Mini-OX Probe

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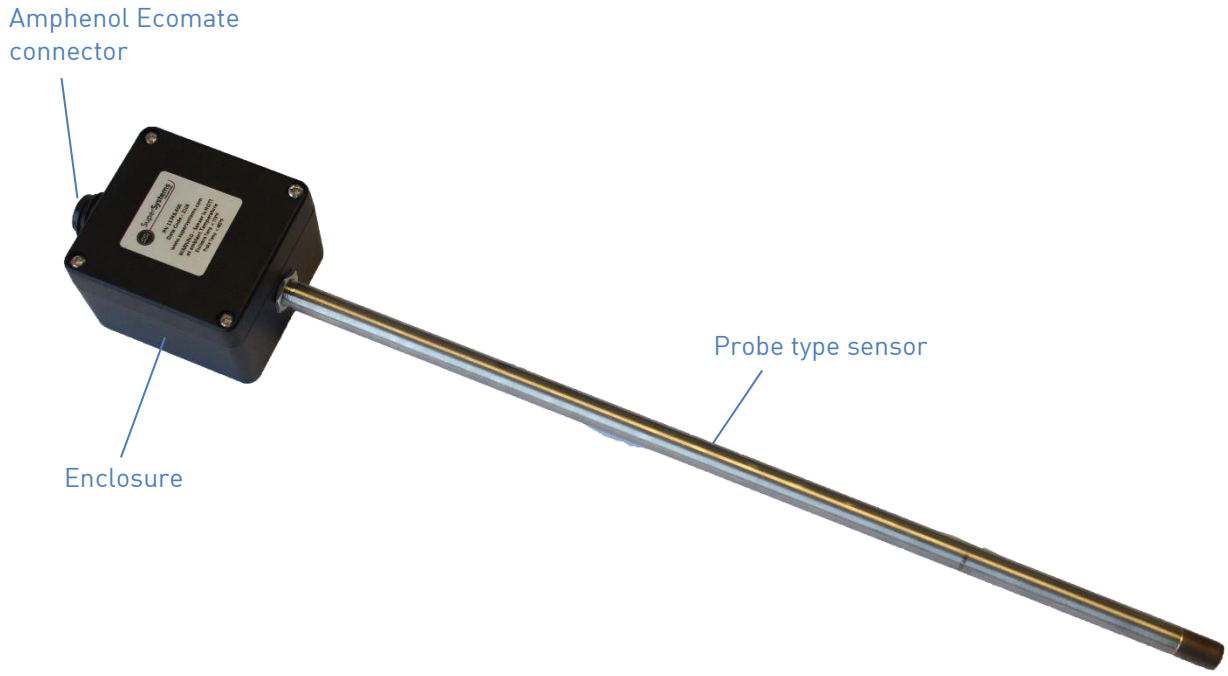
Introduction

Thank you for choosing Super Systems Inc. for your heat treat needs. The Mini-OX Probe is designed to determine the oxygenconcentration in air or inert gas mixtures in areas that are not easily accessible, or inclosed systems, such as ventilation pipes, flues andcontainers.

The actual oxygen sensor is mounted in the tip of thestainless-steel probe and is protected by a stainless-steel sintered cap which acts as both a large particulate filter and also as a flame trap. The die-cast aluminium housing accommodates the electronics and ismechanically connected to the sensor probe.

Main Components



Specifications

Electrical Specifications

- Supply voltage: $24V_{DC}$ ±10%
- Current consumption:500mA maximum at $24V_{DC}$

Output

- Digital output: RS232
    - or
- Analog output:
    - 0 – 10 V_{DC}; load 10kΩminimum
      and
    - 4 – 20mA; load 600Ω maximum

Performance Specifications

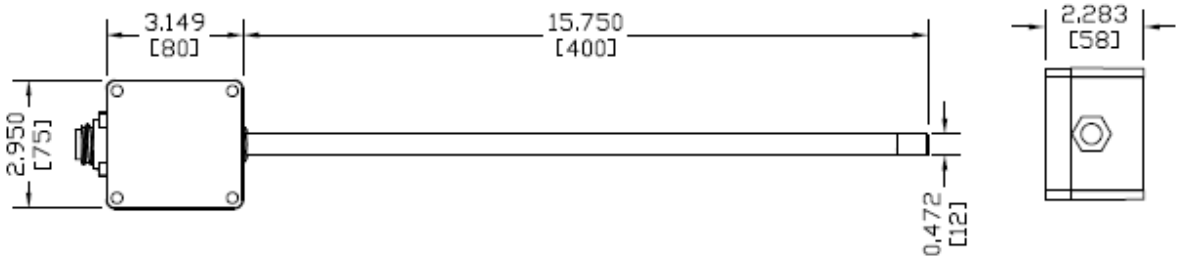
- Measurement range:
    - RS232 output; 0.1 and 100% O_2
    - Analog output (standard range shown – analog output measurement range is also user-selectable)
        - 0.1 - 25% O_2
        - 0.1 - 100% O_2
- Accuracy after factory calibration: 1% vol. O_2
    - Accuracy valid for measurements at Standard Barometric Pressure (SBP) in ambient gas temperatures of -22°F to +140°F (-30°C to +60°C)
- Repeatability after calibration: 0.5% vol. O_2
- Resolution;
    - RS232 output: 0.01% vol. O_2
    - Analog output:
        - 0 – 10V_{DC}: 0.01V
        - 4 – 20mA: 0.01mA
- Response time (10—90% step);< 15s
- Warmup time (prior to sensor operation); 60s
- Output stabilisation time; 5 – 10mins

Environmental Specifications

- Temperature limits (housing);
    - Storage; 14°F to +185°F (-10°C to +85°C)
    - Operating; 14°F to +185F (-10°C to +85°C)
- Temperature limits (permissible gas temperature at probe tip);
    - -148°F to 752°F (-100°C to +400°C)
- Gas flow rate; 0 to 33ft/s

Mechanical Specifications

- Weight; < 1lb (450g)
- Dimensions:



Warnings

- This equipment may only be installed by a suitably qualified technicianin accordance with the instructions in this manual and any applicable standards associated with the country or industry.
- Failure to correctly adhere to these instructions may result in serious injury or death and in this regard the manufacturer will not be held liable.
- This equipment may only be operated and maintained by trained technical personnel. The technical personnel must strictly adhere to the instructions given in this manual, and any prevailing standards/certificates (depending on application).
- Where instructed, you must read the User Guides and Datasheets referenced within this manual. There, you can find detailed information on the equipment.
- The operator may only perform modifications and repairs to the equipment/system with written approval of the manufacturer.
- Do NOT operate damaged equipment.
- If faults cannot be rectified, the equipment must be taken out of service and secured against unintentional commissioning.

WARNING:
The warning symbol is used to indicate instructions that, if they are not followed, can result in minor, serious or even fatal injuries to personnel.

CAUTION:
The caution symbol is used to indicate instructions that, if they are not followed, can result in damage to the equipment (hardware and/or software), or a system failure occurring.

NOTE: Highlights an essential operating procedure, condition or statement.

INSTALLATION

To ensure the best performance from your equipment, it must be installed correctly.

CAUTION:Protect the device from accidental shocks or vibrations as this may damage the board.

