

Analysis Report



Data

Test name:

2019-10_EXT_ISGLOBAL_30_kits_OCT

Number of devices tested:

30

Test dates:

2019-10-01 02:00:00+02:00 - 2019-10-08 02:00:00+02:00

Test author(s):

Óscar González - Victor Barberán

Disclaimer

The methods used in this analysis are subject to the low amount of devices tested, and in general, a *common sense* approach is applied. This means that the plots indicate only trends and highlight some (but not all) potential faulty devices.

Below, the confidence intervals used are those of the normal distribution (meaningful for sample numbers >30) and of the t-student distribution.

Conclusions are derived by analysing the data further and testing the devices for longer periods if needed. Please, also note that statistical significance cannot be inferred from these amounts of devices, so some assumptions for normality have to be accepted. Comments and further discussion are always welcome.

Finally, the individual sensors components integrated in the Smart Citizen hardware have their own accuracies and dispersions, for which Smart Citizen cannot assume any liability other than trying to work with the most appropriate selection. The tests we perform are aimed to determine and assume any failures in the sensors and their integration within the Smart Citizen hardware. For more information, please check the [official documentation](#) and the datasheets of each of the sensors.

Warnings

All devices show similar amounts of data. No data loss concern

Conclusions

- Three dubious PM sensor was replaced and tested for longer (07/10/2019) - 10167, 10173, 10174

Device 10142 is not replaced (<2% RH error)

Time Series Plots

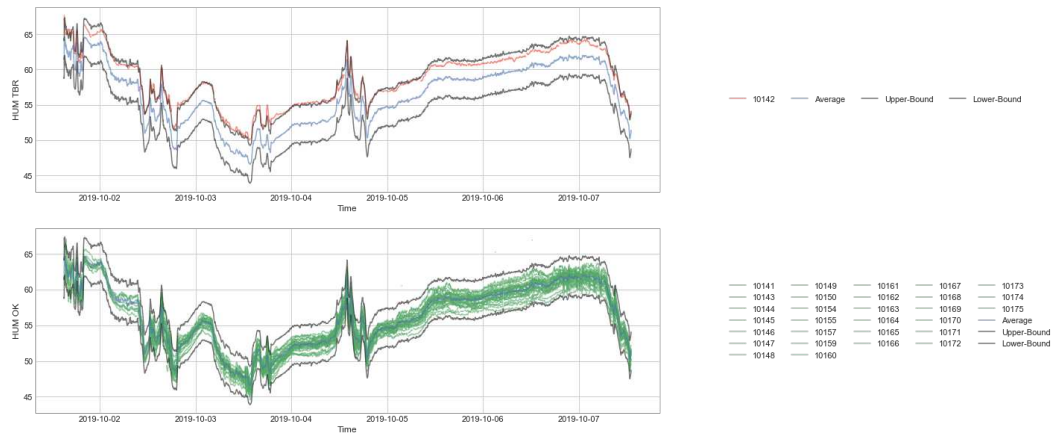
Min Date available: 2019-10-01

Max Date available: 2019-10-08

(1/10) - HUM

Using t-student Distribution

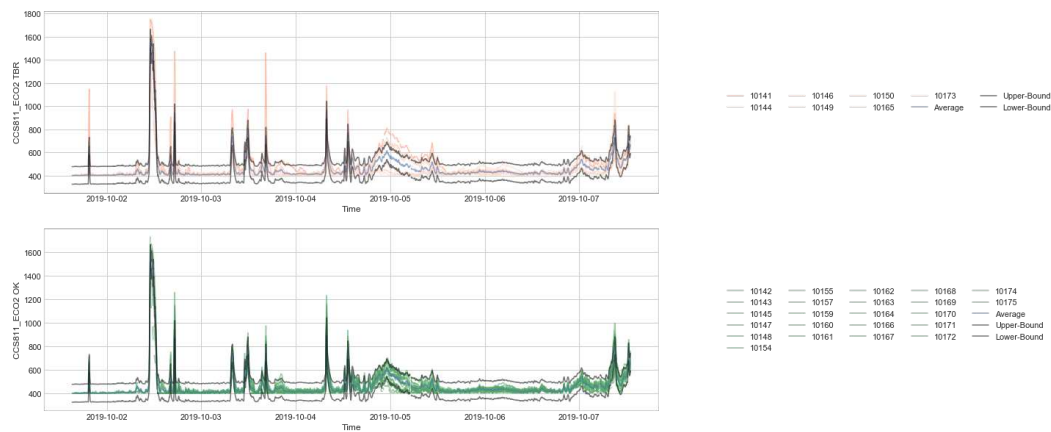
WARNING: Device 10142 out of 5% limit - 30.7% out



