

# PERSONAL CO2 SAFETY MONITOR AND DATA LOGGER

## User Manual



**SAN-10**

1-13-21

# CONTENTS

INTRODUCTION .....	2
FEATURES .....	2
MONITOR .....	3
LCD DISPLAY .....	3
OPERATION .....	4
Power button .....	4
Temperature Units Button .....	4
Menu Status .....	4
Alarm Threshold .....	5
Automatic Atmospheric Pressure Compensation .....	6
Man Down Alarm .....	6
Reset Button .....	6
DOWNLOADING DATA LOGS .....	7
CALIBRATION .....	10
MAINTENANCE .....	11
Calibration .....	11
Cleaning and Storage .....	11
SPECIFICATIONS .....	12
Device Specifications .....	12
CO2 Sensor Specifications .....	12
Temperature Sensor Specifications .....	12
Relative Humidity Sensor Specifications .....	12
TROUBLESHOOTING .....	13
SUPPORT & WARRANTY .....	14

## INTRODUCTION

Congratulations on your purchase of the SAN-10 Personal CO2 Monitor and Data Logger. It is designed to alert employees who work in enclosed areas where carbon dioxide buildup may cause personal harm. If CO2 buildup occurs, it will show the level on screen, flash, alarm and vibrate. In addition the SAN-10 includes built-in data logging and a man-down alarm that uses an accelerometer to set off the alarm if a sudden shock to the unit (like the wearer falling down) occurs.

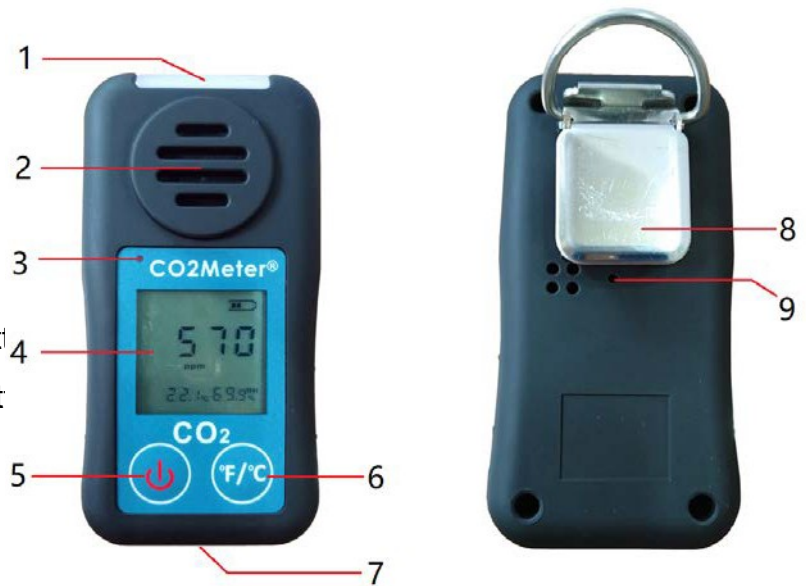
The SAN-10 uses a non-dispersive infrared CO2 sensor to provide long term stability. It is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

## FEATURES

- Audible, visual strobe and vibrating alarms
- Large LCD display
- Rugged design with protective rubber enclosure
- Heavy duty metal clip
- Front facing sensor unit
- Rechargeable Battery 4.2v, 1500mAh
- Micro USB cable and Wall USB charger
- Rechargeable Li-Ion battery – 20+ hours per charge
- Man down alarm - leveraging accelerometer technology
- Dual calibration methods: Ambient Air (300-600ppm) and Nitrogen (0-200ppm)
- Automatic atmospheric pressure compensation for CO2 concentrations
- No over-exposure or negative memory effects
- Stable NDIR sensor for CO2 detection.
- CO2, temperature, relative humidity, barometric pressure, and alarm log data logging with time stamping
- Up to 149,500 time-stamped records in internal memory. Data can be exported via USB

