OxyPro

Oxygen Deficiency Monitor

User Manual

Document Version

Rev	Issue Date	Comment	Checked By	Approved By	Remarks
01	2024/09/26	Issued for Initial Review			

This Page is Intentionally Blank

Table of contents

1 DESCRIPTION AND DEFINITIONS

1.1 Scope of the Manual

This manual provides installation, operation and routine maintenance instructions for the OxyPro - Oxygen Deficiency Monitor, abbreviated to "instrument" in the remainder of this manual.

1.2 Safety Information

Read this manual and ensure that you fully understand its content before you attempt to install, use or maintain the instrument. Important safety information is highlighted in this manual as WARNINGs and CAUTIONs, which are used as follows:

	WARNING
⚠	Warnings highlight specific hazards which, if not taken into account, may result in personal injury or death.

> **CAUTION**
> Cautions highlight hazards which, if not taken into account, can result in damage to the instrument or to other equipment or property.

This manual also incorporates 'Be aware of' information, which is used as follows:
This highlights information which it is useful for you to be aware of (for example, specific operating conditions, and so on).

1.3 Description

The Instrument is a fixed wall mounted gas detector with an integral oxygen sensor that outputs a linear 4-20mA signal that represents an ambient oxygen concentration. This output must be integrated into a gas detection system as the instrument gives no warning or alarm of an oxygen-deficient environment, its function being solely to measure the ambient level of oxygen. It offers a measurement of ambient oxygen based on the principles of paramagnetism, a non-depleting and inherently linear measurement technique.

The instrument is designed to be installed within indoor working environments such as laboratories, workshops or analyser shelters.

Gas sample measurements are shown on the instrument display, and can be output as a milliamp (mA) signal to a gas detection system.

The instrument requires little routine maintenance, other than calibration which is essential for the accuracy of the gas measurements.

⚠️	**WARNING** The instrument is not to be used in certified or hazardous locations (potentially explosive atmospheres)
⚠️	**WARNING** The instrument is not suitable for corrosive atmospheres (those atmospheres where gases and vapours are present in concentrations high enough to cause corrosion to normal industrial appliances or where specialised coatings, materials or finishes would normally be specified to avoid corrosion)

1.4 Ordering Options

For the latest ordering options please contact *sales@psctexas.com*

2 SPECIFICATION

WARNING

The protection, accuracy, operation and condition of the equipment may be impaired if the instrument is not installed in accordance

2.1 General

Dimensions:

Length x height x width:	210 x 200 x 106 mm
Mass	10 lbs

2.2 Environmental Limits

Ambient temperature range

Operating temperature	41 to 113 °F (5 to 45 °C)
Storage temperature	23 to 122 °F (-5 to 50 °C)
Operating pressure range	Ambient
Operating ambient humidity range	10 to 90% RH, non-condensing
Operating altitude range	–500 * to 4000 † metres (-1600 * to 13000 † feet)
Enclosure	IP66

2.3 Power

AC Input Voltage	100-120 V / 200-240 V
Mains Frequency	50-60 Hz
AC Input Current	2.0/1.23 at 120/230 VAC

3 INSTALLATION

	WARNING Warnings highlight specific hazards which, if not taken into account, may result in personal injury or death.
	WARNING The instrument is only suitable for installation in indoor general purpose areas.
	WARNING Gases have differing densities and can rise or sink in ambient air. The instrument must be installed in a suitable location relative to the gas hazard. A suitable hazard assessment must be carried out before installing the instrument.

CAUTION

Do not install the instrument where it is subjected to high levels of vibration or large variations in ambient temperature as these may cause false alarms.

3.1 Unpack the Instrument

When your OxyPro arrives, carefully unpack and inspect for any damage during shipping. If any damage has occurred, please contact Process Solutions immediately.
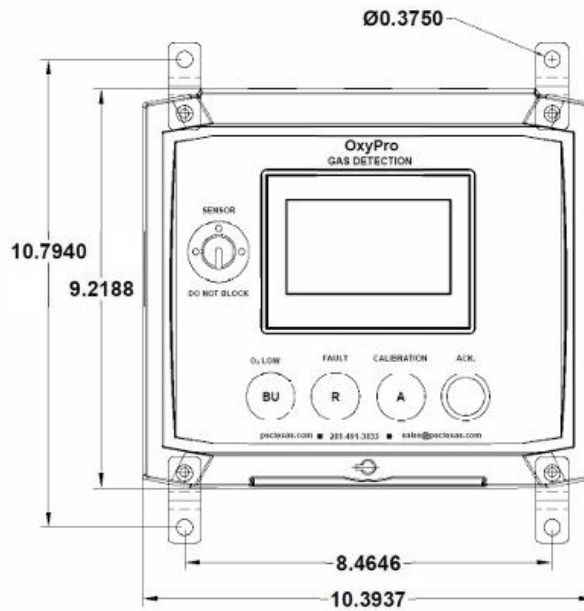
3.2 Mechanical Installation

Figure 1- OxyPro Dimensions

☞ The OxyPro is designed to be mounted on the wall at eye level or where the operator can view the screen. It is recommended to be installed in a general-purpose area.

☞ The OxyPro is equipped with a wall mount tab located in each corner. Refer to the diagram below for additional information.

3.3 Power Supply

1. The standard OxyPro is designed to be powered by 100-240VAC @ 50/60 Hz and is supplied with a standard six-foot cord.

2. If determined by the operator that another source is needed, the terminals are listed below and can be found inside the enclosure as illustrated in below diagram Figure 2.

3. If included as an option, the OxyPro can be configured for a 24VDC power supply. In which case refer to diagram Figure 3.

POWER 120V AC
1 PH, 60Hz, 12AWG MAX
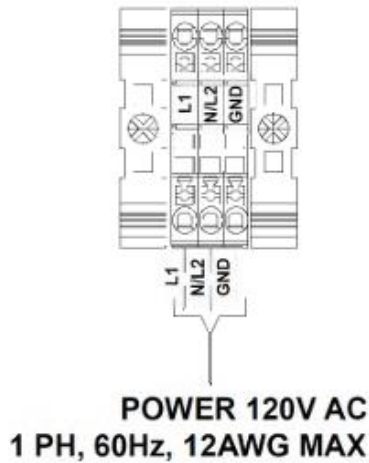
Figure 2- Supply Power

POWER 24V DC
5A, 12AWG MAX
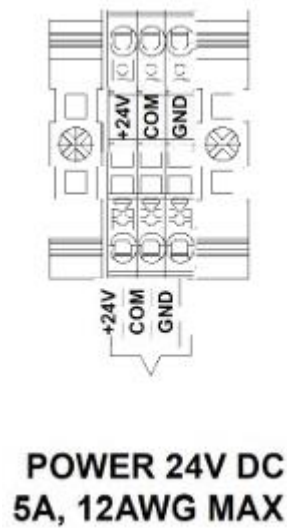
Figure 3- Supply Power

