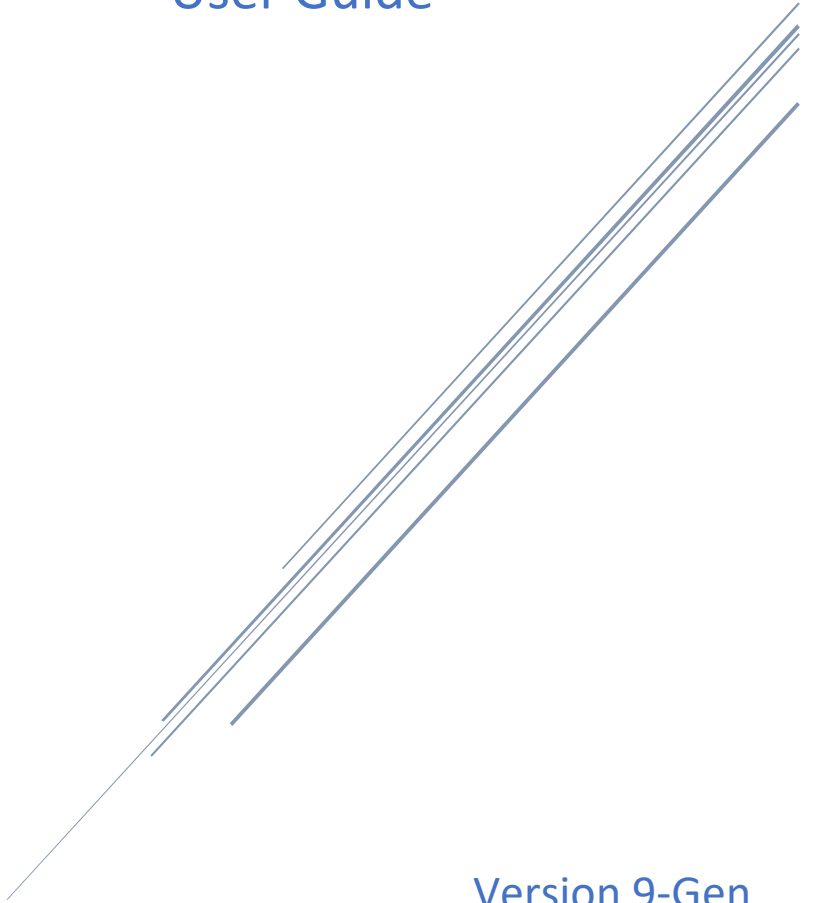# NORTHCLIFF ENVIRO MONITOR

User Guide

Version 9-Gen

Northcliff Enviro Monitor

User Guide

This guide applies to both Enviro Monitor models: The standard Enviro Monitor model and the "Indoor Plus" model (that includes Equivalent Carbon Dioxide and Total Volatile Organic Compounds measurements).

Setup

1. Connect the powerpack to the power socket on the underside of your Enviro Monitor. Be sure to connect it as per the photo and not to the USB socket. Locate your Enviro Monitor in a sheltered location, away from sun and rain – either using its wall mounting capabilities or using the base unit. An optional weather cover can be used if your Enviro Monitor is in a more exposed location.

2. A few minutes after powering your Enviro Monitor, you should see a screen like this, if your Enviro Monitor has been configured with an active display.

…. or with just a serial number, if your Enviro Monitor has been configured with an inactive display and with no external data feeds.
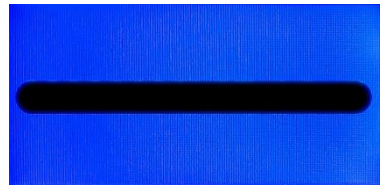
…. or with a serial number and a web link, if your Enviro Monitor has been configured with an inactive display and with external data feeds.
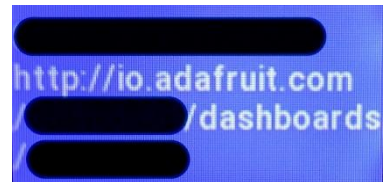
3. A standard Enviro Monitor has 14 screen modes if it's configured with an active display or only one screen mode if it's configured with an inactive display. The Noise Level option adds 3 more display modes and the Indoor Plus

option adds a further 2 display modes. We'll look at the screen modes in more detail later in this document.