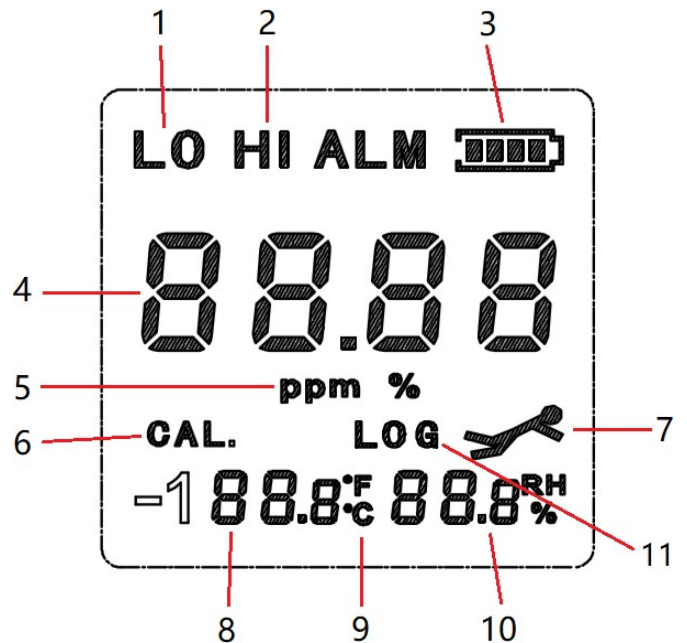
## MONITOR

1. Visual alarm/strobe
2. Front facing sensor
3. Charging indicator
4. LCD display
5. Power button
6. Temperature units switching button
7. USB port and charging inlet (bottom)
8. Heavy duty metal clip
9. Factory reset button





## LCD DISPLAY

1. Low alarm indicator
2. High alarm indicator
3. Battery indicator
4. CO2 concentration
5. CO2 concentration units (ppm or % when >9,999 ppm)
6. Calibration icon
7. Man down alarm
8. Air Temperature
9. Temperature unit (Fahrenheit or centigrade degrees)
10. % Relative Humidity
11. Data logging indicator




## OPERATION

### Power button

1. When the Monitor is turned off, press the power button  to turn on the unit.
2. When the Monitor is turned on, press the power button  for 3 seconds to turn off the unit.


When the unit is first turned on, it performs 5 seconds countdown for Monitor warm up, then enters normal display with current CO2, temperature, and humidity readings displayed. The monitor starts taking measurements when power on and updates readings every 2 seconds.






### Temperature Units Button









1. Press  shortly to switch temperature units: °F and °C.

### Menu Status

Press the temperature unit switching button  for **5** seconds to enter into **Menu status**.

There are six menu items that can be accessed by pressing the temperature unit switching button  momentarily to cycle between **AIR**, **N2**, **Hx.x**, **Lx.x**, **A ON/AOFF**, **SC**, **Px**, **Log** and **E** (exit). The menu items are described in the following table.

Menu Items	Functional Description
AIR ("AIR")	<b>Ambient Air Calibration.</b> User presses the power button  to implement <b>Ambient Air Calibration</b> (300~600ppm).
N2 ("N2")	<b>Nitrogen Calibration.</b> Press the power button  to start nitrogen calibration (0~200ppm).
H0.5/H0.5T/H1.0/H1.5/H3.0	<b>High Alarm Threshold</b> setup. Press the power button  to switch the high alarm threshold: H0.5 (5000 ppm), H0.5T (5000 ppm TWA), H1.0 (10000 ppm), H1.5 (15000 ppm), and H3.0 (30000 ppm).
L0.5/L0.5T/L1.0/L1.5/L3.0	<b>Low Alarm Threshold</b> setup. Press the power button  to switch the low alarm threshold: L0.5 (5000 ppm), L0.5T (5000 ppm TWA), L1.0 (10000 ppm), L1.5 (15000 ppm), and L3.0 (30000 ppm).
A ON A OFF	<b>Man down alarm</b> set on/off. Press the power button  to switch "A ON" to turn on the man down alarm or "AOFF" to turn off the man down alarm)

