BARBEN ANALYTICAL

AMETEK®



Instruction Manual

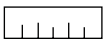
OXYvisor™

Oxygen Analyzer Software
for use with Windows PC

Optical O_2 Products


Dashboard


Diagnostics


Settings


Calibration


Logs



BARBEN ANALYTICAL

Software Instructional Manual
OXYvisor™ Optical Oxygen Analyzer

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Document Revision Table

Revision	Document No.	Device Serial	Date
1	1901 OXYvisor Software IM	1808-A-A-1-001	January 4th, 2019

Disclaimer

This operations and maintenance manual is a guide. The information in this manual has been carefully checked and is believed to be accurate for the intended use of this analyzer. However, Barben Analytical assumes no responsibility for any inaccuracies that may be contained in this manual. In no event will Barben Analytical be liable for direct, indirect, incidental, special or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. Barben Analytical reserves the right to make improvements in this manual and to the products it describes at any time, without notice or obligation.

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Section 1 - General Intro & Safety

1.1 Introduction

Thank you for your purchase of the OXYvisor optical oxygen analyzer. Barben Analytical is a market leading analytical supplier that designs, manufactures and sells analytical measurement products for the process industries. Our core products consist of pH and ORP electrochemical sensors along with gas and liquid phase optical oxygen analyzers. These products are designed to meet the most difficult and robust applications found in the industrial process markets such as; Chemical, Refining, Petrochemical, Oil & Gas, Pulp & Paper, Power and Semiconductor. Barben Analytical is an Ametek company, within the Thermal Process Management business unit (TPM BU). Ametek is a US company, operating globally throughout the world, with revenues exceeding $4 Billion.

For additional product and services related to this use and installation of this OXYvisor product, such as field start-up services, classroom product trainings, wet-gas sample probes, heated sample lines, pressure reduction stations or other needs please contact us at Barben Analytical.

- **Sample Probes**
- **Pressure Reduction Stations (PRS)**
- **Heated Sample Lines (HSL)**
- **Sample Conditioning Panels (SCP)**
- **Manual & AutoCal Panels**
- **Field Start-Up Services**
- **Product and Applications Training**

1.2 About the OXYvisor's OxygenAnalyzer software product

The OXYvisor is Barben Analytical's second generation optical oxygen analyzer. The analyzer measures from trace level (ppmv) oxygen to percent level oxygen in both the gas and liquid phases (range and application dependent on sensor selection). It's intended for indoor and outdoor use, as a continuous analytical measuring device, in manufacturing and industrial processes, along with laboratories. The device has been tested and approved for use in hazardous areas via a third party OSHA approved NRTL, Underwriters Laboratories Inc. (UL LLC), with North American (NEC, CEC) and global (ATEX, IEC) certifications.

The OXYvisor can be entirely setup via the HMI through-the-glass keypad (less AGI compressibility input). The OxygenAnalyzer software is not required for setup, configuration or use of the OXYvisor.

The Oxygen Analyzer software is included as an accessory for those users who have access to a PC (and the area permits the connection) and prefer to setup, configure, trend and/or data-log via a PC.

The Oxygen Analyzer software utilizes two-way read-write capability with the OXYvisor via RS485 two-wire serial communication. The user will need a RS485 cable to connect from the OXYvisor to the PC (cable not part of standard supply). The Oxygen Analyzer software allows for easy setup of all the OXYvisor's configurations and settings, including advanced features (AGI compressibility routine) only accessed via the software. Although not required, we would recommend using the software for detailed setups of auto-calibration, AGI compressibility and alarm relays with high/low set-points.

1.3 Definition of Symbols

Definition of the symbols for hazardous, cautionary, precautionary and general information are found and defined here below.



WARNING

Safety warning indicates a potentially or imminently hazardous situation which, if not avoided, may result in personal injury or environmental contamination.



CAUTION

General warning, caution, that if an operating procedure which, if not strictly observed, may result in damage or malfunction of the analyzer.



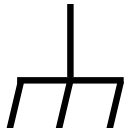
CAUTION

Caution, possibility of electric shock may occur if an operating procedure which, if not strictly observed, may occur.



IEC 60417-5019

Protective conductor terminal.



IEC 60417-5020

Frame or chassis terminal.



IEC 60417-5032

Alternating Current (AC)

IEC 60417-5031

Direct Current (DC)



Useful and/or important information that should not be overlooked

1.4 Safety Summary

The OXYvisor is designed for use in manufacturing, industrial and laboratory analytical applications. Individual installations may vary in scope. The installer should consult national and local codes along with any site specific installation requirements to ensure that governing regulations are met.

The OXYvisor goes through functional, quality and performance testing prior to leaving the factory. For safe operation, prior to installation or operation, please read the entire manual and adhere strictly to all the WARNINGS, CAUTIONS, and NOTES contained within this manual. Failure to do so could result in serious injury to the operator, the equipment or property.



If the equipment is used in a manner not specified, the protection provided by the equipment may be impaired!

1.4.1 Electrical Safety



Up to 264 VAC may be present in the analyzer housings. Always shut down power source(s) before performing maintenance or troubleshooting. Only a qualified electrician should make electrical connections and ground checks.

1.4.2 Grounding

Instrument grounding is mandatory. Performance specifications and safety protection are void if instrument is operated from an improperly grounded power source.



Verify ground continuity of all equipment before applying power

1.4.3 General Installation Precautions

When installing optional electronic measurement or control equipment, general installation precautions should be observed:

- **Select a site that is free from direct sunlight, extreme temperatures, or abrupt temperature variations.**
- **Select a site where the ambient air is free from corrosive gases, or abrasive materials.**

The equipment should not be connected to surfaces or enclosures subjected to severe vibration or conductive heat. Protective shock absorbent, non-thermally conductive mounts should be installed to isolate the equipment from excessive vibration and thermal conduction.

- **Do not install analyzer near equipment emitting electromagnetic interference (e.g. AC pumps, motors, etc).**
- **Electrical wiring should be installed according to the National Electrical Code, local regulations and codes along with and in addition to any other applicable industry codes and regulations.**
- **The supply voltage should strictly adhere to the instrument specifications, be supplied from a stable reliable source, and be provided with proper ground connection(s).**
- **Signal connections should be made using shielded wiring.**
- **Signal , control, and interface wiring should be located separately from power supply lines.**

Section 2 - Software Installation

2.1 OXYvisor- OxygenAnalyzer PC Requirements

Minimum PC Requirements	
Item Description	Specification Recommendations (Comments)
Processor	1 gigahertz (GHz) or faster
Memory	1 gigabyte (GB) for 32-bit or 2 gigabyte (GB) for 64-bit
Hard disk space	8 GB for 32-bit OS and 10 GB for 64-bit OS
Operating System	Windows 10 (this is the recommended and fully tested version, but not required)
USB Port	2.0 or 3.0 USB port
Internet Connection	Not required but drivers for RS485 - USB cable should be installed if not available

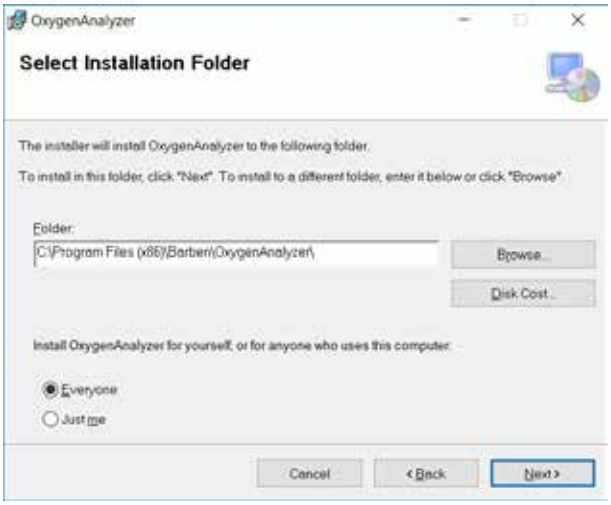
2.2 OxygenAnalyzer - Software Installation

Software Installation gives step-by-step installation of the OXYvisor's OxygenAnalyzer software.



Starting the software installation

Double Click on the "Setup" file on the CD provided with your OXYvisor. The setup file will walk you through the software installation process. Click Next on each of the screens to successfully install the software on the computer.

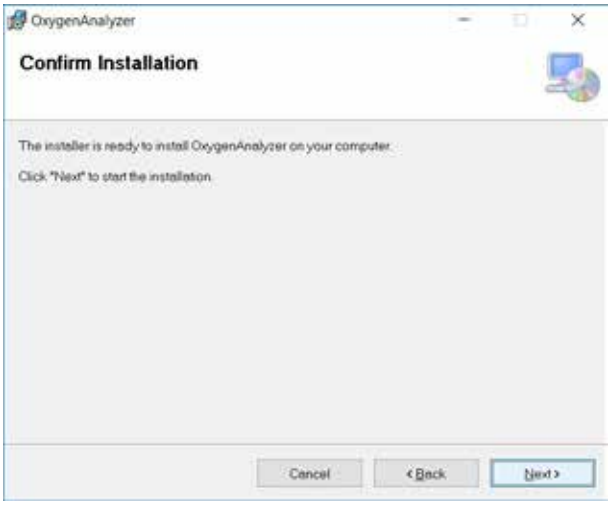


Select installation folder

The installer will install the OxygenAnalyzer to the selected file folder.

Once you have selected the preferred file location,

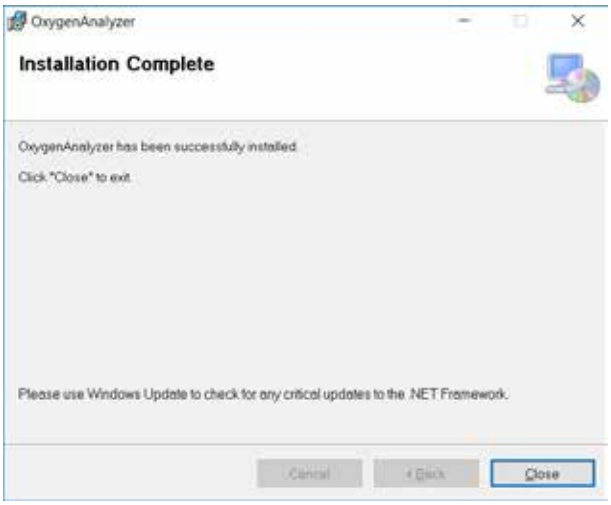
Click "NEXT" to continue installation



Confirm the installation

The installer is ready to install the OxygenAnalyzer software onto the computer.

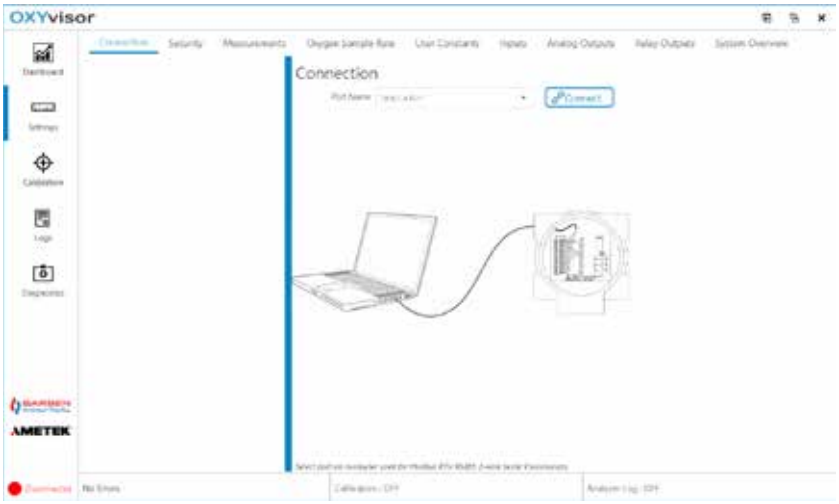
Click “NEXT” for the installation to begin.



Installation complete

The OxygenAnalyzer software has been successfully installed onto the computer.

