

Rosemount™ 6888C In-Situ Combustion Oxygen Analyzer

For use in Hazardous Areas



NOTICE

This guide provides basic guidelines for Rosemount 6888 In-Situ Oxygen Analyzers. It does not provide instructions for configuration, diagnostics, maintenance, service, troubleshooting, or flame-proof installations. Refer to the [Rosemount 6888C Manual](#) for more instruction.

Essential instructions

Read this page before proceeding!

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

- Read all instructions prior to installing, operating, and servicing the product.
- If you do not understand any of the instructions, contact your Emerson representative for clarification.
- Follow all warnings, cautions, and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation, and maintenance of the product.
- Install your equipment as specified in the installation instructions of the appropriate instruction manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, use qualified personnel to install, operate, update, program, and maintain the product.
- Use only factory documented components for repair. Tampering and unauthorized substitution and parts can affect product 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 6888C O₂ Transmitter. 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 Instruction Manual

The following definitions apply to Warnings, Cautions, and Notices found throughout this publication.

WARNING!

Highlights an operation or maintenance procedure, practice, condition, statement, etc., which if not strictly observed, could result in injury, death, or long-term health hazards of personnel.

CAUTION!

Highlights an operation or maintenance procedure, practice, condition, statement, etc., which if not strictly observed, could result in damage to or destruction of equipment or loss of effectiveness.

NOTICE

Highlights an essential operating procedure, condition, or statement.

WARNING!

EXPLOSION

Do not open when an explosive atmosphere may be present.

WARNING!

ELECTRIC SHOCK

Do not open while energized.

CAUTION!

EQUIPMENT DAMAGE

For the standard housing probe and direct replacement probe, only use supply cables & certified cable glands rated > 105 °C (221 °F).

CAUTION!

EQUIPMENT DAMAGE

For the autocal housing, only use supply cables and certified cable glands rated > 85 °C (185 °F).

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1 Installation

⚠ WARNING!

Before installing this equipment, read the Essential Instructions at the front of this Quick Start Guide. Failure to follow safety instructions could result in serious injury or death.

⚠ WARNING!

ELECTRIC SHOCK

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

1.1 Mechanical installation

Note that 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, a *weld plate* for welding to the flue gas duct can be supplied.

⚠ WARNING!

ELECTRIC SHOCK

Install all protective equipment covers and safety ground leads after installation. Failure to install covers and ground leads could result in serious injury or death. Do not install the transmitter or the Rosemount 6888 Xi in hazardous areas or in the vicinity of flammable liquids.

1.1.1 Rosemount 6888C Probe installation

Complete the following steps to install the Rosemount 6888C Probe in the duct.

Prerequisites

Ensure all components are available to install the Rosemount 6888C O₂ probe.

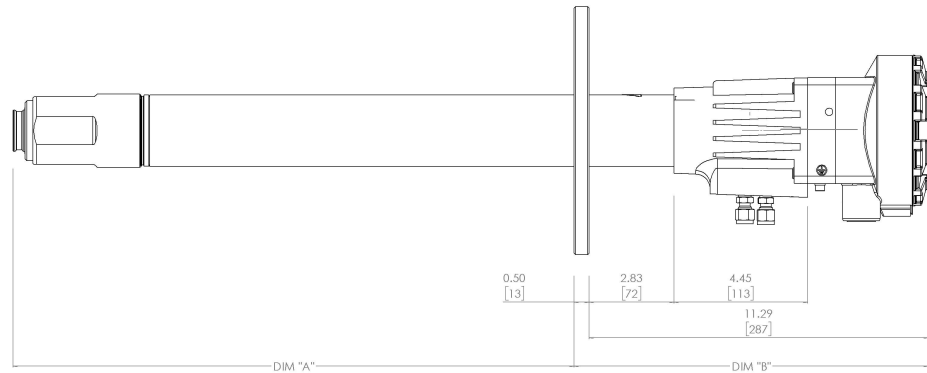
Procedure

1. If using the optional ceramic diffusion element, the vee-deflector must be correctly oriented. Before inserting the Rosemount 6888C probe, check the direction of gas flow in the duct. Orient the vee-deflector so the apex points upstream towards the flow.
2. 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 2-1/2 in. (63.5 mm).

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

Figure 1-1: 6888C Probe with Standard Terminations/Electronics Housing



Note

All dimensions are in inches with millimeters in parentheses.

Figure 1-2: 6888C Probe with Integral Autocal Housing

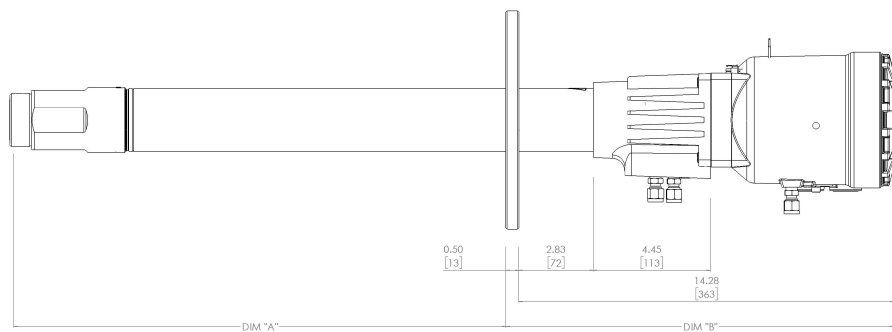


Table 1-1: Removal/Installation

Probe length	DIM A insertion depth	DIM B removal envelope standard housing	DIM B removal envelope accessory housing
18 in. (457 mm) probe	16.10 (409)	15.77 (401)	19.26 (490)
3 ft (0.91 m) probe	32.52 (826)	46.6 (1182)	50.1 (1271)

Table 1-1: Removal/Installation (continued)

Probe length	DIM A insertion depth	DIM B removal envelope standard housing	DIM B removal envelope accessory housing
6 ft (1.83 m) probe	68.52 (1740)	82.6 (2097)	86.1 (2186)

