

AimSafety™ PM150-CO₂

Carbon Dioxide Gas Monitor

User Instructions



PM150-CO2 Portable Gas Monitor


- 1 General Information 4
- 2 Specifications 4
 - 2.1 PM150-CO2 Specifications 4
 - 2.2 Sensor Specification 4
- 3 Product Overview..... 5
 - 3.1 Monitor Overview 5
 - 3.2 Display Overview..... 5
- 4 Activation 6
 - 4.1 Activating the PM150-CO₂ 6
 - 4.2 Error Messages..... 6
 - 4.3 Bump Test 7
- 5 Mode 8
 - 5.1 Measuring Mode 8
 - 5.2 Display Mode 8
 - 5.3 Settings Mode 9
 - 5.4 Setting Mode Symbols..... 9
- 6 Setting Mode..... 10
 - 6.1 Alarm Activation..... 10
 - 6.2 Adjust alarm set points 10
 - 6.3 Data Log 10
- 7 Menu Screens..... 11
 - 7.1 Menu Flow Chart..... 11
 - 7.2 Clear Max (Peak Values)..... 12
 - 7.3 Clear STEL and TWA..... 12
 - 7.4 Adjust Unit 12
 - 7.5 Factory Reset..... 12
 - 7.6 Self-Test..... 13
- 8 Calibration..... 14
 - 8.1 Calibration Gas Values 14
 - 8.2 Zero (N₂) Calibration..... 14
 - 8.3 Span Calibration 15
- 9 Software Manager 16
 - 9.1 Software Overview..... 16
 - 9.1.1 Read 17
 - 9.1.2 Write 17
 - 9.1.3 Calibration..... 17
 - 9.1.4 Log..... 17
 - 9.1.5 Firmware Upgrade 17
 - 9.2 Window menu..... 18
 - 9.2.1 Menu – File..... 18
 - 9.2.2 Menu – Tools..... 18
 - 9.2.3 Menu – Device..... 18
- 10 Maintenance 19
 - 10.1 Sensor Replacement 20
 - 10.2 Battery Replacement 20
- 11 Battery Charging 21
 - 11.1 To charge the battery:..... 21

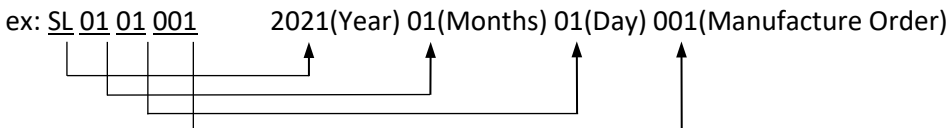
12 Appendix A – Table of Figures..... 21

Product Limited Warranty 22

 Technical Support Contact Information 22

 General Contact Information 22

 WARNING
Any unauthorized attempt to repair or modify the product, or any other cause of damage beyond the range of the intended use, including damage by fire, lightening, or other hazard, voids liability of the manufacturer.
Only activate this product only if sensor, visual, detection, and audible cover are clear from contaminants such as dirt and debris that could block the area where gas is to be detected.
Do not clean and rub the LCD screen of the products with a dry cloth or hands in hazardous environment to prevent static electricity buildup.
If the CO2 concentration reaches 0 ppm, a calibration should be performed.

CAUTIONS
Before operating this device, please read and understand this manual.
This device is not an analyzer, but a gas detector.
Do not use the device if calibration and self-test continuously fail.
Clean device with a soft cloth. Do not use chemical substances for cleaning.
View a serial number on the label at the back side of the device. (ex. 2021.01.01)
1. The serial number indicates below.
ex: <u>SL</u> <u>01</u> <u>01</u> <u>001</u> 2021(Year) 01(Months) 01(Day) 001(Manufacture Order)


1 General Information

The PM150-CO₂ is a portable single gas detector designed to detect the presence of carbon dioxide gas in ambient environment. When activated, PM150-CO₂ continuously monitors ambient air for the presence of carbon dioxide gas and alerts the user to potentially unsafe exposure with LED, vibrating, and audible alarms if gas concentration exceeds alarm set points. The settings value can be adjusted manually or by connecting to the PC software.

2 Specifications

2.1 PM150-CO2 Specifications

Model	PM150-CO2 Detector
Sensor Type	Nondispersive infrared (NDIR)
Measurement	Diffusion type
Display	LCD display
Audible	90dB at 10cm
Warning Lamp	Red Flashing LEDs
Vibration	Vibration Alarm
Battery	Rechargeable Li-ion (polymer) power supply unit (500mAh)
Charging Time	100 minutes from empty battery to fully charge based on power off state and charging with adaptor
Temperature	-20°C to +50°C
Humidity	5% to 95% RH (Non-condensing)
Case	Rubber Enclosure
Accessories	Calibration Cap, Charging Cable (USB C-Type) and Adaptor
Calibration Flow Rate	Flow rate: 0.2 LPM (N ₂ , CO ₂)
Size	2.13" (W) x 3.92" (H) x 1.53" (D) (54 mm x 99.5 mm x 38.8 mm)
Weight	4.76 oz (135 g)
Operating Life	14 days (Expected) (in measuring mode without alarm)
Event Log	Recent 30 alarms
Approval	EMC Directive (2014/30/EU), ROHS

2.2 Sensor Specification

Gas	Measuring range	Low Alarm	High Alarm	Resolution
CO ₂	0-5.0% vol 0-50,000 ppm	0.5% vol 5,000 ppm	1% vol 10,000 ppm	0.01% vol 100 ppm

