



# RESET Air Accredited Monitor

Sample Testing Report for  
Passed Monitors

2021.11.09



## Disclosure Statement

This is a report based on internal testing performed based on the RESET Air Standard for Accredited Monitors.

Data and results of this report are not permitted to be released for public viewing unless it has been granted access by RESET.



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# 1. Introduction and Methodology

This is a RESET Air Accredited Monitor – Grade B testing report for the indoor air quality monitoring units, sample monitors.

The monitors were placed in close vicinity and tested for PM<sub>2.5</sub>, TVOC, CO<sub>2</sub>, temperature, and humidity in an ambient indoor environment, and were subjected to fluctuation in readings caused by human activities indoor and air quality changes outdoor. They were placed in the room furthest away from the outdoors and left unperturbed until the end of the testing period. Data accuracy, trend consistency, and the discrepancy between units were evaluated.

The date and time used in the data below are based on China Standard Time.

All tests were performed in Shanghai in the RESET Office Laboratory.

The tests were performed by Stanton Wong.

The report was written by Rico Xi.



## 2. Preparation

- All test monitors and reference monitors were placed next to each other for consistent sampling.
- The door of the office laboratory remained open during testing to allow an overall ambient environment.
- The indoor testing environment is equipped with a central ventilation system. Ventilation lowers the air pollutant concentrations over time even with the door closed.
- An outdoor environment is used to measure the CO<sub>2</sub> baseline.

### Monitors to be Tested

Brand	Product Series	Device No.	Device ID
Sample Brand	Sample Models	No. 1	tstA0000001
		No. 2	tstA0000002
		No. 3	tstA0000003
		No. 4	tstA0000004
		No. 5	tstA0000005

Note: The Sample Models monitors measure the following parameters: PM<sub>2.5</sub>, TVOC, CO<sub>2</sub>, temperature, and humidity.

### Reference Monitors

Brand	Product Series	Testing Parameters	Monitor ID
DST	NANO	TVOC, CO <sub>2</sub> , Temperature, Humidity	rfA0000000
TSI <sup>2</sup>	Q-Trak 7575-x	Temperature, Humidity	—

<sup>1</sup> **Grade B** Certified air quality monitors.

**DST NANO**, used as a backup reference for the TVOC, CO<sub>2</sub> and Temperature and Humidity monitoring tests.

<sup>2</sup> **Grade A** air quality monitors.

**TSI Q-Trak 7575-x**, used as a backup reference for Temperature and Humidity monitoring tests.

### 3. Set up, Testing Procedure, Results, and Analysis

#### 1) PM<sub>2.5</sub> (unit: µg/m<sup>3</sup>)

##### Set Up

- i. Outdoor air was the source of PM<sub>2.5</sub>
- ii. Airsns NANO and TSI DustTrak were used as reference monitors
- iii. Data from Sample Monitors were recorded on Sample Data Platform, and data from Airsns NANO were recorded on QLEAR. Both were averaged over 30-minute intervals, and then extracted to .csv

