Instruction Manual
IM-106-350, Rev 2.3
October 2008

Oxymitter 5000
Oxygen Transmitter

ROSEMOUNT® Analytical

http://www.raihome.com

EMERSON. Process Management

HIGHLIGHTS OF CHANGES

Effective September, 2006 Rev 2.0

Page	Summary
General	Reformatted entire manual from a two column layout. Replaced SPS 4000 information with SPS 4001B information. Removed all references to JIS specifications. Added information pertaining to the Local Operator Interface (LOI). Added information pertaining to the remote electronics option.
Cover	Updated photo.
Page TOC-4	Removed List of Illustrations and List of Tables from the table of contents in Rev 1.6.
Page i	Moved from backside of cover in Rev 1.4.
Page 1-2	Updated Figure 1-1, Typical System Package to show SPS 4001B and remote electronics.
Page 1-5	Updated Figure 1-2, Oxymitter 5000 AutoCalibration System Options to show the SPS 4001B.
Page 1-6	Added Figure 1-3, Membrane Keypad and Figure 1-4, Local Operator Interface (LOI). Added step 4 under System Features.
Page 1-7	Removed step 6 under System Features from Rev 1.6.
Page 1-10	Added Figure 1-7, Typical System Installation – Oxymitter 5000 with Remote Electronics.
Page 1-11	Removed Figure 1-5, SPS 4000 from Rev 1.6.
Page 1-14	Updated Figure 1-11, Abrasive Shield Assembly.
Page 1-15 thru 1-16	Updated the specifications table.
Page 1-17 thru 1-18	Updated Table 1-1, Product Matrix.
Page 1-19	Removed Table 1-5, Single Probe Autocalibration Sequencer Coding from Rev 1.6.
Page 2-1	Added second and third Warning.
Page 2-3	Removed Figure 2-2, Oxymitter 5000 Installation (with SPS 4000) from Rev 1.6.
Page 2-4	Added Figure 2-2, Oxymitter 5000 Remote Electronics Installation.
Page 2-10	Added remote electronics information and Figure 2-8, Remote Electronics Mounting.
Page 2-11	Added both Notes and fourth Warning.
Page 2-12	Removed Figure 2-9, Terminal Block from Rev 1.6.
Page 2-13	Added Figure 2-10, Electrical Installation - Oxymitter 5000 with Integral Electronics.
Page 2-14	Removed information under Electrical installation (For Oxymitter 5000 with SPS 4000), along with Figures 2-9 and 2-10 from Rev 1.6.
Page 2-14 thru 2-15	Added information under Electrical Installation (with Remote Electronics).
Page 2-16	Added Figure 2-11, Electrical Installation - Oxymitter 5000 with Remote Electronics.
Page 2-17	Added information regarding the installation of the interconnecting cable.
page 2-19	Added body text under IMPS 4000 Connections and SPS 4001B Connections.
Page 3-1	Revised procedural steps under Terminal Block Wiring.

HIGHLIGHTS OF CHANGES (CONTINUED)

Effective September, 2006 Rev 2.0 (Continued)

Page	Summary
Page 3-2	Added Caution.
Page 4-1 thru 4-6	Added Section 4, Configuration of Oxymitter 5000 with LOI.
Page 5-1 thru 5-4	Pages 3-6 thru 3-10 in Section 3, Startup and Operation of Rev 1.6 was moved to Section 5, Startup and Operation of Oxymitter 5000 with Membrane Keypad.
Page 6-1 thru 6-10	Added Section 6, Startup and Operation of Oxymitter 5000 with LOI.
Page 7-1	Added body text under Overview.
Page 7-2	Added Figure 7-1, O_2 Sensor mV Reading vs. % O_2 at 736°C (Reference Air, 20.9% O_2).
Page 7-4	Added Figure 7-2, Diagnostic LEDs.
Page 7-6	Removed Table 5-2, Calibration Fault Troubleshooting and Added Table 7-2, Diagnostic/Unit Alarm Fault Definitions - LOI.
Page 7-7 thru 7-21	Added the LOI in Figures 7-3 thru 7-17 with descriptive text to accompany each figure.
Page 7-22 and 7-23	Added text and Figure 7-18, Probe Leakage Paths.
Page 8-0	Moved the "Calibration Record for Rosemount Analytical in Situ O_2 Probe", from the back of the section to the front.
Page 8-6 and 8-7	Added information under the Calibration with LOI heading.
Page 8-7	Removed information regarding LED Status Indicators and Table 4-1, Diagnostic/Unit Alarms from Rev 1.6.
Page 8-8 thru 8-21	Updated procedural steps throughout section.
Page 8-9	Removed Figure 4-4, Terminal Block from Rev 1.6. Updated Figure 8-3, Oxymitter 5000 with Integral Electronics - Exploded View, to show the LOI module and Window Cover.
Page 8-10	Added Figure 8-4, Oxymitter 5000 with Remote Electronics - Exploded View.
Page 8-15	Revised information under Heater Strut Replacement.
Page 8-17	Added Figure 8-9, Probe to Probe Head Assembly - Remote Electronics Only
Page 8-20	Revised Replacement Procedure for Ceramic Diffusion Element Replacement.
Page 8-21	Added Figure 8-12, Contact and Thermocouple Assembly Replacement.
Page 8-22	Removed information regarding the SPS 4000 Maintenance and Component Replacement from pages 4-17 thru 4-24 in Rev 1.6.
Page 10-5	Added Figure 10-5, Catalyst Regeneration and corresponding text.
Page A-1 thru A-14	Moved Safety Instructions P-3 thru P-11 from the preface in Rev 1.6 to Appendix A in Rev 2.0.
Page B-1	Moved Section 10, Return of Material from Rev 1.6 to Appendix B in Rev 2.0.
Page C-1 thru C-6	Moved Appendix A in Rev 1.6 to Appendix C in Rev 2.0.
Page D-1 thru D-10	Moved Appendix B in Rev 1.6 to Appendix D in Rev 2.0.
Page E-1	Moved Appendix C in Rev 1.6 to Appendix E in Rev 2.0.

HIGHLIGHTS OF CHANGES (CONTINUED)

Effective January, 2007 Rev 2.1

Page	Summary
General	Revised reference air specifications to read 1 l/min (2 scfh) throughout the manual.
Page 7-1 thru 7-6	Added section 7.
Page 8-22	Added the paragraph and procedural steps after 'Heater Not Open, but Unable to Reach 736°C Setpoint.'
Page 11-1	Added Model 375 Handheld Communicator information.
Page 11-2	Added Asset Management Solutions (AMS) information.
Page A-2 thru A-24	Added note 11 to the safety data section. Added new language translations.
Page B-1	Updated the return of materials address.
Back cover	Updated the address blocks.

Effective July 2008 Rev. 2.2

Page	Summary
Page 6-4	Added note regarding cleaning the LOI screen before use.

HIGHLIGHTS OF CHANGES (CONTINUED)

Effective October 2008 Rev. 2.3

Page	Summary
All pages	Changed revision level and date to reflect this revision.
General	Added new Section 8 PlantWeb Alerts; updated section numbers of remaining sections. Updated all page number and section number references to renumbered sections. Revised all references to "Model 375 Handheld Communicator" to read "Field Communicator."
Page xi	Revised e-mail address to read "@emerson.com."
Page 1-15	Deleted Standard range data from specifications listing.
Page 2-8	Revised Figure 2-6.
Page 2-16	Revised Figure 2-11.
Page 3-2	Revised first paragraph of Oxymitter 5000 Configuration discussion.
Page 3-2	Revised Figure 3-2 and related text.
Page 3-5	Revised Recommended Configuration discussion.
Page 4-1	Deleted reference to "Hazardous Area" Oxymitter.
Page 4-2	Revised first paragraph of Oxymitter 5000 Configuration discussion.
Page 4-3	Revised Figure 4-2 and related text.
Page 4-5	Revised Recommended Configuration discussion
Page 6-7	Revised "Analog" description for "SYSTEM/Input/Output:.
Page 7-1	Revised "Overview" discussion.
Page 7-2	Revised Figure 7-1.
Page 7-3	Deleted "Logic I/O Configurations" discussion and Table 7-1.
Page 7-4	Revised Figure 7-2.
Pages 8-1 through 8-10	Added new PlantWeb Alerts section.
Page 9-6	Revised Table 9-1 and Table 9-2.
Page 9-11	Added new Fault 5, Line Frequency Error discussion and illustration. Updated remaining fault and figure numbers in this section.
Page 9-23	Added new Fault 18, SPS Handshake Failed discussion and illustration.
Pages 9-24 and 9-25	Revised "Calibration Passes ..." discussion.
Page C-1	Revised tabular Fieldbus Parameters listing.
Page C-5 and C-6	Relocated previous Tables C-4 and C-5 to Appendix D. Added new Table C-4, Operating Modes.
Page D-1	Revised to incorporate "Introduction" and new table D-1 (relocated from Appendix C).
Page D-2	Revised to incorporate new table D-2 (revised and relocated from Appendix C).
Page D-4	Revised "Simulation" discussion.
Back Cover	Revised e-mail addresses to read "@emerson.com."

Table of Contents

Oxymitter Oxygen Transmitters

READ THIS PAGE BEFORE PROCEEDING!

ESSENTIAL INSTRUCTIONS

Emerson Process Management 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 Rosemount Analytical 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 Process Management 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 Process Management. 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.

Section i Introduction

PREFACE

The purpose of this manual is to provide information concerning the components, functions, installation and maintenance of the Oxymitter 5000 Oxygen Transmitter.

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.

OXYMITTER 5000 WITH FIELDBUS COMMUNICATIONS

NOTE
Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

⚠CAUTION

The products described in this manual are NOT designed for nuclear-qualified applications.

Using non-nuclear-qualified products in applications that require nuclear-qualified hardware or products may cause inaccurate readings.

For information on Fisher-Rosemount nuclear-qualified products, contact your local Fisher-Rosemount Sales Representative.

CE

Rosemount Analytical satisfies all obligations coming from legislation to harmonize the product requirements in the European Union.

WHAT YOU NEED TO KNOW

⚠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.

BEFORE INSTALLING AND WIRING A ROSEMOUNT ANALYTICAL OXYMITTER 5000 OXYGEN TRANSMITTER

1. What type of installation does your system require?

   Use the following drawings, Figure 1 and Figure 2, to identify which type of installation is required for your Oxymitter 5000 system.

CAN YOU USE THE QUICK START GUIDE?

Use this Quick Start Guide if...

1. Your system requires an Oxymitter 5000 with or without the SPS 4001B OPTION. Installation options for the Oxymitter 5000 are shown in Figure 1.
2. Your system does NOT require an IMPS 4000 OPTION installation.
3. Your system does NOT use a Remote Electronics as shown in Figure 2.
4. You are familiar with the installation requirements for the Oxymitter 5000 Oxygen Transmitter. You are familiar with the installation requirements for the Oxymitter 5000 Oxygen Transmitter with a SPS 4001B.

If you cannot use the Quick Start Guide, turn to Section 2, Installation, in this Instruction Manual.

Figure 1. Installation Options - Oxymitter 5000 with Integral Electronics

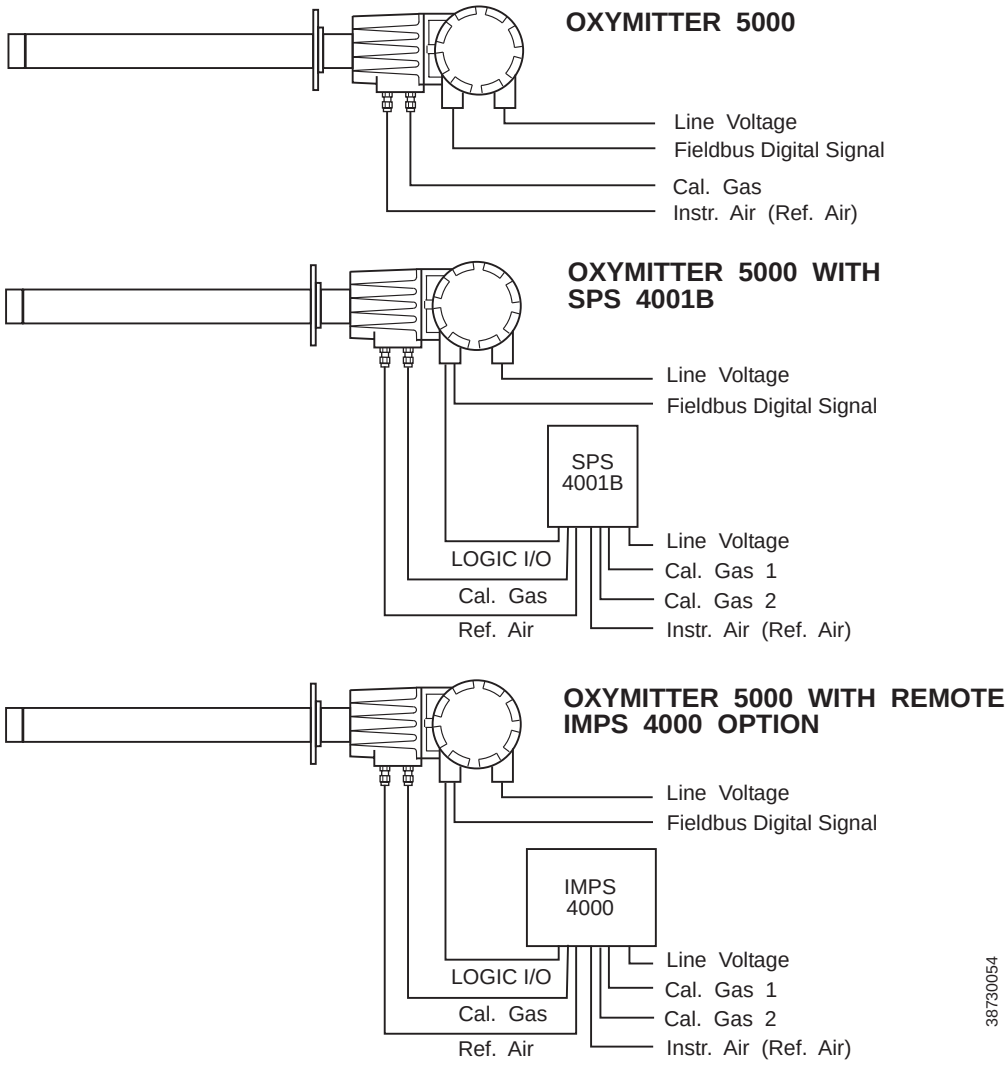
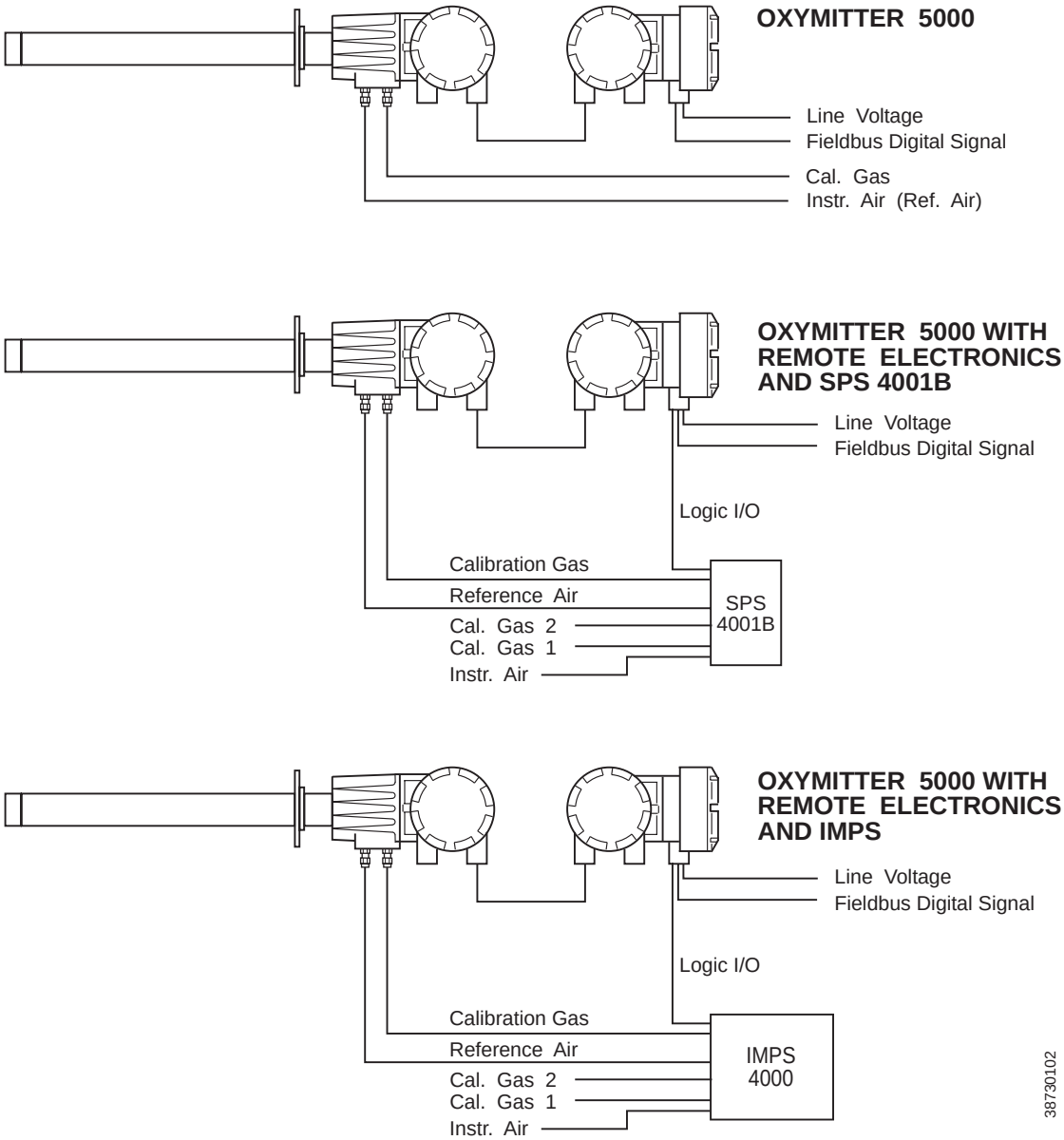


Figure 2. Installation Options - Oxymitter 5000 with Remote Electronics



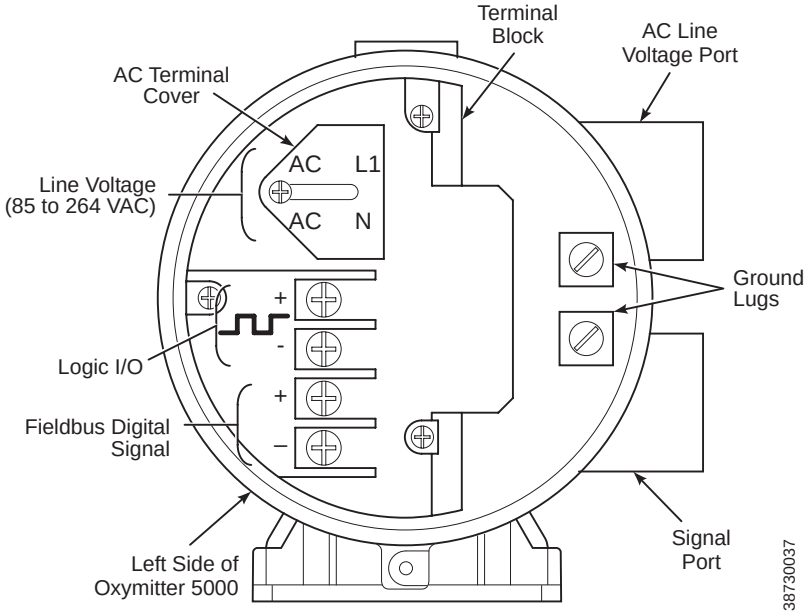
QUICK START GUIDE FOR OXYMITTER 5000 SYSTEMS

Before using the Quick Start Guide, please read "WHAT YOU NEED TO KNOW" on page v of this section.

1. Install the Oxymitter 5000 in an appropriate location on the stack or duct. Refer to "Selecting Location" in Section 2, Installation, for information on selecting a location for the Oxymitter 5000.
2. If using an SPS 4001B, connect the calibration gasses to the appropriate fittings on the SPS 4001B manifold.
3. Connect reference air to the Oxymitter 5000 or SPS 4001B, as applicable.
4. If using an SPS 4001B, make the wiring connections as shown in the SPS 4001B Single Probe Autocalibration Sequencer Instruction Manual.
5. If NOT using an SPS 4001B, make the following wire connections as shown in Figure 3: line voltage, fieldbus digital signal, and logic I/O.
6. Verify the Oxymitter 5000 switch configuration is as desired. Refer to "Oxymitter 5000 Configuration", in Section 3, Configuration of Oxymitter 5000 with Membrane Keypad, or "Oxymitter 5000 Configuration", in Section 4, Configuration of Oxymitter 5000 with LOI.
7. Apply power to the Oxymitter 5000; the cell heater will turn on. Allow approximately one half hour for the cell to heat to operating temperature. Once the ramp cycle has completed and the Oxymitter 5000 is at normal operation, proceed with step 8 or 9.
8. If using an SPS 4001B, initiate a semi-automatic calibration.
9. If NOT using an SPS 4001B, perform a manual calibration. Refer to "Calibration with Keypad" or "Calibration with LOI" both in Section 10, Maintenance and Service, in this instruction manual.

NOTE
If your system has a membrane keypad you can refer to the Quick Reference Guide Instructions on the following page.

Figure 3. Oxymitter 5000 without SPS 4001B Wiring Diagram



QUICK REFERENCE GUIDE MANUAL CALIBRATION INSTRUCTIONS

Performing a Manual Calibration with a Membrane Keypad

1. Place the control loop in manual.
2. Press the CAL key. The CAL LED will light solid.
3. Apply the first calibration gas.
4. Press the CAL key. When the unit has taken the readings using the first calibration gas, the CAL LED will flash continuously.
5. Remove the first calibration gas and apply the second calibration gas.
6. Push the CAL key. The CAL LED will light solid. When the unit has taken the readings using the second calibration gas, the CAL LED will flash a two-pattern flash or a three-pattern flash. A two-pattern flash equals a valid calibration, three-pattern flash equals an invalid calibration.
7. Remove the second calibration gas and cap off the calibration gas port.
8. Press the CAL key. The CAL LED will be lit solid as the unit purges. When the purge is complete, the CAL LED will turn off.
9. If the calibration was valid, the DIAGNOSTIC ALARMS LEDs indicate normal operation. If the new calibration values are not within the parameters, the DIAGNOSTIC ALARMS LEDs will indicate an alarm.
10. Place the control loop in automatic.

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 Process Management's field service throughout the U.S. and abroad.

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

Emerson Process Management may also be reached via the Internet through e-mail and the World Wide Web:

e-mail: GAS.CSC@emerson.com

World Wide Web: www.raihome.com

Section 1 Description and Specifications

COMPONENT CHECKLIST

A typical Rosemount Analytical Oxymitter 5000 Oxygen Transmitter 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.

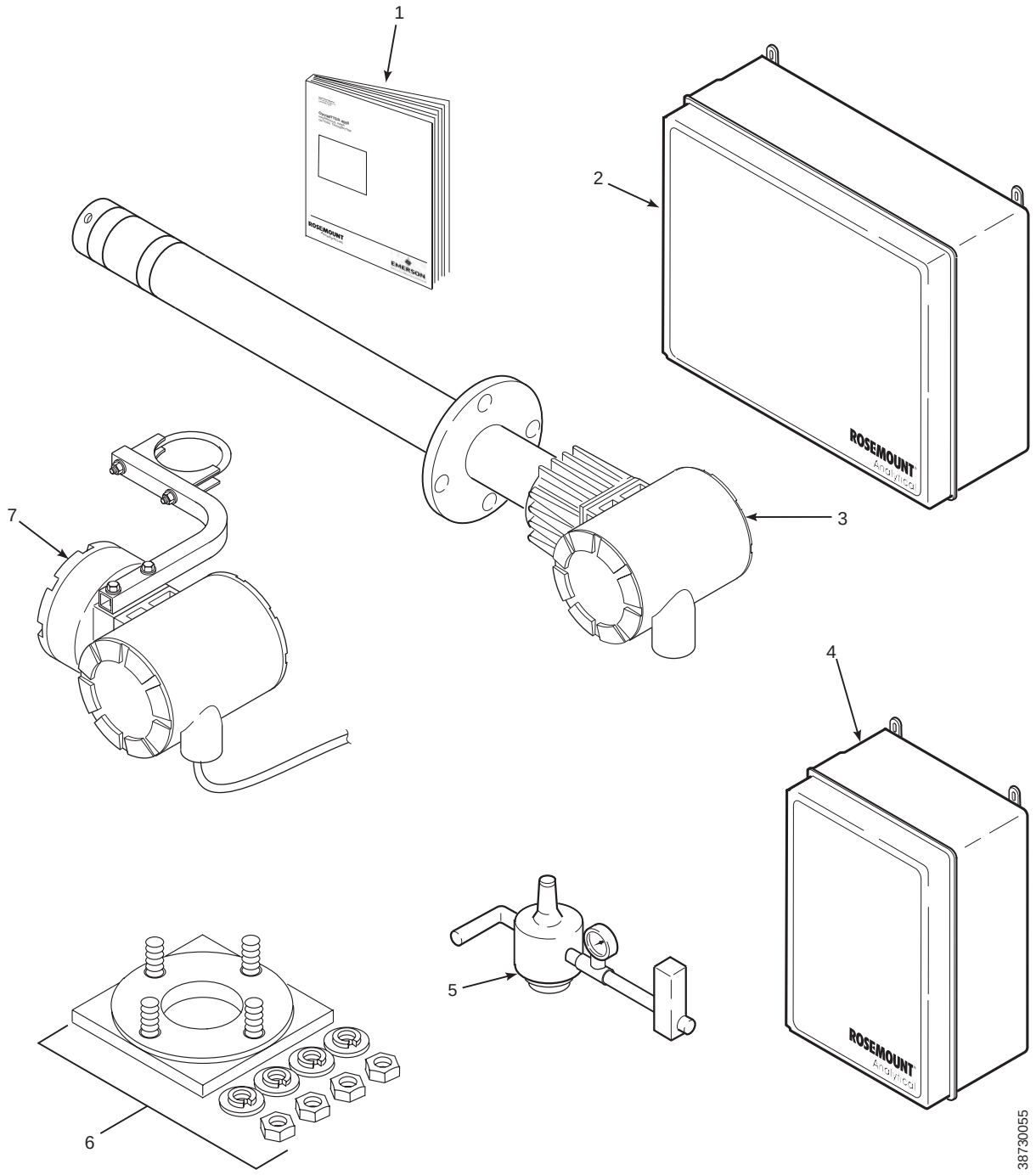
Also, use the product matrix in Table 1-1 at the end of this section to compare your order number against your unit. The first part of the matrix defines the model. The last part defines the various options and features of the Oxymitter 5000. Ensure the features and options specified by your order number are on or included with the unit.

SYSTEM OVERVIEW

Scope

This Instruction Manual is designed to supply details needed to install, start up, operate, and maintain the Oxymitter 5000. Integral signal conditioning electronics outputs a digital FOUNDATION fieldbus signal representing an O_2 value and provides a membrane keypad or fully functional Local Operator Interface (optional) for setup, calibration, and diagnostics. This same information, plus additional details, can be accessed via fieldbus digital communications.

Figure 1-1. Typical System Package



1. Instruction Manual
2. IMPS 4000 Intelligent Multiprobe Test Gas Sequencer (Optional)
3. Oxymitter 5000 with Integral Electronics
4. SPS 4001B Single Probe Autocalibration Sequencer (Optional) (Shown with reference air option)
5. Reference Air Set (used if SPS 4001B without reference air option or IMPS 4000 supplied)
6. Adapter Plate with Mounting Hardware and Gasket
7. Remote Electronics and Cable (Optional)

FOUNDATION Fieldbus Technology

FOUNDATION fieldbus is an all digital, serial, two-way communication system that interconnects field equipment such as sensors, actuators, and controllers. Fieldbus is a Local Area Network (LAN) for instruments used in both process and manufacturing automation with built-in capacity to distribute the control application across the network. The fieldbus environment is the base level group of digital networks in the hierarchy of planet networks.

The fieldbus includes a standardized physical interface to the wire, bus powered devices on a single wire, and intrinsic safety options, and enables additional capabilities, such as:

- Increased capabilities due to full digital communications
- Reduced wiring and wire terminations due to multiple devices on one set of wires
- Increased selection of suppliers due to interoperability
- Reduced loading on control room equipment with the distribution of some control and input/output functions to field devices
- Speed options for process control and manufacturing applications

System Description

The Oxymitter 5000 is designed to measure the net concentration of oxygen in an industrial combustion processes process; i.e., the oxygen remaining after all fuels have been oxidized. The probe is permanently positioned within an exhaust duct or stack and performs its task without the use of a sampling system.

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.

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 Oxymitter 5000 to provide exceptional sensitivity at low oxygen concentrations.

The Oxymitter 5000 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

Oxymitter 5000 units are available in seven length options, giving the user the flexibility to use an in situ penetration appropriate to the size of the stack or duct. The options on length are 18 in. (457 mm), 3 ft (0,91 m), 6 ft (1,83 m), 9 ft (2,7 m), 12 ft (3,66 m), 15 ft (4,57 m), and 18 ft (5,49 m).

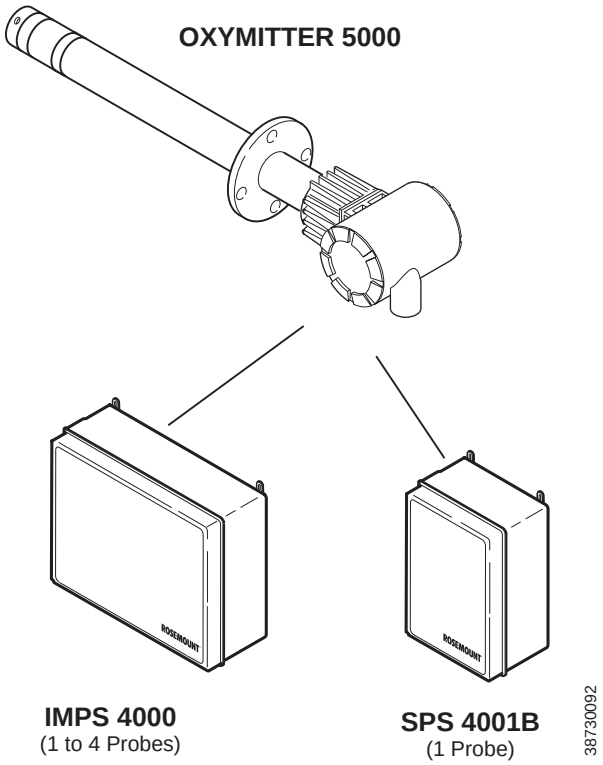
The integral electronics control probe temperature and provide an output that represents the measured oxygen concentration. The power supply can accept voltages of 90-250VAC and 50/60 Hz; therefore no setup procedures are required. The oxygen sensing cell is maintained at a constant temperature by modulating the duty cycle of the probe heater portion of the integral electronics. The integral electronics accepts millivolt signals generated by the sensing cell and produces the outputs to be used by remotely connected devices. The output is a FOUNDATION fieldbus digital communication signal.

The Oxymitter 5000 transmitter is available with an integral or remote electronics package. Two calibration gas sequencers are available: the IMPS 4000 and the SPS 4001B (Figure 1-2).

Systems with multiprobe applications may employ an optional IMPS 4000 Intelligent Multiprobe Test Gas Sequencer. The IMPS 4000 provides automatic calibration gas sequencing for up to four Oxymitter 5000 units and accommodates autocalibrations based on the CALIBRATION RECOMMENDED signal from the Oxymitter 5000, a timed interval set up via fieldbus or the IMPS 4000, or when a calibration request is initiated.

For systems with one or two Oxymitter 5000 units per combustion process, an optional SPS 4001B Single Probe Autocalibration Sequencer can be used with each Oxymitter 5000 to provide automatic calibration gas sequencing. The SPS 4001B is fully enclosed in a NEMA cabinet suited for wall-mounting. The sequencer performs autocalibrations based on the CALIBRATION RECOMMENDED signal from the Oxymitter 5000, a timed interval set up in fieldbus, or whenever a calibration request is initiated.

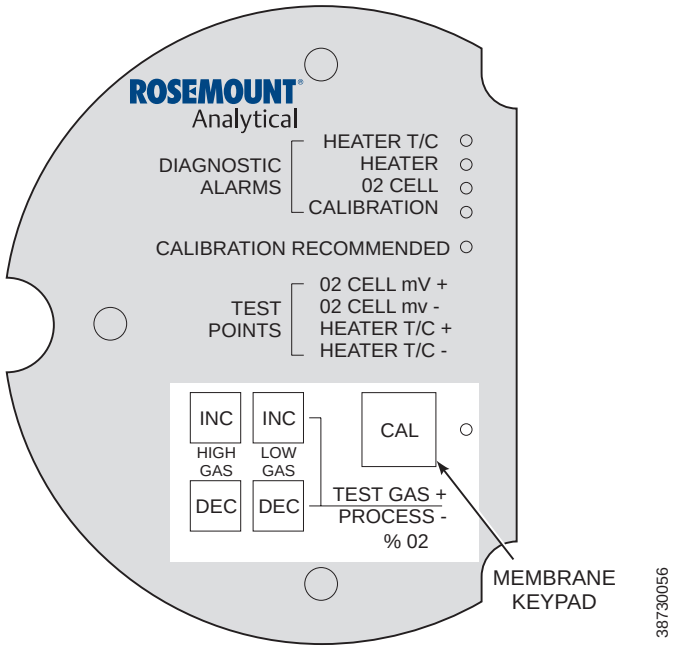
Figure 1-2. Oxymitter 5000
AutoCalibration System Options



System Features

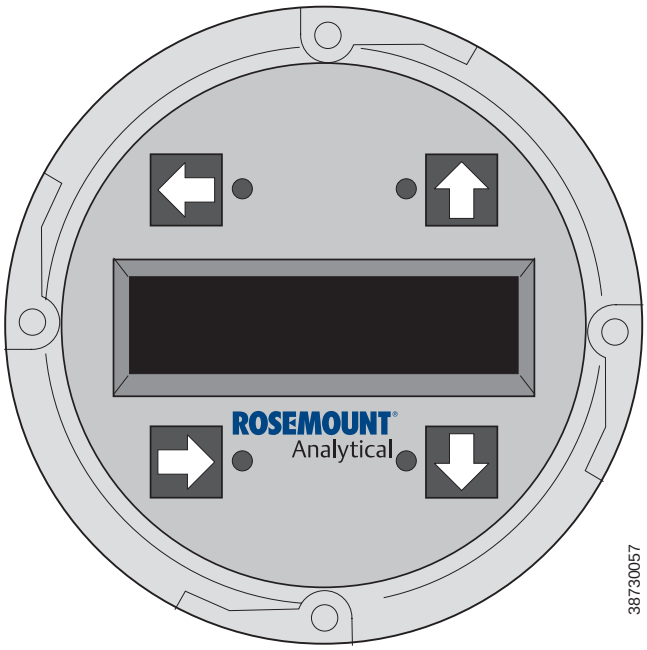
1. The CALIBRATION RECOMMENDED feature detects when the sensing cell is likely out of limits. This may eliminate the need to calibrate on a "time since last cal" basis.
2. The cell output voltage and sensitivity increase as the oxygen concentration decreases.

Figure 1-3. Membrane Keypad



3. Membrane keypad, Figure 1-3, and FOUNDATION fieldbus communication are standard.

Figure 1-4. Local Operator Interface (LOI)



4. An optional Local Operator Interface, Figure 1-4, allows continuous O_2 display and full interface capability.
5. Field replaceable cell, heater, thermocouple, and diffusion element.
6. The Oxymitter 5000 is constructed of rugged 316 L stainless steel for all wetted parts.

7. The electronics are adaptable for line voltages from 90-250 VAC; therefore, no configuration is necessary.
8. The Oxymitter 5000 membrane keypad is available in five languages:

   English
   French
   German
   Italian
   Spanish

9. An operator can calibrate and diagnostically troubleshoot the Oxymitter 5000 in one of four ways:
   a. Membrane Keypad. The membrane keypad, housed within the right side of the electronics housing, provides fault indication by way of flashing LEDs. Calibration can be performed from the membrane keypad.
   b. LOI. The optional LOI takes the place of the membrane keypad and allows local communication with the electronics. Refer to Section 6 for more information.
   c. FOUNDATION fieldbus Interface. The Oxymitter 5000's output carries a signal containing the oxygen level encoded in digital format. This digital output can also be used to communicate with the Oxymitter and access all of the Oxymitter's status information.
   d. Optional IMPS 4000. The Programmable Logic Controller (PLC) in the IMPS 4000 provides fault indications using flashing LEDs and LCD display messages. Refer to the IMPS 4000 Intelligent Multiprobe Test Gas Sequencer Instruction Manual for more information.

Handling the Oxymitter 5000

⚠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 Oxymitter 5000 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 Oxymitter 5000, 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 1-5 shows a typical system wiring.

A typical system installation for an Oxymitter 5000 with integral electronics is shown in Figure 1-6. A typical system installation for an Oxymitter 5000 with remote electronics is shown in Figure 1-7.

A source of instrument air is optional at the Oxymitter 5000 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 Oxymitter 5000.

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 or the solenoid valves in the IMPS 4000 or SPS 4001B.

NOTE:
The electronics is rated NEMA 4X (IP66) and is capable of operation at temperatures up to 185°F (85°C).

The optional LOI is also rated for operation at temperatures up to 185°F (85°C). The infrared keypad functionality will degrade at temperatures above 158°F (70°C).

Retain the packaging in which the Oxymitter 5000 arrived from the factory in case any components are to be shipped to another site. This packaging has been designed to protect the product.

Figure 1-5. Oxymitter 5000 FOUNDATION Fieldbus Connections

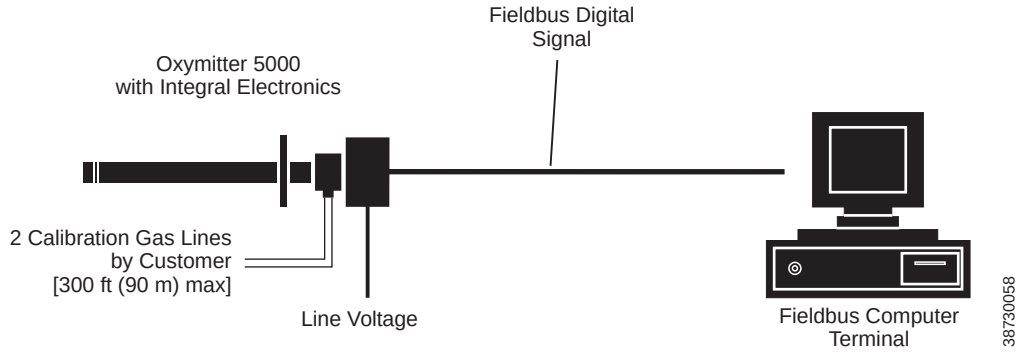


Figure 1-6. Typical System Installation - Oxymitter 5000 with Integral Electronics

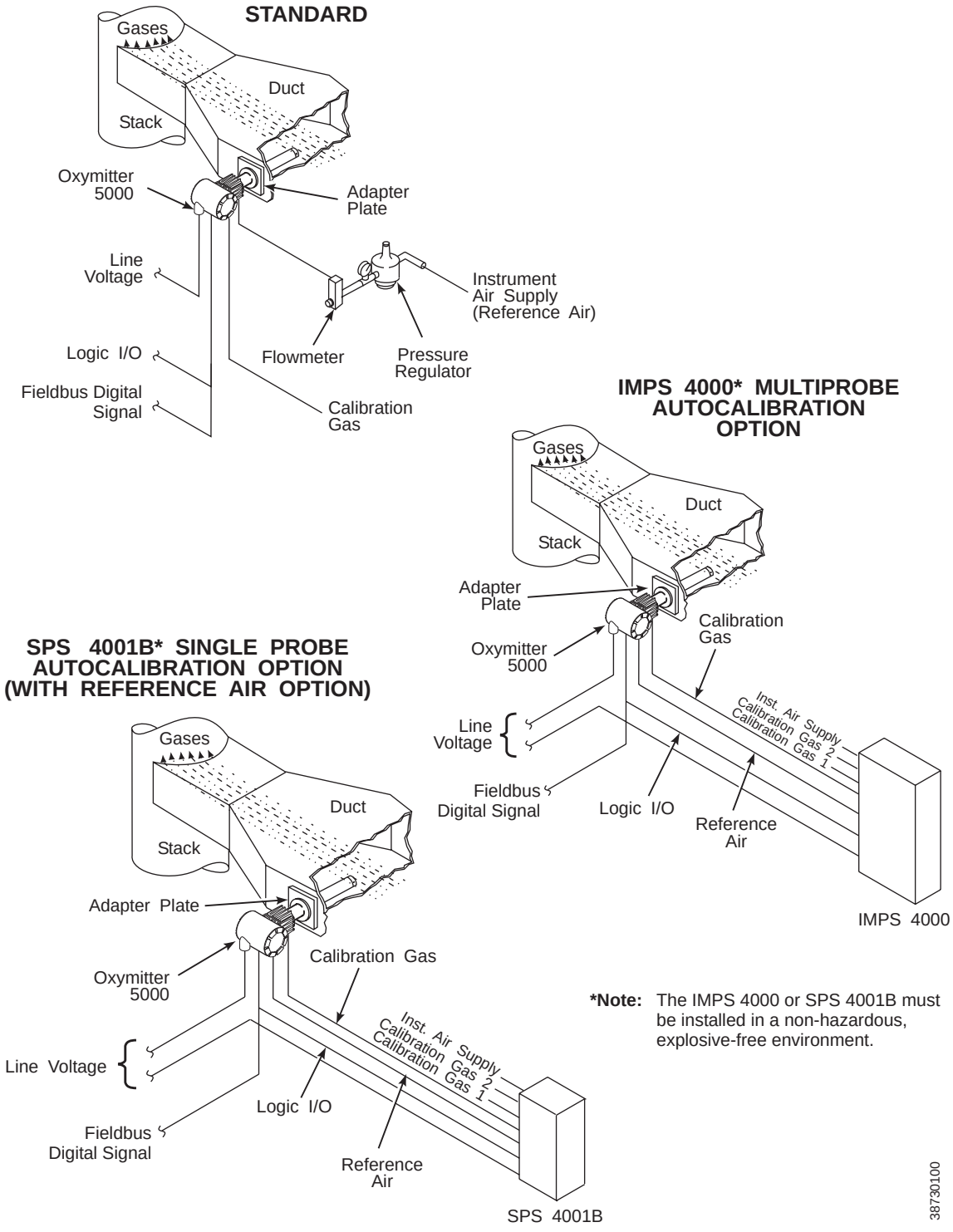
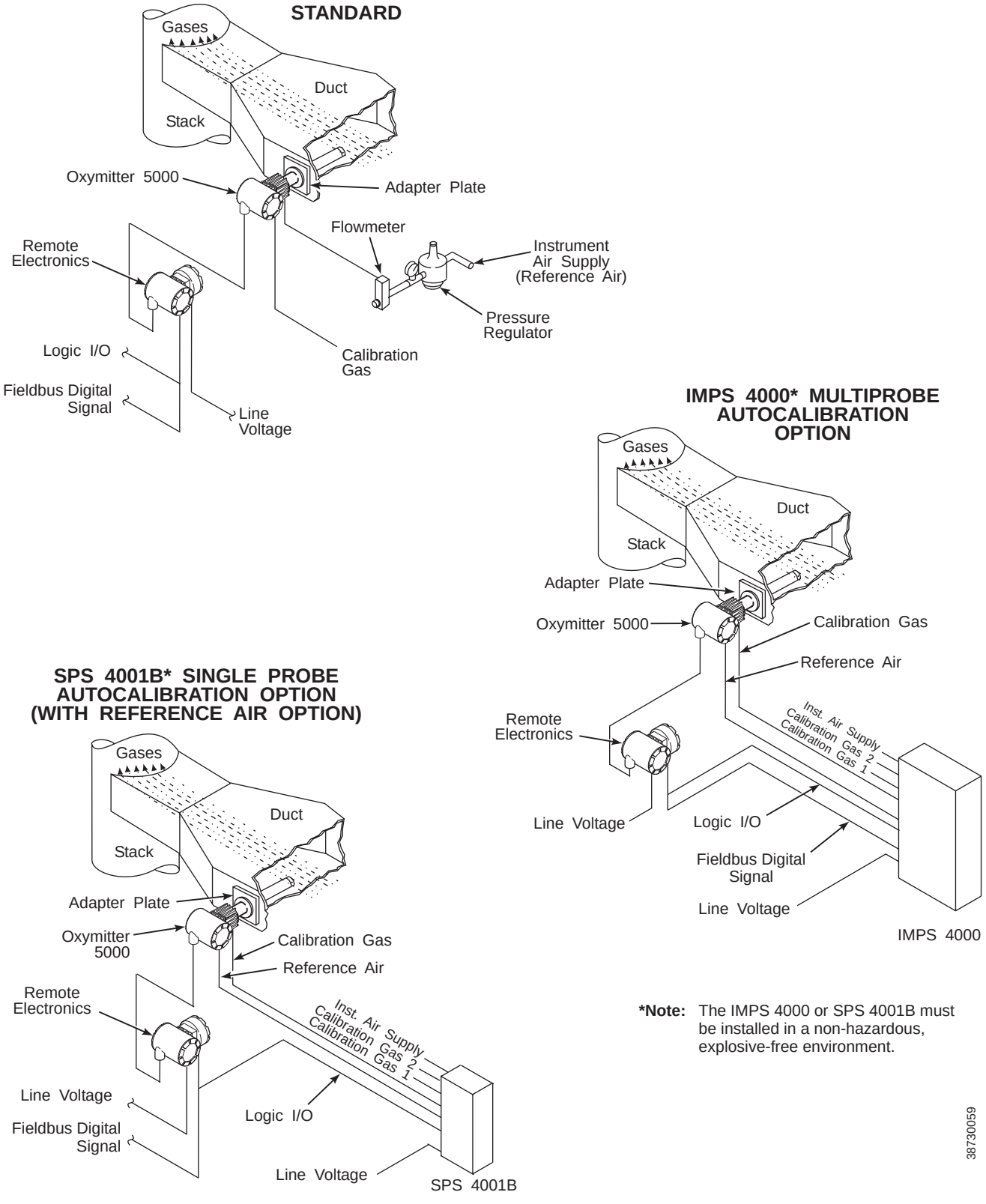


Figure 1-7. Typical System Installation - Oxymitter 5000 with Remote Electronics



***Note:** The IMPS 4000 or SPS 4001B must be installed in a non-hazardous, explosive-free environment.

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IMPS 4000 (OPTIONAL)

Information on the IMPS 4000 is available in the IMPS 4000 Intelligent Multiprobe Test Gas Sequencer Instruction Manual.

SPS 4001B (OPTIONAL)

The SPS 4001B Single Probe Autocalibration Sequencer provides the capability of performing automatic, timed or on demand, calibrations of a single Oxymitter 5000 without sending a technician to the installation site.

Mounting

The SPS 4001B is fully enclosed in a NEMA cabinet suited for wall-mounting. This cabinet provides added protection against dust and minor impacts. The SPS 4001B consists of a manifold and a calibration gas flowmeter. The manifold provides electrical feedthroughs and calibration gas ports to route power and signal connections and calibration gases to and from the sequencer. In addition, the manifold houses two calibration gas solenoids that sequence the gases to the Oxymitter 5000, a pressure switch that detects low calibration gas pressure, and two PC boards. A terminal strip housed within the terminal cover provides convenient access for all user connections.

Components optional to the SPS 4001B include a reference air flowmeter and pressure regulator. The reference air flowmeter indicates the flow rate of reference air continuously flowing to the Oxymitter 5000. The reference air pressure regulator ensures the instrument air (reference air) flowing to the Oxymitter 5000 is at a constant pressure [20 psi (138 kPa)]. The regulator also has a filter to remove particulates in the reference air and a drain valve to bleed the moisture that collects in the filter bowl.

Brass fittings and Teflon tubing are standard. Stainless steel fittings and tubing are optional. Also, disposable calibration gas bottles are available as an option or can be purchased through a local supplier.

Operation

The SPS 4001B works in conjunction with the Oxymitter 5000's CALIBRATION RECOMMENDED feature to perform an autocalibration. This feature automatically performs a gasless calibration check every hour on the Oxymitter 5000. If a calibration is recommended and its contact output signal is set for "handshaking" with the sequencer, the Oxymitter 5000 sends a signal to the sequencer. The sequencer automatically performs a calibration upon receiving the signal. Thus, no human interface is required for the automatic calibration to take place.

For further SPS 4001B information, refer to the SPS 4001B Single Probe Autocalibration Sequencer Instruction Manual.

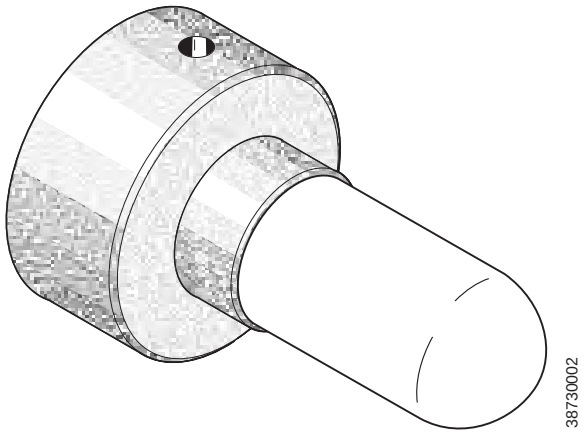
PROBE OPTIONS

Diffusion Elements

Ceramic Diffusion Assembly

The ceramic diffusion assembly, Figure 1-8, is the traditional design for the probe. Used for over 25 years, the ceramic diffusion assembly provides a greater filter surface area. This element is also available with a flame arrestor, and with a dust seal for use with an abrasive shield.

Figure 1-8. Ceramic Diffusion Assembly



Snubber Diffusion Assembly

The snubber diffusion assembly, Figure 1-9, is satisfactory for most applications. This element is also available with a flame arrestor and with a dust seal for use with an abrasive shield.

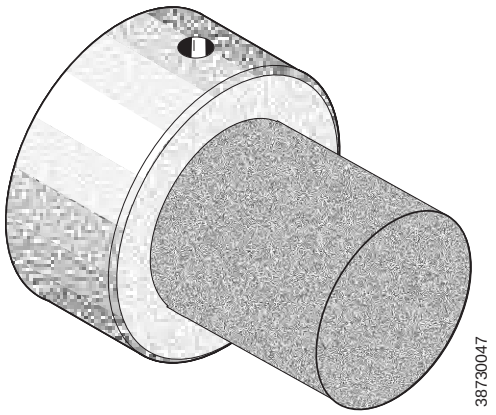
Figure 1-9. Snubber Diffusion Assembly

Cup-Type Diffusion Assembly

The cup-type diffusion assembly, Figure 1-10, is typically used in high temperature applications where frequent diffusion element plugging is a problem. It is available with either a 10 or 40 micron, sintered, Hastelloy element.

This element is also available with a dust seal for use with an abrasive shield.

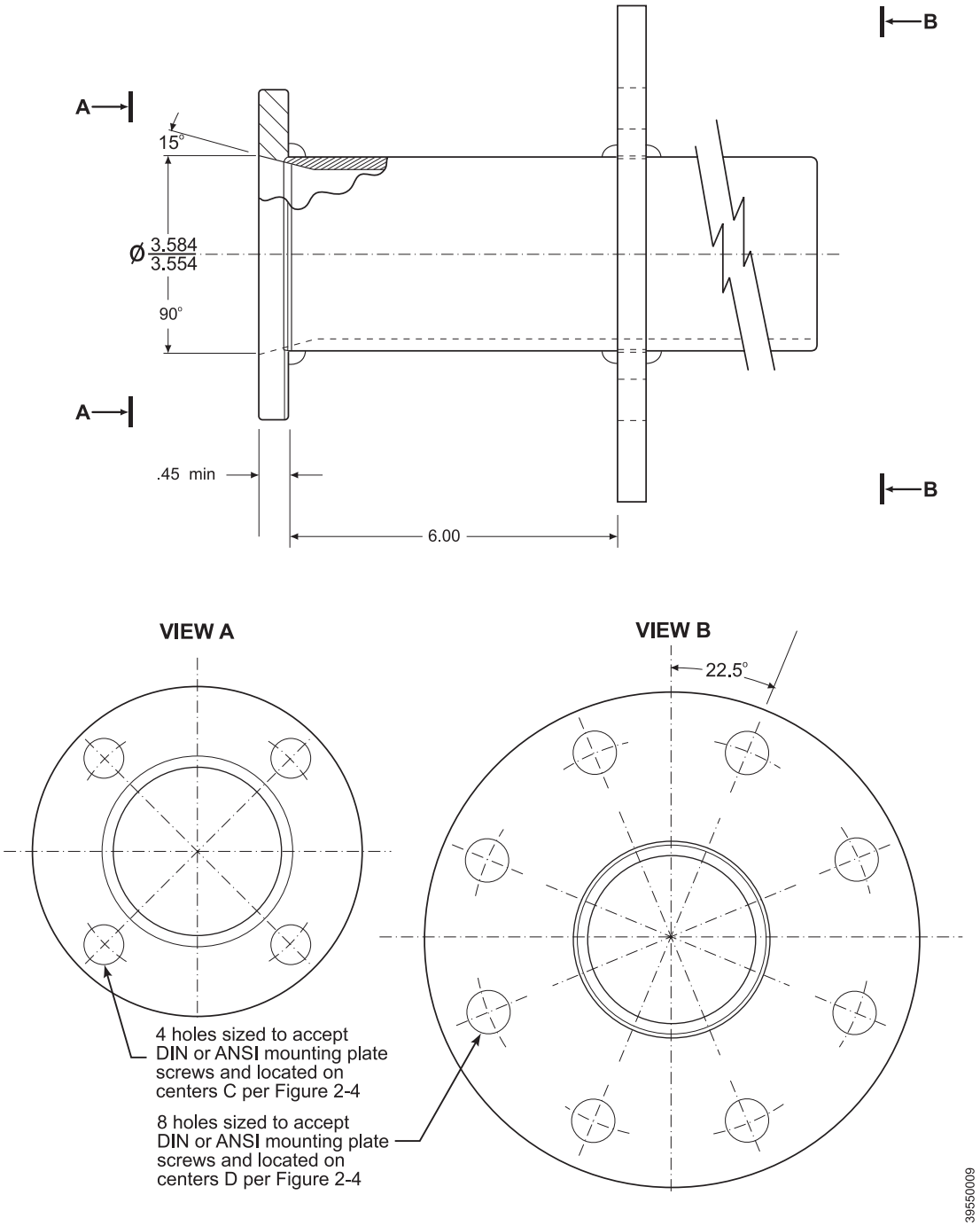
Figure 1-10. Hastelloy Cup-Type Diffusion Assembly



Abrasive Shield Assembly

The abrasive shield assembly, Figure 1-11, is a stainless steel tube that surrounds the probe assembly. The shield protects against particle abrasion, provides a guide for ease of insertion, and acts as a position support, especially for longer probes. The abrasive shield assembly uses a modified diffuser and vee deflector assembly, fitted with dual dust seal packing.

Figure 1-11. Abrasive Shield Assembly



NOTE

In highly abrasive applications, rotate the shield 90 degrees at normal service intervals to present a new wear surface to the abrasive flow stream.

