



## ON/OFF Correlation Tests

The purpose of this test is to determine the time needed to obtain representative readings in a one-shot mode, or to use the PMS5003 in an alternate matter. For this, two kits V2.0 are used with several PM Boards and **one** PMS5003 connected to each of them. One of them is set in a continuous operation mode, while the other operates in on/off mode with different on-times.

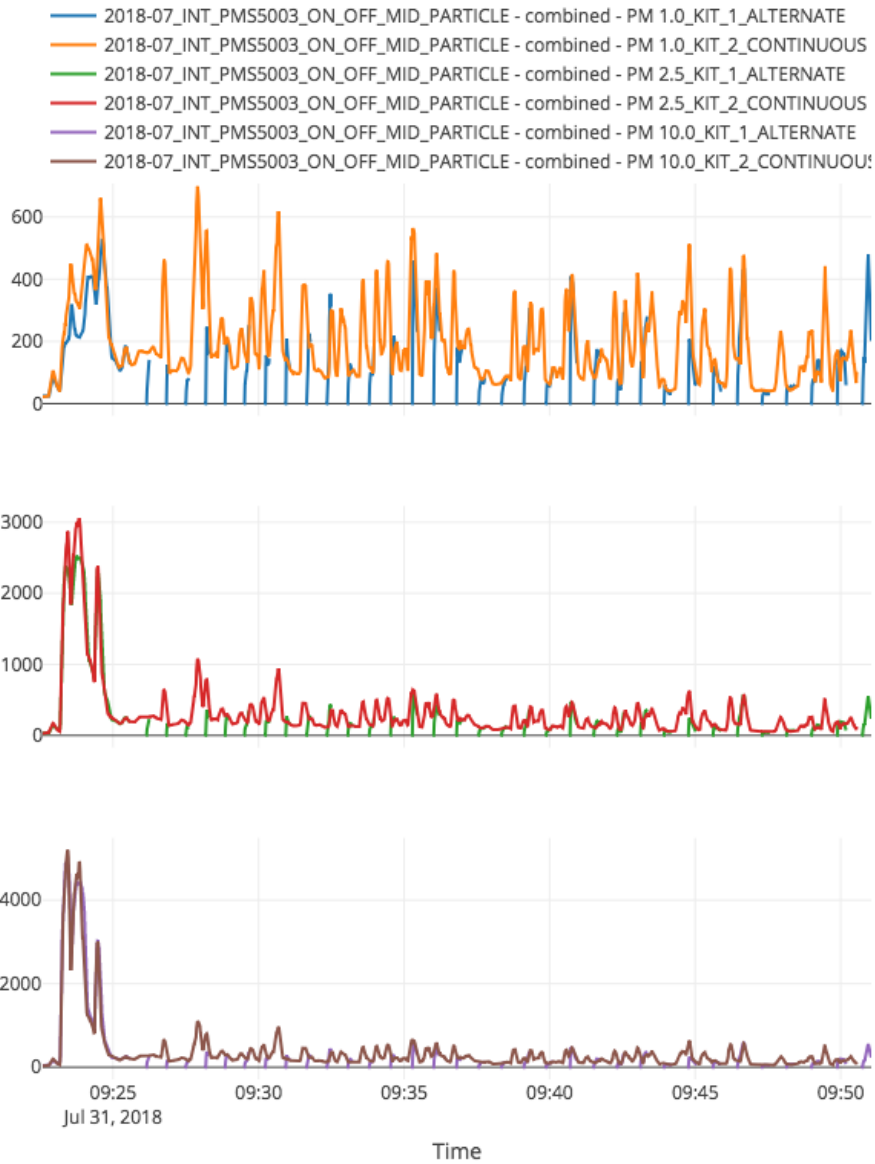
### TESTS:

- 2018-07\_INT\_PMS5003\_ON\_OFF\_LOW\_PARTICLE: 30min logging with normal ambient air
- 2018-07\_INT\_PMS5003\_ON\_OFF\_MID\_PARTICLE: 30min logging with a particle generator under the sensors

