ADVANCED MICRO INSTRUMENTS

An ENPRO Company

HIGH PERFORMANCE **RELIABILITY** **INTUITIVE DESIGN**



Operator Manual

OPERATOR MANUAL

Special Message from Advanced Micro Instruments® (AMI):

The ***COMMAND CENTER*** **USER INTERFACE Software** gives you access to the more sophisticated features available on your AMI Gas Analyzer(s).

Because It is important that you have the latest version of the ***COMMAND CENTER*** installed on your computer or laptop, we encourage you to register your Analyzer at www.***AMIO2***.com. Doing so will **allow us to send you an automatic alert whenever an updated version of the sofware is available for download.** All software downloads for registered users through the customer login/registration portal at www.***AMIO2***.com are **FREE**.

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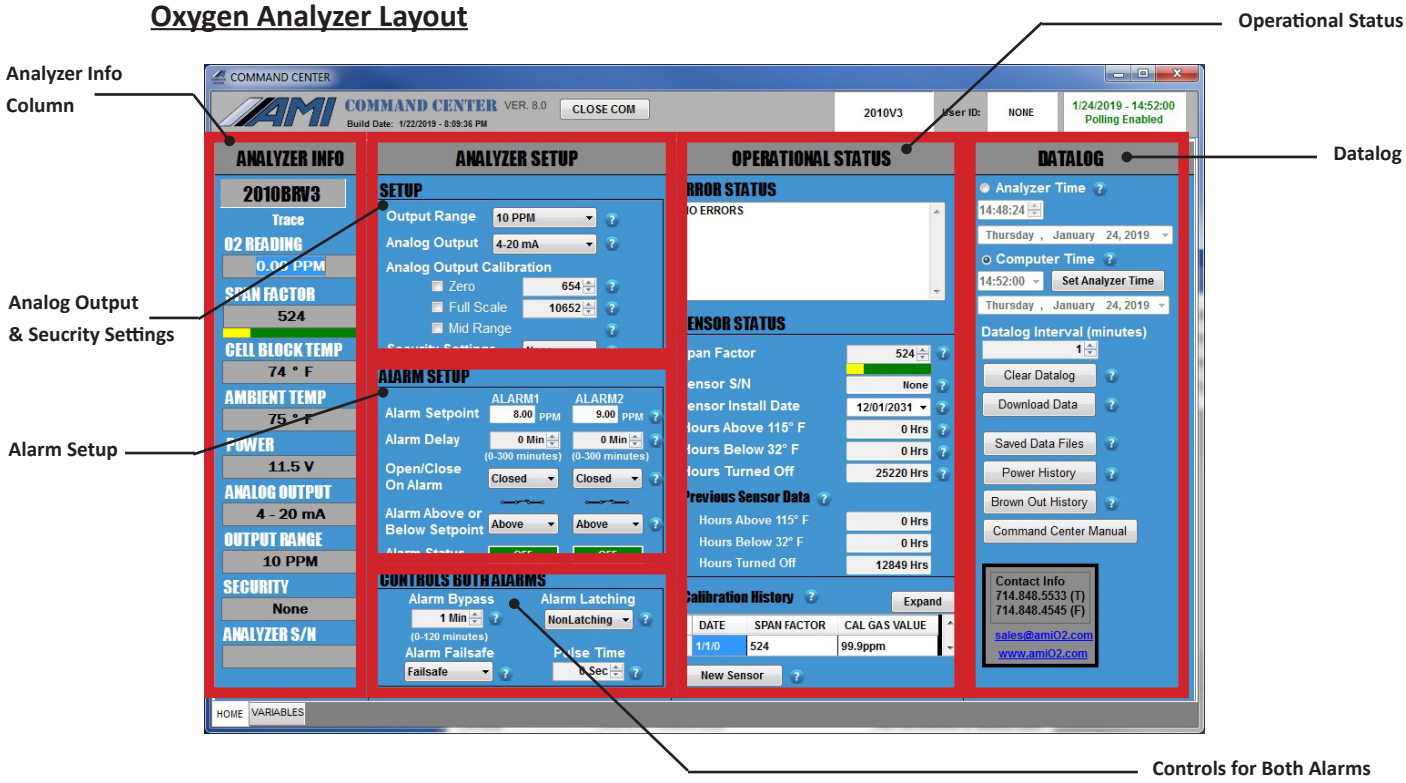
COMMAND CENTER **USER INTERFACE Software** Minimum Requirements

Windows 7
1Ghz or faster processer (32-bit x86 or 64-bit x64)
4GB RAM
8GB available disk space
.Net Framework 4.0

I. *COMMAND CENTER* USER INTERFACE LAYOUT

*The **COMMAND CENTER** is a universal platform that works across AMI's Gas Measurement Analyzers. The software, once opened on a computer or laptop and then connected to an AMI Analyzer, will recognize the Analyzer and display the proper the version of the Interface.*

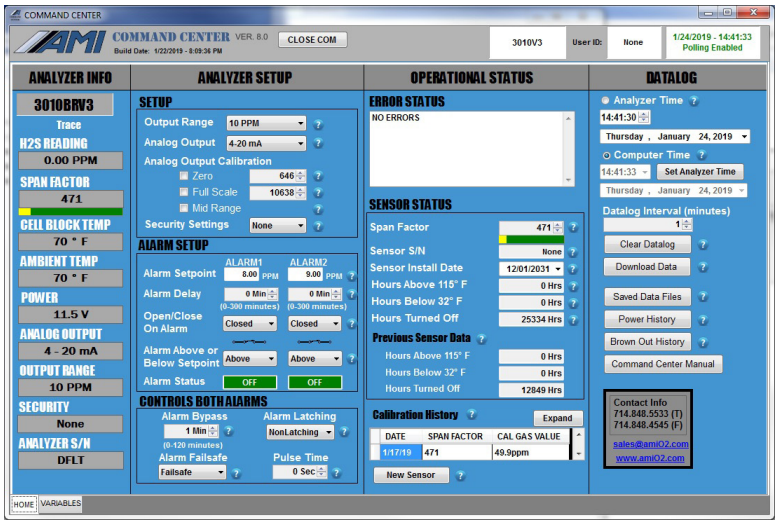
Oxygen Analyzer Layout



The ***COMMAND CENTER*** **USER INTERFACE** contains 6 sections (each one is highlighted by a red box above):

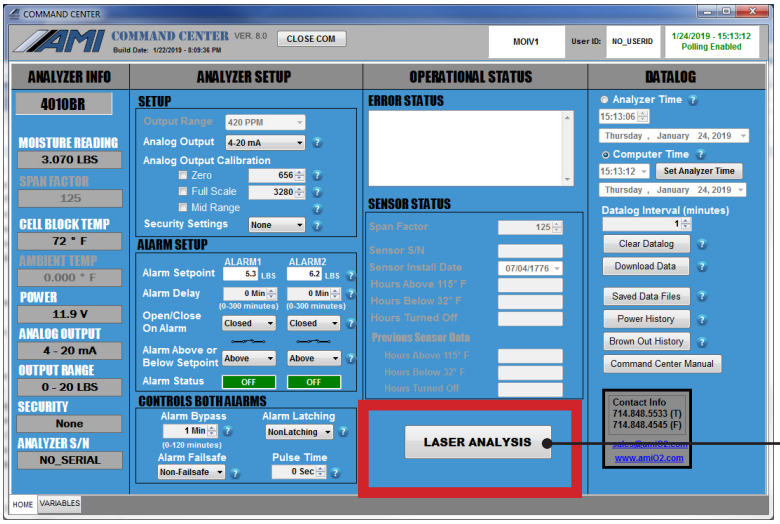
- **Analyzer Info Column**
  displays the current readings for gas measurement, span factor, cell block temperature, ambient temperature, power, analog output, output range, security and the serial number of the Analyzer
- **Analog Output & Security Settings Setup**
  allows the user to make selection changes to the Output Range, Analog Output and Security Settings. It also contains the settings to use during Analog Output Calibration
- **Alarm Setup**
  contains the settings for the 2 independent alarms, including delays and alarm logic
- **Controls for Both Alarms**
  contains the settings that control both alarms (these cannot be set for each alarm individually)
- **Operational Status Column**
  contains the Error Status Display and the Sensor Status Area (for oxygen and H_2S Analyzers)
- **Datalog Column**
  allows the user to set the Analyzer time and Datalog Interval as well as download Analyzer Measurement Data as a graph or spreadsheet. The user can also clear the Datalog and view the Power History and Brown-out History

H_2S Analyzer Layout



The layout of the Interface that appears, when connected to a H_2S Analyzer, is exactly the same as when connected to an Oxygen Analyzer (see page 2).

Moisture Analyzer Layout



Laser Analysis

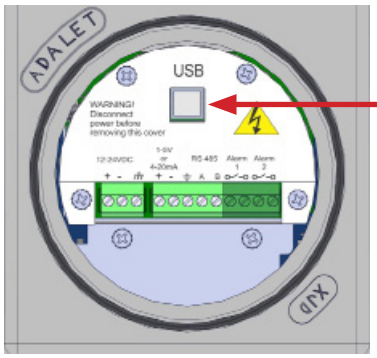
The layout of the Interface, when connected to a Moisture Analyzer, is slightly different. At the bottom of the OPERATIONAL STATUS COLUMN, you will find the LASER ANALYSIS Button, which is used for specific advanced features and functions available only for the **MODEL 4010LX**.

END OF COMMAND CENTER LAYOUT

II. *COMMAND CENTER ELECTRONICS PLATFORM* SET-UP

The installation and setup of the ***COMMAND CENTER*** **USER INTERFACE Software** is the same across all AMI Gas Measuremnt Analyzers (oxygen, hydrogen sulfide and moisture).