(2/10) - CCS811_ECO2

Using t-student Distribution

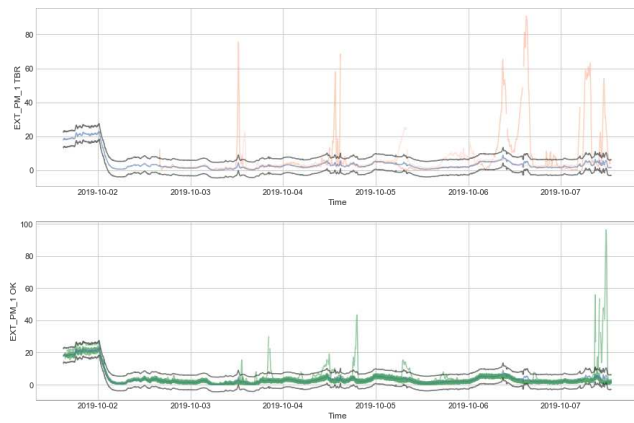
WARNING: Device 10141 out of 5% limit - 17.8% out
WARNING: Device 10144 out of 5% limit - 5.6% out
WARNING: Device 10146 out of 5% limit - 10.4% out
WARNING: Device 10149 out of 5% limit - 8.2% out
WARNING: Device 10150 out of 5% limit - 10.4% out
WARNING: Device 10165 out of 5% limit - 7.6% out
WARNING: Device 10173 out of 5% limit - 7.7% out



(3/10) - EXT_PM_1

Using t-student Distribution

WARNING: Device 10167 out of 5% limit - 13.5% out
WARNING: Device 10173 out of 5% limit - 7.1% out

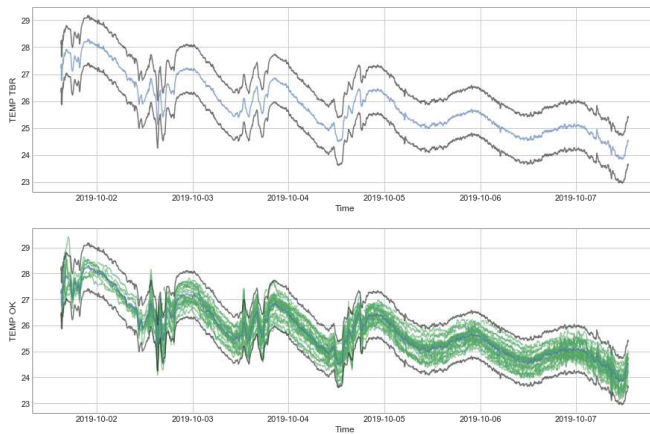


10167 10173 Average Upper-Bound Lower-Bound

10141 10148 10159 10165 10172
 10142 10149 10160 10166 10174
 10143 10150 10161 10168 10175
 10144 10154 10162 10169 Average
 10145 10155 10163 10170 Upper-Bound
 10146 10157 10164 10171 Lower-Bound
 10147

(4/10) - TEMP

Using t-student Distribution



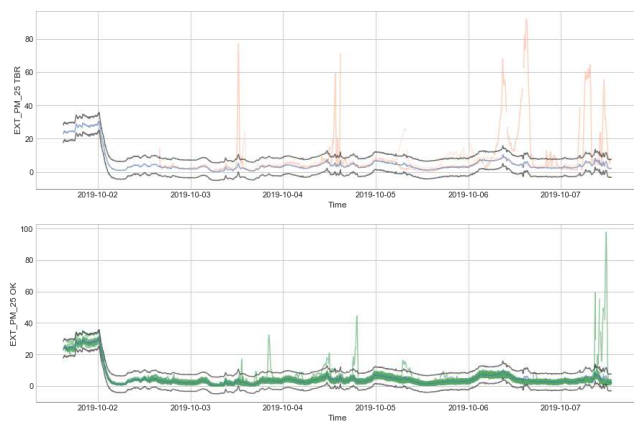
Average Upper-Bound Lower-Bound

10141 10148 10160 10167 10173
 10142 10149 10161 10168 10174
 10143 10150 10162 10169 10175
 10144 10154 10163 10170 Average
 10145 10155 10164 10171 Upper-Bound
 10146 10157 10165 10172 Lower-Bound
 10147 10159 10166