You can scroll through each of the screen modes of an Enviro Monitor that's configured with an active display, by touching the window shown here in the photo until the screen changes to the next mode and then remove your finger from the window*. Repeat that process for each screen mode. After you reach that last screen, the next selection returns to screen #1. *Note that the screen selection response could be delayed when your Enviro Monitor is transmitting external data. If that happens, wait a few seconds before trying again.

If your Enviro Monitor has been configured with an inactive display, the screen will always display the unit's serial number (and the data feed web link if external data feeds are enabled) and it is not possible to scroll through the any other screens.

Skip steps 4 to 17 if your Enviro Monitor is not configured to support Luftdaten or if Luftdaten has already been set up for you.

4. To set up Luftdaten, you first need to know the serial number of the Raspberry Pi computer that is inside your Enviro Monitor.

   If your Enviro Monitor has been configured with an active display, the serial number is shown on screen #14, so scroll through the screens until you get to a screen that looks something like either one of these. Take note of the number. That will be used as your Sensor ID on Luftdaten.
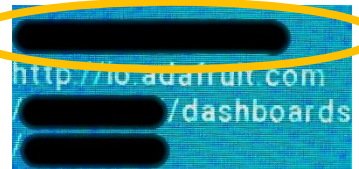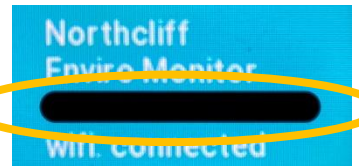
   If your Enviro Monitor has been configured with an inactive display, the serial number is always shown as the long number in one of these two screen formats. Take note of the number. That will be used as your Sensor ID on Luftdaten.
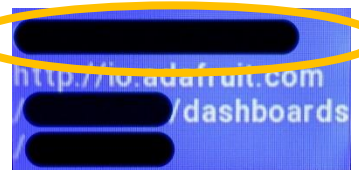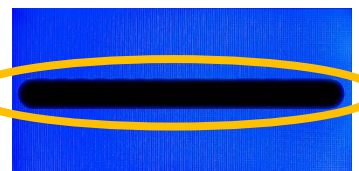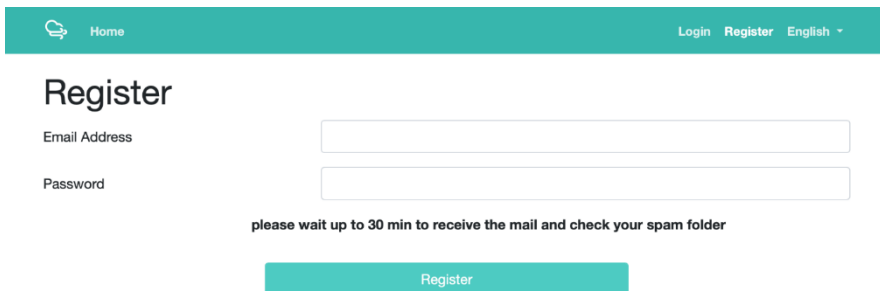
You now need to register your device with Luftdaten.

On a separate computer, go to:
https://meine.luftdaten.info/register

5. Type your email address that you want associated with the account and a password and then click "Register".

6. Complete the registration process by following the web link that will be sent to you by email.

7. Click on the "My sensors" page and then "Register new sensor".

8. In the box that says "Sensor ID", type in the serial number that you made a note of in either steps 8 or 9, making sure that you type it carefully and correctly.

9. Under "Sensor Board", select "raspi".

10. Give your sensor a name in the box that says "Personal sensor name", something like "Eric's Enviro Monitor", and then fill in your address details. If you don't want to reveal your exact location, then you can leave the "Publish exact location" box empty.