3.3.1 Digital Output

1. The standard OxyPro includes multiple digital outputs for an optional stack light or to communicate with your DCS system. For the outputs available, please refer to Figure 4

2. Each output is Normally Open, meaning that they will make contact only by triggering the status of the pairing condition. Each contact will accept 10-30VDC @ .5A.
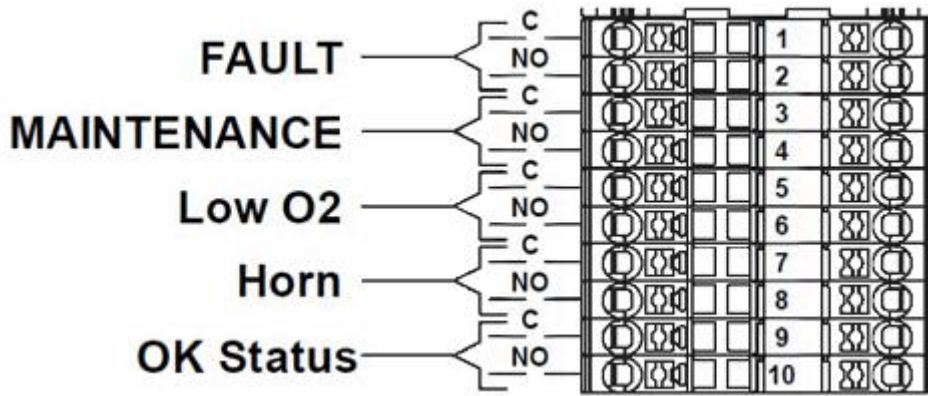
Figure 4- Digital Output

3.3.2 Analog Outputs

1. The standard OxyPro has an analog output to communicate with your DCS system. For the analog outputs available, please refer to Figure 5
2. The Analog output is a 4-20mA signal and represents an O2 range of 0-25%. It is an active output meaning that it does not need an external power source.
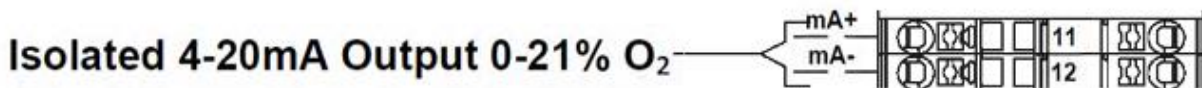
Figure 5- Analog Output

3.3.3 Digital Inputs

1. The standard OxyPro has a digital input for remote acknowledgment. For the digital inputs available, please refer to Figure 6

2. Although similar to the Alarm Acknowledge on the front panel, the Remote Acknowledge allows the operator to place a button outside of the space where the OxyPro is present. The digital input is a 24VDC contact (powered by the OxyPro) that when closed will acknowledge the current alarm on the OxyPro. The OxyPro will silence the audible announcer for 60 seconds before sounding again until the alarm is resolved.

Figure 6- Digital Inputs

3.4 Electrical Safety

⚠️	**WARNING** 12 / 32 Ensure that the electrical installation of the instrument conforms with all applicable local and national electrical safety requirements
⚠️	**WARNING** Obey the safety instructions given below when you install the instrument; if you do not, the instrument warranty may be invalidated, the instrument may not operate correctly, or it may be damaged.
⚠️	**WARNING** Ensure that the cables that you connect to the instrument are routed so that they do not present a trip hazard.

3.4 Electrical Safety

4 USER INTERFACE AND SET-UP

4.1 Indicators Diagram

There are multiple indicators included with this unit by default for various alarms and functions. In addition, there are optional indicators that may be included

Figure 7- Indicators Diagram

Key	Description
1	Oxygen Sensor
2	Low Low O2 Alarm indicator
3	Fault Alarm indicator
4	Calibration Mode indicator
5	Acknowledge Button
6	Latch to Open Unit
7	Power Supply
8	LED Light Bar (Optional)

1. The Low alarm indicates that oxygen concentration has fallen below the first "Low" alarm setpoint. Operators should take caution in this condition and follow internal safety protocol.

-   The Low alarm is indicated by a change on the display screen with the blue numerical oxygen concentration value changing to flashing yellow and illuminating the Fault Light.

-   If included as an option, the Low alarm will additionally alert operators via an audible announcer and/or a corresponding light on the LED light bar.

2. The Low Low alarm indicates that oxygen concentration has fallen below the second "Low Low" alarm setpoint. Operators should immediately vacate, or refrain from entering, the area during this condition while following internal safety protocol.

-   The Low Low alarm is indicated by a change on the display screen with the blue numerical oxygen concentration value changing to flashing red. In addition, the blue "O2 Low" light on the unit, below the display, will turn on.

-   If included as an option, the Low Low alarm will additionally alert operators via an audible announcer and/or a corresponding light on the LED light bar.

3. The Fault alarm indicates that there is an error with the oxygen sensor. Operators should take caution and follow internal safety protocol during this condition.

-   When the Fault alarm is triggered, it will indicate via the red "Fault" light on the unit, below the display.

-   If included as an option, the Fault alarm will additionally alert operators via an audible announcer and/or a corresponding light on the LED light bar.

4. Calibration Mode is indicated when an operator has set the operating state to maintenance mode. The unit will indicate when operating in this condition via an orange/ yellow "Calibrate" light on the unit, below the display. For more information on Calibrations, please review the Calibrations Chapter of this Manual

