Roscid Technologies

Manual

4-20 mA Loop Powered two Wire Oxygen transmitter

O2 Tracer-R- DIS

O2Tracer

Manufactured by
Roscid Technologies, Inc.
215 Salem St
Suite L
Woburn, MA 01801
Phone: (781)933-4007
www.roscid.com
Rev G..00

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 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 our 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. Roscid will reserve judgment on whether a unit is in warranty once it is received back from the end-user at the end user shipping expense

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

O2Tracer/O2 Tracer-R-DIS

Contents:

1. Introduction

1.1 Overview

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.

1.2 Micro fuel sensor

The oxygen sensor used in the Model O2Tracer is a Micro-Fuel Cell. It is a sealed plastic disposable electrochemical transducer.
The active components of the Micro-Fuel Cell are a cathode, an anode, and 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 mix-ture. 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 oxygen, the characteristic curve has close to an absolute zero (within ± 1 ppm oxygen). In practical application, zeroing may still 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.)

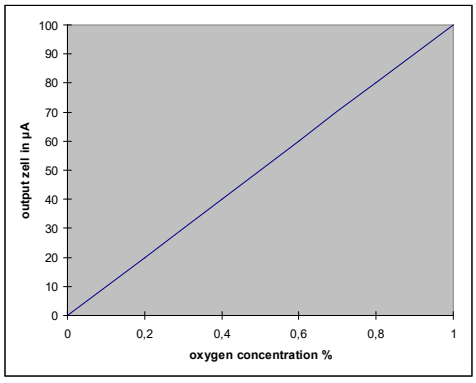


Figure 1-1. Characteristic Input/Output Curve for a Micro-Fuel Cell

2. Operation

2.1. Installation

The installation of the transmitter is very simple.

Mounting

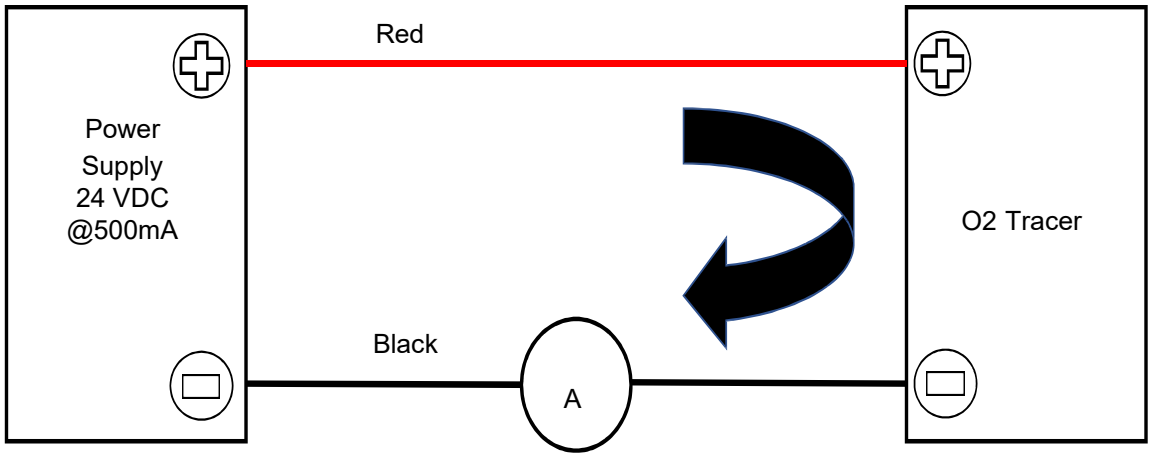
The mounting can be made with 2 screws when you open up the enclosure. Show Figure 1.

Figure 1

Connect the Transmitter with the both fittings on your sample line and adjust a flow between 0.5 and 1 L/min.

NOTE: Anytime mounting the cell holder with horizontal pipefitting, remove cover on the top or you will not get a reliable measurement.

Wiring Diagram-O2 Tracer



Iout (4-20mA)

2.2 Changing of the measurement cell

Attention: Please don’t touch sensor membrane. The surface has a small Teflon membrane which can be destroyed by contact (finger oils). The sensor has to be exchange if there is a contaminant on the surface of Teflon membrane.