11. In "Additional information", fill in the details of where your sensor is located.

12. Under "Hardware configuration", select "PMS5003" from the first dropdown, and "BME280" from the second dropdown. **Do not change the numbers in the PIN boxes! They should be "1" for the PMS5003 and "11" for the BME280.**

13. Click the "Lookup entered address" button and then pinpoint your location on the map, or enter your latitude and longitude manually.

14. Scroll to the very bottom and click "Save settings" to save the entered sensor settings. On the "My sensors" page, you should now see your sensor listed.

15. After a few minutes, you should see the "Last Update" time and date change to indicate that data has been received. If you click on "Data", then you'll see the most recent data, and if you click on the links "show on map", then you'll see your data on the map. This means that your Enviro Monitor is working *and* sending data successfully to Luftdaten!

16. If you click on the tab at the bottom left corner then you can change the variable being displayed. You can also download your data as a CSV from: https://archive.luftdaten.info/.

17. If your data is not appearing on the "My Sensors" page after more than 10 or 15 minutes, double-check that you entered the serial number correctly from the serial number screen.

Screen Modes

The following screen modes are available if your Enviro Monitor has been configured with an active display. If it's been configured with an inactive display, the unit's serial number (or the unit's serial number and remote data access web link) is always displayed, on a background colour that changes with the Air Quality Rating - Blue: Great, Green: OK, Yellow: Alert, Orange: Poor and Red: Bad. The display is configured as inactive when using the optional weather cover.

Icon Display

This mode gives you an overview of the Enviro Monitor's readings as per the following screenshot.
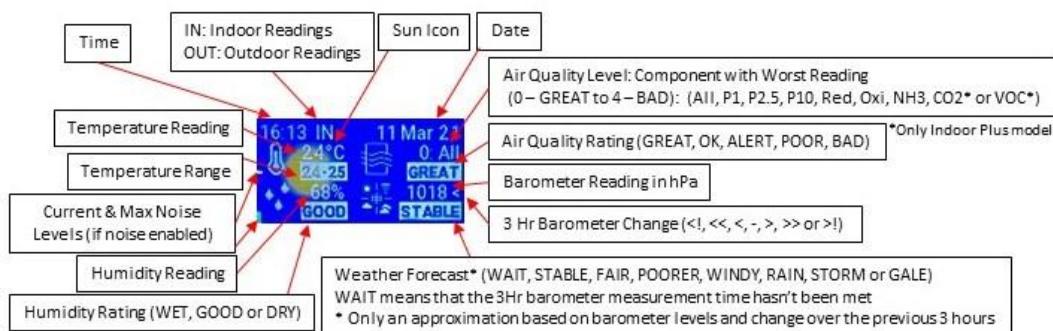
If you have two Enviro Monitors (an indoor unit and an outdoor unit) or you have an indoor unit that captures outdoor data from Luftdaten or Adafruit IO, the display of the indoor unit cycles between indoor and outdoor readings.

The brightness of the display's background, varies with the time of day or night and its colour changes with the Air Quality Rating – Blue: Great, Green: OK, Yellow: Alert, Orange: Poor and Red: Bad. A sun icon will appear on the display between sunrise and sunset, to indicate the sun's position between horizons – rising on the bottom right and setting on the bottom left of the display.

Air Quality

This mode displays the current air quality readings.

A standard Enviro Monitor shows the following readings:

P1 – 1 micron or less air particles in ug/m3
P2.5 – 2.5 micron or less air particles in ug/m3
P10 – 10 micron or less air particles in ug/m3
Oxi – Oxidising Gases (e.g. NO2) in ppm*
Red – Reducing Gases (e.g. CO) in ppm*
NH3 – Ammonia Gas in ppm*

The colour of each reading indicates its level relative to thresholds (Blue: great, Green: OK, Yellow: alert, Orange: poor, Red: bad).

If you have two Enviro Monitors (an indoor unit and an outdoor unit) or you have an indoor unit that captures outdoor data from Luftdaten or Adafruit IO, the display of the indoor unit cycles between indoor and some outdoor readings.