Figure 1-3: Probe Installation

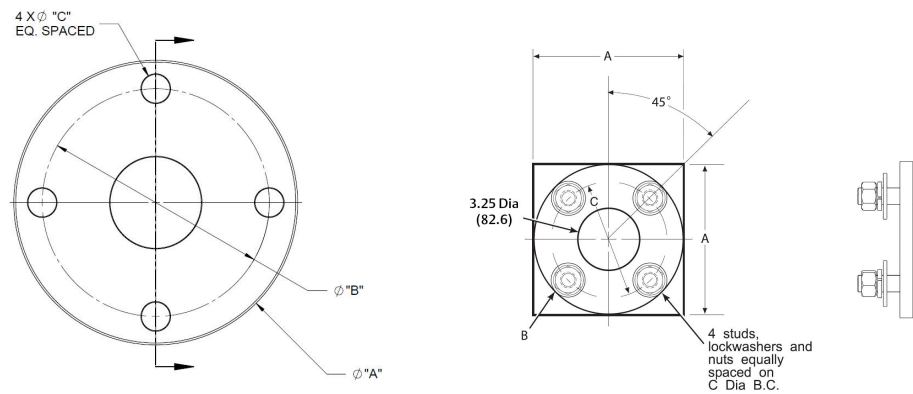


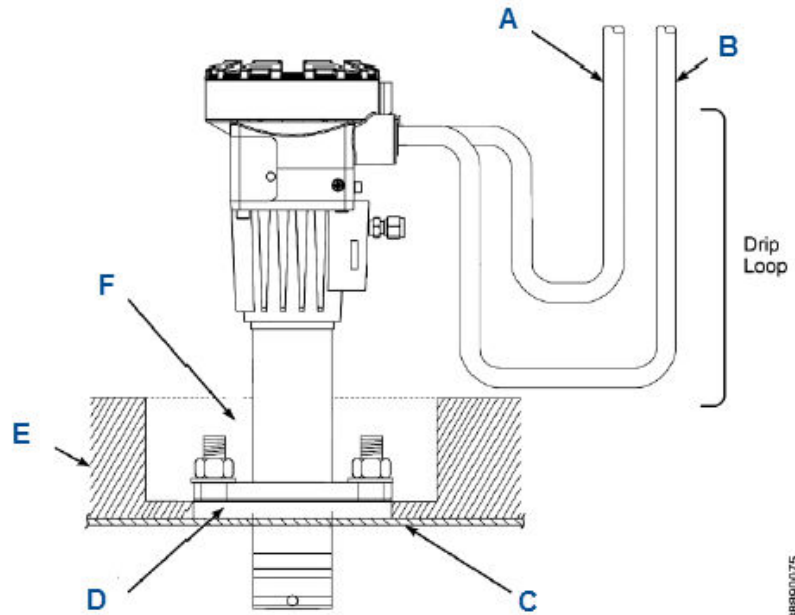
Table 1-2: Mounting Flange

	ANSI	DIN
Flange dia	8.25 (210)	
Hold dia	.75 (20)	
(4) holes eq sp on BC	6.00 (152)	6.70 (170)

Table 1-3: Installation weld plate outline

	ANSI	DIN
A	7.75 (197)	8.5 (215)
B thread	.625 (11)	(M-16x2)
C dia	6.00 (152)	6.70 (170)

Figure 1-4: Drip Loop and Insulation Removal



- A. Line voltage
- B. Logic I/O, 4-20 mA signal
- C. Stack or duct metal wall
- D. Adapter plate
- E. Insulation
- F. **Note**

Replace insulation after installing Rosemount 6888C.

Note

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

1.2 Electrical

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 transmitter 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, connection to the main electrical power supply must be made through a circuit breaker (min 10 A) which will disconnect all current-carrying conductors during a fault situation. The circuit breaker should also include a mechanically operated isolating switch. If not, then another external means of disconnecting the supply from the equipment should be located close by. Circuit breakers or switches must comply with a recognized standard such as IEC 60947.

NOTICE

To maintain proper earth grounding, ensure a positive connection exists between the transmitter 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).

1.2.1

Wiring for Rosemount 6888 Transmitter Probe only (no Rosemount 6888 Xi Electronics)

The Rosemount 6888 Transmitter Probe has built-in electronics that control the heater temperature and amplify the raw O₂ 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 transmitter electronics. There is no O₂ display or keypad on the probe, so setup must be conducted through HART communications via a 475 handheld communicator or Asset Management Solutions (AMS).

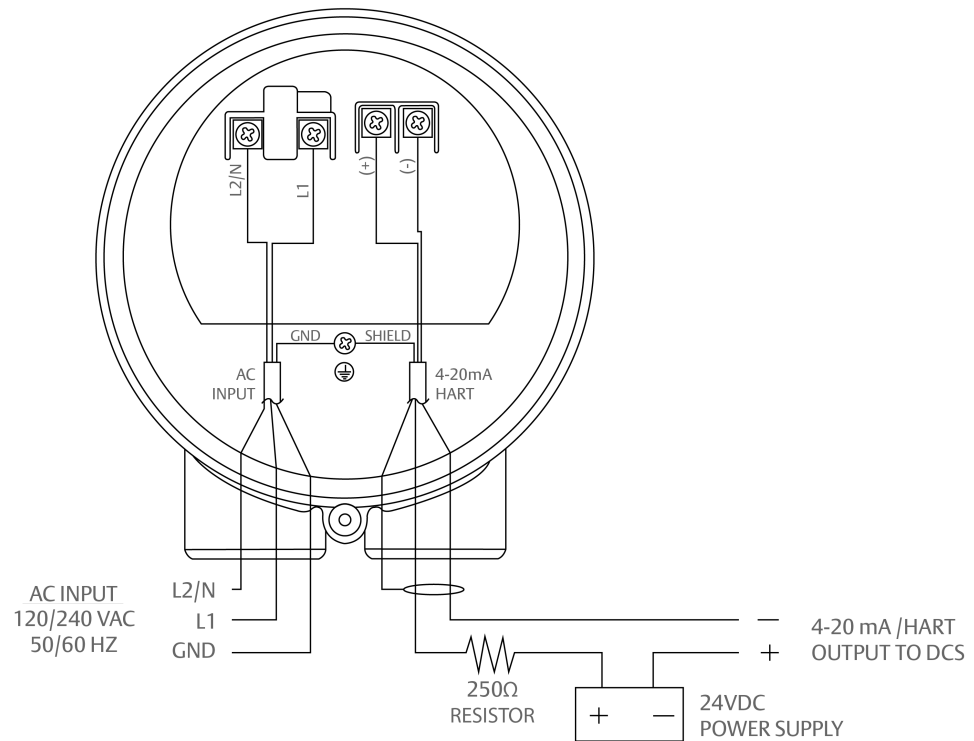
Procedure

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 Rosemount 6888C accepts line voltage at 120/240 Vac ±10%, 50/60 Hz. No setup is required.

3. Connect the 4-20 mA signal wires at the transmitter. Use a shielded twisted wire pair. Do not allow bare shield wires to contact the circuit boards. Insulate the shield wires prior to termination.

The transmitter electronics are loop-powered, i.e., the 4-20 mA signal wires supply 24 Vdc from the DCS or an external power supply.

Figure 1-5: Rosemount 6888C Standard Probe Housing

4. Terminate the shield only at the transmitter electronics housing unless using a Rosemount 6888 Xi. When using the Rosemount 6888 Xi Advanced Electronics, terminate the shield at both ends.
5. Reinstall cover on transmitter.

1.2.2 Standard housing transmitter probe with Rosemount 6888 Xi Electronics

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

1. Remove cover screws from the front cover of the Rosemount 6888 Xi. Swing down the front cover of the interface box.
2. Pull out the I/O board on the right side of the card rack inside the Rosemount 6888 Xi.

If your system is configured to operate two transmitter probes, there are two I/O interface boards.

3. Connect the 4-20 mA signal wires at J4 of the I/O board. Attach the supplied ferrite clamp over the 4-20 mA OUT wires that extend past the shield.