3 Product Overview

3.1 Monitor Overview



Figure 3-1

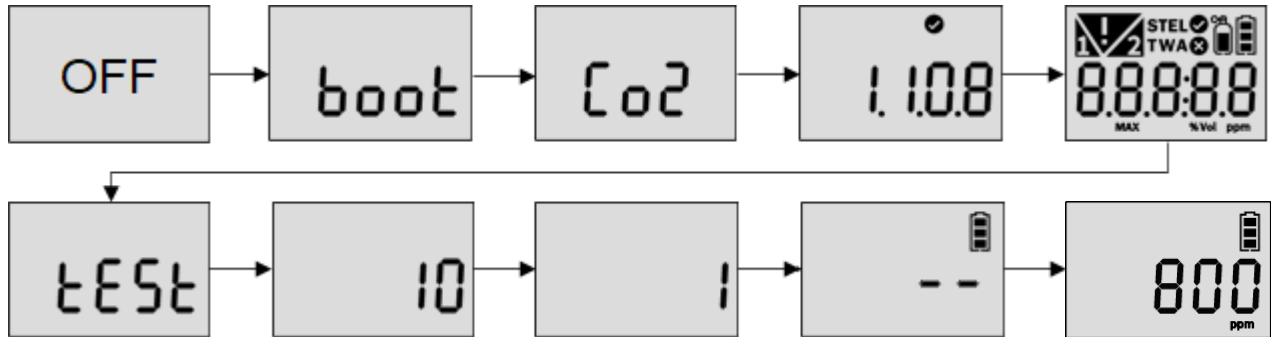
3.2 Display Overview

	Calibration / Setting Success		Calibration / Setting Failure
%Vol ppm	Measurement Unit		Standard Gas Calibration
	Remaining Battery		Alarm Condition
	1 st Alarm Display		2 nd Alarm Display
MAX	Max Value	STEL TWA	Short Term Exposure Limit Time Weighted Average
	Test Success		Test Fail
	Over Limit		End of Test

4 Activation

4.1 Activating the PM150-CO₂

Move the monitor to a fresh air environment, which is free of hazardous gas. Press and hold down the power button for approximately two (2) seconds until the gas type (CO₂) is displayed. Upon activation, gas type (CO₂), firmware version, and display appears, and the detector performs the self-diagnostic test for 10 seconds. After self-test is successful, the detector countdown is displayed for 10 seconds. Allow the detector to stabilize for 90 seconds until warm up message (---) is no longer displayed. The detector will then display the current CO₂ concentration.



4.2 Error Messages

If stabilization has failed, Error mark is displayed and measuring mode will not be entered. In this case, contact AimSafety for repair or return.

Err-1	Initial setting error
Err-2	Sensor error
Err-3	Memory error
L-bat	Low battery

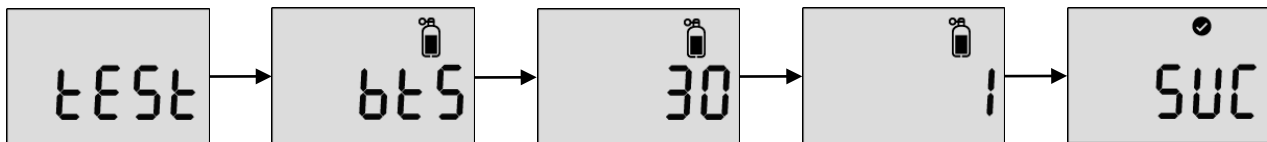
4.3 Bump Test

A bump test is used to test that the monitor is working properly. During a bump test, a known concentration of gas is applied to the sensor to verify that the sensor responds to the gas, and the alarms activate. This is the only way to effectively confirm that all characteristics of the monitor and the sensor are working correctly.

⚠ WARNING
A bump test should be conducted before each day's use. Ensure that you are in a clean environment before performing a Bump Test. The monitor must be calibrated if it fails a Bump Test.

To perform the bump test:

- Prepare a gas cylinder with a CO₂ concentration that exceeds the low and high alarm set points.
- Press and hold the Function key and power button for three seconds in the measurement mode. Press the Function key until "TEST" is displayed and press the power button two (2) seconds to enter the mode.
- Press the Function key until "BTS" is displayed and press the power button to activate it.
- After pressing the power button, apply a CO₂ gas over low and first alarm and the 30 seconds count down is displayed.
- Once the test has passed, "SUC" (✓) icon appears on the display. If test is failed, "FA" (✗) mark appears on the display.



5 Mode

5.1 Measuring Mode



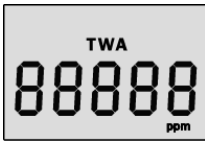



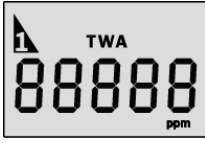

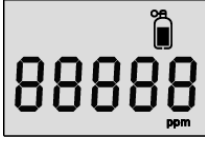
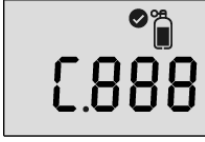

When activated, gas concentration is displayed in measuring mode

5.2 Display Mode

In the measuring mode, by pressing Function key, the following icons will appear in the following order.

Max value → STEL value → TWA value → 1st alarm set point → 2nd alarm set point → STEL alarm set point → TWA alarm set point → Firmware version → Calibration concentration → Calibration interval remaining date → Bump test interval remaining date.

- To move to the next menu, press the Function key.
- At the last step, press Function key or do not push any button for 10 seconds, the device will return to the Measuring Mode.






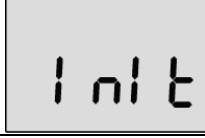
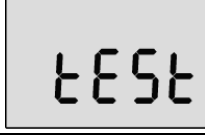
	Max Value		Measured STEL value
	Measured TWA value		Low Alarm Value Setting
	High Alarm Value Setting		STEL Alarm Value Setting
	TWA Alarm Value Setting		Firmware version
	Calibration Concentration		Calibration interval remaining date
	Bump test interval remaining date		

5.3 Settings Mode

In the settings mode, users can adjust set points, perform calibration, and reset previous values.



