlock by Emerson is available for heater power disconnect whenever there is a loss of the process flame or a heater runaway condition (heater over-temperature) in the O<sub>2</sub> probe. This input is internally powered by the Rosemount 6888Xi and is actuated via a dry contact output from your flame scanner. A closed contact indicates a flame is present. An open contact indicates a loss of flame.

### Procedure

1. Refer to [Figure 2-13](#). Connect the signal wires from the burner management system flame status output to the flame status input terminals of J2.  
The flame status sensing device is supplied by the customer. Refer to the applicable OEM documents for signal wiring details.
2. Remove the J1 and J2 connectors from the AC relay board.
3. Connect the AC line input to the J1 connector.
4. Connect the AC power to the probe to the J2 connector.
5. Reinstall connector J1 and J2 to the AC relay board.

Figure 2-13: Single channel with flame safety wiring diagram

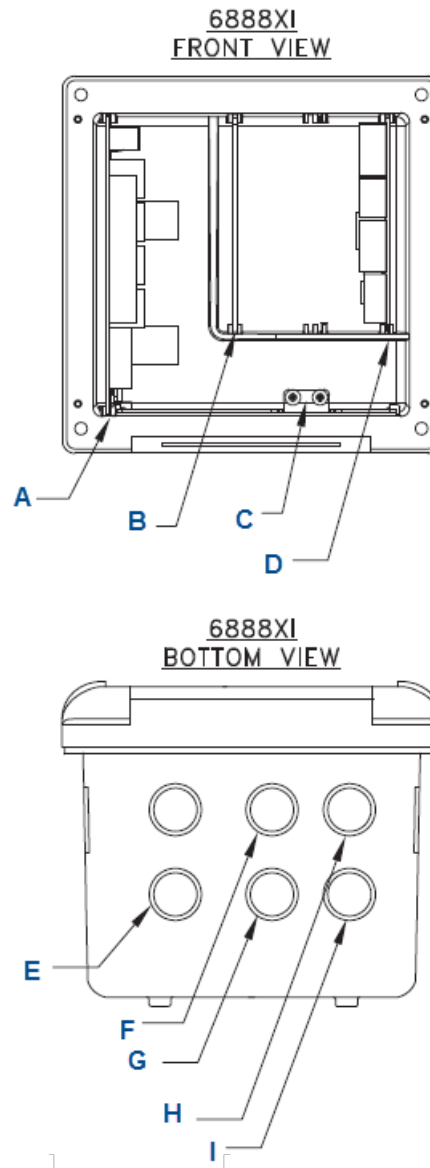


**Note**

- A. See [Rosemount 6888Xi Instruction Manual](#) for additional installation and operating instructions.
- B. All wiring marked with an asterisk (\*) is factory wiring inside the Rosemount 6888Xi.
- C. Except for JP5, JP7, and JP8 on IO board, jumper and switch settings are factory set and are shown for reference only.
- D. IO board 4-20 mA/HART loop power settings  
 JP5: Pins 1-2 internal power Rosemount 6888Xi to Rosemount 6888 Analyzer, pins 2-3 external power Rosemount 6888Xi to Rosemount 6888 Analyzer (requires 250 Ω resistor across J4, PR+ to PR-)  
 JP7/JP8: Pins 1-2 internal power Rosemount 6888Xi to DCS, pins 2-3 external power Rosemount 6888Xi to DCS

See [Table 2-8](#) for the Rosemount 6888Xi configuration matrix.

Figure 2-14: Rosemount 6888Xi Front and Bottom View



- A. Power supply board
- B. AC relay board
- C. Shield ground
- D. IO board
- E. Plug
- F. AC input
- G. Loss of flame output to burner management system
- H. Alarm relay, SPS/IMPS
- I. 4-20 mA/HART output

## 2.3.4 Wire analyzer probe with integral autocalibration and HART<sup>®</sup> communications

This probe contains gas-switching solenoids so that the Rosemount 6888Xi Electronics can control the introduction of calibration gases.

You can initiate a calibration in one of the following ways:

- Automatically with a calibration recommended diagnostic
- Automatically by time since last calibration
- Manually with external dry contact
- Manually with HART communications
- Manually with the Rosemount 6888Xi local operator interface keypad

---

### Note

You can only implement the integral autocalibration feature when using the probe with the Rosemount 6888Xi Advanced Electronics

---

### Procedure

1. Remove the two covers from the analyzer.
2. Connect the line (**L1** wire) to the **L1** terminal, the neutral (**L2**) wire to the **L2/N** terminal, and the ground wire to the ground lug.  
The Rosemount 6888A accepts line voltage at 120/240 Vac  $\pm$ 10 percent, 50/60 Hz. No setup is required.
3. Connect the 4-20 mA signal wires from the Rosemount 6888Xi to the connections in the side chamber of the analyzer.  
Do not connect the signal wires to the terminals in the main chamber where the AC input wires are connected. Use a shielded twisted wire pair.

### NOTICE

Do not allow bare shield wires to contact the circuit boards. Insulate the shield wires prior to termination.

---

The 24 VDC loop power is sourced from the Rosemount 6888Xi.

4. Terminate the shield at both the probe and the Rosemount 6888Xi Advanced Electronics.

### NOTICE

The 4-20 mA signal represents the O<sub>2</sub> value and also powers the probe-mounted electronics. Superimposed on the 4-20 mA signal is HART information accessible through a Field Communicator or Asset Management Solutions (AMS) software.

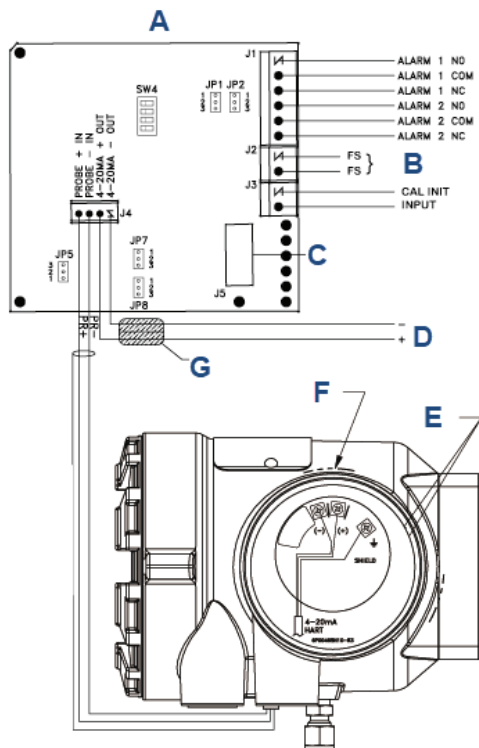
---

5. Reinstall both covers on the analyzer.

- Follow the remaining electrical installation instructions for the Rosemount 6888Xi included with your system configuration.

See [Table 2-8](#) for the Rosemount 6888Xi ordering information.

**Figure 2-15: Input/output (IO) board connections**



- IO board, Channel 1
- Optional
- Ribbon cable to display board **J2**, Sensor 1
- 4-20 mA HART output
- Test points
- Signal
- Ferrite clamp

**Table 2-9: IO board jumper settings**

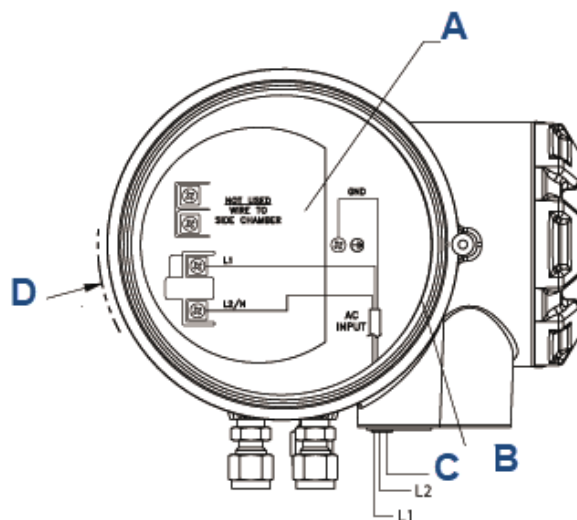
Jumper	Setting
JP1	Pins 2-3
JP2	Pins 2-3
JP5	Pins 1-2, internal power Pins 2-3, external power
JP7	Pins 1-2, internal power Pins 2-3, external power



**Table 2-9: IO board jumper settings** *(continued)*

Jumper	Setting
JP8	Pins 1-2, internal power Pins 2-3, external power

**Figure 2-16: Analyzer probe field connections**



- A. Test point group
- B. #8 pan heated screen (internal ground)
- C. Ground
- D. Power

See [Figure 2-11](#) and [Figure 2-12](#).

### 2.3.5 Wire analyzer probe with integral autocalibration and FOUNDATION™ Fieldbus communications

This probe contains gas-switching solenoids so that the Rosemount 6888Xi Advanced Electronics can control the introduction of calibration gases.

You can manually initiate calibrations in the following ways:

- Calibration recommended diagnostic
- Time since last calibration
- External dry contact
- FOUNDATION® Fieldbus communications
- Rosemount 6888Xi local operator interface (LOI) keypad

You can only implement the integral autocalibration feature when using the probe with a Rosemount 6888Xi.

### Procedure

1. Remove the two covers from the analyzer.
2. Connect the line (**L1**) wire to the **L1** terminal, the neutral (**L2**) wire to the **L2/N** terminal, and the ground wire to the ground lug.

The analyzer accepts 120/240 Vac  $\pm$ 10% line voltage and 50/60 Hz. No setup is required.

3. Connect the FOUNDATION Fieldbus wires from the Rosemount 6888 side housing to the FF segment.

### NOTICE

The Rosemount 6888A probe is not rated as intrinsically safe (IS) and will render any IS or FISCO segment it is wired to as non-IS. Use a shielded twisted wire pair. Do not allow bare shield wires to contact the circuit boards.

4. Terminate the shield at both the probe and the Rosemount 6888Xi Advanced Electronics.

### NOTICE

The FOUNDATION Fieldbus signal represents the O<sub>2</sub> value and also powers the probe-mounted electronics.

5. Reinstall both covers on analyzer.

### Postrequisites

Follow the remaining electrical installation instructions for the Rosemount 6888Xi included with your system configuration.

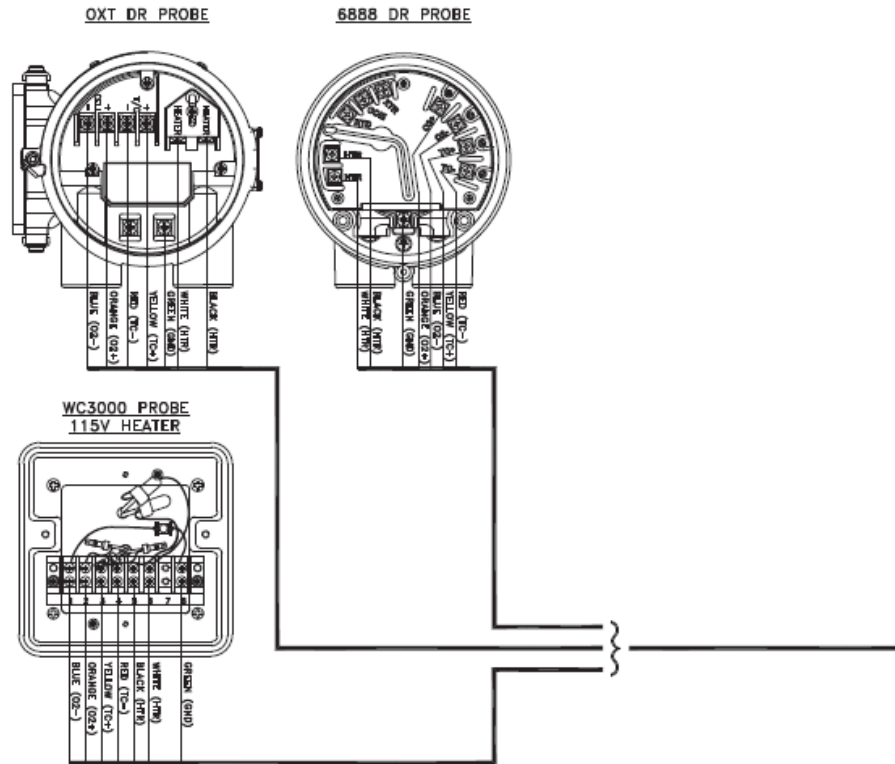
## 2.3.6 Wire the traditional architecture system with direct replacement probe (no electronics inside)

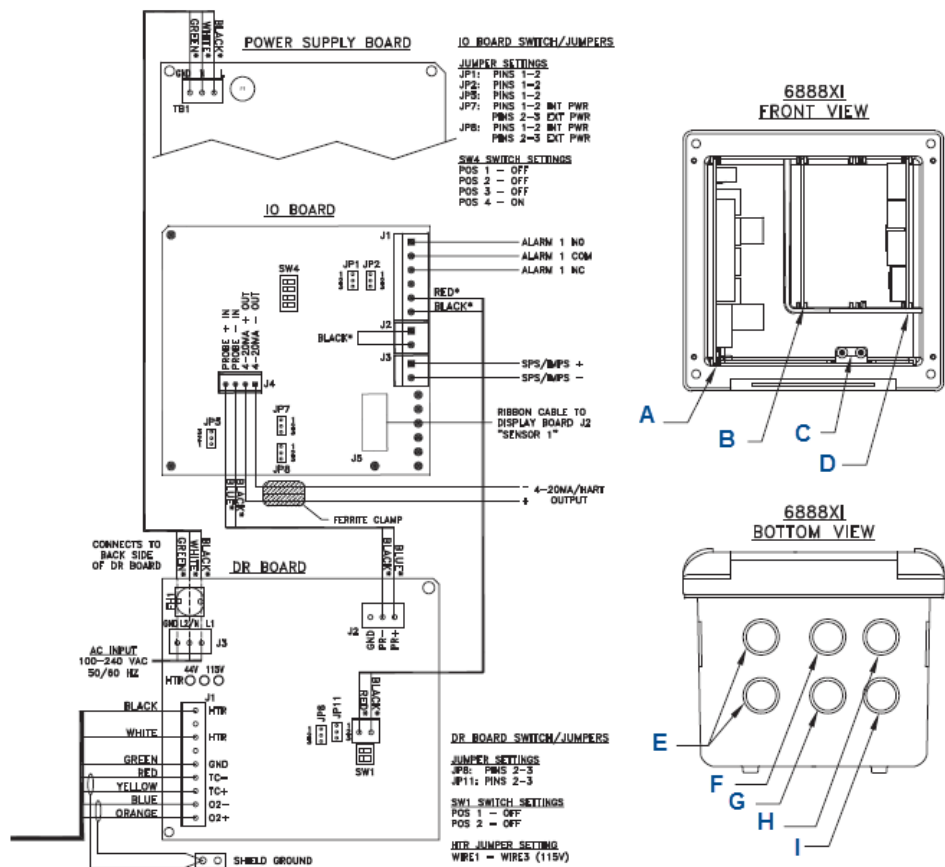
Here there are no electronics inside the probe head, so the raw sensor signals for the heater thermocouple and zirconium oxide (ZrO<sub>2</sub>) sensor are sent to a remote Rosemount 6888 Xi electronics. The Rosemount 6888Xi electronics also directly applies power to the probe heater in order to maintain the correct sensor temperature. This arrangement calls for a 7-conductor cable to carry this power and the sensor signals. Maximum length for this cable is 200 feet.

### Procedure

1. Remove cover from probe.
2. Feed all DR probe wiring through line power conduit of probe.
3. Connect DR probe heater power leads to DR probe connectors, [Figure 2-17](#). See [Table 2-8](#) for the Rosemount 6888Xi product matrix.

**Figure 2-17: Wiring Diagrams - Traditional Architecture with Direct Replacement Probe (no Electronics Inside)**





**Note**

- A. See [Rosemount 6888Xi Instruction Manual](#) for additional installation and operating instructions.
- B. All wiring marked with an asterisk (\*) is factory wiring inside the Rosemount 6888Xi.
- C. Except for JP7 and JP8 on IO board, jumper and switch settings are factory set and are shown for reference only.

- A. Power supply board
- B. DR board
- C. Shield ground
- D. IO board
- E. Plug
- F. Probe cable
- G. AC input
- H. Alarm relay SPS/IMPS
- I. 4-20 mA/HART output

4. Connect O<sub>2</sub> signal and thermocouple wires to DR probe connectors.

## 2.3.7 Wire the traditional architecture cable connections

A traditional architecture configuration is used to provide for remote location of the analyzer electronics.

### NOTICE

The traditional architecture cable is provided at the specified length and is ready for installation. The cable glands must be properly terminated to maintain EMC/EMI noise protection.

### Procedure

1. Install the cable and lead wires to the probe per manufacturer's instructions.
2.
  - a) Unscrew the locking nut from the gland assembly and slide the locking nut back along the cable.
  - b) Pull the gland body away from the plastic insert.

### ▲ CAUTION

Use care not to damage the cable shield braid.

- c) At the probe housing, apply polytetrafluoroethylene (PTFE) tape or similar sealing compound to the tapered pipe threads.
- d) Thread the gland body into the probe housing until properly seated.
- e) Ensure the cable shield braid is evenly formed over the gray insert. When properly formed, the braid should be evenly spaced around the circumference of the insert and not extend beyond the narrow diameter portion.
- f) Carefully press the gray insert into the gland body. The grooves on the insert should align with similar grooves inside the gland body.
- g) Press the insert in until it bottoms out in the gland body.
- h) Slide the locking nut up and thread it onto the gland body.
- i) Tighten the locking nut so the rubber grommet inside the plastic insert compresses against the cable wall to provide an environmental seal.

## 2.4 Pneumatic installation

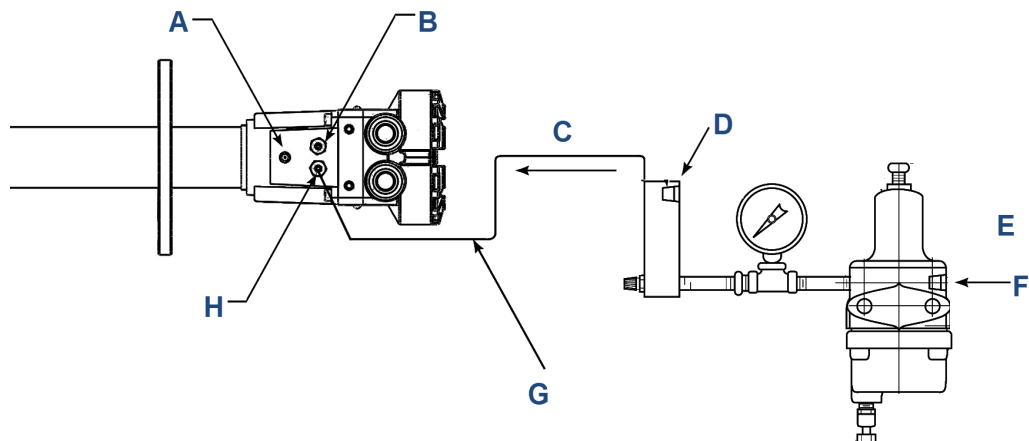
### 2.4.1 Reference air package

After the Rosemount 6888A is installed, connect the reference air set to the analyzer unit.

Refer to the schematic diagram in [Figure 2-18](#) for a locally assembled reference air supply.

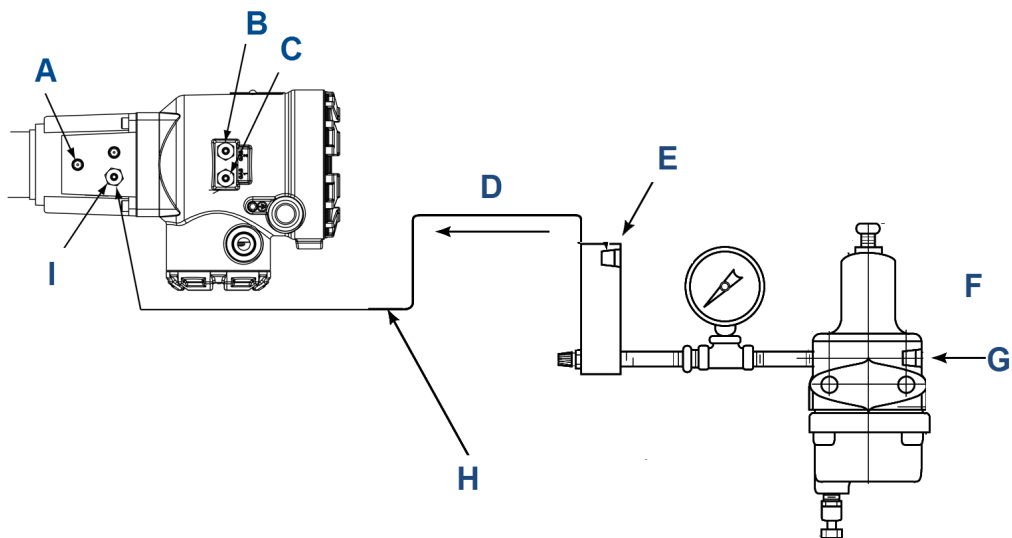
Instrument air (reference air): 5 psig (0.34 barg) minimum, 8 psig (0.55 barg) maximum at 2.0 scfh (1.01 L/min) maximum; less than 40 parts per million total hydrocarbons. Set regulator outlet pressure at 5 psig (0.34 barg). Use the reference air set or the optional Rosemount SPS 4001B to supply reference air.

