SenseiAQ Software
Using SenseiAQ to Analyze Air Quality
Application User Guide – Version 1.0 updated 6/25/2021

Information on how to interpret data provided by SenseiAQ

SenseiAQ provides a lot of information. If you are knowledgeable on how Air Quality is measured, how the EPA reports Air Quality you might not need to read this section.   If not, here are some helpful hints and some additional sources to help you interpret the data and take appropriate actions.

Figures 13, 14 show the values in micrograms/m^3 for PM2.5 and 10 which are used to calculate the AQI values reported in SenseiAQ. Note that the values displayed by SenseiAQ are every minute (and can be adjusted) whereas the EPA index itself is calculated over a 24 hour period and is outdoors.. Nevertheless the AQI index itself serves as a simple, easy to understand scale together with mass concentration and particle count.
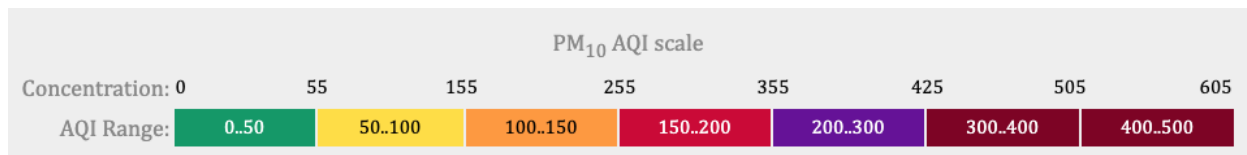

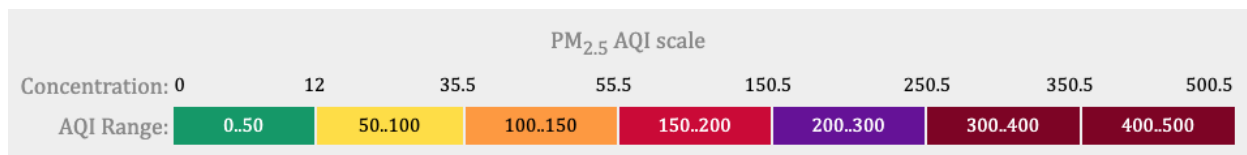**Figure 13 - PM 10 AQI Scale and Mass Concentration**

Figure 14 - PM 10 AQI Scale and Mass Concentration

SenseiAQ's Dashboard has 3 PM 'dials', for PM10 (Coarse), PM2.5 (Fine), PM1.0 (Very or Ultra Fine) reporting mass concentration, the AQI and a minute by minute display for the last 60 minutes. See Fig. 13

Sample rate is controlled by software commands per the data sheet on our website.. The factory defaults are every second and the dashboard updates every minute. By default, the IPS starts to send data automatically via UART every 1 second as the device is powered up: a series of data strings containing particle counts (PC) and mass concentration (PM) data followed by both device serial number and its network serial key. The PC data is in #/L, and the PM is in ug/m3 . Allow at least 5 seconds to obtain stable data. The IPS will run a self-cleaning cycle for 10 seconds once a week by default.

