

Manual

4-20 mA Loop Powered two Wire Oxygen transmitter

OxyTran II




RO-SO2PMR



OxyTran II

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Warnings

This instrument conforms to DIN57411 part 1 / VDE 041 part 1 "protective measures for electronic measuring instruments" and has left the factory in faultless condition. To maintain this condition and to guarantee harmless operation of the instrument, the user has to observe all warnings and directives of the manual.

Interruption of the protective grounding line or loosening the ground connection inside or outside the instrument may lead to dangerous situations. Disconnecting the ground is prohibited.

Disconnect power whenever electronic service is required. Care should be taken when opening or removing parts of the instrument; connectors may be under tension. Service should be performed by authorized personnel only.

If proper operation is not possible anymore, the instrument has to be disconnected from all power lines and measures should be taken to prevent inadvertent operation.

Safe operation is not possible:

- When the instrument has been visibly damaged during shipping or installation
 - When the instrument does not function
 - after extended storage in unfavorable surroundings
-

Warranty

This equipment is sold subject to the mutual agreement that it is warranted by us free from defects of material and of construction, and that our liability shall be limited to replacing or repairing at our factory (without charge, except for transportation), or at customer plant at our option, any material or construction in which defects become apparent within one year from the date of shipment, except in cases where quotations or acknowledgements provide for a shorter period. Components manufactured by others bear the warranty of their manufacturer. This warranty does not cover defects caused by wear, accident, misuse, neglect or repairs other than those performed by Roscid Technologies or an authorized

service center. We assume no liability for direct or indirect damages of any kind and the purchaser by the acceptance of the equipment will assume all liability for any damage which may result from its use or misuse.

We reserve the right to employ any suitable material in the manufacture of Roscid's apparatus, and to make any alterations in the dimensions, shape or weight of any parts, in so far as such alterations do not adversely affect our warranty.

Important Notice

This instrument provides measurement readings to its user, and serves as a tool by which valuable data can be gathered. The information provided by the instrument may assist the user in eliminating potential hazards caused by his process; however, it is essential that all personnel involved in the use of the instrument or its interface, with the process being measured, be properly trained in the process itself, as well as all instrumentation related to it.

The safety of personnel is ultimately the responsibility of those who control process conditions. While this instrument may be able to provide early warning of imminent danger, it has no control over process conditions, and it can be misused. In particular, any alarm or control systems installed must be tested and understood, both as to how they operate and as to how they can be defeated. Any safeguards required such as locks, labels, or redundancy, must be provided by the user or specifically requested of Roscid Technologies at the time the order is placed.

Therefore, the purchaser must be aware of the hazardous process conditions. The purchaser is responsible for the training of personnel, for providing hazard warning methods and instrumentation per the appropriate standards, and for ensuring that hazard warning devices and instrumentation are maintained and operated properly.

Roscid Technologies, the manufacturer of this instrument, cannot accept responsibility for conditions beyond its knowledge and control.

No statement expressed or implied by this document or any information disseminated by the manufacturer or its agents, is to be construed as a warranty of adequate safety control under the user's process conditions.

Oxygen-Transmitter

OxyTrans

(ROSCID TECHNOLOGIES 2016)

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Appendix

1. Introduction

1.1 Overview

The analyzer is segmented in two systems:

1. Unit of analysis with electro-chemical micro fuel sensor
2. Unit of interpretation with electronic signal treatment, display and analog Output

The analyzer unit is working to transporting the measuring gas to the sensor membrane of micro fuel sensor. The micro fuel sensor is an electro-chemical and galvanic cell which is transforming the oxygen in measuring gas into an electrical current.

The Electronic is using the electronically signal of the sensor and transforming this signal in a concentration value and an analog signal.

1.2 Micro fuel sensor

The oxygen sensor used in the Model OxyTran II is a Micro-Fuel Cell designed and manufactured by Al Instruments. It is a sealed plastic disposable electrochemical transducer.

The active components of the Micro-Fuel Cell are a cathode, an anode, and the 15% aqueous KOH electrolyte in which they are immersed. The cell converts the energy from a chemical reaction into an electrical current in an external electrical circuit. Its action is similar to that of a battery.