4.2 Start-up Screen

The Start-up screen is the default screen for the OxyPro and displays current oxygen concentration levels, alarm notifications, date, time, system statuses, and access to the settings menus.
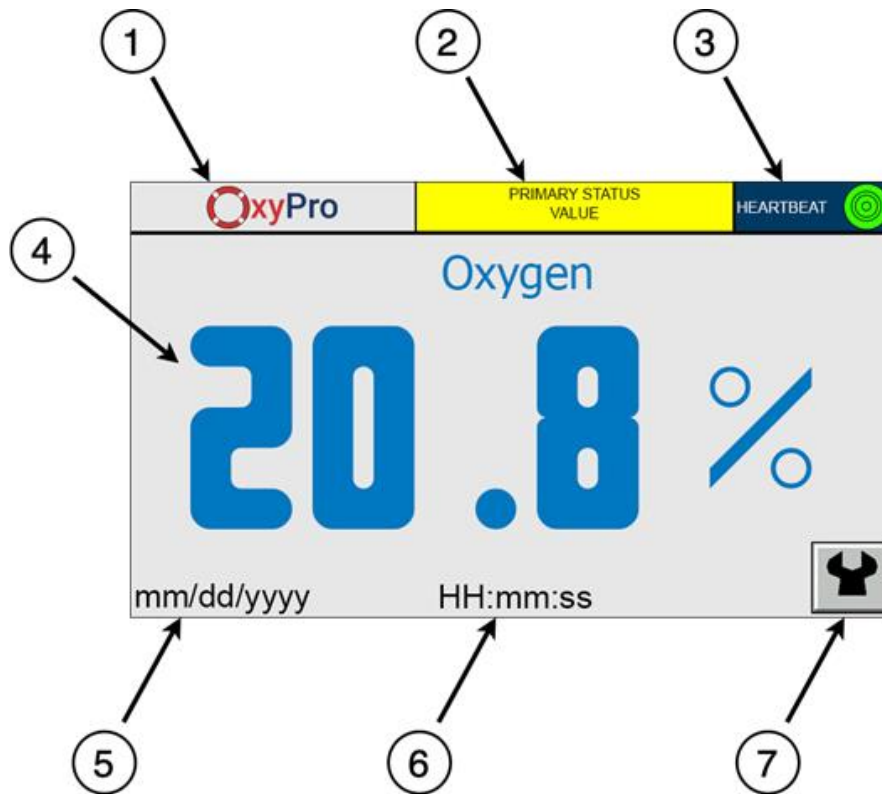
Figure 8- Start-up-Screen

Key	Description
1	OxyPro Logo
2	Primary Status
3	Heartbeat
4	Oxygen Concentration Value
5	Date
6	Time
7	Maintenance Icon / Main Menu screen

1. The **OxyPro Logo** is displayed in the top left of the screen and is a non-functional feature.

2. The **Primary Status** is displayed in the top middle of the screen and indicates normal, alarm, and error statues.

- **Normal** is indicated when the unit is in proper working condition.

- **Sensor Malfunction** is indicated when a malfunction has occurred within the sensor and the unit needs to be returned to the factory for repair.

- **Cal in Progress** is indicated when the unit is currently undergoing the calibration process.

- **Comm Failure** is indicated when the oxygen sensor is having a communication error with the interface.

- **Factory Reset** is indicated when the unit has recently undergone a reset back to all default settings.

- **Calibration Required** is indicated when the oxygen sensor requires calibration.

3. The **Heartbeat** feature is displayed in the top right of the screen. It includes a constantly blinking icon that indicates if the interface is properly communicating with the oxygen sensor.

- A green blinking light indicates that the interface is properly communicating with the oxygen sensor.

- A red blinking light indicates that the unit is not properly communicating with the oxygen sensor and troubleshooting is required.

4. The **Current Oxygen Concentration Value** is displayed in the majority of the Home Screen in large numeric values.

- Values in blue indicate that oxygen concentration is in safe conditions.

- Values in yellow indicate that oxygen concentration is in a "Low" condition and operators should take caution while following internal safety protocol.

- Values in red indicate that oxygen concentration is in an "Low Low" condition and operators should immediately leave, or not enter, the area while following internal safety protocol.

5. The **Date** is displayed in the lower left corner of the screen and can be programmed from the "Main Menu."

6. The **Time** is displayed in the lower middle of the screen and can be programmed from the "Main Menu."

7. The **Maintenance** icon is displayed in the lower right corner of the screen and is used to access the "Main Menu" and "Advanced Menu."

4.3 Main Menu Screen

The Main Menu screen allows operators to view the Alarms Log, oxygen concentration Trends, perform Single Point Calibrations, set the Date and Time, and access the Advanced Menu.

To access the Main Menu screen, select the "Maintenance" icon in the bottom right corner of the home screen.

- From the Main Menu, operators can navigate to the Alarms Log screen, Trending values screen, Single Point Calibration screen, Time Setup Screen, and Advanced Menu screen.
- Upon entering other screens, operators can return to the Main Menu screen by selecting the "left facing arrow" icon or select the Home icon to return to the Home screen, both located at the lower right corner of the display.

Figure 9- Main Menu Screen
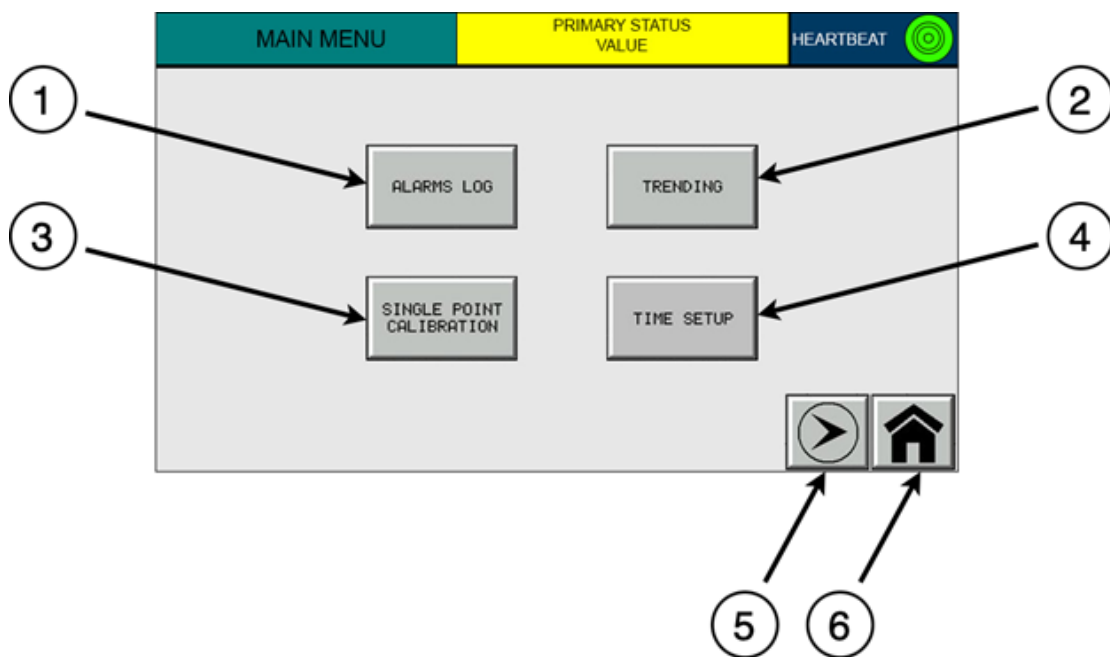
Key	Description
1	Alarms Log screen
2	Trending Values screen
3	Single Point Calibration screen
4	Time and Date Setup screen
5	Advanced Menu screen
6	Home Icon / Home screen

1. The **Alarms Log** can be accessed by selecting the "Alarms Log" icon in the top left of the Main Menu screen.

- The Alarms Log will display the most recent alarms that have been trigged on the unit.

