

Rosemount™ 5081FG

Two-Wire In-Situ Oxygen Analyzer (550° to 1600°C)



HIGHLIGHTS OF CHANGES

Effective April, 2017 Rev. 2.1

Page	Summary
General	Reformatted entire manual in accordance with Emerson style guide. Revised all illustration formats.
Cover	Updated manual revision level and release date.
1-5	Revised Figure 1-2.
1-7	Revised Specifications.
1-9	Revised Table 1-1, Product Matrix.
2-11	Corrected reference to installation drawings in the warning regarding intrinsically safe applications.
2-14	Revised Reference Air Package illustrations.
3-3	Revised Figure 3-3.
3-5	Revised Figure 3-5 to reflect update to Diagnostics Menu.
3-7	Added Operator Adjustable Parameters discussion and Table 3-1.
3-18, 3-19	Added Current Slope and Current Constant diagnostic descriptions.
4-2, 4-3	Revised Figures 4-1 and 4-2.
4-5, 4-6, 4-7	Revised Figure 4-3, sheets 1, 2, and 3.
5-8	Added Calibration Passes discussion.
6-1 through 6-5	Revised all procedures to reflect changes to Figure 6-1.
6-2	Revised Figure 6-1 to reflect components configuration changes.
7-1	Revised Table 7-1, Replacement Parts list. Updated part numbers.
Appendix C	Added new Appendix C containing installation drawings for intrinsically safe applications.

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Oxygen Analyzers

READ THIS PAGE BEFORE PROCEEDING!

ESSENTIAL INSTRUCTIONS

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's Rosemount products. Failure to follow the proper instructions may cause any one of the following situations to occur: Loss of life; personal injury; property damage; damage to this 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.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Emerson. Unauthorized parts and procedures can affect the product's performance, place the safe operation of your process at risk, **and VOID YOUR WARRANTY.** Look-alike substitutions may result in fire, electrical hazards, or improper operation.
- **Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.**

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

⚠ CAUTION

If a Model 275/375 Universal HART® Communicator is used with this unit, the software within the Model 275/375 may require modification. If a software modification is required, please contact your local Emerson Service Group or National Response Center at 1-800-433-6076 or 1-888-433-6829.

Section i Introduction

Preface	page i-iii
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PREFACE

The purpose of this manual is to provide information concerning the components, functions, installation and maintenance of the Rosemount 5081FG Two-Wire In-Situ Oxygen Analyzer (550° to 1600°C).

Some sections may describe equipment not used in your configuration. The user should become thoroughly familiar with the operation of this module before operating it. Read this instruction manual completely.

DEFINITIONS

The following definitions apply to WARNINGS, CAUTIONS, and NOTES found throughout this publication.

WARNING

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

NOTE

Highlights an essential operating procedure, condition, or statement.

SYMBOLS

-  : EARTH (GROUND) TERMINAL
-  : PROTECTIVE CONDUCT OR TERMINAL
-  : RISK OF ELECTRICAL SHOCK
-  : WARNING: REFER TO INSTRUCTION MANUAL

NOTE TO USERS

The number in the lower right corner of each illustration in this publication is a manual illustration number. It is not a part number, and is not related to the illustration in any technical manner.

Technical Support Hotline:

For assistance with technical problems, please call the Customer Support Center (CSC). The CSC is staffed 24 hours a day, 7 days a week.

Phone: 1-800-433-6076, 1-440-914-1261

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

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

Emerson may also be reached via the Internet through email and the World Wide Web:

Email: GAS.CSC@emerson.com

Section 1
Description and Specifications

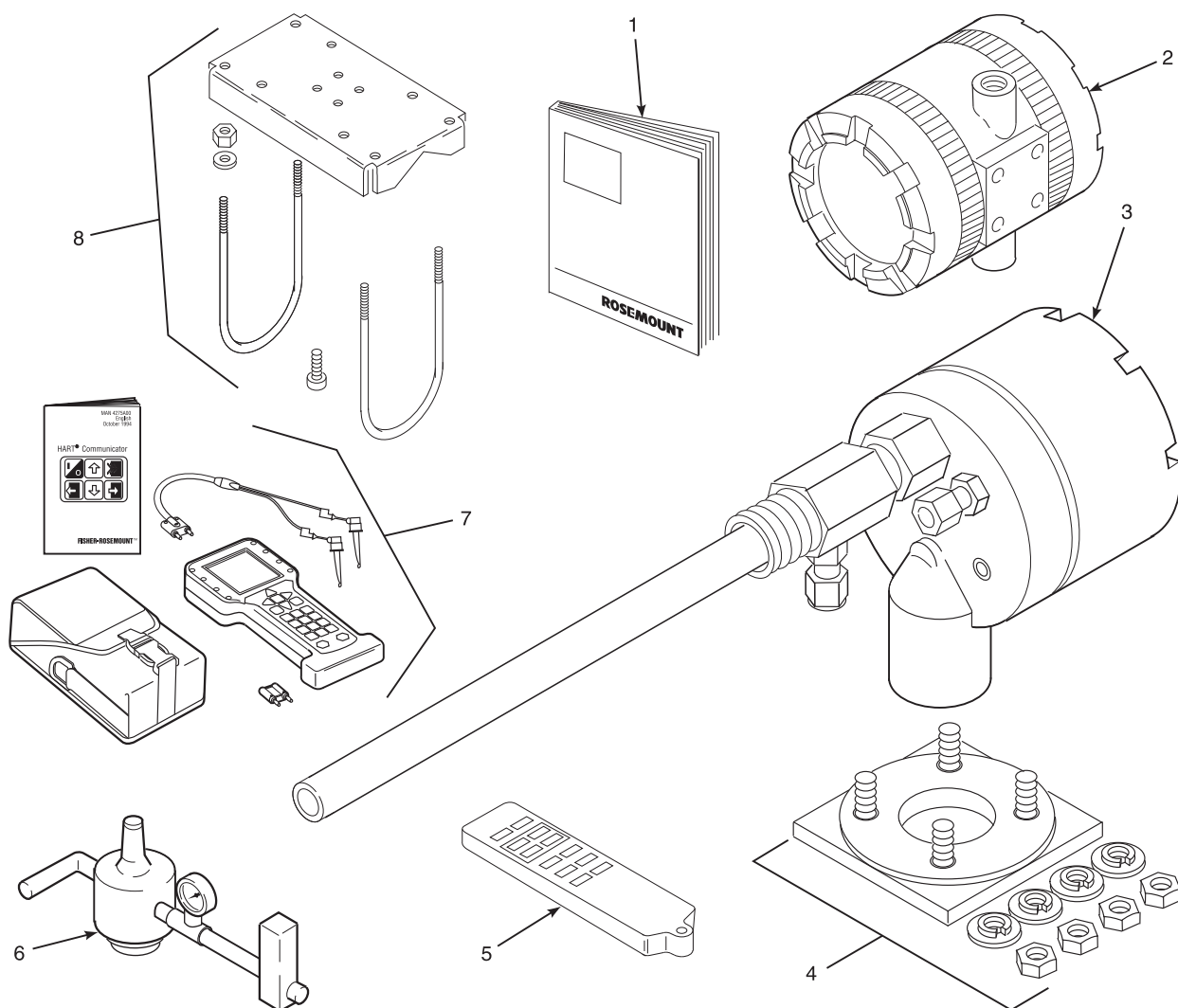
Component Checklist	page 1-1
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**COMPONENT
CHECKLIST**

A typical Rosemount Two-Wire In-Situ Oxygen Analyzer should contain the items shown in Figure 1-1. Record the part number, serial number, and order number for each component of your system in the table located on the first page of this manual.

Also, use the product matrix in Table 1-1 at the end of this section to compare your order number against your unit. The first part of the matrix defines the model. The last part defines the various options and features of the Rosemount 5081FG Analyzer. Ensure the features and options specified by your order number are on or included with the unit.

Figure 1-1. Typical System Package



39580001

1. Instruction Manual
2. Rosemount 5081 Transmitter
3. Oxygen Probe
4. Adapter Plate with Mounting Hardware and Gasket (Optional)
5. Infrared Remote Control (IRC)
6. Reference Air Set (Optional)
7. Field Communicator Package (Optional)
8. Pipe Mounting Kit (Optional)

SYSTEM OVERVIEW**Scope**

This Instruction Bulletin is designed to supply details needed to install, start up, operate, and maintain the Rosemount Two-Wire In-Situ Oxygen Analyzer. The analyzer consists of an oxygen probe and Rosemount 5081 transmitter. The signal conditioning electronics of the Rosemount 5081 transmitter outputs a 4-20 mA signal representing an O₂ value. An infrared remote control (IRC) allows access to setup, calibration, and diagnostics. This same information, plus additional details, can be accessed with the HART field communicator or Asset Management Solutions (AMS) software.

System Description

The Rosemount Two-Wire In-Situ Oxygen Analyzer is designed to measure the net concentration of oxygen in an industrial process; i.e., the oxygen remaining after all fuels have been oxidized. The oxygen probe is permanently positioned within an exhaust duct or stack and performs its task without the use of a sampling system. Rosemount 5081 transmitter is mounted remotely and conditions the oxygen probe outputs.

The equipment measures oxygen percentage by reading the voltage developed across a heated electrochemical cell, which consists of a small yttria stabilized, zirconia disc. Both sides of the disc are coated with porous metal electrodes. When operated at the proper temperature, the millivolt output voltage of the cell is given by the following Nernst equation:

$$EMF = KT \log_{10}(P1/P2) + C$$

Where:

1. P2 is the partial pressure of the oxygen in the measured gas on one side of the cell.
2. P1 is the partial pressure of the oxygen in the reference air on the opposite side of the cell.
3. T is the absolute temperature.
4. C is the cell constant.
5. K is an arithmetic constant.

NOTE

For best results, use clean, dry, instrument air (20.95% oxygen) as the reference air.

NOTE

The probe uses a Type B thermocouple to measure the cell temperature.

When the cell is at operating temperature and there are unequal oxygen concentrations across the cell, oxygen ions will travel from the high oxygen partial pressure side to the low oxygen partial pressure side of the cell. The resulting logarithmic output voltage is approximately 50 mV per decade.

The output is proportional to the inverse logarithm of the oxygen concentration. Therefore, the output signal increases as the oxygen concentration of the sample gas decreases. This characteristic enables the Rosemount Two-Wire In-Situ Oxygen Analyzer to provide exceptional sensitivity at low oxygen concentrations.

The oxygen analyzer measures net oxygen concentration in the presence of all the products of combustion, including water vapor. Therefore, it may be considered an analysis on a “wet” basis. In comparison with older methods, such as the portable apparatus, which provides an analysis on a “dry” gas basis, the “wet” analysis will, in general, indicate a lower percentage of oxygen. The difference will be proportional to the water content of the sampled gas stream.

System Configuration

The equipment discussed in this manual consists of two major components: the oxygen probe and the Rosemount 5081 transmitter.

Oxygen probes are available in three length options, providing In-Situ penetration appropriate to the size of the stack or duct. The options on length are 20 in. (508 mm), 26 in. (660 mm), or 38 in. (965 mm).

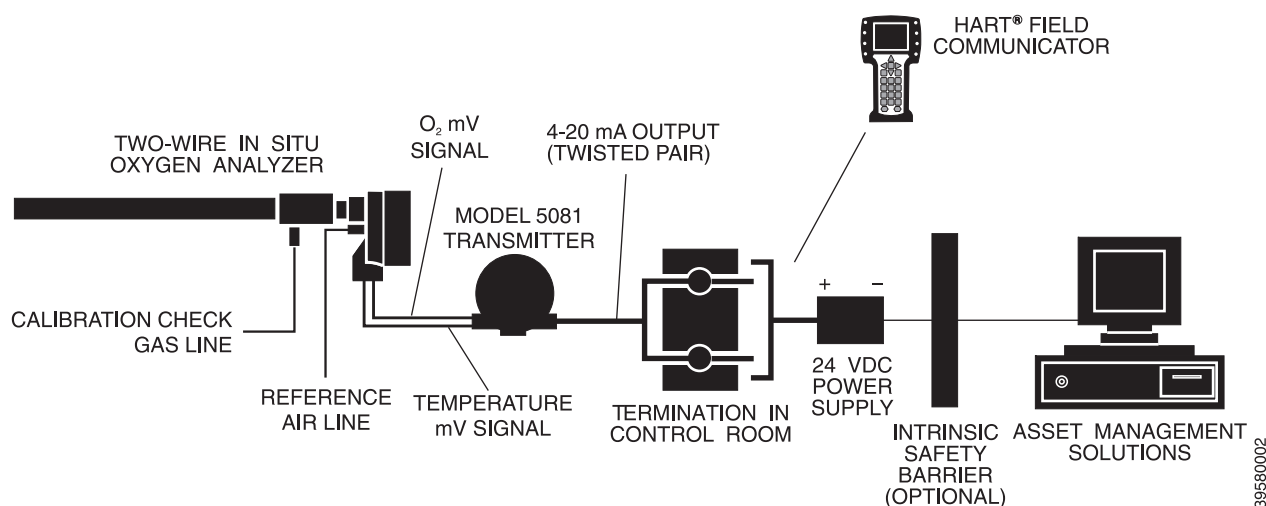
Rosemount 5081 transmitter is a two-wire transmitter providing an isolated output, 4-20 mA, that is proportional to the measured oxygen concentration. A customer-supplied 24 VDC power source is required to simultaneously provide power to the electronics and a 4-20 mA signal loop. The transmitter accepts millivolt signals generated by the probe and produces the outputs to be used by other remotely connected devices. The output is an isolated 4-20 mA linearized current.

System Features

1. The cell output voltage and sensitivity increase as the oxygen concentration decreases.
2. High process temperatures eliminate the need for external cell heating and increase cell accuracy.
3. HART communication is standard. To use the HART capability, you must have either:
 - (a) Field Communicator
 - (b) Asset Management Solutions (AMS) software for the PC
4. Easy probe replacement due to the light-weight, compact probe design.
5. Remote location of the Rosemount 5081 transmitter removes the electronics from high temperature or corrosive environments.
6. Power is supplied to the electronics through the 4-20 mA line for intrinsic safety (IS) purposes.
7. Infrared remote control (IRC) allows interfacing without exposing the electronics.

8. An operator can operate and diagnostically troubleshoot the Two-Wire In-Situ Oxygen Analyzer in one of two ways:
 - a. Infrared Remote Control. The IRC allows access to fault indication menus on the Rosemount 5081 transmitter LCD display. Calibration can be performed from the IRC keypad.
 - b. Optional HART Interface (Figure 1-2). The Two-Wire In-Situ Oxygen Analyzer'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:
 - Field Communicator - The field communicator requires Device Description (DD) software specific to the Two-Wire In-Situ Oxygen Analyzer. The DD software will be supplied with many field communicators but can also be programmed into existing units at most Fisher-Rosemount service offices. See Section 4: HART/AMS, for additional HART information.
 - Personal Computer (PC) - The use of a personal computer requires AMS software available from Fisher-Rosemount.
9. Selected Distributed Control Systems - The use of distributed control systems requires input/output (I/O) hardware and AMS Security codes are provided to (by infrared remote control) prevent unintended changes to analyzers adjacent to the one being accessed.
10. A calibration check procedure is provided to determine if the Rosemount Two-Wire In-Situ Oxygen Analyzer is correctly measuring the net oxygen concentration in the industrial process.

Figure 1-2. Two-Wire In-Situ Oxygen Analyzer HART Connections and AMS Application



Handling the Analyzer

The probe was specially packaged to prevent breakage due to handling. Do not remove the padding material from the probe until immediately before installation.

CAUTION

It is important that printed circuit boards and integrated circuits are handled only when adequate antistatic precautions have been taken to prevent possible equipment damage.

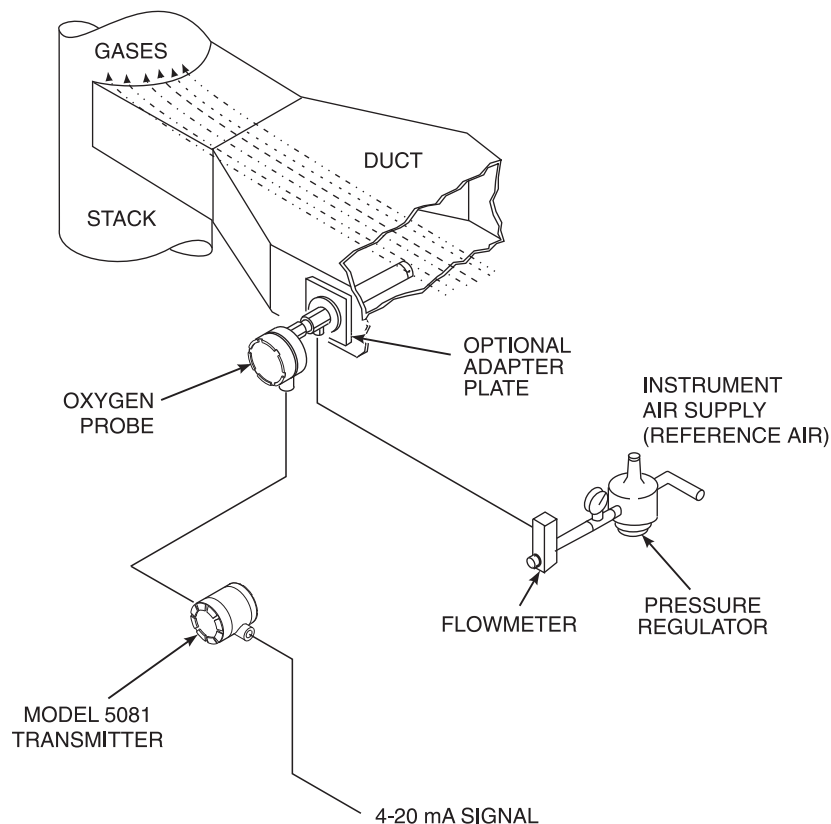
The oxygen probe is designed for industrial applications. Treat each component of the system with care to avoid physical damage. Some probe components are made from ceramics, which are susceptible to shock when mishandled.

System Considerations

Prior to installing your Rosemount Two-Wire In-Situ Oxygen Analyzer, make sure you have all the components necessary to make the system installation. Ensure all the components are properly integrated to make the system functional.

After verifying that you have all the components, select mounting locations and determine how each component will be placed in terms of available line voltage, ambient temperatures, environmental considerations, convenience, and serviceability. Figure 1-1 shows a typical system package. A typical system installation is shown in Figure 1-3.

Figure 1-3. Typical System Installation



39580003

A source of instrument air is optional at the oxygen probe for reference air use. Since the unit is equipped with an in place calibration feature, provisions can be made to permanently connect calibration gas bottles to the oxygen probe.

If the calibration gas bottles will be permanently connected, a check valve is required next to the calibration fittings on the integral electronics.

This check valve is to prevent breathing of the calibration gas line and subsequent flue gas condensation and corrosion. The check valve is in addition to the stop valve in the calibration gas kit.

NOTE:

The electronics is rated NEMA 4X (IP65) and is capable of operation at temperatures up to 65°C (149°F).

Retain the packaging in which the Rosemount Two-Wire In-Situ Oxygen Analyzer arrived from the factory in case any components are to be shipped to another site. This packaging has been designed to protect the product.

SPECIFICATIONS

Transmitter	
Net O ₂ Range	0 to 25% O ₂
System Accuracy	±1.5% of reading or 0.05% O ₂ , whichever is greater
System Response in Flue Gas	Initial – less than 3 seconds, T90 – less than 8 seconds
Probe Lengths	20 in. (508 mm) 26 in. (660 mm) 38 in. (965 mm)
Process Temperature Limits:	550° to 1400°C (1022° to 2552°F) Operation to 1600°C (2912°F) with reduced cell life
Ambient Temperature Limits:	-40° to 149°C (-40° to 300°F)
Mounting and Mounting Position	Vertical or horizontal
Materials of Construction (Process Wetted Parts):	
Inner Probe	Zirconia
Outer Protection Tube	Alumina [1600°C (2912°F) limit] Inconel 600 [1000°C (1832°F) limit]
Probe Junction Box	Cast aluminum
Speed of Installation/Withdrawal	1 in. (25,4 mm) per minute
Hazardous Area Certification	Intrinsically safe per IEC 60079-0: 2011 IEC 60079-11: 2011. ⁽¹⁾
Reference Air Requirement	100 mL per minute (2,119 scfh) of clean, dry instrument air; 1/4 in. tube fittings
Calibration Check Gas Fittings	1/4 in. tube fittings
Cabling	Two twisted pairs, shielded
Continued on Next Page	

Electronics

Electronics Enclosure	IP65 (NEMA 4X), weatherproof, and corrosion-resistant
Materials of Construction	Low copper aluminum
Ambient Temperature Limits	-20° to 65°C (-4° to 149°F)
Relative Humidity	95% with covers sealed
Power Supply and Load Requirements	See Figure 1-4
Inputs (from O ₂ Probe)	Two wires - O ₂ signal Two wires - type B thermocouple
Output	One 4-20 mA signal with superimposed digital HART signal
Hazardous Area Certification	ATEX EEx ia IIC T4 or T5 ⁽²⁾ NEC Class 1 Div 1 Group B,C,D
Power Transient Protection	IEC 801-4
Shipping Weight	10 lbs (4,5 kg)

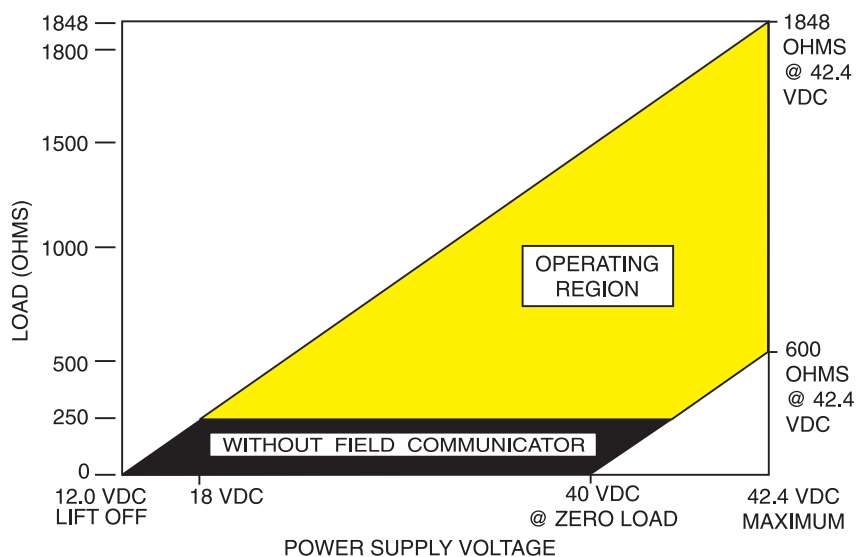
Infrared Remote Control

Power Requirements	Three AAA Batteries
Hazardous Area Certification	ATEX EEx ia IIC Class 1, Div 1, Group A, B, C, D

⁽¹⁾ Thermocouple and O₂ probe cell are both unpowered, developing a millivolt emf, and are considered a "simple apparatus" by certifying agencies.

⁽²⁾ Dependent on ambient temperature limits.

Figure 1-4. Power Supply and Load Requirements



39580007

Instruction Manual

IM-106-5081, Rev. 2.1

April 2017

Rosemount 5081FG

Table 1-1. Product Matrix

5081FG	High Temperature Oxygen Flue Gas Analyzer									
5081FG	High Temperature Analyzer - Instruction Manual									
	Code	Sensing Probe Type								
	1	20 in. (508 mm) probe, 1/4 in. tube fittings								
	2	26 in. (660 mm) probe, 1/4 in. tube fittings								
	3	38 in. (965 mm) probe, 1/4 in. tube fittings								
	Code	Probe Outer Tube Material - Maximum Operating Temperature								
	1	Alumina - 2912°F (1600°C) maximum - 1.25 NPT mounting								
	2	Inconel Alloy - 1832°F (1000°C) maximum - 1.25 NPT mounting								
	Code	Mounting Adapter- Stack Side								
	0	No adapter plate required uses 1.25 NPT ("0" must also be chosen under "Mounting Adapter" below)								
	1	New flanged installation - Square weld plate with studs (matches "Mounting Adapter" below)								
	2	Model 450 mounting ("4" must also be chosen under "Mounting Adapter" below)								
	3	Competitor's Mount ("5" must also be chosen under "Mounting Adapter" below)								
	Code	Mounting Adapter - Probe Side								
	0	No adapter plate								
	1	ANSI 2 in. 150 lb flange to 1.25 NPT adapter (6 in. dia. flange, 4.75 in. BC with 4 x 0.75 in. dia. holes)								
	2	DIN to 1.25 NPT adapter (184 mm flange, 145 mm BC with 4 x 18 mm dia. holes)								
	3	JIS to 1.25 NPT adapter (155 mm flange, 130 mm BC with 4 x 13 mm dia. holes)								
	4	Model 450 to 1.25 NPT adapter								
	5	Competitor's mounting flange								
	Code	Electronics & Housing - Intrinsically Safe, NEMA 4X, IP65								
	1	5081 Electronics (Hart-compatible) - ATEX EEx ia IIC T5								
	2	5081 Electronics (Hart-compatible) - CSA pending								
	3	5081 Electronics (Hart-compatible) - FM Class 1, Div. 1, Groups B,C,D								
	Code	Housing Mounting								
	1	Surface or wall mounting								
	2	1/2 to 2 in. pipe mounting								
	Code	Communications								
	1	No remote control								
	2	Infrared Remote Control (IRC) (LCD display through cover window)								
	Code	Calibration Accessories								
	1	No hardware								
	2	Calibration and reference air flowmeters and reference air pressure regulator								
	Code	Armored Cable Length								
	00	No cable								
	11	20 ft (6 m)								
	12	40 ft (12 m)								
	13	60 ft (18 m)								
	14	80 ft (24 m)								
	15	100 ft (30 m)								
	16	150 ft (45 m)								
	17	200 ft (61 m)								
	18	300 ft (91 m)								
	19	400 ft (122 m)								
	20	500 ft (152 m)								
5081FG	2	1	0	0	1	1	1	2	11	Example

Section 2 Installation

Pre-Installation	page 2-2
Mechanical Installation	page 2-2
Electrical Installation	page 2-11
Pneumatic Installation	page 2-14

 WARNING

Before installing this equipment, read the “Safety instructions for the wiring and installation of this apparatus” in Appendix A. Failure to follow safety instructions could result in serious injury or death.

PRE-INSTALLATION

Inspect

Carefully inspect the shipping container for any evidence of damage. If the container is damaged, notify the carrier immediately.

Packing List

Confirm that all items shown on the packing list are present. Notify Rosemount immediately if items are missing.

WARNING

Before installing this equipment, read the "Safety instructions for the wiring and installation of this apparatus" in Appendix A. Failure to follow safety instructions could result in serious injury or death.

MECHANICAL INSTALLATION

CAUTION

Avoid installation locations near steam soot blowers.

Locating Oxygen Probe

1. The location of the oxygen probe in the stack or flue is important for maximum accuracy in the oxygen analyzing process. The probe must be positioned so the gas it measures is representative of the process. Longer ducts may require several analyzers since the O₂ can vary due to stratification. A point too near the wall of the duct, or the in-side radius of a bend, may not provide a representative sample because of the very low flow conditions. The sensing point should be selected so the process gas temperature falls within a range of 550° to 1400°C (1022° to 2552°F). Figure 2-1 provides mechanical installation references.
2. Check the flue or stack for holes and air leakage. The presence of this condition will substantially affect the accuracy of the oxygen reading. Therefore, either make the necessary repairs or install the probe upstream of any leakage.
3. Ensure the area is clear of internal and external obstructions that will interfere with installation and maintenance access to the probe. Allow adequate clearance for probe removal (Figure 2-1).

Figure 2-1. Probe Installation Details

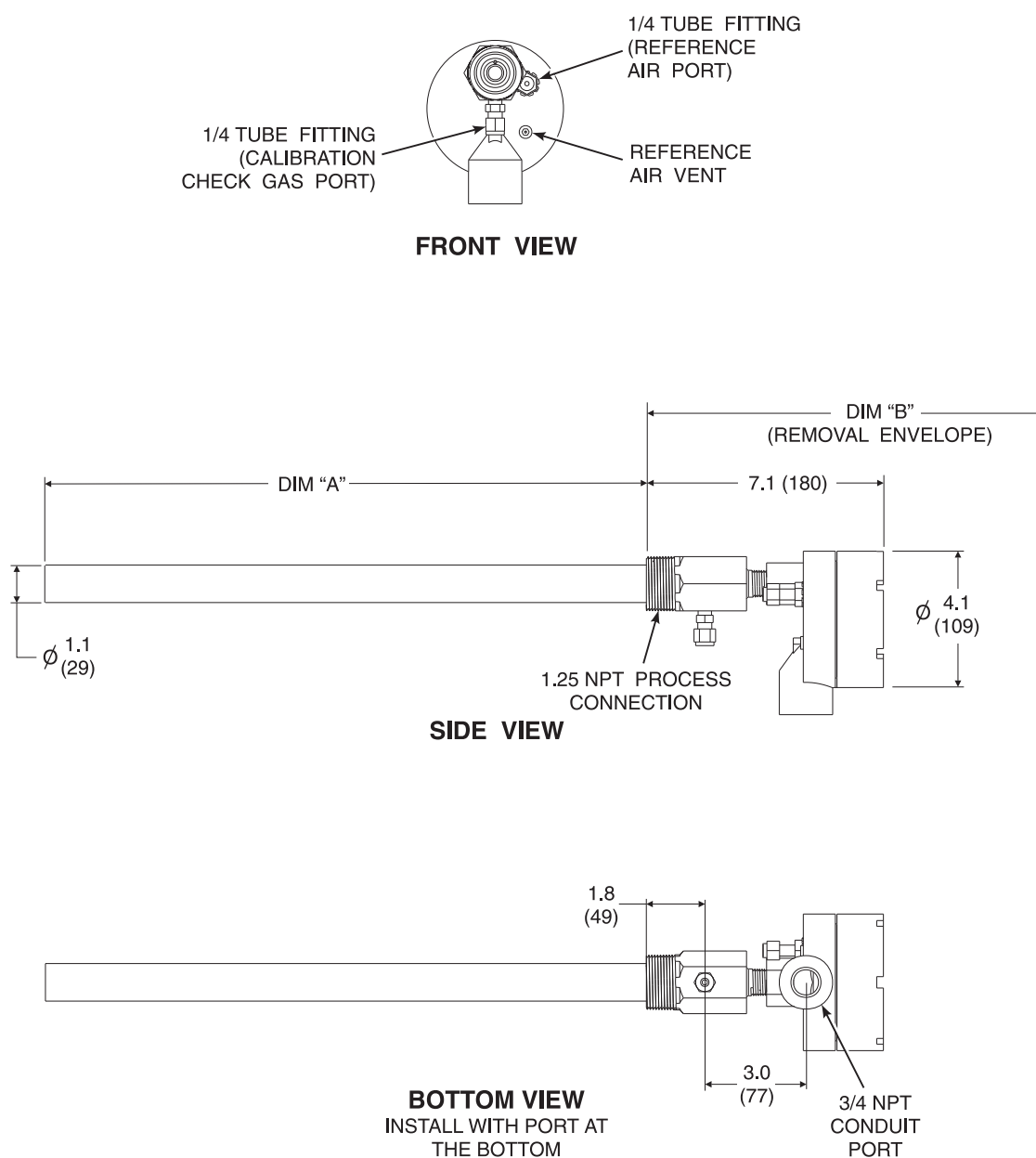


TABLE 1. INSTALLATION (REMOVAL)

PROBE	DIM "A"	DIM "B"
20 IN.	20 (508)	31 (787)
26 IN.	26 (660)	37 (940)
38 IN.	38 (965)	49 (1244)

NOTE: DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

39580004

Installing Oxygen Probe

⚠ CAUTION

The probe was specially packaged to prevent breakage due to handling. Do not remove the padding material from the probe until immediately before installation.

1. Ensure all components are available to install the probe.

NOTE

Leave the probe inner protective cover in place until installation. This is required to protect the ceramic cell during movement.

2. If using an optional adapter plate (Figure 2-2) or an optional mounting flange (Figure 2-3), weld or bolt the component onto the duct. The through hole in the stack or duct wall and refractory material must be 2 in. (50,8 mm) diameter, minimum.
3. If the optional adapter plates are not used, a 2 in. NPT, schedule 40, pipe nipple (Figure 2-4) should be welded to the stack or duct wall. When a 2 in. NPT to 1.25 NPT adapter is threaded to the welded pipe nipple, the adapter provides the pipe threads needed for the probe's process fitting.
4. Where high particulate or slag is in the flue gas stream, it may be desirable to inset the probe in the refractory as shown in Figure 2-5. Use pipe couplings and nipples to adjust the probe insertion depth.
5. Use high temperature material (alumina wool) to seal around the probe during insertion. This prevents hot gases from escaping or cold air from entering the stack or duct.
6. Initially insert the probe to a depth of 3 in. (76,2 mm) or 1/2 the depth of the stack or duct refractory, whichever is greater.

⚠ CAUTION

After initial insertion, do not insert the probe at a rate exceeding 1 in. per minute (25.4 mm per minute) or damage to the probe may result due to thermal shock.

7. After initial insertion, insert the probe at a rate of 1 in. (25,4 mm) per minute until the probe is fully inserted.
8. Install anti-seize compound on the pipe threads and screw the probe into the process flange or adapter.
9. If insulation was removed to access the duct work for probe mounting, make sure the insulation is replaced. See Figure 2-4.

⚠ CAUTION

If the ducts will be washed down during outage, MAKE SURE to power down the probes and remove them from the wash area.