By installation of new micro fuel cell make the following:

1. Power the unit down (OFF)
2. Screw the cover with the four screws on the top of. Please be careful with the O-Ring inside the cover.
3. Remove the cell holder (Figure 3). Remove the screws from the PCB, unplug the white connector with the yellow and green wire from the cell. Remove the old cell as needed,
4. Take the new micro fuel cell out of the package
5. Install the sensor the same as the old way

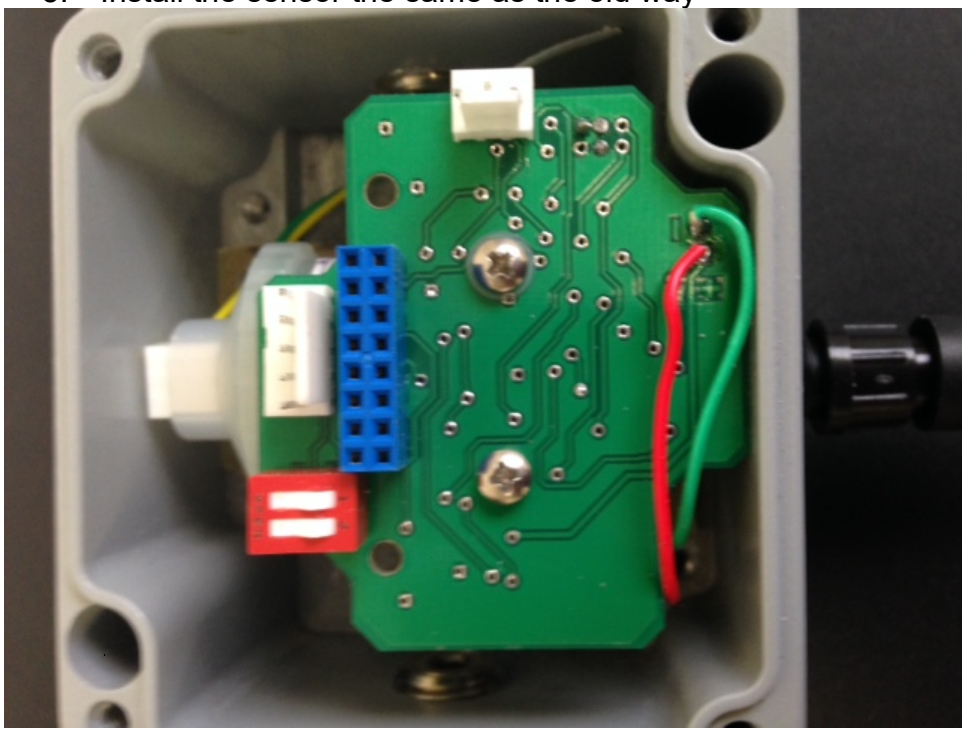


Figure 3

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

6. Please purge the sampling system with gas preferably room O2.

Please note: when you reinstall the Cover it will be fit only in this direction. Make sure that no cable will be squeezed/pinched between the cover or the cell holder and electronic.

2. 3. Calibration

Procedure, Calibration, O2 Tracer Series

Introduction:

The O2 Tracer Series measures the Partial Pressure of Oxygen in a sample gas. Typically, The device monitors the Ambient environment, and has been calibrated for 20.95% O2 at Sea Level Pressure. The Oxygen measuring cell has a Voltage (mVolt) output that is linear with the partial Pressure of Oxygen in the measured sample. Additionally, the Cell outputs no Voltage in the absence of Oxygen in the Sample gas.

Factory Calibration:

NOTE: this calibration is done for correction of the Displayed Value only, the 4-20 mA. Loop current is calibrated in a separate procedure.

The procedure for Factory calibration involves Zeroing the measured output with a short-circuit in place of the O2 Cell. The Cell is then re-installed, and exposed to ambient air, regulated to 1013 mb. (14.69 PSIA) absolute Pressure. There are no hardware (Potentiometer) adjustments, the procedure is done using the installed calibration Software. The Zero Calibration is then verified by 100% Nitogen Purge of the O2 Tracer sample chamber.

Indications for Re-calibration:

The majority of cases in which field calibration is desirable is when the Sample pressure differs significantly from 1013 mb. The displayed %O2 value will correspond to:

$$\%O2_{DISPLAYED} = \%O2_{MEAS} * P_{SAMPLE}./1013\ mb. \quad (1)$$

As an example, if sampling at an altitude of 1 mile (Denver?):

$$\%O2_{DISPLAYED} = 20.95\% * 834/1013 = 17.25\%$$

Other conditions for which field calibration may be advantageous is when measured % O2 is typically significantly different from the 21% reference calibration.

Field Calibration:

The Majority of Field calibrations require adjustment of the Signal Span only. The simplest method is to calibrate the Span to the local ambient environment. Calibration to other than ambient will require additional steps and precautions.

Tools Required:

To establish communications with the O2 Tracer, a special (Female DB9 to 3 pin, .1" Center "Molex" –style connector) cable is required. Since the majority of Computers no longer have a serial Port available, an USB to Serial Converter is usually required. Several Programs to configure a "dumb Terminal", i.e. Hyperterminal, Teratem, Xterm, etc. are available at little or no cost. Contact Roscid Technologies for assistance for above. Also required is a 24 VDC power source.

