WatchGas
Detection

USER MANUAL

PDM PRO CO_2

Sustainable Gas Detector

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 performed.

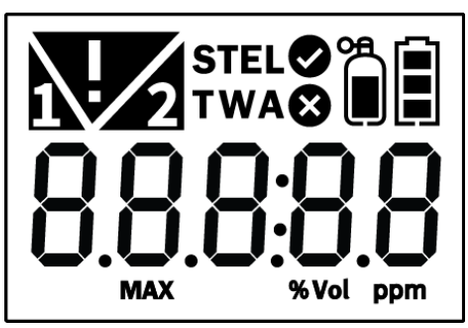
Caution

- 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

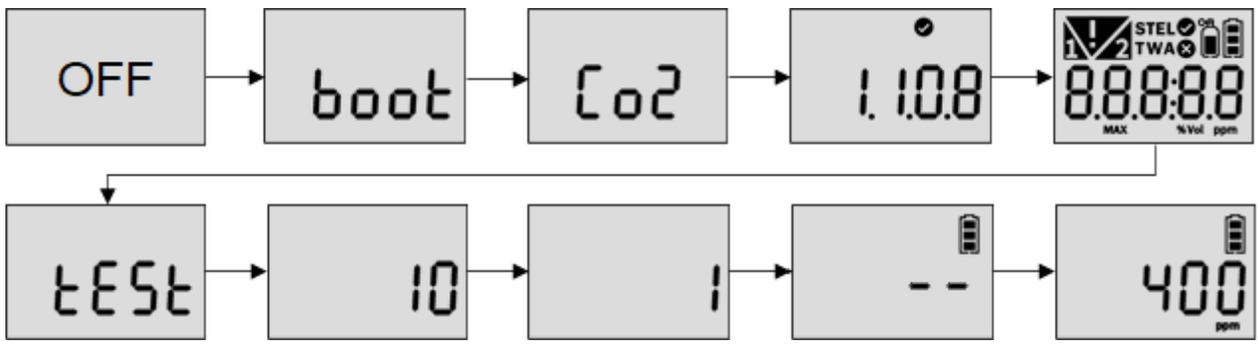


DISPLAY SYMBOLS

- 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. Activation & Deactivation

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.



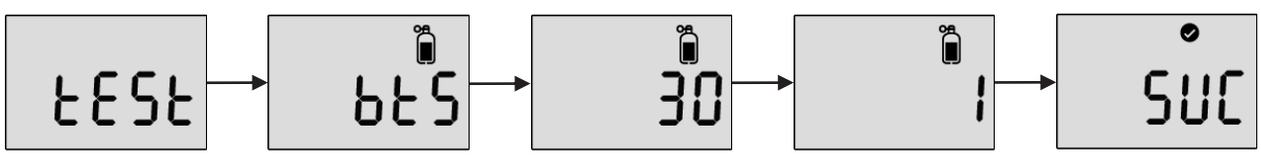
If the stabilization is failed, Error mark is displayed and measuring mode will not be entered. In this case, contact WatchGas at +31 (0)85 01 87 709 or info@watchgas.eu

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 see a 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.
   - Press and hold the Enter button and power button for three seconds in the measurement mode. Press the Enter button until "TEST" is displayed and press the power button 2 sec to enter the mode.
   - 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 MEASURING 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.

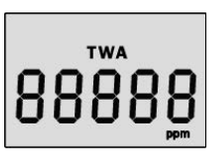
- To move to the next menu, press the Enter button.
- At the last step, press Enter button or do not push any button for 10 seconds, the device will return to the Measuring Mode.