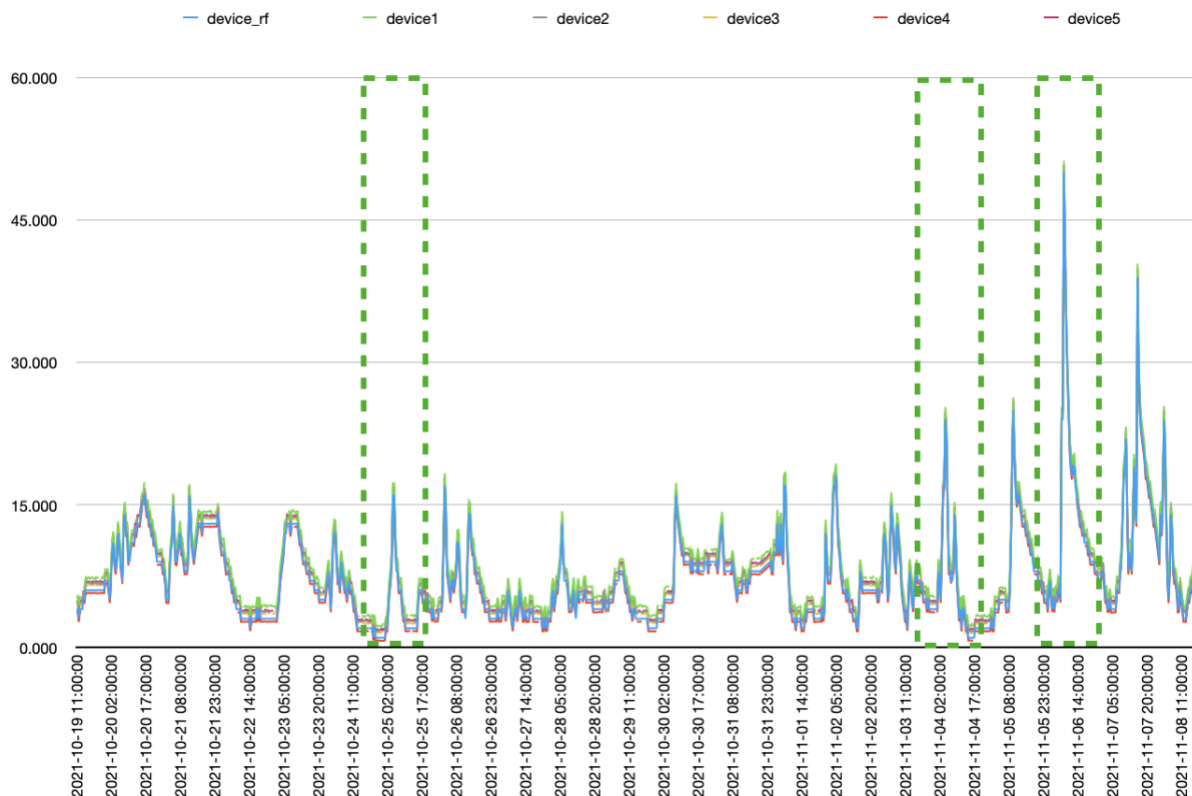
##### Target Accuracy

Below is a table highlighting expected PM<sub>2.5</sub> accuracy for Grade B monitors.

Accuracy	Grade B
0-150	±5 && 15%
150-500	±5 && 20%

#### Results - PM<sub>2.5</sub> Overall

October 19, 2021 – November 8, 2021



Overview of sample monitors and reference Airsns NANO PM<sub>2.5</sub>(blue) readings. Peaks from the following tables are taken from the maxima in the green boxes.

Peak 1 - ug/m3							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-10-25 04:30	16	16.59	17.273	16.656	16.526	15.677	16.804
Percent Difference to Avg			4.05%	0.41%	-0.37%	-5.64%	1.30%
Avg Pass/Fail			PASS	PASS	PASS	PASS	PASS
Percent Difference to Reference			7.65%	4.02%	3.23%	-2.04%	4.90%
Reference Pass/Fail			PASS	PASS	PASS	PASS	PASS

Peak 2 - ug/m3							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-11-04 04:30	24	24.622	25.291	24.764	24.529	23.719	24.809
Percent Difference to Avg			2.68%	0.57%	-0.38%	-3.74%	0.75%
Avg Pass/Fail			PASS	PASS	PASS	PASS	PASS
Percent Difference to Reference			5.24%	3.13%	2.18%	-1.18%	3.31%
Reference Pass/Fail			PASS	PASS	PASS	PASS	PASS

Peak 3 - ug/m3							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-11-06 08:00	50	50.579	51.22	50.657	50.517	49.697	50.805
Percent Difference to Avg			1.26%	0.15%	-0.12%	-1.76%	0.45%
Avg Pass/Fail			PASS	PASS	PASS	PASS	PASS
Percent Difference to Reference			2.41%	1.31%	1.03%	-0.61%	1.60%
Reference Pass/Fail			PASS	PASS	PASS	PASS	PASS

### Description

The peaks occur naturally in the office environment. Higher peaks were caused by outdoor pollution before filtration systems get turned on.

### [Avg] Intra-model Variability

The test monitors all recorded data close to the average and exhibited similar trends.

### [Reference] Reference Comparison

The test monitors recorded data close to the reference monitor and exhibited similar trends comparing to the reference.

### Analysis - PM<sub>2.5</sub>

	No. 1	No. 2	No. 3	No. 4	No. 5
Avg - Trend	PASS	PASS	PASS	PASS	PASS
Avg – Within Range	PASS	PASS	PASS	PASS	PASS
Reference - Trend	PASS	PASS	PASS	PASS	PASS
Reference – Within Range	PASS	PASS	PASS	PASS	PASS

#### **[Avg] Intra-model Variability**

The test monitors performed well for PM<sub>2.5</sub> in regard to intra-model variability, recording values and trends that are consistent to each other.

#### **[Reference] Reference Comparison**

The test monitors performed well for PM<sub>2.5</sub> in regard to reference comparison, recording values and trends that are similar to the reference.