To access the O2 Serial port, Remove the (4) Cover screws. The 3 pin connector is located at right edge of exposed PCB. On the computer, if not already present, install the USB to Serial Converter, as well as the terminal program. Open up a terminal session, and set the Comm port:

BAUD RATE	19.2K
DATA BITS	8
STOP BITS	1
PARITY	NONE
CONTROL	NONE

Calibrating to Ambient (20.95% O2) environment

NOTE: WHEN MEASUREMENT IS CONFIGURED AS %OXYGEN,THE SPAN CALIBRATION IS FORCED TO 20.95%. Calibration to other values is possible, described further in the text.

Connect 3-pin cable Connector to 3 pin PCB header. C onnect the DB9 connectors. Apply 24 VDC power to the O2 Tracer. Data should now be present on terminal screen (Fig. 1). Allow the O2 Tracer to stabilize fully, 10-20 minutes) at the desired Ambient
conditions.

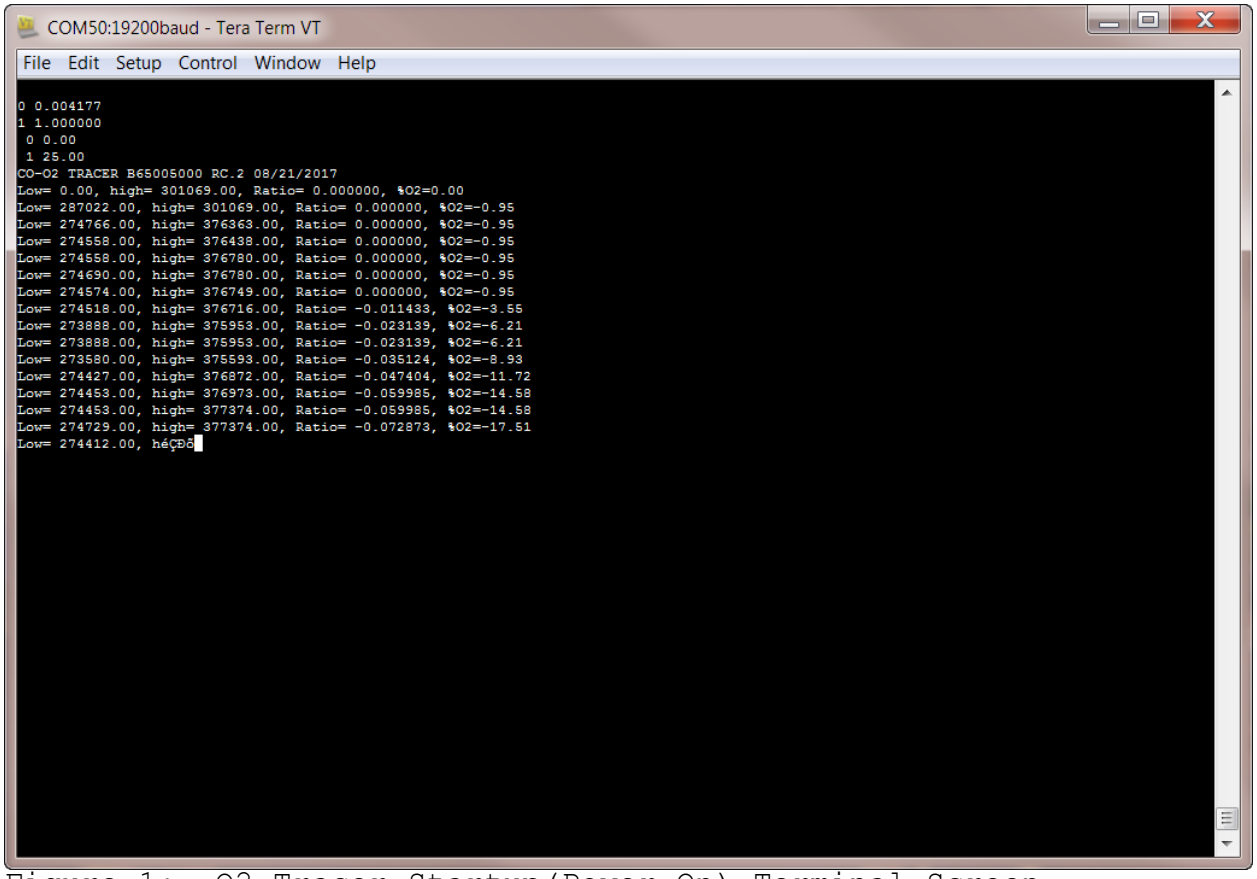


Figure 1: O2 Tracer Startup(Power On) Terminal Screen.

When the output has stabilized, begin Calibration by inputting <ESC> (Fig. 2).