SC ("50")	<p><b>Real time clock setup</b></p> <p>Press the power button  to enter the real time clock setup:</p> <p>a. Press the  button to switch between Year (4), Month (0), Day (d), Hour (h), Minute (i), Second (5) and E. to exit.</p> <p>b. Press the power button  to increase the value until the correct time is set. This value is a cyclic change. Press the power button  again to save and exit the menu status.</p> <p>For example, set the month to February by pressing the power button  in "0":</p> <p>0 2</p>
Px	<p><b>Data logging period setup</b></p> <p>Press the power button  to switch the data logging period between: P30 (30 seconds), P60 (60 seconds), P120 (120 seconds or 2 minutes), P300 (300 seconds or 5 minutes), P600 (600 seconds or 10 minutes) or P900 (900 seconds or 15 minutes).</p>
Log ("LOG")	<p><b>Data logging memory operation</b></p> <p>Press the power button  to switch the data logging memory operation between:</p> <ul style="list-style-type: none"> <li>• EP (Export data logging by USB)</li> <li>• RES (Reset the memory)</li> <li>• E (Exit without operation).</li> </ul>
E	<p><b>Exit.</b> Press the power button  to exit the menu status.</p>

## Alarm Threshold

The SAN-10 is equipped with audible, visual and vibration alarms to alert users when the ambient oxygen concentration exceeds either of the two factory preset alarm levels:

- **Danger High Alarm:** LED will flash and audible alarm will sound 3x / sec.
- **Warning Low Alarm:** LED will flash and audible alarm will sound 2x / sec.

There are high and low alarm thresholds. Both high and low alarm has five thresholds: 5,000 ppm, 5000 ppm TWA (time-weighted average over 8 hours), 1.0%, 1.5%, and 3.0%. While the high alarm threshold cannot be less than the low alarm threshold they can be the same alarm level.

## Automatic Atmospheric Pressure Compensation

The CO<sub>2</sub> measurement is affected by atmospheric pressure or altitude changing. When users are at high altitude, compensation is made internally to ensure maximum monitor accuracy.

This device has automatic atmospheric pressure compensation for CO<sub>2</sub> concentrations by means of a digital atmospheric pressure sensor integrated in the unit.

## Man Down Alarm

Falling by breathing dangerous gases can cause serious injury and even fatality to workers. If the Man down alarm function in SAN-10 is set on, SAN-10 can detect falls and send a man down alert which will activate the audible and visual alarms and alert other people in the area.

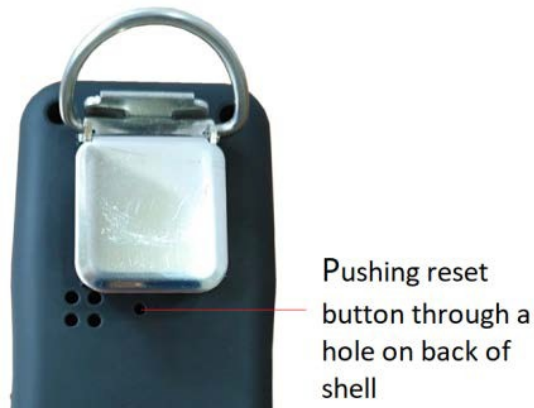


The man-down detection uses a three-axis accelerometer to automatically monitor the user's movements in order to identify a sudden fall or impact and a lack of movement for a period of 6 seconds.

Once alerted, you can turn off the man-down alarm by pressing either of the two buttons.