SPECIFICATIONS

Oxymitter Specifications		
O_2 Range		
Accuracy	±0.75% of reading or 0.05% O_2, whichever is greater	
System Response to Calibration Gas	Initial – less than 3 seconds, T90 – less than 8 seconds	
Temperature Limits		
Process	32° to 1300°F (0° to 704°C) up to 2400°F (1300°C) with optional accessories	
Electronics Housing	-40° to 158°F (-40° to 70°C) ambient	
Electronics Package	-40° to 185°F (-40° to 85°C) [Operating temperature of electronics inside of instrument housing, as read by FOUNDATION fieldbus.]	
Local Operator Interface	-40° to 158°F (-40° to 70°C), [above 158°F (70°C) the infrared keypad will cease to function, but the Oxymitter 5000 will continue to operate properly.]	
Probe Lengths	18 in. (457 mm) 3 ft (0,91 m) 6 ft (1,83 m) 9 ft (2,74 m)	12 ft (3,66 m) 15 ft (4,57 m) 18 ft (5,49 m)
Mounting and Mounting Position	Vertical or horizontal; a spool piece, (P/N 3D39761G02), is available to offset transmitter housing from hot ductwork.	
Materials		
Probe	Wetted or welded parts - 316L stainless steel (SS) Non-wetted parts - 304 SS, low-copper aluminum	
Electronics Enclosure	Low-copper aluminum	
Calibration	Manual, semi-automatic, or automatic	
Calibration Gas Mixtures Recommended	0.4% O_2, Balance N_2 8% O_2, Balance N_2	
Calibration Gas Flow	2.5 l/min (5 scfh)	
Reference Air	1 l/min (2 scfh), clean, dry, instrument-quality air (20.95% O_2), regulated to 34 kPa (5 psi)	
Electronics	NEMA 4X, IP66 with fitting and pipe on reference exhaust port to clear dry atmosphere	
Electric Noise	EN 61326-1, Class A	
Line Voltage	90-250 VAC, 48/62 Hz. No configuration necessary. 3/4 in. -14 NPT conduit port	
Certifications	General Purpose	

Table continued on next page

Oxymitter Specifications	
Signals	
Digital Output	FOUNDATION fieldbus compatible
Logic I/O	Two-terminal logic contact configurable as either an alarm output or as a bi-directional calibration handshake signal to IMPS 4000 or SPS 4001B, self-powered (+5 V) in series with 340 ohms Conduit ports — 3/4 in.-14 NPT (for Foundation fieldbus and logic I/O signal lines)
Power Requirements:	
Probe Heater	175 W nominal
Electronics	10 W nominal
Maximum	500 W

Table 1-1. Product Matrix

OXT5A	**Oxymitter 5000 In Situ Oxygen Transmitter with FOUNDATION Fieldbus Communications**					
	Oxygen Transmitter - Instruction Book					
	Code	**Sensing Probe Type**				
	1	ANSI (N. American Std.) Probe with Ceramic Diffuser				
	2	ANSI Probe with Flame Arrestor and Ceramic Diffuser (General Purpose Only)				
	3	ANSI Probe with Snubber Diffuser				
	4	DIN (European Std.) Probe with Ceramic Diffuser				
	5	DIN Probe with Flame Arrestor and Snubber Diffuser (General Purpose Only)				
	6	DIN Probe with Snubber Diffuser				
		Code	**Probe Assembly**			
		0	18 in. (457 mm) Probe			
		1	18 in. (457 mm) Probe with Abrasive Shield (1)			
		2	3 ft (0,91 m) Probe			
		3	3 ft (0,91 m) Probe with Abrasive Shield (1)			
		4	6 ft (1,83 m) Probe			
		5	6 ft (1,83 m) Probe with Abrasive Shield (1)			
		6	9 ft (2,74 m) Probe			
		7	9 ft (2,74 m) Probe with Abrasive Shield (1)			
		8	12 ft (3,66 m) Probe			
		9	12 ft (3,66 m) Probe with Abrasive Shield (1)			
		A	15 ft (4,57 m) Probe with Abrasive Shield (1)			
		B	18 ft (5,49 m) Probe with Abrasive Shield (1)			
			Code	**Mounting Hardware- Stack Side**		
			0	No Adapter Plate		
			1	New Installation - Square Weld Plate with Studs		
			2	Mounting to Model 218 Mounting Plate (with Model 218 Shield Removed)		
			3	Mounting to Existing Model 218 Support Shield		
			4	Competitor's Mount(2)		
			5	Mounting to Model 132 Adapter Plate		
				Code	**Mounting Hardware- Probe Side**	
				0	No Mounting Hardware in Adapter Plate	
				1	Probe Only (ANSI) (N. American Std.)	
				2	New Bypass or New Abrasive Shield (ANSI)	
				4	Probe Only (DIN)	
				5	New Bypass or New Abrasive Shield (DIN)	
					Code	**Electronic Housing - NEMA 4X, IP66**
					12	Transient Protected Filtered Termination, Integrally Mounted to Probe.
					14	Transient Protected Filtered Termination, Mounted Remotely, Requires Cable.
OXT5A	**3**	**3**	**1**	**1**	**12**	**Example**

Cont'd

Code	Operator Interface[3]
1	Membrane Keypad - Fieldbus, Blind Cover
2	Membrane Keypad - Fieldbus, Window Cover
3	Gas Fluorescent LOI, Fieldbus, English only, Window Cover

Code	Language
1	English
2	German
3	French
4	Spanish
5	Italian

Code	Termination Filtering
00	No Option - Specified as Part of Electronic Housing

Code	Calibration Accessories
00	No Hardware
01	Calibration Gas Flow Rotometers & Reference Gas Set
02	Autocalibration Systems - Order by separate part number (for safe areas only)

Code	Control Suite Functionality
00	Basic Control Suite
01	Deduct Basic Control Suite

Code	Electronics to Probe Cable
00	No Cable
10	20 ft (6 m) Cable
11	40 ft (12 m) Cable
12	60 ft (18 m) Cable
13	80 ft (24 m) Cable
14	100 ft (30 m) Cable
15	150 ft (45 m) Cable
16	200 ft (61 m) Cable

Cont'd	1	3	00	01	00	00	Example

NOTES:
High Sulfur Service:
High sulfur cell can be selected for any probe; add a line item note to your purchase order requesting the high sulfur ZrO2 cell in place of the standard ZrO2 cell. Add 4232 UOM to the system matrix UOM total.

(1) Recommended uses: High velocity particulates in flue stream, installation within 10 ft (3,5 m) of soot blowers or heavy salt cake buildup. Applications: Pulverized coal, recovery boilers, lime kiln.

(2) Where possible, specify ANSI or DIN designation; otherwise, provide details of the existing mounting plate as follows:

Plate with studs	Bolt circle diameter, number, and arrangement of studs; stud thread; and stud height above mounting plate.
Plate without studs	Bolt circle diameter, number, and arrangement of holes; thread; and depth of stud mounting plate with accessories.

(3) Startup, calibration, and operation can be implemented using the standard membrane keypad. Remote access and additional functionality available via Fieldbus Communications (DeltaV).

Table 1-2. Calibration Components

Part Number	Description
1A99119G01	Two disposable calibration gas bottles - 0.4% and 8% O_2, balance nitrogen - 550 liters each*
1A99119G02	Two flow regulators for calibration gas bottles
1A99119G03	Bottle rack

Notes:
**Calibration gas bottles cannot be shipped via airfreight.*
When the bottles are used with CALIBRATION RECOMMENDED features, the bottles should provide 2 to 3 years of calibrations in normal service.

Table 1-3. Intelligent Multiprobe Test Gas Sequencer Versions

Part Number	Description	Number of Oxymitters
3D39695G01	IMPS	1
3D39695G02	IMPS	2
3D39695G03	IMPS	3
3D39695G04	IMPS	4
3D39695G05	IMPS w/115 V Heater	1
3D39695G06	IMPS w/115 V Heater	2
3D39695G07	IMPS w/115 V Heater	3
3D39695G08	IMPS w/115 V Heater	4
3D39695G09	IMPS w/220V Heater	1
3D39695G10	IMPS w/220V Heater	2
3D39695G11	IMPS w/220V Heater	3
3D39695G12	IMPS w/220V Heater	4

Section 2 Installation

⚠WARNING

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

⚠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

The Oxymitter 5000 (OXT5A) can be installed in general purpose areas only. Do not install the OXT5A in hazardous areas. For hazardous areas use the OXT5C.

MECHANICAL INSTALLATION

Selecting Location

1. The location of the Oxymitter 5000 in the stack or flue is most important for maximum accuracy in the oxygen analyzing process. The Oxymitter 5000 must be positioned so the gas it measures is representative of the process. Best results are normally obtained if the Oxymitter 5000 is positioned near the center of the duct (40-60% insertion). Longer ducts may require several Oxymitter 5000 units since the O_2 can vary due to stratification. A point too near the wall of the duct, or the inside 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 32° to 1300°F (0° to 704°C). Figure 2-1 through Figure 2-8 provide mechanical installation references. The ambient temperature of the integral electronics housing must not exceed 185°F (85°C). For higher ambient temperatures, we recommend the remote mounted electronics option.
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 Oxymitter 5000 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 membrane keypad or LOI. Allow adequate clearance for removal of the Oxymitter 5000.

⚠CAUTION

Do not allow the temperature of the Oxymitter 5000 electronics to exceed 185°F (85°C) or damage to the unit may result.

Probe Installation

1. Ensure all components are available to install the Oxymitter 5000. If equipped with the optional ceramic diffusion element, ensure it is not damaged.
2. The Oxymitter 5000 may be installed in tact as it is received.

NOTE
An abrasive shield is recommended for high velocity particulates in the flue stream (such as those in coal-fired boilers, kilns, and recovery boilers). Vertical and horizontal brace clamps are provided for 9 ft and 12 ft (2,75 m and 3,66 m) probes to provide mechanical support for the Oxymitter 5000. Refer to Figure 2-6.

3. Weld or bolt adapter plate (Figure 2-5) onto the duct.
4. If using the optional ceramic diffusion element, the vee deflector must be correctly oriented. Before inserting the Oxymitter 5000, check the direction of gas flow in the duct. Orient the vee deflector so the apex points upstream toward the flow (Figure 2-7). This may be done by loosening the setscrews and rotating the vee deflector to the desired position. Retighten the setscrews.

Figure 2-1. Oxymitter 5000
Probe Installation

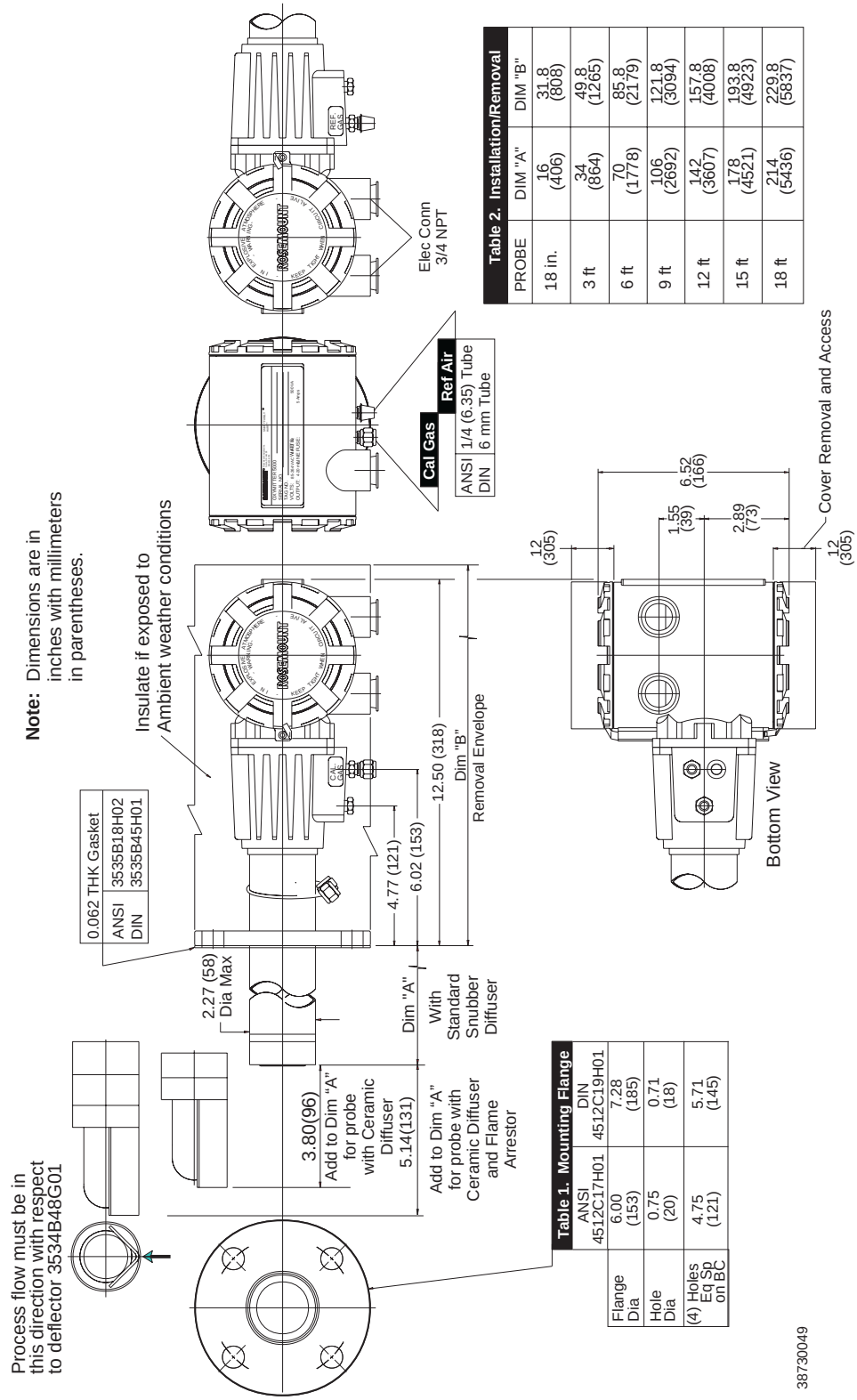


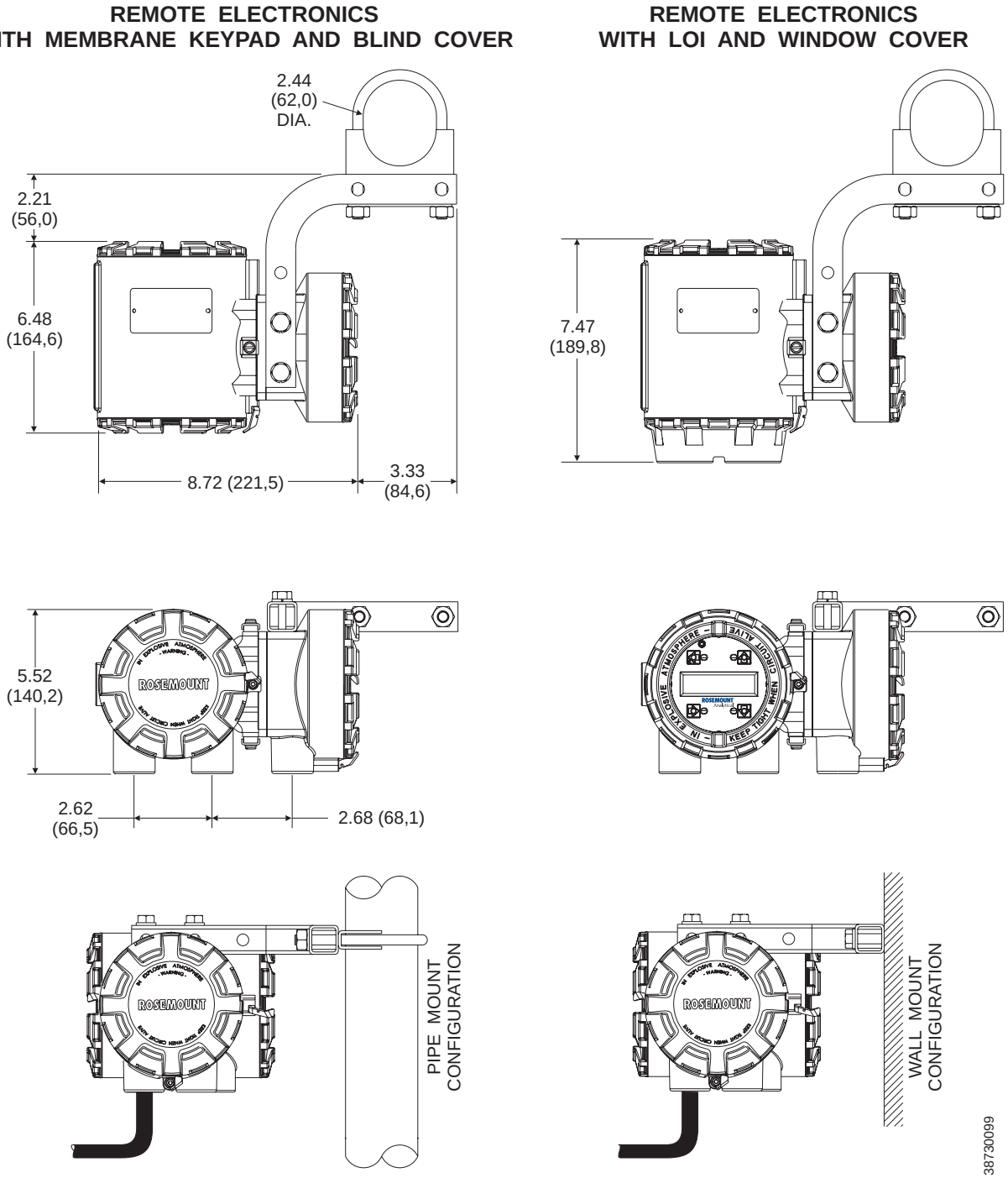
Table 1. Mounting Flange

	ANSI 4512C17H01	DIN 4512C19H01
Flange Dia	6.00 (153)	7.28 (185)
Hole Dia	0.75 (20)	0.71 (18)
(4) Holes Eq Sp on BC	4.75 (121)	5.71 (145)

Table 2. Installation/Removal

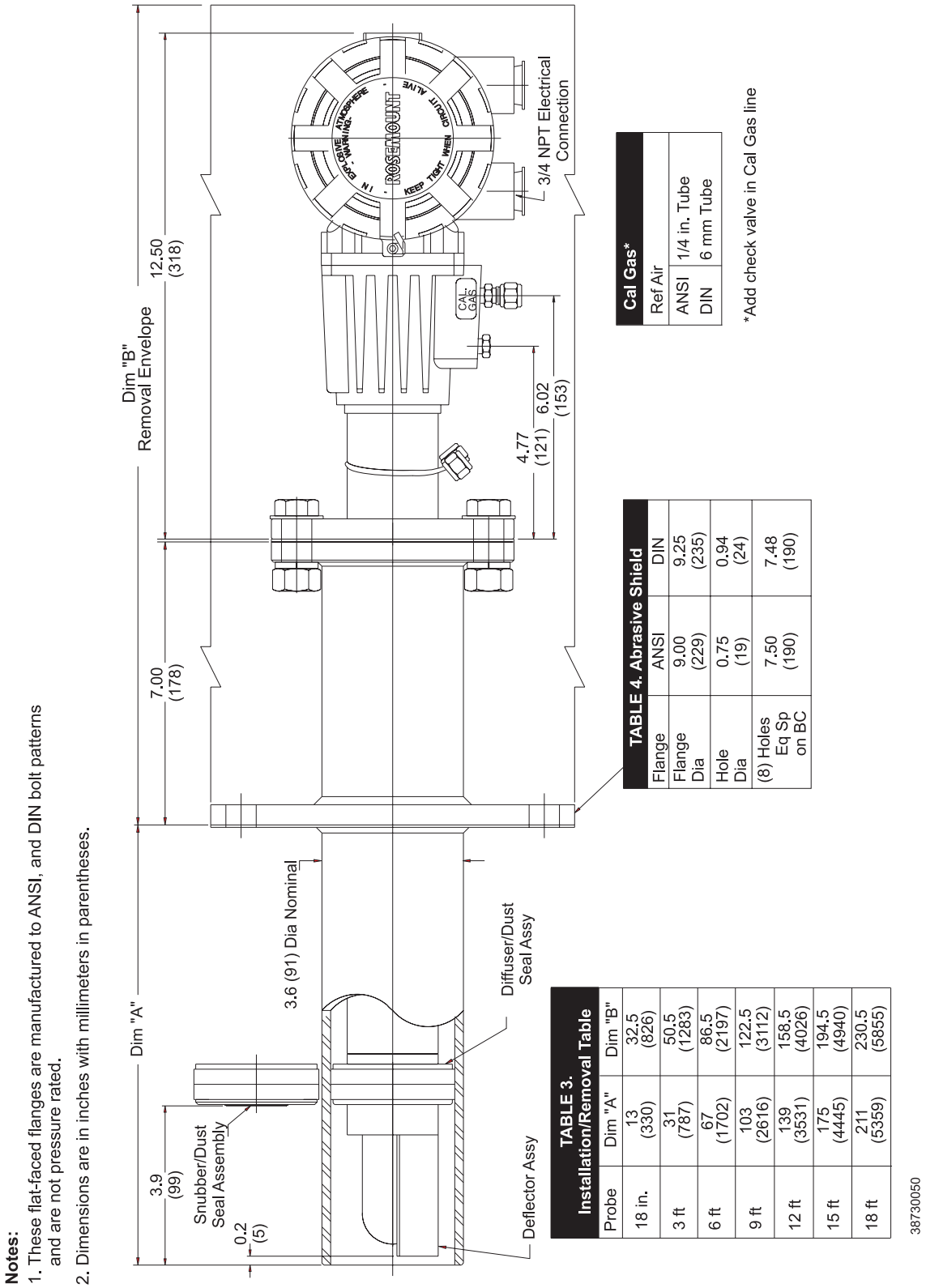
PROBE	DIM "A"	DIM "B"
18 in.	16 (406)	31.8 (808)
3 ft	34 (864)	49.8 (1265)
6 ft	70 (1778)	85.8 (2179)
9 ft	106 (2692)	121.8 (3094)
12 ft	142 (3607)	157.8 (4008)
15 ft	178 (4521)	193.8 (4923)
18 ft	214 (5436)	229.8 (5837)

Figure 2-2. Oxymitter 5000
Remote Electronics Installation



Note: Dimensions are in inches with millimeters in parentheses.

Figure 2-3. Oxymitter 5000 with Abrasive Shield



Notes:
1. These flat-faced flanges are manufactured to ANSI, and DIN bolt patterns and are not pressure rated.
2. Dimensions are in inches with millimeters in parentheses.

TABLE 3. Installation/Removal Table

Probe	Dim "A"	Dim "B"
18 in.	13 (330)	32.5 (826)
3 ft	31 (787)	50.5 (1283)
6 ft	67 (1702)	86.5 (2197)
9 ft	103 (2616)	122.5 (3112)
12 ft	139 (3531)	158.5 (4026)
15 ft	175 (4445)	194.5 (4940)
18 ft	211 (5359)	230.5 (5855)

TABLE 4. Abrasive Shield

Flange	ANSI	DIN
Flange Dia	9.00 (229)	9.25 (235)
Hole Dia	0.75 (19)	0.94 (24)
(8) Holes Eq Sp on BC	7.50 (190)	7.48 (190)

Cal Gas*	
Ref Air	
ANSI	1/4 in. Tube
DIN	6 mm Tube

*Add check valve in Cal Gas line

Figure 2-4. Oxymitter 5000
Adapter Plate Dimensions

ADAPTER PLATE OUTLINE

TABLE 5. ADAPTER PLATE* DIMENSIONS FOR OXYMITTER 5000

Dimensions in. (mm)	ANSI (P/N 4512C34G01)	DIN (P/N 4512C36G01)
"A"	6.00 (153)	7.5 (191)
"B" Thread	0.625-11	(M-16 x 2)
"C" Dia	4.75 (121)	5.708 (145)

*Part numbers for adapter plates include attaching hardware.

TABLE 6. ADAPTER PLATE* DIMENSIONS FOR OXYMITTER 5000 WITH ABRASIVE SHIELD

Dimensions in. (mm)	ANSI (P/N 3535B58G02)	DIN (P/N 3535B58G06)
"A"	9.00 (229)	9.25 (235)
"B" Dia	4.75 (121)	3.94 (100)
"C" Thread	0.625-11	(M-16 x 2)
"D" Dia	7.50 (191)	7.48 (190)

*Part numbers for adapter plates include attaching hardware.

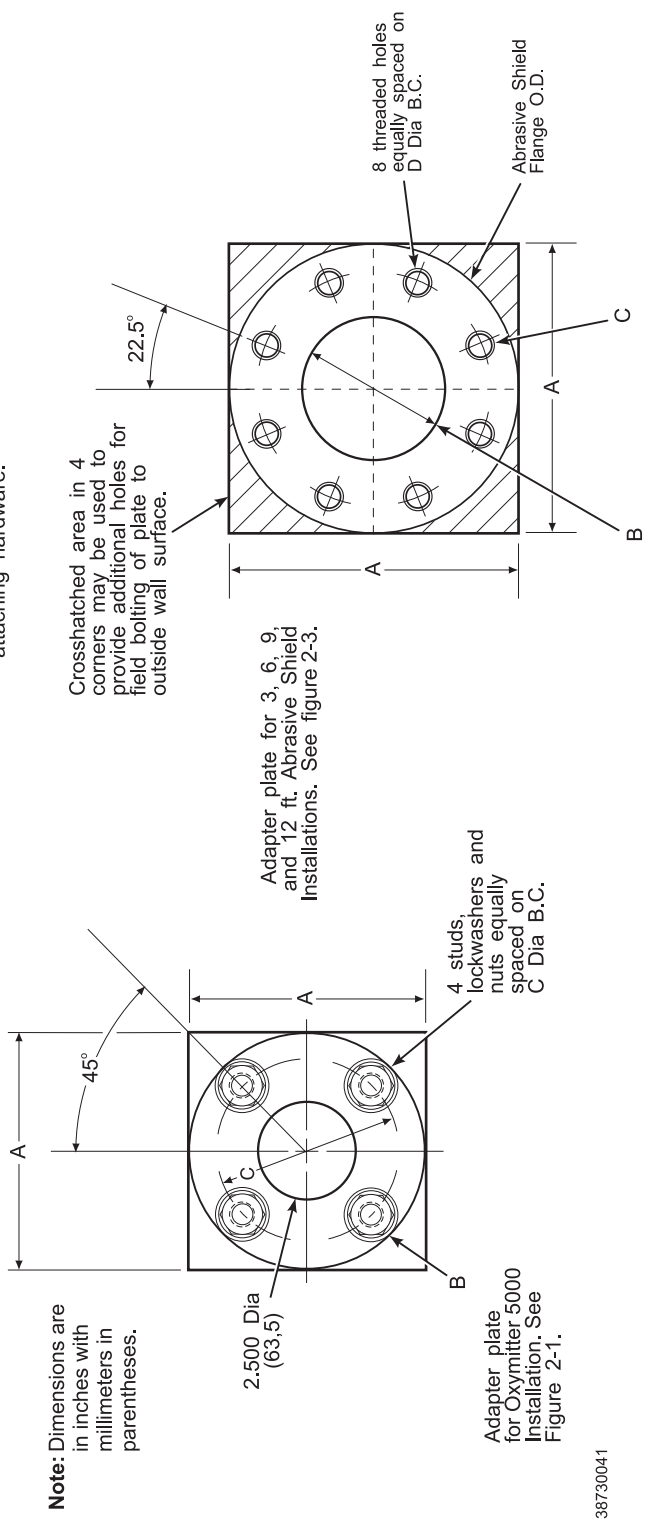
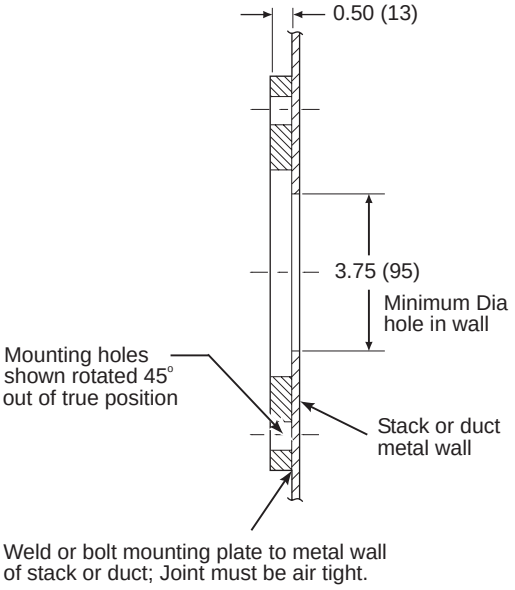
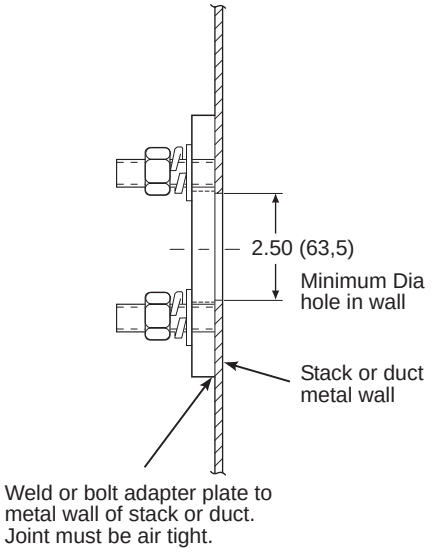


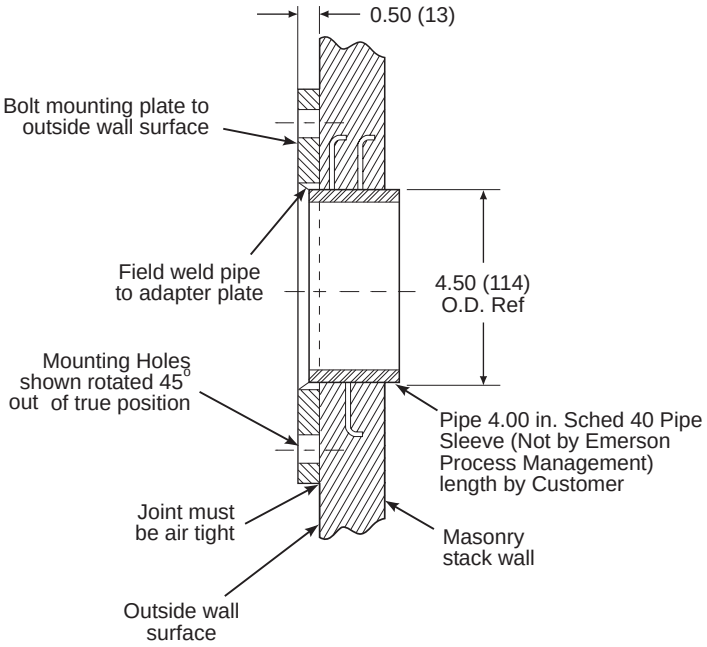
Figure 2-5. Oxymitter 5000
Adapter Plate Installation

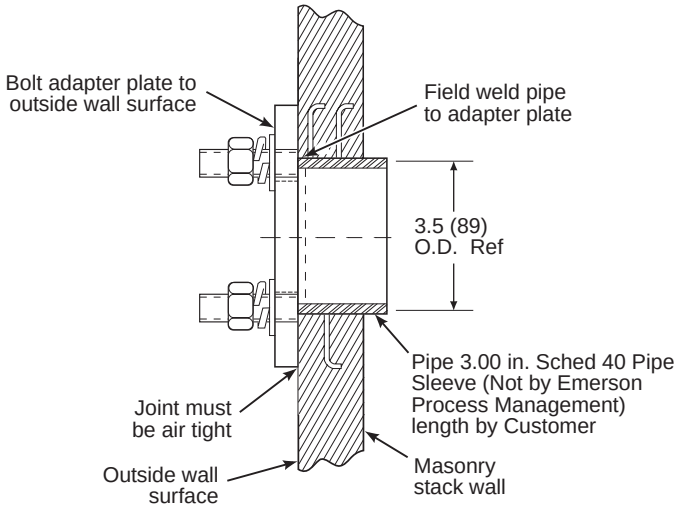
INSTALLATION FOR METAL WALL STACK OR DUCT CONSTRUCTION





INSTALLATION FOR MASONRY WALL STACK CONSTRUCTION





Notes:
1. Dimensions are in inches with millimeters in parentheses.
2. All masonry stack work and joints except adaptor plate are not furnished by Rosemont Analytical.

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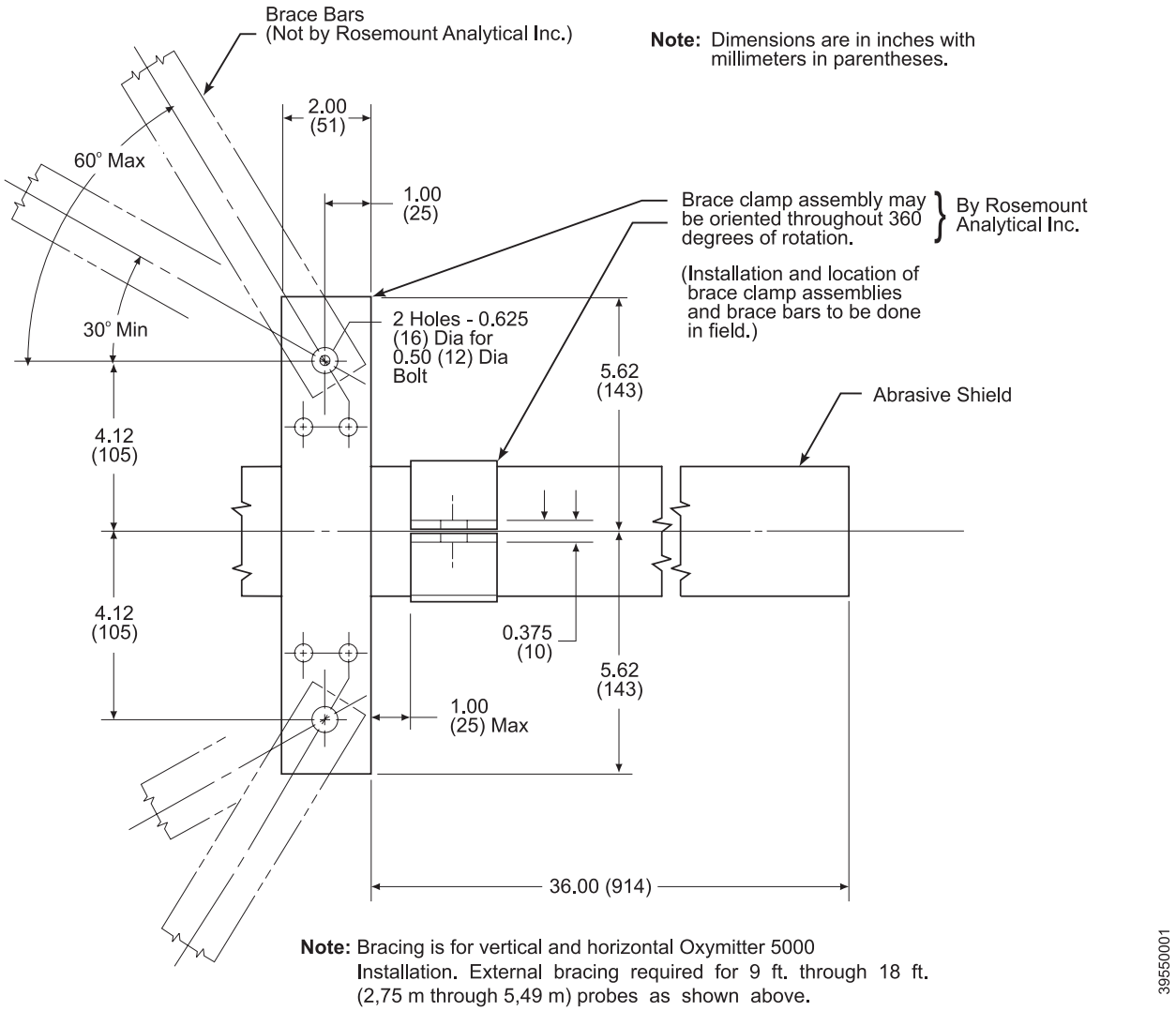
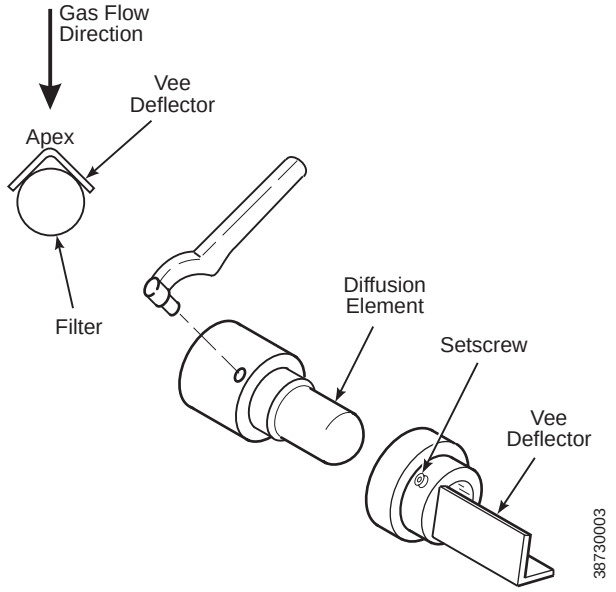
Figure 2-6. Oxymitter 5000 Abrasive Shield Bracing Installation



5. In vertical installations, ensure the system cable drops vertically from the Oxymitter 5000 and the conduit is routed below the level of the electronics housing. This drip loop minimizes the possibility that moisture will damage the electronics (Figure 2-8).
6. If the system has an abrasive shield, check the dust seal gaskets. The joints in the two gaskets must be staggered 180 degrees. Also, make sure the gaskets are in the hub grooves as the Oxymitter 5000 slides into the 15 degree forcing cone in the abrasive shield.

Figure 2-7. Orienting the Optional Vee Deflector



7. Insert probe through the opening in the mounting flange and bolt the unit to the flange. When probe lengths selected are 9 to 18 ft (2.74 to 5.49 m), special brackets are supplied to provide additional support for the probe inside the flue or stack (Figure 2-6).

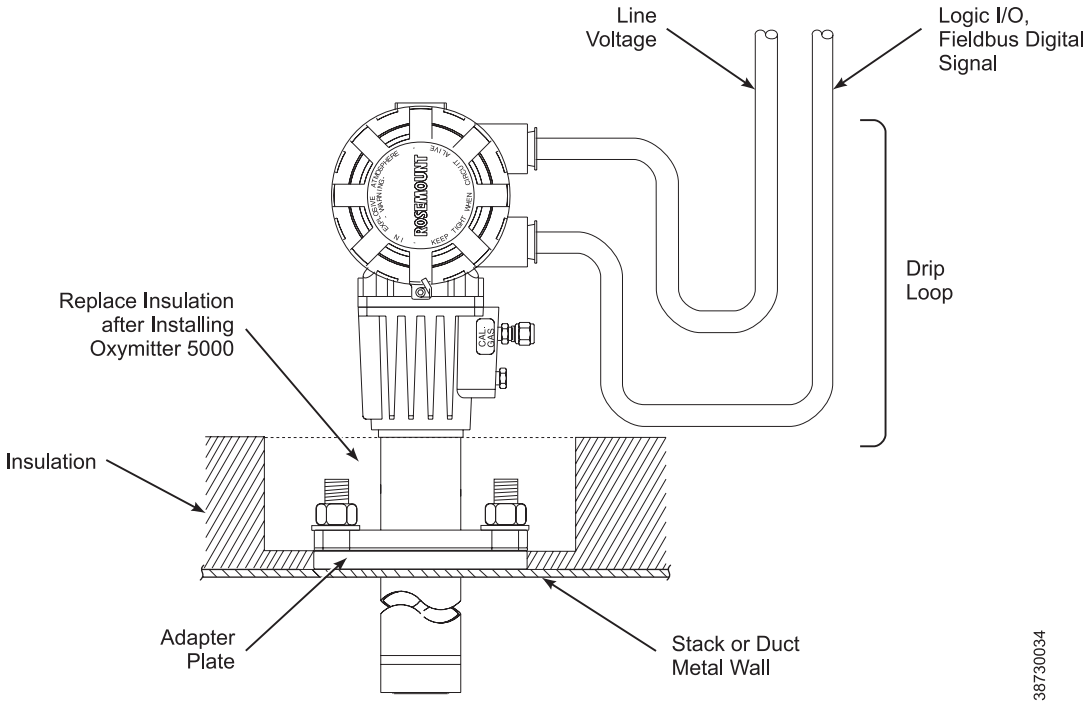
NOTE
If process temperatures will exceed 392°F (200°C), use anti-seize compound on stud threads to ease future removal of Oxymitter 5000. For ambient temperatures that will exceed 185°F (85°C), we recommend the remote mounted electronics option.

⚠CAUTION

Uninsulated stacks or ducts may cause ambient temperatures around the electronics to exceed 185°F (85°C), which may cause overheating damage to the electronics.

8. If insulation is being removed to access the duct work for Oxymitter 5000 mounting, make sure the insulation is replaced afterward (Figure 2-8).

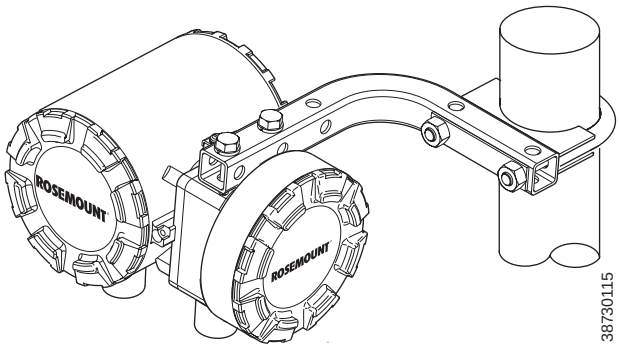
Figure 2-8. Installation with Drip Loop and Insulation Removal



Remote Electronics Installation

For an Oxymitter 5000 equipped with remote electronics, install the probe according to the instructions in "Probe Installation". Install the remote electronics unit on a stand pipe or similar structure, Figure 2-9.

Figure 2-9. Remote Electronics Mounting



ELECTRICAL INSTALLATION (WITH INTEGRAL ELECTRONICS)

All wiring must conform to local and national codes.

⚠WARNING

Disconnect and lock out power before connecting the power supply.

⚠WARNING

Install all protective 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.

⚠WARNING

The probe and probe abrasive shield are heavy. Use proper lifting and carrying procedures to avoid personnel injury.

NOTE
To maintain proper earth grounding, ensure a positive connection exists between the sensor housing, the electronics housing, and earth. The connecting ground wire must be 14 AWG minimum. Refer to Figure 2-10.

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

Connect Line Voltage

1. Remove cover (31).
2. Connect the line, or L1 wire to the L1 terminal and the neutral, or L2 wire, to the N terminal (Figure 2-10). The Oxymitter 5000 automatically will configure itself for 90-250 VAC line voltage and 50/60 Hz. The power supply requires no setup.
3. Connect fieldbus Digital Signal and Logic I/O Calibration Handshake Leads. Use individual shielded twisted wire pairs. Terminate the shield only at the electronics housing.

a. Fieldbus Digital Signal. The fieldbus digital signal carries the O_2 value. This digital signal can also be used to communicate with the Oxymitter.

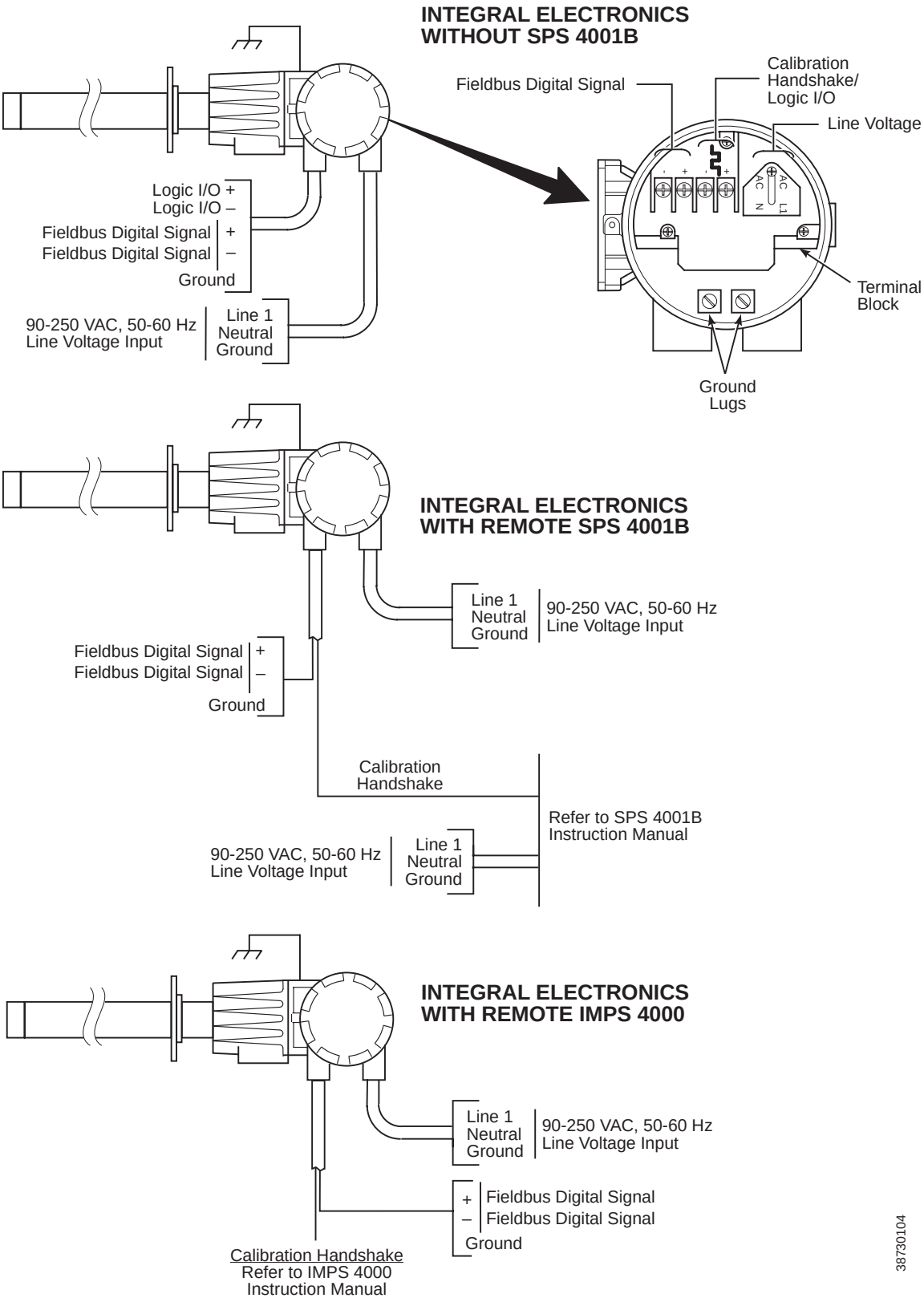
b. Calibration Handshake/Logic I/O. The output can either be an alarm or provide the handshaking to interface with an IMPS 4000 or SPS 4001B. For more information, refer to "Calibration Handshake Signal" in Section 4: Configuration of Oxymitter 5000 with LOI, and either the IMPS 4000 Intelligent Multiprobe Test Gas Sequencer Instruction Manual or the SPS 4001B Single Probe Autocalibration Sequencer Instruction Manual.

c. If autocalibration is not utilized, a common bi-directional logic contact is provided for any of the diagnostic alarms listed in Table 9-1. The assignment of alarms which can actuate this contact can be modified to one of seven additional groupings listed in Table 3-1 and Table 4-1.

   The logic contact is self-powered, +5 VDC, 340 ohm series resistance. An interposing relay will be required if this contact is to be utilized to annunciate a higher voltage device, such as a light or horn, and may also be required for certain DCS input cards. A Potter & Brumfield R10S-E1Y1-J1.0K 3.2 mA DC or an equal interposing relay will be mounted where the contact wires terminate in the control/relay room.

d. Install cover (31, Figure 10-3).

Figure 2-10. Electrical Installation - Oxymitter 5000 with Integral Electronics



ELECTRICAL INSTALLATION (WITH REMOTE ELECTRONICS)

All wiring must conform to local and national codes.

⚠WARNING

Disconnect and lock out power before connecting the power supply.

⚠WARNING

Install all protective 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.

⚠WARNING

The probe and probe abrasive shield are heavy. Use proper lifting and carrying procedures to avoid personnel injury.

NOTE
To maintain proper earth grounding, ensure a positive connection exists between the sensor housing, the electronics housing, and earth. The connecting ground wire must be 14 AWG minimum. Refer to Figure 2-11.

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

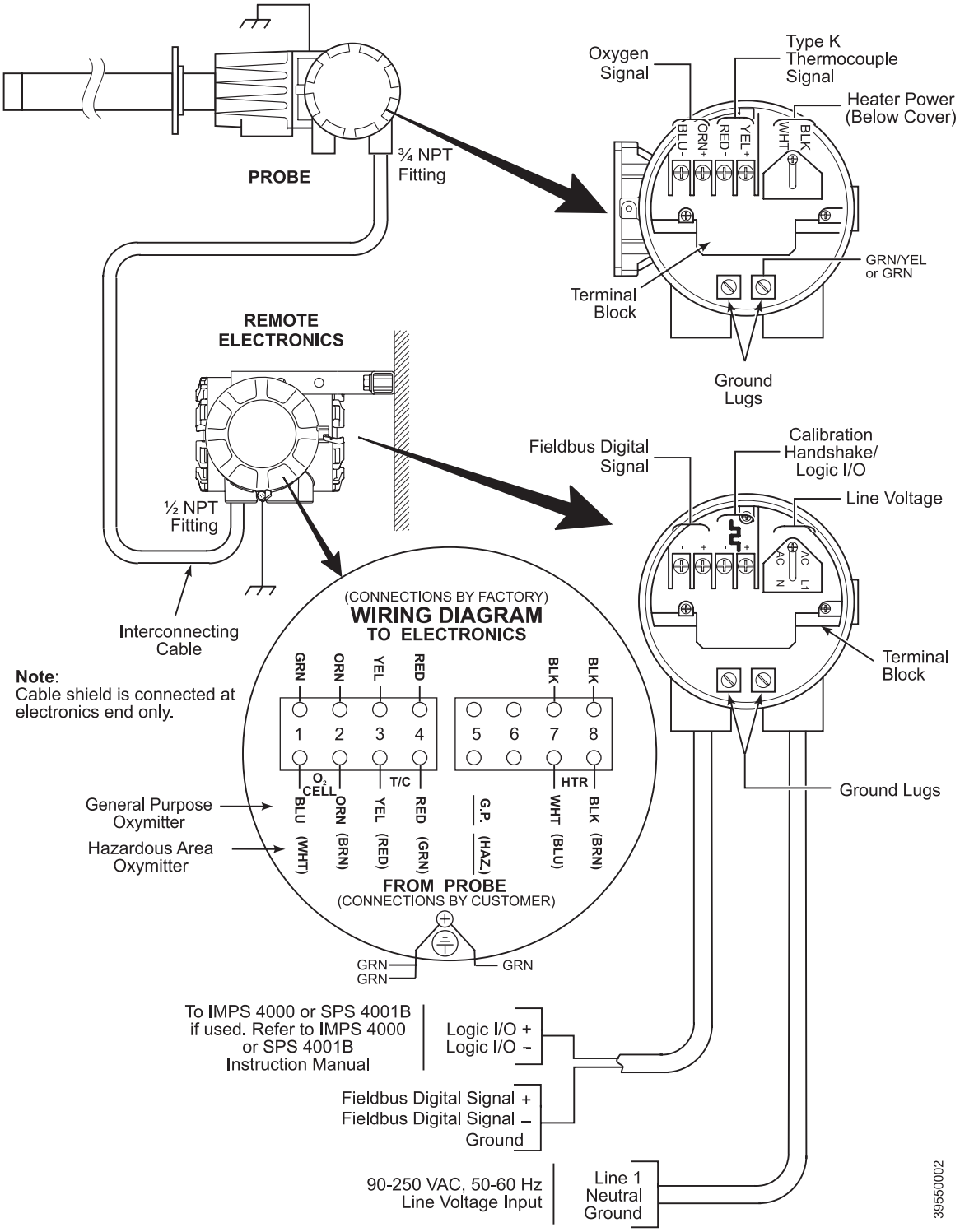
Connect Line Voltage

1. Remove cover (31) from remote electronics.
2. Connect the line, or L1 wire to the L1 terminal and the neutral, or
3. L2 wire, to the N terminal (Figure 2-11). The Oxymitter 5000 automatically will configure itself for 90-250 VAC line voltage and 50/60 Hz. The power supply requires no setup.

4. Connect fieldbus Digital Signal and Logic I/O Calibration Handshake Leads, see Figure 2-10. Use individual shielded twisted wire pairs. Terminate the shield only at the electronics housing.
   a. Fieldbus Digital Signal. The fieldbus digital signal carries the O_2 value. This digital signal can also be used to communicate with the Oxymitter.
   b. Calibration Handshake/Logic I/O. The output can either be an alarm or provide the handshaking to interface with an IMPS 4000 or SPS 4001B. For more information, refer to "Calibration Handshake Signal" in Section 4: Configuration of Oxymitter 5000 with LOI, and either the IMPS 4000 Intelligent Multiprobe Test Gas Sequencer Instruction Manual or the SPS 4001B Single Probe Autocalibration Sequencer Instruction Manual.
   c. If autocalibration is not utilized, a common bi-directional logic contact is provided for any of the diagnostic alarms listed in Table 9-1. The assignment of alarms which can actuate this contact can be modified to one of seven additional groupings listed in Table 4-1.

      The logic contact is self-powered, +5 VDC, 340 ohm series resistance. An interposing relay will be required if this contact is to be utilized to annunciate a higher voltage device, such as a light or horn, and may also be required for certain DCS input cards. A Potter & Brumfield R10S-E1Y1-J1.0K 3.2 mA DC or an equal interposing relay will be mounted where the contact wires terminate in the control/relay room.
5. Install cover (31, Figure 10-4).

Figure 2-11. Electrical Installation - Oxymitter 5000 with Remote Electronics



Install Interconnecting Cable

A multi-conductor power/signal cable connects between the probe and the remote electronics housing. Use the following procedure to connect the probe to the remote electronics.

NOTE
If interconnect cable was not purchased with the Oxymitter 5000, consult the factory for the proper wire type and gauge.

1. Run the multi-conductor cable between the probe and the remote electronics installation site. Use new cable conduit or trough as needed.
2. Remove cover (3, Figure 10-4) from remote electronics junction box (5).
3. See (Figure 2-11). Install cable and lead wires in the remote electronics conduit port shown. This conduit port accepts a 1/2 in. NPT fitting.
4. Connect the electronics end of the interconnecting cable (32) to the "FROM PROBE" side of terminal block (Figure 2-11). Use the color codes labeled "General Purpose Oxymitter".
5. Remove cover (31, Figure 10-4) from left hand side of probe housing (25). Install the cable and lead wires in the probe housing conduit port shown. This conduit port accepts a 3/4 in. NPT fitting.
6. See (Figure 2-11). Connect the heater power leads, the thermocouple leads, and the oxygen signal leads of the interconnecting cable to the terminal block. The cable leads are tagged for polarity. To avoid a shock hazard, the heater power terminal cover must be installed.
7. Install covers (3 and 31, Figure 10-4). Verify that all housing ports are closed and sealed against leakage.

PNEUMATIC INSTALLATION

Reference Air Package

After the Oxymitter 5000 is installed, connect the reference air set to the Oxymitter 5000. Refer to Figure 2-12.

Instrument Air (Reference Air): 10 psig (68.95 kPag) minimum, 225 psig (1551.38 kPag) maximum at 1 l/min (2 scfh) maximum; less than 40 parts per million total hydrocarbons. Regulator outlet pressure should be set at 5 psi (35 kPa). Reference air can be supplied by the reference air set of the IMPS 4000 or SPS 4001B.

If using an IMPS 4000, refer to the IMPS 4000 Intelligent Multiprobe Test Gas Sequencer Instruction Manual for the proper reference air connections.

If using an SPS 4001B, refer to the SPS 4001B Single Probe Autocalibration Sequencer Instruction Manual for the proper reference air connections.

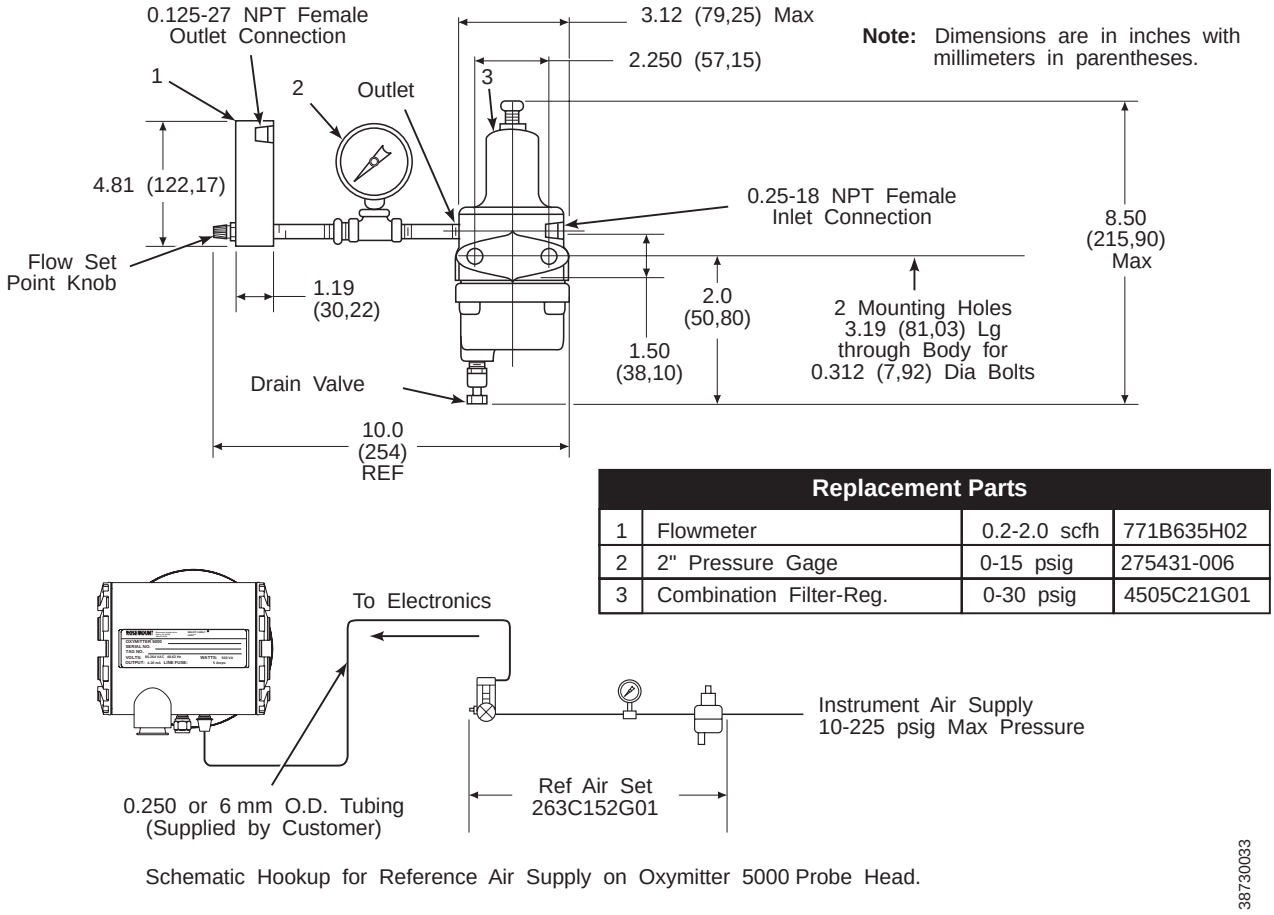
⚠CAUTION

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% O_2. Do not use gases with hydrocarbon concentrations of more than 40 parts per million. Failure to use proper gases will result in erroneous readings.

