Calibration and Configuration Manual

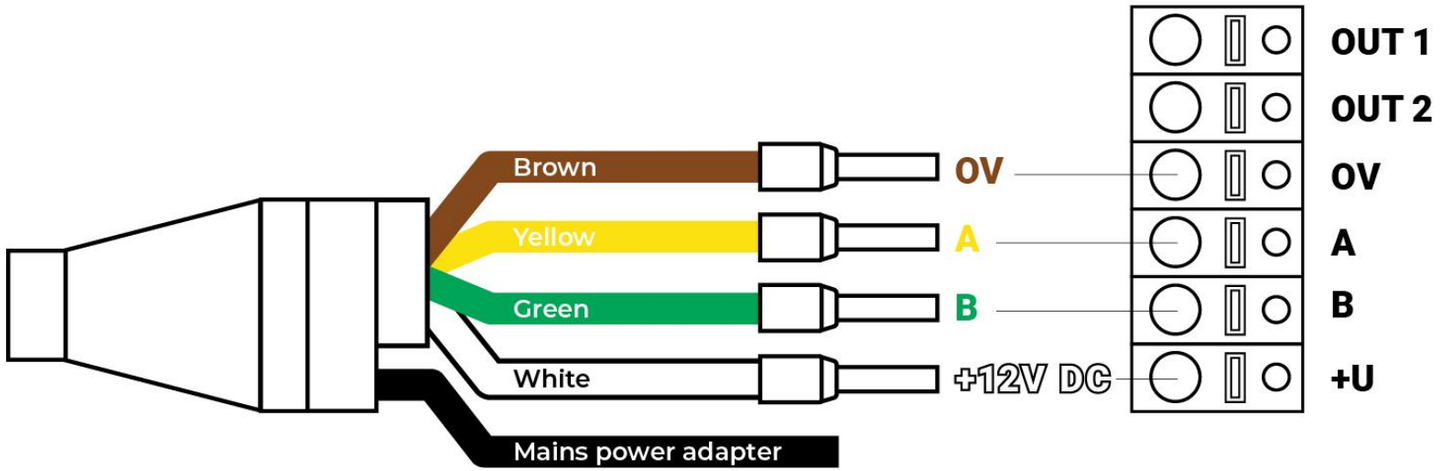
2023

Calibration

Calibration of Evikon MCI gas detector series based on the PluraSens® Platform can be done via PluraSens® Configurator software. This document is made using the PluraSens® v4.5 release.

It is very important that the gas detector has had 24 hours of warmup time before the calibration process to ensure stability, repeatability, reaction time and correct measurement data. For calibration of the gas detector it is needed to have the correct calibration gas, applicator for the calibration gas, USB-RS485 interface converter and power supply.

To start the calibration process, the gas detector has to be connected with a power supply. A USB-RS485 interface converter is needed to connect the gas detector with the computer. E1187 USB-RS485 converter also provides power to the gas detector. Refer to below Diagram for guidance.



Accessories with order codes for calibrating gas detectors are shown in the table below.

Item Code	Description	Sample Picture
RE-715020	Fixed flow regulator, 0,3 liters per minute, for 34 l and 103 l cylinders	
GTA-2204	2,5 m gas tubing Ø4/5 mm with applicators	
E1187	USB-RS485 converter for PluraSens® configuration	

PluraSens® Configurator is a multifunctional platform for gas detectors, transmitters, loggers etc. To calibrate a gas detector, after opening the software, choose the first icon which refers to gas detectors (figure 1).

Figure 1. PluraSens® Configurator home page.

By clicking on the gas icon, the user has two options- E2600 series or E2660 series (figure 2).

Figure 2. Choosing gas detector series.

After choosing the correct series, the general page for gas detectors will open. An Example of the General page is shown in figure 3.

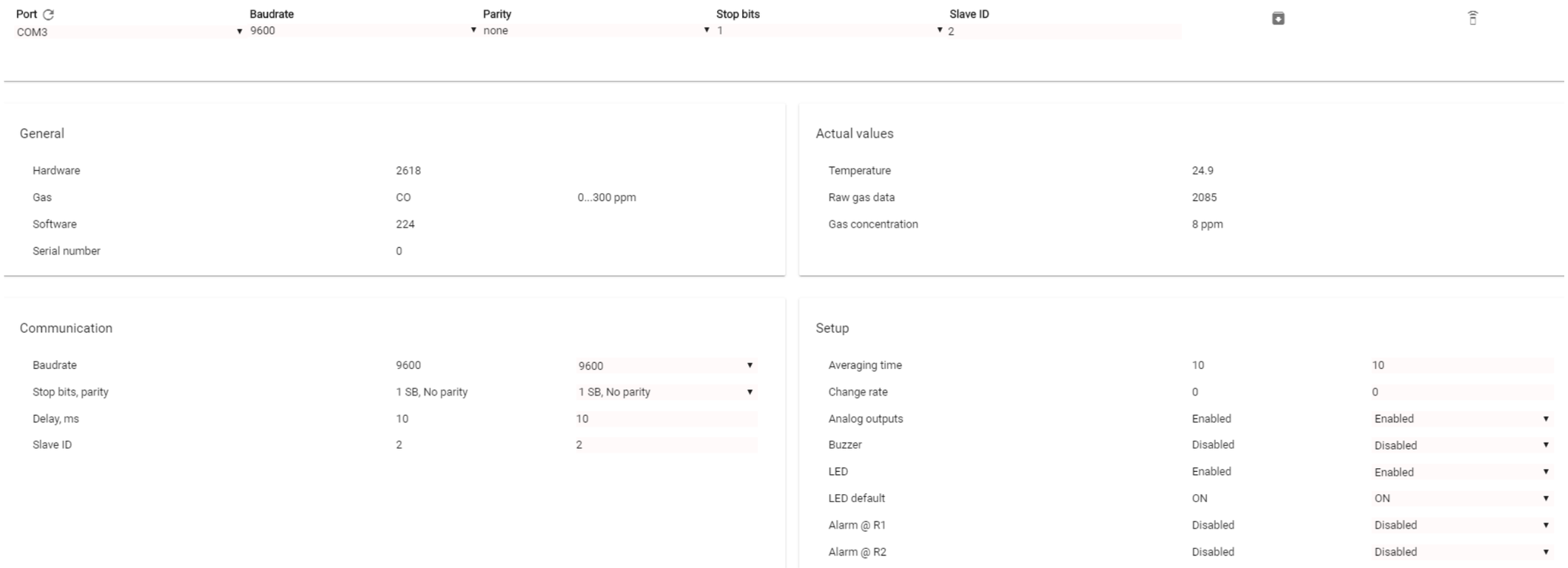
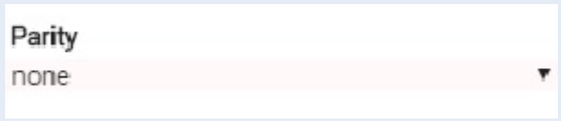
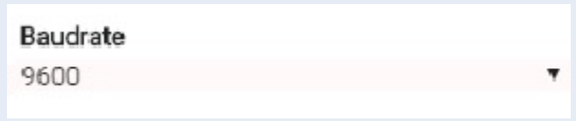