**Figure 2-18: Plant schematic diagram, standard housing**



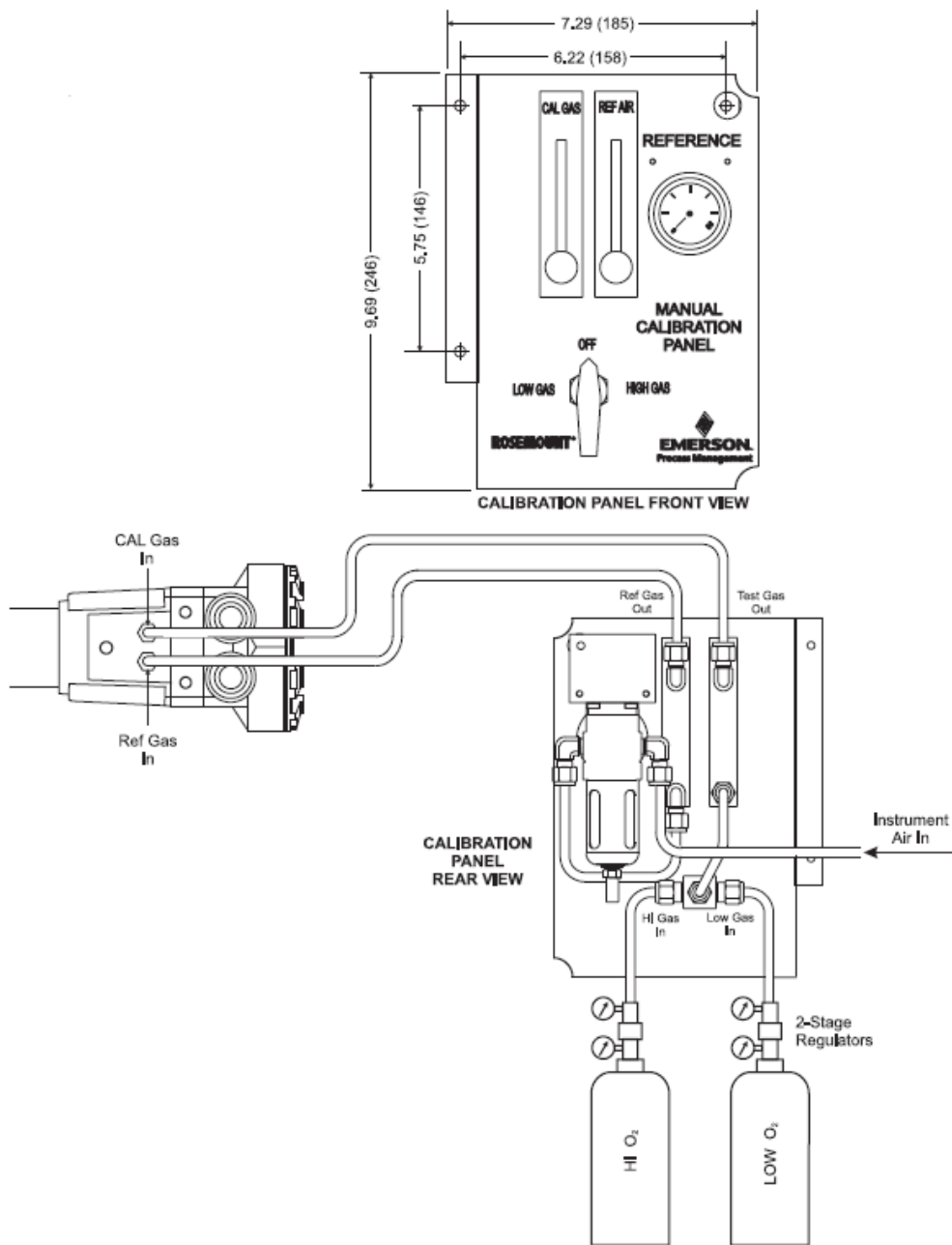
- A. Vent
- B. Calibration gas: 1/4-in. tube
- C. To analyzer
- D. Reference air flow meter
- E. Instrument air supply: 10 psig (0.69 barg) to 80 psig (5.52 barg) pressure
- F. 1/4-in.-18 NP female inlet connection
- G. 1/4-in. or 6 mm O.D. tubing (supplied by customer)
- H. Reference gas: 1/4-in. tube

Figure 2-19: Plant air schematic diagram, accessory housing



- A. Vent
- B. Calibration gas 1: ¼-in. tube
- C. Calibration gas 2: ¼-in. tube
- D. To analyzer
- E. Reference air flow meter
- F. Instrument air supply: 10 psig (0.69 barg) to 80 psig (5.52 barg) pressure
- G. ¼-in.-18 NPT female inlet connection
- H. ¼-in. or 6 mm O.D. tubing (supplied by customer)
- I. Reference gas: ¼-in. tube

Figure 2-20: Manual calibration panel



**Note**  
Dimensions are in inches with millimeters in parentheses.

Reference air components are included in the optional manual calibration panel (Figure 2-20) and the Rosemount SPS 4001 Single Probe Autocalibration Sequencer.



## NOTICE

The optional Rosemount SPS 4001B Sequencer can only be used when the Rosemount 6888Xi Advanced Electronics option is selected. The Rosemount 6888Xi must be properly configured for autocalibration.

See the [SPS 4001B Single Probe Autocalibration Sequencer Instruction Manual](#) for wiring and pneumatic connections.

## 2.4.2 Calibration gas

The analyzer uses two calibration gas concentrations: low gas (0.4 percent O<sub>2</sub>, balance N<sub>2</sub>) and high gas (8 percent O<sub>2</sub>, balance N<sub>2</sub>).

### ⚠ CAUTION

#### **Failure to use proper gases will result in erroneous readings.**

Do not use 100 percent nitrogen as a low gas (zero gas). We recommend using between 0.4 percent and 2.0 percent O<sub>2</sub> for the zero gas. Do not use gases with hydrocarbon concentrations of more than 40 parts per million.

### ⚠ CAUTION

Before washing down the ducts, verify that the Rosemount 6888A Analyzers have been powered down and removed from the wash areas.

### ⚠ CAUTION

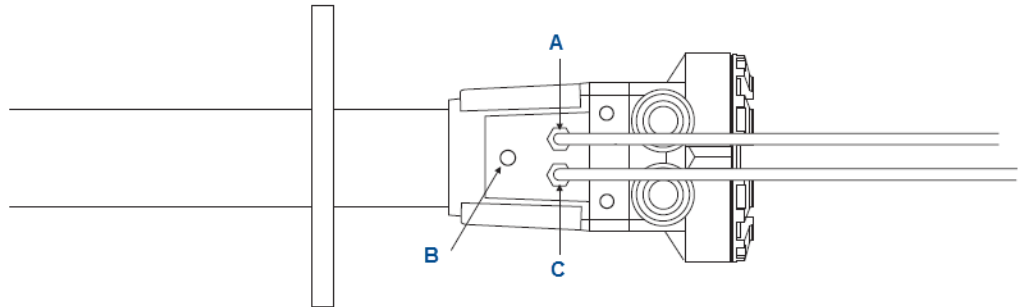
#### **Damage can result from having a cold analyzer exposed to process gases.**

Upon completing installation, ensure that the analyzer is turned on and operating before firing up the combustion process.

During outages, if possible, leave all analyzers running to prevent condensation and premature aging from thermal cycling.

See [Figure 2-21](#) for the calibration gas connections.

**Figure 2-21: Calibration gas connections**



- A. Calibration gas in
- B. Reference air vent
- C. Reference air in

**Figure 2-22: Traditional architecture cable gland assembly**



## 3 Configuration, start-up, and operation

### ⚠ WARNING

#### Electrical shock

Failure to install covers and ground leads could result in serious injury or death. Install all protective covers and ground leads after installation.

### ⚠ CAUTION

If external loop power is used, the power supply must be a safety extra low voltage (SELV) type.

## 3.1 Power up analyzer without Rosemount 6888Xi

### Procedure

1. Apply AC line power to the analyzer.
2. Apply 24 VDC loop power to the analyzer.
3. Using either the DCS control or a Field Communicator, verify communications to the analyzer.

The analyzer probe takes approximately 45 minutes to warm up to the 1,357 °F (736 °C) heater set point. The 4-20 mA signal remains at a default value of 3.5 mA, and the O<sub>2</sub> reading remains at 0 percent through this warm-up period. After warm-up, the probe begins reading oxygen, and the 4-20 mA output is based on the default range of 0 to 10 percent O<sub>2</sub>.

If there is an error condition at start-up, an alarm message is displayed.

## 3.2 Power up the Rosemount 6888 Analyzer with single/dual channel or single channel and flame safety interlock Rosemount 6888Xi

### Procedure

1. Apply AC line power to the transmitter.
2. Apply AC line power to the Rosemount 6888Xi. Run the Rosemount 6888Xi Quick Start Wizard ([Run Rosemount 6888Xi Quick Start Wizard](#)). At the **Auto Cal Device** screen, select the calibration method based on the Rosemount 6888 Analyzer as follows:
  - a. Standard probe housing configuration - Select None, SPS, or IMPS as appropriate. Do not select Integral or calibration will not be possible.
  - b. Integral autocal probe housing - Select Integral only. If Integral is not selected, calibration will not be possible.
3. Verify communications between the analyzer and the Rosemount 6888Xi. The Rosemount 6888Xi display is preconfigured to display O<sub>2</sub> and cell temperature for single channel configurations and both O<sub>2</sub> readings for dual channel configurations.

The analyzer probe takes approximately 45 minutes to warm up to the 736 °C (1357 °F) heater setpoint. The 4-20 mA signal remains at a default value of 3.5 mA, and the O<sub>2</sub> reading remains at 0% through this warm-up period. After warm up, the probe begins reading oxygen, and the 4-20 mA output is based on the default range of 0-10% O<sub>2</sub>.

If there is an error condition at startup, an alarm message is displayed on the Rosemount 6888Xi.

## 3.3 Power up the Rosemount 6888A direct replacement probe (no electronics inside) with traditional architecture Rosemount 6888Xi

### Procedure

1. Apply AC line power to the Rosemount 6888Xi.
2. Run the Quick Start Wizard as described in [Run Rosemount 6888Xi Quick Start Wizard](#).
3. At the **Auto Cal Device** screen, select None, SPS, or IMPS as appropriate. Do not select Integral or calibration will not be possible.

The analyzer probe takes approximately 45 minutes to warm up to the 1,357 °F (736 °C) heater set point. The 4-20 mA signal remains at a default value of 3.5 mA, and the O<sub>2</sub> reading remains at 0 percent through this warm-up period. After warm-up, the probe begins reading oxygen, and the 4-20 mA output is based on the default range of 0 to 10 percent O<sub>2</sub>.

If there is an error condition at start-up, the Rosemount 6888Xi displays an alarm message.

## 3.4 Run Rosemount 6888Xi Quick Start Wizard

When you first power up the Rosemount 6888Xi, a short wizard program guides you through the basic setup. Once configured, the Rosemount 6888Xi retains the setup, and the wizard will not repeat.

### Procedure

1. Apply power to the Rosemount 6888Xi.  
Once the device powers on, the **Quick Start Wizard** screen appears. With a dual channel Rosemount 6888Xi, the wizard runs for both channels in succession.
2. Press **Enter** to continue.
3. On the **Sensor Type** screen, use the **Up** and **Down** keys to select O<sub>2</sub>.  
Do not select CO, as this option is reserved for future use.
4. Press **Enter** to continue.
5. On the **Device Type** screen use the **Up** and **Down** keys to select HART® or FF (FOUNDATION™ Fieldbus), whichever applies.
6. At the **Auto Cal Device** screen, use the **Up** and **Down** keys to select the calibration method to be used. The methods are defined as follows:
  - None: Manual calibration with the standard probe housing configuration.
  - SPS: Automatic calibration with the standard probe housing configuration using the Rosemount SPS 4001B.
  - IMPS: Automatic calibration with the standard probe housing configuration using the Rosemount IMPS.
  - Integral: Automatic calibration with the integral autocal probe housing configuration.
7. Press **Enter** to continue.

---

### Note

If you select SPS, IMPS, or Integral, you must still configure automatic calibration as On. Verify other parameters, such as test gas values and gas times, as well. Refer to the [Rosemount 6888Xi Reference Manual](#) for calibration setup details.

---

8. When prompted by Setup Correct?, use the **Up** and **Down** keys to select Yes.

If you select No, the wizard restarts.

9. Press **Enter** to continue.

The Rosemount 6888Xi displays several screens while saving the configuration, resets itself, and then returns to the main screen.

## 3.5 Re-initiating Rosemount 6888 Xi wizard

To re-initiate the wizard setup, reset the I/O board to default factory conditions.

### Procedure

1. Apply power to the Rosemount 6888 Xi.
2. When the main screen appears, press **Menu** several times until the **System** menu appears.
3. Use the **Up** and **Down** keys to select Configure IOB.
4. Press **Enter** to continue.
5. When the **Configure IOB** screen appears, use the **Up** and **Down** keys to select I/O Board 1.  
With a dual channel Rosemount 6888 Xi, you can reset and reconfigure either or both I/O boards.
6. Press **Enter** to continue.
7. When the **I/O board 1** menu appears, use the **Up** and **Down** keys to select Reset I/O Board.
8. Press **Enter** to continue.
9. When the **Reset** menu appears, use the **Up** and **Down** keys to select Factory Defaults.
10. Press **Enter** to continue.
11. When prompted, use the **Up** and **Down** keys to select Yes.
12. Press **Enter** to continue.

The Rosemount 6888 Xi displays several screens while saving the configuration, resets itself, and then displays the **Wizard** screen.

## 3.6 Calibration

The Rosemount 6888 O<sub>2</sub> analyzer system can be calibrated in the installed condition without removing the instrument from the process duct and also while the combustion process is on-line. A stainless steel tube runs the length of the probe and delivers the calibration gases into the cell area. Factory calibration is usually satisfactory for initial start-up and operation, but the most accurate measurement is gained by executing a calibration under normal operating conditions.

Emerson recommends using 0.4% O<sub>2</sub> and 8% O<sub>2</sub> as calibration gases, with a balance of nitrogen in the gas bottles, but other values can be used as long as the electronics are configured identically. Do not use instrument air or pure

nitrogen as calibration gas values. Use a two-stage pressure regulator to establish a pressure of 20 psi from the bottles and set the flow meter to 5 scfh flow rate.

### 3.6.1 Manual/semi-automatic calibration

A technician can calibrate the Rosemount 6888A probe with standard housing by following prompts via the display of the Rosemount 6888Xi Electronics or via HART® communications to a Field Communicator or Asset Management Solutions (AMS) console.

Manually switch the gases based upon these prompts. We recommend using 0.4 percent O<sub>2</sub> and 8 percent O<sub>2</sub>, balance nitrogen as calibration gases. Always use a two-stage pressure regulator set to 20 psig (1.38 barg). Set the calibration gas flow meter for a maximum of 5 scfh with the cal gas fitting removed from the probe. A diffuser/filter that is plugged over time may cause the flow meter to deliver less flow to the sensing cell, but never readjust the flow rate until a new diffuser is installed. Readjusting the flow meter back up to the 5 scfh level could pressurize the cell during calibration and cause the O<sub>2</sub> reading to shift downwards.

The electronics determine if the calibration was successful and calculate new calibration values. New calibration values are not automatically loaded into the electronics after a successful calibration, however. You have the choice to accept or reject the new values.

A significant calibration change may cause a bump in the O<sub>2</sub> readings at the DCS console, causing operator concern. Record the calibration data on a log (cell slope, constant, and impedance, as well as the speed of response data). If the electronics is used, it stores calibration data for the past ten successful calibrations.

#### **⚠ CAUTION**

##### **Reading errors**

Make sure the calibration gas cap is replaced tightly after calibration is complete. Many combustion processes operate at a slight negative pressure (draft pressure) and can draw ambient air down the cal gas lines and into the sensing cell, causing a falsely elevated O<sub>2</sub> reading. The same phenomenon is possible if the calibration gas hoses are permitted to become degraded or loose.

### 3.6.2 Fully automatic calibration

For fully automatic calibration, the Rosemount 6888Xi Electronics must manage the actuation of solenoids to introduce gases into the probe.

#### **Calibrate probes with standard electronics housing**

In addition to the Rosemount 6888Xi, this arrangement requires a separate single probe sequencer (SPS), which is a solenoid box for switching calibration gases,

or a larger intelligent multi-probe sequencer (IMPS), which can handle the auto-calibration for up to four probes in one box.

You can initiate automatic calibration in several ways:

- A calibration recommended diagnostic that is periodically checking cell impedance.
- Push button on the Rosemount 6888Xi.
- HART® communications from a hand-held communicator or AMS.
- An external contact closure.
- Time since the last successful calibration.

If the O<sub>2</sub> measurement is being used for automatic control, always place the O<sub>2</sub> control loop into manual prior to calibrating. Always inform the operator prior to calibrating. The Rosemount 6888Xi Electronics provides an in cal contact closure for this purpose. An initiate cal contact is also provided.

The Rosemount 6888Xi Electronics sequences the calibration gases in turn into the sensing cell. A 300 second flow time is the factory default for both gases and also for the purge cycle, which lets the probe signal come back to the normal flue gas readings. The 4-20 mA signal representing O<sub>2</sub> can be held during the calibration cycle or permitted to vary with the bottled gases, in which case a record of the calibration can be trended at the DCS.

Calibration setup is found under the detailed setup menu.

## Calibrate probe with integral auto-calibration housing

This probe contains the auto-calibration solenoids within the blue electronics housing, eliminating the need and cost for a Rosemount SPS solenoid enclosure. Both calibration gases are permanently piped into two ports on the probe. It's important to confirm that there are no piping leaks or the calibration bottles will leak down prematurely.

---

### Note

The calibration sequence from the Rosemount 6888Xi electronics will be identical to that for manual/semiautomatic calibration, but with the integral auto-calibration version of this probe it is not possible to conduct a manual calibration. The factory offers a probe rebuild capacity if solenoid or other failures occur.

---

### Note

Calibration gas bottles are piped and under pressure at all times, so be sure to leak-check all fittings, tubings, and connections. Always use dual-stage pressure regulators.

---

## 3.6.3

## Other features associated with calibration

1. Cal check capability: You can choose to look at new calibration values prior to having them load in and become active. If this feature is selected, a *calibration changed* alarm comes up after the calibration is complete. Push the **Diagnostics** button on the Rosemount 6888Xi to require an **Accept Cal**



step so that the technician or operator can decide if they are ready to accept a potentially large change in calibration values.

2. Plugged diffuser diagnostic: This feature measures the return-to-process rate after calibration gases are removed and will alarm when this time exceeds 75% of the purge time configured. A *purge time too short* alarm indicates that the diagnostic could not work because of a short purge time and is another indication that the diffuser is plugged. Increase purge time in this case.

Another feature that comes with the plugged diffuser diagnostic is auto gas switching. Instead of waiting for a configured flow time, this feature switches calibration gases and also ends the purge sequence when the readings settle out. This saves time and gas.

3. Tolerance check: Alarms if the cell MV signal is significantly different from the expected signal of the bottles noted in the setup. This indicates if the wrong bottles are being used or if a bottle runs out in the middle of a calibration.

Calibration setup is under the **Detailed Setup** menu.

Calibration setup can be found in the Rosemount 6888Xi menu.

For the factory default menu, see [Figure 3-1](#).