- To enter the setting mode, press and hold the Function key & power button simultaneously for three seconds. The following menu ALr → CAL → CLr MAX → CLr and STEL, TWA → Unit → Init → tEst is displayed.
- To move to the next menu, press the Function key.
- To enter the menu, press and hold down the power button.

5.4 Setting Mode Symbols

Setting	Submenu	LCD	Action
ALr	1 st Alarm 2 nd Alarm		1 st Alarm concentration setting 2 nd Alarm concentration setting
CAL	ZERO (N2) SPAN (CO2)		Zero (N2) calibration Span (CO2) calibration
CLr MAX	-		Delete maximum alarm Concentration
CLr STEL, TWA	-		Delete STEL and TWA Concentration
Unit	%vol / ppm		Concentration unit conversion
Init	-		Reset
Test	Self Bts		Self-test Bump test

6 Setting Mode

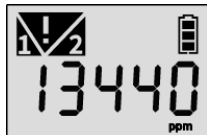
6.1 Alarm Activation

When the gas concentration exceeds alarm set points,  or  will be displayed and the device will vibrate, flash (LED), and beep. To remove alarms, move to a clean air location. When a gas concentration is decreased below the alarm set points, alarm will stop.



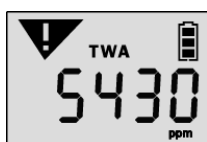
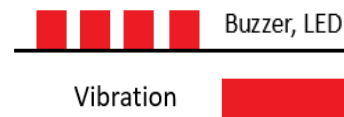
Low Alarm

- Audible Alarm: Three (3) beeps per seconds
- LED: Three (3) flashes per seconds
- Vibration: One (1) vibration per second



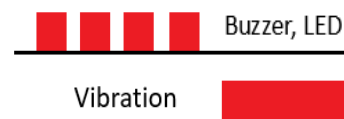
High Alarm

- Audible Alarm: Four (4) beeps per seconds
- LED: Four (4) flashes per seconds
- Vibration: One (1) vibration per second

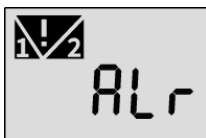


STEL & TWA Alarm

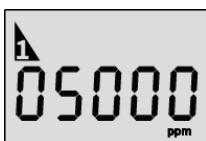
- Audible Alarm: Four (4) beeps per seconds
- LED: Four (4) flashes per seconds
- Vibration: One (1) vibration per second



6.2 Adjust alarm set points



- To enter the setting mode, press and hold the Function key and power button simultaneously for two seconds.
- In the alarm setting icon, press and hold down the power button for two (2) seconds.



- Press the Function key to change the alarm set points.
- Press the power button to save the value and move to the next step.

CAUTION

Ensure that the high alarm setpoint must be greater than low alarm setpoint. Alarm setpoints may vary by a country, states, and company policy. Unless specified in your company's safety instruction, use the preset alarm setpoints. Before the alarm adjustment, check with your safety manager or authorized dealer.

Ensure Standard Factory alarm set points vary depending on countries, states, and companies.

Before changing alarm setpoints, ensure the alarm set points follow your local guidelines.

For safety, users are not allowed to set the 1st alarm value to zero. When attempting to set 1st alarm to zero, the value will change to 400 ppm.

6.3 Data Log

The detector stores the last 30 event logs. If the data is filled, the new log event overwrites the oldest log events.

The data log is stored at one (1) minute intervals, and it stores about 64,000 data logs.

Data logs consisting of event log, bump, and calibrations are stored at one (1) minute intervals.

To transfer event logs and data log to a computer:

- Install the current AimSafety CO₂ USB link software found at www.macurco.com/downloads
- Connect the detector to a computer via the supplied USB-C cable.

7 Menu Screens

7.1 Menu Flow Chart

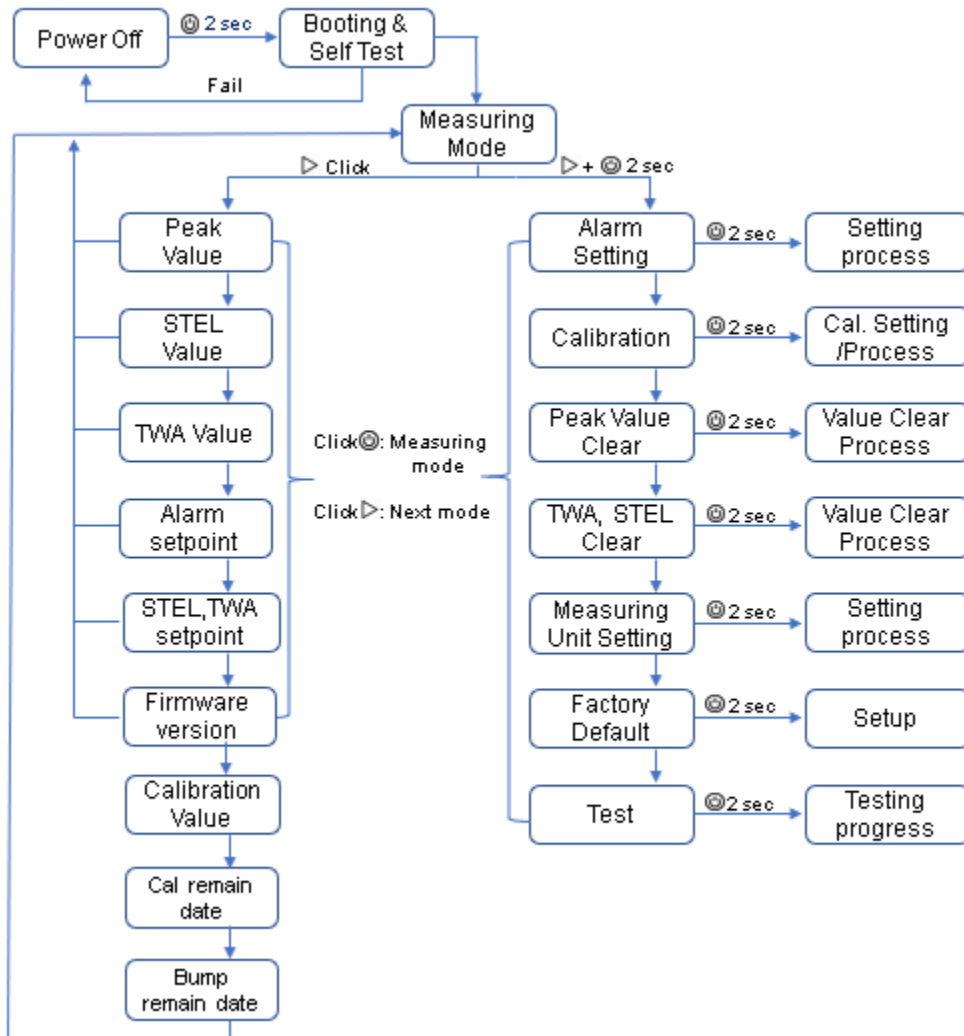
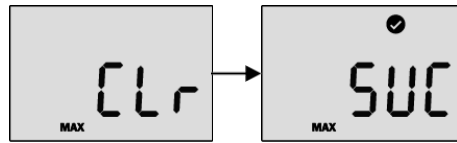