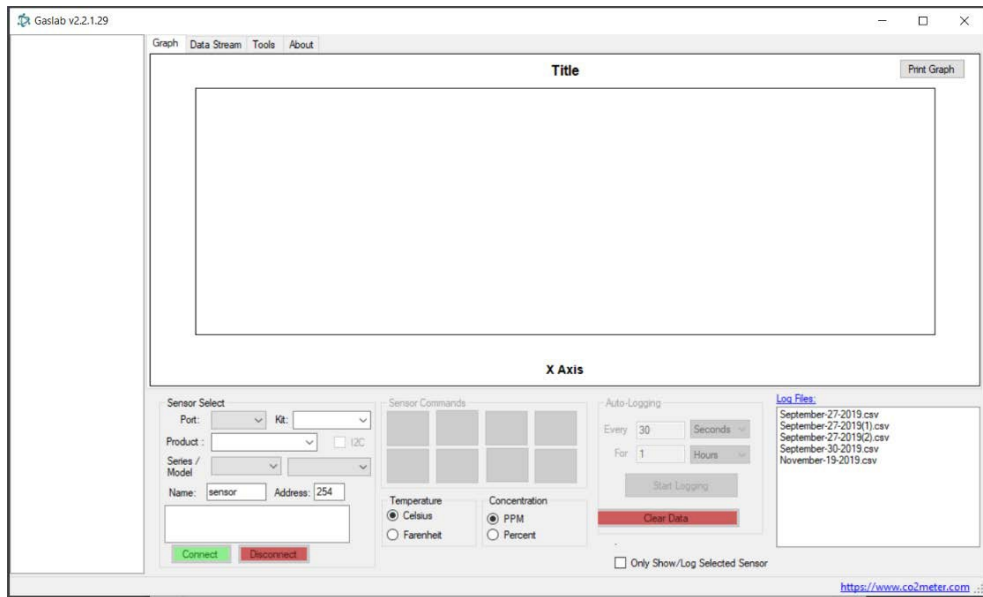
## Reset Button

Users can reset the unit by pushing a reset button through a hole on back of shell.

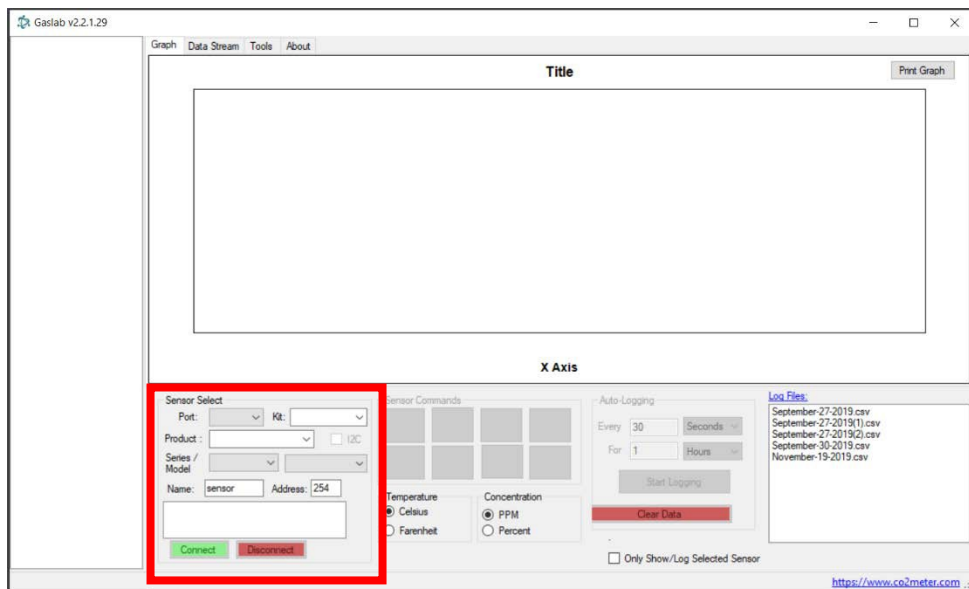


## DOWNLOADING DATA LOGS

1. Download latest version of GasLab®: <https://www.co2meter.com/pages/downloads>
2. Power on the SAN-10 device
3. Wait for 5 second warm up countdown
4. Connect the SAN-10 to your Windows PC with the USB cable
5. Open the Gaslab software



6. Set Sensor Select options.



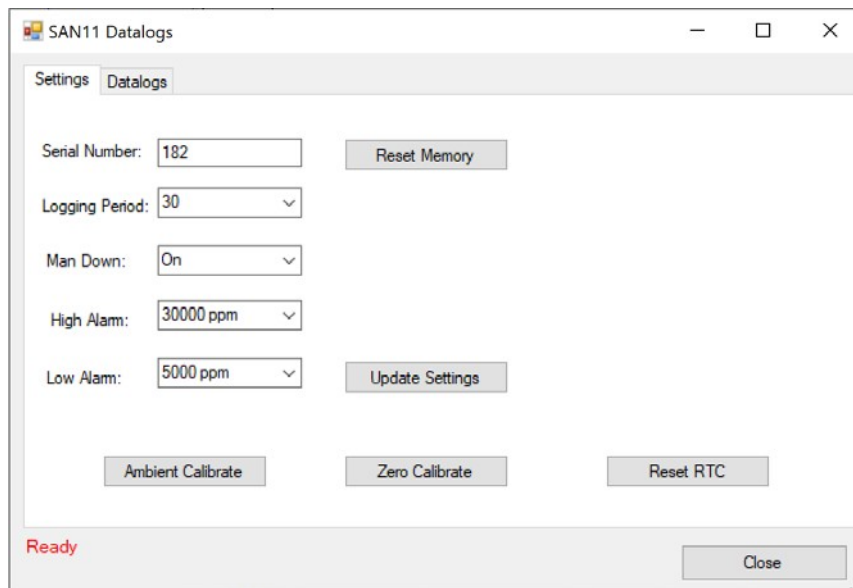
7. Select the Port in which your SAN-10 device is connected.
8. Do not select a Product.
9. Select SAN-XY under Series/Model.



