

3M Personal Safety Division
3M™ EVM Series Environmental Monitor






EVM Series
Quick Start Guide



EVM and User Interface





Turning On/Off and Navigating

1. Press  key power on. (Following a splash/welcome screen, the Start screen will appear.)
2. Navigating to measurement screens - press  keys.
 - Navigating to menu options - press  keys.
 - To open a selected menu or to save settings - press  key.
3. In the powered on mode, press and hold  key to power down the instrument.



Start Screen and Measurement Views

You will visit the start screen frequently to access measurements, setup, calibration, unit info, and file system screens.

- Press  keys to access the measurements screens.
- To select a menu option, press  keys.

Overview of running measurements

Quick Help List: typical gas, particulates, or air quality measuring overview

1. Turn the EVM on and check the battery power.
2. **Reset/Clear** memory, if necessary (**Start/File System** menu).
 - This will clear out data history before your logging begins to ensure you have sufficient memory space.
3. Set-up your session parameters either in 3M™ Detection Management Software (**DMS**) or via the instrument's **Setup screen**.
4. Verify the time and date is set correctly (**Setup/Time-Date** menu).
5. Calibrate each sensor/parameter via the **Calibration** screen.
6. Place the EVM in a specific location for area monitoring.
7. Press the  key to Start logging.
8. When you are ready to end your logging, press  key.
9. Review your results either on the instrument (via the File System screen) or download to DMS for further analysis (graphs/charts, saving and printing).

Particulate Measurements

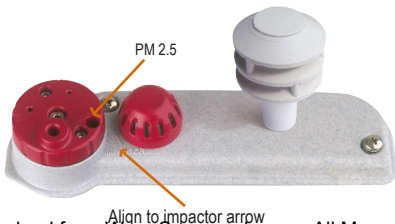
Particulate setup

1. To change particulate settings select: **Setup/Particulate**.
2. Particulate screen appears and includes the following adjustable fields:
 - **Particulate** field (enable/disable pump collection), **Profile** field (applying a correction factor), and **Gravimetric mass/volume** fields (displays accumulated mass and air volume. These fields are reset when performing gravimetric sampling.)

Adjusting the Impactor

To adjust the impactor, turn the turret until one of the following is selected: PM2.5, PM4, PM10, or PM (all dust ranging from 0 µm-100 µm).

- The example below illustrates the impactor set to PM 2.5.

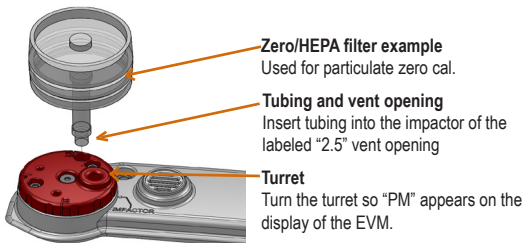


Particulate Zero Calibration

Prior to calibrating, ensure the impactors are well-greased with an applied thin-film of silicone grease. (Please see "Impactor Care" on page 10 or EVM series user manual.)

1. Attach the **Zero/HEPA** filter and tubing into the turret. Rotate the turret to **PM**.
2. Select **Calibration** from the **Start** screen and select **PM** (using up/down arrows).
3. Press **Cal** softkey and then press **Start** softkey. Once level is stabilized, press **Set** softkey.
4. Once level has been set, you can press **Save** or **Cancel**. (Please refer to Chapter 4 of EVM series manual for more information.)

NOTE: Once saved, the instrument will apply the zero calibration to all profiles. The zero calibration is stored in the History screen and a calibration. Verify can be performed (to ensure no drifting).



Particulate Advanced Calibration (Gravimetric)

Gravimetric Calibration Overview

(1) Reset the gravimetric and volume accumulators; (2) Insert a new (sealed) gravimetric cassette; (3) Measure in the specific location for approximately four to eight hours; (4) Record the value displayed in the gravimetric accumulator field displayed in the particulate screen. (This value is used in conjunction with the weight of the measured dust in the cassette.); (5) Remove the gravimetric cassette and weigh the filtered contents. (Typically, send to a lab for results.); (6) To determine the correction factor, calculate the ratio between the particulate mass value and the weight from the gravimetric filter lab analysis. (Ratio = true weight/EVM gravimetric displayed value). (7) Enter user correction value (Setup)Particulate screen. Select profile field and then press Edit softkey. Add Factor using up/down arrows. Press On/OFF/Esc key twice to return to start screen.)