Mounting Instructions

Dimensions: tolerance ±.019in (0.5mm):

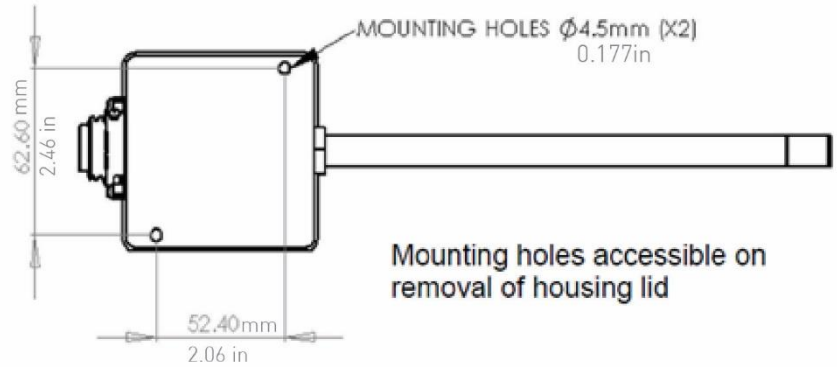


Figure 1 Mounting Hole Positions

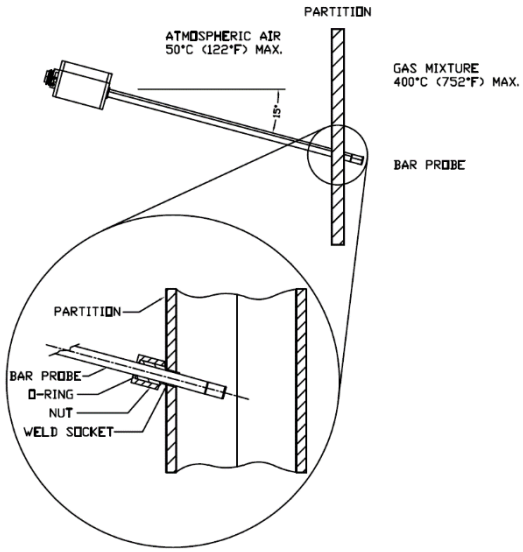


Figure 2 Probe Mounting Details

Electrical Connections

WARNINGS:

All wiring MUST be in accordance with the National Electrical Code and any local codes, ordinances, and regulations.

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

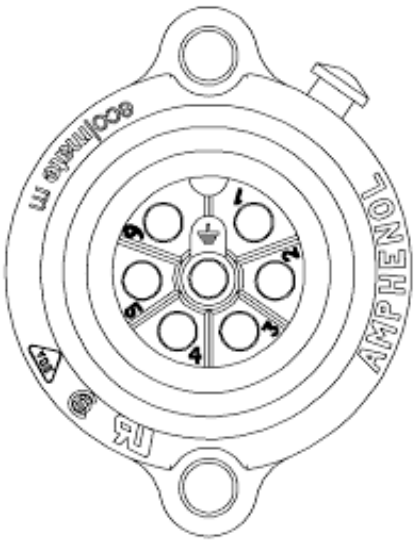
The device wiring should be in a separate conduit. Do NOT install wiring in any conduit or junction boxes with high voltage wiring.

CAUTION:

- Do NOT install the device suspended from the cable.
- Avoid exerting excessive tensile force on the cable (e.g. tugging).

Housing: Amphenol Ecomate C016 30C006 100 12
Mating Connector: Binder 99-4218-00-07

NOTE: Mating connector also supplied.



PINOUT:

Pin 1: $24V_{DC} \pm 10\%$
Pin 2: $0V_{DC}$
Pin 3: Calibrate
Pin 4: Cycle
Pin 5: 4 – 20mA / RS232 Tx
Pin 6: 0 – $10V_{DC}$/ RS232 Rx
Centre: Housing / Probe Earth

Figure 3 Electrical Connections

NOTES:

- Output pins 5 and 6 are both referenced to the power supply $0V_{DC}$ (pin 2). Due to high current flow in the supply GND, when monitoring the 0 – $10V_{DC}$ output (pin 6) it is recommended that a separate GND wire for the measurement system is taken from pin 2. This removes errors due to voltage drops in the power supply connections.
- Assignment of output pins 5 and 6 selectable by altering the position of the jumper links on the PCB; refer to Figure 5 for details.

Cable Pin Assignments (P/N A21069.10)

Wire color	Assignment
Red	24VDC+
Black	Power ground
Green	Calibrate
Brown	Digital ground
Blue	Cycle
Orange	4-20mA +
White	Analog ground
Yellow	0-10V +
Bare wire	Earth ground