10. Press Connect. When connected the window should appear as shown below:

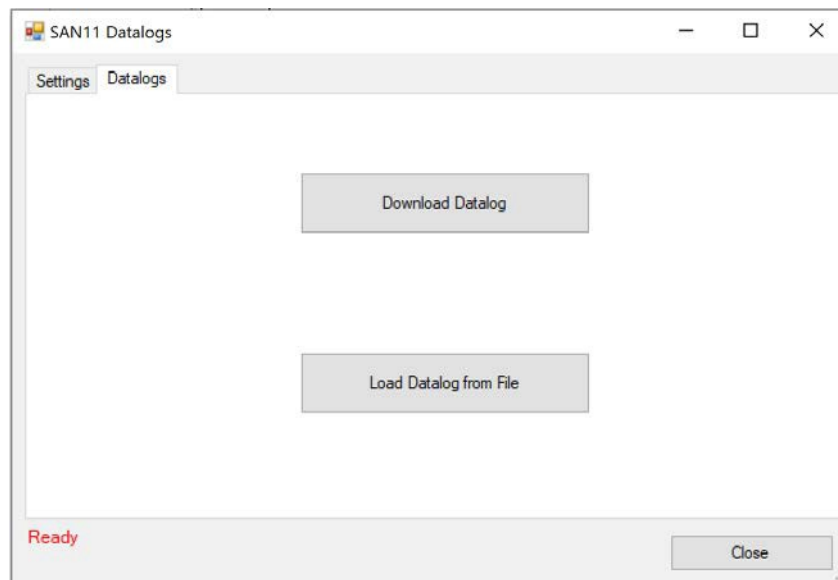


11. Click Configure Sensor and the following page will appear:



12. Make sure the Serial Number matches the one found on the back of your device.

13. Select the Datalogs tab.



14. Click the Download Datalog button. Name and select a location to save your file.

Data logs are .CSV (common separated values) files which can be opened or imported into any spreadsheet program.

## CALIBRATION

Step 1. Power the unit on by pressing and holding the power button for 3 seconds

Step 2. Press and hold the °F/°C button for 5-10 seconds to open the first menu

Step 3. Use the °F/°C button to scroll through the first menu which will read:

- a) AIR (Ambient Air Calibration Option)
- b) N2 (Zero Nitrogen Calibration Option)
- c) L 0.5 (Low alarm threshold)
- d) H 3.0 (High alarm threshold)
- e) A ON (Alarm option. Turns the alarm on and off)
- f) E (To exit the menu and return to home screen)



SAN-10

Step 4. Perform AIR or N2 calibration

<p>“AIR” Ambient air calibration</p> <ul style="list-style-type: none"><li>Follow above instructions to access the menu</li><li>The “AIR” option is the first to appear</li><li>Bring the unit OUTSIDE or use 400ppm CO2</li><li>Press the power button to start the calibration</li><li>If the screen reads “FAIL” repeat until the calibration passes</li></ul> <p><b>*IF THE MONITOR DOES NOT READ IN THE 300-600 PPM RANGE BEFORE PERFORMING THE CALIBRATION, IT WILL NOT CALIBRATE IN THE FIRST MENU.</b></p>	<p>“N2” Nitrogen calibration</p> <ul style="list-style-type: none"><li>Follow above instructions to access the menu</li><li>Go to “N2” option</li><li>Expose the device to nitrogen gas</li><li>Press the power button to start the calibration</li><li>If the screen reads “FAIL” repeat until the calibration passes</li></ul> <p><b>*IF THE MONITOR DOES NOT READ IN THE 0-200 PPM RANGE IT WILL NOT CALIBRATE IN THE FIRST MENU.</b></p>
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Step 5. **(USE ONLY IF THE DEVICE IS NOT IN RANGE AND FAILED TO CALIBRATE IN THE FIRST MENU)**

To open the second menu press and hold the °F/°C button while already in the first menu.