2. The Trending screen can be accessed by selecting the "Trending" icon in the top right of the Main Menu screen.

- The Trending screen allows operators to view oxygen concentration trends for the past six minutes as well as the current oxygen concentration value.

- The Trending function must be enabled manually and is not enabled by default.

- To enable the Trending function, toggle the "Disabled" icon in the lower middle "Trending" section of the screen so that it now reads as "Enabled."

3. The **Single Point Calibration** screen can be accessed by selecting the "Single Point Calibration" icon in the bottom right of the Main Menu screen.

- The Single Point Calibration screen allows operators to enter Calibration Mode, set calibration values, and calibrate the oxygen sensor.

- For more information on the Single Point Calibration Procedure, please review the Calibrations Procedure Chapter, Single Point Calibration Procedure Section of this Manual.

4. The **Time and Date Setup** screen can be accessed by selecting the "Time Setup" icon at the bottom right of the Main Menu screen.

- The Time and Date Setup screen allows operators to modify the time and date displayed on the Home screen.

- To modify the time, select the time input field on the left side of the Time and Date Setup screen.

  o Operators can modify the time using the up/down arrows keys on the keypad to adjust the value in a 24 hour time scale (military time) format.

  o To change from modifying hours, minutes, and seconds, use the left and right arrow keys on the keypad.

  o When finished, select the "Enter" icon to input the new values and return to the Time and Date Setup screen.

  o To exit the keypad without modifying the time, click the "Esc" icon.

  o Select the "Close" icon to return to the Main Menu.

- To modify the date, select the date input field on the right side of the Time and Date Setup screen.
  o Operators can modify the date using the up/down arrows keys on the keypad to adjust the value in a MM/DD/YYYY format.

  o To change from modifying the month, day, or year, use the left and right arrow keys on the keypad.

  o When finished, select the "Enter" icon to input the new values and return to the Time

and Date Setup screen.

- o To exit the keypad without modifying the date, click the "Esc" icon.

- o Select the "Close" icon to return to the Main Menu.

5. The **Advanced Menu** screen can be accessed by selecting the "right facing arrow" icon ⊘ in the bottom right corner of the Main Menu screen. For more information about the Advanced Menu, please review the Advanced Menu Chapter of this Manual.

4.4 Advance Menu Screen

The Advanced Menu screen is password protected and allows operators to perform Advanced Sensor Calibration, review Sensor Diagnostics, modify the Alarm Setup (setpoints and analog outputs), modify Password Entry settings, modify Sensor Commands and restore their factory settings, view PLC Status information, modify Outputs Setup and Testing for digital outputs, and review the Communication Wiring diagram.

1. To access the Advanced Menu screen, select the "Maintenance" icon 🔧 in the bottom right corner of the home screen, this will display the Main Menu screen.

2. Next, select the "right facing arrow" icon ➡ in the bottom right corner of the Main Menu screen to access the Advanced Menu. The Advanced Menu screen is password protected, so the password will need to be entered to access this menu.

- To enter the password, click on the password section and then input the password on the keypad. Next click "enter" on the number pad, then click "enter" again on the password screen.

- On the same password screen, Password Protection can be timed out for convenience while programming alarm setpoints. By default, the password time out period will be according to its previous entry. To change the time out period, select the "password time out" value then use the keypad to input the time out value in minutes, up to 60 minutes.

3. Once in the Advanced Menu screen, operators can return to the Main Menu screen by selecting the "left arrow key" icon ⬅ at the bottom right of the Advanced Menu screen.
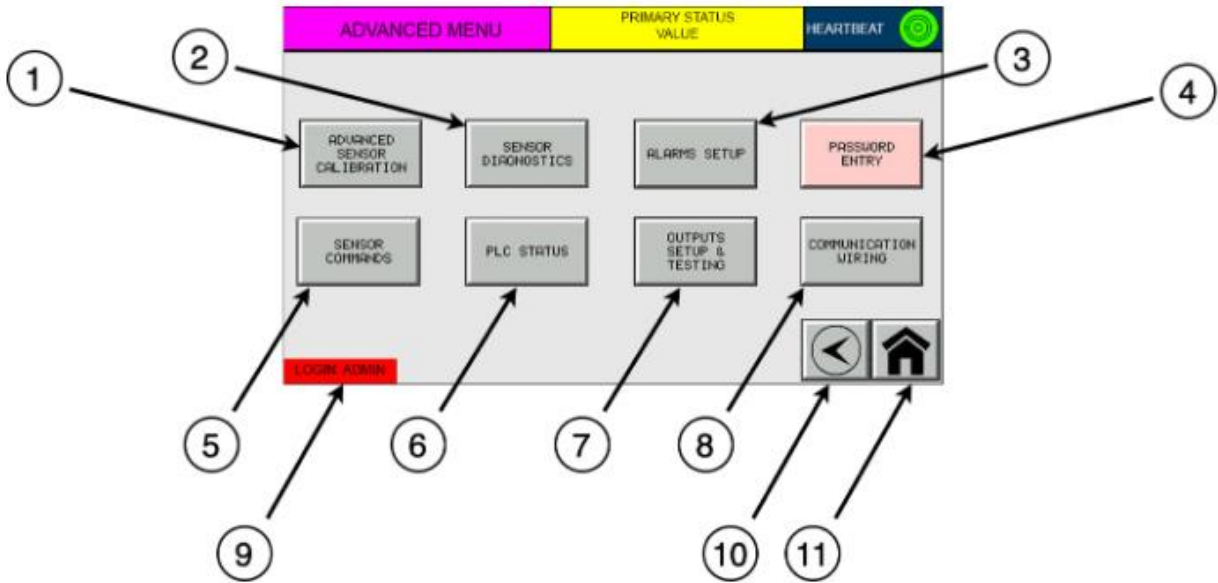
Figure 10- Advance Menu Screen

Key	Description
1	Advanced Sensor Calibration screen
2	Sensor Diagnostics screen
3	Alarms Setup screen
4	Password Entry screen
5	Sensor Commands screen
6	PLC Status screen
7	Output Setup & Testing screen
8	About screen
9	Password Login status
10	Return icon / Main Menu screen
11	Home icon / Home screen

1. The **Advanced Sensor Calibration** screen can be accessed by selecting the "Advanced Sensor Calibration" icon in the top left of the Advanced Menu screen.

- The Advanced Sensor Calibration screen gives operators the option of performing a **Single Point** or **Two Point** calibration of the oxygen sensor.

- For **Single Point** calibrations, please review the Calibrations Procedure Chapter, Single Point Calibration Procedure Section of this Manual.

- For **Two Point** calibrations, please review the Calibrations Procedure Chapter, Two Point Calibration Procedure Section of this Manual.