System Block Diagram

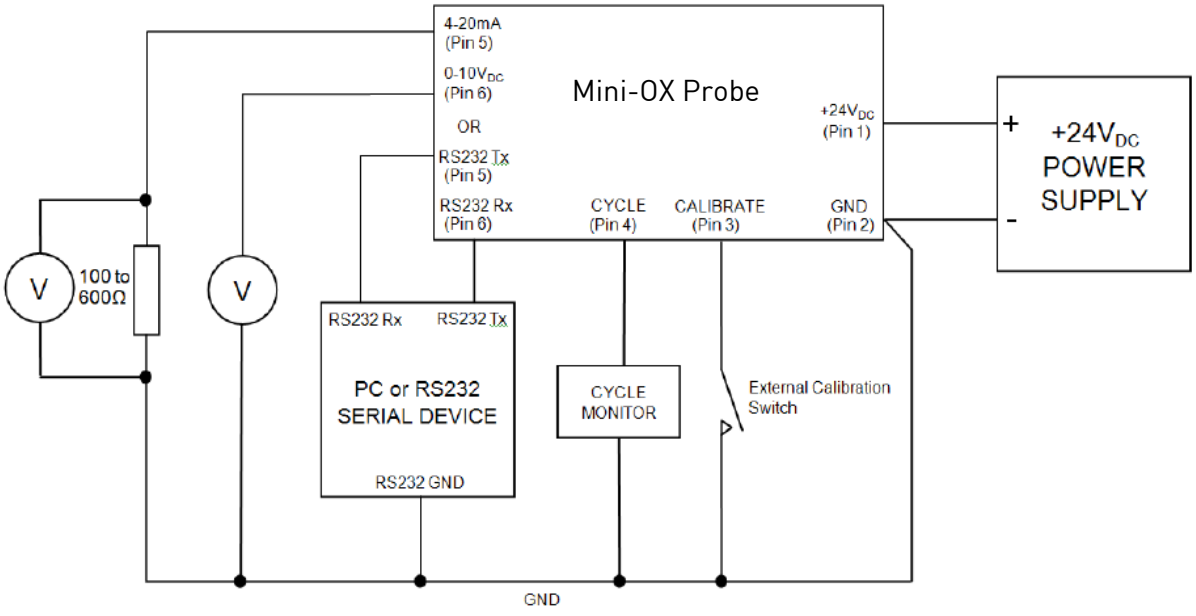


Figure 4 Block Diagram

PCB Layout

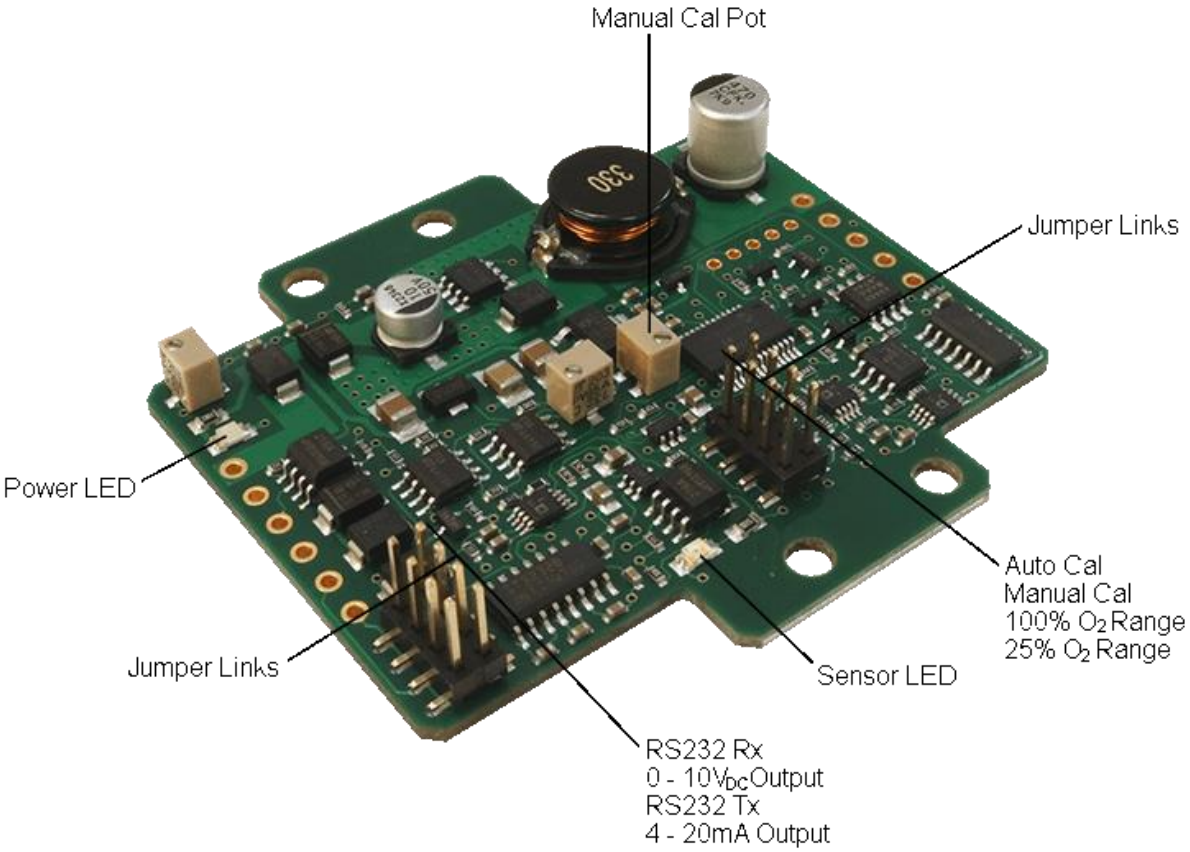


Figure 5 PCB Layout

INITIAL STARTUP

Commissioning Checks

Before commissioning the equipment read the **Warnings** section of this document.
Complete the following essential tasks BEFORE switching the system ON for the first time:

- Ensure compliance with permissible installation position.
- Verify the device is mounted correctly and securely.
- Verify the device and wiring are all undamaged.
- Ensure the cables are strain-free.
- Ensure the device is connected properly, with all its inputs and outputs complete. All screw terminals are properly tightened. All connectors seated correctly.

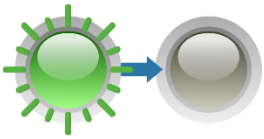
CAUTION:Test the power supply to ensure it is "24V_{DC} ± 10%" before wiring to the board.

CAUTION:Failure to test the suitability of the power supply BEFORE first power on could result in irreversible product damage that is NOT covered by warranty.

Switching ON

When the device is initially powered ON, the:

Red LED illuminates solid to indicate power is being supplied to the interface.



Green LED blinks rapidly then goes OFF to indicate that the microprocessor is operational.

NOTE: LEDs are only visible when the lid is removed from the analyzer housing.

NOTE:If a fault is detected, an error is displayed (RS232 variant), or theanalog output will remain at 4mA or 0V. Refer to Error Conditions.

If the error condition persists, switch the device OFF and contactSSi for assistance.

First-time Calibration

Calibration, or re-referencing, is required when the product is powered ON in the process application for the first time. Refer to Calibrating.

SYSTEM CONFIGURATION

The Mini-OX can be configured to output measuring ranges of 0 – 25% O_2 and 0 – 100% O_2; the entire measurement range is linear in both cases.

NOTE:Factory default is 0 – 25% O_2 with linear4-20mA and 0-10V_{DC} outputs.

When configured for 0 – 100% O_2, the analog output ranges can becustomized to suit the application. Refer to Setting the Calibration Type and Measurement Range.

The outputs can be configured to either 4 – 20mA and 0 – 10V_{DC} or RS232. Refer to Setting the Output Type below.

NOTE: All outputs are referenced to the system GND.

A digital 3.3V_{DC} logic output cycles at the same frequency as the electrochemical pumping action of the oxygen sensing cell during normal operation, thus providing a real-time sensor health check. If the output ceases to cycle, the sensor has entered a start-up or error state. This provides fault proof operation.

NOTE: The digital output is also used during the calibration process to indicate the interface status.

A green on-board LED mirrors the CYCLE output and can be used to visually determine the sensor status or during the calibration process. A red LED indicates the unit has power applied.

Setting the Output Type

The interface board is fitted with two jumper links which set the calibration type (Manual or Automatic) and oxygen measurement range (100% or 25%). These settings may be configured at any time by adjusting the position of the header pin jumper links on the board.

WARNING: The equipment MUST be powered OFF.
The jumper links MUST also be repositioned correctly and in the correct orientation.

1. Using a Philips screwdriver, remove the four screws and lid from the probe housing.
2. Using thin-nosed pliers, remove and replace the jumper links to the desired positions:
    - **RS232;**RS232 Rx and RS232 Tx
    - **Analog output;**0 – 25% O_2 or 0 – 100% O_2

NOTE: When selecting the output, you must choose either 4-20mA and 0-10V_{DC} or RS232 Tx and Rx.

NOTE: Ensure jumper links are correctly seated and in the correct orientation as shown in Figure 6.

3. When configuration is complete, replace the four screws and lid; secure to the analyzer housing using a Philips screwdriver.

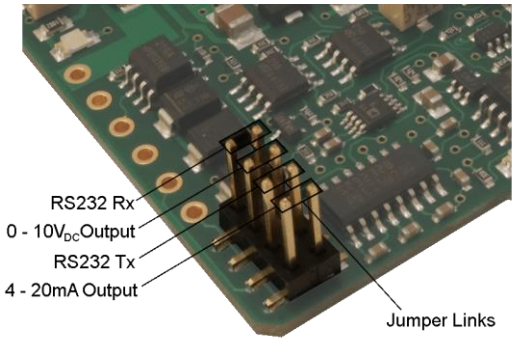


Figure 6 Output jumper link configuration

Setting the Calibration Type and Measurement Range

The interface board is fitted with two jumper links which set the calibration type (Manual or Automatic) and oxygen measurement range (100% or 25%). These settings may be configured at any time by adjusting the position of the header pin jumper links on the board.