PM10.0 includes ALL particles 10.0 and below so it includes the PM2.5 and PM1.0 data. Ideally all 3 will be green but because PM2.5 and 1.0 are more dangerous the Mass Concentration (and particle count) limits are lower for the smaller particles per Fig 11, 12.. Good for PM10 is < 55 ug/m^3, for PM2.5 it's < 12 ug/m^3, for PM1.0 there is no recommended MC value so we are using PM2.5. The EPA and other regulatory bodies will likely establish PM1.0 values that are lower than PM 2.5 For reference the WHO PM2.5 value is 10.0. Many countries have their own AQI scales with most higher but a few lower than the EPA.
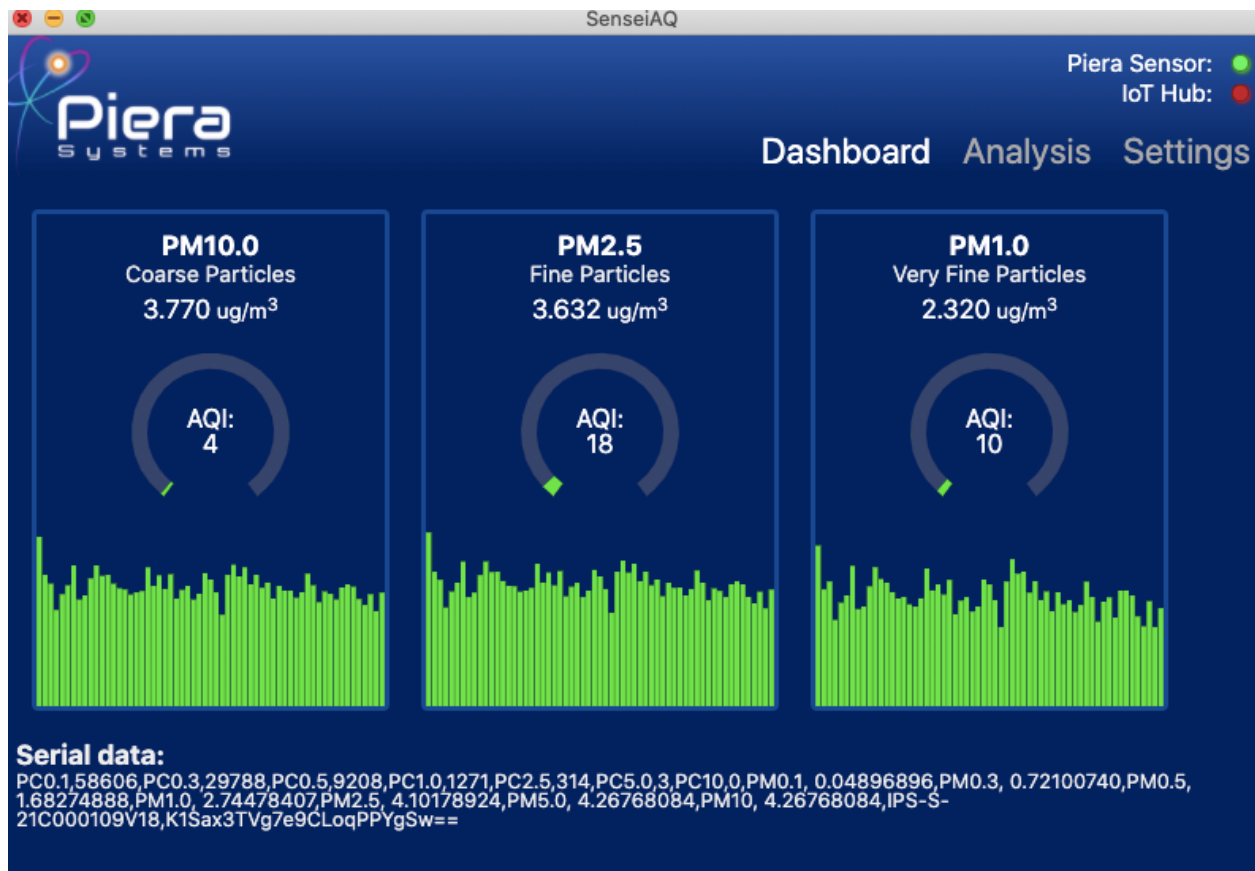