1 

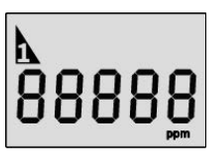
Max Value

2 

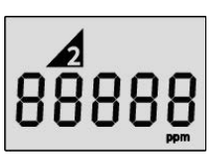
Measured STEL value

3 

Measured TWA value

4 

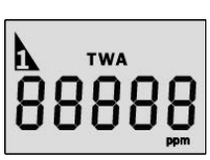
Low Alarm Value Setting

5 

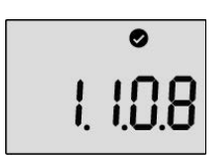
High Alarm Value Setting

6 

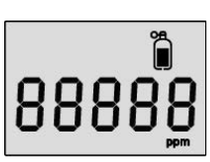
STEL Alarm Value Setting

7 

TWA Alarm Value Setting

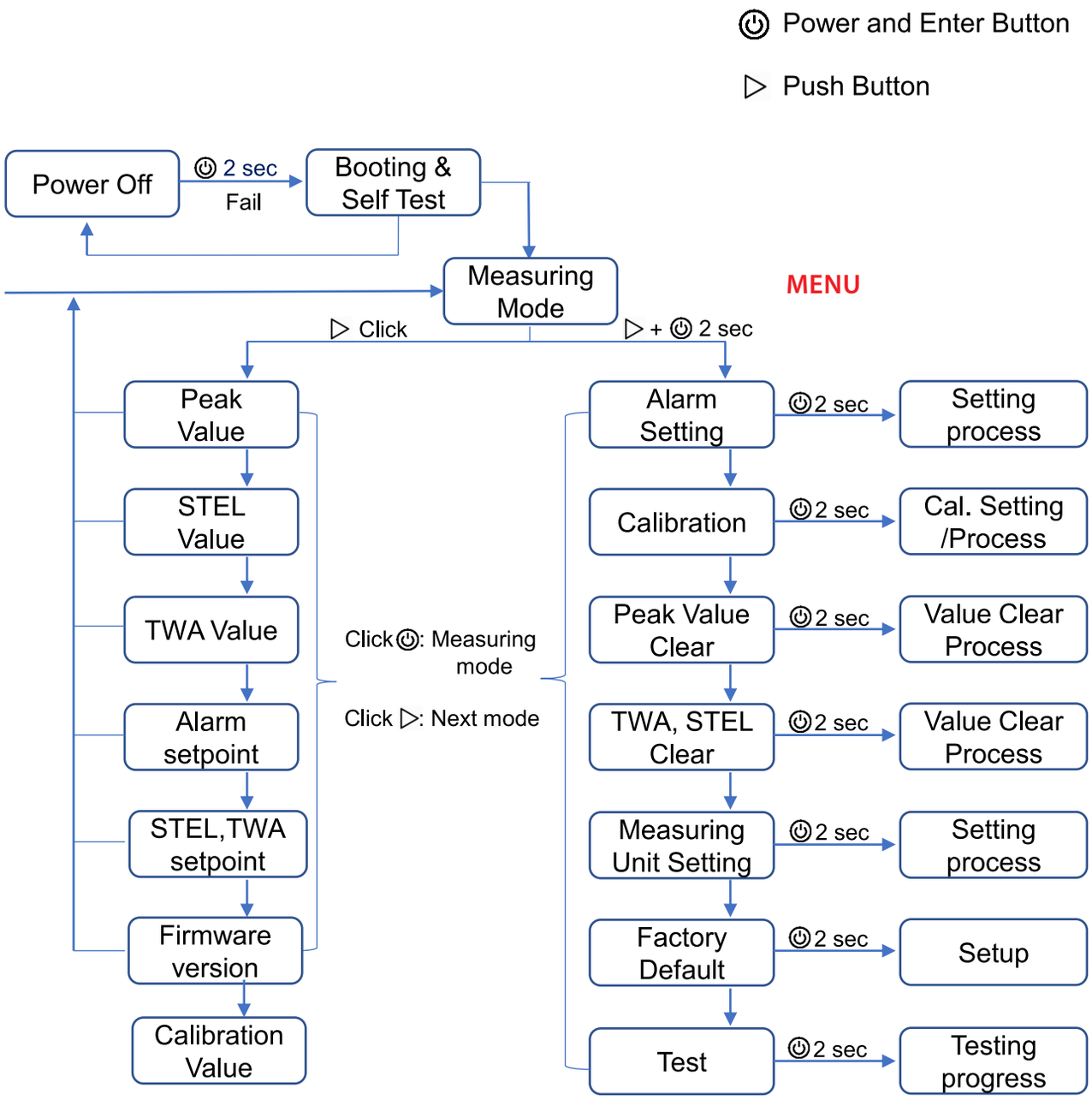
8 

Firmware version

9 

Calibration Concentration

3.3. MENU OVERVIEW



Note:

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

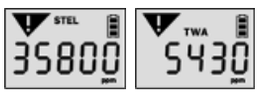
	Setting	Submenu	LCD	Action
1	**ALr**	Low Alarm High Alarm		Low alarm concentration setting High alarm concentration setting
2	**CAL**	Fresh N_2 CO_2		Fresh air Calibration N_2 Calibration CO_2 Calibration
3	**CLr**			Delete maximum alarm Concentration
4	**CLr STEL, TWA**			Delete maximum STEL and TWA concentration
5	**Unit**	%vol / ppm		Concentration unit conversion
6	**Init**			Reset
7	**Test**	Self Bts		Self test Bump test

4.1.1 ALARM ACTIVATION

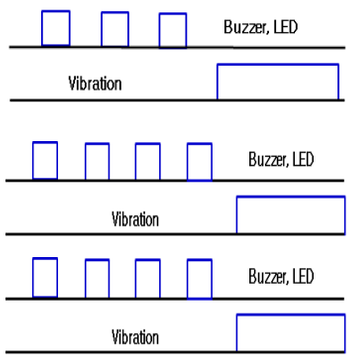
When the gas concentration exceeds alarm set points, 1 or 2 and ▼ will be displayed and the device will vibrate, flash (LED), and give an acoustic signal. To remove alarms, move to a clean air location. When a gas concentration is decreased below the alarm setpoints, alarm will stop.

