watchgas
detection

PDM PRO CO₂

AIRWATCH

PDM PRO CO₂
MANUAL

Contents

Description

The PDM PRO CO_2 is a portable single gas detector designed to detect the presence of carbon dioxide gas in ambient environment. When activated, PDM PRO CO_2 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 in the event that gas concentration exceeds alarm setpoints. The settings value can be adjusted manually or by connecting to a PC software.

⚠ 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.
- 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 the static electricity.
- Perform cleaning and maintenance of the products in fresh air that is free of hazardous gases
- Test the response of a sensor regularly by the gas concentration exceeding alarm set points.
- Test LED, audio and vibration manually.
- If the temperature changes sharply during use of the device (e.g., indoors vs outdoors), the value of the measured gas concentration can suddenly change. Please use the detector after the gas concentration value has stabilized.
- Severe vibration or shock to the device may cause a sudden reading change. Please use detector after the value of gas concentration has stabilized. Excessive shock to the detector can cause the device and/or sensor to malfunction.
- Alarm value should be set based on local regulations. Therefore, alarm values should be changed only under the responsibility and approval of the administration of the work site where the instrument is used.
- Use IR communications in the safety zone which is free of hazardous gases.
- Replace the battery and sensor in a clean environment, which is free of hazardous gas.
- If the CO_2 concentration reaches 0 ppm, the calibration should be perform

⚠ Caution

- Before operating this device, please read the manual carefully.
- This device is not an analyzer, but a gas detector.
- If calibration and self-test fails continuously, please do not use the device and contact a WatchGas distributor.
- Clean detectors with a soft cloth and do not use chemical substances for cleaning.

1. Product Overview

DETECTOR COMPONENTS

1. LCD display
2. Buzzer
3. Gas sensor
4. Power button
5. Enter button
6. Alarm LEDs

DISPLAY SYMBOLS

| Symbol	Description
✓	Calibration / Setting Success
%Vol ppm	Measurement Unit
🔋	Battery indicator
1	Low Alarm
2	High Alarm
MAX	Max value
SUC	Test succes
OL	Over Limit
✗	Calibration / Setting Failure
	Standard gas calibration
	Alarm condition
STEL	Short Term Eposure Limit
TWA	Time Weighted Average
FA	Test Fail
End	End of test
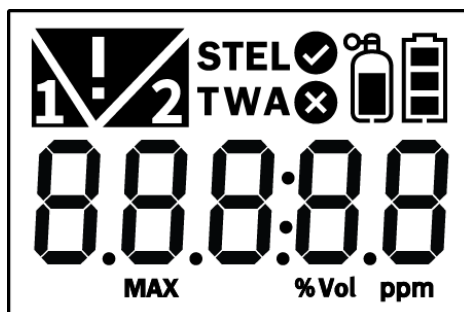
2. Activatie & Deactivatie

1. Move to a fresh air environment, which is free of hazardous gas
2. Press and hold down the power button for approximately 2 seconds until the gas type (CO_2) is displayed.
3. Upon activation, gas type(CO_2), firmware version, and display appears, and the detector performs the self diagnostic test for 10 seconds.
4. After self test is successful, the detector countdown is displayed for 10 seconds.
5. Allow the detector to stabilize for 90 seconds until warm up message(---) is no longer displayed.
6. The detector displays current CO_2 concentration.
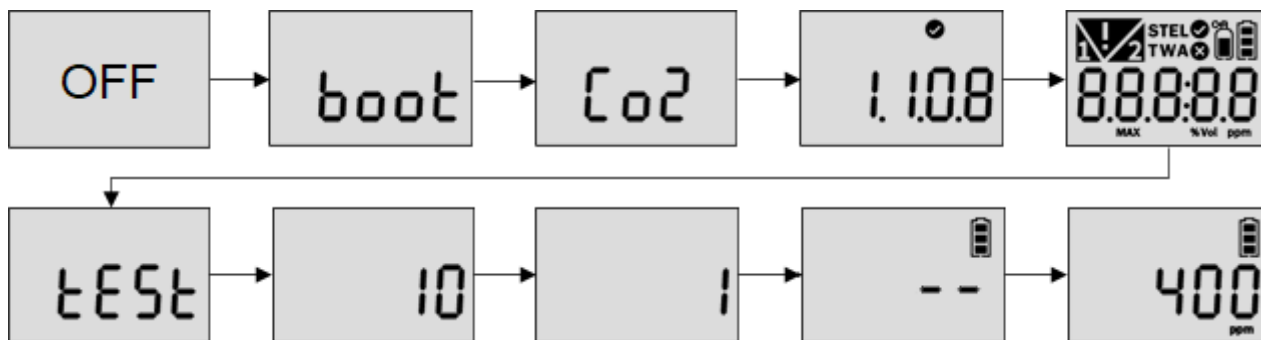
If the stabilization is failed, Error mark is displayed and measuring mode will not be entered. In this case, contact WatchGas at +31 (0)85 01 87 709 or info@watchgas.eu