WARNING:The equipment MUST be powered OFF.
The jumper links MUST also be repositioned correctly and in the correct orientation.

1. Using a Philips screwdriver, remove the four screws and lid from the probe housing.
2. Using thin-nosed pliers, remove and replace the jumper links to the desired positions:
    - **Calibration type;** Manual (MANUAL CAL) or Automatic (AUTO CAL)
    - **Measuring range;**0 – 25% O_2 or 0 – 100% O_2

NOTE: Ensure jumper links are correctly seated and in the correct orientation as shown in Figure 7.

3. When configuration is complete, replace the four screws and lid;secure to the analyzer housing using a Philips screwdriver.

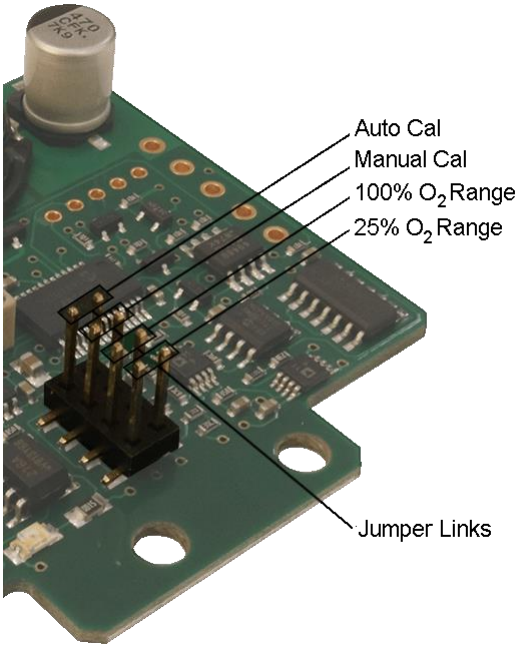


Figure 7 Jumper Link Configuration

Digital Variant – RS232 Output

NOTE:When connecting the Mini-OX using the RS232 connections ensure *Tx* goes to *Rx* of the PC and *Rx* goes to *Tx* of the PC.

The Mini-OX communicates via standard COM port settings that are default on most PCs and many other RS232 compatible devices. If communication problems are occurring, use the settings below to configure the PC or device COM Port:

- **Baudrate:** 9600
- **Data bits:** 8
- **Parity:** None
- **Stop bits:** 1
- **Flow control:** None

With the Mini-OX RS232 outputs connected to a PC (or other RS232 compatible device), you can access two modes of operation; continuous data streaming and the menu screens. Menu structure has been created using VT100 terminal codes; refer to APPENDIX A – MENU STRUCTURE for full menu structure and example screens.

Recommended programs for communicating via PC serial RS232 are Tera Term, HyperTerminal (Windows default), or PuTTY. The following sub-sections are based on Tera Term usage, instructions may vary if using another program.

When the Mini-OX receives an <*ENTER*> keystroke from the connected PC or device, it automatically displays the **`Menu Password`** screen and stops streaming O_2 % and *Td* values. Once the correct password is entered followed by the <*ENTER*> keystroke, the menu screens are accessed. The menu screens are primarily for diagnostics and information although there are user configurable options that may be changed (automatic O_2 calibration %, the amount of output filtering (averaging) and the analogue output ranges). The menu security password may also be changed if required.

Menu SecurityPassword

The password is factory set to "default". This however may be changed to a user specific password as follows.

1. Connect the Mini-OX via the RS232 interface to the PC.
2. Press <*ENTER*>; the **`Menu Password`** screen displays.
3. Input your current security password.
4. Press <*ENTER*> to access the **`Menu`** screens.
5. Type "2" to access the**`Configuration`** menu.
6. Type "3" to access the **`Password Menu`** screen.
7. Input your new security password.
   NOTE: Password is case sensitive and a maximum 15 characters.
8. Press <*ENTER*> to save.
   NOTE:The new password is now stored in memory and is retained on power loss.
   NOTE: Pressing <*ESC*> returns the screen to the previous menu.

Automatic Calibration Value

The system is factory set to automatically calibrate to 20.7% O_2 to allow simple calibration in fresh air. The auto calibration value is factory set to 20.7% to take into account average humidity in the atmosphere. If a calibration with a gas of a different known O_2 concentration is required, the factory set value may be changed via the RS232 interface.

1. Connect the Mini-OX via the RS232 interface to the PC.
2. Press <*ENTER*>; the **Menu Password** screen displays.
3. Input your security password.
4. Press <*ENTER*> to access the **Menu** screens.
5. Type "2" to access the**Configuration** menu.
6. Type "1" to access the **Enter Auto Calib**screen.
7. Input the oxygen concentration (%) of the calibration gas as a number to 2 decimal places.
8. Press <*ENTER*> to save.
   NOTE:The new automatic calibration value is now stored in memory and is retained on power loss.

NOTE:If calibration is required with a different gas of known O_2 concentration and access to the RS232 menus via a PC is not available, a manual calibration must be performed. Refer to Manual Calibration.

Variable Output Filtering (T_d Averaging)

The Mini-OX is factory default to use adaptive output filtering to give an optimum balance between output stability and response to oxygen changes. This balance may be altered to suit the needs of your application.

1. Connect the Mini-OX via the RS232 interface to the PC.
2. Press <*ENTER*>; the **Menu Password** screen displays.
3. Input your security password.
4. Press <*ENTER*> to access the **Menu** screens.
5. Type "2" to access the**Configuration** menu.
6. Type "2" to access the**Enter T_d Averaging** screen.
7. Input the required number, between 0 and 200; 0 for adaptive filtering (recommended), 1 for very fast and dynamic output response but relatively unstable to 200 for an extremely stable output but very slow response to oxygen changes.
8. Press <*ENTER*> to save.
   NOTE: The new averaging value is now stored in memory and is retained on power loss.

Analog Output Minimum and Maximum Ranges

The Mini-OX is factory default to output a range of 0 – 25% O_2 via its two analog outputs. This range can be expanded to 0 – 100% O_2 by repositioning the jumper link as described in Figure 7. When the unit is reconfigured to output 0 – 100% O_2 the user also has the option to fully customize the output ranges via RS232. This is extremely useful in applications where the O_2 variation is within a narrow band as it allows the analogue outputs to be tailored to this limited range.

NOTE: The minimum and maximum range adjustment does NOT apply to the RS232 output and is overruled if the unit is reconfigured for 0 – 25% O_2 operation.

1. Ensure the Mini-OX is configured for 0 – 100% O_2 operation, see Figure 7.
2. Connect the Mini-OX via the RS232 interface to the PC.
3. Press <*ENTER*>; the **Menu Password** screen displays.
4. Input your security password.
5. Press <*ENTER*> to access the **Menu** screen.
6. Type "2" to access the**Configuration** menu.
7. Type "3" to access the**Enter O_2 Max Range** screen.
8. Input the required number, between 1.00 and 100.00 to represent the maximum output range.
   NOTE:The number must also be greater than the saved minimum range.
9. Press <*ENTER*> to save.
10. Press <*ESC*> to return to the **Configuration** menu.
11. Type "4" to access the**Enter O_2 Min Range** screen.
12. Input the required number, between 0.00 and 99.00 to represent the minimum output range.
    NOTE:The number must also be less than the saved maximum range.
13. Press <*ENTER*> to save.
    NOTE:The new ranges are now stored in memory and are retained on power loss.

