SpectraSensors®
An Endress+Hauser Company

OXY5500 Analyzer

Safety Manual

P/N 4900002247 rev B

OXY5500 Analyzer

Safety Manual

Products of

SpectraSensors®
An Endress+Hauser Company

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Revision History

Revision	Engineering Order	Date
A	EO16609	Dec. 21, 2016
B	ECR17051	April 7, 2017

NOTE:
ATEX/IECEx SCHEDULE DRAWING.
NO MODIFICATION PERMITTED WITHOUT
SIGNATORY APPROVAL AND REFERENCE
TO THE NOTIFIED BODY.

ATEX/IECEx DESIGNEE:

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1 - Introduction

SpectraSensors' OXY5500 analyzer is a stand-alone oxygen meter designed to detect oxygen in gases such as Natural Gas and air. Its design is based on fluorescence quenching technology that creates very stable, internally referenced measured values.

In order to operate the analyzer safely, it is important to closely review all information contained in the manuals provided with the analyzer. Refer to **Documents Provided with the OXY5500 Analyzer**. This manual is divided into the following sections:

- General Safety Instructions (Chapter 2)
- Equipment Installation (Chapter 3)
- Equipment Operation (Chapter 4)
- Equipment Maintenance and Service (Chapter 5)

How to Use This Manual

Take a moment to familiarize yourself with this manual by reading the **Table of Contents**. This manual has been written to address the most common safety issues related to the installation and operation of the OXY5500 analyzer. Additional information has been provided with the purchased analyzer to instruct qualified users in the general installation, operation and maintenance of the equipment.

Images, tables and charts have been included with instruction to provide a visual understanding of the analyzers and its functions. Special symbols are also used to provide the user with key information regarding the system configuration and/or operation. Users should pay close attention to this information.

Conventions Used in this Manual

In addition to the symbols and instructional information, this manual is created with "hot links" to enable the user to quickly navigate between different sections within the manual. These links include table, figure and section references and are identified by a pointing finger cursor  when rolling over the text. Simply click on the link to navigate to the associated reference.

Documents Provided with the OXY5500 Analyzer

Each OXY5500 analyzer shipped from the factory is packaged with documents specific to the model that was purchased. Generally, the documents included with each shipment are:

- Safety Manual
- Operator's Manual

- Sample Conditioning System (SCS) Manual, if applicable
- Calibration Certificate
- OXY5500 Service Software Manual

SpectraSensors Overview

SpectraSensors, Inc. is a leading manufacturer of technologically advanced electro-optic gas analyzers for the industrial process, gas distribution and environmental monitoring markets. Headquartered in Houston, Texas, SpectraSensors was incorporated in 1999 as a spin-off of the NASA/Caltech Jet Propulsion Laboratory (JPL) for the purpose of commercializing space-proven measurement technologies initially developed at JPL. SpectraSensors was acquired by the Endress + Hauser Group in 2012, which has expanded our reach in the global marketplace.

2 - General Safety Information

Each analyzer shipped from the factory includes documentation for the purpose of relaying installing, operating and safety instructions to the responsible party and/or operator of the equipment. This chapter reviews the general safety instruction for every OXY5500 analyzer.

Intended Equipment Use

The OXY5500 analyzer is intended for use as instructed in the documentation package provided with the equipment. This information provided should be read and referenced by anyone installing, operating or having direct contact with the OXY5500 analyzer. Any use of the equipment in a manner not specified by SpectraSensors could impair the protection provided by the equipment.

Warning Labels and Cautions

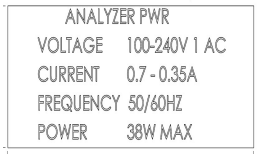
Instructional icons are provided in all equipment manuals and on the OXY5500 analyzer to alert the user of potential hazards, important information and valuable tips. Following are the symbols and associated warning and caution types to observe when servicing the analyzer. Some of these symbols are provided for instructional purposes only and are not labeled on the system.