**Figure 3-1: Calibration Defaults**

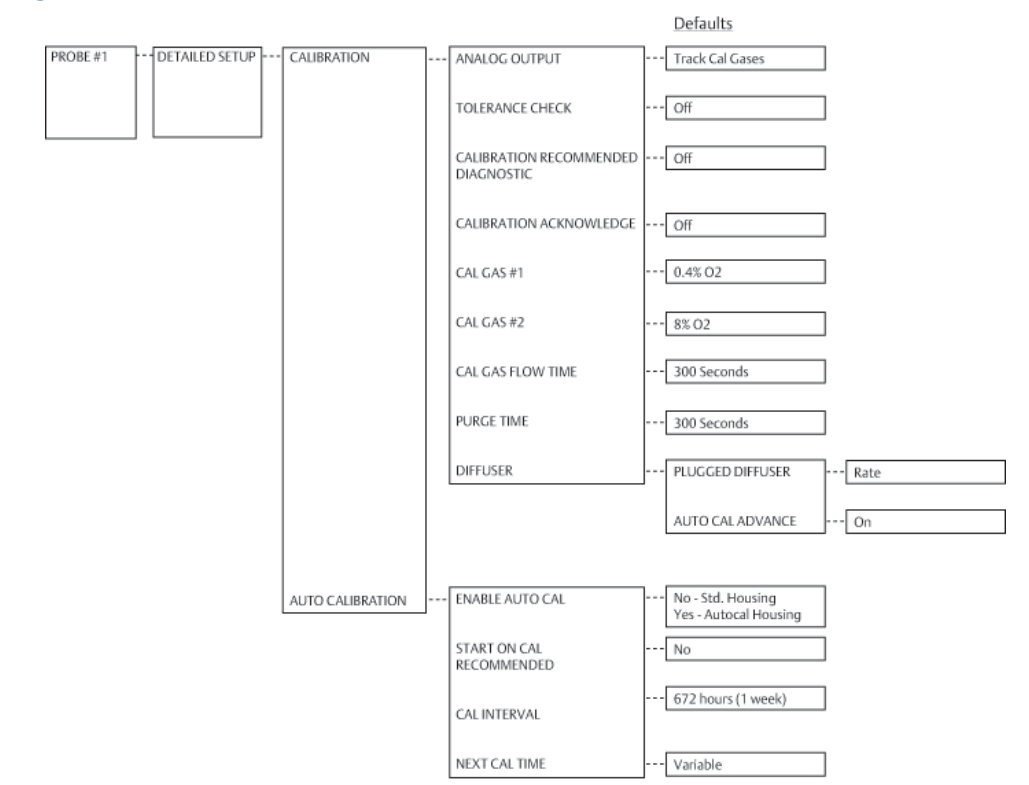
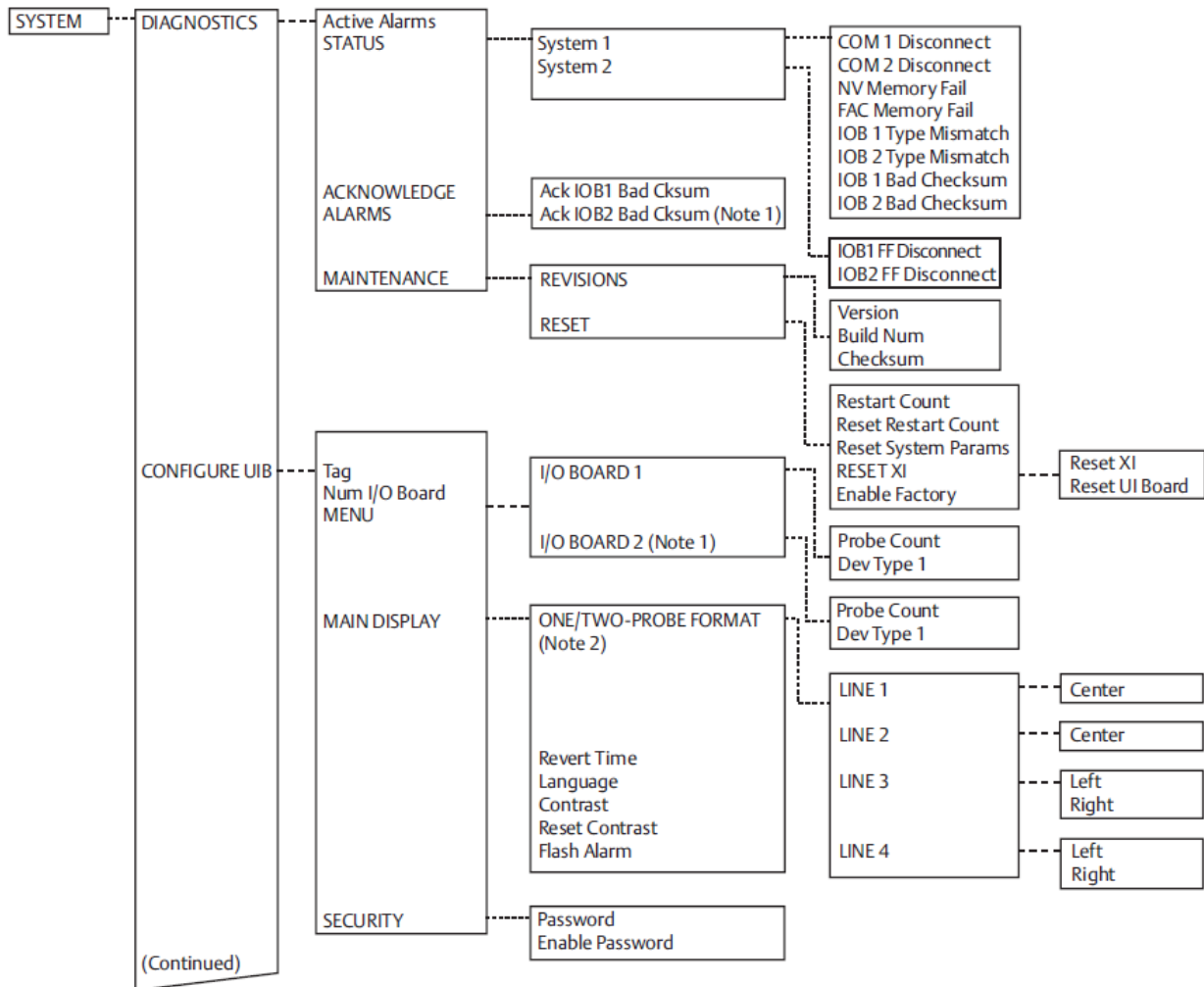
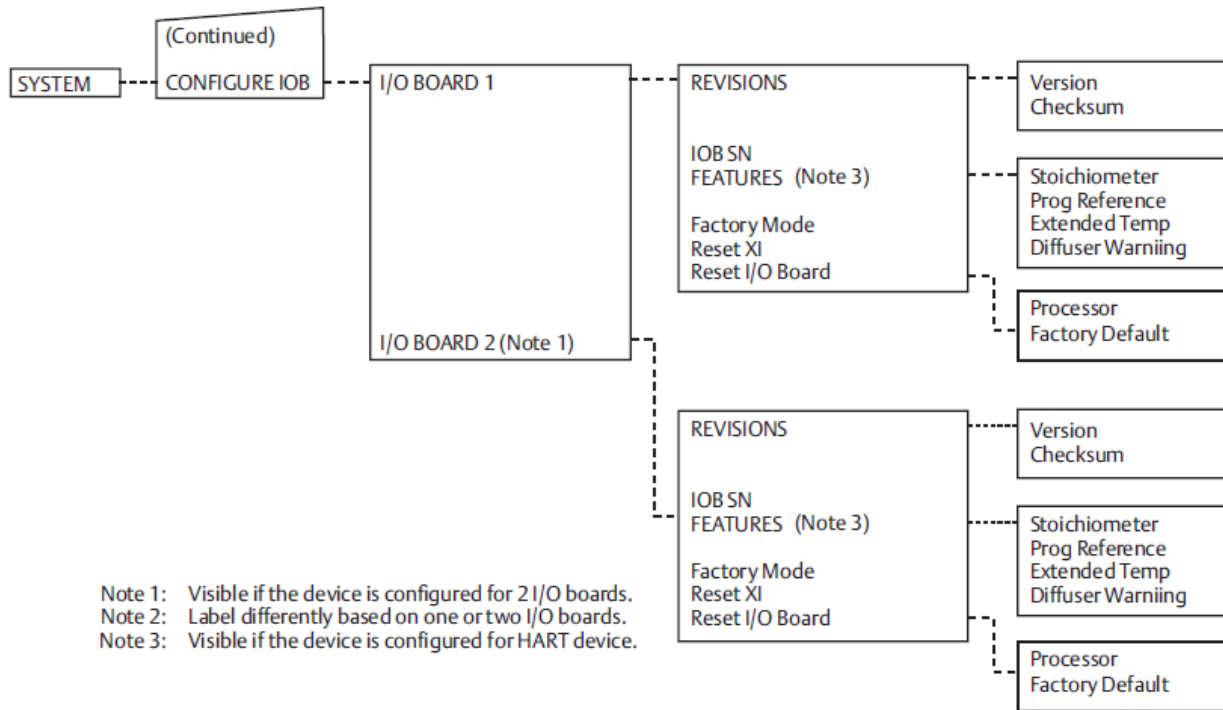
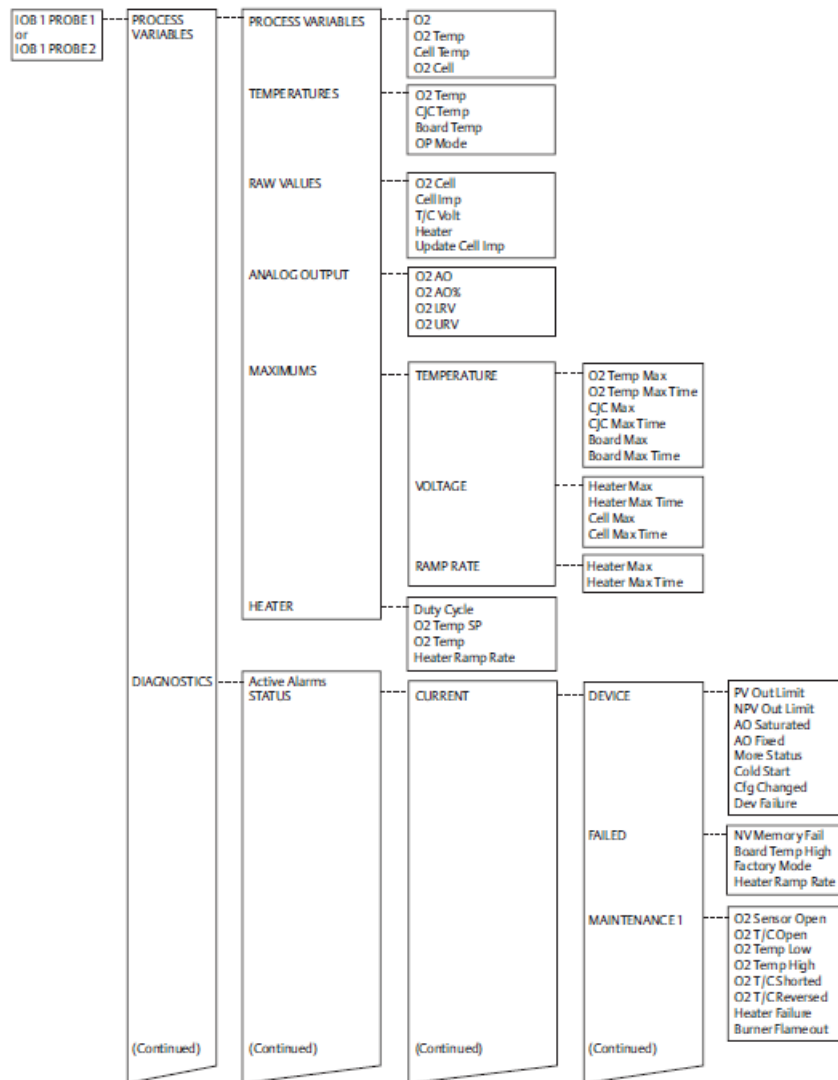
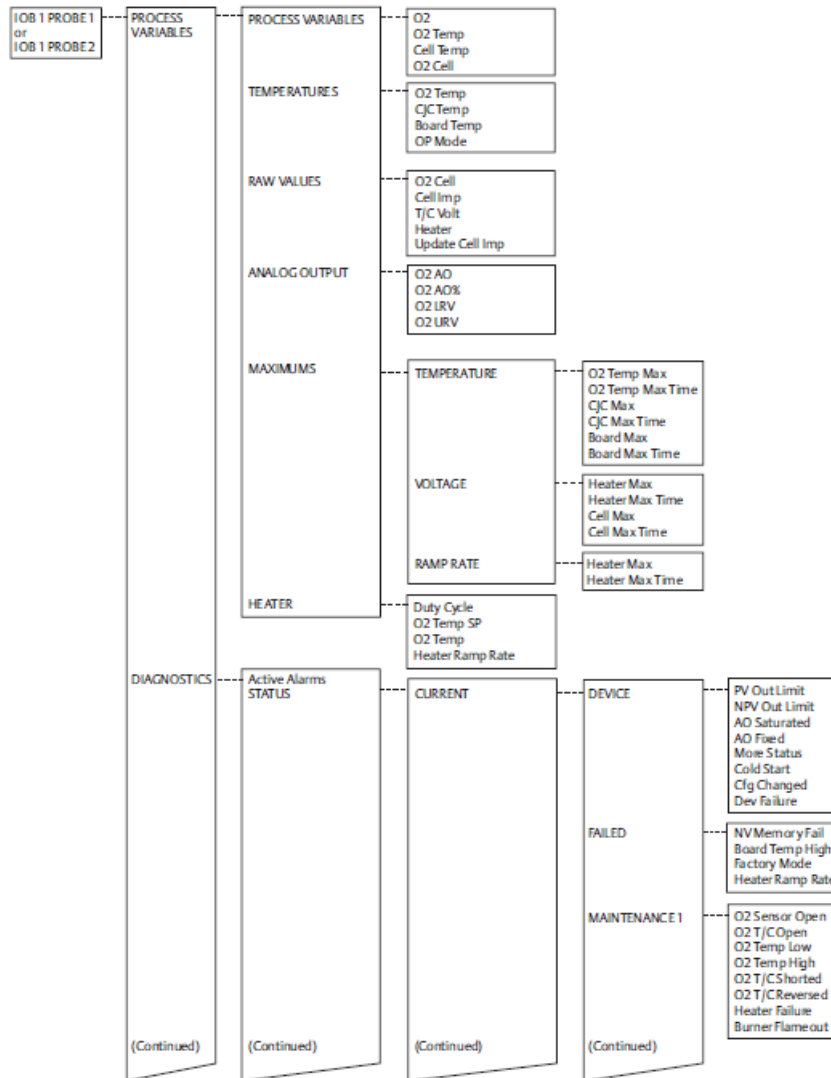


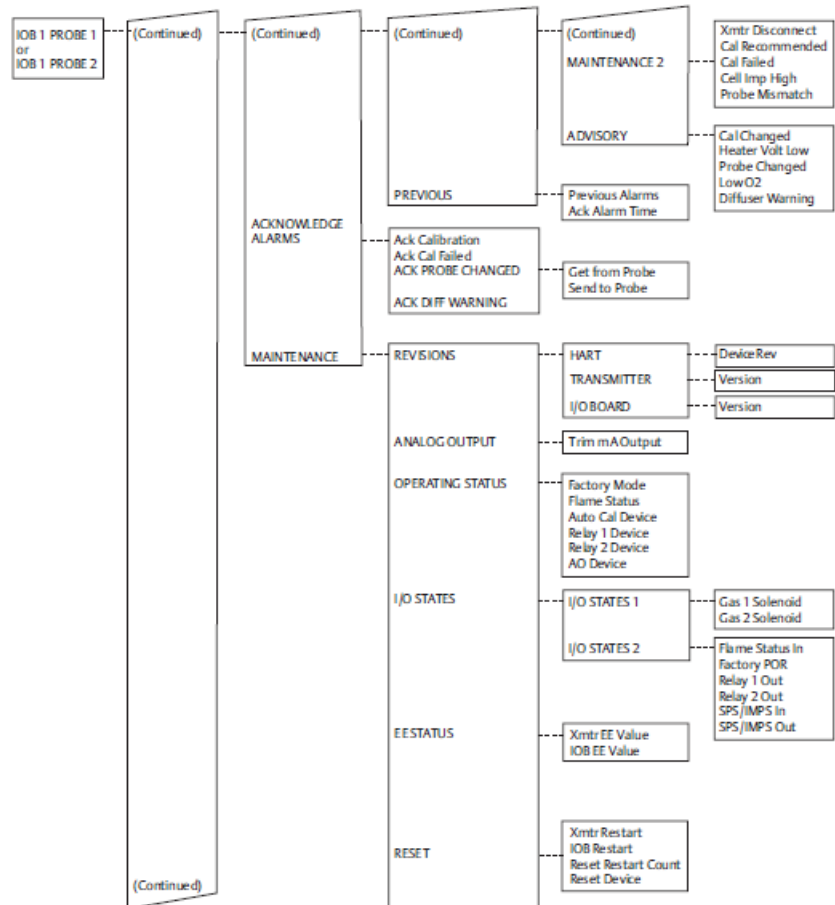
Figure 3-2: HART Menu Trees - Rosemount 6888 Xi

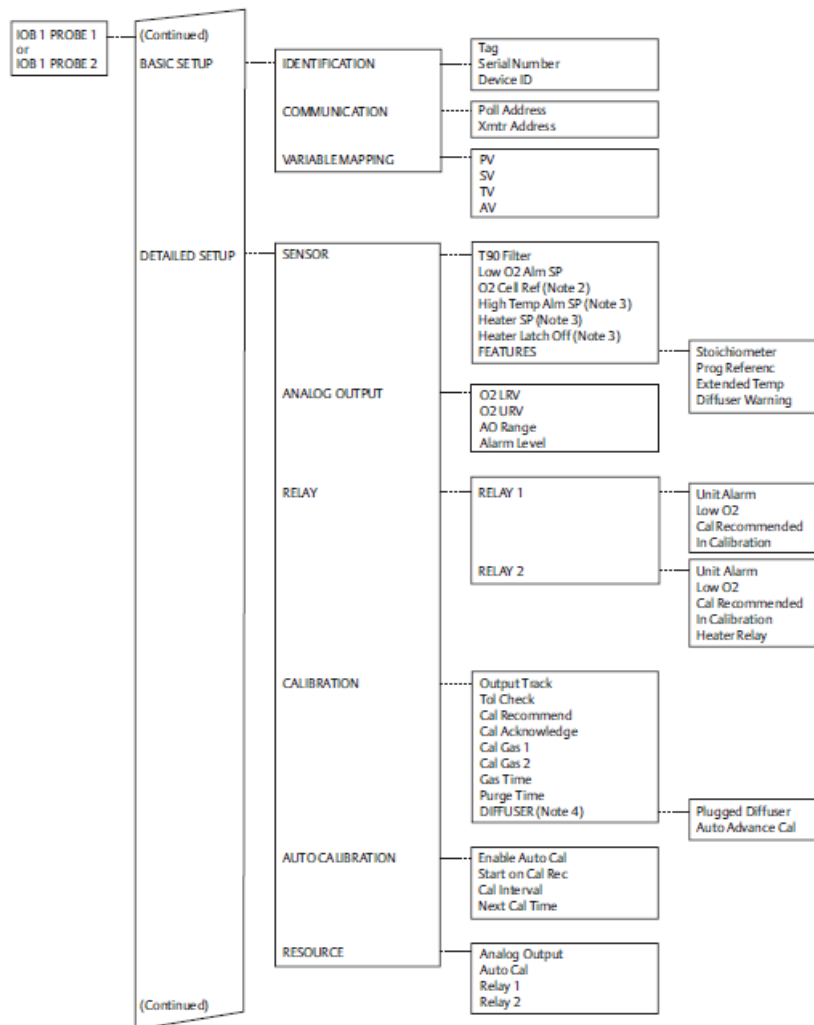


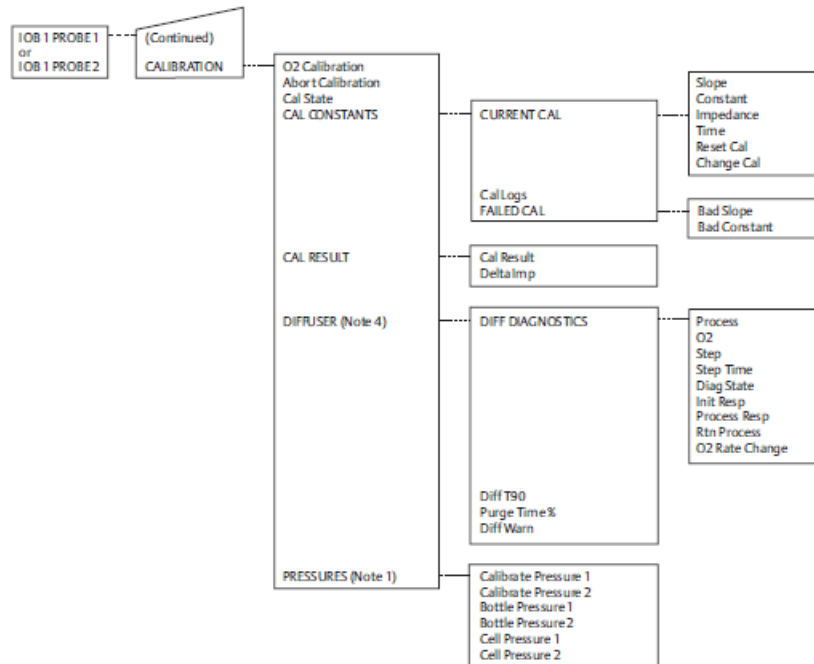








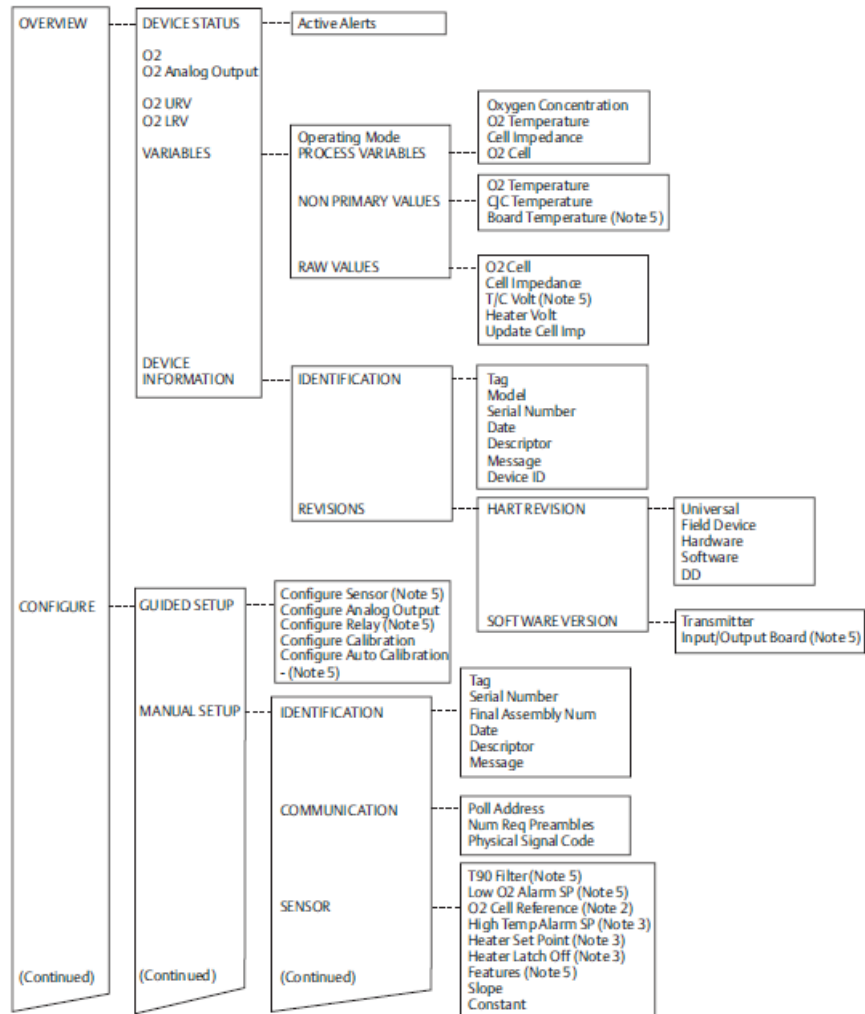


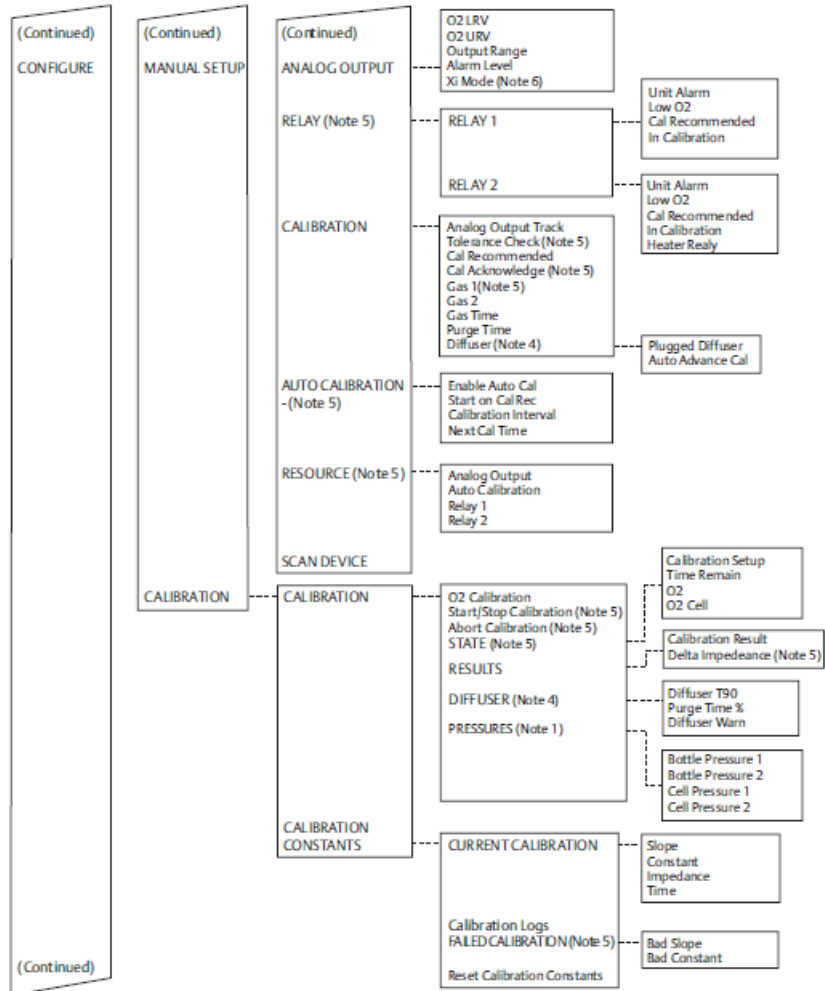


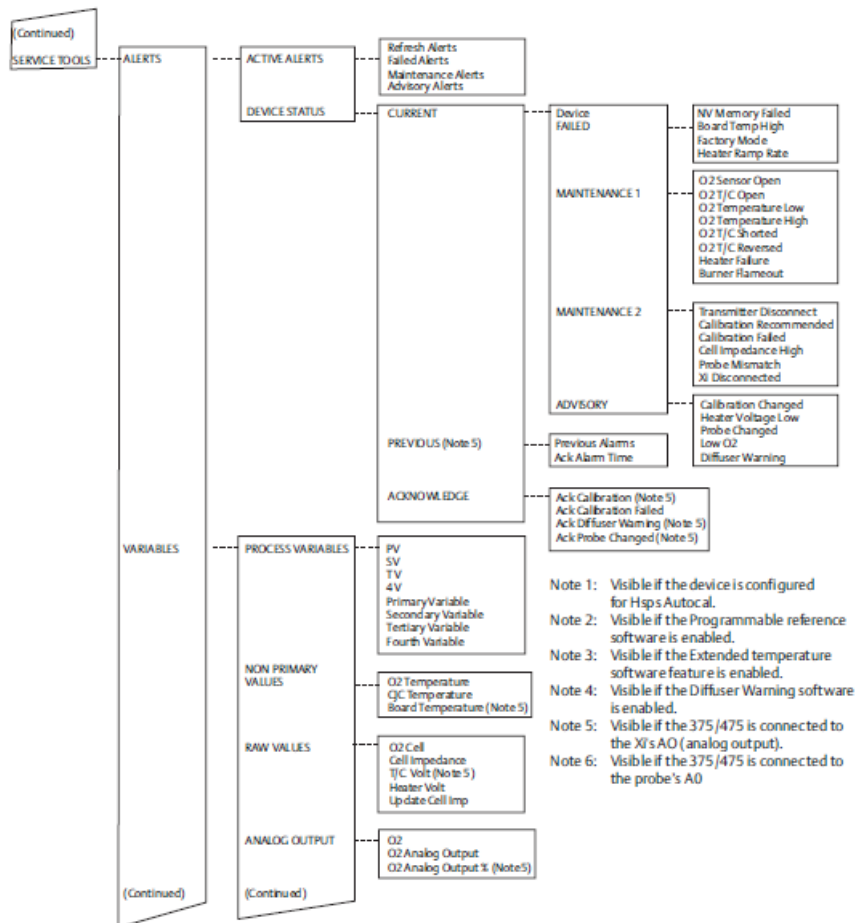
- Note 1: Visible if the device is configured for HSPS Autocal.  
 Note 2: Visible if the Programmable References software feature is enabled.  
 Note 3: Visible if the Extended Temperature software feature is enabled.  
 Note 4: Visible if the Diffuser Warning software feature is enabled.