Logging Particulates

1. Before logging particulates, ensure the impactors are clean and well-greased.
2. From the start screen or any measurement screen, press **▶■** key.
3. Press **▶■** key to end the logged session. (See "Viewing logged results" to access past sessions.)

Volatile Organic Compounds (VOCs)

VOCs, air pollution with carbon-containing chemicals, are measured using a Photoionization detector 10.6eV. The EVM is equipped to notify you when maintenance and cleaning is required for the PID sensor. A PID sensor error will appear indicating:

(1) if the sensor needs to be cleaned, or (2) the lamp needs replacing.



PID Zero Calibration

The PID ppm zero calibration preferred method is to flush with Zero Grade Air. Alternatively, Nitrogen may be used. For best response time, it is recommended to set the flow rate at 1 LPM. NOTE: Please refer to the EVM series manual for more information on the PID ppm/ppb sensors.




1. Connect the Zero Grade Air, tubing, and cal. cup to the EVM. (Please skip this step if you are not applying a gas.)
2. Select **Calibration** from the **Start** screen and select **PID** (using up/down arrows).
3. Press **Cal** softkey and then press **Zero** softkey. Once level is stabilized, press **Set** softkey. (Typically takes 60 seconds to stabilize.)
4. Once level has been set, you can press **Save** or **Cancel**. (Disconnect components and return to the start screen via On/Off/Esc key.)

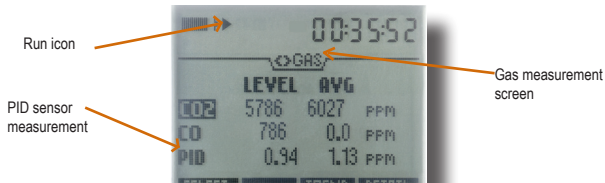
PID Span Calibration

Typically, Isobutylene is used when the VOCs are unknown. NOTE: in order to measure specific VOCs, you will want to use the relevant VOC for your calibrated gas source for a ppm/ppb sensors. (Please refer to the manual for PID correction factor table; Appendix C for details.)

1. Connect Isobutylene, regulator, tubing and cal cap to the EVM.
2. Follow steps 2-4 above (in PID Zero Cal. section) but select **Span** softkey instep 3.

Logging VOCs

1. From the start screen or any measurement screen, press  key.
 - To view VOCs measurements, select either the Gas or Composite screen by pressing  keys from the start screen.
2. Press  key to stop logging. (See "Viewing logged results" to access past sessions.)



Toxic Gases

The following toxic gases table displays a quick overview of the ranges and the gases needed to perform zero and span calibrations.

| Type of Gas | Range | Res. | Zero cal gas | Span cal gas |
|-------------------------------------|---------------|---------|-----------------------------------|-------------------------|
| Carbon Monoxide (CO) | 0 -1000 ppm | 1 ppm | nitrogen/pure air | CO |
| Chlorine (CL ₂) | 0.0 - 20 ppm | 0.1 ppm | nitrogen/pure air | CL ₂ |
| Ethylene Oxide (EtO) | 0.0 - 20 ppm | 0.1 ppm | nitrogen/pure air | EtO |
| Hydrogen Cyanide (HCN) | 0.0 - 50 ppm | 0.1 ppm | nitrogen/pure air | HCN |
| Hydrogen Sulfide (H ₂ S) | 0 - 500 ppm | 1 ppm | nitrogen/pure air | H ₂ S |
| Nitrogen Dioxide (NO ₂) | 0.0 - 50 ppm | 0.1 ppm | nitrogen/pure air | NO ₂ |
| Nitric Oxide (NO) | 0.0 - 100 ppm | 0.1 ppm | nitrogen/pure air | NO |
| Oxygen (O ₂) | 0.0 - 30% | 0.1% | nitrogen *1.0 L/min. flow rate | Room air *span 20.9% |
| Sulphur Dioxide (SO ₂) | 0.0 - 50 ppm | 0.1 ppm | nitrogen/pure air | SO ₂ |

Carbon Dioxide Gas

Similar to toxic gases, the carbon dioxide sensor should be calibrated prior to logging.

Toxic and Carbon Dioxide Zero Calibration

Depending on the gas of interest, the toxic zero calibration is performed with the gas indicated in the table above. The CO₂ sensor requires a calibration gas, a regulator with at least 1.0 Liter/minute flow rate, and a hose/tubing. Nitrogen (N₂) is the recommended gas for a zero calibrating (If you are not applying a gas, start at step 2.)