(5/10) - EXT_PM_25

Using t-student Distribution

WARNING: Device 10167 out of 5% limit - 13.3% out
 WARNING: Device 10173 out of 5% limit - 6.8% out



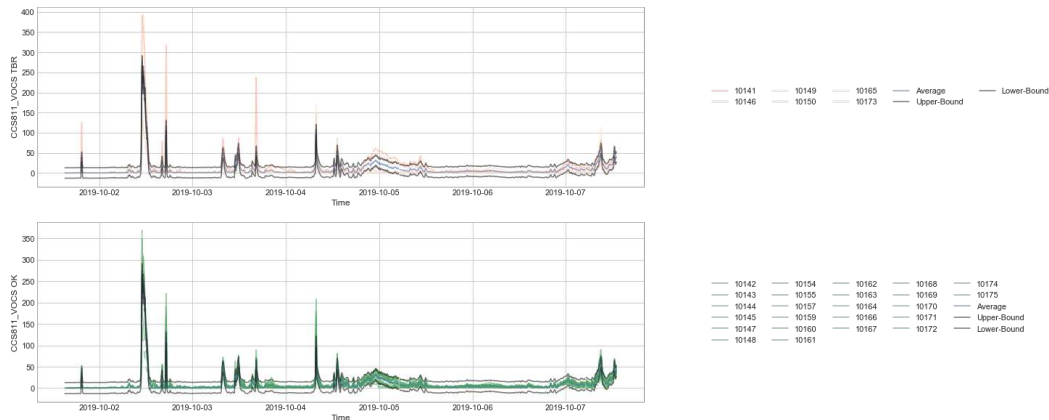
10167 10173 Average Upper-Bound Lower-Bound

10141 10148 10159 10165 10172
 10142 10149 10160 10166 10174
 10143 10150 10161 10168 10175
 10144 10154 10162 10169 Average
 10145 10155 10163 10170 Upper-Bound
 10146 10157 10164 10171 Lower-Bound
 10147

(6/10) - CCS811_VOCS

Using t-student Distribution

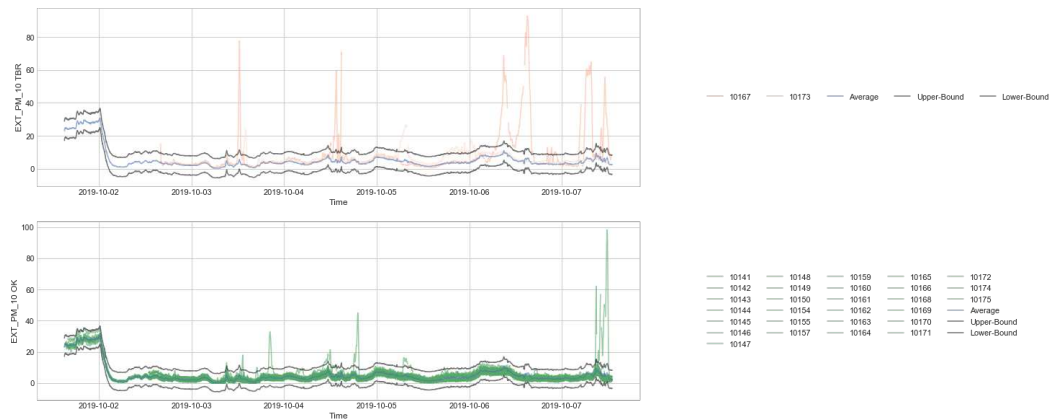
WARNING: Device 10141 out of 5% limit - 16.0% out
 WARNING: Device 10146 out of 5% limit - 8.9% out
 WARNING: Device 10149 out of 5% limit - 5.9% out
 WARNING: Device 10150 out of 5% limit - 8.3% out
 WARNING: Device 10165 out of 5% limit - 6.2% out
 WARNING: Device 10173 out of 5% limit - 6.9% out