Low Alarm
Audible Alarm: 3 beeps per seconds
LED: 3 flashes per seconds
Vibration: 1 vibration per second

High Alarm
Audible Alarm: 4 beeps per seconds
LED: 4 flashes per seconds
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

Press the Enter button to change the alarm setpoints.
Press the power button to save the value and move to the next step

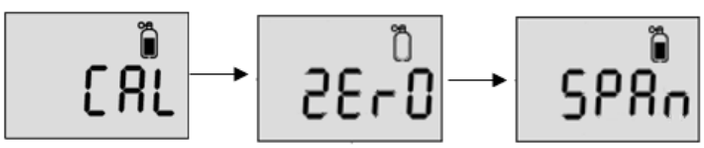
4.1.3. DATA LOG AND EVENTLOG

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.

4.2. CALIBRATION

Caution

- Initial calibration is performed on all devices prior to shipment.
- The detector has the zero calibration(N_2) and span calibration(CO_2)
- Depending on use, a frequency of calibration should be adjusted. 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.
- Before calibration, move to a fresh air, which is free of toxic and combustible gases.
- If calibration fails, perform re-calibration again. If the repeated calibration continues to fail, contact authorized safety managers or distributors.



Calibration Gas

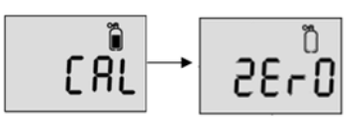
Calibration Type	Zero	Span
Gas Type	N_2	CO_2
Concentration (recommended)	99.99%vol	20,000ppm, 2%vol

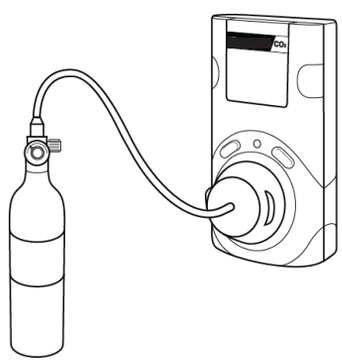
Note: Span concentration can be changed.

Warning

Never preform a zero calibration in ambient air.

1 - Zero (N_2) Calibration





1. In the "CAL" mode, press the Enter button to move to the "ZERO(N_2)" calibration.
2. Plug the calibration cap to the detector and connect the calibration cylinder with N_2 (99.9%vol)
3. Press the power button start zero calibration. Release the N_2 gas from the cylinder.
4. After 90 seconds, when N_2 calibration is successful, success message(V) appears. But, If N_2 calibration is failed, FAIL message(X) appears.
5. Device will return to measuring mode automatically.

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

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 N_2 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.**

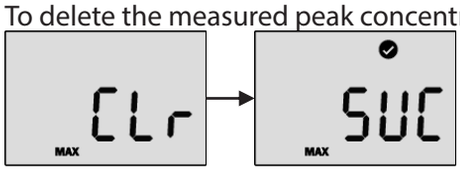
Caution

- Do not change the calibration concentration unless dealers or safety managers authorized by WatchGas give permission to change to another calibration concentration.

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

4.3. CLEAR MAX

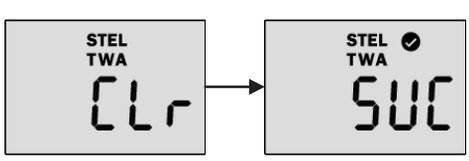
To delete the measured peak concentration in the detector, follow below steps.