2. The **Sensor Diagnostics** screen can be accessed by selecting the "Sensor Diagnostics" icon in the top row of the Advanced Menu screen.

- From the Sensor Diagnostics screen, operators can review Fault Flags and Maintenance Flags in addition to reviewing explanations of meaning for each Flag.

3. The **Alarms Setup** screen can be accessed by selecting the "Alarms Setup" icon in the top row of the Advanced Menu screen.

- This screen allows operators to input custom setpoints for the Low alarm, Low Low alarm, restore default values, and modify Analog Output.

- For more information about modifying Alarm setpoints, please review the Alarms and Indicators Chapter, Alarms Setup Section of this Manual.

- For more information about modifying Analog Output, please review the Alarms and Indicators Chapter, Analog Output Section of this Manual.

4. The Password Entry screen can be accessed by selecting the "Password Entry" icon in the top right corner of the Advanced Menu screen. This screen allows operators to modify the settings for the password protection function of Advanced Menu screen options.

- The Password Time Out period allows operators to enter the Advanced Menu screen to view and modify advanced settings without having to reenter the password each time.

   o To modify Password Time Out settings, select the Password Time Out input field and use the keypad to enter the desired password time out duration, up to 60 minutes.

   o Once the desired Time Out period has been input, select the "Enter" key to save the changes.

   o To exit the Password Time Out settings without making changes, select the "Esc" key to return to the Password Entry screen.

- The **Password** can be changed as needed.

   o To change the Password, select the "Password" input field then use the keypad to enter the new password.

   o Once the desired Password has been input, select the "Enter" key to save the changes.

   o To exit the Password Time Out settings without making changes, select the "Esc" key to return to the Password Entry screen.

- To **Logout** from the Advanced Menu, thus bypassing the Password Time Out function, select the "Logout" icon under the "Logout Now" section, then select the "Home" icon. This will force the next user to enter the password before accessing the Advanced Menu screen.

5. The **Sensor Commands** screen can be accessed by selecting the "Sensor Commands" icon in the bottom left corner of the Advanced Menu screen. This screen allows operators to review information about the oxygen sensor, communication, and com port data.

6. The **PLC Status** screen can be accessed by selecting the "PLC Status" icon in the bottom row of the Advanced Menu screen. This screen allows operators to review interface information and output statuses.

7. The **Outputs Setup & Testing** screen can be accessed by selecting the "Outputs Setup & Testing" icon in the bottom row of the Advanced Menu screen. This screen allows operators to review statuses, modify switch, and test the function of the Low Low alarm, Low alarm, Fault alarm and their respective indicators. In addition, this screen allows operators to test the "Acknowledge" button function. For more information about Digital Output Setup & Testing, please review the Digital Outputs Chapter, Digital Outputs Setup Section of this Manual.

8. The **Communication Wiring** screen can be accessed by selecting the "Communication Wiring" icon in the bottom right corner of the Advanced Menu screen. This screen allows operators to review basic wiring of the unit.

9. The **Password Login Status** can be viewed at the lower left corner of the Advanced Menu screen.

- If the user is logged in, the "LOGIN: ADMIN" graphic should be displayed here.

- Once the **Password Timeout** has passed, this notification will no longer appear.

- For more information on **Password Entry** and settings, please review the Password Entry Section of this Chapter.

10. The "left facing arrow" icon allows operators to return to the Main Menu screen.
11. The Home icon allows operators to return to the Home screen.

4.5 Digital Output Screen
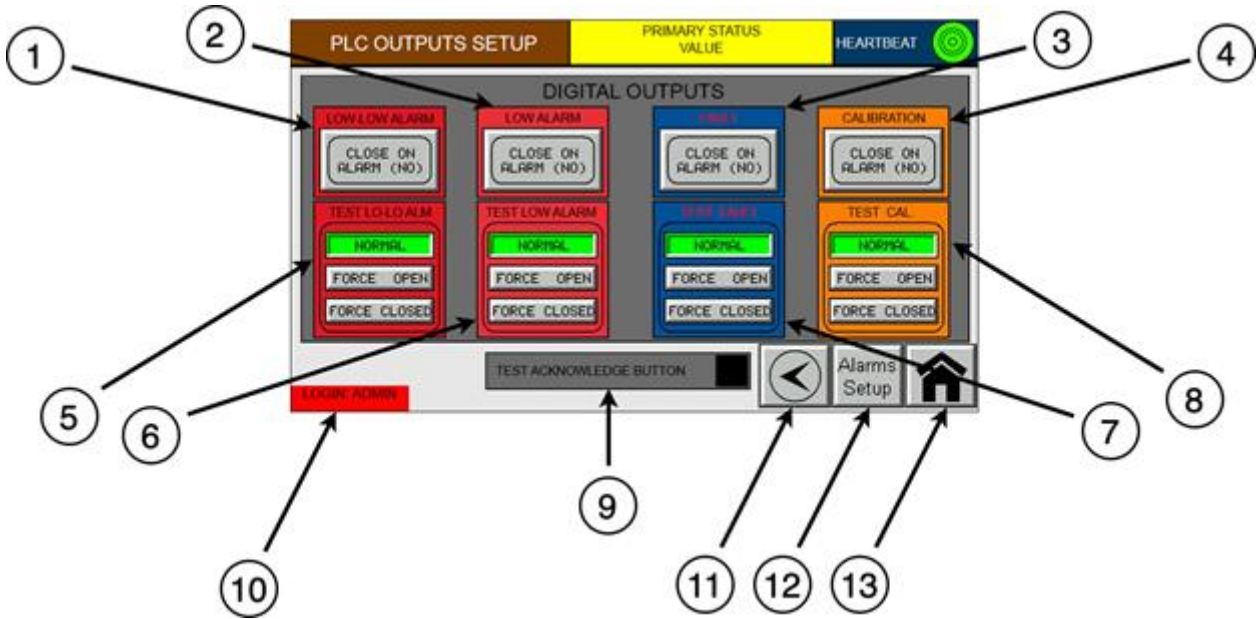
Figure 11 - Digital Output Set-up Screen

Key	Description
1	Low Low Alarm switch
2	Low Alarm switch
3	Fault Alarm switch
4	Calibration switch
5	Test Low Low Alarm function
6	Test Low Alarm function
7	Test Fault Alarm function
8	Test Calibration function
9	Test Acknowledge Button function
10	Password Login status
11	Return icon / Advanced Menu screen
12	Alarms Setup shortcut
13	Home icon / Home screen

4.5.1 Accessing the Digital Outputs Screen

The Digital Outputs screen allows users to invert switches and test or disable the functions for Low alarm, Low Low alarm, Fault, Calibration, and Acknowledge button.

1. To access the Digital Outputs screen, select the "Maintenance" icon in the bottom right corner of the home screen, this will display the Main Menu screen.