Figure 2-2. Optional Adapter Plate

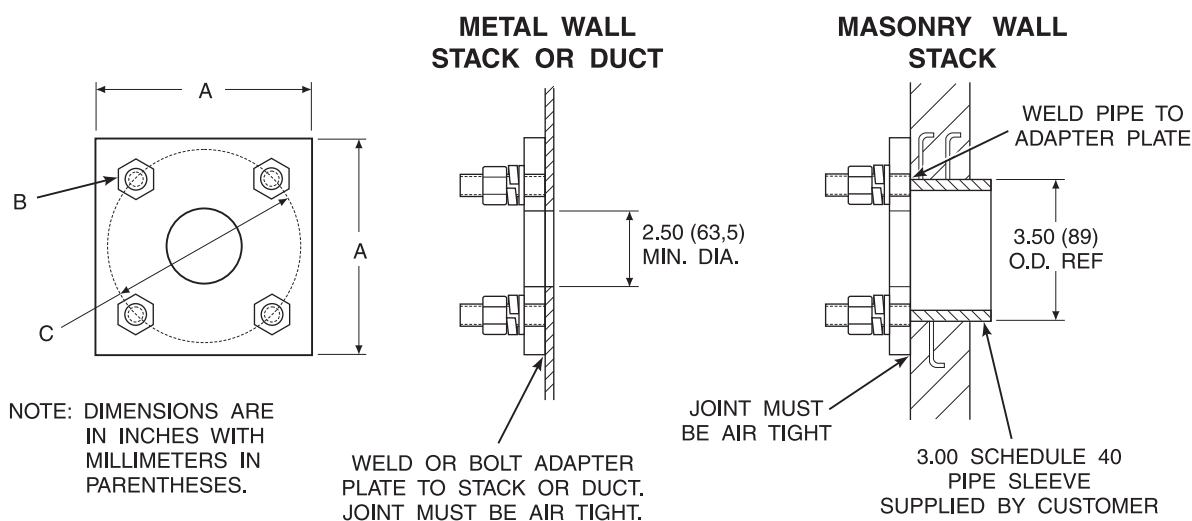
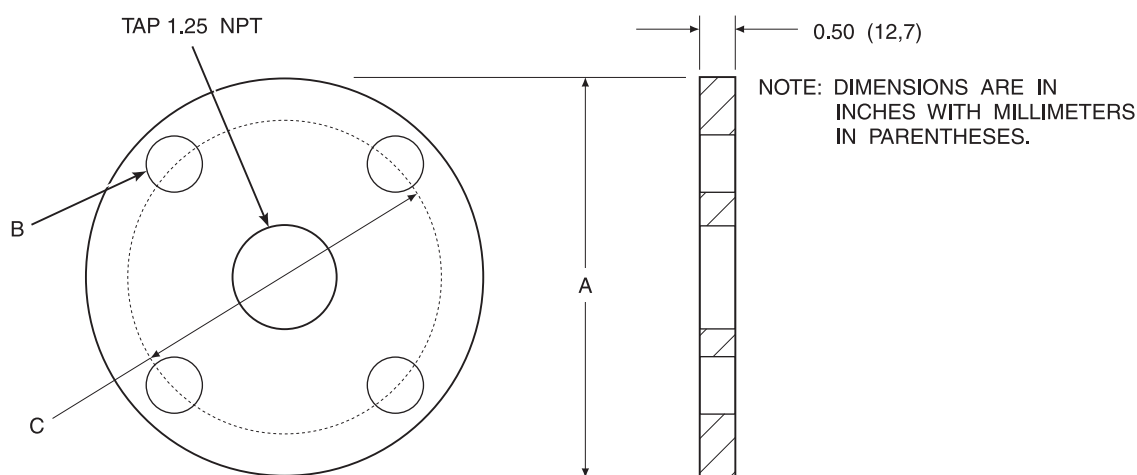


PLATE DIMENSIONS			
DIMENSION	ANSI 4512C34G01	DIN 4512C36G01	JIS 4512C35G01
"A"	6.00 (153)	7.5 (191)	6.50 (165)
"B" THREAD	0.625-11	M-16x2	M-12x1.75
"C" DIA.	4.75 (121)	5.71 (145)	5.12 (130)

39580008

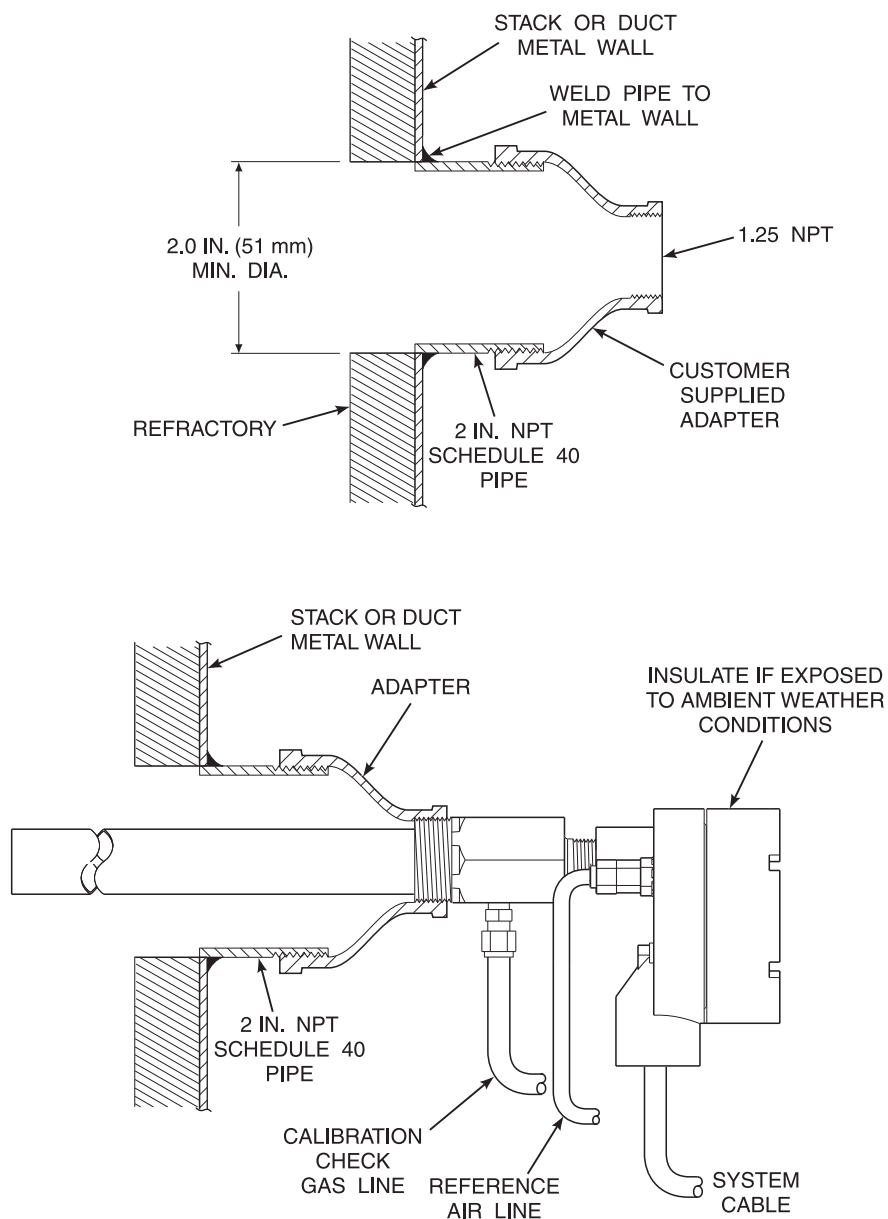
Figure 2-3. Optional Probe Mounting Flange



FLANGE DIMENSIONS				
DIMENSION	ANSI 5R10158H01	DIN 5R10158H02	JIS 5R10158H03	MODEL 450 5R10158H04
"A" DIA.	6.00 (153)	7.28 (185)	6.10 (155)	9.00 (229)
"B" DIA.	0.75 (20)	0.71 (18)	0.59 (15)	0.50 (13)
"C" DIA.	4.75 (121)	5.71 (145)	5.12 (130)	7.68 (195)

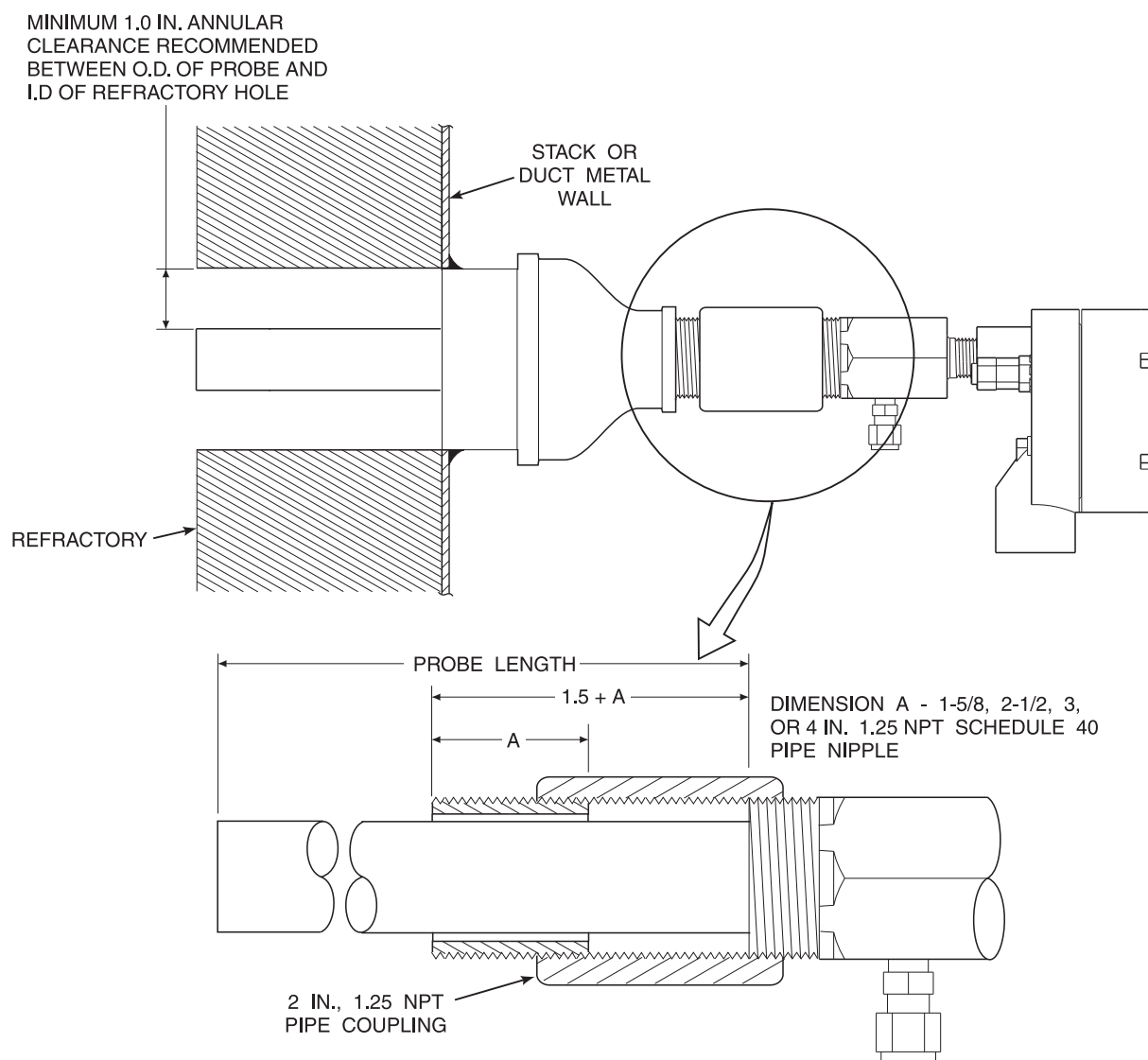
39580009

Figure 2-4. Horizontal Probe Installation



39580010

Figure 2-5. Adjusting Probe Insertion Depth



Locating Rosemount 5081 Transmitter

1. Ensure the Rosemount 5081 transmitter is easily accessible for maintenance and service and for using the infrared remote control (if applicable).

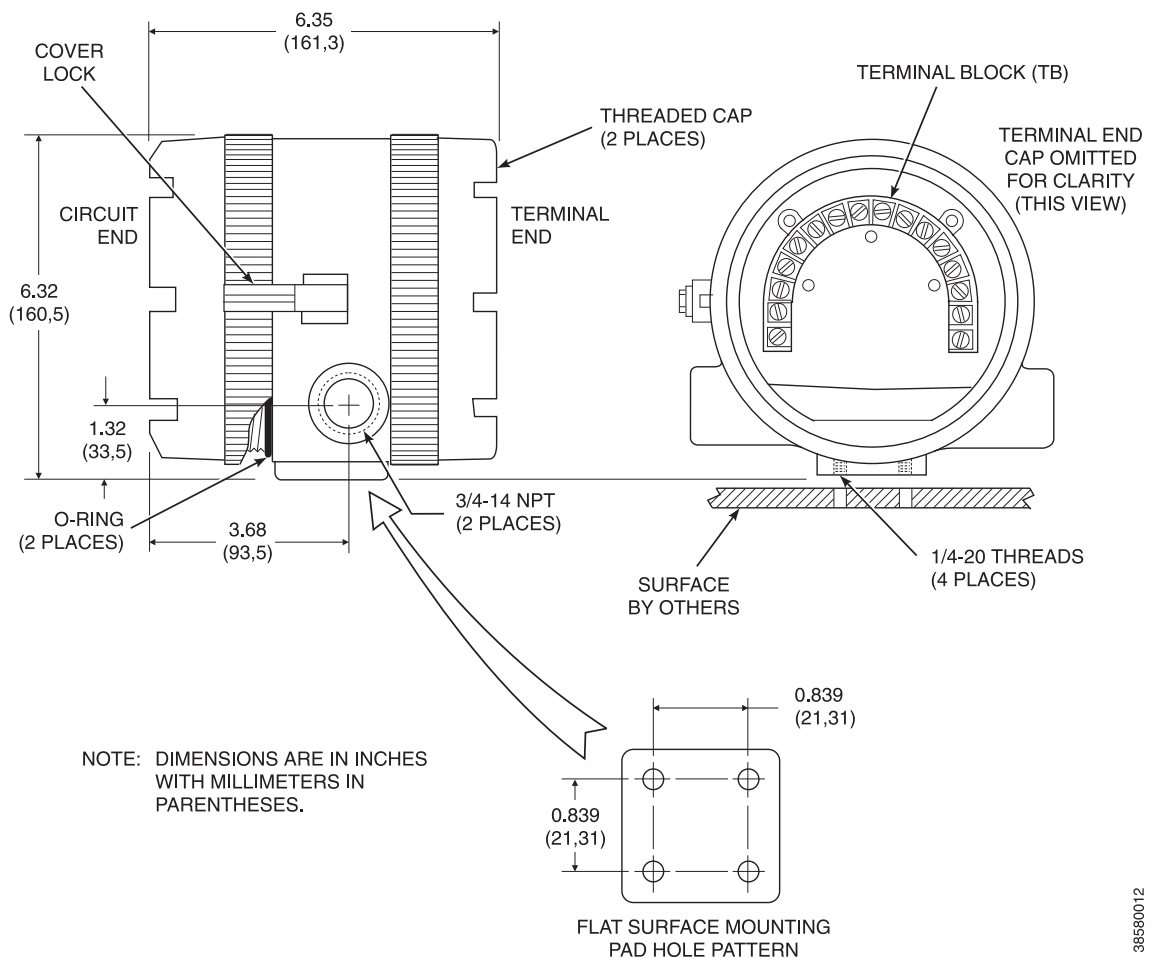
CAUTION

Do not allow the temperature of the Rosemount 5081 transmitter exceed 65°C (149°F) or damage to the unit may result.

Installing Rosemount 5081 Transmitter

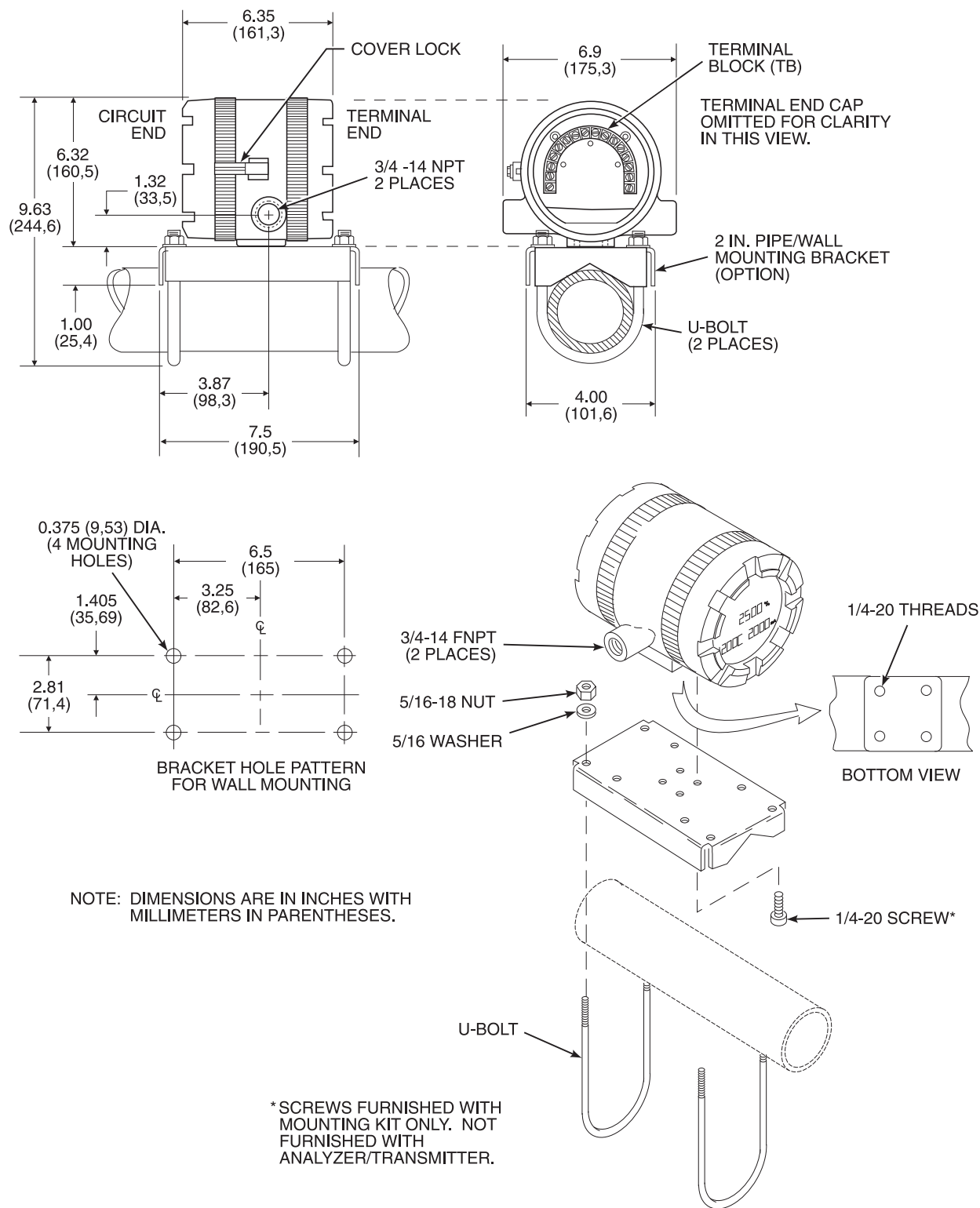
2. The ambient temperature of the transmitter housing must not exceed 65°C (149°F). Locate the electronics in an area where temperature extremes, vibration, and electromagnetic and radio frequency interference are minimal.
 3. Locate the Rosemount 5081 transmitter within 150 ft (45,7 m) of the oxygen probe due to wiring and signal considerations.
1. Ensure all components are available to install the Rosemount 5081 transmitter.
 2. Choose a method or location to mount the transmitter.
 - a. Flat Surface Mounting. The transmitter may be mounted on a flat surface using the threaded mounting holes located on the bottom of the transmitter housing. Refer to Figure 2-6 for installation references.
 - b. Pipe Mounting. An optional pipe mounting bracket is available for this type of installation. Refer to Figure 2-7 for installation references.

Figure 2-6. Flat Surface Mounting Dimensions



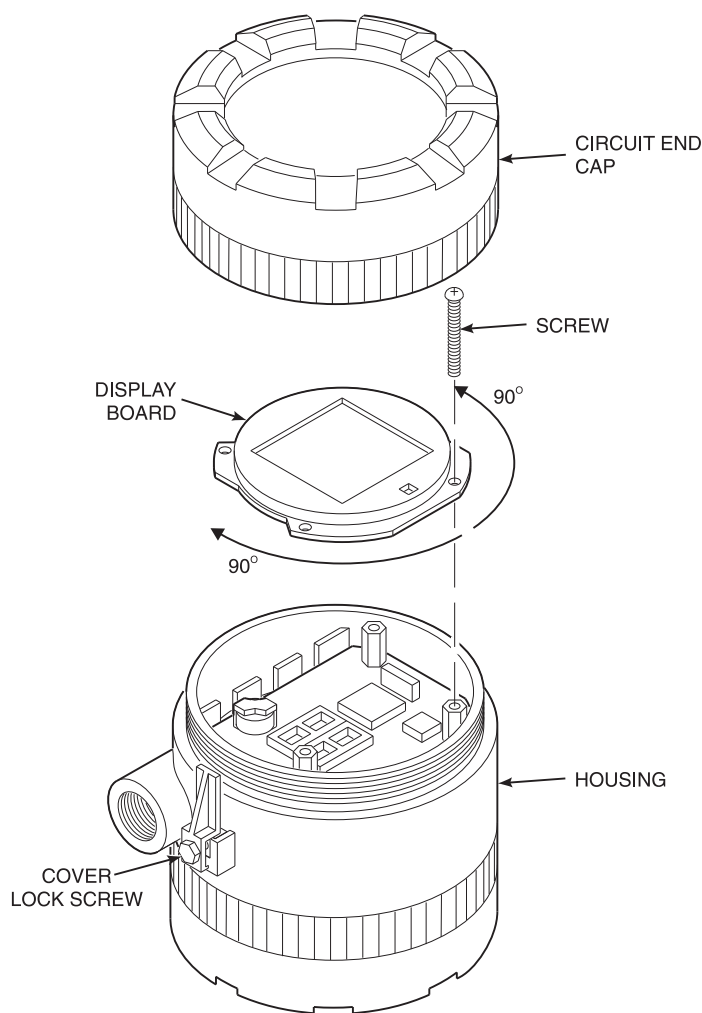
38580012

Figure 2-7. Pipe Mounting Dimensions



3. For correct viewing orientation, the display may be changed 90 degrees, using the following procedure:
 - a. Refer to Figure 2-8. Loosen the cover lock screw until the cover lock is disengaged from the knurled surface on the threaded circuit end cap.
 - b. Remove the circuit end cap.
 - c. Remove the three screws retaining the display board in place.
 - d. Lift and rotate the display board 90 degrees either way.
 - e. Reposition the display board on the standoffs. Install and tighten all three screws.
 - f. Install the circuit end cap and tighten the cover lock screw to secure the cover lock in place.

Figure 2-8. Display Positioning Assembly



39580014

ELECTRICAL INSTALLATION

All wiring must conform to local and national codes.

WARNING

For intrinsically safe applications, refer to the installation drawings in Appendix C of this Instruction Manual.

WARNING

Disconnect and lock out power before connecting the unit to the power supply.

WARNING

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.

WARNING

To meet the Safety Requirements of IEC 1010 (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. This 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 947.

General

The power supply and signal wiring should be shielded. Also, make sure the signal wiring is grounded at the Rosemount 5081 transmitter end only. Do not ground the signal loop at more than one point. Twisted pairs are recommended. Ground the transmitter housing to an earth ground to prevent unwanted electromagnetic interference (EMI) or radio frequency interference (RFI).

NOTE

For optimum EMI/RFI immunity, shield the 4-20 mA current loop cable and enclose in an earth grounded metal conduit.

NOTE

Never run signal or sensor wiring in the same conduit, or open tray, with power cables. Keep signal or sensor wiring at least 12 in. (0,3 m) away from other electrical equipment and 6.5 ft (2 m) from heavy electrical equipment.

⚠ CAUTION

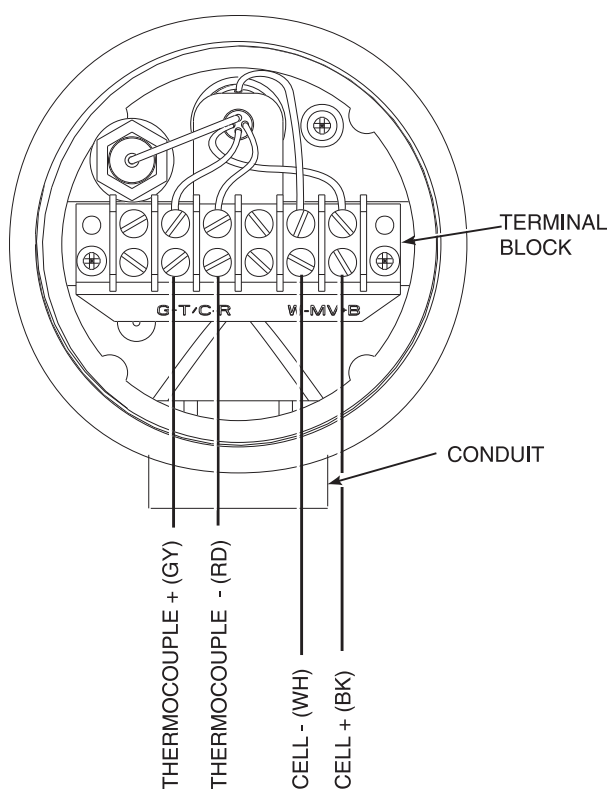
Moisture accumulation in the transmitter housing can affect its performance and may void its warranty.

It is necessary to prevent moisture from entering the Rosemount 5081 transmitter housing. The use of weather-tight cable glands is required. If conduit is used, plug and seal connections on the transmitter housing to prevent moisture accumulation in the terminal side of the housing.

Oxygen Probe Signal Connections

1. Two signals represent the O₂ value and the cell temperature. The probe provides these values to the Rosemount 5081 transmitter for processing and signal conditioning.
2. Wiring connections for the probe are shown in Figure 2-9.

Figure 2-9. Oxygen Probe Terminal Block



39580063

Rosemount 5081 Transmitter 4-20 mA and Signal Connections

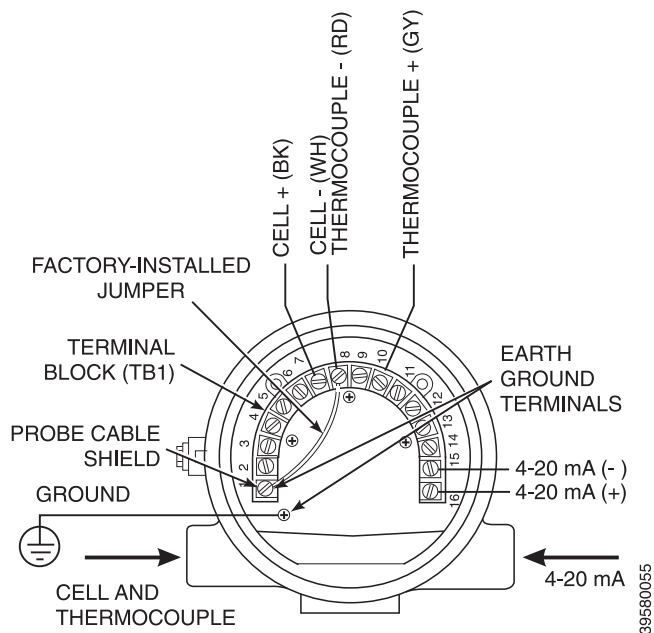
1. A 4-20 mA signal represents the O₂ value. Superimposed on the 4-20 mA signal is HART information that is accessible through a HART field communicator or AMS software.
2. Two signals representing the O₂ value and the cell temperature are supplied to the Rosemount 5081 transmitter from the oxygen probe.
3. Wiring connections for the Rosemount 5081 transmitter are shown in Figure 2-10.

NOTE

The ground arrangement shown in Figure 2-10 limits the amount of noise introduced into the electronics.

4. Connect wire shields to terminal 1. Connect earth ground as shown.

Figure 2-10. Transmitter
Terminal Block



PNEUMATIC INSTALLATION

General

Reference air is required for O₂ calculation, and calibration check gas is required during a calibration check. Refer to Figure 2-11 for the gas connections on the oxygen probe.

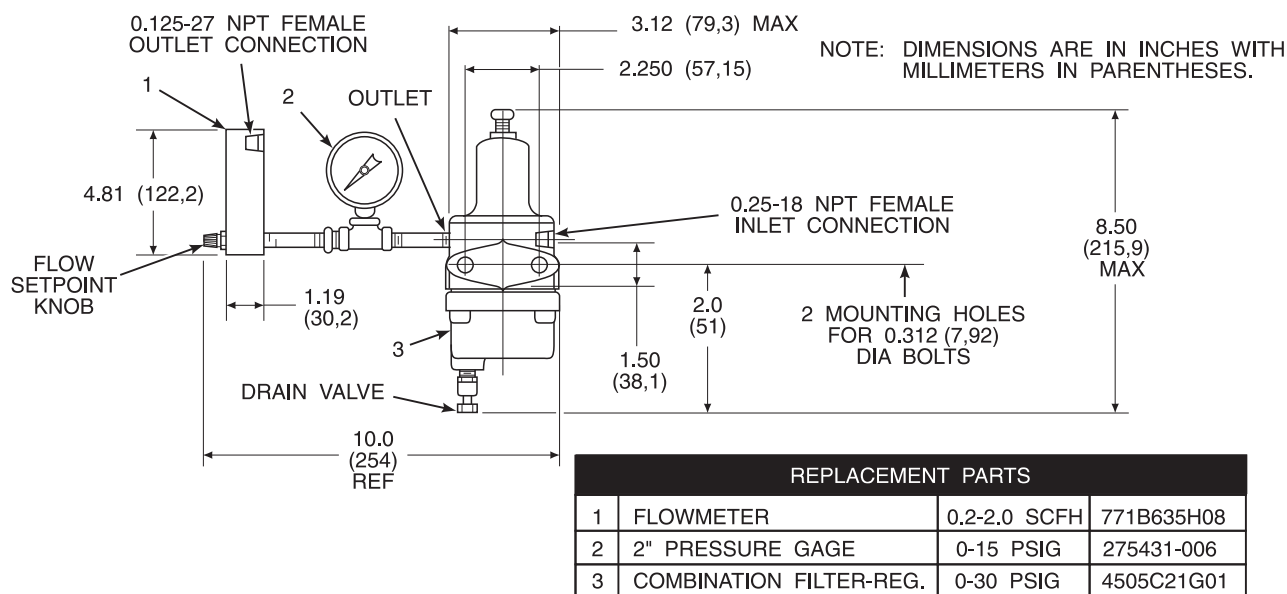
Reference Air Package

After the oxygen probe is installed, connect the reference air set. Install the reference air set according to Figure 2-11.

Instrument Air (Reference Air)

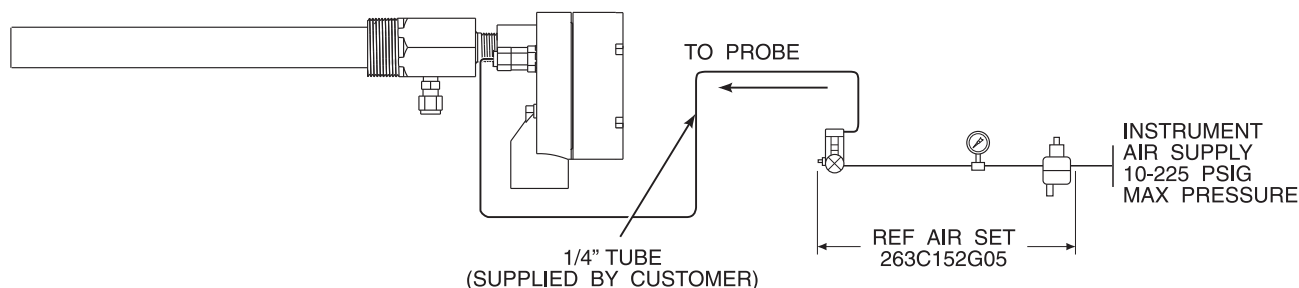
Instrument air is required for reference. Refer to the reference air schematic, Figure 2-12. Use 10 psig (68,95 kPa gage) minimum, 225 psig (1551,38 kPa gage) at 0.2 scfh (100 ml/min.); less than 40 parts-per-million total hydrocarbons. Regulator outlet pressure should be set at 5 psi (35 kPa).

Figure 2-11. Air Set, Plant Air Connections



39580005

Figure 2-12. Reference Air Schematic



39580006

Calibration Gas

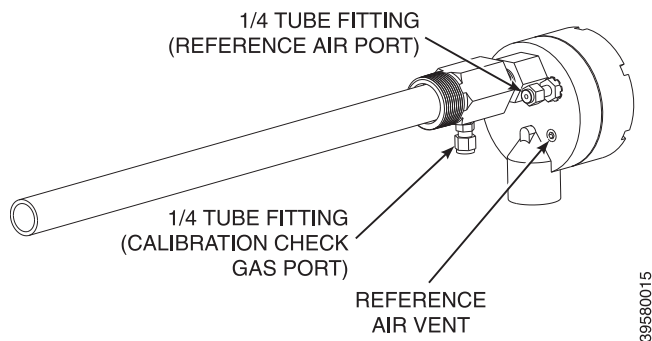
Two calibration check gas concentrations are used with the Two-Wire In-Situ Oxygen Analyzer: Low Gas - 0.4% O₂ and High Gas - 8% O₂, each with the balance in nitrogen.

⚠ CAUTION

Do not use 100% nitrogen as a low gas (zero gas). It is suggested 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.

Do not use 100% nitrogen for the low (0%) check gas. See Figure 2-13 for the probe connections. Set both calibration check gases at the same flow rate: 5 scfh (2,5 l/min).

Figure 2-13. Gas Connections at Oxygen Probe



Section 3 Startup and Operation

General	page 3-1
Power Up	page 3-1
Establishing Proper Calibration Gas Flow Rate	page 3-3
Operation	page 3-4
Program Menu	page 3-7
Diagnostics Menu	page 3-16
Cal Check Menu	page 3-22

GENERAL

 **WARNING**

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.

Verify Mechanical Installation

Ensure the Two-Wire In-Situ Oxygen Analyzer is installed correctly. See Mechanical Installation in Section 2: Installation for mechanical installation information.

Verify Terminal Block Wiring

Ensure the wiring of both the oxygen probe terminal block and Rosemount 5081 transmitter terminal block is correct. Refer to Electrical Installation in Section 2: Installation for electrical installation and wiring information.

POWER UP

General

The Two-Wire In-Situ Oxygen Analyzer displays the current oxygen reading on the LCD face of the Rosemount 5081 transmitter. The O₂ concentration, cell temperature, and 4-20 mA output current are displayed as shown in Figure 3-1. This and other information may also be accessed using HART/AMS.

Startup Display

When the probe is first inserted into the stack, some time is required until the minimum operating temperature [550°C (1022°F)] is reached. Some time is also required for the electronics to reach an operating state. Therefore, when the unit is first powered up, a faulted operation display as shown in Figure 3-2 may be displayed by the transmitter until the probe operating temperature is reached and the electronics are working properly (approximately 5 minutes).

Operating Display

After the probe has reached operating temperatures, the Rosemount 5081 transmitter display should look similar to Figure 3-1. The display will now track the O₂ concentration, cell temperature, and 4-20 mA output current.