Click “CLOSE” for the installation to begin.



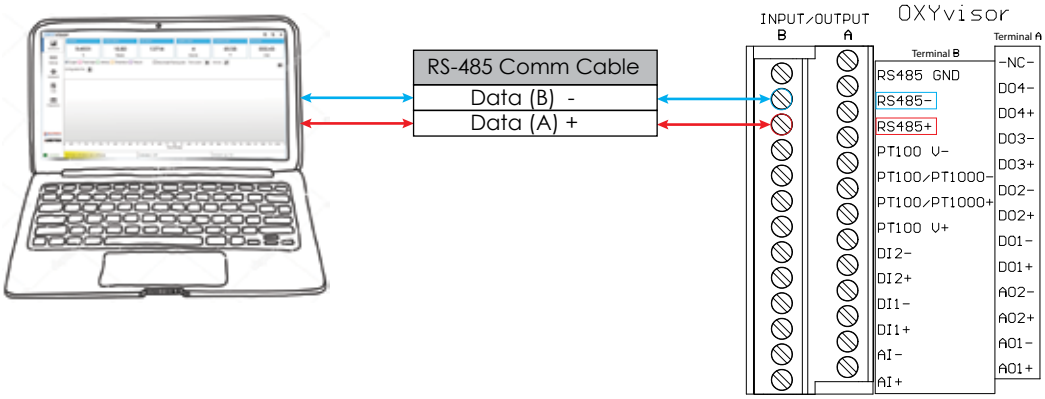
Launch the software

Upon successful installation, the main software window will open as shown below. If you have not made the wiring connections to the RS485 terminals located in the rear compartment of your **OXYvisor** you will see the **DISCONNECTED** indication (bottom left).

Section 3 - Hardware (Wiring) Connection

3.1 Hardware (Wiring) Connection

The **OXYvisor** communicates to a PC via the Modbus RS485. In order to use the OxygenAnalyzer software with a PC the user will need a RS485 cable. The connection between the PC and OXYvisor via the RS485 cable is shown below. The RS485 is typically terminated with USB for connection to the PC and 2-wire pinned leads for connection to the **OXYvisor** rear terminal, Input/Output terminal "B", RS485+ and RS485-.



DANGER

Do not open the **OXYvisor** *compartment(s) when an explosive atmosphere is present. Consult OXYvisor product manual to preserve the protection afforded by the equipment*

Up to 264 VAC may be present in the **OXYvisor** *analyzer housing. Always shut down power source(s) before performing maintenance or troubleshooting. Only a qualified electrician should make electrical connections and ground checks.*

CAUTION

Note: It is recommended to use a USB-RS485 converter with a CH340 chip. USB-RS485-WE. We do not recommend a FTDI USB-RS485 converter cable.

3.2 - Common Accessories

The software itself, OxygenAnalyzer, is included in the purchase of the **OXYvisor**. For other accessories, such as the RS485 connecting cable and USB Memory stick please contact your sales rep.

Accessories for PC Software and Data Logging		
Part No.	**Description**	**Purpose**
B4XYZ-0XYZ	USB RS-485 Cable (USB to pinned leads), 5ft	Connect from PC to **OXYvisor**
B4XYZ-0XYZ	USB Memory stick 2 GB, short profile	Download data-log from **OXYvisor** to memory USB

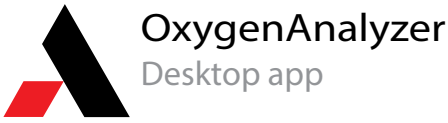
Section 4 - Software or OXYvisor

4.1 Starting the OXYvisor Software

Once the OXYvisor OxygenAnalyzer software has been installed and the PC has been connected to the OXYvisor via an appropriate RS485 connecting cable you can begin using the software.

Start the OxygenAnalyzer software via your desktop Icon or from the windows program menu.





OxygenAnalyzer software desktop ICON (far left) and windows start menu program ICON (near left)



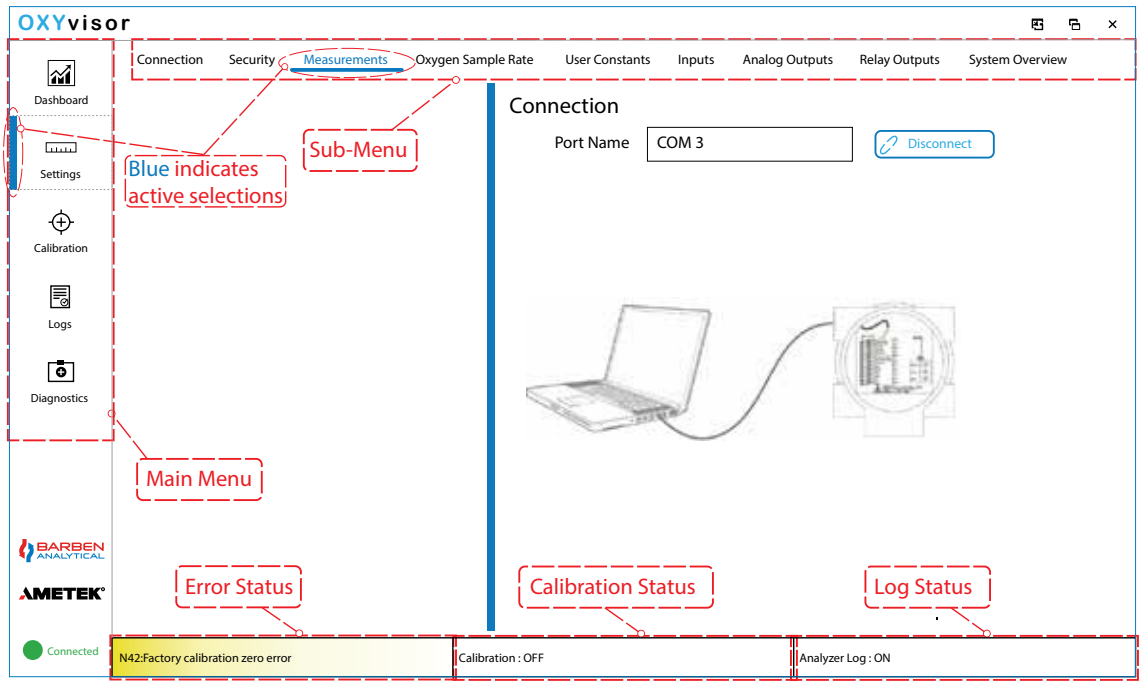
Once the software is connected to the OXYvisor, the HMI on the OXYvisor will still work for viewing on the Main and Alternate displays. However, the user at the HMI will not be allowed to change the configuration, settings or be able to perform any calibrations while the analyzer is connected to the PC OxygenAnalyzer software.



Auto-calibrations (scheduled or initiated) have priority over other activities, including software activities. If auto-calibration occurs while the PC software is connected the user can still fetch data and observe values, however the **Calibration Status** will be ON and the save function will not be available for any configuration changes until after the auto-calibration is complete.

4.2 Software - Structure - Main Menu Overview

As shown in the screen below (RED), the **Main Menu** items are located on the left side of the window. The **Sub-Menu** tabs are located horizontally on the top. On the very bottom of the window, you will find **Error Status**, **Calibration Status** (ON or OFF) and **Analyzer Logging Status** (ON or OFF).

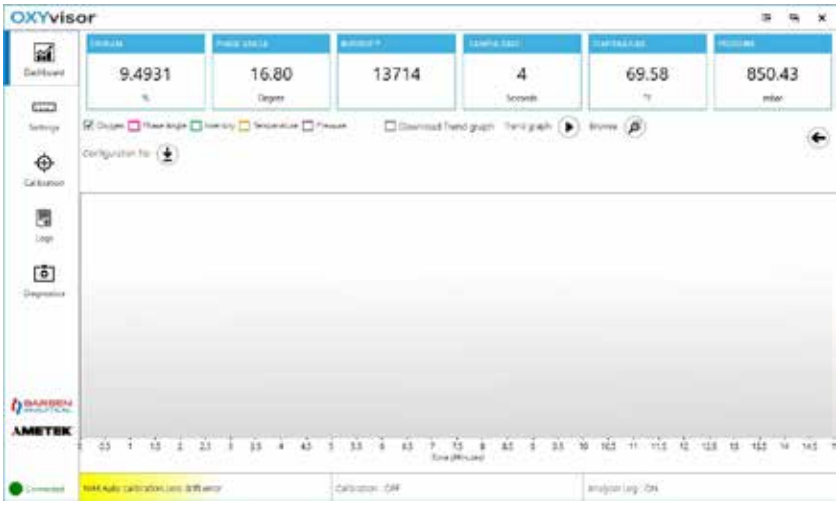


Main Menu	Description	Available Sub-menus
Dashboard	Shows Live Measurement Values from OXYvisor	
Settings	OXYvisor Configuration and Setting Menus	Connection Security Measurements Oxygen Sample Rate User Constants Inputs Analog Outputs Relay Outputs System Overview
Calibration	Calibration options for the OXYvisor	Last Cal Status Factory Calibraiton Manual Calibration Auto Cal Setup Auto Cal Schedule Temp/Pressure Cal
Logs	Logging options	Error Log Calibration Log Data Log
Diagnostics	Diagnostic Test and AO Trim	Test Gas Insert Relay Test Analog output trim

USEFUL INFORMATION

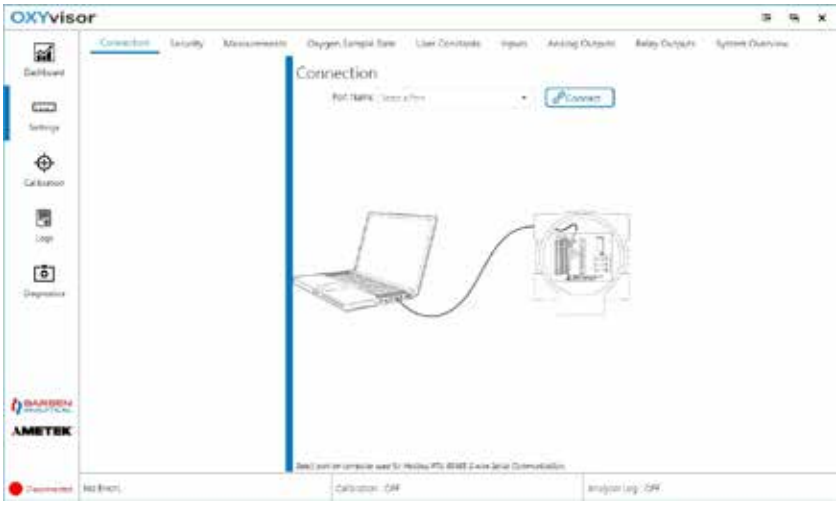
"Fetching from Device" message will occur when switching between Main Menus or Sub-Menus. Once the software retrieves active values from the OXYvisor they will be displayed on the screen, the message will go away and the settings will be available for change.

4.3 OXYvisor - Software - Dashboard and Connectivity



Dashboard

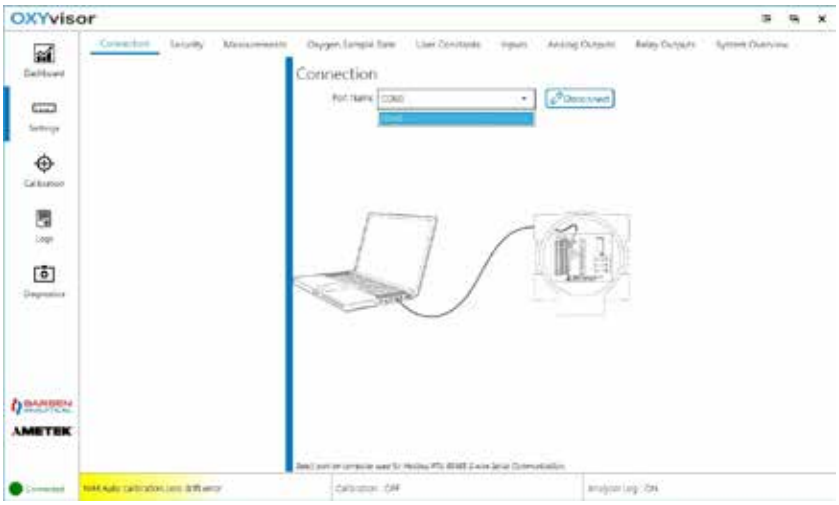
Upon startup, the software should start displaying the Oxygen concentration, phase angle, and other parameters as shown on left.