Calibration Gas

Two calibration gas concentrations are used with the Oxymitter 5000, Low Gas - 0.4% O_2 and High Gas - 8% O_2. See Figure 2-13 for the Oxymitter 5000 connections.

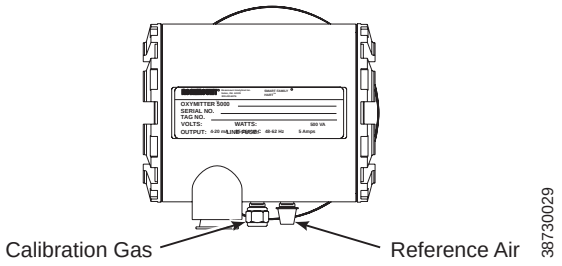
Figure 2-12. Air Set, Plant Air Connection



Replacement Parts			
1	Flowmeter	0.2-2.0 scfh	771B635H02
2	2" Pressure Gage	0-15 psig	275431-006
3	Combination Filter-Reg.	0-30 psig	4505C21G01

Schematic Hookup for Reference Air Supply on Oxymitter 5000 Probe Head.

Figure 2-13. Oxymitter 5000 Calibration Gas Connections



IMPS 4000 CONNECTIONS

See the IMPS 4000 Intelligent Multiprobe Sequencer Instruction Manual for wiring and pneumatic connection.

SPS 4001B CONNECTIONS

See the SPS 4001B Single Probe Autocalibration Sequencer Instruction Manual for wiring and pneumatic connection.

NOTE:

Upon completing installation, make sure that the Oxymitter 5000 is turned on and operating prior to firing up the combustion process. Damage can result from having a cold Oxymitter 5000 exposed to the process gases.

During outages, and if possible, leave all Oxymitter 5000 units running to prevent condensation and premature aging from thermal cycling.

⚠CAUTION

If the ducts will be washed down during outage, MAKE SURE to power down the Oxymitter 5000 units and remove them from the wash areas.

Section 3 Configuration of Oxymitter 5000 with Membrane Keypad

VERIFY INSTALLATION

⚠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.

NOTE
Refer to Appendices C, D, and E for fieldbus information concerning the Oxymitter 5000.

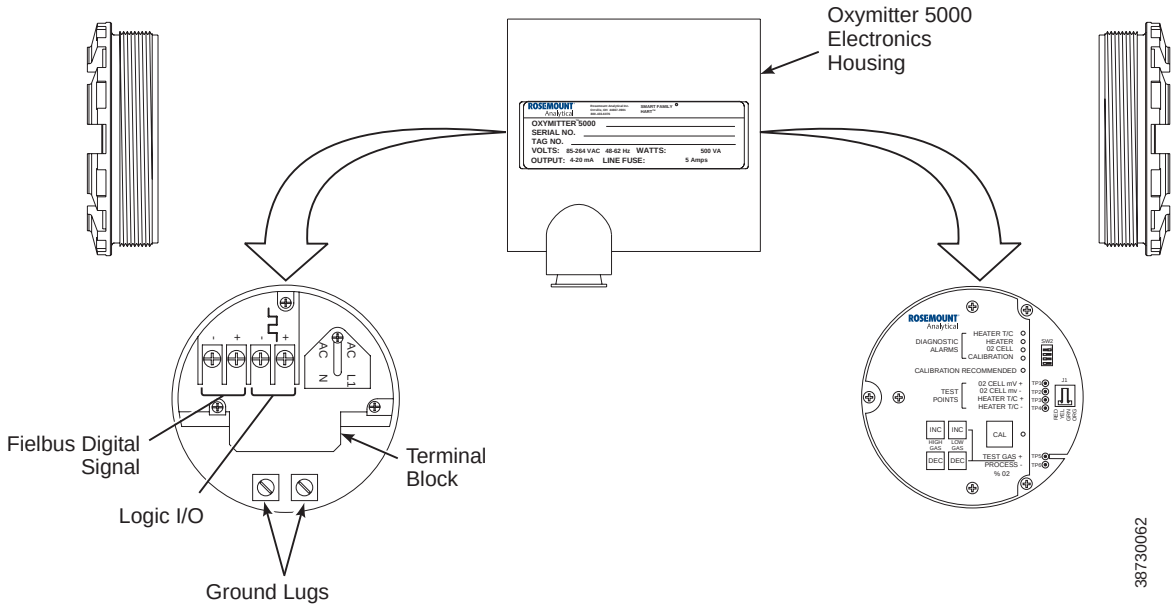
Mechanical Installation

Ensure the Oxymitter 5000 is installed correctly. See Section 2: Installation.

Terminal Block Wiring

1. Remove cover (31, Figure 10-3 or Figure 10-4) to expose terminal block (29).
2. Check the terminal block wiring (Figure 3-1). Be sure the power, fieldbus signal, and the logic outputs are properly connected and secure. To avoid a shock hazard, the power terminal cover must be installed. For units with remote electronics, check the terminal block wiring at the probe and at the remote electronics unit.
3. Install housing cover (31, Figure 10-3 or Figure 10-4) on terminal block (29).

Figure 3-1. Electronics Housing Terminals and Membrane Keypad



Oxymitter 5000 Configuration

⚠CAUTION

Remove power before changing defaults. If defaults are changed under power, damage to the electronics package may occur.

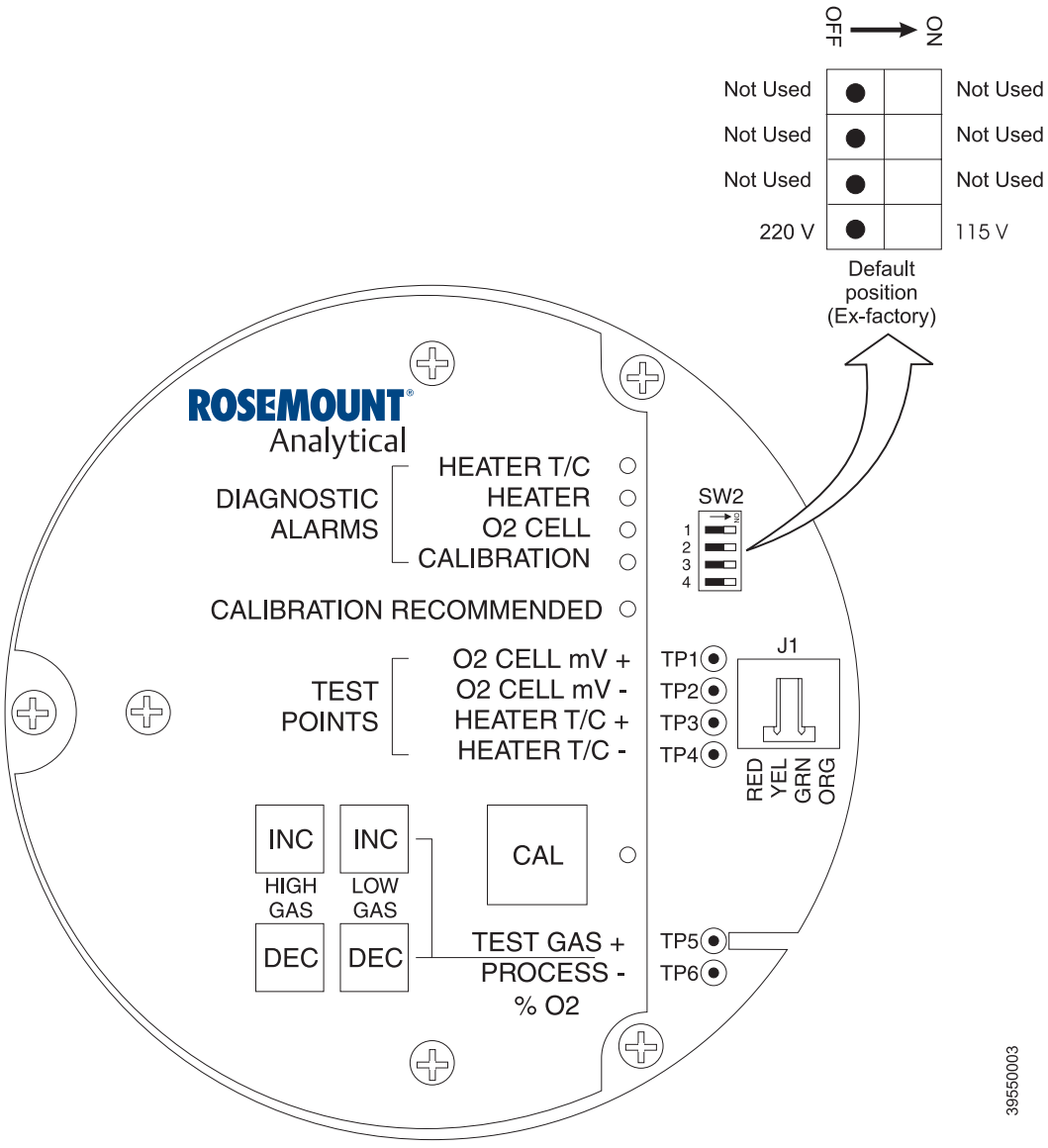
Located on the microprocessor board, the top board, is a switch that controls the cell heater for 115 or 220 VAC operation. Position 4 of this switch (SW2) is functional only when the software is set for manual voltage selection (Auto Tune = No). Otherwise, the internal electronics auto detect the input line voltage and sets the heater voltage accordingly (Auto Tune = Yes).

Positions 1, 2 and 3 of SW2 are not used and should remain in the OFF position.

⚠WARNING

Typically, the probe's sensing cell, in direct contact with the process gases, is heated to approximately 1357°F (736°C). The external temperature of the probe body may exceed 842°F (450°C). If operating conditions also contain high oxygen levels and combustible gases, the Oxymitter 5000 may self-ignite.

Figure 3-2. Defaults - Oxymitter 5000 with Membrane Keypad



Read O_2 Concentration

Once the cell is up to operating temperature, the % O_2 concentration can be read using the following method:

1. Access TP5 and TP6 next to the membrane keypad. Attach a multimeter across TP5 and TP6. The calibration and process gases can now be monitored. Pressing the INC or DEC once will cause the output to switch from the process gas to the calibration gas. Pressing INC or DEC a second time will increase or decrease the calibration gas parameter. If the keys have been inactive for one minute, the output reverts to the process gas.
2. When a calibration has been initiated, the value at TP5 and TP6 is the % O_2 seen by the cell.

   Oxygen levels, as seen on the multimeter, are:
   8.0% O_2 = 8.0 VDC
   0.4% O_2 = 0.4 VDC

NOTE
The maximum reading available at TP5 and TP6 is 30 VDC. While the Oxymitter will measure concentrations up to 40% the test point output will reach a maximum of 30 VDC at a 30% oxygen concentration.

An alternate means to display the % O_2 concentration is via the field communicator and FOUNDATION fieldbus. Refer to Section 7: Field Communicator for details.

LOGIC I/O

This two-terminal logic contact can be configured either as a solid-state relay-activated alarm or as a bi-directional calibration handshake signal to an IMPS 4000 or SPS 4001B. The configuration of this signal depends on the setting of the LOGIC I/O PIN MODE via FOUNDATION fieldbus or LOI. The ten different modes available are explained in Table 3-1.

Alarm

When configured as an alarm, this signal alerts you to an out-of-spec condition. The output is 5 V in series with a 340 ohm resistor. For optimum performance, Emerson Process Management recommends connecting the output to a Potter & Brumfield 3.2 mA DC relay (P/N R10S-E1Y1-J1.0K).

Of the ten modes in Table 3-1, mode 0 through mode 7 are the alarm modes. The factory default is mode 5 for Oxymitter 5000 units without an IMPS 4000 or SPS 4001B. In this mode, the output will signal when a unit alarm or a CALIBRATION RECOMMENDED indication occurs.

Calibration Handshake Signal

If using an optional IMPS 4000 or SPS 4001B, the logic I/O must be configured for calibration handshaking. Of the ten modes in Table 3-1, only modes 8 and 9 are configured for calibration handshaking. For an Oxymitter 5000 with an IMPS 4000 or an SPS 4001B, the factory sets the default to mode 8. In this mode, the logic I/O will be used to communicate between the Oxymitter 5000 and sequencer and to signal the sequencer when a CALIBRATION RECOMMENDATION indication occurs.

Table 3-1. Logic I/O Configuration

Mode	Configuration
0	The unit is not configured for any alarm condition.
1	The unit is configured for a Unit Alarm.
2	The unit is configured for Low O_2.
3	The unit is configured for both a Unit Alarm and Low O_2.
4	The unit is configured for a High Cell Impedance/CALIBRATION RECOMMENDED.
5*	The unit is configured for both a Unit Alarm and a High Cell Impedance/CALIBRATION RECOMMENDED.
6	The unit is configured for both a Low O_2 and High Cell Impedance/CALIBRATION RECOMMENDED.
7	The unit is configured for a Unit Alarm, a Low O_2, and a High Cell Impedance/CALIBRATION RECOMMENDED.
8**	The unit is configured for a calibration handshake with IMPS 4000 or SPS 4001B. CALIBRATION RECOMMENDED will initiate the calibration cycle.
9	The unit is configured for a calibration handshake. CALIBRATION RECOMMENDED will not initiate the calibration cycle with the IMPS 4000 or SPS 4001B.

*The default condition for an Oxymitter 5000 without an IMPS 4000 or SPS 4001B.
**The default condition for an Oxymitter 5000 with an IMPS 4000 or SPS 4001B.

Table 3-2. Logic I/O Parameters

Parameter	Definition	Range	Parameter Number
IO_PIN_MODE	This parameter represents the operating mode of the discrete IO pin of the transmitter.	1-10	40
IO_PIN_STATE	This parameter represents the current state of the transmitter's discrete IO pin. 0=FALSE, 1=TRUE.	0-1	41

Recommended Configuration

Fieldbus Signal Upon Critical Alarm

Rosemount Analytical Inc. recommends that the factory default be utilized. When a critical alarm occurs which causes the O_2 reading to become unstable or unreliable, the Oxymitter will flag the O_2 reading. All further O_2 readings will be flagged as "BAD". Status and associated blocks will become "Out Of Service".

If the O_2 measurement is being utilized as part of an automatic control loop, the loop should be placed into manual upon this failure event or other appropriate action should be taken.

Calibration

Rosemount Analytical Inc. recommends utilizing an autocalibration system, actuated by the "Calibration Recommended" diagnostic. New O_2 cells may operate for more than a year, but older cells may require recalibration every few weeks as they near the end of their life. This strategy ensures that the O_2 reading is always accurate, and eliminates many unnecessary calibrations based on calendar days or weeks since previous calibration. When utilizing the SPS 4001B or IMPS 4000, consider wiring some or all associated alarm contacts.

1. CALIBRATION INITIATE. Contact from the control room to an SPS 4001B or IMPS 4000 (one per probe) provides the ability to manually initiate a calibration at any time from the control room. Note that calibrations can also be initiated via fieldbus, or from the keypad on the Oxymitter 5000.
2. IN CALIBRATION. One contact per probe provides notification to the control room that the "calibration recommended" diagnostic has initiated an automatic calibration through the SPS 4001B or IMPS 4000. If the O_2 signal is being utilized in an automatic control loop, this contact should be utilized to place the control loop into manual during calibration.
3. CALIBRATION FAILED. One contact per probe from an SPS 4001B or IMPS 4000 to the control room for notification that the calibration procedure failed. Grouped with this alarm is an output from a pressure switch which indicates when the calibration gas bottles are empty.

Section 4 Configuration of Oxymitter 5000 with LOI

VERIFY INSTALLATION

⚠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.

NOTE
Refer to Appendices C, D, and E for fieldbus information concerning the Oxymitter 5000.

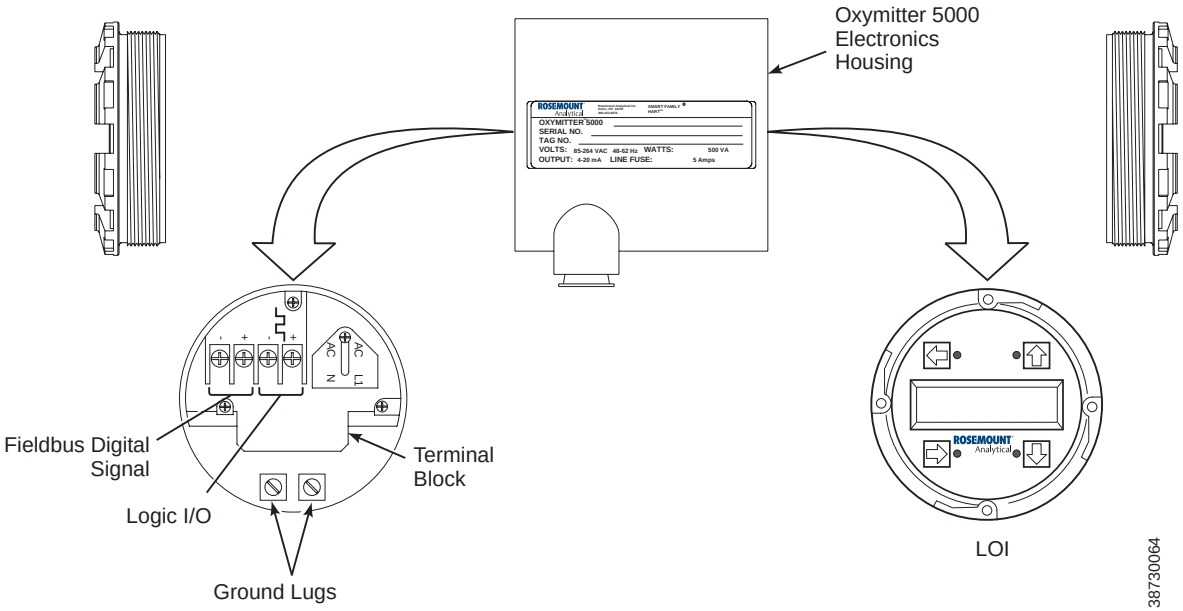
Mechanical Installation

Ensure the Oxymitter 5000 is installed correctly. See Section 2: Installation.

Terminal Block Wiring

1. Remove cover (31, Figure 10-3 or Figure 10-4) to expose terminal block (29).
2. Check the terminal block wiring, Figure 4-1. Be sure the power, fieldbus digital signal, and logic outputs are properly connected and secure. To avoid a shock hazard, the power terminal cover must be installed. For units with remote electronics, check the terminal block wiring at the probe and at the remote electronics unit.
3. Install housing cover (31, Figure 10-3 or Figure 10-4) on terminal block (29).

Figure 4-1. Electronics Housing Terminals with LOI



Oxymitter 5000 Configuration

⚠CAUTION

Remove power before changing defaults. If defaults are changed under power, damage to the electronics package may occur.

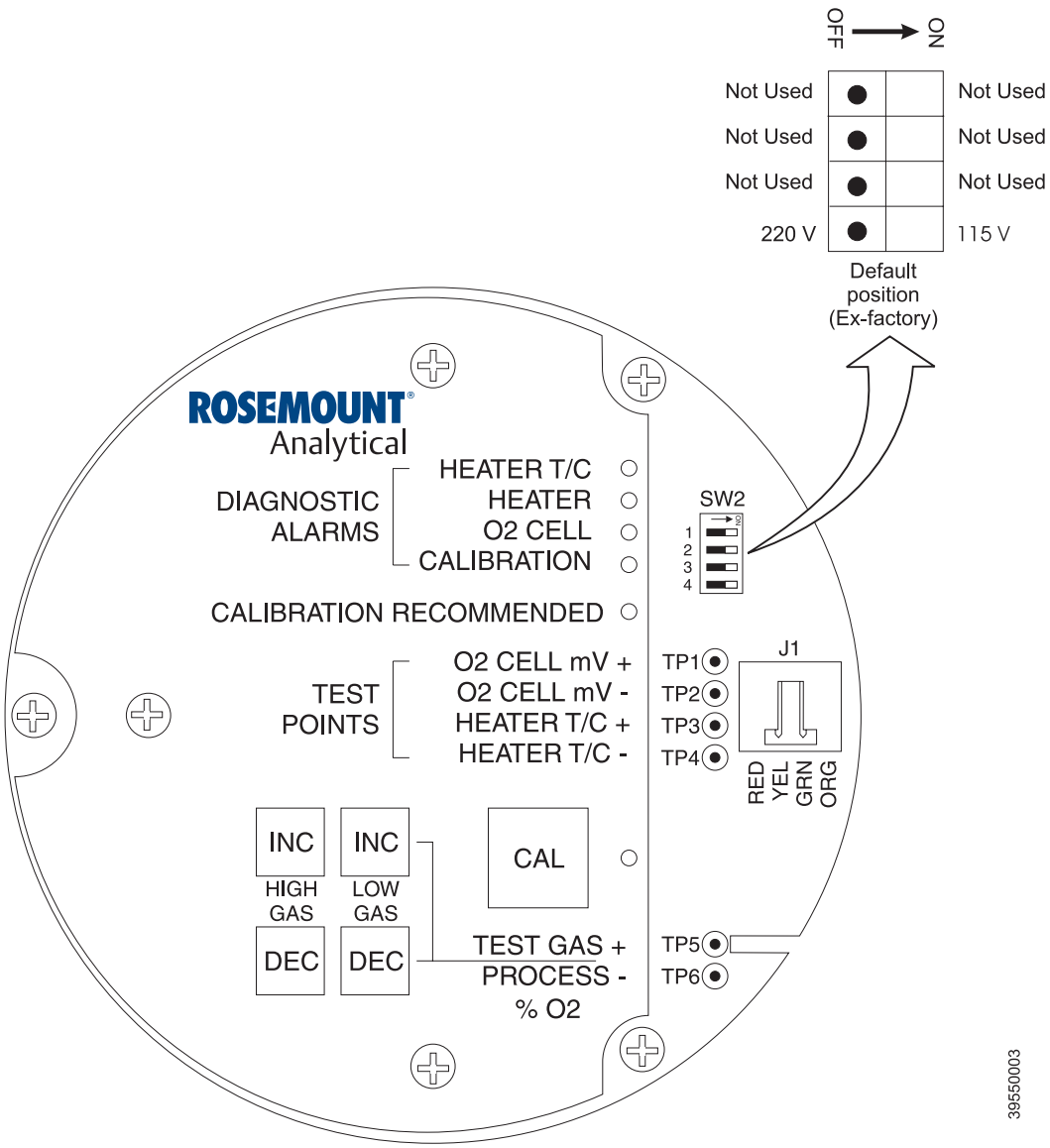
Located on the microprocessor board, the top board, is a switch that controls the cell heater for 115 or 220 VAC operation. Position 4 of this switch (SW2) is functional only when the software is set for manual voltage selection (Auto Tune = No). Otherwise, the internal electronics auto detect the input line voltage and sets the heater voltage accordingly (Auto Tune = Yes).

Positions 1, 2 and 3 of SW2 are not used and should remain in the OFF position.

⚠WARNING

Typically, the probe's sensing cell, in direct contact with the process gases, is heated to approximately 1357°F (736°C). The external temperature of the probe body may exceed 842°F (450°C). If operating conditions also contain high oxygen levels and combustible gases, the Oxymitter 5000 may self-ignite.

Figure 4-2. Defaults - Oxymitter 5000 with LOI



Read O_2 Concentration

Once the cell is up to operating temperature, the O_2 percentage can be read using the following method:

1. To access TP5 and TP6 under the LOI module (Figure 4-2), power down the Oxymitter 5000 and remove the LOI module. Attach alligator leads from a multimeter across TP5 and TP6. Install the LOI module and power up the Oxymitter 5000. Allow time for the cell to reach operating temperature. The calibration and process gases can now be monitored.
2. When a calibration has been initiated, the value at TP5 and TP6 is the % O_2 seen by the cell.

   Oxygen levels, as seen on the multimeter, are:
   8.0% O_2 = 8.0 VDC
   0.4% O_2 = 0.4 VDC

NOTE
The maximum reading available at TP5 and TP6 is 30 VDC. While the Oxymitter will measure concentrations up to 40% the test point output will reach a maximum of 30 VDC at a 30% oxygen concentration.

An alternate means to display the % O_2 concentration is via the field communicator and FOUNDATION fieldbus. Refer to Section 7: Field Communicator for details.

LOGIC I/O

This two-terminal logic contact can be configured either as a solid-state relay-activated alarm or as a bi-directional calibration handshake signal to an IMPS 4000 or SPS 4001B. The configuration of this signal depends on the setting of the LOGIC I/O PIN MODE via FOUNDATION fieldbus or LOI. The ten different modes available are explained in Table 4-1.

Alarm

When configured as an alarm, this signal alerts you to an out-of-spec condition. The output is +5 Vdc in series with a 340 ohm resistor.

For optimum performance, Emerson Process Management recommends connecting the output to a Potter & Brumfield 3.2 mA DC relay (P/N R10S-E1Y1-J1.0K).

Of the ten modes in Table 4-1, mode 1 through mode 7 are the alarm modes. The factory default is mode 5 for Oxymitter 5000 units without an IMPS 4000 or SPS 4001B. In this mode, the output will signal when a unit alarm or a CALIBRATION RECOMMENDED indication occurs.

Calibration Handshake Signal

If using an optional IMPS 4000 or SPS 4001B, the logic I/O must be configured for calibration handshaking. Of the ten modes in Table 4-1, only modes 8 and 9 are configured for calibration handshaking. For an Oxymitter 5000 with an IMPS 4000 or an SPS 4001B, the factory sets the default to mode 8. In this mode, the logic I/O will be used to communicate between the Oxymitter 5000 and the sequencer and to signal the sequencer when a CALIBRATION RECOMMENDED indication occurs.

Table 4-1. Logic I/O Configuration

Mode	Configuration
0	The unit is not configured for any alarm condition.
1	The unit is configured for a Unit Alarm.
2	The unit is configured for Low O_2.
3	The unit is configured for both a Unit Alarm and Low O_2.
4	The unit is configured for a High Cell Impedance/CALIBRATION RECOMMENDED.
5*	The unit is configured for both a Unit Alarm and a High Cell Impedance/CALIBRATION RECOMMENDED.
6	The unit is configured for both a Low O_2 and High Cell Impedance/CALIBRATION RECOMMENDED.
7	The unit is configured for a Unit Alarm, a Low O_2, and a High Cell Impedance/CALIBRATION RECOMMENDED.
8**	The unit is configured for a calibration handshake with IMPS 4000 or SPS 4001B. CALIBRATION RECOMMENDED will initiate the calibration cycle.
9	The unit is configured for a calibration handshake. CALIBRATION RECOMMENDED will not initiate the calibration cycle with the IMPS 4000 or SPS 4001B.

*The default condition for an Oxymitter 5000 without an IMPS 4000 or SPS 4001B.
**The default condition for an Oxymitter 5000 with an IMPS 4000 or SPS 4001B.

Recommended Configuration

Fieldbus Signal Upon Critical Alarm

Rosemount Analytical Inc. recommends that the factory default be utilized. When a critical alarm occurs which causes the O_2 reading to become unstable or unreliable, the Oxymitter will flag the O_2 reading. All further O_2 readings will be flagged as "BAD". Status and associated blocks will become "Out Of Service".

If the O_2 measurement is being utilized as part of an automatic control loop, the loop should be placed into manual upon this failure event or other appropriate action should be taken.

Calibration

Rosemount Analytical Inc. recommends utilizing an autocalibration system, actuated by the "calibration recommended" diagnostic. New O_2 cells may operate for more than a year, but older cells may require recalibration every few weeks as they near the end of their life. This strategy ensures that the O_2 reading is always accurate, and eliminates many unnecessary calibrations based on calendar days or weeks since previous calibration. When utilizing the SPS 4001B or IMPS 4000, consider wiring some or all associated alarm contacts.

1. CALIBRATION INITIATE. Contact from the control room to an SPS 4001B or IMPS 4000 (one per probe) provides the ability to manually initiate a calibration at any time from the control room. Note that calibrations can also be initiated via fieldbus, or from the keypad on the Oxymitter 5000.
2. IN CALIBRATION. One contact per probe provides notification to the control room that the "calibration recommended" diagnostic has initiated an automatic calibration through the SPS 4001B or IMPS 4000. If the O_2 signal is being utilized in an automatic control loop, this contact should be utilized to place the control loop into manual during calibration.

3. CALIBRATION FAILED. One contact per probe from an SPS 4001B or IMPS 4000 to the control room for notification that the calibration procedure failed. Grouped with this alarm is an output from a pressure switch which indicates when the calibration gas bottles are empty.

Section 5 Startup and Operation of Oxymitter 5000 with Membrane Keypad

POWER UP

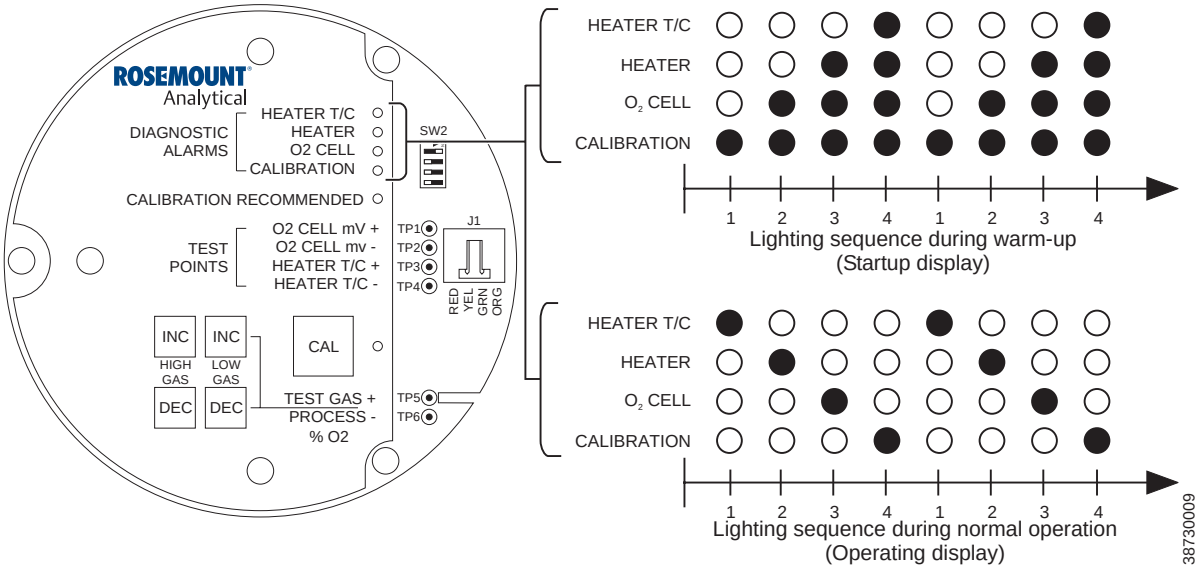
Startup Display

When power is applied to the probe, the cell heater turns on. It takes approximately one half hour for the cell to heat to operating temperature. This condition is indicated by the top four LEDs (DIAGNOSTIC ALARMS) on the membrane keypad (Figure 5-1). Starting with the CALIBRATION LED, the LEDs light in ascending order until all four LEDs are on. At this point, all four turn off and the cycle starts again. This ramp cycle continues until the cell is up to operating temperature.

Operating Display

The ramp cycle turns into a cycle where the diagnostic LEDs light in sequence from the top to the bottom, one at a time. After the bottom LED turns on, the sequence starts again at the top with the HEATER T/C LED (Figure 5-1).

Figure 5-1. Startup and Normal Operation



Error

If there is an error condition at startup, one of the diagnostics LEDs will be blinking. Refer to Section 9: Troubleshooting, to determine the cause of the error. Clear the error, cycle power, and the operating display should return.

Keypad

The five membrane keys on the membrane keypad are only used during calibration to adjust the high and low gas and to initiate the calibration sequence (Figure 5-2).

Reference Air

Ensure reference air, if used, is set to 1 l/min (2 scfh)

OPERATION

Overview

Ensure the Oxymitter 5000 is at normal operation. The diagnostic LEDs will display the operating cycle. All other LEDs should be off (Figure 5-1).

DIAGNOSTIC ALARM LEDs

If there is an error in the system, one of these LEDs will flash various blink codes (Section 9: Troubleshooting). In the case of multiple errors, only one will be displayed based on a priority system. Correct the problem and cycle power. The operating display will return or the next error will be displayed. The alarms are:

HEATER T/C
HEATER
O_2 CELL
CALIBRATION

CALIBRATION RECOMMENDED LED

Turns on when the system determines that a calibration is recommended. Further information is available in Section 10: Maintenance and Service.

TEST POINTS

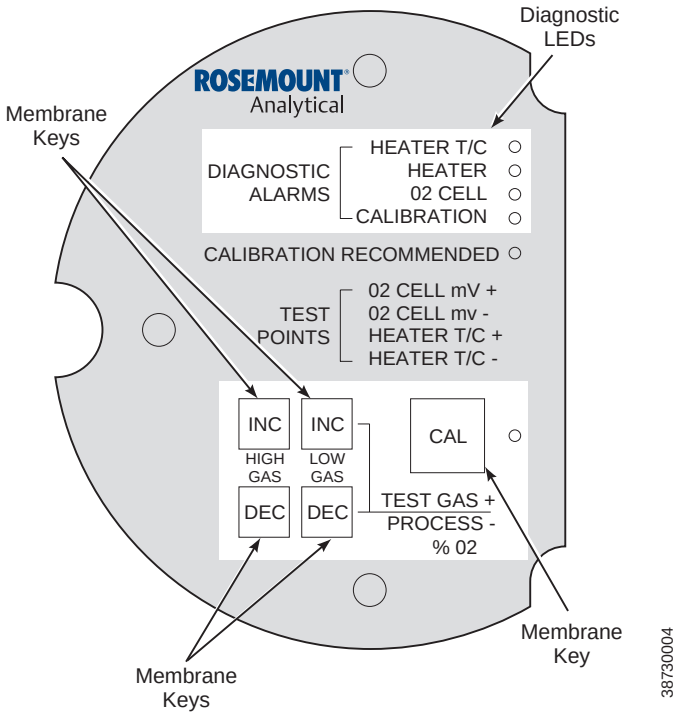
Test points 1 through 6 will allow you to monitor with a multimeter: the heater thermocouple, O_2 cell millivolt, and the process O_2.

1. TP1 and TP2 monitor the oxygen cell millivolt output which equates to the percentage of oxygen present.
2. TP3 and TP4 monitor the heater thermocouple.
3. TP5 and TP6 monitor the process gas or the calibration gas parameter.

CAL LED

The CAL LED is on steady or flashing during calibration. Further information is available in Section 10: Maintenance and Service.

Figure 5-2. Calibration Keys



Keys

INC and DEC. The INC and DEC keys are used to set the values of the calibration gases. Attach a multimeter across TP5 and TP6. The calibration and process gases can now be monitored. Pressing the INC or DEC once will cause the output to switch from the process gas to the calibration gas. Pressing INC or DEC a second time will increase or decrease the calibration gas parameter. If the keys have been inactive for one minute, the output reverts to the process gas. When a calibration has been initiated, the value at TP5 and TP6 is the % O_2 seen by the cell.

Oxygen levels, as seen on the multimeter, are:
8.0% O_2 = 8.0 volts DC
0.4% O_2 = 0.4 volts DC

CAL

The CAL key can:

- Initiate a calibration.
- Sequence through calibration.
- Abort the calibration.

NOTE
Refer Section 10: Maintenance and Service, for calibration instructions.

Section 6 Startup and Operation of Oxymitter 5000 with LOI

POWER UP

Startup Display

When power is applied to the probe, the cell heater turns on. It takes approximately one half hour for the cell to heat to operating temperature. This condition is indicated by a "warm up" display on the LOI (Figure 6-1). This message will continue to display until the cell is up to operating temperature.

Operating Display

The normal operating display is the $\%O_2$ concentration. The "normal" display is shown in Figure 6-2.

Error

If there is an error condition at startup, an alarm message will be displayed. Refer to Section 9: Troubleshooting, to determine the cause of the error. Clear the error, cycle power, and the $\%O_2$ display should return.

LOI

The Local Operator Interface can be used to change the software and alarm settings, to adjust the high and low gas settings, and to initiate the calibration sequence. Refer to the LOI menu (Figure 6-4).

Figure 6-1. Startup Display

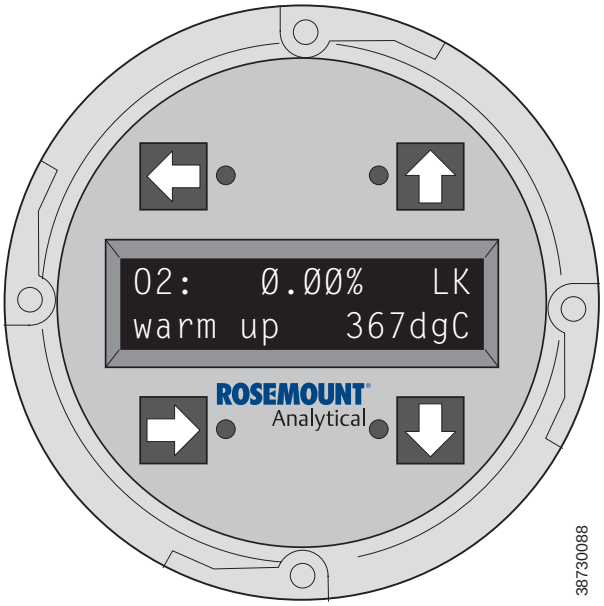


Figure 6-2. O_2 Concentration Display

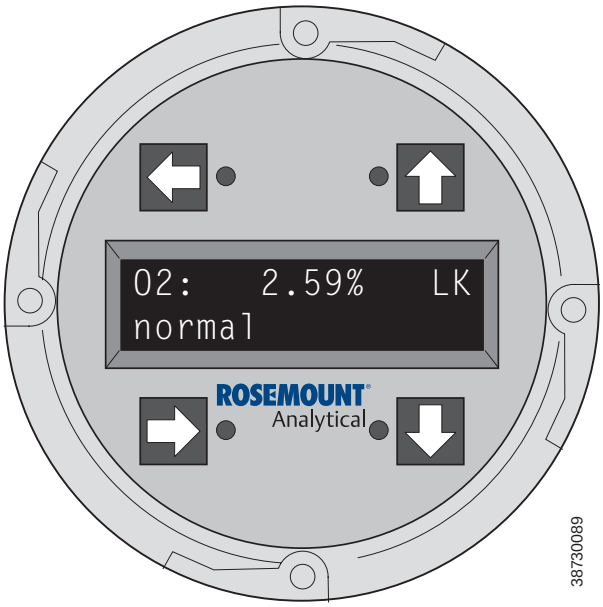
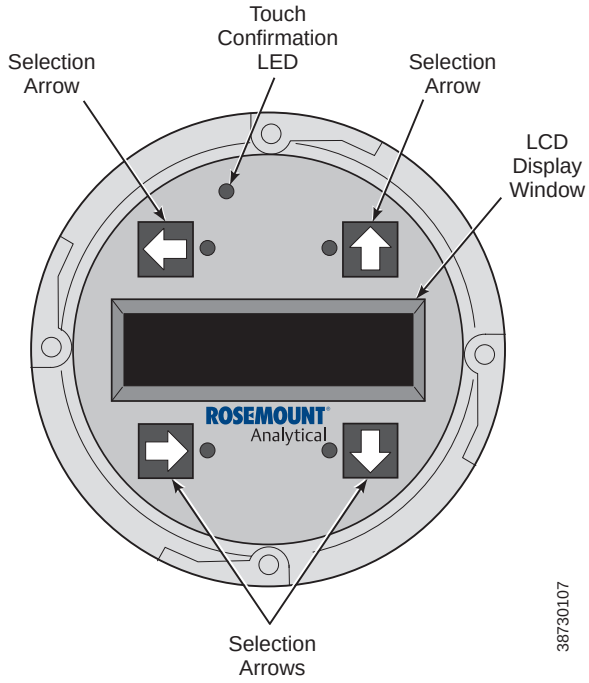


Figure 6-3. LOI Features



START OXYMITTER 5000 CALIBRATION

Refer to Section 10: Maintenance and Service, for calibration instructions.

NAVIGATING THE LOCAL OPERATOR INTERFACE

Overview

The Local Operator Interface (LOI), shown in Figure 6-3, utilizes a bright blue gas-fluorescent display. Intensity is adjustable. There is an Infrared LED source and a detector for each key. The detectors can detect a finger placed above the button through the glass window. There is no need to open the instrument in bad weather in order to access the electronics.

Lockout

The Local Operator Interface (LOI) has a lockout feature that prevents nuisance actuation by someone brushing against the glass window, raindrops, dirt, insects, etc. This lockout mode is automatically established when no buttons are pushed for 30 seconds (default). This countdown to lockout is configurable.

In order to unlock the display, input a "Z" pattern. First, push the top left (gray) arrow, then the top right, followed by the bottom left and finally the bottom right. The "LK" notation in the upper right corner of the display will now disappear. Push the gray arrow at the top left hand corner once more to enter into the menu structure. Once one moves deeper into the menu structure, additional time is provided to the user so that the lockout initiation does not become a nuisance. This additional "revert" time is defaulted at one hour and is also user configurable.

NOTE
Always clean dust and soil away from the LOI screen each time the LOI is used. Excessive dust can prevent the LOI from entering lockout. This condition can cause uncommanded operations to occur.

LOI KEY DESIGNATIONS

The gray key (top left) will move one level higher in the menu structure. When entering numbers, this key will move the cursor to the left. This key also doubles as an "Enter" key, once numbers are entered, and when the cursor is moved to its left-most position. The new data entry value will appear in the top line of the LOI display once it is accepted.

The blue key (bottom left) acts as a selector when choosing from among a number of menu items. This key will move the cursor to the right when entering numbers.

Up/Down keys (to the left side of the keypad) are used to increment up and down when selecting from a series of menu picks. They are used for incrementing values up and down for data input.

LOI MENU TREE

This LOI menu for the Oxymitter 5000 is shown in Figure 6-4. This menu tree is specific to the Oxymitter 5000. The menu tree will assist in navigating the LOI.

Menu items in normal text display information only. Menu items in italics permit data entry. Menu items in bold text are procedures.

Figure 6-4. Menu Tree for Local Operator Interface on the Oxymitter 5000 (Sheet 1 of 2)

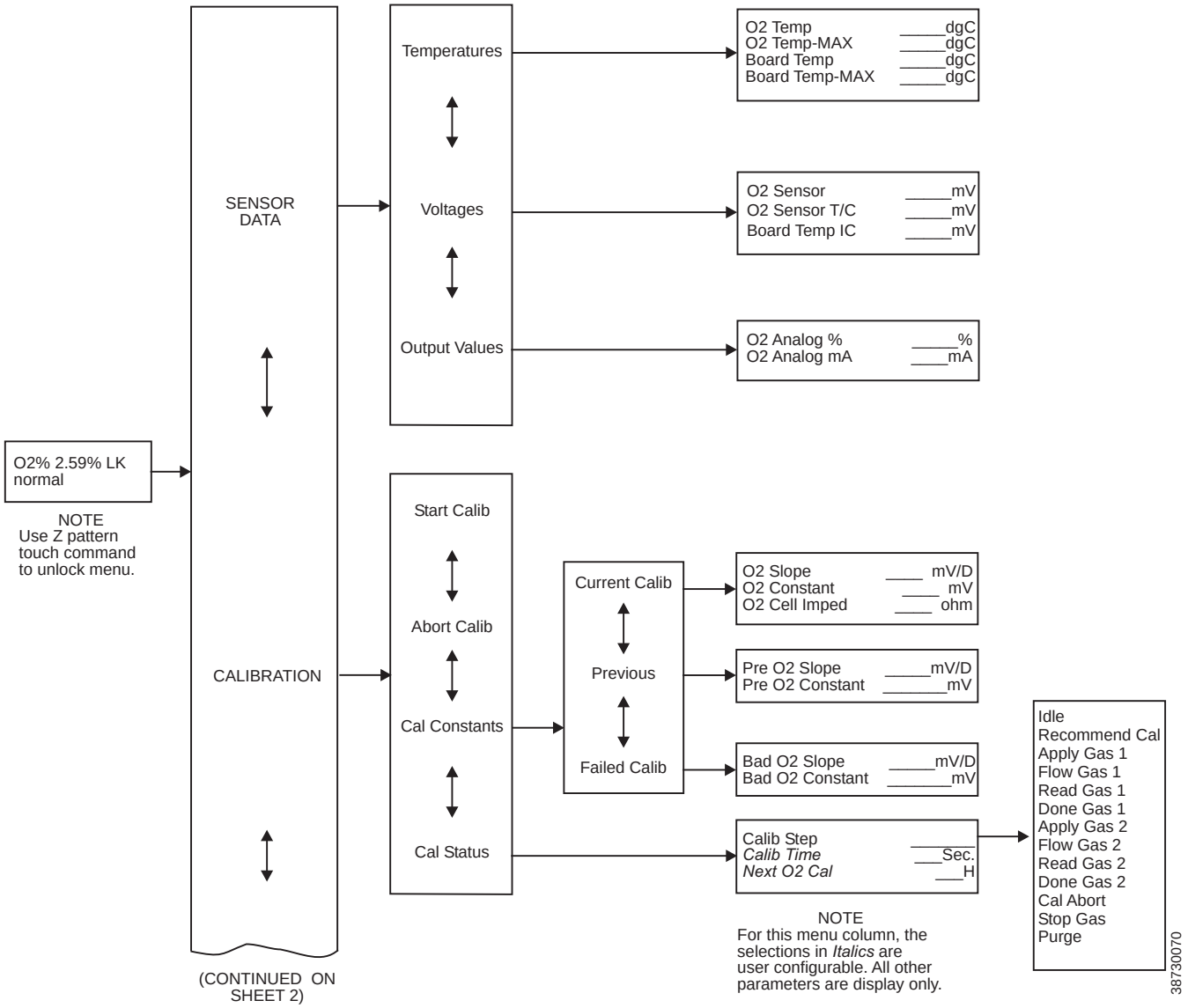
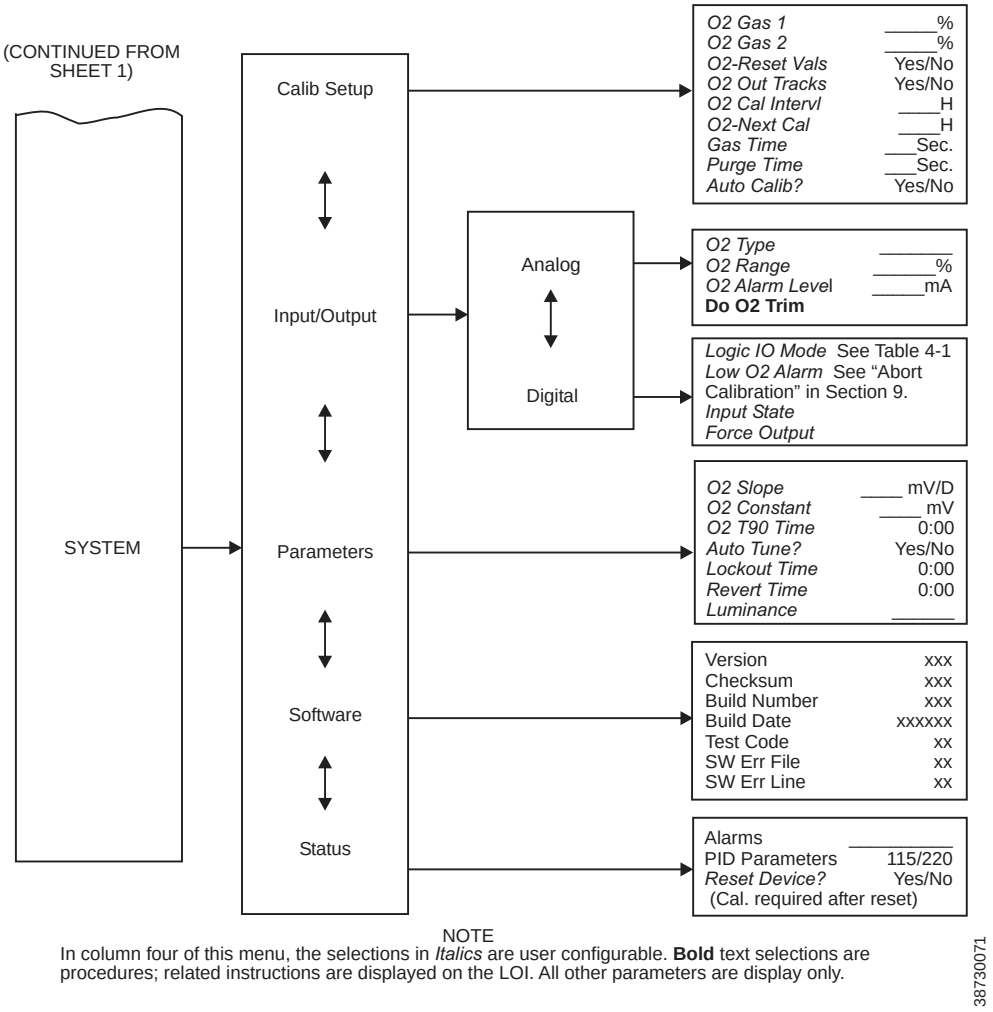


Figure 6-4. Menu Tree for Local Operator Interface (LOI) on the Oxymitter 5000 (Sheet 2 of 2)



NOTE
In column four of this menu, the selections in *Italics* are user configurable. **Bold** text selections are procedures; related instructions are displayed on the LOI. All other parameters are display only.

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OXYMITTER 5000 SETUP AT THE LOI

In setting up the Oxymitter 5000 from the LOI, it is best to start at the SYSTEM/Calibration Setup menu, Figure 6-4.

SYSTEM/Calibration Setup

O2 Gas #1 - Enter the high or low cal gas value (the order is not important).

O2 Gas #2 - Enter the second cal gas value.

NOTE
Refer to Section 10: Maintenance and Service, for calibration instructions.

NOTE
Emerson Process Management recommends 0.4% O_2 and 8% O_2 for calibration gases.

O2 Reset Values - Resets factory default values.

O2 Output Tracks - 4 to 20 mA signal can be held at the last value during calibration, or the signal can be left to track the cal gases.

O2 Cal Interval - If automatic calibration is selected, this selects the interval between calibrations.

O2 Next Cal - If automatic calibration is selected, this selects the time until the first initial calibration takes place.

Gas Time - How long should each cal gas flow. Factory default is 300 seconds, but the user may want to vary this depending on the length of calibration gas tubing runs.

Purge Time - Used if the O_2 output is selected to hold the last value during calibration. After the second cal gas is removed, how long until the sensor comes back to the normal process reading, and the fieldbus digital signal can be released.

Auto Calib? - Select "Yes" if an SPS or IMPS autocalibration system is part of the system.

SYSTEM/Input/Output

Analog

These parameters are not used on the Oxymitter 5000.

Digital

A bi-directional logic signal may be configured as an alarm, or as a calibration handshake signal.

Logic I/O Mode - One of 9 different sets of conditions can be set for the digital signal. See Table 9-2.

Low O2 Alarm - If any of the conditions noted above include a low O_2 process alarm, set the value here.

Input State - Notes the current condition of the bi-directional digital signal.

Force Output - Forces the output state of the signal to either open or closed. This is used primarily when diagnosing potential problems with this signal.

SYSTEM/Parameters

O2 Slope - O_2 slope is data regarding the strength of the sensing cell output. This information is automatically calculated after a calibration, and the user does not normally input this data.

O2 Constant - O_2 constant is the amount of voltage a cell generates with ambient air as the calibration gas. Again, this is normally calculated as a result of calibration, and is not normally input by the user.

O2 T90 Time - Some users may feel that the O_2 reading is too active for certain processes. This feature permits the user to dampen the O_2 signal. The default value is zero seconds dampening.

Auto Tune - The electronics detects the line voltage powering the instrument automatically and picks proper algorithms for heater control. User can force a high voltage algorithm, or a low, but Auto Tune is the default, and is recommended.

Lockout Time - Keypad lockout time default is 30 sec., but it is user configurable. A "Z" keypad pattern will unlock the keypad.

Revert Time - Once a user goes one level deep into the menu structure, an additional "revert time" is provided to prevent nuisance lockouts. One hour is the default, and it is user configurable.

Luminance - Gas fluorescence brightness is user adjustable.

SYSTEM/Status

Alarms - Diagnostic alarms. Section 9: Troubleshooting.

PID Parameter - Displays the line voltage, powering the Oxymitter, and infers the temperature control algorithm being used to control heater temperature.

Reset Device - Device can be reset here as opposed to re-powering. Calibration parameters will be lost.

SYSTEM/Software

This is data regarding the Oxymitter 5000 software version, and errors that may have occurred.

SENSOR DATA

Displays information about the O_2 cell and thermocouple.

Temperatures

O2 Temp - Indicates the thermocouple temperature at the sensing cell; this should always be 1357°F (736°C).

O2 Temp Max - Maximum temperature the cell has seen. (Some process temperatures can exceed the 1357°F (736°C) setpoint temperature, and this will ***indicate this condition.)***

Board Temp - The temperature inside the Oxymitter electronics housing 185°F (85°C), is the max.

Board Temp Max - This is the maximum temperature that the electronics has experienced over time.

Voltages

The raw mV signals feeding the temperature indications listed in the previous paragraph.

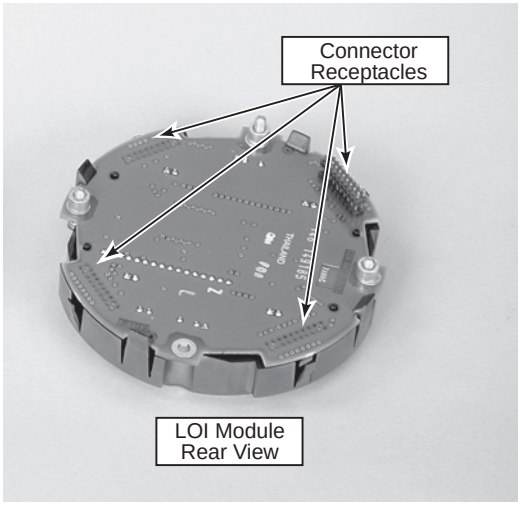
Output Values

Indication of the current readings for O_2.

LOI INSTALLATION

The LOI module connects to the top of the electronic assembly in the electronics housing. There are four matching connectors (Figure 6-5) on the back of the LOI module that allow the user to orient (rotate) the LOI as desired.