Figure 3. Gas detector general menu.

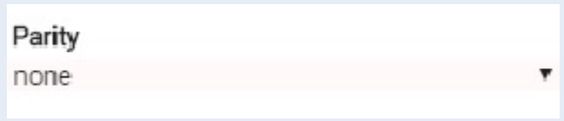
Modbus Communication Section (Located on TOP). is constant for all pages of the PluraSens® Configurator. The following figure gives a brief explanation of the Modbus Communication Section.



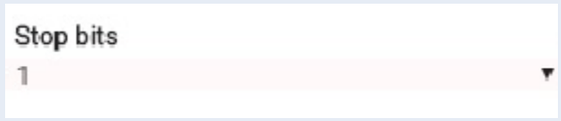
1. Select the appropriate COM Port, throught which EVIKON E1187 is connected to user PC



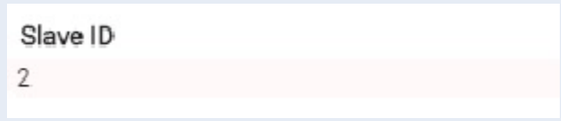
2. Select Appropriate Baud Rate, By Default Evikon Gas detectors use 9600



3. Select Appropriate Parity Bit, By Default Evikon Gas detectors use None



4. Select Appropriate Stop Bits, By Default Evikon Gas detectors use 1 Stop Bit



5. Slave ID is the Modbus ID of the Gas Detector, By Default Evikon Gas Detectors have Modbus ID 1, This should be changed from Communication Settings when connecting Gas detector to a Controller.

6. Read button

7. Write button

Once the Correct Modbus Parameters are set and the read button is clicked, the general information and actual values will be fetched from the gas detector and shown in respective sections.

The General Setting page has 4 sections.

- General information - (Located on Upper left side)
- Actual Values (Readings from the Device) - (Located on Upper Right side)
- Communication Settings - (Located on Lower Left side)
- Setup - (Located on Lower Right side)

Modbus Parameters can be updated by using the communication setting section and then pressing the write button. Note that once the communication parameters are successfully updated the Gas Detector is no longer available for communication on previous Modbus settings. Thus the Modbus Communication Section (Located on TOP of General setting page) must be updated as per new settings to access the Gas Detector again.

Details on the Setup section can be found in the table below.

Parameter	Available Options	Remarks
Averaging Time	Configurable in Seconds	Averaging time of Gas Reading to be done by transmitter.
Change Rate	0...65535	Maximum change rate of gas concentration per second ÷ resolution
Analog Outputs	Enabled/Disabled	Enabled by Default
Buzzer	Enabled/Disabled	Usability depends on Ordered Model, All Detectors don't have buzzers
LED	Enabled/Disabled	Usability depends on Ordered Model, All Detectors don't have Visual Signaling option on enclosure
LED Default	ON / OFF	Red LED normally ON or OFF
Alarm @ R1	Enabled/Disabled	Sound & visual signaling with Relay 1 (All Detectors don't have buzzer or Visual Signaling option)
Alarm @ R2	Enabled/Disabled	Sound & visual signaling with Relay 2 (All Detectors don't have buzzer or Visual Signaling option)

From the left vertical menu, the user needs to choose calibration. Calibration button is shown on figure 4.