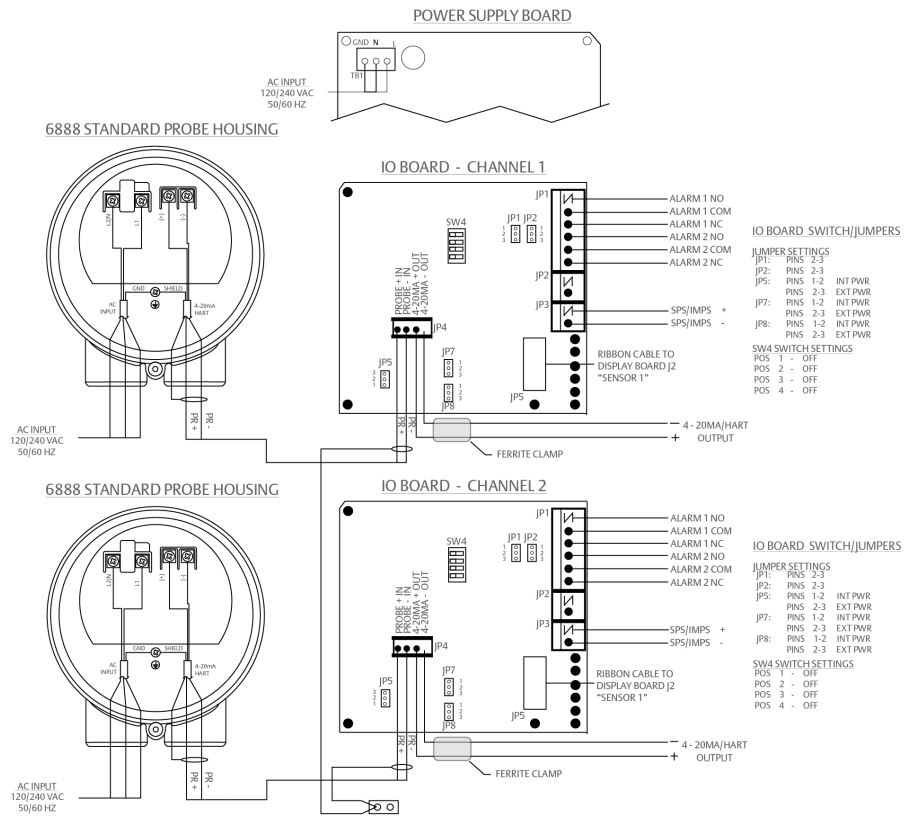
NOTICE

Installation of the ferrite clamp over the 4-20 mA OUT wires is required for 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 6888 Xi. 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 SPS or IMPS (if used) to the applicable terminals of J3.

Refer to the SPS or IMPS instruction manual for wiring details.
6. Reinstall the I/O board in the card rack of the Rosemount 6888 Xi.
7. If your system is configured for two channel operation, repeat steps 2 through 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 6888 Xi.
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 to the power supply board.

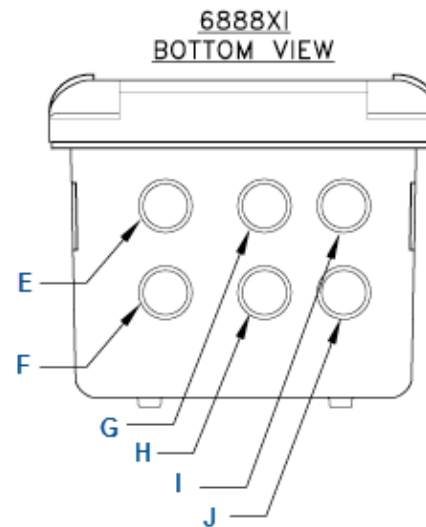
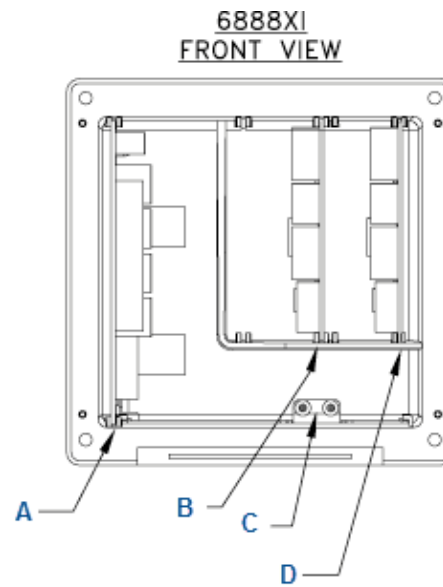
Figure 1-6: Wiring Diagrams - Single/Dual Channel Wiring Diagram



NOTICE

- A. **Except for JP5, JP7, and JP8 on IO board, jumper and switch settings are factory set and are shown for reference only.**
- B. **IO board 4-20 mA loop power settings**
 - **JP5: Pins 1-2 internal power Rosemount 6888 Xi to Rosemount 6888 Transmitter**
 - **Pins 2-3 external power Rosemount 6888 Xi to Rosemount 6888 Transmitter (requires 250 Ω resistor across J4, PR+ to PR-)**
 - **JP7/JP8: Pins 1-2 internal power Rosemount 6888 Xi to DCS**
 - **Pins 2-3 external power Rosemount 6888 Xi to DCS**

Figure 1-7: Wiring Diagrams - Single/Dual Channel Wiring Diagram



- A. Power supply board
- B. Channel #2 IO board
- C. Shield ground
- D. Channel #1 IO board
- E. AC input to P/S
- F. Plug
- G. Channel #2 alarm relay SPS/IMPS
- H. Channel #2 4-20 mA / HART output
- I. Channel #1 alarm relay SPS/IMPS
- J. Channel #1 4-20 mA/HART output

1.2.3 Connecting the Transmitter probe with integral autocal to HART communications

This probe contains gas-switching solenoids so that the Rosemount 6888 Xi 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 6888 Xi local operator interface keypad. The integral autocal feature can only be implemented when the probe is used with a Rosemount 6888 Xi.

1. Remove the two covers from the transmitter.
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.

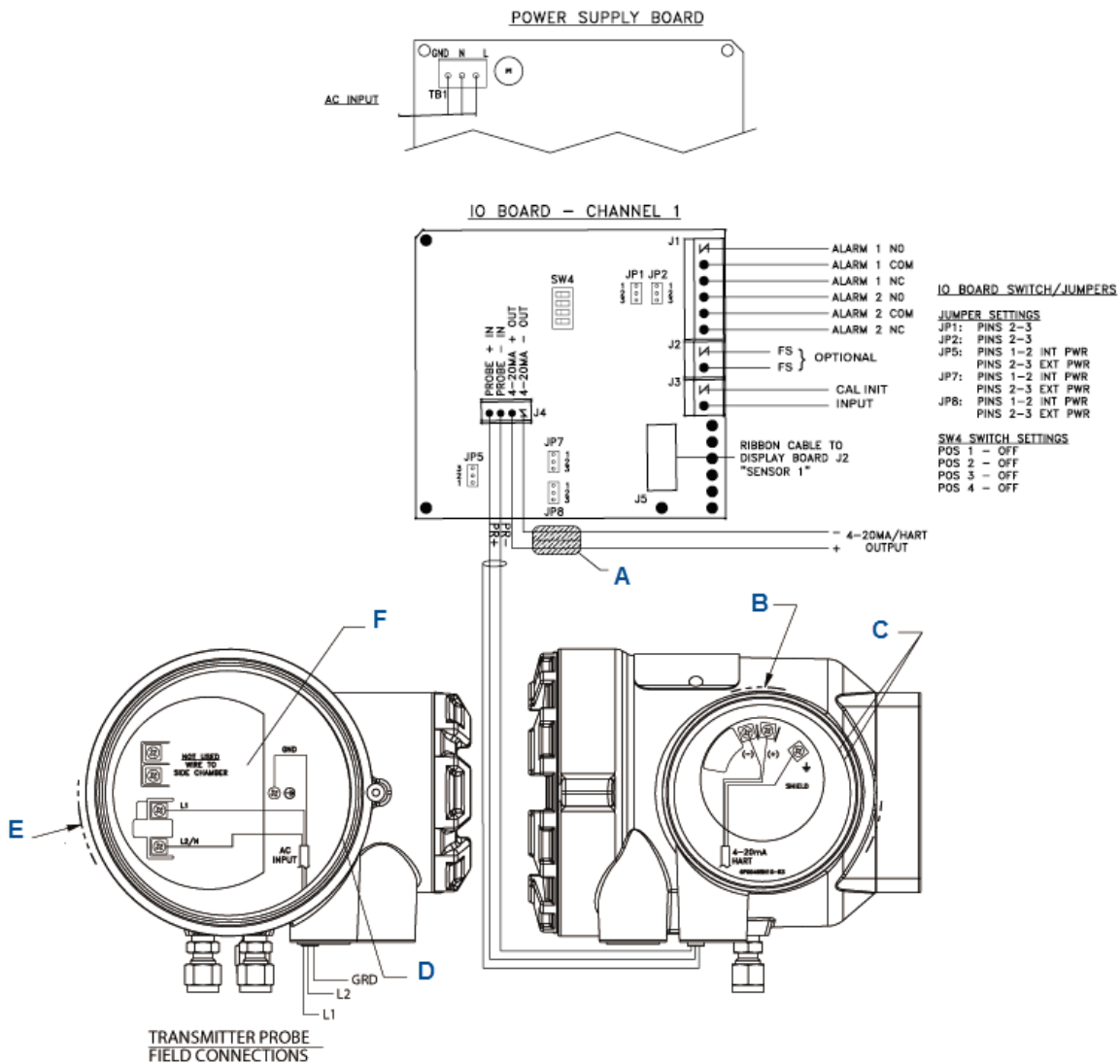
The Rosemount 6888C accepts line voltage at 120/240 Vac \pm 10%, 50/60 Hz. No setup is required.