## 2) TVOC (unit: ppb)

### Set Up

- i. Office air was the source of TVOC
- ii. Airsns NANO and TSI DustTrak were used as reference monitors
- iii. Data from Sample Monitors were recorded on Sample Data Platform, and data from Airsns NANO were recorded on QLEAR. Both were averaged over 30-minute intervals, and then extracted to .csv

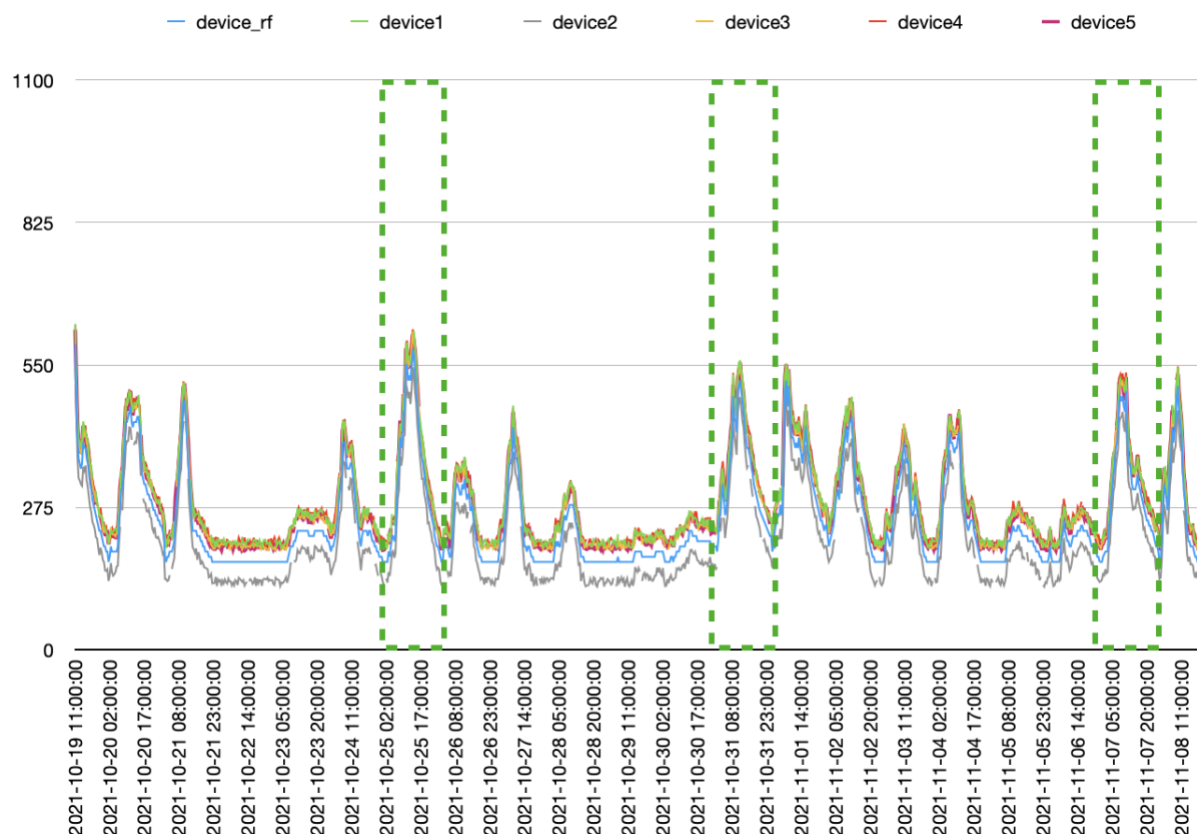
### Target

Below is a table highlighting expected TVOC accuracy for Grade B monitors.

Accuracy (ppb)	Grade B
65-260	±8.7 && 15%
440 - 2180	±8.7 && 20%

### Results - TVOC Overall

October 19, 2021 – November 8, 2021



Overview of sample monitors and reference Airsns NANO TVOC(blue) readings. Peaks from the following tables are taken from the maxima in the green boxes.

Peak 1 - ppb							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-10-25 14:00	570	588.67	614.574	529.756	596.804	608.097	594.119
Percent Difference to Avg			4.31%	-10.54%	1.37%	3.25%	0.92%
Avg Pass/Fail			PASS	PASS	PASS	PASS	PASS
Percent Difference to Reference			7.53%	-7.32%	4.59%	6.47%	4.14%
Reference Pass/Fail			PASS	PASS	PASS	PASS	PASS

Peak 2 - ppb							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-10-31 11:30	520	541.63	558.992	487.966	557.65	548.761	554.793
Percent Difference to Avg			3.15%	-10.42%	2.91%	1.31%	2.40%
Avg Pass/Fail			PASS	PASS	PASS	PASS	PASS
Percent Difference to Reference			7.23%	-6.36%	6.99%	5.38%	6.47%
Reference Pass/Fail			PASS	PASS	PASS	PASS	PASS