Figure 3-1. Normal Operation Display

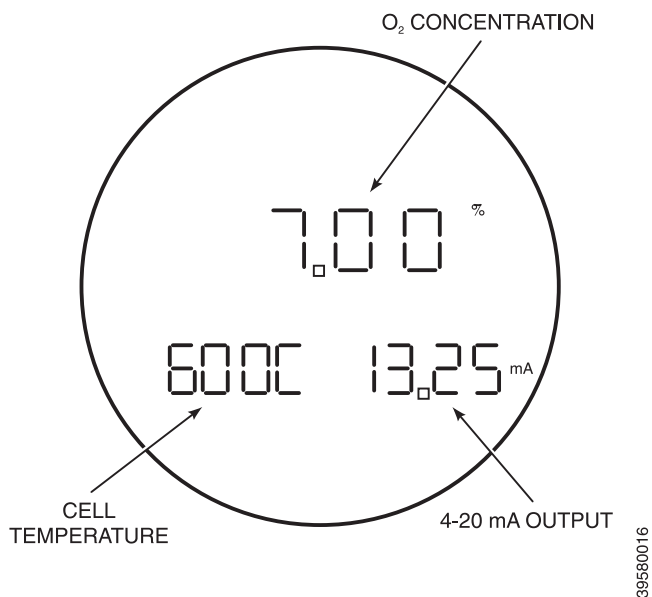


Figure 3-2. Faulted Operation Display



ESTABLISHING PROPER CALIBRATION GAS FLOW RATE

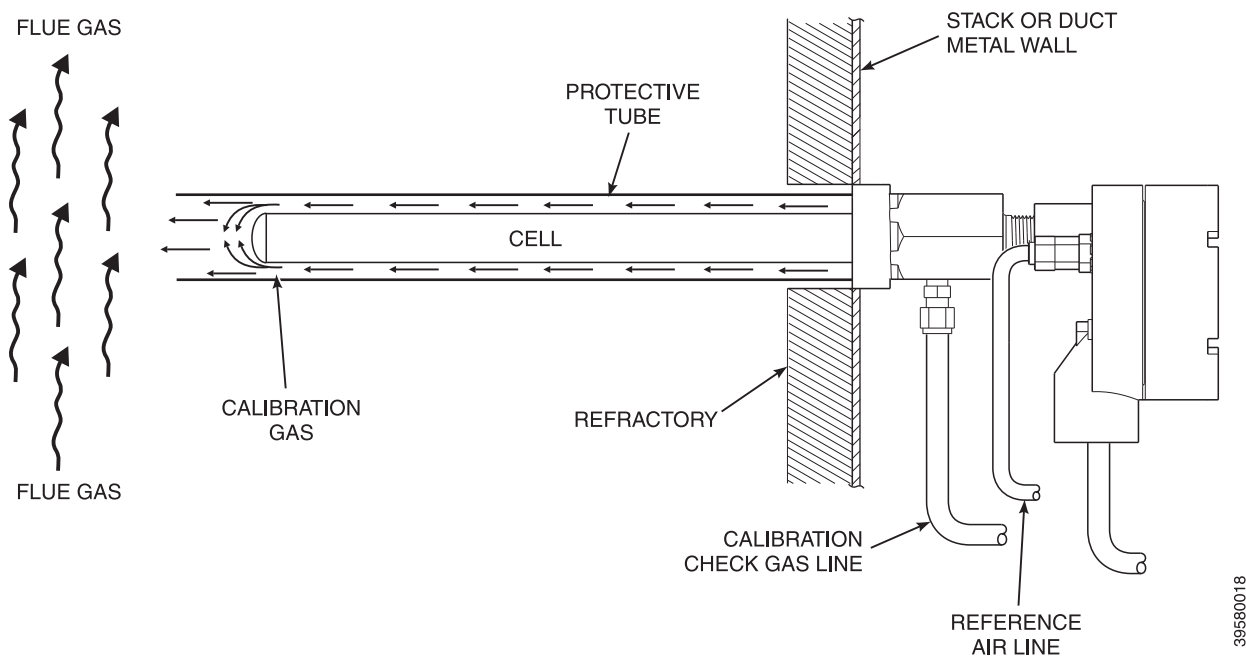
The calibration gas flow must be enough to ensure that no combustion flue gases mix with the calibration check gases and only clean, good calibration check gas surrounds the cell without expending excess gas (Figure 3-3). Monitor the O₂ concentration using an IRC or a field communicator. Set the calibration check gas flow rate as follows:

NOTE

Only set the calibration check gas flow rate at startup. It is not necessary to perform this procedure for each calibration check.

1. Adjust the calibration check gas flow to 5 scfh (2,5 l/min.) to ensure the cell is surrounded by calibration check gas. Due to the cooling effect of the gas, the cell temperature will decrease slightly, causing the O₂ concentration to drop. Once the electronics compensates for this effect, the O₂ concentration will stabilize.
2. Next, slowly reduce the calibration check gas flow until the O₂ concentration changes, which indicates that the calibration check and flue gases are mixing. Increase the flow rate until this effect is eliminated.

Figure 3-3. Proper Calibration Check Gas Flow Rate



OPERATION

Overview

This section explains the operator controls and displays of the Two-Wire In-Situ Oxygen Analyzer. The use of the Infrared Remote Control (IRC) and the Rosemount 5081 transmitter Liquid Crystal Display (LCD) are described in detail.

HART/AMS operation is not covered here. Refer to Section 4: HART/AMS.

Display

The LCD on the circuit end of the Rosemount 5081 transmitter displays O₂ concentration, cell temperature, and 4-20 mA output current during normal operation (Figure 3-4). The LCD will also display fault conditions when they occur. To interact with the transmitter, use the IRC and navigate through a series of menus displayed on the LCD.

Menu Tree

The screens that can be displayed are shown in the menu tree of Figure 3-5. These screens are displayed on the LCD and are accessed using the IRC keypad.

Figure 3-4. Normal Operation Display

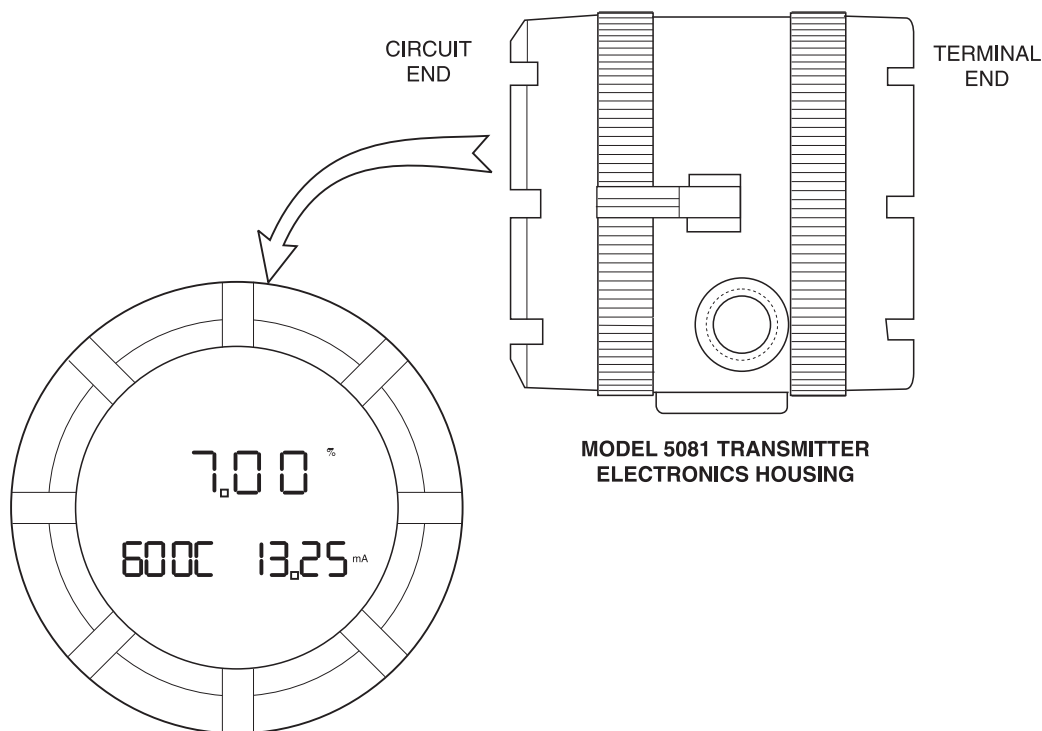
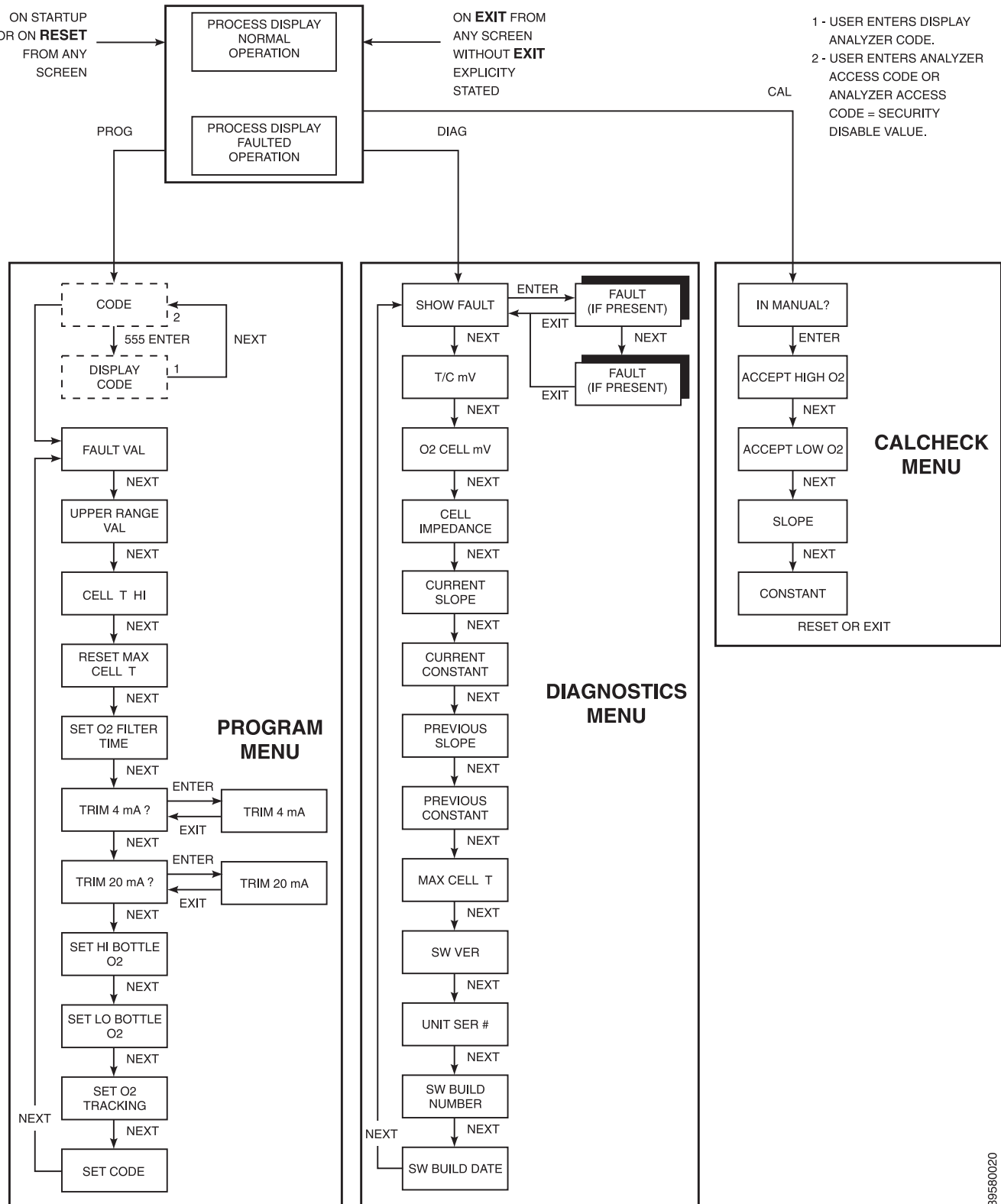


Figure 3-5. Transmitter Menu Tree



Navigation

The IRC in Figure 3-6 is used to interact with the Rosemount 5081 transmitter and navigate through the screens on the LCD.

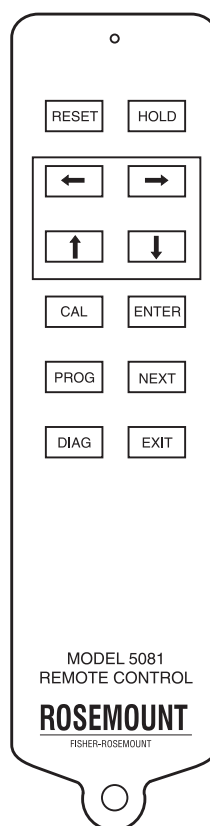
1. Hold the IRC within 6 ft (1,8 m) of the Rosemount 5081 transmitter and within 15 degrees from the centerline of the transmitter LCD. The amount of ambient light may also affect IRC performance:

NOTE

The LCD may react slowly to IRC commands. Allow sufficient time between key presses to avoid undesired or repeated commands from accumulating in the command queue.

2. Use the keys on the IRC to navigate through the menu screens. Refer to Figure 3-6. General usage is as follows:
 - a. RESET. Returns to the PROCESS DISPLAY screen at the top of the menu tree. Any non-entered number in the exited state will be ignored, and the previous data will be used.
 - b. HOLD. Not used.
 - c. Left/Right Arrow. Moves left and right among editable digits on the display.
 - d. Up/Down Arrow. Increases or decreases the value of the currently selected digit on the display.
 - e. CAL. Accesses the CALCHECK MENU branch of the menu tree. Only works from the PROCESS DISPLAY screen.

Figure 3-6. Infrared Remote Control (IRC)



39580021

- f. PROG. Accesses the PROGRAM MENU branch of the menu tree. Only works from the PROCESS DISPLAY screen.
- g. DIAG. Accesses the DIAGNOSTICS MENU branch of the menu tree. Only works from the PROCESS DISPLAY screen.
- h. ENTER. Initiates the editing process and causes the most significant digit of the edited item to start flashing. Also processes the entry so the previous value updates to the new value entered using the arrow keys. Failure to press ENTER before exiting a screen will cancel the input value and revert to the previous value.
- i. NEXT. Accesses the next user screen as shown in the menu tree. Any non-entered number in the exited state will be ignored, and the previous data will be used.
- j. EXIT. Exits from sub-branches of the menu tree where an exit option is explicitly shown. Otherwise, returns to the PROCESS DISPLAY screen at the top of the menu tree. Any non-entered number in the exited state will be ignored, and the previous data will be used.

PROGRAM MENU

The PROGRAM MENU branch of the menu tree allows you to program and edit some process parameters, faults, outputs, and security codes. To access this branch of the menu tree, press the PROG key on the IRC when in the PROCESS DISPLAY screen (Normal or Faulted). If security is enabled, you must enter the analyzer code to gain further access to the screens in this branch. Each screen in this branch is accessed sequentially using the NEXT key. Refer to Figure 3-5 during the following menu and screen descriptions.

NOTE

To edit a screen value, press ENTER to access the data field. Use the left and right arrow keys to move among the digits in the data field. Note that the editable position will be flashing. To change the value of a digit, use the up and down arrow keys to increase or decrease the value. When finished editing, press ENTER to accept the value. To go to the next screen in the menu, press NEXT.

Operator Adjustable Parameters

Figure 3-1 lists the range and default value of operator-adjustable variables used by the Rosemount 5081 transmitter. Each of these variables may be adjusted using the PROGRAM MENU screens.

Table 3-1. Adjustable Parameters

Parameter	Function	Range	Factory Default
CODE	Use to enter the access code for this analyzer; select 555 to display designated analyzer code	000 - 999 (excluding 000 and 555)	000 (no code)
FAULT VAL	Use to designate a 4-20mA value that when displayed will indicate an analyzer-faulted condition	3.8mA - 24mA	3.6mA
UPPER RANGE VAL	Use to set upper O ₂ % limit equivalent to 20mA output (adjust the slope of the analyzer)	2.0% - 25.0%	25%
CELL T HI	Use to set upper cell temperature for no-fault condition	650°C - 1600°C	1600°C
SET O2 FILTER TIME	Use to adjust analyzer response time to changing O ₂ %	0 - 300 seconds	0 seconds
SET HI BOTTLE O2	Use to define actual O ₂ % of high calibration check gas		8%
SET LO BOTTLE O2	Use to define actual O ₂ % of low calibration check gas		2%
SET CODE	Use to set security code for this analyzer	000 - 999 (excluding 000 and 555)	000 (no code)

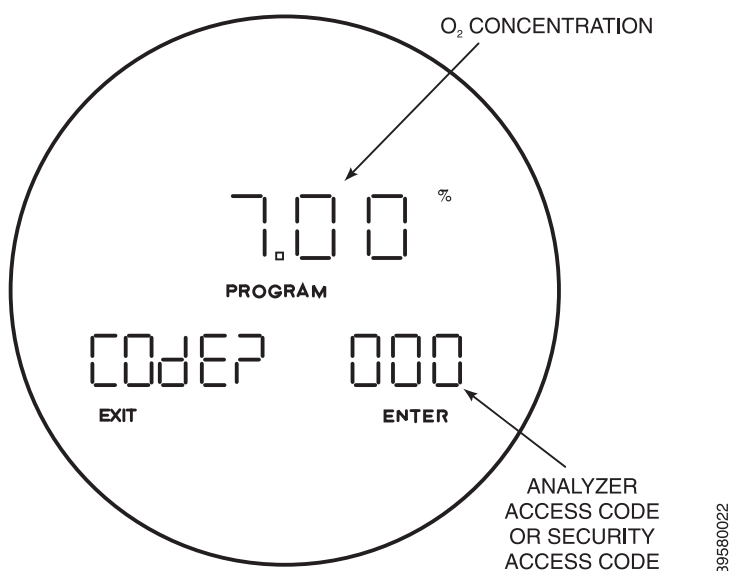
Code

Refer to Figure 3-7. After pressing the PROG key, this screen will display if security is enabled (see Set Code). Use this screen to identify a specific analyzer in a process to prevent accessing an adjacent analyzer when using the IRC.

Press ENTER to begin editing. At this point, you can either specify the analyzer by its access code or view its code if it is unknown.

1. To gain further access to the screens in the PROGRAM MENU branch, enter the correct three-digit analyzer access code using the arrow keys and press ENTER. If security is disabled, this screen does not appear and the system displays the FAULT VAL screen.
2. If the analyzer access code is unknown, enter 555 and press ENTER to access the DISPLAY CODE screen. In that screen you will be able to view the analyzer access code.

Figure 3-7. Code



39580022

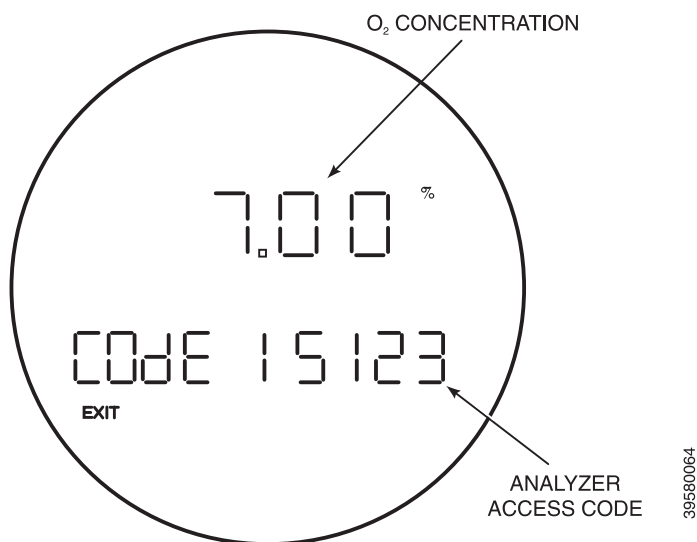
Display Code

Refer to Figure 3-8. This screen is accessible from the CODE screen by entering 555 and pressing ENTER. The DISPLAY CODE screen identifies the analyzer access code so you can return to the CODE screen and enter the code as described in Code. To return to the CODE screen, press NEXT.

Fault Val

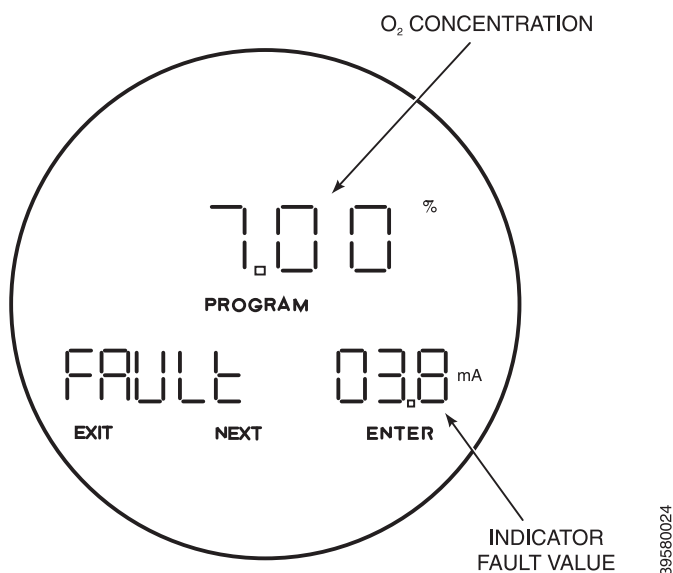
Refer to Figure 3-9. Use this screen to set the value that the 4-20 mA output will drive to and display during a fault condition. Press ENTER to begin editing. Use the arrow keys to enter a fault value. The fault value can be between 3.8 and 24 mA. Then, press ENTER to accept the value. Pressing NEXT displays the UPPER RANGE VAL screen. Refer to Section 5: Troubleshooting, for the actual fault conditions.

Figure 3-8. Display Code



39580064

Figure 3-9. Fault Val



39580024

Upper Range Val

Refer to Figure 3-10. Use this screen to set the value of the upper range limit. This value is the maximum limit of the O₂ concentration measurement and is used to scale the 4-20 mA output. Press ENTER to begin editing. Use the arrow keys to select and change the value. The upper range value can be between 0 and 25%. Then, press ENTER to accept the value. Pressing NEXT displays the CELL T HI screen.

Cell T Hi

Refer to Figure 3-11. Use this screen to set the value of the upper cell temperature fault condition. This value is the maximum allowed cell temperature before a fault condition is indicated. Press ENTER to begin editing. Use the arrow keys to select and change the value. The value must be between 550°C and 1600°C. Press ENTER to accept the value. Pressing NEXT displays the RESET MAX CELL T screen.

Figure 3-10. Upper Range Val

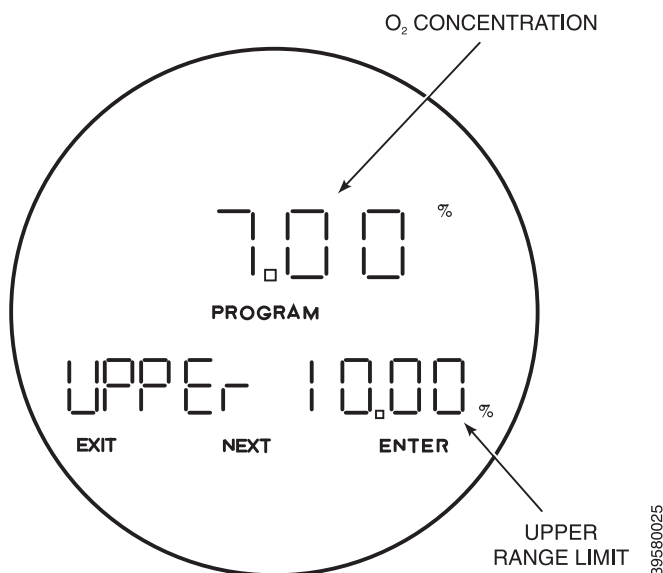
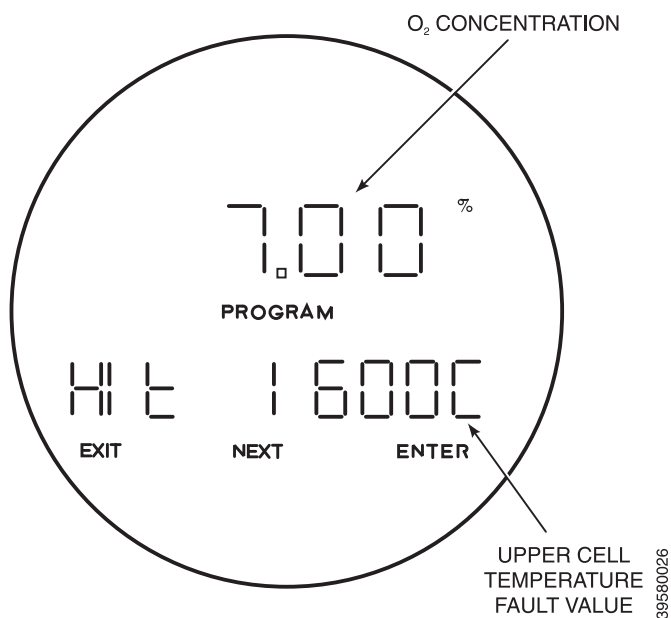


Figure 3-11. Cell T Hi



Reset Max Cell T

Refer to Figure 3-12. The transmitter tracks the maximum cell temperature obtained. Use this screen to reset the maximum cell temperature attained value to the current cell temperature. Press ENTER to begin editing. Use the arrow keys to select and change the value (Y/N). Then, press ENTER to accept the value. Pressing NEXT displays the SET O₂ FILTER TIME screen.

Set O₂ Filter Time

Refer to Figure 3-13. In some applications it is beneficial to dampen the raw O₂ signal coming from the cell. Use this screen to enter the amount of time it will take the O₂ to reach 90% of the new reading. Press ENTER to begin editing. Use the arrow keys to select and change the screen value to the O₂ filter value (in seconds). Enter a value between 0 and 300 seconds and press ENTER to accept the value. Press NEXT to access the TRIM 4 mA? screen.

Figure 3-12. Reset Max Cell T

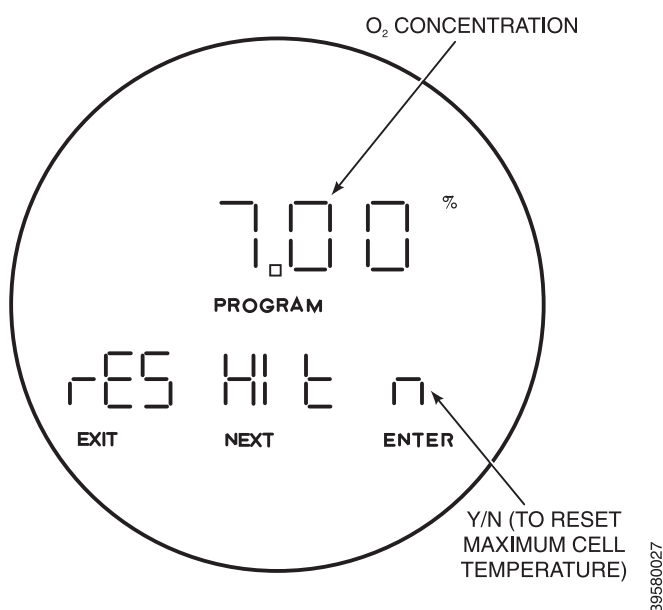
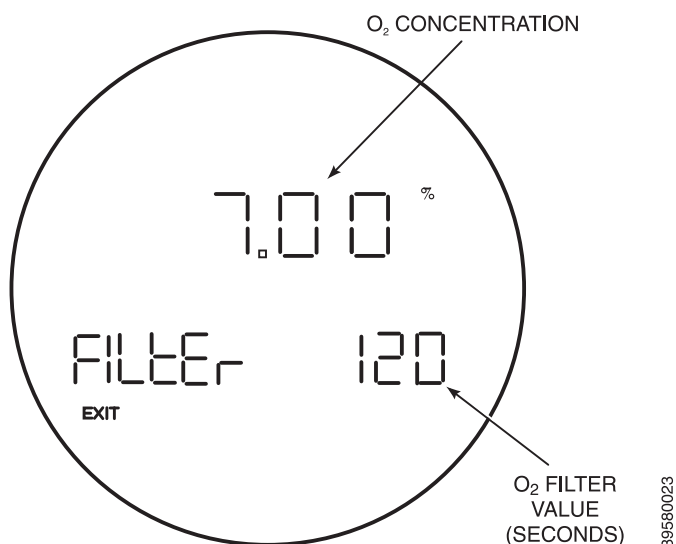


Figure 3-13. Set O₂ Filter Time



Trim 4mA

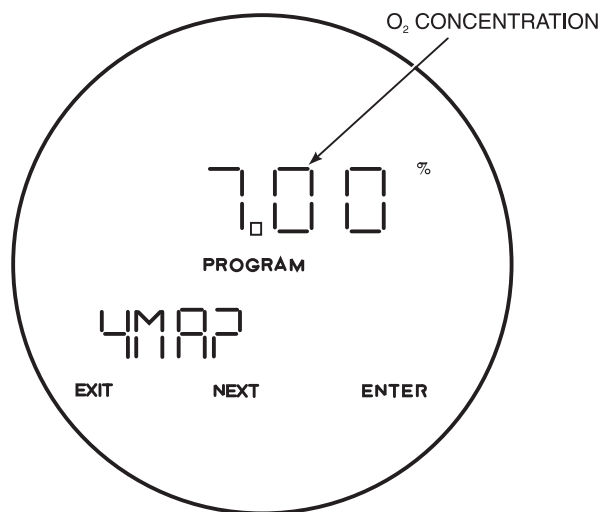
Refer to Figure 3-14. Use this screen to trim the 4 mA value of the 4-20 mA output.

NOTE

Before trimming the 4 mA value you must break the loop to add the ammeter. Power down the unit, connect the ammeter in series with Rosemount 5081 transmitter terminals 15(-) and 16(+), power up the unit, and return to the TRIM 4 mA screen.

Press ENTER to begin editing. Use the arrow keys to select and change the screen value to the value displayed on the installed ammeter. Press ENTER to accept the value. After the value is entered, the unit calibrates itself to ensure it outputs 4 mA. Both the display and the ammeter will display 4 mA. Pressing EXIT returns to the initial TRIM 4 mA screen, and pressing NEXT displays the TRIM 20 mA? screen.

Figure 3-14. Trim 4mA



39580028

Trim 20mA

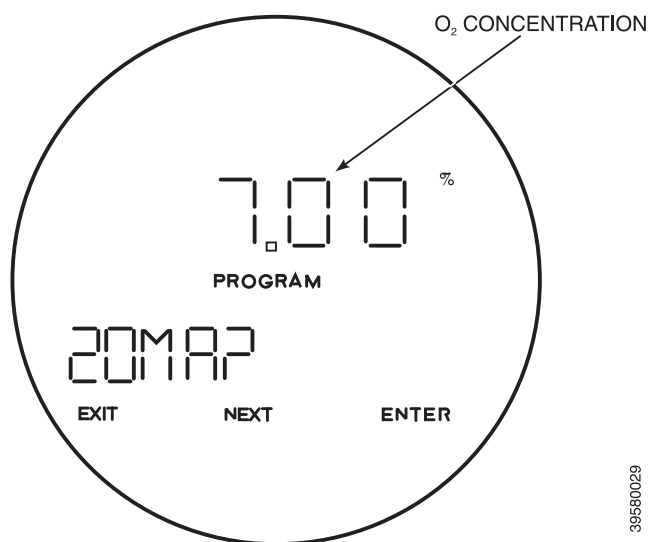
Refer to Figure 3-15. Use this screen to trim the 20 mA value of the 4-20 mA output.

NOTE

Before trimming the 20 mA value you must break the loop to add the ammeter. Power down the unit, connect the ammeter in series with Rosemount 5081 transmitter terminals 15(-) and 16(+), power up the unit, and return to the TRIM 20 mA screen.

Press ENTER to begin editing. Use the arrow keys to select and change the screen value to the value displayed on the installed ammeter. Press ENTER to accept the value. After the value is entered, the unit calibrates itself to ensure it outputs 20 mA. Both the display and the ammeter will display 20 mA. Pressing EXIT returns to the initial TRIM 20 mA screen, and pressing NEXT displays the SET HI BOTTLE O₂ screen.

Figure 3-15. Trim 20mA



39580029

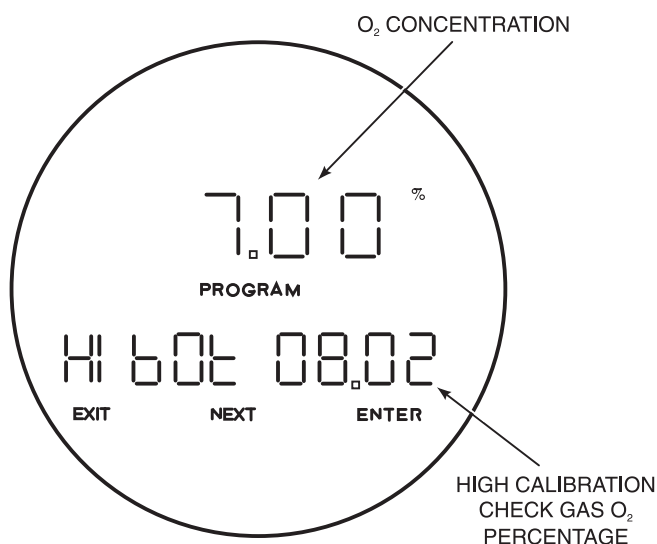
Set Hi Bottle O₂

Refer to Figure 3-16. Use this screen to identify, within the electronics, the percentage of O₂ used as the high calibration check gas. Press ENTER to begin editing. Use the arrow keys to select and change the screen value to the O₂ percentage of the high calibration check gas. Press ENTER to accept the value.

Set Lo Bottle O₂

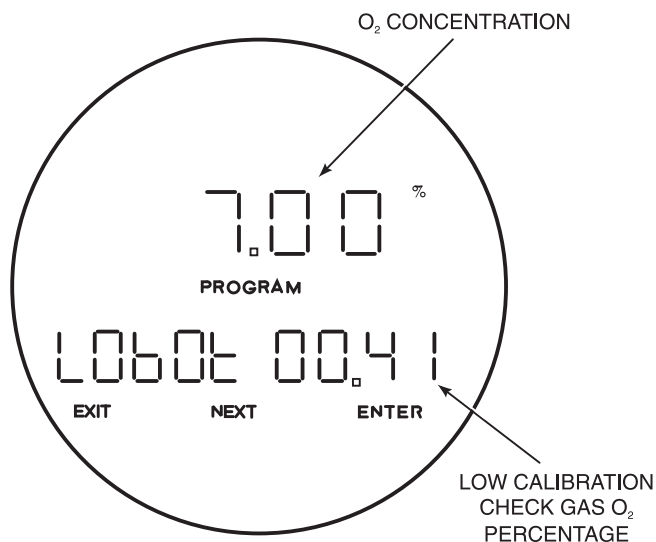
Refer to Figure 3-17. Use this screen to identify, within the electronics, the percentage of O₂ used as the low calibration check gas. Press ENTER to begin editing. Use the arrow keys to select and change the screen value to the O₂ percentage of the low calibration check gas. Press ENTER to accept the value. Press NEXT to display the SET O₂ TRACKING screen.

Figure 3-16. Set Hi Bottle O₂



39560030

Figure 3-17. Set Lo Bottle O₂



39560031

Set O₂ Tracking

Refer to Figure 3-18. Use this screen to permit the 4-20 mA line to track the O₂ value during a calibration check. Press ENTER to begin editing. Use the arrow keys to select Y or N. Entering Y (yes) will allow the 4-20 mA line to track the O₂ value during the calibration check. Entering N (no) will hold the O₂ value steady during the calibration check. Press ENTER to accept the value. Press NEXT to display the SET CODE screen.