(7/10) - EXT_PM_10

Using t-student Distribution

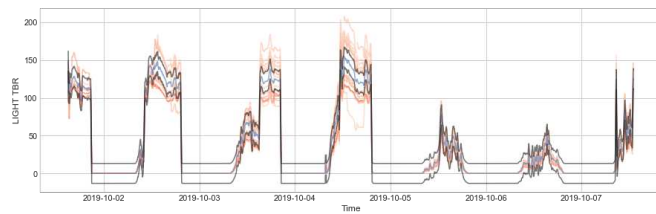
WARNING: Device 10167 out of 5% limit - 13.1% out
 WARNING: Device 10173 out of 5% limit - 6.5% out



(8/10) - LIGHT

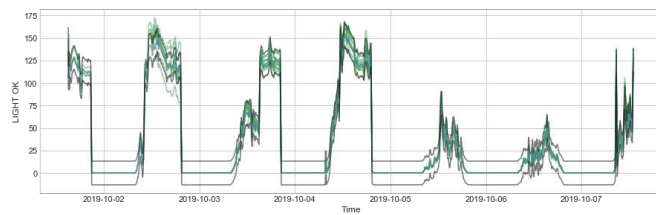
Using t-student Distribution

WARNING: Device 10141 out of 5% limit - 23.9% out
 WARNING: Device 10142 out of 5% limit - 16.9% out
 WARNING: Device 10143 out of 5% limit - 9.8% out
 WARNING: Device 10145 out of 5% limit - 12.4% out
 WARNING: Device 10146 out of 5% limit - 22.6% out
 WARNING: Device 10150 out of 5% limit - 18.2% out
 WARNING: Device 10161 out of 5% limit - 6.3% out
 WARNING: Device 10162 out of 5% limit - 12.4% out
 WARNING: Device 10163 out of 5% limit - 10.2% out
 WARNING: Device 10164 out of 5% limit - 13.9% out
 WARNING: Device 10166 out of 5% limit - 12.3% out
 WARNING: Device 10167 out of 5% limit - 10.5% out
 WARNING: Device 10169 out of 5% limit - 9.9% out
 WARNING: Device 10171 out of 5% limit - 10.0% out
 WARNING: Device 10174 out of 5% limit - 9.1% out
 WARNING: Device 10175 out of 5% limit - 11.9% out



10141 10146 10163 10169
 10142 10150 10164 10171
 10143 10161 10166 10174
 10145 10162 10167 10175

Average
 Upper-Bound
 Lower-Bound

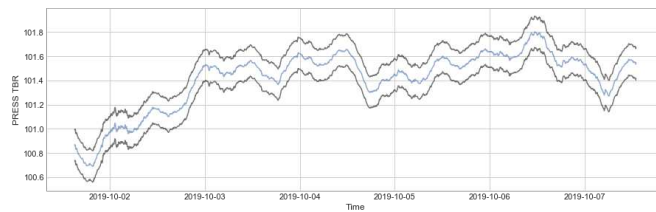


10144 10154 10160 10170
 10147 10155 10165 10172
 10148 10157 10168 10173
 10149 10159

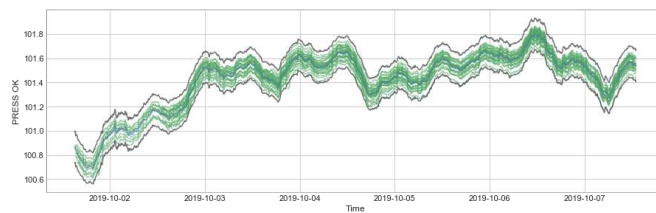
Average
 Upper-Bound
 Lower-Bound

(9/10) - PRESS

Using t-student Distribution



Average Upper-Bound Lower-Bound



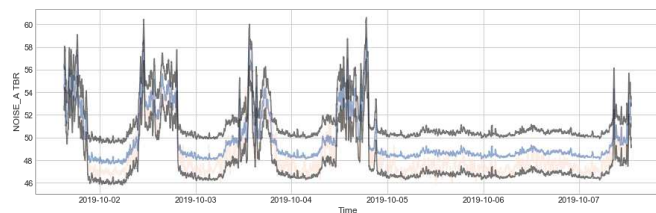
10141 10148 10160 10167 10173
 10142 10149 10161 10168 10174
 10143 10150 10162 10169 10175
 10144 10154 10163 10170
 10145 10155 10164 10171
 10146 10157 10165 10172
 10147 10159 10166

