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## USER MANUAL

**FORBIX SEMICON** 

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Air quality monitor for the detection of  
dust particle pollution in the atmosphere



### Air Monitor PM2.5

#### The set consists of

|                           |       |
|---------------------------|-------|
| PM2.5 Dust monitor FBXDQM | 1 no. |
| Adapter power supply      | 1 no. |

Designed and Manufactured in INDIA

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### Precautions:

- Do not drop or apply jerk. Internal electronic circuits are fragile and may get ruptured if not handled carefully
- Do not attempt to open or rectify any FORBIX SEMICON devices. Warranty is void once the security sticker is detached
- Internal sensor and glass is fragile, handle with extreme care
- While cleaning the sensor glass make sure to turn off the unit
- Use a dry cloth to clean the glass of the sensor from time to time
- Avoid damp / humid climates. Keep away from moist / dry weather
- Keep away from direct sunlight for prolonged hours
- Do not connect adapters other than supplied by FORBIX SEMICON

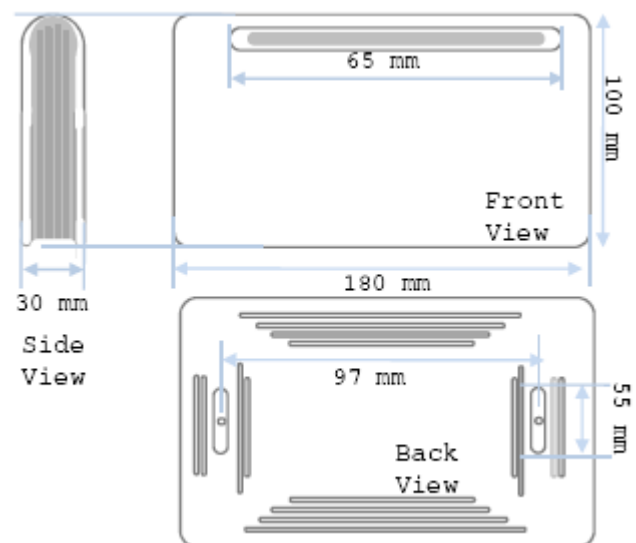
### How to operate

- Connect the dust monitor to 12VDC adapter
- Wait for 5-6 minutes before the readings start showing up
- “dust Sense” (for atleast 30 seconds), shows up on boot up screen after a countdown time of 90 seconds. Blow some air into the left orifice if needed. This will speedup the booting process
- Dust Quality Monitor machines (DQM) can be kept on a table or mounted on the wall

The sensor is located inside the left orifice of the machine. The display shows the present and average value of PM2.5 pollution levels.

The monitor is capable of checking values from 10 – 1400  $\mu\text{g}/\text{m}^3$ . On the left bottom corner of the display shows the AQI (Air Quality Index) bar. The PM2.5 values are categorized as GOOD, NORMAL, POOR and ALARM.

### Physical Dimensions



The dust monitor unit can be kept on a table or hang to wall (mounted on 2 screws). Make

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• **Why average and current values are different?**

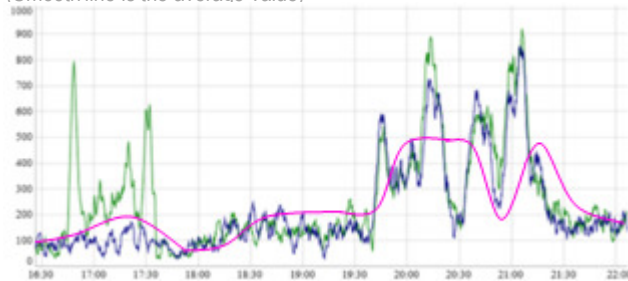
Average and current dust readings will ALWAYS be different. Current values are the instantaneous readings. Every sample of instantaneous value is added to the previous value over a period of time and divided by the total number of samples. Therefore, the current value may show as 475  $\mu\text{g}/\text{m}^3$ , but the average may still continue to show 85  $\mu\text{g}/\text{m}^3$ . Over a period of many minutes, when current values continues to remain high, the average values will slowly rise

Comparison of FBXDQM to LASER sensor based monitors, over a period of many hours.

\_ BLUE: LASER sensor

\_ GREEN: Model under test (FBXDQM)

Variation from 100-1000  $\mu\text{g}/\text{m}^3$  smoke injection (Smooth line is the average value)



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• **Why does values in PM2.5 vary? What sensor is used and how accurate is it?**

Usually PM2.5 values will vary in the same room. The values will continuously vary within  $\pm 30 \mu\text{g}/\text{m}^3$  to  $80 \mu\text{g}/\text{m}^3$ . Dust PM2.5 values depends on the environmental conditions of the room, furniture, carpets, curtains etc. FBXDQM machines use optical sensor with an accuracy of more than 90% under room temperature. The random (Brownian) motion of the particles, makes the sensor show values differently. It is not possible for particle density to be constant in a room (even though it is closed). The sensor is internally calibrated to nullify such changes for sudden variation. User should ignore the specific reading, if sudden change is visible on the monitor

• **How soon the display changes the values?**

Usually it take around 30 seconds for the monitor to display the new reading. But if the PM2.5 values are very stable (which is seldom the condition), the monitor might stick to a constant value.