Figure 3-3: HART Menu Trees - 375/475 Field Communicator







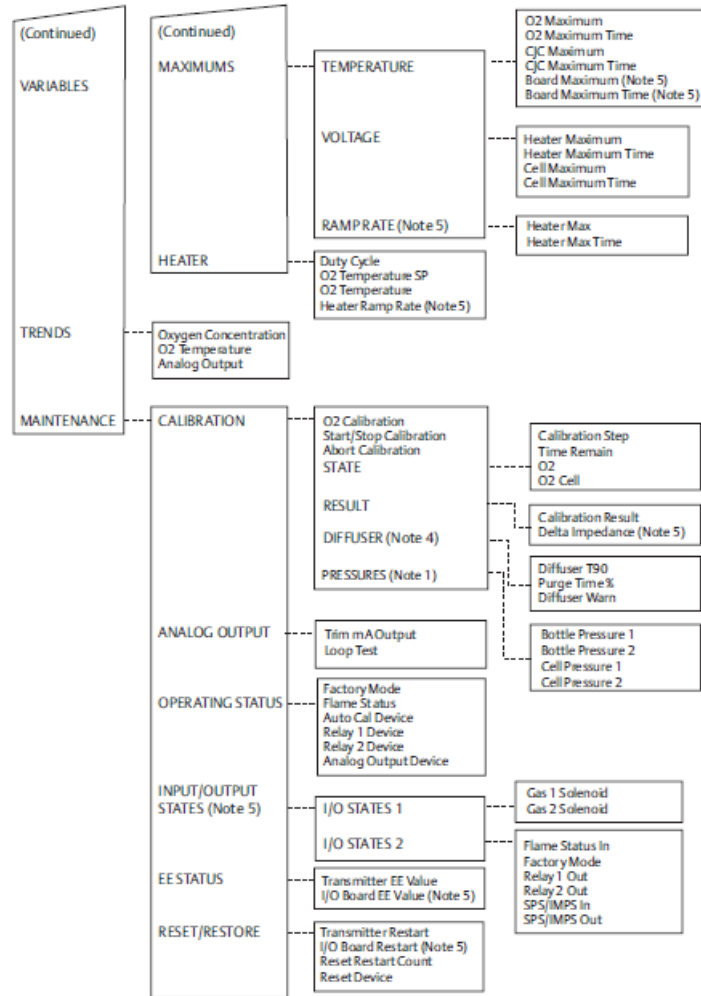
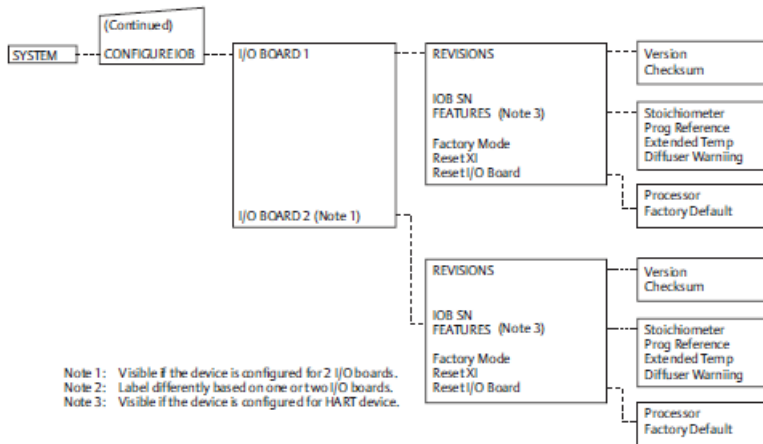
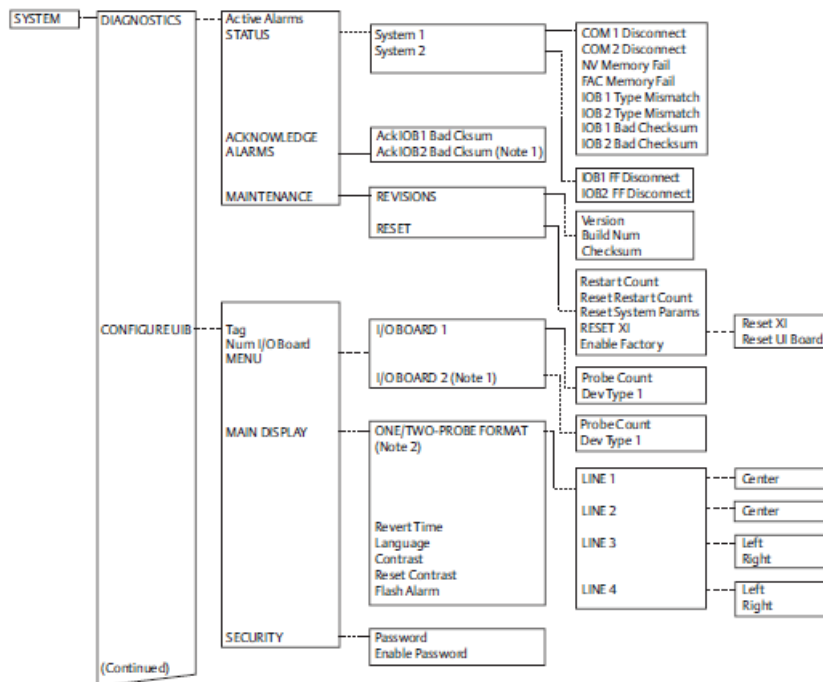
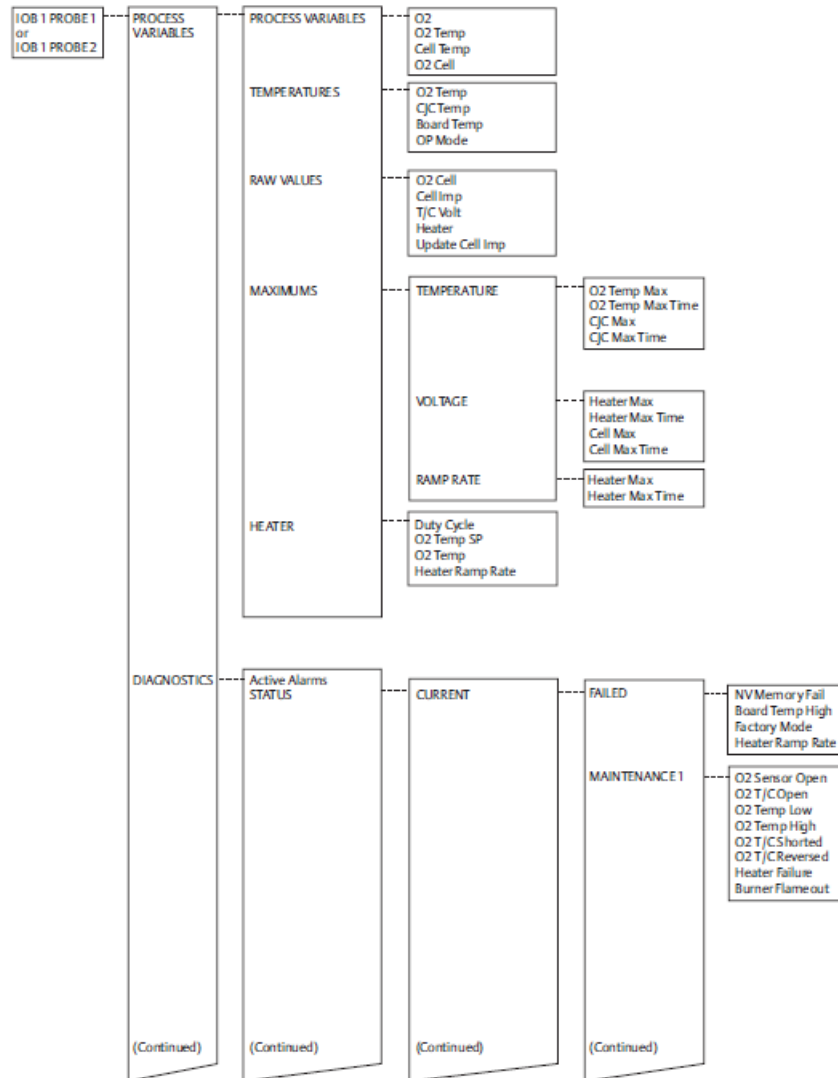
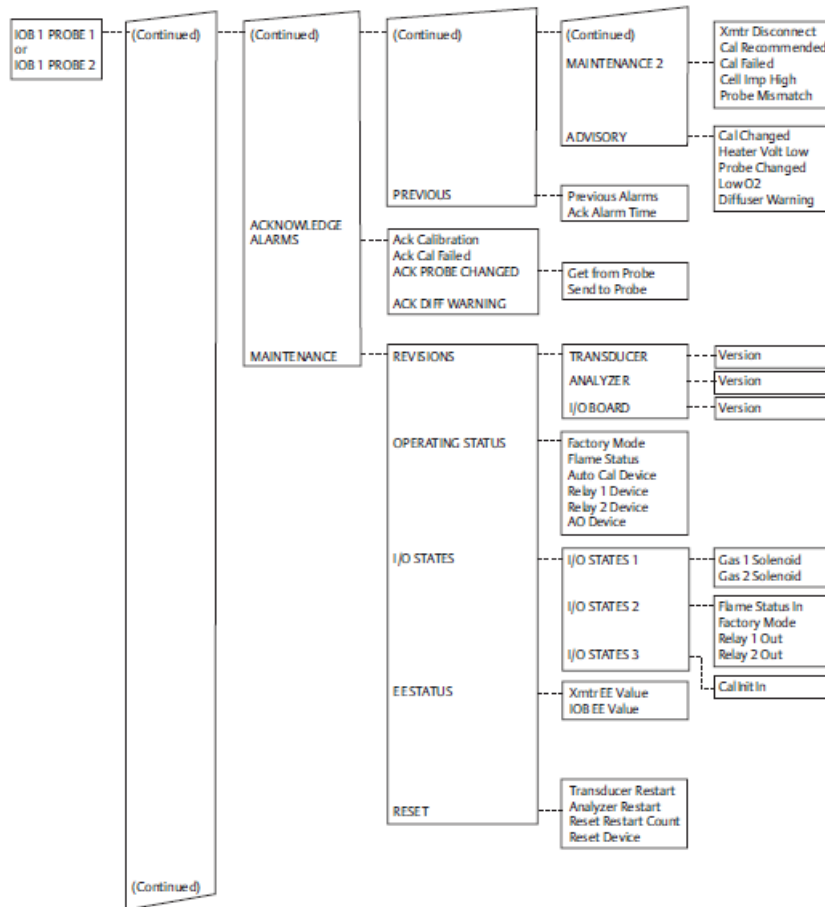


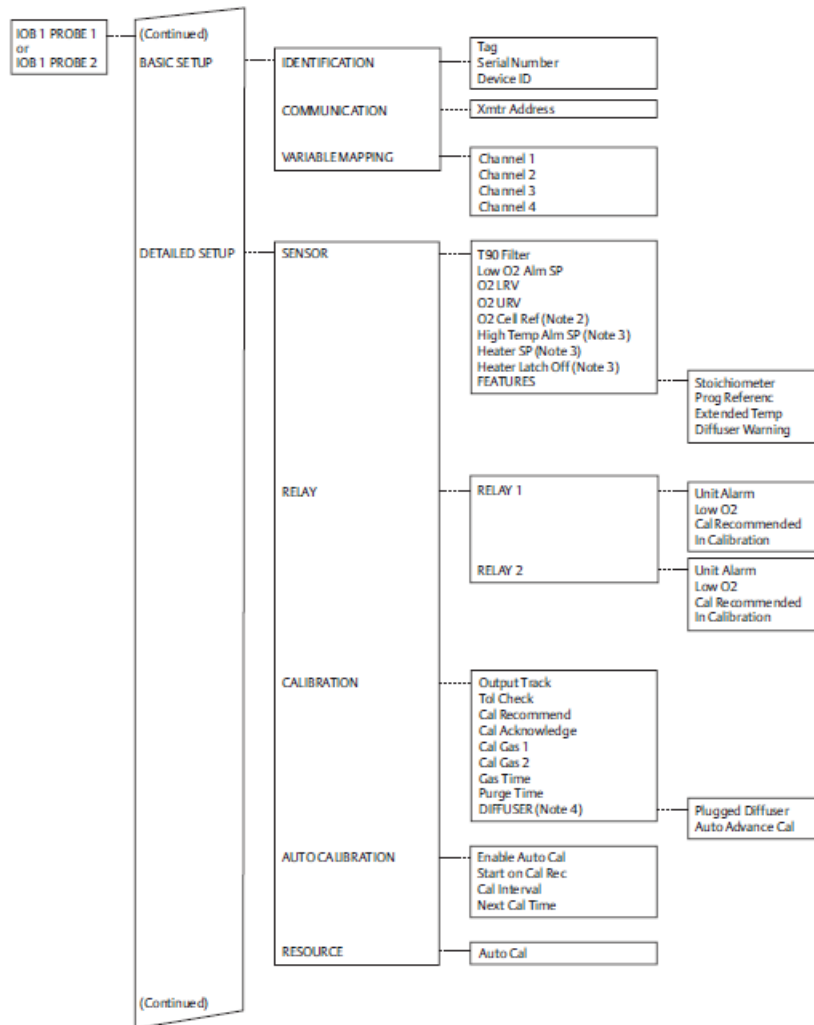
Figure 3-4: FOUNDATION Fieldbus Menu Trees - Rosemount 688Xi



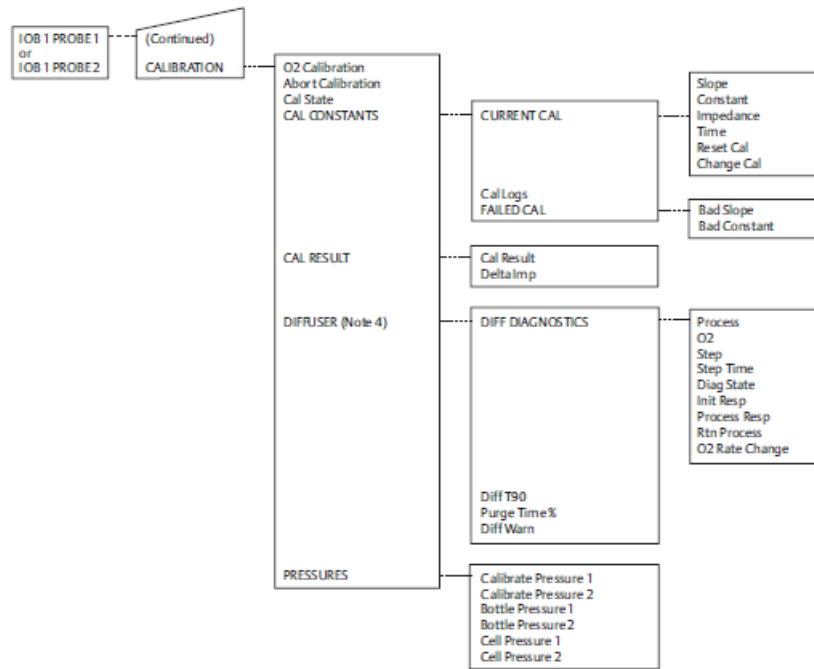
Note 1: Visible if the device is configured for 2 I/O boards.  
 Note 2: Label differently based on one or two I/O boards.  
 Note 3: Visible if the device is configured for HART device.