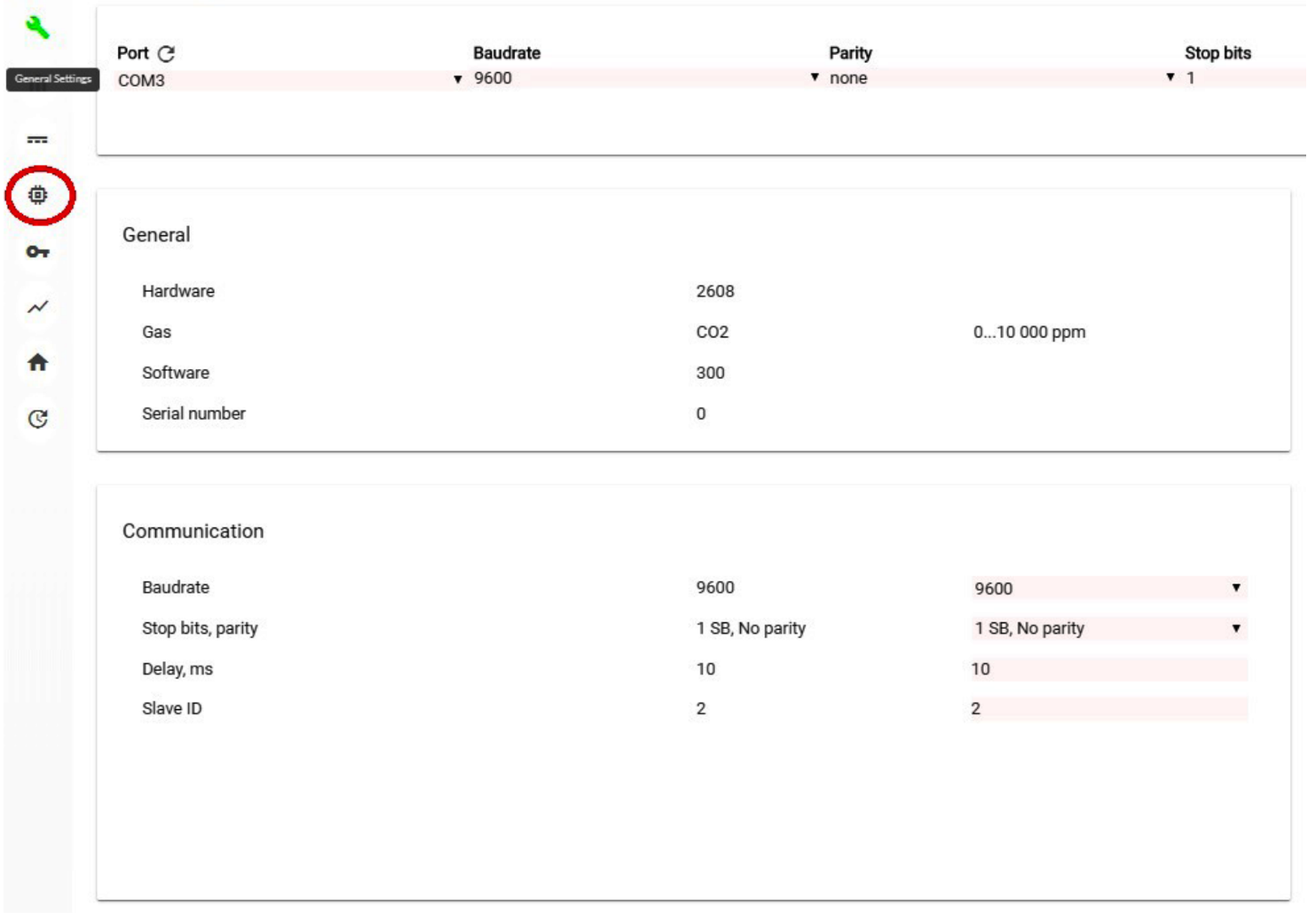


Figure 4. Gas Detector general menu.

When entering the calibration menu, the user needs to type in a password. Password for calibration is 0xA55A. Password tab is shown on figure 5.

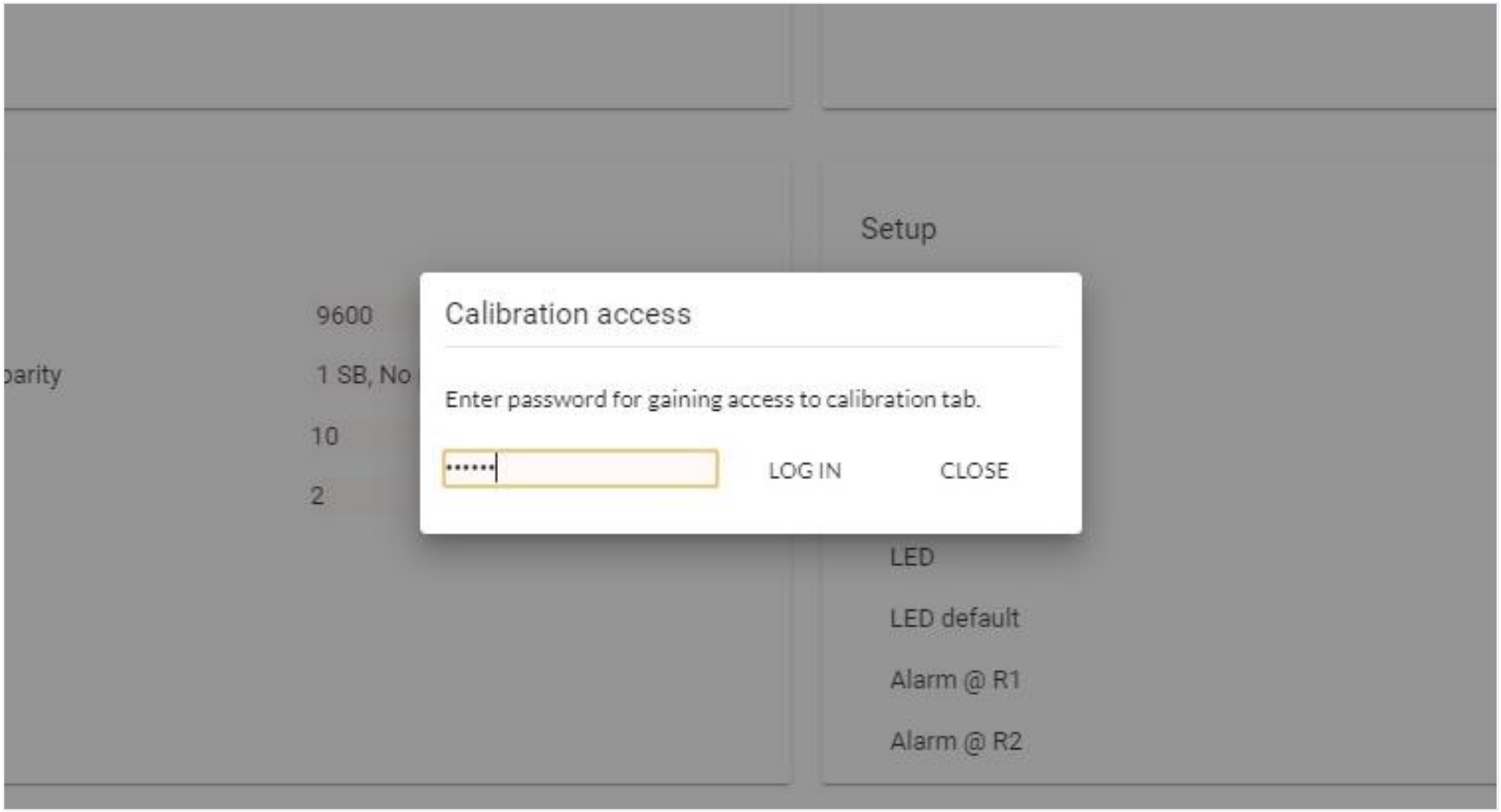


Figure 5. Password tab.