There is, however, an important difference in the operation of a battery as compared to the Micro-Fuel Cell: In the battery, all reactants are stored within the cell, whereas in the Micro-Fuel Cell, one of the reactants (oxygen) comes from outside the device as a constituent of the sample gas being analyzed. The Micro-Fuel Cell is therefore a hybrid between a battery and a true fuel cell. (All of the reactants are stored externally in a true fuel cell.)

1.3 The Effect of Pressure

In order to state the amount of oxygen present in the sample in parts-per-million or a percentage of the gas mixture, it is necessary that the sample diffuse into the cell under constant pressure (Dalton's Law).

If the total pressure increases, the rate that oxygen reaches the cathode through the diffusing membrane will also increase. The electron transfer, and therefore the external current, will increase, even though the oxygen concentration of the sample has not changed.

It is therefore important that the sample pressure at the fuel cell (usually vent pressure) remain relatively constant between calibrations.

1.4. Calibration Characteristics

Given that the total pressure of the sample gas on the surface of the Micro-Fuel Cell input is constant, a convenient characteristic of the cell is that the current produced in an external circuit is directly proportional to the rate at which oxygen molecules reach the cathode, and this rate is directly proportional to the concentration of oxygen in the gaseous mixture. In other words, it has a linear characteristic curve, as shown in Figure 1-1. Measuring circuits do not have to compensate for nonlinearities. In addition, since there is zero output in the absence of oxygen, the characteristic curve has close to an absolute zero (within ± 1 ppm oxygen). In practical application, zeroing may still be used to compensate for the combined zero offsets of the cell and the electronics. (The electronics is zeroed automatically when the instrument power is turned on.)

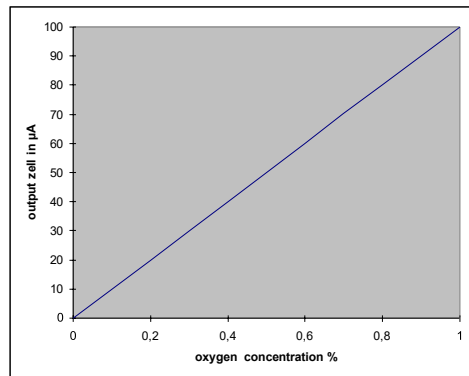


Figure 1-1. Characteristic Input/Output Curve for a Micro-Fuel Cell

2. Operation

2.1. Installation

The installation of the transmitter is very simple.

Mounting

The mounting can be made with the delivered Mounting Kit. For the first use the holding plate and fix it on the wall or any place on your mounting rack. Putt the pipe clip trough the long holes on the side of the holding plate and fix the cell housing with it. Show Figure 1.

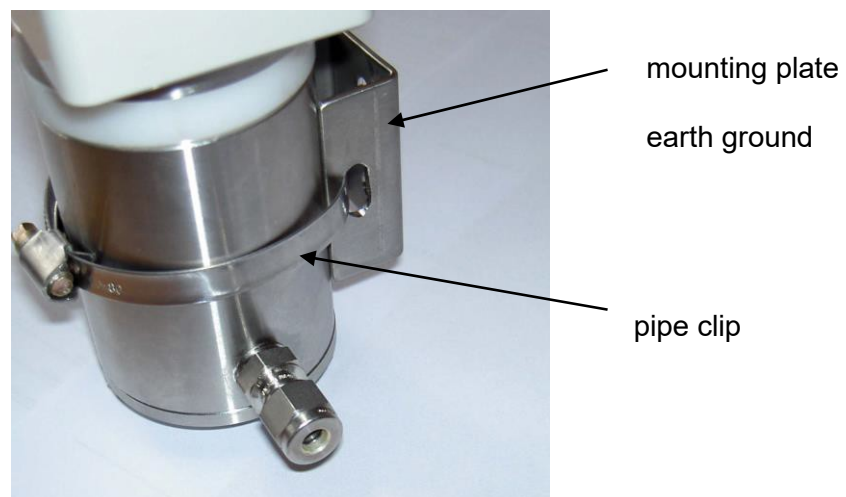


Figure 1

Connect the Transmitter with a sampling line (1/4" tube) to the fittings on the transmitter and adjust the flow between 0.5 and 1 L/min.