Figure 6-5. LOI Module Connectors

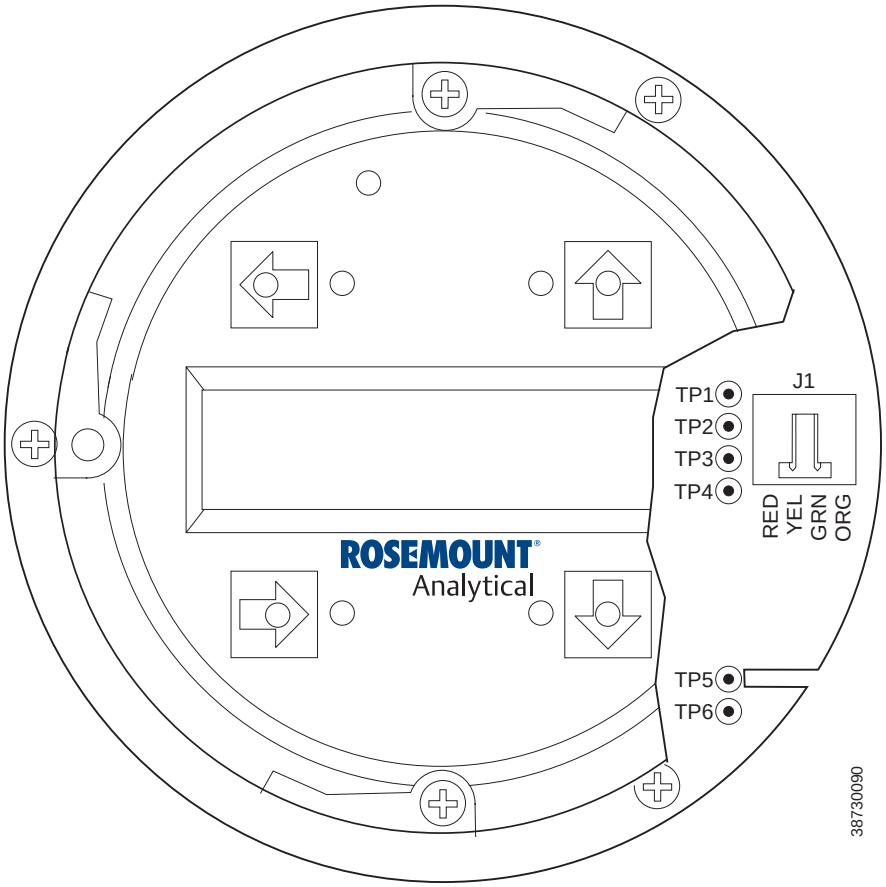


OXYMITTER 5000 TEST POINTS

Refer to Figure 6-6. System test points are located on the board below the LOI module. Test points 1 through 6 allow you to monitor with a multimeter: the heater thermocouple, the O_2 cell millivolt, and the process O_2.

- TP1 and TP2 monitor the oxygen cell millivolt output which equates to the percentage of oxygen present.
- TP3 and TP4 monitor the heater thermocouple.
- TP5 and TP6 monitor the process gas or the calibration gas parameter.

Figure 6-6. Oxymitter 5000 - Test Points



Section 7 Field Communicator

OVERVIEW

The Field Communicator is a communications interface device. It provides a common communications link to HART and foundation Fieldbus instruments. The Field Communicator has a liquid crystal display (LCD). An instruction manual, included with the Field Communicator, details the specific functions of all the keys.

To interface with the Oxymitter 5000 the communicator requires a termination point along a common fieldbus terminal block with the Oxymitter 5000. The Field Communicator accomplishes this task by using a fieldbus digital signal to network the components.

The Field Communicator may be interfaced with a personal computer (PC) to update the communicator, transfer files, and enable new licences using the 375 Easy Upgrade Programming Utility. To connect the Field Communicator to a PC an IrDA interface adapter is required.

Refer to the proper Field Communicator documentation in regard to the PC interface option.

FIELDBUS TERMINAL BLOCK CONNECTIONS

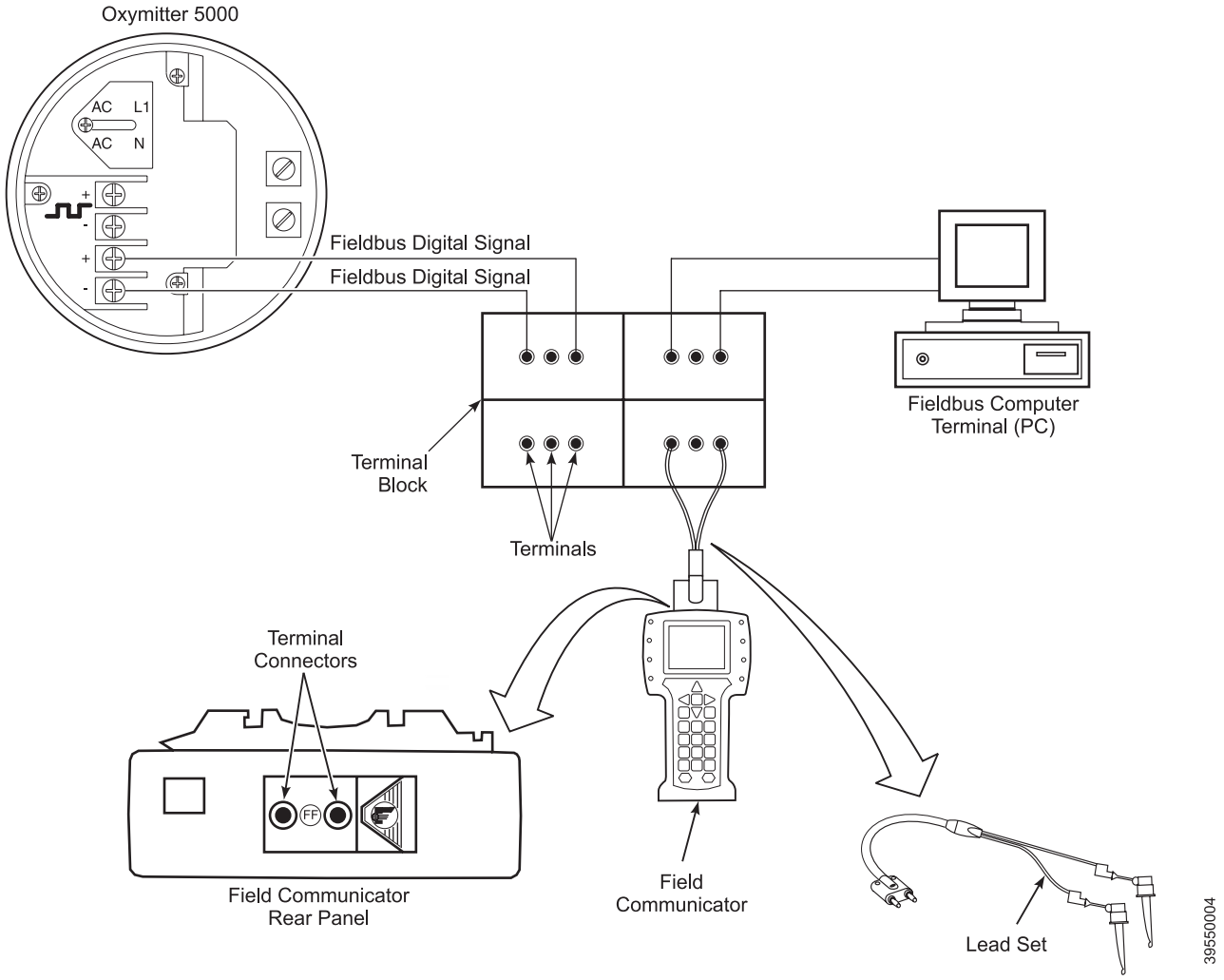
Any device implemented into the system is routed through the fieldbus terminal block. The Field Communicator uses the supplied lead set to connect to the terminal block while the Oxymitter 5000 uses the wires connected to the probe as shown in Figure 7-1.

Refer to the proper Field Communicator documentation in regard to the PC interface option.

⚠WARNING

Explosions can result in death or serious injury. Do not make connections to the Field Communicator's serial port, digital signal line, or NiCad recharger jack in an explosive atmosphere.

Figure 7-1. Fieldbus Terminal Block Connections



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 Oxymitter 5000. Off-line operations can include interfacing the Field Communicator with a PC (refer to applicable Field Communicator documentation regarding Model 375/PC applications). In the on-line mode the communicator is connected to a fieldbus terminal block.

NOTE
If the Field Communicator is turned on while connected to the fieldbus terminal block, 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.

FIELDBUS MENU TREE

This section provides a menu tree for the fieldbus communicator. This menu tree is specific to Oxymitter 5000 applications. Refer to Appendix C: Fieldbus Parameter Description for the applicable range, units, and description of the fieldbus menu parameters.

Figure 7-1. Fieldbus Menu Tree,
Sheet 1 of 2

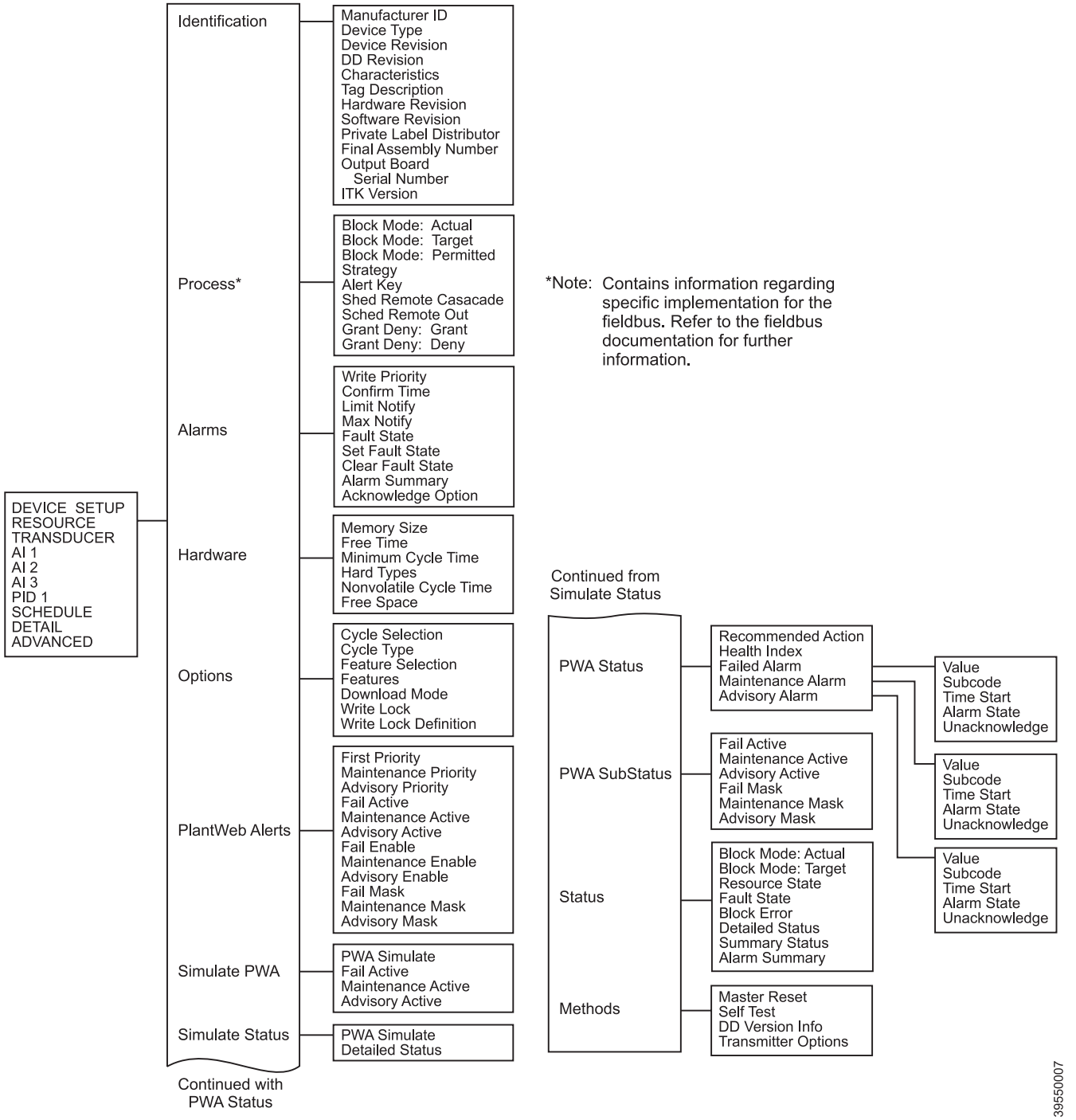
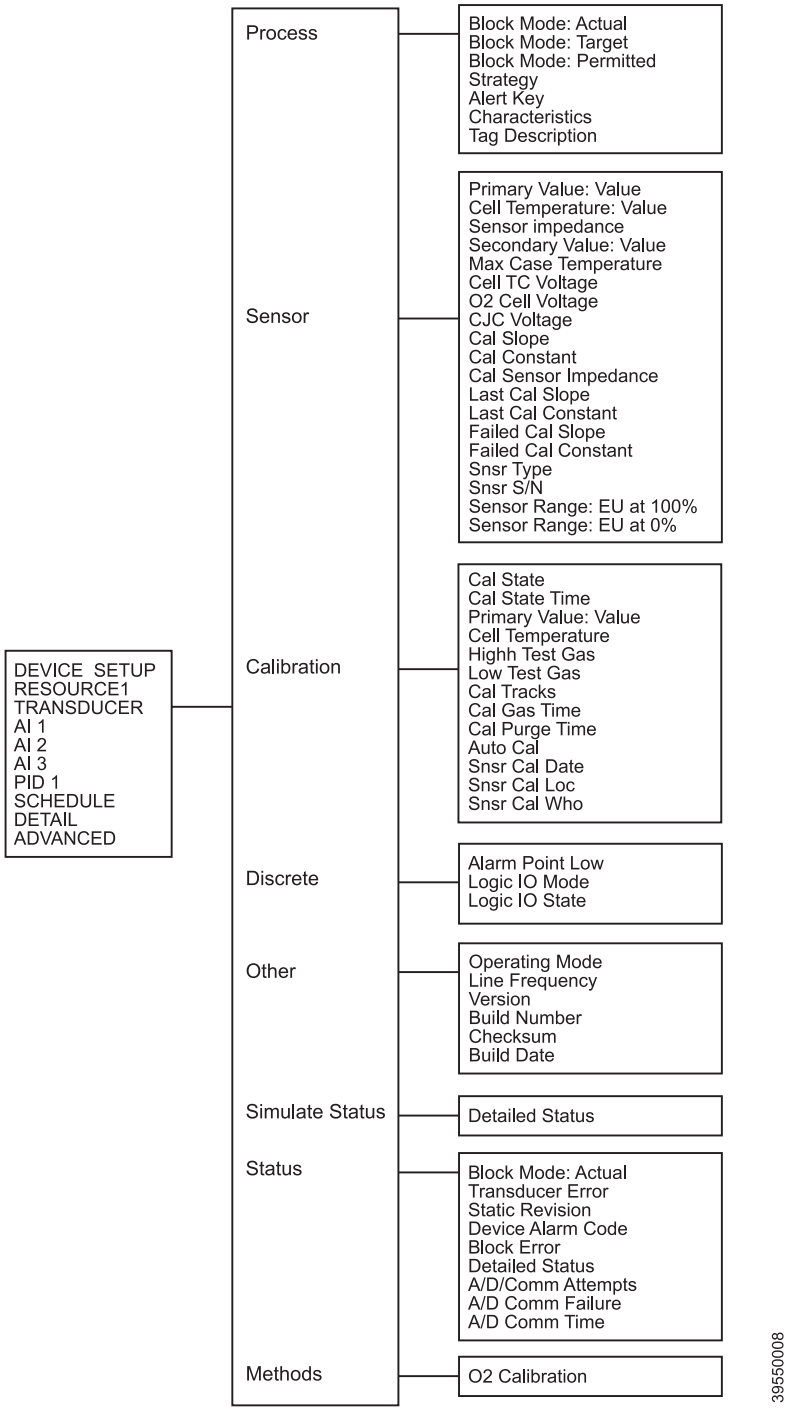


Figure 7-1. Fieldbus Menu Tree,
Sheet 2 of 2



FOUNDATION FIELDBUS O_2 CAL METHOD

To perform a calibration using the FOUNDATION fieldbus use the following procedure.

1. Run the O_2 Calibration | Method in the Transducer Block (Transducer | Method).

⚠WARNING

Failure to remove the Oxymitter 5000 from automatic control loops prior to performing this procedure may result in dangerous operating conditions.

2. In the first O_2 CAL screen, a "Loop should be removed from automatic control" warning appears. Remove the Oxymitter 5000 from any automatic control loops to avoid a potentially dangerous operating condition and press OK.
3. From this point follow the on-screen prompts to complete the calibration procedure. When a step is complete select Proceed to Next Step and press the Next button.
4. During the wait periods, such as during a purge, the Time Remaining display may be updated by selecting Update and pressing Next button.

Section 8 PlantWeb Alerts

INTRODUCTION

This section describes how device-specific alarms unique to the Oxymitter 5000 are included in the alarm mapping rules already defined in the “Rosemount Common Practice Resource Book Specification”.

PLANTWEB ALERT GROUPS

The PlantWeb Alerts (PWA) software supports three groups of alarms for three severity levels: 1) Failed, 2) Maintenance, and 3) Advisory. Each PWA can be configured for one or more of the three alarm groups. The PWA alarms and their severity level default settings are listed in Table 8-1.

Table 8-1. PWA Alarms for Oxymitter 5000

PlantWeb Alert	Severity Level Default
Reserved: none	
Line Input Out of Range	Advisory
NV Writes Deferred	Advisory
Calibration Recommended	Advisory
Simulate Active	Advisory
Handshake Failure	Maintenance
High Electronics Temperature	Maintenance
Calibration Error	Maintenance
Sensor Heater Temperature Variance	Maintenance
Oxygen Sensor Degraded	Failed
Thermocouple Malfunction	Failed
Sensor Heater Malfunction	Failed
Sensor Heater Over Temperature	Failed
NV Memory Failure	Failed
ADC Failure	Failed
Oxygen Sensor Disconnect	Failed
Inter Board Comm Failure	Failed

Each alarm condition can be “Enabled”, “Disabled”, or have alarm reporting “Suppressed”. The PWA alarms must be “Enabled” to allow the corresponding alarm condition to be detected. The PWA alarms can be “Suppressed” to mask out failures from annunciation.

PLANTWEB ALERT CONFIGURATION

The PWA alarm parameters are user-configurable. To configure the PlantWeb alerts, select “Configuration/Setup“ from the Resource Block using the Asset Management Software (AMS) or use the field communicator to select Resource | PlantWeb Alerts from the fieldbus menu. One of five PWA Configuration screens can be displayed using AMS:

1. O2 Alerts
2. Temperature Alerts
3. Calibration Alerts
4. Device Alerts
5. FF/Device Alerts

The O_2 Alerts Configuration/Setup screen is shown in Figure 8-1. the other four PWA Configure screens are similar. Use the screens to reconfigure the PWA alarm settings.

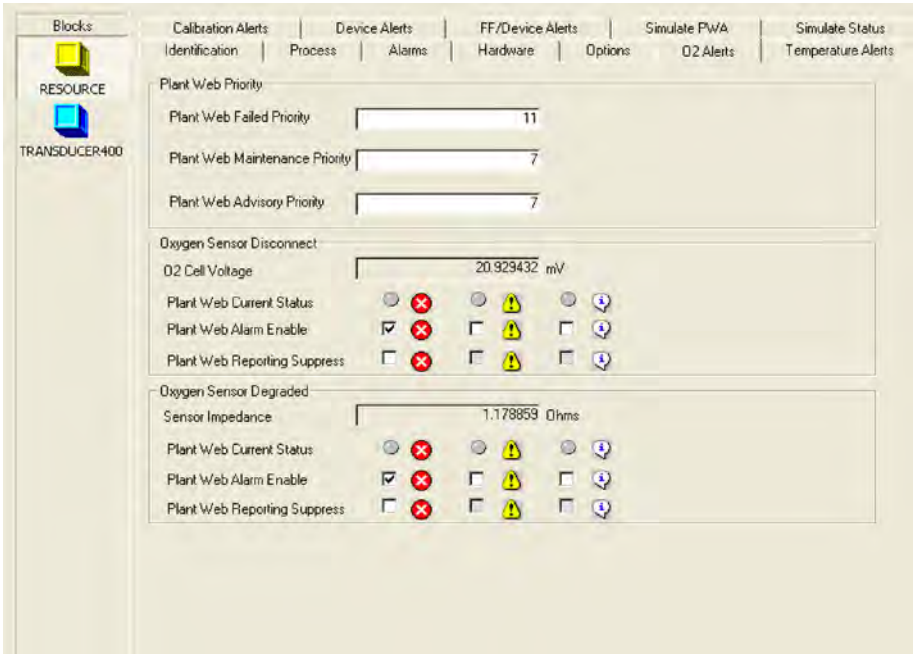
PlantWeb Priorities

Typically, the PlantWeb Alert Priorities are automatically set by the host. Using the AMS Configuration/Setup screen, the PlantWeb Alert Priority can be set from 0 to 15. The priority must be set to 4 or higher for the alarm condition to be broadcast.

Reset PWA Defaults

To reset the Oxymitter 5000 to the default “PWA Enable” settings, use the Master Reset method. Select Methods | Master Reset from the Resource Block and select "PWA Defaults" as the reset type. The PWA will be reset to the default “PWA Enable” settings.

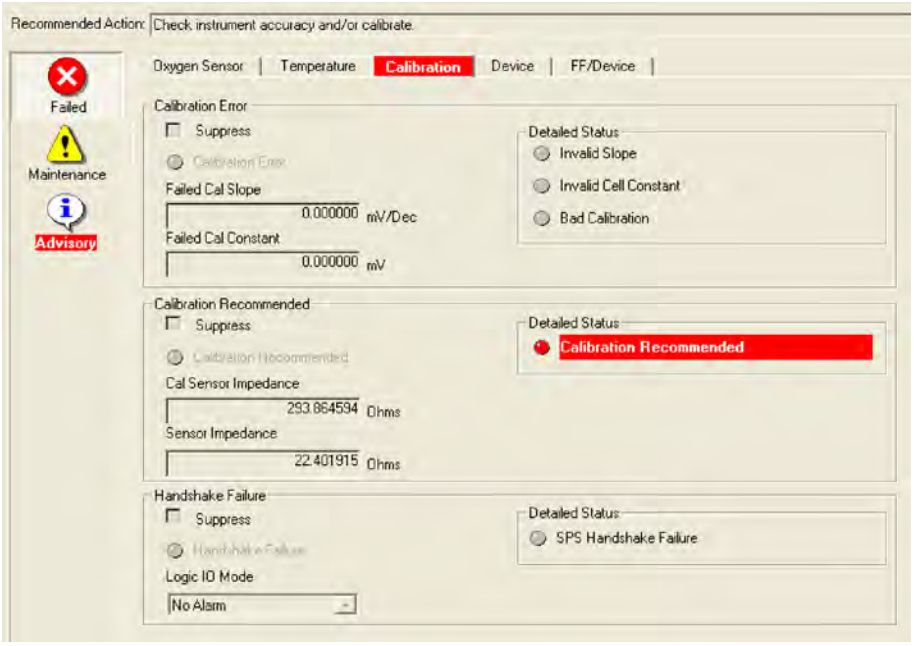
Figure 8-1. PWA Configuration/Setup Screen



PWA Device Diagnostics

To view the active PWA alarms, select "Device Diagnostics" from the AMS or the Resource | PWA SubStatus menu of the 375 Field Communicator. The Device Diagnostics screen (Figure 8-2) is displayed.

Figure 8-2. PWA Device Diagnostics Screen



FIELDBUS/PWA SIMULATE

Fieldbus simulation and PWA simulation can be enabled and disabled using the DD method. Use the "Transmitter Options" method to enable/disable the Fieldbus or PlantWeb Alerts simulation.

Selecting “Fieldbus simulation” enables both the Fieldbus function block simulation and PWA simulation. Selecting “PWA simulation” enables PlantWeb Alert simulation only.

⚠CAUTION

Do not use the PWA Simulate feature for normal operations. When used improperly the Simulate feature can alter, disable, or activate device alarms.

The simulation feature should not be used for normal operations. This feature is to be used by authorized personnel for testing or demonstration purposes only.

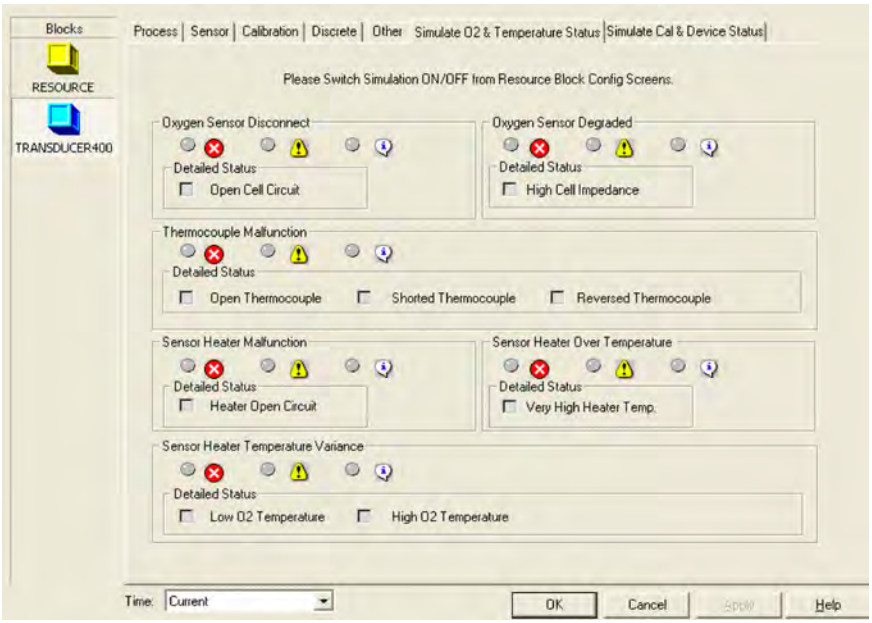
Configure Simulation from AMS

Use the following procedure to configure PWA simulation using AMS.

1. Run "Transmitter Options" method in the Resource Block.
2. In the "Transmitter Options" menu, select either "Simulate Switch" or "PWA Simulate".
3. Select "Enable" to enable the simulation feature or "Disable" to disable the simulation feature.
4. Once the method is complete, select the "Simulate PWA" tab in the Resource Block, Figure 8-3. If the simulation is enabled, the "PlantWeb Alarm Simulate" parameter is configurable otherwise it is read-only.

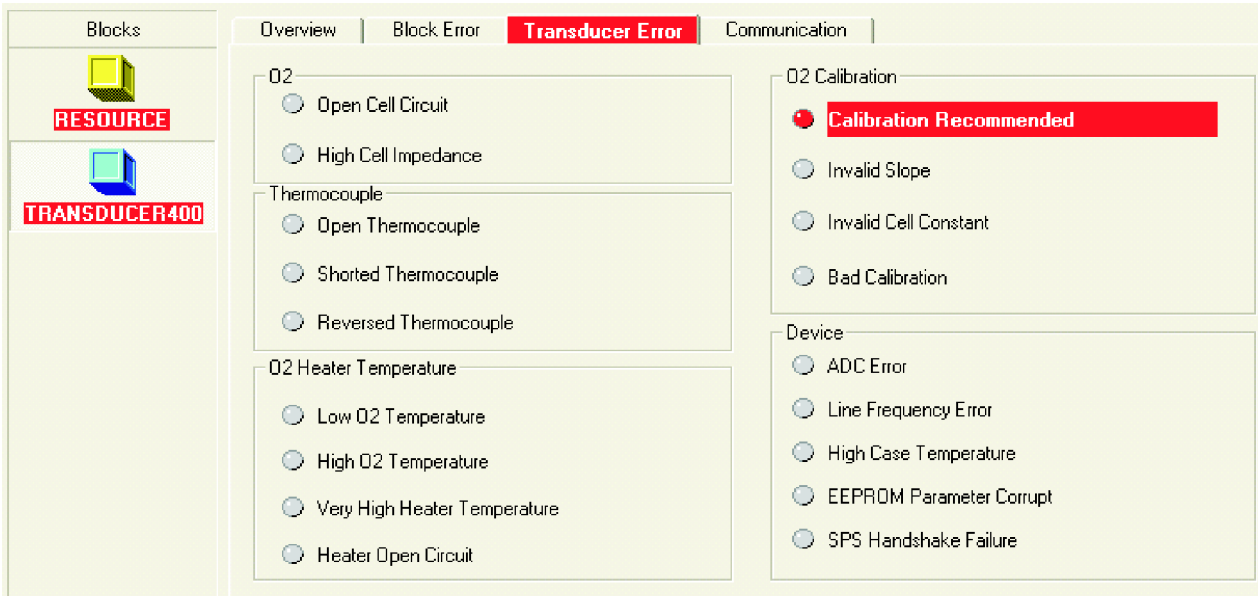
Figure 8-3. Simulate PWA Screen

Figure 8-4. Simulate Status Screen - O2 & Temperature Status



5. Now select Simulation on/off from the "Simulate PWA" screen. When Fieldbus Simulation is on, the "Simulation Switch" LED is illuminated. When PWA simulation is on, the "PWA Simulate" LED is illuminated.
6. If PWA Simulation is on, all PWA active parameters and Resource and Transducer Block status parameters are configurable. Otherwise they are read-only.
7. To simulate PlantWeb alerts, use the "Simulate PWA" screen in the Resource Block. To simulate block alarms, use "Simulate Status" in the Resource Block or use "Simulate O2 & Temperatures" or "Simulate Cal & Device Status" in the Transducer Block.
8. Select "Device Diagnostics" to view the active PWA alarms.
9. When "Device Diagnostics" is selected, press the "Status" button to see the Resource or Transducer Block detailed status displays. The Transducer Error screen is shown in Figure 8-5.

Figure 8-5. Device Diagnostics - Transducer Error Screen



Configure Simulation with the Model 375 Field Communicator

Use the following procedure to configure PWA simulation using the Model 375 Field Communicator.

1. Run "Transmitter Options" method in the Resource Block (Resource | Methods).
2. In the "Transmitter Options" menu, select either "Simulate Switch" or "PWA Simulate".
3. Select "Enable" to enable PWA simulation or "Disable" to disable the simulation feature.
4. Once the method is complete, select "Resource | Simulate PWA" in the Resource Block. If the simulation is enabled, the "PWA Simulate" parameter is configurable. Otherwise it is read only.
5. Now select Simulation on/off from the "PWA Simulate" parameter. When PWA Simulation is on, all of the PWA active parameters and the Resource and Transducer Block status parameters are configurable. Otherwise they are read only.
6. To simulate PlantWeb Alerts, select the alerts listed under “Failed Active”, “Maintenance Active” and “Advisory Active” (Resource | Simulate PWA).
7. To simulate block alarms, select the alarms listed under “Detailed Status” in the Resource Block (Resource | Simulate Status) or under “Detailed Status” in the Transducer Block (Transducer | Simulate Status).
8. Select Resource|PWA SubStatus to see the active PWA alarms and masks. Select Fail Active, Maintenance Active or Advisory Active for active PWA alarms.
9. Select Resource | Status | Detailed Status or Transducer | Status | Detailed Status to see the Resource or Transducer Block detailed status.

PARAMETER DESCRIPTIONS

Descriptions of the PlantWeb Alert Parameters that are supported by the Oxymitter 5000 Fieldbus Output Board are listed in Table 8-2.

Table 8-2. Descriptions of PlantWeb Alert Parameters

Parameter	Alarms	AMS Tab	What does the alert indicate?	What is affect on instrument?	Recommended Action	Description
Oxygen Sensor Disconnect	Transducer Block: Open Cell Circuit	O_2	This alert is active when the oxygen sensor has a very high output.	The oxygen PV quality status will go to BAD.	Check cell wires or replace the oxygen cell.	The oxygen cell interface is designed to indicate a very high output if the cell becomes disconnected from the electronics. It is possible that a wire connection to the cell, either in the probe tip or at the electronics, has become loose or broken. The cell may also have become damaged from mechanical stress. In extreme cases, a very low oxygen concentration in the process may cause this alarm. Diagnosis must be done at the analyzer. Refer to Section 9: Troubleshooting for details.
Oxygen Sensor Degraded	Transducer Block: High Cell Impedance	O_2	This alert is activated when the oxygen sensor impedance indicates that the cell is beyond its useful life.	The oxygen PV quality status will go to BAD.	Replace the oxygen cell.	Oxygen cells will degrade over time due to aging and corrosion. An increasing cell resistance is a good indicator of reduced cell performance. As the cell impedance increases, the cell output falls off and response time increases. Calibrating the instrument will compensate for the increased cell resistance up to several hundred ohms, beyond which the cell is no longer functional. Diagnosis must be done at the analyzer. Refer to Section 9: Troubleshooting for details.
Thermocouple Malfunction	Transducer Block: Open Thermocouple Shorted Thermocouple Reversed Thermocouple	Temp-erature	This detects a miswired or faulty thermocouple.	The oxygen PV quality status will go to BAD.	Check the thermocouple wires for loose or broken connections.	When the heater thermocouple alarms are initiated, they diagnose one of three states: 1) Open 2) Shorted 3) Reversed The problem could be caused by a mechanical failure in the probe tip or at the electronics. Power to the Oxymitter must be cycled to resume operation. Diagnosis must be done at the analyzer. Refer to Section 9: Troubleshooting for details.
Sensor Heater Malfunction	Transducer Block: Heater Open Circuit	Temp-erature	This alert indicates that no measurable heat energy is being detected at the oxygen sensor.	The oxygen PV quality status will go to BAD.	Test or replace the cell heater.	Mechanical or thermal stress may eventually cause the oxygen cell heater to fail. The resistance of a properly functioning cell heater will measure less than 100 ohms. A failed heater will generally measure as an open circuit. Diagnosis must be done at the analyzer. Refer to Section 9: Troubleshooting for details.
Sensor Heater Over Temperature Failure	Transducer Block: Very High Heater Temperature	Temp-erature	This alert indicates a very high heater temperature; temperature is rising out of control.	The oxygen PV quality status will go to BAD.	Cycle power or replace the electronics stack.	A heater over-temperature/out of control problem would generally be caused by the inability of the Oxymitter to limit power to the heater. This could be caused by a latched triac on the power supply in the electronics stack.

Parameter	Alarms	AMS Tab	What does the alert indicate?	What is affect on instrument?	Recommended Action	Description
Sensor Heater Temperature Variance	Transducer Block: Low O2 Temp High O2Temp	Temp-erature	This alert indicates a sensor heater temperature that is too high or too low.	Instrument will not reliably measure O_2 concentration Until problem is corrected, the oxygen PV status will be UNCERTAIN.	Allow instrument several minutes to reach proper temperature.	Cell temperature control may become erratic for the following reasons: 1) Temperature is settling during startup. 2) Large variations in process temperature or flow. 3) Fluctuations or noise in the power supplied to the instrument.
Calibration Error	Transducer Block: Invalid Slope Invalid Cell Constant Bad Calibration	Calibration	This alert indicates that the slope and constant values determined from the calibration did not fall within an acceptable range.	Instrument will revert back to the calibration slope and constant values determined from previous successful calibration.	Check the calibration gas supplies and connections.	Make sure the oxygen concentrations of the calibration gases match the concentration values in the Oxymitter. If the calibration has been performed correctly this alarm may indicate that the oxygen sensor requires replacement. Refer to Section 9: Troubleshooting for details.
Calibration Recommended	Transducer Block: Calibration Recommended	Calibration	This alert indicates that the sensor resistance has changed by a pre-determined amount since the last calibration.	The oxygen measurement may be inaccurate.	Check instrument accuracy and/or calibrate.	Oxygen cells will degrade over time due to aging and corrosion. An increasing cell resistance is a good indicator of reduced cell performance. As the cell impedance increases, the cell output falls off and response time increases. Calibrating the instrument will compensate for the increased cell resistance. If using the Oxymitter with an IMPS or SPS calibration sequencer, increased cell impedance can automatically trigger a calibration.
Handshake Failure	Transducer Block: SPS Handshake Failure	Calibration	This alert indicates that the SPS/IMPS handshake does not function properly.		Check SPS/IMPS setup.	
High Electronics Temperature	Transducer Block: Case Temp High	Device	This alert indicates that the electronics temperature has exceeded 80°C. The device will cease to operate reliably beyond 85°C.	There should be no effect on the instrument until the temperature exceeds 85°C.	Evaluate mounting location and environment.	The Oxymitter may require special mounting considerations if installed in a very hot location.
ADC Failure	Transducer Block: ADC Error	Device	This alert indicates faulty operation of the device electronics.	The oxygen PV quality status will go to BAD.	Cycle power or replace the electronics stack.	The Analog to Digital Converter (ADC) is continuously monitored by the device for correct operation. Refer to Section 9: Troubleshooting for details.
Line Input Out of Range	Transducer Block: Line Frequency Error	Device	This alert indicates that the line input power to the device is outside the proper operating limits.	The oxygen PV quality status will go to BAD.	Check line input power for proper voltage and frequency.	The device power supply continuously monitors the line input. Measured variations in the line input power are used to compensate the sensor heater control and check for faulty line conditions. Refer to Section 9: Troubleshooting for details.

Parameter	Alarms	AMS Tab	What does the alert indicate?	What is affect on instrument?	Recommended Action	Description
NV Memory Failure	Transducer Block: EEPROM Parameter Corrupt Resource Block Manufacturing Block Integrity Error NV Integrity Error ROM Integrity Error Lost Deferred NV Data	FF/Device	The non-volatile parameter storage on the CPU board is now unreliable.	All device settings will be lost and the oxygen PV quality status will go to BAD.	At startup, wait 5 minutes with power applied. Then, cycle power again.	This alarm will generally occur during a startup condition. Rarely, the Oxymitter could be powered down while a parameter is being stored to the non-volatile memory. The parameter will then be tagged as bad on the next power-up and the entire memory contents will be written with default parameters. All calibration data is lost and the unit should be recalibrated. If the unit does not recover automatically, the memory may be faulty and the electronics stack should be replaced. Refer to Section 9: Troubleshooting for details.
NV Writes Deferred	Resource Block: NV Writes Deferred	FF/Device				A high number of writes to non-volatile memory has been detected. To prevent premature failure of the memory, the write operations have been deferred. The data will be saved on a 6-hour cycle. This condition usually occurs because a program has been entered that writes to function block parameters that are not normally expected to be written to on a cyclic basis.
Inter Board Communication Failure	Transducer Block: Communication Failure	FF/Device	This alert indicates a communication failure between the FF board and the device.	The device data are invalid.	Verify device is powered. Check the installation of the Fieldbus Output Board on its carrier board. If the above are OK, replace the carrier board and/or Fieldbus Output Board.	There is no communication possible between the Fieldbus Output Board and the Oxymitter's computer board.
PWA Simulate Active		FF/Device	This alert occurs when the PWA simulate mode is activated.			The PWA active parameters can now be written. The resource block detailed status parameters and the internal alerts in the Transducer Block where the PWA active alarms originate can also be written.

Section 9 Troubleshooting

OVERVIEW

While the Oxymitter 5000 electronics provides a significant number of diagnostic alarms to assist in troubleshooting potential problems, it is good to place these alarms in perspective with respect to the instrument's operating principles:

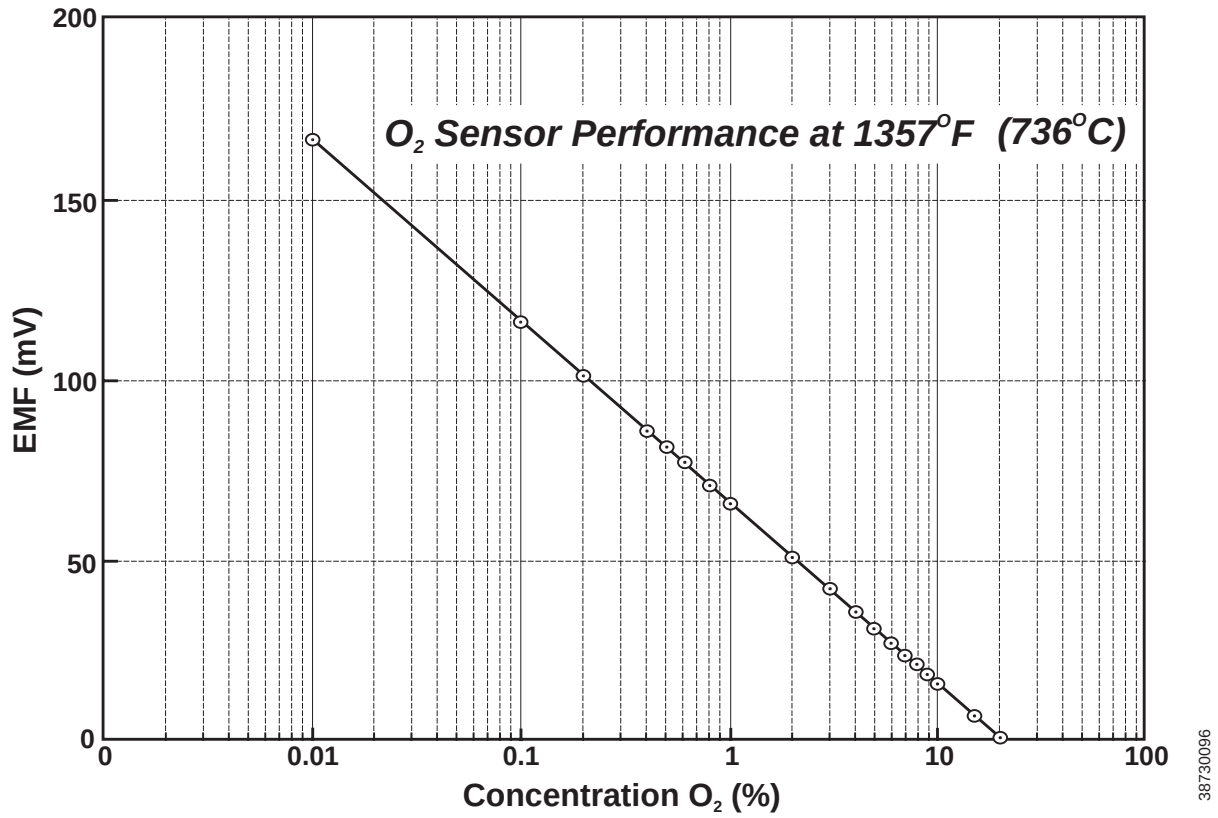
When the Zirconium Oxide sensing cell is heated to its setpoint [1357°F (736°C)], the cell will generate a voltage that represents the difference between the process O_2% and the reference O_2% inside the probe (20.95% O_2 ambient air).

Test points, Figure 9-1, are provided to read the raw millivolt value generated by the thermocouple that controls the cell temperature and also the raw cell signal.

The cell temperature at test points 3 and 4 should always be stable at approximately 29 to 30 millivolts, which represent the [1357°F (736°C)] setpoint temperature.

When flowing calibration gasses, the raw cell millivolt value at test points 1 and 2 should represent the levels on the chart in Figure 9-1. Note that the raw cell millivolt value increases logarithmically as the O_2 concentration decreases.

Figure 9-1. O_2 Sensor mV vs. $\%O_2$ at 1357°F (736°C) (Reference Air, 20.9% O_2)



O_2 %	100	20	15	10	9	8	7	6	5	4
EMF(mV)	-34	1.0	7.25	16.1	18.4	21.1	23.8	27.2	31.2	36.0
O_2 %	3	2	1	0.8	0.6	0.5	0.4	0.2	0.1	0.01
EMF(mV)	42.3	51.1	66.1	71.0	77.5	81.5	86.3	101.4	116.6	166.8

⚠WARNING

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

GENERAL

The troubleshooting section describes how to identify and isolate faults that may develop in the Oxymitter 5000. When troubleshooting, reference the following.

Grounding
It is essential that adequate grounding precautions are taken when installing the system. Thoroughly check both the probe and electronics to ensure the grounding quality has not degraded during fault finding. The system provides facilities for 100% effective grounding and the total elimination of ground loops.

Electrical Noise
The Oxymitter 5000 has been designed to operate in the type of environment normally found in a boiler room or control room. Noise suppression circuits are employed on all field terminations and main inputs. When fault finding, evaluate the electrical noise being generated in the immediate circuitry of a faulty system. Ensure all cable shields are connected to earth.

Loose Integrated Circuits
The Oxymitter 5000 uses a microprocessor and supporting integrated circuits (IC). If the electronics are handled roughly during installation or located where subjected to severe vibration, the ICs could work loose. Before troubleshooting the system, ensure all ICs are fully seated.

Electrostatic Discharge
Electrostatic discharge can damage the ICs used in the electronics. Before removing or handling the processor board or the ICs, ensure you are at ground potential.

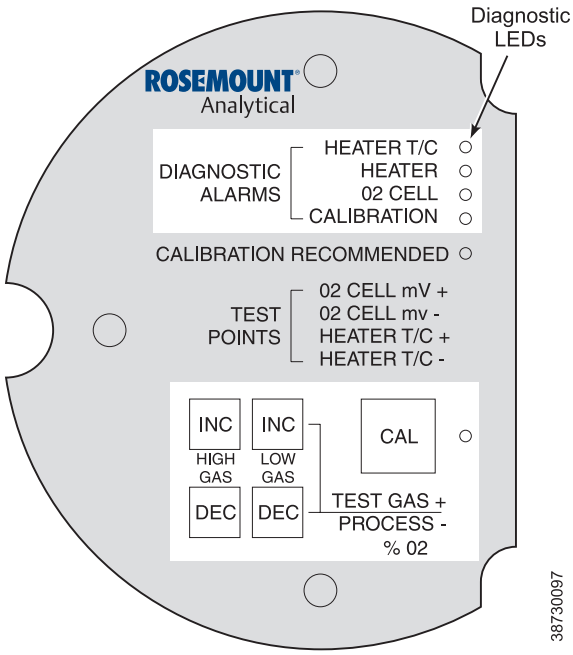
ALARM INDICATIONS

Once an alarm condition is identified, the Oxymitter 5000 electronics offers a number of diagnostics to interpret the specific alarm.

If the Oxymitter 5000 has the simple keypad operator interface, the majority of fault conditions will be indicated by one of the four LEDs referred to as diagnostic, or unit alarms on the operator's keypad (Figure 9-2). An LED will flash a code that will correspond to an error message. Only one LED will blink at a time. An alarm code guide is provided inside the screw-on cover for the electronics.

Alarm indications will also be available via fieldbus computer terminal or the optional LOI. When the error is corrected and/or power is cycled, the diagnostic alarms will clear or the next error on the priority list will appear.

Figure 9-2. Diagnostic LEDs



ALARM CONTACTS

If autocalibration is not used, a common bidirectional logic contact is provided for any of the diagnostic alarms listed in Table 9-1. The assignment of alarms which can actuate this contact can be modified to one of seven additional groupings (mode 0 through mode 7) listed in Table 3-1.

The logic contact is self-powered, +5 VDC, with a 340 ohm series resistance. An interposing relay will be required if this contact is to be utilized to annunciate a higher voltage device, such as a light or horn. An interposing relay may also be required for certain DCS input cards.

A Potter & Brumfield R10S-E1Y1-J1.0K 3.2 mA DC or an equal interposing relay will be mounted where the contact wires terminate in the control/relay room.

If autocalibration systems are used, the bidirectional logic contact is utilized as a "hand-shake" signal between the autocalibration system (SPS 4001B or IMPS 4000) and is unavailable for alarm purposes. Additional contacts are provided through the autocalibration systems, noted below.

SPS 4001B and IMPS 4000, 1-4 probes

- One contact closure per probe from the control room to the SPS 4001B or IMPS 4000 for "calibration initiate".
- One contact output per probe from the SPS 4001B or IMPS 4000 to the control room for "in calibration" notification.
- One contact output per probe from the SPS 4001B or IMPS 4000 to the control room for "calibration failed" notification. (Includes output from pressure switch indicating "cal gas bottles empty").

Additional IMPS 4000 Alarm Contacts

- One contact per IMPS 4000 for "low calibration gas flowing".
- One contact per IMPS 4000 for "high calibration gas flowing".

IDENTIFYING AND CORRECTING ALARM INDICATIONS

For an Oxymitter 5000 with a membrane keypad, faults are indicated by four diagnostic, or unit, alarm LEDs. A pattern of repeating blinks define the problem. A condensed table of the errors and the corresponding blink codes can be found on the inside right cover of the electronics housing. Table 9-1 also identifies the blink code and fault status of each LED.

For an Oxymitter 5000 with the optional LOI, alarm messages are displayed on the LOI display window when the alarm status display is accessed via the LOI menu. A listing of the alarm/fault messages and the related fault status descriptions and fault numbers are shown in Table 9-2.

Table 9-1. Diagnostic/Unit Alarm Fault Definitions - Membrane Keypad Only

LED	Flashes	Status	Fault Number	Self Clearing
HEATER T/C	1	Open	1	No
	2	Shorted	2	No
	3	Reversed	3	No
	4	A/D Comm Error	4	No
	5	Line Frequency Error	5	No
HEATER	1	Open	6	No
	2	High High Temp	7	No
	3	High Case Temp	8	Yes
	4	Low Temp	9	Yes
	5	High Temp	10	Yes
O_2 CELL	1	High mV/Cell Open	11	Yes
	3	Bad	12	Yes
	4	EEprom Corrupt	13	No
CALIBRATION	1	Invalid Slope	14	Yes
	2	Invalid Constant	15	Yes
	3	Last Calibration Failed	16	Yes
	**	Calibration Recommended		Yes

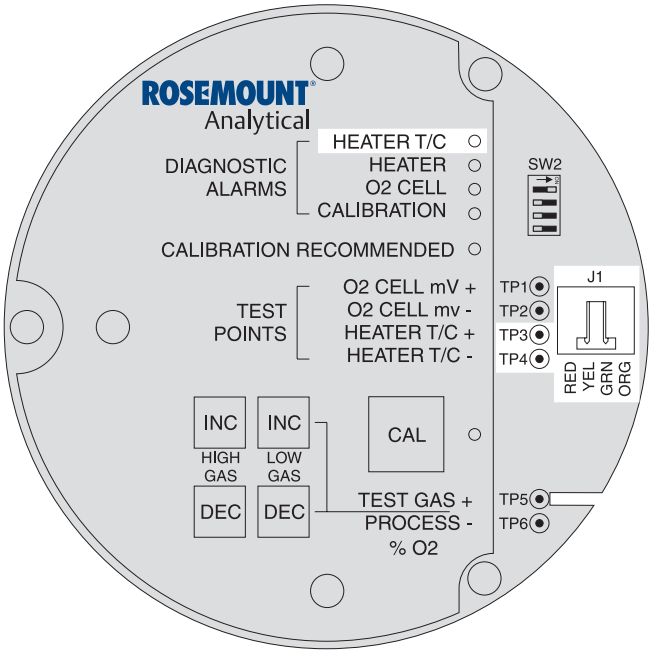
**Critical alarm conditions will render the O_2 measurement as unusable. Alarms which are not self-clearing (Self-Clearing = NO) will require a reset. Perform the Reset Procedure in Section 3: Configuration of Oxymitter 5000 with Membrane Keypad to continue operation.*

***The CALIBRATION RECOMMENDED alarm flashes the Calibration Recommended LED on the operator's keypad.*

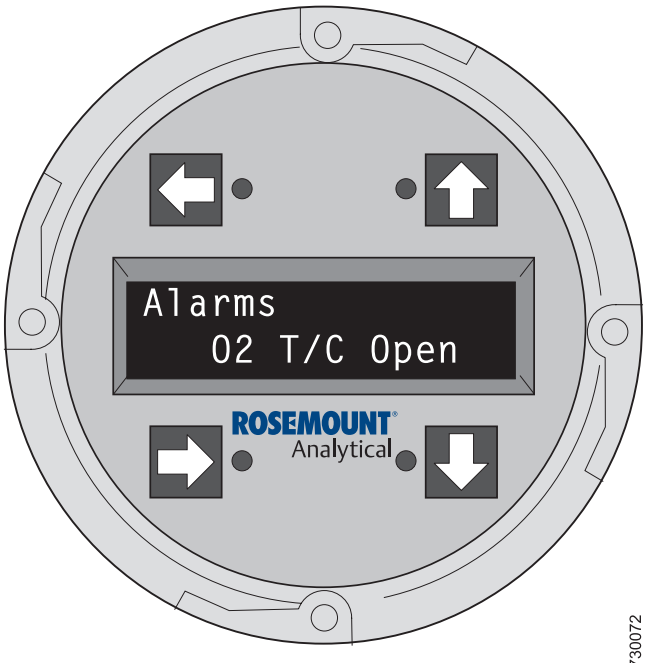
Table 9-2. Diagnostic/Unit Alarm Fault Definitions - LOI

Message	Status	Fault Number	Self Clearing
O2 T/C OPEN	Heater T/C Open	1	No
O2 T/C SHORTED	Heater T/C Shorted	2	No
O2 T/C REVERSED	Heater T/C Polarity Reversed	3	No
ADC ERROR	A/D Comm Error	4	No
LINE FREQ ERROR	Incorrect Input Line Frequency Detected on Power Up	5	No
O2 HEATER OPEN	O2 Heater Open	6	No
VERY HI O2 TEMP	Very High Process Temperature	7	No
BOARD TEMP HI	Electronics Overheated	8	No
O2 TEMP LOW	Low Process Temperature	9	Yes
O2 TEMP HI	High Process Temperature	10	Yes
O2 CELL OPEN	O2 Cell Open	11	Yes
O2 CELL BAD	O2 Cell Failed	12, 13, 14	Yes
EEPROM CORRUPT	EEprom Failed	15	No
CALIB FAILED	Last Calibration Failed	16	Yes
SPS HANDSHAKE ERROR	SPS or IMPS Handshake Failed	17	Yes
CALIBRATION RECOMMENDED	O2 Calibration Required	N/A	Yes

Figure 9-3. Fault 1, Open Thermocouple



KEYPAD



LOI

38730072

Fault 1, Open Thermocouple

Figure 9-3 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and a Oxymitter 5000 with an LOI (lower view). The upper view also shows J1 and test points TP1 through TP6, located on the microprocessor board, below the membrane keypad or the LOI module.

Membrane Keypad

When Fault 1 is detected, the HEATER T/C LED flashes once, pauses for three seconds, and repeats.

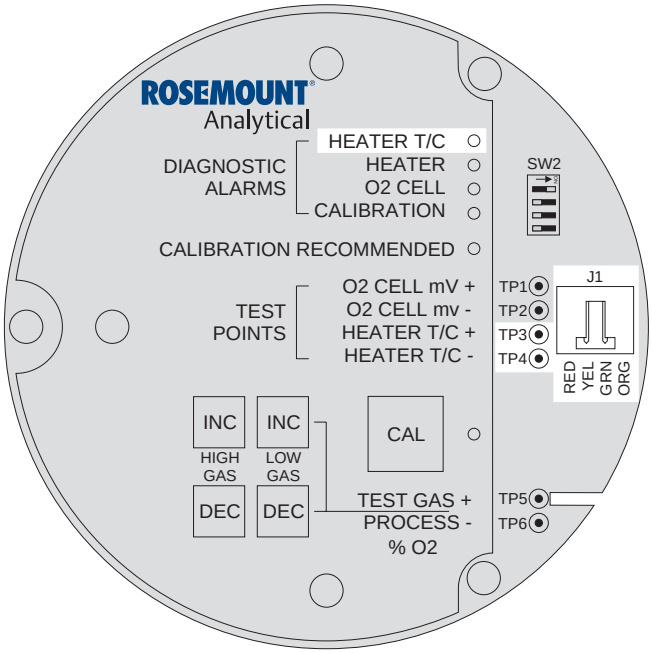
1. Check connector J1. Ensure the connector is properly seated.
2. Using a multimeter, measure the voltage from TP3+ to TP4-. If the reading is 1.2 VDC ±0.1 VDC, the thermocouple is open.
3. Remove power. Disconnect J1. Measure the resistance across the red and yellow thermocouple leads. The resistance should be approximately 1 ohm.
4. If the thermocouple is open, see "Heater Strut Replacement" in Section 10: Maintenance and Service.

LOI

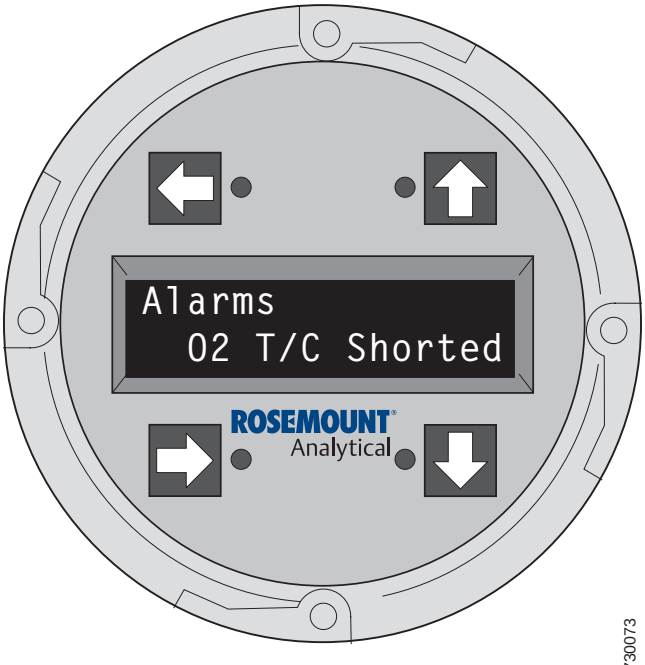
When Fault 1 is detected, the LOI displays the "O2 T/C Open" message.

1. Remove power. Unscrew and remove the LOI module from the electronic assembly.
2. Reconnect power to the Oxymitter 5000.
3. Perform the diagnostic steps 1 through 4 shown for the membrane keypad.