Calibration menu is shown on figure 6.

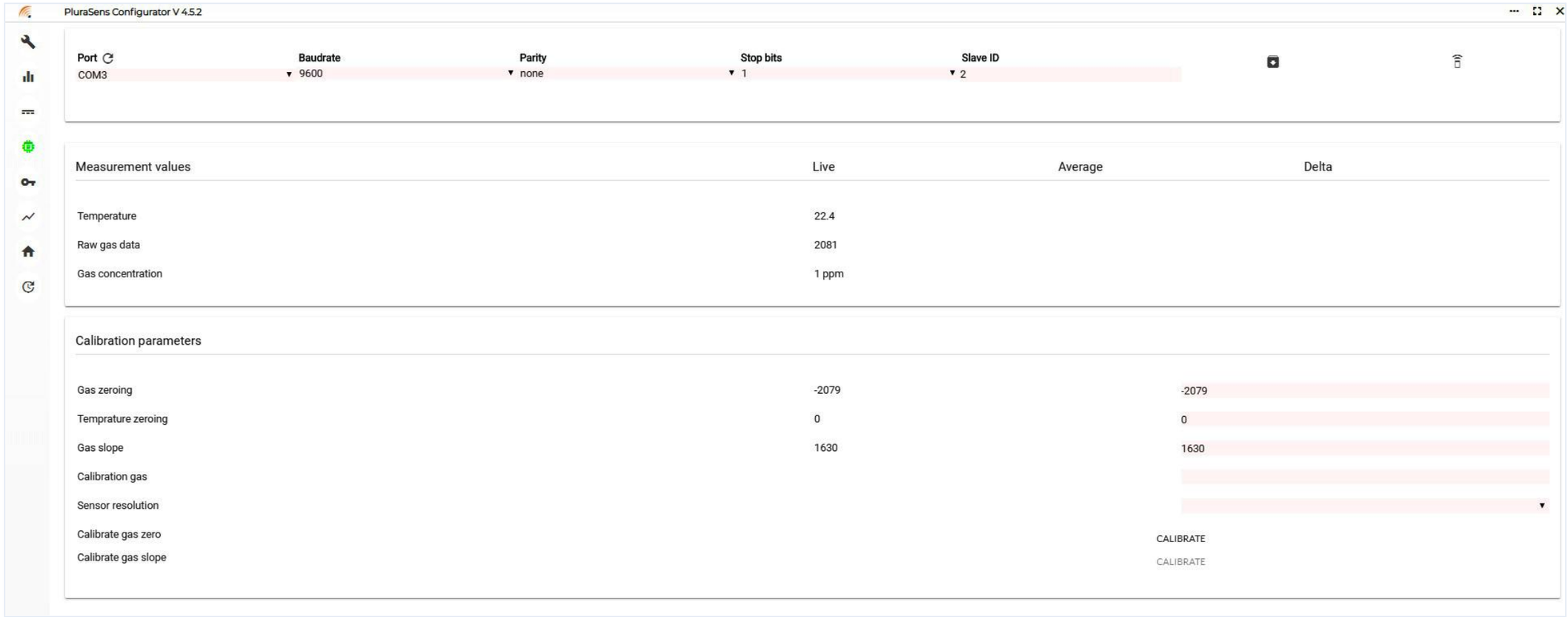


Figure 6. Calibration menu.

By pressing F1 or Read from the top right of the menu, the program will show the present parameters of the gas detector. By pressing F2 or Write, the user can set values manually.

Zero Calibration

Zero Calibration is the process of adjusting the gas detector to ensure accurate readings when there is no presence of the target gas. It establishes a baseline reference point or "zero" for the instrument's measurement scale

Slope Calibration

Slope calibration is also known as span calibration. In gas detectors it refers to the process of adjusting the instrument's response or sensitivity to a specific gas concentration. It involves setting the upper end of the measurement scale by exposing the gas detector to a known concentration of the target gas.

The following Section does not apply to CO2 (10k and 40k) gas detectors.

The first step in calibrating the gas detector is the zero gas calibration. The zero gas calibration has to be done without the attached applicator. Gas detector has to be in fresh air (normal air composition ≈78,1%vol N; ≈21%vol O2 etc) where there are no interruptive gasses present. Press the CALIBRATE button next to "Calibrate gas zero". Zero gas calibration button is shown on figure 7.

NB! When calibrating O2 gas detectors at low O2 concentrations it is recommended to perform zero calibration with pure nitrogen. If normal ambient air (≈21%vol O2) is measured, then the zero calibration is not necessary.