SETTINGS (Disconnected)

If the software has issues connecting, the message "**DISCONNECTED**" is shown in the lower left corner of the window, in red.

Check wiring connections and re-launch the program. If you are still having issues check your com port selections in **SETTINGS/ CONNECTION.**



SETTINGS / CONNECTION

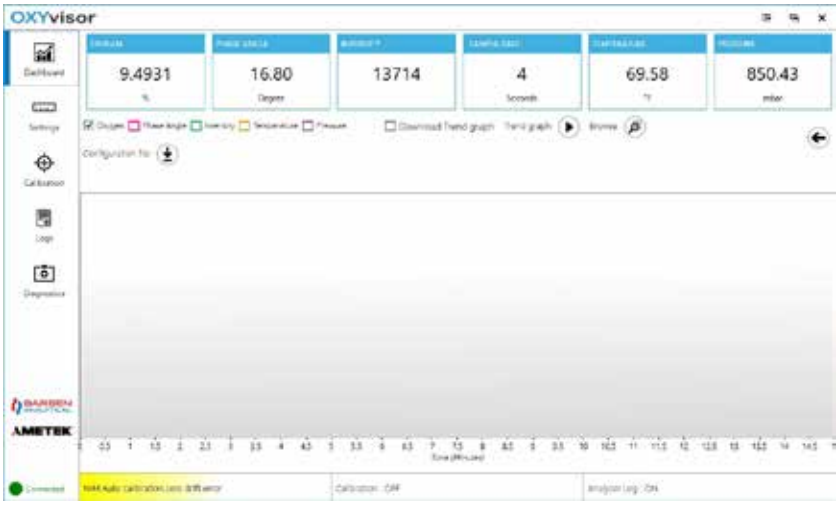
Allows selection of the PC's COM Port for communication to the OXYvisor. Under the **SETTINGS** menu, select the sub-menu **CONNECTION**, to select COM port via drop-down menu.

Once connected, the message "**CONNECTED**" will be shown in the lower left corner of the window, in green.

USEFUL INFORMATION

The OXYvisor should automatically detect the COM Port connected to the computer. If nothing is detected via the software, check the wiring connections on the Terminal Board and the connection to the computer. If the COM port is still not detected, try switching to a different USB port on the computer for the COM port to be detected on the software.

4.4 OXYvisor - Software - Dashboard Interface



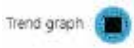
DASHBOARD - (Connected)

Click on the **Dashboard** tab on the Top left corner. The Oxygen readings and other parameters will be displayed as shown below.



DASHBOARD - Trending / Graphing

To trend or graph, check the boxes of the specific parameters you want to be displayed and click the **Trend graph** button.





DASHBOARD - Saving Trend Data

To save the trend data

1. Click on the **Browse** button, select the location of the file to be saved.

2. Check the **Download Trend graph** option and click the **Trend Graph** button to start the data logging and plot the data in real-time.



DASHBOARD - Input/Output Status

An additional display options can viewed by clicking the ← button. This will show the **Input/Output** current status display.

4.5 OXYvisor- Settings - Security



SETTINGS / SECURITY

Security menu is used to set a password to each or all of the menu's in the OXYvisor HMI.

To enable or lockout a menu (requires password)

1. Enter four digit number next to menu
2. Select the check box next to the menu

USEFUL INFORMATION

Record your password in a safe location. If lost or forgotten, contact the factory.

CAUTION

Enabling the security settings via the software will mean that the password is required at either software or HMI interface.

4.6 OXYvisor - Settings - Measurement



SETTINGS / MEASUREMENT

Allows user to configure the BOSx oxygen sensor type, media (gas or liquid phase), humidity, pressure compensation type, measurement units (O_2, Temp & Pres) and the Signal Data (signal length).



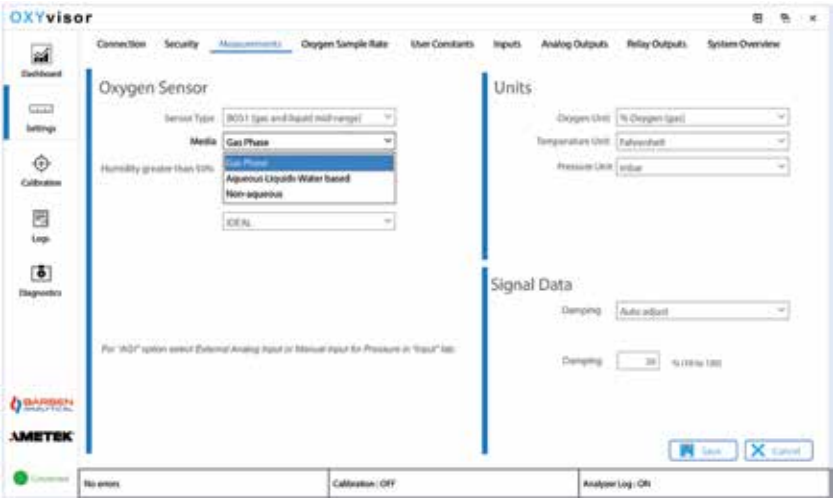
SETTINGS/MEASUREMENT - Sensor Type

User must select the BOS_X **SENSOR TYPE** that you have purchased with the OXYvisor instrument. Options are

BOS1: 0 to 5% O_2 (mid range)

BOS2: 0 to 25% O_2 (full range)

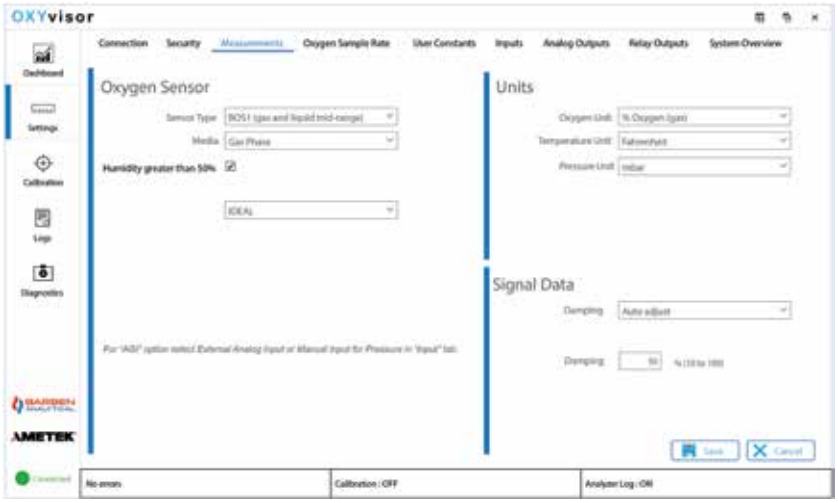
BOS3: 0 to 300 ppm O_2 (trace range)



SETTINGS / MEASUREMENT - Media

Media: Select the proper media for the application. **Gas Phase**, **Aqueous Liquids-Water based** or **Non-Aqueous** environment.

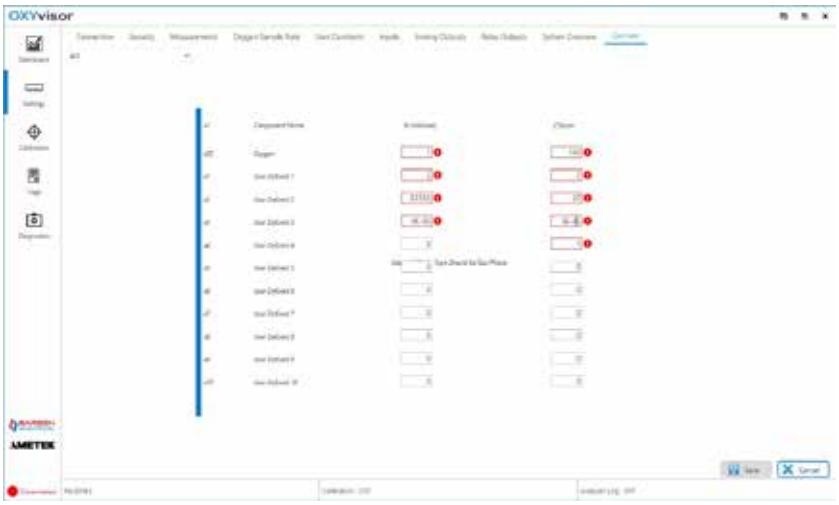
Note: For ppm or ppb dissolved oxygen (DO) in water solution, select Aqueous Liquids.



SETTINGS / MEASUREMENT - Humidity

If the humidity of the process (environment) in which the sensor is going to measure in, is greater than 50%, and the user wants a special dry basis O_2 calculation then select this box.

This selection accounts for the water vapor content (assumes 100% saturated at the measured temperature) and reports the oxygen on a dry basis if the water were to be removed.



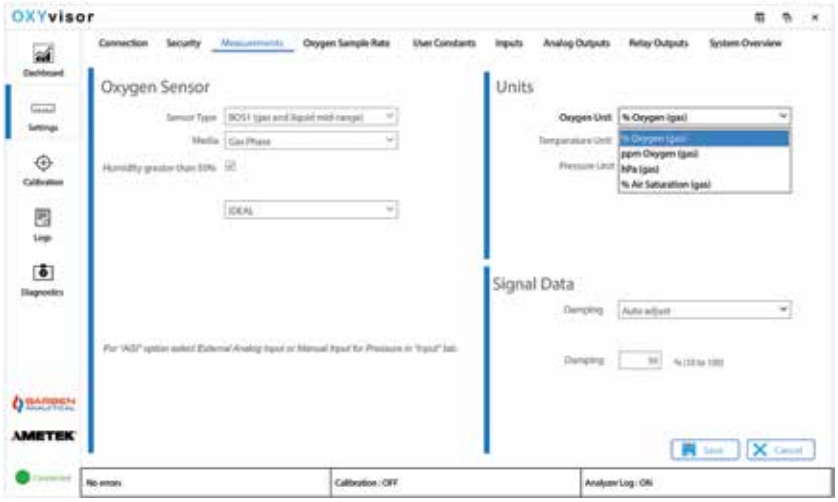
SETTINGS / MEASUREMENT - AGI

IDEAL, signifies the pressure comp will use the Ideal Gas Law for calculation. This is the default and recommended for almost all applications.

If advanced compressibility factor needs to be used, select the **AGI** option and enter the %Volume (mole) and Z factor for each component present.