Step 1: Remove the explosion-proof cover to access the USB Port (Type B) of the Analyzer



USB Port (Type B)

(DC Power Version is shown. Instructions are the same for the AC Power Version)

Step 2: Establish a Communication Link between your Laptop and the Analyzer

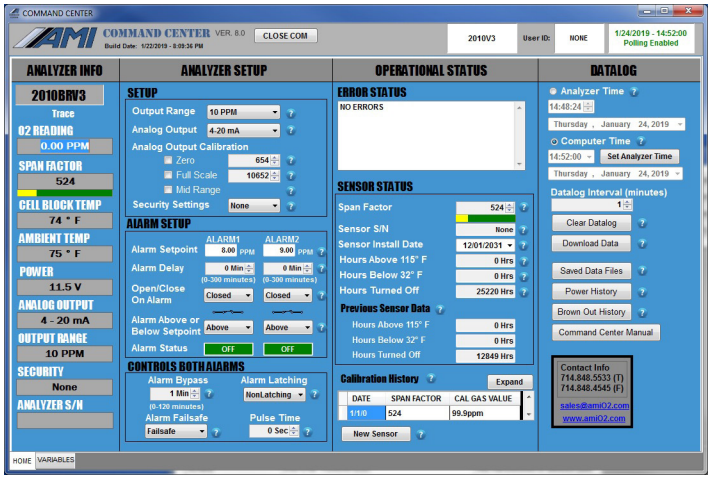


USB Type A Connector



USB Type B Connector

a) Power up your Laptop and open the current version of the ***COMMAND CENTER*** **USER INTERFACE Software**.

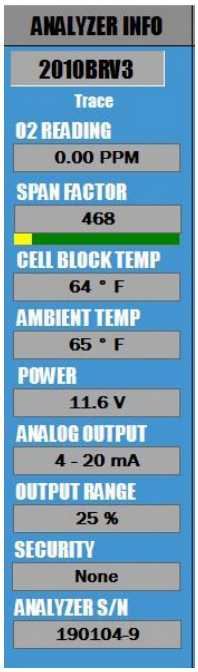


Left: ***COMMAND CENTER*** **USER INTERFACE** window shown (Oxygen Analyzer Layout)

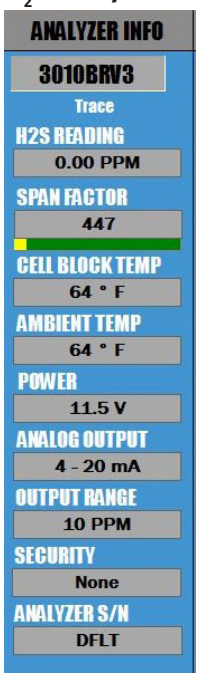
b) Using a USB cable with a Type A Connector on one end and a Type B Connector on the other, insert the Type A Connector into the USB port of your laptop and the Type B Connector into the USB port of the Analyzer on the Explosion-proof side.

c) Once the link is established, the software will automatically recognize the Analyzer and *populate the Analyzer Info Column with information specific to your Analyzer*.

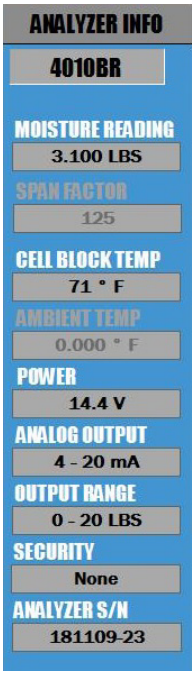
Oxygen Analyzer



H_2S Analyzer



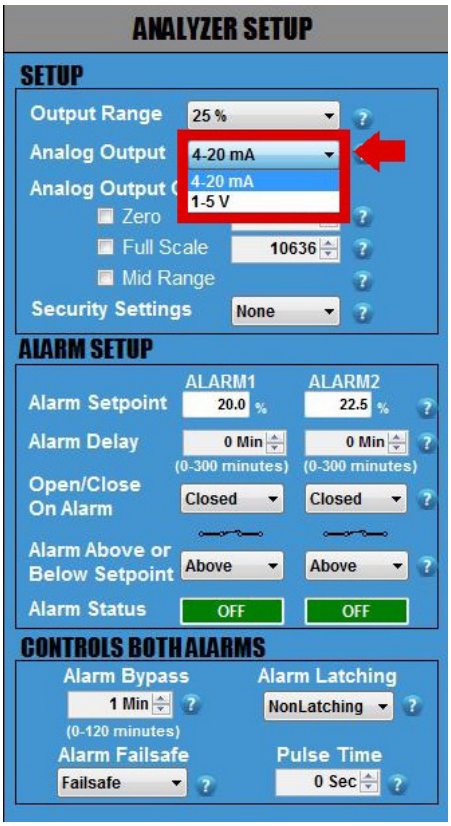
Moisture Analyzer



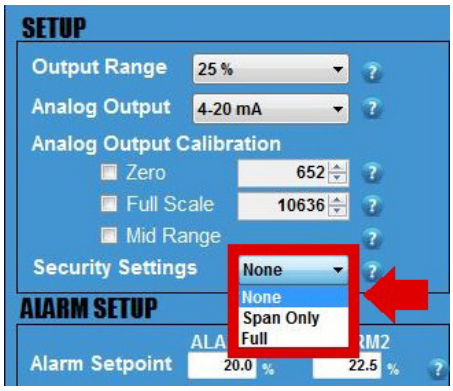
d) The Analyzer Info Column will display the following information about your Analyzer:

- Analyzer Model Number
- Measurement Reading for your AMI Analyzer
- Cell Block Temperature
- Ambient Temperature (not displayed on **THE MODEL 4010LX**)
- Input Power, either AC or DC
- Analog Output Setting (4–20mA or 1–5 VDC)
- Output Range Selection
- Security Selection
- Analyzer Serial Number

Step 3: Selection of Options in Analyzer Setup Area & Syncing with Electronic Flow Meter (EFM)



a) View ANALOG OUTPUT Setting.
This is set and calibrated at the factory per your order requirements prior to shipping. If you wish to change the analog output from 4–20mA or 1–5 VDC or vice versa, refer to the instructions shown on page 8.

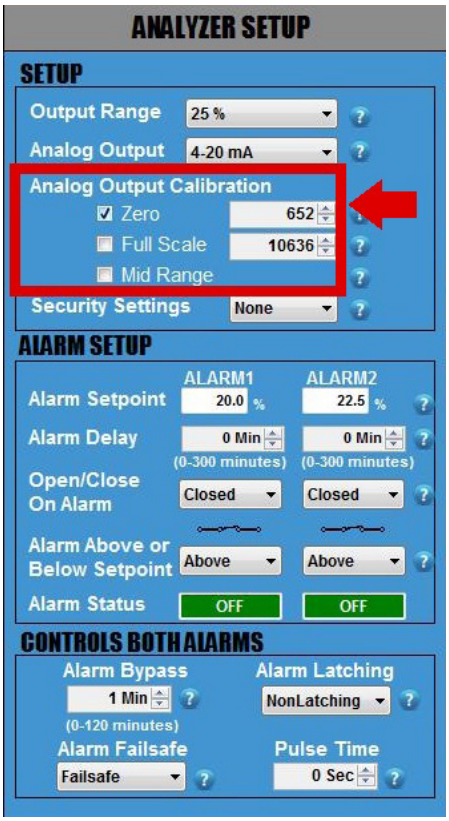


b) Set your desired SECURITY SETTINGS.
You have 3 options available to select from:

–NONE allows anyone to make changes to the Analyzer's settings using the front panel

–SPAN ONLY (this setting is NOT AVAILABLE on **THE MODEL 4010LX**)

–FULL **prevents** anyone from changing the Analyzer's settings using the front panel. However, you can still use the front panel to check the Analyzer's status values by pushing any of the buttons
(i.e., pressing the ALARM ONE Button displays the setpoint for ALARM ONE, pressing the ALARM TWO Button displays the setpoint for ALARM TWO, and so on)



c) Sync your electronic flow meter (EFM) or similar device to your Analyzer.

The following steps are critical because they will ensure that both devices display the same measurement readings and, thereby, prevent unnecessary confusion in the future.

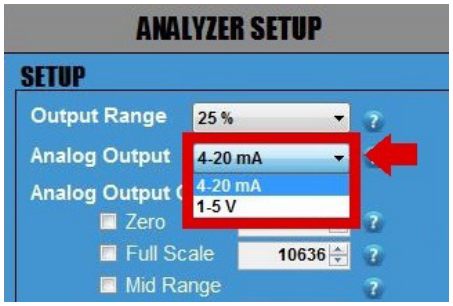
1. By now, you have already wired your EFM or similar device to the Analyzer using the Analyzer's analog output terminals.

2. Click on the small square box next to ZERO and the reading of the Analyzer should display the low end of your output range. Confirm that the reading on your EFM or similar device matches the reading on the Analyzer. If it does not, use the UP and DOWN ARROWS to the right of ZERO to adjust the readings of the Analyzer until the reading of the EFM or similar device is now the same.

3. Once this is done, click on the square next to FULL SCALE. The reading of the Analyzer should display the high end of your output range. Confirm that the reading on your EFM or similar device matches the reading on the Analyzer. If it does not, use the UP and DOWN ARROWS to right of FULL SCALE to adjust the reading of the Analyzer until the reading of the EFM or similar device is now the same.

4. Repeat Step 2 (ZERO) and Step 3 (FULL SCALE) once more to confirm that both your EFM or similar device and the Analyzer are displaying the same readings.

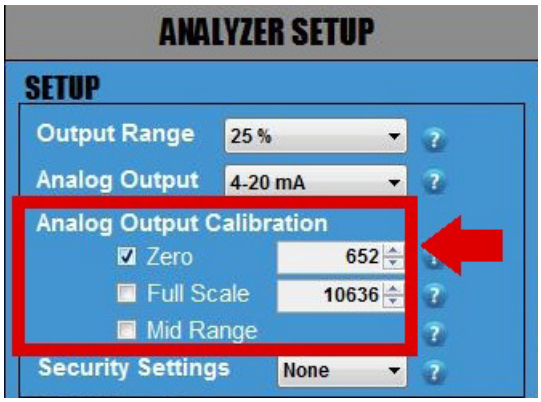
5. Last, click on MID RANGE. This will check the linearity. There are no values to adjust as this is just a midpoint validation.