Fault codes

Err-1	Initial setting error
Err-2	Sensor error
Err-3	Memory error
Err-4	Low battery

2.1 BUMP TEST

1. Before daily use, users are required to perform bump test to check that the sensor responds to CO_2 gas.
2. To perform the bump test, follow the below steps.
   • Obtain a gas cylinder containing CO_2 gas over low and high alarm.
   • Enter the menu by simultaneously pressing the Enter and Power button for three seconds. Then, press the Enter button until "TEST" is displayed. Press the power button for 2 sec to enter the test menu.
   • Press the Enter button until "BTS is displayed and press the power button to activate it.
   • After pressing the power button, apply a CO_2 gas over low alarm after the 30 seconds count down is displayed.
   • Once the test is passed, "SUC"(V) icon appears on the display. If test is failed, "FA"*(X) mark appears on the display.
   • The device will automatically return to measuring mode.
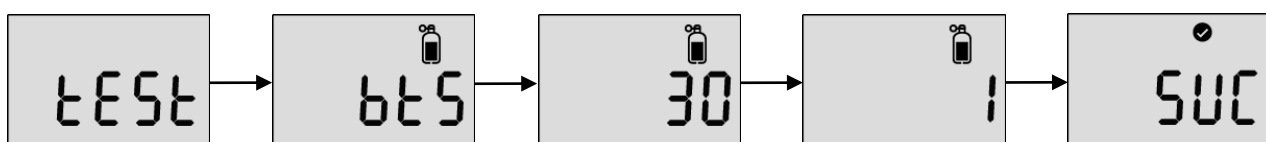
3. Mode

3.1 DETECTION MODE

When activated, gas concentration is displayed in measuring mode

3.2 DISPLAY MODE

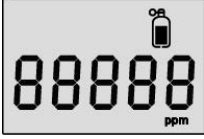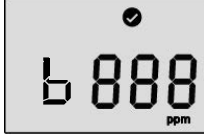In the measuring mode, by pressing Enter button, the following ICONs will appear in order. Max value -> STEL value -> TWA value -> Low alarm setpoint -> High alarm setpoint -> STEL alarm setpoint -> TWA alarm setpoint ->Firmware version ->Calibration concentration.

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

1 Max Value

2 Measured STEL value

3 Measured TWA value

4 Low Alarm Value Setting

5 High Alarm Value Setting

6 STEL Alarm Value Setting

7 TWA Alarm Value Setting

8 Firmware version

9 Calibration Concentration

10 Cal: Remaining calibration interval

11 Bump: remaining bump interval

3.3. MENU OVERVIEW

◉ Power and Enter Button

▷ Push Button

| Power Off | → ◉ 2 sec / Fail → | Booting & Self Test |

Measuring Mode

▷ Click

▷ + ◉ 2 sec

Peak Value

STEL Value

TWA Value

Alarm setpoint

STEL,TWA setpoint

Firmware version

Calibration Value

Click ◉: Measuring mode

Click ▷: Next mode

Alarm Setting	◉ 2 sec →	Setting process
Calibration	◉ 2 sec →	Cal. Setting /Process
Peak Value Clear	◉ 2 sec →	Value Clear Process
TWA, STEL Clear	◉ 2 sec →	Value Clear Process
Measuring Unit Setting	◉ 2 sec →	Setting process
Factory Default	◉ 2 sec →	Setup
Test	◉ 2 sec →	Testing progress

