

AQ-SPEC

Air Quality Sensor Performance Evaluation Center

Evaluation Summary

Sensor Description

Manufacturer/Model:
Oizom/Polludrone Smart

Pollutants:
PM_{1.0}, PM_{2.5}, and PM₁₀
mass concentration

Time Resolution:
1-min

Type: Optical



- Overall, the accuracy of the Oizom Polludrone Smart sensors decreased from 67.3% to 34.3% as PM_{2.5} conc. increased over the tested concentration range. The sensors underestimated PM_{2.5} measurements from FEM T640x in the laboratory experiments at 20 °C and 40% RH.
- The Oizom Polludrone Smart sensors exhibited high precision for all T/RH combinations and all PM concentrations.
- The Oizom Polludrone Smart sensors (IDs: 0001, 0002, 0003) showed low intra-model variability in both the field and laboratory evaluations.
- Data recovery was ~95% - 100% from all units in both field and laboratory evaluations.
- For PM_{1.0}, the Oizom Polludrone Smart sensors showed strong correlations ($0.82 < R^2 < 0.87$) with the corresponding T640 data in the field evaluation. For PM_{2.5}, the sensors showed strong correlations with the corresponding FEM T640 data ($0.76 < R^2 < 0.82$) in the field evaluation and very strong correlations with the FEM T640x in the laboratory evaluations ($R^2 > 0.96$). For PM₁₀, the sensors showed weak correlations ($0.33 < R^2 < 0.35$) with T640 data in the field evaluations.
- The same three Oizom Polludrone Smart units were tested both in the field (1st stage of testing) and in the laboratory (2nd stage of testing).

Field Evaluation Highlights

- Deployment period 07/31/2021 to 09/29/2021 : the three Oizom Polludrone Smart sensors showed strong correlations with the corresponding T640 PM_{1.0}, PM_{2.5} and weak correlations with the corresponding PM₁₀ mass concentrations.
- The units exhibited low intra-model variability and data recovery for all PM fractions was ~95-99% from all units.

Additional Information

Field evaluation report:

<http://www.aqmd.gov/aq-spec/evaluations/field>

Lab evaluation report:

<http://www.aqmd.gov/aq-spec/evaluations/laboratory>

AQ-SPEC website:

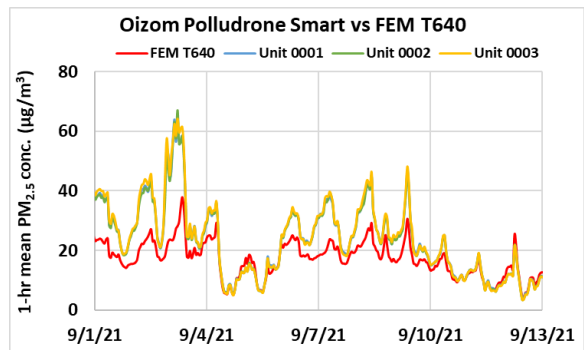
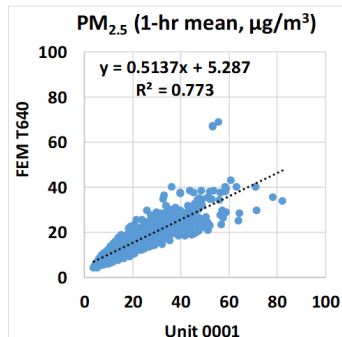
<http://www.aqmd.gov/aq-spec>

1-hr mean, all ref. instr.

PM_{1.0}: $0.82 < R^2 < 0.87$

PM_{2.5}: $0.76 < R^2 < 0.82$

PM₁₀: $0.33 < R^2 < 0.35$



Coefficient of Determination (R^2) quantifies how the three sensors followed the PM_{2.5} concentration change by the reference instruments.

An R^2 approaching the value of 1 reflects a near perfect agreement, whereas a value of 0 indicates a complete lack of correlation.