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Booting screen for 90 seconds countdown timer for sensor heating



1<sup>st</sup> sensor capturing for 30 seconds



Dust PM2.5 readings



Percentage of clean air

2% means air is dirty and sensor reading is more than  $800 \mu\text{g}/\text{m}^3$  or so.

98% means air is clean sensor readings around  $10-20 \mu\text{g}/\text{m}^3$

PM2.5 values and average values can vary to a great extent (because of Brownian motion of particles)

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Value less than  $100 \mu\text{g}/\text{m}^3$



Value  $100 - 400 \mu\text{g}/\text{m}^3$



Value  $400 - 800 \mu\text{g}/\text{m}^3$



Value exceeding  $800 \mu\text{g}/\text{m}^3$

Corresponding value of air quality index to the displayed PM2.5 readings

Allow the machine to settle for 5-8 minutes for the internal averaging calculations to start.

Initial few readings may be an indicative value and not an accurate value.

Once the sensor heater has warmed up considerably the readings start showing up on the screen.

Min reading value =  $10 \mu\text{g}/\text{m}^3$

Max. reading value =  $1400 \mu\text{g}/\text{m}^3$

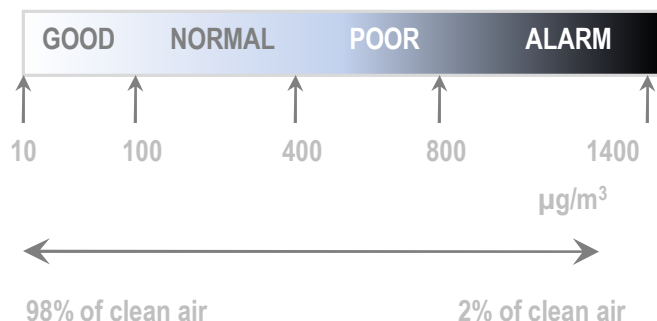
Average value =  $\frac{\Sigma (\text{current value})}{\text{No. of samples}}$

Percentage value shown in the denominator is an indication for clean air.

98% denotes the dust monitor reading is near around  $10\text{-}20 \mu\text{g}/\text{m}^3$

2% denotes the PM2.5 value has cross  $1300\text{-}1350 \mu\text{g}/\text{m}^3$

| Air Quality Index | Recommended actions                                                                                                      |
|-------------------|--------------------------------------------------------------------------------------------------------------------------|
| Good              | Breathing air quality is healthy                                                                                         |
| Normal            | Air purifier is preferable. Might cause breathing troubles (like coughing, sneezing) if exposed for a prolonged duration |
| Poor              | Not good for health. Will cause health hazard if continuously exposed under these breathing conditions                   |
| ALARM             | Smoky air, not fit to breathe even for more than 10-15 minutes. Recommend to turn off the monitor in such cases          |



• **What are the values that can I expect to see in my room?**

Usually indoors, the quality of air stays in NORMAL condition, somewhere around  $100\text{-}300 \mu\text{g}/\text{m}^3$  (strictly depending on the population, furniture and environmental conditions inside the room). Under the influence of smoke or bad ventilation or open windows near roadside the values may show up higher (indicating poor). Using a good quality air purifier, the air quality indication should move to good

• **What are the precautionary measures and maintenance needed?**

When subjected to rooms which are full of smoke or dust, and the reading says ALARM, the monitor should be turned OFF. After prolong use, there may be some dust accumulation on the sensor lens. Use a soft dry silk cloth or swab to gently wipe away the dust and clean the sensor. Do not use alcohol or water to clear the dust

**Frequently asked questions (FAQ)**

• **Explain me the functionality of the machine?**

This is an air quality PM2.5 dust pollution monitor. It gives the reading of ambient air in room in  $\mu\text{g}/\text{m}^3$

• **Which model of the two is suitable for me, FBXDQMW or FBXDQMG?**

Both the models are functionally the same. The background light of the LCD screen is bluish-white for FBXDQMW model and lemon-green in the FBXDQMG model

• **Can the machine be operated or on battery?**

The monitor operates on 12VDC power supply. We provide 220VDC to 12VDC converter adapter along with the package. User can use external 12V battery pack. The working period depends on specific battery's capacity. On an average, 4-6AH/12VDC rechargeable lead acid battery may last for 6-8 hrs. with LCD light on.