Figure 7-1

7.2 Clear Max (Peak Values)

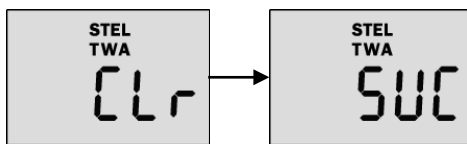


To delete the measured peak concentration in the detector, follow below steps.

1. Press the Function key & power button simultaneously and the Function key until CLr (max) is displayed.
2. Press the power button to clear the peak value.
3. After the successful activation, SUC (V) mark is displayed. If it fails, FA (X) mark is displayed.

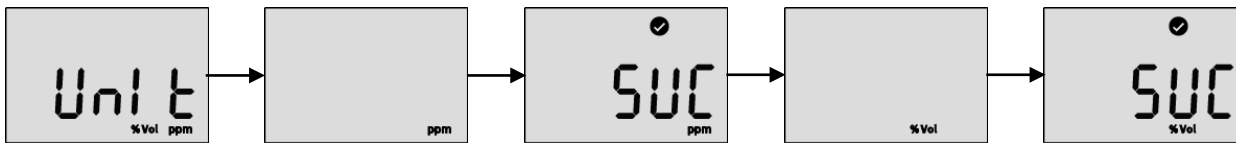
7.3 Clear STEL and TWA

To delete the measured STEL and TWA value in the detector, follow below steps:



1. Press the Function key until CLr (STEL & TWA) is displayed.
2. Press the power button to delete the TWA and STEL values
3. After the successful activation, SUC with (V) mark is displayed.

7.4 Adjust Unit

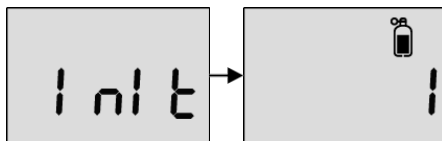


To change the unit (ppm or %Vol) in the detector, follow below steps:

1. Press the Function key until Unit is displayed and power button to enter the mode.
2. Press the Function key to select a unit (ppm or %Vol) and power button to save it.
3. After the successful activation, SUC (V) mark is displayed. If it fails, FA (X) mark is displayed.

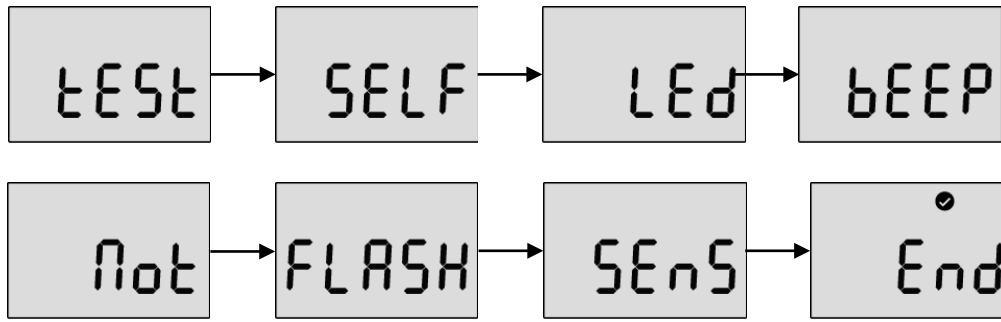
7.5 Factory Reset

To restore the factory setting, please follow below steps:



1. Press the Function key until "Init" is displayed.
2. Press the power button to apply it.
3. After the successful activation, SUC (V) mark is displayed. If it fails, FA (X) mark is displayed.

7.6 Self-Test



To perform the self-diagnostic test, follow below steps.

1. Press the Function key until Test is displayed
2. Press the power button for three seconds. In the “SELF” display, press the power button for three seconds to activate the self-test. While it is activated, the detector will test LED, beeping, vibration, flash memory, and sensor. After the successful test, (V) mark is displayed. If the test fails, FA with (X) mark is displayed.
3. If the self-test fails, the Error message appears.

8 Calibration

CAUTION

Initial calibration is performed on all devices prior to shipment.

The detector has the zero calibration (N₂) and span calibration (CO₂)

The frequency of calibration depends on the use case. More frequent calibrations may be required depending on the frequency of use and personal risk. For instance, if you use the device daily, weekly or monthly calibration may need to be performed, while the device is used a few times a year, monthly or quarterly calibration may be required. Before calibration, check with your safety managers to ensure calibration accessibility.