Laboratory Evaluation Highlights

Accuracy (PM_{2.5})

$$A (\%) = 100 - \frac{|\bar{X} - \bar{R}|}{\bar{R}} * 100$$

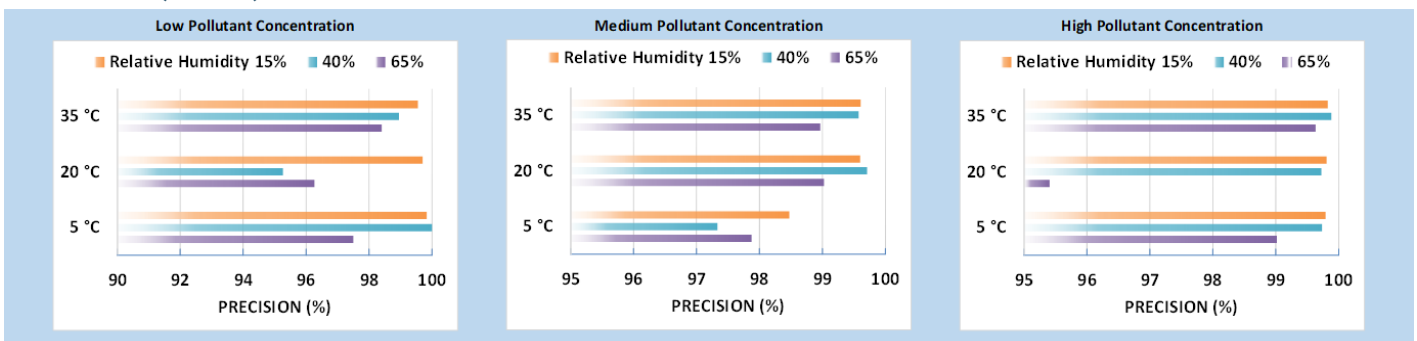
Steady state #	Sensor Mean (µg/m ³)	FEM T640x (µg/m ³)	Accuracy (%)
1	6.1	9.1	67.3
2	30.1	50.4	59.7
3	51.0	99.3	51.4
4	77.8	197.5	39.4
5	103.4	301.6	34.3

Accuracy was evaluated by a concentration ramping experiment at 20 °C and 40% RH. The sensor's readings at each ramping steady state are compared to the reference instrument.



A negative % means sensors' overestimation by more than two fold. The higher the positive value (close to 100%), the higher the sensor's accuracy.

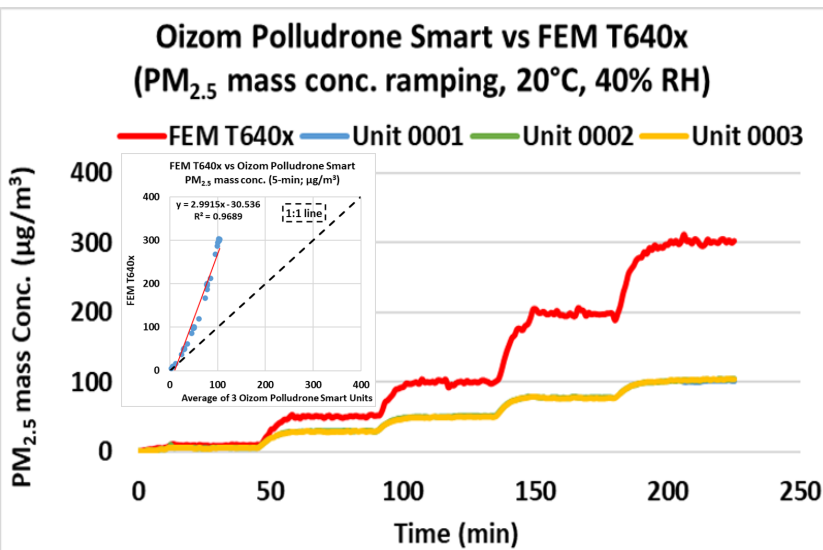
Precision (PM_{2.5})



100% represents high precision.

Sensor's ability to generate precise measurements of PM_{2.5} concentration at low, medium, and high pollutant levels were evaluated under 9 combinations of T and RH, including extreme weather conditions like cold and dry (5 °C and 15%) cold and humid (5 °C and 65%), hot and humid (35 °C and 65%), or hot and dry (35 °C and 15%).

Coefficient of Determination



The Oizom Polludrone Smart sensors showed very strong correlations with the corresponding FEM T640x PM_{2.5} data ($R^2 > 0.96$) at 20 °C and 40% RH.

Climate Susceptibility

From the laboratory studies, temperature and relative humidity had minimal effect on the Oizome Polludrone Smart sensors; at the 65% RH change point, the sensors showed some spiked conc. changes and enhancement in PM_{2.5} mass concentration at 65% RH at 20 °C and 35 °C .

Observed Interferents

N/A



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