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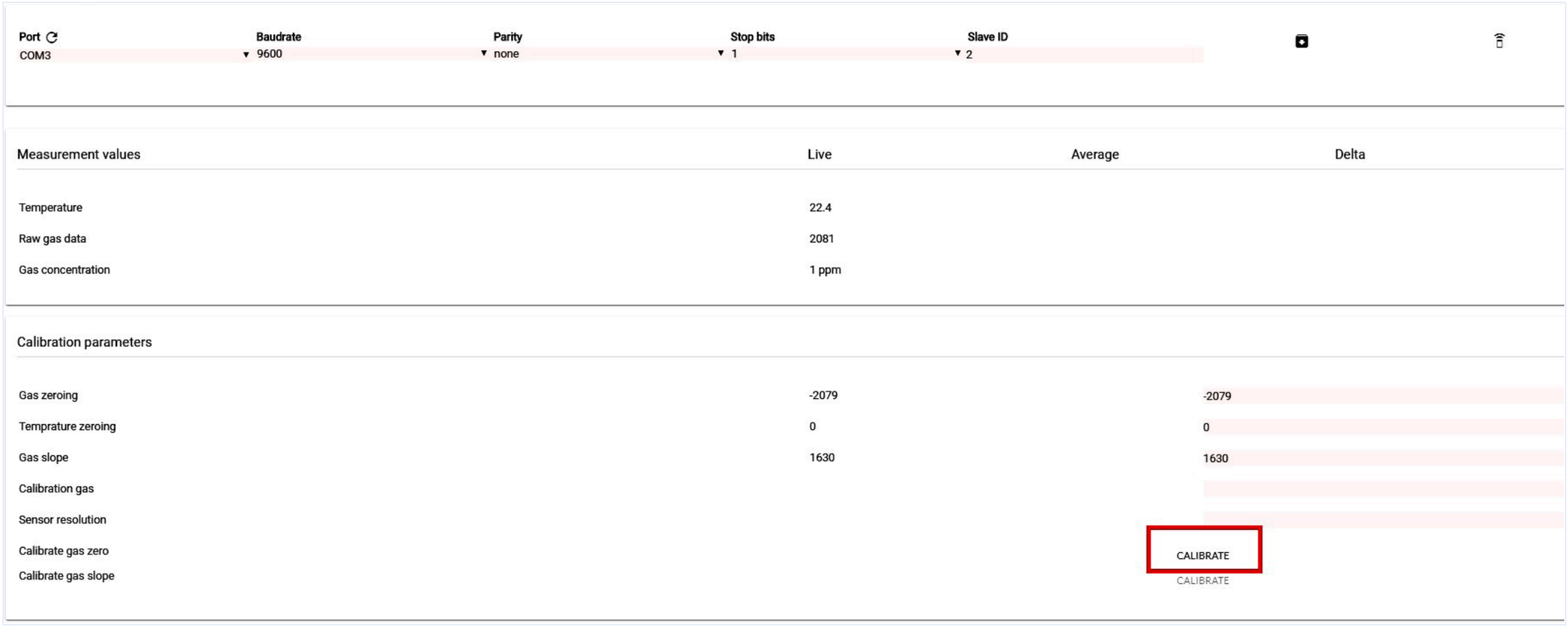


Figure 7. Zero gas calibration button.

After clicking the calibration button, the program will ask confirmation if the gas detector has been prepared for the calibration for at least 24 hours (refer to chapter 1.1 General). Confirmation tab is shown on figure 8.