Set Code

Refer to Figure 3-19. Use this screen to set the security code for the Rosemount 5081 transmitter. Press ENTER to begin editing. Use the arrow keys to select and change the value. Select any value between 000 and 999, excluding 000 and 555. Code 000 indicates that no code is set. Code 555 accesses the DISPLAY CODE screen. Press ENTER to accept the value. Pressing NEXT returns to the FAULT VAL screen at the beginning of the PROGRAM MENU.

Figure 3-18. Set O₂ Tracking

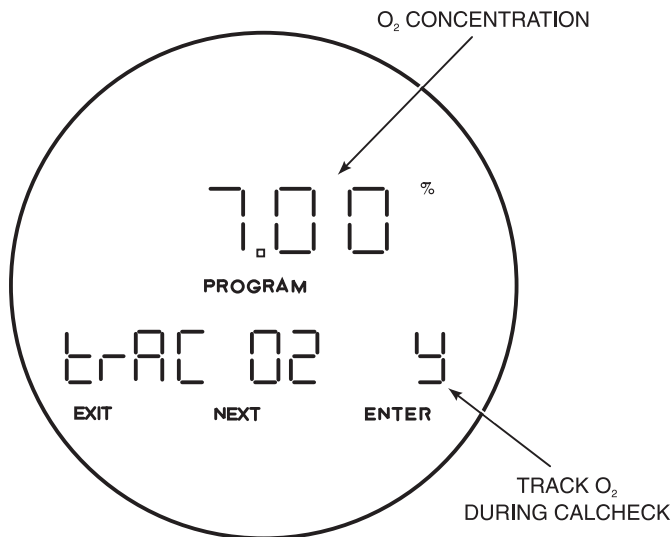
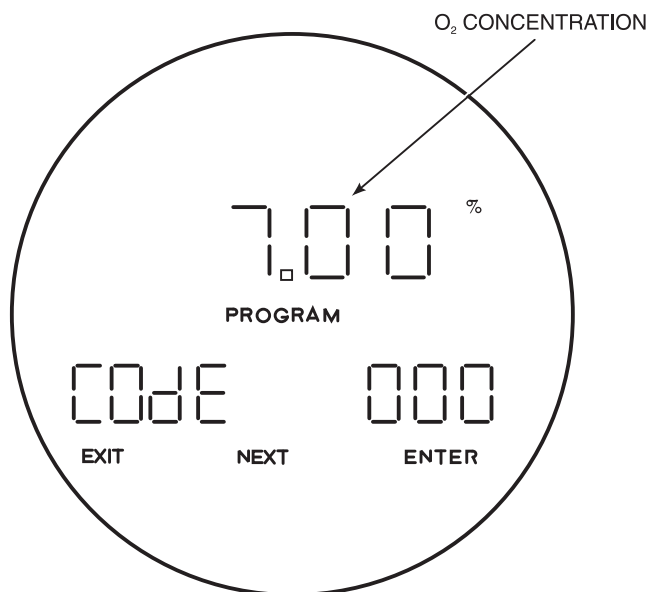


Figure 3-19. Set Code



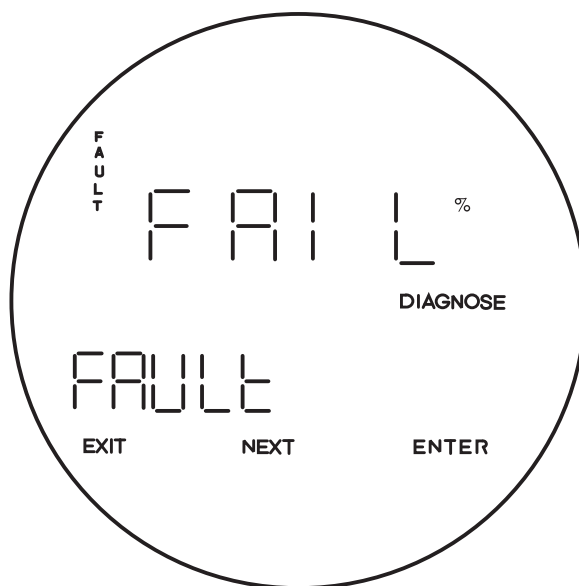
DIAGNOSTICS MENU

The DIAGNOSTICS MENU branch of the menu tree allows you to examine outputs, current faults, and unit information. None of the items in the DIAGNOSTICS MENU are editable. This branch of the menu tree may be accessed by pressing DIAG on the IRC when in the PROCESS DISPLAY screen (Normal or Faulted). Each screen in this branch is accessed sequentially by pressing NEXT. Refer to the menu in Figure 3-5 when reviewing the following menu and screens.

Show Fault

Refer to Figure 3-20. After pressing DIAG, this screen displays. Pressing ENTER accesses a screen displaying the current fault (if any). If more than one fault exists, and you are in the FAULT screen, press NEXT to go to the next fault. Information on the fault screens can be found in Section 5: Troubleshooting. Press EXIT to return from this fault sub-menu and press NEXT to access the T/C mV screen.

Figure 3-20. Show Fault



39580034

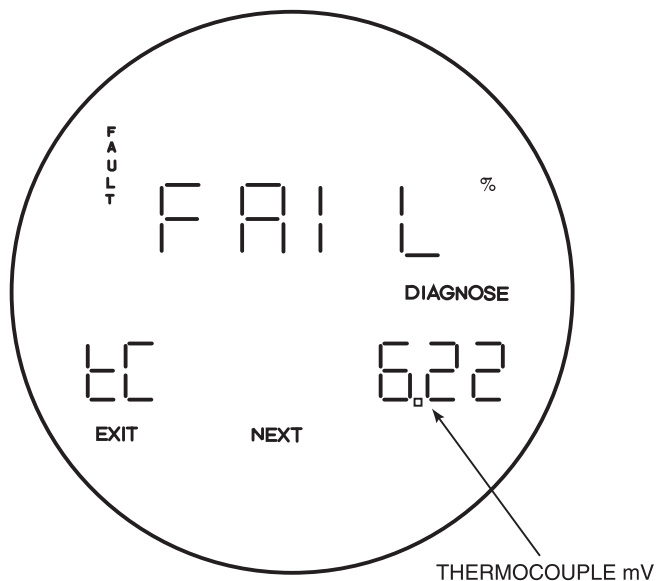
T/C mV

Refer to Figure 3-21. Use this screen to examine the cell thermocouple mV output. Three decimal places are displayed. Pressing NEXT accesses the O₂ CELL mV screen.

O₂ CELL mV

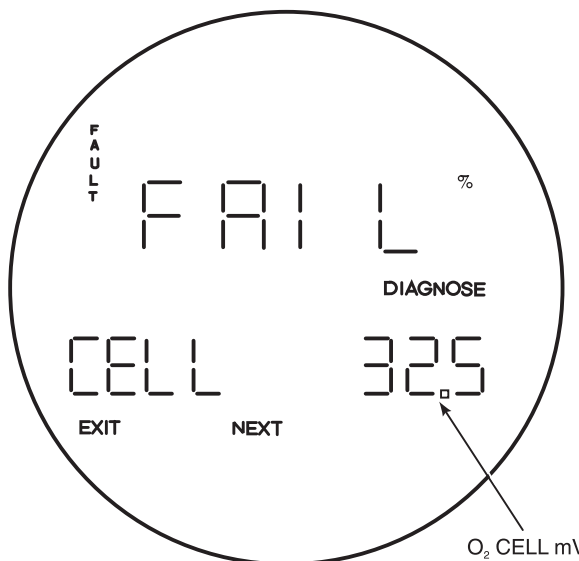
Refer to Figure 3-22. Use this screen to examine the O₂ CELL mV output. Pressing NEXT accesses the CELL IMPEDANCE screen.

Figure 3-21. T/C mV



39580035

Figure 3-22. O₂ CELL mV



39580036

Cell Impedance

Refer to Figure 3-23. Use this screen to examine the O₂ cell impedance status. GOOD indicates the cell is operating normally. WARN indicates the cell has degraded but is still operational. HI indicates that the cell has degraded but is still operational; however, failure will occur soon. Pressing NEXT accesses the CURRENT SLOPE screen.

NOTE
 Temperature influences cell impedance. Wait until the cell is at operating temperature before checking cell impedance. If checked before the cell reaches 550°C (1022°F), this screen displays a fail indication.

Current Slope

Refer to Figure 3-24. Use this screen to examine the slope calculated from the most recent calibration check. The slope is the amount of cell voltage generated for a given O₂ value. For each calibration check, record the slope over the life of the probe. Tracking the slope will indicate if the probe is degrading. Press NEXT to access the CURRENT CONSTANT screen.

Figure 3-23. Cell Impedance

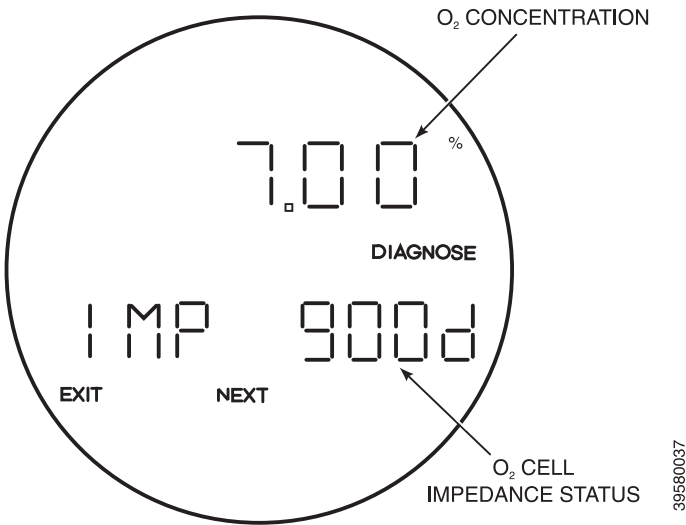
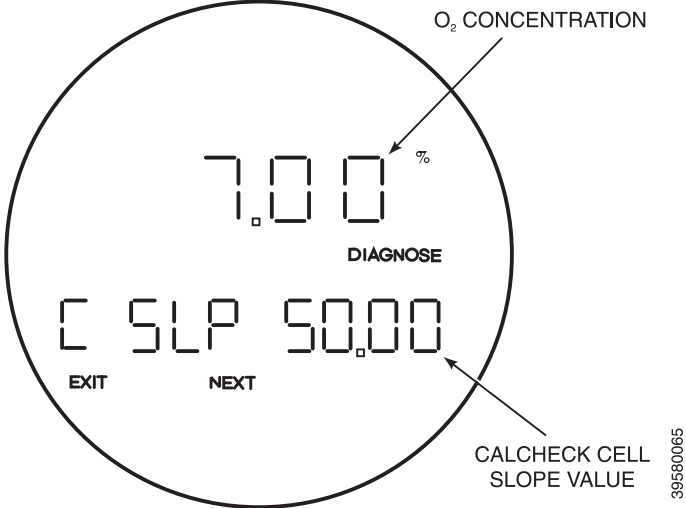


Figure 3-24. Current Slope



Current Constant

Refer to Figure 3-25. Use this screen to examine the cell zero constant calculated from the most recent calibration check. The constant represents the voltage generated by the cell when no difference exists between the amount of O₂ on the reference and process sides of the cell. Press NEXT to access the PREVIOUS SLOPE screen.

Previous Slope

Refer to Figure 3-26. Use this screen to examine the slope value stored from the second to last calibration check. The slope is the amount of cell voltage generated for a given O₂ value. For each calibration check, record the slope over the life of the probe. Tracking the slope will indicate if the probe is degrading. Press NEXT to access the PREVIOUS CONSTANT screen.

Figure 3-25. Current Constant

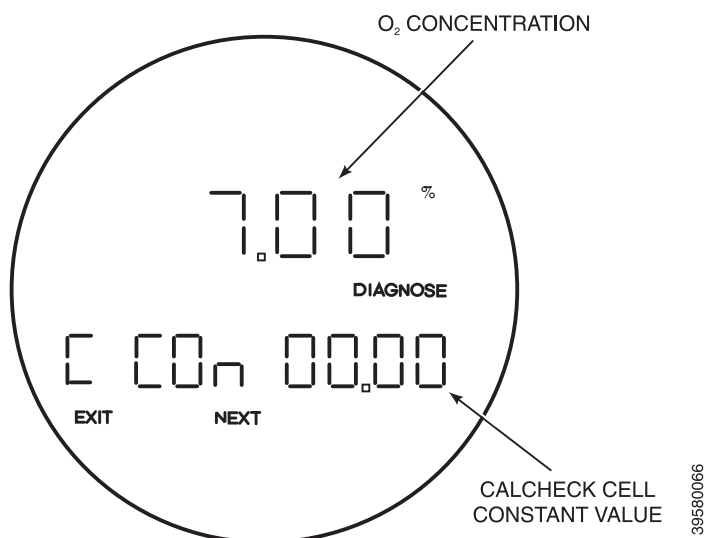
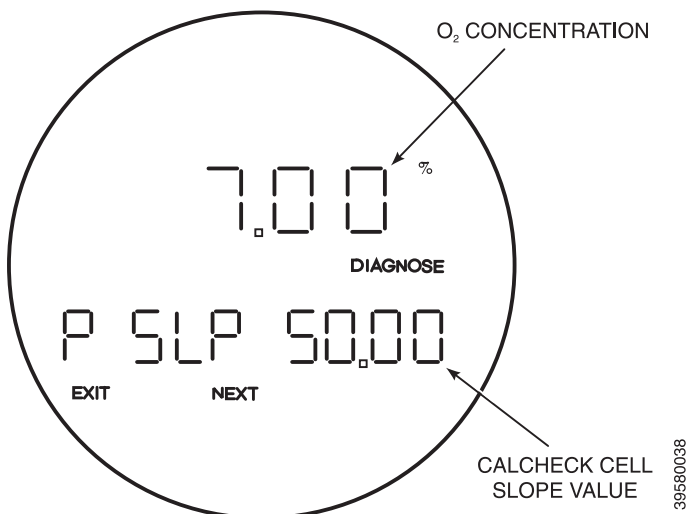


Figure 3-26. Previous Slope



Previous Constant

Refer to Figure 3-27. Use this screen to examine the cell zero constant stored from the second to last calibration check. The constant represents the voltage generated by the cell when no difference exists between the amount of O₂ on the reference and process sides of the cell. Press NEXT to access the MAX CELL T screen.

Max Cell T

Refer to Figure 3-28. Use this screen to examine the maximum temperature attained by the O₂ cell. This value can be reset under the PROGRAM MENU. Pressing NEXT accesses the SW VER screen.

Figure 3-27. Previous Constant

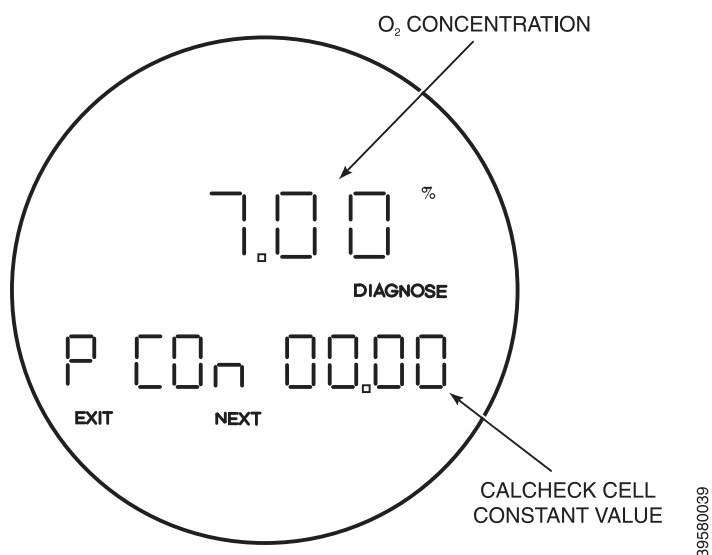
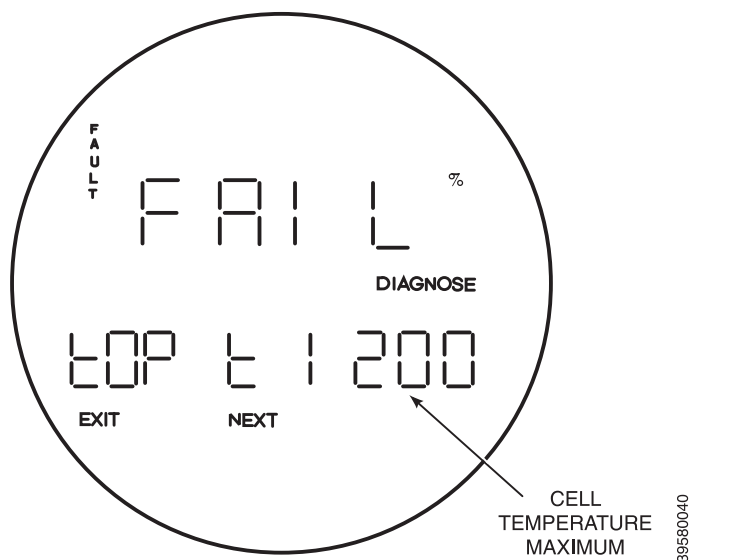


Figure 3-28. Max Cell T



SW Ver (SOft)

Use this screen to see the software version number for the Rosemount 5081 transmitter. Pressing NEXT accesses the UNIT SER # screen.

Unit Ser # (SEr)

Use this screen to see the unit serial number for the Rosemount 5081 transmitter. Pressing NEXT accesses the SW BUILD NUMBER screen.

SW Build Number (bLdn)

Use this screen to see the software build number for the Rosemount 5081 transmitter. Pressing NEXT accesses the SW BUILD DATE screen.

SW Build Date (bd)

Use this screen to see the software build date for the Rosemount 5081 transmitter. Pressing NEXT returns to the beginning of the DIAGNOSTICS MENU branch (the SHOW FAULT screen).

CAL CHECK MENU

The CALCHECK MENU branch of the menu tree (Figure 3-5) allows you to perform a calibration check of the analyzer. Before performing a calibration check, ensure the high calibration check gas and low calibration check gas O₂ percentages are entered into the electronics via the PROGRAM MENU. To set these values, refer to Set Hi Bottle O₂ and Set Lo Bottle O₂.

Once these values are set, access the CAL-CHECK MENU branch by pressing CAL on the IRC when in the PROCESS DISPLAY screen (Normal or Faulted). Each screen in this branch identifies a process step in the calibration check procedure. The first screen in the sequence is the IN MANUAL? screen.

In Manual?

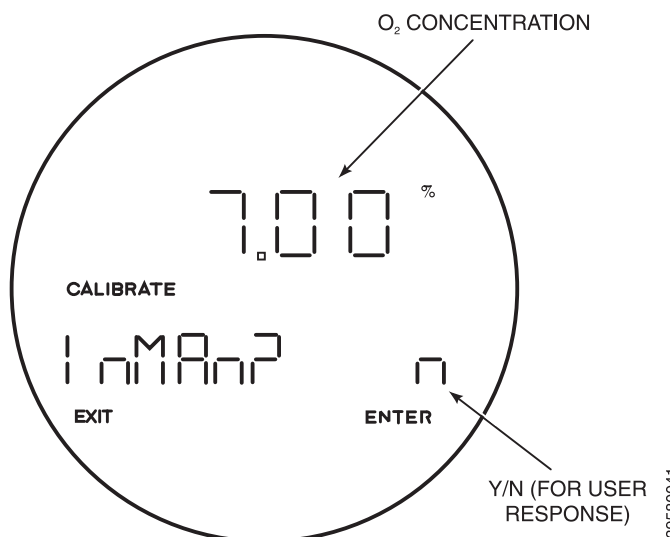
⚠ WARNING

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

Refer to Figure 3-29. If the O₂ output value is used in any automatic process control loops the loop must be placed in manual to begin a calibration check.

Once the analyzer is removed from any automatic control loops press ENTER to edit the screen. Use the arrow keys to select Y (yes); press ENTER to start a calibration check and to display the ACCEPT HIGH O₂ screen.

Figure 3-29. In Manual?



Accept High O₂

Refer to Figure 3-30. After pressing ENTER to begin the calibration check, the high calibration check gas starts to flow. After waiting approximately three minutes for the displayed O₂ value to settle, press NEXT to accept the high calibration check gas reading and apply the low calibration check gas. The next screen to display is the ACCEPT LOW O₂ screen.

Accept Low O₂

Refer to Figure 3-31. Once the low calibration check gas is applied, wait approximately three minutes for the displayed O₂ value to settle. Once the value settles, press NEXT to accept the reading and to display the SLOPE screen.

Figure 3-30. Accept High O₂

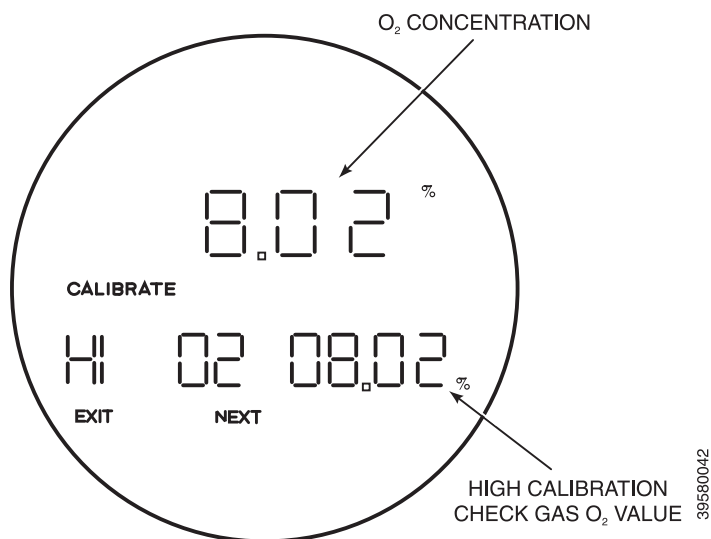
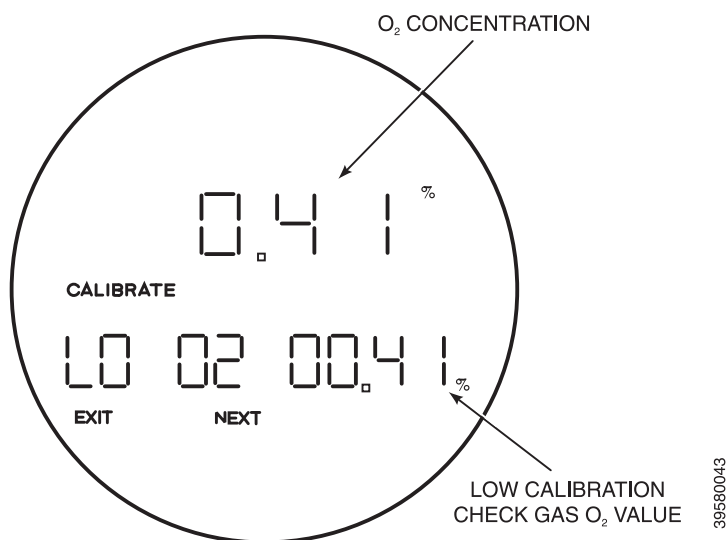


Figure 3-31. Accept Low O₂



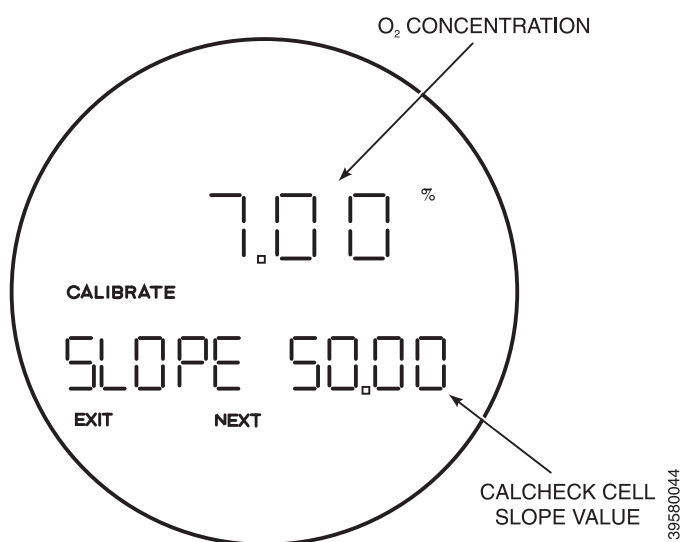
Slope

Refer to Figure 3-32. Use this screen to examine the slope calculated from current calibration check. The slope is the amount of cell voltage generated for a given O₂ value. After each calibration check, record the slope over the life of the probe. Tracking the slope will indicate if the probe is degrading. Press NEXT to access the CONSTANT screen.

Constant

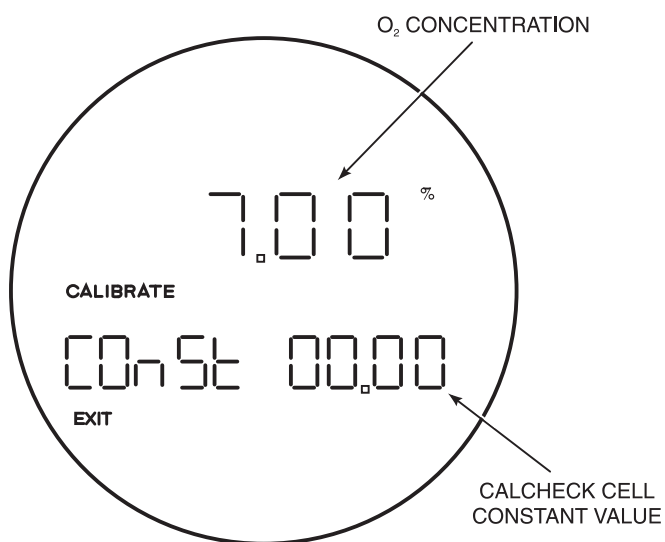
Refer to Figure 3-33. Use this screen to examine the cell zero constant calculated from the current calibration check. The constant represents the voltage generated by the cell when no difference exists between the amount of O₂ on the reference and process sides of the cell. Note this value for comparison against future calibration checks. Press RESET or EXIT to return to the PROCESS DISPLAY screen.

Figure 3-32. Slope



39580044

Figure 3-33. Constant



39580045

Section 4 HART/AMS

Overview	page 4-1
Field Communicator Signal Line Connections	page 4-2
Field Communicator PC Connections	page 4-4
Off-Line and On-Line Operations	page 4-4
HART/AMS Menu Tree	page 4-4
Field Communicator Start Cal Check Method	page 4-8

OVERVIEW

The HART field communicator is a hand-held communications interface device. It provides a common communications link to all microprocessor-based instruments that are HART compatible. The field communicator has a liquid crystal display (LCD) and keypad. A pocket-sized manual, included with the field communicator, details the specific functions of the keypad keys.

To interface with the Rosemount 5081FG Analyzer, the field communicator requires a termination point along the 4-20 mA current loop and a minimum load resistance of 250 ohms between the field communicator and the power supply.

The field communicator accomplishes its task using a frequency shift keying (FSK) technique. With the use of FSK, high-frequency digital communication signals are superimposed on the analyzer's 4-20 mA current loop. The field communicator does not disturb the 4-20 mA signal, since no net energy is added to the loop.

The field communicator may be interfaced with a personal computer (PC), providing that special software has been installed. To connect the field communicator to a PC, an interface adapter is required. Refer to the proper field communicator documentation regarding the PC interface option.

FIELD COMMUNICATOR SIGNAL LINE CONNECTIONS

The field communicator can connect to the analyzer's analog output signal line at any wiring termination in the 4-20 mA current loop. There are two methods of connecting the field communicator to the signal line. For applications in which the signal line has a load resistance of 250 ohms or more, refer to method 1. For applications in which the signal line load resistance is less than 250 ohms, refer to method 2.

Method 1, For Load Resistance $\geq$ 250 Ohms

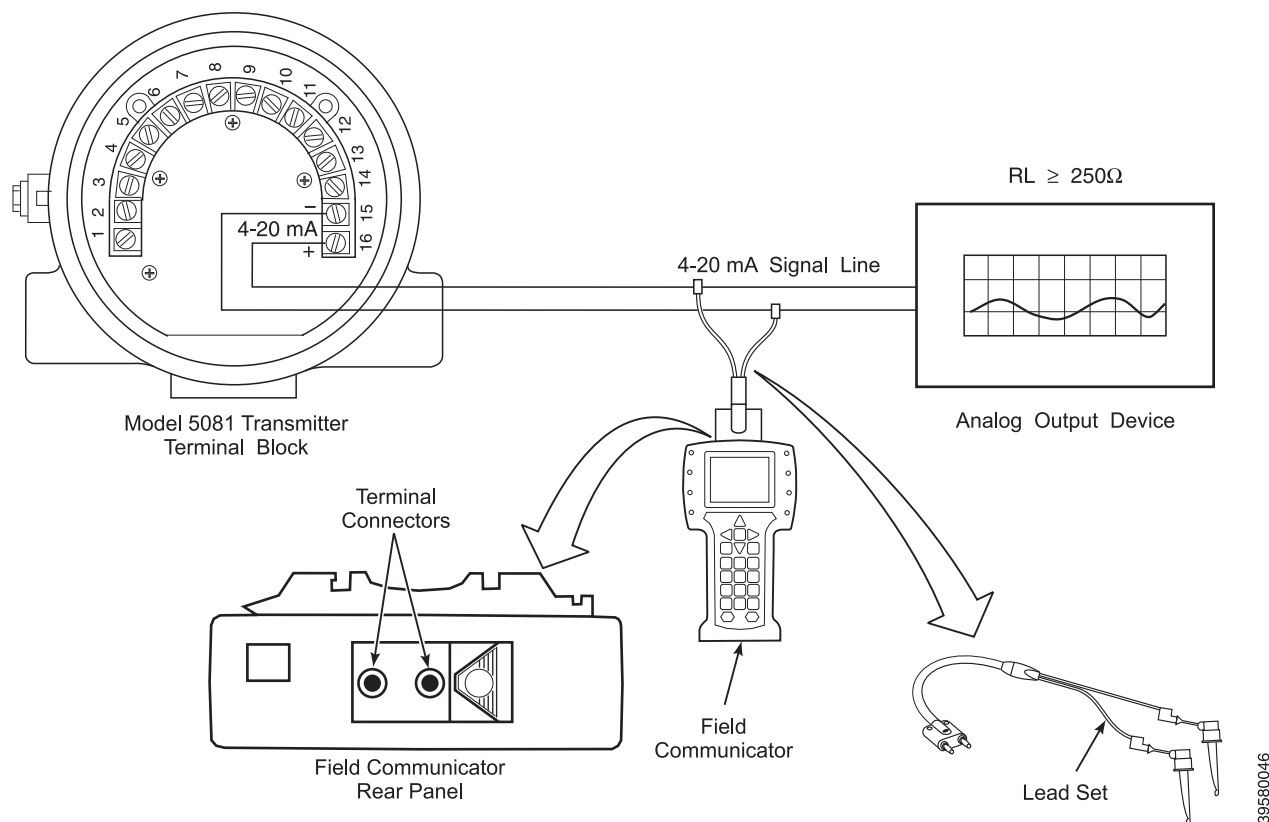
Refer to Figure 4-1 and the following steps to connect the field communicator to a signal line $<$ 250 ohms or more of load resistance.

⚠ WARNING

Explosions can result in death or serious injury. Do not make connections to the field communicator's serial port, 4-20 mV signal line, or NiCad recharger jack in an explosive atmosphere.

Using the supplied lead set, connect the field communicator in parallel with to the Rosemount 5081FG Analyzer. Use any wiring termination points in the analog output 4-20 mA signal line.

Figure 4-1. Signal Line Connections, $\geq$ 250 Ohms Load Resistance



Method 2, For Load Resistance < 250 ohms

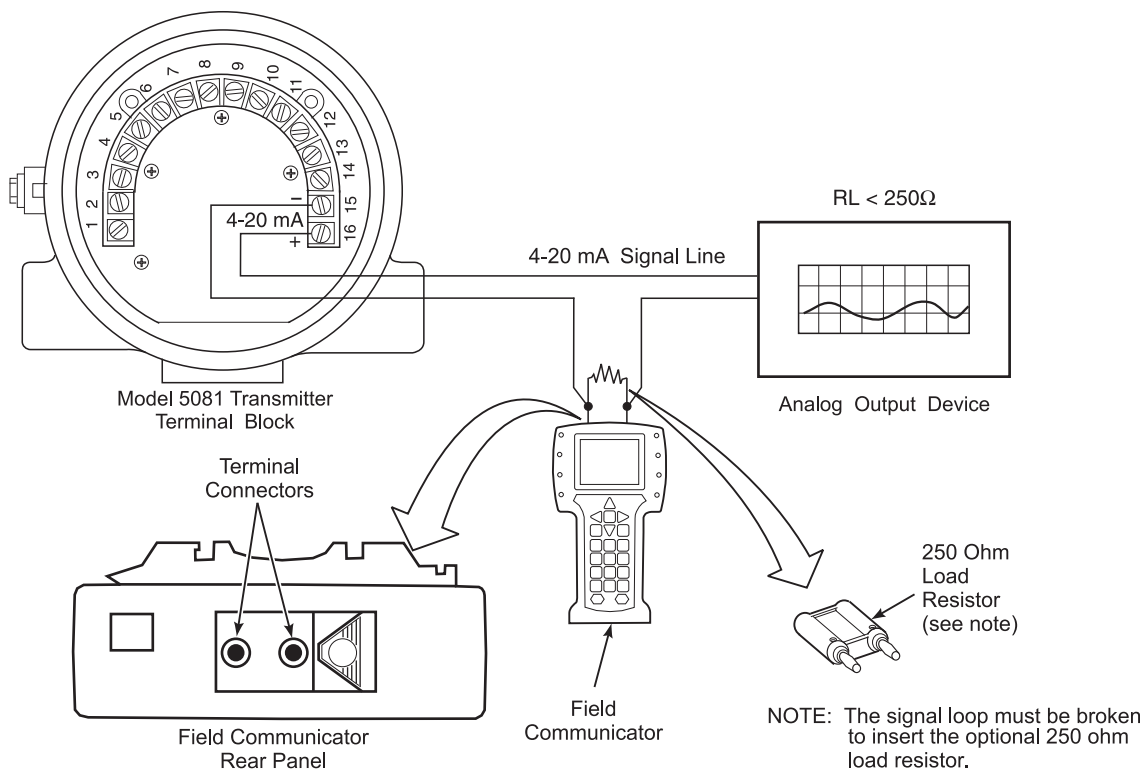
Refer to Figure 4-2 and the following steps to connect the field communicator to a signal line with < 250 ohms load resistance.

⚠ WARNING

Explosions can result in death or serious injury. Do not make connections to the field communicator's serial port, 4-20 mA signal line, or NiCad recharger jack in an explosive atmosphere.

1. At a convenient point break the analog output 4-20 mA signal line and install the optional 250 ohm load resistor.
2. Plug the load resistor into the rear panel of the field communicator.

