

# AQ-SPEC

## Air Quality Sensor Performance Evaluation Center

### Sensor Description

Manufacturer/Model:  
2B Technologies POM  
(FEM EQOA-0815-227)

Pollutant: Ozone

Linear Dynamic Range:  
2 ppb - 10 ppm

Type: UV Absorption

Time Resolution:  
10-second to 1-hour



### 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:

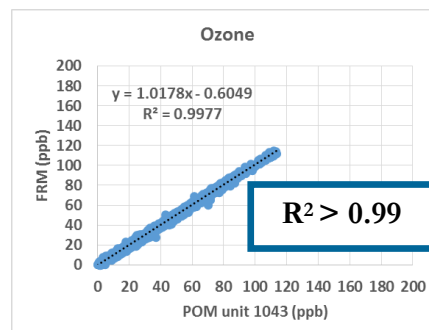
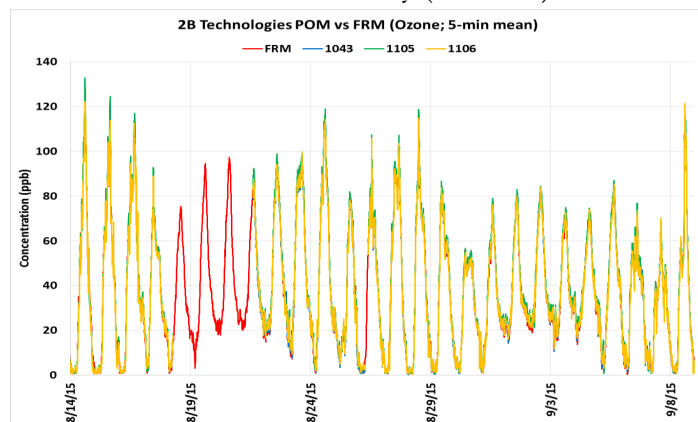
<http://www.aqmd.gov/aq-spec>

### Evaluation Summary

- Overall, the three POM units showed high accuracy, compared to the FRM ozone monitor, for a concentration range between 0 to 400 ppb.
- The three POM units exhibited high precision during almost all tested environmental conditions (ozone conc., T and RH). POM 1122 experienced some instability at 5 °C, 40% RH and 20 °C, 65% RH.
- The three POM units showed low intra-model variability (~13%), as well as good data recovery (> 90%).
- They showed very strong correlations with the FRM instrument from both the field ( $R^2 > 0.99$ ) and laboratory studies ( $R^2 > 0.99$ ).

### Field Evaluation Highlights

- Deployment period 07/29/2015- 09/09/2015: the three POM units followed the ozone concentration change as monitored by FRM instrument.
- POM 1043, 1105, and 1106 had 99%, 92%, and 91% data recovery, respectively.
- The units have low intra-model variability (+/- 10%).



Coefficient of Determination ( $R^2$ ) quantifies how the three sensors followed the ozone concentration change by FRM.

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

Steady State (#)	Sensor mean (ppb)	FRM (ppb)	Accuracy (%)
1	37.1	41.0	90.5
2	73.8	82.1	89.9
3	107.1	120.8	88.6
4	212.7	235.0	90.5
5	296.8	330.9	89.7

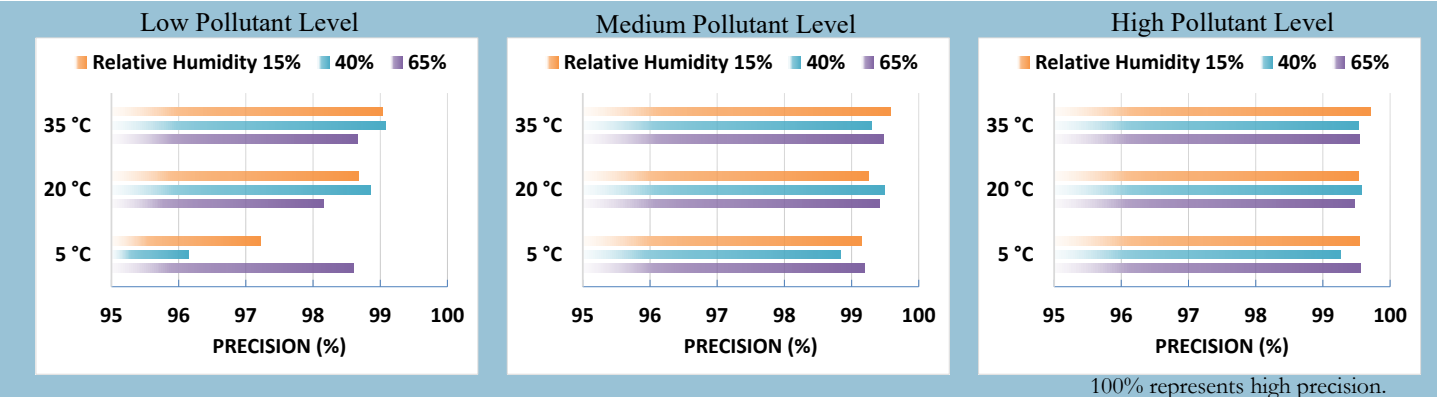
Three brand new POMs were used in the lab testing.

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

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



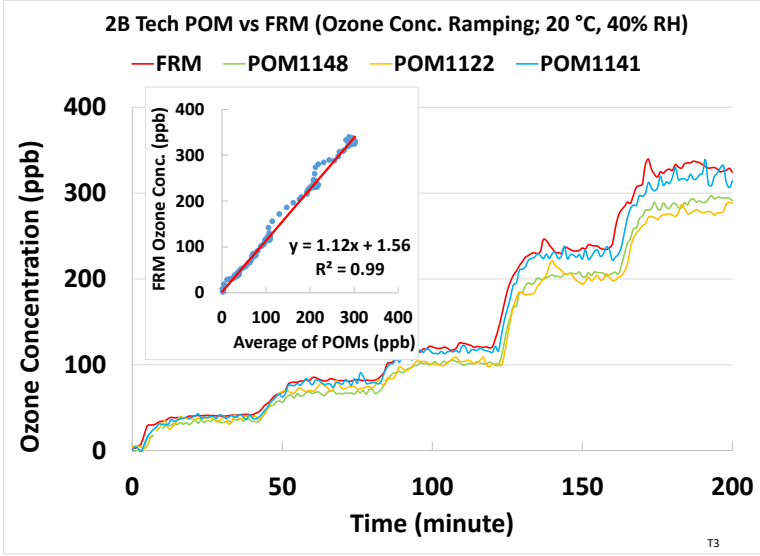
## Precision



100% represents high precision.

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

## Coefficient of Determination



The three POM units showed very strong correlations with the corresponding FRM data ( $R^2 > 0.99$ ) at 20 °C and 40% RH.

## Climate Susceptibility ( $R^2$ )

$R^2$	5 °C	20 °C	35 °C
15%	0.99	0.99	0.99
40%	0.99	0.99	0.99
65%	0.99	0.99	0.99

From the laboratory studies, temperature and humidity did not affect 2B POM's linear correlations with FRM instrument.

## Observed Interferents

None.

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