Figure 9-4. Fault 2, Shorted Thermocouple



KEYPAD



LOI

38730073

Fault 2, Shorted Thermocouple

Figure 9-4 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and an Oxymitter 5000 with an LOI (lower view). The upper view also shows J1 and test points TP1 through TP6, located on the microprocessor board, below the membrane keypad or the LOI module.

Membrane Keypad

When Fault 2 is detected, the HEATER T/C LED flashes twice, pauses for three seconds, and repeats.

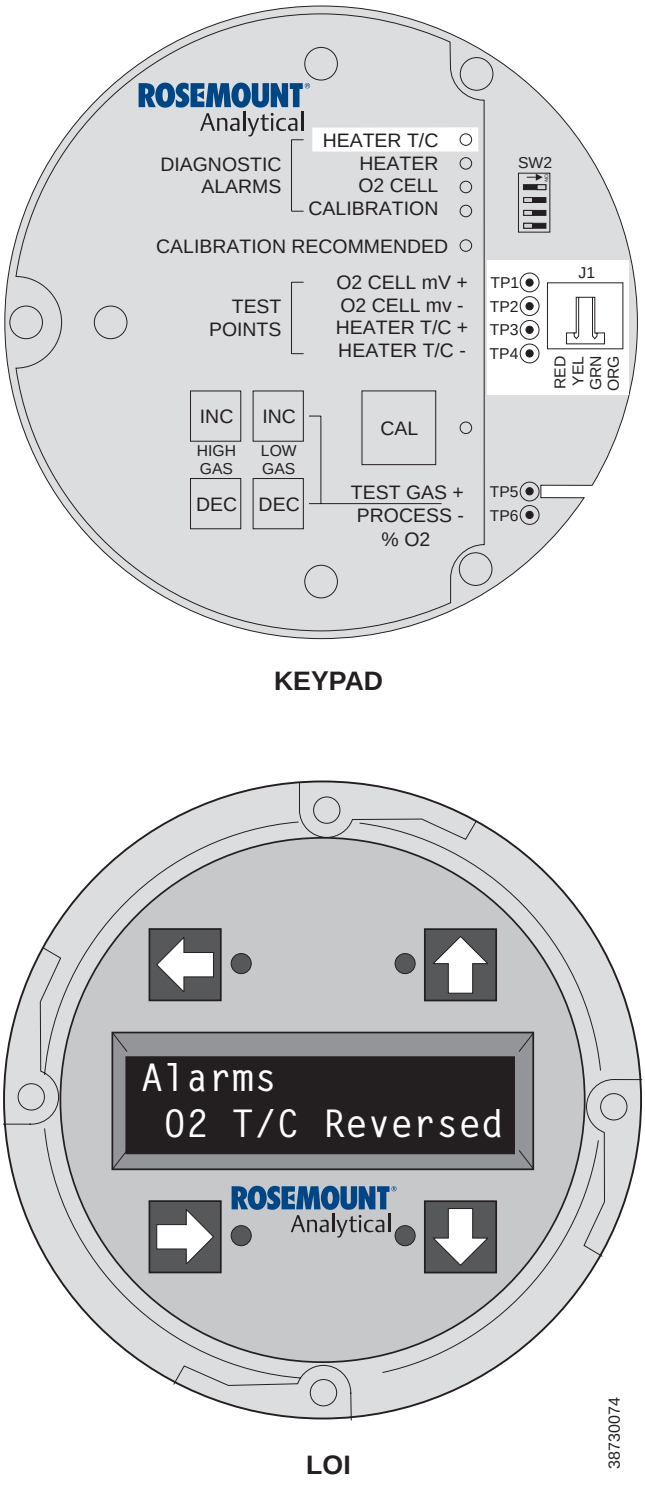
1. Using a multimeter, measure the voltage from TP3+ to TP4-. If the reading is 0 ±0.5 mV, then a shorted thermocouple is likely.
2. Remove power and disconnect J1.
3. Measure the resistance from TP3+ to TP4-. The reading should be approximately 20K ohms.
4. If so, the short is not on the PC board. The thermocouple wiring or the thermocouple is shorted. See "Heater Strut Replacement" in Section 10: Maintenance and Service.

LOI

When Fault 2 is detected, the LOI displays the "O2 T/C Shorted" message.

1. Remove power. Unscrew and remove the LOI module from the electronic assembly.
2. Reconnect power to the Oxymitter 5000.
3. Perform the diagnostic steps 1 through 4 shown for the membrane keypad.

Figure 9-5. Fault 3, Reversed Thermocouple



Fault 3, Reversed Thermocouple Wiring or Faulty PC Board

Figure 9-5 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and an Oxymitter 5000 with an LOI (lower view). The upper view also shows J1 and test points TP1 through TP6, located on the microprocessor board, below the membrane keypad or the LOI module.

Membrane Keypad

When Fault 3 is detected, the HEATER T/C LED flashes three times, pauses for three seconds, and repeats.

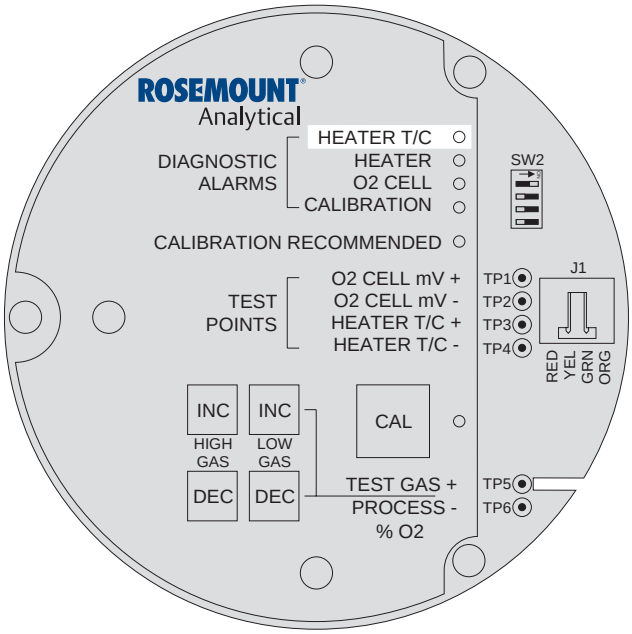
1. Using a multimeter, measure the voltage from TP3+ to TP4-. If the reading is negative, the thermocouple wiring is reversed.
2. Check red and yellow wires in the J1 connector for the proper placement.
3. If the wiring is correct, the fault is in the PC board. See "Electronic Assembly Replacement" in Section 10: Maintenance and Service.

LOI

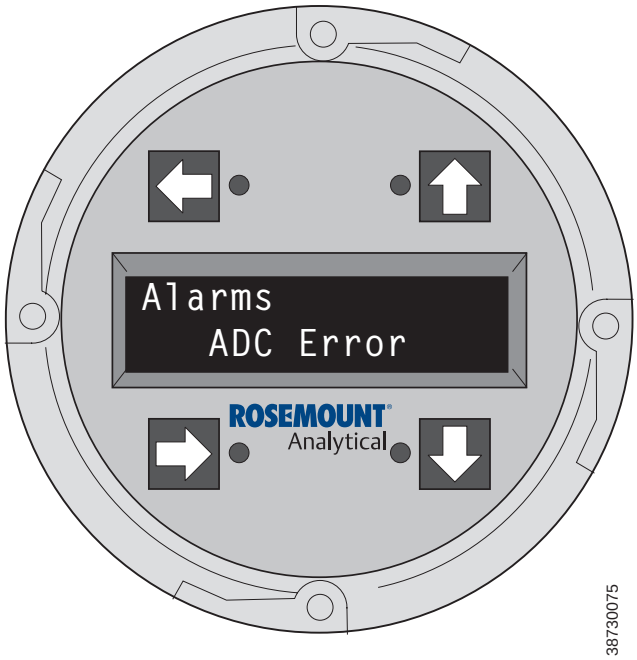
When Fault 3 is detected, the LOI displays the "O2 T/C Reversed" message.

1. Remove power. Unscrew and remove the LOI module from the electronic assembly.
2. Reconnect power to the Oxymitter 5000.
3. Perform the diagnostic steps 1 through 3 shown for the membrane keypad.

Figure 9-6. Fault 4, A/D Comm Error



KEYPAD



LOI

Fault 4, A/D Comm Error

Membrane Keypad

When Fault 4 is detected, the HEATER T/C LED flashes four times, pauses for three seconds, and repeats (Figure 9-6).

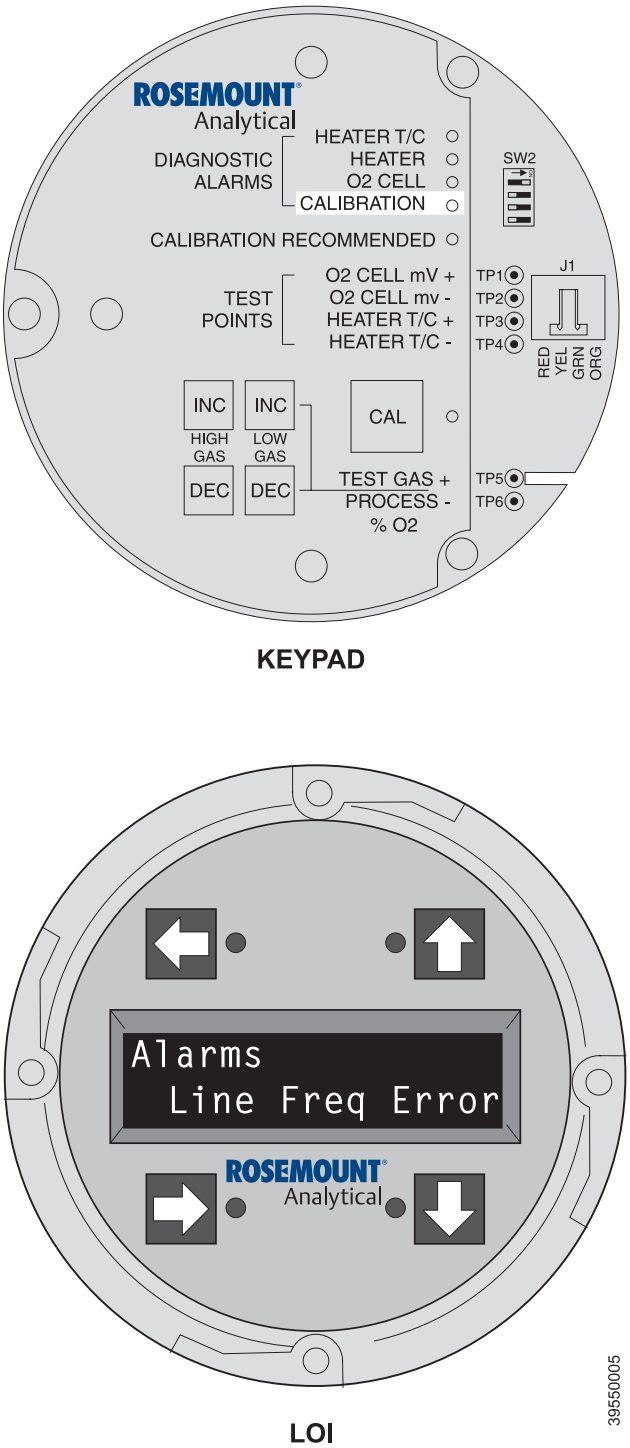
1. Call the factory for assistance.

LOI

When Fault 4 is detected, the LOI displays the "ADC Error" message.

1. Call the factory for assistance.

Figure 9-7. Fault 5, Line Frequency Error



Fault 5, Line Frequency Error

Figure 9-7 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and a Oxymitter 5000 with an LOI (lower view).

Membrane Keypad

When Fault 5 is detected, the HEATER LED flashes five times, pauses for three seconds, and repeats.

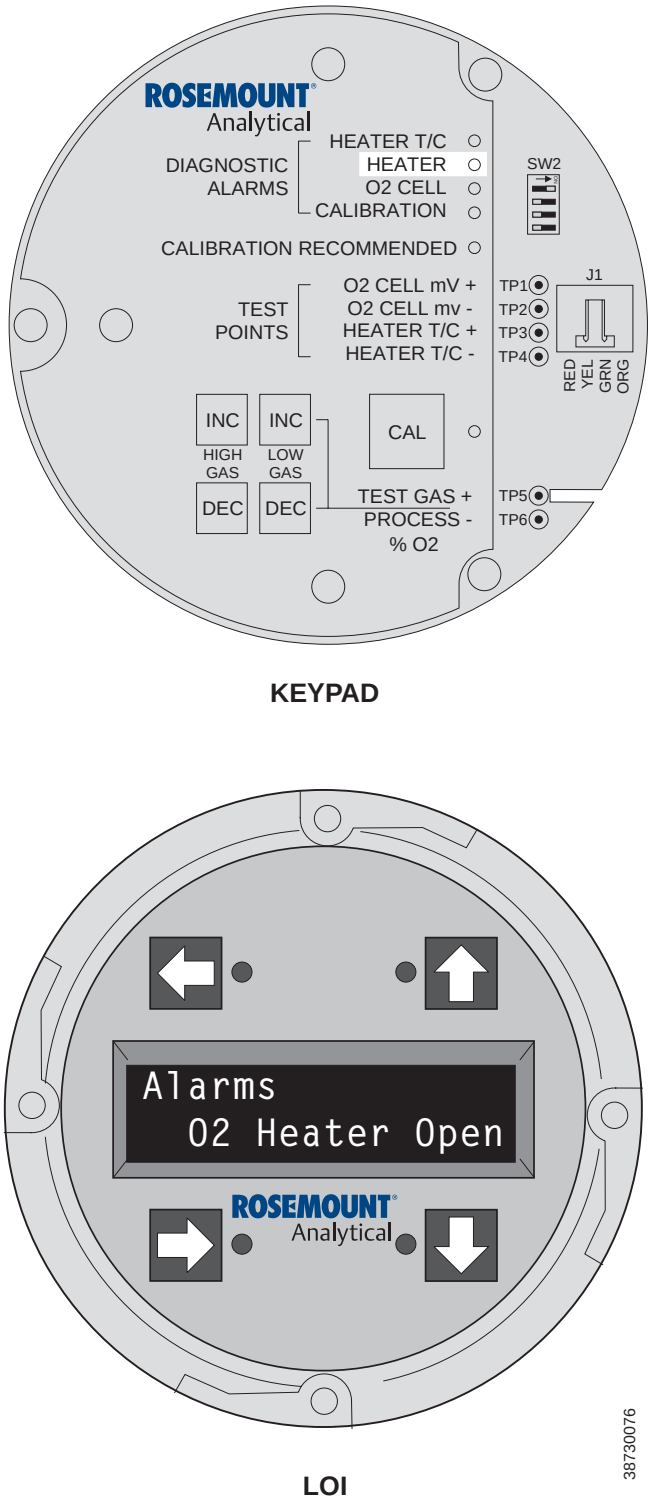
1. Remove power.
2. Remove the electronic assembly per "Electronic Assembly Replacement" in Section 10: Maintenance and Service.
3. Using a multimeter and frequency counter, measure the line input to the Oxymitter 5000 power supply board for an out of range voltage, current, or frequency reading.
4. The measurements should be within the ranges indicated in the equipment specifications listed in Section 1: Description and Specifications.

LOI

When Fault 5 is detected, the LOI displays the "Line Freq Error" message.

1. Remove power. Unscrew and remove the LOI module from the electronic assembly.
2. Perform the diagnostic steps 2 through 4 shown for the membrane keypad.

Figure 9-8. Fault 6, Open Heater



Fault 6, Open Heater

Figure 9-8 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and a Oxymitter 5000 with an LOI (lower view).

Membrane Keypad

When Fault 6 is detected, the HEATER LED flashes once, pauses for three seconds, and repeats.

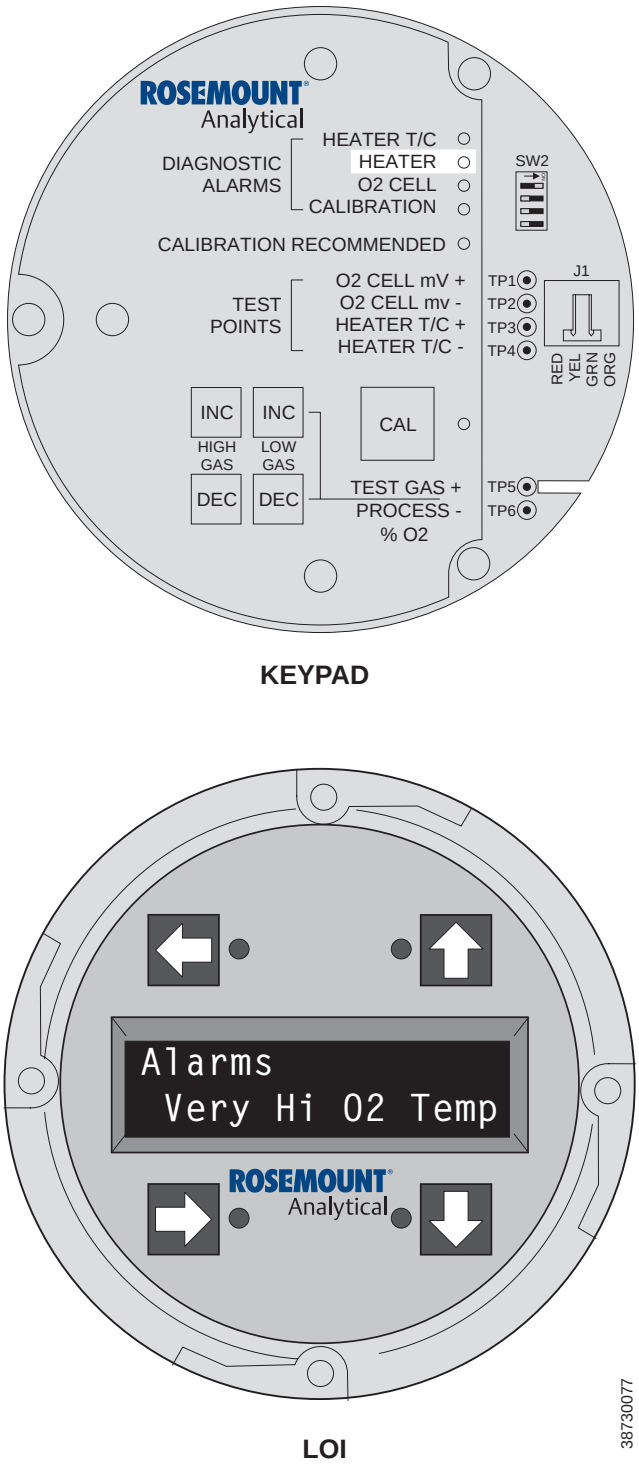
1. Remove power.
2. Remove the electronic assembly per "Electronic Assembly Replacement" in Section 10: Maintenance and Service.
3. Using a multimeter, measure the resistance across the terminals of heater connector, J8.
4. The measurement should be approximately 72 ohms. If the heater is open, see "Heater Strut Replacement" in Section 10: Maintenance and Service.

LOI

When Fault 6 is detected, the LOI displays the "O2 Heater Open" message.

1. Remove power. Unscrew and remove the LOI module from the electronic assembly.
2. Perform the diagnostic steps 2 through 4 shown for the membrane keypad.

Figure 9-9. Fault 7, High High Heater Temp



Fault 7, High High Heater Temp

Figure 9-9 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and an Oxymitter 5000 with an LOI (lower view).

Membrane Keypad

When Fault 7 is detected, the HEATER LED flashes twice, pauses for three seconds, and repeats.

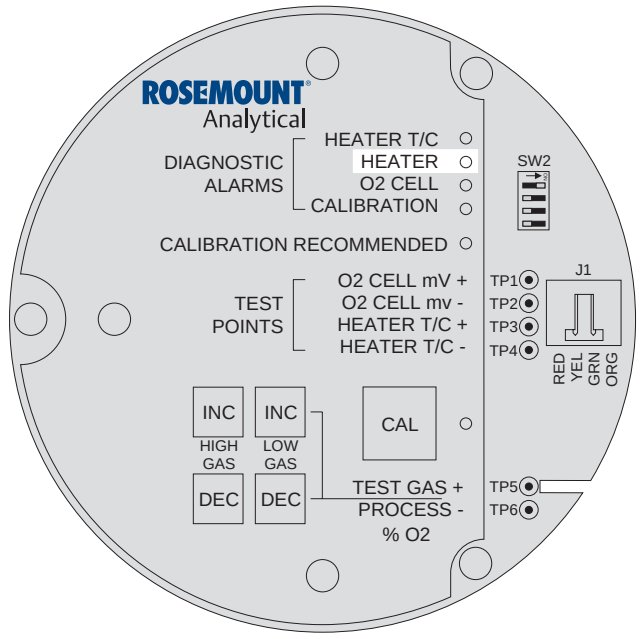
1. The High High Heater Temp alarm will activate when the thermocouple produces a voltage of 37.1 mV [1652°F (900°C)].
2. The triac and the temperature control may be at fault.
3. Remove power. Allow Oxymitter 5000 to cool for five minutes. Restore power.
4. If the condition repeats, replace the electronic assembly per "Electronic Assembly Replacement" in Section 10: Maintenance and Service.

LOI

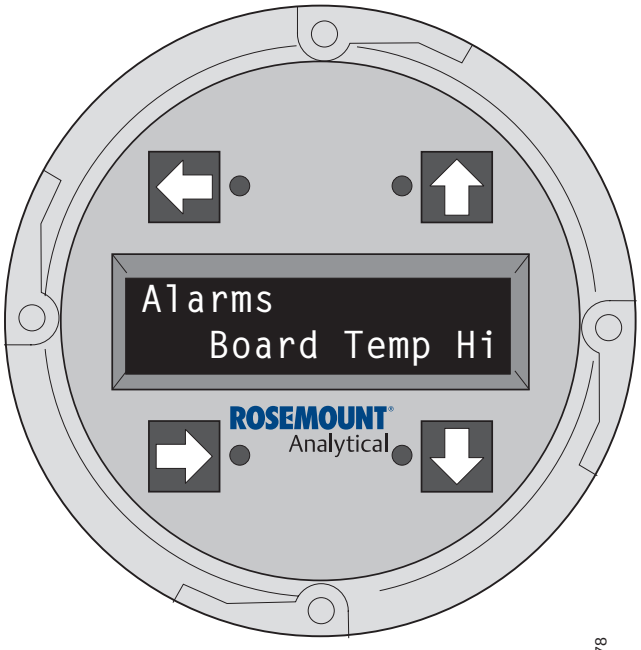
When Fault 7 is detected, the LOI displays the "Very Hi O2 Temp" message.

1. The very high O2 temperature alarm will activate when the thermocouple produces a voltage of 37.1 mV [1652°F (900°C)].
2. The triac and the temperature control may be at fault.
3. Remove power. Allow the Oxymitter 5000 to cool for five minutes. Restore power.
4. If the condition repeats, replace the electronic assembly per "Electronic Assembly Replacement" in Section 10: Maintenance and Service.

Figure 9-10. Fault 8, High Case Temp



KEYPAD



LOI

38730078

Fault 8, High Case Temp

Figure 9-10 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and an Oxymitter 5000 with an LOI (lower view).

Membrane Keypad

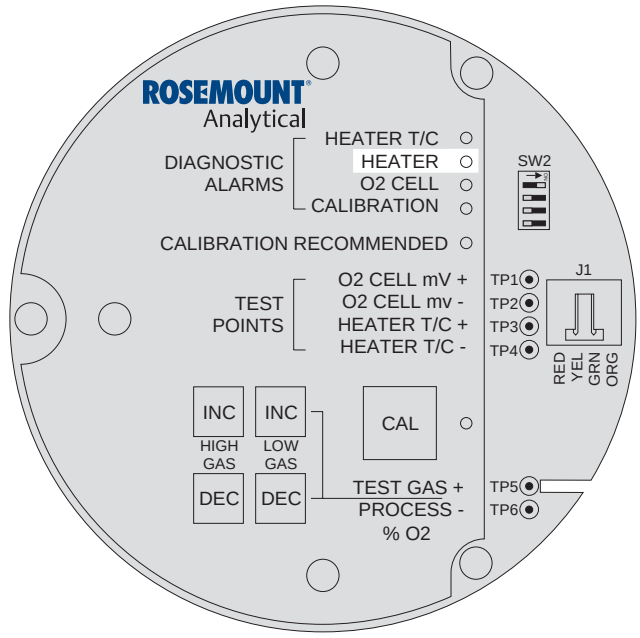
When Fault 8 is detected, The HEATER LED flashes three times, pauses for three seconds, and repeats.

1. If the case temperature exceeds [185°F (85°C)], the temperature control will shut off and a fieldbus alarm will be sent.
2. This signifies that the environment where the Oxymitter 5000 is installed exceeds the ambient temperature requirements or that heat due to convection is causing case temperature to rise above the limit.
3. Placing a spool piece between the stack flange and the Oxymitter 5000 flange may eliminate this problem.
4. If a spool piece does not solve the problem, relocation is the only solution.

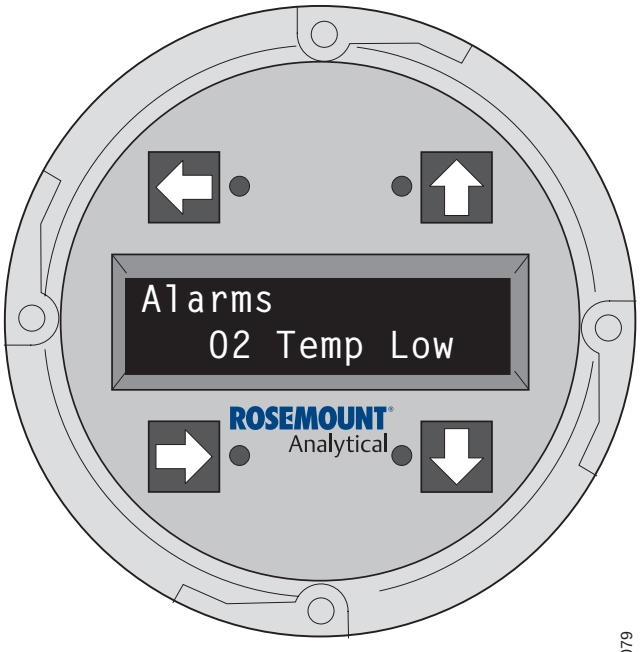
LOI

When Fault 8 is detected, the LOI displays the "Board Temp Hi" message. Refer to the comments in paragraphs 1 through 4 above.

Figure 9-11. Fault 9, Low Heater Temp



KEYPAD



LOI

38730079

Fault 9, Low Heater Temp

Figure 9-11 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and an Oxymitter 5000 with an LOI (lower view).

Membrane Keypad

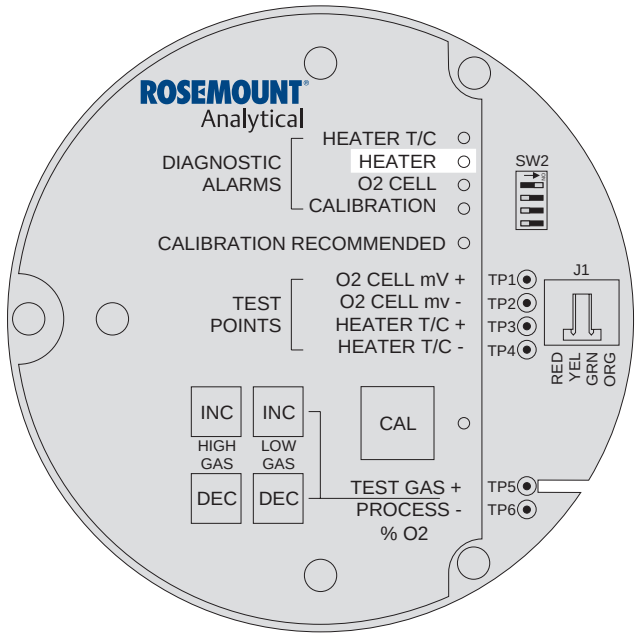
When Fault 9 is detected, the HEATER LED flashes four times, pauses for three seconds, and repeats.

1. The low heater temperature alarm is active when the thermocouple reading has dropped below 28.6 mV.
2. If the thermocouple reading continues to ramp downward for one minute and does not return to the temperature set point of approximately 29.3 mV, then an Open Heater fault will be displayed.
3. Power down the electronics. Remove the electronic assembly per "Electronic Assembly Replacement" in Section 10: Maintenance and Service. Using a multimeter, measure the resistance across the terminals of heater connector, J8.
4. If the heater is good, the reading will be approximately 70 ohms. If the heater is open, see "Heater Strut Replacement" in Section 10: Maintenance and Service.

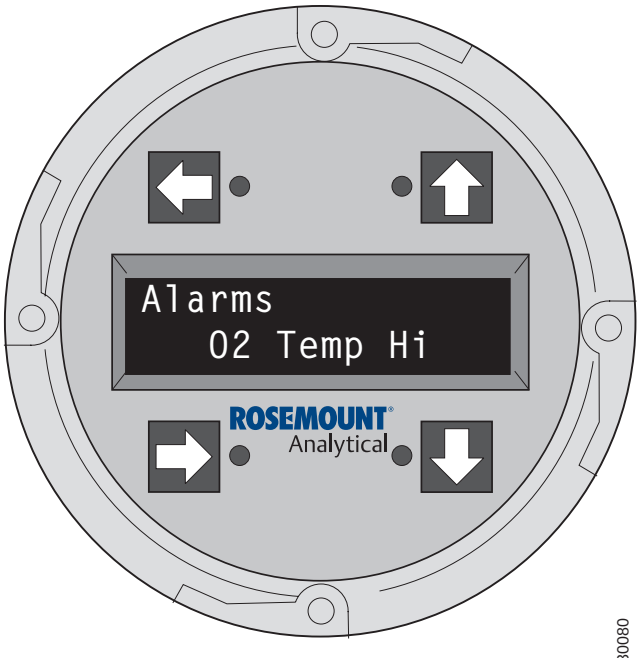
LOI

When Fault 9 is detected, the LOI displays the "O2 Temp Low" message. Refer to the comments and procedures in paragraphs 1 through 4 above.

Figure 9-12. Fault 10, High Heater Temp



KEYPAD



LOI

38730080

Fault 10, High Heater Temp

Figure 9-12 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and an Oxymitter 5000 with an LOI (lower view).

Membrane Keypad

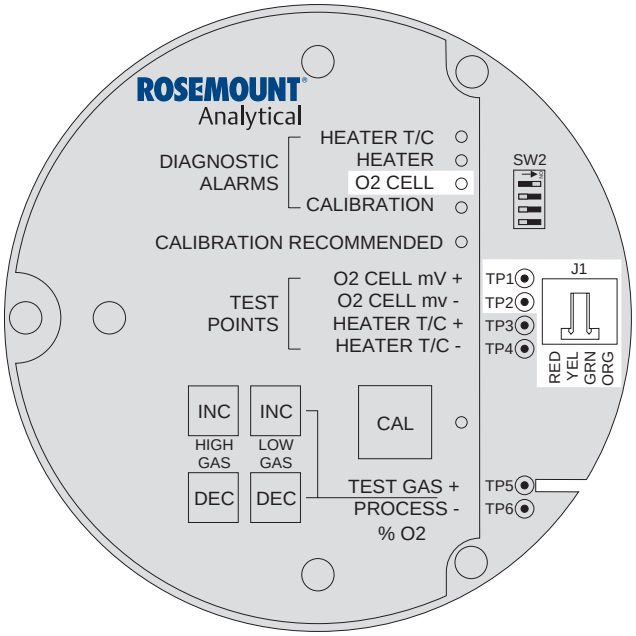
When Fault 10 is detected, the HEATER LED flashes five times, pauses for three seconds, and repeats.

1. If the thermocouple produces a voltage in excess of approximately 30.7 mV, the high heater temp alarm activates.
2. An alarm is sent via fieldbus.
3. This alarm is self-clearing. When temperature control is restored and the thermocouple voltage returns to the normal range, the alarm clears.
4. If the temperature continues to rise, the next alarm will be the High High Heater Temp alarm.

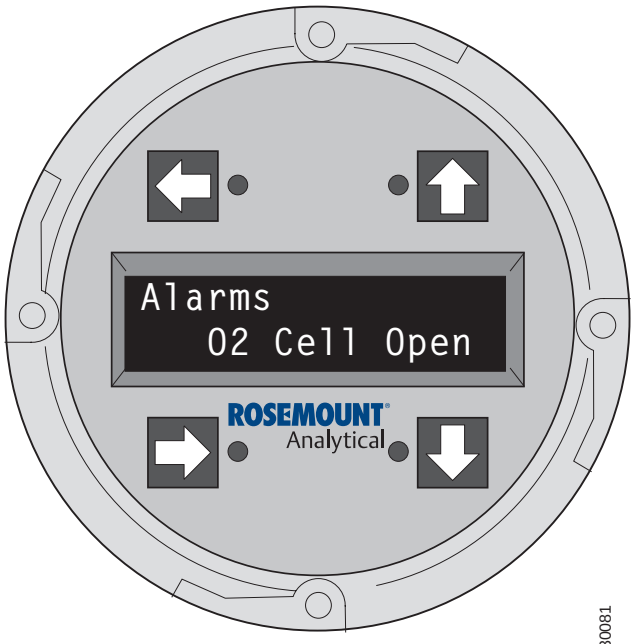
LOI

When Fault 10 is detected, the LOI displays the "O2 Temp Hi" message. Refer to the comments and procedures in paragraphs 1 through 4 above.

Figure 9-13. Fault 11, High Cell mV/Cell Open



KEYPAD



LOI

38730081

Fault 11, High Cell mV/Cell Open

Figure 9-13 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and an Oxymitter 5000 with an LOI (lower view). The upper view also shows J1 and test points TP1 through TP6, located on the microprocessor board, below the membrane keypad or the LOI module.

Membrane Keypad

When Fault 11 is detected, the O2 CELL flashes once, pauses for three seconds, and repeats.

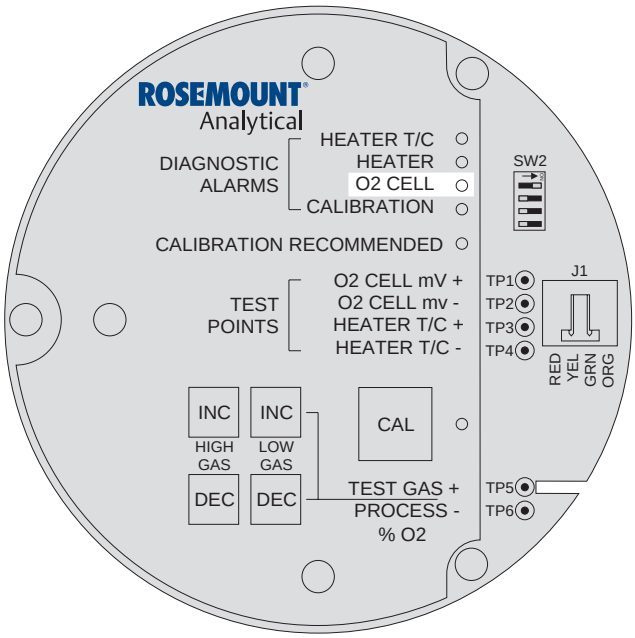
1. Using a multimeter, measure across TP1+ to TP2-. If you measure 204 mV to 1 volt DC, the cell reading is due to high combustibles. This is a self-clearing alarm, once the combustible conditions go away. If you measure 1.2 VDC, the cell wires, either orange or green, have become detached from the input.
2. One possible cause is connector J1. The orange or green wire has come loose from the crimped connection.
3. The platinum pad could also be at fault. The pad could have broken free from the back of the cell.
4. Replace heater strut per "Heater Strut Replacement" in Section 10: Maintenance and Service. If necessary, replace the cell and flange assembly per "Cell Replacement" in Section 10: Maintenance and Service.

LOI

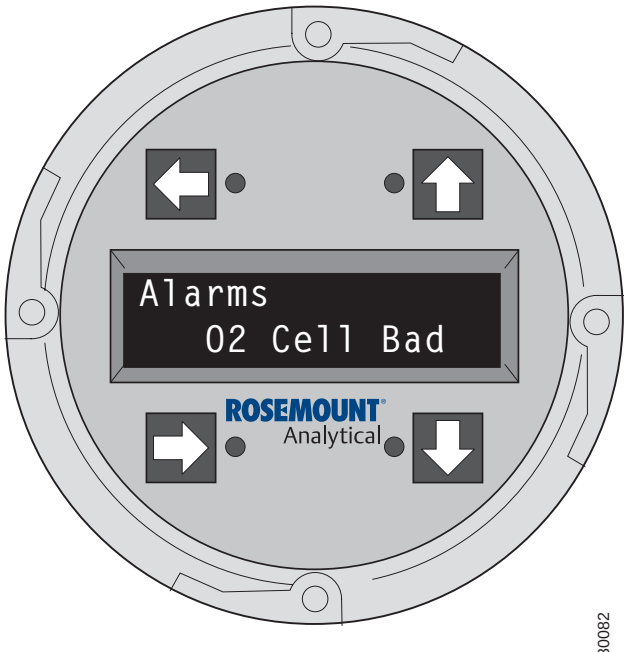
When Fault 11 is detected, the LOI displays the "O2 Cell Open" message.

1. Remove power. Unscrew and remove the LOI module from the electronic assembly.
2. Reconnect power to the Oxymitter 5000.
3. Perform the diagnostic steps 1 through 4 shown for the membrane keypad.

Figure 9-14. Fault 12, Bad Cell



KEYPAD



LOI

38730082

Fault 12, Bad Cell

Figure 9-14 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and an Oxymitter 5000 with an LOI (lower view).

Membrane Keypad

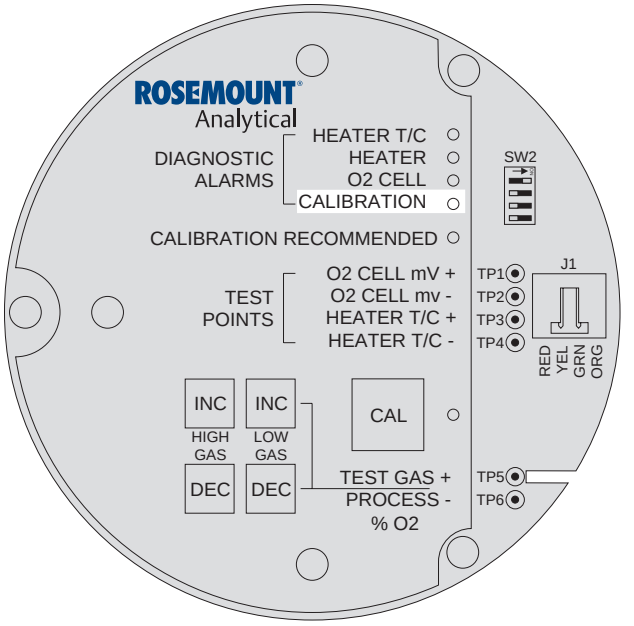
When Fault 12 is detected, the O2 CELL flashes three times, pauses for three seconds, and repeats.

1. The bad cell alarm activates when the cell exceeds the maximum resistance value.
2. The cell should be replaced. See "Cell Replacement" in Section 10: Maintenance and Service, for cell replacement instructions.

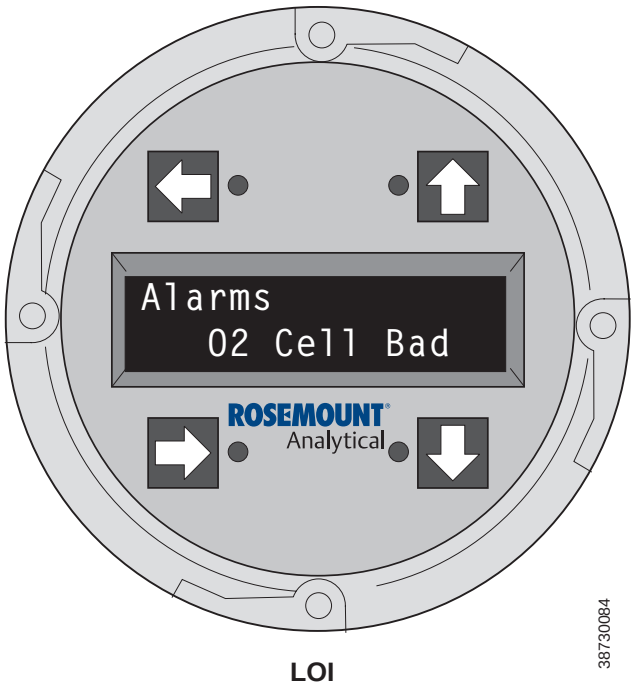
LOI

When Fault 12 is detected, the LOI displays the "O2 Cell Bad" message. Refer to the comments and procedures in paragraphs 1 and 2 above.

Figure 9-15. Fault 13, Invalid Slope



KEYPAD



LOI

Fault 13, Invalid Slope

Figure 9-15 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and an Oxymitter 5000 with an LOI (lower view).

Membrane Keypad

When Fault 13 is detected, the CALIBRATION LED flashes once, pauses for three seconds, and repeats.

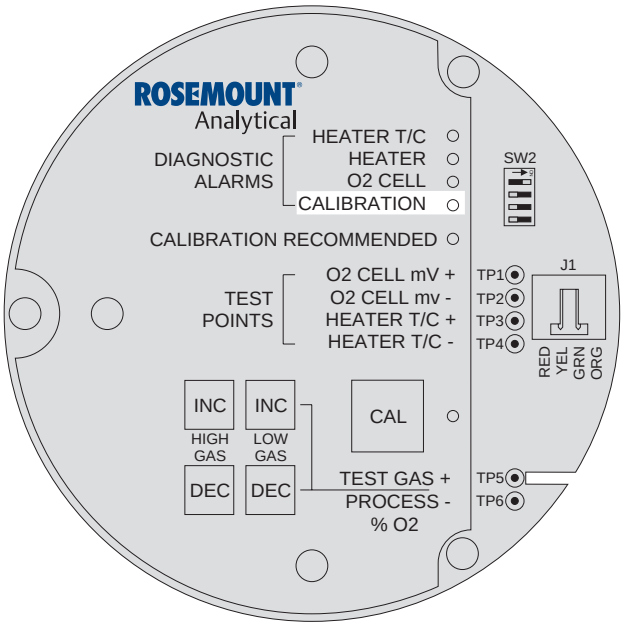
1. During a calibration, the electronics calculates a slope value. If the value of the slope is less than 35 mV/dec or more than 52 mV/dec, the slope alarm will be active until the end of the purge cycle.
2. See "Manual Calibration with Membrane Keypad" in Section 10: Maintenance and Service. Verify the calibration by carefully repeating it. Ensure the calibration gases match the calibration gas parameters. If you attach a multimeter to TP1+ and TP2-, sample gas measurements are:

   8% O_2 ≈ 23 mV
   0.4% O_2 ≈ 85 mV
3. Power down the Oxymitter 5000 and remove it from the stack.
4. Replace the cell per "Cell Replacement" in Section 10: Maintenance and Service.

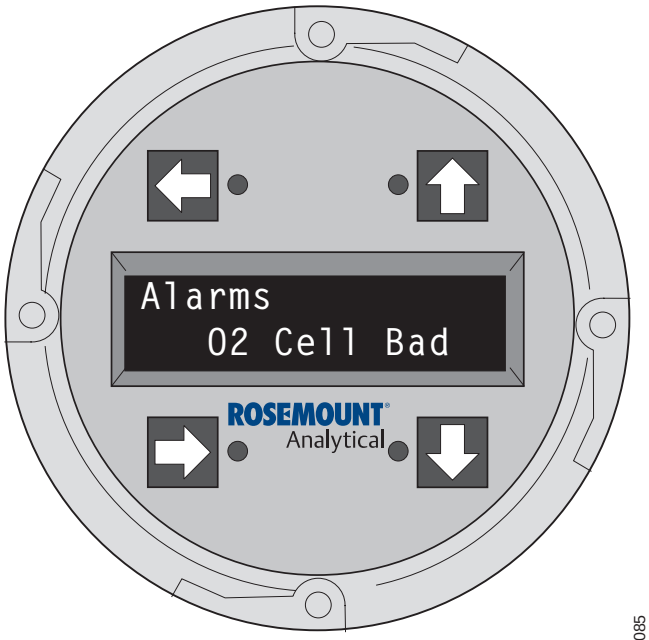
LOI

When Fault 13 is detected, the LOI displays the "O2 Cell Bad" message. Refer to the comments and procedures in paragraphs 1 through 4 above.

Figure 9-16. Fault 14, Invalid Constant



KEYPAD



LOI

38730085

Fault 14, Invalid Constant

Figure 9-16 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and an Oxymitter 5000 with an LOI (lower view).

Membrane Keypad

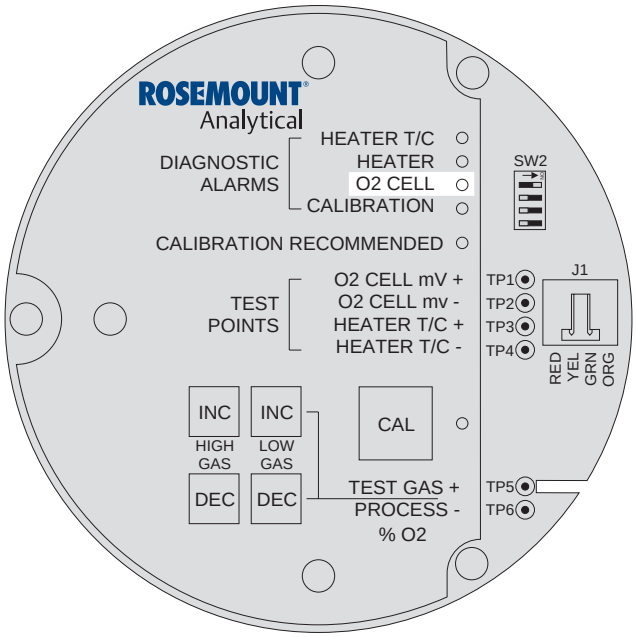
When Fault 14 is detected, the CALIBRATION LED flashes twice, pauses for three seconds, and repeats.

1. After a calibration has been performed, the electronics calculates a cell constant value.
2. If the cell constant value is outside of the range, -4 mV to 10 mV, the alarm will activate. See "Manual Calibration with Membrane Keypad" in Section 10: Maintenance and Service, and verify the last calibration was performed correctly.
3. Power down the Oxymitter 5000 and remove it from the stack.
4. Replace the cell per "Cell Replacement" in Section 10: Maintenance and Service.

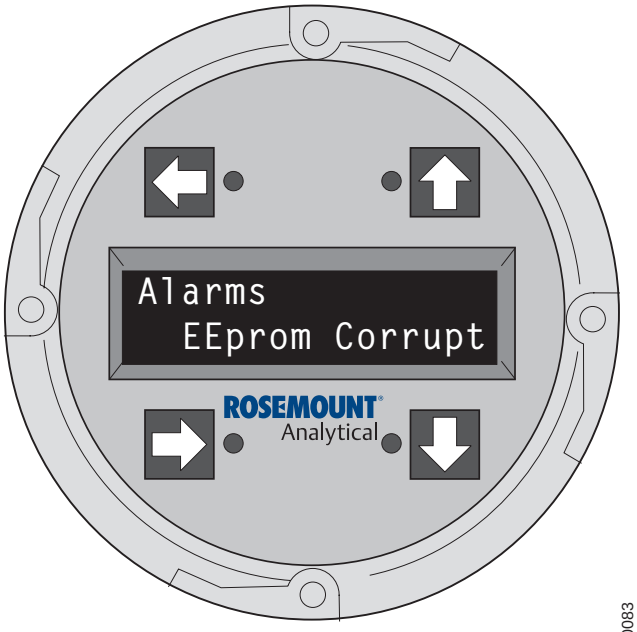
LOI

When Fault 14 is detected, the LOI displays the "O2 Cell Bad" message. Refer to the comments and procedures in paragraphs 1 through 4 above.

Figure 9-17. Fault 15, EEprom Corrupt



KEYPAD



LOI

38730083

Fault 15, EEprom Corrupt

Figure 9-17 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and an Oxymitter 5000 with an LOI (lower view).

Membrane Keypad

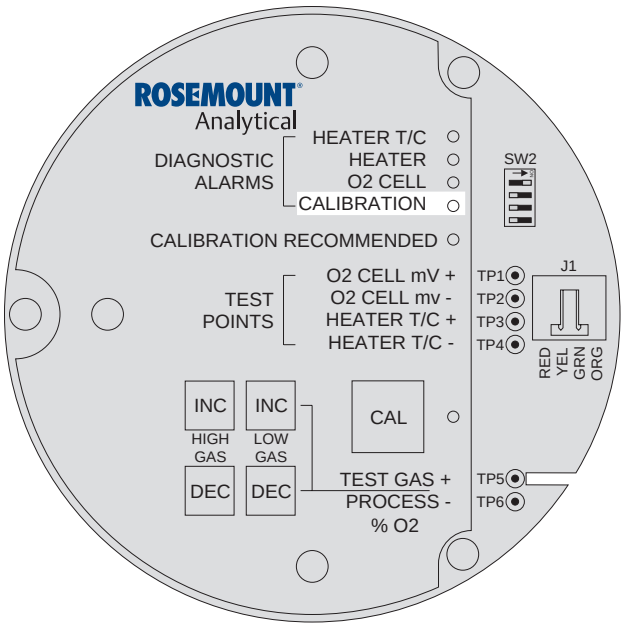
When Fault 15 is detected, the O2 CELL LED flashes four times, pauses for three seconds, and repeats.

1. This alarm can occur if the EEprom is changed for a later version. At power up, the EEprom is not updated.
2. To correct this problem, power down and then restore power. The alarm should clear.
3. If the alarm occurs while the unit is running, there is a hardware problem on the microprocessor board.
4. If cycling the power does not clear the alarm, see "Electronic Assembly Replacement" in Section 10: Maintenance and Service.

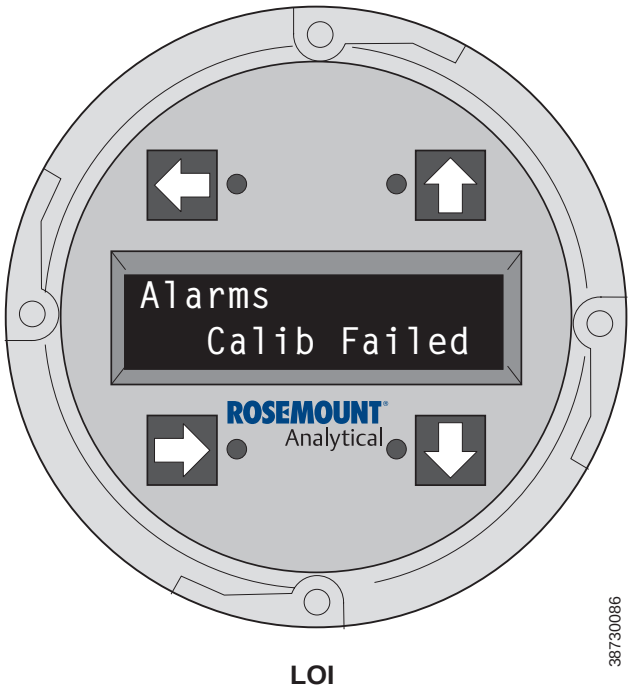
LOI

When Fault 15 is detected, the LOI displays the "EEprom Corrupt" message. Refer to the comments and procedures in paragraphs 1 through 4 above.

Figure 9-18. Fault 16, Last Calibration Failed



KEYPAD



LOI

38730086

Fault 16, Last Calibration Failed

Figure 9-18 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and an Oxymitter 5000 with an LOI (lower view).

Membrane Keypad

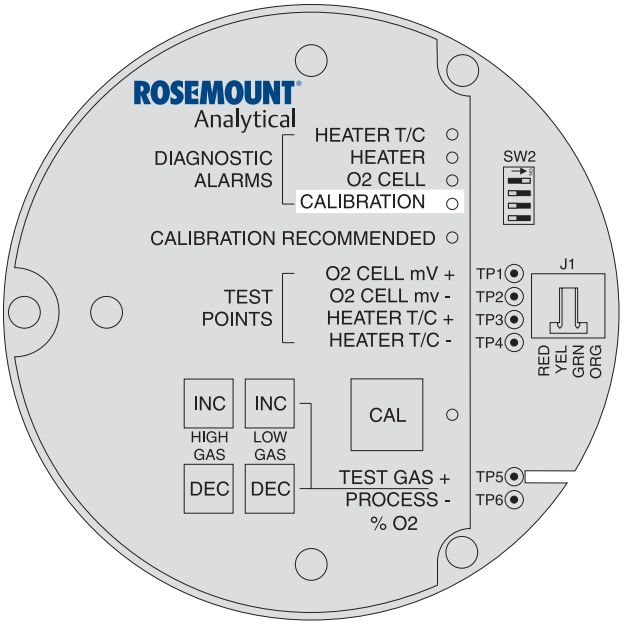
When Fault 16 is detected, the CALIBRATION LED flashes three times, pauses for three seconds, and repeats.

1. The last calibration failed alarm activates when the slope and constant values calculated are out of range and the unit reverts to using the previous calibration values.
2. The cell should be replaced. See "Cell Replacement" in Section 10: Maintenance and Service, for cell replacement instructions.

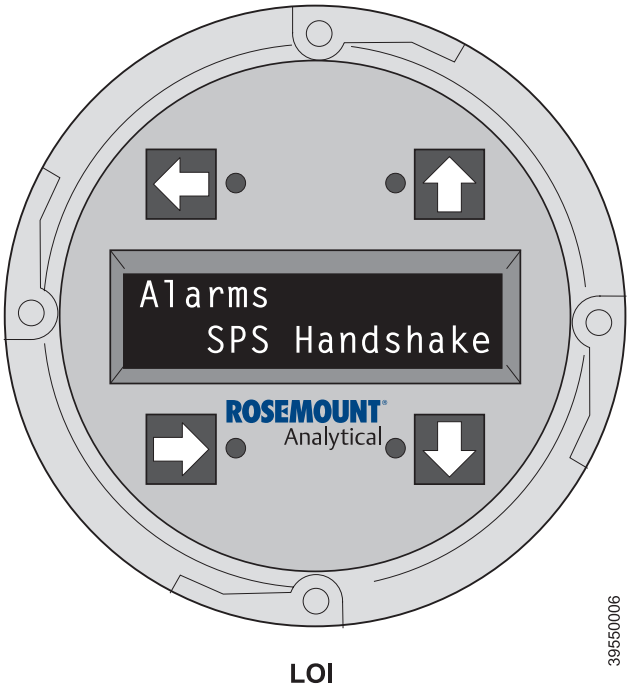
LOI

When Fault 16 is detected, the LOI displays the "Calib Failed" message. Refer to the comments in paragraphs 1 and 2 above.

Figure 9-19. Fault 17, SPS Handshake Failed



KEYPAD



LOI

Fault 17, SPS Handshake Failed

Figure 9-19 shows the electronic assembly for an Oxymitter 5000 with a membrane keypad (upper view) and an Oxymitter 5000 with an LOI (lower view).

Membrane Keypad

When Fault 17 is detected, the CALIBRATION LED flashes four times, pauses for three seconds, and repeats.

1. The SPS handshake failed alarm activates when the SPS or IMPS handshake sequence fails to establish communication with the Oxymitter 5000.
2. The SPS/IMPS setup should be checked. Refer to the applicable SPS or IMPS Instruction Manual for setup instructions.

LOI

When Fault 17 is detected, the LOI displays the "SPS Handshake" message. Refer to the comments in paragraphs 1 and 2 above.

HEATER NOT OPEN, BUT UNABLE TO REACH 736°C SETPOINT

The temperature setpoint of 736°C can not be reached because the Oxymitter 5000 has an "autotune" function for establishing heater control parameters. Probes mounted into processes that operate at above 600°C may have a hard time controlling the temperature with the "autotune" function enabled. To disable the autotune function, conduct the following procedure with the LOI.

1. Select System.
2. Select Parameters.
3. Select Auto Tune?
4. Select No to disable the Auto Tune function.

CALIBRATION PASSES BUT STILL READS INCORRECTLY

There are a few fault conditions where no alarm indication is present and the probe passes calibration, but the O_2 reading may still be incorrect:

An incorrect flow rate of calibration gases can cause a shifted calibration. If the flow rate of calibration gases is too low, process gases can mix in with the calibration gases causing a mixture at the cell that is different than what is noted on the calibration gas bottles. Always set the calibration flow rate when a new diffuser is installed, and never readjust this flow rate until another new diffuser is installed. For applications with heavy particulate loading, see "Probe Passes Calibration, But O_2 Still Reads Low".

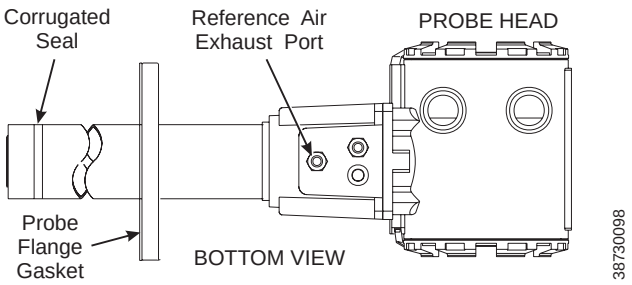
No or improper reference air supplied.