Peak 3 - ppb							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-11-07 11:00	500	515.62	527.208	464.316	523.978	535.729	526.849
Percent Difference to Avg			2.22%	-10.47%	1.61%	3.83%	2.16%
Avg Pass/Fail			PASS	PASS	PASS	PASS	PASS
Percent Difference to Reference			5.30%	-7.40%	4.68%	6.90%	5.23%
Reference Pass/Fail			PASS	PASS	PASS	PASS	PASS

### Description

Spikes occur after the coffee machine is cleaned in the connected space next door.

### [Avg] Intra-model Variability

The test monitors all recorded data close to the average and exhibited similar trends.

### [Reference] Reference Comparison

The test monitors recorded data close to the reference monitor and exhibited similar trends comparing to the reference.

## Analysis - TVOC

	No. 1	No. 2	No. 3	No. 4	No. 5
Avg - Trend	PASS	PASS	PASS	PASS	PASS
Avg – Within Range	PASS	PASS	PASS	PASS	PASS
Reference - Trend	PASS	PASS	PASS	PASS	PASS
Reference – Within Range	PASS	PASS	PASS	PASS	PASS

### **[Avg] Intra-model Variability**

The test monitors performed well for TVOC in regard to intra-model variability, recording values and trends that are consistent to each other.

### **[Reference] Reference Comparison**

The test monitors performed well for TVOC in regard to reference comparison, recording values and trends that are similar to the reference.

### 3) CO<sub>2</sub> (unit: ppm)

#### Set Up

- i. CO<sub>2</sub> was naturally generated in the office
- ii. Airsns NANO was used as a reference monitor
- iii. Data from Sample Monitors were recorded on Sample Data Platform, and data from Airsns NANO were recorded on QLEAR. Both were averaged over 30-minute intervals, and then extracted to .csv

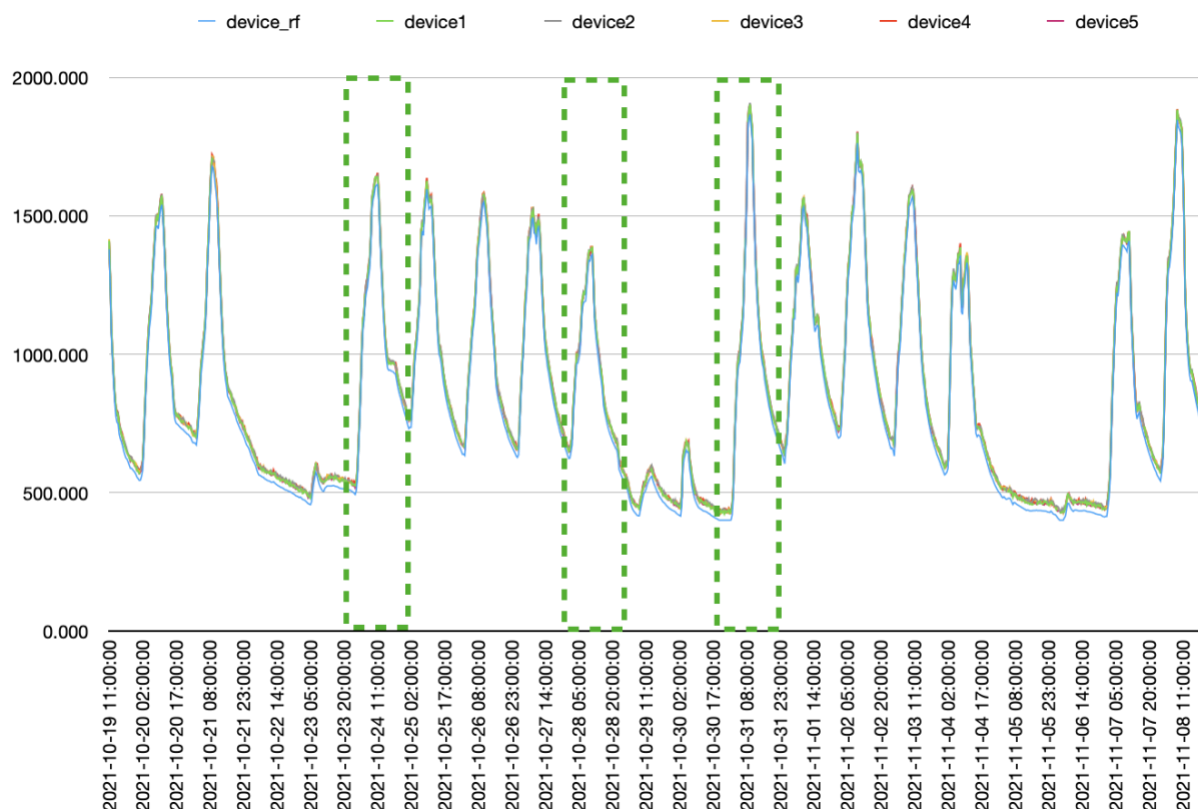
#### Target

Below is a table highlighting expected CO<sub>2</sub> accuracy for Grade B monitors.