Equipment Labels

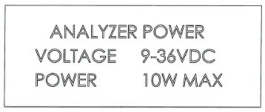
*Warning statement for **hazardous voltage**. Contact may cause electric shock or burn. Turn off and lock out system before servicing.*

Failure to follow all directions may result in damage or malfunction of the analyzer.

***PROTECTIVE EARTH GROUND** - Symbol indicates the connection point of the ground wire from the main power source.*



Power specifications for AC connection.



Power specifications for DC connection.

Access for signal wiring.

WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS

AVERTISSEMENT - DANGER DE CHARGE ELECTROSTATIQUE POTENTIELS - VOIR LES INSTRUCTIONS

Follow instructions to avoid electrostatic discharge.

WARNING - USE DAMP CLOTH TO CLEAN DISPLAY AND KEYPAD TO AVOID STATIC ELECTRICITY DISCHARGE.

AVERTISSEMENT - AUX CHARGES ELECTROSTATIQUES. UTILISER UN CHIFFON HUMIDE POUR NETTOYER L'AFFICHEUR ET LE CLAVIER.

Use appropriate tools to avoid electrostatic discharge.

WARNING - EXPLOSION HAZARD – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2 OR ZONE 2 (II 3G)

AVERTISSEMENT - RISQUE D'EXPLOSION – LA SUBSTITUTIOND E COMPOSANTSP EUTR ENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2 OU ZONE 2 (II 3G)

Substitution of components may void certification.

WARNING - EXPLOSION HAZARD - DO NOT REPLACE _____ UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS

AVERTISSEMENT - RISQUE D'EXPLOSION - COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX AVANT DE REMPLACER LE _____

Switch off power before replacing components to avoid explosion risk.

WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS

AVERTISSEMENT - RISQUE D'EXPLOSION - AVANT DE DECONNECTER L'EQUIPEMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX

Switch off power before disconnecting system to avoid explosion risk.

CAUTION: DO NOT OPERATE MACHINE WITH GROUNDING WIRE DISCONNECTED

ATTENTION: NE PAS METTRE L'APPAREIL EN MARCHE QUAND LE CON DUCTEUR DE MISE A LA TERRE EST DEBRANCHE.

Ensure grounding wire is connected at all times during operation.

Instructional Symbols

General notes and important information concerning the installation and operation of the analyzer.

Failure to follow all directions may result in damage or malfunction of the analyzer.

*Warning statement for **hazardous voltage**. Contact may cause electric shock or burn. Turn off and lock out system before servicing.*

Maximum voltage and current specifications for fuses.

Analyzer Technical Specifications

For each model of the OXY5500 analyzer, a set of technical specifications are provided that outline recommended equipment settings and ratings. Refer to Appendix A for technical specifications for the OXY5500.

Equipment Rating

The OXY5500 is a stand-alone precision system enclosed in a NEMA 4X and IP66 rated stainless steel case. The rugged design and low power consumption makes the OXY5500 ready for an indoor or outdoor application in Class 1, Division 2, Groups A, B, C and D environments according to CSA standards CAN/CSA C22.2 No. 0-M91, CAN/CSA C22.2 No. 94.2-07 / UL50E, CAN/CSA C22.2 No. 213-M1987, CAN/CSA 61010-1-12, ANSI/UL 61010-1, CAN/CSA C22.2 No. 60529:05, ANSI/ISA 12.12.01 - 2007 and ANSI/IEC 60529 - 2004. In addition, the Oxygen analyzer is also marked as ⟨Ex⟩ II 3 G, Ex nA IIC T3 Gc IP66 and certified according to ATEX/IECEx standards IEC/EN 60079-0 and IEC/EN 60079-15.

All electrical and communications specifications are provided in the OXY5500 Operator's Manual (P/N 4900002239).