An example of changing the minimum and maximum output ranges would be in a fresh air atmosphere where the O_2 range is between 20-21%. The user could set the minimum output range to 19% and the maximum output range to 22% and the outputs would vary linearly between. The minimum and maximum ranges lock out the outputs at the set limits so 19% O_2 or lower would set the analog outputs to $0V_{DC}$/4mA and 22% O_2or higher would set the analog outputs to $10V_{DC}$/20mA.

Analog Variants – 0-10$V_{DC}$and 4-20mA Output Values

O_2%	Output Values			
	0 – 10V_{DC} output		4 – 20mA output	
	0.1 – 25% O_2	0.1 – 100% O_2	0.1 – 25% O_2	0.1 – 100% O_2
20.7%	8.28V_{DC}	2.07V_{DC}	17.25mA	7.34mA
100%	-	10V_{DC}	-	20mA
90%	-	9.0V_{DC}	-	18.4mA
25%	10V_{DC}	2.5V_{DC}	20mA	8mA
5%	2.0V_{DC}	0.5V_{DC}	7.2mA	4.8mA
0.01% (see Note)	0.04V_{DC}	0.01V_{DC}	4.06mA	4.02mA

NOTE: The analog output ranges actually represent 0 to 25% or 0 to 100% O_2 however as SSi's oxygen sensors cannot measure below 0.1% O_2 this value is displayed as the range minimum.

OPERATION

Operating Tips

To ensure the best performance from your equipment it is important that the attached oxygen sensor is installed and maintained correctly.

RS232 Operation

With the Mini-OX RS232 outputs connected to a PC (or any other RS232 compatible device), you can access two modes of operation; continuous data streaming and the menu screens. Refer to Digital Variant – RS232 Output. Refer also to Appendix A.

Continuous Data Streaming

On power up, after the initial 60-second heater delay, the Mini-OX will automatically begin outputting the measured O_2 concentration and sensor t_d as both an averaged and raw value. The averaged values give a stable output with the amount of averaging user variable while the raw un-averaged values allow the user to detect sudden oxygen changes.

The averaged value is the measurement output on both the 4 – 20mA and 0 – 10V_{DC} outputs. The sensor t_d value is the measure of the partial pressure of oxygen in the measurement gas. The O_2 concentration (%) is the t_d value scaled by the stored calibration value.
To stop or restart the data streaming:

1. Connect the Mini-OX via the RS232 interface to the PC.
2. Type "S" (not case sensitive).
   NOTE: Data streaming automatically ceases during calibration.

Menu Screens

The menu screens are primarily for diagnostics and information although there are user configurable options that may be changed. Refer to Digital Variant – RS232 Output.

To access the menu structure:

1. Connect the Mini-OX via the RS232 interface to the PC.
2. Press <*ENTER*>; the **`Menu Password`** screen displays.
   NOTE: The Mini-OX stops outputtingO_2% and $t_d$values.
3. Input your security password.

4. Press <*ENTER*> to access the **Menu** screens.

MAINTENANCE

WARNING:BEFORE performing any type of maintenance on the equipment read Warningson page 7 of this document.
WARNING: The attached oxygen sensor is heated to over 700°C (1300°F) and is a source of ignition. Ensure the sensor is cool before attempting to touch or service the equipment.

Cleaning

Clean the outer surfaces of the housing regularly with non-abrasive materials to prevent a buildup of contaminants. Isopropyl alcohol (IPA) and a lint-free cloth is recommended.

CAUTION: Never use any of the following for cleaning purposes:

- Chemical cleaning agents
- High-pressure water or steam

Calibrating

Mini-OX does not directly measure the oxygen concentration but instead measures the partial pressure of oxygen within the measurement gas. In order to output an oxygen concentration (%) the sensor must be calibrated, or more specifically, re-referenced in a known gas concentration, typically fresh air.

Regular calibration removes the effects of application and atmospheric pressure changes and also eliminates any sensor drift that may occur during the first few hundred hours of operation.

Calibration, or re-referencing, is achieved by connecting the calibration input to GND and monitoring the status of the digital cycle output or by visually monitoring the on-board green LED. During the calibration process the output will either automatically calibrate to a fixed reference or can be manually calibrated to any output by way of a PCB mounted potentiometer.

NOTE: The fixed reference is factory set to 20.7% O_2 for calibration in fresh air,however this value may be altered for calibration with a reference gas of any known oxygen concentration. Any new calibration value will be stored on power loss.

The auto or manual calibrate function is user configurable; refer to Setting the Calibration Type and Measurement Range.

Output Variant	Recommended CalibrationPoints / Recommended Calibration Gas
0.1 - 25% O_2	20.7% O_2/ Fresh air
0.1 - 100% O_2	100% O_2/ Pure oxygen

Automatic Calibration

1. Ensure the Mini-OX is configured for automatic calibration. Refer to Setting the Calibration Type and Measurement Range
2. Place the sensor probe in the calibration gas, typically fresh air.
3. Allow the output tostabilize for at least 5 minutes (10 minutes if powering from cold).
4. Referring to page 9; Apply GND to the CALIBRATE input (pin 3) for a minimum 12s. During the 12s the CYCLE output (pin 4) and the green LED will go high/on, blink rapidly, go high/on, go low/off then return to cycling normally to indicate normal operation has resumed. At this point remove GND from pin 3.

   NOTE:The output will now track to the correct value for the calibration gas. If calibrating in fresh air, the output value (RS232/Voltage/Current) given equates to 20.7% oxygen with an error of ± 0.2%. After calibration in fresh air the voltage output should read 8.28V. The current output should read 17.25mA, and the RS232 will stream a five character ASCII code representing the O_2%.
5. Calibration is complete.

   NOTE: New calibration values are stored in memory and retained on power loss.

Manual Calibration

1. Ensure the Mini-OX is configured for manual calibration. Refer to Setting the Output Type section.
2. Place the sensor probe in the calibration gas, typically fresh air.
3. Allow the output tostabilize for at least 5 minutes (10 minutes if powering from cold).
4. Referring to page 9; Apply GND to the CALIBRATE input (pin 3) for a minimum 5s or until the CYCLE output and green LED blink at a steady 1Hz. Remove GND from pin 3. Manual Calibration is now initialised.
5. Adjust the MANUAL CAL POT until the output equals the correct value of the calibration gas concentration (see page 18).
6. Re-apply GND to pin 3 for a minimum 5s. During the 5s the CYCLE output/LED will blink rapidly, go high/on, go low/off then return to cycling normally to indicate normal operation has resumed. At this point remove GND from pin 3.

   NOTE:The output will now track to the correct value for the calibration gas[c].
7. Calibration is complete.

   NOTE: New calibration values are stored in memory and retained on power loss.

Error Conditions

If the oxygen sensor is incorrectly connected or is damaged, the Mini-OX will highlight this by blinking the CYCLE output (pin 4) and green LED in a *3 short blinks – 1 long blink* pattern or continuously OFF. In addition, an error code displays on the RS232 output and the analog outputs will default to 4mA and 0V.