*The gas ppm levels are approximations, based on a number of gases (Refer to https://www.sgxsensortech.com/content/uploads/2015/02/1143_Datasheet-MiCS-6814-rev-8.pdf for details).

The Indoor Plus Enviro Monitor adds:

CO2 - Equivalent Carbon Dioxide in ppm

VOC - Total Volatile Organic Compounds in ppb

Refer to Appendix 1 for more information about these measurements and their thresholds.

Air Quality Graphs

These modes show the trend of each air quality reading over time. The black line shows the trend and the colour of the graph shows the level, relative to the set threshold for that reading (Blue: Great, Green: OK, Yellow: Alert, Orange: Poor and Red: Bad). If you have two Enviro Monitors (an indoor unit and an outdoor unit) or you have an indoor unit that captures outdoor data from Luftdaten or Adafruit IO, the graphs of the indoor unit cycles between indoor and some outdoor readings.

P1 – 1 micron or less air particles in ug/m3

P2.5 – 2.5 micron or less air particles in ug/m3

P10 – 10 micron or less air particles in ug/m3
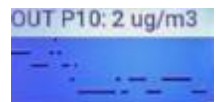
Oxi – Oxidising Gases (e.g. NO2) in ppm*

Red – Reducing Gases (e.g. CO) in ppm*

NH3 – Ammonia Gas in ppm*
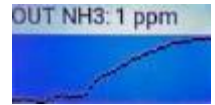
The Indoor Plus Enviro Monitor adds:
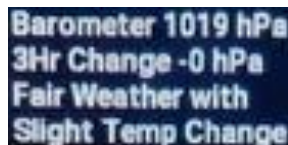
CO2 - Equivalent Carbon Dioxide in ppm

VOC - Total Volatile Organic Compounds in ppb
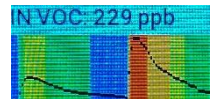
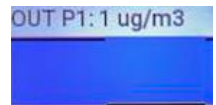Refer to Appendix 1 for more information about these measurements and their thresholds.
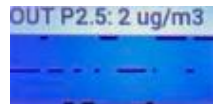
Barometer and Weather Forecast

This mode shows the current air pressure reading in hPa, as well as the air pressure reading change over the previous 3 hour period. Those readings are then converted

Barometer 1019 hPa
3Hr Change -0 hPa
Fair Weather with
Slight Temp Change

into a weather forecast*. **The weather forecast is an estimate, solely based on air pressure changes and should not be relied upon for accurate weather forecasts.**

Climate and Light Graphs

These modes show the trend of each climate and light level reading over a period of time. The black line shows the trend and the colour of the graph shows the level, relative to the set threshold for that reading (blue: very low, green: low, yellow: moderate, orange: high, red: very high).

If you have two Enviro Monitors (an indoor unit and an outdoor unit) or you have an indoor unit that captures outdoor data from Luftdaten or Adafruit IO, the graphs of the indoor unit cycles between indoor and some outdoor readings.

Temperature in °C

OUT Temp: 21.6 C

Relative Humidity in %

Air Pressure in hPa
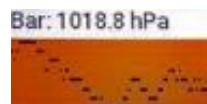
Light Level in Lux (impacted by the optional weather cover, if fitted)
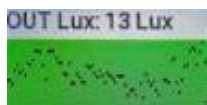
Noise Level Graphs

The following three screen modes are only available when Noise Level measurement is set up and activated. Noise level values, their trends and maximum levels can be observed. Noise levels <= 70 dB(A) are shown in green, >70 bB(A) and <= 90 dB(A) are shown in yellow and > 90dB(A) are shown in red. In addition to these three screens, setting up and activation of Noise Level measurement, activates a current and maximum noise level bar graph on the left side in the Icon Display mode.

The Noise Level readings have limited accuracy and should not be used for critical noise measurement applications.

Current approximate Noise Level in dB(A)

Approximate Noise Level history and maximum noise level. The maximum noise level is reset when other display modes are selected.

Approximate Noise Level history by frequency band. Red represents lower frequency levels, green mid-range frequency levels and red upper frequency levels.