Personnel Responsibility

The safety of the analyzer is the responsibility of the installer and the organization he/she represents.

Potential Risks Affecting Personnel

This section addresses the appropriate actions to undertake when faced with hazardous situations during or before service of the analyzer. It is not possible to list all potential hazards within this document. The user is responsible for identifying and mitigating any potential hazards present when servicing the analyzer.

Technicians are expected to follow all safety protocols established by the customer that are necessary for servicing the analyzer. This may include, but is not limited to, lockout/tagout procedures, toxic gas monitoring protocols, PPE requirements, hot work permits and other precautions that address safety concerns related to performing service on process equipment located in hazardous areas.

Mitigating risks

Refer to the instructions for each situation listed below to mitigate associated risks.

Electrocution hazard

1. Shut off power at the main disconnect external to the analyzer.

Complete this action before performing any service that requires working near the main input power or disconnecting any wiring or other electrical components.

2. Open enclosure door.

If service must be performed with power engaged:

1. Note any live electrical components and avoid any contact with them.
2. Only use tools with a safety rating for protection against accidental contact with voltage up to 1000V (IEC 900, ASTF-F1505-04, VDE 0682/201).

Explosion hazard

Any work in a hazardous area must be carefully controlled to avoid creating any possible ignition sources (e.g., heat, arching, sparking, etc.). All tools must be

appropriate for the area and hazards present. Electrical connections must not be made or broken with power on (to avoid arching).

Electrostatic discharge

Use a damp cloth to clean the display and keypad to avoid static electricity discharge.

Adhere to all warning labels to prevent damage to the unit. Refer to **"Warning Labels and Cautions"** on page 2-1.

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3 - Equipment Installation

The information in this chapter is related to safety during the equipment installation.

Mounting the Analyzer

The OXY5500 is manufactured for wall installations. Depending on your application and configuration, the analyzer will come mounted on a plate or Unistrut® (or equivalent) metal frame. Refer to the OXY5500 Operator's Manual (P/N 4900002239) or the layout diagrams provided with the purchased OXY5500 analyzer for detailed mounting dimensions.

Mounting brackets for equipment intended to be mounted on a wall and/or part/s that support heavy loads shall withstand four times the maximum static load.

When mounting the analyzer, be sure to position the instrument so that it is not difficult to operate adjacent devices. Allow 1 meter (three feet) of room in front of the analyzer and any switches.

It is critical to mount the analyzer so that the supply and return lines reach the supply and return connections on the chassis, while still maintaining flexibility, so that the sample lines are not under excessive stress.

Lifting/carrying the analyzer

At approximately 5.44 Kg (12 lbs) without sample conditioning system (SCS), the OXY5500 can easily be lifted from the packaging and moved to the installation location. Take care to lift or carry the analyzer by the enclosure and not by any ancillary probes or cables, or damage may occur.

If the analyzer is configured with an optional integrated sample conditioning system (SCS), two individuals may be required to lift and move the analyzer system. Refer to the OXY5500 SCS Overview Manual (P/N 4900002244) for more information.

Environmental Considerations

The analyzer should be mounted in an enclosure or, if outside, under a sun shade to prevent direct sunlight exposure.

The analyzer shall not be mounted more than 2,000 meters above sea level.

Opening/Closing the Analyzer Enclosure

***Hazardous voltage and risk of electric shock**. Failure to properly ground the analyzer may create a high-voltage shock hazard.*

Conduit seals or Ex e cable gland should be used where appropriate in compliance with local regulations.

Apply 20 in-lbs of torque on each bolt to ensure the door is closed properly to maintain required ingress protection.

Protective chassis and ground connections

Before applying any electrical signal or power, the protective and chassis grounds must be connected.

Protective ground

- The protective ground (AWG and mm2), routed with the phase and neutral wire, shall be equal or greater than the phase or neutral wires.
- The protective ground shall be connected in such a way that it is unlikely to be removed during servicing that does not require disconnection of the protective conductor.
- The protective ground is the first wire to be connected to the analyzer and the last one to be removed; its color can be either solid green or green/yellow.