Average
 Upper-Bound
 Lower-Bound

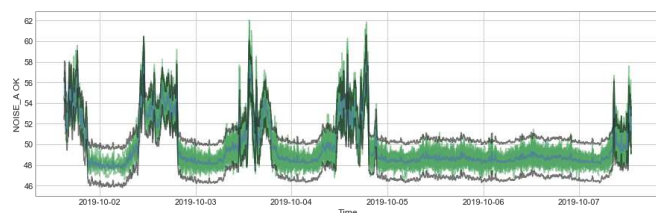
(10/10) - NOISE_A

Using t-student Distribution

WARNING: Device 10145 out of 5% limit - 5.8% out



10145 Average Upper-Bound Lower-Bound



10141 10149 10161 10167 10173
 10142 10150 10162 10168 10174
 10143 10154 10163 10169 10175
 10144 10155 10164 10170
 10146 10157 10165 10171
 10147 10159 10166 10172
 10148 10160

Average
 Upper-Bound
 Lower-Bound

Summary

| | #_OK_DEVICES | DISPERSION | #_TBR_DEVICES |
|-------------|--------------|------------|---------------|
| HUM | 29 | 0.97247 | 1 |
| CCS811_ECO2 | 23 | 27.6167 | 7 |
| EXT_PM_1 | 28 | 1.66019 | 2 |
| TEMP | 30 | 0.321624 | 0 |
| EXT_PM_25 | 28 | 1.93325 | 2 |
| CCS811_VOCS | 24 | 4.71271 | 6 |
| EXT_PM_10 | 28 | 2.12462 | 2 |
| LIGHT | 14 | 4.79079 | 16 |
| PRESS | 30 | 0.0470005 | 0 |
| NOISE_A | 29 | 0.663889 | 1 |
| BATT | NaN | NaN | NaN |