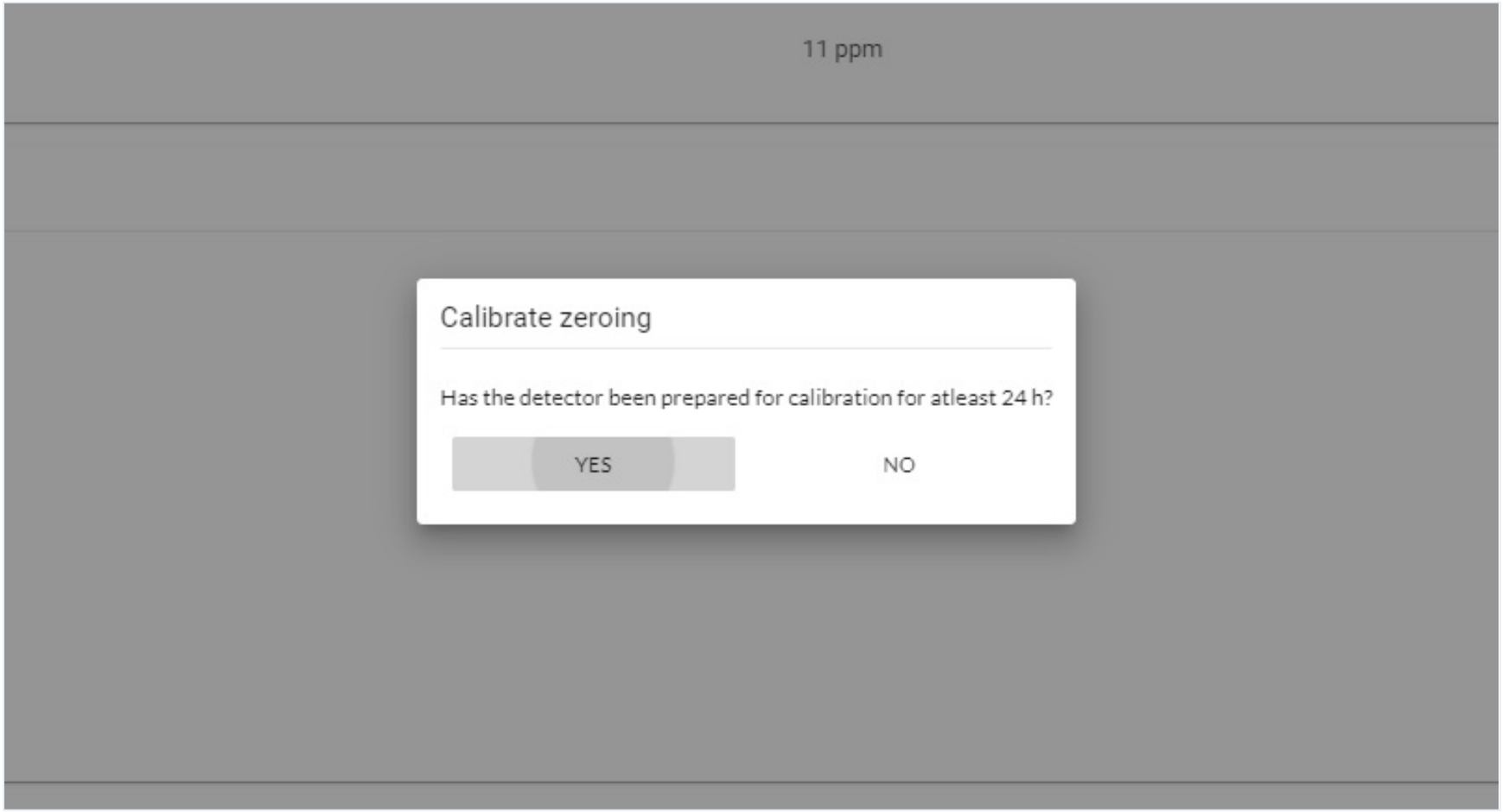


Figure 8. Confirmation tab for zero gas calibration.

After confirming the preparation of the gas detector, the software starts measurements for zero gas calibration. The program will do 10 measurements within 10 seconds. After 10 measurements, the average measured value is being calculated and zero deviation written (gas zeroing). After zero gas calibration the gas concentration should be zero. If not, then repeat Zero gas calibration by pressing the Calibrate button.

After zero gas calibration it is possible to calibrate gas slope. Gas slope calibration determines the sensitivity of the gas detector. In order to execute the gas slope calibration, the user needs to have the correct calibration gas with the applicator.

Attach the applicator of the calibration gas to the sensor head of the gas detector. Open the valve of the calibration gas. The recommended flow of the gas is 0,2...0,5 l/min. Let the gas flow for 3-5 minutes and at the same time click the Read button from the top right of the screen every 10-20 seconds to check gas concentration reading. It is needed that the gas concentration reading is stable and doesn't change more than 2% from the value. Do not turn the valve off until the calibration is done.

When the concentration of the gas is stable then the user has to define resolution and calibration gas. The resolution of the gas can be found in the gas detector's user manual from the Specifications table. The calibration gas means the calibration gas concentration which can be found on the calibration gas cylinder.

NOTE : Gas Resolution works as a Divider The following Table shows how different selections are used in suitable scenarios.

(Resolution is divided by the Value of Calibration Gas Concentration)

Resolution	Remarks
0.001	3 Decimal points (Used for PID sensors below 32 ppm of target gas range)
0.01	2 decimal Point (Used for Oxygen / %Vol readings, PID sensors)
0.1	1 decimal Point (Used for ppm / %LEL(MOS))
1	Means a 1 to 1 Translation , Normally used for ppm or %LEL(Pellistor) (without Decimal points)
10	Special Assignments Only
100	Special Assignments Only

After stabilization of the gas concentration and adding values to resolution and calibration gas, the user can click on the gas slope calibration button. After clicking on the calibration button, the user must confirm that the previous step of the zero gas calibration is done. The program will do 10 measurements in 10 seconds. The gas slope calibration button and process is shown on figure 9.

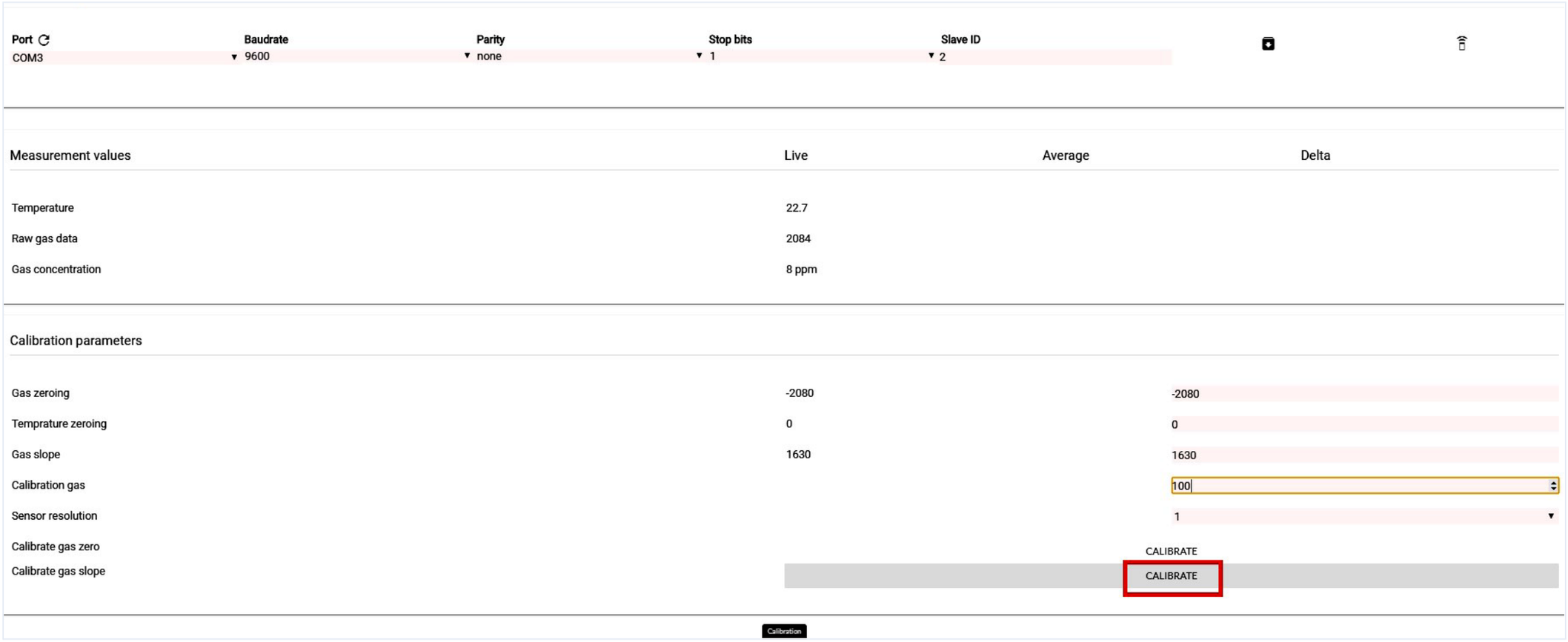


Figure 9. Gas slope calibration button and process.