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

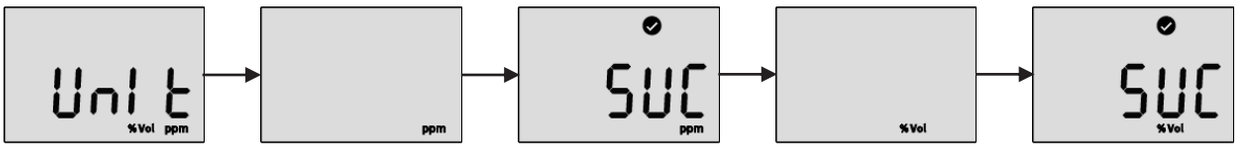
4.4. CLEAR STEL AND TWA

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 UNIT



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

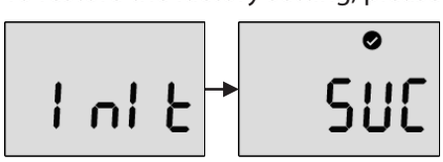
1. In the menu, press the Enter button until Unit is displayed and power button to enter the mode.
2. Press the Enter button to select a unit (ppm or %vol) and power button to save it.
3. After the successful activation, SUC(V) mark is displayed. If it fails, FA(X) mark is displayed.
4. Press the Power button to return to the menu.

4.6 FACTORY RESET

Warning

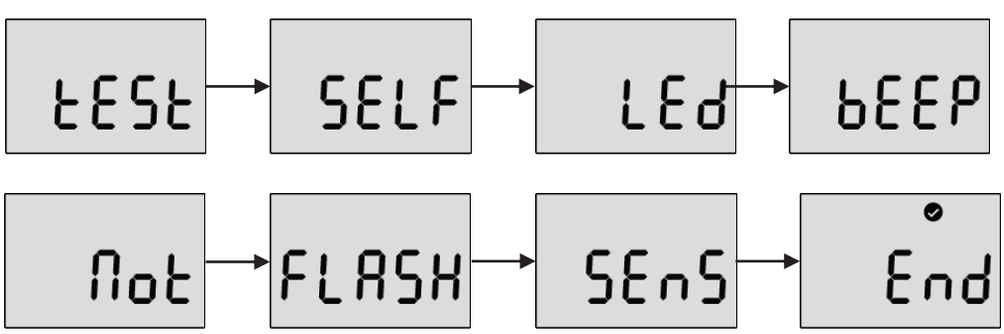
Device settings will be overwritten when factory reset is preformed.

To restore the factory setting, please follow below steps.



1. In the menu, press the Enter button until "Initiate" 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.

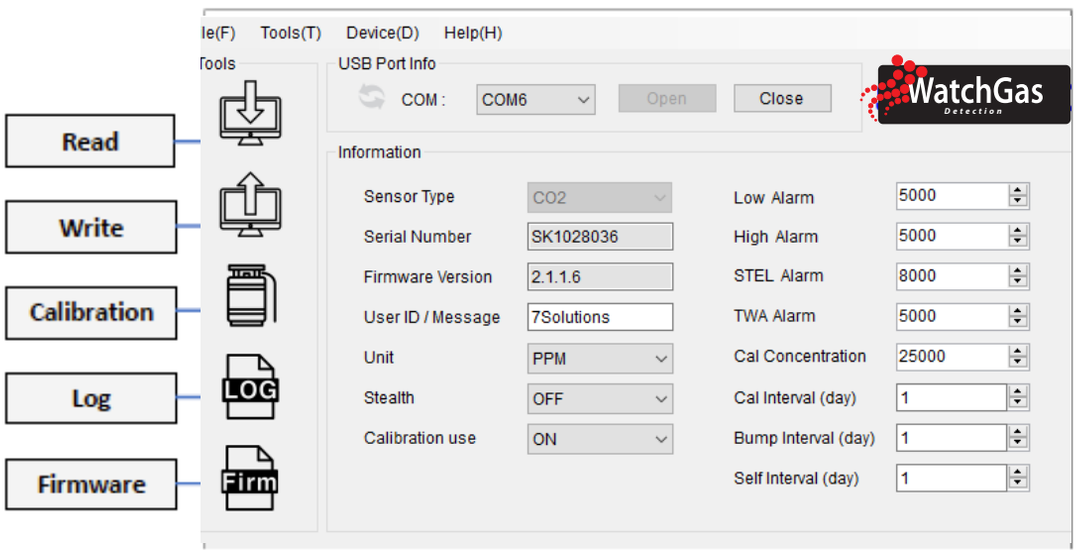
4.8 BUMP TEST

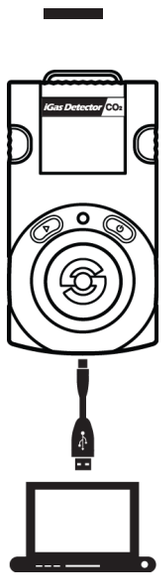
Refer to 2.1

5. Configuration software

To configure the PDM Pro CO_2 use the WatchGas USB Link program. The latest version is available at www.watchgas.eu

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)
- **Gas 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)** – The calibration reminder informs every fixed day (can adjust 0 (n/a) ~ 365)
- **Bump Interval (Days)** – The Bump test reminder informs every fixed day (can adjust 0 (n/a) ~ 365)
- **Self Interval (Days)** – 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.