OPTIONAL

d) Changing your ANALOG OUTPUT from 4–20mA to 1–5 VDC or vice versa. (*Skip this step if you DO NOT want to change your* ANALOG OUTPUT.)

Click on the drop down menu of ANALOG OUTPUT and select the output option that you wish to change to.



IMPORTANT

Whenever you change the ANALOG OUTPUT from 4–20mA to1–5 VDC or vice versa, you will need to complete the following steps to verify your ANALOG OUTPUT.

1. Attach a multimeter to the Green Analog Out Terminal Connector of your Analyzer. Make sure your multimeter is set appropriately, either current for 4–20mA or voltage for 1–5 VDC .

2. Click on the square box next to ZERO to confirm that your multimeter is displaying either 4mA or 1VDC (the number of digits displayed on the screen will depend on the multimeter that you use). If the reading of the multimeter does not match the reading of the Analyzer, use the UP and DOWN ARROWS to the right of ZERO to adjust the values until the reading of the multimeter is either 4mA or 1VDC.

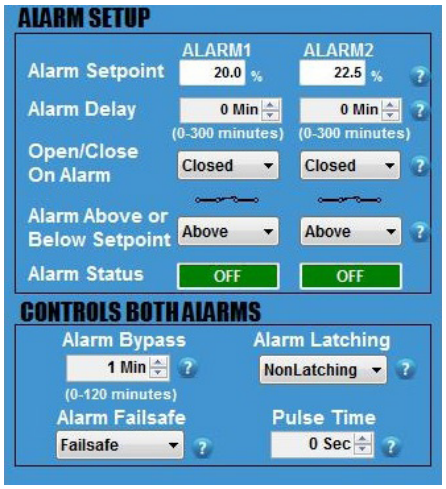
3. Once this is completed, click on the square box next to FULL SCALE to confirm that your multimeter is displaying either 20mA or 5VDC. If the reading of the multimeter does not match the reading of the Analyzer, use the UP and DOWN ARROWS to the right of FULL SCALE to adjust the values until the reading of the multimeter is now either 20mA or 5VDC .

4.. Repeat Step 2 (ZERO) and Step 3 (FULL SCALE) again until you can confirm that your multimter is displaying 4mA or 1VDC for ZERO and 20mA or 5VDC for FULL SCALE.

5. Last, click on MID RANGE. This will check the linearity. There are no values to adjust as this is just a midpoint validation.

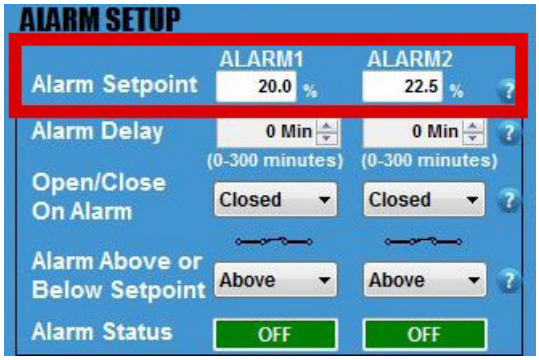
6. Once you have completed this section, disconnect the multimeter.

Step 4: Alarm Logic & Setup

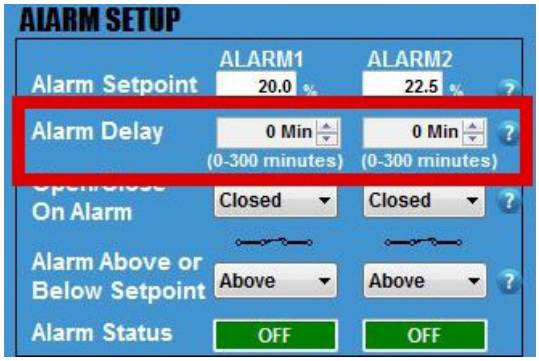


The Analyzer features 2 independent Concentration Alarms –one for ALARM 1 and one for ALARM 2. The settings for these alarms, including setpoints, relay contacts, close/open logic and alarm delays, are adjusted through the ***COMMAND CENTER***.

It is important that you plan out how you want your ALARM LOGIC to work for each ALARM before you start adjusting the settings discussed in this section.



a) Set the ALARM SETPOINTS.
Enter your desired value for each setpoint and then press the ENTER key on your laptop. Keep in mind that your values cannot exceed the limit of the Measurement Range that you previously selected.



b) Set the ALARM DELAYS.
There are 2 ALARM DELAYS. Each ALARM DELAY setting is located beneath the corresponding ALARM that it controls.

Enter your desired time duraction for each ALARM DELAY and press the ENTER key on your laptop. You can also adjust using the UP and DOWN ARROWS. The range is from 0 to 300 minutes.

Note: This feature is especially helpful at custody transfer points when customers are allowed to exceed contractual limits for a predetermined amount of time.



c) Click on the drop-down menu and set the relay contact of each individual ALARM to OPEN or CLOSE when its respective ALARM is triggered.

Each setting corresponds to a schematic symbol below. When the OPEN ON ALARM is selected, the schematic symbol opens. When the CLOSE ON ALARM is selected, the schematic symbol closes.

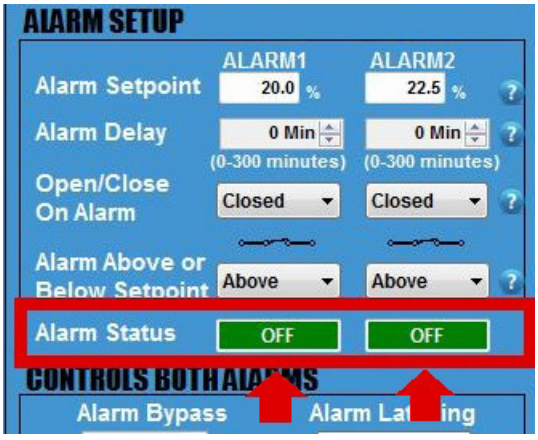
The setting also corresponds to the ALARM column that it lies underneath.



d) Click on the drop-down menu and set the ALARM to trigger ABOVE SETPOINT or BELOW SETPOINT.

For ALARM ABOVE SETPOINT, the ALARM will trigger if your readings rise above your ALARM SETPOINT.

For ALARM BELOW SETPOINT, the ALARM will trigger if your readings fall below your ALARM SETPOINT.



e) View the ALARM STATUS.
Both independent ALARMS have their own ALARM STATUS.

If an ALARM is not triggered, the ALARM STATUS will display 'OFF' in green.

If an ALARM is triggered, its ALARM STATUS will display 'ON' in red.

*For an ALARM to be triggered, it will take into account the complete logic of how the ALARM was set up. This includes SETPOINT, DELAY, OPEN/CLOSE CONTACT ON ALARM, and ALARM ABOVE OR BELOW SETPOINT.

Step 5: Setup of the Controls for Both Alarms

IMPORTANT:
For this section, the adjustments discussed below affect both ALARMS and **CANNOT** be set independently for each ALARM.



a) Set the ALARM BYPASS. Use the UP and DOWN ARROWS to set the duration of your ALARM BYPASS (HOLDOFF).

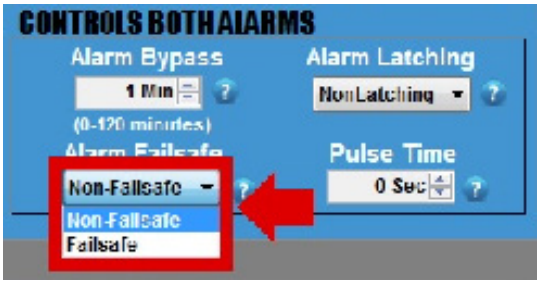
Note: This feature disables both ALARMS and ANALOG OUTPUTS for those of you using the analog output for control..



b) Click on the drop-down menu and set the ALARM relay contacts to LATCHING or NONLATCHING.

-If set to NONLATCHING, the relay contacts will energize when the measurement readings exceeds the ALARM SETPOINTS and then de-energize when the measurement readings drop below the ALARM SETPOINTS.

- If this is set to LATCHING, the relay contacts will energize when the measurement readings exceeds the ALARM SETPOINTS but also remain engaged when the reading drops below the ALARM SETPOINTS. A person will have to press the ALARM HOLDOFF Button for 1 second on the front panel of the Analyzer to disengage the relay contacts.



c) Click on the drop-down menu and set the ALARMS to FAILSAFE or NON FAILSAFE.

- If set to FAILSAFE, the ALARMS will trigger if the power supplied to the Analyzer drops below 8.5V. However, the ALARMS will not clear until the power moves back up and exceeds 12V.

- If set to NONFAILSAFE, the ALARMS will not trigger if the power supplied to the Analyzer drops below 8.5V.



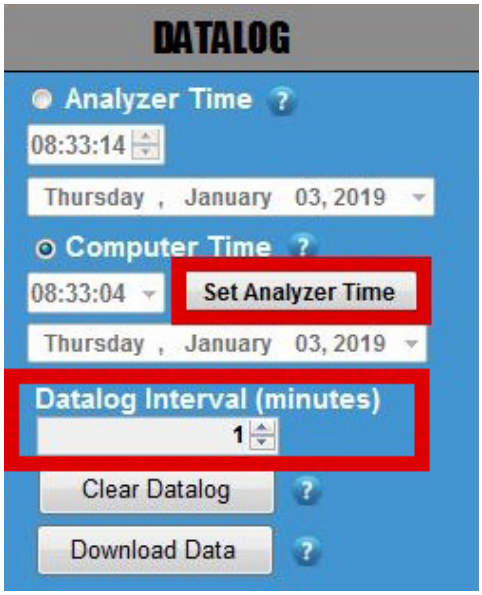
WARNING: **DO NOT adjust this setting unless you are using a pulse-latch slam valve!**

d) CHECK WITH THE VALVE MANUFACTURER for the correct pulse time and then set your desired PULSE TIME using the UP and DOWN Arrows.