Probe Passes Calibration, O_2 Still Reads High

External Reference Air Leak - There may be a leak that is permitting ambient air to mix with the process gases. Since many combustion processes are slightly negative in pressure, ambient air can be drawn into the cell area, biasing the O_2 reading upward.

1. Make sure that the calibration gas line is capped tightly between calibrations. If autocal is used, make sure the check valve is seating properly.
2. A leak in the Oxycore viton o-ring seal can allow ambient air to migrate down the annular space between the sensor core and probe tube, and then into the cell. Always inspect the viton o-ring when removing and reinstalling the Oxycore sensor core.

Figure 9-20. Probe Leakage Paths



Internal Reference Air Leak - There may be a leak inside the Oxycore sensor core itself, permitting the reference air (20.95% O_2) to mix with the process gases at the cell. To confirm this leak condition, pressurize the inside (reference side) of the probe by plugging the reference air exhaust port with your finger for 1 minute. (the conduit ports where the signal and power wires pass may also need to be sealed.) The O_2 reading should decrease slightly. If the O_2 reading increases during this test, there is a leak inside the probe.

1. Acid condensation inside the probe can degrade the red silicon tube (32, Figure 10-3) that carries the cal gas to the cell. Remove housing (25) to inspect this hose. (See Section 10: Maintenance and Service). Black Viton™ material is optionally available with greater chemical resistance.
2. The sensing cell (4, Figure 10-3) is fastened to the end of the probe tube and uses a corrugated washer (5, Figure 10-3) to separate the process gases from the ambient reference air. The corrugated washer may be damaged by corrosion. Discard used washer.

NOTE
Always install a new corrugated washer whenever the sensing cell is removed from the probe.

Bad Reference Side Cell Electrode - A bad reference side cell electrode can cause an elevated O_2 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.

Probe Passes Calibration, O_2 Still Reads Low

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

NOTE
It is important not to pressurize the sensing cell during calibrations by flowing excessive cal gas against a plugged diffuser. Calibration flow rates should be set only when a new diffuser is installed. As the diffuser plugs, do not adjust the flow rates upward.

How do I detect a plugged diffuser?

The O_2 signal's speed of response will degrade. The O_2 trend in the control room will become smoother.

When calibrating, the calibration gas flow rate will be noted to be lower. Never readjust this flow upwards. Adjust this flow only when a new diffuser is installed.

Always note the time it takes for the cell to recover to the normal process value after the cal gas is removed. As the diffuser plugs, this recovery time will get longer and longer. Use the Calibration Record provided.

Can I calibrate a badly plugged diffuser?

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

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

Adjust the flow rate back up until this mixing is just eliminated. Calibrate at this flow rate. Replace the diffuser at the first opportunity.

⚠WARNING

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

Calibration Record

For

Rosemount Analytical In Situ O_2 Probe

Probe Serial Number: _____

Probe Tag Number: _____

Probe Location: _____

Date Placed Into Service: _____

Date	Slope	Constant	Impedance	$Response_{initial}$	$Response_{final}$

Notes: $Response_{initial}$ When the second calibration gas is turned off, note the number of seconds required for the O_2 value to begin migrating back to the process value.

$Response_{final}$ When the second calibration gas is turned off, note the number of seconds required for the O_2 value to settle out at the process value.

Section 10 Maintenance and Service

OVERVIEW

This section identifies the calibration methods available and provides the procedures to maintain and service the Oxymitter 5000.

⚠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.

CALIBRATION WITH KEYPAD

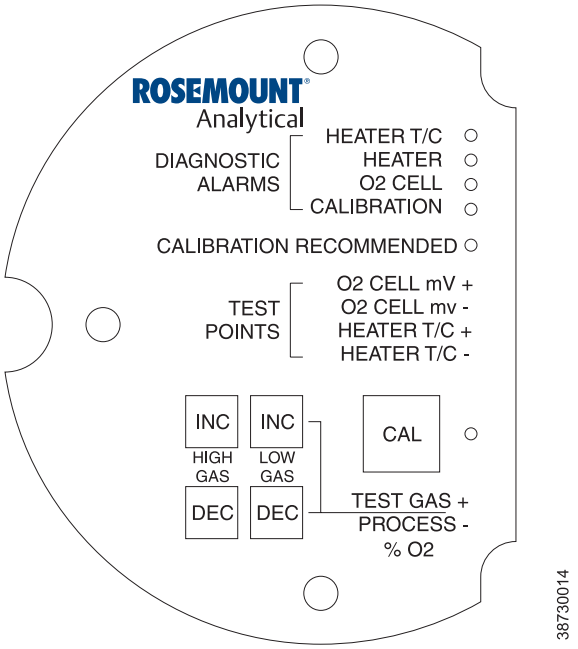
During a calibration, two calibration gases with known O_2 concentrations are applied to the Oxymitter 5000. Slope and constant values calculated from the two calibration gases determine if the Oxymitter 5000 is correctly measuring the net concentration of O_2 in the industrial process. A calibration record sheet has been provided at the front of this section to track performance.

Before calibrating, verify that the calibration gas parameters are correct by setting the gas concentrations used when calibrating the unit (see "Overview" in Section 5: Startup and Operation of Oxymitter 5000 with Membrane Keypad, or Section 6: Startup and Operation of Oxymitter 5000 with LOI) and by setting the calibration gas flowmeter. The calibration gas flowmeter regulates the calibration gas flow and must be set to 5 scfh. Only adjust the flowmeter to 5 scfh after placing a new diffusion element on the end of the Oxymitter 5000. Adjusting the flowmeter at any other time can pressurize the cell and bias the calibration.

In applications with a heavy dust loading the O_2 probe diffusion element may become plugged over time, causing a slower speed of response. The best way to detect a plugged diffusion element is to note the time it takes the Oxymitter 5000 to return to the normal process reading after the last calibration gas is removed and the calibration gas line is blocked off. A plugged diffusion element also can be indicated by a slightly lower reading on the flowmeter.

Change the diffusion element when the calibration gas flowmeter reads slightly lower during calibration or when response to the process flue gases becomes very slow. Each time the diffusion element is changed, reset the

Figure 10-1. Membrane Keypad



calibration gas flowmeter to 5 scfh and calibrate the Oxymitter 5000. To change the diffusion element refer to "Ceramic Diffusion Element Replacement".

Three types of calibration methods are available: automatic, semi-automatic, and manual.

NOTE
A calibration can be aborted any time during the process. Press the CAL key (Figure 10-1) on the Oxymitter 5000 keypad three times within three seconds, or abort via the LOI, FOUNDATION fieldbus, or an IMPS 4000. An aborted calibration will retain the values of the previous good calibration.

Automatic Calibration

Automatic calibrations require no operator action. However, the calibration gases must be permanently piped to the Oxymitter 5000, an SPS 4001B or IMPS 4000 must be installed to sequence the gases, and the logic I/O must be set to mode 8 via the FOUNDATION fieldbus computer terminal using the IO_PIN_MODE parameter so the sequencer and Oxymitter 5000 can communicate.

Depending on your system setup, an automatic calibration can be initiated by the following methods:

1. The Oxymitter 5000's CALIBRATION RECOMMENDED alarm signals that a calibration is required.
2. Use the LOI to enter a "time since last cal" (CAL INTRVL) parameter that will initiate an automatic calibration at a scheduled time interval (in hours). To configure the CAL INTRVL parameter, refer to "Oxymitter 5000 Setup at the LOI" in Section 6: Startup and Operation of Oxymitter 5000 with LOI for the LOI.

3. Enter a time to next calibration using the TIME_TO _NEXT_CAL parameter via fieldbus. Calibrations will then occur regularly at this interval.
4. If using an IMPS 4000, enter a time interval via the IMPS 4000 keypad that will initiate an automatic calibration at a scheduled time interval (in hours). To set the CalIntvX parameter of the CHANGE PRESETS display mode refer to the IMPS 4000 Intelligent Multiprobe Test Gas Sequencer Instruction Manual for more information.

Once an automatic calibration is initiated, by any of the methods previously described, the Oxymitter 5000's CALIBRATION RECOMMENDED alarm signals an IMPS 4000 or SPS 4001B to initiate a calibration. The sequencer sends an "in cal" signal to the control room so that any automatic control loops can be placed in manual. Then the sequencer begins to sequence the calibration gases.

Semi-Automatic Calibration

Semi-automatic calibrations only require operator initiation. However, the calibration gases must be permanently piped to the Oxymitter 5000, an SPS 4001B or IMPS 4000 must be installed to sequence the gases, and the logic I/O must be set to mode 8 or 9 via the FOUNDATION fieldbus computer terminal to allow the sequencer and the Oxymitter 5000 to communicate.

Depending on your system setup, a semi-automatic calibration can be initiated by the following methods:

1. Oxymitter 5000 with membrane keypad. Press the CAL key on the Oxymitter 5000 keypad.
2. Oxymitter 5000 with LOI. Select "Start Calib" from the CALIBRATION menu.
3. IMPS 4000. Use the IMPS 4000 keypad to change the InitCalX parameter of the CHANGE PRESETS display mode from 0000 to 0001. Refer to the IMPS 4000 Intelligent Multiprobe Test Gas Sequencer Instruction Manual for more information.
4. FOUNDATION fieldbus. Use fieldbus to perform the O_2 CAL method.
5. Remote Contact. Initiate a calibration from a remote location via the remote contact input connection provided by an IMPS 4000 or SPS 4001B. Refer to the documentation available for the control system in use for more information.

Once a semi-automatic calibration is initiated by any of the methods previously described, the Oxymitter 5000's CALIBRATION RECOMMENDED alarm signals an IMPS 4000 or SPS 4001B to initiate a calibration. The sequencer sends an "in cal" signal to the control room so that any automatic control loops can be placed in manual. Then the sequencer begins to sequence the calibration gases.

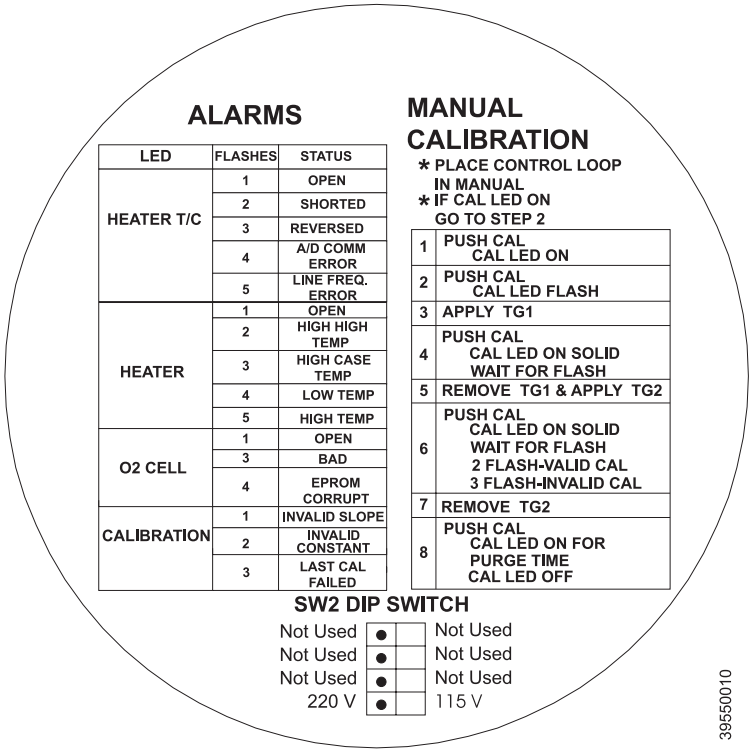
Manual Calibration with Membrane Keypad

Manual calibrations must be performed at the Oxymitter 5000 site and will require operator intervention throughout the process. Manual calibration instructions, in condensed form, can also be found on the inside of the right electronics housing cover. See Figure 10-2.

Use the following procedure to perform a manual calibration:

1. Place control loop in manual.

Figure 10-2. Inside Right Cover



2. Verify the calibration gas parameters are correct per "Calibration with Keypad".
3. If performing a manual calibration with the CALIBRATION RECOMMENDED LED off and the CAL LED off, start at step a.
4. If performing a manual calibration with the CALIBRATION RECOMMENDED LED on and the CAL LED on, start at step b.
   a. Push the CAL key. The CALIBRATION RECOMMENDED LED will come on and the CAL LED will be on solid. If a multimeter is attached across TP5 and TP6, the reading will display the percentage of oxygen seen by the cell.
   b. Push the CAL key. The CALIBRATION RECOMMENDED LED will turn off and the CAL LED will flash continuously. The flashing LED indicates that the Oxymitter 5000 is ready to accept the first calibration gas.
   c. Apply the first calibration gas. (Electronics will abort the calibration if step d is not done within 30 minutes).
   d. Push the CAL key; the CAL LED will be on solid. A timer is activated to allow the calibration gas adequate time to flow (default time of five minutes). When the timer times out, the Oxymitter 5000 has taken the readings using the first calibration gas and the CAL LED will flash continuously. The flashing indicates the Oxymitter 5000 is ready to take readings using the second calibration gas.
   e. Remove the first calibration gas and apply the second calibration gas. (Electronics will abort the calibration if step f is not done within 30 minutes).

f. Push the CAL key; the CAL LED will be on solid. The timer is activated for the second calibration gas flow. When the timer times out, the CAL LED will flash a 2 pattern flash or a 3 pattern flash (2 pattern flash equals a valid calibration, 3 pattern flash equals an invalid calibration). If the slope or the constant is out of specification, a diagnostic alarm LED will be flashing. The diagnostic alarm will remain active until the purge cycle is over. If the three pattern flash occurs without a diagnostic alarm, the calibration gases could be the same or the calibration gas was not turned on.

   A flashing CAL LED indicates the calibration is done. (See Section 9: Troubleshooting, for an explanation of the 2 pattern and 3 pattern flashes).

g. Remove the second calibration gas and cap off the calibration gas port.

h. Push the CAL key; the CAL LED will be on solid as the unit purges. (Default purge time is three minutes). When the purge is complete, the CAL LED will turn off and the Oxymitter 5000 output unlocks from its held value and begins to read the process O_2.

   If the calibration was valid, the DIAGNOSTIC ALARMS LEDs will indicate normal operation. If either new calibration value (slope or constant) is not within parameters, the DIAGNOSTIC ALARMS LED will indicate an alarm. (See Section 9: Troubleshooting, for alarm codes). If the calibration was invalid, the Oxymitter 5000 will return to normal operation, as it was before a calibration was initiated, and the parameters will not be updated.

5. Place control loop in automatic.

FOUNDATION FIELDBUS O_2 CAL METHOD

To perform a calibration using the FOUNDATION fieldbus, use the following procedure.

1. From the computer running the fieldbus control program, run the O_2 Cal Method.

⚠WARNING

Failure to remove the Oxymitter 5000 from automatic control loops prior to performing this procedure may result in dangerous operating conditions.

2. In the first O_2 CAL screen, a "Loop should be removed from automatic control" warning appears. Remove the Oxymitter 5000 from any automatic control loops to avoid a potentially dangerous operating condition and press OK.
3. From this point, following the on-screen prompts to complete the calibration procedure. When a step is complete, select Proceed to Next Step and press the Next button.
4. During the wait periods, such as during a purge, the Time Remaining display may be updated by selecting Update and pressing Next button.

CALIBRATION WITH LOI

Refer to Figure 6-4 for a view of the LOI menu tree. To calibrate the Oxymitter 5000 from the LOI, access the CALIBRATION/ Start Calibration menu.

CALIBRATION/Start Calibration

This is the starting point for calibrations. The LOI will instruct the user through this entire procedure. Select "Abort Calib" at any time to abort the calibration.

1. The LOI displays the following:

   Apply Gas 1
   Hit E when ready

   The Oxymitter 5000 is ready to accept the first calibration gas. Apply the first calibration gas. (Electronics will abort the calibration if this step is not done within 30 minutes).

2. Touch the Enter key to start the Gas 1 flow. A timer is activated to allow the calibration gas adequate time to flow (default time of five minutes). The LOI displays:

   Flow Gas 1 xxxxs
   Read Gas 1 xxxxs
   Done Gas 1

   The display counts down the seconds remaining to flow Gas 1, then the time remaining for sensing the O_2 concentration of Gas 1. Done Gas 1 indicates completion.

3. Remove the first calibration gas and apply the second calibration gas. (Electronics will abort the calibration if this step is not done within 30 minutes). The LOI displays the following:

   Apply Gas 2
   Hit E when ready

4. Touch the Enter arrow to start the Gas 2 flow. The timer is activated and the LOI displays:

   Flow Gas 2 xxxxs
   Read Gas 2 xxxxs
   Done Gas 2
   Stop Gas
   Hit E when ready

5. Remove the second calibration gas and cap off the calibration gas port. Then touch the Enter arrow to indicate completion. The timer is activated and the LOI displays:

   Purge xxxxs

   The default purge time is three minutes. When the gas purge timer times out the Oxymitter 5000 begins to read the process O_2.

Abort Calibration

Exits the calibration. After calibration gases are removed, and the purge times out, the instrument goes back to normal operational mode.

Cal Constants - Results of the Calibration

Current calibration
If the calibration passed these values will be updated. Log these values on the calibration log sheet supplied. If the process has high levels of particulate, the response back to the process after cal gas is also removed.

Previous Calibration
Values from the prior good calibration.

Failed Calibration
Bad calibration values are not loaded into the electronics.

Calibration Status

Calibration Step
The current step in an active calibration procedure.

Calibration Time
Time until the next scheduled calibration.

Next O2 Cal
Time until the next O_2 calibration, if different than the next scheduled calibration.

OXYMITTER 5000 REPAIR

Each of the following procedures details how to remove and replace a specific component of the Oxymitter 5000.

⚠WARNING

It is recommended that the Oxymitter 5000 be removed from the stack for all service activities. The unit should be allowed to cool and be taken to a clean work area. Failure to comply may cause severe burns.

⚠WARNING

Disconnect and lock out power before working on any electrical components. There is voltage up to 115 VAC.

Removal and Replacement of Probe

1. Remove.
   a. Turn off power to the system.
   b. Shut off the calibration gases at the cylinders and the instrument air.
   c. Disconnect the calibration gas and instrument air lines from the Oxymitter 5000.
   d. Remove left housing cover (31, Figure 10-3 or Figure 10-4).
   e. Remove all signal and power wiring to the probe.
   f. Remove insulation to access the mounting bolts.
   g. Unbolt the Oxymitter 5000 from the stack and take it to a clean work area.
   h. Allow the unit to cool to a comfortable working temperature.
2. Replace.
   a. Bolt the Oxymitter 5000 to the stack and install the insulation.
   b. Connect all signal and power leads at the probe. Refer to Section 2: Installation, for detailed wiring instructions.
   c. Connect the calibration gas and instrument air lines to probe.
   d. Install left housing cover (31, Figure 10-3 or Figure 10-4).
   e. Turn on instrument air.
   f. Restore power to the system; refer to "Power Up" in Section 5: Startup and Operation of Oxymitter 5000 with Membrane Keypad or "Power Up" in Section 6: Startup and Operation of Oxymitter 5000 with LOI. When the probe is at operating temperature, calibrate the probe per "Calibration with Keypad".

NOTE
Recalibration is required whenever electronic cards or sensing cell is replaced.

Figure 10-3. Oxymitter 5000 with Integral Electronics - Exploded View

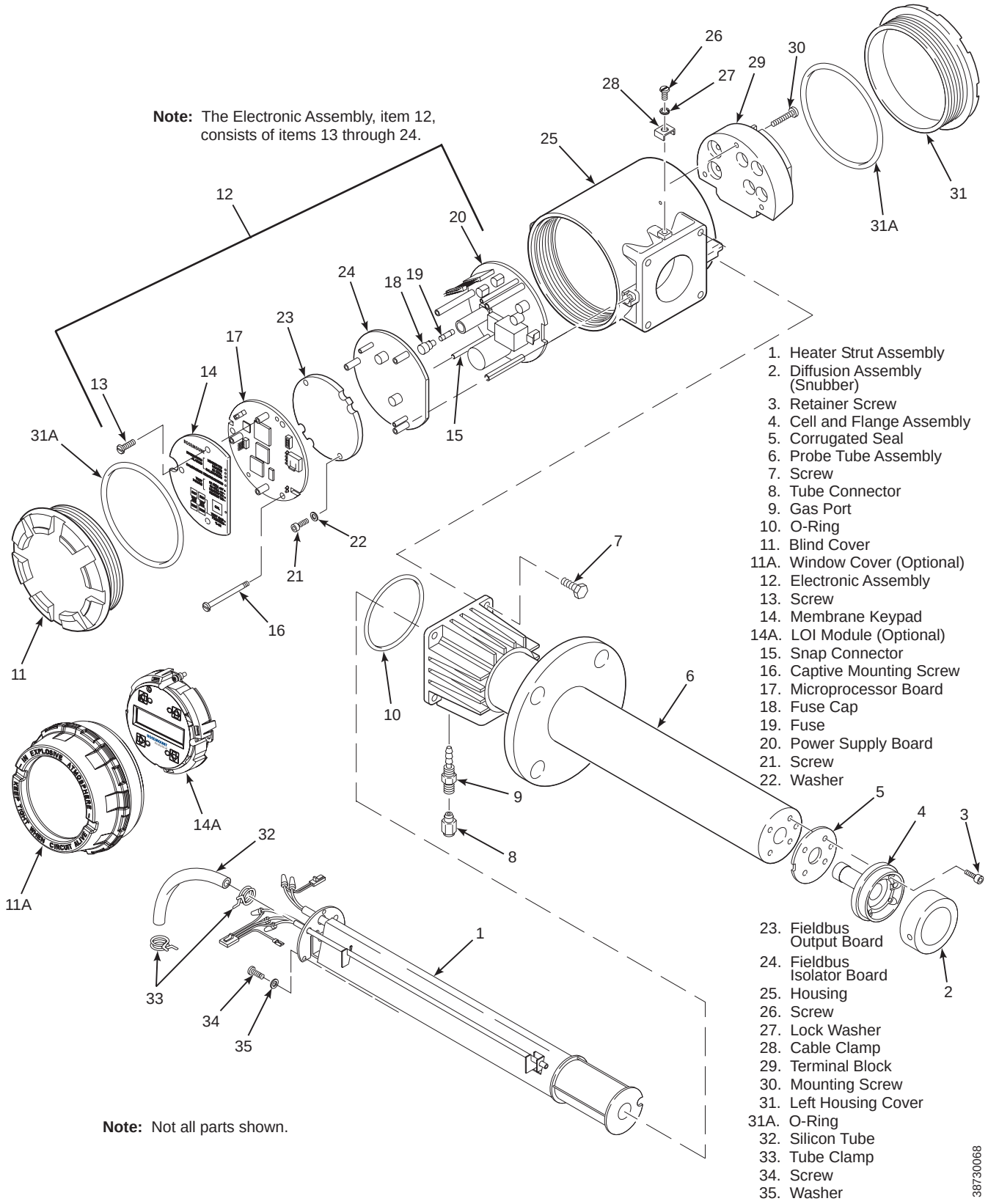
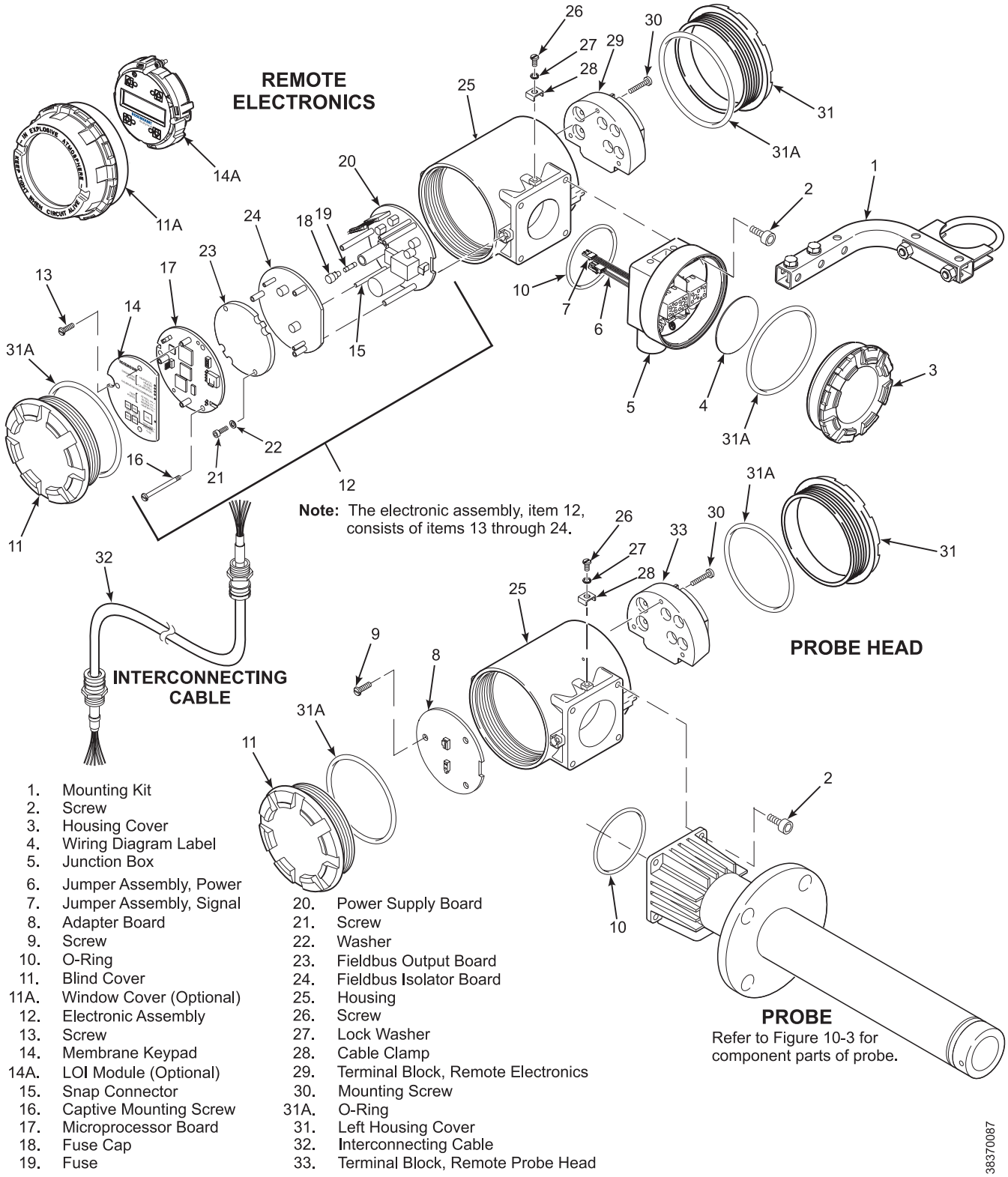


Figure 10-4. Oxymitter 5000 with Remote Electronics - Exploded View



1. Mounting Kit
2. Screw
3. Housing Cover
4. Wiring Diagram Label
5. Junction Box
6. Jumper Assembly, Power
7. Jumper Assembly, Signal
8. Adapter Board
9. Screw
10. O-Ring
11. Blind Cover
11A. Window Cover (Optional)
12. Electronic Assembly
13. Screw
14. Membrane Keypad
14A. LOI Module (Optional)
15. Snap Connector
16. Captive Mounting Screw
17. Microprocessor Board
18. Fuse Cap
19. Fuse
20. Power Supply Board
21. Screw
22. Washer
23. Fieldbus Output Board
24. Fieldbus Isolator Board
25. Housing
26. Screw
27. Lock Washer
28. Cable Clamp
29. Terminal Block, Remote Electronics
30. Mounting Screw
31A. O-Ring
31. Left Housing Cover
32. Interconnecting Cable
33. Terminal Block, Remote Probe Head

Replace Entire Integral Electronics (with Housing)

NOTE
Only perform this procedure on units with integral electronics.

NOTE
Recalibration is required whenever electronic cards or sensing cell is replaced.

1. Follow the instructions in "Removal and Replacement of Probe" to remove the Oxymitter 5000 from the stack or duct.
2. Remove the right housing cover uncovering the electronic assembly (Figure 10-5).
3. Depress and remove the J1 (cell and T/C) connector from the J1 socket. Loosen the three captive mounting screws (16, Figure 10-3 or Figure 10-4) on the microprocessor board (top board).
4. The J8 connector (heater leads) (Figure 10-6) can be accessed by moving the J1 connector leads out of the slot on the microprocessor board (17) and sliding the electronic assembly (12) partially out of the housing (Figure 10-3 or Figure 10-4).
5. Squeeze the J8 connector on the sides and carefully remove. The electronic assembly can now be completely removed from the housing.
6. Remove four screws (7, Figure 10-3) from the probe finned housing. The probe and the electronic housing can now be separated.
7. When reinstalling or replacing the electronic housing make sure that O-ring (10) is in good condition. Place the J1 and J8 connectors in the hole on the flat side of the electronic housing.
8. Hold the J1 and J8 connectors out and to the probe side of the electronic housing. Make sure that the conduit port of the electronic housing is on the same side as the CAL and REF gas ports. Replace the four screws and tighten.
9. Reconnect the J8 connector to the power supply board. Make sure the connector is secure.
10. Holding the J1 connector leads, slide the electronic assembly the rest of the way into the housing. Align the electronic assembly so that it fits flush on the pins. To ensure that it is flush, gently try to rotate the electronics. If the electronics rotates, repeat the alignment.
11. Reconnect the J1 connector to the microprocessor board. Ensure the connector is secure and tighten the three captive screws on the microprocessor board (top board).
12. Replace the housing cover and ensure it is tight.
13. Follow the instructions in "Removal and Replacement of Probe" to install the Oxymitter 5000 into the stack or duct.

Figure 10-5. Electronic Assembly

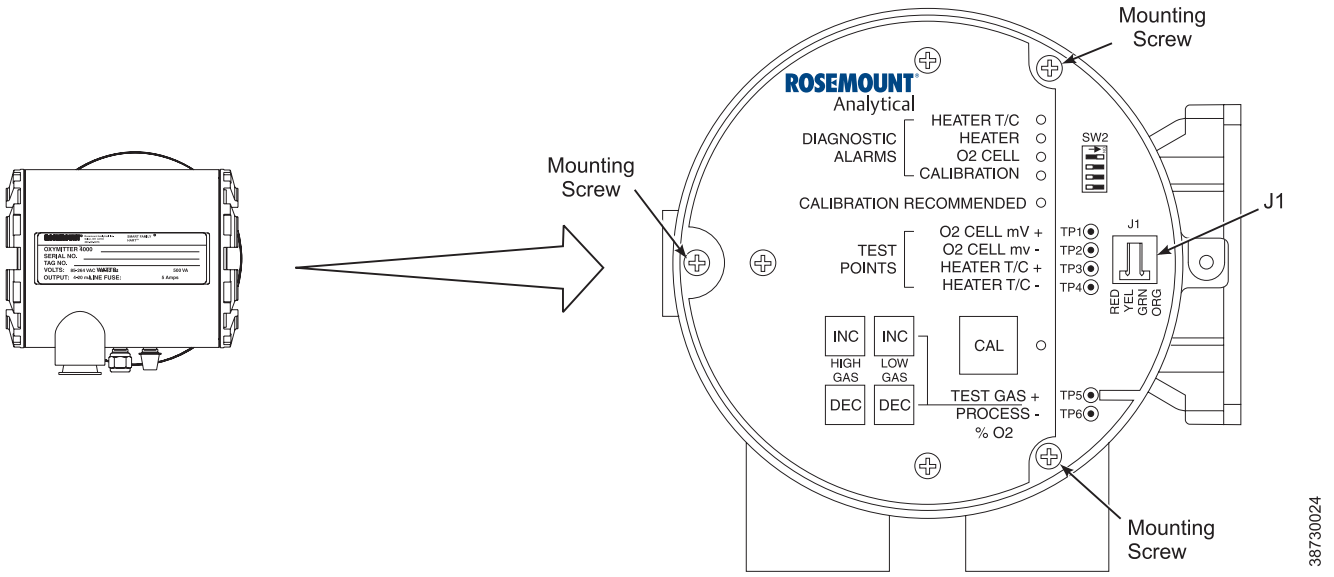
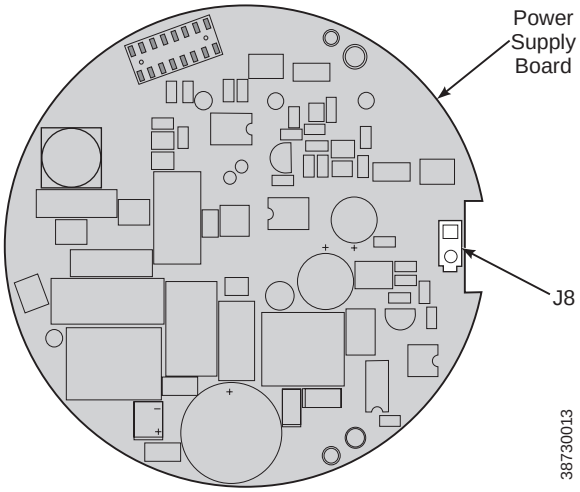


Figure 10-6. J8 Connector



Electronic Assembly Replacement

See Figure 10-5.

1. Remove the right housing cover uncovering the electronic assembly.
2. Depress and remove the J1 (cell and T/C) connector from the J1 socket. Loosen the three captive mounting screws (16, Figure 10-3 or Figure 10-4) on the microprocessor board (top board).

3. The J8 connector (heater leads) can be accessed by moving the J1 connector leads out of the slot on microprocessor board (17) and sliding the electronic assembly (12) partially out of the housing (Figure 10-6).
4. Squeeze the J8 connector on the sides and carefully remove. The electronic assembly can now be completely removed from the housing.
5. Reconnect the J8 connector to the power supply board. Make sure the connector is secure.
6. Holding the J1 connector leads, slide the electronic assembly the rest of the way into the housing. Align the electronic assembly so that it fits flush on the pins. To ensure that it is flush gently try to rotate the electronics. If the electronics rotate, repeat the alignment.
7. Reconnect the J1 connector to the microprocessor board. Ensure the connector is secure and tighten the three captive mounting screws on the microprocessor board (top board).
8. Replace the housing cover and ensure it is tight.

Terminal Block Replacement

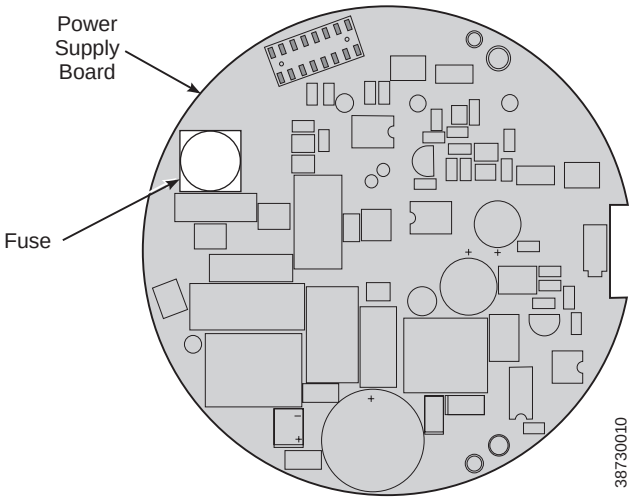
1. Unscrew left housing cover (31, Figure 10-3).
2. Loosen mounting screws (30) on terminal block (29) and carefully lift the block out of the housing.
3. Carefully align the new terminal block on the pins so that it sits flat in the housing. The round end of the terminal block should be on the opposite side of the housing conduit ports and should not be able to rotate.
4. Tighten the three mounting screws and ensure the terminal block is secure in the housing.

Fuse Replacement

See Figure 10-7.

1. Remove the right housing cover uncovering the electronic assembly.
2. Depress and remove the J1 (cell and T/C) connector from the J1 socket. Loosen the three captive mounting screws (16, Figure 10-3 or Figure 10-4) on the microprocessor board (top board).
3. The J8 connector (heater leads) (Figure 10-6) can be accessed by moving the J1 connector leads out of the slot on the microprocessor board (17, Figure 10-3 or Figure 10-4) and sliding the electronic assembly (12) partially out of the housing.
4. Squeeze the J8 connector on the sides and carefully remove. The electronic assembly can now be completely removed from the housing.
5. Completely remove the three mounting screws (16) on the microprocessor board (17).

Figure 10-7. Fuse Location



6. Turn the electronic assembly over so that you are looking at the bottom of the power supply printed circuit board. Gently depress the two white posts one at a time. Carefully separate the power supply board (20) from the microprocessor board (17).
7. Remove fuse (19) and replace it with a new one (Figure 10-7).
8. Align the white posts with the post holes on the power supply board and the pin connector on the power supply board with the connector port on the back of the microprocessor board. Gently push the boards together until the white posts snap in place. Ensure the assembly is secure by gently trying to separate the boards.
9. Reconnect connector J8 to the power supply board. Make sure the connector is secure.
10. Holding the J1 connector leads, slide the electronic assembly the rest of the way into the housing. Align the electronic assembly so that it fits flush on the pins. To ensure that it is flush gently try to rotate the electronics. If the electronics rotate, repeat the alignment.
11. Reconnect the J1 connector to the microprocessor board. Ensure the connector is secure and tighten the three captive screws on the microprocessor board (top board).
12. Replace the housing cover and ensure that it is tight.

Entire Probe Replacement (Excluding Probe Head)

1. Do not attempt to replace the probe until all other possibilities for poor performance have been considered. If probe replacement is needed, see Table 11-1 for part numbers.
2. Follow the instructions in "Removal and Replacement of Probe" to remove the Oxymitter 5000 from the stack or duct.
3. Separate the probe and the probe head per "Replace Entire Integral Electronics (with Housing)", steps 2 through 6.
4. Reinstall the probe head on the new probe per "Replace Entire Integral Electronics (with Housing)", steps 7 through 13.

Heater Strut Replacement

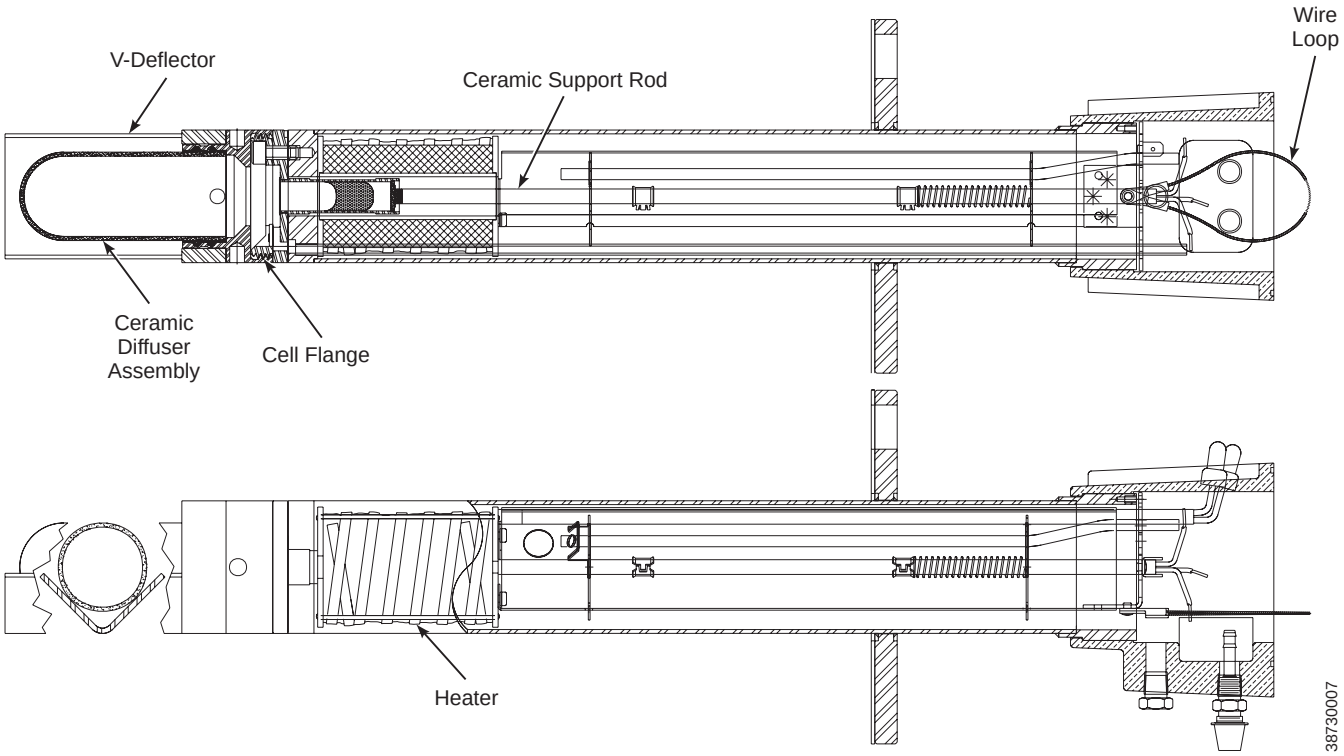
This paragraph covers heater strut replacement. Do not attempt to replace the heater strut until all other possibilities for poor performance have been considered. If heater strut replacement is needed, order a replacement heater strut (Table 11-1). Refer to Figure 10-3 or Figure 10-4 to view the component parts of the Oxymitter 5000.

⚠WARNING

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

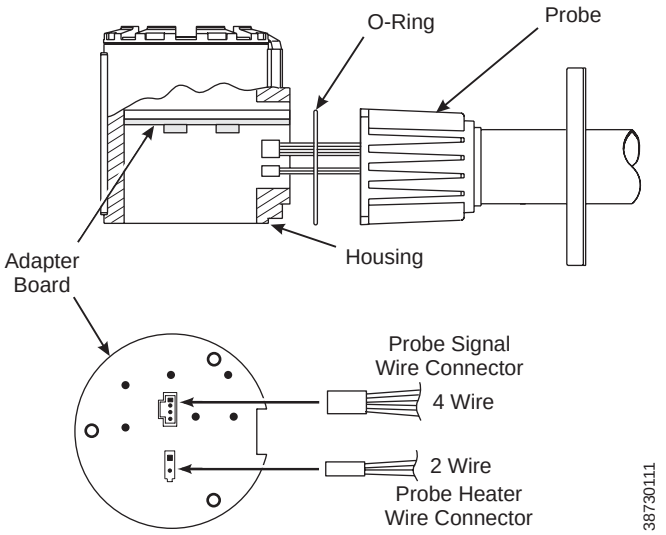
1. Follow the instructions in "Removal and Replacement of Probe" to remove the Oxymitter 5000 from the stack or duct.
2. For a unit with integral electronics, disconnect electronics per "Replace Entire Integral Electronics (with Housing)", steps 2 through 5.
3. For a unit with remote electronics, remove cover (11, Figure 10-4) from housing (25) along with adapter board (8) and screw (9) from heater strut assembly (1, Figure 10-3).
4. Remove four screws (2, Figure 10-4). Remove the probe from housing (25).
5. Remove tube clamps (33, Figure 10-3) and silicon tubes (32, Figure 10-3) from the CAL and REF gas ports and the CAL and REF gas lines.
6. Loosen, but do not remove, three screws (34, Figure 10-3). The spring tension will release and the heater strut assembly should move up.
7. When the spring tension is released, remove three screws (34). Grasp the wire loop and carefully slide the heater strut assembly (Figure 10-8) out of the probe tube.
8. When replacing the strut, orient the probe so the small calibration gas tube is at the 6 o'clock position of the probe tube. Align the slot on the heater plate with the calibration gas line in the probe tube. Slide the strut into the probe tube. It will turn to align the hole on the back plate of the strut with the calibration gas line. When the hole and the calibration gas line are aligned correctly, the strut will slide in the rest of the way.
9. As the strut installation nears completion, install the guide rod into the calibration gas tube to assist in guiding the calibration gas tube through the hole in the end of the strut.
10. Push down on the back plate of the strut to make sure you have spring tension and then tighten the three screws on the back plate.
11. Replace the CAL and REF gas silicon tubes.
12. For units with integral electronics, install the entire electronics per "Replace Entire Integral Electronics (with Housing)", steps 7 through 13.

Figure 10-8. Heater Strut Assembly



13. For units with remote electronics, install the probe head as follows:
    a. See Figure 10-9. Make sure that the O-ring is in good condition. Seat the O-ring in the mating groove of the probe.
    b. Insert the probe signal cables into the housing.
    c. Turn the conduit ports of the housing to the CAL and REF gas ports side of the probe and position the housing on the probe.
    d. Install and tighten four screws (2, Figure 10-4).
    e. Reconnect the probe signal cables to the probe signal and heater wire connectors, Figure 10-9. Make sure the connectors are secure.
    f. Install and tighten cover.
14. Follow the instructions in "Removal and Replacement of Probe" to install the Oxymitter 5000 into the stack or duct.

Figure 10-9. Probe to Probe Head Assembly - Remote Electronics Only

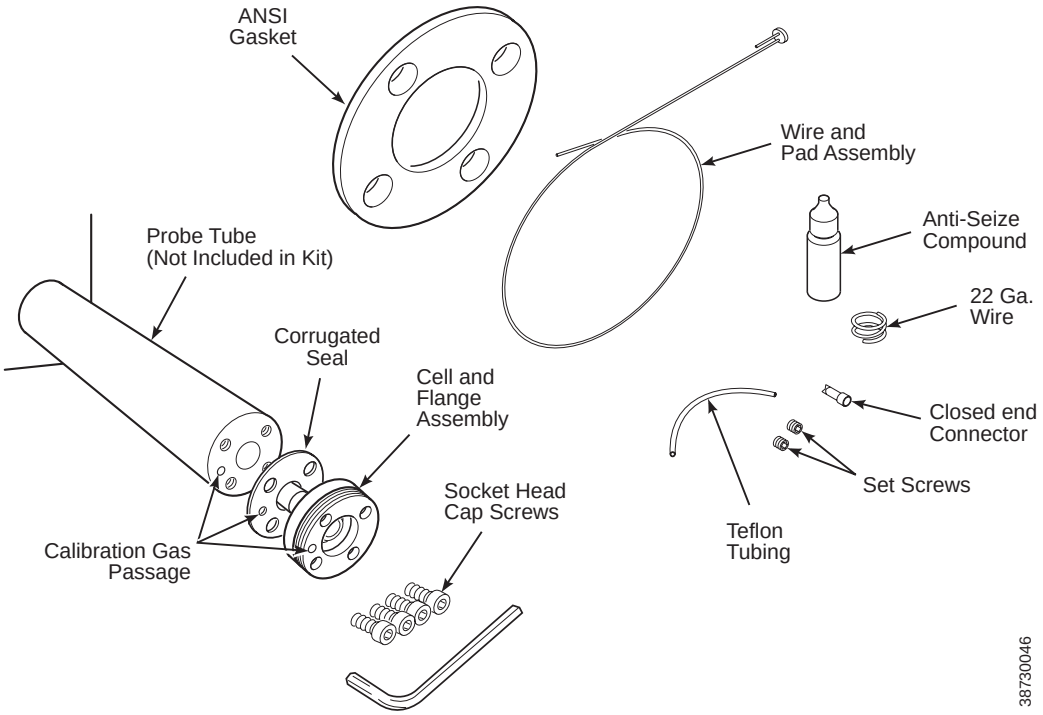


Cell Replacement

This paragraph covers oxygen sensing cell replacement. Do not attempt to replace the cell until all other possibilities for poor performance have been considered. If cell replacement is needed, order the cell replacement kit (Table 11-1). Refer to Figure 10-3 or Figure 10-4 to view the component parts of the Oxymitter 5000.

The cell replacement kit (Figure 10-10) contains a cell and flange assembly, corrugated seal, setscrews, socket head cap screws, and anti-seize compound. The items are carefully packaged to preserve precise surface finishes. Do not remove items from the packaging until they are ready to be used. Spanner wrenches and hex wrenches needed for this procedure are part of an available special tools kit (Table 11-1 and Figure 11-2).

Figure 10-10. Cell Replacement Kitl



⚠WARNING

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

Disconnect and lock out power before working on any electrical components. There is voltage of up to 115 VAC.

⚠CAUTION

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

1. Follow the instructions in "Removal and Replacement of Probe" to remove the Oxymitter 5000 from the stack or duct.

NOTE
To determine if the diffuser needs to be replaced, refer to "Calibration with Keypad".

2. If the probe uses the standard diffusion element, use a spanner wrench to remove the diffuser assembly.

3. If equipped with the optional ceramic diffusion assembly, remove and discard the setscrews and remove the vee deflector (Figure 10-11). Use spanner wrenches from the probe disassembly kit (Table 11-1 and Figure 11-2), to turn the hub free from the retainer. Inspect the diffusion element. If damaged, replace the element.
4. Loosen the four socket head cap screws from the cell and flange assembly and remove the assembly and the corrugated seal. The cell flange has a notch that may be used to gently pry the flange away from the probe. Note that the contact pad inside of the probe will sometimes fuse to the oxygen sensing cell. If the cell is fused to the contact pad, push the cell assembly back into the probe (against spring pressure) and quickly twist the cell assembly. The cell and contact pad should separate. If the contact pad stays fused to the cell, a new contact/thermocouple assembly must be installed. Disconnect the cell and the thermocouple wires at the crimp connections and withdraw the cell with the wires still attached.
5. For units with integral electronics, disconnect the entire electronics per "Replace Entire Integral Electronics (with Housing)", steps 2 through 5.
6. Remove four screws (7, Figure 10-3) from the probe finned housing. The probe and the probe head can now be separated.
7. If the contact assembly is damaged, replace the strut or the contact pad. Instructions for replacing the contact pad are in the cell replacement kit.
8. Remove and discard the corrugated seal. Clean the mating faces of the probe tube and retainer. Remove burrs and raised surfaces with a block of wood and crocus cloth. Clean the threads on the retainer and hub.
9. Rub a small amount of anti-seize compound on both sides of the new corrugated seal.
10. Assemble the cell and flange assembly, corrugated seal, and probe tube. Make sure the calibration tube lines up with the calibration gas passage in each component. Apply a small amount of anti-seize compound to the screw threads and use the screws to secure assembly. Torque to 35 in-lbs (4 N·m).
11. Install the entire electronics per "Replace Entire Integral Electronics (with Housing)", steps 7 through 13.
12. Apply anti-seize compound to the threads of the cell assembly, hub, and setscrews. Reinstall the hub on the cell assembly. Using pin spanner wrenches, torque to 10 ft-lbs (14 N·m). If applicable, reinstall the vee deflector, orienting apex toward gas flow. Secure with the setscrews and anti-seize compound. Torque to 25 in-lbs (2.8 N·m).
13. On systems equipped with an abrasive shield, install the dust seal gaskets, with joints 180° apart.
14. Reinstall the probe and gasket on the stack flange.
15. Follow the instructions in "Removal and Replacement of Probe" to install the Oxymitter 5000 into the stack or duct. If there is an abrasive shield in the stack, make sure the dust seal gaskets are in place as they enter the 15° reducing cone.
16. Turn on power and monitor thermocouple output. It should stabilize at 29.3+0.2 mV. Set reference air flow at 1 l/min (2 scfh). After the Oxymitter 5000 stabilizes, calibrate the unit. If new components have been installed, repeat calibration after 24 hours of operation.

Ceramic Diffusion Element Replacement

NOTE
This refers to the ceramic diffusion element only.

General

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

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

Damage to the ceramic diffusion element may become apparent during calibration. Compare probe response with previous response. A broken diffusion element will cause a slower response to calibration gas. Hex wrenches needed to remove setscrews and socket head screws in the following procedure are available as part of a Probe Disassembly Kit, Table 11-1.

Replacement Procedure

1. Follow the instructions in "Removal and Replacement of Probe" to remove the Oxymitter 5000 from the stack or duct.
2. Loosen setscrews, Figure 10-11, using hex wrench from Probe Disassembly Kit, Table 11-1, and remove vee deflector. Inspect setscrews. If damaged, replace with stainless setscrews coated with anti-seize compound.

Figure 10-11. Ceramic Diffuser Element Replacement

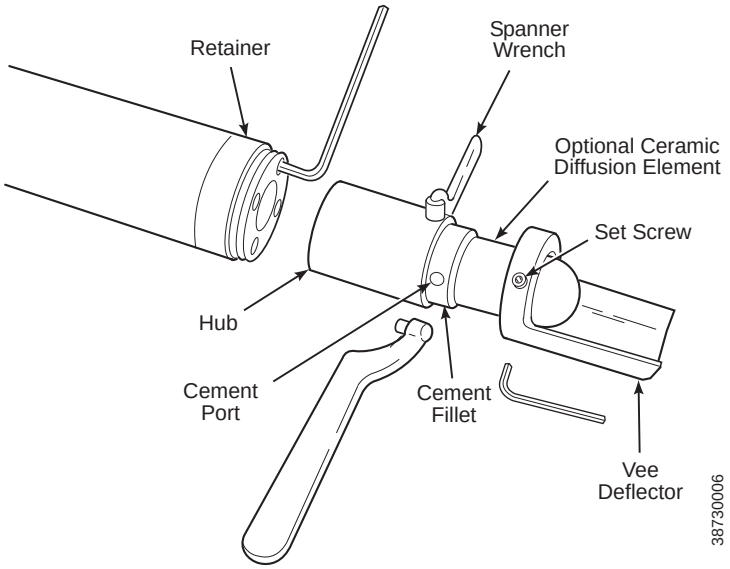
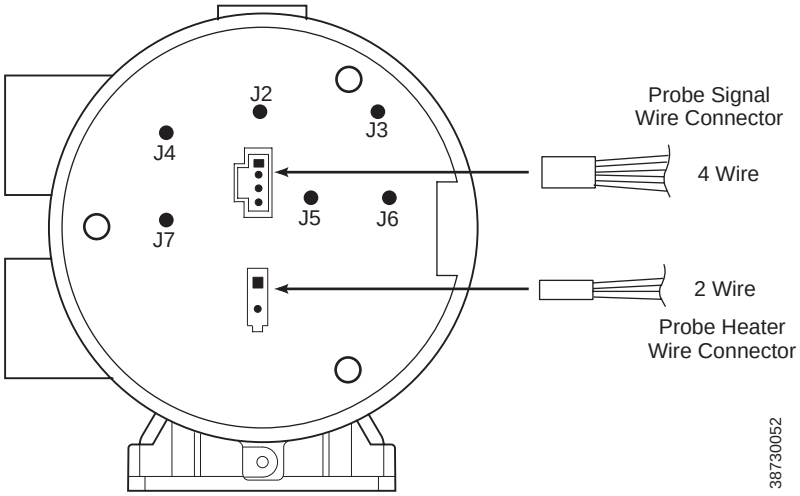


Figure 10-12. Contact and Thermocouple Assembly Replacement



Termination Housing Wiring (Remote Electronics Probe Head Only)

Under normal circumstances, the right termination housing cover should not need to be removed. This side of the housing contains the probe signal wire connector and the probe heater wire connector that plug into the adapter board. If these wires should become disconnected or need to be replaced, use the diagram in Figure 10-12 to reconnect the wires.

Section 11 Replacement Parts

PROBE REPLACEMENT PARTS

Table 11-1. Replacement Parts for Probe

Figure and Index Number	Part Number		Description
	No Dust Seal	With Dust Seal	
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G01	3D39649G01	18" ANSI Probe with Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G02	3D39649G02	3' ANSI Probe with Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G03	3D39649G03	6' ANSI Probe with Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G04	3D39649G04	9' ANSI Probe with Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G05	3D39649G05	12' ANSI Probe with Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	--	3D39649G53	15' ANSI Probe with Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	--	3D39649G54	18' ANSI Probe with Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G11	3D39649G11	18" DIN Probe with Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G12	3D39649G12	3' DIN Probe with Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G13	3D39649G13	6' DIN Probe with Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G14	3D39649G14	9' DIN Probe with Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G15	3D39649G15	12' DIN Probe with Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G17	3D39648G17	18" ANSI Probe with Flame Arrestor and Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G18	3D39648G18	3' ANSI Probe with Flame Arrestor and Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G19	3D39648G19	6' ANSI Probe with Flame Arrestor and Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G20	3D39648G20	9' ANSI Probe with Flame Arrestor and Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G21	3D39648G21	12' ANSI Probe with Flame Arrestor and Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	--	3D39649G55	15' ANSI Probe with Flame Arrestor and Ceramic Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	--	3D39649G56	18' ANSI Probe with Flame Arrestor and Ceramic Diffuser

Table 11-1. Replacement Parts for Probe (Continued)

Figure and Index Number	Part Number		Description
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G27	3D39649G27	18" DIN Probe with Flame Arrestor and Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G28	3D39649G28	3' DIN Probe with Flame Arrestor and Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G29	3D39649G29	6' DIN Probe with Flame Arrestor and Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G30	3D39649G30	9' DIN Probe with Flame Arrestor and Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G31	3D39649G31	12' DIN Probe with Flame Arrestor and Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G33	3D39649G33	18" ANSI Probe with Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G34	3D39649G34	3' ANSI Probe with Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G35	3D39649G35	6' ANSI Probe with Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G36	3D39649G36	9' ANSI Probe with Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G37	3D39649G37	12' ANSI Probe with Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	--	3D39649G49	15' ANSI Probe with Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	--	3D39649G50	18' ANSI Probe with Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G43	3D39649G43	18" DIN Probe with Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G44	3D39649G44	3' DIN Probe with Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G45	3D39649G45	6' DIN Probe with Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G46	3D39649G46	9' DIN Probe with Snubber Diffuser
10-3, 1 thru 6, 8,9,32 thru 35	3D39648G47	3D39649G47	12' DIN Probe with Snubber Diffuser
10-3, 6	3D39644G01		18" ANSI Probe Tube Assy.
10-3, 6	3D39644G02		3' ANSI Probe Tube Assy.
10-3, 6	3D39644G03		6' ANSI Probe Tube Assy.
10-3, 6	3D39644G04		9' ANSI Probe Tube Assy.
10-3, 6	3D39644G05		12' ANSI Probe Tube Assy
10-3, 6	3D39644G17		15' ANSI Probe Tube Assy.
10-3, 6	3D39644G18		18' ANSI Probe Tube Assy.
10-3, 6	3D39644G11		18" DIN Probe Tube Assy.
10-3, 6	3D39644G12		3' DIN Probe Tube Assy.
10-3, 6	3D39644G13		6' DIN Probe Tube Assy.
10-3, 6	3D39644G14		9' DIN Probe Tube Assy.
10-3, 6	3D39644G15		12' DIN Probe Tube Assy.
10-3, 6	3D39645G01		18" Heater Strut Assy.
10-3, 1	3D39645G02		3' Heater Strut Assy.
10-3, 1	3D39645G03		6' Heater Strut Assy.
10-3, 1	3D39645G04		9' Heater Strut Assy.
10-3, 1	3D39645G05		12' Heater Strut Assy.
10-3, 1	3D39645G07		15' Heater Strut Assy.
10-3, 1	3D39645G08		18' Heater Strut Assy.