## Results

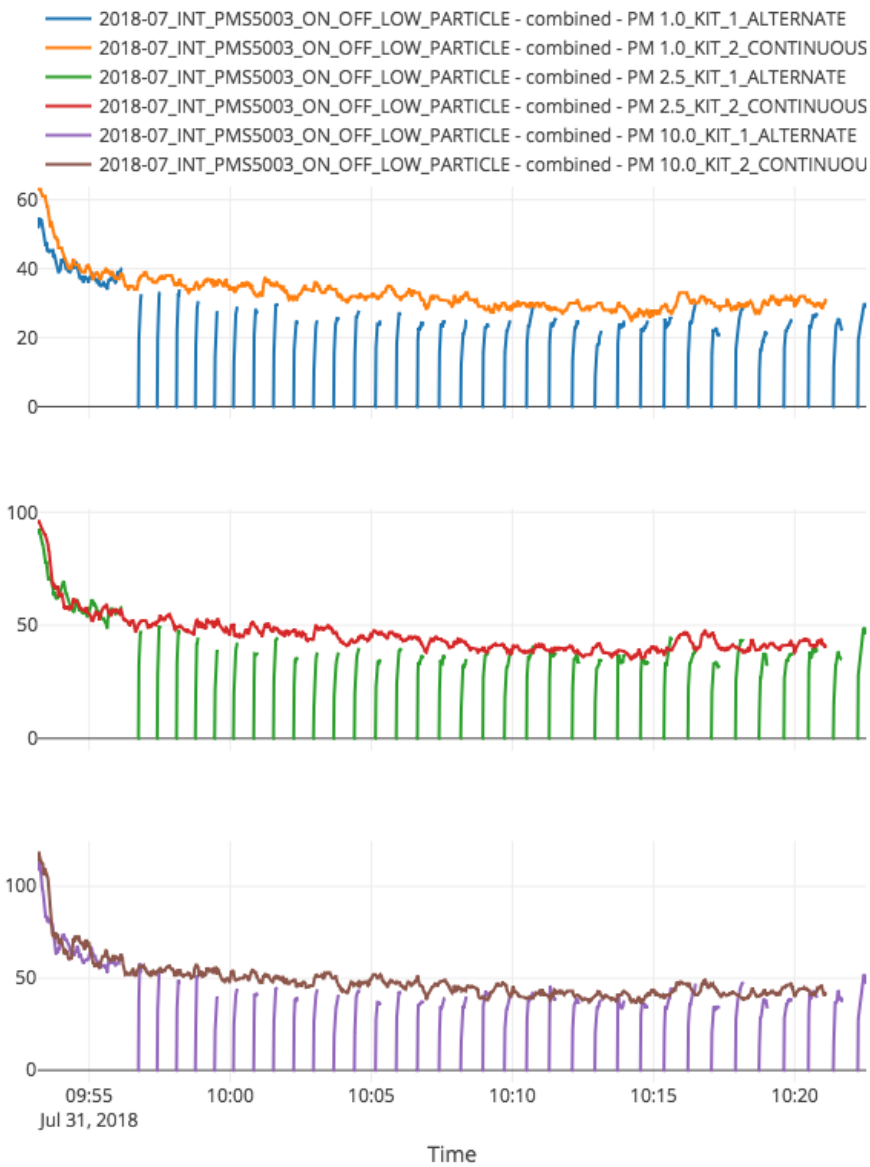
### 2018-07\_INT\_PMS5003\_ON\_OFF\_MID\_PARTICLE

- 30min logging with a particle generator under the sensors. Initial 3min in stabilised conditions. Below are PM1, PM2.5 and PM10 for each PMS



**2018-07\_INT\_PMS5003\_ON\_OFF\_LOW\_PARTICLE**

- 30min logging with normal ambient air. Initial 3min in stabilised conditions. Below are PM1, PM2.5 and PM10 for each PMS