2. Next, select the "right facing arrow" icon in the bottom right corner of the Main Menu screen to access the Advanced Menu. The Advanced Menu screen is password protected, which will need to be entered to change digital output settings.

- To enter the password, click on the password section and then input the password on the keypad. Next click tap "enter" on the number pad, then click tap "enter" again on the password screen.

- The Password Timeout can also be modified from this screen. For more information on password protection settings, please review the Advanced Menu Chapter, Password Entry Section of this Manual.

3. From the Advanced Menu screen, select the "Outputs Setup & Testing" icon in the bottom row to access the Output Setup screen.

4. The Fault alarm, Calibration alarm, Low alarm, Low Low alarm, and Acknowledge features can be tested within this interface.

4.5.2 Digital Outputs Set-up

The digital outputs screen allows operators to invert switches for fault, calibration, Low alarm, and Low Low alarm to work in a perpetual state of normally-open or normally-closed outputs. Additionally, this screen can be used for testing the proper function of indicators for the alarms, Calibration, and the Acknowledge button. For all digital output indicators, a Force Closed is a test function to verify the feature is working correctly. A ForceForce Open is a disabling function that prevents the feature from operating.

1. The **Low Low** alarm switch can be inverted and/or tested from this screen.

- The "Close On Alarm (No)" feature can be used to invert the Low Low alarm.

- Once this feature is activated, the icon will change to display "Open On Alarm (NC)" to allow the switch to revert back to its default setting.

2. The **Low** alarm switch can be inverted and/or tested from this screen.

- The "Close On Alarm (No)" feature can be used to invert the Low alarm switch.

- Once this feature is activated, the icon will change to display "Open On Alarm (NC)" to allow the switch to revert back to its default setting.

3. The **Fault** alarm switch can be inverted and/or tested from this screen.

- The "Close On Alarm (No)" feature can be used to invert the Fault alarm.

    o Once this feature is activated, the icon will change to display "Open On Alarm (NC)" to

allow the switch to revert back to its default setting.

4. The **Calibration** switch can be inverted and/or tested from this screen.

- The "Close On Alarm (No)" feature can be used to invert the Calibration switch.

    o Once this feature is activated, the icon will change to display "Open On Alarm (NC)" to allow the switch to revert back to its default setting.

5. **Test Lo-Lo Alm** function includes "Normal", "Force Open", and "Force Close."

- **Normal** will allow the Low Low alarm to function as normal.

- **Force Open** will disable the Low Low alarm from functioning.

- **Force Close** will activate the Low Low alarm to ensure its proper function in addition to testing its indicators.

6. **Test Low Alarm** function includes "Normal", "Force Open", and "Force Close."

- **Normal** will allow the Low alarm to function as normal.

- **Force Open** will disable the Low alarm from functioning.

- **Force Close** will activate the Low alarm to ensure its proper function in addition to testing its indicators.

7. The **Test Fault** function includes "Normal", "Force Open", and "Force Close."

- **Normal** will allow the Fault alarm to function as normal.

- **Force Open** will disable the Fault alarm from functioning.

- **Force Close** will activate the Fault alarm to ensure its proper function in addition to testing its indicators.

8. The **Test Fault** function includes "Normal", "Force Open", and "Force Close."

- **Normal** will allow the Fault alarm to function as normal.

- **Force Open** will disable the Fault alarm from functioning.

- **Force Close** will activate the Fault alarm to ensure its proper function in addition to testing its indicators.

9. The **Test Acknowledge Button** can be tested from this screen.

- To test if the Acknowledge button is functioning properly, press the button.

- If working properly, a green square will appear in the "Test Acknowledge Button" section at the bottom middle of the screen.

- If not working properly, no change will occur and the black square on the right side will not change to green, thus indicating that troubleshooting is required.

10. The **Password Login Status** can be viewed at the lower left corner of the Digital Outputs screen.

- If the user is logged in, the "LOGIN: ADMIN" graphic should be displayed here.

- Once the **Password Timeout** has passed, this notification will no longer appear.

- For more information on **Password Entry** and settings, please review the Advanced Menu Chapter, Password Entry Section of this Manual.

11. The "left facing arrow" icon [<] allows operators to return to the Advanced Menu screen.

12. The **"Alarms Setup"** shortcut icon [Alarms Setup] allows users to quickly switch over to the Alarms Setup screen.

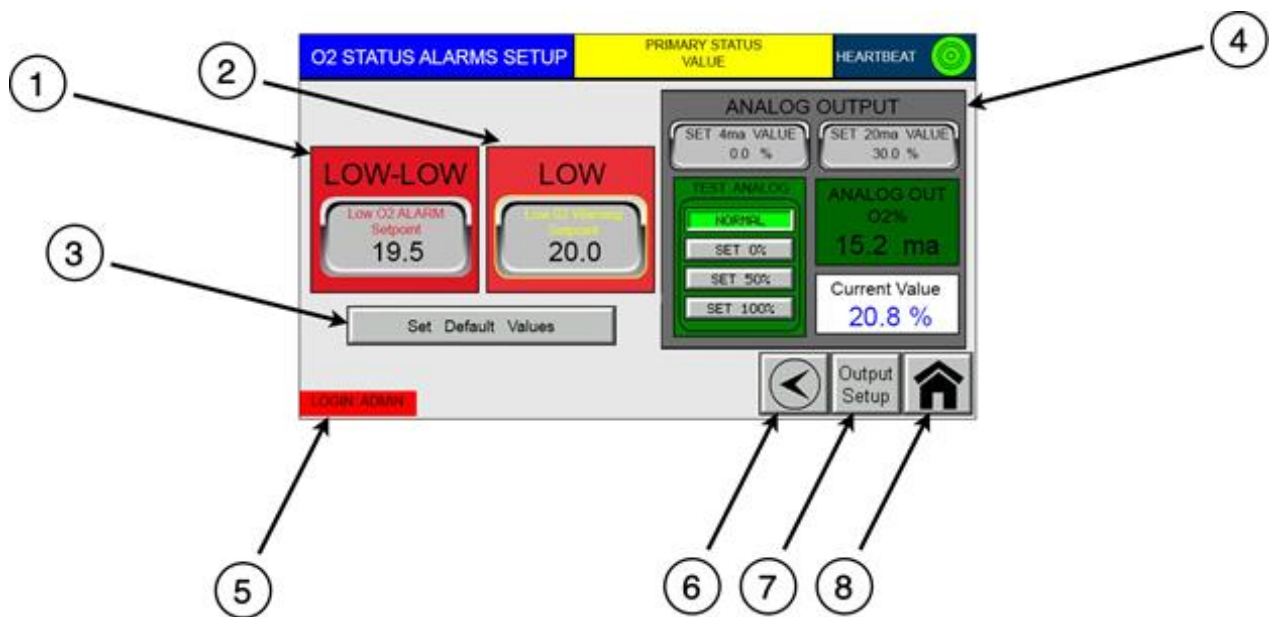13. The Home icon [🏠] allows operators to return to the Home screen.