Chassis ground

- The chassis wire must be at least 6mm^2.
- The chassis ground wire shall be connected to the rod or frame of the shelter as soon as the protective ground wire is connected to the instrument.

Electrical Wiring Requirements

Interconnection of the analyzer enclosure shall be accomplished using wiring methods approved for Class 1, Division 2 hazardous locations as per the Canadian Electrical Code (CEC) Appendix J and the National Electric Code (NEC) Article 501. The installer is responsible for complying with all local installation codes.

External Circuit Breaker Requirements

Because the breaker in the customer-provided power distribution panel or switch will be the primary means of disconnecting the power from the analyzer, the power distribution panel should be located in close proximity to the equipment and within easy reach of the operator, or within 10 feet of the analyzer.

The customer-provided circuit breaker must be marked as the disconnecting device for the analyzer. This switch or breaker shall not interrupt the protective earth conductor.

The electrical installation to which the analyzer is connected must be protected against transients. The protective device must be set at a level not exceeding 140% of the peak rated voltage values at the power supply terminals.

After installing all necessary conduit runs, make sure any remaining conduit hubs, if installed with the Analyzer (Module 1) enclosure, are CSA and/or UL Certified and rated Type 4X and/or IP66.

Thread lubricant must be applied on all conduit hub threaded connections. SpectraSensors recommends using STL8 lubricant on all conduit screw thread and it's taped openings.

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4 - Equipment Operation

This chapter provides an overview of safety operational instructions for the OXY5500.

Operating Controls

The OXY5500 analyzer is shipped with complete operational instructions and drawings. Refer to the **"Documents Provided with the OXY5500 Analyzer"** on page 1-1 to review the operational control instructions for the equipment.

Intermittent Operation

If the analyzer is to be stored or shut down for a short time period, follow the instructions for isolating the measurement cell and sample conditioning system (SCS).

To prepare, clean and decontaminate the analyzer for shipment or storage:

1. Shut off the process gas flow.
2. Allow all residual gas to dissipate from the lines.
3. Connect a purge supply, regulated to the specified sample supply pressure, to the sample supply port.
4. Confirm that any valves controlling the sample flow effluent to the low pressure flare or atmospheric vent are open.
5. Turn on the purge supply to purge the system and clear any residual process gases.
6. Turn off the purge supply.
7. Allow all residual gas to dissipate from the lines.
8. Close any valves controlling the sample flow effluent to the low pressure flare or atmospheric vent.
9. Disconnect power to the system.

Confirm the power source is disconnected at the switch or circuit breaker. Make sure the switch or breaker is in the "OFF" position and locked with a padlock.

10. Confirm all digital/analog signals are turned off at the location from which they are being monitored.
11. Disconnect all digital/analog wires from the system.
12. Disconnect the phase and neutral wires from the analyzer.

13. Disconnect the protective ground wire from the analyzer system.
14. Disconnect all tubing and signal connections.
15. Cap all inlets and outlets to prevent foreign material such as dust or water from entering the system).
16. Ensure the analyzer is free from dust, oils or any foreign material. Refer to "**Cleaning the Instrument**".
17. Pack the equipment in the original packaging in which it was shipped, if available. If the original packaging material is no longer available, the equipment should be adequately secured (to prevent excessive shock or vibration).
18. If returning the analyzer to the factory, complete the Decontamination Form provided by SpectraSensors **"Customer Service"** on page 5-2 and attach to the outside of the shipping package as instructed before shipping.

Cleaning the Instrument

The housing should be cleaned only with a moist cloth to avoid electro-static discharge.

The SMA-fiber connector of the sensor can be cleaned only with a lint-free cloth. The sensor tip may be rinsed only with distilled water or ethanol.