Further testing

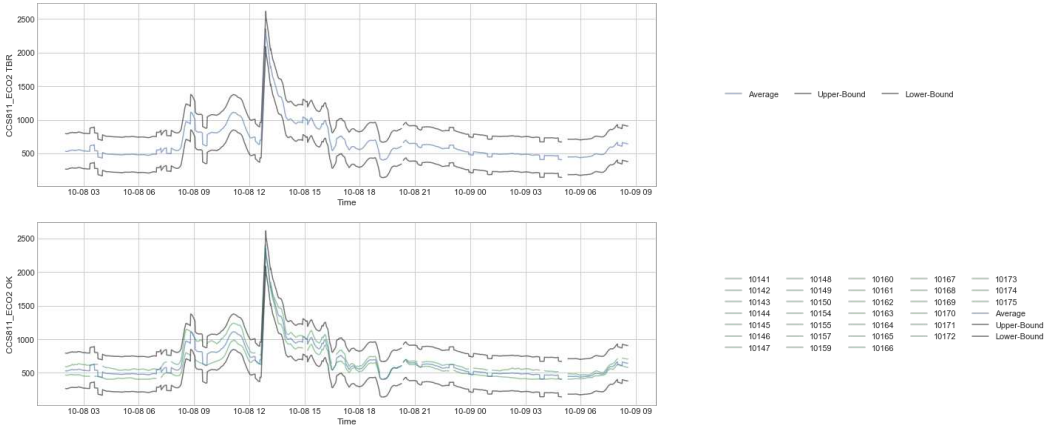
Time Series Plots

Min Date available: 2019-10-08 02:00:00+02:00

Max Date available: None

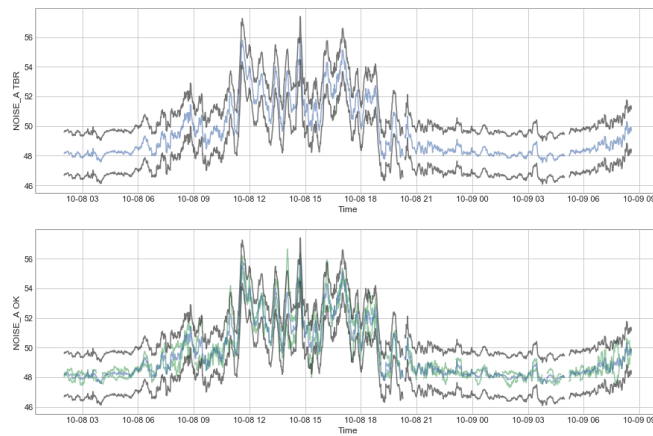
(1/10) - CCS811_ECO2

Using t-student Distribution



(2/10) - NOISE_A

Using t-student Distribution



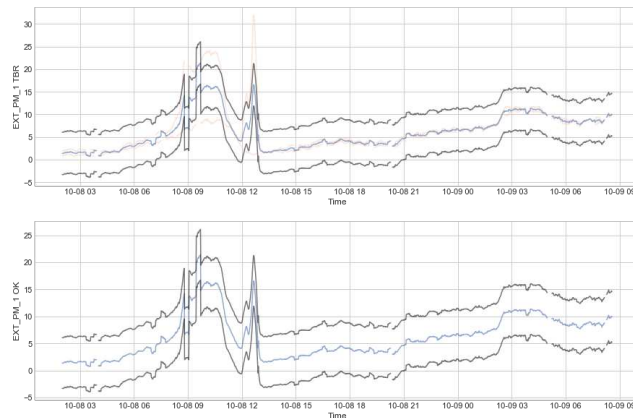
— Average — Upper-Bound — Lower-Bound

10141 10148 10160 10167 10173
 10142 10149 10161 10168 10174
 10143 10150 10162 10169 10175
 10144 10154 10163 10170
 10145 10155 10164
 10146 10157 10165
 10147 10159 10166
 Average
 Upper-Bound
 Lower-Bound

(3/10) - EXT_PM_1

Using t-student Distribution

WARNING: Device 10167 out of 5% limit - 8.1% out
 WARNING: Device 10174 out of 5% limit - 8.1% out

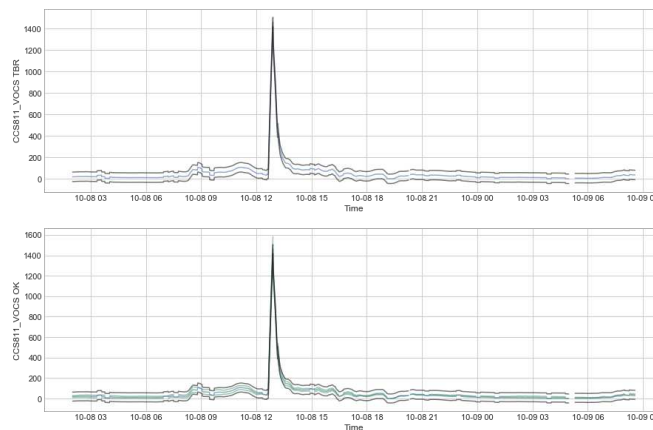


10167 10174 — Average — Upper-Bound — Lower-Bound

10141 10148 10159 10165 10172
 10142 10149 10160 10166 10173
 10143 10150 10161 10168 10175
 10144 10154 10162 10169
 10145 10155 10163 10170
 10146 10157 10164 10171
 10147
 Average
 Upper-Bound
 Lower-Bound