CAUTION

1. **Manual calibration can be disabled in the WatchGas software**
2. **If no button is pressed for 10 seconds, the device will return to measuring mode.**
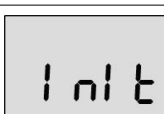
4. Setting mode

In the setting mode, users can adjust alarm setpoints, perform calibration, and reset previous values.
1. To enter the setting mode, press and hold the Enter button & power button simultaneously for three seconds. The following menu ALr -> CAL -> Clr MAX -> Clr STEL, TWA -> Unit -> Init ->Test is displayed.
2. To move the next menu, press the Enter button.
3. To enter the menu, press and hold down the power button.

CAUTION

- Ensure that the high alarm setpoint must be greater than low alarm setpoint.

Before the alarm adjustment, check with your safety manager or dealer authorized by WatchGas. Alarm setpoints may vary by a country or company policy. Unless specified in your company's safety instruction, use the preset alarm setpoints. Always comply with the local safety regulations.
- Beware Standard Factory alarm set points may 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 Low alarm value to zero. When attempting to set Low alarm to zero, the value changes to 400ppm!
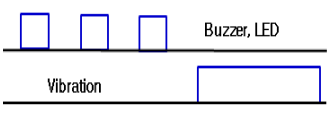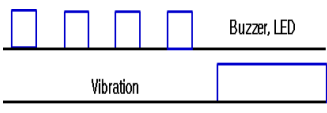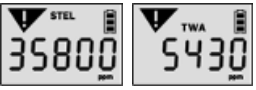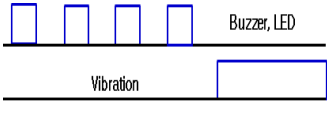
SETTING MODE SYMBOLS

	Setting	Submenu	LCD	Action
1	ALr	Low Alarm High Alarm	ALr	Low alarm concentration setting High alarm concentration setting
2	CAL	N₂ CO₂	CAL	N₂ Calibration CO₂ Calibration
3	CLr		CLr	Delete maximum alarm Concentration
4	CLr STEL, TWA		CLr	Delete maximum STEL and TWA concentration
5	Unit	%vol / ppm	Unit	Concentration unit conversion
6	Init		Init	Reset
7	Test	Self Bts	tESt	Self test Bump test

4.1.1 ALARM ACTIVATION

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

	Low Alarm Audible Alarm: 3 beeps per second LED: 3 flashes per second Vibration: 1 vibration per second	
	High Alarm Audible Alarm: 4 beeps per second LED: 4 flashes per second Vibration: 1 vibration per second	
	TWA and STEL Alarm Audible Alarm: 4 beeps per seconds LED: 4 flashes per seconds Vibration: 1 vibration per second	

4.1.2. ADJUST ALARM SETPOINTS

	Adjust alarm setpoints To enter the setting mode, press and hold the Enter button and power button simultaneously for two seconds. In the alarm setting icon, press and hold down the power button for 2 seconds

4.1.3. DATA LOG AND EVENT LOG

1. The detector stores the last 30 event logs. If the data is filled, the new log event overwrites the oldest log events.
2. The datalog stores gas reading at every 1minute interval, and it stores about 64,000 data logs.
3. Data logs consisting of event log, bump, calibration are stored at 1minute interval.
4. To transfer event logs and data log to a computer, use the WatchGas USB-Link software, refer to 5.1.4.

CAUTION

- Prior to shipment, every device is calibrated.
- The PDM PRO CO2 features 2-point calibration: a zero calibration (performed with N_2) and span calibration (performed with CO_2).
- Frequency of calibration should be adjusted, depending on use. An instrument that is used more should be calibrated more often. A PDM that is used daily might require weekly or monthly calibration, while a PDM that is used a few times per year might only be calibrated monthly or quarterly. Check with your safety managers to ensure calibration facilities are sufficient for the elected calibration interval.
- Perform calibration in a fresh air environment, which is free of toxic and combustible gases.
- If calibration fails, perform calibration again. If calibration fails repeatedly, contact your authorized WatchGas distributor.