1. Connect the appropriate gas/pure air, regulator, tubing, and cal. cup to the EVM.
2. Select **Calibration** from the **Start** screen and choose a specific toxic using ▲▼ keys. (i.e., CO).
3. Press **Cal** softkey and then press **Zero** softkey. Once level is stabilized, press **Set** softkey. (Allow at least 90 seconds to stabilize.)
4. Press **Save** or **Cancel** softkey to store the process. Disconnect components and return to the start screen via **On/Off/Esc** key.






Toxic and Carbon Dioxide Span Calibration

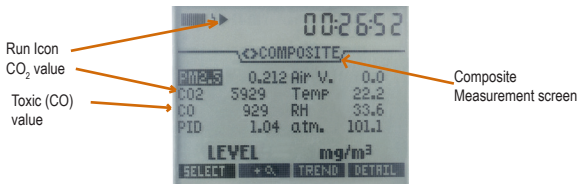
To perform a span calibration with a specific toxic gas, please reference the toxic gas table. For the CO₂ span calibration, the range (or span) should be a sizeable fraction of the selected full scale range of the gas.

NOTE: The range for the CO₂ sensor is 0 to 5,000 ppm. For a span calibration, it is recommended to span cal to the value you will be measuring (i.e., 2,000 ppm).

1. Connect the appropriate gas, regulator, tubing and cal cap to the EVM.
2. Follow steps 2-4 above (in Toxic Zero Calibration section) but select **Span** softkey in step 3. (**NOTE:** For Oxygen span calibration, the typical span is 20.9%.)

Logging Toxic Gases or Carbon Dioxide

1. From the Start screen or any Measurement screen, press  key.
 - To view gas measurements, select either the Gas or Composite screens (by pressing  from the start screen when Setup is selected.)
2. Press  key to stop logging. (See "Viewing logged results" to access past sessions.)





Particulate advanced calibration (Gravimetric filtering)

Gravimetric Calibration Overview

(1) Reset the gravimetric and volume accumulators; (2) Insert a new (sealed) gravimetric cassette; (3) Measure in the specific location for approximately four to eight hours; (4) Notate the value displayed in the gravimetric accumulator field (displayed in the particulate screen. (This value is used in conjunction with the weight of the measured dust in the cassette.); (5) Remove the gravimetric cassette and weigh the filtered contents. (Typically, sent to a lab for results.); (6) To determine the correction factor, calculate the ratio between the particulate mass value and the weight from the gravimetric filter lab analysis.

Measuring particulates

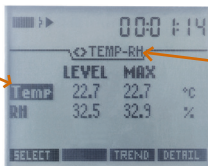
1. From the start screen or any measurement screen, press the  key. (Prior to logging, a 5 second count-down appears.)
2. Press  key to end the logged session. (See "Viewing logged results" to view past sessions.)

Temperature and Relative Humidity

Logging/Viewing Temperature and/or Relative Humidity

The Temperature and Relative Humidity readings are viewable in either the Temp-RH measurement screen or in the Composite screen.

Temp/RH
measurements



Temp/RH
measurement screen

Particulate Air Flow

Calibration

For Airflow meter calibration, an accurate flow meter (such as a primary standard calibrator) and tubing is required.

1. Attach the primary standard calibrator tubing to the air flow outlet.
2. Navigate to the **Setup\Calibration\Flow RT (rate)** screen.
3. Press the **Cal** softkey and then press **Start** softkey.
4. Adjust the flow rate (using the up and down arrow keys) so the primary standard calibrator is 1.67 LPM and then confirm by pressing the **Save** softkey.

NOTE: It should be noted that in order for the impactors to work properly the flow rate must be adjusted to 1.67 LPM.

AirProbe inlet
with attachment



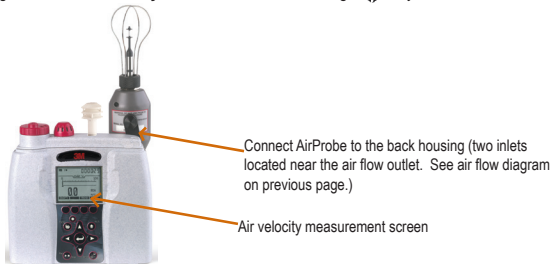
Air Flow Outlet

*To calibrate, connect
primary standard
calibrator with tubing

Air Velocity

To view air velocity measurements, perform or verify the following:

1. The air velocity probe is enabled in **Setup\AUX\Air Velocity** screen.
2. Connect the air velocity probe and attachment to the EVM unit to the auxiliary Air probe inlet.
(See Air Probe inlets diagram in previous section, "Particulate Air Flow".)
3. Turn Air Velocity Probe switch **On**.
4. Navigate to the **Air Velocity** measurement screen using ◀▶ keys.