Never use benzene, acetone, alcohol or other organic solvents.

5 - Maintenance and Service

This chapter provides safety information related to maintenance and service of the OXY5500 analyzer.

Fuse Ratings and Characteristics

Use only the same type and rating of fuse for replacements. Refer to the specifications listed in Table 5–1.

Refer to Figure 5–1 for an illustration of the fuse enclosure. Instructions for replacing a fuse can be found in the OXY5500 Operator's Manual (P/N 4900002239).

Table 5–1 *Fuse specifications*

Description	Rating
Cartridge fuse, 216 Series, 5 x 20 mm, Fast Act	800 mA, 250V

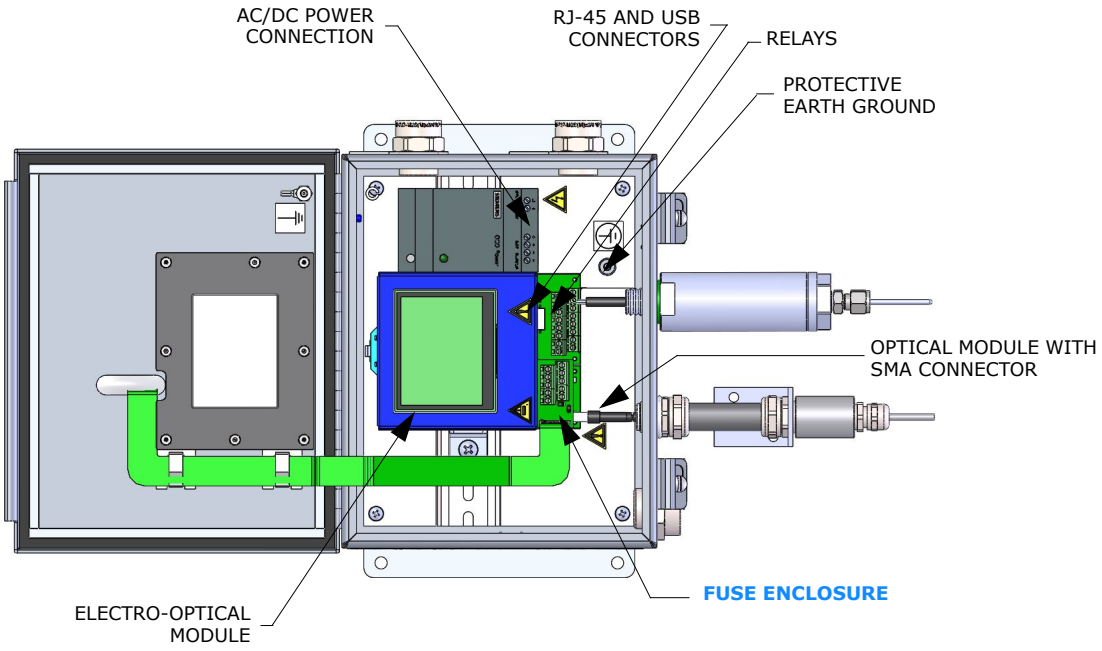

Figure 5–1 *Inside cabinet view - fuse location*

Service Contact

Technical and Customer Service and can be reached as follows:

Customer Service

4333 W Sam Houston Pkwy N, Suite 100
Houston, TX 77043-1223
United States of America

For SpectraSensors North America Service:

Phone: 1-800-619-2861, and press 2 for Technical Service
Fax: 1-713-856-6623
E-mail: service@spectrasensors.com
Hours: Service engineers are on duty Monday-Friday, 8:00 a.m. to 5:00 p.m. Central Time.

For SpectraSensors International Service, please contact the SpectraSensors distributor or the E+H Sales Center in your area, or contact:

Phone: +1-713-466-3172, and press 2 for Technical Service
Fax: +1-713-856-6623
E-mail: techsupport@spectrasensors.com

Before contacting Technical Service

Before contacting Technical Services, prepare the following information to send with your inquiry:

- Diagnostic downloads using the procedures provided in the associated firmware manual
- Contact information
- Description of the problem or questions

Access to the information above will greatly expedite our response to your technical request.