Calibration Gas

Calibration Type	Zero	Span
Gas Type	N_2	CO_2
Concentration (recommended)	99.99%vol	20,000ppm, 2%vol

Note: Span concentration can be changed. The span concentration set in the PDM PRO CO_2 should match the concentration mentioned on the span gas cylinder.
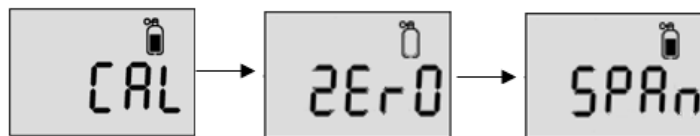
Warning

Never preform a zero calibration in ambient air.

1- Zero (N_2) Calibration
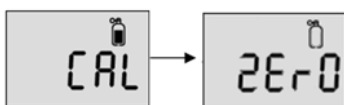
1. Druk in de "CAL"-modus op de Enter-knop om naar de "ZE-RO(N2)"-kalibratie te gaan.
2. Sluit de kalibratiedop aan op de detector en verbind de kalibratiecilinder met N2 (99,9% vol)
3. Druk op de aan/uit-knop om de nulkalibratie te starten. Start de flow door de regelaar te openen.
4. Na 90 seconden, wanneer de N2-kalibratie succesvol is, verschijnt het bericht succes (V). Maar als de N2-kalibratie mislukt, verschijnt het bericht FAIL (X).
5. Het apparaat keert automatisch terug naar de meetmodus.
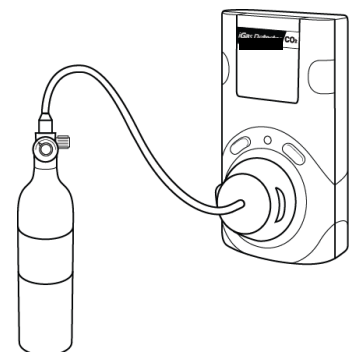
Note: Use a flow regulator with a flow of 0.2 l/min or higher.

2 - Span Calibration

1. In the calibration mode, press the Enter button to move to span calibration.
2. Confirm span gas concentration. Press Power button to skip digits and confirm. Press Enter to adjust digit.
3. Plug the calibration cap to the detector and connect the calibration cylinder with CO$_2$ (20,000ppm)
4. Press the power button to start calibration. Release CO$_2$ gas from the cylinder.
5. After 90 seconds, when the calibration is successful, success message(V) appears. If SPAN calibration fails, fail message(X) appears.
6. The device will automatically return to measuring mode.

   Note: Calibration can be aborted by pressing the Power Button.

CAUTION
- Never preform a N$_2$ calibration in ambient air.
- Always ensure that the span concentration matches the CO$_2$ concentration in the cylinder"

4.3. CLEAR MAX
To delete the measured peak concentration in the detector, follow below steps.
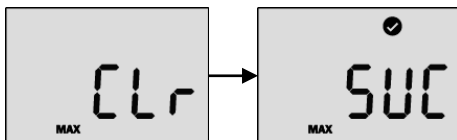
1. Press the Enter button & power button simultaneously and the Enter button until Clr(max) is displayed.
2. Press the power button to clear the peak value.
3. After the successful clearance, "SUC" (V) mark is displayed. If it fails, FA (X) mark is displayed.
4. Press Power button to return to menu
5.

4.4. CLEAR STEL AND TWA
To delete the measured STEL and TWA value in the detector, follow below steps
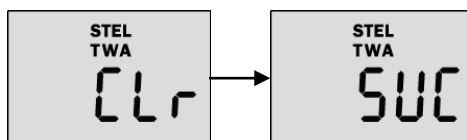
1. Press the Enter button until Clr(STEL & TWA) is displayed.
2. Press the power button to delete the TWA and STEL value
3. After the successful clearance, "SUC" (V) mark is displayed.
4. Press Power button to return to menu.