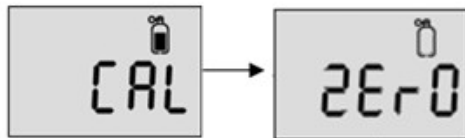
If calibration fails, attempt to perform a re-calibration. If the calibration continues to fail, contact an authorized distributor or AimSafety.

8.1 Calibration Gas Values



Gas Type	Zero (N ₂)	Span (CO ₂)
Concentration	99.99% Vol	20,000 ppm, 2% Vol

8.2 Zero (N₂) Calibration



1. Assemble the calibration equipment with zero gas cylinder. See Figure 8-1
2. In the “CAL” mode, press the Function key to move to the “ZER0” calibration.
3. Attach the calibration cap to the detector.
4. Press and hold the power button for three (3) seconds to start the zero calibration. Once the countdown timer has started, open the valve on the regulator to start the flow of gas.
5. After 90 seconds, when the zero calibration is successful, success message (V) appears. If the zero calibration fails, FAIL message (X) appears.

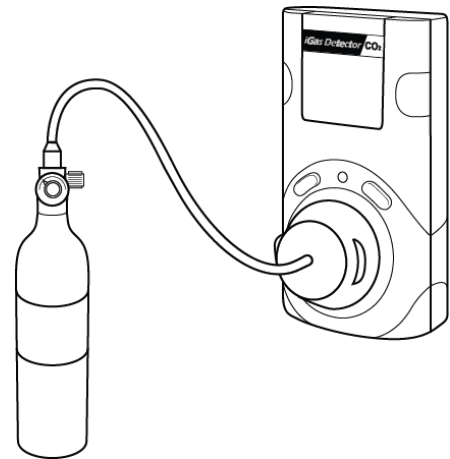


Figure 8-1

Note: Press the power button during the 90 second countdown to abort the zero calibration.

CAUTION

Use the regulator with a flow rate of 0.2 LPM (Liters per minute).

8.3 Span Calibration



1. Assemble the calibration equipment with span gas cylinder. See Figure 8-1
2. In the “CAL” mode, press the Function key to move to the “SPAn” calibration.
3. Attach the calibration cap to the detector.
4. Press and hold the power button for three (3) seconds to start the span calibration. Once the countdown timer has started, open the valve on the regulator to start the flow of gas.
5. After 90 seconds, when the span calibration is successful, success message (V) appears.
If span calibration fails, fail message (X) appears.

Note: Press the power button during the 90 second countdown to abort the span calibration.

CAUTION

Do not change the calibration concentration without a safety managers authorization.

Use the regulator with a flow rate of 0.2 LPM (Liters per minute).

9 Software Manager

9.1 Software Overview

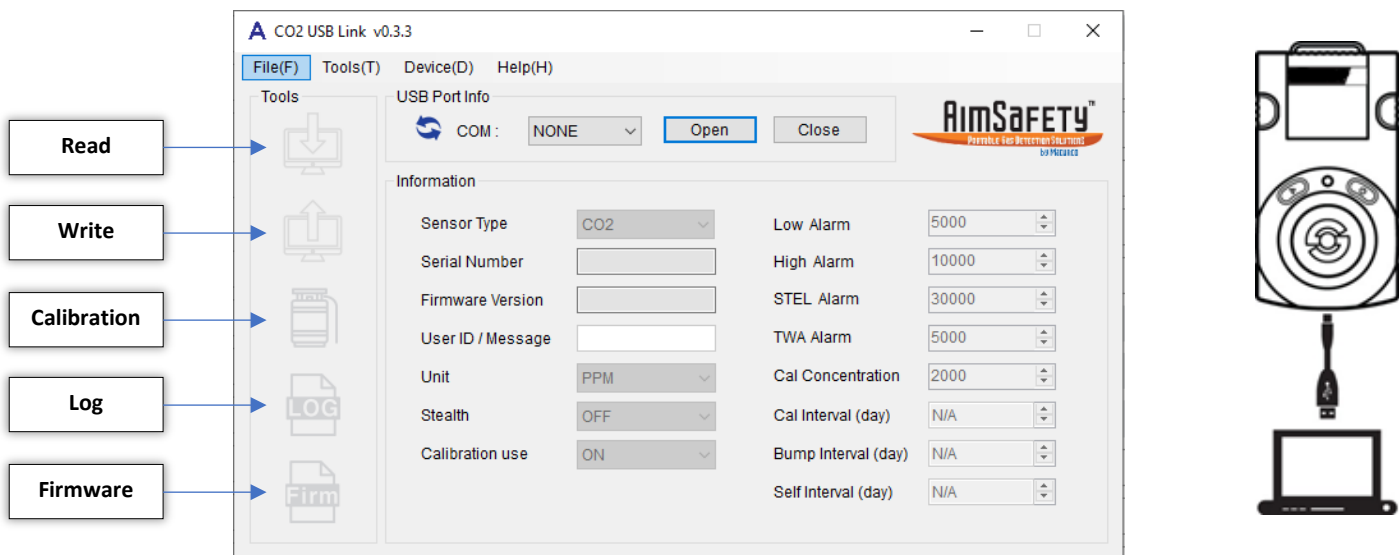


Figure 9-1

- **Sensor Type** – The current sensor type in the device (CO₂, cannot be changed)
- **Serial Number** – PM150-CO₂ serial number
- **Firmware Version** – Current firmware version of the unit (can change by upgrading)
- **User ID/Message** – The User ID can be used to add a custom message
- **Unit** – Adjust measuring unit to ppm or %Vol
- **Stealth** – Disable the alarm, buzzer, and LED
- **Calibration Use** – Disable/Enable the calibration access
- **Low Alarm & High Alarm** – The 1st and 2nd alarm set points (Min/Max: 400 ppm (0.04% Vol) - 49,999 capitalize (5% Vol))
- **STEL Alarm & TWA Alarm** – Short Term Exposure Limit and Time Weighted Average level of concentration of CO₂ (Min/Max: 400 ppm (0.04% Vol) - 49,999 ppm (5% Vol))
- **Gas Concentration** – This allows a user to enter/amend correct concentration of the gas cylinder (Min/Max: 400 ppm (0.04% Vol) - 49,999 ppm (5% Vol))
- **Calibration Interval (day)** – The calibration reminder can be adjusted from 0 (N/A) – 365 days (Default setting is N/A)
- **Bump Interval (Days)** – The Bump test reminder can be adjusted from 0 (N/A) – 365 days (Default setting is N/A)
- **Self-Interval (Days)** – The Self-test reminder can be adjusted from 0 (N/A) – 365 days (Default setting is N/A)