USEFUL INFORMATION

Components must total 100%

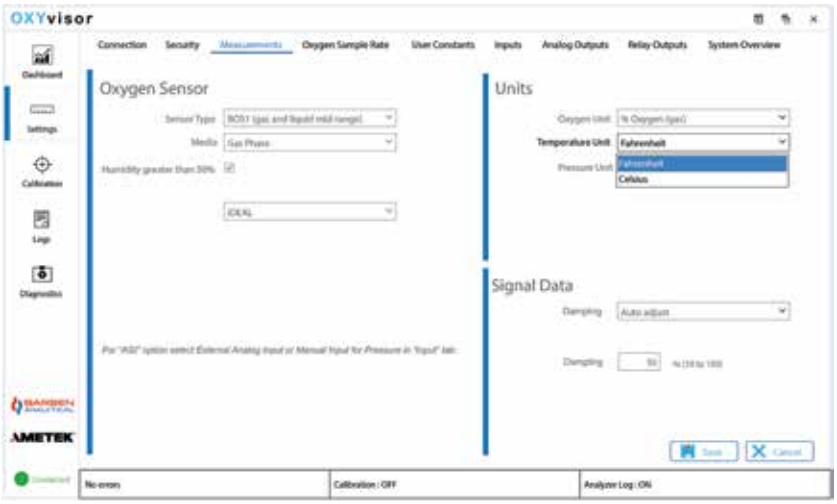


SETTINGS / MEASUREMENT - O2 Units

Oxygen Units: Depending on your selection for **Gas** or **Aqueous Phase** measurements, the options for oxygen units will be:

Gas Phase: % Oxygen, ppm Oxygen, hPa, % Air Saturation

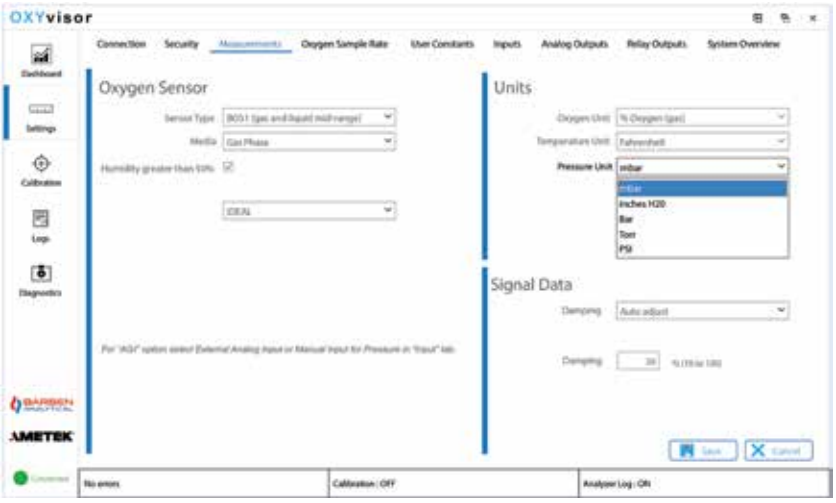
Aqueous Phase: ppm or ppb dissolved oxygen.



SETTINGS / MEASUREMENT - Temp Units

Temperature Units: There are two options to display the temperature units:

Fahrenheit or degree **Celsius**.

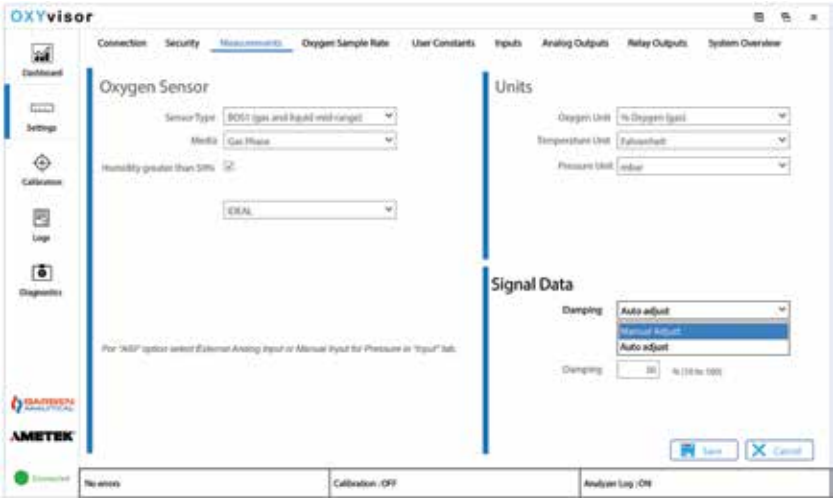


SETTINGS / MEASUREMENT - Pressure Units

Pressure Unit: The pressure can be displayed as:

mBar, **inches H_2O, Bar, Torr** or **PSI**

Note: unless otherwise specifically stated, all the displayed pressure measurements are absolute pressure.



SETTINGS / MEASUREMENT - Signal Data

The **SIGNAL DATA** allows for technical adjustments to the signal's pulse length and intensity.

AUTO ADJUST is the default and recommended for almost all applications.

The **INTENSITY** may be adjusted up or down depending on sensor style and application.

CAUTION

Changes to **SIGNAL DATA** may affect the measurement performance and lifetime of the sensor. Please consult the OXYvisor manual for a detailed explanation of when to change these settings and what the recommended values would be for different cases.

CAUTION

If the OXYvisor is displaying a X22 error, "Signal intensity is too high" decrease the INTENSITY (signal strength) until the error goes away immediately! Failure to do so will cause damage to the sensor. Consult OXYvisor manual for further details and suggestions on properly setting this parameter.

4.7 OXYvisor - Settings - Oxygen Sample Rate

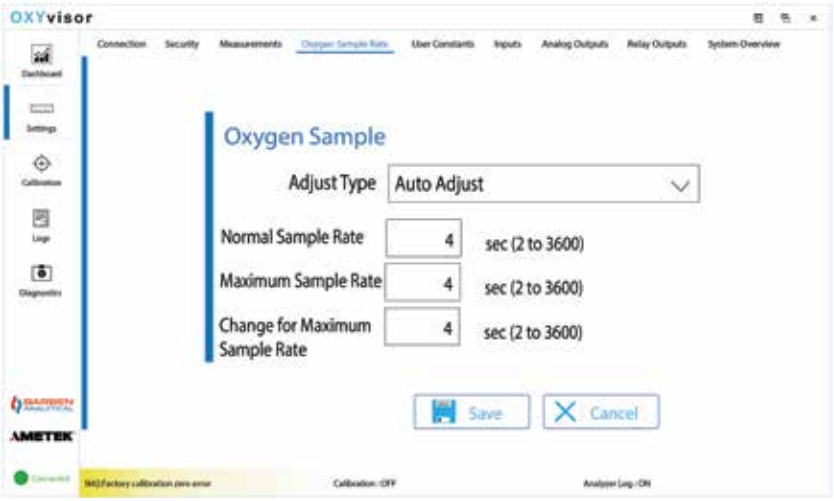


SETTINGS / OXYGEN SAMPLE RATE - Manual

The **OXYGEN SAMPLE RATE** determines how often to pulse the LED which results in a new measurement update.

We recommend the slowest sample rate acceptable for the applications to lower the drift and extend the life of the sensor.

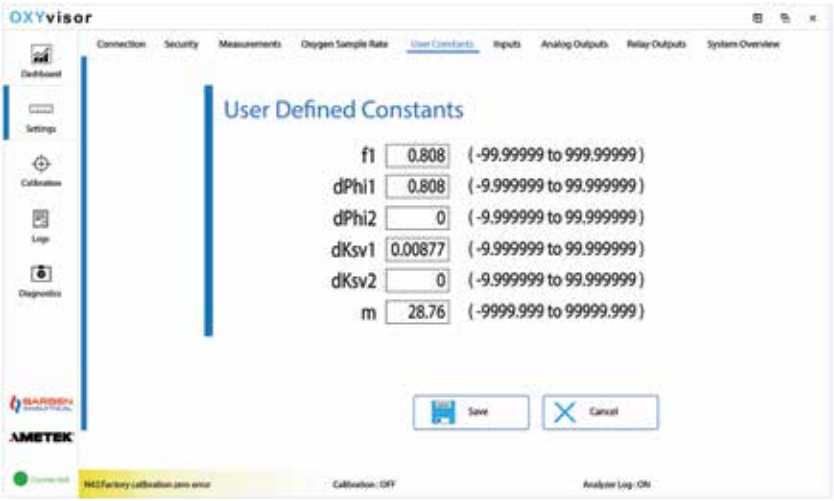
The recommended **SAMPLE RATE** is 60 seconds.



SETTINGS / OXYGEN SAMPLE RATE - Auto

The **AUTO ADJUST**, an advanced feature, is used to sample at a slow sample rate until a step-change is detected in the process and then a faster rate is used to capture the moving process values. Once the analyzer detects stability in the measurement it automatically goes back to the slow sample rate. User defines the sample times and tolerances in this screen.

4.8 OXYvisor - Settings - User Constants



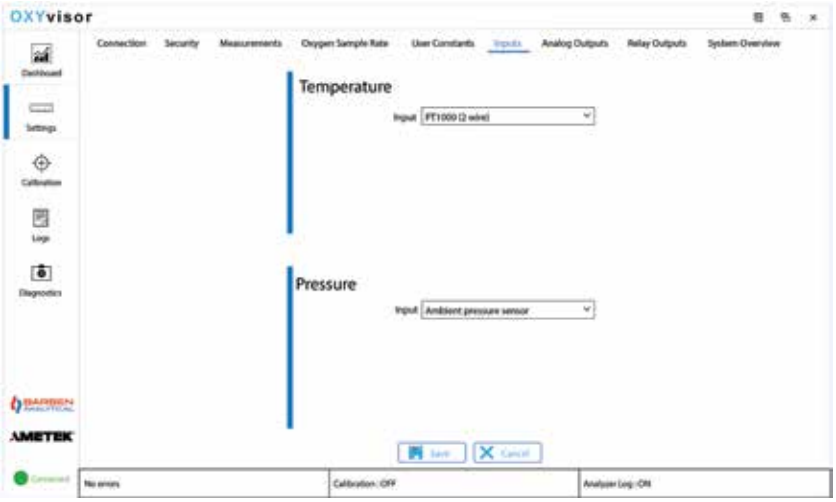
SETTINGS / USER CONSTANTS

Do not adjust these values unless you have received a special sensor with these values from the factory. The **USER CONSTANTS** are the Stern-Volmers oxygen sensor constants. These values are automatically populated for standard BOS_X sensors. These should not be changed unless advised by Barben Analytical Personnel.

CAUTION

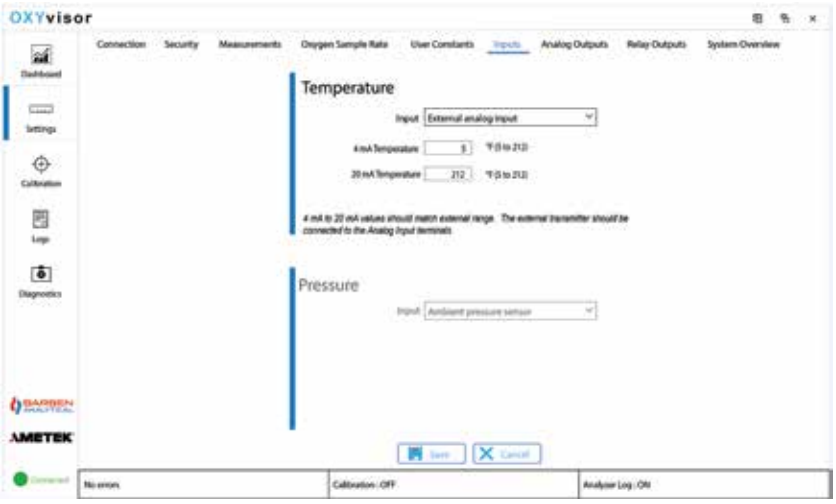
Changes to the **USER CONSTANTS** may affect the measurement performance and lifetime of the sensor. Please consult the OXYvisor manual for a detailed explanation of when to change these settings and what the recommended values would be.

4.9 OXYvisor- Settings - Inputs



SETTINGS / INPUTS

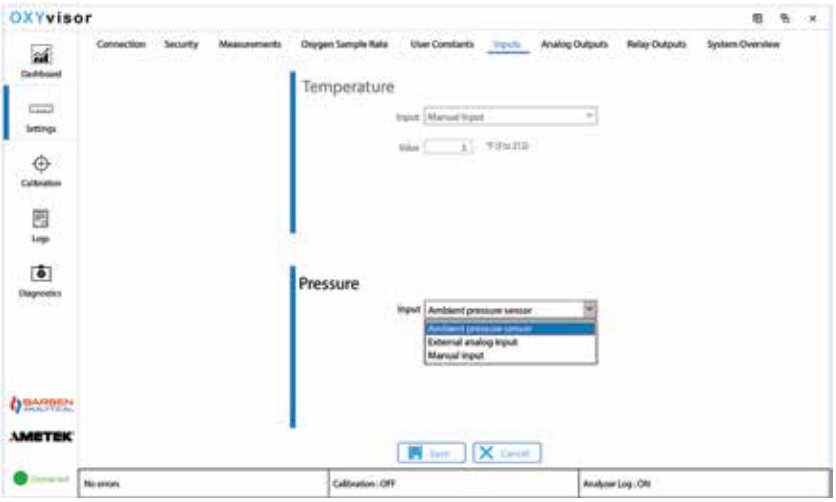
The OXYvisor allows for the use of different types of temperature and pressure sensors to be used for the measurement calculations.