4.5 Adjust Unity
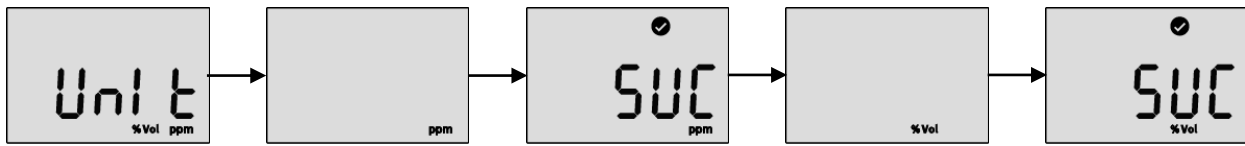
To change the unit (ppm or Vol) in the detector, follow below steps:
1. In the menu, press the Enter button until Unit is displayed and power button to enter the mode.
2. Press the Enter button to select a unit (ppm or %vol) and power button to save it.
3. After the successful activation, SUC(V) mark is displayed. If it fails, FA(X) mark is displayed.
4. Press the Power button to return to the menu.

4.6 FACTORY RESET

To restore the factory setting, please follow below steps.
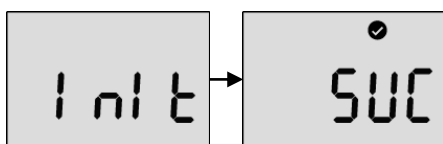
1. In the menu, press the Enter button until "Init" is displayed.
2. Press the power button to apply it.
3. After the successful activation, SUC(V) mark is displayed. If it fails, FA(X) mark is displayed.
4. Press the Power button to return to the menu.

4.7 SELF TEST
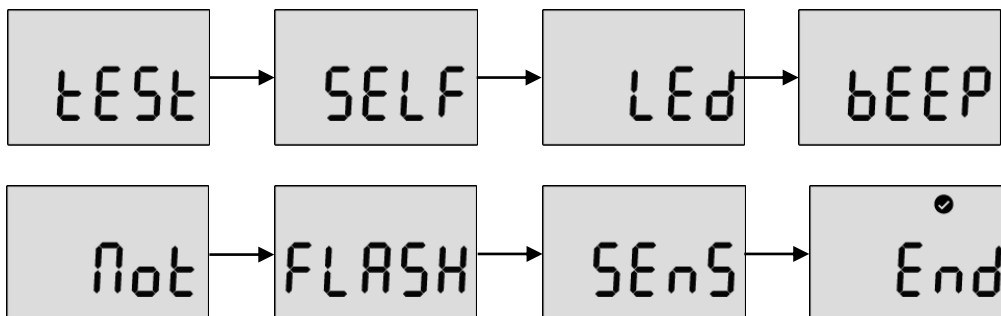
To perform the self diagnostic test, follow below steps.
1. Press the Enter button until Test is displayed
2. Press the power button for three seconds. In the "SELF" display, press the power button for three seconds to activate the self test. While it's activated, the detector will test LED, beeping, 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.
4. The device will automatically return to measuring mode.