NOTE: Important mounting instructions: Units must be mounted horizontally at all time or measurement can be inconsistent.

Make the electrical connections as follow (Figure 2):

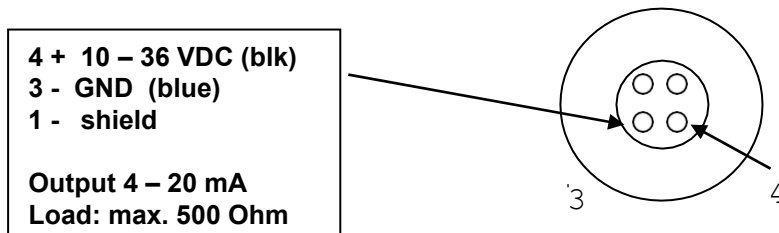


Figure 2

After power on, the display will show a value

Electrical Connections for explosion proofed OxyTrans

The Oxygen Transmitter OxyTrans needs two electrical Connections.

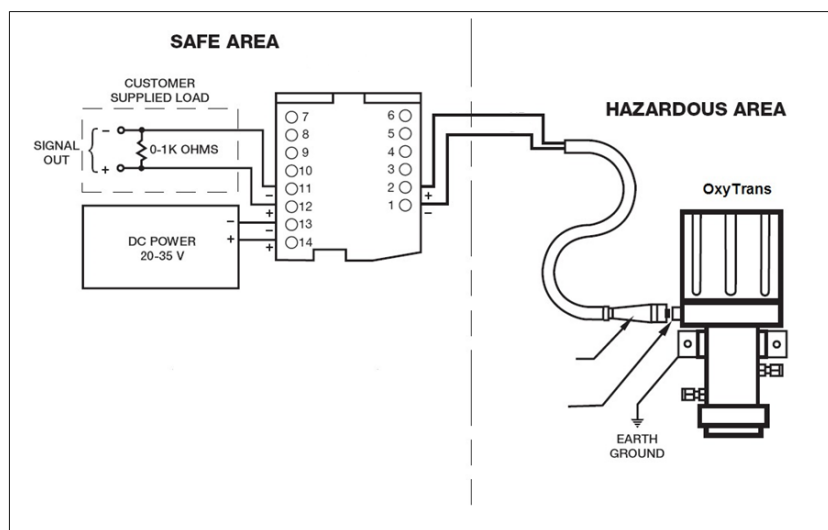
- 1) Chassis ground connection should made by the mounting bracket (Screw) of the transmitter. This is required to reduce the sensitivity to radio frequency interference (RFI). An adequate ground connection is can be established by mounting on a metal gas tubing. The connection is necessary to reduce electrostatic problems.
- 2) The signal and power are supplied by a single 4 Pin electrical connector on the right side. The Transmitter is supplied with a 1.5m long connection cable with two wires (shield is available if needed). Other cable lengths are available. The power supply is 12 – 30 VDC. Connect the Transmitter has to be connected to a repeater (for example: Pepperl

Fuchs: KCD2-STC-1 (202927)). Any transmitter that meets the following data's is

valid: $U = 28V$, $R = 300 \text{ Ohm}$, $U_m = 250V \text{ eff or GS}$

Values: $U_i = 28V$, $I_i = 93mA$, $C_i = 14 \text{ nF}$, $L_i = 1,5 \text{ mH}$, $P_i = 700mW$

Temperature Range: $+5^\circ\text{C}$ to $+50^\circ\text{C}$



For any installation in a hazardous areas, it is necessary to use the recommendations of the DIN standard. Disconnecting or connecting of the unit under Voltage should be avoided. Recommend using an IS barrier by Pepperl Fuchs: KCD2-STC-1 (202927)

2.1.2. Split Version

connect the plug to the cable port on the transmitter.