Accuracy	Grade B
400-2000	±50 && 3%
2000-5000	±50 && 5%

#### Results - CO<sub>2</sub> Overall

October 19, 2021 – November 8, 2021



Overview of sample monitors and reference Airsns NANO CO<sub>2</sub> (blue) readings. Peaks from the following tables are taken from the maxima in the green boxes.

Peak 1 - ppm							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-10-24 11:00	1613	1644.1	1639.45	1645.31	1640.5	1655.49	1639.63
Percent Difference to Avg			-0.28%	0.08%	-0.22%	0.69%	-0.27%
Avg Pass/Fail			PASS	PASS	PASS	PASS	PASS
Percent Difference to Reference			1.63%	1.98%	1.69%	2.60%	1.64%
Reference Pass/Fail			PASS	PASS	PASS	PASS	PASS

Peak 2 - ppm							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-10-31 09:30	1867	1899.6	1902.41	1908.16	1895.36	1900.58	1891.59
Percent Difference to Avg			0.15%	0.45%	-0.22%	0.05%	-0.42%
Avg Pass/Fail			PASS	PASS	PASS	PASS	PASS
Percent Difference to Reference			1.88%	2.18%	1.51%	1.78%	1.31%
Reference Pass/Fail			PASS	PASS	PASS	PASS	PASS

Peak 3 - ppm							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-10-28 10:30	1355	1384	1378.64	1384.4	1387.14	1391.25	1378.33
Percent Difference to Avg			-0.38%	0.03%	0.23%	0.53%	-0.41%
Avg Pass/Fail			PASS	PASS	PASS	PASS	PASS
Percent Difference to Reference			1.73%	2.15%	2.34%	2.64%	1.71%
Reference Pass/Fail			PASS	PASS	PASS	PASS	PASS

### Description

All peaks were caused by regular use of the office space next to the testing space without the fresh air system turned on.

### [Avg] Intra-model Variability

The test monitors recorded data within range of each other. All of them showed similar trends.

### [Reference] Reference Comparison

The test monitors recorded data similar in values when compared with the reference monitor. Data trends from the test monitors were similar to that of the reference.

## Analysis - CO<sub>2</sub>

	No. 1	No. 2	No. 3	No. 4	No. 5
Avg - Trend	PASS	PASS	PASS	PASS	PASS
Avg – Within Range	PASS	PASS	PASS	PASS	PASS
Reference - Trend	PASS	PASS	PASS	PASS	PASS
Reference – Within Range	PASS	PASS	PASS	PASS	PASS

### **[Avg] Intra-model Variability**

The test monitors performed well for CO<sub>2</sub> in regard to intra-model variability, recording values and trends that are consistent to each other.

### **[Reference] Reference Comparison**

The test monitors performed well for CO<sub>2</sub> in regard to reference comparison, recording values and trends that are similar to the reference.

#### 4) Temperature (unit: °C)

##### Set Up

- i. The testing chamber was subject to ambient temperature fluctuation
- ii. Airsns NANO was used as a reference monitor
- iii. Data from Sample Monitors were recorded on Sample Data Platform, and data from Airsns NANO were recorded on QLEAR. Both were averaged over 30-minute intervals, and then extracted to .csv