5. Software Manager

5.1 Software Overview
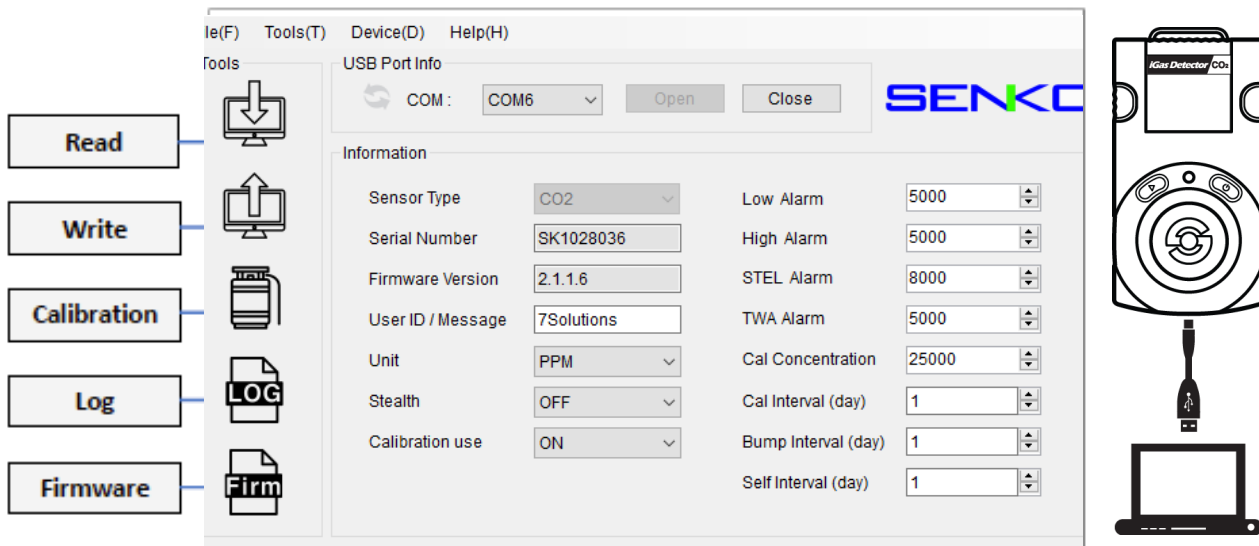

- Sensor Type – The current sensor type in the device (CO_2, cannot be changed)
- Serial Number – PDM PRO CO_2 serial number (cannot be changed)
- Firmware Version – Current firmware version of the unit (can change by upgrading)
- User ID/Message - Set User ID/Name
- Unit – Adjust to ppm or %vol
- Stealth – Disable/enable the alarm, buzzer, and LED (not recommended)
- Calibration Use – Disable/enable manual calibration
- Low Alarm & High Alarm – The 1st and 2nd alarm set points (Min/Max: 400ppm ~ 49,999ppm (0.04 - 5%vol)
- STEL Alarm & TWA Alarm – Short Term Exposure Limit and Time Weighted Average level of concentration of CO_2 (Min/Max: 400ppm ~ 49,999ppm (0,04-5%vol)
- Cal Concentration – This allows a user to enter/amend correct concentration of the gas cylinder (Min/Max: 400ppm (0.04%vol) ~ 49,999ppm (5%vol)
- Calibration Interval (day) – Reminds users to calibrate the device. Set betweeen 0 (off) and 365 days.
- Zelfde geldt voor Bump interval en Self interval. Recommended max. 180 days
- Bump Interval (day) – The Bump test reminder informs every fixed day (can adjust 0 (n/a) ~ 365)
- Self Interval (day) – The Self test reminder informs every fixed day (can adjust 0 (n/a) ~ 365) *Default 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.

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

5.1.2 WRITE
The "Write"-button saves changes to the instrument. Without clicking the "Write"-button, no changes are applied or saved. When clicking the "Write"-button, acknowledge with "Yes" or cancel with "No".