Note:

- When the software is opened, the fields are grayed out and before it can be used, the “OPEN” button must be clicked.
- Without clicking the “Write” button, configured and customized settings will not be applied, and neither be saved.
- If the USB connection is successful, the “Success” icon appears. If the connection fails, reconnect the USB cable or check the device manager to see the connection status.

9.1.1 Read

The “Read” button (upper-left side first icon) allows a user to retrieve the stored data.

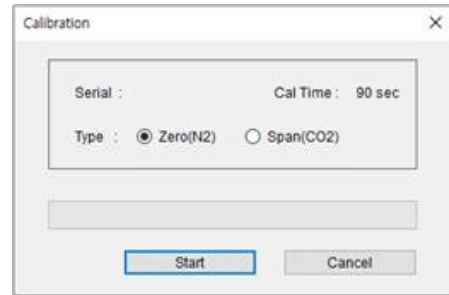
9.1.2 Write

The “Write” button (upper-left side second icon) has one of the most important roles in this software interface. All configurations and customized settings will be saved by clicking “Write” button. When a user configures the instrument’s settings, “Write” button must be clicked and a message will pop-up. Click “Yes”.

9.1.3 Calibration

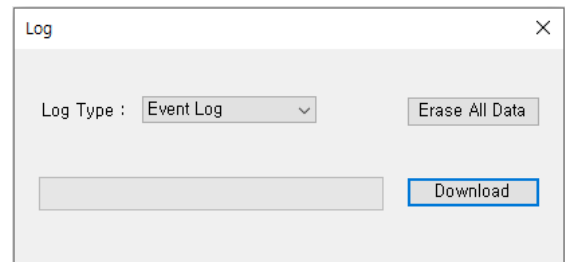
To perform the calibration using the software:

1. Connect the unit to the PC using instrument’s USB-C cable.
2. Attach the calibration cap and connect with zero (N₂) or CO₂ gas cylinder.
3. Open the software and click “Calibration” (middle-left side icon) to open the calibration wizard.
4. Choose the calibration gas type and click “Start” and turn on the cylinder valve.
5. The zero (N₂) and span (CO₂) calibrations each take 90 seconds.



9.1.4 Log

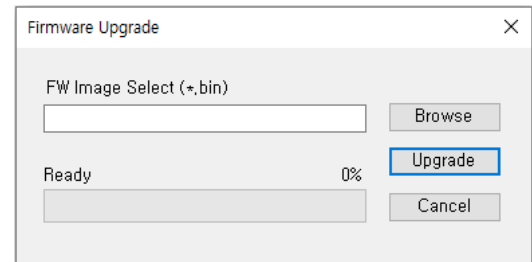
The most recent 30 logs will be stored in the device are automatically erased one by one the earliest logs when new events occur. There are two types of logs, “Event Log” and “Event + Data log”, available to download. Choose the log and click “Download” button. The log files will be downloaded named with the unit’s Serial number in a “.csv” format. Clicking the “Erase” button will remove all the logs from the device’s memory and cannot be recovered.



9.1.5 Firmware Upgrade

To upgrade the latest firmware version of PM150-CO:

1. Click “Browse” button and navigate to the firmware file location
2. Select the new firmware file and click the “Open” button
3. Click “Write” to begin the firmware upgrade process
4. When upgrade is complete, power off the device and turn it back on
5. The “F-UP” → “boot” message will be displayed up and the upgrade is complete.

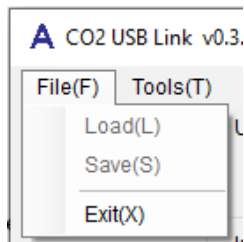


Note:

Pressing “Cancel” button during the upgrading process will cancel and close the Firmware Upgrade Wizard.

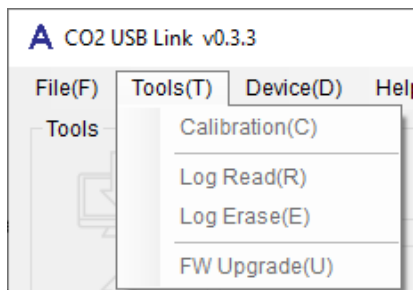
9.2 Window menu

9.2.1 Menu – File



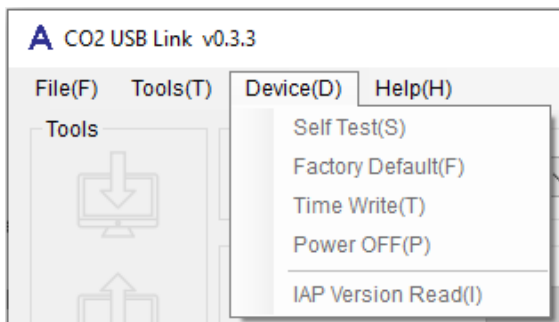
- **Load(L)** – Load the installed settings
- **Save(S)** – Save the current settings
- **Exit(X)** – Finish the work and exit the program