(4/10) - CCS811_VOCS

Using t-student Distribution



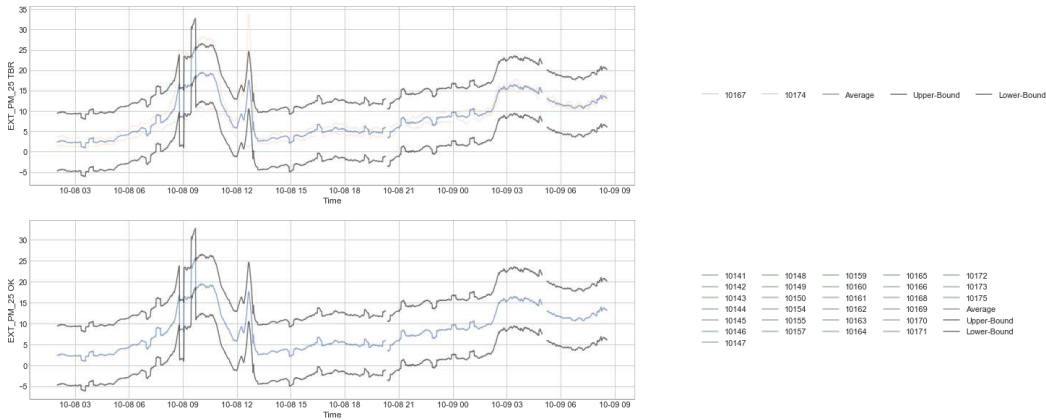
— Average — Upper-Bound — Lower-Bound

10141 10148 10160 10167 10173
 10142 10149 10161 10168 10174
 10143 10150 10162 10169 10175
 10144 10154 10163 10170
 10145 10155 10164
 10146 10157 10165
 10147 10159 10166
 Average
 Upper-Bound
 Lower-Bound

(5/10) - EXT_PM_25

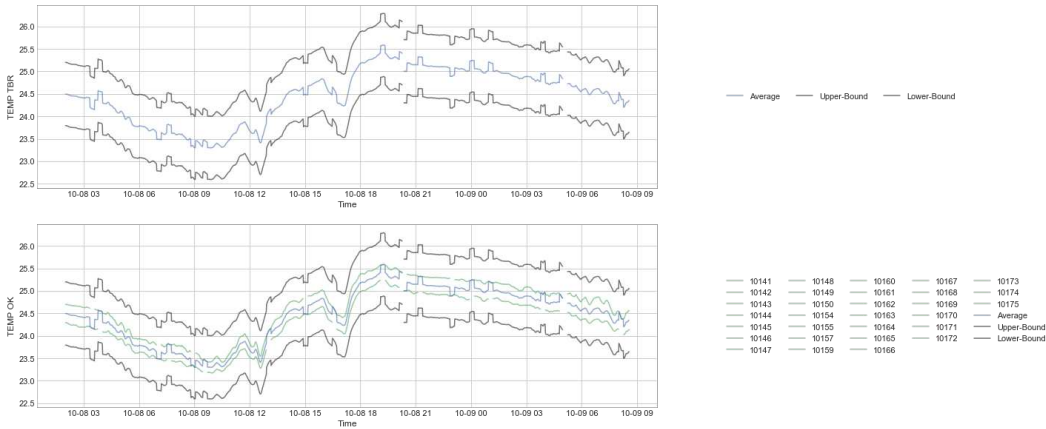
Using t-student Distribution

WARNING: Device 10167 out of 5% limit - 6.5% out
WARNING: Device 10174 out of 5% limit - 6.5% out