3. Connect the 4-20 mA signal wires from the Rosemount 6888 Xi to the connections in the side chamber of the transmitter.

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. 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 6888 Xi.

4. Terminate the shield at both the probe and the Rosemount 6888 Xi Advanced Electronics.
5. Reinstall both covers on transmitter.

Figure 1-8: Integral autocal and HART communications



- A. Ferrite clamp
- B. Signal
- C. Test points
- D. #8 pan htd scr (internal ground)
- E. Power
- F. Test point group

NOTICE

A. Except for JP5, JP7, and JP8 on 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 6888 Xi to Rosemount 6888 transmitter**
 - **Pins 2-5: external power Rosemount 6888 Xi to Rosemount 6888 transmitter (requires 2,500 resistor across J4, PR+ to PR-)**
- **JP7/JP8**
 - **Pins 1-2: internal power to DCS**
 - **Pins 2-3: external power Rosemount 6888 Xi to DCS**

NOTICE

I/O board - Channel 2 is a duplicate of Channel 1.

1.2.4 Connecting the Transmitter probe with integral autocal to FOUNDATION Fieldbus™ communications

This probe contains gas-switching solenoids so that the Rosemount 6888 Xi 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 6888 Xi local operator interface keypad. The integral autocal feature can only be implemented when the probe is used with a Rosemount 6888 Xi.

1. Remove the two covers from the transmitter.
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 6888C accepts line voltage at 120/240 Vac \pm 10%, 50/60 Hz. No setup is required.

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

Note that the Rosemount 6888 probe is not rated as intrinsically safe 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.

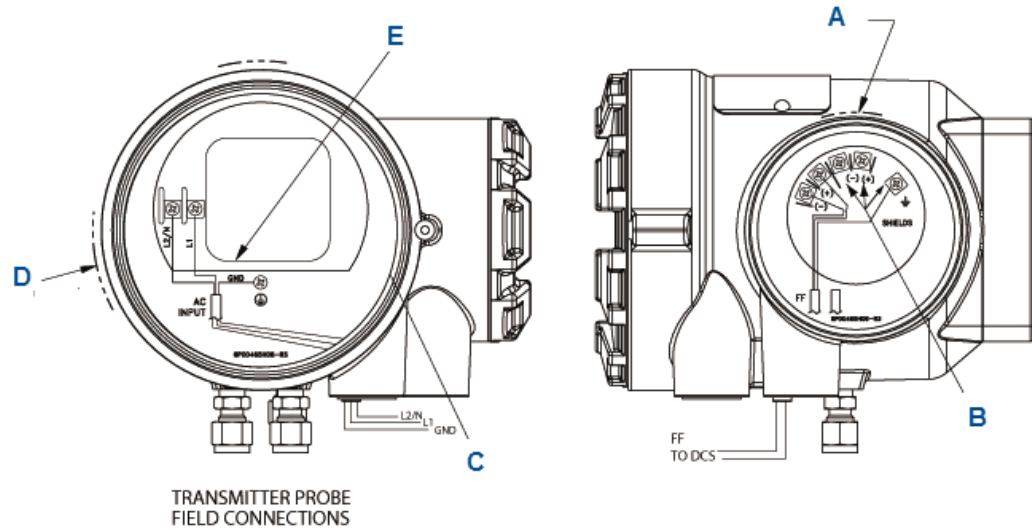
4. Terminate the shield at both the probe and the Rosemount 6888 Xi Advanced Electronics.

NOTICE

The FOUNDATION Fieldbus signal represents the O₂ value and also powers the probe-mounted electronics.

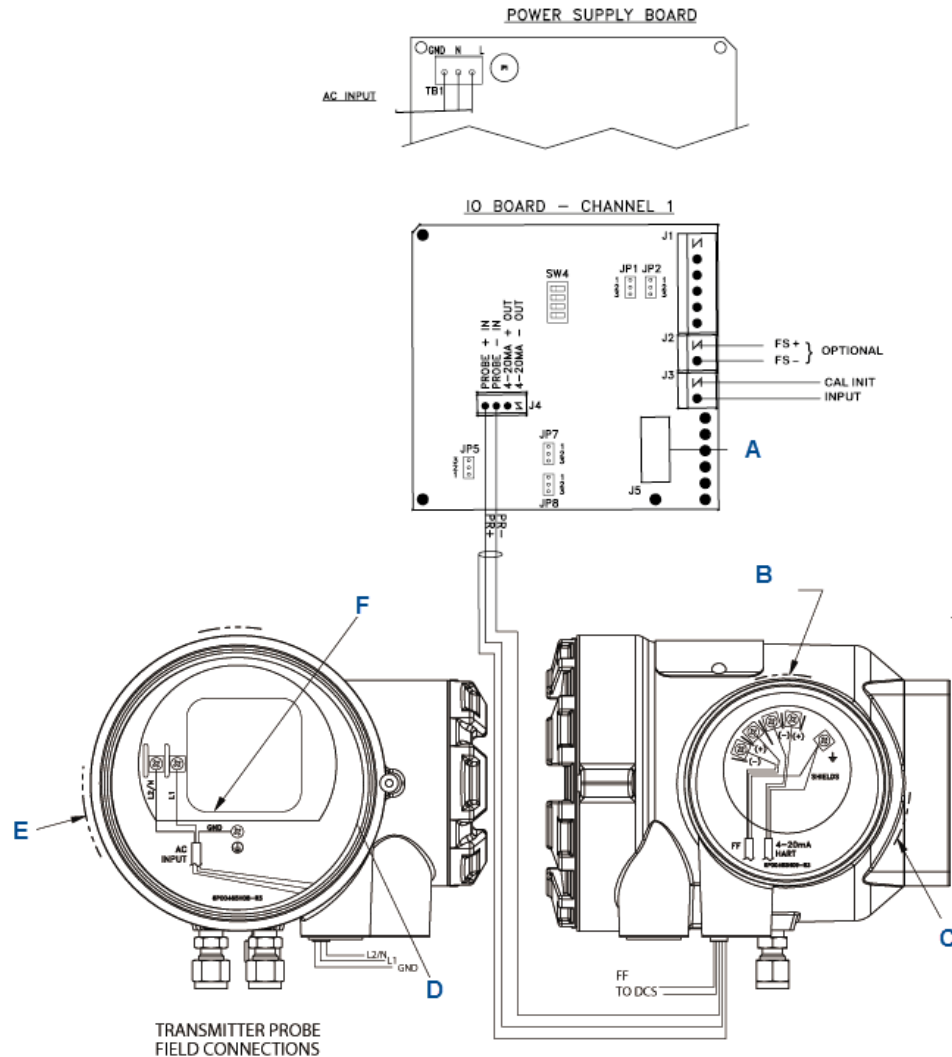
5. Reinstall both covers on transmitter.