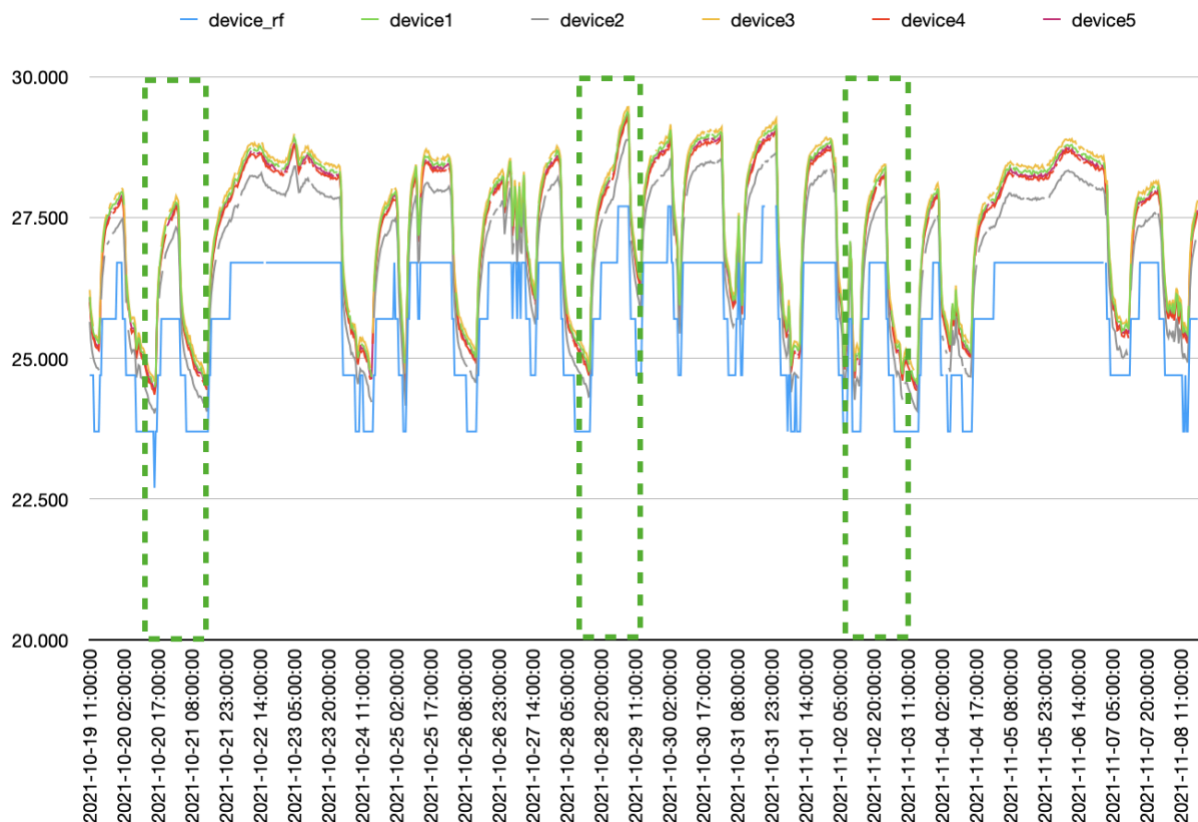
##### Target

Below is a table highlighting expected temperature accuracy for Grade B monitors.

	<b>Grade B</b>
<b>Accuracy</b>	$\pm 1$

#### Results - Temperature Overall

October 19, 2021 – November 8, 2021



Overview of sample monitors and reference Airsns NANO temperature(blue) readings. Peaks from the following tables are taken from the maxima in the green boxes.

Peak 1 - °C							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-10-21 01:00	25.70	27.68	27.768	27.329	27.885	27.679	27.736
Difference to Avg			0.09	-0.35	0.21	0.00	0.06
Difference to Reference			2.07	1.63	2.19	1.98	2.04

Peak 2 - °C							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-10-29 07:30	27.70	29.26	29.371	28.88	29.462	29.275	29.329
Difference to Avg			0.11	-0.38	0.20	0.01	0.07
Difference to Reference			1.67	1.18	1.76	1.58	1.63

Peak 3 - °C							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-11-03 01:00	26.70	28.25	28.387	27.888	28.442	28.228	28.315
Difference to Avg			0.13	-0.36	0.19	-0.02	0.06
Difference to Reference			1.69	1.19	1.74	1.53	1.62

### Description

The peaks occurred naturally due to office temperature fluctuation with no additional disturbance.

### [Avg] Intra-model Variability

All temperature data recorded from the test monitors were consistent with each other and fit in the criteria of Grade B monitors.

### [Reference] Reference Comparison

The trend of the five monitors were consistent with the trend of the reference monitor, but the test monitor readings are slightly higher by approximately 1-2°C when compared with the reference.



## Analysis - Temperature

	No. 1	No. 2	No. 3	No. 4	No. 5
Avg - Trend	PASS	PASS	PASS	PASS	PASS
Avg – Within Range	PASS	PASS	PASS	PASS	PASS
Reference - Trend	PASS	PASS	PASS	PASS	PASS
Reference – Within Range	FAIL	FAIL	FAIL	FAIL	FAIL

### [Avg] Intra-model Variability

The test monitors performed well for temperature in regard to intra-model variability, recording values and trends that are consistent to each other.

### [Reference] Reference Comparison

The test monitors performed well for temperature in regard to reference comparison, recording trends similar to the reference. Values recorded are slightly higher than expected.