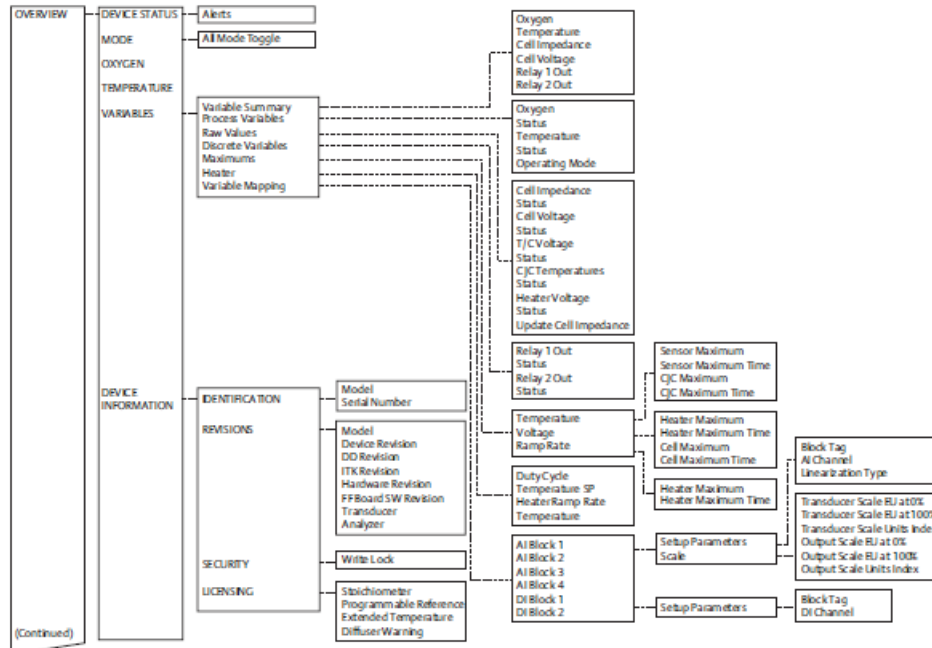




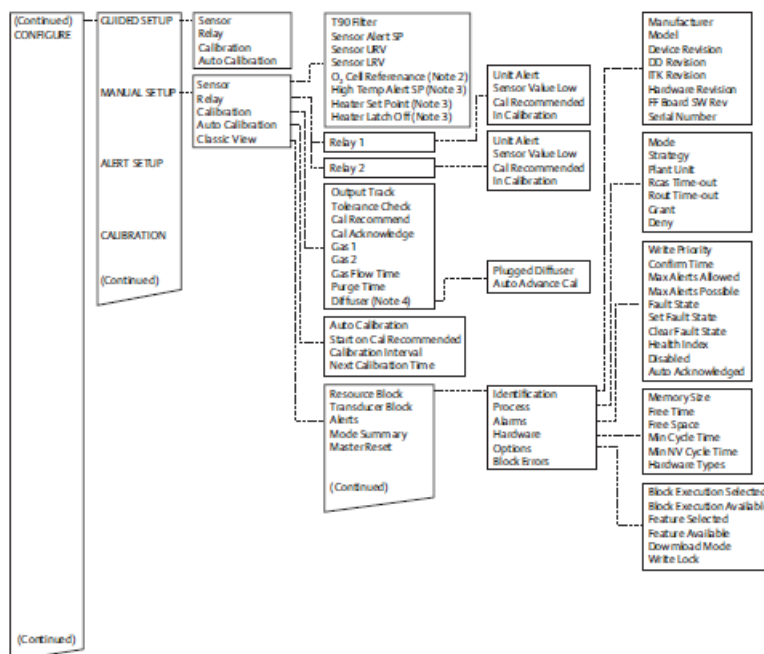


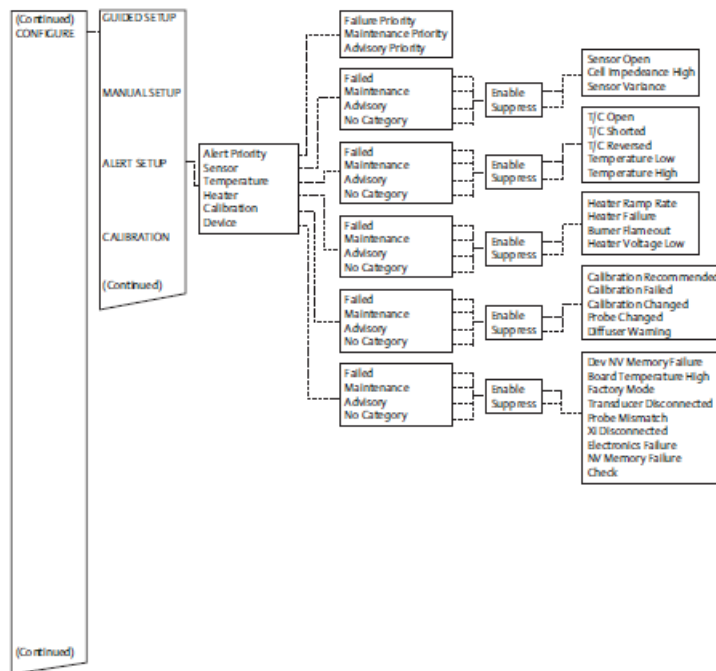
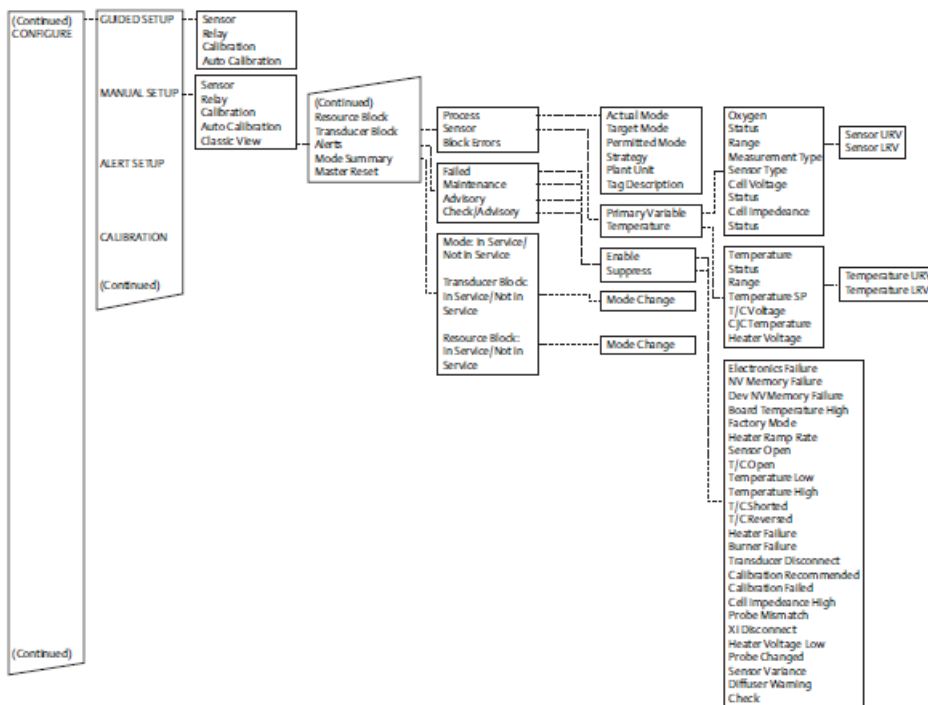
- Note 1: N/A
- Note 2: Visible if the Programmable References software feature is enabled.
- Note 3: Visible if the Extended Temperature software feature is enabled.
- Note 4: Visible if the Diffuser Warnings software feature is enabled.
- Note 5: Visible if the Factory Mode switch is on.

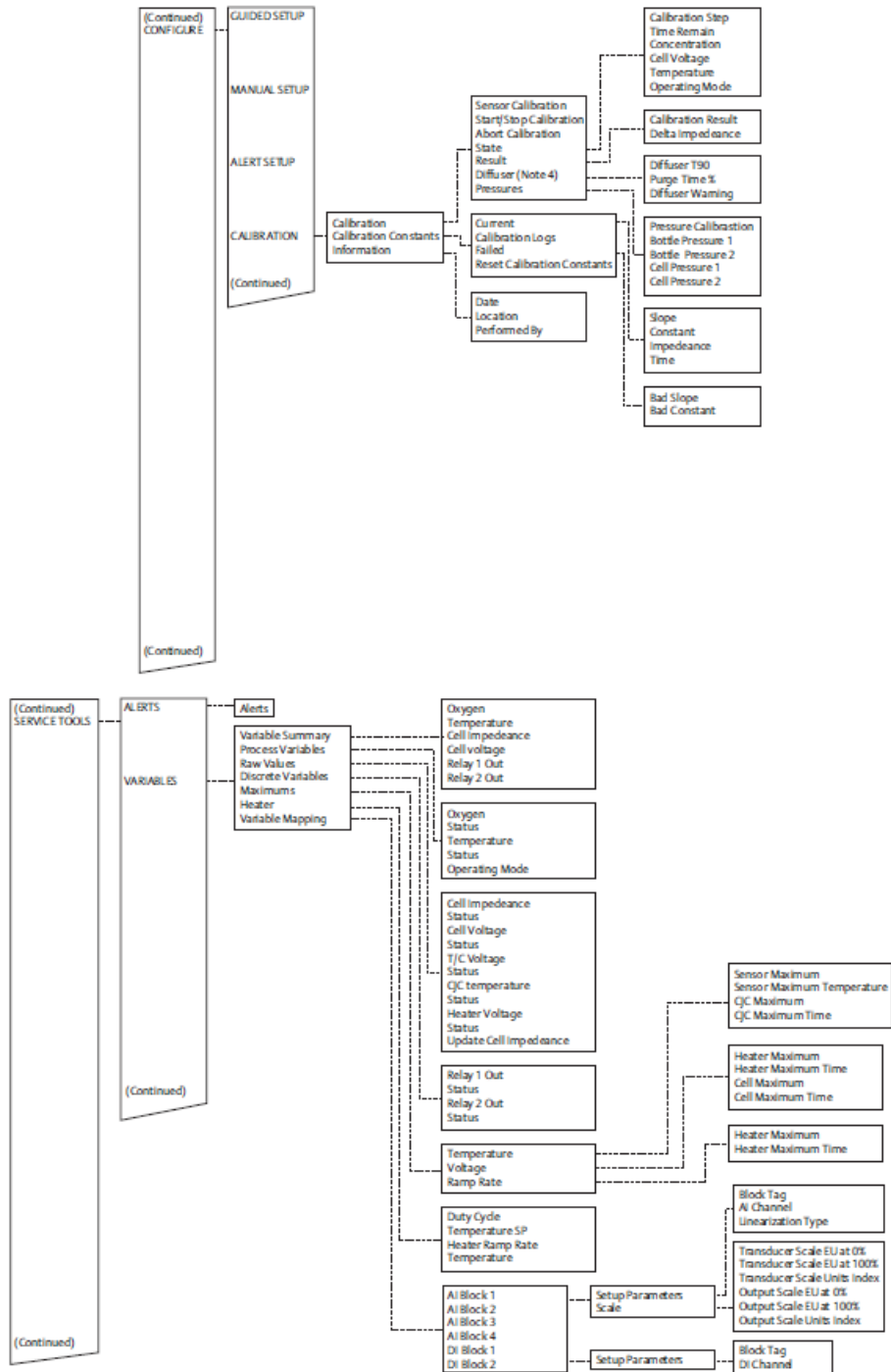
Figure 3-5: FOUNDATION Fieldbus Menu Trees - 375/475 Field Communicator

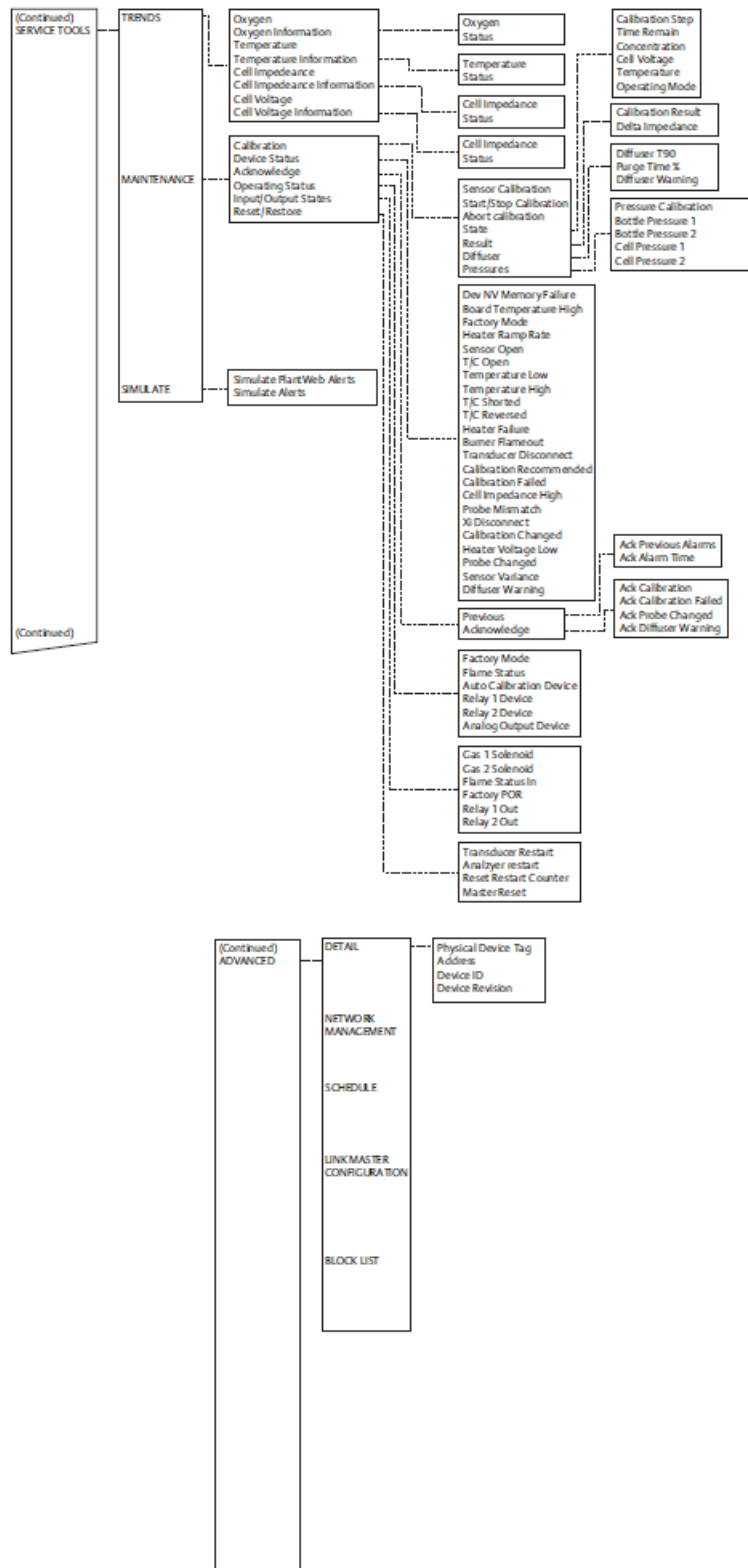


- Note 1: N/A
- Note 2: Visible if the Programmable Reference software feature is enabled.
- Note 3: Visible if the Extended Temperature software is enabled.
- Note 4: Visible if the Diffuser Warning software feature is enabled.









## 3.8 System parameter descriptions

Among the parameters available through the 375/475 Communicator menus are a number of system parameters, which define variables that configure a specific probe in the analyzer system. System parameters are described in the following table.

**Table 3-1: System Parameters**

Parameter name	Unit	Description
O <sub>2</sub>	%	Current oxygen concentration value (O <sub>2</sub> %). The value should reflect the last good O <sub>2</sub> value if it is in the <i>Lock</i> state during calibration.
O <sub>2</sub> Temp	°C	Current O <sub>2</sub> sensor temperature.
CJC Temp	°C	Current cold junction temperature.
O <sub>2</sub> Cell	mV	Raw mV value for O <sub>2</sub> sensor.
Cell Imp	ohm	Cell impedance/sensor resistance measured.
Heater	V	Heater voltage.
O <sub>2</sub> AO	mA	Analog output value represents the O <sub>2</sub> concentration measurement.
O <sub>2</sub> Temp Max	°C	This is the highest O <sub>2</sub> sensor temperature reached since last reset.
O <sub>2</sub> Temp Max Time	Days ago	Time stamp of the highest O <sub>2</sub> sensor temperature reached since last reset.
Temperature   CJC Max	°C	This is the highest temperature reached at the cold junction since last reset.
Temperature   CJC Max Time	Days ago	Time stamp of the highest temperature reached at the cold junction since last reset.
Voltage   Heater Max	°C	This is the highest heater voltage reached since last reset.
Voltage   Heater Max Time	Days ago	Time stamp of the highest heater voltage reached since last reset.
Voltage   Cell Max	°C	This is the highest cell voltage reached since last reset.
Voltage   Cell Max Time	Days ago	Time stamp of the highest cell voltage reached since last reset.
OP Mode	--	Device operating mode: <i>PO</i> = Power up <i>WU</i> = Warm up (analog output is railed) <i>NM</i> = Normal operation <i>CA</i> = Calibrating (analog output can be tracking or locked at last good value based on <i>AO Tracks</i> configuration) <i>AL</i> = Alarm detected (recoverable) <i>SF</i> = Alarm detected (non-recoverable)

**Table 3-1: System Parameters (continued)**

Parameter name	Unit	Description
Active alarms	--	Current alarms (see <a href="#">Troubleshoot</a> )
Device	--	Alarm state
Failed	--	Alarm state: On/Off NV Memory Fail, Board Temp High, Factory Mode, Heater Ramp Rate
Maintenance 1	--	Alarm state: On/Off O <sub>2</sub> Sensor Open, O <sub>2</sub> T/C Open, O <sub>2</sub> Temp Low, O <sub>2</sub> Temp High, O <sub>2</sub> T/C Shorted, O <sub>2</sub> T/C Reversed, Heater Failure, Burner Flameout
Maintenance 2	--	Alarm state: On/Off Xmtr Disconnect, Cal Recommended, Cal Failed, Cell Imp High, Probe Mismatch
Advisory	--	Alarm state: Xmtr Disconnect, Cal Recommended, Cal Failed, Cell Imp High, Probe Mismatch
Duty Cycle	--	O <sub>2</sub> heater duty cycle. Value between 0 and 1.
O <sub>2</sub> Temp SP	°C	PID temperature set point.
Heater Ramp Rate	°C/sec	Heater ramp rate calculated in °C per second.
Operating Status	--	Device configuration: On/Off Factory Mode, Flame Status (IO Board DIP Switch setting), Auto Cal Device, Relay 1 Device, Relay 2 Device, AO Device
Xmtr EE Val	--	Analyzer board nonvolatile memory diagnostic.
Xmtr Restart	--	Software restart count for the analyzer.
HART   Device Rev	--	HART device revision number.
Analyzer   Version	--	Software version number for the analyzer.
Tag	--	Device tag: Up to 8 characters long.
Serial Number	--	Probe serial number.
Device ID	--	Unique device ID number. (HART)
PV	--	Primary variable assignment: O <sub>2</sub> (HART).
SV	--	Secondary variable assignment: Cell imp (HART).
TV	--	Third variable assignment: Cell imp (HART).
4V	--	Fourth variable assignment: O <sub>2</sub> cell (HART).
Xmtr Address	--	Analyzer board polling address.
O <sub>2</sub> LRV	%	Primary variable (O <sub>2</sub> %) lower range value.
O <sub>2</sub> URV	%	Primary variable (O <sub>2</sub> %) upper range value.

**Table 3-1: System Parameters (continued)**

Parameter name	Unit	Description
Alarm Level	--	O <sub>2</sub> alarm level 0 = 3.5 mA 1 = 21.1 mA
Cal Gas 1	%	Test gas 1 value. This is the actual value of the gas being applied during the Test Gas 1 phase of a calibration.
Cal Gas 2	%	Test gas 2 value. This is the actual value of the gas being applied during the Test Gas 2 phase of a calibration.
Gas Time	sec	Test gas application time. This is the length of time test gases are applied to the O <sub>2</sub> probe during low or high test gas phase of a calibration.
Purge Time	sec	Test gas purge time. This is the length of time before the output will be returned to the process reading after a calibration.
Slope	mV/Dec	Current calibration slope. This is the slope value that was calculated as a result of the last successful calibration.
Constant	mV	Current calibration constant. This is the constant value that was calculated as a result of the last successful calibration.
Impedance	ohm	Cell impedance. This is the sensor resistance that was calculated as a result of the last successful calibration.
Time	Days ago	Time stamp of the last successful calibration.
Cal Logs   Slope	mV/Dec	Previous calibration slope. There are ten calibration results. 1 is the most recent, and 10 is the least recent calibration slope.
Cal Logs   Constant	mV	Previous calibration constant. There are ten calibration results. 1 is the most recent, and 10 is the least recent calibration constant.
Cal Logs   Impedance	ohm	Previous cell impedance. This is the sensor resistance that was calculated as a result of a previous successful calibration. There are ten calibration results. Index 1 is the most recent, and Index 10 is the least recent sensor resistance measured.
Cal Logs   Time	Days ago	Time stamp of the previous successful calibration. There are ten calibration time stamps. Index 1 is the most recent, and Index 10 is the least recent time stamp.



Table 3-1: System Parameters (continued)

Parameter name	Unit	Description
Cal Result	--	Calibration result: 0 = None 1 = Success 2 = Failed constant 3 = Failed slope 4 = Failed temperature 5 = Gas 1 tolerance error 6 = Gas 2 tolerance error 7-10 (future) 11 = AutoCal no resp 12 = AutoCal out of sync 13 = AutoCal abort 14 = No solenoid 15 = Warmup abort 16 = Alarm abort

## 3.9 Parameter setup

### 3.9.1 Test gas values

Use a Field Communicator to set test gas values for calibration. A Rosemount 6888A shipped from the factory has test gas values for low and high set to 0.4% and 8.0% respectively. Perform this process each time an analyzer board is replaced.

#### Procedure

1. Use the 375/475 Field Communicator to access the main HART menu.
2. From the main menu, select CONFIGURE.
3. From the **CONFIGURE** menu, select MANUAL SETUP.
4. From the **MANUAL SETUP** menu, select CALIBRATION.
5. From the **CALIBRATION** menu, select GAS 1.
6. Press the **Right** key to edit the gas value.
7. Use the stylus to enter the new gas value. Then press **ENTER** when finished.
8. Use the stylus to select **SEND** to update the Rosemount 6888A.
9. Repeat steps 5 through 8 for Gas 2.

## 3.9.2 Set test gas times

Use a Field Communicator to set test gas flow time and purge time for calibration.

A Rosemount 6888A shipped from the factory has test gas flow time and purge time set to 300 seconds. You must complete the process each time an analyzer board is replaced.

### Procedure

1. Use the 375/475 Field Communicator to access the main HART menu.
2. From the main menu, select CONFIGURE.
3. From the **CONFIGURE** menu, select MANUAL SETUP.
4. From the **MANUAL SETUP** menu, select CALIBRATION.
5. From the **CALIBRATION** menu, select GAS TIME.
6. Press the **Right** key to edit the gas value.
7. Use the stylus to enter the new gas value; then press **ENTER** when finished.
8. Use the stylus to select SEND to update the Rosemount 6888A.
9. From the **GAS TIME** menu, select PURGE TIME.
10. Press the **Right** key to edit the gas value.
11. Use the stylus to enter the new gas value; then press **ENTER** when finished.
12. Use the stylus to select SEND to update the Rosemount 6888A.

## 3.9.3 Track output during calibration

Use a Field Communicator to set how the analog output value will function during calibration.

A Rosemount 6888A shipped from the factory has output tracking set to No, i.e., the analog output holds the last value during the calibration cycle. You must perform this process each time an analyzer board is replaced.

### Procedure

1. Use the 375/475 Field Communicator to access the main HART menu.
2. From the main menu, select CONFIGURE.
3. From the **CONFIGURE** menu, select MANUAL SETUP.
4. From the **MANUAL SETUP** menu, select CALIBRATION.
5. From the **CALIBRATION** menu, select ANALOG OUTPUT TRACK.
6. Press the **Right** key to edit, then the **Up** and **Down** keys to select YES or NO.
  - No - The analog output holds the last value during calibration.
  - Yes - The analog output tracks the actual measurement during calibration.
7. Use the stylus to press ENTER when finished.
8. Use the stylus to press SEND to update the Rosemount 6888A.

## 3.9.4 Configure analog output

The analog output signal from the Rosemount 6888A can be configured for the 4-20 mA range and fault condition. A separate configuration is set up when the Rosemount 6888A is used with the optional Rosemount 6888Xi Advanced Electronics. When the Rosemount 6888A is used without the Rosemount 6888Xi, this parameter must be set to NO. If it is set to YES and a Rosemount 6888Xi is not connected, the Rosemount 6888A triggers an alarm and forces the analog output to the fault level. If the Rosemount 6888A is used later with a Rosemount 6888Xi, the Rosemount 6888Xi automatically sets this parameter to YES.

A Rosemount 6888A shipped from the output has the analog outputs set to 4 to 20 mA range with a 3.5 mA alarm level. You must complete the process each time an analyzer board is replaced.

1. Use the 375/475 Field Communicator to access the main HART menu.
2. From the main menu, select CONFIGURE.
3. From the **CONFIGURE** menu, select MANUAL SETUP.
4. From the **MANUAL SETUP** menu, select ANALOG OUTPUT.
5. From the **ANALOG OUTPUT** menu, select from the following parameters; then press **ENTER**.
  - O<sub>2</sub> LRV: O<sub>2</sub> value at lower analog output value (0% at 4 mA, non-configurable)
  - O<sub>2</sub> URV: O<sub>2</sub> value at upper analog output value (50% max at 20 mA)
  - Output Range: Range of analog output (4-20 mA, non-configurable)
  - Alarm level: O<sub>2</sub> alarm level (3.5 mA or 21.1 mA)
  - Rosemount Xi Mode: Selects whether or not the Rosemount 6888A is used with a Rosemount 6888Xi (should always be set to NO for a stand-alone Rosemount 6888A)
6. Use the stylus to enter the value; then press ENTER when finished.
7. Use the stylus to press SEND to update the Rosemount 6888A.

## 3.10 Calibrate

New O<sub>2</sub> cells may operate for more than a year without requiring calibration, but older cells may require calibration every few weeks as they near the end of their life.