Figure 1-9: Integral Autocal and FOUNDATION Fieldbus Communications without Optional Rosemount 6888 Xi



- A. *Signal*
- B. *Not used*
- C. *#8 pan htr scr (internal ground)*
- D. *Power*
- E. *Probe test point group*

Figure 1-10: Integral autocal and FOUNDATION Fieldbus Communications with Rosemount 6888 Xi



- A. Ribbon cable to display board J2 Sensor 1
- B. Signal
- C. HART connection (Used as a communication bus from probe transmitter electronics to optional Rosemount 6888 Xi. Not accessible to 475 communicator or AMS)
- D. #8 pan htr scr (internal ground)
- E. Power
- F. Probe test point group

IO board switch/jumpers

Jumper settings

- 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
- JP8
 - Pins 1-2 internal power
 - Pins 2-3 external power

SW4 switch settings

- Position 1 - Off
- Position 2 - Off
- Position 3 - Off
- Position 4 - Off

NOTICE

- A. **Except for JP5, JP7, and JP8 on 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**

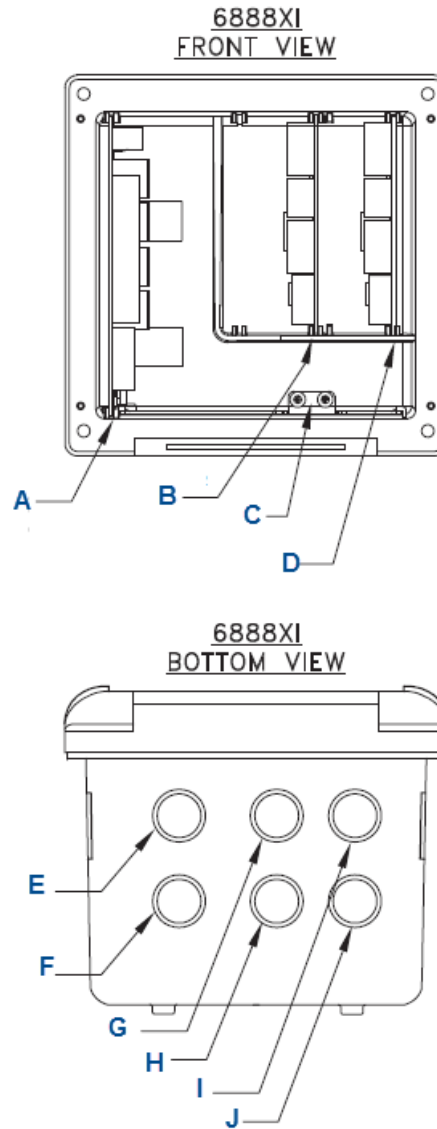
JP5

- **Pins 1-2 internal power Rosemount 6888 Xi to Rosemount 6888 Transmitter**
- **Pins 2-3 external power Rosemount 6888 Xi to Rosemount 6888 Transmitter (requires 2,500 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**

Figure 1-11: Wiring Diagrams - Integral Autocal and FOUNDATION Fieldbus, Communications with Rosemount 6888Xi



- A. Power supply board
- B. Channel #2 IO board
- C. Shield ground
- D. Channel #1 IO board
- E. AC input to P/S
- F. Plug
- G. Channel #2 alarm relay, SPS/IMPS
- H. Channel #2 4-20 mA/HART output
- I. Channel #1 alarm relay, SPS/IMPS
- J. Channel #1 4-20 mA/HART output

1.2.5 Connecting the traditional architecture system to the direct replacement probe

A traditional architecture configuration is used to provide for remote location of the transmitter electronics. All electronics are housed inside the Rosemount 6888 Xi. A multi-conductor power/signal cable connects between the probe and the Rosemount 6888Xi. Use the following procedure to connect the traditional architecture probe to the Rosemount 6888 Xi.

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

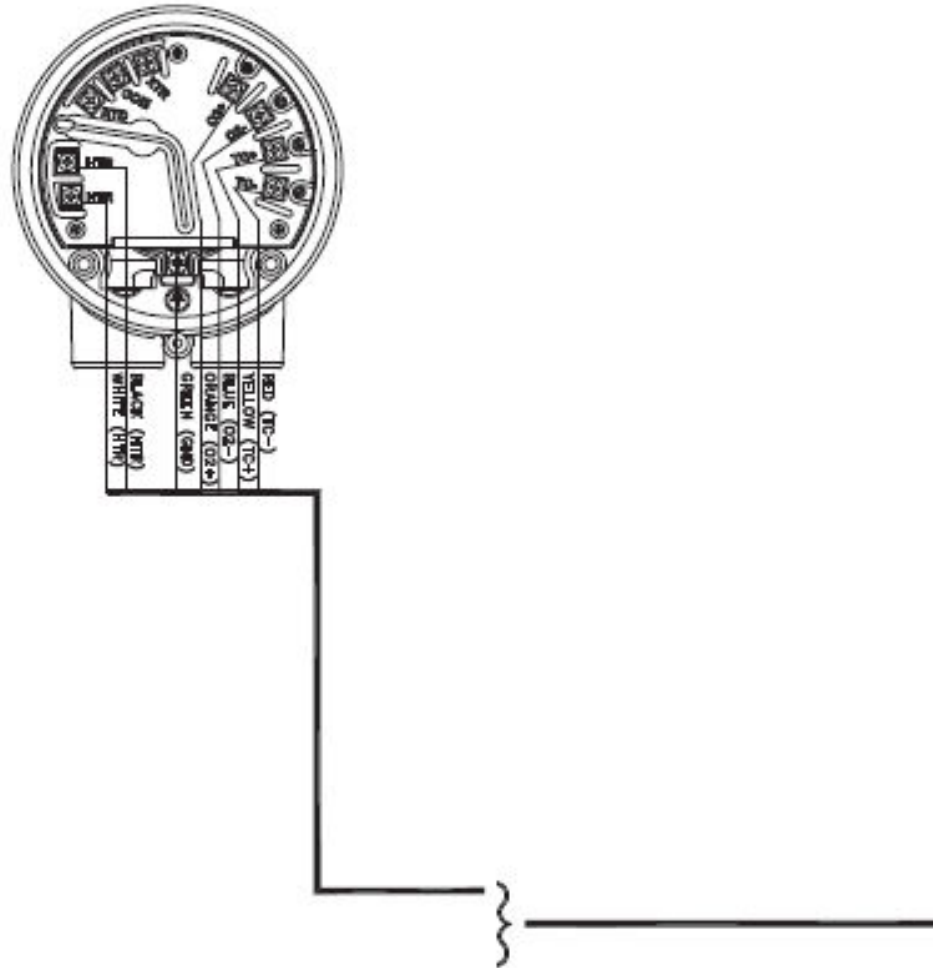
1. Run the 7-conductor cable between the traditional architecture probe and the installation site for the Rosemount 6888 Xi. Use new cable conduit or trough as needed.
2. Install the cable and lead wires to the probe per manufacturer's instructions.
3. Install the cable at the probe housing and at the Rosemount 6888 Xi enclosure according to the following procedure:
 - a. Unscrew locking nut from gland assembly and slide locking nut back along cable.
 - b. Pull the gland body away from the plastic insert. Use care not to damage the cable shield braid.
 - c. Insert the cable wires into the proper entry port in either the probe housing or the Rosemount 6888 Xi enclosure.
 - d. At the probe housing, apply Teflon tape or similar sealing compound to the tapered pipe threads. Thread the gland body into the probe housing until properly seated.
 - e. At the Rosemount 6888 Xi enclosure, insert the gland body into the left front cable port from the inside of the enclosure. Use the rubber O-ring provided to seal the cable port.
 - f. 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.
 - g. Carefully press the gray insert into the gland body.

The grooves on the insert should align with similar grooves inside the gland body. 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. Tighten the locking nut so the rubber grommet inside the plastic insert compresses against the cable wall to provide an environmental seal.
4. At the Rosemount 6888 Xi, connect the cable leads to the connectors on the transmitter I/O board.