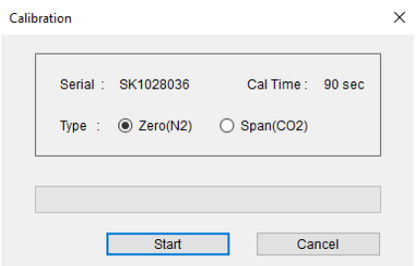
5.1.2 WRITE

The "Write" button (upper-left side second icon) has one of the most important role in this software interface. Because every single and each configured or customized settings will be saved by clicking "Write" button. When a user configures the instrument`s settings, "Write" button will be clicked and message will pop-up. Click "Yes".

5.1.3 CALIBRATION

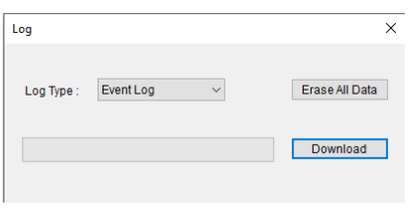
To perform the calibration using software, follow the below:

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.



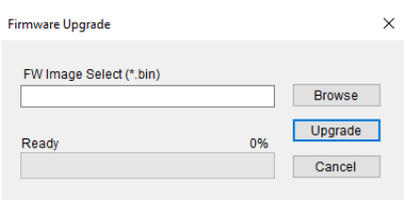
5.1.4 LOG

All recent 30 events and 64.000 gas readings will be stored in the device and will be automatically erases one by one from the earliest logs when new event occurs. 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 will be downloaded and created by unit`s Serial number and will be 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 CO_2, 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

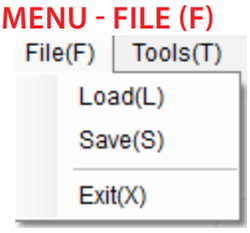


Note:

Pressing "Cancel" button during the upgrading process will cancel and close the Firmware Upgrade Wizard

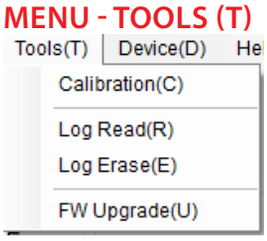
5.2 WINDOW MENU

5.2.1 MENU - FILE (F)



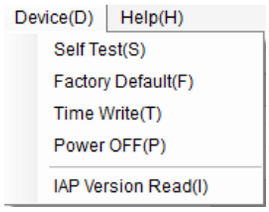
- **Load(L)** Load the installed settings
- **Save(S)** Save the current settings
- **Exit(X)** Finish the work and end the program (close the tap)

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)** C lean all the logs from the storage (erased logs cannot be recovered)
- **FW Upgrade(U)** Open the firmware upgrade window to start upgrading process

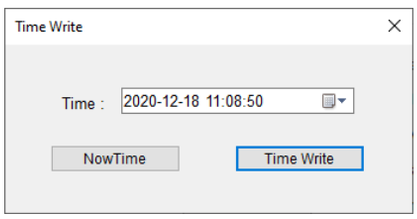
5.2.3 MENU - DEVICE (D)



- **Self Test(S)** Automatic self diagnose of the unit
- **Test order:** LED -> Beep -> 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.



6. Maintenance

For maintenance please contact WatchGas or an authorized WatchGas dealer. and refer to the service manual.

Warning

-Before dissembling the detector, power it off.

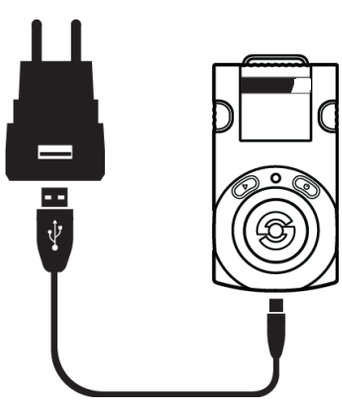
-Maintanance can only be preformed by authorized service centers.

-It is absolutely prohibited to replace battery at potential explosion or dangerous regions.

-Unauthorized opening the detector and/or replacement of components will void intrinsic safety.

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 can still charge by connecting to a PC and the purpose of connection is not for charging but for linking the PC program.

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	-20°C ~ +50°C
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 T_{90}	≤ 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 CO_2 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

Calibration Gas for CO_2 (Span) and N_2 (Fresh-Air)

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.

WatchGas Detection

WatchGas
Klaverbaan 121
2908 KD Capelle aan den IJssel
The Netherlands
+31 (0)85 01 87 709
info@watchgas.eu - www.watchgas.eu

V1.3