A **CALIBRATION RECOMMENDED** alarm provides notice of when a calibration is required. This strategy ensures that the O<sub>2</sub> reading is always accurate and eliminates many unnecessary calibrations based on calendar days or weeks since previous calibration.

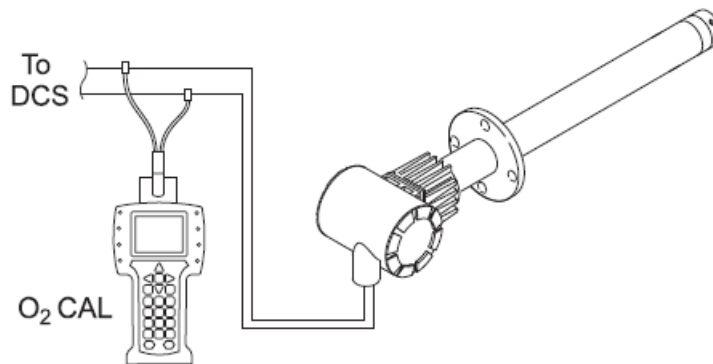
You can calibrate the Rosemount 6888A Analyzer manually through the handheld 375/475 Field Communicator or the optional Rosemount 6888Xi. Fully automatic calibration can be performed using the optional Rosemount 6888Xi advanced

electronics and the Rosemount SPS4001B Single Probe Autocalibration Sequencer or the Rosemount IMPS 4000 Intelligent Multiprobe Sequencer.

### 3.10.1 Calibrate manually

This section covers manual calibration. For automatic calibration details, see the [Rosemount SPS 4001B Single Probe Autocalibration Sequencer Manual](#).

**Figure 3-6: Simplified calibration method**



#### Procedure

1. Use the Field Communicator to access the main HART® menu.
2. From the main menu, select CONFIGURE.
3. From the **CONFIGURE** menu, select CALIBRATION.
4. From the **CALIBRATION** menu, again select CALIBRATION.
5. From the **CALIBRATION** menu, select O<sub>2</sub> CALIBRATION.

#### **⚠ WARNING**

Failure to remove the Rosemount 6888A from automatic control loops prior to performing this procedure may result in a dangerous operating condition.

In the first screen, a Loop should be removed from automatic control warning occurs.

6. Remove the Rosemount 6888A from any automatic loop controls to avoid a potentially dangerous operating condition. Press **OK** when ready.
7. At the next screen, when the step shows `APPLY GAS 1`, press **OK** to continue.
8. When Flow Gas 1 and Read Gas 1 are complete and the step shows `APPLY GAS 2`, press **OK** to continue.
9. When Flow Gas 2 and Read Gas 2 are complete and the step shows `STOP GAS`, press **OK** to continue the calibration with purge.

10. When the screen shows `Loop may be returned to automatic control`, press **OK** to return to the **CALIBRATION** screen.
11. On the **CALIBRATION** screen, select **RESULT**.  
On the **RESULT** screen, the results of the calibration are displayed. In the event the calibration cycle fails, the reason is displayed here as well. The calibration results are described as follows:
  - Success** Calibration completed successfully
  - Failed Constant** The calculated calibration constant is outside the range of  $\pm 20.00$ .
  - Failed Slope** The calculated calibration slope is outside the suggested range of 34.5 to 57.5.
  - WarmUp Abort** Attempted to perform a calibration during warm-up.
  - Alarm Abort** Another alarm occurred and caused the calibration cycle to abort.
12. In the event of a calibration failure, do the following:
  - a) From the **RESULT** menu, press **HOME** to return to the main menu.
  - b) From the main menu, select **SERVICE TOOLS**.
  - c) From the **OVERVIEW** menu, select **ALERTS**.
  - d) From the **ALERTS** menu, select **ACTIVE ALERTS**.  
The **ACTIVE ALERTS** menu should contain an **A: CALIBRATION FAILED** alarm.
  - e) Press the **Left** key to return to the **ALERTS** menu.
  - f) From the **ALERTS** menu, select **DEVICE STATUS**.
  - g) From the **DEVICE STATUS** menu, select **ACKNOWLEDGE**.
  - h) From the **ACKNOWLEDGE** menu, select **ACK CALIBRATION FAILED**.

When the process is complete, the system returns to the **ACKNOWLEDGE** menu.

## 3.10.2 Calibration log

The Rosemount 6888A stores the current and previous 10 calibrations. The stored data includes the slope, constant, cell impedance, and time (in days) since that calibration. The log can be accessed as follows:

Using the Field Communicator: **Configure** → **Calibration** → **Calibration Constants** → **Calibration Logs**.

When first entering the log, the screen displays `Calibration 1`. This is the most recent previous calibration, not the current calibration. `Calibration 0` displays the current calibration. Use the keypad or communicator keys to navigate through the logs. The factory default for log entries is a slope of 50.00 mV/Dec and a constant of 0.00 mV. Any log entries with these values means there have not been at least 10 calibrations performed to fill the entire log.

## 3.11 D/A trim

The D/A trim procedure is used to calibrate the 4-20 mA output signal to a precision mA measurement device. Only the signal to the DCS needs to be trimmed.

### Procedure

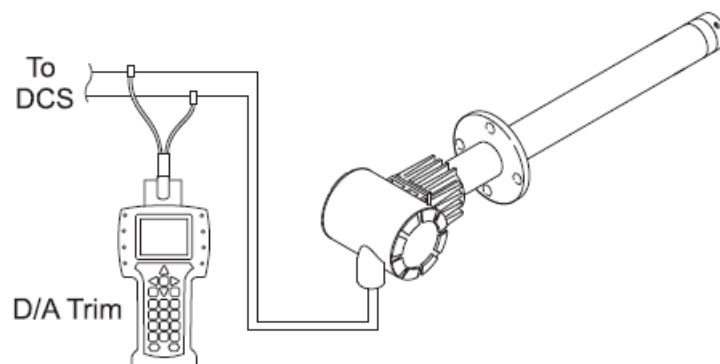
1. Use the 375/475 Field Communicator to access the main HART menu.
2. From the main menu, select SERVICE TOOLS.
3. From the **SERVICE TOOLS** menu, select MAINTENANCE.
4. From the **MAINTENANCE** menu, select ANALOG OUTPUT.
5. From the **ANALOG OUTPUT** menu, select TRIM mA OUTPUT.  
In the first screen, a Loop should be removed from automatic control warning occurs.

### ⚠ WARNING

Failure to remove the Rosemount 6888A from automatic control loops prior to performing this procedure may result in a dangerous operating condition.

6. Remove the Rosemount 6888A from any automatic control loops to avoid a potentially dangerous operating condition. Press **OK** when ready.
7. Follow the prompts on the 375/475 to perform the trim.
8. Use the stylus to enter the new measured analog output value; then press **ENTER** to accept.
9. When trim is complete, press **OK** to return to the **ANALOG OUTPUT** menu.

Figure 3-7: D/A Trim Method - Simplified



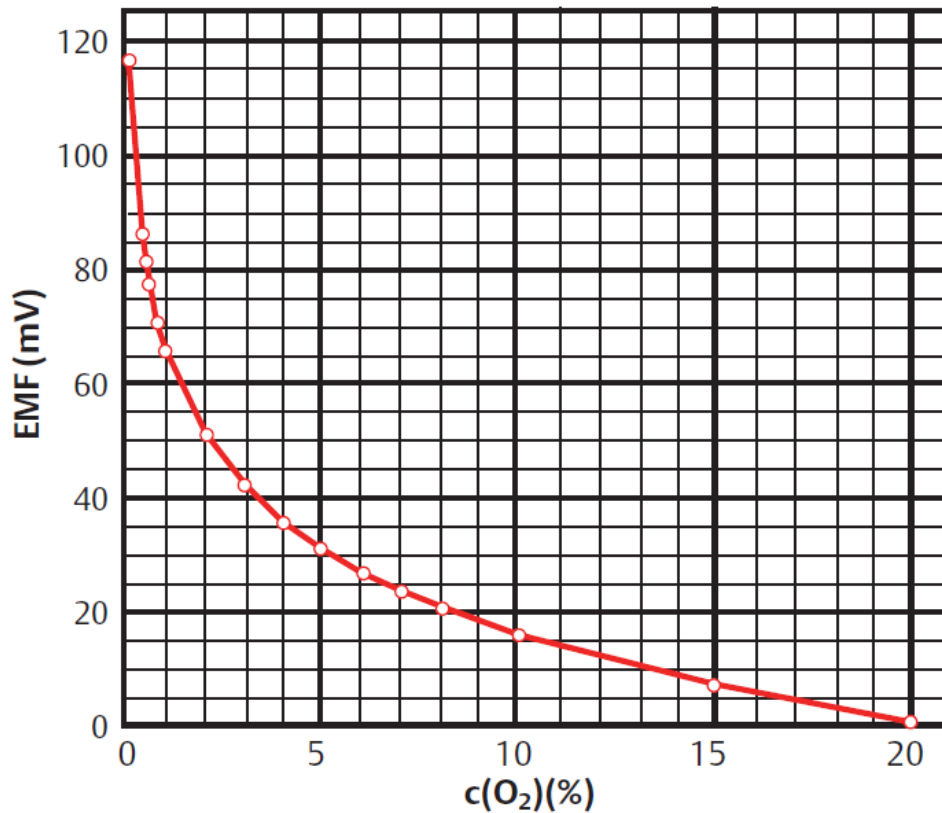
## 4 Troubleshoot

### 4.1 Overview

When the zirconium oxide sensing cell is heated to its setpoint [736 °C (1357 °F)], the cell generates a voltage that represents the difference between the process O<sub>2</sub> % and the reference O<sub>2</sub> % inside the probe (20.95% O<sub>2</sub> instrument or ambient air).

When flowing calibration gases, the raw cell millivolt value should represent the levels on the chart in [Figure 4-1](#). Note that the raw cell millivolt value increases logarithmically as the O<sub>2</sub> concentration decreases.

**Figure 4-1: O<sub>2</sub> Sensor mV Reading vs %O<sub>2</sub> at 736 °C (1357 °F) (Reference Air, 20.95% O<sub>2</sub>)**



O <sub>2</sub> %	EMF (mV)
100	-34
20	1.0
15	7.25
10	16.1
9	18.4
8	21.1
7	23.8
6	27.2
5	31.2
4	36.0
3	42.3
2	51.1
1	66.1
0.8	71.0



O <sub>2</sub> %	EMF (mV)
0.6	77.5
0.5	81.5
0.4	86.3
0.2	101.4
0.1	116.6
0.01	166.8

## 4.2 Electrical issues

### ⚠ WARNING

#### ELECTRIC SHOCK

Install all protective equipment covers and ground leads after troubleshooting. Failure to install covers and ground leads could result in serious injury or death.

Consider the following equipment conditions, features, and requirements when troubleshooting a problem.

### 4.2.1 Grounding

It is essential that adequate grounding precautions are taken when installing the system.

Thoroughly check both the probe and electronics to ensure the grounding quality has not degraded during fault finding. The system provides facilities for 100 percent effective grounding and total elimination of ground loops.

### 4.2.2 Electrical noise

Emerson designed the analyzer to operate in an environment normally found in a boiler room or control room.

Noise suppression circuits are employed on all field terminations and main inputs. When fault finding, evaluate the electrical noise being generated in the immediate circuitry of a faulty system. Ensure all cable shields are connected to earth.

### 4.2.3 Electrostatic discharge

### ⚠ CAUTION

Electrostatic discharge can damage ICs in the electronics.

Before removing or handling the processor board or the ICs, ensure you are at ground potential.

## 4.3 Alarm indications

The operators running the process are usually the first to recognize a problem at the O<sub>2</sub> measuring system. Critical alarms that render the O<sub>2</sub> measurement unusable will force the 4-20 mA analog output signal representing O<sub>2</sub> to go to a default condition, as follows:

4-20 mA signal alarm level	Analyzer condition
0 mA	Analyzer power is off or completely failed
3.5 mA	Critical alarm - analyzer reading unusable (factory default)
3.8 mA	Reading under range (Example - you set range to 2-10%. Current reading is 1.9%.)
4 to 20 mA	Normal operation
20.5 mA	Reading over range (Example - range is 0-10%. Current reading is 12%.)
>21 mA	Critical alarm - analyzer reading is unusable (you can choose this alarm level instead of the factory default level of 3.5 to 3.6 mA).

### NOTICE

To ensure correct operation, make sure that the Digital Control System is configured to interpret signal levels correctly.

Once an alarm condition is identified, the Rosemount 6888A offers several diagnostics to interpret the specific alarm.

Alarm indications are available via the optional Rosemount 6888 Xi or the Field Communicator and Rosemount Asset Management Solutions (AMS) software. When the error is corrected and/or power is cycled, the diagnostic alarms will clear or the next error on the priority list will appear.

## 4.4 Identifying and correcting fault indications

There are two types of alarms: recoverable and non-recoverable. If an existing alarm is recoverable, the alarm-active indication disappears when the alarm condition no longer exists. If an alarm is not recoverable, the alarm indication continues to be displayed after the cause of the alarm condition is corrected. AC power to the transmitter must be cycled to clear a non-recoverable alarm.

Alarm messages are displayed on the optional Rosemount 6888Xi or the Field Communicator. A listing of the alarm/fault messages and the related fault status descriptions are shown in [Table 4-1](#).

Fault conditions that give no fault indication and that allow the probe to pass calibration are listed and discussed in [Calibration passes, but still reads incorrectly](#).

**Table 4-1: Diagnostic/Unit Alarm Fault Definitions**

Message	Status	Alert	Self clearing	Rail A out
NV Memory Fail	A checksum error was detected in the nonvolatile memory configuration data when the unit was turned on. Default values have been loaded. Check to see that your configurations have not been changed. Cycle the power to clear alarm.	Failed	No	Yes
Board Temp High	The electronics board reading is above the threshold. The board may not function correctly. The predefined temperature threshold is 86 °C (187 °F) for IO board or 126 °C (259 °F) for transmitter board.	Failed	No	Yes
O2 Sensor Open	The cell impedance is reading less than -1.0 Vdc, indicating the O <sub>2</sub> sensor wires may be disconnected or the O <sub>2</sub> sensor junction may be open. Check wiring.	Maint	Yes	Yes
O2 TC Open	The O <sub>2</sub> sensor heater thermocouple voltage is reading more than 0.065 volt, indicating the thermocouple wires may be disconnected or the thermocouple junction may be open. Check wiring.	Maint	Yes	Yes
O2 Temp Low	The sensor heater temperature is below the low temperature threshold. If extended temperature feature is not enabled, the pre-defined low temperature threshold is 726 °C (1339 °F). If extended temperature feature is enabled, the pre-defined low temperature threshold is 726 °C (1339 °F) if the Heater SP is set to Normal or 540 °C (1030 °F) if it is set to Low.	Maint	Yes	Yes

**Table 4-1: Diagnostic/Unit Alarm Fault Definitions (continued)**

Message	Status	Alert	Self clearing	Rail A out
O2 Temp High	The heater temperature is above the defined temperature threshold. If extended temperature feature is not enabled, the pre-defined high temperature threshold is 750 °C (1382 °F). If extended temperature feature is enabled, the high temperature threshold is defined by the High Temp Alm SP parameter.	Maint	Yes	Yes No
O2 T/C Shorted	This diagnostic is only intended to detect a copper short of the thermocouple connections at the electronic connector. The cell heater T/C voltage is reading close to zero, indicating the thermocouple wires may be shorted.	Maint	Yes	Yes
O2 T/C Reversed	The O <sub>2</sub> sensor heater temperature thermocouple voltage is reading a negative voltage, indicating the thermocouple wire connections may be reversed. Check wiring.	Maint	Yes	Yes
Cal Failed	A calibration error occurred during the last calibration. Check the cal result for more details. Acknowledge calibration failed or recalibrate to clear alarm.	Maint	Yes	No
Cell Imp High	The O <sub>2</sub> sensor impedance/cell resistance value measurement is greater than 2000 Ohms, indicating the cell may be beyond its useful life.	Maint	Yes	No
Xi Disconnect	It indicates using transmitter's AO when connected to Rosemount 6888Xi and Rosemount 6888Xi is disconnected.	Maint	Yes	Yes
Htr Voltage Low	The heater voltage for the O <sub>2</sub> heater is below 30 volts. Check heater power.	Adv	Yes	No

## 4.5 Calibration passes, but still reads incorrectly

There are a few fault conditions where no alarm indication is present and the probe passes calibration, but the O<sub>2</sub> reading may still be incorrect.

An incorrect flow rate of calibration gases can cause a shifted calibration. If the flow rate of calibration gases is too low, process gases can mix in with the calibration gases, causing a mixture at the cell that is different from what is noted on the calibration gas bottles. Always set the calibration flow rate when a new diffuser is installed and never readjust this flow rate until another new diffuser is installed. For applications with heavy particulate loading, see [Probe passes calibration, O<sub>2</sub> still reads low](#).

If reference air is not supplied or is improperly supplied, the calibration may read incorrectly.

## 4.5.1 Probe passes calibration, O<sub>2</sub> still reads high

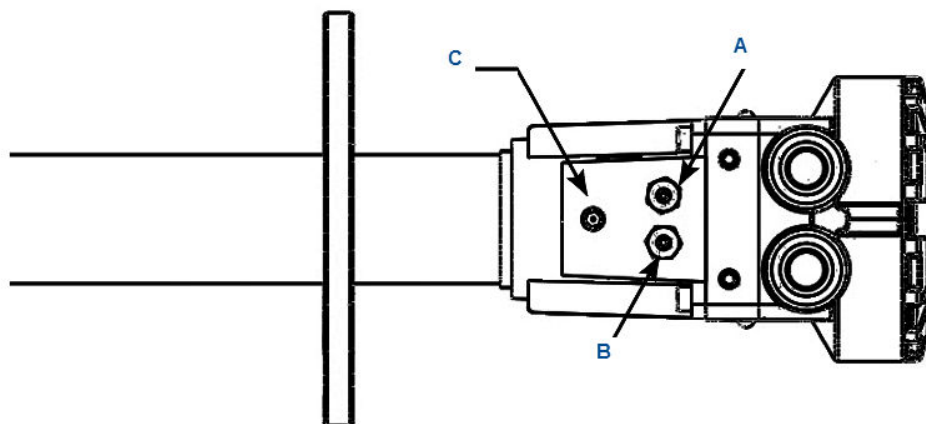
### External reference air leak

There may be a leak that is permitting ambient air to mix with the process gases. Since many combustion processes are slightly negative in pressure, ambient air can be drawn into the cell area, biasing the O<sub>2</sub> reading upward.

#### Procedure

1. Verify that the calibration gas is capped tightly between calibrations.
2. If autocal is used, verify that the check valve is sealing properly.

**Figure 4-2: Probe Leakage Paths**



- A. Calibration gas 1/4 in. tube
- B. Reference air 1/4 in. tube
- C. Vent

3. If an abrasive shield is used, a small leak at the probe flange can migrate down the annular space between the probe OD and shield ID to the sensing cell, causing a false high O<sub>2</sub> reading.

### Internal reference air leak

See Figure 4-2. There may be a leak inside the O<sub>2</sub> probe itself, permitting the reference air (20.95% O<sub>2</sub>) to mix with the process gases at the cell. To confirm this leak condition, pressurize the inside (reference side) of the probe by plugging the reference air exhaust port with your finger for one minute. (The conduit ports where the signal and power wires pass may also need to be sealed.) The O<sub>2</sub> reading should decrease slightly. If the O<sub>2</sub> reading increases during this test, there is a leak inside the probe.

1. Acid condensation inside the probe can degrade the hose that carries the calibration gas to the cell. Inspect this hose. Dislodging or improper installation of the calibration gas or reference air hose can cause a leakage path.
2. The sensing cell is fastened to the end of the probe tube and uses a corrugated washer to separate the process gases from the ambient reference air. The corrugated washer may be damaged by corrosion. Discard used washer.

#### NOTICE

Always install a new corrugated washer whenever you remove the sensing cell from the probe.

### Bad reference side cell electrode

A bad reference side cell electrode can cause an elevated O<sub>2</sub> reading. This fault is usually indicated by a frequent *Calibration Recommended* alarm and increasing cell impedance readings. A high cell impedance can be calibrated out, but if the impedance continues to increase rapidly, the sensing cell must be replaced.

## 4.5.2 Probe passes calibration, O<sub>2</sub> still reads low

The diffusion element at the end of the probe is a passive filter. It plugs very slowly, because there is no active flow being drawn across it. In applications that have a heavy particulate loading (coal or wood fired boilers, cement and lime kilns, catalyst regeneration, recovery boilers, etc.), this diffusion element will eventually plug.

#### NOTICE

It is important not to pressurize the sensing cell during calibrations by flowing excessive calibration gas against a plugged diffuser. Always use a two-stage regulator for setting calibration gas pressure. Calibration flow rates should be set only when a new diffuser is installed. As the diffuser plugs, do not adjust the flow rates upward.

## 4.5.3 How do I detect a plugged diffuser?

When the diffuser is plugged:

- The O<sub>2</sub> cell's speed of response will degrade.
- The O<sub>2</sub> trend in the control room will become smoother.

When calibrating, the calibration gas flow rate will read lower. Never readjust this flow upwards to correct for a plugged diffuser.

#### NOTICE

Adjust this flow only when a new diffuser is installed.

Always note the time it takes for the cell to recover to the normal process value after the calibration gas is removed. As the diffuser plugs, this recovery time will increase. Use a calibration record to record and track calibration response times.

The Rosemount 6888Xi Advanced Electronics is available with an enhanced software feature to automatically characterize the rate of diffuser pluggage during a calibration cycle.

#### Related information

[Calibrate](#)

### 4.5.4 Can I calibrate a badly plugged diffuser?

It may not be possible to immediately replace a plugged diffuser while the process is on-line.

You can calibrate the probe without pressurizing the cell by adjusting the calibration gas flow rate downward before calibration. For instance, say the process is at 3%, and the first calibration gas is 8%. Adjust the flow of calibration gas downward until the reading begins to migrate from 8% to lower values, indicating that the process gases are now mixing with the calibration gases.

Adjust the flow rate back up until the gases stop mixing. Calibrate at this flow rate. Replace the diffuser as soon as possible.

#### **⚠ WARNING**

##### **ELECTRIC SHOCK**

Install all protective equipment covers and safety ground leads after troubleshooting. Failure to install covers and ground leads could result in serious injury or death.





## 5 Maintenance and service

### 5.1 Overview

This section identifies the calibration methods available and provides the procedures to maintain and service the Rosemount 6888A O<sub>2</sub> transmitter.