5.1.3 CALIBRATION
To perform the calibration using software, follow the below:
1. Connect the unit to the PC using instrument`s USB
2. Plug the calibration cap and connect with N_2 or CO_2 gas cylinder.
3. Open the software and click "Calibration" (middle-left side icon) and wizard will come up
4. Choose the calibration gas type and click "Start" with releasing the gas from the cylinder.
5. The zero(N_2) and span(CO_2) calibration takes 90 seconds.
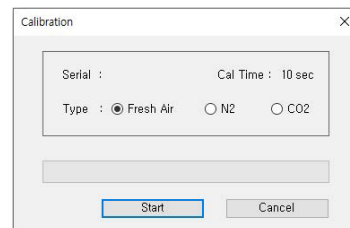
5.1.4 LOG
All recent 30 events and 64.000 gas readings are stored in the device When the memory is full, the oldest event or data point is overwritten when the detector is activated.There are two types of event logs, "Event Log" and "Event + Data log" are available to download. Choose the log and click "Download" button. The log files are downloaded and created by unit's Serial number and are in ".csv" format. However, clicking "Erase" button will clear all the logs from the storage of device and cannot be recovered.
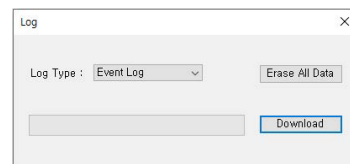
5.1.5 UPGRADE (FIRMWARE)
1. To upgrade the latest firmware version of the PDM PRO CO₂, follow the below:
2. Click "Browse" button and navigate to the firmware location
3. Choose the firmware and click the "Open" button
4. Click "Write" to begin upgrading process
5. When upgrade is finished, power off the device and turn it on
6. The "F-UP" ->"boot" message will come up and upgrade is complete
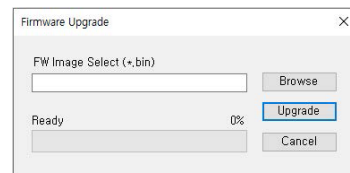
Note:Pressing "Cancel" button during the upgrading process will cancel and close the Firmware Upgrade Wizard

5.2 WINDOW MENU
5.2.1 MENU - FILE (F)
- **Load(L)** Load the installed settings
- **Save(S)** Save the current settings
- **Exit(X)** Finish the work and end the program
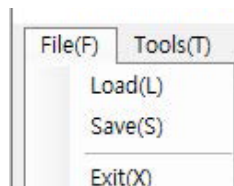
5.2.2 MENU - TOOLS (T)
- **Calibration(C**) Open the calibration window to start calibration process
- **Log Read(R)** Retrieve and save the log events
- **Log Erase(E)** Clean all the logs from the storage (erased logs cannot be recovered)
- **FW Upgrade(U)** Open the firmware upgrade window to start upgrading process

5.2.3 MENU - DEVICE (D)

Device(D)   Help(H)
Self Test(S)
Factory Default(F)
Time Write(T)
Power OFF(P)
IAP Version Read(I)
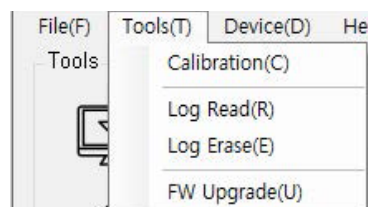
- **Self Test(S)** Automatic self diagnose of the unit
- **Test order:** LED -> Beep -> Vibration motor -> Flash -> Sensor -> End
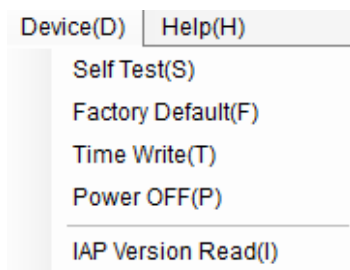- **Factory Default(F)** Reset original settings and specifications
- **Time Write(T)** To set a time by user location (or sync to PC time)
- **Power OFF(P)** Turn off the device
- **IAP Version Read(I)**

5.2.3.1 MENU - DEVICE

- Now Time - When you click the "Now Time" button, it automatically sets the current time on the PC of the operator. The initial time is preset in the factory in South Korea, so to apply the time in your location, press "Now time" and press "time write".
- Time Write by clicking "Time Write" button, selected and customized time will set.

Time Write   ×
Time : 2020-12-18 11:08:50 ▦▾
NowTime   Time Write
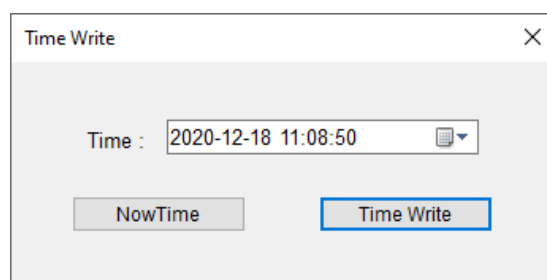
6. Maintenance
For maintenance please contact WatchGas or an authorized WatchGas dealer.
and refer to the service manual.

