

# AQ-SPEC

## Air Quality Sensor Performance Evaluation Center

### Evaluation Summary

#### Sensor Description

Manufacturer/Model:  
Vaisala/AQT530

Pollutants:  
CO

Time Resolution:  
1-min

Type: Electrochemical



- Overall, the accuracy of the Vaisala AQT530 sensors ranged from 91.4% to 99.2%. Overall, the sensors slightly overestimated the CO measurements from FRM T300U in the laboratory experiments at 20°C and 40% RH. Note that the sensors have an upper CO measurement range of 10 ppm.
- The Vaisala AQT530 sensors exhibited high precision for all T/RH combinations and all CO concentrations.
- The Vaisala AQT530 sensors (IDs: 673, 885, 847) showed low intra-model variability in the field and laboratory evaluations.
- Data recovery was ~93% - 100% from all units in both field and laboratory evaluations.
- The Vaisala AQT530 sensors showed very strong correlations ( $0.91 < R^2 < 0.93$ , 5-min mean) with the corresponding FRM Horiba data in the field evaluation and very strong correlations with the FRM T300U in the laboratory evaluations ( $R^2 > 0.95$ ).
- The same three Vaisala AQT530 units were tested both in the field (1<sup>st</sup> stage of testing) and in the laboratory (2<sup>nd</sup> stage of testing).

### Field Evaluation Highlights

- Deployment period 01/14/2022 to 03/25/2022 : the three Vaisala AQT530 sensors showed very strong correlations with the corresponding FRM CO data.
- The units exhibited low intra-model variability and data recovery for CO measurements was ~93-97% from all units.

#### Additional Information

##### Field evaluation report:

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

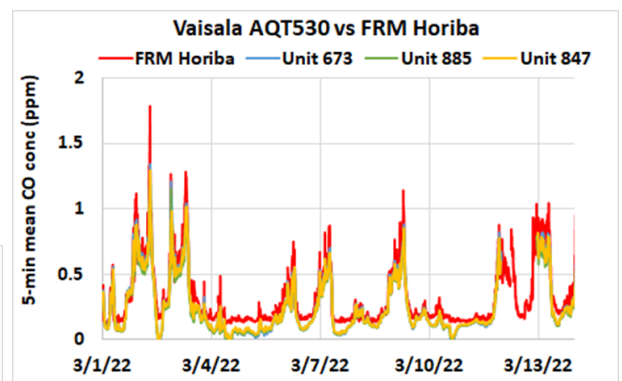
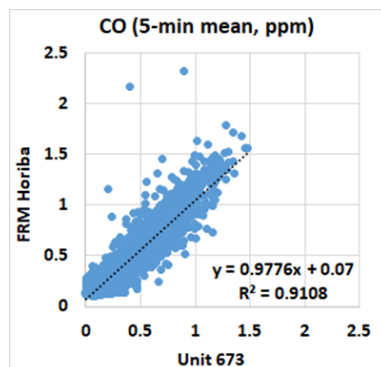
##### Lab evaluation report:

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

##### AQ-SPEC website:

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

5-min mean  
 $0.91 < R^2 < 0.93$



Coefficient of Determination ( $R^2$ ) quantifies how the three sensors followed the CO 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 (CO)

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

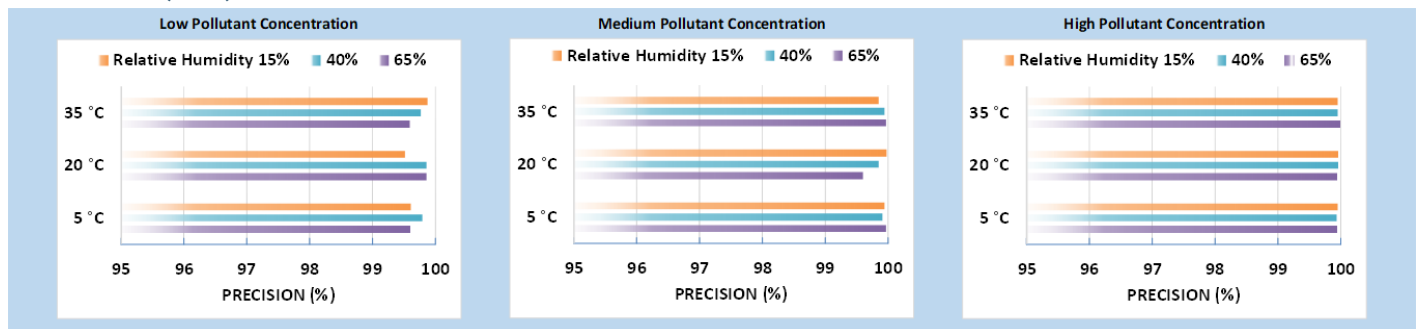
Steady State (#)	Sensor Mean (ppm)	FRM T300U (ppm)	Accuracy (%)
1	1.2	1.1	91.4
2	4.3	4.1	96.3
3	7.3	7.3	99.2

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.

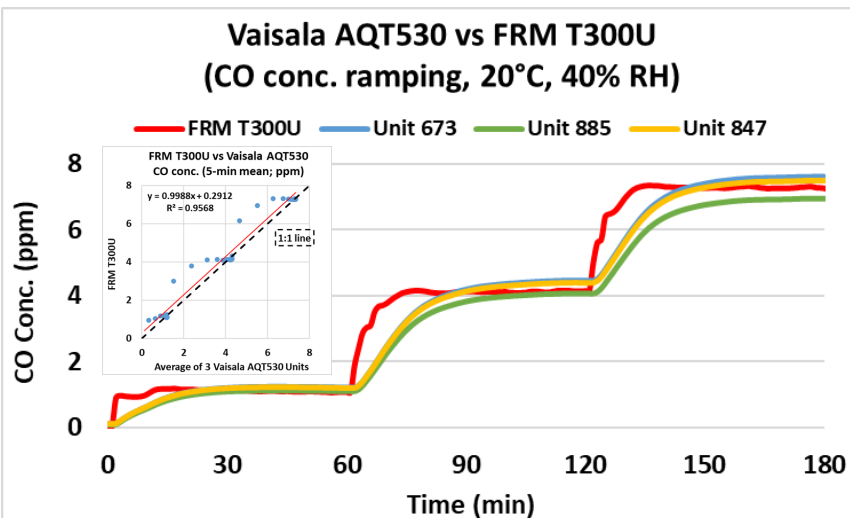


## Precision (CO)



Sensor's ability to generate precise measurements of CO 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% RH) cold and humid (5°C and 65% RH), hot and humid (35°C and 65% RH), or hot and dry (35°C and 15% RH).

## Coefficient of Determination



The Vaisala AQT530 sensors showed very strong correlations with the corresponding FRM T300U CO data ( $R^2 > 0.95$ ) at 20°C and 40% RH.

## Climate Susceptibility

From the laboratory studies, temperature and relative humidity had minimal effect on the precision of CO concentrations as recorded by the Vaisala AQT530 sensors. The sensors' CO reading were higher at higher T.

## Observed Interferents

N/A



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