#### **⚠ WARNING**

##### **ELECTRIC SHOCK**

Install all protective equipment covers and safety ground leads after equipment repair or service. Failure to install covers and ground leads could result in serious injury or death.

### 5.2 Maintenance intervals

The required maintenance interval depends on the ambient and process conditions the analyzer is exposed to.

The zirconium oxide sensing cell is non-depleting and has no specific shelf life or a defined life in flue gas operation. The sensitivity of a sensing cell that is mounted inside a boiler that is burning natural gas may shift slightly over several years. Acidic compounds are the main aggressors to the sensing cell, typically SO<sub>2</sub>, resulting from sulfur contained in coal and heavy oil fuels, and also HCl from the combustion of plastics in municipal incinerators and in industrial thermal oxidizers. Sensing cells may experience significant degradation and signal shift in this type of service, particularly if the operating levels of O<sub>2</sub> are very low (below 1% O<sub>2</sub>).

A calibration check is recommended on a quarterly basis (every three months) by flowing bottled gas to the probe. (Verify that the operations personnel are notified when doing this and also make sure that the O<sub>2</sub> control loop is placed in manual mode). If the probe readings vary significantly from the bottle values, conduct a formal calibration as noted in [Configuration, start-up, and operation](#).

The optional Rosemount 6888Xi offers a `calibration recommended` diagnostic that indicates when the probe needs to be calibrated.

Combustion processes with a high level of ash or other particulate content will cause the diffusion element on the end of the probe to plug. A significantly plugged diffuser causes a slower speed of response to changing O<sub>2</sub> levels in the process. This can usually be seen on the recorded trends in the control room.

When performing a calibration check or actual calibration, the calibration flow meter may read lower if the diffuser is significantly plugged. Never increase the flow rate, however, as this can cause a shifted calibration. Adjust the calibration flow rate only when a new diffuser is installed. Always record the response time back to the process after the calibration gases are removed. Diffuser plugging can be tracked through the calibration record.

Visually inspect the probe during plant outages, paying particular attention to condensed components. Condensation can be reduced or eliminated by insulating the probe installation, including the probe mount, flange, and blue housing.

## 5.3 Calibrate

The Rosemount 6888A O<sub>2</sub> transmitter can be calibrated manually through the handheld 375/475 Field Communicator or automatically through the Rosemount SPS4001 Single Probe Autocalibration Sequencer or the Rosemount IMPS 4000 Intelligent Multiprobe Test Gas Sequencer and the Rosemount 6888Xi Advanced Electronics.

### 5.3.1 Manual calibration

Refer to [Manual/semi-automatic calibration](#) to perform a manual calibration.

### 5.3.2 Automatic calibration

Contact from the Rosemount 6888Xi Advanced Electronics to a Rosemount SPS4001B (one per probe) or Rosemount IMPS4000 (up to four probes) provides the ability to manually initiate a calibration at any time from the control room. The Rosemount 6888Xi interface must be used with the Rosemount SPS4001B or Rosemount IMPS4000 in order to perform an auto/semi-auto calibration. Refer to the [Rosemount SPS4001B](#) or [Rosemount IMPS4000](#) instruction manual for further details on how to configure and perform an automatic calibration.

## 5.4 Repair

Each of the following procedures details how to remove and replace a specific component of the Rosemount 6888A.

### **⚠ WARNING**

#### BURNS

Remove the transmitter from the stack for all service activities. Allow the unit to cool and take it to a clean work area. Failure to comply may cause severe burns.

### **⚠ WARNING**

#### ELECTRIC SHOCK

Disconnect and lock out power before working on any electrical components. There is voltage up to 240 Vac.

## 5.4.1 Remove and replace probe

### Remove probe

Complete the following steps to remove the probe from the stack.

#### Procedure

1. Turn off power to the system.
2. Shut off the calibration gases at the cylinder and the instrument air.
3. Disconnect the calibration gas and instrument air lines from the transmitter.
4. Remove housing cover.
5. Remove all signal and power wiring to the probe.
6. Remove insulation to access the mounting probe.
7. Unbolt the transmitter from the stack and take it to a clean work area.
8. Allow the unit to cool to a comfortable working temperature.

### Replace probe

Complete the following steps to replace the probe in the stack.

#### Procedure

1. Bolt the transmitter to the stack and install the insulation.
2. Connect all signal and power leads at the probe.  
Refer to [Install](#) for detailed wiring instructions.
3. Connect the calibration gas and instrument air lines to the probe.
4. Install the housing cover.
5. Turn on instrument air.
6. Restore power to the system.  
Refer to [Power up](#).

#### NOTICE

Recalibration is required whenever the electronic cards or sensing cell are replaced.

## 5.4.2 Replace transmitter board

The transmitter board is not repairable and must be replaced if any component fails.

See [Figure 5-1](#) for item number references. The transmitter board is available as a standalone kit or with the plastic cover and mounting plate.

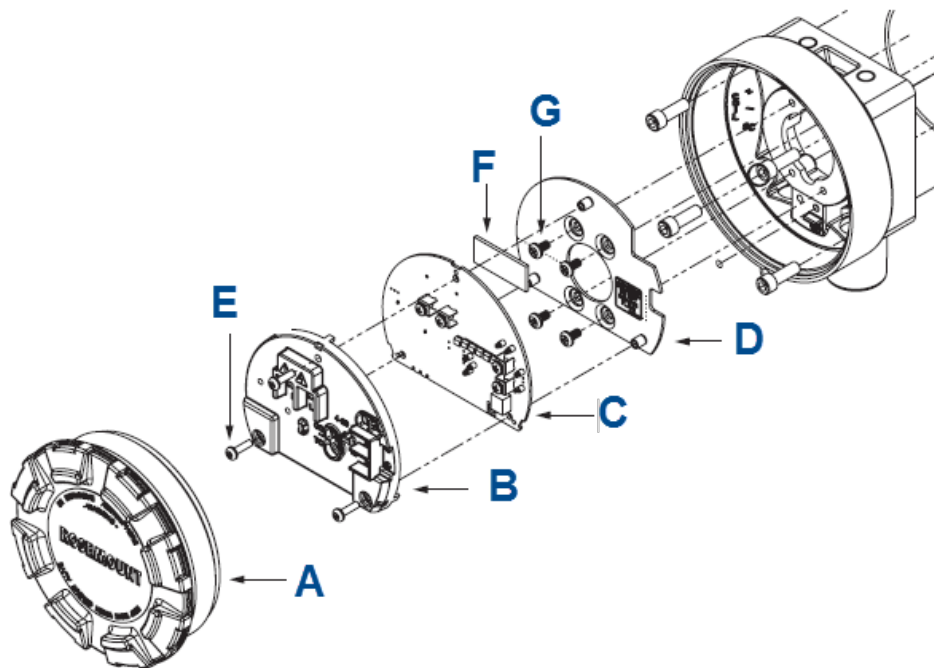
**⚠ WARNING**

ELECTRIC SHOCK  
Disconnect and lock out power before working on any electrical components.

**⚠ CAUTION**

MEASUREMENT ERRORS  
Failure to resynchronize the calibration parameters with a Rosemount 6888Xi after replacing the transmitter board or recalibrating the instrument may cause an inaccurate O<sub>2</sub> measurement. When the transmitter board is replaced and the calibration parameters are not synchronized with the Rosemount 6888Xi, the parameters in the Rosemount 6888Xi will be used as default to calculate the O<sub>2</sub> measurement.

**Figure 5-1: Transmitter board mounting**



- A. Cover
- B. Plastic cover
- C. Transmitter board
- D. Mounting plate
- E. Screws
- F. Thermal pad
- G. Screws

**Procedure**

1. Remove cover (A) from the transmitter housing.

2. Disconnect the power and signals from the transmitter board (C).
3. Remove the three screws (E) securing the plastic cover (B) and transmitter board (C) to mounting plate (D).
4. The plastic cover snaps onto the transmitter board with three tabs. Pull the cover and board away from the mounting plate.  
The thermal pad (F) will most likely remain attached to the mounting plate.
5. Disconnect the two wire harness connectors from the back of the transmitter board and remove the plastic cover and transmitter board.  
Replacement transmitter boards come in two configurations:
  - a. Transmitter board with thermal pad and mounting screws
  - b. Transmitter board, thermal pad, plastic cover, mounting plate, and mounting screws
6. Do one of the following:
  - If only the transmitter board is being replaced, carefully unsnap the plastic cover from the old transmitter board and then snap it onto the new board. Make sure to place the cover so that the screw terminals for the power and signal wiring fit into the openings.
  - If the transmitter board, plastic cover, and mounting plate are being replaced, the plastic cover should already be snapped onto the transmitter board.
7. Remove the old thermal pad from the mounting plate.
8. Attach the new thermal pad to the mounting plate 1 in. up from the flat edge of the pad.

**⚠ CAUTION**

**Do not reassemble without the thermal pad in place.**

If the transmitter board, plastic cover, and mounting plate are being replaced, the thermal pad should already be in place on the mounting plate.

9. If the mounting pad is being replaced, remove the four screws (H) securing the plate to the housing. Install the new mounting plate using four screws.

**NOTICE**

Replacement screws are provided if any become lost or damaged.

10. Reconnect the two wire harness connectors to the back of the transmitter board.

**NOTICE**

The connectors are different and individually keyed to prevent misconnection.

11. Carefully push the wire harnesses through the hole in the mounting plate.
12. Align the transmitter board with plastic cover over the three standoffs on the mounting plate.
13. Install the three screws to secure the board to the mounting plate.  
Replacement screws are provided if any become lost or damaged.
14. Reconnect the power and signal wires to the transmitter board.
15. Reinstall the cover to the transmitter housing.
16. Reapply power to the transmitter. Prior to using the transmitter for measurement purposes, perform one of the following:
  - Transmitter without Rosemount 6888Xi: Recalibrate the transmitter. See [Power up analyzer without Rosemount 6888Xi](#).
  - Transmitter with Rosemount 6888Xi: When initialization is complete, the transmitter begins to heat up, but an alarm condition is shown on the Rosemount 6888Xi. Synchronize the calibration parameters via the Rosemount 6888Xi as follows:
    - a. Press **DIAG** once to view the alarms. A `Probe Changed` alarm appears.
    - b. Press **EXIT** once to enter the **Diagnostic** menu.
    - c. Use the **Up** and **Down** keys to select 3-Acknowledge Alarms. Press **ENTER**.
    - d. Use the **Up** and **Down** keys to select 3-Ack Probe Changed. Press **ENTER**.
    - e. Use the **Up** and **Down** keys to select 1-Send To Probe. Press **ENTER**.
    - f. When transfer is complete, press **EXIT** twice to return to the main menu.

### 5.4.3 Replace DR terminal board

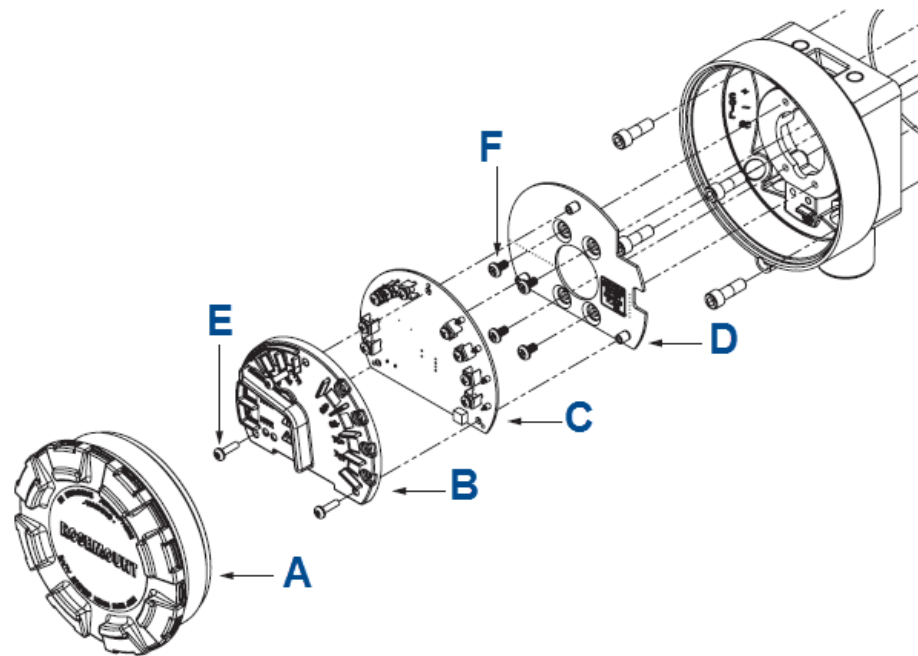
The DR terminal board is not repairable and must be replaced if any component fails. See [Figure 5-2](#) for letter references. The DR board is available as a standalone kit or with the plastic cover and mounting plate.

#### **⚠ WARNING**

**ELECTRIC SHOCK**

Disconnect and lock out power before working on any electrical components.

**Figure 5-2: DR terminal board mounting**



- A. Cover
- B. Plastic cover
- C. DR terminal board
- D. Mounting plate
- E. Screws
- F. Screws

**Procedure**

1. Remove cover (A) from the DR probe housing.
2. Disconnect the power and signal wires from the DR terminal board (C).
3. Remove the three screws (E) securing the plastic cover (B) and DR terminal board (C) to mounting plate (D).
4. Disconnect the two wire harness connectors from the back of the transmitter board.  
Replacement DR terminal boards come in two configurations:
  - a. DR terminal board with thermal pad and mounting screws
  - b. DR terminal board, thermal pad, plastic cover, mounting plate, and mounting screws
5. If the mounting pad is being replaced, remove the four screws (F) securing the plate to the housing.
6. Install the new mounting plate using four screws.  
Replacement screws are provided if any become lost or damaged.

7. Reconnect the two wire harness connectors to the back of the DR terminal board.  
The connectors are different and individually keyed to prevent misconnection.
8. Carefully push the wire harnesses through the hole in the mounting plate and align the DR terminal board with plastic cover over the three standoffs on the mounting plate.
9. Install the three screws to secure the board to the mounting plate.  
Replacement screws are provided if any become lost or damaged.
10. Reconnect the power and signal wires to the transmitter board.
11. Reinstall the cover to the DR probe housing.
12. Reapply power to the DR probe.

## 5.4.4 Heater strut replacement

If heater strut replacement is needed, order a replacement heater strut kit ([Table 6-1](#)). Refer to [Figure 5-3](#) for item letter references.

### **⚠ WARNING**

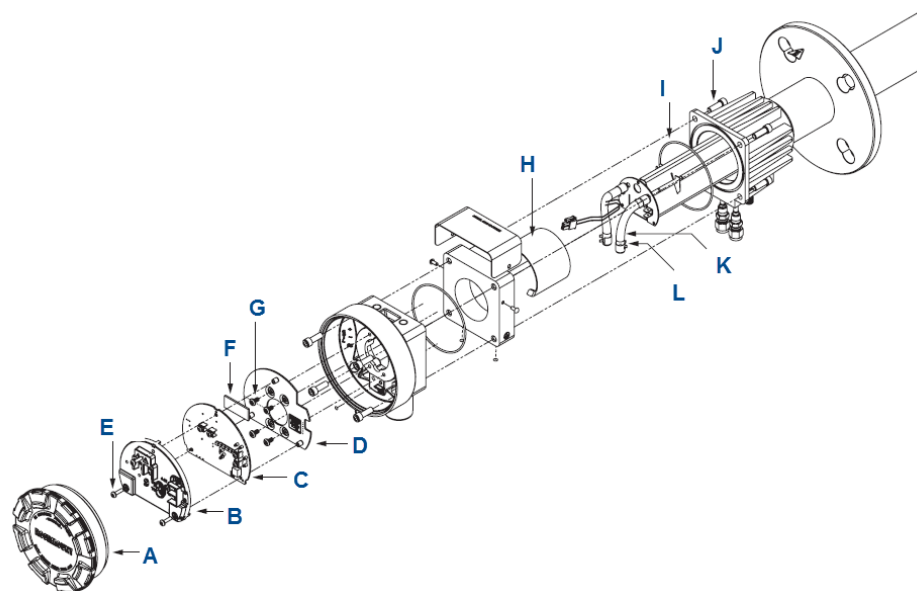
#### **BURNS**

Use heat resistant gloves and clothing when removing probe. Do not attempt to work on the probe until it has cooled to room temperature. The probe can be as hot as 427 °C (800 °F). This can cause severe burns.

---



**Figure 5-3: Housing/Strut Exploded View**



- A. Cover
- B. Plastic cover
- C. Transmitter board
- D. Mounting plate
- E. Housing screws
- F. Thermal pad
- G. Screws
- H. Strut clamp
- I. O-ring
- J. Screws
- K. Viton tube
- L. Tube clamp

### Procedure

1. Follow the instructions in [Remove and replace probe](#) to remove the transmitter from the stack or duct.
2. Follow the instructions in [Replace transmitter board](#) or [Replace DR terminal board](#) to remove the electronics from the housing.
3. Remove four screws (E). Remove housing from probe using care not to damage the strut wire harnesses or O-ring (I).
4. Remove the strut clamp (H) from inside the finned housing on the probe.
5. Remove tube clamps (L) and Viton tubes (K) from the CAL and REF gas ports and the CAL and REF gas lines. Leave the clamps in place on the hoses for later reassembly.
6. Grasp the wire loop and carefully slide the heater strut assembly out of the probe tube.

7. When replacing the strut, orient the probe so that the small calibration gas tube is at the 6 o'clock position of the probe tube.
8. Align the slot on the heater plate with the calibration gas line in the probe tube.
9. Slide the strut into the probe tube.  
The strut turns to align the hole on the back plate of the strut with the calibration gas line. When the hole and calibration gas line are aligned correctly, the strut slides in the rest of the way.
10. As the strut insertion nears completion, install the guide rod into the calibration gas tube to assist in guiding the calibration gas tube through the hole in the end of the strut.
11. Replace the CAL and REF gas Viton tubes (K).
12. Insert the strut clamp (H) back into the finned housing on the probe.  
The opening should be down to allow for clearance for the gas tubes.
13. Carefully install the O-ring (I) back into the groove between the two housings.  
A small amount of silicone grease may be used to hold the O-ring in place. Do not use petroleum based grease.
14. Insert the strut wire harnesses into the housing.
15. Turn the conduit ports of the housing to the CAL and REF gas ports side of the probe and position the housing on the probe.
16. Install and tighten the four screws (J).
17. Follow the instructions in [Replace transmitter board](#) to install the electronics into the housing.
18. Follow the instructions in [Remove and replace probe](#) to install the transmitter into the stack or duct.

## 5.4.5 Replace oxygen sensing cell

If cell replacement is needed, order the cell replacement kit ([Table 6-1](#)).

The cell replacement kit ([Figure 5-4](#)) contains a cell and flange assembly, corrugated seal, setscrews, socket head cap screws, and anti-seize compound. The items are carefully packaged to preserve precise surface finishes. Do not remove items from the packaging until they are ready to be used. Spanner wrenches and hex wrenches needed for this procedure are part of an available special tools kit ([Table 6-1](#)).

### **⚠ WARNING**

#### **BURNS**

Use heat-resistant gloves and clothing when removing the probe. Do not attempt to work on these components until they have cooled to room temperature. Probe components can be as hot as 300 °C (572 °F). This can cause severe burns.

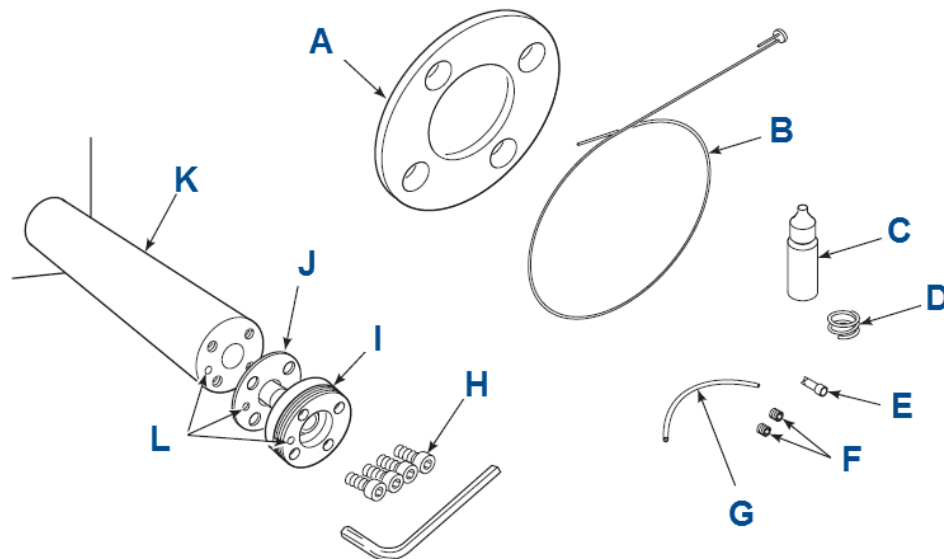
Disconnect and lock out power before working on any electrical components. There is voltage up to 240 Vac.

**⚠ CAUTION**

**EQUIPMENT DAMAGE**

Do not remove the cell unless you are certain it needs to be replaced. Removal may damage the cell and platinum pad. Follow the complete troubleshooting procedure to make sure the cell needs to be replaced before removing it.

**Figure 5-4: Cell Replacement Kit**



- A. ANSI gasket
- B. Wire and pad assembly
- C. Anti-seize compound
- D. 22 gauge wire
- E. Closed end connector
- F. Set screws
- G. Teflon tubing
- H. Socket head cap screws
- I. Cell and flange assembly
- J. Corrugated seal
- K. Probe (not included in kit)
- L. Calibration gas passage

**Procedure**

1. Follow the instructions in [Remove and replace probe](#) to remove the transmitter from the stack or duct.
2. If the probe uses the standard diffusion element, use a wrench to remove the diffuser assembly.
3. If equipped with the optional ceramic diffusion assembly, remove and discard the setscrews and remove the vee deflector.

4. Use spanner wrenches from the probe disassembly kit ([Table 6-1](#)) to turn the hub free from the retainer.
5. Inspect the diffusion element. If it is damaged, replace the element.
6. Loosen the four socket head cap screws from the cell and flange assembly.
7. Remove the assembly and the corrugated seal.

### NOTICE

The cell flange has a notch that may be used to gently pry the flange away from the probe. The contact pad inside of the probe sometimes fuses to the oxygen sensing cell. If the cell is fused to the contact pad, push the cell assembly back into the probe (against spring pressure) and quickly twist the cell assembly.