This sets the duration of time that the Analyzer sends power to the relay contacts to open or close the valve when an ALARM is triggered. The Alarm 1 Contact will open the slam valve, while the Alarm 2 Contact will close the valve.

This features is helpful because it eliminates the need to continually draw power while the valve is closed.

Step 6: Datalog Interval & Setup



a) SET ANALYZER TIME
Click the Analyzer Time and manually set the time. Or click Computer Time and then the SET ANALYZER TIME Button. The time should automatically adjust and closely match the time shown on your laptop.

b) DATA COLLECTION INTERVAL (minutes)
Then set your desired collection interval for the DATALOGGER by adjusting the time (in minutes). The DATALOGGER allows you to store a time-stamped recording that contains the moisture reading, average temperature of the Cell Block, average power supply voltage and minimum voltage supplied to the Analyzer.

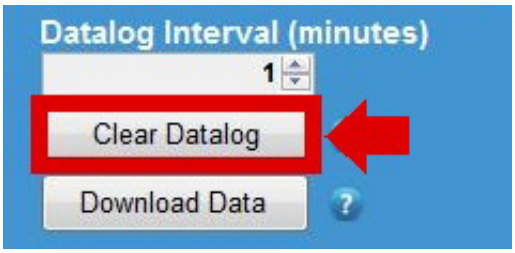
Important: The default setting for the DATALOGGER

Oxygen Analyzers & H_2S Analyzers

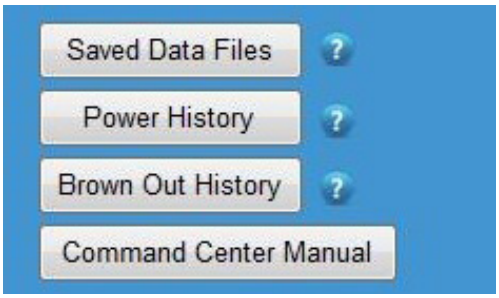
The DATALOGGER collects data for 15 days in 1-minute intervals. If you increase the duration of the interval, the data collection period also increases proportionally. Therefore, if you increase increase the interval to 2 minutes, the data collection period adjusts to 30 days. Every 3 minutes will increase the collection period to 45 days and so forth.

Moisture Analyzers

The DATALOGGER collects data for 5 days in 1-minute intervals. If you increase the duration of the interval, the data collection period also increases proportionally. Therefore, if you increase increase the interval to 2 minutes, the data collection period adjusts to 10 days. Every 3 minutes will increase the collection period to 15 days and so forth.



c) CLEAR DATA LOG
Press the CLEAR DATA LOG Button to clear any recorded data performed at the factory.

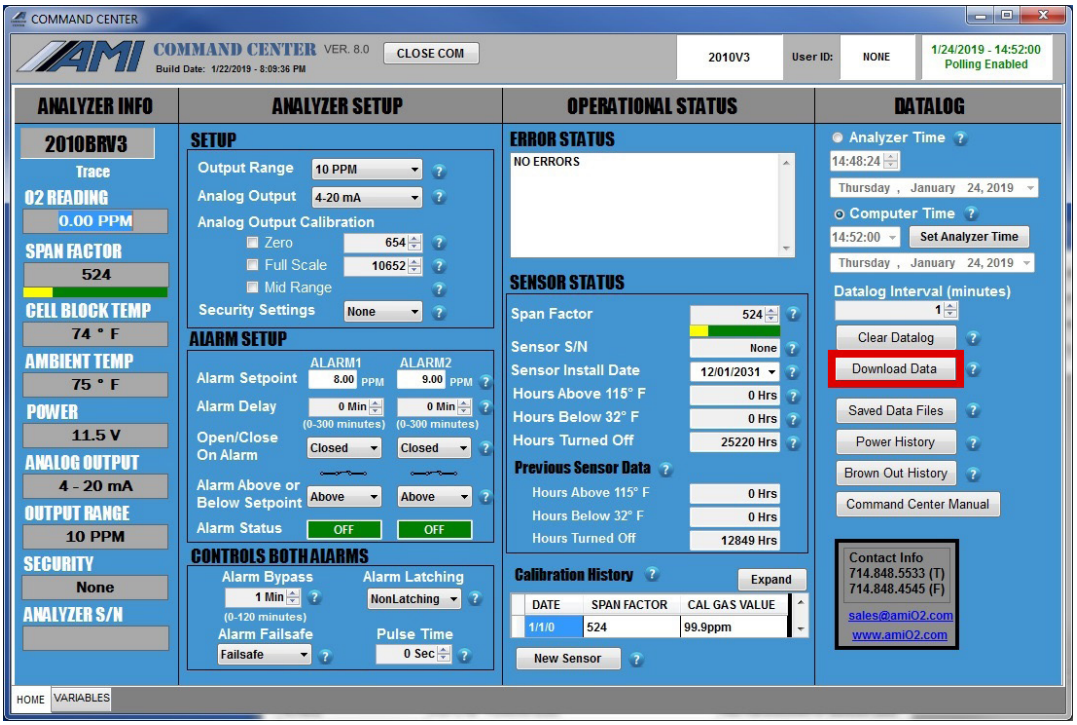


You can also view Saved Data Files, Power History, Brown-out History, and the Manual by pressing their respective buttons in this column.

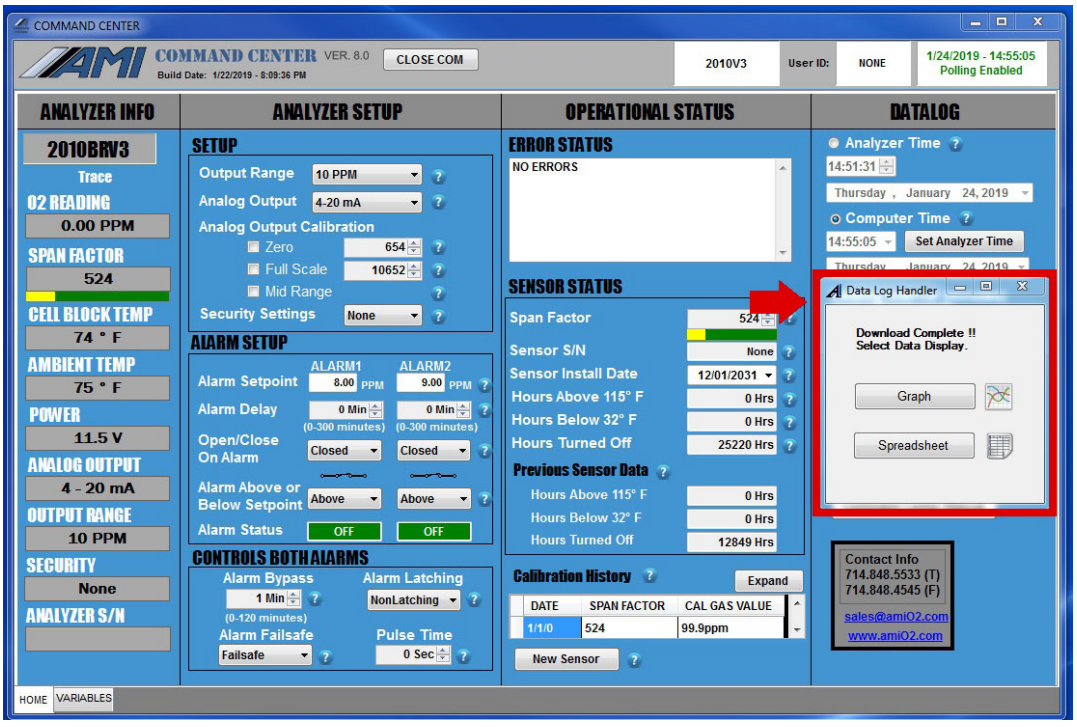
END OF COMMAND CENTER SETUP

III. *COMMAND CENTER* DOWNLOAD DATA

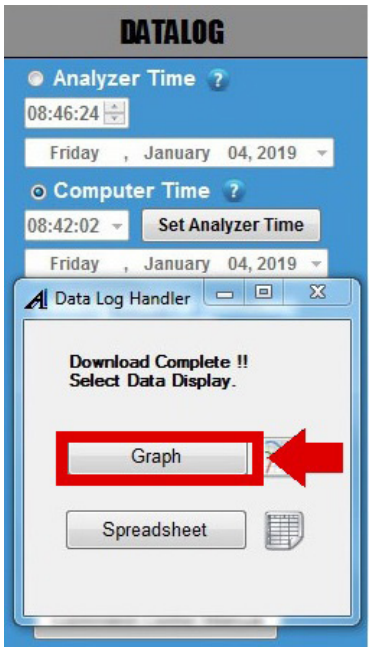
The directions for downloading data on the ***COMMAND CENTER*** are the same across all AMI Gas Measurement Analyzers (oxygen, hydrogen sulfide and moisture).