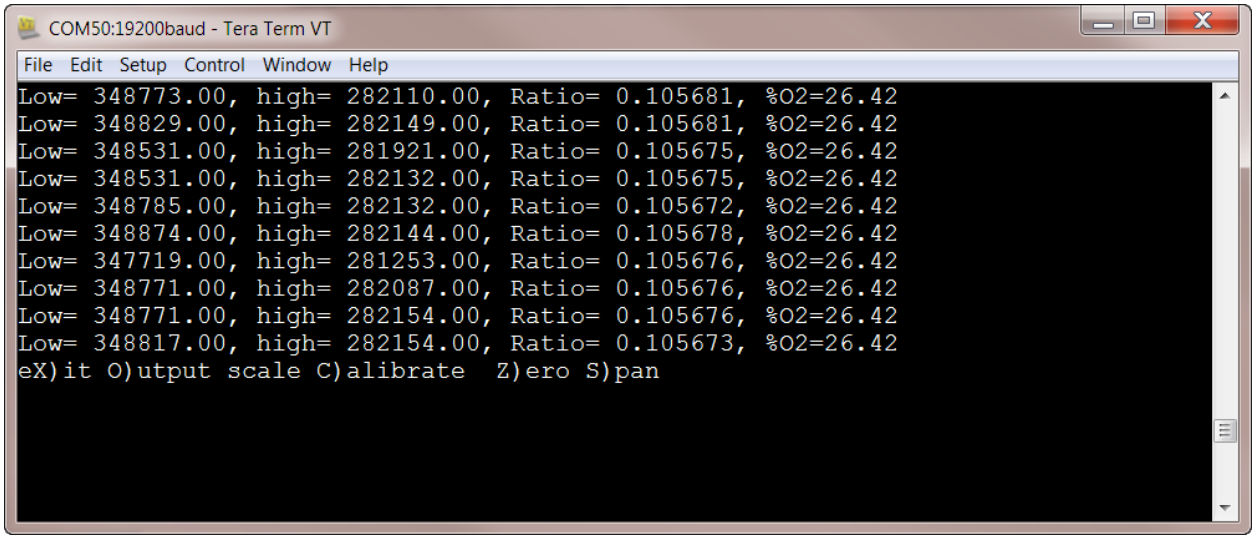


Figure 2: Main menu, after <ESC> Key entered.

Enter <C>, Note: input characters ARE case sensitive!

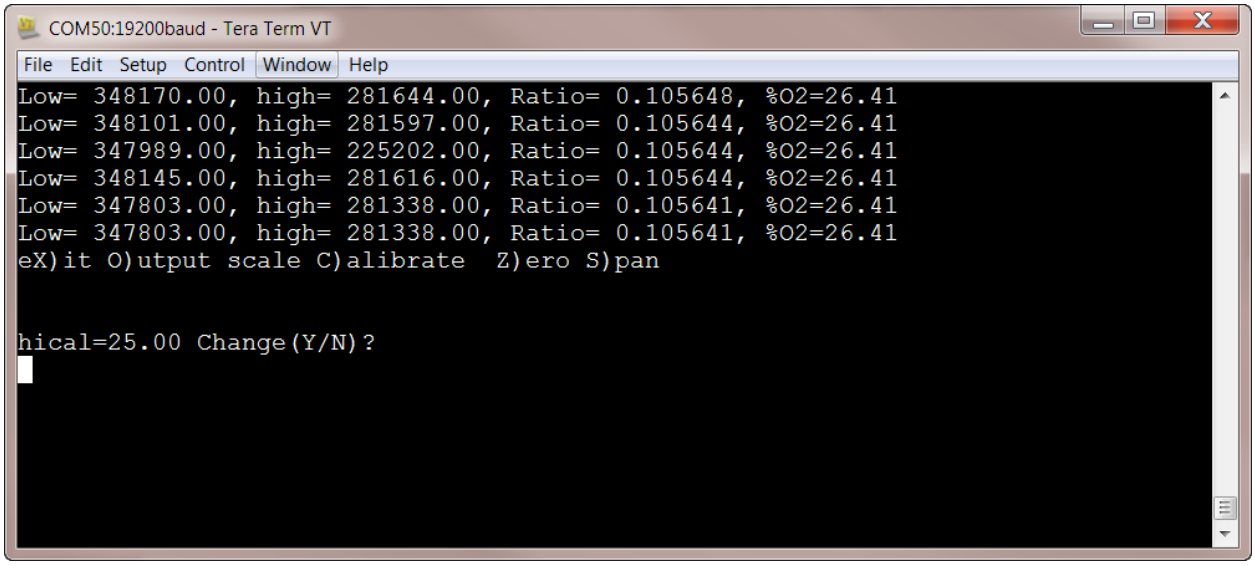


Figure 3: Span Point Calibration Value, IGNORED when %O2 configured

Enter <N>, Value is ignored .