2.2 Insertion of a new measurement cell

Attention: Please don't touch sensor membrane. The surface has a small Teflon membrane which can be destroyed by contact. The sensor has to be exchanged if there is a destroyed surface of Teflon membrane.

By installation of new micro fuel cell make the following:

1. Shut off the unit
2. Screw off the wing nut from the cell block. Please be carefully that you don't shift or destroy the O-Ring.
3. Take the new micro fuel cell out of the package
4. Please be careful by putting the cell of the center off the cell block bottom (the sensor membrane wall will be below)
5. Push the cell together with the cell bottom in the cell block (contact surface will be on the top) and screw on the wing nut.

Attention: The cover will be fit only in one direction!

6. Please restart the equipment and rinse the sampling system with gas (nitrogen) immediately.

Note: before you will read a plausible value, the cell has to run for some hours on nitrogen or your measuring gas



Enclosure with KF40 Flange

to install a new sensor, perform the following steps:

1. turn off the unit
2. unscrew the plastic ring from the cell housing
3. take the new sensor out of the bag.
4. insert the new sensor into the cell housing with the contact rings to the two exposed contacts
5. screw the plastic ring into the housing to hold the cell in place



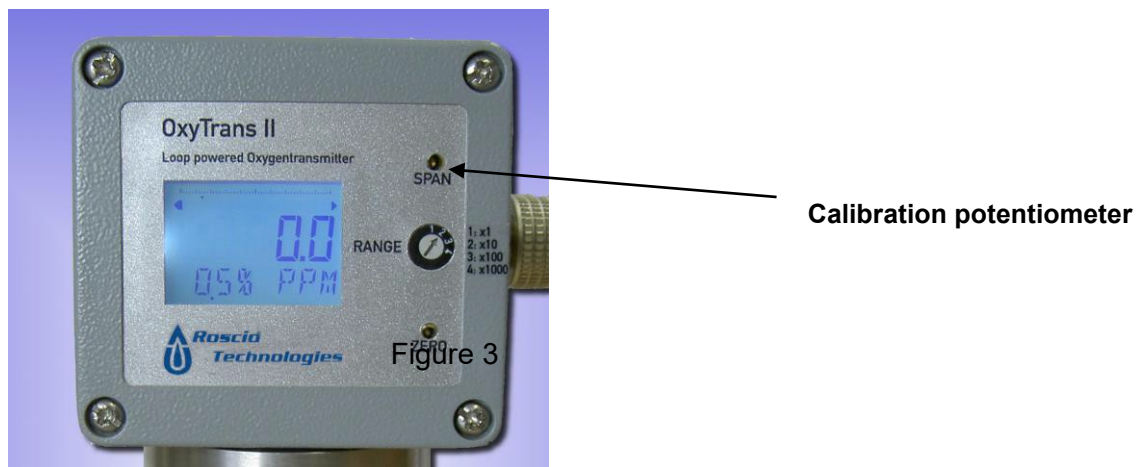
Install the unit in to your box – turn it on and purge it with purging gas (nitrogen or measuring gas).

Warning: the new sensor needs to be purged for a couple of hours or until the reading is stable before making any adjustments.

2.3 Display

The Display shows you the current oxygen value. On the Top of the display you will see a bar graph which symbolized the analog Signal. (Figure 3).