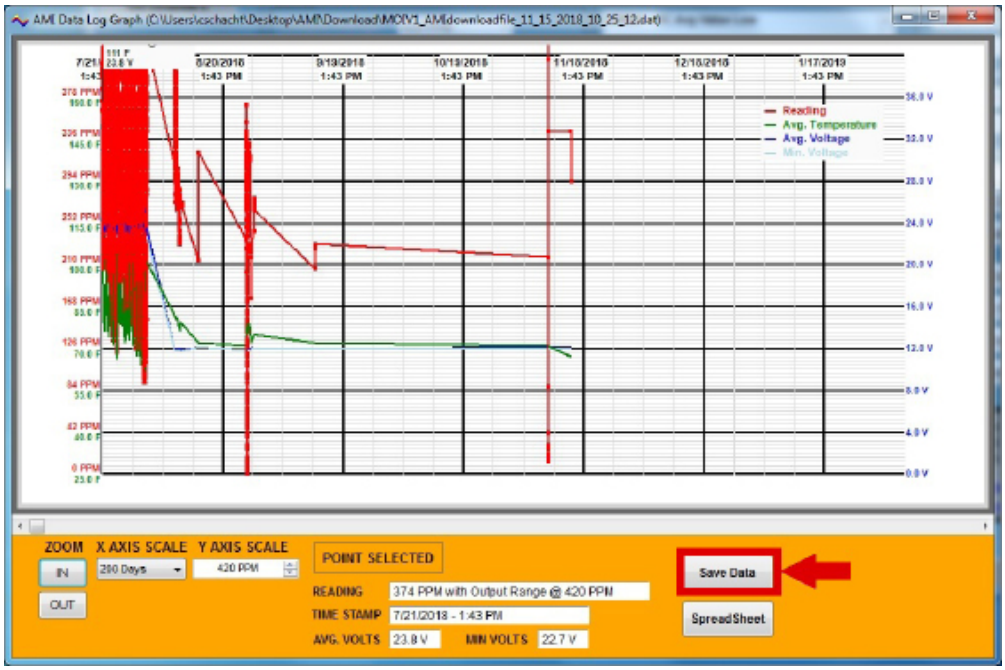
To begin, click the DOWNLOAD DATA Button located on the ***COMMAND CENTER*** **User Interface.**



A DATALOG HANDLER window will appear, giving you the option of seeing your downloaded data as either a graph or spreadsheet.

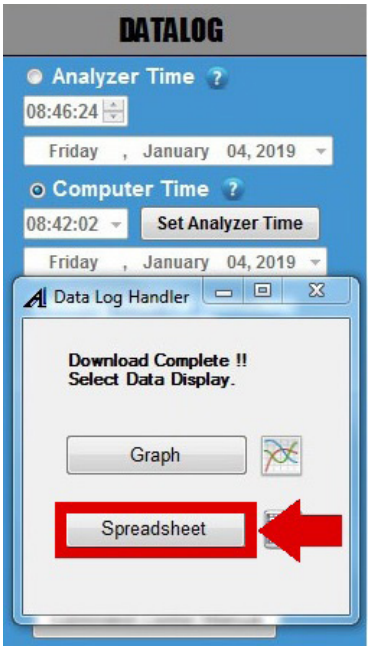


To see the graph, click the GRAPH Button.

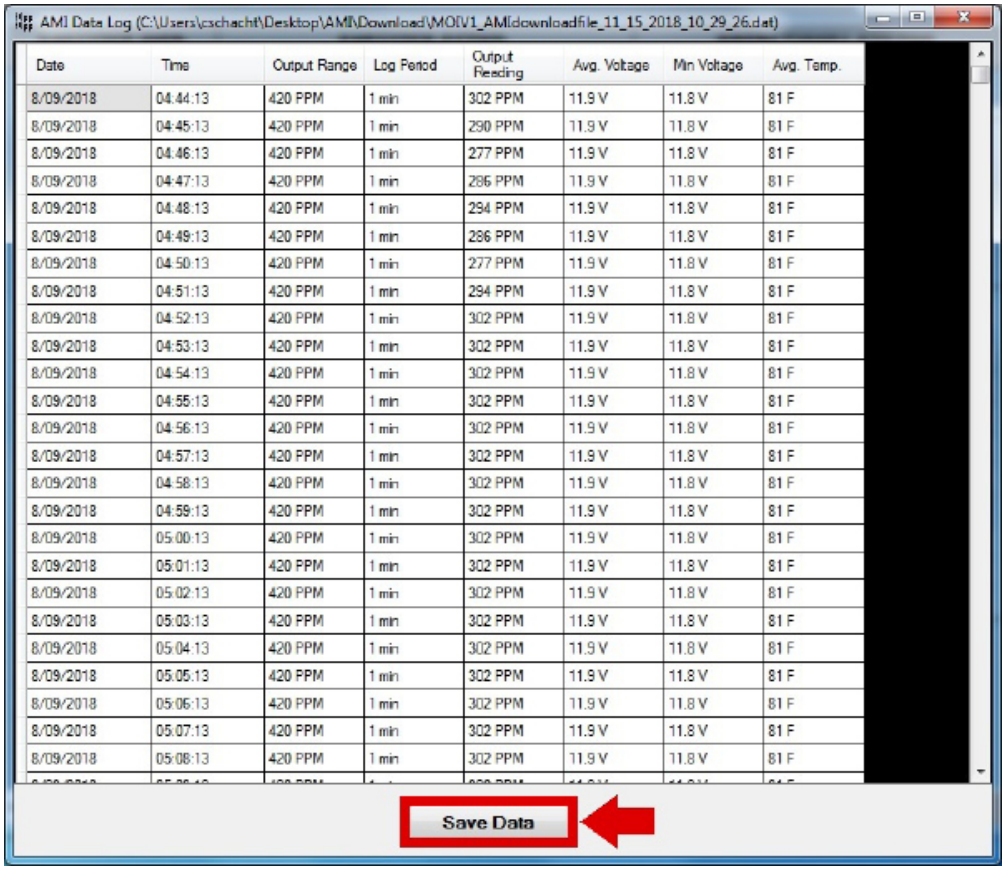


(Sample Graph of Downloaded Data)

You can save your graph to a file by clicking the SAVE DATA Button.



To see your downloaded data as a spreadsheet instead, click the SPREADSHEET Button. on the DATALOG HANDLER Window.



Date	Time	Output Range	Log Period	Output Reading	Avg. Voltage	Min Voltage	Avg. Temp.
8/09/2018	04:44:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:45:13	420 PPM	1 min	290 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:46:13	420 PPM	1 min	277 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:47:13	420 PPM	1 min	286 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:48:13	420 PPM	1 min	294 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:49:13	420 PPM	1 min	286 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:50:13	420 PPM	1 min	277 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:51:13	420 PPM	1 min	294 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:52:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:53:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:54:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:55:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:56:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:57:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:58:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:59:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:00:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:01:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:02:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:03:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:04:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:05:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:06:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:07:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:08:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F

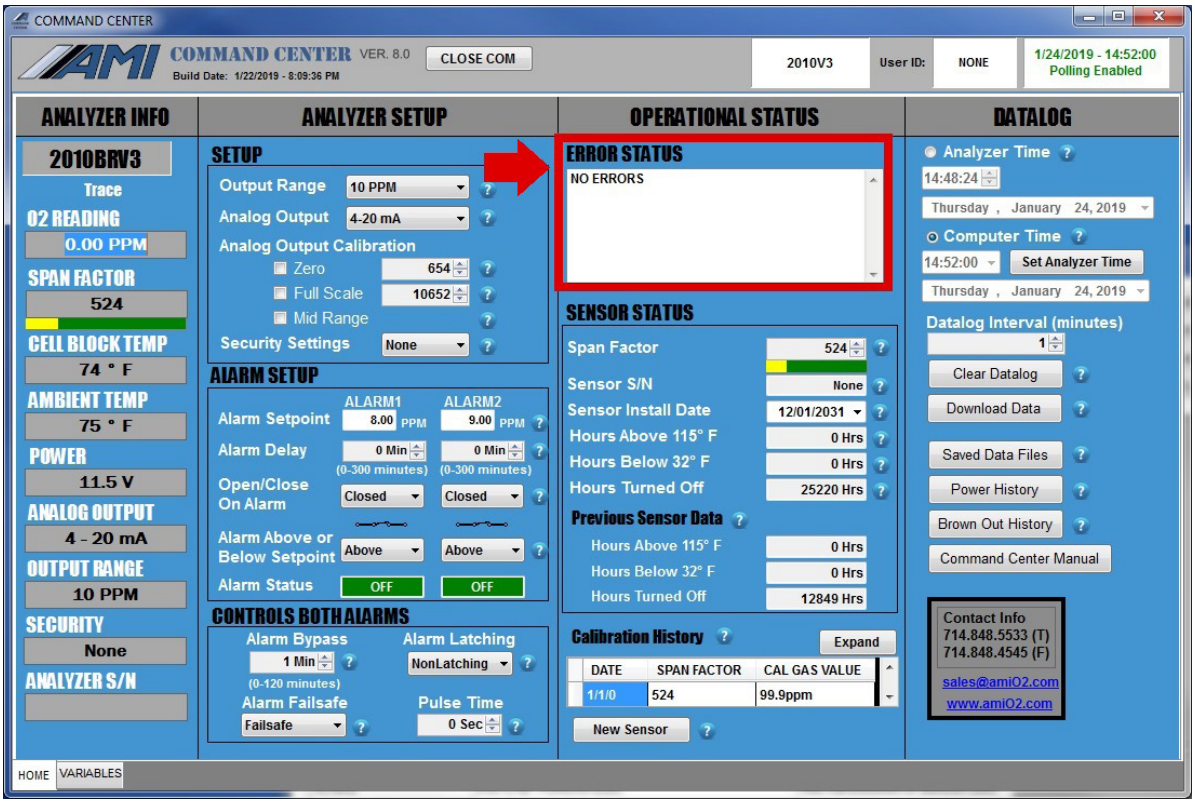
(Sample Spreadsheet of Downloaded Data)

You can save your spreadsheet to a file by clicking the SAVE DATA Button.

END OF DATA DOWNLOAD

IV. *COMMAND CENTER* ERROR STATUS DISPLAY

The feature is available for all AMI Gas Measuremnt Analyzers (oxygen, hydrogen sulfide and moisture).

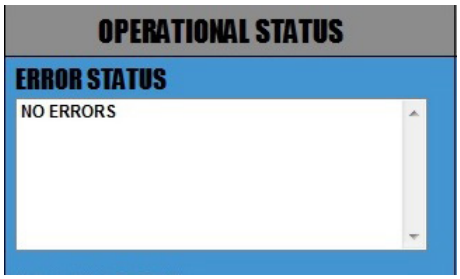


The ERROR STATUS DISPLAY is located at the top of the Operational Status Column of the ***COMMAND CENTER*** **User Interface**.