After gas slope calibration, the gas detector is calibrated and will show the final values.

Following Table explains all the Calibration Parameters from the configuration page.

Parameter	Definition
Gas Zeroing	Offset for Zero Calibration of Gas Concentration
Temperature Zeroing	Offset for Zero Calibration of Temperature
Gas Slope	Sensitivity Value for the Sensor
Calibration Gas	Concentration of Calibration Gas Applied
Sensor Resolution	Divider for using Suitable decimal point depending on Gas Concentration unit.

Ensure that concentration is the same as the calibration gas concentration. It may vary ±2% from the value. If not, repeat the gas slope calibration step.

When the calibration process is done, turn off the valve and detach the applicator. Gas concentration should start to fall to 0 ppm (excluding CO2 and O2). CO2 and O2 gas concentrations depend on the surrounding environment (standard ~400 ppm CO2 and ~21%vol O2).

This Following Section applies to CO2 (10k and 40k) calibration only

When calibrating CO2 gas detectors, it is needed to put Calibration Gas value manually on the field. The following table must be kept in mind when entering calibration gas value or setting up setpoints.

CO2 Model	Gas Concentration	Relay and Analog Set points
10k ppm	As per Actual.	As per Actual.
40k ppm	As per Actual.	Values to be divided by 10 and then entered in Configurator.

Attach the applicator of the calibration gas to the sensor head of the gas detector. Open the valve of the calibration gas. The recommended flow of the gas is 0,2...0,5 l/min. Let the gas flow for 3-5 minutes and at the same time click the Read button from the top right of the screen every 10-20 seconds to check gas concentration reading. It is needed that the gas concentration reading is stable and doesn't change more than 2% from the value. Do not turn the valve off until the calibration is done

After that click Write. The CO2 gas detector calibration page is shown on figure 10.

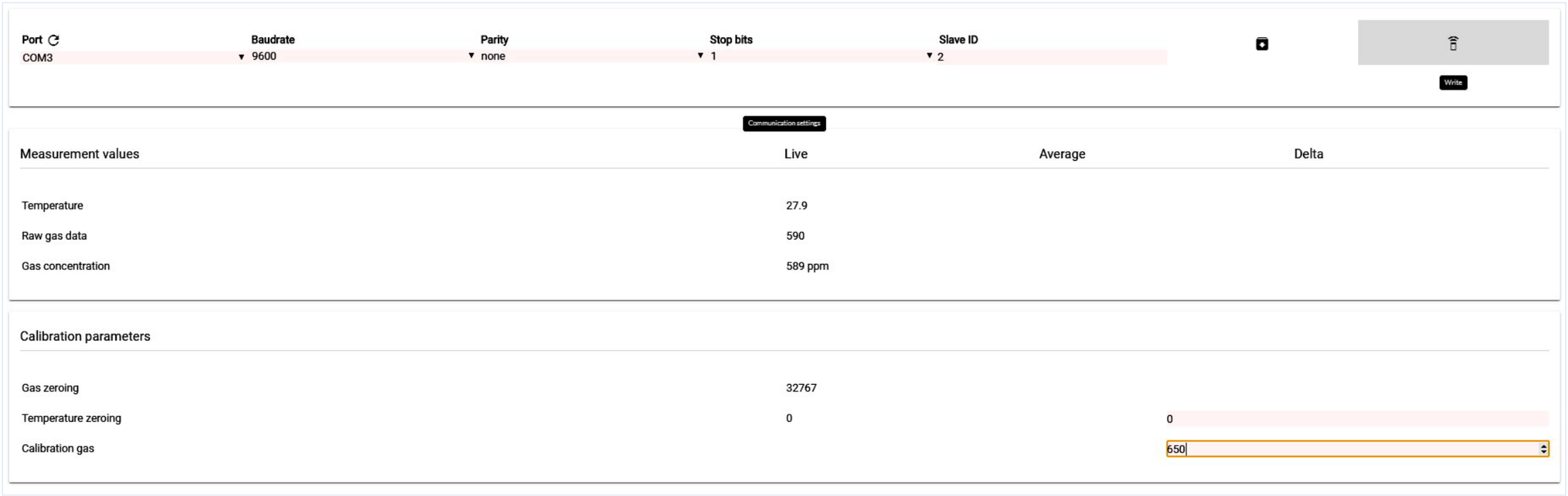


Figure 10. CO2 gas detector calibration page

Configuring analog and relay outputs

Once the gas detector is accessed through Modbus, User can configure the analog outputs by accessing the relevant page. Figure 11 shows the configuration page for Analog outputs.