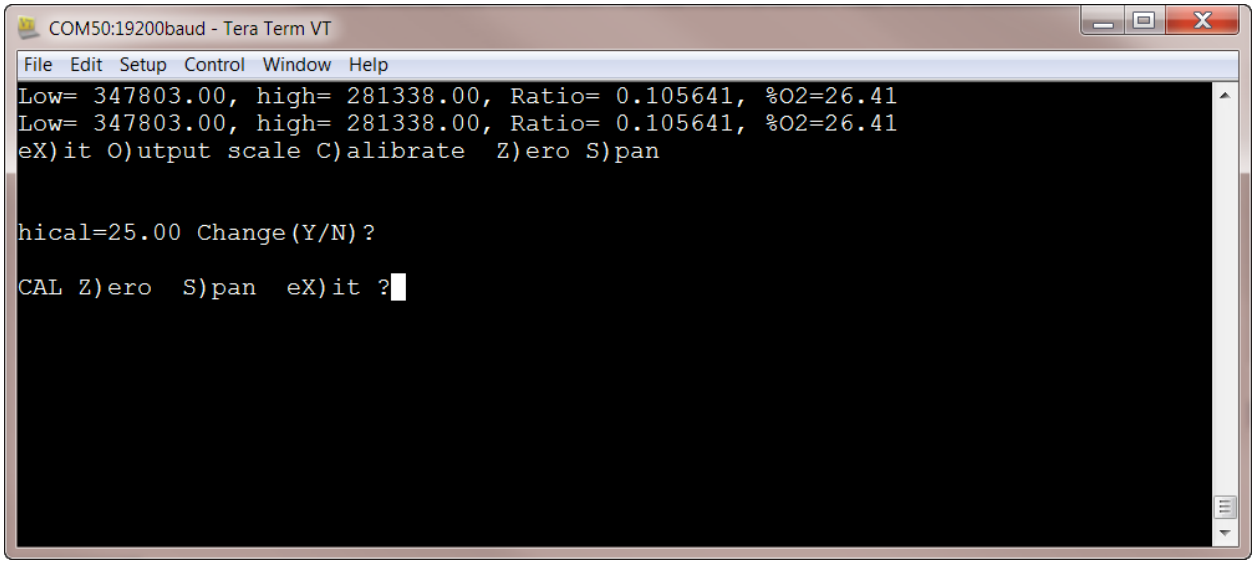


Figure 4: Calibration Choices

Enter <S>, then <X>. See Figure 5.

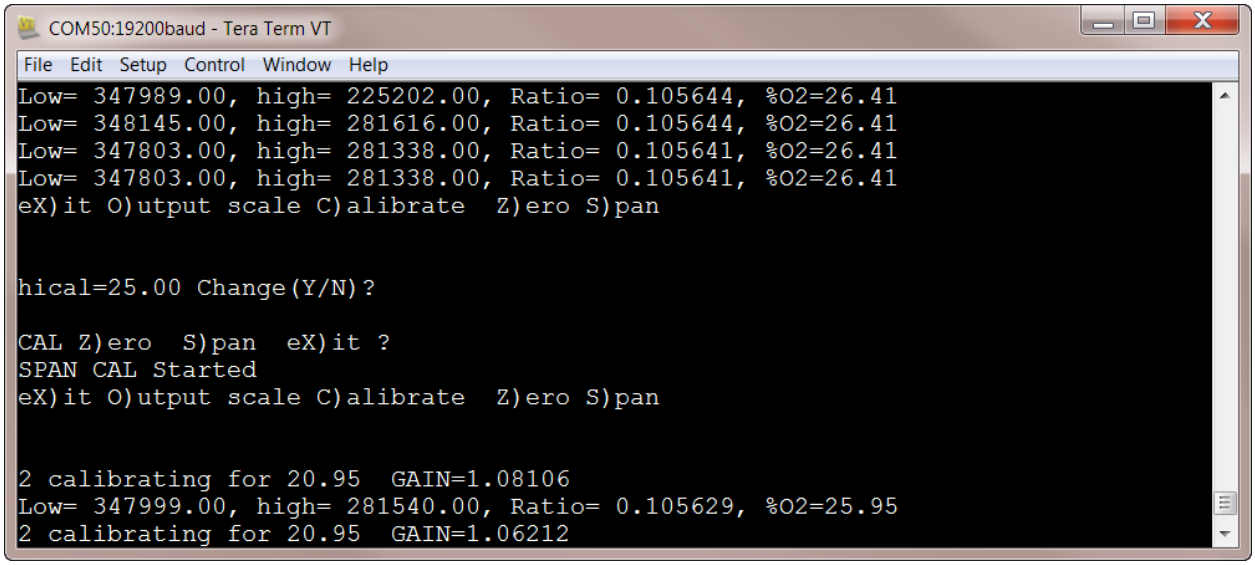


Figure 5: Data stream indicating Calibration in progress

Allow this state to continue for Several minutes, until readings are stable at 20 .95% O2. Re-enter <ESC> key.