Appendix A: Specifications

Table A–1 *OXY5500 analyzer specifications*

Application Data			
Target Components	O_2		
Principle of Measurement	Fluorescent Quenching		
Typical Measurement Ranges	**OP-9** [1]	**OP-6** [1]	**OP-3** [1]
	0-200 ppmv (default) 0-10 to 10-1,000 ppmv [2] User setting	0-5% 0-1 to 0-5% User setting	0-50% 0-10 to 0-100% User setting
Lower Limit of Detection	0.5 ppmv	20 ppmv	300 ppmv
Accuracy at 20-25° C	±5% of Reading	±3% of Reading	±2% of Reading
Repeatability	±1% of Reading		
Measurement Update Time	Programmable Sampling Rate (default 30 seconds)		
Temperature Range	-4° to 140° F (-20° to 60° C)		
Sample Inlet Pressure	140-275 KPaG (20-40 PSIG) to sample panel regulator		
Sample Pressure Range	800-1400 mbara (standard)		
Maximum Probe Pressure	275 KPaG (40 PSIG), consult factory		
Sample Flow Rate	Typical 1.0 SLPM (2.1 scfh)		
Recommended Calibration	Two-point calibration in oxygen-free environment (Nitrogen) and a second span point (cylinder gas). Validate with O_2 in N_2 reference (cylinder gas).		
Electrical & Communications			
Input Power (Voltage and Max. Power)	100-240 VAC, 50/60 Hz or 9-36 VDC 5 Watts @ 24 VDC, 14 Watts @ 120 VAC, 22 Watts at 240 VAC		
Communication	**Analog**: Qty (2) 4-20mA outputs and (1) 4-20 mA input (sample pressure) **Fieldbus**: RS-232C, RS-485, Ethernet 10/100 with Modbus **Output Relays**: Qty (2) 250 mA max load (Concentration and Fault Alarms) USB 2.0 works with Service Software only 4 GB Internal Memory with Internal Data Logging		
LCD Display	Concentration, Temperature, Sample Rate, Data Logging, Diagnostics, plus Full Menu for Setup, Calibration, etc.		
Service Software	Windows software. Connect via USB port. Download data logs, trend and monitor, calibrate and troubleshoot.		

1. Analyzer ships with one sensor. Additional sensors are optional.
2. Accuracy specification applies to concentrations up to 300 ppmv.

Table A-1 *OXY5500 analyzer specifications (Continued)*

Physical	
Enclosure Type	NEMA Type 4X and IP66 rated, 304 and 316 (optional) Stainless Steel
Analyzer Dimensions	280 x 230 x 114 mm (11 x 9 x 4.5 inches) H X W x D (not including Sample Conditioning System)
Controller to Probe Cable Length	0.7 m - *Standard* 2.5 m and 5.0 m - *Optional*
Weight	2.2 Kg (4.9 lbs) (not including Sample Conditioning System)
Sample Probe Construction	316 Stainless Steel
Area Classification - Certification	**CSA**: Class 1, Div. 2, Groups A, B, C and D T4 **ATEX/IECEx**: II 3 G, Ex nA IIC T3 Gc IP66, LCIE 16 ATEX 1012 X, IECEx LCIE 16.0009 X CE

Probe assemblies and other such equipment required for analyzer operation must meet with all manufacturer specifications.

Technical Notes

- **Waterproof Enclosure**: The enclosure and fittings are designed for IP66/NEMA4X ratings. In order to maintain this rating, all connections must be made with proper hardware and adhering to suggested procedures. Use of incorrect materials can compromise the integrity of the environmental seals.

For a complete listing of new or updated certificates, please visit the product page at www.spectrasensors.com.

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