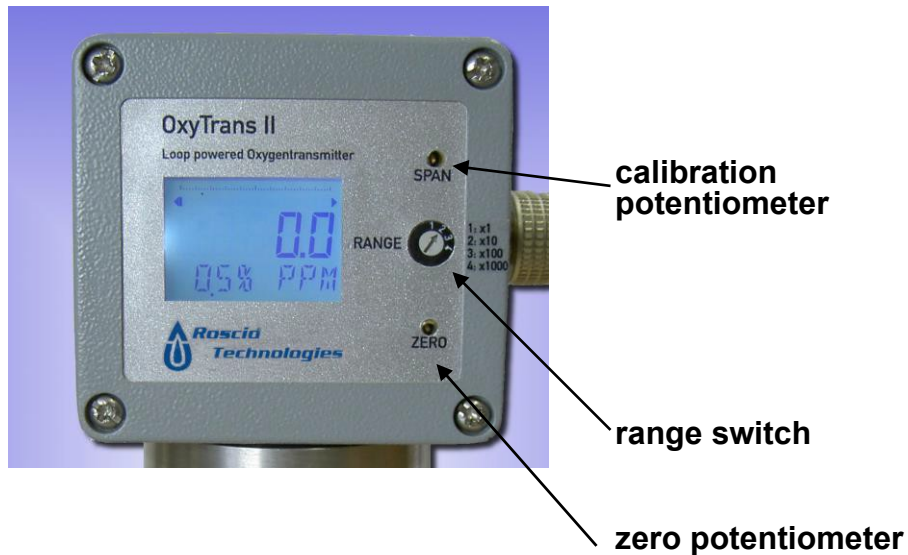
The Display shows you up to the tenfold value of the adjusted mA output (example: analogue Output: 0-100 ppm; Display 0 – 1000 ppm).



2. 4. Range Switch

The Oxygen transmitter at ppm Range has 4 Ranges (0-10, 0-100, 0-1000 and 0 – 10000 ppm) and in % range 3 Measuring ranges (0-0,25 ;0 – 2,5 und 0 – 25%) You can change the ranges with the switch on the front of the transmitter (picture 4). The values in the display has to multiplied with factors that be written on the right side next to the switch.

example.: display „ **8.5**“in range x 10 is 85 ppm and so on. The analog signal on the output is switching with the range.



2. 5. Calibration

The calibration of the Instrument is very simple. You need a calibration gas or Air (only for the % ranges). Select a Calibration gas which is equivalent to your measuring range, for example: in Range 0 – 100 ppm use approx. 40 -50 ppm O₂ in N₂. Please make sure that the pressure during the calibration is approximately the same as the process.

To calibrate the equipment please conduct following tasks:

1. Remove the cover (if applicable) over the Cal Potentiometer. (Figure 3).
2. Connect the Calibration gas with cell and purge the measuring cell with it.
3. The display will show you the current value.
4. Wait until the value is stable. Give the unit some time for that. A good calibration is very important for an accurate measurement. The unit needs more time for stabilizing at lower concentration values than higher values.
5. If the value is stable, adjust the potentiometer with a small screwdriver until the unit shows the correct value matching the NIST traceable gas.
6. If applicable, place the cover over the cal potentiometer

Note: we recommend frequent calibrations if accuracy or the process oxygen is varying.

3. Maintenance

3.1. Out of service

When the analyzer is out of service for more than 12 hours the following steps need to be executed:

Please make sure that the measurement cell is closed. No oxygen from outside or gas pipeline with air should be in contact with measurement cell.

After Restarting of the equipment please purge the sampling system with nitrogen and restart with calibration of the equipment.

3.2 Cell Replacement



THE SENSOR USED IN THE ANALYZER USES ELECTROLYTES WHICH CONTAIN TOXIC SUBSTANCES, MAINLY LEAD AND POTASSIUM HYDROXIDE, THAT CAN BE HARMFUL IF TOUCHED, SWALLOWED, OR INHALED. AVOID CONTACT WITH ANY FLUID OR POWDER IN OR AROUND THE UNIT. WHAT MAY APPEAR TO BE PLAIN WATER COULD CONTAIN ONE OF THESE TOXIC SUBSTANCES. IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH EYES WITH WATER FOR AT LEAST 15 MINUTES. CALL PHYSICIAN. (SEE APPENDIX, MATERIAL SAFETY DATA SHEET.)

CAUTION: Do not disturb the integrity of the cell package until the cell is to actually be used. If the cell package is punctured and air is permitted to enter, the cell will require an excessively long time to reach zero after installation (1-2 weeks!).

3.2.1 When to Replace a Cell

The characteristics of the Micro-Fuel Cell show an almost constant output throughout its useful life and then fall off sharply towards zero at the end.