4.6 Alarm Settings

Figure 12- Alarm Set-up Screen

Key	Description
1	Low Low Alarm setup
2	Low Alarm setup
3	Set Default Values icon.
4	Analog Output settings
5	Password Login status
6	Return icon / Main Menu screen
7	Digital Outputs shortcut
8	Home icon / Home screen

4.6.1 Alarm Setup

The alarm setup feature will allow the user to reconfigure the alarm settings' upper and lower limits, setpoint tolerance ranges, and analog output amperage values. The configurable functions are: Low, Low Low, Analog Output, and Test Analog.

1. The Low Low alarm will activate once the oxygen level has dropped below this setpoint value within a tolerance of ±0.1% O2. This will alert operators to immediately vacate, or avoid entering, the area while following internal safety protocol for Low Low oxygen conditions.

- This setpoint can be configured by tapping the "Low Low" alarm icon and inputting the desired value. This setpoint value must be less than the Low alarm value, but greater than 0% oxygen. The default setpoint for the Low Low alarm is 19.5% oxygen. If the Low Low alarm setpoint is higher than the Low alarm, an error message will appear until the issue is resolved.

- When the Low Low alarm is triggered, the numerical display for oxygen concentration will change from solid blue to include flashes of red numbers in standard models. Additionally, the blue "O2 Low" light on the unit, below the display, will turn on.

- If included as an option, the Low Low alarm will additionally alert operators via an audible announcer and/or a green light on the LED light bar.

- The Low Low alarm will not terminate until the "Acknowledge" button has been pressed after oxygen concentration has returned to normal conditions.

- Pressing the "Acknowledge" button before oxygen concentration returns to normal will pause the optional audible announcer for 60 seconds. If oxygen concentration has not returned to normal within 60 seconds after pressing the "Acknowledge" button, it will need to be pressed again to pause the announcer for an additional 60 seconds. The announcer will not terminate until the "Acknowledge" button has been pressed after oxygen concentration has returned to normal conditions.

2. The **Low** alarm will activate once the oxygen level has dropped below this setpoint value within a tolerance of ±0.1% O2. This will alert operators to take caution while following internal safety protocol for Low oxygen conditions.

- This setpoint can be configured by tapping the "Low" alarm icon and inputting the desired value.

This setpoint value must be less than 20.8% oxygen but greater than the **Low Low** alarm value. The default setpoint for the Low alarm is 20.0% oxygen. If the Low alarm setpoint is lower than the Low Low alarm, an error message will appear until the issue is resolved.

- When the Low alarm is triggered, the numerical display for oxygen concentration will change from solid blue to include flashes of yellow numbers in standard models.

- If included as an option, the Low alarm will additionally alert operators via an audible announcer and/or a green light on the LED light bar.

- The Low alarm will automatically terminate once oxygen concentration has returned to normal conditions.

- The "Acknowledge" button can be pressed to pause the optional audible annoucer for 60 seconds during Low alarm conditions. If oxygen concentrations remain in Low alarm conditions for more than 60 seconds after the "Acknowledge" button is pressed, the announcer will resume and the button will need to be pressed again to pause the audible alarm for an additional 60 seconds.

3. The **Set Default Values** function is a single-tap feature that restores low and low low setpoint values to factory default setpoints.

4.6.2 Analog Output

The settings for the Fault alarm cannot be adjusted. The Fault alarm indicates when there is an error with the sensor.

- **Analog Output** is an adjustable 4-20ma value setting that controls analog output power. This can be configured to any range between 0 - 100% output with quick-selection features of normal, 0%, 50%, and 100% in the Test Analog feature. Adjusting the Analog Output allows users to scale oxygen concentration values accordingly, so that users may integrate oxygen values with their DCS.

4.6.3 Fault Alarm

The settings for the Fault alarm cannot be adjusted. The Fault alarm indicates when there is an error with the sensor.

- The **Fault** alarm indicates that there is an error with the sensor and troubleshooting is required.

    o When the Fault alarm is triggered, the red "fault" light on the unit, below the display, will turn on.

    o If included as an option, the Fault alarm will additionally alert operators via an audible announcer and/or a red light on the LED light bar.

    o The Fault alarm will not terminate until the "Acknowledge" button has been pressed after the Fault error has been resolved.

    o Pressing the "Acknowledge" button before the Fault error has been resolved will pause the optional audible announcer for 60 seconds. If Fault error has not resolved within 60 seconds after pressing the "Acknowledge" button, it will need to be pressed again to pause the announcer for an additional 60 seconds. The announcer will not terminate until the "Acknowledge

4.6.4 Accessing the Alarm Screen

The Alarms Setup screen allows users to configure custom setpoints for the Low and Low Low alarms in addition to configuring the Analog Output settings.

1. To access the **Alarm Setup** screen, select the "Maintenance" icon in the bottom right corner of the home screen, this will display the **Main Menu** screen.

2. Next, select the "right facing arrow" icon in the bottom right corner of the Main Menu screen to access the **Advanced Menu**. The Advanced Menu screen is password protected, which will need to be entered to change alarm set points.

    o To enter the password, click on the password section and then input the password on the keypad. Next click "enter" on the number pad, then click "enter" again on the password screen.

    o The **Password Timeout** can also be modified from this screen. For more information on password protection settings, please review the Advanced Menu Chapter, Password Entry Section of this Manual.

3. From the Advanced Menu screen, select the "Alarms Setup" icon in the top row to access the Alarm Setup screen.

4. The **Low** alarm, **Low Low** alarm, **Analog Output**, and **Test Analog** settings can be viewed and reconfigured within this interface.