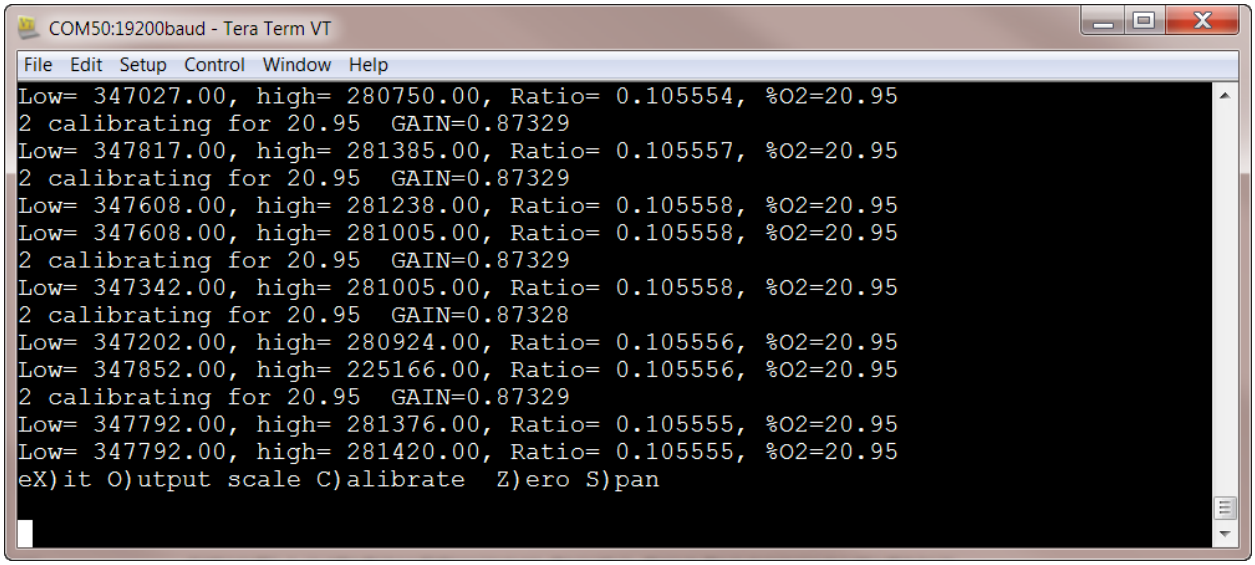


Figure 6: <ESC> Key , Readings Stable

Enter the following: <C> <N> <X>. The screen Should now be paused at the Save prompt.

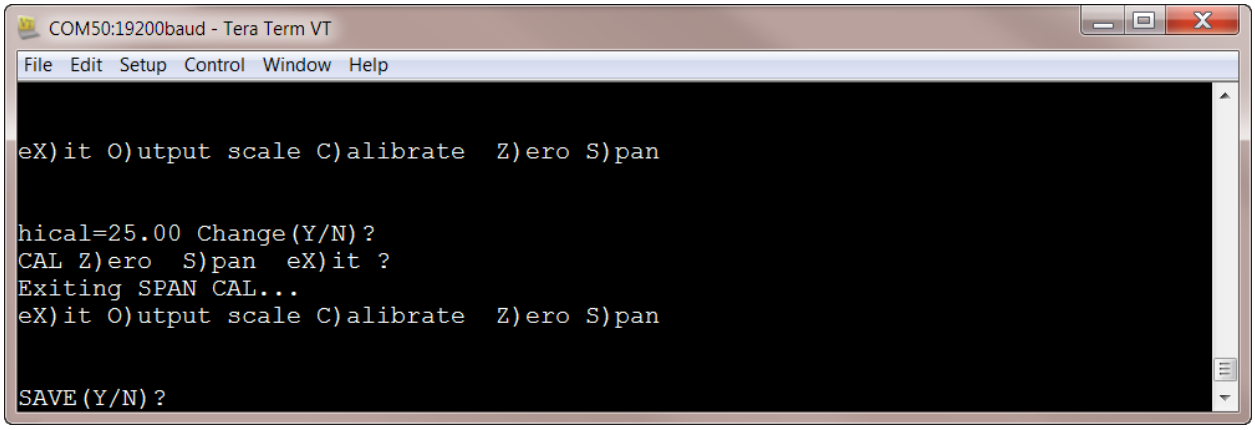


Figure 7: Save prompt for retaining calibration

If satisfied with Results, Enter <Y>.