### Target errors

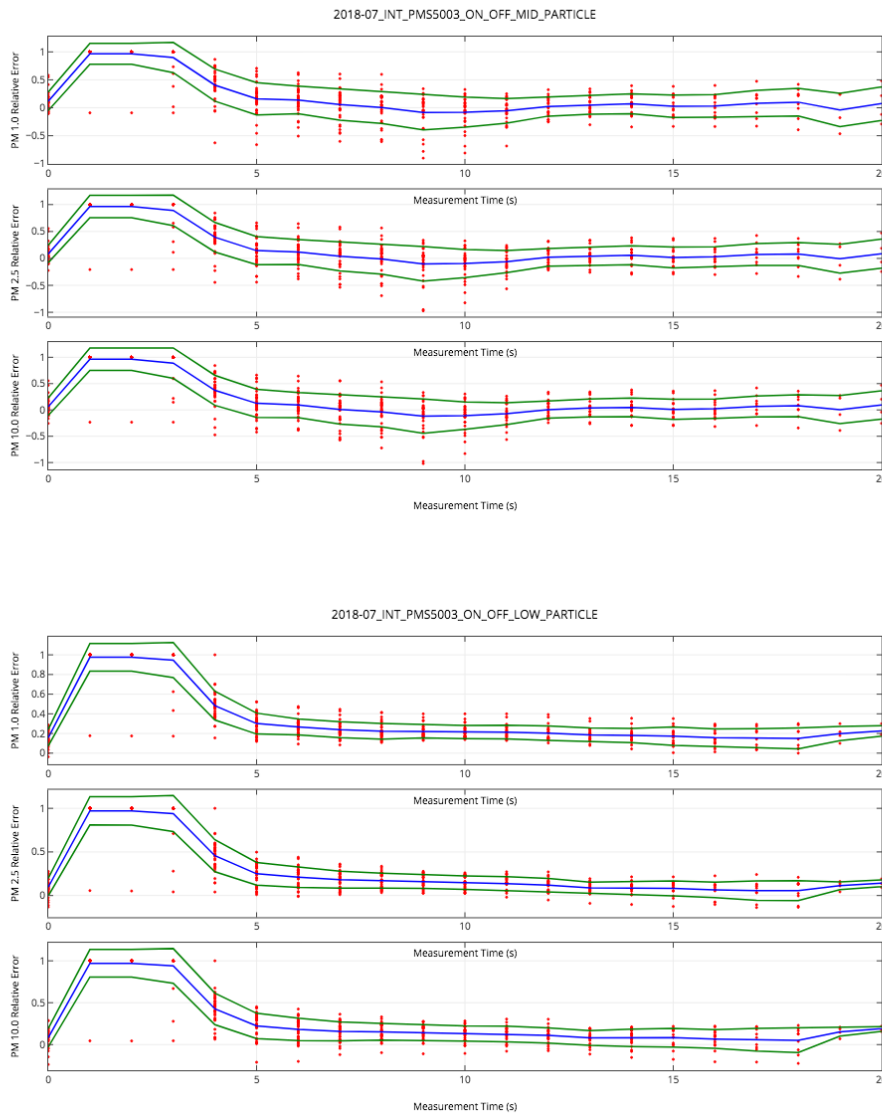
The initial 3min are used to determine target errors on the stabilisation phase. For each dataset, they are below:

	<b>High PN</b>	<b>Average</b>	<b>Std Deviation</b>
Relative_error_PM 1.0		0.15	0.17
Relative_error_PM 2.5		-0.02	0.16
Relative_error_PM 10.0		-0.10	0.20

	<b>Low PN</b>	<b>Average</b>	<b>Std Deviation</b>
Relative_error_PM 1.0	1.0	0.07	0.07
Relative_error_PM 2.5	2.5	0.01	0.07
Relative_error_PM 10.0	10.0	0.04	0.08

## Measurement iterations

The measurement errors are plotted below, versus the wake up time.