5 CALIBRATION

The calibration procedure will need to be performed after each system start-up and/or location change. This procedure ensures a consistent operational range between 0-99% O2 monitorization and ensures linear measurements within ±0.2% tolerances.
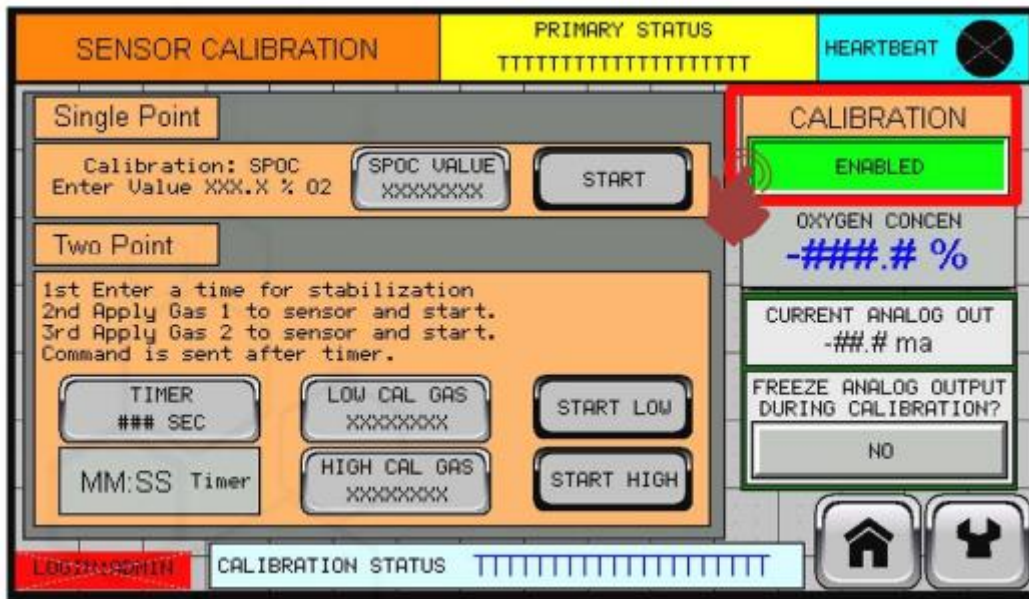
5.1 Single Point Calibration
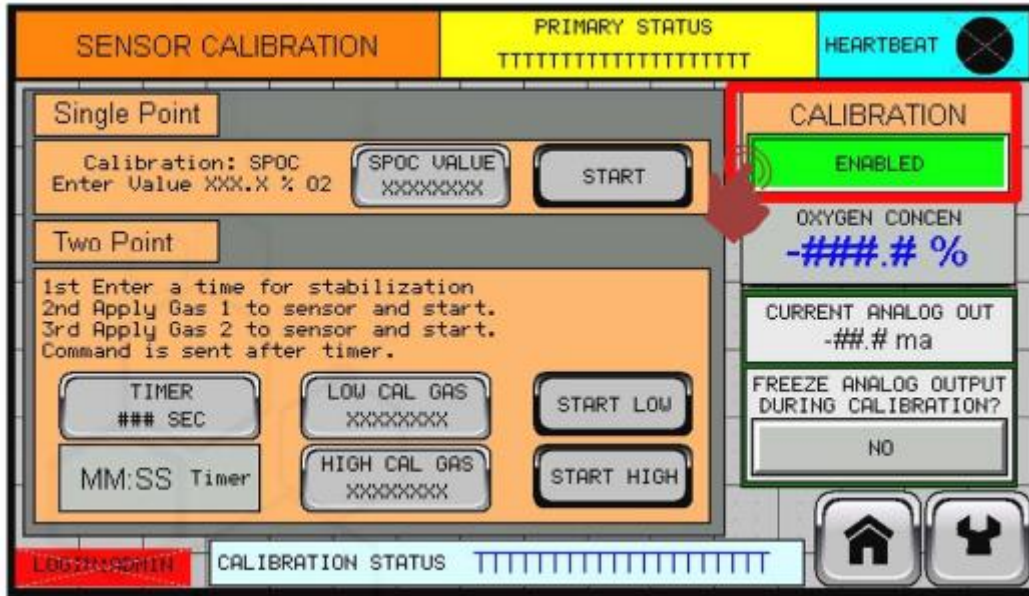
1. Verify the lid is closed securely.

2.   To enter Calibration Mode, toggle the "Disabled" icon in the "Calibration" section in the upper right side of the screen so that it now reads as "Enabled." The orange/yellow indicator light on the unit, below the display, will begin to flash.

3. Once enabled, operators can then modify the SPOC Value by selecting the SPOC Value input field and using the keypad to input the desired value, then clicking "Enter." To exit the SPOC Value screen without making changes, click the "Esc" icon to return to the Single Point Calibration screen.

4. Once the desired SPOC Value screen is input, select the "Start" icon to begin the calibration process.

5. The "Start" icon will indicate as "Running" during the calibration process and the "Calibration Status" at the lower middle of the screen will indicate as "Sensor Calibrating." Additionally, the orange/yellow indicator light will stop flashing and begin to indicate constantly.

6.   Once the calibration process has ended, the "Calibration Status" will briefly indicate as "Calibration Complete" before exiting Calibration Mode and indicating as "Calibration Disabled." At this point, the orange/yellow indicator light will turn off.

5.2 Two Point Calibration

1. Verify the lid is closed securely.

2. To enter Calibration Mode, toggle the "Disabled" icon in the "Calibration" section in the upper right side of the screen so that it now reads as "Enabled." The orange/yellow indicator light on the unit, below the display, will begin to flash.

3. Once enabled, operators can then modify the SPOC Value by selecting the SPOC Value input field and using the keypad to input the desired value, then clicking "Enter." To exit the SPOC Value screen without making changes, click the "Esc" icon to return to the Single Point Calibration screen.

4. Connect the Calibration cap to the OxyPro sensor.

5. Apply a pure gas containing no O2 concentration and set the "LOW CAL GAS" box to 0.

6. Allow time for stabilization.

7. Once the value is stable, press "START LOW" calibration process. The Timer will begin countdown to 0, the Calibration light activate for two (2) seconds, and then it will turn off. Once it is off, the sensor is ready to receive the High point calibration. It is mandatory to do the High point calibration immediately after the Low Point Calibration to avoid sensor malfunction.

8. Apply a gas with a known High O2 concentration to the system (set the system to 20.9 if using ambient air) set this concentration in the "HIGH CAL GAS" box.

9. Wait for stabilization.

10. Press "START HIGH" calibration process. The Timer will start running, once the timer reaches 0, the Calibration light will stay solid for ten (10) seconds and then shut off. Once the calibration light is off, the system is ready.

Note: the minimum oxygen difference between the Low-Cal Gas and the High-Cal Gas need to be over 20%

6 STORAGE AND DISPOSAL

6.1 Storage

Refit any protective plastic covers and place the instrument and any associated equipment in its original packaging before storage. Alternatively, seal it inside a waterproof plastic bag, sack, or storage box.

Store the instrument and any associated equipment in a clean, dry area. Do not subject it to excessively hot, cold, or humid conditions: see *Section 2.2.*

6.2 Disposal

Dispose of the instrument and any associated equipment safely, and in accordance with all of your local and national safety and environmental requirements.

☞ The instrument is not suitable for disposal in municipal waste streams (such as landfill sites, domestic recycling centres and so on).

☞ If you send the instrument to psctexas or your local psctexas agent for disposal, it must be accompanied by a correctly completed decontamination certificate.