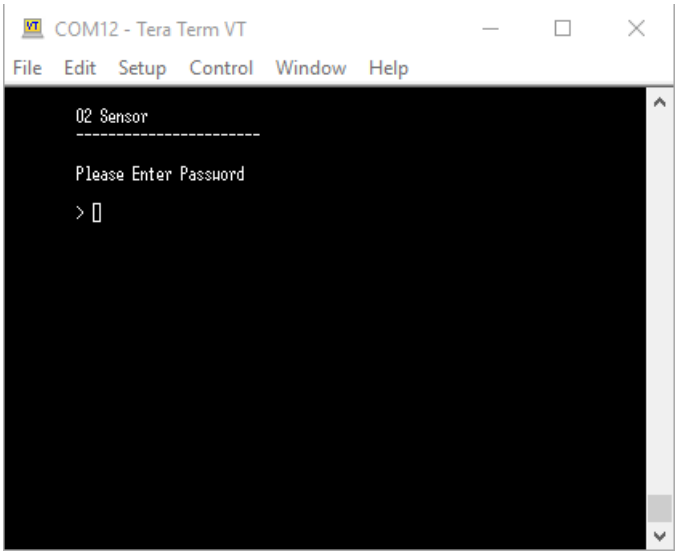
If an error condition occurs, the equipment should be powered down and all wiring checked before reapplying the power. If the error condition remains, contact SSi for guidance.

Disposal

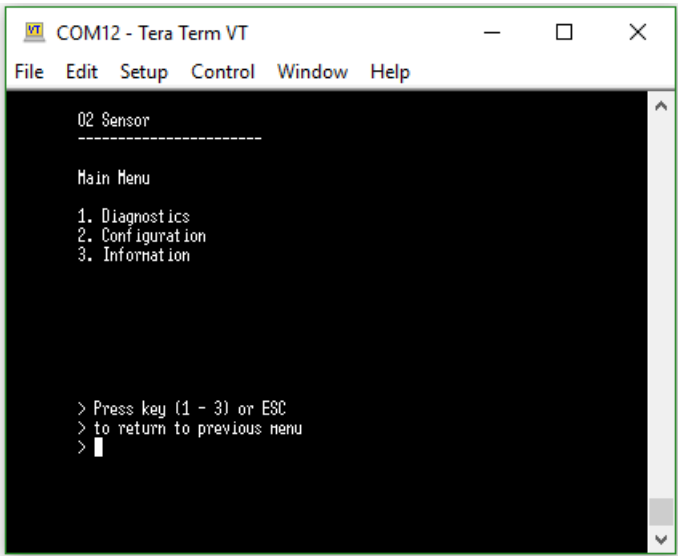
The Mini-OX should be disposed of as electrical waste. Please observe your local regulations.