9.2.2 Menu –Tools



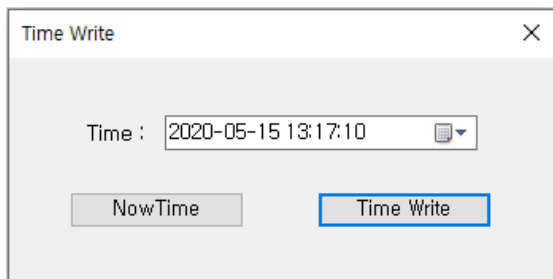
- **Calibration(C)** – Open the calibration window to start calibration process
- **Log Read(R)** – Retrieve and save the log events
- **Log Erase(E)** – Remove all the logs from the device’s memory (erased logs cannot be recovered)
- **FW Upgrade(U)** – Open the firmware upgrade window to start upgrading process

9.2.3 Menu – Device



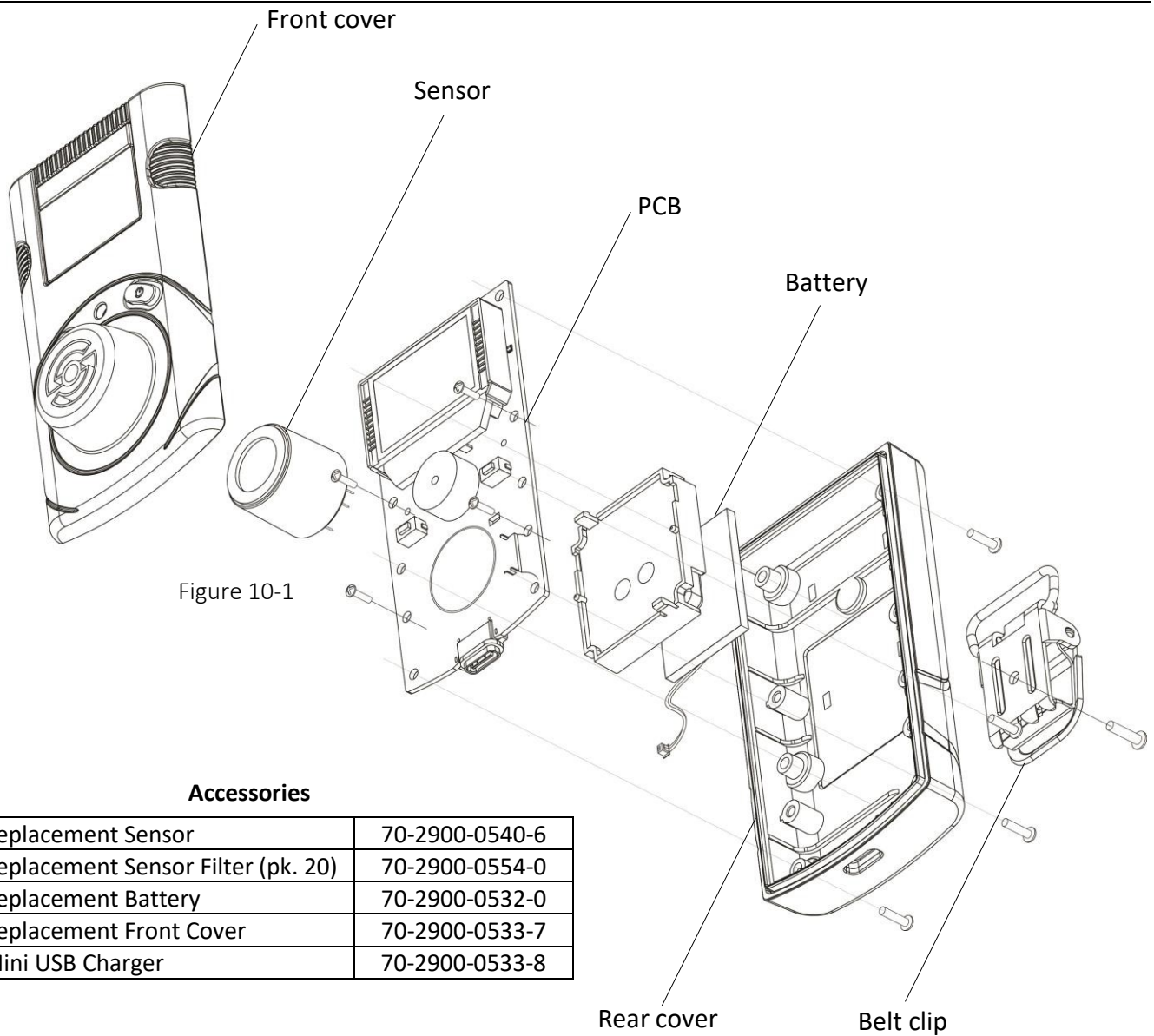
- **Self-Test(S)** – Automatic self diagnostics of the unit
Test order: LED → Beep → Vibration Motor → Flash → Sensor → End
- **Factory Default(F)** – Reset original settings and specifications
- **Time Write(T)** – To set the local time based on device settings
- **Power OFF(P)** – Turn off the device
- **IAP Version Read(I)**

9.2.3.1 Menu – Device



- **Now Time** – When the “Now Time” button is clicked, the PC time will be set in the device. The initial time set in the instrument is based on the factory time zone. The time will need to be updated to reflect the current time zone that the instrument will be used in.
- **Time Write** – Click the “Time Write” button to use the customized time selected.

10 Maintenance



Accessories

Replacement Sensor	70-2900-0540-6
Replacement Sensor Filter (pk. 20)	70-2900-0554-0
Replacement Battery	70-2900-0532-0
Replacement Front Cover	70-2900-0533-7
Mini USB Charger	70-2900-0533-8

CAUTION

Power off the device before disassembly.

Replacement of components can impact product performance. Repairs should only be performed by authorized personal.

Only use replacement parts supplied by AimSafety.

A full calibration is required after sensor replacement.