Figure 15: Good Air Quality for all PM values

Figure 16 Was taken in a home that had Hazardous Air due to Air Filters that were very dirty. The purple shows the Hazardous readings with MC ~500 ug, then the sensor was taken outdoors while the filters were replaced and the AC unit turned on (the green period) then it was brought back indoors and you can see the gradual clearing of the air. Since the filters were MERV-6 quality they don't filter out the Fine and UFP particles as well so they decrease but don't come down completely. You can see that while the PM10 is good (green bars on the right), the PM2.5 is still unhealthy. Note that of the 41.468 ug/m3 reported as PM2.5, 24.559 of that is PM1.0 It is only yellow because we are using the same scale as PM2.5. The point is that most of bad air is PM1.0 and below which is more dangerous and requires much higher MERV rating filters.
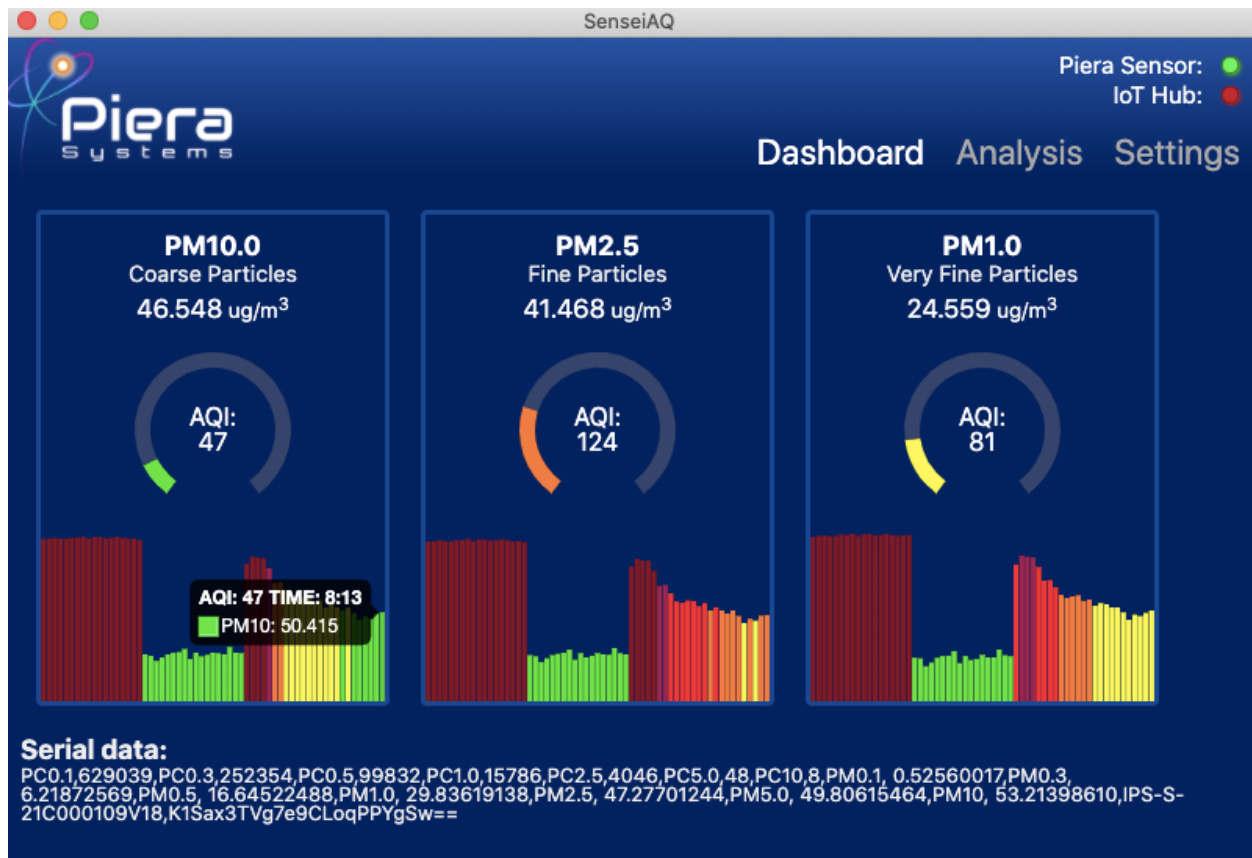

Figure 16: Poor Air Quality air due to poor filtration example

Appendix D: Additional Reference Information on measuring Air Quality

This White Paper, "Testing, Testing, 1.2.3.. discusses the EPA's test method for PM sensors and the IPS Test Report.

California's South Coast Air Quality Monitoring District which covers southern CA and Los Angeles has an excellent website and a program for testing and reporting on sensors and Air Quality monitors.

The EPA's Airnow.gov website and application shows real-time AQI data and also a Fire and smoke map and several other useful tools and educational material.

LocalHaze is a free application that displays outdoor Air Quality from a number of sensor networks including the EPA, Purple Air, etc.

The EPA's Ai Sensor Toolbox provides insight into the EPA's initiatives to help educate on low cost sensors.

The Encyclopedia of the Environment is a wealth of information regarding Particulate Matter and its health effects.