Any error(s) detected by the Analyzer will be displayed in this area. Additionally, every error will have an assigned error code and message (see the next page for a complete list of the existing error codes).

Error Status Display: Error Reference Guide

Error Number	Message
0	No 2F Triggger
1	No DC Trigger
2	TEC Set Pt Low
3	TEC Set Pt High
4	DC Avg Value Low
5	2F Avg Value Low
6	Power Supply Low
7	PPM OverRange
8	LBS Over Range
9	2F MaxtoMin Too Low
10	2F H2O Peak Out of Index
11	2F CH4 Peak Out of Index
12	Over/Under Pressure
13	H20 DC Peak Too Large
14	Over/Under Temperature
15	
16	FPGA Bad Read
17	Memory Bad Read
18	Memory Bad Write
19	Analytical Timeout
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	ADC Sample High
33	ADC Sample Low
34	ADC Conversion TimeOut
35	DC SAMPLE TO LOW
36	
37	
38	
39	
40	
41	
42	
43	
44	
45	

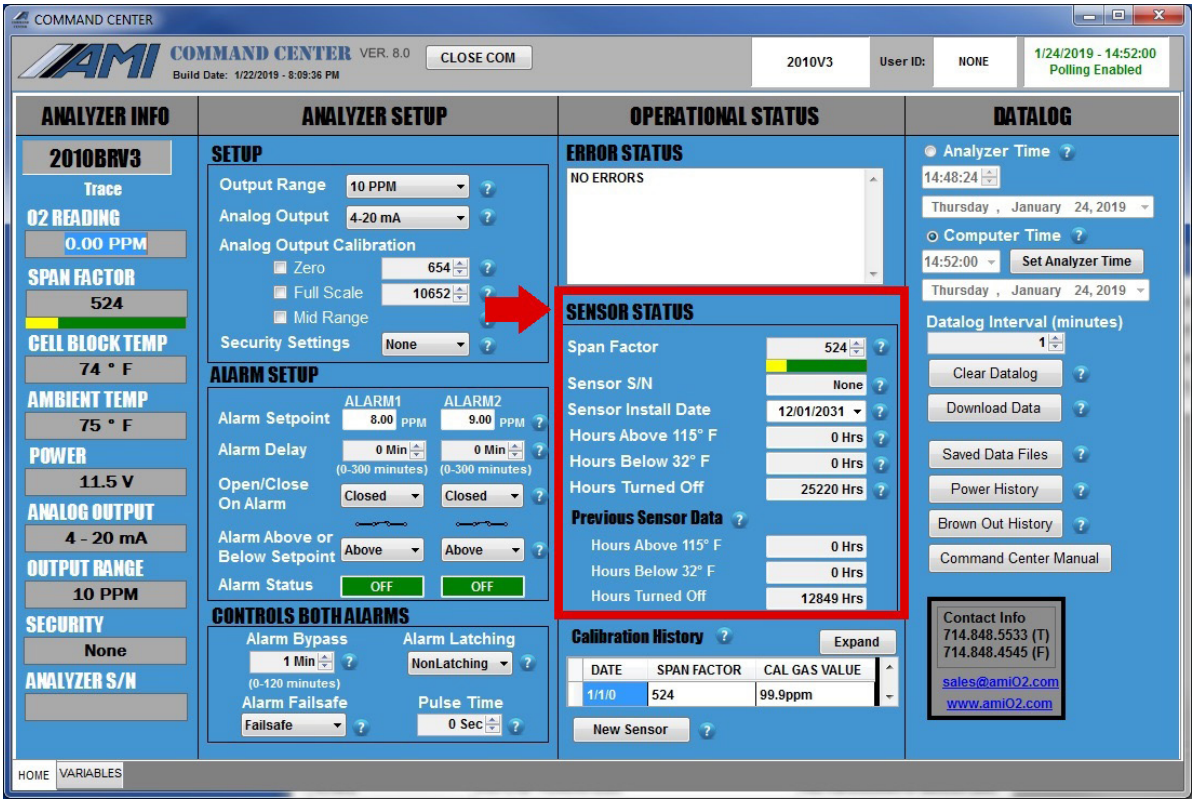


Note:
Once troubleshooting is completed and the error is resolved, the message will automatically be removed from the Error Status Display by the Analyzer.

END OF ERROR STATUS DISPLAY

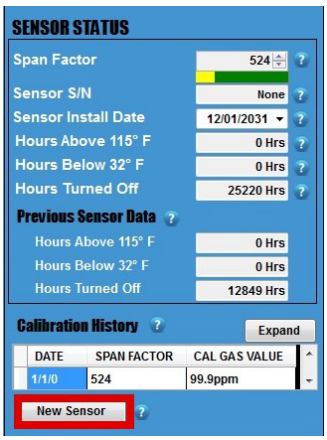
V. SENSOR & CALIBRATION SECTION

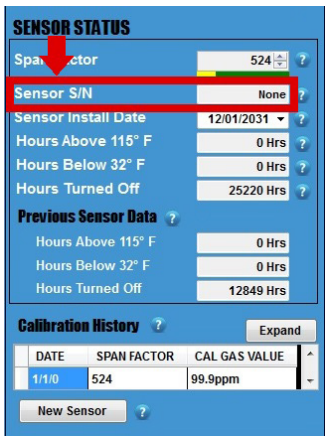
The section applies only to AMI Oxygen & Hydrogen Sulfide Analyzers.



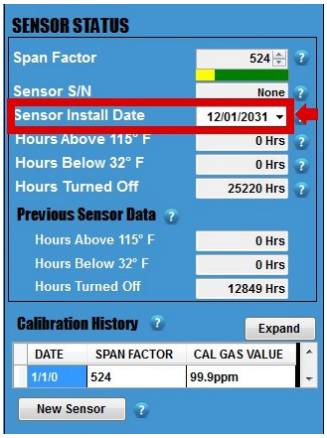
The SENSOR STATUS Area is located in the middle of the OPERATIONAL STATUS COLUMN of the ***COMMAND CENTER*** **User Interface.**

- The SPAN FACTOR is shown and can be adjusted during calibration using the arrows
- The SENSOR S/N (serial numbers) can be displayed in its respective cell

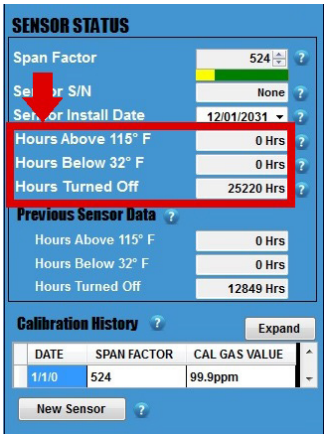




Click on the NEW SENSOR Button at the bottom of the OPERATIONAL STATUS COLUMN. A drop down window will open and allow you to enter the serial number of your sensor. Once you close the window, the serial number will now be displayed in its designdated cell.

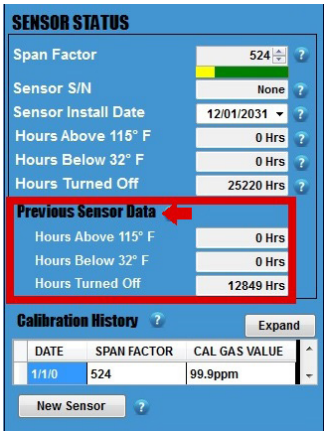


To enter the date of the sensor installation, click on the pull down menu and make the proper selection.

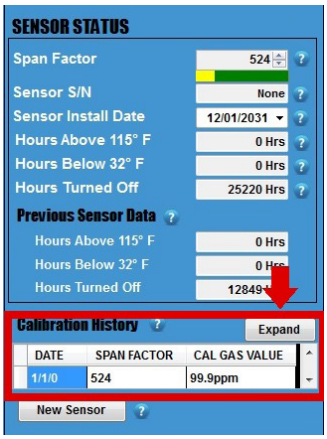


These cells show the following information:

- Number of hour(s) the sensor operated above 115°F
- Number of hour(s) the sensor operated below 32°F
- Number of hour(s) the Analyzer was turned off



The cells in this area shows the data from the previous sensor that was installed in the Analyzer.