SETTINGS / INPUTS - Temperature

The OXYvisor allows for the following type of temperature inputs: Manual, PT1000 RTD, 4-20mA input from an external temperature transmitter.

If the external analog input option is selected, adjust the 4 and 20mA points to match the range of the temperature transmitter.



SETTINGS / INPUTS - Pressure

The OXYvisor allows the following type of pressure inputs: Manual, On-board ambient pressure sensor, or a 4-20mA can input from an external pressure transmitter.

If the external pressure transmitter is selected adjust the 4 and 20 mA points to match the range of the external pressure transmitter.

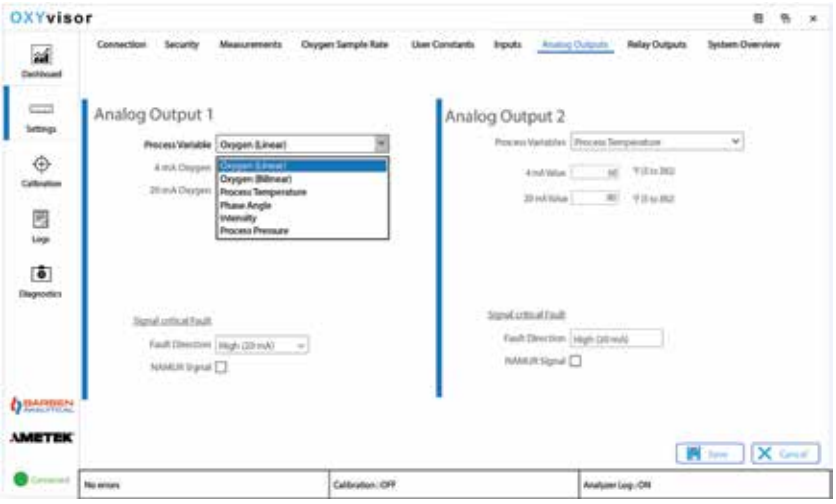


SETTINGS / INPUTS - Pressure

Same as above. This screen shows when the external pressure transmitter has been chosen and how the user must match the analog 4-20 mA range of the external device.

If value on display does not precisely match the output from the xmttr see **CALIBRATION/ Temp-Press Cal**

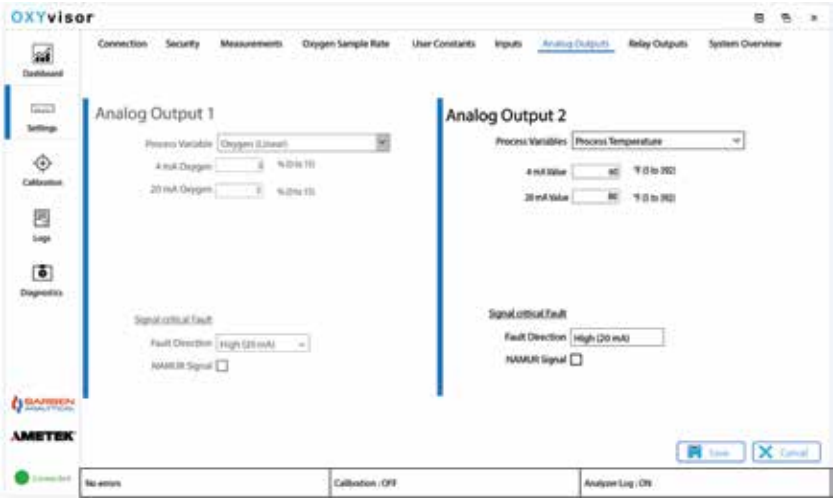
4.10 OXYvisor - Settings - Analog Outputs



SETTINGS / ANALOG OUTPUTS

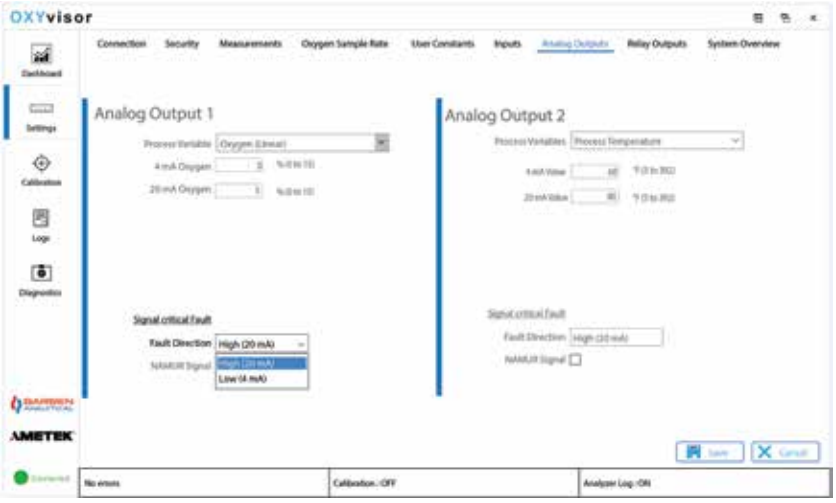
The OXYvisor provides two 4-20mA **ANALOG OUTPUT** signals which can be configured to two different process variables. The options are Oxygen, Temperature, Phase Angle, Intensity and Pressure.

If these are activated, but not wired you will receive an error N53 or N54, “open circuit.”



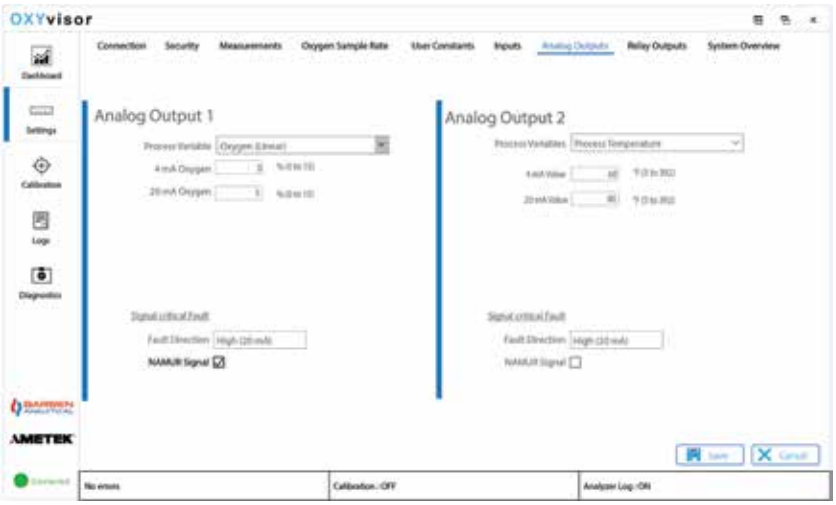
SETTINGS / ANALOG OUTPUTS - 4 - 20 mA

Sets the 4-20 mA analog output ranges.



SETTINGS / ANALOG OUTPUTS - Fault Direction

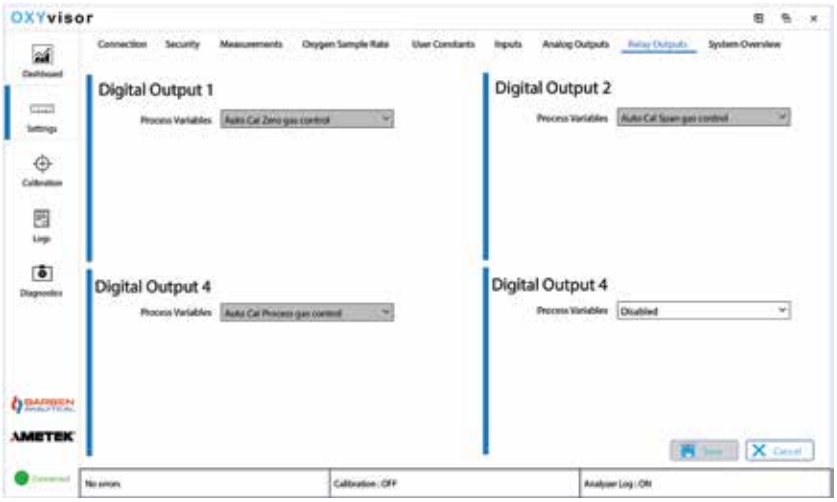
The **Fault Direction** can be configured to fail low (4mA point) or fail high (20mA point.)



SETTINGS / ANALOG OUTPUTS - NAMUR

The OXYvisor has the provision for **NAMUR** output signal with fail low at 3.6mA and fail high at 21mA point. This can be enabled by checking the box for **NAMUR** signal.

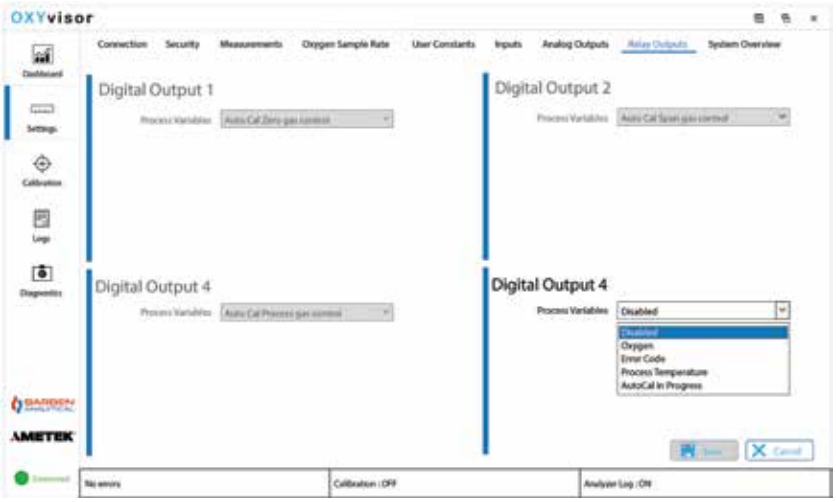
4.11 OXYvisor - Settings - Relay Outputs



SETTINGS / RELAY OUTPUTS

The OXYvisor has 4 programmable digital **RELAY OUTPUTS,** which can be connected to low-wattage solenoid valves or other alarm/annunciators.

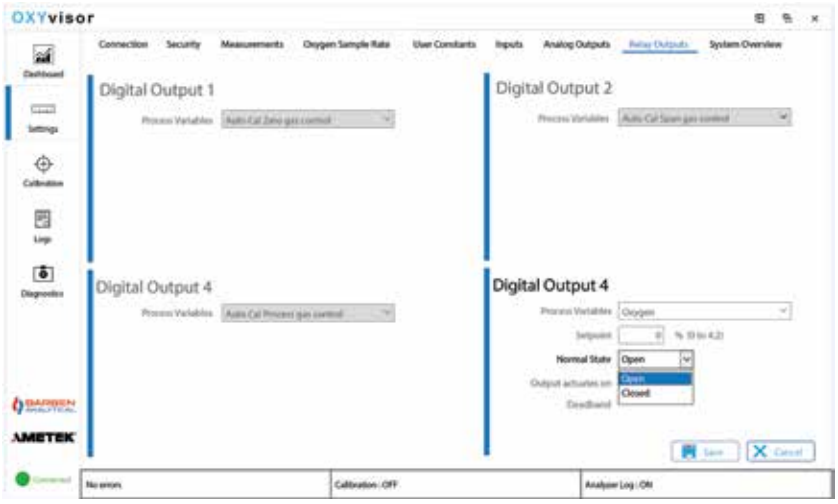
Relays can be programmed as NC or NO and activated based upon general (any) error, specific errors, high or low set-point (with hysteresis) or time-based to operate auto-cal solenoids.