Assuming a confidence interval of 95%, the target value for the measurement mean is  $(\mu - \sigma < \mu < \mu + \sigma)$  and the values for each period are extracted from the plots above:

<b>Target Time</b>	<b>Low PN</b>	<b>High PN</b>
PM 1.0	15s	4s
PM 2.5	15s	5s
PM 10.0	12s	5s

## Conclusion

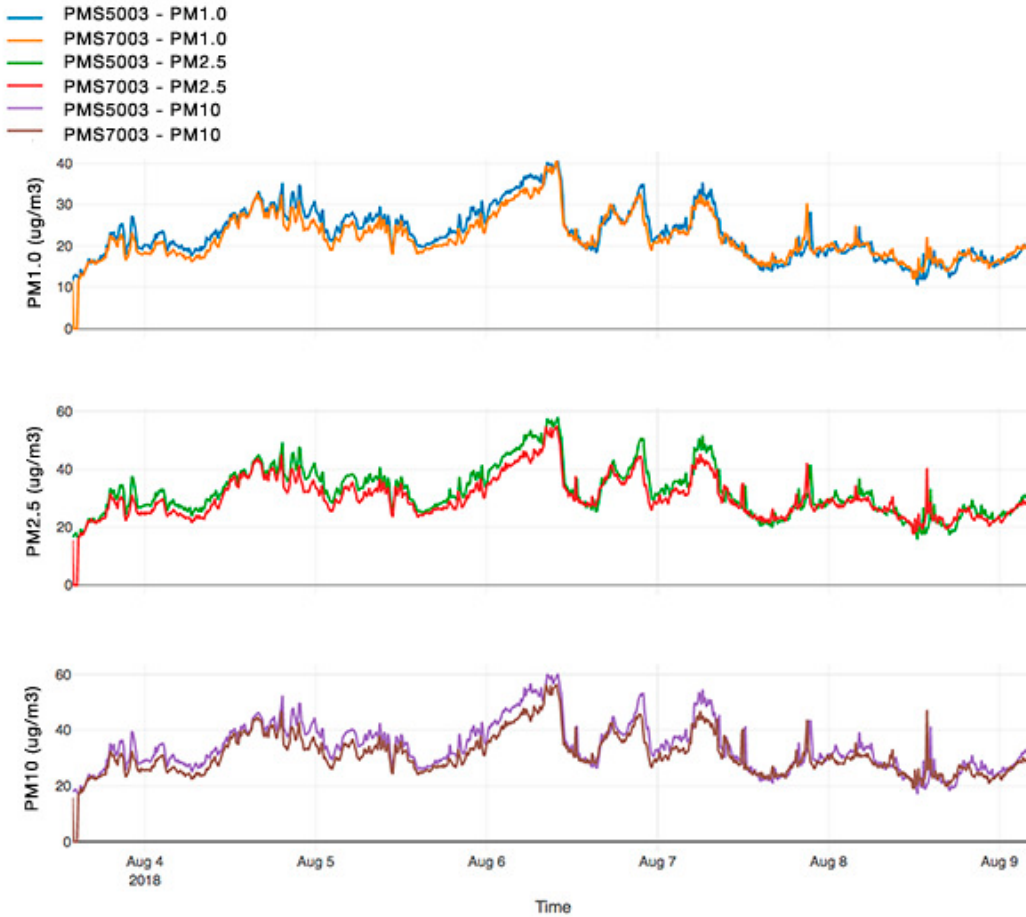
1. Although the PMS has a faster response at high PN, the variability and the measurement averages are

higher as well. **This can also be due to the measurement method uncertainty**

2. For low PN, the time required for stabilisation is between 12s and 15s, to achieve a level of 95% confidence with respect to that of stabilised levels
3. The target time should be 15s, although lower values could be considered down to 12s if there are battery concerns

## 7003 vs 5003 Correlation Tests

Tests were conducted over two weeks in Barcelona in order to compare both, PlanTower PMS7003 and PMS5003. Results are shown before for normal urban environment levels of exposure:



In all three tests, the results show a great level of correlation between the two sensors. The lower levels in the RMSE are likely to be due to the sensor casing, rather than the sensors themselves:

	Average Level	RMSE	R2
PM 1.0	13.89	2.34	0.90
PM 2.5	19.40	3.78	0.88
PM 10.0	20.49	4.43	0.85