APPENDIX A – MENU STRUCTURE

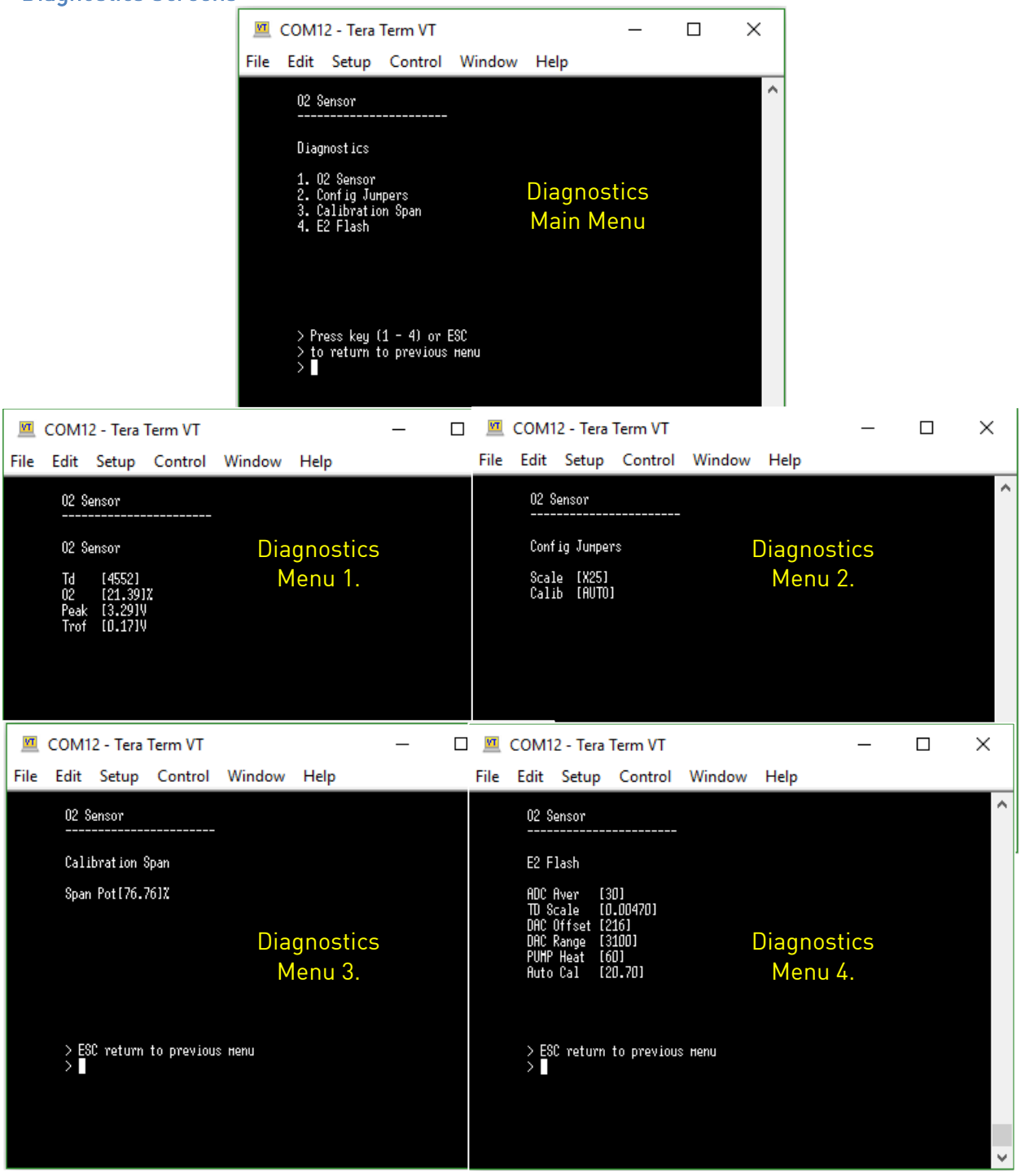
Password Screen



Main Menu

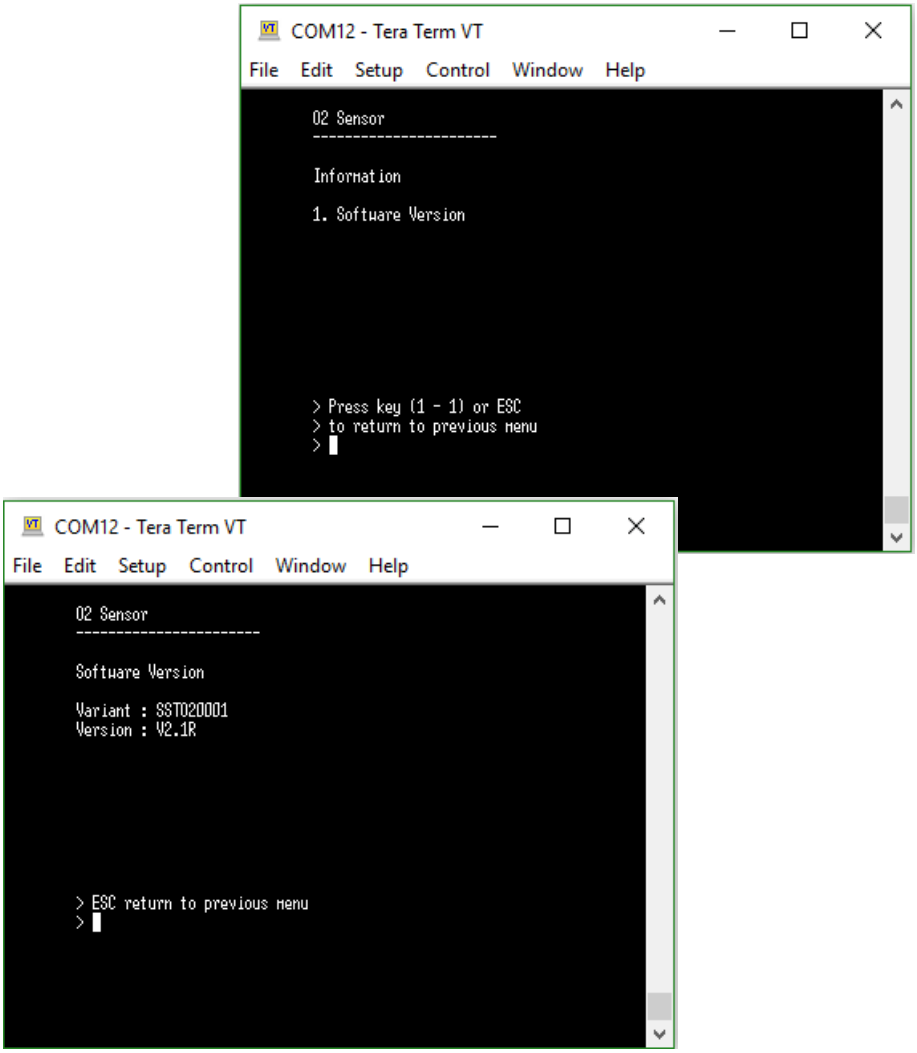


Diagnostics Screens



Configuration Screens

Information Screens



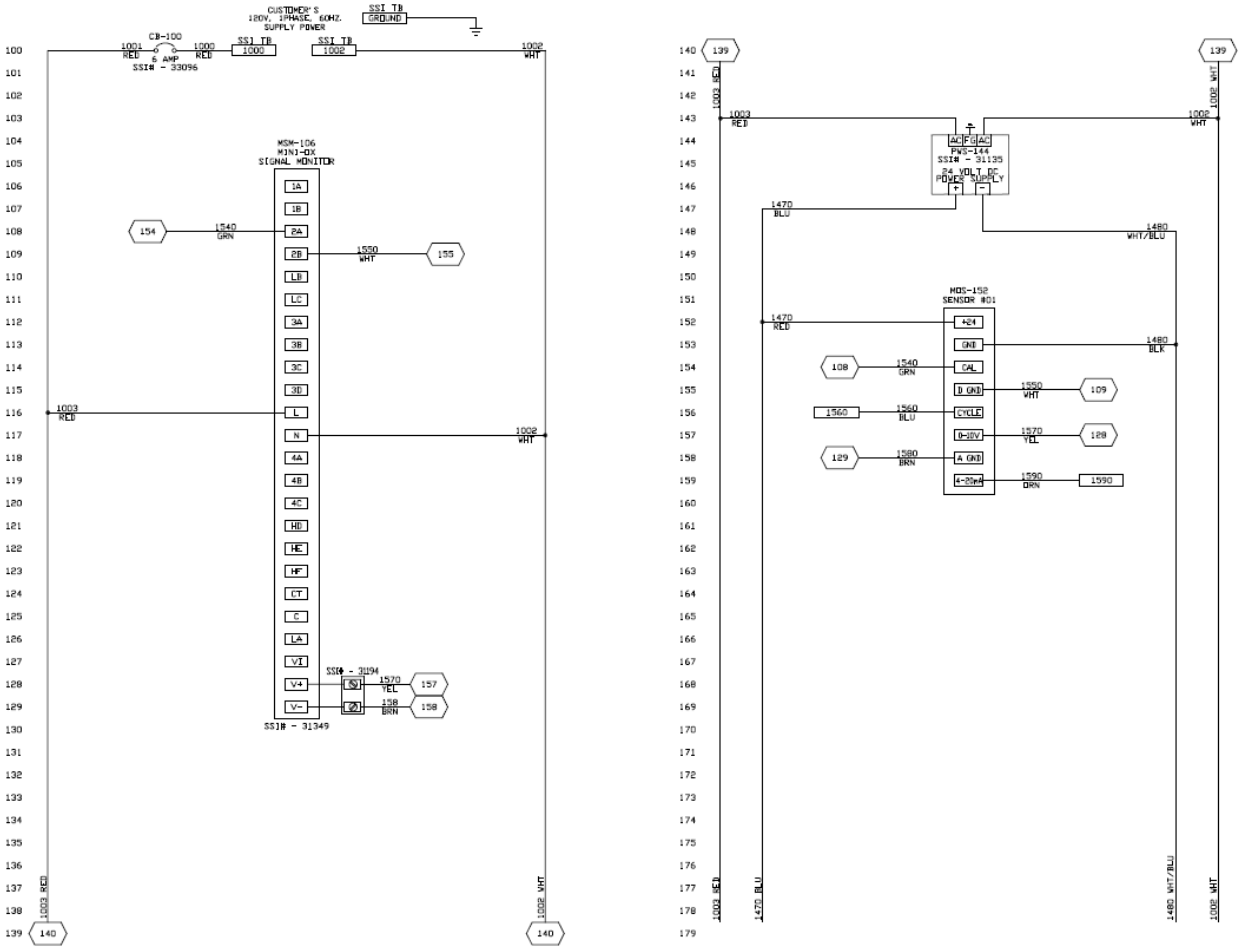
CAUTION	INFORMATION
Do not exceed maximum ratings and ensure sensor(s) are operated in accordance with their requirements. Carefully follow all wiring instructions. Incorrect wiring can cause permanent damage to the device. Zirconium dioxide sensors are damaged by the presence of silicone. Vapours (organic silicone compounds) from RTV rubbers and sealants are known to poison oxygen sensors and MUST be avoided. Do NOT use chemical cleaning agents. **Failure to comply with these instructions may result in product damage.**	As customer applications are outside of SSi's control, the information provided is given without legal responsibility. Customers should test under their own conditions to ensure that the equipment is suitable for their intended application. For technical assistance or advice, please contact SSi at 513-772-0060.

General Note: SSi reserves the right to make changes to product specifications without notice or liability. All information is subject to SSi's own data and considered accurate at time of going to print.

APPENDIX B – Automatic Calibration using a Series 8 Controller (with Wiring Diagram and Configuration Information)

1. Place the sensor probe in the calibration gas, typically fresh air.
2. Press the F2 F2 button on the Series 8.
3. Press the up arrow ▲ until the display reads "run," then press the Enter ↵ button.
4. Wait about 30 seconds. When the display no longer reads "run," calibration is complete.