Step 6. This menu will allow you to calibrate without range limitations. The second menu will read:

- o -AIR (Ambient Air Calibration Option without limits)
- o -N2 (Zero Nitrogen Calibration Option without limits)
- o E (To exit the menu and return to home screen)

Step 7. When calibration is complete make sure the unit is reading within the span values. You can test with fresh air which should read about 400ppm CO2.

## MAINTENANCE

### Calibration

The SAN-10 comes pre-calibrated from the factory. However, the CO<sub>2</sub> sensor should be calibrated at least once a year, or as described in your company's safety procedures. You can perform the calibration yourself, or you can return it for factory calibration at a nominal fee. The temperature and humidity sensors do not require calibration and should remain accurate for the life of your unit.

### Cleaning and Storage

Apply sparingly with a soft cloth and allow drying completely before using. Do not use soap or Alcohol cleaning. Do not use aromatic hydrocarbons or chlorinated solvents for cleaning.

## SPECIFICATIONS

Dual Beam NDIR (Non-dispersive-Infrared) CO<sub>2</sub> diffusion sensor with Automatic Background Calibration (ABC) turned off.

### Device Specifications

Operating Environment	32°F~122°F (0°C~50°C), <95% RH non-condensing
Storage	14°F~140°F (-10°C~60°C), <99% RH non-condensing
Power Supply	Li-ion battery (4.2V, 1500mAh), Micro USB cable w. Wall USB charger
Dimensions	3.9x2.0x1.7 Inch (98x50x42mm)
Weight	4.76 oz. (135 grams)

Out of range of operating conditions will impact the accuracy of CO<sub>2</sub> measurement.

### CO<sub>2</sub> Sensor Specifications

Measurement Range	0-50,000ppm
Display Resolution	1ppm / 0.01%
Accuracy	±40ppm or ±3% of reading
Repeatability	±20ppm @ 400ppm
Temperature Dependence	Typ. ±0.3% of reading per °C or ±4ppm per °C, whichever is greater, referenced to 25 °C
Pressure Dependence	0.13% of reading per mmHg
Response Time	About 2 min for 90% of step change
Warm-up Time	<5 seconds at 22°C
Measurement interval	2 seconds

### Temperature Sensor Specifications

Temperature Range	14~140°F (-10.0~60.0°C) display
Display Resolution	0.1°F (0.1°C)
Display Options	°F/°C switchable
Accuracy	±0.9°F (±0.5°C)
Response Time	5~30 seconds (device must equilibrate with environment)

### Relative Humidity Sensor Specifications

Measurement Range	0.0~99.9%RH
Display Resolution	1%RH
Accuracy	±4.5%RH
Response Time	<8 seconds for 63% of step change

## TROUBLESHOOTING

Symptom / Issue	Possible Cause / Resolution
Cannot power on	Press the Power Button for more than 5 seconds
	Check that the Li-ion battery is charged
	If monitor is charged but will not turn on, contact support
Monitor is not recognized by computer or software	Verify that software and drivers are installed correctly before attaching monitor to PC.
	Verify the software and drivers were installed before the monitor was plugged into the PC with the USB cable.
	Verify that the ftd2xx.dll file is in the same folder as the executable program.
	Try using a different USB cable.
Windows reports “unknown device” error	<a href="#">Follow these instructions for troubleshooting GasLab driver installation.</a>
Slow response	The log file stored in the monitor is very large. The monitor needs time to transfer data to your computer.
Readings do not change	Confirm the monitor is correctly connected to the computer. Make sure the computer recognizes your monitor and connects with your monitor successfully.

## SUPPORT & WARRANTY

The quickest way to obtain technical support is via email. Please include a clear, concise definition of the problem and any relevant troubleshooting information or steps taken so far, so we can duplicate the problem and quickly respond to your inquiry.

For more information visit our website:

<https://www.co2meter.com/>

### **We are here to help!**

For information or technical support, please contact us.

Support@CO2Meter.com  
(386) 310 - 4933



CO2Meter, Inc.  
131 Business Center Drive Ste A3  
Ormond Beach, FL 32174 USA