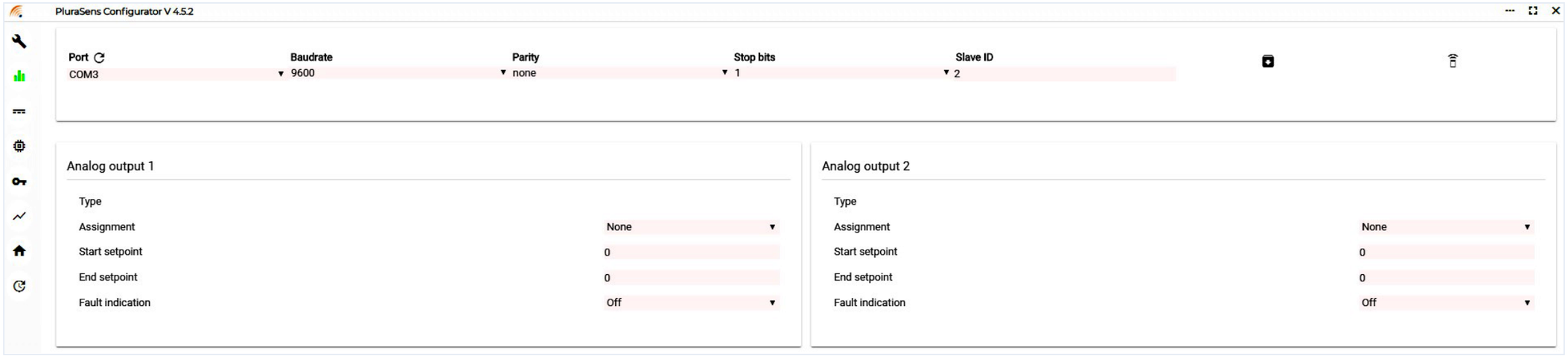


Figure 11. Analog Outputs page

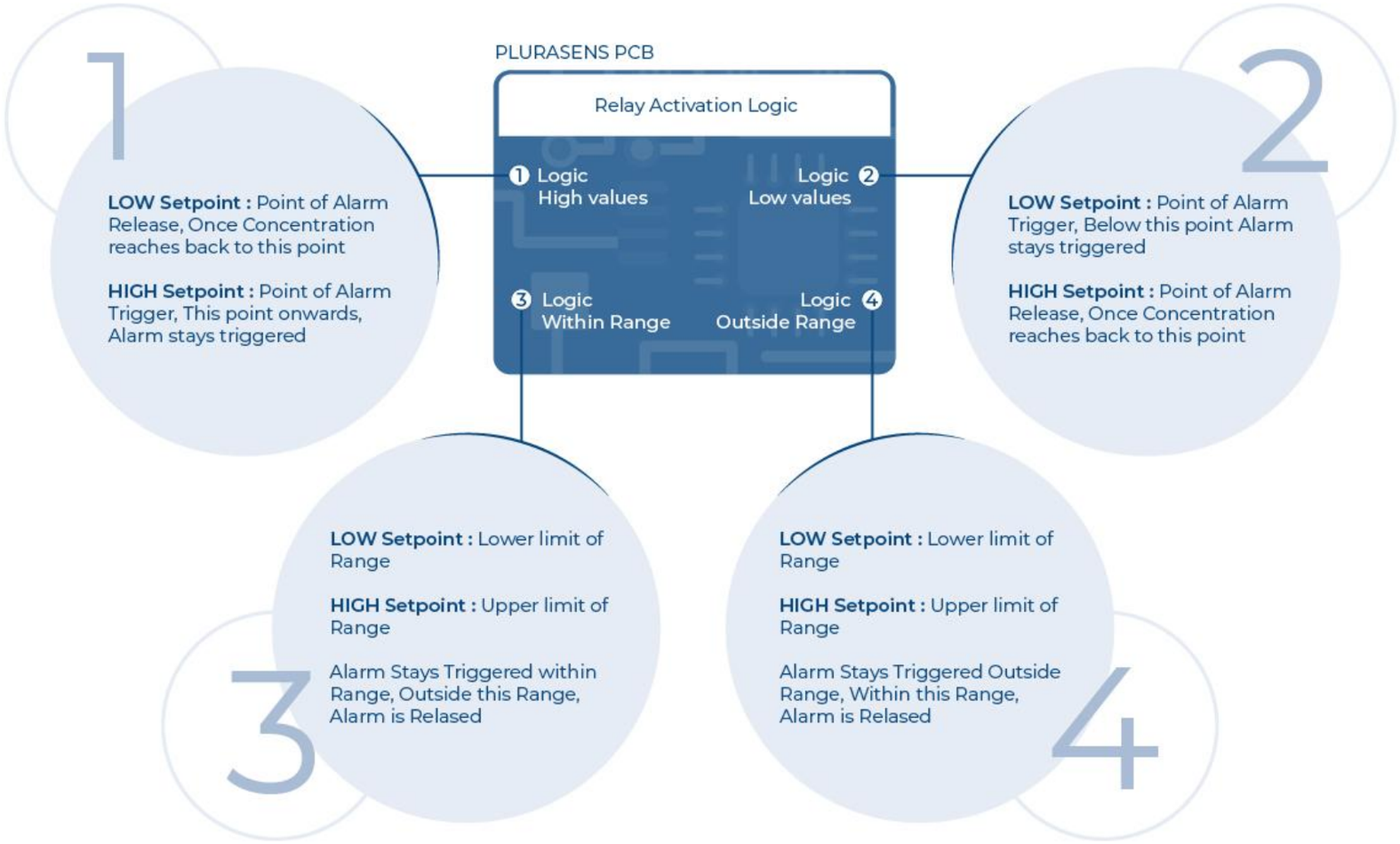
The Following Table shows the details of all options in the analog output page.

Parameter	Definition
Assignment	Select between Gas or Temperature (Gas for 2600 Series, Temp for 2200 Series)
Start Setpoint	Start of Range (This value will correspond to 4mA)
End Setpoint	End of Range (This value will correspond to 20mA)
Fault Indication	Selection between Off, 3.5mA or 21.5mA

Note: For Both Analog and Relay Outputs , Actual Set points must be divided by the Resolution value and then entered so it can cater the decimal point value correctly e.g. (For oxygen 0-5% Vol with 0.01 Resolution , 2% and 4% set points will be entered as 2/0.01 = 200 , 4/0.01=400) - For CO2 Refer to the table in CO2 section.

The Relay outputs for the gas detector can also be configured through the PluraSens® Configurator. Figure 12 shows the configuration page for Relay outputs.

Figure 12. Relay Output page

The Following illustration shows the different ways Relays can be operated in PluraSens®.

Note: Applicable to SPST Relays.