For additional help, see Automatic Calibration section, Series 8 Manual, or contact SSi at 513-772-0060.



Configuration Settings Series 804 - Mini-OX			
Run Parameters		**Configuration**	
Name	Value	Parameter	Default
OP	0	P1	MV
Unit	NONE	P2	NNN.N
SPLo	0.5	P3	0
SPHi	20.9	P4	25
SP1	20.9	P5	0
SP2	0.5	P6	79.96
SPrr	OFF	P7	HP
ALtSPLo	-17.8	P11	NONE
ALtSPHi	204.4	P12	T.RUN
SPTrim	0	P13	HEAT
Pb	11.1	P14	NONE
Ti	360	P15	4.2
Td	OFF	P21	NONE
cbLo	AUTO	P24	NONE
cbHi	AUTO	P27	NONE
Mr	0	P31	NONE
oFS	0	P32	100
FiLt	8	P33	NONE
oPLo	0	P34	OFF
oPHi	100	P35	OFF
LdAL	OFF	P36	0
LEAL	OFF	P41	DLL
HcAL	OFF	P42	MIN
tdUr	30s	P43	RES
tthr	OFF	P51	NONE
		P52	NONE
		P61	1
		P62	19.2
		P63	NONE
		P64	NONE
		P71	T.ST
		P72	T.ST
		P73	AC.AL
		P74	STD
		P75	OP
		P76	2
		P77	4
		P81	NONE
		rEcS	NONE
		rEcL	NONE
		PHAS	NONE

Appendix C: Replacing Honeywell MF010/MF020 with Mini-OX

The Honeywell MF010/MF020 sensor has identical pin layout to Mini-OX but different wiring and functionality.

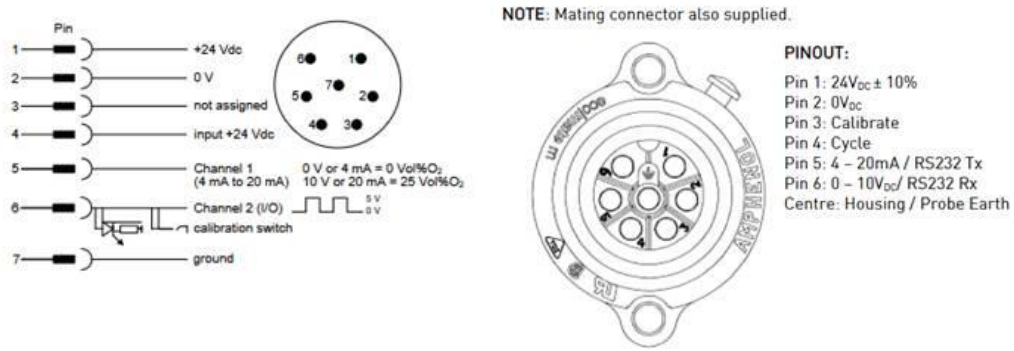


Figure 8 MF010/MF020 (left) and Mini-OX (right)

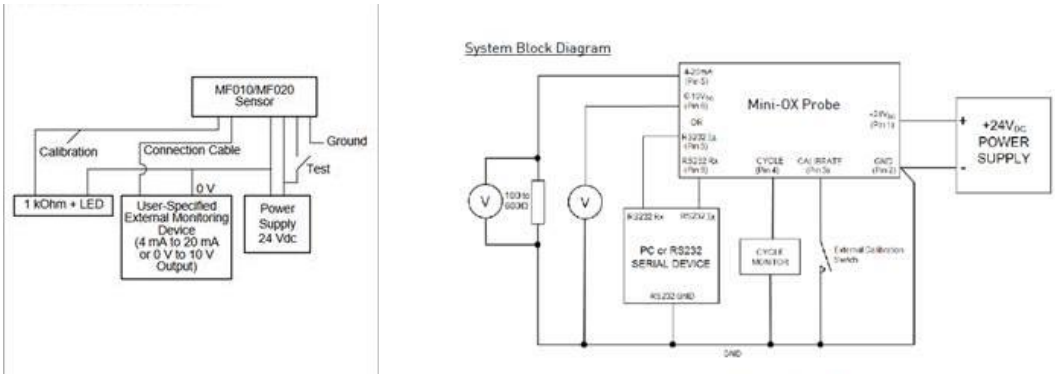


Figure 9 MF010/MF020 (left) and Mini-OX (right)

To avoid damaging your equipment, follow the instructions below.

When installing Mini-OX, remove (do not connect) your current sensor's Pin 4 and 6.

(Connecting the Mini-OX sensor using the pin out of the original sensor will result in a voltage signal being supplied to the wrong Pin.)

The signals on Honeywell Pin 6 must be reconfigured and connected to SSi Pin 3 and 4 to emulate the old sensor.

The Heartbeat (cycle) wire connects to Mini-OX Pin 4, referenced to ground.

The Calibrate wire and button connects to Pin 3 (SSI sensor) referenced to ground.

The Test button is no longer needed.

For additional support, contact SSi at 513-772-0060.

System Requirements

Part Number	Description
13746.400	Mini-OX
A21069.10	Cable, 10ft
31349	Series 804 Controller
31194	Voltage divider
31135	Power supply

Warranty

Limited Warranty for Super Systems Products:

The Limited Warranty applies to new Super Systems Inc. (SSI) products purchased direct from SSI or from an authorized SSI dealer by the original purchaser for normal use. SSI warrants that a covered product is free from defects in materials and workmanship, with the exceptions stated below.

The limited warranty does not cover damage resulting from commercial use, misuse, accident, modification or alteration to hardware or software, tampering, unsuitable physical or operating environment beyond product specifications, improper maintenance, or failure caused by a product for which SSI is not responsible. There is no warranty of uninterrupted or error-free operation. There is no warranty for loss of data—you must regularly back up the data stored on your product to a separate storage product. There is no warranty for product with removed or altered identification labels. SSI DOES NOT PROVIDE ANY OTHER WARRANTIES OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME JURISDICTIONS DO NOT ALLOW THE LIMITATION OF IMPLIED WARRANTIES, SO THIS LIMITATION MAY NOT APPLY TO YOU. SSI is not responsible for returning to you product which is not covered by this limited warranty.

If you are having trouble with a product, before seeking limited warranty service, first follow the troubleshooting procedures that SSI or your authorized SSI dealer provides.

SSI will replace the PRODUCT with a functionally equivalent replacement product, transportation prepaid after PRODUCT has been returned to SSI for testing and evaluation. SSI may replace your product with a product that was previously used, repaired and tested to meet SSI specifications. You receive title to the replaced product at delivery to carrier at SSI shipping point. You are responsible for importation of the replaced product, if applicable. SSI will not return the original product to you; therefore, you are responsible for moving data to another media before returning to SSI, if applicable. Data Recovery is not covered under this warranty and is not part of the warranty returns process. SSI warrants that the replaced products are covered for the remainder of the original product warranty or 90 days, whichever is greater.

Revision History

Rev.	Description	Date	MCO#
-	First Release	4/20/21	2311
A	Added Appendix C to address conversion from Honeywell products	1/29/2025	2365