## 5) Humidity (unit: %RH)

### Set Up

- i. The testing chamber was subject to ambient humidity fluctuation
- ii. Airsns NANO was used as a reference monitor
- iii. Data from Sample Monitors were recorded on Sample Data Platform, and data from Airsns NANO were recorded on QLEAR. Both were averaged over 30-minute intervals, and then extracted to .csv

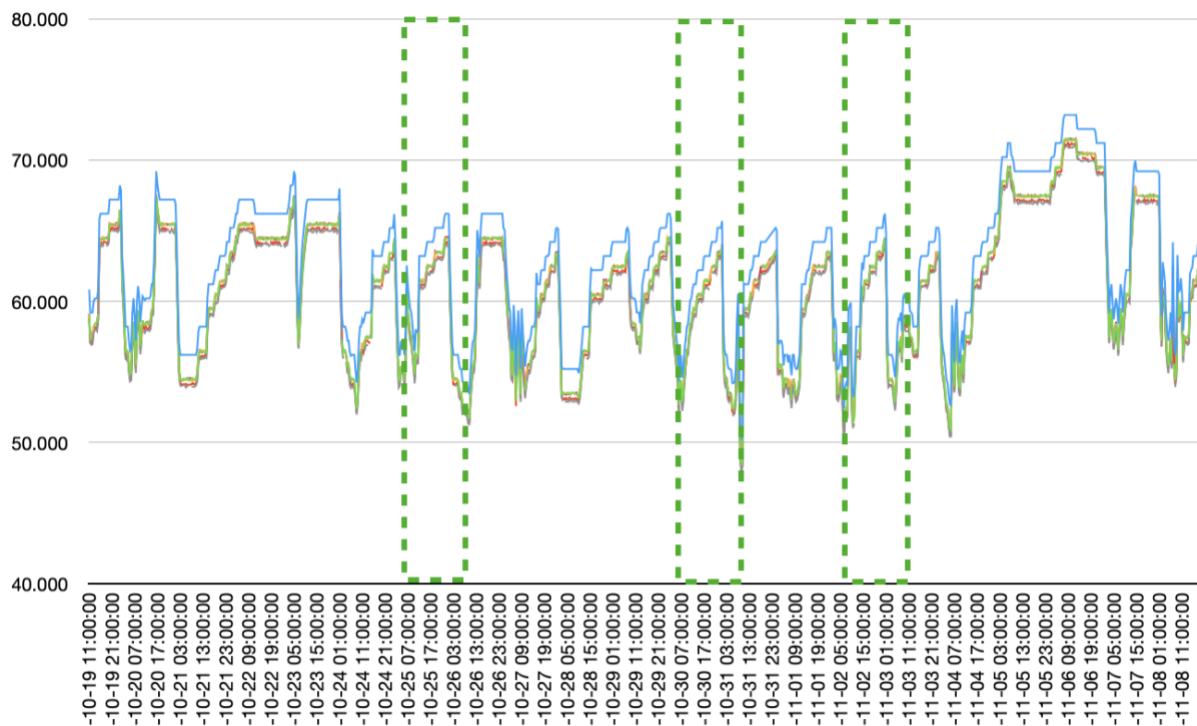
### Target

Below is a table highlighting expected relative humidity accuracy for Grade B monitors.

	<b>Grade B</b>
<b>Accuracy</b>	$\pm 8\%$

### Results - Humidity Overall

August 30, 2021 – September 14, 2021



Overview of sample monitors and reference Airsns NANO temperature(blue) readings. Peaks from the following tables are taken from the maxima in the green boxes.

Peak 1 - %RH							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-10-25 23:30	66.20	64.306	64.449	64.016	64.496	64.014	64.554
Percent Difference to Avg			0.22%	-0.45%	0.30%	-0.45%	0.39%
Percent Difference to Reference			-2.68%	-3.35%	-2.61%	-3.36%	-2.52%

Peak 2 - %RH							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-10-31 01:00	65.68	63.772	63.889	63.54	63.874	63.531	64.024
Percent Difference to Avg			0.18%	-0.36%	0.16%	-0.38%	0.40%
Percent Difference to Reference			-2.76%	-3.31%	-2.79%	-3.33%	-2.55%

Peak 3 - %RH							
Time	Reference	Avg	No.1	No.2	No.3	No.4	No.5
2021-11-03 00:30	66.20	64.299	64.459	64.033	64.357	64.151	64.496
Percent Difference to Avg			0.25%	-0.41%	0.09%	-0.23%	0.31%
Percent Difference to Reference			-2.66%	-3.33%	-2.82%	-3.14%	-2.61%

### Description

Peaks occurred naturally due to ambient humidity fluctuation with no additional disturbance.