Figure 1-12: Wiring Diagrams - Traditional Architecture with Direct Replacement Probe (no Electronics Inside)

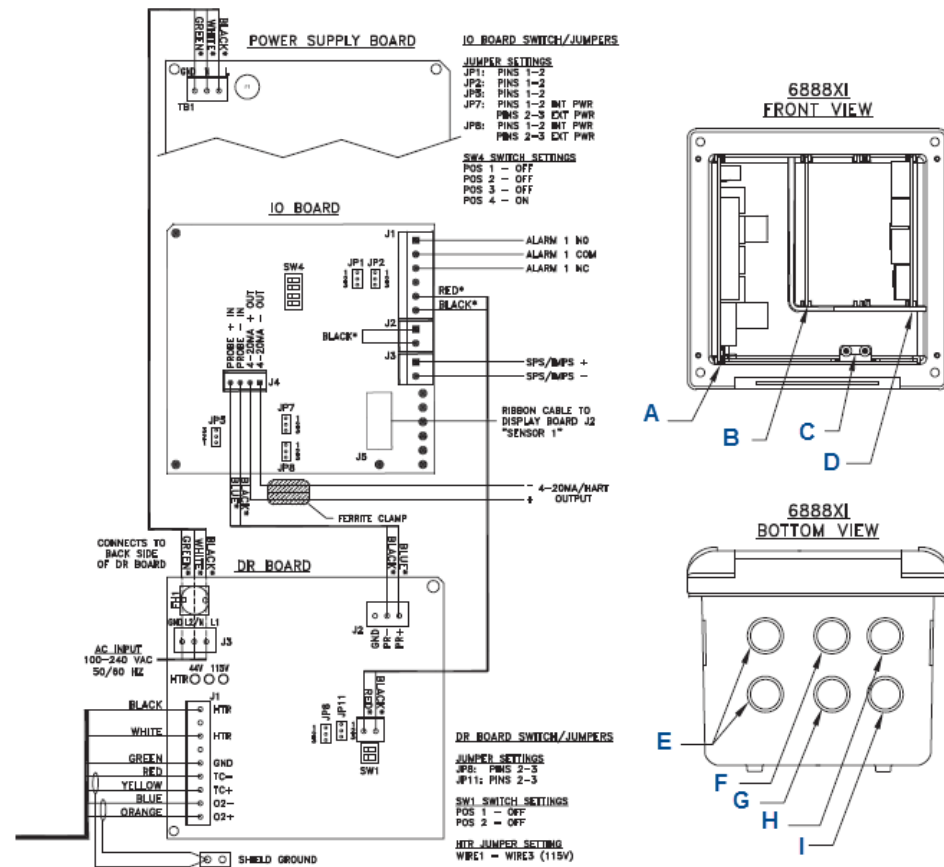
6888 DR PROBE



NOTICE

- A. See the 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.

Figure 1-13: Wiring Diagrams - Traditional Architecture with Direct Replacement Probe (no Electronics Inside)



- 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

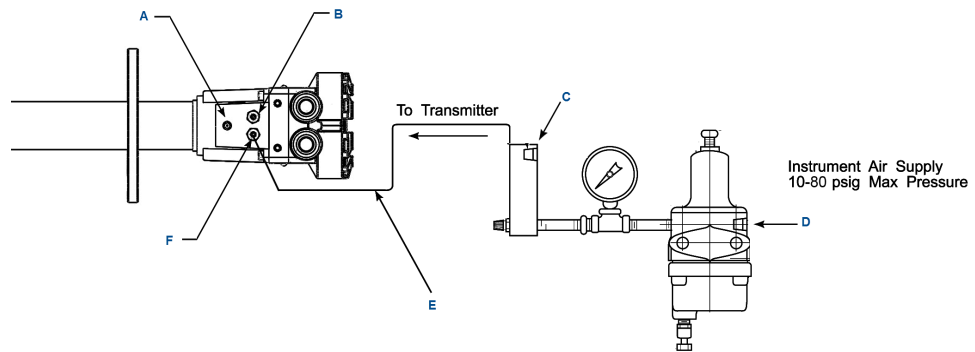
1.3 Pneumatic installation

Reference air package

After the Rosemount 6888C is installed, connect the reference air set to the unit. Refer to the schematic diagram and the mounting dimensions in [Figure 1-14](#) for a locally assembled reference air supply.

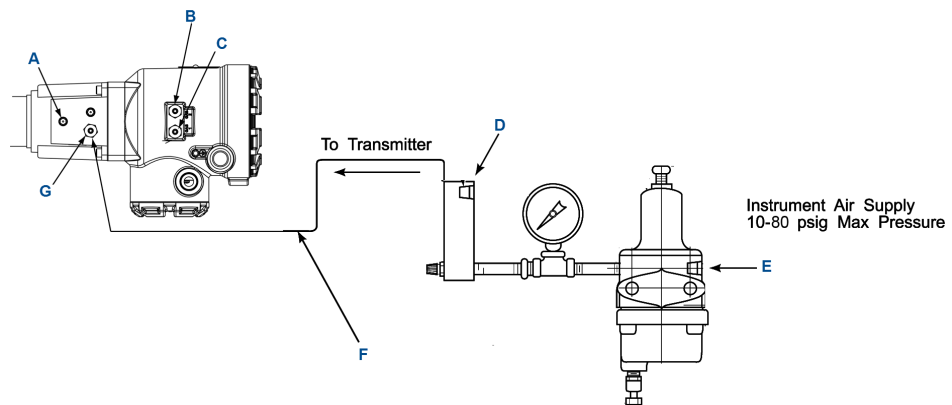
Instrument air (reference air): 5 psi (34 kPa) minimum, 8 psi (54 kPa) maximum at 2.0 scfh (1.01 L/min) maximum; less than 40 parts per million total hydrocarbons. Regulator outlet pressure should be set at 5 psi (34 kPa).

Figure 1-14: Plant air schematic diagram, standard housing



- A. Vent
- B. Calibration gas: 1/4 in. tube
- C. Reference air flowmeter
- D. 0.25-18 NPT female inlet connection
- E. 0.25 or 6 mm O.D. tubing (supplied by customer)
- F. Reference gas: 1/4 in. tube

Figure 1-15: Plant air schematic diagram, accessory housing



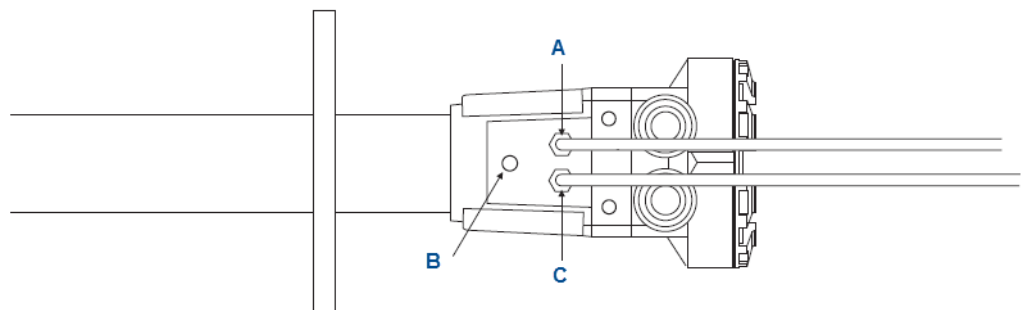
- A. Vent
- B. Calibration gas 1: 1/4 in. tube
- C. Calibration gas 2: 1/4 in. tube
- D. Reference air flowmeter
- E. 0.25-18 NPT female inlet connection
- F. 0.25 or 6 mm O.D. tubing (supplied by customer)
- G. Reference gas: 1/4 in. tube

1.3.1 Calibration gas

Two calibration gas concentrations are used with this transmitter, low gas - 0.4% O₂, balance N₂, and high gas - 8% O₂, balance N₂.