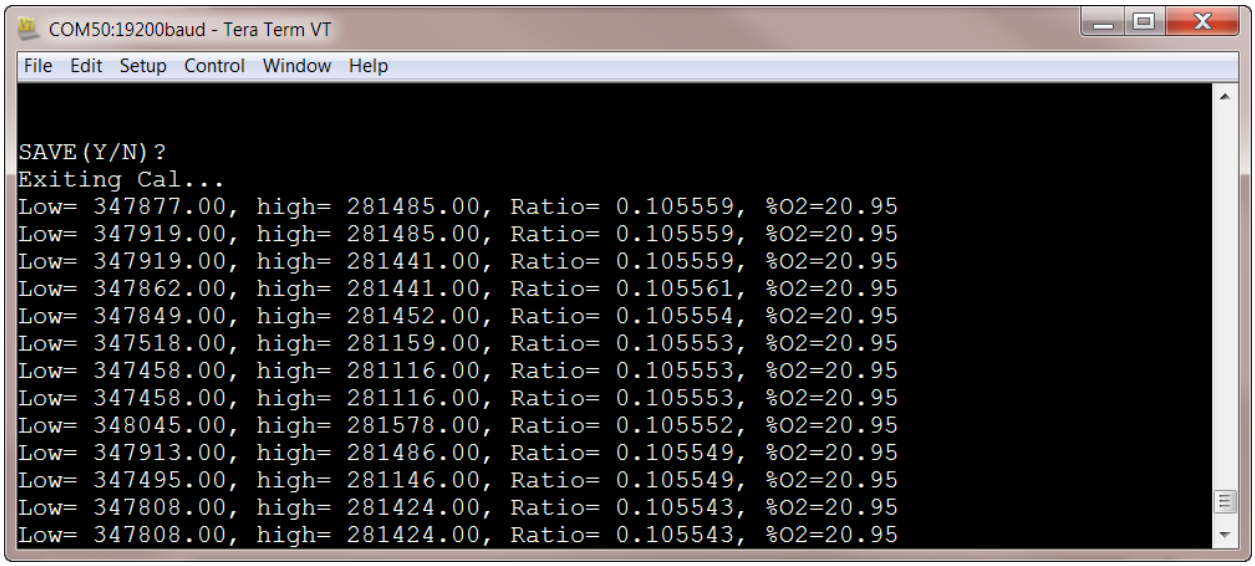
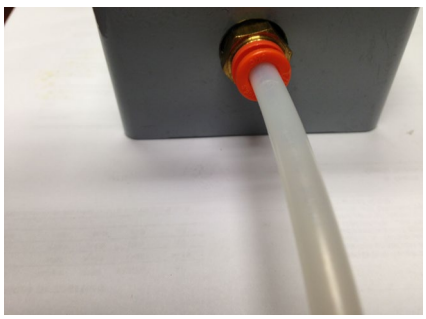
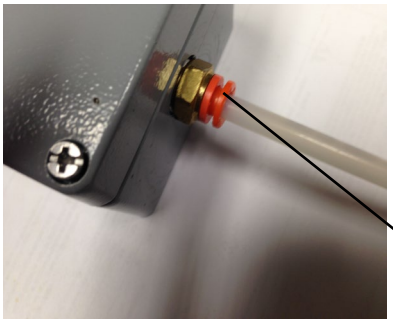


Figure 8: Span Calibration Completed.

2.4 Gas Line connection to O2 Tracer

1) Use a ¼” tube and slide into fitting until secure (see picture below), if compression fittings insert tube , hand tighten and then use a wrench and tighten a quarter turn.