SETTINGS / RELAY OUTPUTS - AutoCal DO4

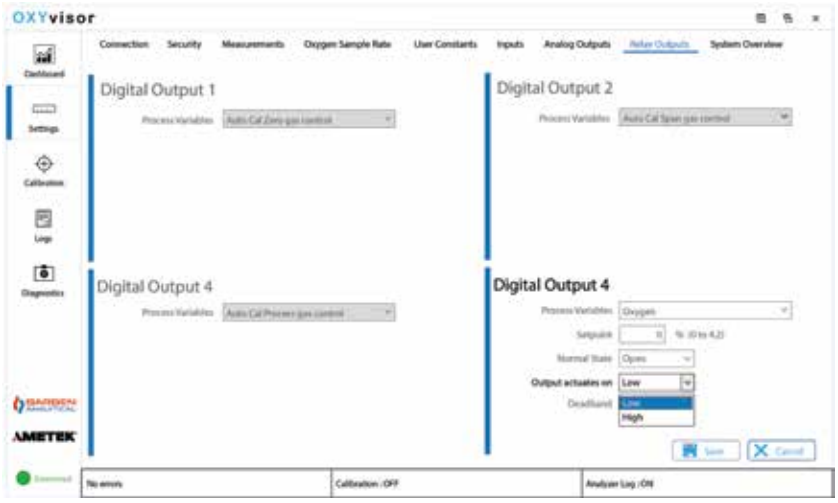
When **AutoCal** is enabled, it automatically assigned D01, D02 and D03 for these functions.

During this time **Digital Output 4** can still be configured as an alarm/indicator as either **NC** or **NO** and which can be enabled if process variable (PV) exceeds or passes a critical value. It also has a unique selection, **AutoCal in Progress**



SETTINGS / RELAY OUTPUTS - Setpoint

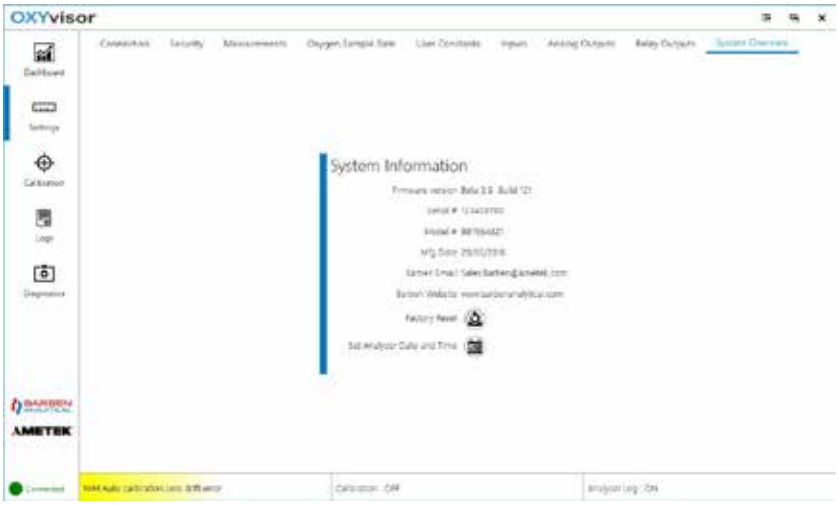
After tying a relay to a PV of O_2 or Temp, the **SETPOINT** is entered as the trigger value at which the relay will change state (open/close). The **NORMAL STATE** is selected as **NO** or **NC**.



SETTINGS / RELAY OUTPUTS - Setpoint

The **OUTPUT ACTUATES ON** determines if the alarm triggers when above (high) or below (low) the SETPOINT. The **DEADBAND** is set to avoid "chatter" on a relay when process is close to **SETPOINT.**

4.12 OXYvisor - Settings - System Overview



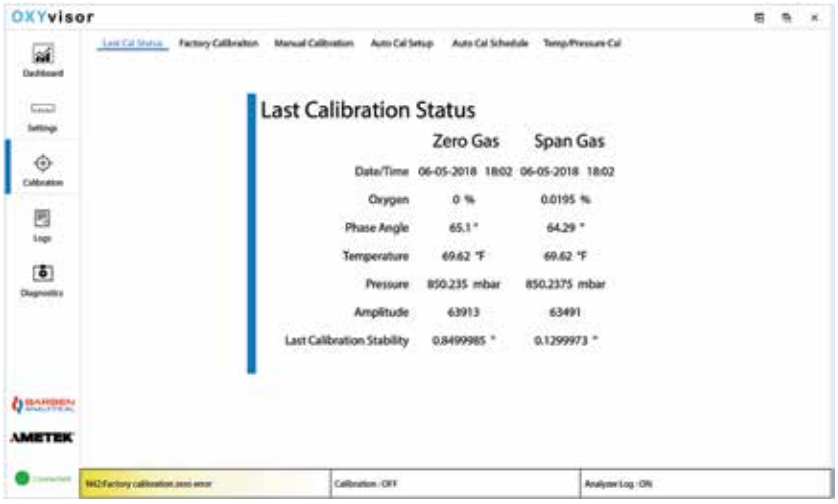
SETTINGS / SYSTEMS OVERVIEW

SYSTEM OVERVIEW contains the OXYvisor's S/N, model #, manufactured date and factory contact.

Contains the **FACTORY RESET**. This will return the analyzer to original factory configuration settings and values.

Date and Time can be set to the local date/time.

4.13 OXYvisor - Calibration - Last Cal Status

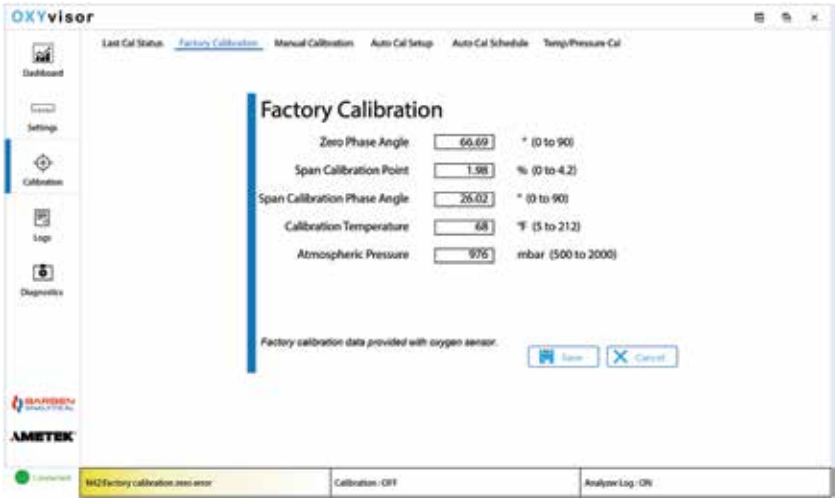


CALIBRATION / LAST CAL STATUS

Last Calibration Status provides all the important calibration information from the last successful performed calibration.

If single point calibration is performed, then the info contains the new single point data plus the non-calibrated point's previous data.

4.14 OXYvisor - Calibration - Factory Calibration



CALIBRATION / FACTORY CALIBRATION

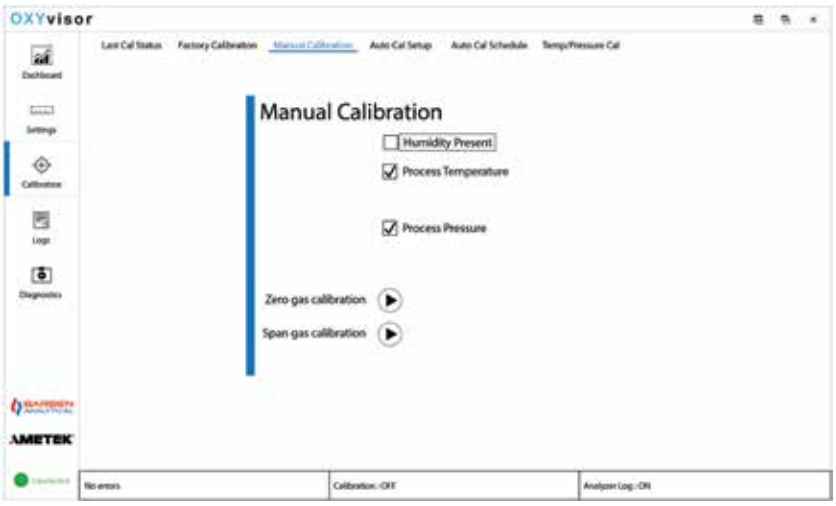
The **Factory Calibration** provides the cal values noted while calibrating a specific sensor at the factory. These values are found on the sensor cal cert and can be loaded into the OXYvisor.

In case of a bad calibration or the incorrect oxygen readings, the user can set the sensor back to factory calibration from this screen.

CAUTION

Using the FACTORY CALIBRATION is only a short term remedy. For best results the user should perform a two-point manual or auto-calibration

4.15 OXYvisor - Calibration - Manual Calibration



CALIBRATION / MANUAL CALIBRATION - Step 1

Manual Calibration allows the user to perform a single point or two-point calibration.

Humidity - Select this option if the calibration gas is presented to the sensor in a wet, saturated environment where the gas humidity is expected over 50%. This will use the calculated oxygen concentration less expected water vapor (assumes 100% saturated).

Select the **Process Temperature** and **Pressure** boxes if you want to use the measured input values during calibration. Otherwise, undo selection and enter manual values for each.

STEP 1 - Manual Calibration - Expose the O_2 sensor to Zero Gas and click the "Zero gas calibration" button to start calibration.

The 4-20 mA outputs will be held during calibration at the last know values.



CALIBRATION / MANUAL CALIBRATION - Step 2

STEP 2 - Manual Calibration - Watch the Phase angle increase and stabilize. Once the phase angle is stable along with the temperature and pressure, click the "Save" button.



CALIBRATION / MANUAL CALIBRATION - Step 3

STEP 3 - Manual Calibration - Expose the sensor to Span gas and click the “Span gas calibration button”. Another screen will allow you to enter the “Span Gas Value”. Enter the concentration of the oxygen gas you will expose the sensor to and click “Next”.



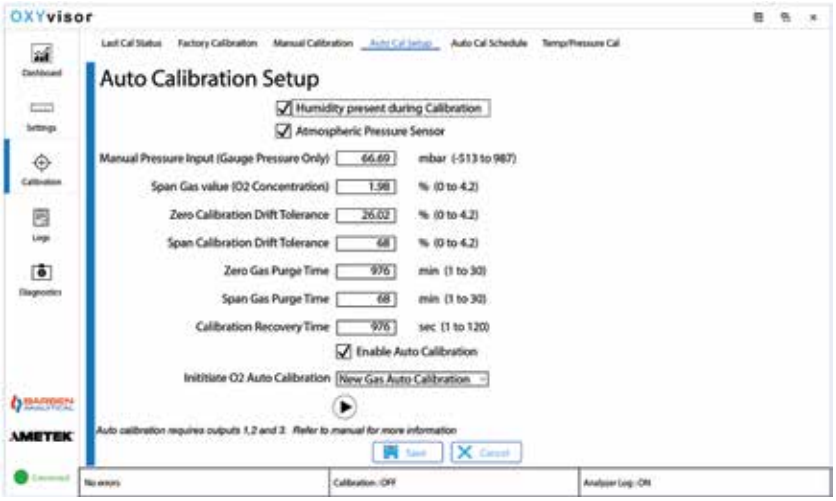
CALIBRATION / MANUAL CALIBRATION - Step 4

STEP 4 - Manual Calibration - Once the Phase angle along with the temperature and pressure is stable, click the “Save” button.

The OXYvisor should now read oxygen values with this updated calibration. You can also click the “Last Cal Status” tab to check if the calibration has been updated.