### [Avg] Intra-model Variability

The monitors being tested all had similar trends and were well within the expected range of each other.

### [Reference] Reference Comparison

The trends of the five test monitors were consistent with that of the reference monitor and the readings were slightly higher, but within the expected range for accuracy.

### Analysis - Humidity

	No. 1	No. 2	No. 3	No. 4	No. 5
Avg - Trend	PASS	PASS	PASS	PASS	PASS
Avg – Within Range	PASS	PASS	PASS	PASS	PASS
Reference - Trend	PASS	PASS	PASS	PASS	PASS
Reference – Within Range	PASS	PASS	PASS	PASS	PASS

#### [Avg] Intra-model Variability

The test monitors performed well for relative humidity in regard to intra-model variability, recording values and trends that are consistent to each other.

#### [Reference] Reference Comparison

The test monitors performed well for relative humidity in regard to reference comparison, recording values and trends that are similar to the reference. Values recorded are slightly lower than expected.

## 4. Results and Conclusions

<b>PM<sub>2.5</sub></b>	No. 1	No. 2	No. 3	No. 4	No. 5
Avg - Trend	PASS	PASS	PASS	PASS	PASS
Avg – Within Range	PASS	PASS	PASS	PASS	PASS
Reference - Trend	PASS	PASS	PASS	PASS	PASS
Reference – Within Range	PASS	PASS	PASS	PASS	PASS

<b>TVOC</b>	No. 1	No. 2	No. 3	No. 4	No. 5
Avg - Trend	PASS	PASS	PASS	PASS	PASS
Avg – Within Range	PASS	PASS	PASS	PASS	PASS
Reference - Trend	PASS	PASS	PASS	PASS	PASS
Reference – Within Range	PASS	PASS	PASS	PASS	PASS

<b>CO<sub>2</sub></b>	No. 1	No. 2	No. 3	No. 4	No. 5
Avg - Trend	PASS	PASS	PASS	PASS	PASS
Avg – Within Range	PASS	PASS	PASS	PASS	PASS
Reference - Trend	PASS	PASS	PASS	PASS	PASS
Reference – Within Range	PASS	PASS	PASS	PASS	PASS

<b>Temperature</b>	No. 1	No. 2	No. 3	No. 4	No. 5
Avg - Trend	PASS	PASS	PASS	PASS	PASS
Avg – Within Range	PASS	PASS	PASS	PASS	PASS
Reference - Trend	PASS	PASS	PASS	PASS	PASS
Reference – Within Range	FAIL	FAIL	FAIL	FAIL	FAIL

<b>Relative Humidity</b>	No. 1	No. 2	No. 3	No. 4	No. 5
Avg - Trend	PASS	PASS	PASS	PASS	PASS
Avg – Within Range	PASS	PASS	PASS	PASS	PASS
Reference - Trend	PASS	PASS	PASS	PASS	PASS
Reference – Within Range	PASS	PASS	PASS	PASS	PASS

*(Temperature and humidity are relatively less important than the other parameters for the purposes of RESET Air Project Certification.)*

### **PM<sub>2.5</sub>**

The Sample Monitors were consistent in measuring PM<sub>2.5</sub> levels. Data recorded were within range of each other and the reference. Trends recorded were clear to interpret, consistent across models, and similar to the reference.

### **TVOC**

The Sample Monitors were consistent in measuring TVOC levels. Data recorded were within range of each other and the reference. Trends recorded were clear to interpret, consistent across models, and similar to the reference. Only one model deviated slightly more from the average than the test monitors.

### **CO<sub>2</sub>**

The Sample Monitors were consistent in measuring CO<sub>2</sub> levels. Data recorded were within range of each other and the reference. Trends recorded were clear to interpret, consistent across models, and similar to the reference.

### **Temperature**

The Sample Monitors were consistent in measuring CO<sub>2</sub> levels. Data recorded were within range of each other. Trends recorded were clear to interpret, consistent across models, and similar to the reference. The test monitor readings are slightly higher than expected when compared with the reference. This is not critical and can be fixed by a calibration.

### **Relative Humidity**

The Sample Monitors were consistent in measuring relative humidity levels. Data recorded were within range of each other and the reference. Trends recorded were clear to interpret, consistent across models, and similar to the reference.

### **Final Thoughts**

The Sample Monitors do **PASS** the RESET Accredited Monitor requirements for Grade B in regards to the following measured parameters: PM<sub>2.5</sub>, TVOC, CO<sub>2</sub>.