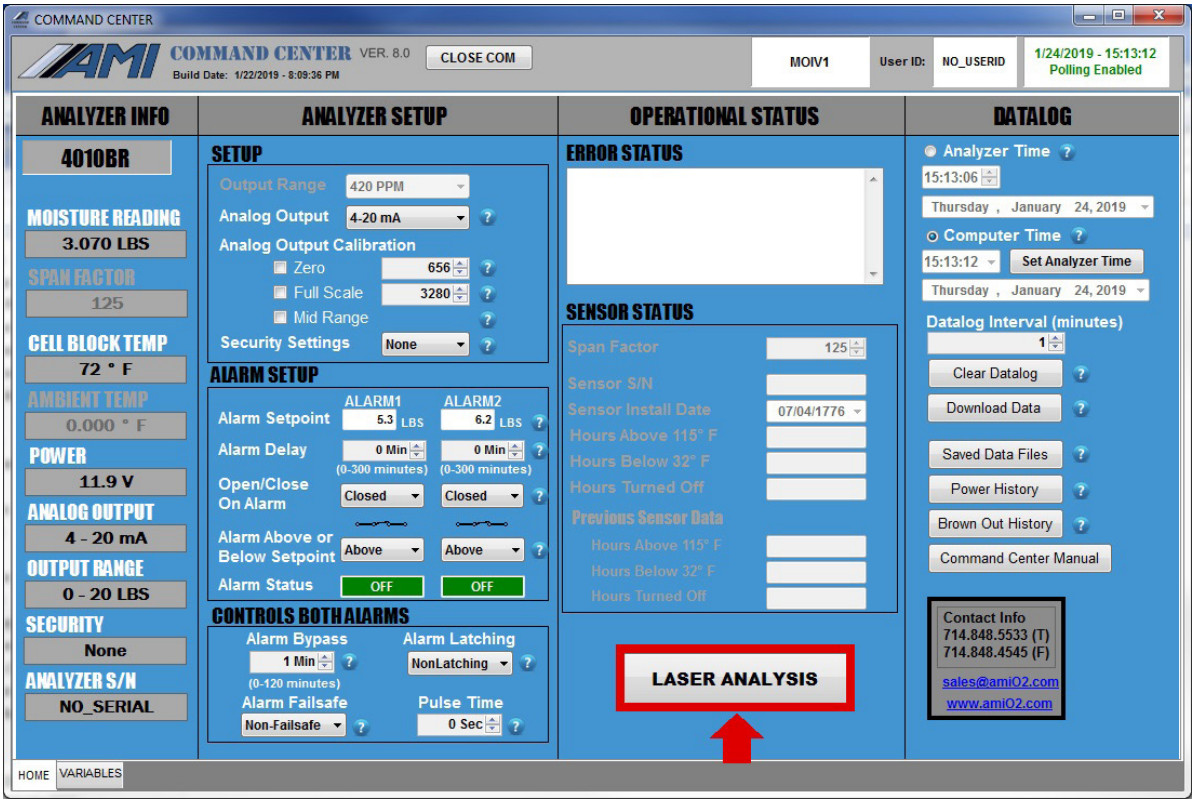
The CALIBRATION HISTORY stores information from the previous 9 calibrations. To view, click the EXPAND Button.

END OF SENSOR & CALIBRATION SECTION

VI. MODEL 4010LX SECTION

The section applies only to **THE MODEL 4010LX** TDL Moisture Analyzer.

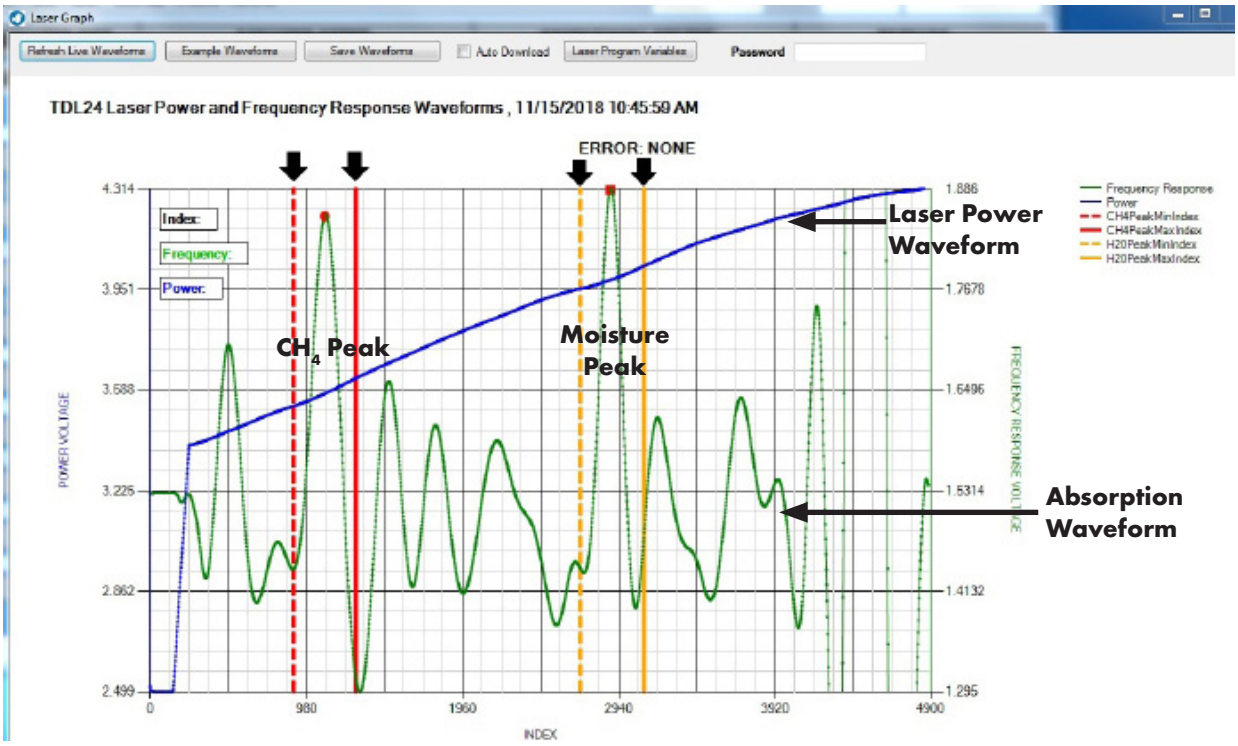
Viewing the Moisture Readings



To view the waveform of your measurement readings, click the LASER ANALYSIS Button located on the bottom of the OPERATIONAL STATUS Column of the ***COMMAND CENTER*** **User Interface.**

A separate Laser Graph Window will appear and display the waveform of the current moisture measurement.

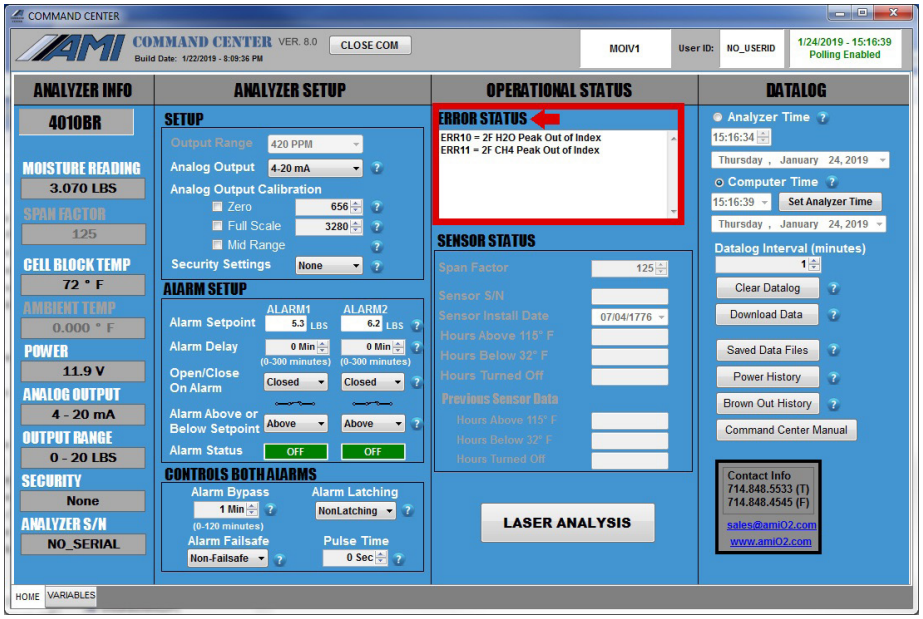
Sample Waveform Displayed in the Laser Graph Window



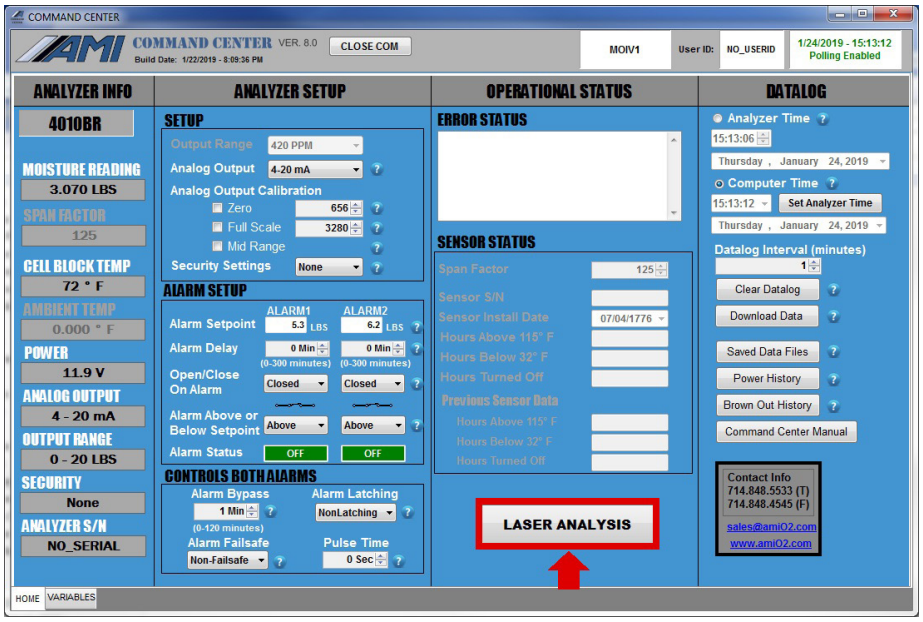
The graph above shows a typical waveform that a user should see when **THE MODEL 4010LX** is measuring the concentration of H_2O in a sample.

- The size of the Moisture Peak will vary, depending on the concentration of H_2O vapor in the sample. The greater the concentration of H_2O vapor in the gas sample, the larger the height and size of the peak.
- The vertical dashed yellow line and solid yellow line represent the acceptable range for your signature water peak
- The CH_4 (methane) peak is a signature portion of the Laser Frequency Absorption Waveform and should always appear in every moisture reading. Its amplitude will be consistent from reading to reading unless there are changes in pressure. If the CH_4 peak is missing, it is an indication that something is likely wrong with your sample gas or how it enters **THE MODEL 4010LX**
- The vertical dashed red line and solid red line represent the acceptable range for your signature methane peak
- The Laser Power Waveform shows that the laser is working and functional
- The Absorption Waveform shows the absorption that is occuring while the moisture measurement is being performed.