See [Figure 1-16](#) for the Rosemount 6888C probe calibration gas connection ports.

Figure 1-16: Rosemount 6888C Calibration Gas Connections



- A. Cal gas in
- B. Ref air vent
- C. Ref air in

⚠ CAUTION!

READING ERRORS

Do not use 100% nitrogen as a low gas (zero gas). Emerson suggests that gas for the low (zero) be between 0.4% and 2.0% O₂. Do not use gases with hydrocarbon concentrations of more than 40 parts per million. Failure to use proper gases will result in erroneous readings.

⚠ CAUTION!

EQUIPMENT DAMAGE

If the ducts will be washed down during outage, **MAKE SURE** to power down the Rosemount 6888C units and remove them from the wash areas.

NOTICE

Upon completing installation, make sure that the transmitter is turned on and operating prior to firing up the combustion process. Damage can result from having a cold Rosemount 6888C unit exposed to the process gases. During outages, if possible, leave all Rosemount 6888C units running to prevent condensation and premature aging from thermal cycling.

2 Configuration, startup, and operation

⚠ WARNING!

ELECTRIC SHOCK

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

⚠ CAUTION!

EQUIPMENT DAMAGE

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

2.1 Powering up Rosemount 6888 Transmitter without Rosemount 6888Xi

Complete the following steps to apply power to the Rosemount 6888 Transmitter without connecting it to the Rosemount 6888Xi.

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

The transmitter 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 O₂ 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% O₂.

If there is an error condition at startup, an alarm message is displayed. Refer to the full instruction manual for troubleshooting alarms.

2.2 Powering up Rosemount 6888 Transmitter with single/dual channel or single channel

Complete the following steps to power up the Rosemount 6888 Transmitter using the Rosemount 6888Xi Electronics.

1. Apply AC line power to the transmitter.
2. Apply AC line power to the Rosemount 6888Xi. Run the Quick Start Wizard as described below. At the Auto Cal Device screen, select the calibration method based on the Rosemount 6888 Transmitter 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 transmitter and the Rosemount 6888Xi.

The Rosemount 6888Xi display is preconfigured to display O₂ and cell temperature for single channel configurations and both O₂ readings for dual channel configurations.

The transmitter 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 O₂ 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% O₂.

If there is an error condition at startup, an alarm message is displayed. Refer to the full instruction manual for troubleshooting alarms.

2.3 Powering up the Rosemount 6888 Direct Replacement Probe (no electronics inside) with traditional architecture Rosemount 6888 Xi

Complete the following steps to power up the Rosemount 6888 Direct Replacement Probe with the Rosemount 6888 Xi Electronics.

1. Apply AC line power to the Rosemount 6888 Xi.
2. Run the Quick Start Wizard as described in [Section 2.4](#).
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 transmitter 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 O₂ 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% O₂.

If there is an error condition at startup, an alarm message is displayed.

2.4 Rosemount 6888 Xi Quick Start Wizard

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

1. Apply power to the Rosemount 6888 Xi.

Once boot-up is complete, the Quick Start Wizard screen appears. With a dual channel Rosemount 6888 Xi, the wizard runs for both channels in succession.

2. Press **Enter** to continue.
3. At the Sensor Type screen, use the **Up** and **Down** keys to select O₂.
Do not select CO as this option is reserved for future use.
4. Press **Enter** to continue.
5. At 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.

NOTICE

If SPS, IMPS, or Integral is selected, you must still configure automatic calibration as On. Other parameters, such as test gas values and gas times, should be verified as well. Refer to the Rosemount 6888 Xi instruction 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 6888 Xi displays several screens while saving the configuration, resets itself, and then returns to the main screen.

2.5 Calibration

The Rosemount 6888 O₂ 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 startup and operation, but most accurate measurement is gained by executing a calibration under normal operating conditions.

Emerson recommends using 0.4% O₂ and 8% O₂ 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. Emerson does not recommend 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 flowmeter to 5 scfh flow rate.

2.5.1 Manual/semi-automatic calibration

The Rosemount 6888 probe with the standard housing can be calibrated in a semi-automatic fashion with a technician following prompts via the display of the Rosemount 6888 Xi Electronics or via HART[®] communications to a Field Communicator or AMS console. The technician needs to manually switch the gases based upon these prompts. Emerson recommends using 0.4% O₂ and 8% O₂, balance nitrogen as calibration gases. Always use a two-stage pressure regulator set to 20 psi. Set the calibration gas flowmeter 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 flowmeter to deliver less flow to the sensing cell, but never readjust the flow rate until a new diffuser is installed. Readjusting the flowmeter back up to the 5 scfh level could pressurize the cell during calibration and cause the O₂ 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. The technician has the opportunity to accept or reject the new values. (A significant calibration change may cause a bump in the O₂ 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 10 successful calibrations.

⚠ CAUTION!

READING ERRORS

Make sure the calibration gas cap is replaced tightly after calibration is complete. A loose or missing cap can permit fresh air to bias the O₂ readings high in processes that run at negative pressure.

2.5.2 Fully automatic calibration

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

Rosemount 6888 Probes with standard electronics housing

In addition to the Rosemount 6888 Xi, this arrangement requires a separate single probe sequencer (SPS), which is a solenoid box for switching calibration gases or a larger intelligent multiprobe sequencer (IMPS) which can handle the autocal for up to four probes in one box.

The automatic calibrations can be initiated in several ways:

- Via a *calibration recommended* diagnostic that is periodically checking cell impedance
- Via push button on the Rosemount 6888 Xi Electronics
- Via HART communications from a 475 handheld communicator or AMS
- Via an external contact closure
- Via time since the last successful calibration

If the O₂ measurement is being used for automatic control, always place the O₂ control loop into manual prior to calibrating. Always inform the operator prior to calibrating. The Rosemount 6888 Xi Electronics provides an *in cal* contact closure for this purpose. An *initiate cal* contact is also provided.

The Rosemount 6888 Xi 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 O₂ 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.

Rosemount 6888 Probe with integral autocal housing

This probe contains the autocal solenoids within the blue electronics housing, eliminating the need and cost for an SPS or IMPS 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 permanently.

NOTICE

The calibration sequence from the Rosemount 6888 Xi Electronics is identical to that for the manual/semiautomatic calibration, but note that with the integral autocal version of this probe it is not possible to conduct a manual calibration. The factory offers a probe rebuild capability if solenoid or other failures occur.

⚠ CAUTION!

LEAKS

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

Appendix A

Rosemount™ 6888C Product Certifications

A.1 European Directive information

A copy of the EC Declaration of Conformity can be found at the end of this Quick Start Guide. The most recent revision of the EC Declaration of Conformity can be found at Emerson.com/Rosemount.