The cell and contact pad should separate. If the contact pad stays fused to the cell, a new contact/thermocouple assembly must be installed. Disconnect the cell and the thermocouple wires at the crimp connections and withdraw the cell with the wires still attached.

8. If the contact assembly is damaged, replace the strut or contact pad.
9. Follow the instructions in [Heater strut replacement](#), steps 2 through 4, to remove the electronics housing,
10. Follow the instructions for replacing the contact pad provided in the cell replacement kit.
11. Remove and discard the corrugated seal.
12. Clean the mating faces of the probe tube and retainer.
13. Remove burrs and raised surfaces with a block of wood and crocus cloth.
14. Clean the threads on the retainer and hub.
15. Rub a small amount of anti-seize compound on both sides of the new corrugated seal.
16. Assemble the cell and flange assembly, corrugated seal, and probe tube.
17. Make sure the calibration tube lines up with the calibration gas passage in each component.
18. Apply a small amount of anti-seize compound to the screw threads and use the screws to secure assembly.
19. Torque to 60 in.-lb (6.8 N m).
20. Follow the instructions in [Heater strut replacement](#), steps 9 through 15, to reassemble the electronics housing.
21. Apply anti-seize compound to the threads of the cell assembly, hub, and setscrews.
22. Reinstall the hub on the cell assembly.
23. Using pin spanner wrenches, torque to 10 ft-lb (14 N m).
24. If applicable, reinstall the vee deflector, orienting apex toward gas flow.
25. Secure with setscrews and anti-seize compound.
26. Torque to 25 in.-lb (2.8 N m).

27. On systems equipped with an abrasive shield, install the dust gaskets with joints 180 ° apart.
28. Follow the instructions in [Remove and replace probe](#) to install the transmitter to the stack or duct.
29. Turn on power and monitor thermocouple output.  
It should stabilize at  $29.3 \pm 0.2$  mV.
30. Set reference air flow at 1 l/min (2 scfh).
31. After the transmitter stabilizes, calibrate the probe.
32. If new components have been installed, repeat calibration after 24 hours of operation.

## 5.4.6 Diffusion element replacement

The diffusion element protects the cell from particles in process gases. Normally, it does not need to be replaced, because the vee deflector protects it from particulate erosion.

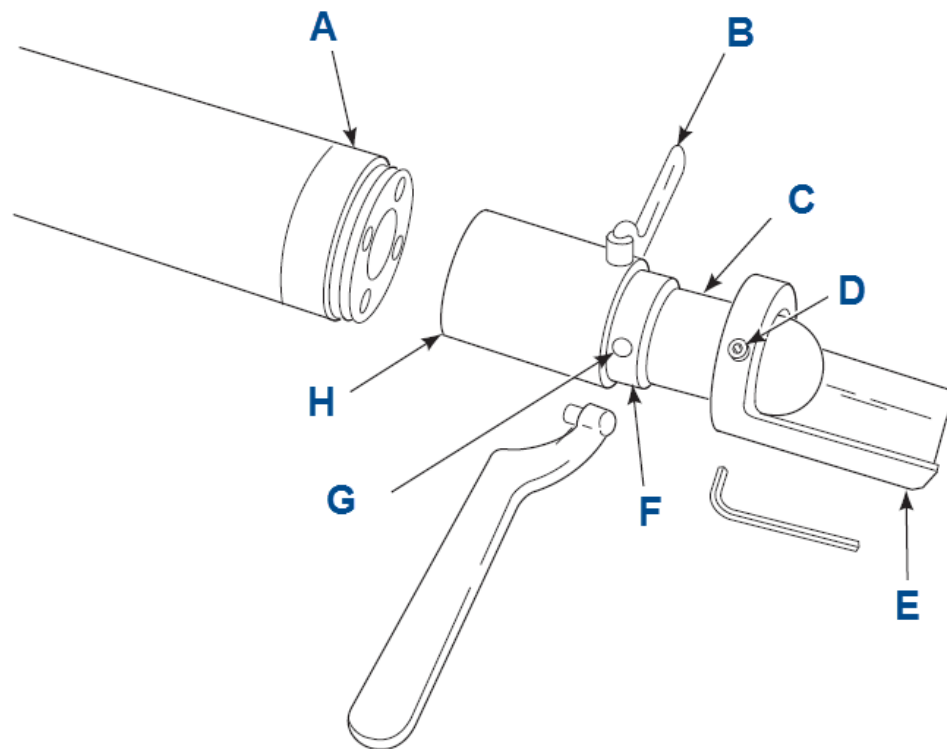
In severe environments, the diffusion element may be broken or subject to excessive erosion. Examine the element whenever removing the probe for any purpose. Replace if damaged.

Damage to the diffusion element may become apparent during calibration. Compare probe response with previous response. A broken diffusion element will cause an inadequate response to calibration gas. Hex wrenches needed to remove setscrews and socket head screws in the following procedure are available as part of a probe disassembly kit, [Table 6-1](#).

### NOTICE

This section refers to the ceramic diffusion element only.

Figure 5-5: Ceramic diffuser element replacement



- A. Retainer
- B. Spanner wrench
- C. Optional ceramic diffusion element
- D. Set screw
- E. Vee deflector
- F. Cement fillet
- G. Cement port
- H. Hub

### Procedure

1. Follow the instructions in [Remove and replace probe](#) to remove the probe from the stack or duct.
2. Loosen set screws (D) using the hex wrench from the probe disassembly kit and remove the vee deflector (E). Inspect sets crews. If damaged, replace with stainless sets crews coated with anti-seize compound.
3. Follow the instructions in [Remove and replace probe](#) to install the probe into the stack or duct.

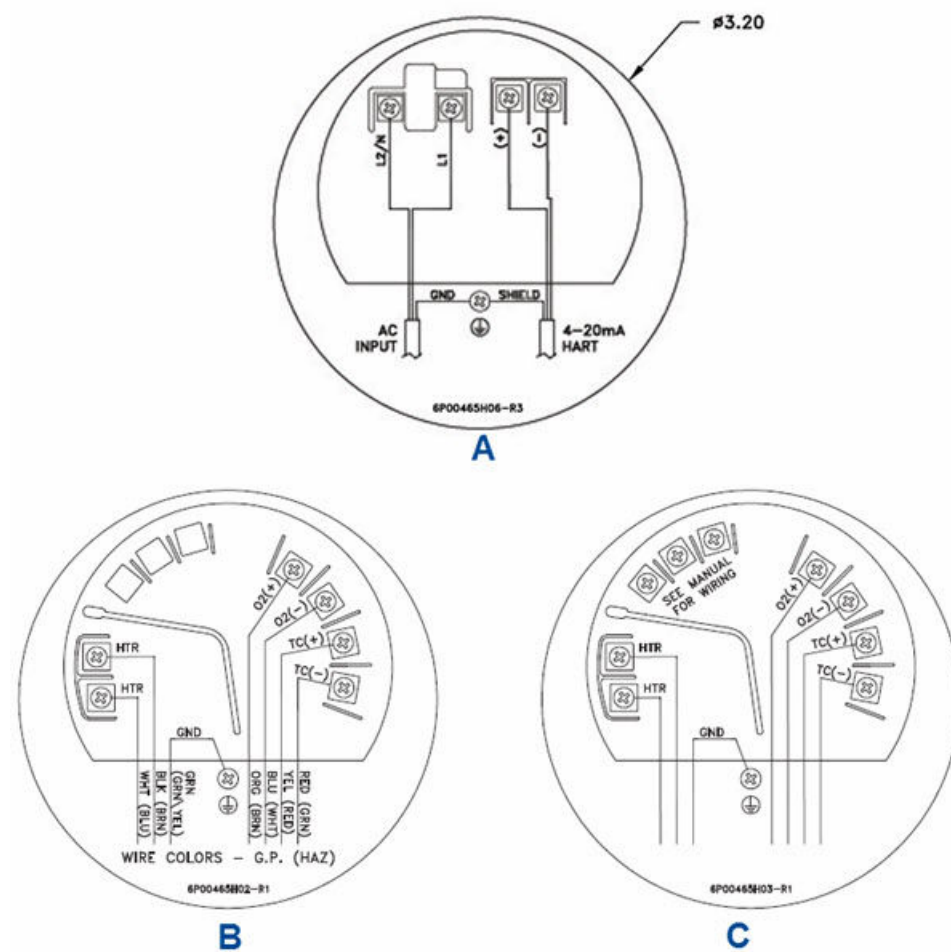
## 5.4.7 Replace blind cover

This section covers the replacement of the main housing cover and the application of the correct field wiring label.

### NOTICE

Field wiring labels are supplied for each product configuration. Ensure the correct label is applied to the inside of the cover that matches your configuration.

Figure 5-6: Field wiring labels



- A. Label for full transmitter
- B. Label for DR probe
- C. Label for DR/YEW probe

### Procedure

1. Remove existing cover from the transmitter housing.
2. Select the new field wiring label that matches the existing label on the inside of the old cover.  
A graphic of each label and its application is shown in [Figure 5-6](#).
3. Peel off the backing.
4. Attach the new label to the inside of the new cover.
5. Install the new cover onto the housing.



## 6 Replacement parts

**Table 6-1: Replacement Part Kits for O<sub>2</sub> Transmitter**

Part Number	Description
6A00448G01	Kit, transmitter board
6A00448G02	Kit, transmitter board with mounting plate and cover
6A00449G01	Kit, DR terminal board
6A00449G02	Kit, DR terminal board with mounting plate and cover
6A00449G10	Kit, DR terminal board, YEW
6A00449G11	Kit, DR terminal board, YEW with mounting plate and cover
6A00452G01	Kit, blind cover, standard, and autocal housing
6A00450G01	Kit, Cell gaskets (pack of five)
6A00451G01	Kit, cover O-rings, standard housing (pack of five)
6A00453G01	Kit, snubber diffuser
6A00453G02	Kit, snubber diffuser with dust seal
6A00453G03	Kit, ceramic diffuser with V-deflector
6A00453G04	Kit, ceramic diffuser with dust seal with V-deflector
6A00453G05	Kit, Hastelloy diffuser with V-deflector
6A00453G06	Kit, Hastelloy diffuser with dust seal with V-deflector
6A00454G01	Kit, strut, 18 inch
6A00454G02	Kit, strut, 3 foot
6A00454G03	Kit, strut, 6 foot
6A00454G04	Kit, strut, 9 foot
6A00454G05	Kit, strut, 12 foot
6A00455G01	Kit, cell replacement, 18 inch, standard cell
6A00455G02	Kit, cell replacement, 3 foot, standard cell
6A00455G03	Kit, cell replacement, 6 foot, standard cell
6A00455G04	Kit, cell replacement, 9 foot, standard cell
6A00455G05	Kit, cell replacement, 12 foot, standard cell
6A00455G11	Kit, cell replacement, 18 inch, acid resistant cell
6A00455G12	Kit, cell replacement, 3 foot, acid resistant cell
6A00455G13	Kit, cell replacement, 6 foot, acid resistant cell
6A00455G14	Kit, cell replacement, 9 foot, acid resistant cell
6A00455G15	Kit, cell replacement, 12 foot, acid resistant cell
6A00456G01	Flange gasket kit, ANSI, general purpose, (pack of five)

**Table 6-1: Replacement Part Kits for O<sub>2</sub> Transmitter (continued)**

6A00456G03	Flange gasket kit, DIN, general purpose (pack of five)
6A00457G01	Spare transmitter board cover
6A00457G02	Spare DR term board cover
6A00475G01	Tool kit - 6888
1A99119G01	Calibration gas bottles - 0.4% and 8% O <sub>2</sub> , balance nitrogen - 550 liters each <sup>(1)</sup>
1A99119G02	Two flow regulators (for calibration gas bottles)
1A99119G03	Bottle rack

*(1) Calibration gas bottles cannot be shipped via air freight.*

## 7 Optional accessories

### 7.1 Asset Management Solutions (AMS)

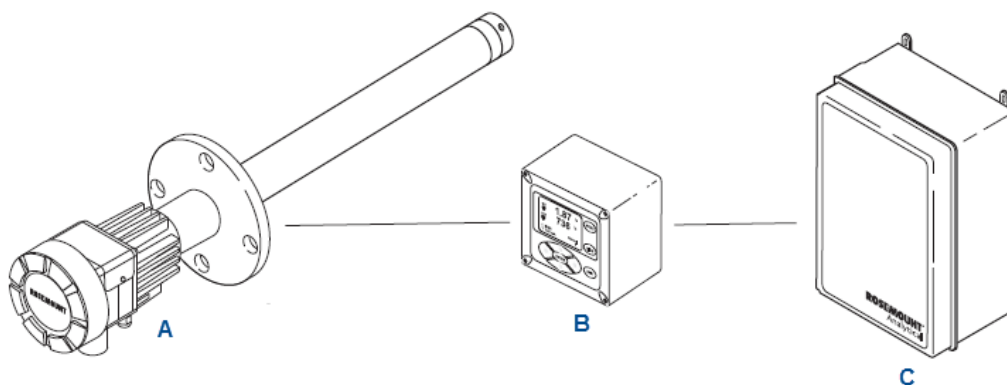
Asset Management Solutions (AMS) software works in conjunction with the HART® communication protocol and offers the capability to communicate with all HART plant devices from a single computer terminal.

For more information, call Rosemount at 1-800-999-9307.

### 7.2 Rosemount SPS 4001B Single Probe Autocalibration Sequencer

Emerson designed the Rosemount SPS 4001B Single Probe Autocalibration Sequencer specifically to perform automatic or on-demand calculations.

**Figure 7-1: Rosemount SPS 4001B**



- A. Rosemount 6888A O<sub>2</sub> Transmitter
- B. Rosemount 6888Xi Advanced Electronics
- C. Rosemount SPS 4001B

The Rosemount SPS 4001B is fully enclosed in a NEMA cabinet suitable for wall-mounting. This cabinet provides added protection against dust and minor impacts.

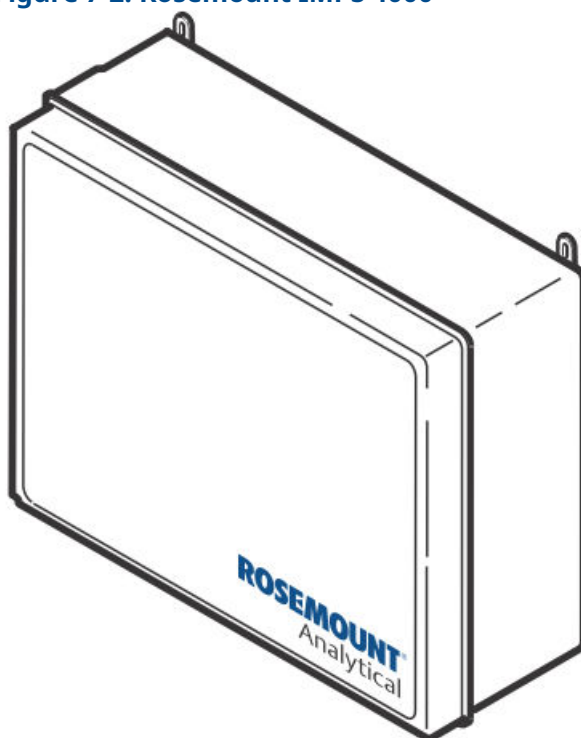
The Rosemount SPS 4001B works in conjunction with the Rosemount 6888A, eliminating out-of-calibration occurrences and the need to send a technician to the installation site.

For more information, call Rosemount at 1-800-999-9307.

## 7.3 Rosemount IMPS 4000 Intelligent Multiprobe Test Gas Sequencer

The Rosemount IMPS 4000 Intelligent Multiprobe Test Gas Sequencer is housed within an IP56 (Type 4X) enclosure and can provide calibration gas sequencing of up to four Rosemount 6888As to accommodate automatic and semi-automatic calibration routines.

Figure 7-2: Rosemount IMPS 4000

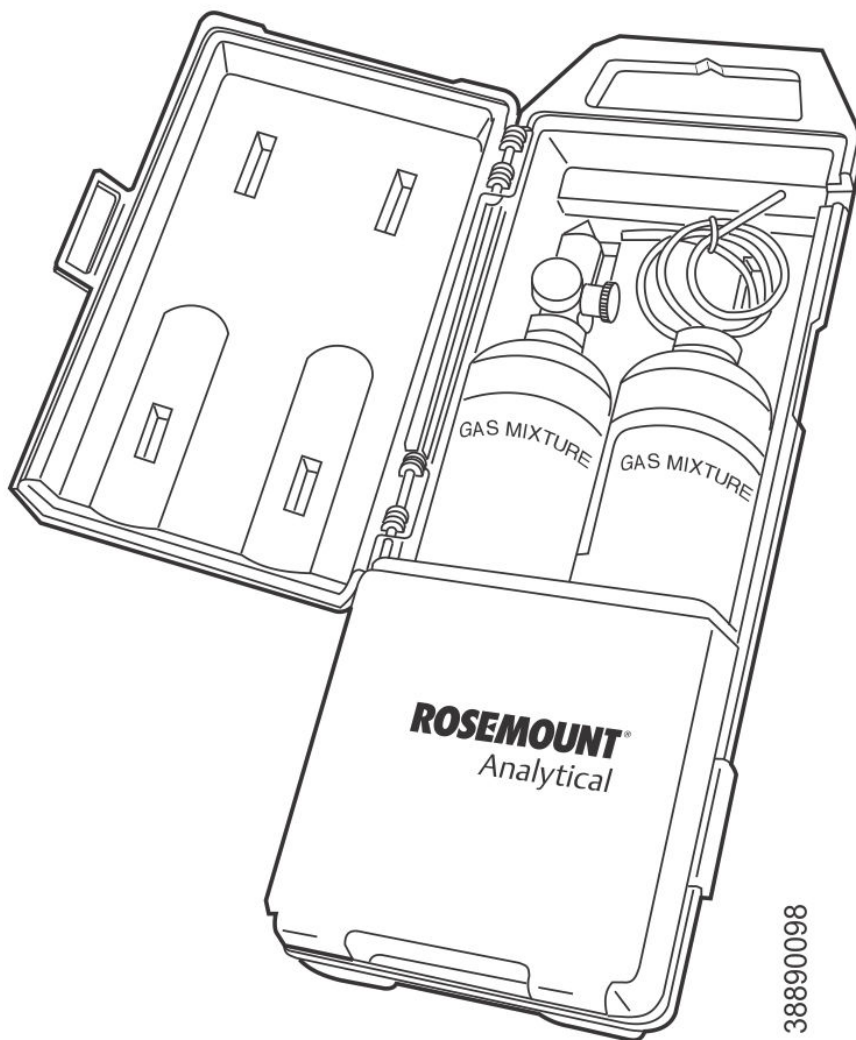


The sequencer works in conjunction with the **CALIBRATION RECOMMENDED** feature, eliminating out-of-calibration occurrences and the need to send a technician to the installation site. In addition, the Rosemount IMPS 4000 provides a remote contact input to initiate a calibration from a remote location and relay outputs to alert when a calibration is in progress, an O<sub>2</sub> probe is out of calibration, calibration gases are on, or calibration pressure is low.

## 7.4 O<sub>2</sub> calibration gas

Emerson has carefully designed the O<sub>2</sub> calibration gas and service kits to provide a more convenient and fully portable means of testing, calibrating, and servicing Rosemount oxygen analyzers.

**Figure 7-3: Calibration Gas Bottles**

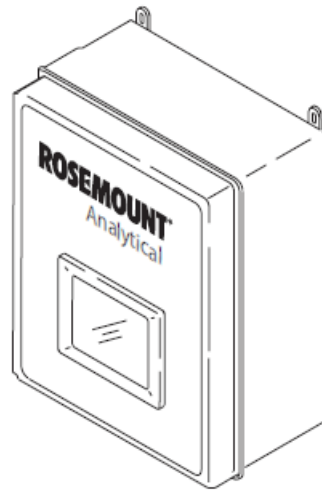


These lightweight, disposable gas cylinders eliminate the need to rent gas bottles.

## 7.5 Optional Rosemount OxyBalance Display and Averaging System

The optional Rosemount OxyBalance Display and Averaging System receives up to eight 4-20 mA signals from individual probes, trends individual outputs, and calculates four programmable averages as additional 4-20 mA outputs. For more information, call Rosemount at 1-800-433-6076.

**Figure 7-4: Rosemount OxyBalance System**



# A Product certifications

For product certifications and the Declaration of Conformity, see the [Rosemount 6888A Quick Start Guide](#).

The most recent revision of the Declaration of Conformity can be found at [Emerson.com/Rosemount](https://emerson.com/Rosemount).





## B Safety data

### B.1 Safety instructions for the wiring and installation of this apparatus

The following safety instructions apply specifically to all EU member states. They should be strictly adhered to in order to assure compliance with the Low Voltage Directive. Non-EU states should also comply with the following unless superseded by local or national standards.

1. Adequate earth connections should be made to all earthing points, internal and external, where provided.
2. After installation or troubleshooting, all safety covers and safety grounds must be replaced. The integrity of all earth terminals must be maintained at all times.
3. Mains supply cords should comply with the requirements of IEC227 or IEC245.
4. All wiring shall be suitable for use in an ambient temperature of greater than 75 °C (167 °F).
5. All cable glands used should be of such internal dimensions as to provide adequate cable anchorage.
6. To ensure safe operation of this equipment, connection to the mains supply should only be made through a circuit breaker which will disconnect all circuits carrying conductors during a fault situation. The circuit breaker may also include a mechanically operated isolating switch. If it does not, then another means of disconnecting the equipment from the supply must be provided and clearly marked as such. Circuit breakers or switches must comply with a recognized standard, such as IEC947. All wiring must conform with any local standards.
7. Where equipment or covers are marked with the following symbol, hazardous voltages are likely to be present beneath. These covers should only be removed when power is removed from the equipment - and then



only by trained service personnel.

8. Where equipment or covers are marked with the following symbol, there is a danger from hot surfaces beneath. These covers should only be removed by trained service personnel when power is removed from the equipment.



Certain surfaces may remain hot to the touch.

9. Where equipment or covers are marked with the following symbol, refer to



the Reference Manual for instructions.

10. All graphical symbols used in this product are from one or more of the following standards: EN61010-1, IEC417, and ISO3864.
11. Where equipment or labels are marked "Do Not Open While Energized" or similar, there is a danger of ignition in areas where an explosive atmosphere is present. This equipment should only be opened when the power is removed and adequate time as specified in the label or in the instruction manual has been allowed for the equipment to cool down - and then only by trained service personnel.



For more information: [Emerson.com](https://www.emerson.com)

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