4.16 OXYvisor - Calibration - Auto-Calibration (AutoCal) Setup

AutoCal Setup is used to configure the auto-calibration settings such as; which pressure sensor to use, span gas value, zero and span gas drift tolerances, purge time, and recovery time. A step-by-step is covered here.



CALIBRATION / AutoCal SETUP - (step-by-step)

a. Check the humidity box if the sensor will be calibrated in a moist environment (>50% RH).

b. Check the **Atmospheric Pressure Sensor (APS)** box if the **APS** is to be used as the pressure measurement during calibration. Otherwise the constant **Manual Pressure Input** value (gauge pressure) can be entered for compensation during calibration.

c. Enter the **Span Gas Value** in proper oxygen units.

d. The **Zero Calibration Drift Tolerance** is the acceptable deviation in O_2 concentration between successive zero-point calibrations. Note, that the tolerance range is dependent upon current BOS_x **Sensor Type** and units will be based on the current **OXYGEN UNIT** selection.

EXAMPLE : **Zero Calibration Drift Tolerance (ZCDT)**

➡ **Sensor Type** = BOS1 (Range = 0 to 4.2% O_2), **Oxygen Unit** = % O_2,

User enters **Zero Calibration Drift Tolerance (ZCDT)** = 0.050 % O_2.

The ZCDT input defines the acceptable drift from the previous calibration. Therefore, following the example, if the analyzer measures +/- 0.051% O_2, or anything greater, while performing the **Zero Calibration**, the analyzer will fail the calibration, will not update the calibration values, will proceed to the **Calibration Recovery Time**, then return to the process measurement using the previously existing calibration values. The analyzer will log and display the following **Error Code**, **N44** - "Auto Calibration Zero Drift Failure, Consult Manual." **Analog Output(s)** will continue to output the measured process value(s) while any of the **Relay Outputs** tied to this type error (**N44** or **General Error**) will be activated. The error an be resolved by running a good calibration.

f. The **Span Calibration Drift Tolerance** (**SCDT**) is the acceptable deviation between successive AutoCal span calibrations. This works the same as the **ZCDT** explained above. Enter the **SCDT** value for the span calibration.

g. The **Zero** and **Span Gas Purge Time** defines how long the sensor is exposed to the test gas prior to the actual calibration being executed. The required purge time for both zero and span gas is dependent on the user's application requirements, sample system and **AutoCal** panel. The required purge time should be determined in the field and will balance the time needed to fully purge the system and reaching 100% stability, between excessive use of test gas and being "off-line."

In-the-field determination of the **Gas Purge Time**. Once the physical installation and basic analyzer setup is complete (preferably including the process flow) the required **Gas Purge Time** can be reviewed.

1. In the **Test/Diagnostic** menu, use the **TEST GAS INSERT** to flow the appropriate test gas. Specifically note the time you begin.

2. Exit the **Test/Diagnostic** menu, back to a main display to watch the Oxygen, temperature and phase angle. Note how long it takes for each of these parameters to stabilize to the new values. Specifically note if the oxygen has come to a value within user defined **ZCDT** or **SCDT**. (Go back to **Test Gas Insert** and **Stop Test Gas**.

3. Use the observed time to achieve stability, plus some comfort time as your **Gas Purge Time**(s). This is normally the same for the Zero and Span gas. To verify, the same procedure can be used for the other gas.

In general, if the sensor environment can be easily flushed with nitrogen in a short period of time, set the **Purge Time** to 1-2 minutes. If the gas takes longer to reach the oxygen sensor and also to flush the system with the known gas, set the **Purge Time** to 3-5 minutes. A sample **AutoCal** can be performed to see how long it takes for the sensor to stabilize in different gases and the **Purge Times** set accordingly.

h. The **Calibration Recovery Time** determines how long to hold the **Analog Outputs** and **Alarms** while the measurement (sensor & sample system) recovers from **AutoCal** under normal process flow. Once the **Recovery Time** is complete, the **Analog Outputs** and any associated **Errors** and alarms will become active.

i. Check the **Enable Auto Calibration** box to activate the **AutoCal** features which include: **Auto-Calibration** , **Test Gas Insert**, and then the **Digital Inputs 1 and 2** that can remotely activate each of these actions respectively.

Enable Auto Calibration engages and secures Relays 1, 2 and 3 for use with AutoCal features and they are no longer available for other functions, unless disabled. Relay 4 is still available for alarm/notification functions.

j. **Initiate O2 Auto Calibration** has two options via the pull down menu:

New Gas Auto Calibration - Use this for new installations or when the test gas bottles have been changed. This selection will begin an **AutoCal** that includes establishing the original baseline values, for the zero and span **Drift Tolerances** to be measured against, during the next successive **AutoCal**. The **Analog Outputs** will be held at the last measured process value during the entire **AutoCal** process; including the **Zero Gas Purge Time**, **Span Gas Purge Time** and the **Calibration Recovery time**.

Observation for stability of the O_2, phase angle and temperature measurements during this step is highly recommended. Increase purge time, recovery time, check flow rates and check for leaks if stability is not achieved during the calibration and recovery steps.

Auto Calibration - Selecting this option will activate the programmed **AutoCal** routine. The **Drift Tolerances** established via the **New Gas Auto Calibration** or previous **AutoCal** will be used to validate the **Auto Calibration**. The **Analog Outputs** will be held at the last measured process value during the entire **AutoCal** process; including the **Zero Gas Purge Time**, **Span Gas Purge Time** and the **Calibration Recovery time**.

4.17 OXYvisor - Calibration - AutoCal Schedule



CALIBRATION / AUTO CAL SCHEDULE

Auto Cal Schedule allows for time-based scheduling of the **AutoCal** function. The calibration schedules can occur once a day at a specific time, once a week or on a calendar day based system. There are four calibration schedules allowed in this menu. Each has the following settings

a. Start time: Select the date and time you want the first calibration to occur

b. Recurrence: There are options for Daily, Weekly or custom recurrence for the **AutoCal** to occur.

c. There is a check box to enable/disable each of the four calibration schedules.

d. The recurrence can be set

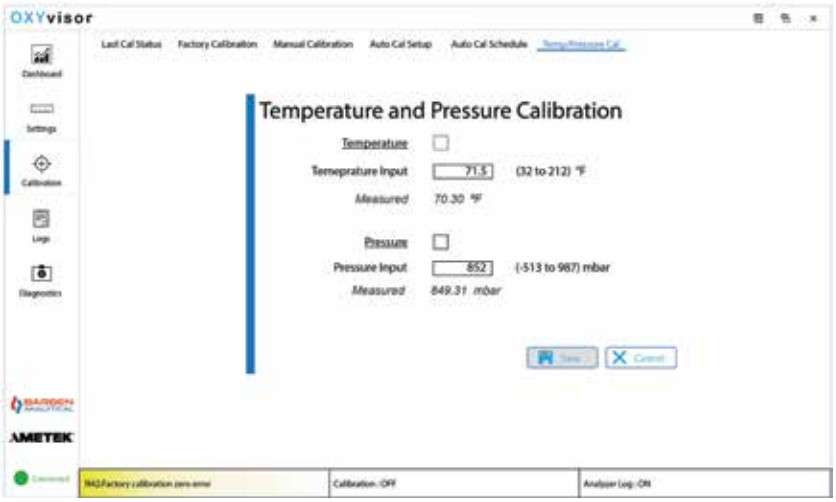
   i. Hourly- for example, every hour, every 12 hours, every 18 hours

   ii. Days- Can be set every 2 days, every 4 days, etc

   iii. Days of the week- Example: Can be set for 3 days of the week, Monday, Wednesday and Friday

Each calibration schedule can be individually customized.

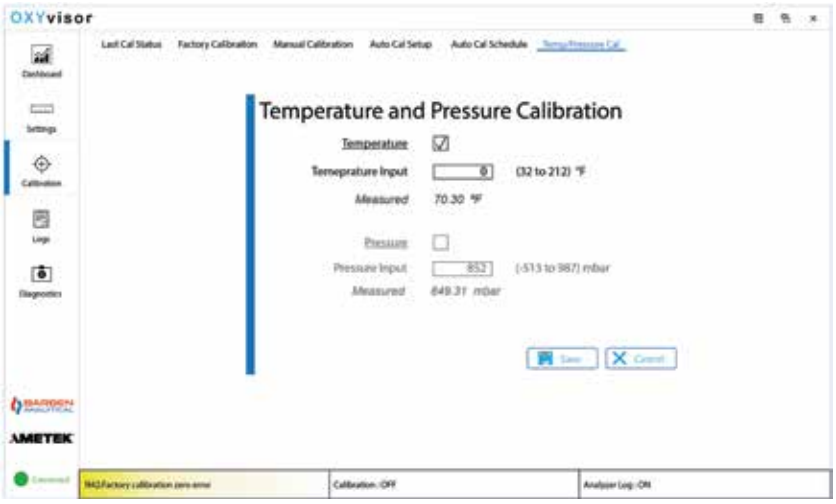
4.18 OXYvisor - Calibration - Temp/Pressure Cal



CALIBRATION / TEMP/PRESSURE CAL

Temp/Pressure Cal allows the user to calibrate the temperature and pressure sensors to a known and more accurate value than what is read by the OXYvisor.

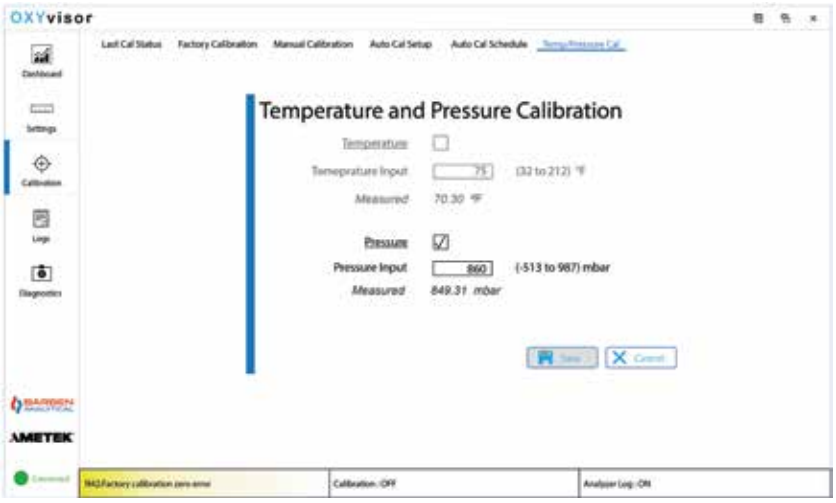
Check the Temperature or Pressure Box to calibrate the sensor. Enter the new value. Click on the Save button to complete the calibration.



CALIBRATION / TEMP/PRESSURE CAL

Temp/Pressure Cal allows the user to calibrate the temperature and pressure sensors to a known and more accurate value than what is read by the OXYvisor.

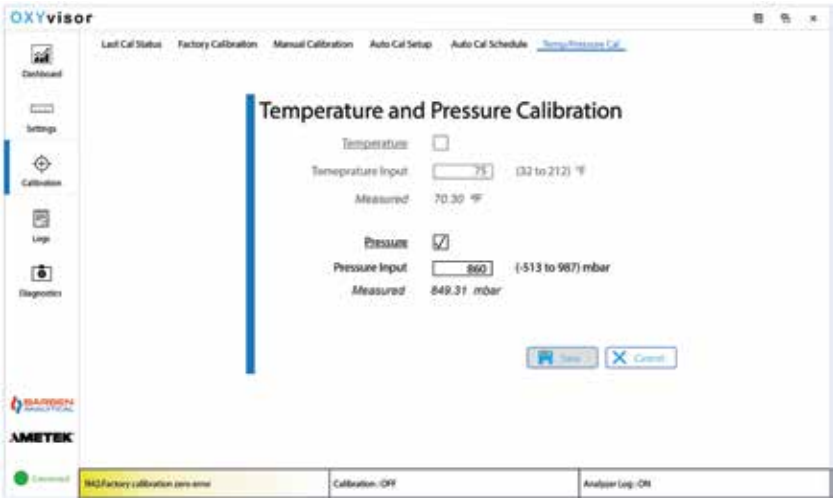
Check the Temperature or Pressure Box to calibrate the sensor. Enter the new value. Click on the Save button to complete the calibration.