Viewing Logged sessions (past sessions)

Once you have logged data and stopped the session, the data is stored under the past session summary menu. (Optional: you can view the data in charts/graphs when downloaded to DMS.)

1. Navigate to **Start \Past Session** screen.
2. Select the **File** field and press the **File** softkey. (**Past Session\Load File** screen will display all of the logged files.) Press **Enter** key to change between different file views.
3. Select the appropriate file (by using up/down arrows) and press the **Load** softkey
4. Press **Detail** softkey to view data.
5. Press ◀▶ keys to view summary data. Repeat as necessary.

| | | |
|------------------------|-------------------------|-------------------|
| 0:1:42:51 | Session Run Time | |
| \Past Session\SUMMARY/ | | |
| MIN | 0.453 | mg/m ³ |
| MAX | 4.396 | mg/m ³ |
| AVG | 0.528 | mg/m ³ |
| MAX STEL | 0.803 | mg/m ³ |
| TWA | 0.113 | mg/m ³ |
| PM4 | | |

Summary session

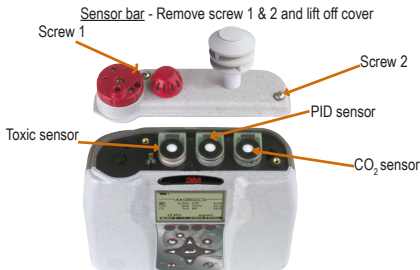
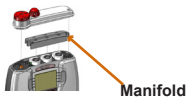
Maintenance/Cleaning

Sensors Locations

The gas sensors are inserted, factory calibrated, and ready for usage upon delivery. (The diagram below is based on the EVM-7 model.) Occasionally, you may have to care for the sensors which will require removing and inserting.

- ☑ **NOTE:** Verify the unit is off and unplugged from the power cord before removing or inserting sensors.

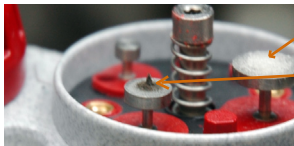
1. Remove the sensor bar (via the screws) and remove the manifold.
2. Sensor bar removal and location of sensors are displayed below.
 - When removing/inserting, align the socket pins to the circuit board accordingly.



Impactor Care and Particulates

The impactor requires periodic greasing and cleaning for particulate measuring only.

1. Remove the turret (red housing cover over the impactor) by removing the right and left screw with the supplied allen wrench (stored behind the access door.)
2. Remove all debris/dust with a Q-tip/cotton.
3. Wipe a **very thin film** of silicone grease onto the metal plates using a Q-tip/cotton.
4. Re-attach by placing the turret cover over the housing and tighten screws.



Thin-layer of silicone is applied to a clean impactor.


Example of accumulated dust (will form into a pyramid)

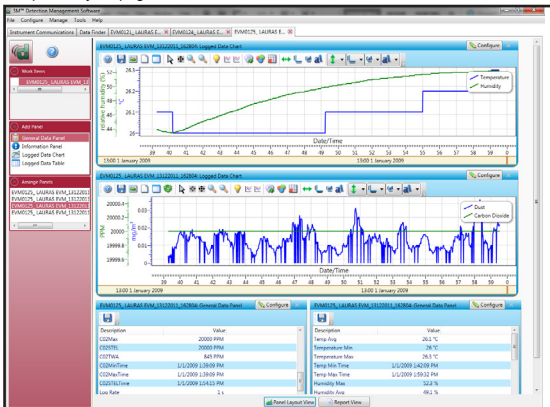
Working with 3M™ Detection Management Software DMS Communicating

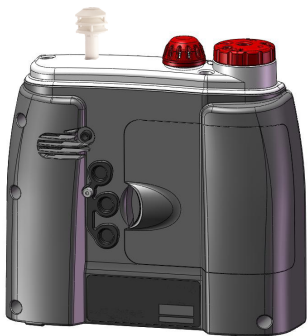
1. When the EVM is **On**, plug the USB cable into the EVM and plug the opposite end to the USB port of your computer. (Refer to illustration below.)



Viewing your data

In DMS once your files are downloaded via  **Download** button, view the data in the panel layout view or reports by clicking on appropriate buttons. See an example of the panel layout page below.





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