Figure 4-2. Signal Line Connections, < 250 Ohms Load Resistance



39560047

FIELD COMMUNICATOR PC CONNECTIONS

There is an option to interface the field communicator with a personal computer. Refer to the applicable field communicator documentation regarding the PC interface option.

OFF-LINE AND ON-LINE OPERATIONS

The field communicator can be operated both off-line and on-line.

Off-line operations are those in which the communicator is not connected to the Rosemount 5081FG Analyzer. Off-line operations can include interfacing the field communicator with a PC (refer to applicable HART documentation regarding HART/PC applications).

In the on-line mode, the communicator is connected to the 4-20 mA analog output signal line. The communicator is connected in parallel to the Rosemount 5081FG Analyzer or in parallel to the 250 ohm load resistor.

NOTE

If the field communicator is turned on while connected to the 4-20 mA analog output signal line, an undefined status indication appears while the communicator warms up. Wait until the warm-up period ends to continue.

The opening menu displayed on the LCD is different for on-line and off-line operations. When powering up a disconnected (off-line) communicator, the LCD will display the Main Menu. When powering up a connected (on-line) communicator, the LCD will display the On-line Menu. Refer to the field communicator manual for detailed menu information.

HART/AMS MENU TREE

This section consists of a menu tree for the field communicator. This menu is specific to Two-Wire In-Situ Oxygen Analyzer applications.

Figure 4-3. HART/AMS Menu Tree (Sheet 1 of 3)

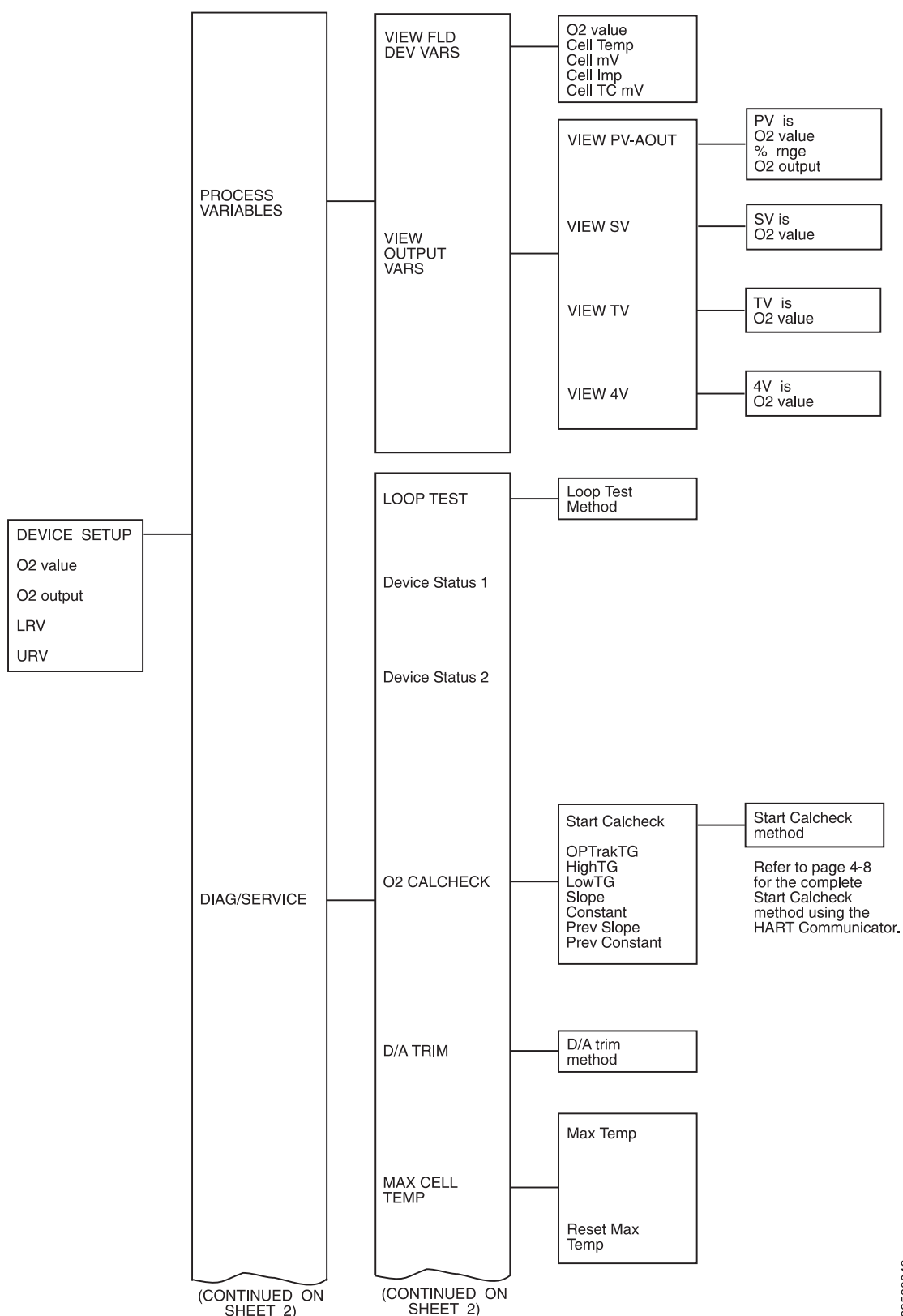
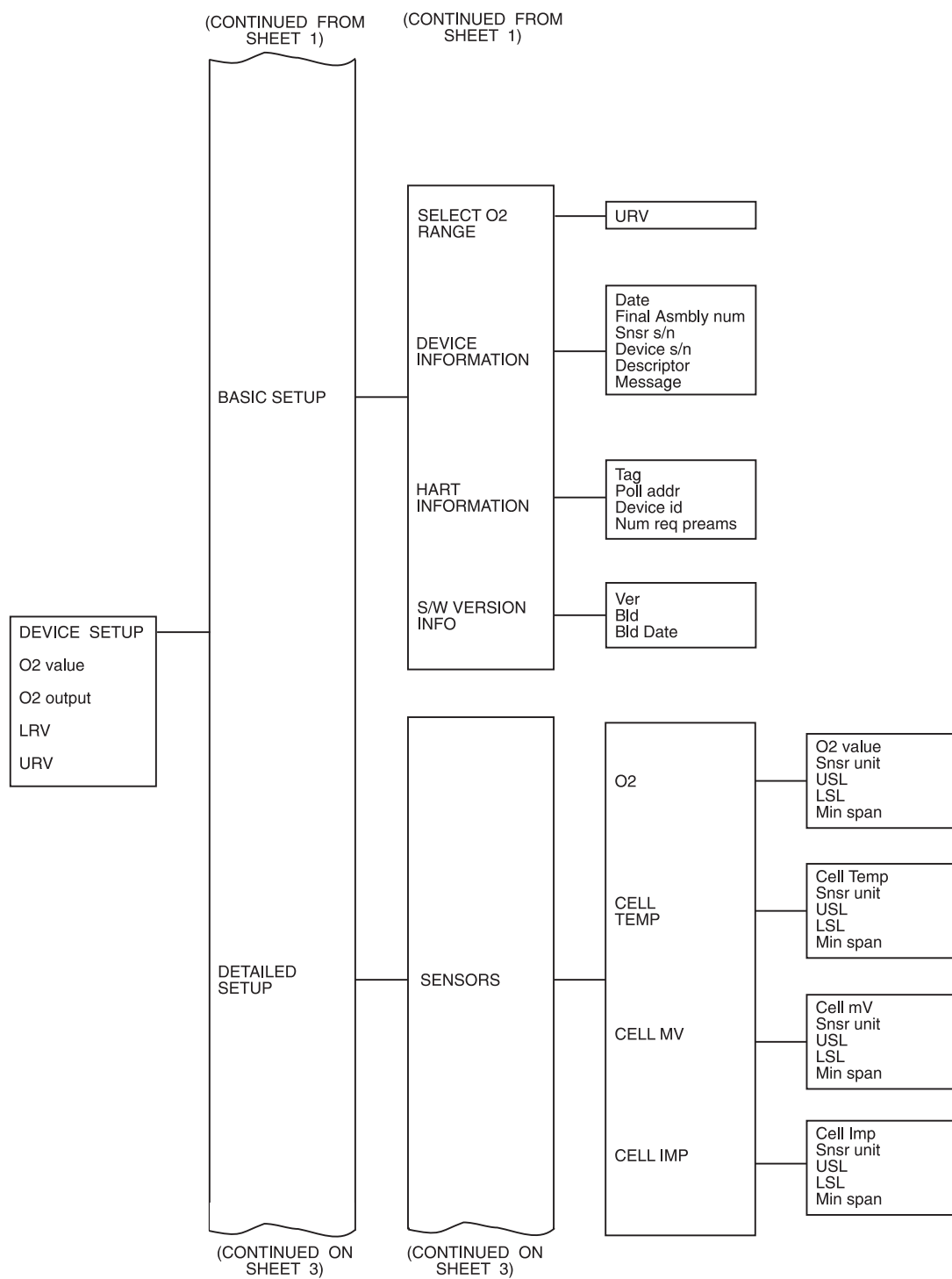
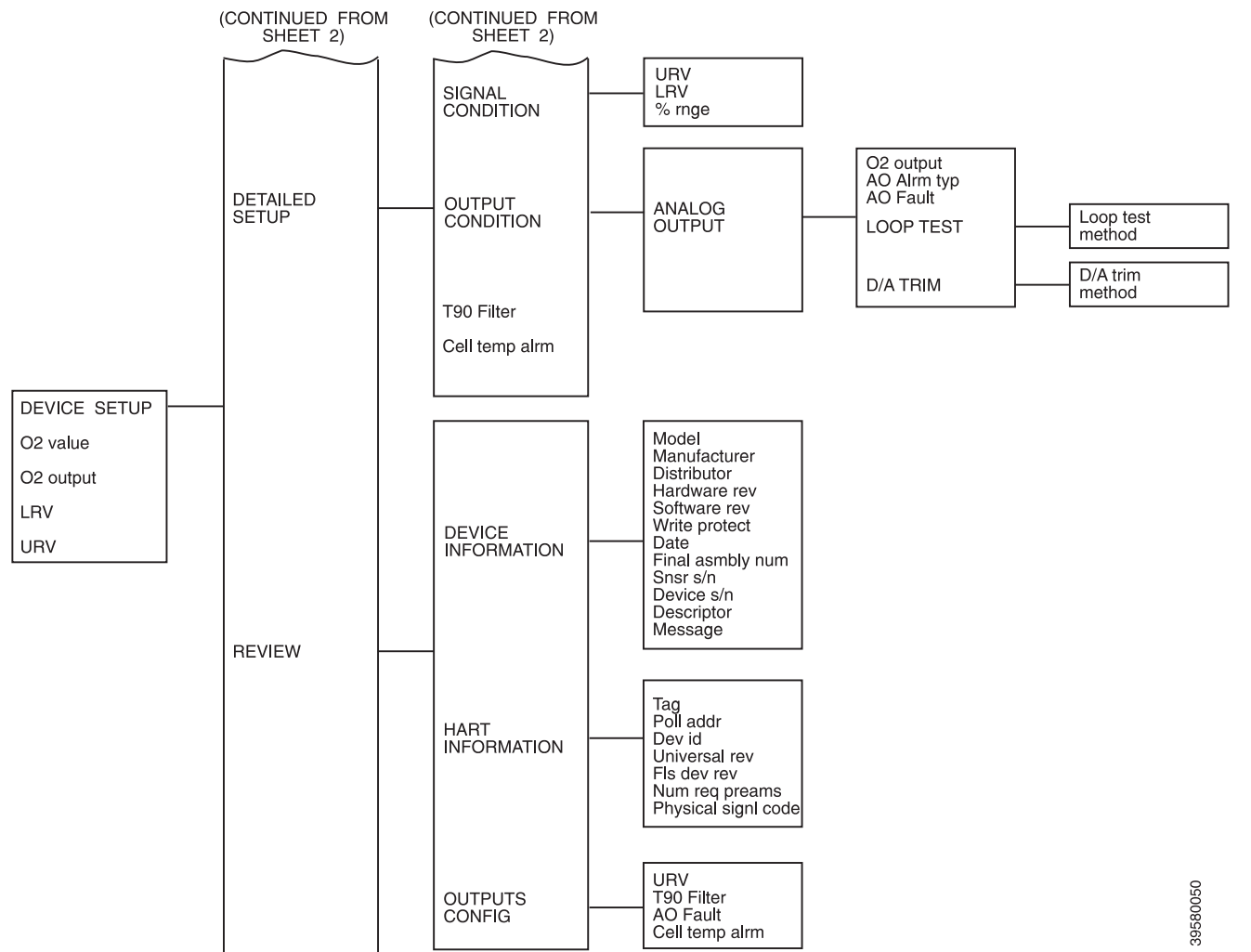


Figure 4-3. HART/AMS Menu Tree (Sheet 2 of 3)



39580049

Figure 4-3. HART/AMS Menu Tree (Sheet 3 of 3)



39580050

FIELD COMMUNICATOR START CAL CHECK METHOD

To perform a calibration check on the Two-Wire In-Situ Oxygen Analyzer with the field communicator, use the following procedure. If necessary, use the menu tree in Figure 4-3 (sheet 1 of 3) for reference.

NOTE

To select a menu item use either the up and down arrow keys to scroll to the menu item. Press the right arrow key or use the number keypad to select the menu item number. To return to a preceding menu, press the left arrow key.

NOTE

Pressing ABORT at any time during this process will purge the calibration check gases and end the calibration check procedure.

1. From the DEVICE SETUP SCREEN, select DIAG/SERVICE.
2. From the DIAG/SERVICE screen, select O₂ CALCHECK.
3. Before starting the calibration check procedure, first set up the high calibration check gas, low calibration check gas, and tracking using HART/AMS.
4. From the O₂ CALCHECK screen, select menu item 1, START CALCHECK, to access the calibration check procedure.

WARNING

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

5. In the first screen, a "Loop should be removed from automatic control" warning appears. Remove the analyzer from any automatic control loops to avoid undesirable equipment performance and press OK.
6. The next screen prompts you to apply the high calibration check gas. This message will only display for approximately three seconds. Press OK.
7. At this point, calibration check gas will flow for approximately three minutes until the gas reading is taken. Once the gas is measured, the message, "Hi gas reading taken," displays for three seconds.
8. Next, the screen prompts you to apply the low calibration check gas. Press OK.
9. The low calibration check gas will flow for approximately three minutes until the reading is taken. Once the gas is measured, the message, "Low gas reading taken," displays for three seconds.
10. Next, the screen prompts you to disconnect the calibration check gases. Press OK. Once the gases are disconnected the system will purge the gases for approximately three minutes.
11. When the "Loop may be returned to automatic control" note appears, return the analyzer to the automatic control loops previously removed and press OK.

Section 5 Troubleshooting

General	page 5-1
Probe Life	page 5-1
Fault Indications	page 5-3
Identifying And Correcting Fault Indications	page 5-4
Calibration Passes, But Still Reads Incorrectly	page 5-8

GENERAL

This troubleshooting section describes how to identify and isolate faults that may develop in the Two-Wire In-Situ Oxygen Analyzer.

PROBE LIFE

The zirconium oxide technology for measuring oxygen is very stable and should provide accurate service for several years.

Life of the probe is negatively impacted by:

- Continued operation at elevated temperatures above 1300°C (2372°F).
- Operation in processes that contain high levels of sulfur, SO₂, or other acidic compounds.

Operating conditions with simultaneously high levels of SO₂ and low levels of O₂ are particularly damaging.

The health and accuracy of a given cell is closely related to the resistance, or impedance, of the cell. Figure 5-1 illustrates that the amount of output from a cell for a given O₂ value (represented as slope) will remain very stable to the point where cell impedance increases to approximately 100 ohms.

Frequently conduct calibration checks to look for the following conditions:

- Continued degradation of cell slope.
- Sluggish response. (Note how long it takes the cell to respond to the application of calibration check gases.) See Figure 5-2.

The slope will be valid only for the process temperature at which the calibration check gases are flowed, so no adjustments to the electronics are made as a result of a calibration check.

Note that cells exposed to temperatures above 1300°C (2372°F) may lose the ability to measure accurately and respond quickly when returned to the lowest end of the operating temperature range [550°C (1022°F)].

Figure 5-1. Slope vs. Impedance

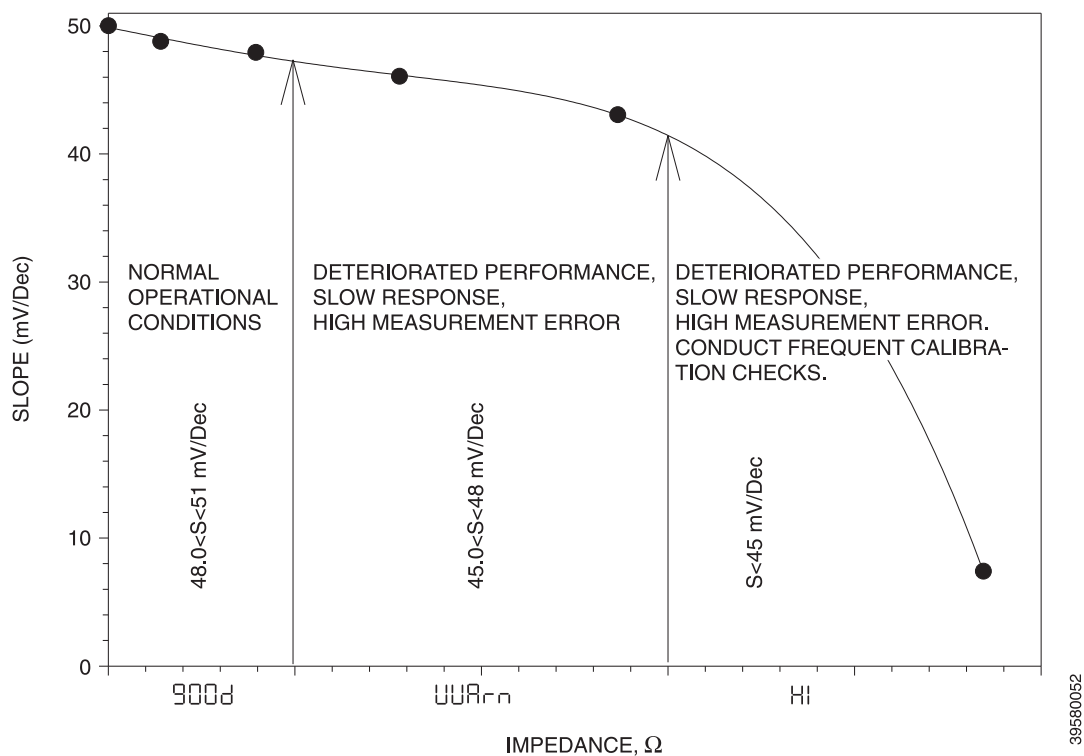
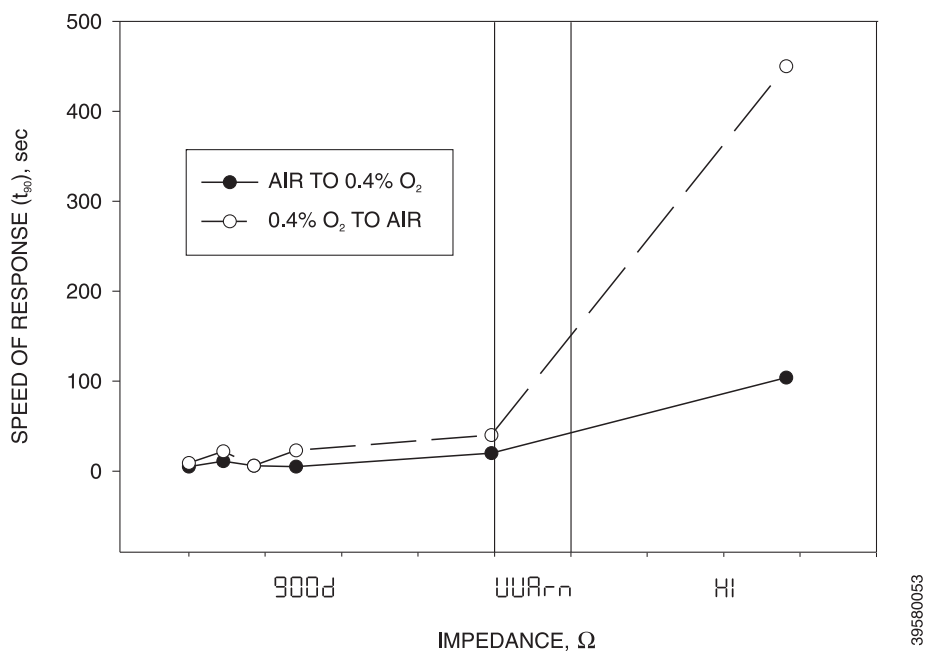


Figure 5-2. Speed of Response



FAULT INDICATIONS

The fault conditions for the Two-Wire In-Situ Oxygen Analyzer will be indicated by the faulted operation display as shown in Figure 5-3. This screen displays when a fault that invalidates the O₂ reading is present. When the error is corrected, the screen will return to a normal operation display unless another error exists.

Figure 5-3. Faulted Operation Display



39580054

IDENTIFYING AND CORRECTING FAULT INDICATIONS

A fault in the operation of the Two-Wire In-Situ Oxygen Analyzer is indicated by the faulted operation display. If no faults exist the display will indicate NONE. Information on the current fault is found under the DIAGNOSTICS MENU as detailed in Section 3: Startup and Operation.

The following paragraphs describe the faults, possible causes, and corrective actions. Refer to Figure 5-4 as needed for test points and wiring information.

NOTE

Allow adequate time for the oxygen probe to reach its operating temperature [approximately 500°C (932°F)] before investigating a fault. The SHOW FAULTS screen of the DIAGNOSTICS menu will indicate a fault until the unit reaches operating temperature.

NOTE

The probe uses a Type B thermocouple to measure the cell temperature. A Type B thermocouple output table may be useful for troubleshooting.

Figure 5-4. Transmitter Terminal Block

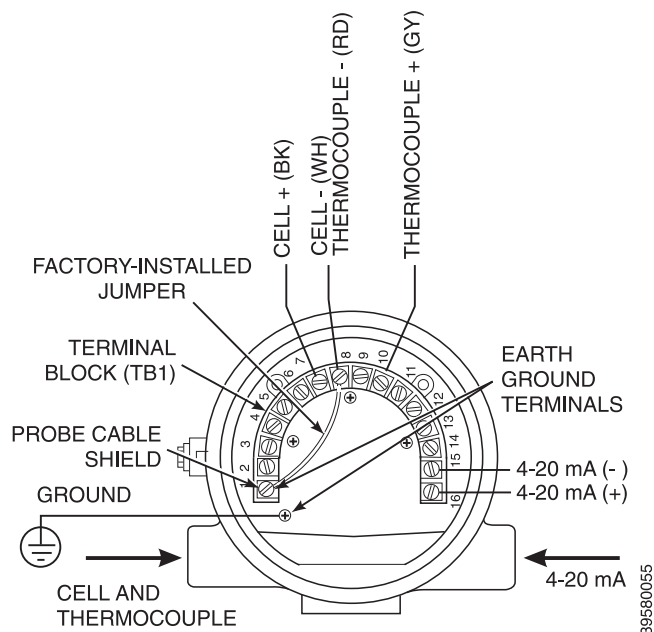


Figure 5-5. Fault 1, Open Thermocouple



39580056

Fault 1, Open Thermocouple

The thermocouple connection is open. The fault displays as shown in Figure 5-5.

1. Refer to Figure 5-4 and check the thermocouple wiring connections at terminals 8 and 10. Ensure the wires are properly connected.
2. Remove power. Disconnect the thermocouple wires (gray and red) from terminals 10 and 8. Measure the continuity across the gray and red thermocouple leads. The measurement should read approximately 1-2 ohms. Larger values indicate the thermocouple is open.
3. If the thermocouple is open, replace the oxygen probe per Oxygen Probe Replacement in Section 6: Maintenance and Service.

Figure 5-6. Fault 2, Reversed Thermocouple



39580057

Fault 2, Reversed Thermocouple Active

The thermocouple connections are reversed. The fault displays as shown in Figure 5-6.

1. Allow adequate time for the oxygen probe to reach operating temperatures. Probe temperatures below approximately 500°C (932°F) may result in this fault.
2. Refer to Figure 5-4. Check the gray (to terminal 10) and red (to terminal 8) wires for the proper placement.
3. Using a multimeter, measure between terminals 8(-) and 10(+). If the reading is negative, the thermocouple wiring is reversed. Rewire as necessary.
4. If the wiring is correct and the probe is at operating temperature, then the transmitter electronics are bad. Replace the faulty analog or CPU board per Electronics Replacement in Section 6: Maintenance and Service.

Figure 5-7. Fault 3, Shorted Thermocouple



39580058

Fault 3, Shorted Thermocouple

The thermocouple connections are shorted. The fault displays as shown in Figure 5-7.

1. Allow adequate time for the oxygen probe to reach operating temperatures. Probe temperatures below approximately 500°C (932°F) may result in this fault.
2. Refer to Figure 5-4. Using a multimeter, measure between terminals 8(-) and 10(+).
3. If the multimeter reading, in voltage mode, is between -0.5 and +0.5 mV, the thermocouple is shorted.
4. If the thermocouple is shorted, replace the oxygen probe per Oxygen Probe Replacement in Section 6: Maintenance and Service.
5. If the thermocouple is not shorted, then replace the faulty analog or CPU board per Electronics Replacement in Section 6: Maintenance and Service.

Figure 5-8. Fault 4, High Probe Temperature



39580059

Fault 4, High Probe Temperature

The probe's temperature has exceeded the maximum cell temperature setpoint. The fault displays as shown in Figure 5-8.

1. If the probe temperature exceeds the maximum cell temperature setpoint, the 4-20 mA signal output will become invalid and go to the default value.
2. Verify that the upper cell temperature setpoint is configured as desired under the PROGRAM MENU in Section 3: Startup and Operation.

Figure 5-9. Fault 5, O₂ Cell Open



39580060

Fault 5, O₂ Cell Open

The O₂ cell connection is open. The fault displays as shown in Figure 5-9.

1. Allow adequate time for the oxygen probe to reach operating temperatures. Probe temperatures below approximately 500°C (932°F) may result in this fault.
2. Refer to Figure 5-4 and check the O₂ cell wiring connections at terminals 7 and 8. Ensure the wires are properly connected.

NOTE

Check the cell output voltage at the probe terminals -- not at the electronics.

3. Apply low calibration check gas (0.4% O₂). Measure the cell output from the O₂ cell wires at the probe terminal block. The cell output should be 100 ±20 mV. If no voltage can be measured the cell is open.
4. If the O₂ cell is open, replace the oxygen probe per Oxygen Probe Replacement in Section 6: Maintenance and Service.

Figure 5-10. Fault 6, Cell Impedance Too High



39580061

Fault 6, Cell Impedance Too High

The O₂ cell impedance has exceeded 100 ohms. The fault displays as shown in Figure 5-10.

1. This fault is usually indicated in conjunction with Fault 5, Cell Open. Correcting Fault 5 should correct Fault 6.
2. Fault 6 appears independently, the cell has degraded beyond specification.
3. If the O₂ cell has become too old, replace the oxygen probe per Oxygen Probe Replacement in Section 6: Maintenance and Service.

Figure 5-11. Fault 7, Reversed O₂ Cell



39580061

Fault 7, Reversed O₂ Cell

The O₂ cell connections are reversed. The fault displays as shown in Figure 5-11.

1. Refer to Figure 5-4. Check the black (to terminal 7) and white (to terminal 8) wires for the proper placement. Rewire if necessary.
2. Apply the low calibration check gas (0.4% O₂).
3. Using a multimeter measure between terminals 7(+) and 8(-). If the cell output reading is negative, the O₂ cell wiring is reversed.
4. If the wiring is correct, check if the multimeter reading is the same as the reading shown on the O₂ CELL mV diagnostics screen (Section 3: Startup and Operation).
5. If the reading is different the transmitter electronics are faulty. Replace the faulty analog or CPU board per Electronics Replacement in Section 6: Maintenance and Service.

CALIBRATION PASSES, BUT STILL READS INCORRECTLY

There are fault conditions where no alarm indication is present and the probe passes calibration, but the O₂ reading may still be incorrect:

Probe Passes Calibration, O₂ 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 O₂ reading upward.

1. Make sure that the calibration gas line is capped tightly between calibrations.

Bad Reference Side Cell Electrode - A bad reference side cell electrode can cause an elevated O₂ 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.

Section 6Maintenance and Service

Overview	page 6-1
Electronics Replacement	page 6-1
Oxygen Probe Replacement	page 6-3

OVERVIEW

This section provides the procedures to maintain and service the Rosemount 5081FG Two-Wire In-Situ Oxygen Analyzer.

⚠WARNING

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.

⚠WARNING

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

ELECTRONICS REPLACEMENT

Display Board Replacement

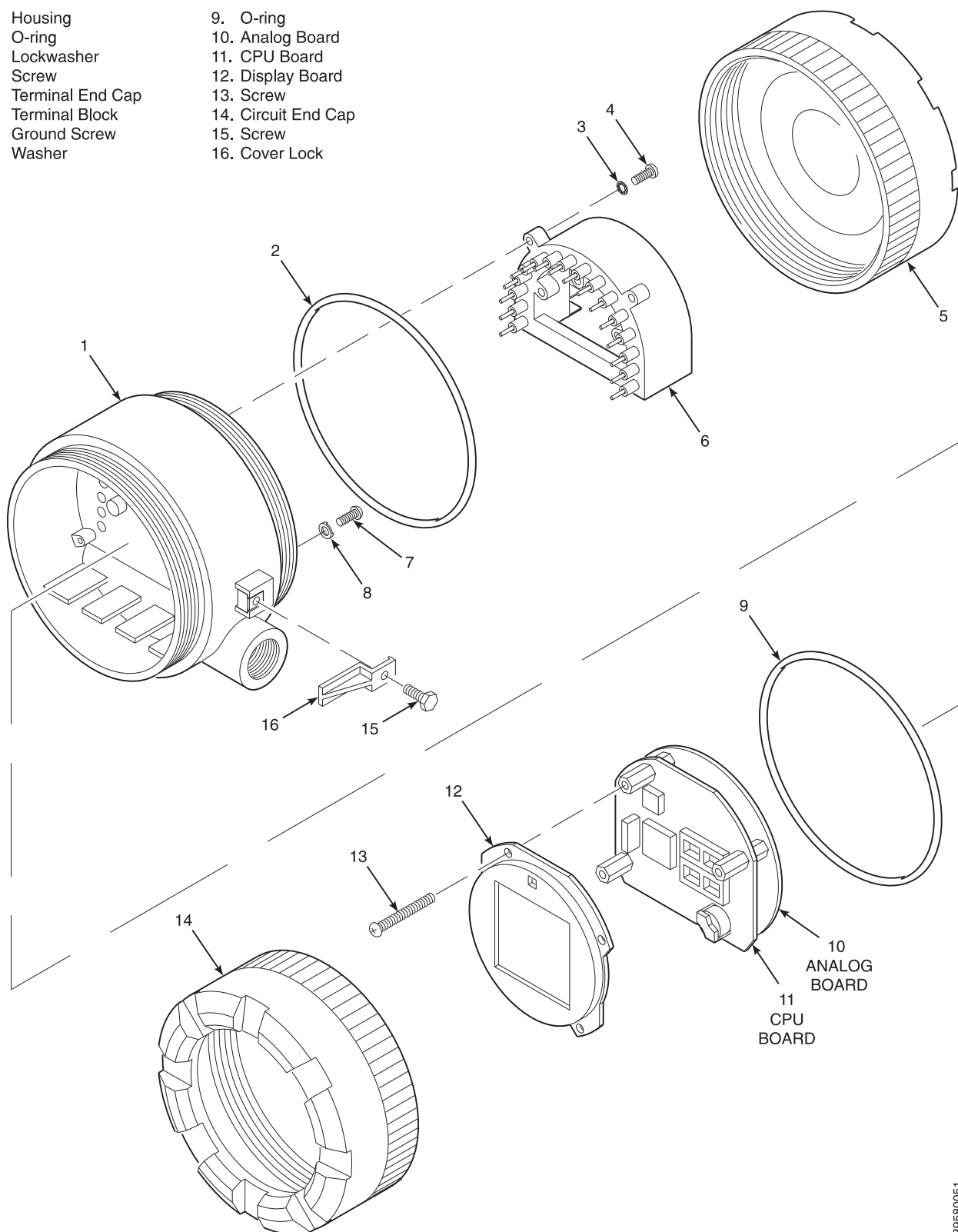
Before replacing any electronic components verify that the power to the Rosemount 5081 transmitter is removed. Refer to Section 7: Replacement Parts for replacement part numbers.

Use the following procedure to replace the display board (12, Figure 6-1).

1. Loosen screw (15) until cover lock (16) disengages from the knurled surface of circuit end cap (14). Remove circuit end cap.
2. Remove three screws (13) retaining the electronics in place.
3. Lift display board (12) to disconnect from CPU board (11). The display board is plugged into the CPU board; use care when removing the display board.
4. Align and plug the replacement display board (12) in the desired orientation. Carefully plug the display board into the mating connector on CPU board (11). Ensure the display board is fully seated.
5. Install and tighten all three screws (13).
6. Install circuit end cap (14). Tighten cover lock screw (15) until cover lock (16) engages knurled surface of circuit end cap (14).

Figure 6-1. Two-Wire In-Situ Oxygen Analyzer - Exploded View

- | | |
|---------------------|---------------------|
| 1. Housing | 9. O-ring |
| 2. O-ring | 10. Analog Board |
| 3. Lockwasher | 11. CPU Board |
| 4. Screw | 12. Display Board |
| 5. Terminal End Cap | 13. Screw |
| 6. Terminal Block | 14. Circuit End Cap |
| 7. Ground Screw | 15. Screw |
| 8. Washer | 16. Cover Lock |



Spare Board Stack Replacement

The spare board stack is composed of the analog board (10, Figure 6-1) and the CPU board (11). Use the following procedure to replace either of these boards.

1. Loosen cover lock screw (15) until cover lock (16) disengages from the knurled surface of circuit end cap (14). Remove circuit end cap.
2. Remove three screws (13).
3. Lift display board (12) to disconnect from CPU board (11). The display board is plugged into the CPU board; use care when removing the display board.
4. Remove terminal end cap (5).
5. Remove two screws (4) and lockwashers (3). Lift terminal block (6) until the analog board (10) is unplugged from the terminal board.
6. Lift failed board stack from housing (1) by the standoffs. Reinstall terminal block (6), lockwashers (3), and screws (4).

NOTE

Rosemount 5081 analyzers shipped after August 2008 incorporate a new display board. If display board replacement is needed for an earlier analyzer unit, both the display and spare board stack must be replaced as matching parts. The earlier model analyzer uses a ribbon cable to connect the display board (12) to the CPU board (10).