Before replacing the cell:

- a. Check your span gas to make sure it is within specifications.
- b. Check for leaks downstream from the cell, where oxygen may be leaking into the system.
- c. is the response time of the transmitter very slow?

If there are no leaks and the span gas is OK, replace the cell.

3.2.2 Storing and Handling Replacement Cells

To have a replacement cell available when it is needed, we recommend that one spare cell be purchased 9-10 months after commissioning the

Oxytran, or shortly before the end of the cell's one-year warranty period.

CAUTION: Do not stock the replacement fuels cells for longer than 6 months. The warranty period starts on the day of shipment.

The spare cell should be carefully stored in an area that is not subject to large variations in ambient temperature (75 °F nominal).

3.2.3 Removing the measurement cell

The micro fuel cell is housed in the cell block. To take out a defected or unusable cell please make the following tasks:

1. Shut off the unit
2. screw off the wing nut from the cell block
3. Please remove carefully the bottom of the cell block with the cell
4. Take the cell carefully from the bottom. Please don't touch the sensor surface.
5. Please dispose of cells in accordance with approved legislation.

3.2.4 Insertion of a new measurement cell

Attention: Please don't touch the sensor membrane. The surface has a small Teflon membrane which can be destroyed by contact. The sensor has to be exchange if the surface of Teflon membrane is damage.

To install a new replacement micro fuel cell, do the following:
If this is not your 1st time replacing the fuel cell, please refer to section 3.2.3.

1. Shut off the unit
2. Take the new micro fuel cell out of the package
3. Unscrew the wing nuts from the cell block. Please be carefully that you don't shift or destroy the O-Ring.
4. Please be careful by putting the cell in the center off the cell block (the sensor membrane wall will face down)
5. Push the cell together with the cell bottom in the cell block (contact surface will be on the top) and refasten the wing nuts.

Attention: The cover will only fit a certain way

6. Please restart the equipment and purge the sampling system with gas (nitrogen) immediately.

3.2.5 Cell Warranty

The Micro Fuel Cell is used in the Model OxyTrans.
With regard to spare cells, warranty period begins on the date of shipment.
The customer should purchase only one spare cell.
Do not attempt to stockpile spare cells.

The normal cells are not designed for applications where CO₂ is a major component in the sample, however concentrations of 1,000 ppm or less will not adversely affect the cell performance. Consult us for available options for either intermittent or continuous CO₂ exposure.

If a cell was working satisfactorily, but ceases to function before the warranty period expires, the customer will receive credit toward the purchase of a new cell.

If you have a warranty claim, you must return the cell in question to the factory for evaluation. If it is determined that failure is due to faulty workmanship or material, the cell will be replaced at no cost to you.

Note: Evidence of damage due to tampering or mishandling will render the cell warranty null and void.

3.3 Troubleshooting

Erratic readings of the Oxygen concentration as reported by the analyzer.

Possible Cause:

- 1.) The analyzer may have been calibrated incorrectly
- 2.) Leakage in the System
- 3.) Atmospheric Oxygen may be diffusing in through the vent
- 4.) Unstable pressure
- 5.) Defective Micro Fuel cell

Solutions:

- 1.) Turn the analyzer off, then back on again. Now proceed to calibrate and zero the analyzer.
- 2.) Check the Sample and Calibration Gas In- and Outlets for leaks

and make sure that the fittings are tight.

- 3) Increase flow rate and/or length or vent tubing so there is no back diffusion of outside oxygen.
- 4.) Please make sure that the measurement gas pressure will be stable. The measurement cell is a pressure sensitive medium and the operation has to be under atmospheric conditions. Changes of the operation pressure will have measurement value deviations as result. In the worst case the measurement cell will be destroyed. Use an adjustable pressure reducer on the measurement gas inlet. Please make sure that the measurement gas outlet is open and there is no pressure (atmospheric).
- 5.) If this step makes no solutions replace the sensor

3. 4. Cleaning of measure cell blocks

If you have a reason to clean the cell block, you can clean this very carefully with a cloth. Don't break the golden spring contacts which are inside. If you have a very big contamination inside the block send the unit to Roscid for cleaning because the electronics has to be remounted.