WAARSCHUWING
Before dissembling the detector, power it off.
-Maintanance can only be preformed by authorized service centers.
-It is absolutely prohibited to replace battery at potential explosion or dangerous regions.
Unauthorized opening of the detector and/or substitution of components will void the manufacturer's liability and warranty.

7. Battery Charging
- To charge the battery,
- Connect the USB-C type cable with the charging port at bottom of the device.
- Connect the USB port with a provided adaptor (5V, 1.2A)
- While charging, the backlight illuminates.
- After the full charging, the back light turns off with full battery symbol.
- In the low battery, the alarm is activated every three minutes

Note
The device will also charge when connected to a PC for settings or retrieving logs.
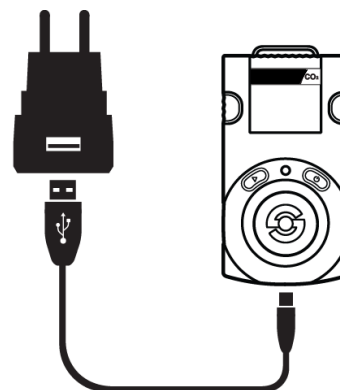
WARNING
Only charge battery in non-hazardous environments , free of hazardous gas.
Only use the original USB-charger.

8. Specification

Size	54(W) x 99,5(H) x 38(D) mm
Weight	135 grams
Sensor technology	Non-dispersive Infrared (NDIR)
Temperature	-20ºC ~ +50ºC
Humidity	5% ~ 95% RH (non-condensing)
Alarm types	High Alarm, Low Alarm, TWA Alarm, STEL Alarm, Over range Alarm, Battery low warning, Calibration due warning
Alarm signal	Acoustic: 90dB @ 10cm Visual: Red flashing LED's Vibration: Vibration alarm
Display	LCD Display
Calibration	Manual 2-point calibration
Datalog	Stores up to 64000 datapoints
Event log	30 Most recent events (overwriting)
Operating time	7 days
Battery charging time	100 minutes
Measuring range	0-5%vol CO_2 or 0-50000ppm CO_2
Sensor resolution	0.1 vol% or 100 ppm
Housing	Rubber enclosed polycarbonate
IP-Rating	IP67
Response Time T⁹⁰	≤ 60sec
EMI/RFI	EMC directive (2014/30/EU)
Sensor Life	5 years (expected)
Safety certifications	**ATEX:** Non-ATEX **CE:** 2014/30/EU RoHS 2
Warranty	24 Months factory warranty
Included accessories	Calibration Cap and USB-C charger (Usable worldwide)

Sensor	Detectable Gas Ranges	Resolution	Article Number
WatchGas PDM Pro CO₂ NDIR sensor	0-5 %vol CO_2 0-50000 ppm CO_2	0.01 %vol 100 ppm	7192008

9. Accesories

Last-O-More Gas
Sampling Hose

WatchGas Sampling
Pump

Fixed Flow Regulator
0.5L per minute
Stainless Steel or 1L
per minute Stainless
Steel regulators

Description	Article Number
WatchGas Last-O-More Gas Sampling Hose 5x8mm	7SOL-411-0018-039
WatchGas Sampling Pump	7177202
WatchGas Fixed Flow Regulator 0.5l/min	CAL-A0195339
Calibration cap for WatchGas PDM	7177200

Also check out the
rest of our PDM Family
range on the WatchGas
website!

10. Limited Warranty

WATCHGAS warrants this product to be free of defects in workmanship and materials-under normal use and service-for two years from the date of purchase from the manufacturer or from the product's authorized reseller.

The manufacturer is not liable (under this warranty) if its testing and examination disclose that the alleged defect in the product does not exist or was caused by the purchaser's (or any third party's) misuse, neglect, or improper installation, testing, or calibrations. 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, water damage or other hazard, voids liability of the manufacturer.

In the event that a product should fail to perform up to manufacturer specifications during the applicable warranty period, please contact the product's authorized reseller or WATCHGAS service center at +31 (0)85 01 87 709 for repair/return information.

V2.0
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