7. Install new spare board stack into housing (1). Carefully seat the analog board onto housing pins. Press firmly on the CPU board standoffs to ensure good contact.
8. Align and plug the replacement display board (12) into the mating connector on the CPU board (11). Ensure the display board is fully seated.
9. Install and tighten all three screws.
10. Install terminal end cap (5) and circuit end cap (14). Tighten cover lock screw (15) until cover lock (16) engages knurled surface of circuit end cap (14).

OXYGEN PROBE REPLACEMENT

The oxygen probe is designed with ceramic materials to provide maximum life at elevated temperatures and is not rebuildable. The condition of the sensing cell can be determined periodically by two methods:

- Note the cell impedance at the electronics. When the impedance displays a warning indication (WARN), increase the frequency of impedance readings. A cell with a sustained high impedance indication (HI) indicates a probe that is beyond its useful life.
- Conduct a calibration check. Follow the prompts provided by the electronics through the process of flowing two calibration check gases of known values. Record the generated slope and constant values.

⚠ WARNING

Use heat resistant gloves and clothing when removing the probe. The probe can be as hot as 1600°C (2912°F). This can cause severe burns.

⚠ WARNING

Do not install or remove probes from a process where pressures are more than a few inches of H₂O positive pressure. Hot gases may escape from the stack and cause severe personal injury.

⚠ WARNING

Do not insert or withdraw a probe into or out of a hot process faster than 1 in. (25,4 mm) per minute or instrument damage from thermal shock may occur.

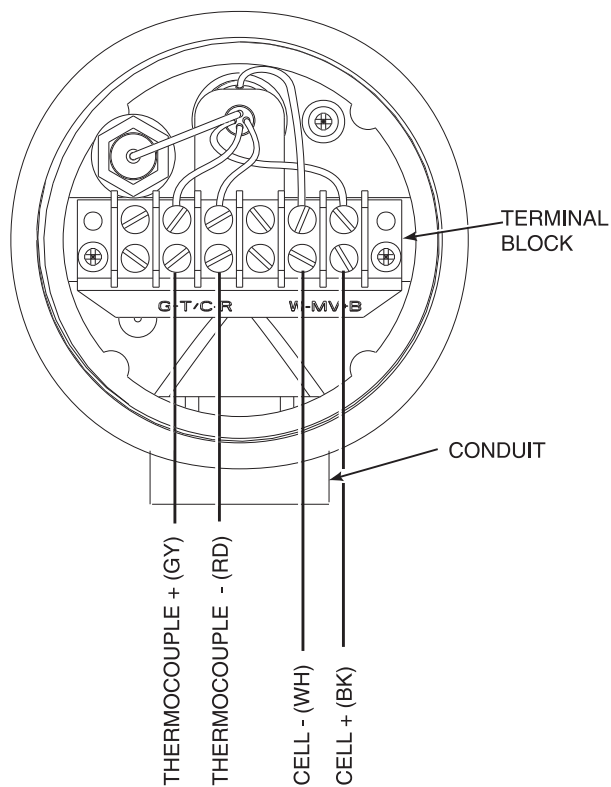
Also, ash, slag, or other materials can build up on the probe body in some applications. If this buildup is causing difficulty when withdrawing the probe, DO NOT FORCE. Rotate the probe back and forth to attempt to loosen the material on the probe body. Or, wait until the process cools down and access the buildup from inside the furnace.

Probe replacement may be conducted online as long as the process in which the probe is mounted is operating at a negative, or slightly positive, pressure. Refer to Section 5: Troubleshooting for more information.

Refer to Table 7-1 for replacement probe part numbers. Before replacing the probe, verify that the reference air and calibration check gas lines are turned off and disconnected from the probe.

1. Remove the end cap of the probe to expose the terminal block.
2. Refer to Figure 6-2. Disconnect the four wires (two oxygen signal wires and two thermocouple wires) from the terminal block.
3. Disconnect the reference air and the calibration check gas lines.
4. Unscrew the probe from the stack and remove.
5. Using a replacement probe, refer to Mechanical Installation in Section 2: Installation for mechanical installation instructions.
6. Refer to Electrical Installation in Section 2: Installation for electrical installation instructions.
7. Refer to Pneumatic Installation in Section 2: Installation for reference air and calibration check gas installation instructions.

Figure 6-2. Oxygen Probe
Terminal Block



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Section 7 Replacement Parts

Table 7-1. Replacement Parts List

Figure and Index Number	Part Number	Description
1-1, 2	6A00093G01	Rosemount 5081 Transmitter ATEX
1-1, 2	6A00093G02	Rosemount 5081 Transmitter CSA
1-1, 2	6A00093G03	Rosemount 5081 Transmitter FM
1-1, 3	5R10092G01	20" Replacement Oxygen Probe, with Alumina Outer Protection Tube
1-1, 3	5R10092G02	26" Replacement Oxygen Probe, with Alumina Outer Protection Tube
1-1, 3	5R10092G03	38" Replacement Oxygen Probe, with Alumina Outer Protection Tube
1-1, 3	5R10092G09	20" Replacement Oxygen Probe, with Inconel 600 Outer Protection Tube
1-1, 3	5R10092G10	26" Replacement Oxygen Probe, with Inconel 600 Outer Protection Tube
1-1, 3	5R10092G11	38" Replacement Oxygen Probe, with Inconel 600 Outer Protection Tube
6-1, 6	1A99777H04	Terminal Block
6-1, 10, 11, 12 and 13	1A99777H06	Spare Board Stack, HART Compatible, with Display Board Assembly
6-1, 12	1A99777H05	Display Board Assembly
6-1, 14	23593-01	Circuit End Cap (with Glass)
6-1, 5	1A99777H01	Terminal End Cap (without Glass)

NOTE

Rosemount 5081 analyzers shipped after August 2008 incorporate a new display board. If display board replacement is needed for an earlier analyzer unit, both the display and spare board stack must be replaced. The earlier model analyzer uses a ribbon cable to connect the display board (12) to the CPU board (11).

Appendix A Safety Data

Safety Instructions	page A-2
Safety Data Sheet for Ceramic Fiber Products	page A-24

SAFETY INSTRUCTIONS

IMPORTANT**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.
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 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 symbol to the right, 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 symbol to the right, 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 symbol to the right, refer to the Operator 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 power is removed and adequate time as specified on the label or in the instruction manual has been allowed for the equipment to cool down - and then only by trained service personnel.



DŮLEŽITÉ

Bezpečnostní pokyny pro zapojení a instalaci zařízení

Následující bezpečnostní pokyny se speciálně vztahují na všechny členské státy EU. Pokyny by měly být přísně dodržovány, aby se zajistilo splnění Směrnice o nízkém napětí. Pokud nejsou pokyny nahrazeny místními či národními normami, měly by je dodržovat i nečlenské státy EU.

1. U všech zemnicích bodů, interních a externích, by mělo být vytvořeno odpovídající uzemnění.
2. Po instalaci nebo odstranění problémů musí být vyměněny všechny bezpečnostní kryty a uzemnění. Vždy musí být zajištěna integrita všech zemnicích svorek.
3. Síťové kabely by měly odpovídat požadavkům normy IEC227 nebo IEC245.
4. Všechna zapojení by měla být vhodná pro použití při vnějších teplotách nad 75 °C.
5. Všechna použitá kabelová hrdla by měla mít takové vnitřní rozměry, aby zajistila odpovídající zakotvení kabelu.
6. Správnou činnost zařízení zajistíte, vytvoříte-li připojení k napájecímu zdroji pouze přes jistič, který v případě poruchy odpojí všechny obvody s konduktory. Jistič může také obsahovat mechanický odpojovač. Pokud ho neobsahuje, musí být zajištěn a jasně označen jiný způsob odpojení zařízení od zdroje. Jističe nebo přepínače musí odpovídat uznávaným normám, např. IEC947. Všechna zapojení musí odpovídat místním normám.
7. Je-li zařízení nebo kryt označen symbolem na pravé straně, pravděpodobně se uvnitř nachází nebezpečné napětí. Tyto kryty by měly být sejmuty pouze po odpojení zařízení od zdroje - a to pouze kvalifikovaným zaměstnancem.
8. Je-li zařízení nebo kryt označen symbolem na pravé straně, povrch zařízení může být velmi horký. Tyto kryty by měly být sejmuty pouze kvalifikovaným zaměstnancem po odpojení zařízení od zdroje. Některé povrchy mohou být stále horké.
9. Je-li zařízení nebo kryt označen symbolem na pravé straně, přečtěte si nejprve instrukce v návodu k obsluze.
10. Všechny grafické symboly používané u výrobku pocházejí z následujících norem: EN61010-1, IEC417 a ISO3864.
11. Pokud je zařízení nebo štítky označeno varováním „Je-li zařízení pod napětím, neotvírejte jej“ či podobným, může dojít ve výbušném prostředí ke vznícení. Zařízení lze otevřít pouze po jeho odpojení od zdroje a ponechání dostatečného času na vychladnutí, jak je uvedeno na štítku nebo v návodu k obsluze - a to pouze kvalifikovaným zaměstnancem.



VIGTIGT

Sikkerhedsinstruktion for tilslutning og installation af dette udstyr.

Følgende sikkerhedsinstruktioner gælder specifikt i alle EU-medlemslande. Instruktionerne skal nøje følges for overholdelse af Lavsspændingsdirektivet og bør også følges i ikke EU-lande medmindre andet er specificeret af lokale eller nationale standarder.

1. Passende jordforbindelser skal tilsluttes alle jordklemmer, interne og eksterne, hvor disse forefindes.
2. Efter installation eller fejlfinding skal alle sikkerhedsdæksler og jordforbindelser reetableres.
3. Forsyningskabler skal opfylde krav specificeret i IEC227 eller IEC245.
4. Alle ledningstilslutninger skal være konstrueret til omgivelsestemperatur højere end 75°C.
5. Alle benyttede kabelforskrutninger skal have en intern dimension, så passende kabelafastning kan etableres.
6. For opnåelse af sikker drift og betjening skal der skabes beskyttelse mod indirekte berøring gennem afbryder (min. 10A), som vil afbryde alle kredsløb med elektriske ledere i fejlsituation. Afbryderen skal indholde en mekanisk betjent kontakt. Hvis ikke skal anden form for afbryder mellem forsyning og udstyr benyttes og mærkes som sådan. Afbrydere eller kontakter skal overholde en kendt standard som IEC947.
7. Hvor udstyr eller dæksler er mærket med dette symbol, er farlige spændinger normalt forekom-mende bagved. Disse dæksler bør kun afmonteres, når forsyningsspændingen er frakoblet - og da kun af instrueret servicepersonale. 
8. Hvor udstyr eller dæksler er mærket med dette symbol, forefindes meget varme overflader bagved. Disse dæksler bør kun afmonteres af instrueret servicepersonale, når forsyningsspænding er frakoblet. Visse overflader vil stadig være for varme at berøre i op til 45 minutter efter frakobling. 
9. Hvor udstyr eller dæksler er mærket med dette symbol, se da i betjeningsmanual for instruktion. 
10. Alle benyttede grafiske symboler i dette udstyr findes i én eller flere af følgende standarder:- EN61010-1, IEC417 & ISO3864.
11. Når udstyr eller etiketter er mærket "Må ikke åbnes, mens udstyret tilføres strøm" eller lignende, er der fare for antændelse i områder, hvor der er en eksplosiv atmosfære. Dette udstyr må kun åbnes, når strømkilden er fjernet, og der er gået tilstrækkelig tid til, at udstyret er kølet ned. Den nødvendige tid hertil er angivet på etiketten eller i brugervejledningen. Udstyret må kun åbnes af en faglært person.

BELANGRIJK

Veiligheidsvoorschriften voor de aansluiting en installatie van dit toestel.

De hierna volgende veiligheidsvoorschriften zijn vooral bedoeld voor de EU lidstaten. Hier moet aan gehouden worden om de onderworpenheid aan de Laag Spannings Richtlijn (Low Voltage Directive) te verzekeren. Niet EU staten zouden deze richtlijnen moeten volgen tenzij zij reeds achterhaald zouden zijn door plaatselijke of nationale voorschriften.

1. Degelijke aardingsaansluitingen moeten gemaakt worden naar alle voorziene aardpunten, intern en extern.
2. Na installatie of controle moeten alle veiligheidsdeksels en -aarding terug geplaatst worden. Ten alle tijde moet de betrouwbaarheid van de aarding behouden blijven.
3. Voedingskabels moeten onderworpen zijn aan de IEC227 of de IEC245 voorschriften.
4. Alle bekabeling moet geschikt zijn voor het gebruik in omgevingstemperaturen, hoger dan 75°C.
5. Alle wartels moeten zo gedimensioneerd zijn dat een degelijke kabel bevestiging verzekerd is.
6. Om de veilige werking van dit toestel te verzekeren, moet de voeding door een stroomonderbreker gevoerd worden (min 10A) welke alle draden van de voeding moet onderbreken. De stroomonderbreker mag een mechanische schakelaar bevatten. Zoniet moet een andere mogelijkheid bestaan om de voedingsspanning van het toestel te halen en ook duidelijk zo zijn aangegeven. Stroomonderbrekers of schakelaars moeten onderworpen zijn aan een erkende standaard zoals IEC947.
7. Waar toestellen of deksels aangegeven staan met het symbool is er meestal hoogspanning aanwezig. Deze deksels mogen enkel verwijderd worden nadat de voedingsspanning werd afgelegd en enkel door getraind onderhoudspersoneel.
8. Waar toestellen of deksels aangegeven staan met het symbool is er gevaar voor hete oppervlakken. Deze deksels mogen enkel verwijderd worden door getraind onderhoudspersoneel nadat de voedingsspanning verwijderd werd. Sommige oppervlakken kunnen 45 minuten later nog steeds heet aanvoelen.
9. Waar toestellen of deksels aangegeven staan met het symbool gelieve het handboek te raadplegen.
10. Alle grafische symbolen gebruikt in dit produkt, zijn afkomstig uit een of meer van devolgende standards: EN61010-1, IEC417 en ISO3864.
11. Op plaatsen waar uitrusting of etiketten zijn voorzien van een melding als "Niet openen bij aanwezigheid van spanning" bestaat er brandgevaar in omgevingen waar een explosieve atmosfeer aanwezig is. Deze uitrusting mag uitsluitend worden geopend wanneer het niet meer onder spanning staat en de uitrusting gedurende de voorgeschreven tijd op het etiket of in de handleiding is afgekoeld - en dan uitsluitend door voldoende opgeleid onderhoudspersoneel.



BELANGRIJK

Veiligheidsinstructies voor de bedrading en installatie van dit apparaat.

Voor alle EU lidstaten zijn de volgende veiligheidsinstructies van toepassing. Om aan de geldende richtlijnen voor laagspanning te voldoen dient men zich hieraan strikt te houden. Ook niet EU lidstaten dienen zich aan het volgende te houden, tenzij de lokale wetgeving anders voorschrijft.

1. Alle voorziene interne- en externe aardaansluitingen dienen op adequate wijze aangesloten te worden.
2. Na installatie, onderhouds- of reparatie werkzaamheden dienen alle beschermdeksels /kappen en aardingen om reden van veiligheid weer aangebracht te worden.
3. Voedingskabels dienen te voldoen aan de vereisten van de normen IEC 227 of IEC 245.
4. Alle bedrading dient geschikt te zijn voor gebruik bij een omgevings temperatuur boven 75°C.
5. Alle gebruikte kabelwartels dienen dusdanige inwendige afmetingen te hebben dat een adequate verankering van de kabel wordt verkregen.
6. Om een veilige werking van de apparatuur te waarborgen dient de voeding uitsluitend plaats te vinden via een meerpole automatische zekering (min.10A) die alle spanningvoerende geleiders verbreekt indien een foutconditie optreedt. Deze automatische zekering mag ook voorzien zijn van een mechanisch bediende schakelaar. Bij het ontbreken van deze voorziening dient een andere als zodanig duidelijk aangegeven mogelijkheid aanwezig te zijn om de spanning van de apparatuur af te schakelen. Zekeringen en schakelaars dienen te voldoen aan een erkende standaard zoals IEC 947.
7. Waar de apparatuur of de beschermdeksels/kappen gemarkeerd zijn met het volgende symbool, kunnen zich hieronder spanning voerende delen bevinden die gevaar op kunnen leveren. Deze beschermdeksels/kappen mogen uitsluitend verwijderd worden door getraind personeel als de spanning is afgeschakeld.
8. Waar de apparatuur of de beschermdeksels/kappen gemarkeerd zijn met het volgende symbool, kunnen zich hieronder hete oppervlakken of onderdelen bevinden. Bepaalde delen kunnen mogelijk na 45 min. nog te heet zijn om aan te raken.
9. Waar de apparatuur of de beschermdeksels/kappen gemarkeerd zijn met het volgende symbool, dient men de bedieningshandleiding te raadplegen.
10. Alle grafische symbolen gebruikt bij dit produkt zijn volgens een of meer van de volgende standaarden: EN 61010-1, IEC 417 & ISO 3864.
11. Op plaatsen waar uitrusting of etiketten zijn voorzien van een melding als "Niet openen bij aanwezigheid van spanning" bestaat er brandgevaar in omgevingen waar een explosieve atmosfeer aanwezig is. Deze uitrusting mag uitsluitend worden geopend wanneer het niet meer onder spanning staat en de uitrusting gedurende de voorgeschreven tijd op het etiket of in de handleiding is afgekoeld - en dan uitsluitend door voldoende opgeleid onderhoudspersoneel.



WICHTIG

Sicherheitshinweise für den Anschluß und die Installation dieser Geräte.

Die folgenden Sicherheitshinweise sind in allen Mitgliederstaaten der europäischen Gemeinschaft gültig. Sie müssen strikt eingehalten werden, um der Niederspannungsrichtlinie zu genügen.

Nichtmitgliedsstaaten der europäischen Gemeinschaft sollten die national gültigen Normen und Richtlinien einhalten.

1. Alle intern und extern vorgesehenen Erdungen der Geräte müssen ausgeführt werden. Nach Installation, Reparatur oder sonstigen Eingriffen in das Gerät müssen alle Sicherheitsabdeckungen und Erdungen wieder installiert werden. Die Funktion aller Erdverbindungen darf zu keinem Zeitpunkt gestört sein.
2. Die Netzspannungsversorgung muß den Anforderungen der IEC227 oder IEC245 genügen.
3. Alle Verdrahtungen sollten mindestens bis 75°C ihre Funktion dauerhaft erfüllen.
4. Alle Kabeldurchführungen und Kabelverschraubungen sollten in Ihrer Dimensionierung so gewählt werden, daß diese eine sichere Verkabelung des Gerätes ermöglichen.
5. Um eine sichere Funktion des Gerätes zu gewährleisten, muß die Spannungsversorgung über mindestens 10 A abgesichert sein. Im Fehlerfall muß dadurch gewährleistet sein, daß die Spannungsversorgung zum Gerät bzw. zu den Geräten unterbrochen wird. Ein mechanischer Schutzschalter kann in dieses System integriert werden. Falls eine derartige Vorrichtung nicht vorhanden ist, muß eine andere Möglichkeit zur Unterbrechung der Spannungszufuhr gewährleistet werden mit Hinweisen deutlich gekennzeichnet werden. Ein solcher Mechanismus zur Spannungsunterbrechung muß mit den Normen und Richtlinien für die allgemeine Installation von Elektrogeräten, wie zum Beispiel der IEC947, übereinstimmen.
6. Mit dem Symbol sind Geräte oder Abdeckungen gekennzeichnet, die eine gefährliche (Netzspannung) Spannung führen. Die Abdeckungen dürfen nur entfernt werden, wenn die Versorgungsspannung unterbrochen wurde. Nur geschultes Personal darf an diesen Geräten Arbeiten ausführen.
7. Mit dem Symbol sind Geräte oder Abdeckungen gekennzeichnet, in bzw. unter denen heiße Teile vorhanden sind. Die Abdeckungen dürfen nur entfernt werden, wenn die Versorgungsspannung unterbrochen wurde. Nur geschultes Personal darf an diesen Geräten Arbeiten ausführen. Bis 45 Minuten nach dem Unterbrechen der Netzzufuhr können derartig Teile noch über eine erhöhte Temperatur verfügen.
8. Mit dem Symbol sind Geräte oder Abdeckungen gekennzeichnet, bei denen vor dem Eingriff die entsprechenden Kapitel im Handbuch sorgfältig durchgelesen werden müssen.
9. Alle in diesem Gerät verwendeten graphischen Symbole entspringen einem oder mehreren der nachfolgend aufgeführten Standards: EN61010-1, IEC417 & ISO3864.
10. Wenn Geräte oder Etiketten mit dem Hinweis "Nicht unter Spannung öffnen" oder ähnlichen Hinweisen versehen sind, besteht in explosionsgefährdeten Umgebungen Entzündungsgefahr. Das Gerät darf nur geöffnet werden, wenn es nicht ans Stromnetz angeschlossen und entsprechend der Zeitangaben auf dem Etikett bzw. in der Betriebsanleitung ausreichend abgekühlt ist. Das Gerät darf nur von geschultem Service-Personal geöffnet werden.



ΣΗΜΑΝΤΙΚΟ

Οδηγίες ασφαλείας για την καλωδίωση και εγκατάσταση της συσκευής

Οι ακόλουθες οδηγίες ασφαλείας εφαρμόζονται ειδικά για όλες τις χώρες μέλη της Ευρωπαϊκής Κοινότητας. Θα πρέπει να ακολουθούνται αυστηρά ώστε να εξασφαλιστεί η συμβατότητα με τις οδηγίες για τη Χαμηλή Τάση. Χώρες που δεν είναι μέλη της Ευρωπαϊκής Κοινότητας θα πρέπει επίσης να ακολουθούν τις οδηγίες, εκτός εάν αυτές αντικαθίστανται από τα Τοπικά ή Εθνικά πρότυπα.

1. Επαρκείς συνδέσεις γείωσης θα πρέπει να γίνονται σε όλα τα σημεία γείωσης, εσωτερικά και εξωτερικά, όπου υπάρχουν.
2. Μετά την εγκατάσταση ή την αντιμετώπιση σφαλμάτων, όλα τα καλύμματα ασφαλείας και οι γειώσεις ασφαλείας πρέπει να επανεγκαθίστανται. Η καλή κατάσταση όλων των ακροδεκτών γείωσης πρέπει να συντηρείται διαρκώς.
3. Τα καλώδια τροφοδοσίας πρέπει να πληρούν τις απαιτήσεις των IEC227 ή IEC245.
4. Όλες οι καλωδιώσεις θα πρέπει να είναι κατάλληλες για χρήση σε θερμοκρασία χώρου υψηλότερη από 75°C.
5. Όλοι οι στυπιοθλίπτες θα πρέπει να είναι τέτοιων εσωτερικών διαστάσεων, ώστε να παρέχουν επαρκή στερέωση των καλωδίων.
6. Για τη διασφάλιση ασφαλούς λειτουργίας αυτής της συσκευής, η σύνδεση τροφοδοσίας θα πρέπει να γίνεται μόνο μέσω ασφαλειοδιακόπτη, ο οποίος θα αποσυνδέει όλους τους ηλεκτροφόρους αγωγούς των κυκλωμάτων, στη διάρκεια κατάστασης σφάλματος. Ο ασφαλειοδιακόπτης μπορεί επίσης να περιλαμβάνει μηχανικό διακόπτη απομόνωσης. Εάν δεν περιλαμβάνει, τότε άλλα μέσα αποσύνδεσης της συσκευής από την τροφοδοσία πρέπει να παροχρηθούν και να σημανθούν σαφώς ως τέτοια. Οι ασφαλειοδιακόπτες ή διακόπτες πρέπει να συμμορφώνονται με αναγνωρισμένα πρότυπα όπως το IEC947. Όλες οι καλωδιώσεις πρέπει να συμμορφώνονται με τα τοπικά πρότυπα.
7. Όπου συσκευές ή καλύμματα είναι σημασμένα με το σύμβολο που εικονίζεται δεξιά, επικίνδυνες τάσεις ενυπάρχουν κάτω από αυτά. Αυτά τα καλύμματα θα πρέπει να αφαιρούνται μόνο όταν έχει αφαιρεθεί η τροφοδοσία από τη συσκευή - και στην περίπτωση αυτή, μόνο από ειδικευμένο τεχνικό προσωπικό.
8. Όπου συσκευές ή καλύμματα είναι σημασμένα με το σύμβολο που εικονίζεται δεξιά, υπάρχει κίνδυνος από καυτές επιφάνειες κάτω από αυτά. Τέτοια καλύμματα θα πρέπει να αφαιρούνται μόνο από ειδικευμένο τεχνικό προσωπικό, όταν έχει αφαιρεθεί η τροφοδοσία από τη συσκευή. Κάποιες επιφάνειες μπορούν να παραμένουν ζεστές στην αφή.
9. Όπου συσκευές ή καλύμματα είναι σημασμένα με το σύμβολο που εικονίζεται δεξιά, ανατρέξτε στις οδηγίες χρήσης της συσκευής.
10. Όλα τα γραφικά σύμβολα που χρησιμοποιούνται σε αυτό το προϊόν είναι από ένα ή περισσότερα από τα εξής πρότυπα: EN61010-1, IEC417 και ISO3864.
11. Όπου συσκευή ή ετικέτα είναι σημασμένη με την ένδειξη "Μην ανοίγετε ενώ βρίσκεται σε λειτουργία" ή άλλη παρόμοια, υπάρχει κίνδυνος ανάφλεξης σε περιοχές με εκρηκτική ατμόσφαιρα. Ο παρών εξοπλισμός πρέπει να ανοίγεται μόνο όταν είναι εκτός ρεύματος και αφού παρέλθει ο κατάλληλος χρόνος που αναγράφεται στην ετικέτα ή στο εγχειρίδιο οδηγιών ώστε να ψυχθεί και μόνο από εκπαιδευμένο προσωπικό συντήρησης.



OLULINE TEAVE

Juhtmestiku ja seadme paigaldamisega seotud ohutusjuhised

Alljärgnevad ohutusjuhised rakenduvad eriti kõigi Euroopa Liidu liikmesriikide suhtes. Antud juhiseid tuleb täpselt järgida, et kindlustada vastavus madalpinge direktiiviga. Euroopa Liitu mittekuuluvad riigid peavad samuti alljärgnevaid juhiseid järgima, va juhul, kui on olemas vastavad kohalikud riiklikud standardid.

1. Ettenähtud maanduspunktide, nii sisemiste kui väliste jaoks tuleb tagada nõuetekohased maaühendused.
2. Pärast paigaldamist või rikketuvastust tuleb kõik turvaümbrised ja turvamaandused uuesti oma kohale seada. Kõigis olukordades tuleb säilitada kõigi maandusklemmide terviklikkus.
3. Toitejuhtmed peavad vastama IEC227 või IEC245 nõuetele.
4. Kogu juhtmestik peab sobima kasutamiseks üle 75°C õhutemperatuuri juures.
5. Kõik juhtmetihendid peavad sisemõõtmete poolest tagama nõuetekohased kaabliühendused.
6. Seadme ohutu töötamise tagamiseks peab ühendus toiteallikaga toimuma vaid läbi automaatkorgi, mis veaolukorras lülitab välja kõik voolukandjad. Automaatkorgil võib olla ka mehhaaniliselt reguleeritav lahkliititi. Vastasel juhul peab seadme toiteallikast lahtiühendamiseks olema teine ja selgelt osutatud moodus. Automaatkorgid või -lülitid peavad vastama tunnustatud standarditele nagu nt IEC947. Kogu juhtmestik peab vastama kohalikele standarditele.
7. Seadmel või ümbristel asuv paremale osutav sümbol tähistab selle all leiduvat ohtlikku pinget. Selliste sümbolitega ümbriseid võib eemaldada vaid juhul, kui seade on toiteallikast lahti ühendatud ning ka siis ainult vastavate oskustega spetsialisti poolt. 
8. Seadmele või ümbristele märgitud paremale osutava sümboli all valitseb kuumadest pindadest tulenev oht. Nimetatud sümbolitega ümbriseid võib eemaldada vaid vastavate oskustega spetsialist, kui seade on toiteallikast lahti ühendatud. Teatud pinnad võivad puudutamise jaoks liiga kuumad olla. 
9. Seadmel või ümbristel leiduva paremale osutava sümboli korral vt juhiste jaoks Toimimisjuhendit.
10. Kõik selle toote juures kasutatavad graafilised sümbolid lähtuvad ühest või enamast järgmistest standarditest: EN61010-1, IEC417 ja ISO3864. 
11. Kui seadmele või siltidele on kirjutatud "Ärge avage voolutarbimine korral" vms, valitseb plahvatusohtlikus keskkonnas süttimise oht. Seadet võib avada ainult siis, kui toide on lahti ühendatud ning seadmel on võimaldatud sildil või kasutusjuhendis osutatud aja jooksul maha jahtuda -- ning ka sellisel juhul ainult vastavate oskustega spetsialisti poolt.

TÄRKEÄÄ

Turvallisuusohje, jota on noudatettava tämän laitteen asentamisessa ja kaapeloinnissa.

Seuraavat ohjeet pätevät erityisesti EU:n jäsenvaltioissa. Niitä täytyy ehdottomasti noudattaa jotta täytettäisiin EU:n matalajännitedirektiivin (Low Voltage Directive) yhteensopivuus. Myös EU:hun kuulumattomien valtioiden tulee nou-dattaa tätä ohjetta, elleivät kansalliset standardit estä sitä.

1. Riittävät maadoituskytkennät on tehtävä kaikkiin maadoituspisteisiin, sisäisiin ja ulkoisiin.
2. Asennuksen ja vianetsinnän jälkeen on kaikki suojat ja suojamaat asennettava takaisin pai-koilleen. Maadoitusliittimen kunnollinen toiminta täytyy aina ylläpitää.
3. Jännitesyöttöjohtimien täytyy täyttää IEC227 ja IEC245 vaatimukset.
4. Kaikkien johdotuksien tulee toimia >75°C lämpötiloissa.
5. Kaikkien läpivientiholkkien sisähalkaisijan täytyy olla sellainen että kaapeli lukkiutuu kun-nolla kiinni.
6. Turvallisen toiminnan varmistamiseksi täytyy jännitesyöttö varustaa turvakytkimellä (min 10A), joka kytkee irti kaikki jännitesyöttöjohtimet vikatilanteessa. Suojaan täytyy myös sisältyä mekaaninen erotuskytkin. Jos ei, niin jännitesyöttö on pystyttävä katkaisemaan muilla keinoilla ja merkittävä siten että se tunnistetaan sellaiseksi. Turvakytkimien tai kat-kaisimien täytyy täyttää IEC947 standardin vaatimukset näkyvyydestä.
7. Mikäli laite tai kosketussuoja on merkitty tällä merkillä on merkinnän takana tai alla hengenvaarallisen suuruinen jännite. Suojaa ei saa poistaa jänniteen ollessa kytkettynä laitteeseen ja poistamisen saa suorittaa vain alan asian-tuntija. 
8. Mikäli laite tai kosketussuoja on merkitty tällä merkillä on merkinnän takana tai alla kuuma pinta. Suojan saa poistaa vain alan asiantuntija kun jännite-syöttö on katkaistu. Tällainen pinta voi säilyä kosketuskuumana jopa 45 mi-nuuttia. 
9. Mikäli laite tai kosketussuoja on merkitty tällä merkillä katso lisäohjeita käyt-töohjekirjasta. 
10. Kaikki tässä tuotteessa käytetyt graafiset symbolit ovat yhdestä tai useammasta seuraavis-ta standardeista: EN61010-1, IEC417 & ISO3864.
11. Jos laitteessa tai tarrassa on merkintä "Älä avaa, kun virta on kytketty" tai vastaava, räjähdysvaarallisissa tiloissa on syttymisen vaara. Nämä laitteet voidaan avata vain silloin, kun virta ei ole kytkettynä ja laitteen on annettu jäähtyä tarrassa tai oppaassa määritetyn ajan. Tällöinkin laitteet saa avata vain koulutettu huoltohenkilökunta.

IMPORTANT

Consignes de sécurité concernant le raccordement et l'installation de cet appareil.

Les consignes de sécurité ci-dessous s'adressent particulièrement à tous les états membres de la communauté européenne. Elles doivent être strictement appliquées afin de satisfaire aux directives concernant la basse tension. Les états non membres de la communauté européenne doivent également appliquer ces consignes sauf si elles sont en contradiction avec les standards locaux ou nationaux.

1. Un raccordement adéquat à la terre doit être effectuée à chaque borne de mise à la terre, interne et externe.
2. Après installation ou dépannage, tous les capots de protection et toutes les prises de terre doivent être remis en place, toutes les prises de terre doivent être respectées en permanence.
3. Les câbles d'alimentation électrique doivent être conformes aux normes IEC227 ou IEC245.
4. Tous les raccordements doivent pouvoir supporter une température ambiante supérieure à 75°C.
5. Tous les presse-étoupes utilisés doivent avoir un diamètre interne en rapport avec les câbles afin d'assurer un serrage correct sur ces derniers.
6. Afin de garantir la sécurité du fonctionnement de cet appareil, le raccordement à l'alimentation électrique doit être réalisé exclusivement au travers d'un disjoncteur (minimum 10A.) isolant tous les conducteurs en cas d'anomalie. Ce disjoncteur doit également pouvoir être actionné manuellement, de façon mécanique. Dans le cas contraire, un autre système doit être mis en place afin de pouvoir isoler l'appareil et doit être signalisé comme tel. Disjoncteurs et interrupteurs doivent être conformes à une norme reconnue telle IEC947.
7. Lorsque les équipements ou les capots affichent le symbole suivant, cela signifie que des tensions dangereuses sont présentes. Ces capots ne doivent être démontés que lorsque l'alimentation est coupée, et uniquement par un personnel compétent.
8. Lorsque les équipements ou les capots affichent le symbole suivant, cela signifie que des surfaces dangereusement chaudes sont présentes. Ces capots ne doivent être démontés que lorsque l'alimentation est coupée, et uniquement par un personnel compétent. Certaines surfaces peuvent rester chaudes jusqu'à 45 mn.
9. Lorsque les équipements ou les capots affichent le symbole suivant, se reporter au manuel d'instructions.
10. Tous les symboles graphiques utilisés dans ce produit sont conformes à un ou plusieurs des standards suivants: EN61010-1, IEC417 & ISO3864.
11. Les équipements comportant une étiquette avec la mention " Ne pas ouvrir sous tension " ou toute autre mention similaire peuvent créer un risque d'incendie dans les environnements explosifs. Ces équipements ne doivent être ouverts que lorsqu'ils sont hors tension et que la durée de refroidissement requise indiquée sur l'étiquette ou dans le manuel d'instructions s'est écoulée. En outre ils ne doivent être ouverts que par un personnel qualifié.



FONTOS

Biztonsági előírások a készülék vezetékeléséhez és üzembeállításához

A következő biztonsági előírások kifejezetten vonatkoznak az összes EU-tagállamra. Ezeket szigorúan be kell tartani a Kisfeszültségű irányelvnek való megfelelés biztosításához. A nem EU-tagállamok szintén tartásuk be a következőket, kivéve ha a helyi és nemzeti szabványok azt másként nem írják elő.