(6/10) - TEMP

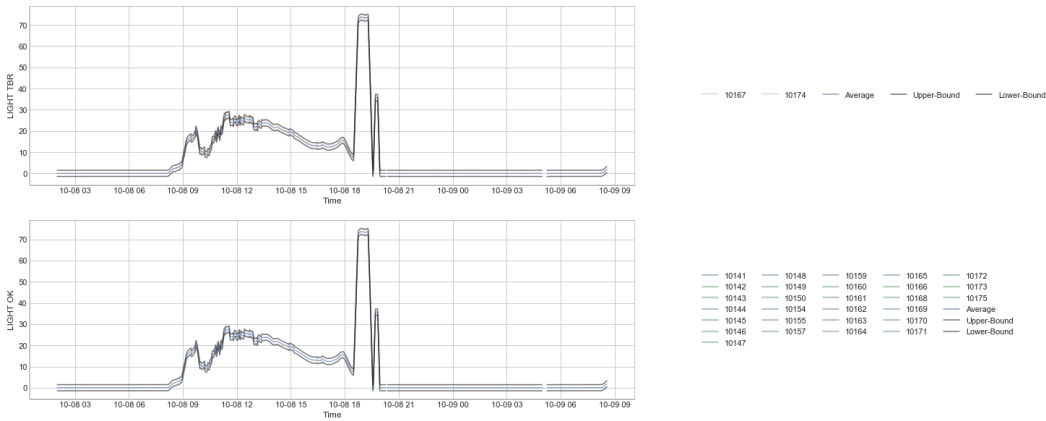
Using t-student Distribution



(7/10) - LIGHT

Using t-student Distribution

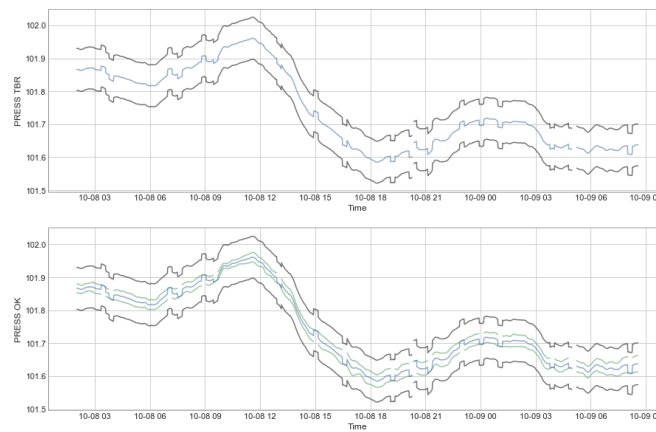
WARNING: Device 10167 out of 5% limit - 6.4% out
WARNING: Device 10174 out of 5% limit - 6.4% out



(8/10) - HUM

| | | | | |
|-------|-------|-------|-------|-------------|
| 10141 | 10148 | 10160 | 10167 | 10173 |
| 10142 | 10149 | 10161 | 10168 | 10174 |
| 10143 | 10150 | 10162 | 10169 | 10175 |
| 10144 | 10154 | 10163 | 10170 | Average |
| 10145 | 10155 | 10164 | 10171 | Upper-Bound |
| 10146 | 10157 | 10165 | 10172 | Lower-Bound |
| 10147 | 10159 | 10166 | | |

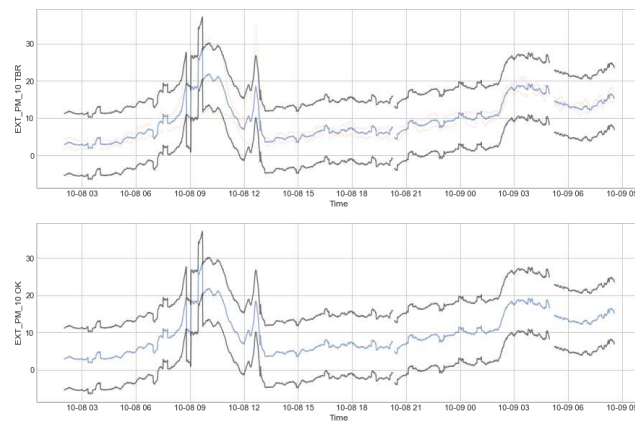
Using t-student Distribution



| | | | | |
|-------|-------|-------|-------|-------------|
| 10141 | 10148 | 10160 | 10167 | 10173 |
| 10142 | 10149 | 10161 | 10168 | 10174 |
| 10143 | 10150 | 10162 | 10169 | 10175 |
| 10144 | 10154 | 10163 | 10170 | Average |
| 10145 | 10155 | 10164 | 10171 | Upper-Bound |
| 10146 | 10157 | 10165 | 10172 | Lower-Bound |
| 10147 | 10159 | 10166 | | |

Using t-student Distribution

```
WARNING: Device 10167 out of 5% limit - 5.5% out
WARNING: Device 10174 out of 5% limit - 5.5% out
```



| | | | | |
|-------|-------|-------|-------|-------------|
| 10141 | 10148 | 10159 | 10165 | 10172 |
| 10142 | 10149 | 10160 | 10166 | 10173 |
| 10143 | 10150 | 10161 | 10168 | 10175 |
| 10144 | 10154 | 10162 | 10169 | Average |
| 10145 | 10155 | 10163 | 10170 | Upper-Bound |
| 10146 | 10157 | 10164 | 10171 | Lower-Bound |
| 10147 | | | | |