Figure 11-1. Cell Replacement Kit

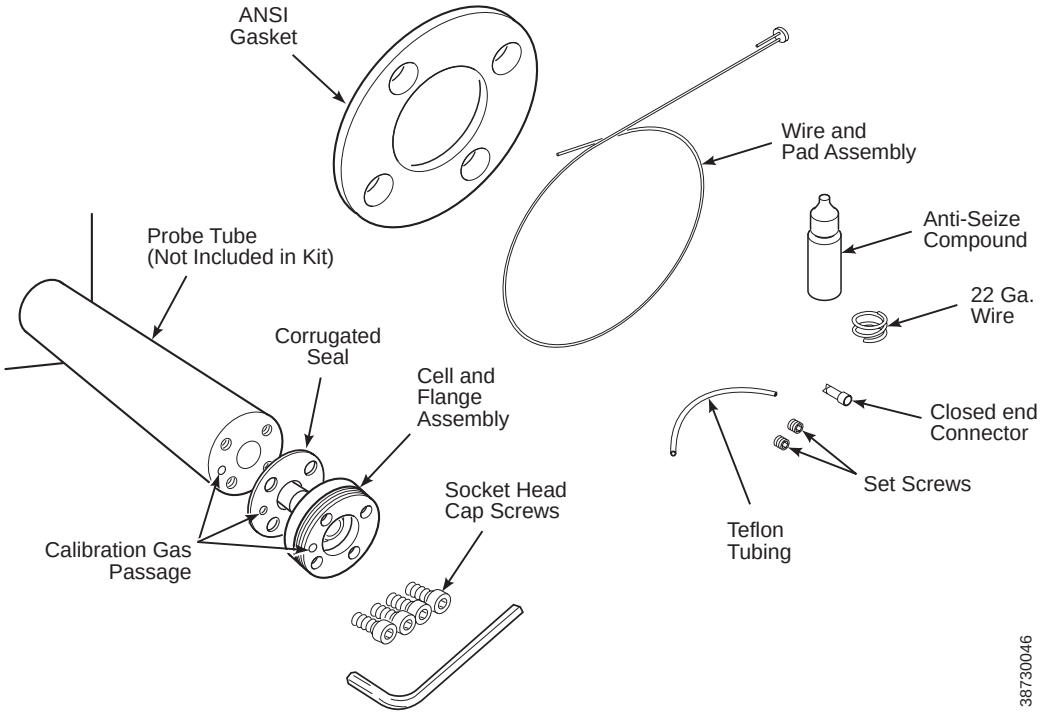


Table 11-1. Replacement Parts for Probe (Continued)

Figure and Index Number	Part Number	Description
11-1	4847B61G02	ANSI 18" Cell Replacement Kit*
11-1	4847B61G03	ANSI 3' Cell Replacement Kit*
11-1	4847B61G04	ANSI 6' Cell Replacement Kit*
11-1	4847B61G05	ANSI 9' Cell Replacement Kit*
11-1	4847B61G06	ANSI 12' Cell Replacement Kit*
11-1	4847B61G34	ANSI 15' Cell Replacement Kit*
11-1	4847B61G35	ANSI 18' Cell Replacement Kit*
11-1	4847B61G14	DIN 18" Cell Replacement Kit*
11-1	4847B61G15	DIN 3' Cell Replacement Kit*
11-1	4847B61G16	DIN 6' Cell Replacement Kit*
11-1	4847B61G17	DIN 9' Cell Replacement Kit*
11-1	4847B61G18	DIN 12' Cell Replacement Kit*

**Includes pad and wire*

Table 11-1. Replacement Parts for Probe (Continued)

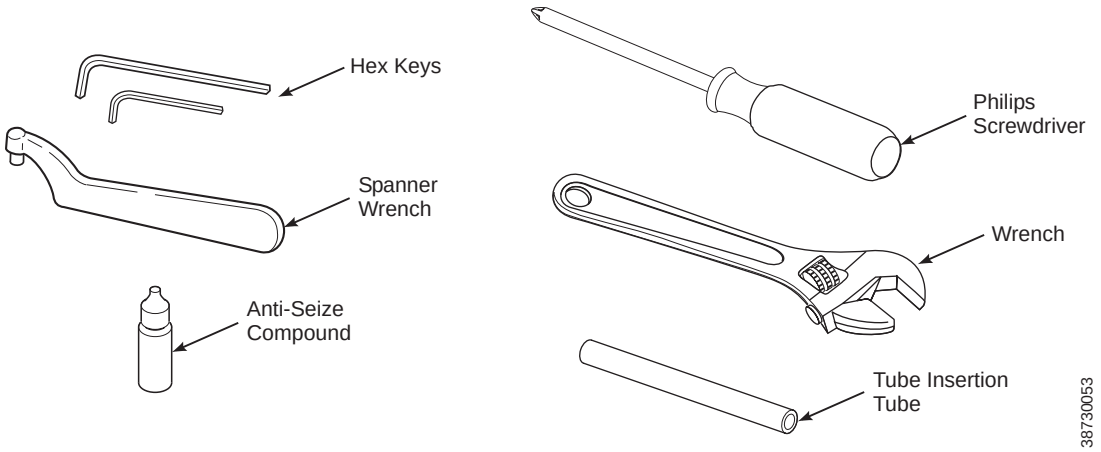
Figure and Index Number	Part Number	Description
	4849B94G01	ANSI High Sulfur/Hl Resistant Cell Only
11-1	4849B94G02	ANSI 18" Cell Replacement Kit, High Sulfur/HCl Resistant*
11-1	4849B94G03	ANSI 3' Cell Replacement Kit, High Sulfur/HCl Resistant*
11-1	4849B94G04	ANSI 6' Cell Replacement Kit, High Sulfur/HCl Resistant*
11-1	4849B94G05	ANSI 9' Cell Replacement Kit, High Sulfur/HCl Resistant*
11-1	4849B94G06	ANSI 12' Cell Replacement Kit, High Sulfur/HCl Resistant*
11-1	4849B94G26	ANSI 15' Cell Replacement Kit, High Sulfur/HCl Resistant*
11-1	4849B94G27	ANSI 18' Cell Replacement Kit, High Sulfur/HCl Resistant*
	4849B94G13	DIN High Sulfur/HCl Resistant Cell Only
11-1	4849B94G14	DIN 18" Cell Replacement Kit, High Sulfur/HCl Resistant*
11-1	4849B94G15	DIN 3' Cell Replacement Kit, High Sulfur/HCl Resistant*
11-1	4849B94G16	DIN 6' Cell Replacement Kit, High Sulfur/HCl Resistant*
11-1	4849B94G17	DIN 9' Cell Replacement Kit, High Sulfur/HCl Resistant*
11-1	4849B94G18	DIN 12' Cell Replacement Kit, High Sulfur/HCl Resistant*
2-4	3D39003G11	DIN 9' Abrasive Shield Assy.
2-4	3D39003G12	DIN 12' Abrasive Shield Assy.
2-4	3D39003G13	ANSI 18" Abrasive Shield Assy
2-4	3D39003G15	DIN 18" Abrasive Shield Assy.
2-4	3D39003G25	ANSI 15' Abrasive Shield Assy.
2-4	3D39003G28	ANSI 18' Abrasive Shield Assy.
10-12	4513C61G03	18" Contact and Thermocouple Replacement Assembly
10-12	4513C61G04	3' Contact and Thermocouple Replacement Assembly
10-12	4513C61G05	6' Contact and Thermocouple Replacement Assembly
10-12	4513C61G06	9' Contact and Thermocouple Replacement Assembly
10-12	4513C61G07	12' Contact and Thermocouple Replacement Assembly
10-12	4513C61G13	15' Contact and Thermocouple Replacement Assembly
10-12	4513C61G14	18' Contact and Thermocouple Replacement Assembly

**Includes pad and wire*

Table 11-1. Replacement Parts for Probe (Continued)

Figure and Index Number	Part Number	Description
1-11, 10-11	3534B18G01	Ceramic Diffuser
1-11	3535B60G01	Ceramic Diffuser with Dust Seal
1-11	3535B62G01	Flame Arrestor Ceramic Diffuser
1-11	3535B63G01	Flame Arrestor Ceramic Diffuser with Dust Seal
1-12	4843B37G01	Snubber Diffuser
1-12	4843B38G02	Snubber Diffuser with Dust Seal
1-12	4846B70G01	Flame Arrestor Snubber Diffuser
1-12	4846B71G01	Flame Arrestor Snubber Diffuser with Dust Seal
10-11	3534B48G01	Vee Deflector Assy.
1-13	4851B89G04	Cup Type Diffusion Assembly, 10 microns
1-13	4851B89G05	Cup Type Diffusion Assembly, 40 microns
1-13	4851B90G04	Cup Type Diffusion Assembly/Dust Seal, 10 microns
1-13	4851B90G05	Cup Type Diffusion Assembly/Dust Seal, 40 microns
11-2	3535B42G02	Probe Disassembly Kit

Figure 11-2. Probe Disassembly Kit



ELECTRONICS REPLACEMENT PARTS

Table 11-2. Replacement Parts for Electronics

Figure and Index Number	Part Number	Description
10-3, 10	120039076	O-Ring
10-3, 11	5R10145G01	Cover
10-3, 11A	6A00170G01	Cover, with Window
10-3, 12	3D39861G01	Electronic Assembly
10-3, 14	4849B72H01	Membrane Keypad English
10-3, 14	4849B72H02	Membrane Keypad German
10-3, 14	4849B72H03	Membrane Keypad French
10-3, 14	4849B72H04	Membrane Keypad Spanish
10-3, 14	4849B72H05	Membrane Keypad Italian
10-3, 14A	6A00115G01	LOI Module (Local Operator Interface)
10-3, 25	5R10146G01	Housing (No Covers)
10-3, 29	08732-0002-0002	Terminal Block Transient Protected, Remote Electronics
10-3, 31A	120039078	O-Ring
10-4, 5	6A00091G01	Junction Box
10-4, 8	6A00143G01	Adapter Board
10-4, 10	120039076	O-Ring
10-4, 11	5R10145G01	Cover
10-4, 11A	6A00170G01	Cover, with Window
10-4, 12	6A00309G01	Electronic Assembly
10-4, 14A	6A00115G01	LOI Module (Local Operator Interface)
10-4, 25	5R10146G01	Housing
10-4, 29	08732-0002-0002	Terminal Block, Transient Protected, Remote Electronics
10-4, 31A	120039078	O-Ring
10-4, 32	6A00201G01	Interconnecting Cable Assembly, 20 ft. (6 m)
10-4, 32	6A00201G02	Interconnecting Cable Assembly, 40 ft. (12 m)
10-4, 32	6A00201G03	Interconnecting Cable Assembly, 60 ft. (18 m)
10-4, 32	6A00201G04	Interconnecting Cable Assembly, 80 ft. (24 m)
10-4, 32	6A00201G05	Interconnecting Cable Assembly, 100 ft. (30 m)
10-4, 32	6A00201G06	Interconnecting Cable Assembly, 150 ft. (46 m)
10-4, 32	6A00201G07	Interconnecting Cable Assembly, 200 ft. (61 m)
10-4, 33	08732-0002-0002	Terminal Block, Transient Protected, Remote Probe Head

Table 11-3. Replacement Parts for Calibration Components

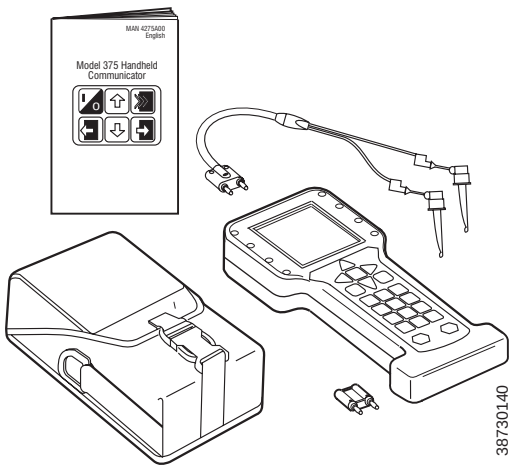
Figure and Index Number	Part Number	Description
11-5	1A99119G01	Calibration Gas Bottles - 0.4% and 8% O2, balance nitrogen - 550 liters each*
11-5	1A99119G02	Two Flow Regulators (for calibration gas bottles)
11-5	1A99119G03	Bottle rack

**Calibration gas bottles cannot be shipped via airfreight.*

Section 12 Optional Accessories

MODEL 375 FIELD COMMUNICATOR

Figure 12-1. Model 375 Field Communicator Package



The Model 375 Field Communicator is an interface device that provides a common communication link to compatible instruments, such as the Oxymitter 5000. Model 375 Field Communications Protocol permits all the information available from the Oxymitter 5000's electronics to be transmitted over the FOUNDATION fieldbus digital signal. By attaching the Field Communicator and Oxymitter 5000 to a terminal block a technician can diagnose problems, configure and calibrate the Oxymitter 5000 as if he or she were standing in front of the instrument.

For more information, call Rosemount Analytical Inc. at 1-800-433-6076.

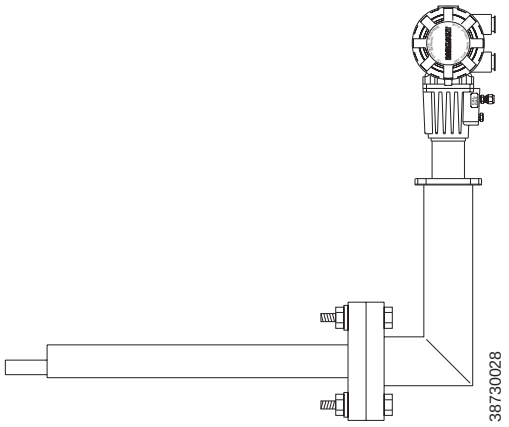
ASSET MANAGEMENT SOLUTIONS (AMS)

Asset Management Solutions (AMS) software works in conjunction with the Model 375 Handheld Communication Protocol and offers the capability to communicate with all plant devices from a single computer terminal.

For more information, call Rosemount Analytical Inc. at 1-800-433-6076.

BY-PASS PACKAGES

Figure 12-2. By-Pass Mounting

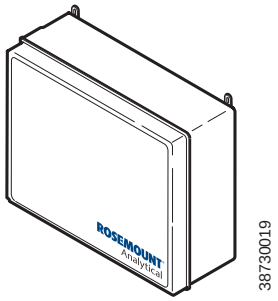


The specially designed Rosemount Analytical By-Pass Package for oxygen analyzers has proven to withstand the high temperatures in process heaters while providing the same advantages offered by the in situ sensor. Inconel or Kanthal steel tubes provide effective resistance to corrosion, and the package uses no moving parts, air pumps, or other components common to other sampling systems.

For more information, call Rosemount Analytical Inc. at 1-800-433-6076.

IMPS 4000 INTELLIGENT MULTIPROBE TEST GAS SEQUENCER

Figure 12-3. IMPS 4000



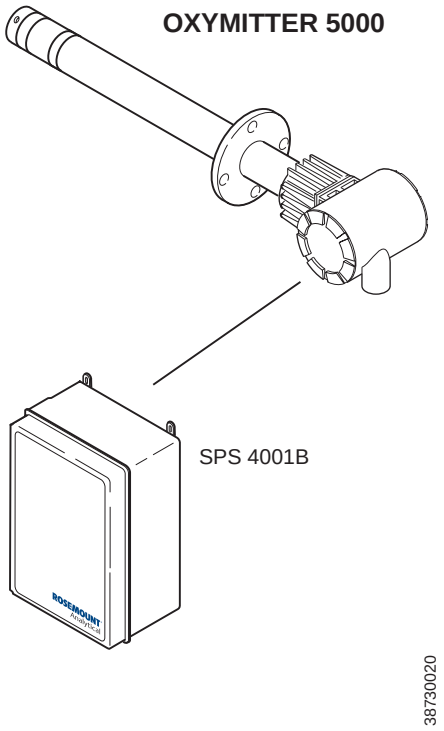
The IMPS 4000 Intelligent Multiprobe Test Gas Sequencer is housed within an IP56 (NEMA 4X) enclosure and has the intelligence to provide calibration gas sequencing of up to four Oxymitter 5000 units to accommodate automatic and semi-automatic calibration routines.

This sequencer works in conjunction with the Oxymitter 5000 CALIBRATION RECOMMENDED feature, eliminating out-of-calibration occurrences and the need to send a technician to the installation site. In addition, the SPS 4001B provides a remote contact input to initiate a calibration from a remote location and relay outputs to alert when a calibration is in progress, an Oxymitter 5000 is out of calibration, calibration gases are on, and calibration gas pressure is low.

For more information, call Rosemount Analytical Inc. at 1-800-433-6076.

SPS 4001B SINGLE PROBE AUTOCALIBRATION SEQUENCER

Figure 12-4. SPS 4001B



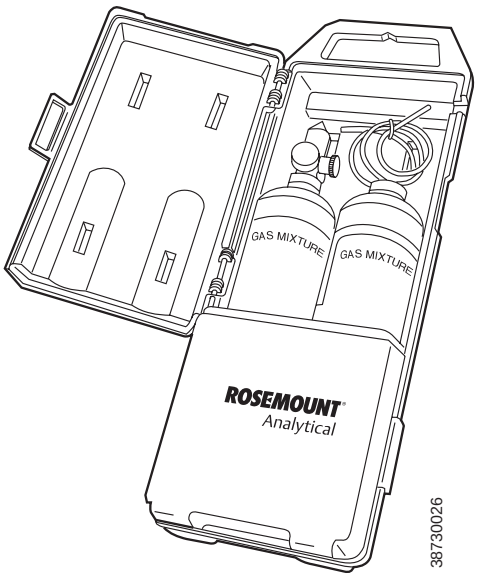
Rosemount Analytical Inc. specifically designed the SPS 4001B Single Probe Autocalibration Sequencer to provide the capability to perform automatic or on-demand Oxymitter 5000 calibrations. The SPS 4001B is fully enclosed in a NEMA cabinet suited for wall-mounting. This cabinet provides added protection against dust and minor impacts.

The SPS 4001B works in conjunction with the Oxymitter 5000's CALIBRATION RECOMMENDED feature, eliminating out-of-calibration occurrences and the need to send a technician to the installation site. In addition, the SPS 4001B provides a remote contact input to initiate a calibration from a remote location and relay outputs to indicate when a calibration is in progress or the Oxymitter 5000 is out of calibration.

For more information, call Rosemount Analytical Inc. at 1-800-433-6076.

O_2 CALIBRATION GAS

Figure 12-5. Calibration Gas Bottles



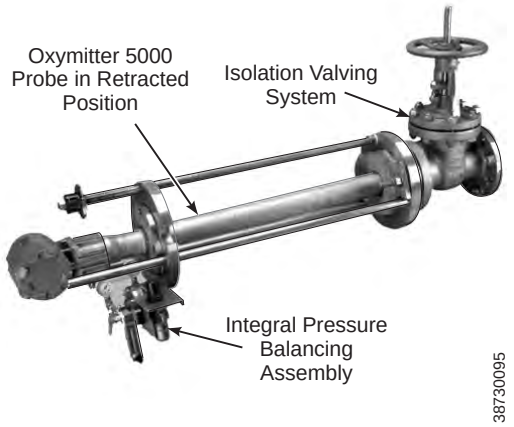
Rosemount Analytical's O_2 Calibration Gas and Service Kits have been carefully designed to provide a more convenient and fully portable means of testing, calibrating, and servicing.

Rosemount Analytical's oxygen analyzers. These lightweight, disposable gas cylinders eliminate the need to rent gas bottles.

For more information, call Rosemount Analytical Inc. at 1-800-433-6076.

CATALYST REGENERATION

Figure 12-6. Catalyst Regeneration



Measure O_2 in catalyst regenerators at pressures up to 50 psi. In-situ design resists plugging due to catalyst fines Class I, Div. I, Group B, C, and D.

Optional pressure balancing arrangement. Optional isolation valving system permits installation and withdrawal while the process is running. Specified by UOP.

See Application Data Sheet ADS 106-300F.A01, Isolation Valving System.

Appendix A Safety Data

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. Sí˙ové 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 installering 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 kabelforskruninger skal have en intern dimension, så passende kabelaflastning 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 fejlsitua-tion. 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 -aardingen 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 oppper-vlakken 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 standaards: 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 meerpolige 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 strickt 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.
2. 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.
3. Die Netzspannungsversorgung muß den Anforderungen der IEC227 oder IEC245 genügen.
4. Alle Verdrahtungen sollten mindestens bis 75°C ihre Funktion dauerhaft erfüllen.
5. Alle Kabeldurchführungen und Kabelverschraubungen sollten in Ihrer Dimensionierung so gewählt werden, daß diese eine sichere Verkabelung des Gerätes ermöglichen.
6. 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.

7. 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.

8. 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.

9. Mit dem Symbol sind Geräte oder Abdeckungen gekennzeichnet, bei denen vor dem Eingriff die entsprechenden Kapitel im Handbuch sorgfältig durchgelesen werden müssen.
10. Alle in diesem Gerät verwendeten graphischen Symbole entspringen einem oder mehreren der nachfolgend aufgeführten Standards: EN61010-1, IEC417 & ISO3864.
11. 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

Οδηγιεσ ασφαλειασ για την καλωδιωση και εγκατασταση τησ συσκευησ

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 παροχηθούν 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 lahklüliti. 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 tartsák 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 földvezetéket 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 vezetéket 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 találhatóak. 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 címkéken 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 időri 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 ciscun 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. Matinimo tinklo laidai turi atitikti IEC227 ar IEC245 reikalavimus.
4. Visi laidai turi būti tinkami naudojimui aplinkos temperatūtoje, 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 mechaniškai veikiantį įzoliavimo jungiklį. Jeigu ne, tuomet turi būti nurodytos kitos įrenginio atjungimo priemonės, ir aiškai 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 dėšinėje, 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 srovės tiekimui" 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 vispāratzītam 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.

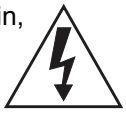
10. Visi šajā izstrādājumā izmantotie grafiskie simboli atbilst vienam vai vairākiem no šiem standartiem: EN61010-1, IEC417 un ISO3864.
11. Ja iekārtai vai uzlīmēm ir marķējums "Neatvērt, kamēr pieslēgta strāvai" vai tamlīdzīga norāde, tas nozīmē, ka sprādzienbīstamā vidē ir uzliesmošanas bīstamība. 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 ħlief 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-ħtiġijiet 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 jiskonnetta l-kondutturi kollha li jkunu jġorru 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 perikoluži taħthom. Dawn l-għatjien għandhom jitneħħew biss meta titneħħa l-provvista tad-dawl mit-tagħmir - u minn ħaddiema 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 ħaddiema tal-manutenzjoni mħarrġa meta titneħħa l-provvista tad-dawl mit-tagħmir. Ċerti wċuħ jistgħu jibqgħu jaħarqu meta tmisshom.

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 wieħed 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 Enerġizzat” jew kliem simili, hemm periklu ta' nar f'żoni fejn atmosfera esplossiva 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 kesaħ – 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 75°C.
5. Alle kabelforskruvninger 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. Kretsbrytere 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 fjærnes 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 fjærnes 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 instrukser.

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 75ºC.
5. As dimensões internas dos bucins 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 cumpliran con las normas IEC 227 o IEC 245.
4. Todo el cableado sera adecuado para una temperatura ambiental de 75ºC.
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 abrira 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 abrira 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 75ºC.
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 frånkoppla alla strömförande kretsar när något fel uppstår. Säkringen kan även ha en mekanisk frånskiljare. Om så inte är fallet, måste ett annat förfarande för att frånskilja 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 föreliggerisk 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 1800ºF) 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 Silicate0-10% 5 mg/cubic meter (TLV)

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

Armorphous Silica/Silicon Dioxide0-10% 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 1800ºF/982ºC) 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 fibroses; 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 masotheliomas.

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.

GENERAL PRECAUTIONS FOR HANDLING AND STORING HIGH PRESSURE GAS CYLINDERS

Edited from selected paragraphs of the Compressed Gas Association's "Handbook of Compressed Gases" published in 1981
Compressed Gas Association
1235 Jefferson Davis Highway
Arlington, Virginia 22202
Used by Permission

1. Never drop cylinders or permit them to strike each other violently.
2. Cylinders may be stored in the open, but in such cases, should be protected against extremes of weather and, to prevent rusting, from the dampness of the ground. Cylinders should be stored in the shade when located in areas where extreme temperatures are prevalent.
3. The valve protection cap should be left on each cylinder until it has been secured against a wall or bench, or placed in a cylinder stand, and is ready to be used.
4. Avoid dragging, rolling, or sliding cylinders, even for short distance; they should be moved by using a suitable handtruck.
5. Never tamper with safety devices in valves or cylinders.
6. Do not store full and empty cylinders together. Serious suckback can occur when an empty cylinder is attached to a pressurized system.
7. No part of cylinder should be subjected to a temperature higher than 52°C (125°F). A flame should never be permitted to come in contact with any part of a compressed gas cylinder.
8. Do not place cylinders where they may become part of an electric circuit. When electric arc welding, precautions must be taken to prevent striking an arc against the cylinder.

Appendix B Return of Material

RETURNING MATERIAL

If factory repair of defective equipment is required, proceed as follows:

1. Secure a return authorization number from a Emerson Process Management Office or representative before returning the equipment. Equipment must be returned with complete identification in accordance with Emerson Process Management instructions or it will not be accepted.

In no event will Emerson Process Management be responsible for equipment returned without proper authorization and identification.

2. Carefully pack defective unit in a sturdy box with sufficient shock absorbing material to ensure that no additional damage will occur during shipping.
3. In a cover letter, describe completely:
   a. The symptoms from which it was determined that the equipment is faulty.
   b. The environment in which the equipment has been operating (housing, weather, vibration, dust, etc.).
   c. Site from which equipment was removed.
   d. Whether warranty or nonwarranty service is requested.
   e. Complete shipping instructions for return of equipment.
   f. Reference the return authorization number.
4. Enclose a cover letter and purchase order and ship the defective equipment according to instructions provided in Emerson Process Management Return Authorization, prepaid, to:

   Emerson Process Management
   RMR Department
   Daniel Headquarters
   11100 Britmore Park Drive
   Houston, TX 77041

If warranty service is requested, the defective unit will be carefully inspected and tested at the factory. If failure was due to conditions listed in the standard Rosemount Analytical warranty, the defective unit will be repaired or replaced at Emerson Process Management's option, and an operating unit will be returned to the customer in accordance with shipping instructions furnished in the cover letter.

For equipment no longer under warranty, the equipment will be repaired at the factory and returned as directed by the purchase order and shipping instructions.

Appendix C Fieldbus Parameter Description

FIELDBUS PARAMETERS

Parameter Mnemonic	Valid Range	Units	Description
ALARM_POINT_LOW	0.0-40.0	% O2	This is the point at which the Low O_2 alarm will become active.
ALERT_KEY			See Function Block Specification, part 1. FF-890, page 50.
AUTOCAL_ENABLED	0: Not enabled 1: Enabled	Enumerated	This parameter enables automatic calibrations.
AUTOCAL_INTERVAL	0-9999	Hours	This is the time between automatic calibrations, in hours.
BLOCK_ALM			See Function Block Specification, part 2. FF-891, page 41.
BLOCK_ERR			See Function Block Specification, part 2. FF-891, page 41
BUILD_DATE		N/A	This is the date that the Oxymitter software was built.
BUILD_NUMBER	0-65535	N/A	This is the build number of the Oxymitter software
CAL_CONSTANT	± 20.0	mV	This parameter represents the constant (offset) value used in the calculation of converting the sensor voltage to an O_2 value. The value of this parameter may be manually entered or calculated during a sensor calibration.
CAL_FAILED_CONSTANT	± 20.0	mV	The constant from the last failed calibration.
CAL_FAILED_SLOPE	34.5-57.5	mV/Decade	The slope from the last failed calibration.
CAL_GAS_TIME	60-1200	Sec	This is the length of time test gases are applied to the O2 probe before each measurement of the calibration cycle.
CAL_LAST_CONSTANT	± 20.0	mV	The constant from the last successful calibration.
CAL_LAST_SLOPE	34.5-57.5	mV/Decade	The slope from the last successful calibration.
CAL_POINT_HI	0.0-40.0	% O2	This is the actual value of the gas being applied during the high test gas phase of a calibration.
CAL_POINT_LO	0.0-40.0	% O2	This is the actual value of the gas being applied during the low test gas phase of a calibration.
CAL_PURGE_TIME	60-1200	Sec	This is the length of time after a calibration is complete before the O2 value status returns to normal.
CAL_SENSOR_IMPEDANCE	0-10000	Ohms	This is the sensor impedance value measured at the time of the last calibration.
CAL_SLOPE	34.5-57.5	mV/Decade	This parameter represents the slope value used in the calculation of converting the sensor voltage to an O2 value. The value of this parameter may be manually entered or calculated during a sensor calibration.
CAL_STATE	See Table 1	Enumerated	This parameter represents the present state the calibration cycle is in. Refer to Table C-1 for the definition of states.
CAL_STATE_STEP	0: No effect 1: Go to next step 2: Abort Calibration	Enumerated	This parameter is used to step the transmitter through a sensor calibration. Setting this parameter to 1 requests the transmitter to move to the next cycle state of the calibration procedure. The request is only valid when the CAL_STATE value represents a state that is waiting for an external event such as the changing of a test gas value. The transmitter will set this parameter value back to 0 when it has completed processing the step request. Setting this parameter to a value of 2 will cause the present calibration to be aborted.
CAL_STATE_TIME	0-1200	Sec	This is the time in seconds remaining in the present calibration state.
CAL_TRACKS			This parameter is no longer supported in the Fieldbus version of the Oxymitter.
CELL_MV_VALUE	± INF	mV	This is the raw signal from the O_2 sensor.

Parameter Mnemonic	Valid Range	Units	Description
CELL_TC_MV_VALUE	-1000.0 - 500.0	mV	This is the raw signal from the O_2 sensor thermocouple.
CELL_TEMPERATURE	-10000 - 10000	^oC	This is the current temperature of the O_2 sensor.
CHECKSUM		N/A	This is the checksum of the Oxymitter software.
COLD_JUNC_MV_VALUE	± INF	mV	This is the raw signal from the case/thermocouple cold junction sensor.
COLLECTION_DIRECTORY			See Transducer Block Specification, part 1. FF-902, page 11.
CONFIG_CHANGED	0-255	N/A	This indicates that a static parameter in the Oxymitter has changed by some means other than Fieldbus.
HIGH_CASE_TEMP	0-10000.0	^oC	This is the highest temperature that has been measured inside the electronics enclosure.
HIGH_CASE_TEMP_RESET	0: No effect 1: Reset high case temperature	Enumerated	This parameter is used to request the parameter CASE_TEMP_MAX be reset to the current internal case temperature. Setting this parameter at a value of 1 will cause the transmitter to reset the CASE_TEMP_MAX value. The transmitter will set this parameter to 0 once it has completed this process.
IO_PIN_MODE	See Table C-2	Enumerated	This parameter represents the operating mode of the discrete IO pin of the transmitter. 0 = Alarm Contact Mode, 1=Calibration Sequence Mode.
IO_PIN_STATE	0: Off 1: On	Enumerated	This parameter represents the current state of the transmitters discrete IO pin. 0 = FALSE, 1 = TRUE.
LINE_FREQUENCY	0-100	Hz	This parameter represents the line frequency.
MODE_BLK			See Function Block Specification, part 1. FF-890, page 50.
O2_PERCENT_OF_RANGE	0.0-100.0	%	This is the percent of total range value.
OPERATING_MODE	See Table C-4	Enumerated	This parameter represents the operating mode of the device.
O2_RANGE	0-40	% O2	This contains the upper and lower % O2 range values, the units, and the precision.
OXY_BLOCK_ALARM	See section 4.7 in FF-903	Enumerated	This is the FF block alarm code. See Transducer Blocks, part 2. FF-903, page 41. See Table C-3.
OXY_BLOCK_ERR	See Table C-3.	Enumerated	This is the Oxymitter's device alarm code.
PRIMARY_VALUE (O2_VALUE)	0.0-25.0	% O2	This is the value that should appear on the output channel of the transducer block. In the Oxymitter, this is the present % O2 reading and should reflect any test gas being applied.
PRIMARY_VALUE_TYPE	See section 4.1 in FF-903	Enumerated	Selected from list in Transducer Block Specification, part 2. FF-903, page 39, section 4.1.
SECONDARY_VALUE	-10000 - 10000	^oC	See Transducer Block Specification, part 2. FF-903, page 37. In the Oxymitter, this is the temperature of the electronics.
SECONDARY_VALUE_ UNITS			See Transducer Block Specification, part 2. FF-903, page 37.
SENSOR_CAL_DATE			See Transducer Block Specification, part 2. FF-903, page 37.
SENSOR_CAL_LOC			See Transducer Block Specification, part 2. FF-903, page 37.
SENSOR_CAL_METHOD			Last calibration method. Selected from list in Transducer Block Specification, part 2. FF-903, page 40, section 4.5.
SENSOR_CAL_WHO			This is used to store the name of the individual who last performed a calibration.
SENSOR_IMPEDANCE	0-10000	Ohms	This is the sensor impedance value that was last measured.
SENSOR_RANGE	0-100	% O2	See Transducer Block Specification, part 2. FF-903, page 37.
SENSOR_SN			See Transducer Block Specification, part 2. FF-903, page 37.
SENSOR_TYPE			Selected from list in Transducer Block Specification, part 2. FF-903, page 40, section 4.3.
ST_REV			See Function Block Specification, part 1. FF-890, page 49.
STATS_ATTEMPTS			This shows the number of communication attempts between the Oxymitter and the internal fieldbus interface card.
STATS_FAILURES			This shows the number of communication failures between the Oxymitter and the internal fieldbus interface card.
STATS_TIMEOUTS			This shows the number of communication failures due to reply time-out between the Oxymitter and the internal fieldbus interface card.
STRATEGY			See Function Block Specification, part 1. FF-890, page 49.

Parameter Mnemonic	Valid Range	Units	Description
TAG_DESC			See Function Block Specification, part 1. FF-890, page 49.
TB_DETAILED_STATUS	0-16777215	Enumerated	This is a bit-enumerated value used to communicate the status of the Oxymitter. (This is similar in nature to the command 48 status bits in HART.)
TRANSDUCER_ DIRECTORY			See Transducer Block Specification, part 1. FF-902, page 11.
TRANSDUCER_TYPE			Selected from list in Transducer Block Specification, part 2. FF-903, page 39, section 4.2.
UPDATE_EVT			See Function Block Specification, part 2. FF-891, page 45.
TIME_TO_NEXT_CAL	0.0-9999.0	Hours	This is the time remaining until the next scheduled calibration.
VERSION		N/A	This is the version of the Oxymitter software.
XD_ERROR			See Transducer Block Specification, part 2. FF-903, page 38.

Table C-1. Calibration State Values

Code Value	Description	External Event Required to Go to Next Step?
0	Normal System Operation	Yes
1	Calibration Required	Yes
2	Apply Test Gas 1	Yes
3	Test Gas 1 Flow	No
4	Test Gas 1 Read	No
5	Test Gas 1 Done	No
6	Apply Test Gas 2	Yes
7	Test Gas 2 Flow	No
8	Test Gas 2 Read	No
9	Test Gas 2 Done	No
10	Abort/Fail	Yes
11	Stop Gas	Yes
12	Purge	No

Table C-2. IO Pin Mode Values

Code Value	Description
0	No Alarm
1	Unit Alarm
2	Low 02 Alarm
3	Low 02/Unit Alarm
4	Cal Recommended
5	Cal Recommended/Unit Alarm
6	Low 02/Cal Recommended
7	Low 02/Unit/Cal Recommended
8	Cal Recommended->Handshake
9	Handshake

Table C-3. Unit Alarm Values

Alarm Number	Value of DETAILED_STATUS	Value of BLOCK_ALARM (see FF-903)	Description
0	0	NONE	No Alarm Active
1	1	MECHANICAL_FAILURE	Open Thermocouple
2	2	MECHANICAL_FAILURE	Shorted Thermocouple
3	4	MECHANICAL_FAILURE	Reversed Thermocouple
4	8	ELECTRONIC FAILURE	ADC Error
5	16	ELECTRONIC FAILURE	Line Frequency Error
6	32	MECHANICAL_FAILURE	Heater Open Circuit
7	64	MECHANICAL_FAILURE	High High Heater Temperature
8	128	MECHANICAL_FAILURE	High Case Temperature
9	256	MECHANICAL_FAILURE	Low Heater Temperature
10	512	MECHANICAL_FAILURE	High Heater Temperature
11	1024	MECHANICAL_FAILURE	Open Cell Circuit
12	2048	N/A	Not a valid alarm
13	4096	MECHANICAL_FAILURE	High AC Impedance / Cell Bad
14	8192	DATA_INTEGRITY_ERROR	EEPROM Parameters Corrupt
15	16384	N/A	Calibration Recommended
16	32768	CONFIGURATION_ERROR	Invalid Slope Value
17	65536	CONFIGURATION_ERROR	Invalid Cell Constant Value
18	131072	CONFIGURATION_ERROR	Bad Calibration
19	262144	MECHANICAL_FAILURE	SPS Handshake Failure
20	524288	ELECTRICAL_FAILURE	FF Communication Failure

Table C-4. Operating Modes

Code Value	Description
0	POWER UP
1	RAMPING
2	AUTOTUNE
3	WARMUP
4	NORMAL
5	CALIBRATING
6	ALARM
7	SYSTEM FAULT
8	CAL RECOMMENDED
9	NOT USED

Appendix D Analog Input (AI) Function Block

INTRODUCTION

The Oxymitter 5000 has three transducer block Input/Output channels for the AI function blocks. The I/O channels assigned to the AI function blocks are identified in Table D-1. The recommended settings are shown in Table D-2.

The Channel 1 analog input block gives the $\%O_2$ reading. The status of channel 1 is affected by the state of the unit alarm, as shown in Table D-3. In all alarm conditions indicated in Table D-3, Channel 1 will read what it believes is the correct oxygen value. Self-clearing alarms are reset when the alarm condition goes away. All others require the Oxymitter 5000 to be restarted.

Table D-1. I/O Channel Configuration

Transducer Block I/O Channel Value	Process Variable	XD_Scale Units
1	Oxygen	%
2	Case Temperature	°C
3	Sensor Temperature	°C

Table D-2. I/O Channel Assignments - Recommended Settings for AI Block

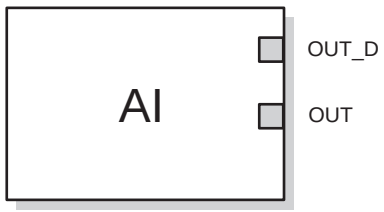
Transducer Block I/O Channel Value	L Type	XD Scale 0%	XD Scale 100%	Units	Out-Scale 0%	Out-Scale 100%	Units
1	Direct	0	100	%	0	100	%
2	Direct	0	100	°C	0	100	°C
3	Direct	0	1000	°C	0	1000	°C

Table D-3. AI Channels Status

Alarm Condition	Channel 1 Status	Channel 2 Status	Channel 3 Status	Self-clearing?
Open Thermocouple	Bad	Good	Good	No
Shorted Thermocouple	Bad	Good	Good	No
Reversed Thermocouple	Bad	Good	Good	No
ADC Error	Bad	Bad	Bad	No
Line Frequency Error	Bad	Good	Good	No
Heater Open	Bad	Good	Good	No
Very High Heater Temperature	Bad	Good	Good	No
High Case Temperature	Bad	Good	Good	No
Low Heater Temperature	Good	Good	Good	Yes
High Heater Temperature	Good	Good	Good	Yes
Open Cell	Good	Good	Good	Yes
High Cell Impedance / Cell Bad	Uncertain	Good	Good	Yes
EEPROM Parameters Corrupt	Bad	Good	Good	No
Calibration Recommended	Good	Good	Good	Yes
Invalid Slope Value	Uncertain	Good	Good	Yes
Invalid Cell Constant Value	Uncertain	Good	Good	Yes
Bad Calibration	Uncertain	Good	Good	Yes
SPS Handshake Failure	Good	Good	Good	Yes
Inter Board Comm Failure	Bad	Bad	Bad	Yes
Power Up, Ramping, Warm Up	Bad	Good	Good	Yes
Normal	Good	Good	Good	Yes
Calibrating	Uncertain	Good	Good	Yes
Alarm	See Alarm Table	Good	Good	Yes
System Fault	Bad	See Alarm Table	See Alarm Table	No
Cal Recommended	Good	Good	Good	

The Analog Input (AI) function block (Figure D-1) processes field device measurements and makes them available to other function blocks. The output value from the AI block is in engineering units and contains a status indicating the quality of the measurement. The measuring device may have several measurements or derived values available in different channels. Use the channel number to define the variable that the AI block processes.

Figure D-1. AI Function Block



OUT = The block output value and status
OUT_D = Discrete output that signals a selected alarm condition

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The AI block supports alarming, signal scaling, signal filtering, signal status calculation, mode control, and simulation. In Automatic mode, the block's output parameter (OUT) reflects the process variable (PV) value and status. In Manual mode, OUT may be set manually. The Manual mode is reflected on the output status. A discrete output (OUT_D) is provided to indicate whether a selected alarm condition is active. Alarm detection is based on the OUT value and user specified alarm limits. Figure D-2 illustrates the internal components of the AI function block, and Table D-4 lists the AI block parameters and their units of measure, descriptions, and index numbers.

Table D-4. Definitions of Analog Input Function Block System Parameters

Parameter	Index Number	Units	Description
ACK_OPTION	23	None	Used to set auto acknowledgment of alarms.
ALARM_HYS	24	Percent	The amount the alarm value must return within the alarm limit before the associated active alarm condition clears.
ALARM_SEL	38	None	Used to select the process alarm conditions that will cause the OUT_D parameter to be set.
ALARM_SUM	22	None	The summary alarm is used for all process alarms in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status parameter. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.
ALERT_KEY	04	None	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
BLOCK_ALM	21	None	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status parameter. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.
BLOCK_ERR	06	None	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.
CHANNEL	15	None	The CHANNEL value is used to select the measurement value. Refer to the appropriate device manual for information about the specific channels available in each device. You must configure the CHANNEL parameter before you can configure the XD_SCALE parameter.
FIELD_VAL	19	Percent	The value and status from the transducer block or from the simulated input when simulation is enabled.
GRANT_DENY	12	None	Options for controlling access of host computers and local control panels to operating, tuning, and alarm parameters of the block. Not used by device.
HI_ALM	34	None	The HI alarm data, which includes a value of the alarm, a timestamp of occurrence and the state of the alarm.
HI_HI_ALM	33	None	The HI HI alarm data, which includes a value of the alarm, a timestamp of occurrence and the state of the alarm.
HI_HI_LIM	26	EU of PV_SCALE	The setting for the alarm limit used to detect the HI HI alarm condition.
HI_HI_PRI	25	None	The priority of the HI HI alarm.
HI_LIM	28	EU of PV_SCALE	The setting for the alarm limit used to detect the HI alarm condition.
HI_PRI	27	None	The priority of the HI alarm.
IO_OPTS	13	None	Allows the selection of input/output options used to alter the PV. Low cutoff enabled is the only selectable option.

Parameter	Index Number	Units	Description
L_TYPE	16	None	Linearization type. Determines whether the field value is used directly (Direct), is converted linearly (Indirect), or is converted with the square root (Indirect Square Root).
LO_ALM	35	None	The LO alarm data, which includes a value of the alarm, a timestamp of occurrence and the state of the alarm.
LO_LIM	30	EU of PV_SCALE	The setting for the alarm limit used to detect the LO alarm condition.
LO_LO_ALM	36	None	The LO LO alarm data, which includes a value of the alarm, a timestamp of occurrence and the state of the alarm.
LO_LO_LIM	32	EU of PV_SCALE	The setting for the alarm limit used to detect the LO LO alarm condition.
LO_LO_PRI	31	None	The priority of the LO LO alarm.
LO_PRI	29	None	The priority of the LO alarm.
LOW_CUT	17	%	If percentage value of transducer input fails below this, PV = 0.
MODE_BLK	05	None	The actual, target, permitted, and normal modes of the block. Target: The mode to “go to” Actual: The mode the “block is currently in” Permitted: Allowed modes that target may take on Normal: Most common mode for target
OUT	08	EU of OUT_SCALE	The block output value and status.
OUT_D	37	None	Discrete output to indicate a selected alarm condition.
OUT_SCALE	11	None	The high and low scale values, engineering units code, and number of digits to the right of the decimal point associated with OUT.
PV	07	EU of XD_SCALE	The process variable used in block execution.
PV_FTIME	18	Seconds	The time constant of the first-order PV filter. It is the time required for a 63% change in the IN value.
SIMULATE	09	None	A group of data that contains the current transducer value and status, the simulated transducer value and status, and the enable/disable bit.
STRATEGY	03	None	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.
ST_REV	01	None	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.
TAG_DESC	02	None	The user description of the intended application of the block.
UPDATE_EVT	20	None	This alert is generated by any change to the static data.
VAR_INDEX	39	% of OUT Range	The average absolute error between the PV and its previous mean value over that evaluation time defined by VAR_SCAN.
VAR_SCAN	40	Seconds	The time over which the VAR_INDEX is evaluated.
XD_SCALE	10	None	The high and low scale values, engineering units code, and number of digits to the right of the decimal point associated with the channel input value. The XD_SCALE units code must match the units code of the measurement channel in the transducer block. If the units do not match, the block will not transition to MAN or AUTO

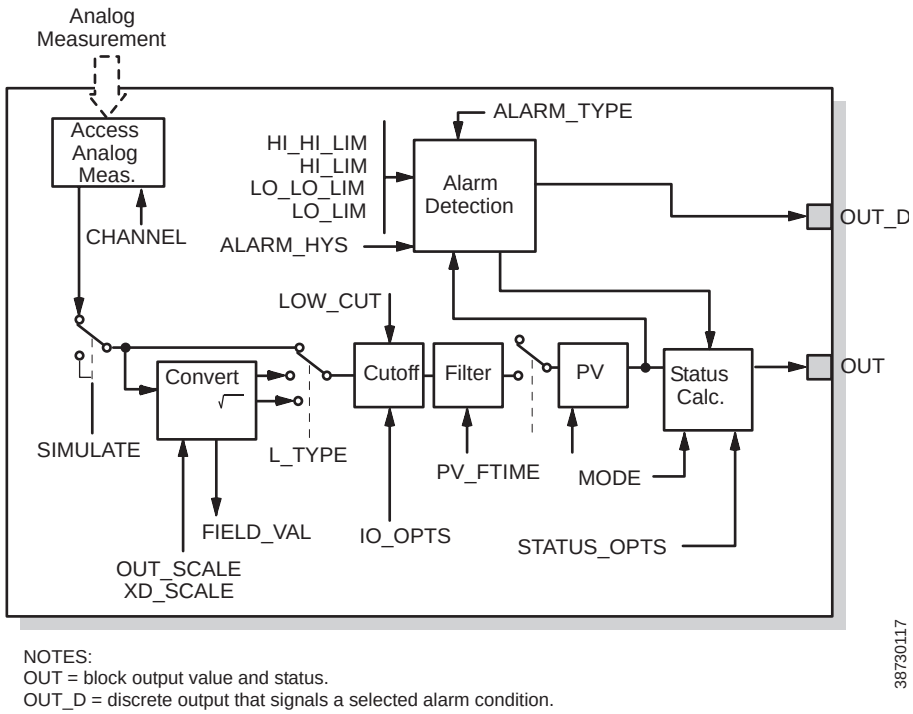
SIMULATION

To support testing, you can either change the mode of the block to manual and adjust the output value, or you can enable simulation through the configuration tool and manually enter a value for the measurement value and its status.

With simulation enabled, the actual measurement value has no impact on the OUT value or the status.

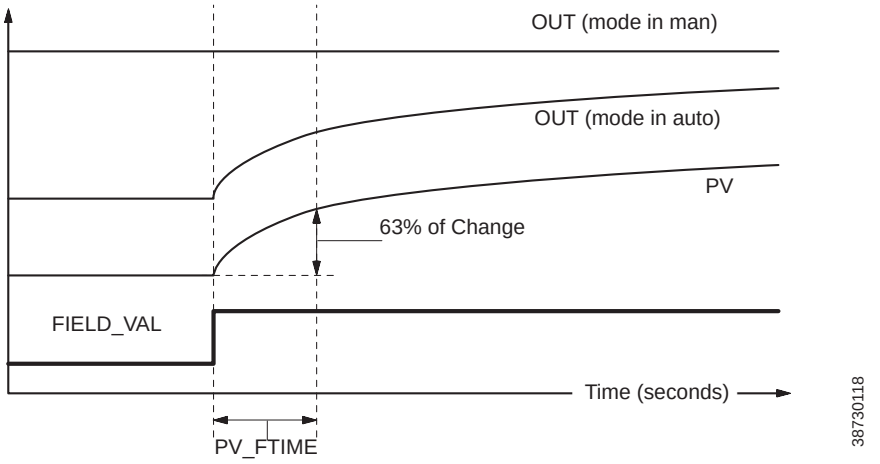
NOTE
See Section 8: PlantWeb Alerts for detailed information regarding simulation.

Figure D-2. Analog Input Function Block Schematic



NOTES:
OUT = block output value and status.
OUT_D = discrete output that signals a selected alarm condition.

Figure D-3. Analog Input Function Block Timing Diagram



FILTERING

The filtering feature changes the response time of the device to smooth variations in output readings caused by rapid changes in input. You can adjust the filter time constant (in seconds) using the PV_FTIME parameter. Set the filter time constant to zero to disable the filter feature.

SIGNAL CONVERSION

You can set the signal conversion type with the Linearization Type (L_TYPE) parameter. You can view the converted signal (in percent of XD_SCALE) through the FIELD_VAL parameter.

$$\text{FIELD\_VAL} = \frac{100 \times (\text{Channel Value} - \text{EU*@0\%})}{(\text{EU*@100\%} - \text{EU*@0\%})}$$

* XD_SCALE values

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You can choose from direct, indirect, or indirect square root signal conversion with the L_TYPE parameter.

Direct

Direct signal conversion allows the signal to pass through the accessed channel input value (or the simulated value when simulation is enabled).

PV = Channel Value

Indirect

Indirect signal conversion converts the signal linearly to the accessed channel input value (or the simulated value when simulation is enabled) from its specified range (XD_SCALE) to the range and units of the PV and OUT parameters (OUT_SCALE).

$$\text{PV} = \left(\frac{\text{FIELD\_VAL}}{100}\right) \times (\text{EU**@100\%} - \text{EU**@0\%}) + \text{EU**@0\%}$$

** OUT_SCALE values

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Indirect Square Root

Indirect Square Root signal conversion takes the square root of the value computed with the indirect signal conversion and scales it to the range and units of the PV and OUT parameters.

$$\text{PV} = \sqrt{\left(\frac{\text{FIELD\_VAL}}{100}\right)} \times (\text{EU**@100\%} - \text{EU**@0\%}) + \text{EU**@0\%}$$

** OUT_SCALE values

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When the converted input value is below the limit specified by the LOW_CUT parameter, and the Low Cutoff I/O option (IO_OPTS) is enabled (True), a value of zero is used for the converted value (PV). This option is useful to eliminate false readings when the differential pressure measurement is close to zero, and it may also be useful with zero-based measurement devices such as flowmeters.

NOTE
Low Cutoff is the only I/O option supported by the AI block. You can set the I/O option in **Manual** or **Out of Service** mode only.

BLOCK ERRORS

Table D-5 lists conditions reported in the BLOCK_ERR parameter. Conditions in *italics* are inactive for the AI block and are given here only for your reference.

Table D-5. BLOCK_ERR Conditions

Condition Number	Condition Name and Description
0	*Other*
1	**Block Configuration Error**: the selected channel carries a measurement that is incompatible with the engineering units selected in XD_SCALE, the L_TYPE parameter is not configured, or CHANNEL = zero.
2	*Link Configuration Error*
3	**Simulate Active**: Simulation is enabled and the block is using a simulated value in its execution.
4	*Local Override*
5	*Device Fault State Set*
6	*Device Needs Maintenance Soon*
7	**Input Failure/Process Variable has Bad Status**: The hardware is bad, or a bad status is being simulated.
8	**Output Failure**: The output is bad based primarily upon a bad input.
9	*Memory Failure*
10	*Lost Static Data*
11	*Lost NV Data*
12	*Readback Check Failed*
13	*Device Needs Maintenance Soon*
14	*Power Up*
15	**Out of Service**: The actual mode is out of service.

MODES

The AI Function Block supports three modes of operation as defined by the MODE_BLK parameter:

- **Manual (Man)** The block output (OUT) may be set manually.
- **Automatic (Auto)** OUT reflects the analog input measurement or the simulated value when simulation is enabled.
- **Out of Service (O/S)** The block is not processed. FIELD_VAL and PV are not updated and the OUT status is set to Bad: Out of Service. The BLOCK_ERR parameter shows Out of Service. In this mode, you can make changes to all configurable parameters. The target mode of a block may be restricted to one or more of the supported modes.

ALARM DETECTION

A block alarm will be generated whenever the BLOCK_ERR has an error bit set. The types of block error for the AI block are defined above.

Process Alarm detection is based on the OUT value. You can configure the alarm limits of the following standard alarms:

- High (HI_LIM)
- High high (HI_HI_LIM)
- Low (LO_LIM)
- Low low (LO_LO_LIM)

In order to avoid alarm chattering when the variable is oscillating around the alarm limit, an alarm hysteresis in percent of the PV span can be set using the ALARM_HYS parameter. The priority of each alarm is set in the following parameters:

- HI_PRI
- HI_HI_PRI
- LO_PRI
- LO_LO_PRI

Alarms are grouped into five levels of priority:

Priority Number	Priority Description
0	The priority of an alarm condition changes to 0 after the condition that caused the alarm is corrected.
1	An alarm condition with a priority of 1 is recognized by the system, but is not reported to the operator.
2	An alarm condition with a priority of 2 is reported to the operator, but does not require operator attention (such as diagnostics and system alerts).
3-7	Alarm conditions of priority 3 to 7 are advisory alarms of increasing priority.
8-15	Alarm conditions of priority 8 to 15 are critical alarms of increasing priority.

STATUS HANDLING

Normally, the status of the PV reflects the status of the measurement value, the operating condition of the I/O card, and any active alarm condition. In Auto mode, OUT reflects the value and status quality of the PV. In Man mode, the OUT status constant limit is set to indicate that the value is a constant and the OUT status is *Good.*

The **Uncertain** - EU range violation status is always set, and the PV status is set high- or low-limited if the sensor limits for conversion are exceeded.

In the STATUS_OPTS parameter, you can select from the following options to control the status handling:

BAD if Limited – sets the OUT status quality to Bad when the value is higher or lower than the sensor limits.

Uncertain if Limited – sets the OUT status quality to Uncertain when the value is higher or lower than the sensor limits.

Uncertain if in Manual mode – The status of the Output is set to Uncertain when the mode is set to Manual.

NOTE
The instrument must be in **Manual** or **Out of Service** mode to set the status option.

NOTE
The AI block only supports the **BAD if Limited** option. Unsupported options are not grayed out; they appear on the screen in the same manner as supported options.

ADVANCED FEATURES

The AI function block provided with Fisher-Rosemount fieldbus devices provides added capability through the addition of the following parameters:

ALARM_TYPE – Allows one or more of the process alarm conditions detected by the AI function block to be used in setting its OUT_D parameter.