1. A megfelelő földelést biztosítani kell az összes rendelkezésre álló földelési ponton, legyen az belső vagy külső.
2. Az üzembeállítás vagy hibaelhárítás után az összes biztonsági burkolatot és biztonsági földvezetékét ki kell cserélni. A földelőkapcsok sértetlenségét mindig biztosítani kell.
3. A tápvezetékeknek eleget kell tenniük az IEC227 vagy IEC245 szabványokban megfogalmazott követelményeknek.
4. Az összes vezetéknek alkalmasnak kell lennie a 75 °C-nál magasabb környezeti hőmérséklet melletti használatra.
5. Az összes használt kábelvezető tömszelencének olyan belső méretűnek kell lennie, hogy biztosítsák a kábelek megfelelő lekötését.
6. A berendezés biztonságos működésének biztosításához az elektromos hálózathoz való csatlakozást csak megszakítón keresztül szabad megvalósítani, amely az összes áramot szállító vezeték bontja hibahelyzet esetén. A megszakító magában foglalhat egy mechanikusan működtethető áramtalanító kapcsolót is. Ellenkező esetben biztosítani kell a berendezés elektromos hálózatról történő lekapcsolásának más módját, és ezt világosan jelezni kell. A megszakítóknak vagy kapcsolóknak meg kell felelniük egy elismert szabványnak, például az IEC947 szabványnak. Az összes vezetéknek meg kell felelnie az összes helyi szabványnak.
7. Ha a berendezés vagy a burkolata a jobb oldalon látható szimbólummal jelzett, alatta valószínűleg veszélyes feszültség van jelen. Az ilyen burkolat csak a berendezés áramtalanítása után távolítható el - és csak képzett szervizszakember végezheti el. 
8. Ha a berendezés vagy a burkolata a jobb oldalon látható szimbólummal jelzett, fenn áll a veszélye, hogy alatta forró felületek találhatók. Az ilyen burkolatot csak képzett szervizszakember távolíthatja el a berendezés áramtalanítása után. Bizonyos felületek érintésre forróak maradhatnak. 
9. Ha a berendezés vagy a burkolata a jobb oldalon látható szimbólummal jelzett, tekintse meg az Üzemeltetési útmutató arra vonatkozó utasításait. 
10. A terméken használt grafikus szimbólumok a következő szabványok legalább egyikéből származnak: EN61010-1, IEC417 és ISO3864.
11. Ha a berendezésen vagy a címkén a „Ne nyissa ki bekapcsolt állapotban” vagy hasonló felhívás szerepel, robbanásveszélyes környezetben fennáll a gyulladás veszélye. Ez a berendezés csak áramtalanítás után nyitható ki, a címkén vagy a kezelési útmutatóban szereplő, a berendezés lehűlését biztosító megfelelő idői ráhagyás után - és csak képzett szervizszakember végezheti el.

IMPORTANTE

Norme di sicurezza per il cablaggio e l'installazione dello strumento.

Le seguenti norme di sicurezza si applicano specificatamente agli stati membri dell'Unione Europea, la cui stretta osservanza è richiesta per garantire conformità alla Direttiva del Basso Voltaggio. Esse si applicano anche agli stati non appartenenti all'Unione Europea, salvo quanto disposto dalle vigenti normative locali o nazionali.

1. Collegamenti di terra idonei devono essere eseguiti per tutti i punti di messa a terra interni ed esterni, dove previsti.
2. Dopo l'installazione o la localizzazione dei guasti, assicurarsi che tutti i coperchi di protezione siano stati collocati e le messa a terra siano collegate. L'integrità di ciascun morsetto di terra deve essere costantemente garantita.
3. I cavi di alimentazione della rete devono essere secondo disposizioni IEC227 o IEC245.
4. L'intero impianto elettrico deve essere adatto per uso in ambiente con temperature superiore a 75°C.
5. Le dimensioni di tutti i connettori dei cavi utilizzati devono essere tali da consentire un adeguato ancoraggio al cavo.
6. Per garantire un sicuro funzionamento dello strumento il collegamento alla rete di alimentazione principale dovrà essere eseguita tramite interruttore automatico (min.10A), in grado di disattivare tutti i conduttori di circuito in caso di guasto. Tale interruttore dovrà inoltre prevedere un sezionatore manuale o altro dispositivo di interruzione dell'alimentazione, chiaramente identificabile. Gli interruttori dovranno essere conformi agli standard riconosciuti, quali IEC947.
7. Il simbolo riportato sullo strumento o sui coperchi di protezione indica probabile presenza di elevati voltaggi. Tali coperchi di protezione devono essere rimossi esclusivamente da personale qualificato, dopo aver tolto alimentazione allo strumento.
8. Il simbolo riportato sullo strumento o sui coperchi di protezione indica rischio di contatto con superfici ad alta temperatura. Tali coperchi di protezione devono essere rimossi esclusivamente da personale qualificato, dopo aver tolto alimentazione allo strumento. Alcune superfici possono mantenere temperature elevate per oltre 45 minuti.
9. Se lo strumento o il coperchio di protezione riportano il simbolo, fare riferimento alle istruzioni del manuale Operatore.
10. Tutti i simboli grafici utilizzati in questo prodotto sono previsti da uno o più dei seguenti standard: EN61010-1, IEC417 e ISO3864.
11. L'indicazione "Non aprire sotto tensione" o simili sull'apparecchiatura o sulle etichette segnala il pericolo di accensione nelle aree in cui è presente un'atmosfera esplosiva. L'apparecchiatura può essere aperta solo quando l'alimentazione è scollegata ed è trascorso il tempo indicato sull'etichetta o nel manuale delle istruzioni per consentirne il raffreddamento. L'operazione può essere effettuata esclusivamente da personale dell'assistenza qualificato.



SVARBU

Šio prietaiso laidų prijungimo ir instaliacijos saugos instrukcijos

Toliau išvardinti saugumo reikalavimai taikomi konkrečiai visoms ES šalims narėms. Jų turi būti griežtai paisoma, kad būtų užtikrintai laikomasi Žemos įtampos direktyvos. Ne ES narės taip pat turi laikytis toliau pateikiamų reikalavimų nebent juos pakeičia vietiniai ar Nacionaliniai standartai.

1. Turi būti atliktas tinkamas įžeminimas visuose įžeminimo taškuose, vidiniuose ir išoriniuose, kur numatyta.
2. Visos apsauginės dangos ir įžemikliai po instaliacijos ar remonto turi būti pakeisti. Visų įžeminimo terminalų vientisumo priežiūra turi būti atliekama nuolat.
3. Maitinimo tinklo laidai turi atitikti IEC227 ar IEC245 reikalavimus.
4. Visi laidai turi būti tinkami naudojimui aplinkos temperatūroje, aukštesnėje nei 75°C.
5. Visi naudojamų kabelių riebokšliai turi būti tokių vidinių matmenų, kad būtų galimas tinkamas kabelio pritvirtinimas.
6. Saugaus šio prietaiso veikimo užtikrinimui, prijungimas prie maitinimo tinklo turi būti atliekamas tik per automatinį pertraukiklį, kuris atjungs visas grandines nešančius konduktorius linijos gedimo metu. Automatinis pertraukiklis taip pat gali turėti mechanškai veikiantį įzoliavimo jungiklį. Jeigu ne, tuomet turi būti nurodytos kitos įrenginio atjungimo priemonės, ir aiškiai pažymėtos, kad jos tokios yra. Automatiniai perjungikliai ar jungikliai turi atitikti pripažintus standartus, tokius kaip IEC947. Visi laidai turi atitikti visus vietinius standartus.
7. Kur įrenginys ar dangos yra pažymėti simboliu dešinėje, žemiau turi būti pavojinga įtampa. Šios dangos turi būti nuimamos tik tada, kai srovė yra pašalinta iš įrenginio - ir tik tuomet tai turi atlikti apmokytas personalas.
8. Ten kur įrenginys ar dangos yra pažymėti simboliu dešinėje, ten yra pavojus nuo karštų paviršių apačioje. Šios dangos gali būti nuimamos tik apmokyto personalo, kai srovė yra pašalinta iš įrenginio. Tam tikri paviršiai gali išlikti karšti liečiant.
9. Ten kur įrenginys ar dangos yra pažymėti simboliu dešinėje, žr. nurodymus Valdymo instrukcijose.
10. Visi grafiniai simboliai naudojami šiam produktui yra iš vieno ar daugiau toliau išvardintų standartų: EN61010-1, IEC417, ir ISO3864.
11. Ten, kur įrenginys ar etiketės yra pažymėti "Neatidaryti esant srovei" ar panašiai, yra užsidegimo pavojus tose vietose, kur yra sprogstamoji atmosfera. Šis įrenginys gali būti atidarytas tuomet, kai yra pašalinta srovė, ir praėjęs atitinkamas laikas, nurodytas etiketėje ar valdymo instrukcijoje, pakankamas įrenginio ataušimui - ir tai tik apmokyto personalo.



SVARĪGI

Drošības norādījumi šīs iekārtas pievienošanai un uzstādīšanai

Turpmākie drošības norādījumi attiecas uz visām ES dalībvalstīm. Tie ir stingri jāievēro, lai nodrošinātu atbilstību Zemsprieguma direktīvai.

Turpmāk norādītais jāievēro arī valstīs, kas nav ES dalībvalstis, ja vien šos norādījumus neaizstāj vietējie vai valsts standarti.

1. Visi pieejamie iekšējie un ārējie zemējuma punkti ir atbilstoši jāiezemē.
2. Pēc uzstādīšanas vai problēmu risināšanas visi drošības pārsegi un drošības zemējuma savienojumi ir jāpievieno atpakaļ. Visiem zemējuma savienojumiem vienmēr jābūt iezemētiem.
3. Elektropadeves vadiem jāatbilst IEC227 vai IEC245 prasībām.
4. Visai elektroinstalācijai jābūt piemērotai lietošanai apkārtējā temperatūrā, kas pārsniedz 75°C.
5. Visu izmantoto kabeļu blīvju iekšējiem izmēriem jābūt tādiem, lai atbilstoši nostiprinātu kabeli.
6. Lai nodrošinātu šīs iekārtas drošu darbību, savienojums ar elektropadeves tīklu jāizveido, izmantojot slēdzi, kas kļūmes gadījumā atvienos visas ķēdes, kurās ir vadītāji. Slēdzī var būt iestrādāts arī mehānisks pārtraucējslēdzis. Ja tāda nav, tad ir jāuzstāda cita veida ierīce iekārtas atvienošanai no strāvas padeves un tā atbilstoši un skaidri jāmarķē. Slēdžiem jāatbilst kādam vispārātzītam standartam, piemēram, IEC947. Visai elektroinstalācijai jāatbilst vietējiem standartiem.
7. Vietās, kur iekārta vai tās pārsegi ir marķēti ar labajā pusē norādīto simbolu, visticamāk, zem tiem ir bīstams spriegums. Šos pārsegus drīkst noņemt tikai tad, ja iekārta ir atvienota no strāvas padeves, – un šos darbus drīkst veikt tikai atbilstoši apmācīti remontdarbu darbinieki. 
8. Vietās, kur iekārta vai tās pārsegi ir marķēti ar labajā pusē norādīto simbolu, apdraudējumu izraisa zem tiem esošās karstās virsmas. Šos pārsegus drīkst noņemt tikai atbilstoši apmācīti remontdarbu darbinieki, kad iekārta ir atvienota no strāvas padeves. Iespējams, dažas virsmas arī pēc iekārtas atvienošanas paliks karstas. 
9. Ja iekārta vai pārsegi ir marķēti ar labajā pusē esošo simbolu, skatiet operatora rokasgrāmatā ietvertos norādījumus. 
10. Visi šajā izstrādājumā izmantotie grafiskie simboli atbilst vienam vai vairākiem no šiem standartiem: EN61010-1, IEC417 un ISO3864.
11. Ja iekārtai vai uzlīmēm ir marķējums "Neatvērt, kamēr pieslēgta strāvai" vai tamlīdzīga norāde, tas nozīmē, ka sprādzienbīstamā vidē ir uzliesmošanas bīstamība. Šo iekārtu drīkst atvērt tikai tad, ja ir atvienota strāva un ir nogaidīts iekārtas atdzišanai nepieciešamais laiks, kas norādīts uzlīmē vai ekspluatācijas rokasgrāmatā, – un šos darbus drīkst veikt tikai atbilstoši apmācīti remontdarbu darbinieki.

IMPORTANTI

STRUZZJONIJIET TAS-SIGURTÀ GĦALL-WIRING U L-INSTALLAZZJONI TAT-TAGĦMIR

L-istruzzjonijiet tas-sigurtà japplikaw speċifikament għall-Istati Membri ta' l-UE. Dawn għandhom jiġu osservati b'mod strett biex tkun żgurata l-konformità mad-Direttiva dwar il-Vultaġġ Baxx. Stati li mhumiex membri ta' l-UE għandhom ukoll ikunu konformi ma' dan li ġej hliet jekk dawn ikunu sostituti mill-Istandards lokali jew Nazzjonali.

1. Konnessjonijiet adegwati ta' l-ert għandhom isiru għall-punti kollha ta' l-ert, interni u esterni, fejn ikun ipprovdut.
2. Wara l-installazzjoni jew meta tipprova ssolvi xi problema, l-għatjien kollha tas-sigurtà u l-erts tas-sigurtà għandhom jitpoġġew lura f'posthom. L-integrità tat-terminali kollha ta' l-ert għandha tinżamm f'kull ħin.
3. Il-wajers tal-provvista tad-dawl għandhom ikunu konformi ml-htigijiet ta' IEC227 jew IEC245.
4. Il-wiring kollu għandu jkun adattat għall-użu f'temperatura ta' l-ambjent ta' iktar minn 75°C.
5. Il-glands tal-kejbils kollha li jintużw iridu jkunu ta' daqs intern tali li jipprovdu ankoraġġ adegwat lill-kejbil.
6. Biex tiżgura t-tħaddim sigur ta' dan it-tagħmir, il-konnessjoni mal-provvista tad-dawl għandha ssir biss permezz ta' *circuit breaker* li jiskonneta l-kondutturi kollha li jkunu jgħorru ċ-ċirkuwiti f'sitwazzjoni meta jkun hemm il-ħsara. Is-*circuit breaker* jista' wkoll jinkludi swiċċ li jiżola li jaħdem b'mod mekkaniku. Jekk dan ma jkunx il-każ, mezz ieħor ta' kif it-tagħmir jiġi skonnettjat minn mal-provvista tad-dawl għandu jkun ipprovdut, u jkun immrkat b'mod ċar li hu hekk. Is-*circuit breakers* jew swiċċijiet iridu jkunu konformi ma' standard rikonoxxut bħal IEC947. Il-wiring kollu jrid ikun konformi ma' l-istandards lokali, jekk ikun hemm.
7. Meta t-tagħmir jew l-għatjien ikunu mmarkati bis-simbolu fuq il-lemin, x'aktarx li jkun hemm vultaġġi perikolużi taħthom. Dawn l-għatjien għandhom jitneħħew biss meta titneħħa l-provvista tad-dawl mit-tagħmir - u minn haddiema tal-manutenzjoni mħarrġa biss. 
8. Meta t-tagħmir jew l-għatjien ikunu mmarkati bis-simbolu fuq il-lemin, ikun hemm periklu mill-uċuħ jaħarqu li jkun hemm taħthom. Dawn l-għatjien għandhom jitneħħew biss minn haddiema tal-manutenzjoni mħarrġa meta titneħħa l-provvista tad-dawl mit-tagħmir. Ċerti uċuħ jistgħu jibqgħu jaħarqu meta tmišshom. 
9. Meta t-tagħmir jew l-għatjien ikunu mmarkati bis-simbolu fuq il-lemin, irreferi għall-Manwal ta' l-Operatur għall-istruzzjonijiet.
10. Is-simboli grafiċi kollha użati f'dan il-prodott huma minn wiehed jew iktar mill-istandards li ġejjin: EN61010-1, IEC417, u ISO3864. 
11. Fejn it-tagħmir u t-tikketti huma mmarkati bil-kliem "Tiftaħx Meta Jkun Energizzat" jew kliem simili, hemm periklu ta' nar f'żoni fejn atmosfera esplosiva hi preżenti. It-tagħmir għandu jinfetaħ biss meta l-provvista tad-dawl tkun mitfija u jkun għadda ħin biżżejjed, kif speċifikat fuq it-tikketta jew fil-manwal ta' l-istruzzjonijiet, biex it-tagħmir ikun kesah – u t-tagħmir għandu jinfetaħ biss minn staff li jkun imħarreġ.

VIKTIG

Sikkerhetsinstruks for tilkobling og installasjon av dette utstyret.

Følgende sikkerhetsinstruksjoner gjelder spesifikt alle EU medlemsland og land med i EØS-avtalen. Instruksjonene skal følges nøye slik at installasjonen blir i henhold til lavspenningsdirektivet. Den bør også følges i andre land, med mindre annet er spesifisert av lokale- eller nasjonale standarder.

1. Passende jordforbindelser må tilkobles alle jordingspunkter, interne og eksterne hvor disse forefinnes.
2. Etter installasjon eller feilsøking skal alle sikkerhetsdeksler og jordforbindelser reetableres. Jordingsforbindelsene må alltid holdes i god stand.
3. Kabler fra spenningsforsyning skal oppfylle kravene spesifisert i IEC227 eller IEC245.
4. Alle ledningsforbindelser skal være konstruert for en omgivelsestemperatur høyere en 750°C.
5. Alle kabelforskrivninger som benyttes skal ha en indre dimensjon slik at tilstrekkelig avlastning oppnåes.
6. For å oppnå sikker drift og betjening skal forbindelsen til spenningsforsyningen bare skje gjennom en strømbryter (minimum 10A) som vil bryte spenningsforsyningen til alle elektriske kretser ved en feilsituasjon. Strømbryteren kan også inneholde en mekanisk operert bryter for å isolere instrumentet fra spenningsforsyningen. Dersom det ikke er en mekanisk operert bryter installert, må det være en annen måte å isolere utstyret fra spenningsforsyningen, og denne måten må være tydelig merket. Kretsbytere eller kontakter skal oppfylle kravene i en annerkjent standard av typen IEC947 eller tilsvarende.
7. Der hvor utstyr eller deksler er merket med symbol for farlig spenning, er det sannsynlig at disse er tilstede bak dekslet. Disse dekslene må bare fjernes når spenningsforsyning er frakoblet utstyret, og da bare av trenet servicepersonell.
8. Der hvor utstyr eller deksler er merket med symbol for meget varm overflate, er det sannsynlig at disse er tilstede bak dekslet. Disse dekslene må bare fjernes når spenningsforsyning er frakoblet utstyret, og da bare av trenet servicepersonell. Noen overflater kan være for varme til å berøres i opp til 45 minutter etter spenningsforsyning frakoblet.
9. Der hvor utstyret eller deksler er merket med symbol, vennligst referer til instruksjonsmanualen for instruks.
10. Alle grafiske symboler brukt i dette produktet er fra en eller flere av følgende standarder: EN61010-1, IEC417 & ISO3864.
11. Når utstyr eller merkelapper bærer advarselen "Må ikke åpnes under spenning" eller lignende, innbærer det fare for eksplosjon i områder med en eksplosiv atmosfære. Utstyret skal bare åpnes når det ikke er noen strømtilførsel, og etter at det har hatt tilstrekkelig tid til å kjøle ned, som spesifisert på merkelappen eller i håndboken. Selv da skal utstyret bare åpnes av erfarne serviceteknikere.



WAŻNE!

Zalecenia dotyczące bezpieczeństwa w zakresie podłączania i instalacji tego urządzenia

Następujące zalecenia dotyczą zwłaszcza stosowania urządzenia we wszystkich krajach Unii Europejskiej. Należy się ściśle do nich stosować w celu zapewnienia zgodności z dyrektywą niskonapięciową. W przypadku instalacji urządzenia w krajach nienależących do Unii Europejskiej należy również przestrzegać poniższych zaleceń, chyba że są one zastąpione lokalnymi lub ogólnokrajowymi standardami.

1. Urządzenie należy podłączyć kablem uziemiającym do wszystkich punktów uziemienia (wewnętrznych i zewnętrznych).
2. Po instalacji lub czynnościach serwisowych należy zamknąć wszystkie pokrywy zabezpieczające i ponownie podłączyć uziemienie. Należy pilnować, by nie doszło do przerwania uziemienia.
3. Przewody zasilające powinny być zgodne z wymaganiami normy IEC227 lub IEC245.
4. Wszystkie przewody powinny być odpowiednie do użytku w środowisku o temperaturze wyższej niż 75°C.
5. Wszystkie dławnice powinny mieć wymiary wewnętrzne zapewniające pewne umocowanie przewodów.
6. W celu zapewnienia bezpiecznej pracy urządzenie należy podłączyć do sieci tylko za pośrednictwem wyłącznika automatycznego, który w razie awarii odłączy wszystkie obwody, w których przepływa prąd. Wyłącznik automatyczny może być również wyposażony w mechaniczny odłącznik napięcia. W przeciwnym razie należy zapewnić i jasno oznaczyć inną możliwość odłączenia urządzenia od zasilania. Wyłączniki automatyczne oraz odłączniki powinny być zgodne z uznawanymi standardami, takimi jak norma IEC947. Wszystkie przewody muszą być zgodne z lokalnymi przepisami.
7. Pod pokrywami lub elementami urządzenia oznaczonymi symbolem pokazanym na rysunku po prawej stronie może występować niebezpieczne napięcie elektryczne. Te pokrywy mogą być zdejmowane tylko po odłączeniu zasilania, wyłącznie przez odpowiednio przeszkolonych pracowników serwisu. 
8. Pod pokrywami lub elementami urządzenia oznaczonymi symbolem pokazanym na rysunku po prawej stronie znajdują się gorące powierzchnie. Te pokrywy mogą być zdejmowane tylko po odłączeniu zasilania, wyłącznie przez odpowiednio przeszkolonych pracowników serwisu. Niektóre powierzchnie mogą pozostać nagrzane przez pewien czas po odłączeniu zasilania. 
9. W przypadku sprzętu oraz pokryw oznaczonych symbolem pokazanym na rysunku po prawej stronie należy zapoznać się ze wskazówkami w Instrukcji operatora i stosować się do nich. 
10. Wszystkie symbole graficzne zastosowane do oznaczenia produktu pochodzą z następujących norm: EN61010-1, IEC417 lub ISO3864.
11. Oznaczenie „Nie otwierać, gdy urządzenie jest pod napięciem” lub podobne oznaczenia informują o ryzyku zapłonu w miejscach, gdzie występuje zagrożenie wybuchem. Urządzenie należy otwierać tylko po odłączeniu zasilania i po upływie czasu na ostygnięcie urządzenia oznaczonego na etykiecie lub w instrukcji obsługi. Urządzenie mogą otwierać wyłącznie odpowiednio przeszkoleni pracownicy serwisu.

IMPORTANTE

Instruções de segurança para ligação e instalação deste aparelho.

As seguintes instruções de segurança aplicam-se especificamente a todos os estados membros da UE. Devem ser observadas rigidamente por forma a garantir o cumprimento da Directiva sobre Baixa Tensão. Relativamente aos estados que não pertençam à UE, deverão cumprir igualmente a referida directiva, exceptuando os casos em que a legislação local a tiver substituído.

1. Devem ser feitas ligações de terra apropriadas a todos os pontos de terra, internos ou externos.
2. Após a instalação ou eventual reparação, devem ser recolocadas todas as tampas de segurança e terras de protecção. Deve manter-se sempre a integridade de todos os terminais de terra.
3. Os cabos de alimentação eléctrica devem obedecer às exigências das normas IEC227 ou IEC245.
4. Os cabos e fios utilizados nas ligações eléctricas devem ser adequados para utilização a uma temperatura ambiente até 75°C.
5. As dimensões internas dos buçins dos cabos devem ser adequadas a uma boa fixação dos cabos.
6. Para assegurar um funcionamento seguro deste equipamento, a ligação ao cabo de alimentação eléctrica deve ser feita através de um disjuntor (min. 10A) que desligará todos os condutores de circuitos durante uma avaria. O disjuntor poderá também conter um interruptor de isolamento accionado manualmente. Caso contrário, deverá ser instalado qualquer outro meio para desligar o equipamento da energia eléctrica, devendo ser assinalado convenientemente. Os disjuntores ou interruptores devem obedecer a uma norma reconhecida, tipo IEC947.
7. Sempre que o equipamento ou as tampas contiverem o símbolo, é provável a existência de tensões perigosas. Estas tampas só devem ser retiradas quando a energia eléctrica tiver sido desligada e por Pessoal da Assistência devidamente treinado.
8. Sempre que o equipamento ou as tampas contiverem o símbolo, há perigo de existência de superfícies quentes. Estas tampas só devem ser retiradas por Pessoal da Assistência devidamente treinado e depois de a energia eléctrica ter sido desligada. Algumas superfícies permanecem quentes até 45 minutos depois.
9. Sempre que o equipamento ou as tampas contiverem o símbolo, o Manual de Funcionamento deve ser consultado para obtenção das necessárias instruções.
10. Todos os símbolos gráficos utilizados neste produto baseiam-se em uma ou mais das seguintes normas: EN61010-1, IEC417 e ISO3864.
11. Sempre que o equipamento ou as etiquetas apresentarem o aviso "Não abrir quando ligado à corrente" ou semelhante, existe um risco de ignição em atmosferas explosivas. Este equipamento só deve ser aberto depois de desligado da corrente eléctrica e o tempo de arrefecimento adequado especificado na etiqueta ou no manual de instruções ter decorrido. O equipamento só pode ser aberto por técnicos qualificados.



DÔLEŽITÉ

Bezpečnostné pokyny pre zapojenie káblov a inštaláciu tohto prístroja

Nasledovné bezpečnostné pokyny sa vzťahujú konkrétne na všetky členské štáty EÚ. Musia byť striktne dodržané, aby sa zaistila zhoda so Smernicou o nízkom napätí. Štáty, ktoré nie sú členskými štátmi EÚ by mali nasledovné pokyny taktiež dodržiavať, pokiaľ nie sú nahradené miestnymi alebo národnými normami.

1. Adekvátne uzemnenia musia byť vykonané na všetkých bodoch uzemnenia, interných aj externých, tam, kde sú poskytnuté.
2. Po inštalácii alebo riešení problémov musia byť všetky bezpečnostné kryty a bezpečnostné uzemnenia vymenené. Integrita všetkých uzemňovacích terminálov musí byť vždy zachovaná.
3. Káble sieťového napájania musia byť v zhode s požiadavkami IEC227 alebo IEC245.
4. Všetky káblové pripojenia by mali byť vhodné pre používanie v teplote okolia vyššej, ako 75°C.
5. Všetky použité káblové priechodky musia mať také vnútorné rozmery, aby poskytovali adekvátne uchopenie kábla.
6. Pre zaistenie bezpečnej prevádzky tohto zariadenia musí byť pripojenie k sieťovému napájaniu zapojené len cez prerušovač obvodu, ktorý počas poruchovej situácie odpojí všetky obvody elektrických vodičov. Prerušovač obvodu by mal obsahovať aj mechanicky ovládaný úsekový vypínač. Ak nie, musí byť poskytnutý iný spôsob odpojenia zariadenia od sieťového napájania a tento spôsob musí byť zreteľne označený. Prerušovače obvodu alebo spínače musia byť v zhode s uznanou normou, ako napr. IEC947. Všetky káblové pripojenia musia vyhovovať akýmkoľvek miestnym normám.
7. Tam, kde je zariadenie alebo kryty označené symbolom na pravej strane, sa pravdepodobne nachádza nebezpečné napätie. Tieto kryty by sa mali odoberať len vtedy, keď je zariadenie odpojené od elektrickej energie a len vyškoleným servisným personálom.
8. Tam, kde je zariadenie alebo kryty označené symbolom na pravej strane, existuje nebezpečenstvo horúcich povrchov. Tieto kryty by mali byť odstraňované len vyškoleným servisným personálom, pričom je zariadenie odpojené od elektrickej energie. Určité povrchy môžu ostať horúce na dotyk.
9. V miestach, kde je zariadenie alebo kryty označené symbolom na pravej strane, si kvôli pokynom pozrite Operátorskú príručku.
10. Všetky obrázkové symboly použité pri tomto produkte zodpovedajú jednej alebo viacerým nasledujúcim normám: EN61010-1, IEC417 a ISO3864.
11. V miestach, kde je zariadenie alebo značky označené nápisom "Neotvárať pod elektrickým prúdom" alebo podobné, existuje nebezpečenstvo vznietenia v oblastiach s prítomnosťou výbušného ovzdušia. Toto zariadenie sa smie otvárať len v prípade odpojenia od elektrického napájania a ponechania zariadenia vychladnúť po dobu uplynutia dostatočného času tak, ako je to uvedené na štítku alebo v návode na použitie - a len vyškoleným servisným personálom.



POMEMBNO

Varnostna navodila za povezavo in vgradnjo naprave

Naslednja varnostna navodila veljajo za vse države članice EU. Zaradi zagotovitve skladnosti z nizkonapetostno direktivo morate navodila strogo upoštevati. V državah, ki niso članice EU, je treba upoštevati tudi naslednje smernice, razen če jih ne zamenjujejo lokalni ali nacionalnimi standardi.

1. Do vseh ozemljitvenih točk, notranjih in zunanjih, ki so na voljo, morajo biti speljane ustrezne ozemljitvene povezave.
2. Po vgradnji ali odpravljanju težav je treba namestiti vse varnostne pokrove in zaščitne ozemljitve. Brezhibnost vseh ozemljitvenih priključkov je treba nenehno preverjati.
3. Omrežni napajalni kabli morajo biti skladni z zahtevami standarda IEC227 ali IEC245.
4. Vsa napeljava mora biti primerna za uporabi pri temperaturi okolja, višji od 75 °C.
5. Notranje dimenzije kabelskih tesnilk morajo zagotavljati ustrezno pritrditev kablov.
6. Za zagotovitev varnega delovanja opreme mora biti povezava z omrežnim napajanjem vzpostavljena prek odklopnega stikala, ki v primeru napake izklopi vse tokokroge s prevodniki. Odklopno stikalo lahko vključuje tudi mehansko izolacijsko stikalo. V nasprotnem primeru morajo biti zagotovljeni in jasno označeni drugi načini za izklop opreme iz napajanja. Odklopna in druga stikala morajo biti skladna z uveljavljenimi standardi, kot je IEC947. Vsa napeljava mora biti skladna z lokalnimi standardi.
7. V opremi ali pod pokrovi, ki so označeni s simbolom na desni, je prisotna nevarna napetost. Te pokrove je dovoljeno odstraniti samo, če je napajanje opreme izklopljeno. To lahko izvaja samo usposobljeno servisno osebje. 
8. Pri opremi ali pod pokrovi, ki so označeni s simbolom na desni, so prisotne nevarne vroče površine. Te pokrove lahko odstranjuje samo usposobljeno servisno osebje. Napajanje opreme mora biti izklopljeno. Določene površine so lahko vroče. 
9. Pri opremi ali pokrovih, ki so označeni s simbolom na desni, si za navodila oglejte priročnik za upravljanje. 
10. Vsi uporabljeni grafični simboli so iz enega ali več naslednjih standardov: EN61010-1, IEC417 in ISO3864.
11. Če je na opremi ali oznakah navedeno "Ne odpirajte, če je pod napetostjo" ali podobno opozorilo, je na območjih z eksplozivnim ozračjem prisotna nevarnost vžiga. To opremo je dovoljeno odpirati samo, če je napajanje izklopljeno in je poteklo dovolj časa, da se oprema ohladi, kot je navedeno na oznaki ali v priročniku z navodili. Opremo lahko odpira samo usposobljeno servisno osebje.

IMPORTANTE

Instrucciones de seguridad para el montaje y cableado de este aparato.

Las siguientes instrucciones de seguridad, son de aplicacion especifica a todos los miembros de la UE y se adjuntaran para cumplir la normativa europea de baja tension.

1. Se deben preveer conexiones a tierra del equipo, tanto externa como internamente, en aquellos terminales previstos al efecto.
2. Una vez finalizada las operaciones de mantenimiento del equipo, se deben volver a colocar las cubiertas de seguridad aasi como los terminales de tierra. Se debe comprobar la integridad de cada terminal.
3. Los cables de alimentacion electrica cumplan con las normas IEC 227 o IEC 245.
4. Todo el cableado sera adecuado para una temperatura ambiental de 75°C.
5. Todos los prensaestopas seran adecuados para una fijacion adecuada de los cables.
6. Para un manejo seguro del equipo, la alimentacion electrica se realizara a traves de un interruptor magnetotermico (min 10 A), el cual desconectara la alimentacion electrica al equipo en todas sus fases durante un fallo. Los interruptores estaran de acuerdo a la norma IEC 947 u otra de reconocido prestigio.
7. Cuando las tapas o el equipo lleve impreso el simbolo de tension electrica peligrosa, dicho alojamiento solamente se abra una vez que se haya interrumpido la alimentacion electrica al equipo asimismo la intervencion sera llevada a cabo por personal entrenado para estas labores.
8. Cuando las tapas o el equipo lleve impreso el simbolo, hay superficies con alta temperatura, por tanto se abra una vez que se haya interrumpido la alimentacion electrica al equipo por personal entrenado para estas labores, y al menos se esperara unos 45 minutos para enfriar las superficies calientes.
9. Cuando el equipo o la tapa lleve impreso el simbolo, se consultara el manual de instrucciones.
10. Todos los simbolos graficos usados en esta hoja, estan de acuerdo a las siguientes normas EN61010-1, IEC417 & ISO 3864.
11. Cuando el equipo o las etiquetas tienen la indicación " No abrir mientras reciba energía" u otra similar, existe el peligro de ignición en zonas donde haya un ambiente explosivo. Este equipo sólo debe ser abierto por personal de servicio cualificado después de apagarlo y dejar pasar el intervalo de tiempo correspondiente indicado en la etiqueta o el manual de instrucciones para que el equipo se enfríe.



VIKTIGT

Säkerhetsföreskrifter för kablage och installation av denna apparat.

Följande säkerhetsföreskrifter är tillämpliga för samtliga EU-medlemsländer. De skall följas i varje avseende för att överensstämma med Lågspännings direktivet. Icke EU medlemsländer skall också följa nedanstående punkter, såvida de inte övergrips av lokala eller nationella föreskrifter.