CALIBRATION / TEMP/PRESSURE CAL

Temp/Pressure Cal allows the user to calibrate the temperature and pressure sensors to a known and more accurate value than what is read by the OXYvisor.

Check the Temperature or Pressure Box to calibrate the sensor. Enter the new value. Click on the Save button to complete the calibration.

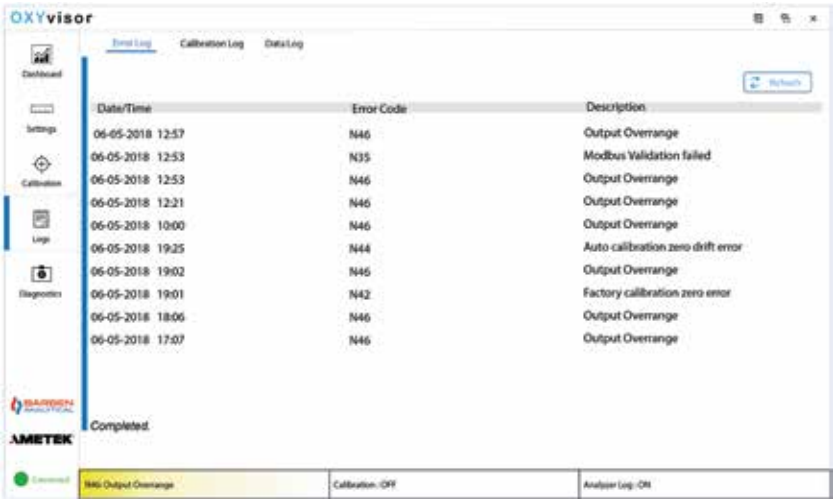


CALIBRATION / TEMP/PRESSURE CAL

Temp/Pressure Cal allows the user to calibrate the temperature and pressure sensors to a known and more accurate value than what is read by the OXYvisor.

Check the Temperature or Pressure Box to calibrate the sensor. Enter the new value. Click on the Save button to complete the calibration.

4.19 OXYvisor - Logs - Error Logs

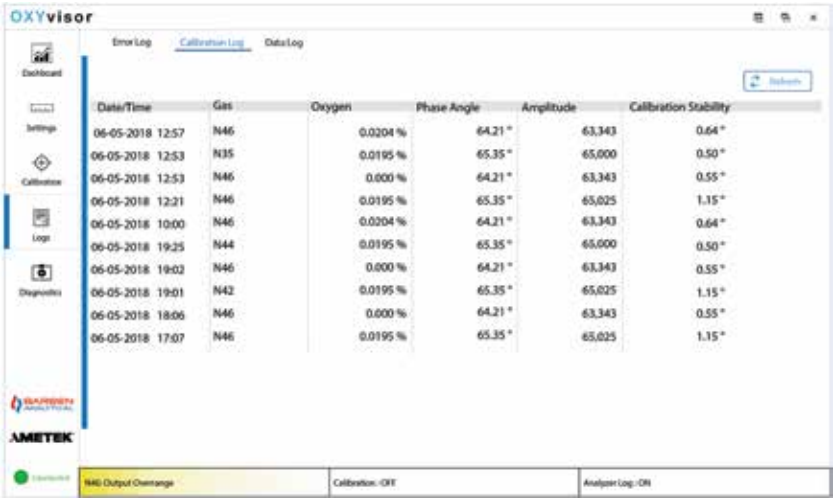


LOGS / ERROR LOGS

The **Error Log** lists the last 10 errors recorded by the OXYvisor. The log includes the date and time at which the error occurred, the error code and the error description. To see the list of most recent errors, click the “Refresh” button on the top right corner.

A list of errors present in current time is displayed in yellow on the lower left corner. It scrolls through different errors present.

4.20 OXYvisor - Logs - Calibration Log



LOGS / CALIBRATION LOG

The **Calibration Log** contains a list of the last ten Zero and Span gas calibrations with parameters such as Oxygen, Phase angle, Amplitude and Calibration Stability.

4.21 OXYvisor - Logs - Data Log



LOGS / DATA LOG

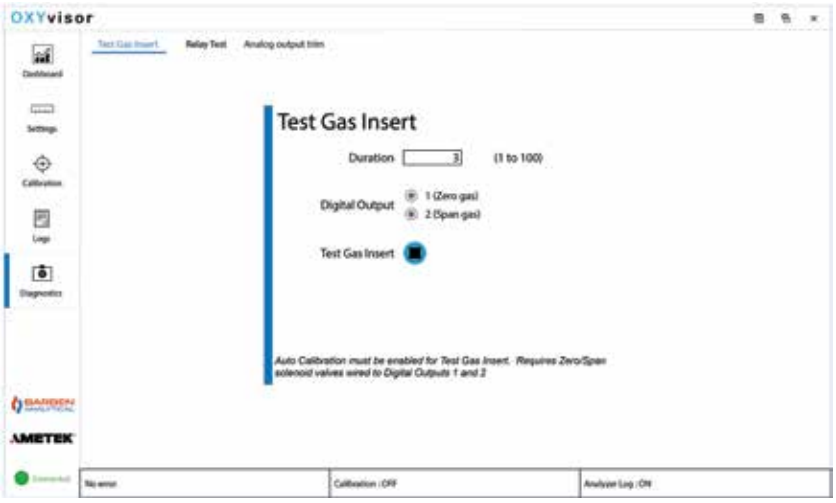
In the **DATA LOG**, critical parameters such as Oxygen, Phase Angle, Intensity, Temperature and Pressure can be logged in an Excel .csv file. Check the parameters that you want to log and click the “Analyzer data log” button to start saving the data. Once complete, you can download it to a USB stick at the analyzer.

The DATA LOG stores the information via the on-board memory. It has a capacity of 2 GB. Once the memory is full, the data is treated as "first in - first out." Also note that large files may take some time to download to the USB stick.

4.22 OXYvisor - Diagnostics - Test Gas Insert

Diagnostics

DIAGNOSTIC allows for remote performance validation of the actual oxygen measurement, via the **TEST GAS INSERT** function, functional testing of the **Relays** and trim adjustments or the **Analog Outputs**.



Diagnostic / Test Gas Insert

Test Gas Insert is directly tied to the AutoCal and is only enabled when AutoCal is enabled. A **TEST GAS INSERT** can be initiated remotely to expose the oxygen sensor to either **Zero Gas** or **Span Gas**. This is a live validation with all features active including the **Analog Outputs**. This feature remotely validates the OXYvisor's measurements and outputs with a known gas concentration.

a. The duration of the test gas insert can be entered in minutes (1 to 100).

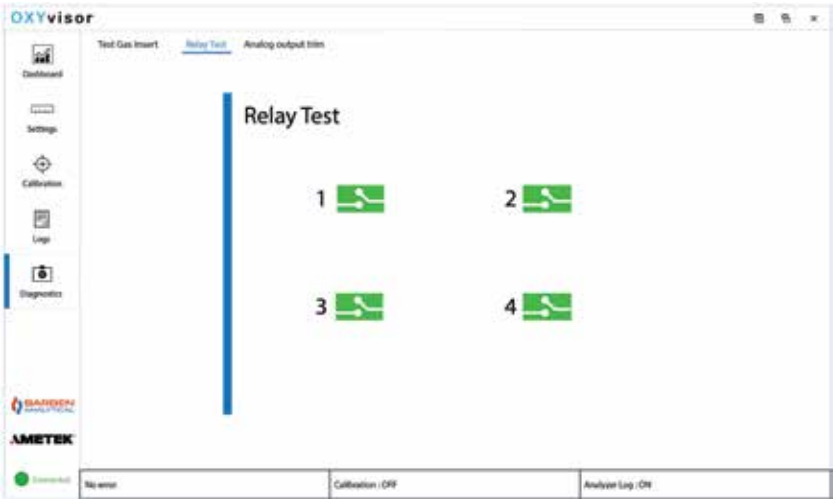
b. User can select wither the Test Gas Insert needs to be configured to Digital Output 1- Zero gas or Digital Output 2- Span Gas.

c. Clicking the Test Gas Insert button, the user can initiate and stop the Test Gas insert at any time.

CAUTION

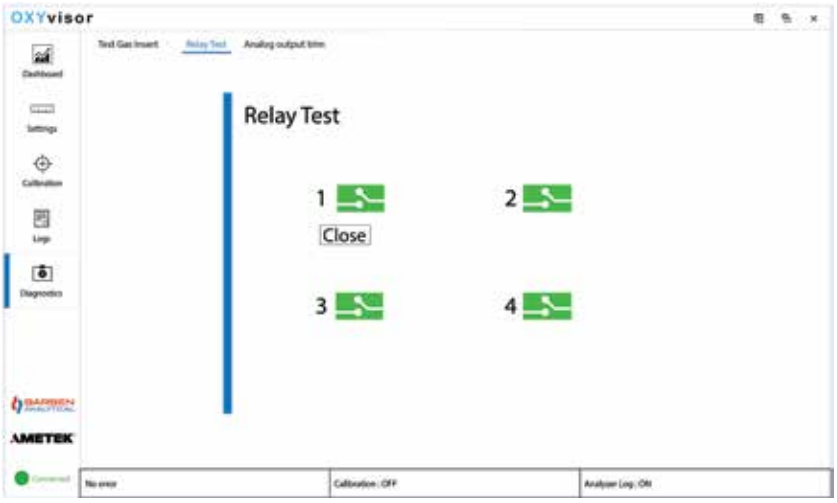
During the TEST GAS INSERT the Analog Outputs, alarm functions and logs are all active.

4.23 OXYvisor - Diagnostics - Relay Test



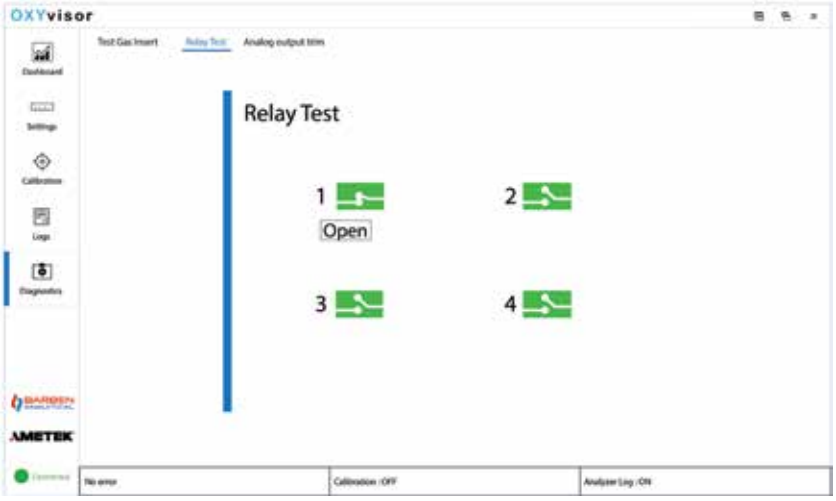
DIAGNOSTIC / RELAY TEST

The **DIAGNOSTIC / RELAY TEST** allows for functional testing of the **Relays**. The green buttons on this screen are active and can switch the relays from their Normally Open/ Close position to their active position.



DIAGNOSTIC / RELAY TEST

The **DIAGNOSTIC / RELAY TEST** allows for functional testing of the **Relays**. The green buttons on this screen are active and can switch the relays from their Normally Open/ Close position to their active position.



DIAGNOSTIC / RELAY TEST

The **DIAGNOSTIC / RELAY TEST** allows for functional testing of the **Relays**. The green buttons on this screen are active and can switch the relays from their Normally Open/ Close position to their active position.

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Software Instructional Manual
OXYvisor™ Optical Oxygen Analyzer

Contact Us

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