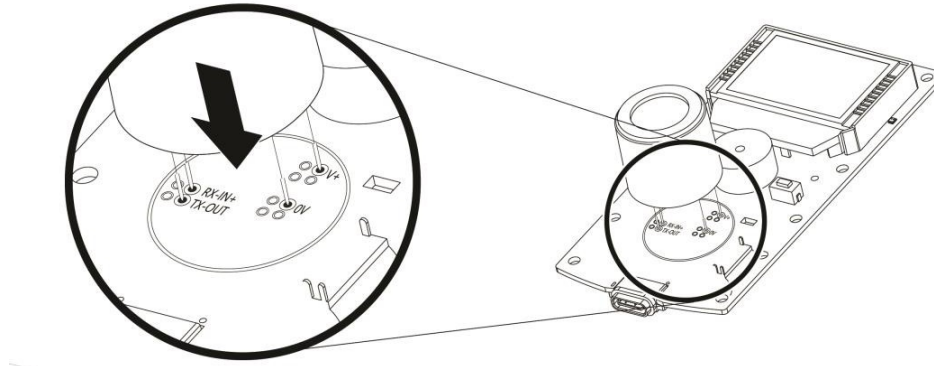


Figure 10-2

10.1 Sensor Replacement

1. Move to a fresh air environment and power off the detector.
2. Remove the back case by unscrewing the six (6) screws.
3. Remove the two (2) screws on the PCB.
4. Carefully replace with the new sensor provided by the authorized dealers or AimSafety. Ensure the sensor pins match with the above image and the sensor is aligned with the PCB.
5. Re- assemble the detector and power up the device.
6. After power up is complete and the sensor readings have stabilized for at least three (3) minutes, perform Zero (N₂, 99.9%vol) calibration and Span (CO₂) calibration.

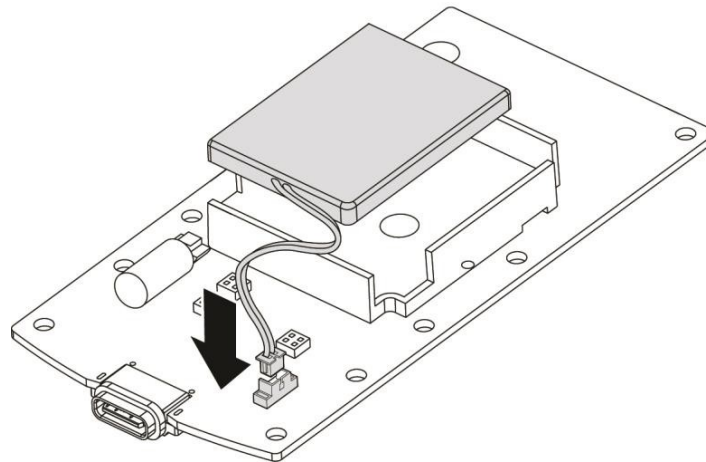


Figure 10-3

10.2 Battery Replacement

1. Move to a fresh air environment and power off the detector.
2. Remove the back case by unscrewing the six (6) screws.
3. Remove the two (2) screws on the PCB.
4. Carefully unplug the battery from the PCB.
5. Place the new battery in the battery protection case
 Battery Specification: Rechargeable Li-ion (polymer) power supply unit (500mAh)
6. Re-assemble the detector and power up the device.
7. Before use, allow the detector to stabilize for three (3) minutes.

11 Battery Charging

11.1 To charge the battery:

- Connect the USB-C type cable with the charging port at the bottom of the device.
- Connect the USB port with a provided adaptor (5V, 1.2A)
- While charging, the backlight illuminates.
- After the charging is complete, the backlight turns off and a full battery symbol is displayed.
- With a low battery, the alarm is activated every three minutes.

Note:

- The device can charge during communication with the PC software.

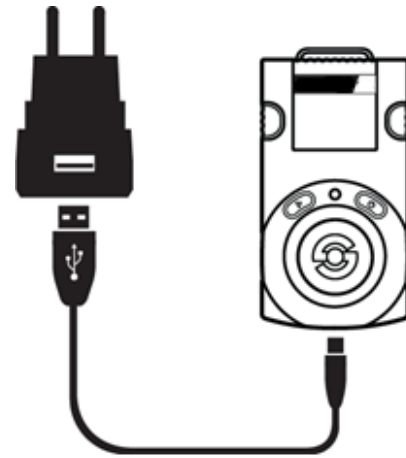


Figure 11-1

12 Appendix A – Table of Figures

Figure 3-1.....	5
Figure 7-1.....	11
Figure 8-1.....	14
Figure 9-1.....	16
Figure 10-1.....	19
Figure 10-2.....	20
Figure 10-3.....	20
Figure 11-1.....	21

Product Limited Warranty

AimSafety warrants this product will be free from defective materials and workmanship for a period of two (2) years from date of manufacture, provided it is maintained and used in accordance with AimSafety instructions and/or recommendations. If any component becomes defective during the warranty period, it will be replaced or repaired free of charge, if the unit is returned in accordance with the instructions below. This warranty does not apply to units that have been altered or had repair attempted, or that have been subjected to abuse, accidental or otherwise. The above warranty is in lieu of all other express warranties, obligations, or liabilities. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE ARE LIMITED TO A PERIOD OF TWO (2) YEARS FROM THE PURCHASE DATE. AimSafety shall not be liable for any incidental or consequential damages for breach of this or any other warranty, express or implied, arising out of or related to the use of said gas monitor. Manufacturer or its agent's liability shall be limited to replacement or repair as set forth above. Buyer's sole and exclusive remedies are return of the goods and repayment of the price, or repair and replacement of non-conforming goods or parts.

Warranty Procedure

Contact the local AimSafety authorized reseller or AimSafety Technical Support to obtain a Return Materials Authorization (RMA). An RMA requires the following information:

- Company name, contact name, phone number, and email address
- Description and quantity of items to be returned
- Equipment serial number(s)
- Reason for return

No returns shall be accepted without an AimSafety RMA. Any returns received without an RMA will be rejected and returned to the sender.

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