2.5 Mounting Unit

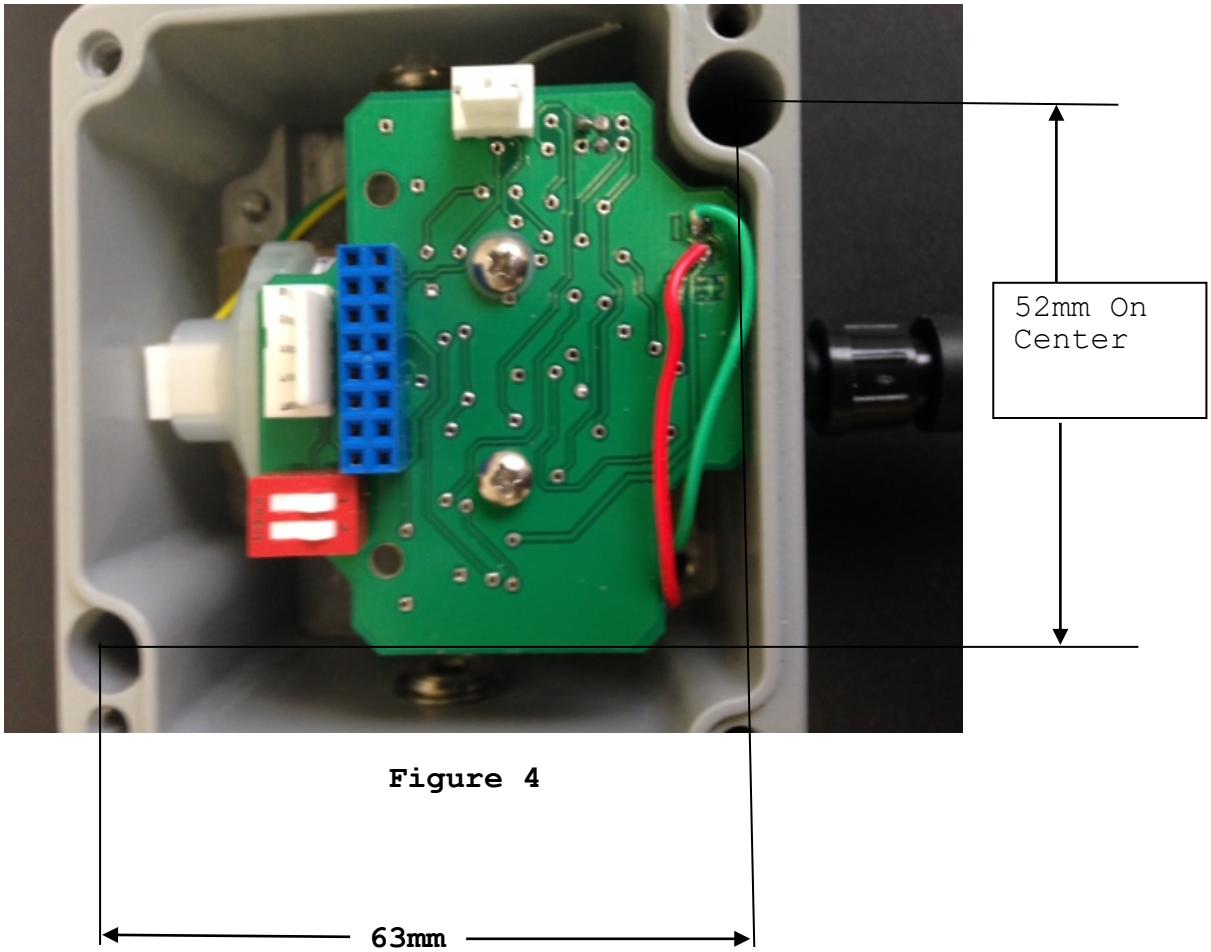


Figure 4

1) Use two #10 sheet/wood screws to mount unit or use a 5 cm square of a heavy-duty Velcro and place it on the back of the unit and the other adhesive part of the Velcro to the mounting area

3. Maintenance

3.1. Out off service

When the analyzer is put 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. This will help prolong the operating life of the sensor.

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

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 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 (dry down) 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 of its operating life

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 slowly

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 O2 trace, or shortly before the end of the cell's one year warranty period.

CAUTION: Do not stockpile cells. 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) or to rough handling.

3.2.3 Cell Warranty

The Micro Fuel Cell is used in the Model O2Tracer.
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 CO_2 is a major component in the sample gas 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 CO_2 exposure.

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 in an inaccurate fashion.
2.) Leakage in the System
3.) Atmospheric Oxygen may be diffusing in through the vent
4.) Unstable pressure
5.) Defect Micro Fuel cell

Solutions:

1.) Turn the analyzer off, then back on again. Now proceed to carefully recalibrate the analyzer.

2.) Check the Sample and Calibration gas In - and Outlets for leaks and make sure the fittings are tight.

3) Increase flow rate and/or length or vent tubing in order to secure there is no back flow to the sensor.

4.) Please make sure that the measurement gas pressure will be stable. The measurement cell is a pressure sensitive medium and the operation have to be under atmospherically conditions. Changes on 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 the above steps do not help resolve the operation issues, the cell might need to be replace

Specification

Measuring range	: 0-25 % O_2.
Calibration	: using room air at 20.9%
Accuracy	: +/- 2% FSD (T= const.) +/- 5% FSD Over the full temperature range
Response time	: 90 % of FSD at 25°C in < 15 s
Flow rate	: 0.5-1L/M
Operating Temperature	: 0 - 50°C
Sample pressure	: 0.1 - 1 barg

Output signal	: 4 -20 mA/DC
Display	: none
Voltage	: 10 - 36 VDC
Oxygen sensor	: Micro-Fuel Cell,
Size	: 85 x 80 x 55 (B x H x T) (over all)
Weight	: 0.4 kg

Please contact following if you have more questions or need additional information.

Roscid Technologies, Inc.
215 Salem ST
Suite L
Woburn, MA 01801
Phone: (781)933-4007
www.roscid.com