OUT_D – Discrete output of the AI function block based on the detection of process alarm condition(s). This parameter may be linked to other function blocks that require a discrete input based on the detected alarm condition.

VAR_SCAN – Time period in seconds over which the variability index (VAR_INDEX) is computed.

VAR_INDEX – Process variability index measured as the integral of average absolute error between PV and its mean value over the previous evaluation period. This index is calculated as a percent of OUT span and is updated at the end of the time period defined by VAR_SCAN.

APPLICATION INFORMATION

The configuration of the AI function block and its associated output channels depends on the specific application. A typical configuration for the AI block involves the following parameters:

Channel

If the device supports more than one measurement, verify that the selected channel contains the appropriate measurement or derived value.

L_TYPE

Select **Direct** when the measurement is already in the engineering units that you want for the block output.

Select **Indirect** when you want to convert the measured variable into another, for example, pressure into level or flow into energy.

Select **Indirect Square Root** when the block I/O parameter value represents a flow measurement made using differential pressure, and when square root extraction is not performed by the transducer.

Scaling

XD_SCALE provides the range and units of the measurement and **OUT_SCALE** provides the range and engineering units of the output.

APPLICATION EXAMPLES

Temperature Transmitter

Situation

A temperature transmitter with a range of –200 to 450°C.

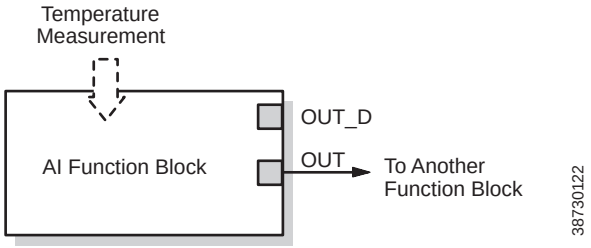
Solution

Table D-6 lists the appropriate configuration settings, and Figure D-4 illustrates the correct function block configuration.

Table D-6. Analog Input Function Block Configuration for a Typical Temperature Transmitter

Parameter	Configured Values
L_TYPE	Direct
XD_SCALE	Not Used
OUT_SCALE	Not Used

Figure D-4. Analog Input Function Block Configuration for a Typical Temperature Transmitter

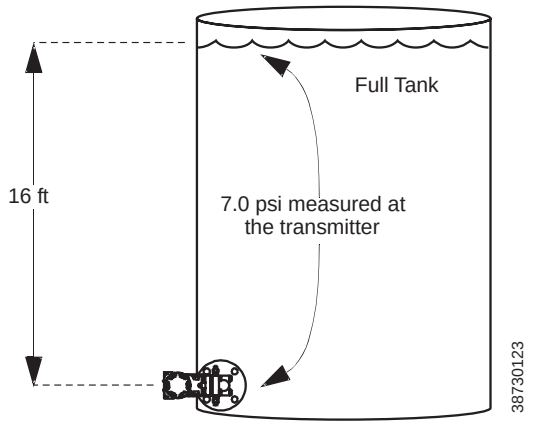


Pressure Transmitter used to Measure Level in an Open Tank

Situation #1

The level of an open tank is to be measured using a pressure tap at the bottom of the tank. The level measurement will be used to control the level of liquid in the tank. The maximum level at the tank is 16 ft. The liquid in the tank has a density that makes the level correspond to a pressure of 7.0 psi at the pressure tap (Figure D-5).

Figure D-5. Situation #1 Diagram



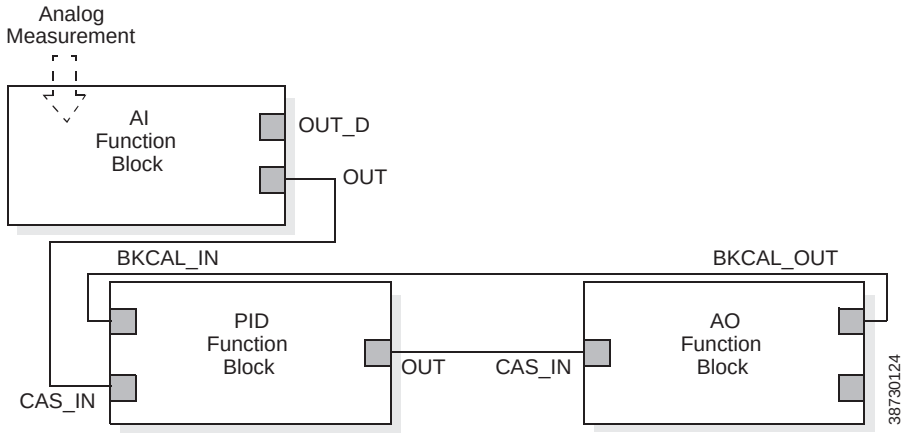
Solution to Situation #1

Table D-4 lists the appropriate configuration settings, and Figure D-5 illustrates the correct function block configuration.

Table D-7. Analog Input Function Diagram for a Pressure Transmitter used in Level Measurement (Situation #1)

Parameter	Configured Values
L_TYPE	Indirect
XD_SCALE	0 to 7 psi
OUT_SCALE	0 to 16 ft

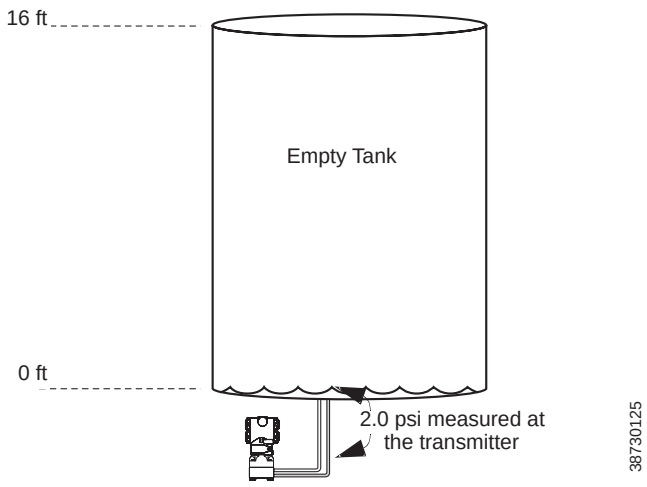
Figure D-6. Function Block Diagram for a Pressure Transmitter used in Level Measurement



Situation #2

The transmitter in situation #1 is installed below the tank in a position where the liquid column in the impulse line, when the tank is empty, is equivalent to 2.0 psi (Figure D-7).

Figure D-7. Situation #2 Diagram



Solution

Table D-6 lists the appropriate configuration settings.

Table D-8. Analog Input Function Diagram for a Pressure Transmitter used in Level Measurement (Situation #2)

Parameter	Configured Values
L_TYPE	Indirect
XD_SCALE	2 to 9 psi
OUT_SCALE	0 to 16 ft

Differential Pressure Transmitter to Measure Flow

Situation

The liquid flow in a line is to be measured using the differential pressure across an orifice plate in the line, and the flow measurement will be used in a flow control loop. Based on the orifice specification sheet, the differential pressure transmitter was calibrated for 0 to 20 in H_20 for a flow of 0 to 800 gal/min, and the transducer was not configured to take the square root of the differential pressure.

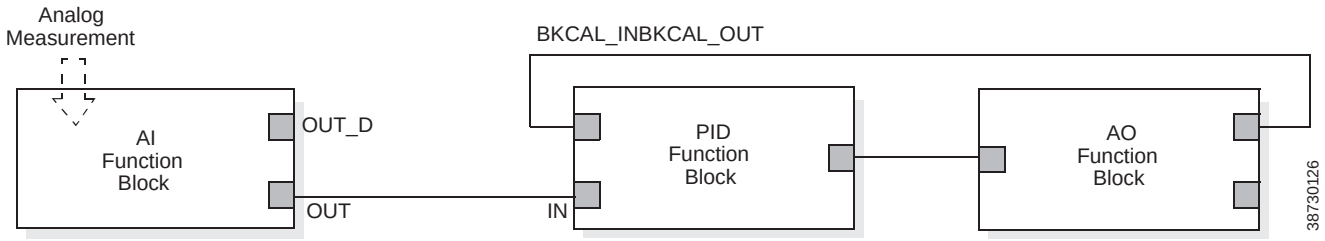
Solution

Table D-9 lists the appropriate configuration settings, and Figure D-8 illustrates the correct function block configuration.

Table D-9. Analog Input Function Block Configuration for a Differential Pressure Measurement

Parameter	Configured Values
L_TYPE	Indirect Square Root
XD_SCALE	0 to 20 in.
OUT_SCALE	0 to 800 gal/min

Figure D-8. Function Block Diagram for a Differential Pressure Transmitter Used in a Flow Measurement



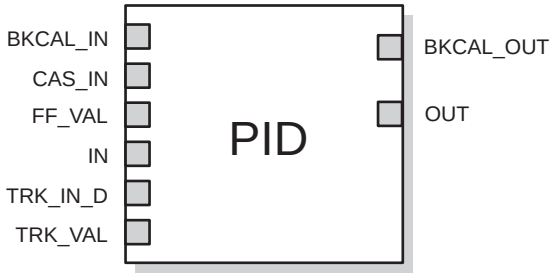
TROUBLESHOOTING

Refer to Table D-10 to troubleshoot any problems that you encounter.

Table D-10. Troubleshooting

Symptom	Possible Cause	Corrective Action
Mode will not leave OOS	1. Target mode not set	1. Set target mode to something other than OOS.
	2. Configuration error	2. BLOCK_ERR will show the configuration error bit set. The following are parameters that must be set before the block is allowed out of OOS: a. CHANNEL must be set to a valid value and cannot be left at initial value of 0. b. XD_SCALE.UNITS_INDX must match the units in the transducer block channel value. c. L_TYPE must be set to Direct, Indirect, or Indirect Square Root and cannot be left at initial value of 0.
	3. Resource block	3. The actual mode of the Resource block is OOS. See Resource Block Diagnostics for corrective action.
	4. Schedule	4. Block is not scheduled and therefore cannot execute to go to Target Mode. Schedule the block to execute.
Process and/or block alarms will not work	1. Features	1. FEATURES_SEL does not have Alerts enabled. Enable the Alerts bit.
	2. Notification	2. LIM_NOTIFY is not high enough. Set equal to MAX_NOTIFY.
	3. Status Options	3. STATUS_OPTS has Propagate Fault Forward bit set. This should be cleared to cause an alarm to occur.
Value of output does not make sense	1. Linearization Type	1. Does not make L_TYPE must be set to Direct, Indirect, or Indirect Square Root and cannot be left at initial value 0.
	2. Scaling	2. Scaling parameters are set incorrectly: a. XD_SCALE.EU0 and EU100 should match that of the transducer block channel value. b. OUT_SCALE.EU0 and EU100 are not set properly.
Cannot Set HI_LIMIT, HI_HI_LIMIT LO_LIMIT, or LO_LO_LIMIT Values	1. Scaling	1. Limit values are outside the OUT_SCALE.EU0 and OUT_SCALE.EU100 values. Change OUT_SCALE or set values within range.

Appendix E PID Function Block



BKCAL_IN = The analog input value and status from another block's BKCAL_OUT output that is used for backward output tracking for bumpless transfer and to pass limit status.
CAS_IN = The remote setpoint value from another function block.
FF_VAL = The feedforward control input value and status.
IN = The connection for the process variable from another function block.
TRK_IN_D = Initiates the external tracking function.
TRK_VAL = The value after scaling applied to OUT in Local Override mode.
BKCAL_OUT = The value and status required by the BKCAL_IN input of another function block to prevent reset windup and to provide bumpless transfer to closed loop control.
OUT = The block output and status.

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The PID function block combines all of the necessary logic to perform proportional/integral/derivative (PID) control. The block supports mode control, signal scaling and limiting, feedforward control, override tracking, alarm limit detection, and signal status propagation.

The block supports two forms of the PID equation: Standard and Series. You can choose the appropriate equation using the FORM parameter. The Standard ISA PID equation is the default selection.

$$\text{Standard Out} = \text{GAIN} \times e \times \left(1 + \frac{1}{\tau_r s + 1} + \frac{\tau_d s}{\tau_d s + 1}\right) + F$$

$$\text{Series Out} = \text{GAIN} \times e \times \left[\left(1 + \frac{1}{\tau_r s}\right) + \left(\frac{\tau_d s + 1}{\alpha \times \tau_d s + 1}\right)\right] + F$$

Where

GAIN: proportional gain value
τ_r: Integral action time constant (RESET parameter) in seconds
s: laplace operator
d: derivative action time constant (RATE parameter)
α: fixed smoothing factor of 0.1 applied to RATE
F: feedforward control contribution from the feedforward input (FF_VAL parameter)
e: error between setpoint and process variable

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To further customize the block for use in your application, you can configure filtering, feedforward inputs, tracking inputs, setpoint and output limiting, PID equation structures, and block output action. Table E-1 lists the PID block parameters and their descriptions, units of measure, and index numbers, and Figure E-1 illustrates the internal components of the PID function block.

Table E-1. PID Function Block System Parameters

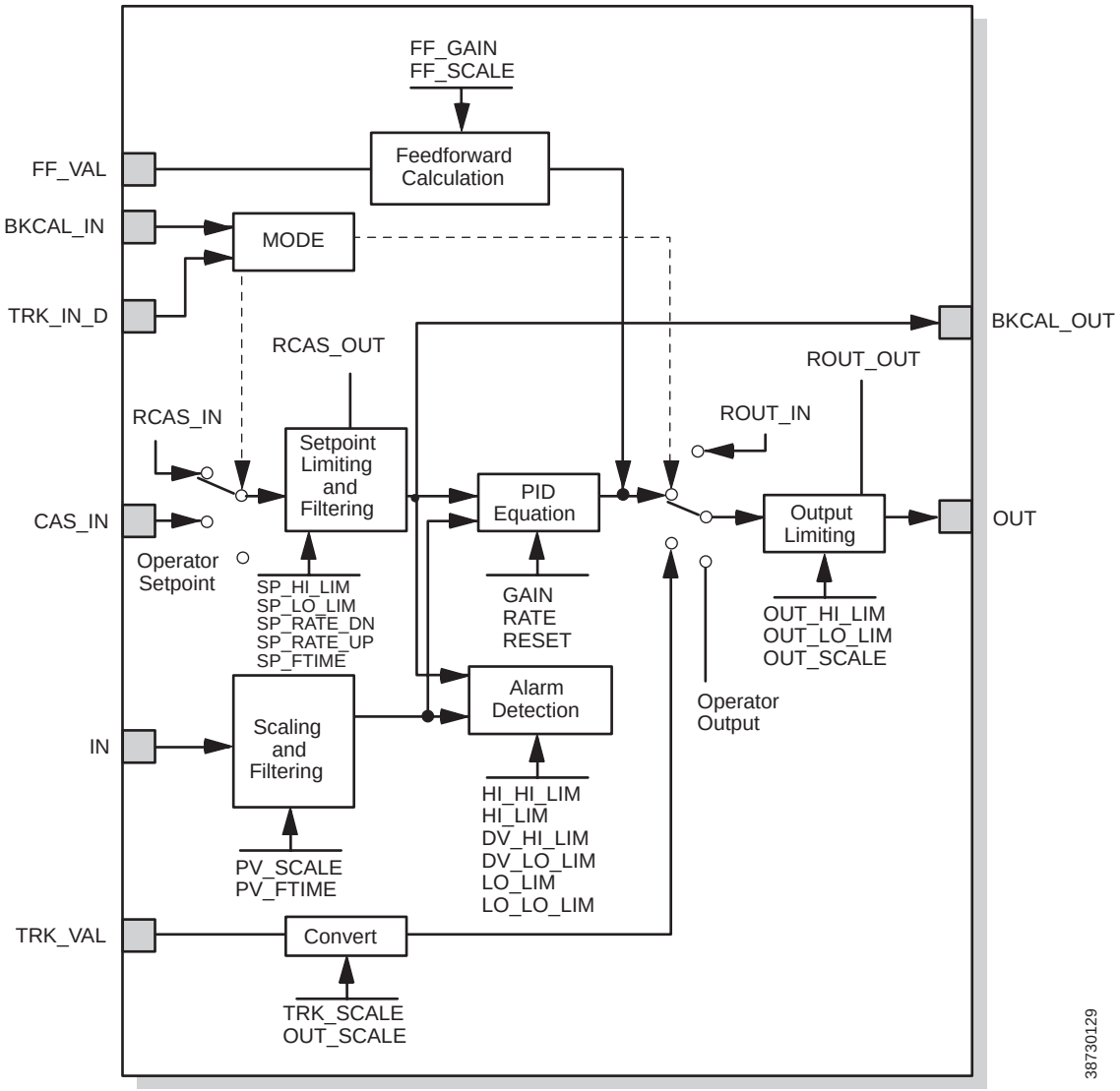
Parameter	Index Number	Units	Description
ACK_OPTION	46	None	Used to set auto acknowledgment of alarms.
ALARM_HYS	47	Percent	The amount the alarm value must return to within the alarm limit before the associated active alarm condition clears.
ALARM_SUM	45	None	The summary alarm is used for all process alarms in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status parameter. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.
ALERT_KEY	04	None	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
ALG_TYPE	74	None	Selects filtering algorithm as Backward or Bilinear.
BAL_TIME	25	Seconds	The specified time for the internal working value of bias to return to the operator set bias. Also used to specify the time constant at which the integral term will move to obtain balance when the output is limited and the mode is AUTO, CAS, or RCAS.
BIAS	66	EU of OUT_SCALE	The bias value used to calculate output for a PD type controller.
BKCAL_HYS	30	Percent	The amount the output value must change away from the its output limit before limit status is turned off.
BKCAL_IN	27	EU of OUT_SCALE	The analog input value and status from another block's BKCAL_OUT output that is used for backward output tracking for bumpless transfer and to pass limit status.
BKCAL_OUT	31	EU of PV_SCALE	The value and status required by the BKCAL_IN input of another block to prevent reset windup and to provide bumpless transfer of closed loop control.

Parameter	Index Number	Units	Description
BLOCK_ALM	44	None	The block alarm is used for all configuration, hardware, connection failure, or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the active status in the status parameter. As soon as the Unreported status is cleared by the alert reporting task, and other block alert may be reported without clearing the Active status, if the subcode has changed.
BLOCK_ERR	06	None	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string so that multiple errors may be shown.
BYPASS	17	None	Used to override the calculation of the block. When enabled, the SP is sent directly to the output.
CAS_IN	18	EU of PV_SCALE	The remote setpoint value from another block.
CONTROL_OPTS	13	None	Allows you to specify control strategy options. The supported control options for the PID block are Track enable, Track in Manual, SP-PV Track in Man, SP-PV Track in LO or IMAN, Use PV for BKCAL OUT, and Direct Acting.
CONTROL_OPTS	13	None	Allows you to specify control strategy options. The supported control options for the PID block are Track enable, Track in Manual, SP-PV Track in Man, SP-PV Track in LO or IMAN, Use PV for BKCAL OUT, and Direct Acting
DV_HI_ALM	64	None	The DV HI alarm data, which includes a value of the alarm, a timestamp of occurrence, and the state of the alarm.
DV_HI_LIM	57	EU of PV_SCALE	The setting for the alarm limit used to detect the deviation high alarm condition.
DV_HI_PRI	56	None	The priority of the deviation high alarm.
DV_LO_ALM	65	None	The DV LO alarm data, which includes a value of the alarm, a timestamp of occurrence, and the state of the alarm.
DV_LO_LIM	59	EU of PV_SCALE	The setting for the alarm limit use to detect the deviation low alarm condition.
DV_LO_PRI	58	None	The priority of the deviation low alarm.
ERROR	67	EU of PV_SCALE	The error (SP-PV) used to determine the control action.
FF_ENABLE	70	None	Enables the use of feedforward calculations.
FF_GAIN	42	None	The feedforward gain value. FF_VAL is multiplied by FF_GAIN before it is added to the calculated control output.
FF_SCALE	41	None	The high and low scale values, engineering units code, and number of digits to the right of the decimal point associated with the feedforward value (FF_VAL).
FF_VAL	40	EU of FF_SCALE	The feedforward control input value and status.
GAIN	23	None	The proportional gain value. This value cannot = 0.
GRANT_DENY	12	None	Options for controlling access of host computers and local control panels to operating, tuning, and alarm parameters of the block. Not used by the device.
HI_ALM	61	None	The HI alarm data, which includes a value of the alarm, a timestamp of occurrence, and the state of the alarm.
HI_HI_ALM	60	None	The HI HI alarm data, which includes a value of the alarm, a timestamp of occurrence, and the state of the alarm.
HI_HI-LIM	49	EU of PV_SCALE	The setting for the alarm limit used to detect the HI HI alarm condition.
HI_HI_PRI	48	None	The priority of the HI HI Alarm.
HI_LIM	51	EU of PV_SCALE	The setting for the alarm limit used to detect the HI alarm condition.
HI_PRI	50	None	The priority of the HI alarm.
IN	15	EU of PV_SCALE	The connection for the PV input from another block.
LO_ALM	62	None	The LO alarm data, which includes a value of the alarm, a timestamp of occurrence, and the state of the alarm.
LO_LIM	53	EU of PV_SCALE	The setting for the alarm limit used to detect the LO alarm condition.
LO_LO_ALM	63	None	The LO LO alarm data, which includes a value of the alarm, a timestamp of occurrence, and the state of the alarm.
LO_LO_LIM	55	EU of PV_SCALE	The setting for the alarm limit used to detect the LO LO alarm condition.

Parameter	Index Number	Units	Description
LO_LO_PRI	54	None	The priority of the LO LO alarm.
LO_PRI	52	None	The priority of the LO alarm.
MATH_FORM	73	None	Selects equation form (series or standard).
MODE_BLK	05	None	The actual, target, permitted, and normal modes of the block. Target: The mode to “go to” Actual: The mode the “block is currently in” Permitted: Allowed modes that target may take on Normal: Most common mode for target
OUT	09	EU of OUT SCALE	The block input value and status.
OUT_HI_LIM	28	EU of OUT_SCALE	The maximum output value allowed.
OUT-LO_LIM	29	EU of OUT_SCALE	The minimum output value allowed.
OUT_SCALE	11	None	The high and low scale values, engineering units code, and number of digits to the right of the decimal point associated with OUT.
PV	07	EU of PV_SCALE	The process variable used in block execution.
PV_FTIME	16	Seconds	The time constant of the first-order PV filter. It is the time required for a 63 percent change in the IN value.
PV_SCALE	10	None	The high and low scale values, engineering units code, and number of digits to the right of the decimal point associated with PV.
RATE	26	Seconds	The derivative action time constant.
RCAS_IN	32	EU of PV_SCALE	Target setpoint and status that is provided by a supervisory host. Used when mode is RCAS.
RCAS_OUT	35	EU of PV_SCALE	Block setpoint and status after ramping, filtering, and limiting that is provided to a supervisory host for back calculation to allow action to be taken under limiting conditions or mode change. Used when mode is RCAS.
RESET	24	Seconds per repeat	The integral action time constant.
ROUT_IN	33	EU of OUT_SCALE	Target output and status that is provided by a supervisory host. Used when mode is ROUT.
ROUT_OUT	36	EU of OUT_SCALE	Block output that is provided to a supervisory host for a back calculation to allow action to be taken under limiting conditions or mode change. Used when mode is RCAS.
SHED_OPT	34	None	Defines action to be taken on remote control device time-out.
SP	08	EU of PV_SCALE	The target block setpoint value. It is the result of setpoint limiting and setpoint rate of change limiting.
SP_FTIME	69	Seconds	The time constant of the first-order SP filter. It is the time required for a 63 percent change in the IN value.
SP_HI_LIM	21	EU of PV_SCALE	The highest SP value allowed.
SP_LO_LIM	22	EU of PV_SCALE	The lowest SP value allowed.
SP_RATE_DN	19	EU of PV_SCALE per second	Ramp rate for downward SP changes. When the ramp rate is set to zero, the SP is used immediately.
SP-RATE_UP	20	EU of PV_SCALE per second	Ramp rate for upward SP changes. When the ramp rate is set to zero, the SP is used immediately.
SP_WORK	68	EU of PV_SCALE	The working setpoint of the block after limiting and filtering is applied.
STATUS_OPTS	14	None	Allows you to select options for status handling and processing. The supported status option for the PID block is Target to Manual if Bad IN.
STRATEGY	03	None	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.
ST_REV	01	None	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.
STRUCTURE. CONFIG	75	None	Defines PID equation structure to apply controller action.
TAG_DESC	02	None	The user description of the intended application of the block.
TRK_IN_D	38	None	Discrete input that initiates external tracking.

Parameter	Index Number	Units	Description
TRK_SCALE	37	None	The high and low scale values, engineering units code, and number of digits to the right of the decimal point associated with the external tracking value (TRK_VAL).
TRK_VAL	39	EU of TRK SCALE	The value (after scaling from TRK_SCALE to OUT_SCALE) applied to OUT in LO mode.
UBETA	72	Percent	Used to set disturbance rejection vs. tracking response action for a 2.0 degree of freedom PID.
UGAMMA	71	Percent	Used to set disturbance rejection vs. tracking response action for a 2.0 degree of freedom PID.
UPDATE_EVT	43	None	This alert is generated by any changes to the static data.

Figure E-1. PID Function BLock Schematic



SETPOINT SELECTION AND LIMITING

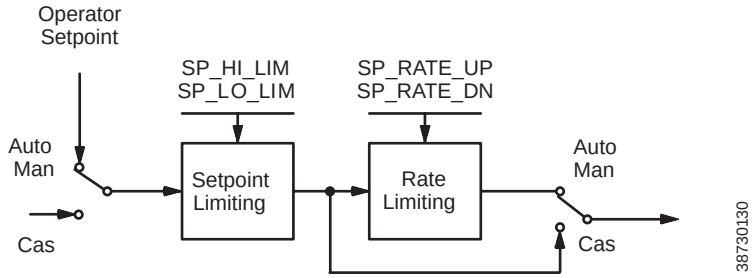
The setpoint of the PID block is determined by the mode. You can configure the SP_HI_LIM and SP_LO_LIM parameters to limit the setpoint. In **Cascade** or **RemoteCascade** mode, the setpoint is adjusted by another function block or by a host computer, and the output is computed based on the setpoint.

In **Automatic** mode, the setpoint is entered manually by the operator, and the output is computed based on the setpoint. In Auto mode, you can also adjust the setpoint limit and the setpoint rate of change using the SP_RATE_UP and SP_RATE_DN parameters.

In **Manual** mode the output is entered manually by the operator, and is independent of the setpoint. In **RemoteOutput** mode, the output is entered by a host computer, and is independent of the setpoint.

Figure E-2 illustrates the method for setpoint selection.

Figure E-2. PID Function Block Setpoint Selection



FILTERING

The filtering feature changes the response time of the device to smooth variations in output readings caused by rapid changes in input. You can configure the filtering feature with the FILTER_TYPE parameter, and you can adjust the filter time constant (in seconds) using the PV_FTIME or SP_FTIME parameters. Set the filter time constant to zero to disable the filter feature.

FEEDFORWARD CALCULATION

The feedforward value (FF_VAL) is scaled (FF_SCALE) to a common range for compatibility with the output scale (OUT_SCALE). A gain value (FF_GAIN) is applied to achieve the total feedforward contribution.

TRACKING

You enable the use of output tracking through the control options. You can set control options in Manual or Out of Service mode only.

The **Track Enable** control option must be set to *True* for the track function to operate. When the Track in Manual control option is set to *True*, tracking can be activated and maintained only when the block is in **Manual** mode. When **Track in Manual** is *False*, the operator can override the tracking function when the block is in **Manual** mode. Activating the track function causes the block's actual mode to revert to **Local Override**.

The TRK_VAL parameter specifies the value to be converted and tracked into the output when the track function is operating. The TRK_SCALE parameter specifies the range of TRK_VAL.

When the TRK_IN_D parameter is *True* and the **Track Enable** control option is *True*, the TRK_VAL input is converted to the appropriate value and output in units of OUT_SCALE.

OUTPUT SELECTION AND LIMITING

Output selection is determined by the mode and the setpoint. In **Automatic**, **Cascade**, or **RemoteCascade** mode, the output is computed by the PID control equation. In **Manual** and **RemoteOutput** mode, the output may be entered manually (see also ”Setpoint Selection and Limiting”). You can limit the output by configuring the OUT_HI_LIM and OUT_LO_LIM parameters.

BUMPLESS TRANSFER AND SETPOINT TRACKING

You can configure the method for tracking the setpoint by configuring the following control options (CONTROL_OPTS):

SP-PV Track in Man — Permits the SP to track the PV when the target mode of the block is Man.

SP-PV Track in LO or IMan — Permits the SP to track the PV when the actual mode of the block is Local Override (LO) or Initialization Manual (IMan).

When one of these options is set, the SP value is set to the PV value while in the specified mode.

You can select the value that a master controller uses for tracking by configuring the **Use PV for BKCAL_OUT** control option. The BKCAL_OUT value tracks the PV value. BKCAL_IN on a master controller connected to BKCAL_OUT on the PID block in an open cascade strategy forces its OUT to match BKCAL_IN, thus tracking the PV from the slave PID block into its cascade input connection (CAS_IN). If the **Use PV for BKCAL_OUT** option is not selected, the working setpoint (SP_WRK) is used for BKCAL_OUT.

You can set control options in **Manual** or **Out of Service** mode only. When the mode is set to **Auto**, the SP will remain at the last value (it will no longer follow the PV.

PID EQUATION STRUCTURES

Configure the STRUCTURE parameter to select the PID equation structure. You can select one of the following choices:

- PI Action on Error, D Action on PV
- PID Action on Error
- I Action on Error, PD Action on PV

Set RESET to zero to configure the PID block to perform integral only control regardless of the STRUCTURE parameter selection. When RESET equals zero, the equation reduces to an integrator equation with a gain value applied to the error:

$$\frac{\text{GAIN} \times e(s)}{s}$$

Where

GAIN: proportional gain value
e: error
s: laplace operator

REVERSE AND DIRECT ACTION

To configure the block output action, enable the **Direct Acting** control option. This option defines the relationship between a change in PV and the corresponding change in output. With **Direct Acting** enabled (True), an increase in PV results in an increase in the output.

You can set control options in **Manual** or **Out of Service** mode only.

NOTE
Track Enable, Track in Manual, SP-PV Track in Man, SP-PV Track in LO or IMan, Use PV for BKCAL_OUT, and **Direct Acting** are the only control options supported by the PID function block. Unsupported options are not grayed out; they appear on the screen in the same manner as supported options.

RESET LIMITING

The PID function block provides a modified version of feedback reset limiting that prevents windup when output or input limits are encountered, and provides the proper behavior in selector applications.

BLOCK ERRORS

Table E-2 lists conditions reported in the BLOCK_ERR parameter. Conditions in *italics* are inactive for the PID block and are given here only for your reference.

Table E-2. BLOCK _ERR Conditions

Condition Number	Condition Name and Description
0	*Other*
1	**Block Configuration Error:** The BY_PASS parameter is not configured and is set to 0, the SP_HI_LIM is less than the SP_LO_LIM, or the OUT_HI_LIM is less than the OUT_LO_LIM.
2	*Link Configuration Error*
3	*Simulate Active*
4	**Local Override:** The actual mode is LO.
5	*Device Fault State Set*
6	*Device Needs Maintenance Soon*
7	**Input Failure/Process Variable has Bad Status:** The parameter linked to IN is indicating a Bad status.
8	*Output Failure*
9	*Memory Failure*
10	*Lost Static Data*
11	*Lost NV Data*
12	*Readback Check Failed*
13	*Device Needs Maintenance Now*
14	*Power Up*
15	**Out of Service:** The actual mode is out of service.

MODES

The PID function block supports the following modes:

Manual (Man)—The block output (OUT) may be set manually.

Automatic (Auto)—The SP may be set manually and the block algorithm calculates OUT.

Cascade (Cas)—The SP is calculated in another block and is provided to the PID block through the CAS_IN connection.

RemoteCascade (RCas)—The SP is provided by a host computer that writes to the RCAS_IN parameter.

RemoteOutput (Rout)—The OUT is provided by a host computer that writes to the ROUT_IN parameter.

Local Override (LO)—The track function is active. OUT is set by TRK_VAL. The BLOCK_ERR parameter shows Local override.

Initialization Manual (IMan)—The output path is not complete (for example, the cascade-to-slave path might not be open). In IMan mode, OUT tracks BKCAL_IN.

Out of Service (O/S)—The block is not processed. The OUT status is set to *Bad: Out of Service*. The BLOCK_ERR parameter shows Out of service.

You can configure the Man, Auto, Cas, and O/S modes as permitted modes for operator entry.

ALARM DETECTION

A block alarm will be generated whenever the BLOCK_ERR has an error bit set. The types of block error for the AI block are defined above.

Process alarm detection is based on the PV value. You can configure the alarm limits of the following standard alarms:

- High (HI_LIM)
- High high (HI_HI_LIM)
- Low (LO_LIM)
- Low low (LO_LO_LIM)

Additional process alarm detection is based on the difference between SP and PV values and can be configured via the following parameters:

- Deviation high (DV_HI_LIM)
- Deviation low (DV_LO_LIM)

In order to avoid alarm chattering when the variable is oscillating around the alarm limit, an alarm hysteresis in percent of the PV span can be set using the ALARM_HYS parameter. The priority of each alarm is set in the following parameters:

- HI_PRI
- HI_HI_PRI
- LO_PRI
- LO_LO_PRI
- DV_HI_PRI
- DV_LO_PRI

Alarms are grouped into five levels of priority:

Priority Number	Priority Description
0	The priority of an alarm condition changes to 0 after the condition that caused the alarm is corrected.
1	An alarm condition with a priority of 1 is recognized by the system, but is not reported to the operator.
2	An alarm condition with a priority of 2 is reported to the operator, but does not require operator attention (such as diagnostics and system alerts).
3-7	Alarm conditions of priority 3 to 7 are advisory alarms of increasing priority.
8-15	Alarm conditions of priority 8 to 15 are critical alarms of increasing priority.

STATUS HANDLING

If the input status on the PID block is Bad, the mode of the block reverts to **Manual**. In addition, you can select the **Target to Manual if Bad IN** status option to direct the target mode to revert to manual. You can set the status option in **Manual** or **Out of Service** mode only.

NOTE
Target to Manual if Bad IN is the only status option supported by the PID function block. Unsupported options are not grayed out; they appear on the screen in the same manner as supported options.

APPLICATION INFORMATION

The PID function block is a powerful, flexible control algorithm that is designed to work in a variety of control strategies. The PID block is configured differently for different applications. The following examples describe the use of the PID block for closed-loop control (basic PID loop), feedforward control, cascade control with master and slave, and complex cascade control with override.

Closed Loop Control

To implement basic closed loop control, compute the error difference between the process variable (PV) and setpoint (SP) values and calculate a control output signal using a PID (Proportional Integral Derivative) function block.

The proportional control function responds immediately and directly to a change in the PV or SP. The proportional term **GAIN** applies a change in the loop output based on the current magnitude of the error multiplied by a gain value.

The integral control function reduces the process error by moving the output in the appropriate direction. The integral term **RESET** applies a correction based on the magnitude and duration of the error. Set the RESET parameter to zero for integral only control. To reduce reset action, configure the RESET parameter to be a large value.

The derivative term **RATE** applies a correction based on the anticipated change in error. Derivative control is typically used in temperature control where large measurement lags exist.

The MODE parameter is a switch that indicates the target and actual mode of operation. Mode selection has a large impact on the operation of the PID block:

- **Manual** mode allows the operator to set the value of the loop output signal directly.
- **Automatic** mode allows the operator to select a setpoint for automatic correction of error using the **GAIN, RESET,** and **RATE** tuning values.
- **Cascade** and **Remote Cascade** modes use a setpoint from another block in a cascaded configuration.
- **Remote Out** mode is similar to **Manual** mode except that the block output is supplied by an external program rather than by the operator.
- **Initialization Manual** is a non-target mode used with cascade configurations while transitioning from manual operation to automatic operation.

- **Local Override** is a non-target mode that instructs the block to revert to Local Override when the tracking or fail-safe control options are activated.
- **Out of Service** mode disables the block for maintenance.

Abrupt changes in the quality of the input signal can result in unexpected loop behavior. To prevent the output from changing abruptly and upsetting the process, select the **SP-PV Track in Man** I/O option. This option automatically sets the loop to **Manual** if a *Bad* input status is detected. While in manual mode, the operator can manage control manually until a Good input status is reestablished.

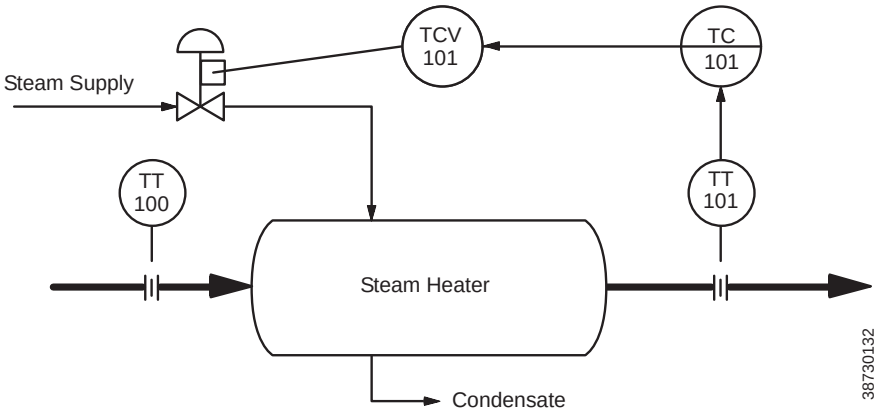
APPLICATION EXAMPLES

Basic PID Block for Steam Heater Control

Situation

A PID block is used with an AI block and an AO block to control the flow steam used to heat a process fluid in a heat exchanger. Figure E-3 illustrates the process instrumentation diagram.

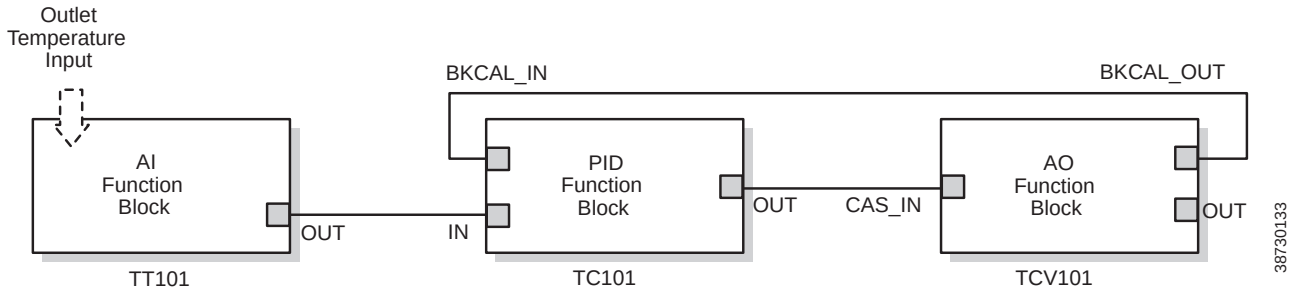
Figure E-3. PID Function Block Steam Heater Control



Solution

The PID loop uses TT101 as an input and provides a signal to the analog output TCV101. The BKCAL_OUT of the AO block and the BKCAL_IN of the PID block communicate the status and quality of information being passed between the blocks. The status indication shows that communications is functioning and the I/O is working properly. Figure E-4 illustrates the correct function block configuration.

Figure E-4. PID Function Block Diagram for Steam Heater Control Example



Feedforward Control

Situation

In the previous example, control problems can arise because of a time delay caused by thermal inertia between the two flow streams (TT100 and TT101). Variations in the inlet temperature (TT100) take an excessive amount of time to be sensed in the outlet (TT101). This delay causes the product to be out of the desired temperature range.

Solution

Feedforward control is added to improve the response time of the basic PID control. The temperature of the inlet process fluid (TT100) is input to an AI function block and is connected to the FF_VAL connector on the PID block. Feedforward control is then enabled (FF_ENABLE), the feedforward value is scaled (FF_SCALE), and a gain (FF_GAIN) is determined. Figure E-5 illustrates the process instrumentation diagram, and Figure E-6 illustrates the correct function block configuration.

Figure E-5. PID Function Block Feedforward Control Example

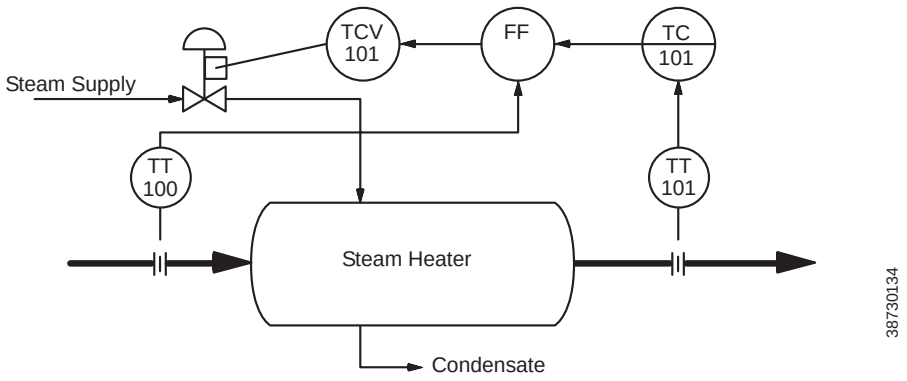
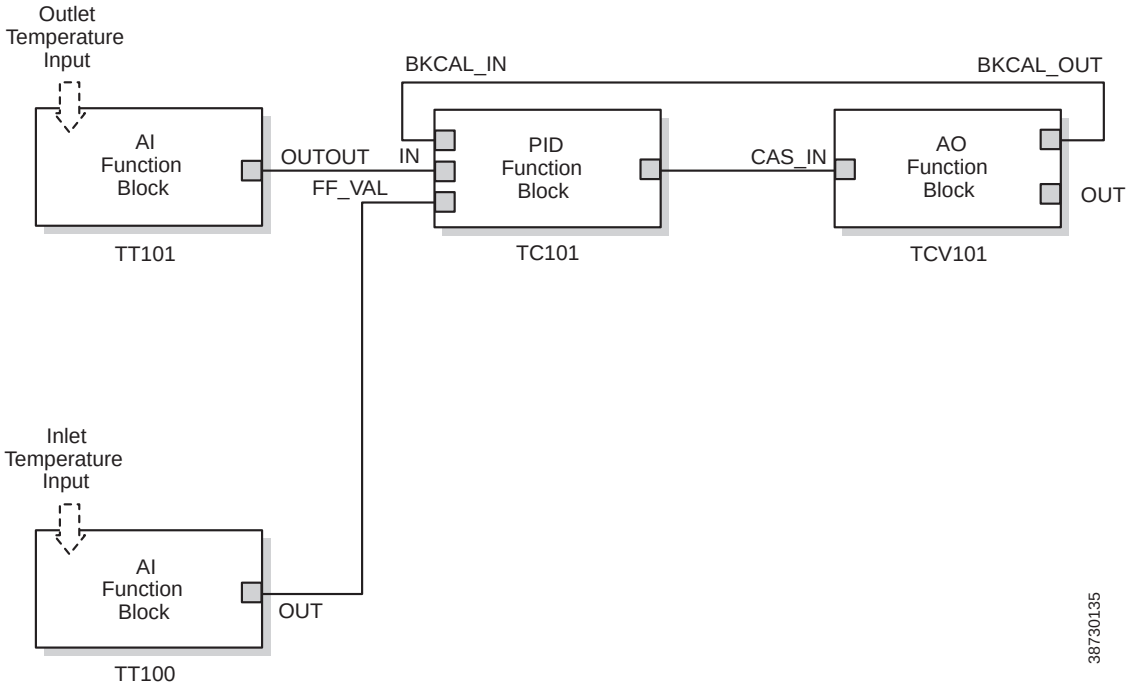


Figure E-6. PID Function Block Diagram for Feedfoward Control

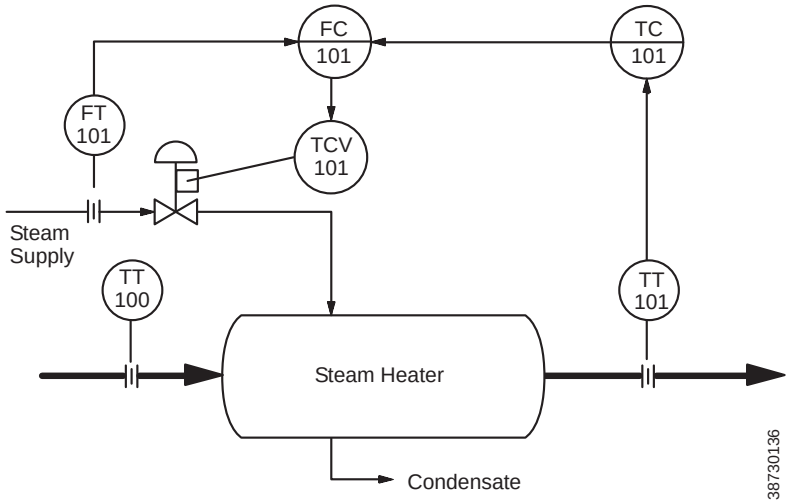


Cascade Control with Master and Slave Loops

Situation

A slave loop is added to a basic PID control configuration to measure and control steam flow to the steam heater. Variations in the steam pressure cause the temperature in the heat exchanger to change. The temperature variation will later be sensed by TT101. The temperature controller will modify the valve position to compensate for the steam pressure change. The process is slow and causes variations in the product temperature. Figure E-7 illustrates the process instrumentation diagram.

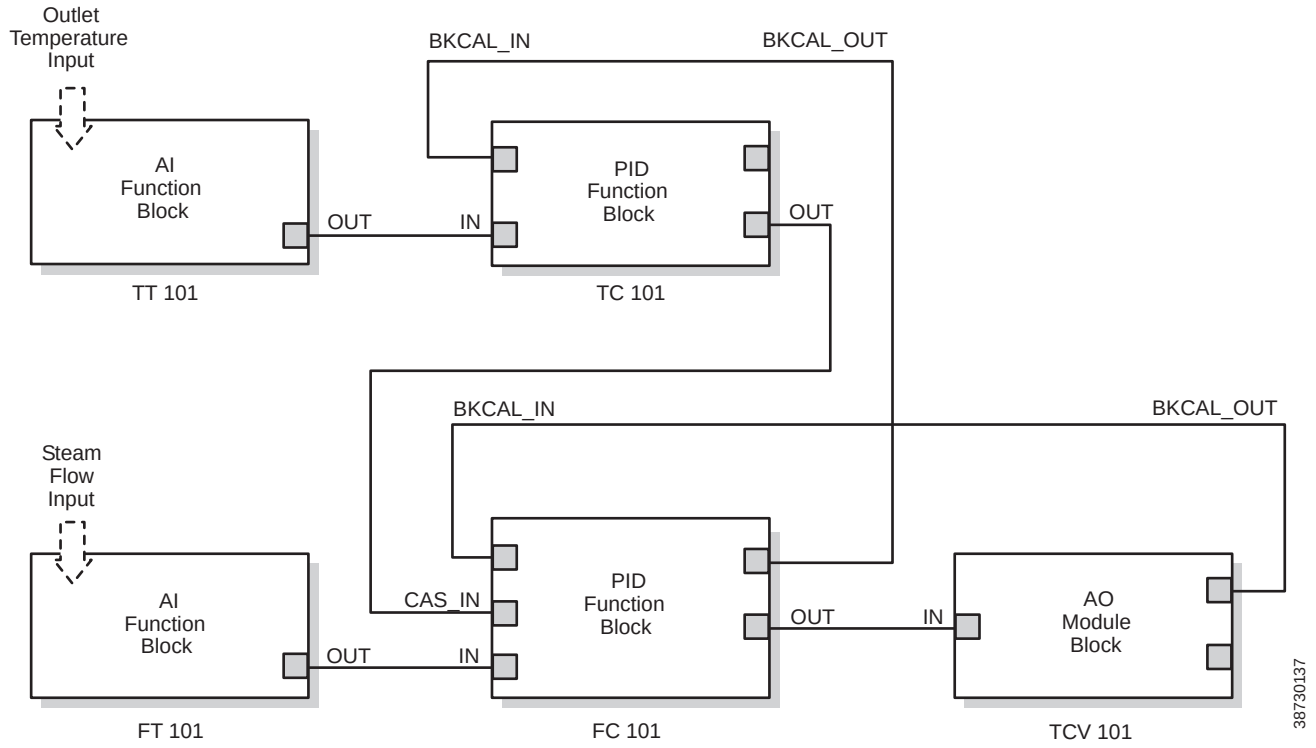
Figure E-7. PID Function Block Cascade Control Example



Solution

If the flow is controlled, steam pressure variations will be compensated before they significantly affect the heat exchanger temperature. The output from the master temperature loop is used as the setpoint for the slave steam flow loop. The BKCAL_IN and BKCAL_OUT connections on the PID blocks are used to prevent controller windup on the master loop when the slave loop is in Manual or Automatic mode, or it has reached an output constraint. Figure E-8 illustrates the correct function block configuration.

Figure E-8. PID Function Block Diagram for Cascade Control Example



Cascade Control with Override

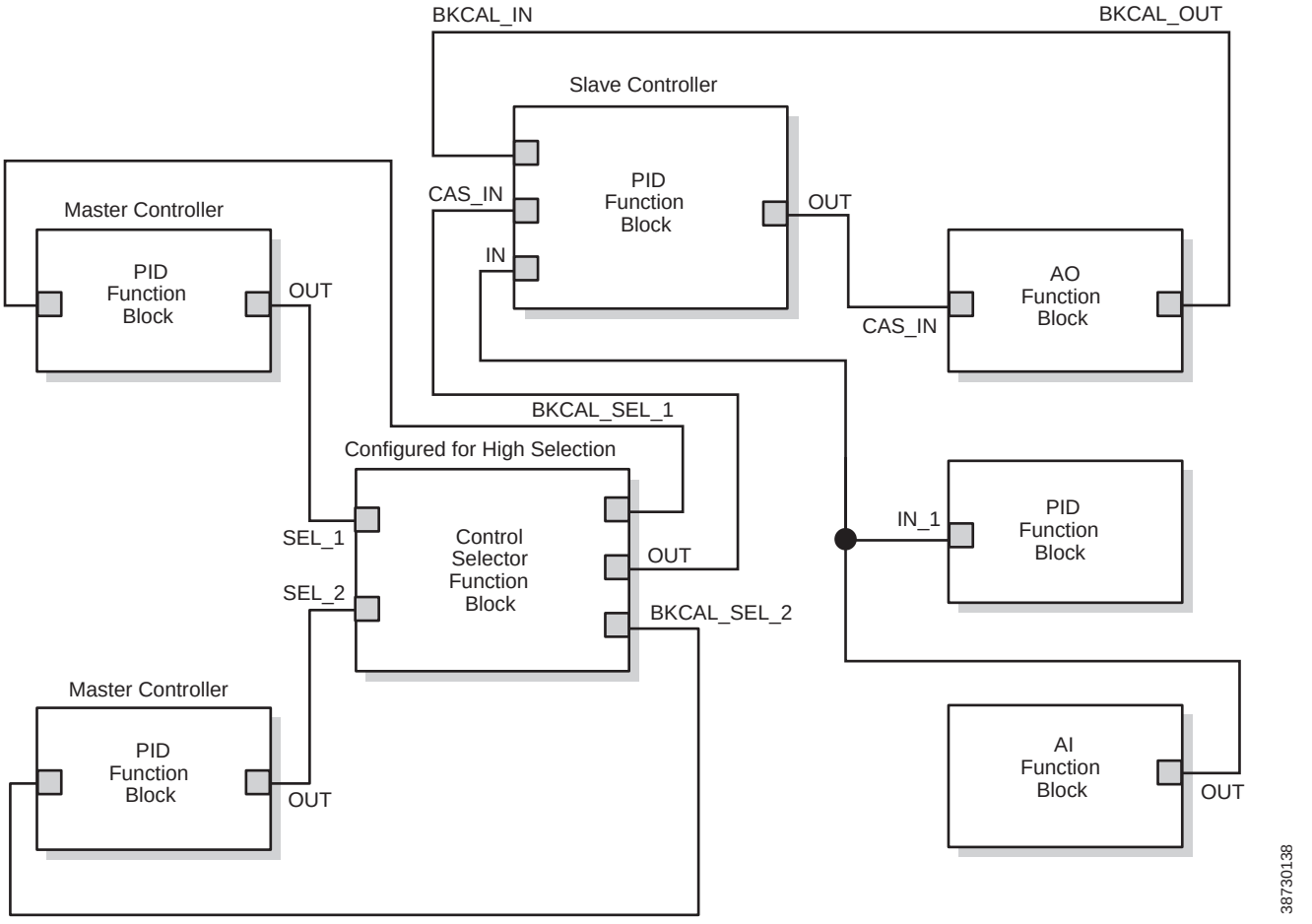
You can use the PID function block with other function blocks for complex control strategies. Figure C-9 illustrates the function block diagram for cascade control with override.

When configured for cascade control with override, if one of the PID function blocks connected to the selector inputs is deselected, that PID block filters the integral value to the selected value (the value at its BKCAL_IN). The selected PID block behaves normally and the deselected controller never winds up. At steady state, the deselected PID block offsets its OUT value from the selected value by the proportional term. When the selected block becomes output-limited, it prevents the integral term from winding further into the limited region.

When the cascade between the slave PID block and the Control Selector block is open, the open cascade status is passed to the Control Selector block and through to the PID blocks supplying input to it. The Control Selector block and the upstream (master) PID blocks have an actual mode of **IMan**.

If the instrument connected to the AI block fails, you can place the AI block in **Manual** mode and set the output to some nominal value for use in the Integrator function block. In this case, IN at the slave PID block is constant and prevents the integral term from increasing or decreasing.

Figure E-9. Function Block Diagram for Cascade Control with Override



TROUBLESHOOTING

Refer to Table E-3 to troubleshoot any problems that you encounter.

Table E-3. Troubleshooting

Symptom	Possible Causes	Corrective Action
Mode will not leave OOS	1. Target mode not set	1. Set target mode to something other than OOS.
	2. Configuration error	2. BLOCK_ERR will show the configuration error bit set. The following are parameters that must be set before the block is allowed out of OOS: a. BYPASS must be off or on and cannot be left at initial value of 0. b. OUT_HI_LIM must be less than or equal to OUT_LO_LIM. c. SP_HI_LIM must be less than or equal to SP_LO_LIM.
	3. Resource block	3. The actual mode of the Resource block is OOS. See Resource Block Diagnostics for corrective action.
	4. Schedule	4. Block is not scheduled and therefore cannot execute to go to Target Mode. Schedule the block to execute.
Mode will not leave IMAN	1. Back Calculation	1. BKCAL_IN a. The link is not configured (the status would show “Not Connected”). Configure the BKCAL_IN link to the downstream block. b. The downstream block is sending back a Quality of “Bad” or a Status of “Not Invited”. See the appropriate downstream block diagnostics for corrective action.
Mode will not change to AUTO	1. Target mode not set	1. Set target mode to something other than OOS.
	2. Input	2. IN a. The link is not configured (the status would show “Not Connected”). Configure the IN link to the block. b. The upstream block is sending back a Quality of “Bad” or a Status of “Not Invited”. See the appropriate upstream block diagnostics for corrective action.
Mode will not change to CAS	1. Target mode not set	1. Set target mode to something other than OOS.
	2. Cascade Input	2.CAS_IN a. The link is not configured (the status would show “Not Connected”). Configure the CAS_IN link to the block. b. The upstream block is sending back a Quality of “Bad” or a Status of “Not Invited”. See the appropriate up stream block diagnostics for corrective action.

Symptom	Possible Causes	Corrective Action
Mode sheds from RCAS to AUTO	1. Remote Cascade Value	1. Host system is not writing RCAS_IN with a quality and status of “good cascade” within shed time (see 2 below).
	2. Shed Timer	2. The mode shed timer, SHED_RCAS in the resource block is set too low. Increase the value.
Mode sheds from ROUT to MAN	1. Remote output value	1. Host system is not writing ROUT_IN with a quality and status of “good cascade” within shed time (see 2 below).
	2. Shed timer	2. The mode shed timer, SHED_RCAS, in the resource block is set too low. Increase the value.
Process and/or block alarms will not work	1. Features	1. FEATURES_SEL does not have Alerts enabled. Enable the Alerts bit.
	2. Notification	2. LIM_NOTIFY is not high enough. Set equal to MAX_NOTIFY.
	3. Status Options	3. STATUS_OPTS has Propagate Fault Forward bit set. This should be cleared to cause an alarm to occur.

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WARRANTY

Rosemount Analytical 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 Analytical 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 Analytical 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 Analytical to comply with the warranty provisions, whether claims by the purchaser are based in contract or in tort (including negligence).

Rosemount Analytical 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 Analytical Inc. but not manufactured by it will be subject to the same warranty as is extended to Rosemount Analytical 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.

Oxymitter 5000

Instruction Manual
IM-106-350, Rev 2.3
October 2008

Oxymitter 5000

Part no._____

Serial no._____

Order no._____

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