1. Tillämplig jordkontakt skall utföras till alla jordade punkter, såväl internt som externt där så erfordras.
2. Efter installation eller felsökning skall samtliga säkerhetshöljen och säkerhetsjord återplaceras. Samtliga jordterminaler måste hållas obrutna hela tiden.
3. Matningsspänningens kabel måste överensstämma med föreskrifterna i IEC227 eller IEC245.
4. Allt kablage skall vara lämpligt för användning i en omgivningstemperatur högre än 75°C.
5. Alla kabelförskruvningar som används skall ha inre dimensioner som motsvarar adekvat kabelförankring.
6. För att säkerställa säker drift av denna utrustning skall anslutning till huvudströmmen endast göras genom en säkring (min 10A) som skall frångöras alla strömförande kretsar när något fel uppstår. Säkningen kan även ha en mekanisk frångörare. Om så inte är fallet, måste ett annat förfarande för att frångöras utrustningen från strömförsörjning tillhandahållas och klart framgå genom markering. Säkring eller omkopplare måste överensstämma med en gällande standard såsom t ex IEC947.
7. Där utrustning eller hölje är markerad med vidstående symbol föreligger risk för livsfarlig spänning i närheten. Dessa höljen får endast avlägsnas när strömmen ej är ansluten till utrustningen - och då endast av utbildad servicepersonal.
8. När utrustning eller hölje är markerad med vidstående symbol föreligger risk för brännskada vid kontakt med uppvärmd yta. Dessa höljen får endast avlägsnas av utbildad servicepersonal, när strömmen kopplats från utrustningen. Vissa ytor kan vara mycket varma att vidröra även upp till 45 minuter efter avstängning av strömmen.
9. När utrustning eller hölje markerats med vidstående symbol bör instruktionsmanualen studeras för information.
10. Samtliga grafiska symboler som förekommer i denna produkt finns angivna i en eller flera av följande föreskrifter:- EN61010-1, IEC417 & ISO3864.
11. För utrustning som markerats med föreskrifter som "Öppna inte när strömmen är på", eller liknande, råder explosionsrisk när det förekommer explosiva ångor. Utrustningen får endast öppnas efter att strömmen stängts av och efter att utrustningen fått svalna under så lång tid som anges i instruktionsboken. Öppnandet får endast utföras av utbildad servicepersonal.



**SAFETY DATA SHEET
FOR CERAMIC FIBER
PRODUCTS****JULY 1, 1996****SECTION I. IDENTIFICATION****PRODUCT NAME**

Ceramic Fiber Heaters, Molded Insulation Modules and Ceramic Fiber Radiant Heater Panels.

CHEMICAL FAMILY

Vitreous Aluminosilicate Fibers with Silicon Dioxide.

CHEMICAL NAME

N.A.

CHEMICAL FORMULA

N.A.

MANUFACTURER'S NAME AND ADDRESS

Watlow Columbia
2101 Pennsylvania Drive
Columbia, MO 65202
573-814-1300, ext. 5170
573-474-9402

HEALTH HAZARD SUMMARY WARNING

- Possible cancer hazard based on tests with laboratory animals.
- May be irritating to skin, eyes and respiratory tract.
- May be harmful if inhaled.
- Cristobalite (crystalline silica) formed at high temperatures (above 1800°F) can cause severe respiratory disease.

SECTION II. PHYSICAL DATA**APPEARANCE AND ODOR**

Cream to white colored fiber shapes. With or without optional white to gray granular surface coating and/or optional black surface coating.

SPECIFIC WEIGHT: 12-25 LB./CUBIC FOOT

BOILING POINT: N.A.

VOLATILES (% BY WT.): N.A.

WATER SOLUBILITY: N.A.

SECTION III. HAZARDOUS INGREDIENTS

MATERIAL, QUANTITY, AND THRESHOLD/EXPOSURE LIMIT VALUES

Aluminosilicate (vitreous) 99+ % 1 fiber/cc TWA

CAS. No. 142844-00-0610 fibers/cc CL

Zirconium Silicate 0-10% 5 mg/cubic meter (TLV)

Black Surface Coating** 0 - 1% 5 mg/cubic meter (TLV)

Amorphous Silica/Silicon Dioxide 0-10% 20 mppcf (6 mg/cubic meter)

PEL (OSHA 1978) 3 gm cubic meter

(Respirable dust): 10 mg/cubic meter,

Intended TLV (ACGIH 1984-85)

**Composition is a trade secret.

SECTION IV. FIRE AND EXPLOSION DATA

FLASH POINT: None

FLAMMABILITY LIMITS: N.A.

EXTINGUISHING MEDIA

Use extinguishing agent suitable for type of surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS / SPECIAL FIRE FIGHTING PROCEDURES

N.A.

SECTION V. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

(See Section III)

EFFECTS OF OVER EXPOSURE

- **EYE** - Avoid contact with eyes. Slightly to moderately irritating. Abrasive action may cause damage to outer surface of eye.
- **INHALATION** - May cause respiratory tract irritation. Repeated or prolonged breathing of particles of respirable size may cause inflammation of the lung leading to chest pain, difficult breathing, coughing and possible fibrotic change in the lung (Pneumoconiosis). Pre-existing medical conditions may be aggravated by exposure: specifically, bronchial hyper-reactivity and chronic bronchial or lung disease.
- **INGESTION** - May cause gastrointestinal disturbances. Symptoms may include irritation and nausea, vomiting and diarrhea.
- **SKIN** - Slightly to moderate irritating. May cause irritation and inflammation due to mechanical reaction to sharp, broken ends of fibers.

EXPOSURE TO USED CERAMIC FIBER PRODUCT

Product which has been in service at elevated temperatures (greater than 1800°F/982°C) may undergo partial conversion to cristobalite, a form of crystalline silica which can cause severe respiratory disease (Pneumoconiosis). The amount of cristobalite present will depend on the temperature and length of time in service. (See Section IX for permissible exposure levels).

SPECIAL TOXIC EFFECTS

The existing toxicology and epidemiology data bases for RCF's are still preliminary. Information will be updated as studies are completed and reviewed. The following is a review of the results to date:

EPIDEMIOLOGY

At this time there are no known published reports demonstrating negative health outcomes of workers exposed to refractory ceramic fiber (RCF). Epidemiologic investigations of RCF production workers are ongoing.

1. There is no evidence of any fibrotic lung disease (interstitial fibrosis) whatsoever on x-ray.
2. There is no evidence of any lung disease among those employees exposed to RCF that had never smoked.
3. A statistical "trend" was observed in the exposed population between the duration of exposure to RCF and a decrease in some measures of pulmonary function. These observations are clinically insignificant. In other words, if these observations were made on an individual employee, the results would be interpreted as being within the normal range.
4. Pleural plaques (thickening along the chest wall) have been observed in a small number of employees who had a long duration of employment. There are several occupational and non-occupational causes for pleural plaque. It should be noted that plaques are not "pre-cancer" nor are they associated with any measurable effect on lung function.

TOXICOLOGY

A number of studies on the health effects of inhalation exposure of rats and hamsters are available. Rats were exposed to RCF in a series of life-time nose-only inhalation studies. The animals were exposed to 30, 16, 9, and 3 mg/m³, which corresponds with approximately 200, 150, 75, and 25 fibers/cc.

Animals exposed to 30 and 16 mg/m³ were observed to have developed a pleural and parenchymal fibrosis; animals exposed to 9 mg/m³ had developed a mild parenchymal fibrosis; animals exposed to the lowest dose were found to have the response typically observed any time a material is inhaled into the deep lung. While a statistically significant increase in lung tumors was observed following exposure to the highest dose, there was no excess lung cancers at the other doses. Two rats exposed to 30 mg/m³ and one rat exposed to 9 mg/m³ developed mesotheliomas.

The International Agency for Research on Cancer (IARC) reviewed the carcinogenicity data on man-made vitreous fibers (including ceramic fiber, glasswool, rockwool, and slagwool) in 1987. IARC classified ceramic fiber, fibrous glasswool and mineral wool (rockwool and slagwool) as possible human carcinogens (Group 2B).

EMERGENCY FIRST AID PROCEDURES

- **EYE CONTACT** - Flush eyes immediately with large amounts of water for approximately 15 minutes. Eye lids should be held away from the eyeball to insure thorough rinsing. Do not rub eyes. Get medical attention if irritation persists.
- **INHALATION** - Remove person from source of exposure and move to fresh air. Some people may be sensitive to fiber induced irritation of the respiratory tract. If symptoms such as shortness of breath, coughing, wheezing or chest pain develop, seek medical attention. If person experiences continued breathing difficulties, administer oxygen until medical assistance can be rendered.
- **INGESTION** - Do not induce vomiting. Get medical attention if irritation persists.
- **SKIN CONTACT** - Do not rub or scratch exposed skin. Wash area of contact thoroughly with soap and water. Using a skin cream or lotion after washing may be helpful. Get medical attention if irritation persists.

SECTION VI. REACTIVITY DATA**STABILITY/CONDITIONS TO AVOID**

Stable under normal conditions of use.

HAZARDOUS POLYMERIZATION/CONDITIONS TO AVOID

N.A.

INCOMPATIBILITY/MATERIALS TO AVOID

Incompatible with hydrofluoric acid and concentrated alkali.

HAZARDOUS DECOMPOSITION PRODUCTS

N.A.

SECTION VII. SPILL OR LEAK PROCEDURES**STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED**

Where possible, use vacuum suction with HEPA filters to clean up spilled material. Use dust suppressant where sweeping if necessary. Avoid clean up procedure which may result in water pollution. (Observe Special Protection Information Section VIII.)

WASTE DISPOSAL METHODS

The transportation, treatment, and disposal of this waste material must be conducted in compliance with all applicable Federal, State, and Local regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION**RESPIRATORY PROTECTION**

Use NIOSH or MSHA approved equipment when airborne exposure limits may be exceeded. NIOSH/MSHA approved breathing equipment may be required for non-routine and emergency use. (See Section IX for suitable equipment).

Pending the results of long term health effects studies, engineering control of airborne fibers to the lowest levels attainable is advised.

VENTILATION

Ventilation should be used whenever possible to control or reduce airborne concentrations of fiber and dust. Carbon monoxide, carbon dioxide, oxides of nitrogen, reactive hydrocarbons and a small amount of formaldehyde may accompany binder burn off during first heat. Use adequate ventilation or other precautions to eliminate vapors resulting from binder burn off. Exposure to burn off fumes may cause respiratory tract irritation, bronchial hyper-reactivity and asthmatic response.

SKIN PROTECTION

Wear gloves, hats and full body clothing to prevent skin contact. Use separate lockers for work clothes to prevent fiber transfer to street clothes. Wash work clothes separately from other clothing and rinse washing machine thoroughly after use.

EYE PROTECTION

Wear safety glasses or chemical worker's goggles to prevent eye contact. Do not wear contact lenses when working with this substance. Have eye baths readily available where eye contact can occur.

SECTION IX. SPECIAL PRECAUTIONS**PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING**

General cleanliness should be followed.

The Toxicology data indicate that ceramic fiber should be handled with caution. The handling practices described in this MSDS must be strictly followed. In particular, when handling refractory ceramic fiber in any application, special caution should be taken to avoid unnecessary cutting and tearing of the material to minimize generation of airborne dust.

It is recommended that full body clothing be worn to reduce the potential for skin irritation. Washable or disposable clothing may be used. Do not take unwashed work clothing home. Work clothes should be washed separately from other clothing. Rinse washing machine thoroughly after use. If clothing is to be laundered by someone else, inform launderer of proper procedure. Work clothes and street clothes should be kept separate to prevent contamination.

Product which has been in service at elevated temperatures (greater than 1800°F/982°C) may undergo partial conversion to cristobalite, a form of crystalline silica. This reaction occurs at the furnace lining hot face. As a consequence, this material becomes more friable; special caution must be taken to minimize generation of air-borne dust. The amount of cristobalite present will depend on the temperature and length in service.

IARC has recently reviewed the animal, human, and other relevant experimental data on silica in order to critically evaluate and classify the cancer causing potential. Based on its review, IARC classified crystalline silica as a group 2A carcinogen (probable human carcinogen).

The OSHA permissible exposure limit (PEL for cristobalite is 0.05 mg/m³ (respirable dust). The ACGIH threshold limit value (TLV) for cristobalite is 0.05 mg/m³ (respirable dust) (ACGIH 1991-92). Use NIOSH or MSHA approved equipment when airborne exposure limits may be exceeded. The minimum respiratory protection recommended for given airborne fiber or cristobalite concentrations are:

CONCENTRATION

Concentration	Personal Protective Equipment
0-1 fiber/cc or 0-0.05 mg/m ³ cristobalite (the OSHA PEL)	Optional disposable dust respirator (e.g. 3M 9970 or equivalent).
Up to 5 fibers/cc or up to 10 times the OSHA PEL for cristobalite	Half face, air purifying respirator equipped with high efficiency particulate air (HEPA) filter cartridges (e.g. 3M 6000 series with 2040 filter or equivalent).
Up to 25 fibers/cc or 50 times the OSHA PEL for cristobalite (2.5 mg/m ³)	Full face, air purifying respirator with high efficiency particulate air (HEPA) filter cartridges (e.g. 3M 7800S with 7255 filters or equivalent) or powered air purifying respirator (PARR) equipped with HEPA filter cartridges (e.g. 3M W3265S with W3267 filters or equivalent).
Greater than 25 fibers/cc or 50 times the OSHA PEL for cristobalite (2.5 mg/m ³)	Full face, positive pressure supplied air respirator (e.g. 3M 7800S with W9435 hose & W3196 low pressure regulator kit connected to clean air supply or equivalent).

If airborne fiber or cristobalite concentrations are not known, as minimum protection, use NIOSH/MSHA approved half face, air purifying respirator with HEPA filter cartridges.

Insulation surface should be lightly sprayed with water before removal to suppress airborne dust. As water evaporates during removal, additional water should be sprayed on surfaces as needed. Only enough water should be sprayed to suppress dust so that water does not run onto the floor of the work area. To aid the wetting process, a surfactant can be used.

After RCF removal is completed, dust suppressing cleaning methods, such as wet sweeping or vacuuming, should be used to clean the work area. If dry vacuuming is used, the vacuum must be equipped with HEPA filter. Air blowing or dry sweeping should not be used. Dust suppressing components can be used to clean up light dust.

Product packaging may contain product residue. Do not reuse except to reship or return Ceramic Fiber products to the factory.

Appendix B Return of Material

RETURNING MATERIAL

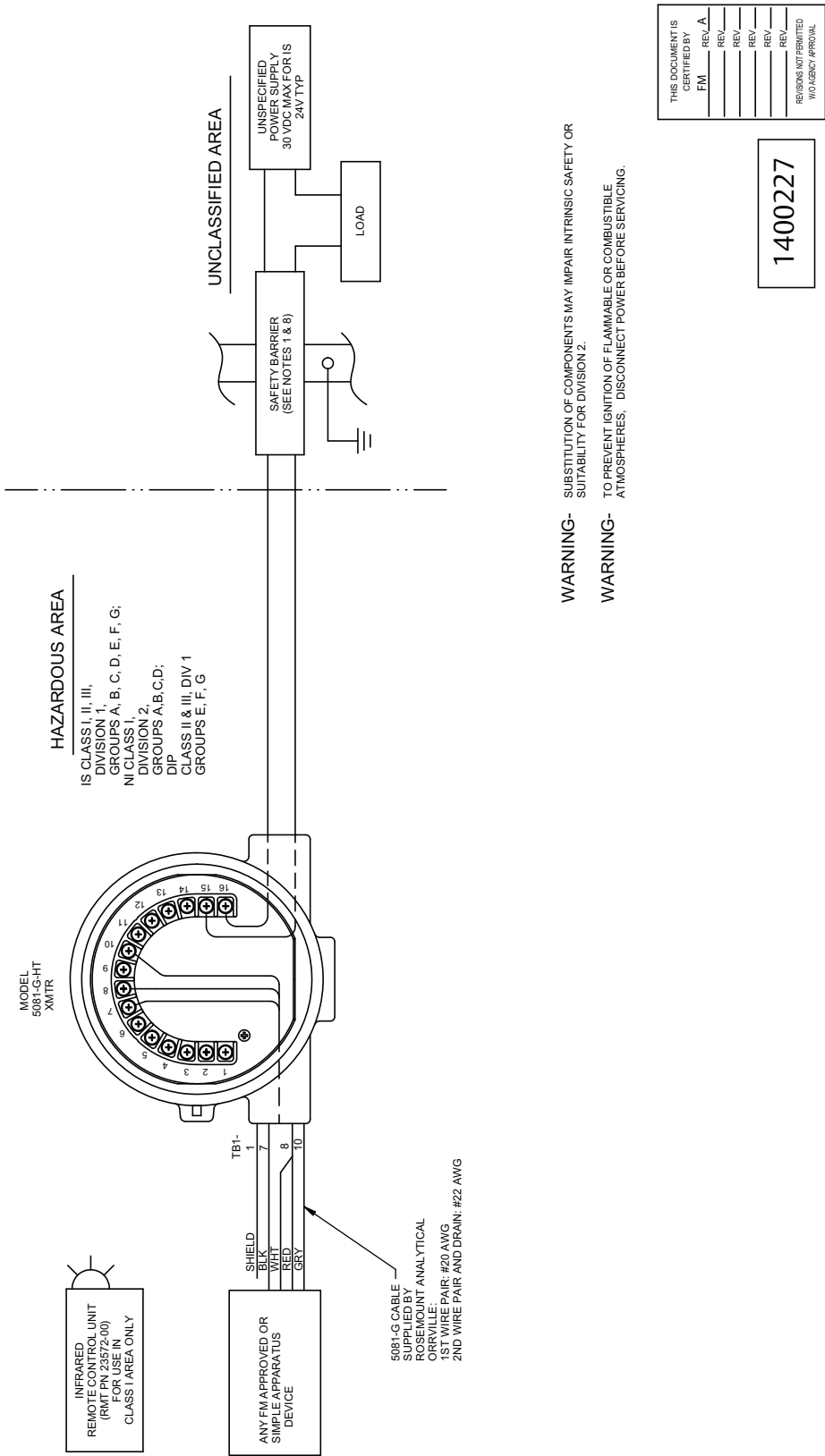
SERVICE SUPPORT - To expedite the return process outside of the United States, contact the nearest Emerson representative. Within the United States, call the Emerson Instrument and Valves Response Center using the 1-800-654-RSMT (7768) toll-free number. This center, available 24 hours a day, will assist you with any needed information or materials. The center will ask for product model and serial numbers, and will provide a Return Material Authorization (RMA) number. The center will also ask for the process material to which the product was last exposed. Emerson Instrument and Valves Response Center representatives will explain the additional information and procedures necessary to return goods exposed to hazardous substances.

Appendix C Schematics

INSTALLATION SCHEMATICS

This section contains drawings applicable to the intrinsically safe installation of the Rosemount 5081 FG Two-Wire In-Situ Oxygen Analyzer according to FM, CSA, and ATEX specifications. Refer to Section 2: Installation for complete installation instructions.

Figure C-1. FM Installation Drawing for Rosemount 5081-G-HT XMTR



12. NO REVISION TO DRAWING WITHOUT PRIOR FM APPROVAL.
11. THE ASSOCIATED APPARATUS MUST BE FM APPROVED.
10. CONTROL EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc.

9. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.

8. THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS WITH ASSOCIATED APPARATUS WHEN THE FOLLOWING IS TRUE:

FIELD	DEVICE INPUT	ASSOCIATED APPARATUS OUTPUT
Vmax OR Ui	Voc, Vi OR Uo;	
Imax OR Ii	Isc, It OR Io;	
Pmax OR Pi	Po;	
Ca+ C cable;	Ca, Ci OR Co	
La+ L cable.	La, Li OR Lo	

7. RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN 1.0 Ohm.

6. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.

5. SENSORS SHALL MEET THE REQUIREMENTS OF SIMPLE APPARATUS AS DEFINED IN ANSI/ISA RP12.06.01 AND THE NEC, ANSI/NFPA 70. THEY CAN NOT GENERATE NOR STORE MORE THAN 1.5V, 0.1A, 25mW OR A PASSIVE COMPONENT THAT DOES NOT DISSIPATE MORE THAN 1.3W. SEE TABLES I AND II.

4. INSTALLATION SHOULD BE IN ACCORDANCE WITH ANSI/ISA RP12.06.01 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS" AND THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70).

3. INTRINSICALLY SAFE APPARATUS (MODEL 5081-G-HT, IRC TRANSMITTER) AND ASSOCIATED APPARATUS (SAFETY BARRIER) SHALL MEET THE FOLLOWING REQUIREMENTS: THE VOLTAGE (Vmax) AND CURRENT (Imax) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (Voc OR Vi) AND CURRENT (Isc OR Ii) WHICH CAN BE DELIVERED BY THE ASSOCIATED APPARATUS (SAFETY BARRIER). IN ADDITION, THE MAXIMUM UNPROTECTED CAPACITANCE (C) AND INDUCTANCE (L) OF THE INTRINSICALLY SAFE APPARATUS, INCLUDING INTERCONNECTING WIRING, MUST BE EQUAL OR LESS THAN THE CAPACITANCE (Ca) AND INDUCTANCE (La) WHICH CAN BE SAFELY CONNECTED TO THE APPARATUS. (REF. TABLES I, II & III).

2. THE CAPACITANCE AND INDUCTANCE OF THE LOAD CONNECTED TO THE SENSOR TERMINALS MUST NOT EXCEED THE VALUES SPECIFIED IN TABLE I WHERE $C_a \geq C_i$ (SENSOR) + C cable;
 $L_a \geq L_i$ (SENSOR) + L cable.

1. ANY SINGLE SHUNT ZENER DIODE SAFETY BARRIER APPROVED BY FM HAVING THE FOLLOWING OUTPUT PARAMETERS:

SUPPLY/SIGNAL TERMINALS TB1-15, 16

Voc OR Vi GREATER THAN 13 V BUT NOT GREATER THAN 30 V
Isc OR It NOT GREATER THAN 200 mA
Pmax NOT GREATER THAN 0.9 W

TABLE I

GAS GROUPS	OUTPUT PARAMETERS	
	Ca (uF)	La (mH)
A, B	10.63	4.28
C	488.63	17.9
D	10,000	34.9

TABLE II

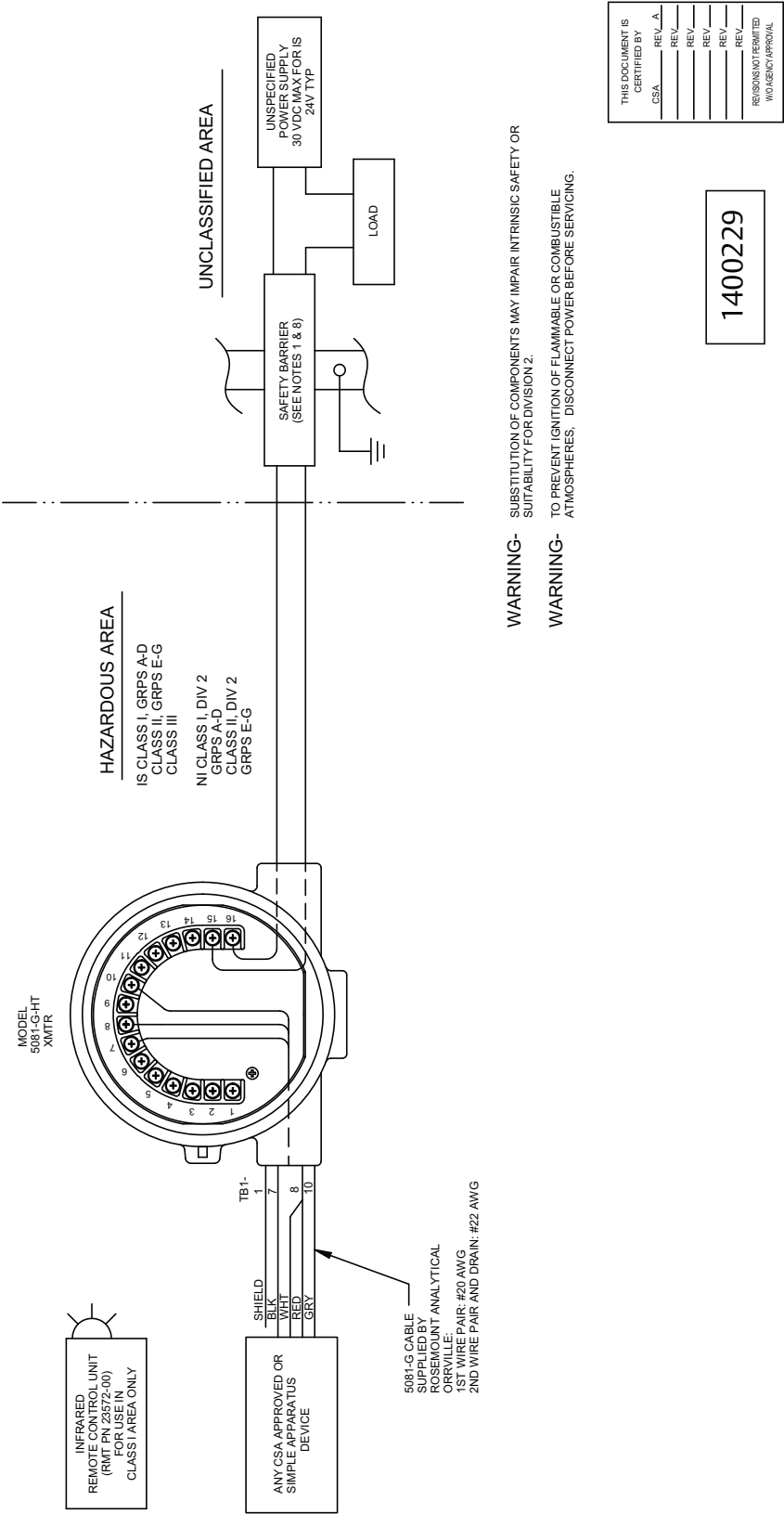
OUTPUT PARAMETERS	MODEL 5081-G-HT TB1-1 THRU 12
Vt	6.51 V
It	86.8 mA
Po	141.27 mW

TABLE III

5081-G-HT ENTITY PARAMETERS SUPPLY / SIGNAL TERMINALS TB 1-15, 16				
MODEL NO.	Vmax (Vdc)	Imax (mA)	Pmax (W)	Li (mH)
5081-G-HT	30	200	0.9	0

1400227

Figure C-2. CSA Installation Drawing for Rosemount 5081-G-HT XMTR



12. NO REVISION TO DRAWING WITHOUT PRIOR CSA APPROVAL.
11. THE ASSOCIATED APPARATUS MUST BE CSA APPROVED.
10. CONTROL EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc.
9. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
8. THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS WITH ASSOCIATED APPARATUS WHEN THE FOLLOWING IS TRUE:
 FIELD DEVICE INPUT — ASSOCIATED APPARATUS OUTPUT

$$\begin{matrix} V_{max} \text{ OR } U_i & V_{oc}, V_i \text{ OR } U_o; \\ I_{max} \text{ OR } I_i & I_{sc}, I_t \text{ OR } I_o; \\ P_{max} \text{ OR } P_i & P_o; \\ C \text{+ C cable;} & C_a, C_t \text{ OR } C_o \\ L \text{+ L cable;} & L_a, L_t \text{ OR } L_o \end{matrix}$$
7. RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN 1.0 Ohm.
6. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.
5. SENSORS SHALL MEET THE REQUIREMENTS OF SIMPLE APPARATUS AS DEFINED IN ANSI/ISA RP12.06.01 AND THE CEC (CSA C22.1). THEY CAN NOT GENERATE NOR STORE MORE THAN 1.5V, 0.1A, 25mW OR A PASSIVE COMPONENT THAT DOES NOT DISSIPATE MORE THAN 1.3W. SEE TABLES I AND II.
4. INSTALLATION SHOULD BE IN ACCORDANCE WITH ANSI/ISA RP12.06.01 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS" AND THE CANADIAN ELECTRICAL CODE (CSA C22.1).
3. INTRINSICALLY SAFE APPARATUS (MODEL 5081-FG-HT, IRC TRANSMITTER) AND ASSOCIATED APPARATUS (SAFETY BARRIER) SHALL MEET THE FOLLOWING REQUIREMENTS: THE VOLTAGE (Vmax) AND CURRENT (Imax) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (Voc OR Vi) AND CURRENT (Isc OR Ii) WHICH CAN BE DELIVERED BY THE ASSOCIATED APPARATUS (SAFETY BARRIER). IN ADDITION, THE MAXIMUM UNPROTECTED CAPACITANCE (Ci) AND INDUCTANCE (Li) OF THE INTRINSICALLY SAFE APPARATUS, INCLUDING INTERCONNECTING WIRING, MUST BE EQUAL OR LESS THAN THE CAPACITANCE (Ca) AND INDUCTANCE (La) WHICH CAN BE SAFELY CONNECTED TO THE APPARATUS. (REF. TABLES I, II & III).
2. THE CAPACITANCE AND INDUCTANCE OF THE LOAD CONNECTED TO THE SENSOR TERMINALS MUST NOT EXCEED THE VALUES SPECIFIED IN TABLE I WHERE $C_a \geq C_i$ (SENSOR) + C cable;
 $L_a \geq L_i$ (SENSOR) + L cable.
1. ANY SINGLE SHUNT ZENER DIODE SAFETY BARRIER APPROVED BY CSA HAVING THE FOLLOWING OUTPUT PARAMETERS:
 SUPPLY/SIGNAL TERMINALS TB1-15, 16
 V_{oc} OR V_i GREATER THAN 13 V BUT NOT GREATER THAN 30 V
 I_{sc} OR I_t NOT GREATER THAN 200 mA
 P_{max} NOT GREATER THAN 0.9 W

TABLE I

GAS GROUPS	OUTPUT PARAMETERS	
	Ca (uF)	La (mH)
A, B	10.63	4.28
C	488.63	17.9
D	10,000	34.9

TABLE II

OUTPUT PARAMETERS	MODEL 5081-G-HT TB1-1 THRU 12
Vi	6.51 V
It	86.8 mA
Po	141.27 mW

TABLE III

5081-G-HT ENTITY PARAMETERS				
SUPPLY / SIGNAL TERMINALS TB 1-15, 16				
MODEL NO.	Vmax (Vdc)	Imax (mA)	Pmax (W)	Li (mH)
5081-G-HT	30	200	0.9	0

1400229

10. PROCESS RESISTIVITY MUST BE LESS THAN 10⁹ OHMS.
9. THE ASSOCIATED APPARATUS MUST BE ATEX APPROVED.
8. CONTROL EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc.
7. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
6. THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS WITH ASSOCIATED APPARATUS WHEN THE FOLLOWING IS TRUE:
FIELD DEVICE INPUT ASSOCIATED APPARATUS OUTPUT
 V_{max} OR V_i V_{oc} , V_{tOR} OR U_o ;
 I_{max} OR I_i I_{sc} , I_t OR I_o ;
 P_{max} OR P_i P_o ;
 C_i + C cable; C_a , C_t OR C_o
 L_i + L cable; L_a , L_t OR L_o
5. RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN 1.0 Ohm.
4. SENSORS SHALL MEET THE REQUIREMENTS OF SIMPLE APPARATUS AS DEFINED IN ANSI/ISA RP12.06.01 AND THE NEC. ANSI/NFPA 70. THEY CAN NOT GENERATE NOR STORE MORE THAN 1.5V, 0.1A, 25mW OR A PASSIVE COMPONENT THAT DOES NOT DISSIPATE MORE THAN 1.3W. SEE TABLES I AND II.
3. INTRINSICALLY SAFE APPARATUS (MODEL 5081-G-HT, IRC TRANSMITTER) AND ASSOCIATED APPARATUS (SAFETY BARRIER) SHALL MEET THE FOLLOWING REQUIREMENTS: THE VOLTAGE (V_{max}) AND CURRENT (I_{max}) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (V_{oc} OR V_i) AND CURRENT (I_{sc} OR I_i) WHICH CAN BE DELIVERED BY THE ASSOCIATED APPARATUS (SAFETY BARRIER). IN ADDITION, THE MAXIMUM UNPROTECTED CAPACITANCE (C_i) AND INDUCTANCE (L_i) OF THE INTRINSICALLY SAFE APPARATUS, INCLUDING INTERCONNECTING WIRING, MUST BE EQUAL OR LESS THAN THE CAPACITANCE (C_a) AND INDUCTANCE (L_a) WHICH CAN BE SAFELY CONNECTED TO THE APPARATUS. (REF. TABLES I, II & III).
2. THE CAPACITANCE AND INDUCTANCE OF THE LOAD CONNECTED TO THE SENSOR TERMINALS MUST NOT EXCEED THE VALUES SPECIFIED IN TABLE I WHERE $C_a \geq C_i$ (SENSOR) + C cable;
 $L_a \geq L_i$ (SENSOR) + L cable.
1. ANY SINGLE SHUNT ZENER DIODE SAFETY BARRIER HAVING ATEX APPROVAL AND HAVING THE FOLLOWING OUTPUT PARAMETERS:
SUPPLY/SIGNAL TERMINALS TB1-15, 16
 V_{oc} OR V_i GREATER THAN 13 V BUT NOT GREATER THAN 30 V
 I_{sc} OR I_i NOT GREATER THAN 200 mA
 P_{max} NOT GREATER THAN 0.9 W

TABLE I

GAS GROUPS	OUTPUT PARAMETERS	
	C_a (uF)	L_a (mH)
IIC	10.63	4.28
IIB	488.63	17.9
IIA	10,000	34.9

TABLE II

OUTPUT PARAMETERS	MODEL 5081-G-HT TB1-1 THRU 12
U_o	6.51 V
I_o	87 mA
P_o	142 mW
C_i	8.6 uF
L_i	120 uH

TABLE III

5081-G-HT ENTITY PARAMETERS					
SUPPLY / SIGNAL TERMINALS TB 1-15, 16					
MODEL NO.	V_{max} (Vdc)	I_{max} (mA)	P_{max} (W)	C_i (nF)	L_i (mH)
5081-G-HT	30	200	0.9	27.9	0

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WARRANTY

Rosemount warrants that the equipment manufactured and sold by it will, upon shipment, be free of defects in workmanship or material. Should any failure to conform to this warranty become apparent during a period of one year after the date of shipment, Rosemount shall, upon prompt written notice from the purchaser, correct such nonconformity by repair or replacement, F.O.B. factory of the defective part or parts. Correction in the manner provided above shall constitute a fulfillment of all liabilities of Rosemount with respect to the quality of the equipment.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF QUALITY WHETHER WRITTEN, ORAL, OR IMPLIED (INCLUDING ANY WARRANTY OF MERCHANTABILITY OF FITNESS FOR PURPOSE).

The remedy(ies) provided above shall be purchaser's sole remedy(ies) for any failure of Rosemount to comply with the warranty provisions, whether claims by the purchaser are based in contract or in tort (including negligence).

Rosemount does not warrant equipment against normal deterioration due to environment. Factors such as corrosive gases and solid particulates can be detrimental and can create the need for repair or replacement as part of normal wear and tear during the warranty period.

Equipment supplied by Rosemount but not manufactured by it will be subject to the same warranty as is extended to Rosemount by the original manufacturer.

At the time of installation it is important that the required services are supplied to the system and that the electronic controller is set up at least to the point where it is controlling the sensor heater. This will ensure, that should there be a delay between installation and full commissioning that the sensor being supplied with ac power and reference air will not be subjected to component deterioration.

CAUTION

The oxygen probe is designed for industrial applications. Treat with care to avoid physical damage. The probe contains components made from ceramic, which are susceptible to shock when mishandled. THE WARRANTY DOES NOT COVER DAMAGE FROM MISHANDLING. WARRANTY IS VOID IF OUTER PROTECTION TUBE IS BROKEN.

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