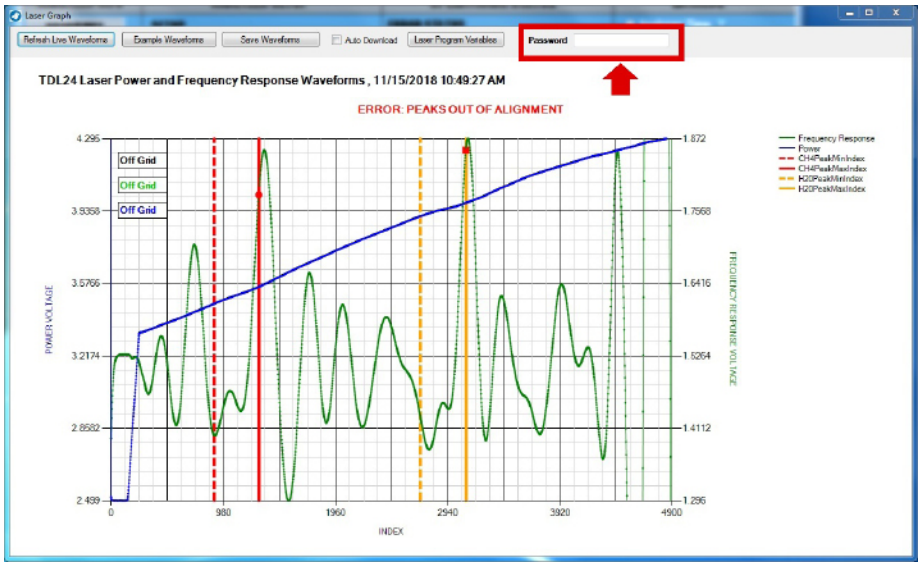
Using *SMART REALIGNMENT* to Realign the Signature Peaks



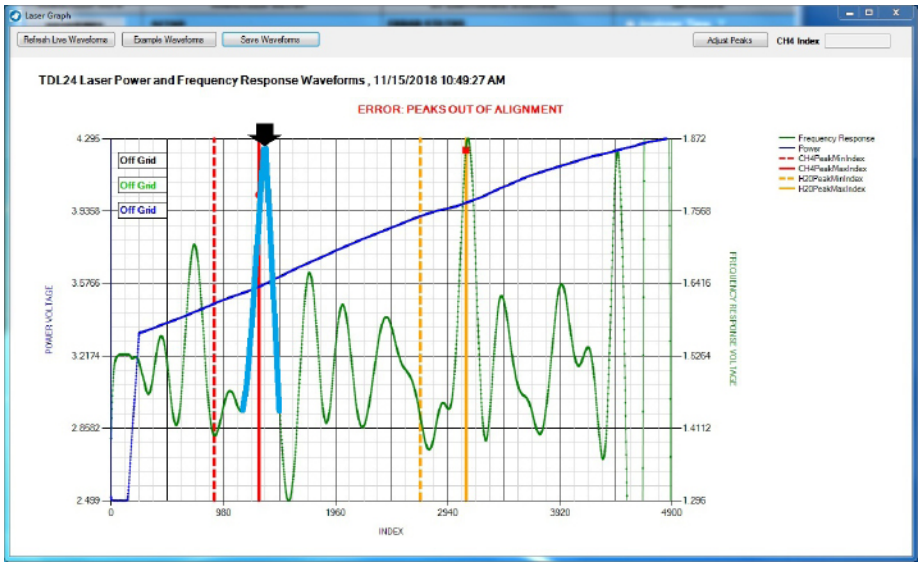
If your signature peaks have shifted, the ERROR STATUS DISPLAY will automatically display the error messages, alerting you to the need to realign your peaks.



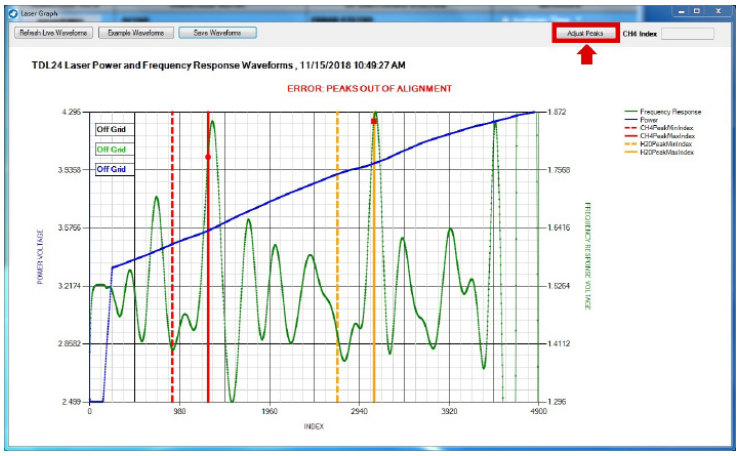
STEP 1: To begin, click on the LASER ANALYSIS Button at the bottom on the Operational Status Column. A new window will appear and display the current measurement waveform.



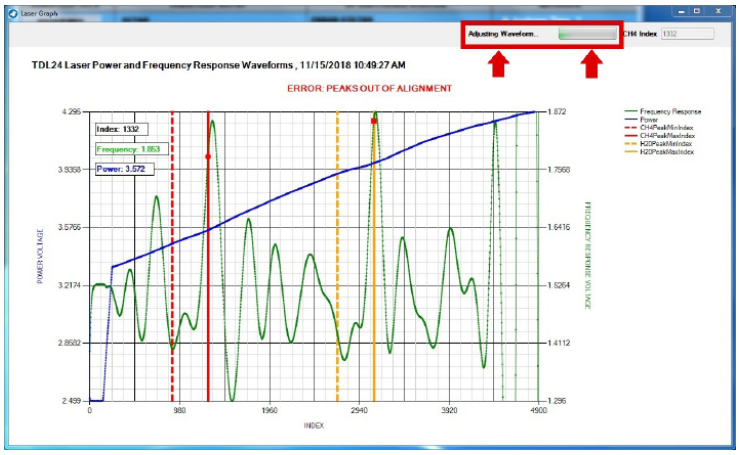
STEP 2: Type in the correct password that you received from AMI in the password entry area. The display window will slightly change.



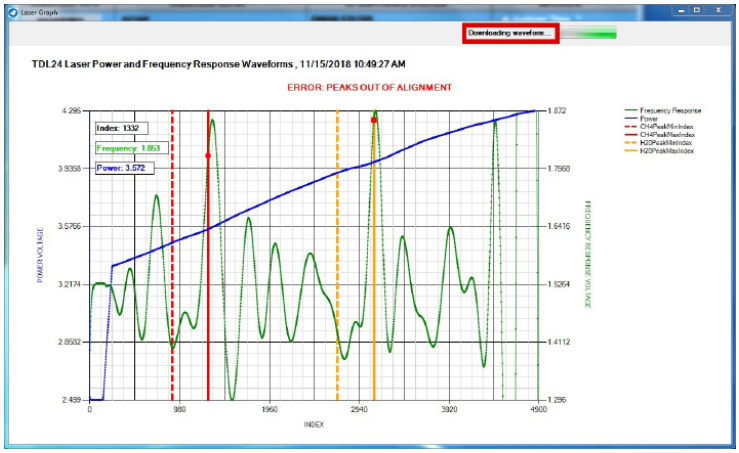
STEP 3: Click on the **TIP** of the misaligned methane signature peak.
Note: This peak is in the left area of the waveform and separated from the signature weak peak by 3 non-designated peaks. It is critical that you click on the tip and no where else on the waveform during this step.



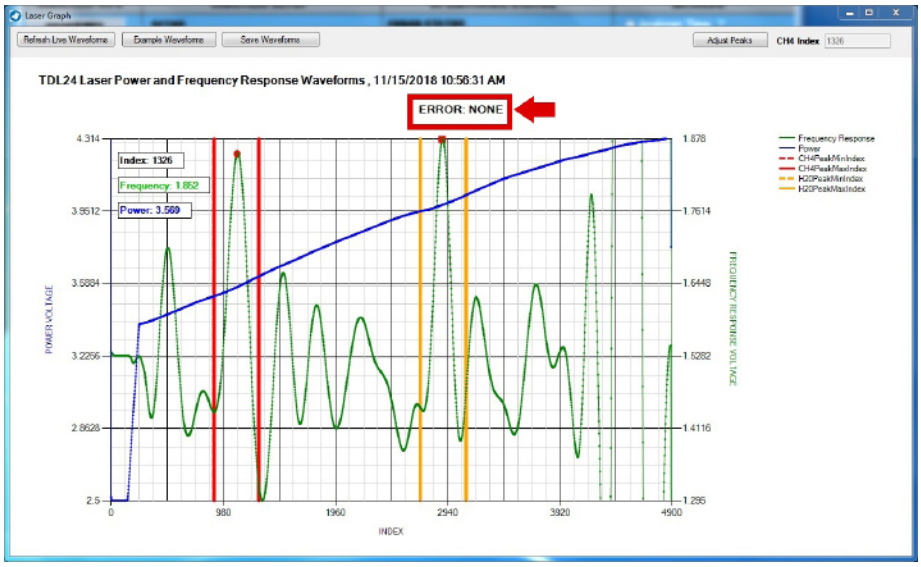
STEP 4: Click on ADJUST PEAKS on the upper right-hand corner of the screen. The display will slightly change again.



While the realignment process is taking place, you will see the screen displaying ADJUSTING WAVEFORM and an adjacent 'working bar' in the upper right-hand corner, highlighted by the red box.



When the process is nearing completion, the screen will adjust once more and display DOWNLOADING WAVEFORM.



Once everything is done, a new waveform will appear, displaying the fully adjusted signature methane peak and water peak. The Red Error Message will also disappear and be replaced with ERROR: NONE.

You have now successfully completed ***SMART REALIGNMENT***. At this point, you can close the ***COMMAND CENTER*** **User Interface Software** Window.

END OF MODEL 4010LX SECTION

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