Serial Number, wifi Status and Data Feed Web Link

When external data feeds have been disabled, this this mode shows the Enviro Monitor's serial number for Luftdaten registration and its wifi connection status.
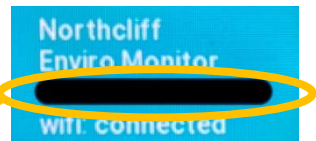
When external data feeds have been enabled, this mode shows the Enviro Monitor's serial number for Luftdaten registration and the web link that can access your Enviro Monitor's data dashboard.
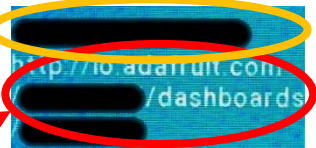
Configuration Options

The Enviro Monitor can be configured to provide the following options:

a) Linked Indoor/Outdoor Units

An indoor and an outdoor Enviro Monitor on one property can be linked to allow the indoor Enviro Monitor's display to alternate between indoor and outdoor readings. Alternatively, an indoor Enviro Monitor can be configured to capture some outdoor readings from either Luftdaten sensors or from another Enviro Monitor's Adafruit IO feeds.

b) Luftdaten

Connection to the global Luftdaten citizen science project https://luftdaten.info/.
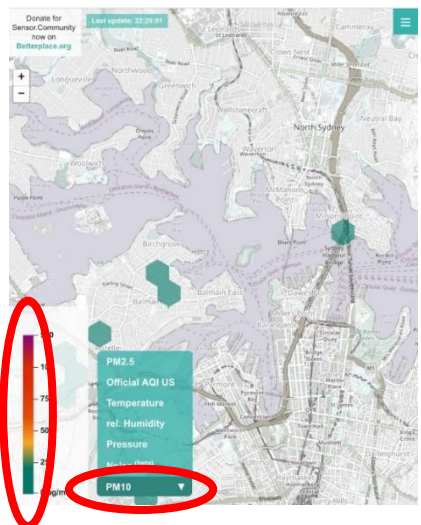
If this option is enabled, you can access your Enviro Monitor's data via ….

https://maps.sensor.community/#2/0.0/0.0

…. and then scroll through the map to the location of your Enviro Monitor. Once you find its location on the map, bookmark it in your internet browser for easy access.

You can access your Enviro Monitor's PM2.5, PM10, Temperature, Humidity and Air Pressure data (and the data from other Luftdaten sensors) by selecting from the parameters in the bottom left of the screen and then selecting the sensor on the map. The colour of the sensor on the map indicates the severity of the reading using the colour scale in the bottom left corner of the screen.

You'll then see the sensor's reading for that parameter in a window on the right. You can get a more detailed explanation of the parameter by selecting "Show explanation" and graphs of the data by selecting "(+)".
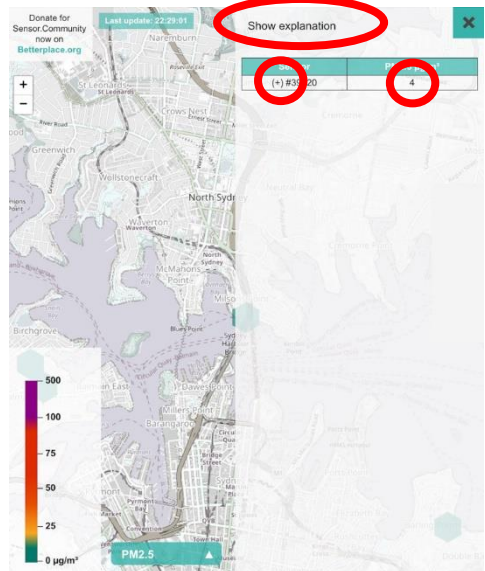
You can also use the
Air Matters App from
the Apple App Store or
Google Play, to give
you even easier access
to your Enviro
Monitor's Luftdaten
data and other air
quality sensors around
the world.