A.2 Ordinary location certification


As standard, the transmitter has been examined and tested to determine that the design meets the basic electrical, mechanical, and fire protection requirements by a nationally recognized test laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

A.3 Installing equipment in North America

The US National Electrical Code (NEC) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions. The marking must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

A.4 USA/Canada


Model String	C
Option Code	
CSA Certificate	70100758
Standards	CAN/CSA Standard C22.2 No.0-10:2015, CAN/CSA C22.2 No. 61010-1-12 Harmonized UL 61010-1:2012 (3rd Edition), CAN/CSA Standard C22.2 No. 94.1-15 Harmonized ANSI/UL Standard 50 (2nd Edition), CAN/CSA Standard C22.2 No. 94.2-15 Harmonized ANSI/UL Standard 50 (2nd Edition), CAN/CSA C22.2 No. 60529:16 and ANSI/ISA 60529:04, CAN/CSA Standard C22.2 No. 30-M1986: 2016, CAN/CSA-C22.2 No. 60079-0: 2015, CAN/CSA-C22.2 No. 60079-1:2016, FM 3600:2011, FM 3615:2006, ANSI/UL-60079-0:2013 (6th Edition), ANSI/UL-60079-1:2015 (7th Edition)

Markings  Type 4X, IP66, Class 1, Division 1, Groups B, C and D; T3, Class 1, Zone 1, AEx db IIB+H2 T3 Gb, Ex db IIB+H2 T3 Gb: $-40\text{ °C} \leq T_a \leq +70\text{ °C}$ (Autocal Housing and Probe assembly); $-40\text{ °C} \leq T_a \leq +90\text{ °C}$ (Standard Housing and Probe assembly eq. “DR Probe”)

Conditions of acceptability

1. The unit is intended to be connected to supply mains by qualified personnel in accordance with national (e.g. CEC, NEC, etc) and local codes.
2. Suitable APPROVED switch and fuse or a circuit breaker shall be provided to facilitate the disconnection of mains power.
3. The maximum operating ambient is considered as follows: 90 °C for 6888C DR Probe, 70 °C for 6888C Transmitter.
4. Mounting Flange temperature shall not exceed 190 °C during combustion process.
5. Calibration air lines and reference air lines shall not contain pure oxygen or combustible gas other than inert/oxygen gas mixture of which oxygen represents no more than that normally present in air.
6. The pressure within the enclosure and gas lines shall not be higher than 1.1 times the atmospheric pressure during the normal operations of the equipment.
7. The 6888C O₂ Analyzers are used with the 6888 Xi Advanced Electronics, which must be installed in a Non-Hazardous Location, per wiring diagram 6R00131.
8. Meets Enclosure Type 4X & IP66 ratings when the reference air vent is routed to a dry area.
9. Units installed with conduit runs must have suitably certified conduit seals installed at the enclosure.
10. Units installed with other than conduit runs and conduit seals, must be fitted with certified or listed cable glands for use in “Class I, Zone 1, Ex/AEx d IIB+H2” and “Class I, Division 1, Group B, C and D” or better, suitable for the ambient temperature range.
11. Flameproof joints are not intended to be repaired.

A.5 Europe

Model String	A
Option Code	
ATEX Certificate	Sira 14ATEX1031X
Standards	EN 60079-0:2012/A11:2013, EN 60079-1:2014
Markings	 II 2 G Ex db IIB+H2 T3 Gb; IP66; $-40\text{ °C} \leq T_a \leq +70\text{ °C}$ (Autocal Housing and Probe assembly); $-40\text{ °C} \leq T_a \leq +90\text{ °C}$ (Standard Housing and Probe assembly eq. “DR Probe”)

Special conditions for safe use (X):

1. Mounting flange temperatures shall not exceed 190 °C during combustion process.

2. The 6888C O₂ Analyzers are used with the 6888 Xi Advanced Electronics (associated equipment not part of this certification) which must be installed in a Safe Area.
3. Calibration air lines and reference air lines shall not contain pure oxygen or combustible gas other than inert/oxygen gas mixture of which oxygen represents no more than that normally present in air.
4. The pressure within the enclosure and gas lines shall not be higher than 1.1 times the atmospheric pressure during the normal operations of the equipment.
5. Fasteners property class must be A2-70 Stainless Steel.
6. Flameproof joints are not intended to be repaired.

**Model String Option A
Code**

IECEX Certificate IECEx CSA 14.0044X

Standards IEC 60079-0:2012/A11:2013, IEC 60079-1:2014

Markings Ex db IIB+H2 T3 Gb; IP66; -40°C ≤ Ta ≤ +70°C (Autocal Housing and Probe assembly); -40 °C ≤ Ta ≤ +90°C (Standard Housing and Probe assembly eq. “DR Probe”)

Special conditions for safe use (X):

1. Mounting Flange temperature shall not exceed 190 °C during combustion process.
2. The 6888C O₂ Analyzers are used with the 6888 XI Advanced Electronics (associated equipment not part of this certification) which must be installed in a safe area.
3. Calibration air lines and reference air lines shall not contain pure oxygen or combustible gases other than inert/oxygen gas mixture of which oxygen represents no more than that normally present in air.
4. The pressure within the enclosure and gas lines shall not be higher than 1.1 times the atmospheric pressure during the normal operations of the equipment.
5. Fasteners property class must be A2-70 Stainless Steel.
6. Flameproof joints are not intended to be repaired.



EU DECLARATION OF CONFORMITY



(No. 1700912)

6888A/6888C

This declaration is issued under the sole responsibility of the manufacturer:

Rosemount Inc., 8200 Market Blvd., Chanhassen, MN 55317 USA

The product,

6888 Oxygen Transmitter, Models 6888A and 6888C

to which this declaration relates, is in conformity with relevant Union harmonization legislation:

(2014/30/EU) EMC Directive

(2014/35/EU) Low Voltage Directive

(2014/68/EU) Pressure Equipment Directive

This equipment has been designed and manufactured with sound engineering practices in accordance with Article 4, Paragraph 3 of the PED

(2014/34/EU) ATEX Directive (Model 6888C)

Provisions of the directive fulfilled by the equipment:

Equipment Group II category 2 G Ex db IIB+H2 T3 Gb ($-40^{\circ}\text{C} \leq \text{Ta} \leq 70^{\circ}\text{C}$)

EC Type Examination Certificate: Sira14ATEX1031X

EC-Type Examination Certificate issued by Sira (0518), Rake Lane Eccleston Chester CH4 9JN, United Kingdom

Product Quality Assessment Notification issued by SGS Baseefa (1180), Rockhead Business Park, Staden Lane, Buxton SK17 9RZ United Kingdom

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

EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements
EN 61010-1:2010	Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements
EN 60079-0:2012+A11:2013	Explosive atmospheres. Equipment. General requirements. (Certified to 60079-0:2012, meets /A11:2013 which does not have any major technical change)
EN 60079-1:2014	Explosive atmospheres. Equipment protection by flameproof enclosures "d"

(Signature)


Chris LaPoint
(Name printed)


Vice President Global Quality, Engineering, & Approvals
(Function name)


July 1, 2017
(Date of issue)

GLOBAL HEADQUARTERS

Emerson Automation Solutions
6021 Innovation Blvd
Shakopee, MN 55379, USA

 +1 800 999 9307 or +1 952 906 8888

 +1 952 949 7001


 gas.csc@emerson.com


www.Emerson.com/RosemountGasAnalysis

NORTH AMERICA

Rosemount

8200 Market Boulevard
Chanhassen, MN 55317

 Toll Free + 1 800 999 9307


 F +1 952 949 7001


 gas.csc@emerson.com


www.Emerson.com/RosemountGasAnalysis

EUROPE

Emerson Automation Solutions
Neuhofstrasse 19a P.O. Box 1046
CH-6340 Baar
Switzerland

 T + 41 (0) 41 768 6111


 F + 41 (0) 41 768 6300


 gas.csc@emerson.com


www.Emerson.com/RosemountGasAnalysis

MIDDLE EAST AND AFRICA

Emerson Automation Solutions
Emerson FZE
Jebel Ali Free Zone
Dubai, United Arab Emirates, P.O. Box 17033

 T +971 4 811 8100


 F +971 4 886 5465


 gas.csc@emerson.com


www.Emerson.com/RosemountGasAnalysis

ASIA-PACIFIC


Emerson Automation Solutions
1 Pandan Crescent
Singapore 128461
Singapore


 T +65 777 8211

 F +65 777 0947

 gas.csc@emerson.com

www.Emerson.com/RosemountGasAnalysis


 [Linkedin.com/company/Emerson-Automation-Solutions](https://www.linkedin.com/company/Emerson-Automation-Solutions)

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