https://air-matters.com/index.html
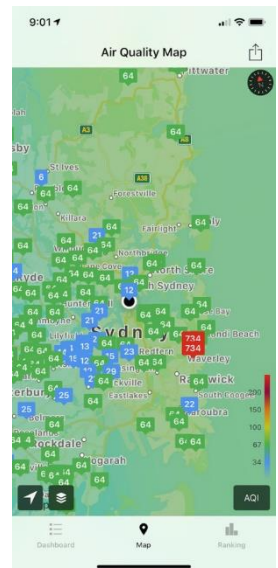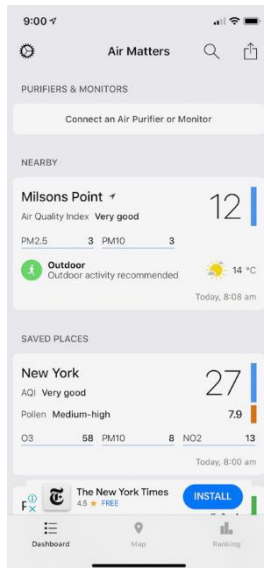
c) Weather Cover/Display Deactivation

The optional weather cover provides greater protection from the elements. When used, the display is not visible and is deactivated (see the Screen Mode section of this guide).
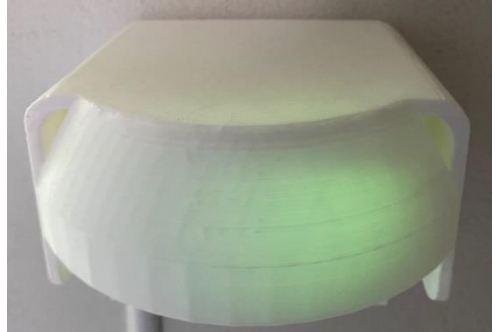
In low lighting conditions, it is possible to see a "glow" from the display under the cover, to indicate the air quality level (Blue: Great, Green: OK, Yellow: Alert, Orange: Poor and Red: Bad). Note that this cover will affect the light level readings. The cover requires a change to the Enviro Monitor's configuration, to modify its temperature and humidity compensation algorithms. The weather cover cannot be used on the "Indoor Plus" Enviro Monitor variant.

d) Remote Data Access

This option provides remote access to the Enviro Monitor's data via Adafruit IO (https://io.adafruit.com/). The remote data access option can be provided on either an Adafruit IO account that is shared with other Enviro Monitor users (up to 40 monitors per shared account) **with publicly visible feed and dashboard data**, or on your own personal Adafruit IO account, where you can have privately visible feed and dashboard data. If you decide to use your own personal Adafruit IO account, you can choose one of six Enviro Monitor remote data feed packages – Premium Plus or Premium Plus Noise (only for use on the Indoor Plus Enviro Monitor), Premium or Premium Noise, Basic Air or Basic Combo. The Premium Plus and Premium packages have 16 and 14 data feeds respectively (or 19 and 17 data feeds with the addition of Noise measurements), and require you to have an Adafruit IO Plus account (current price is US$99 per year), while the other two packages only have 5 data feeds and can be supported on a free Adafruit IO account.

If you choose to use the shared Adafruit IO account **(with publicly visible feeds and dashboards)**, you will be able to use the Premium (or Premium Plus from an Indoor Plus Enviro Monitor) package.

If remote data access is enabled, you can access the data using the web link that's displayed on the last screen of an active display or the screen that's always displayed (if your Enviro Monitor has been configured with an inactive display). Bookmark that web link in your internet browser for easy access to the data.
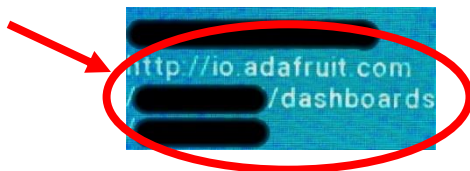
If enabled, and depending upon your Enviro Monitor's remote data package, the Adafruit IO dashboard will show data like the following examples, depending upon your remote data feed package. The data is updated every 10 minutes. Each example shows the format when linked indoor and outdoor Enviro Monitors are used. You will only see an indoor **or** an outdoor measurement if you only have one Enviro Monitor.

Temperature and Relative Humidity Gauges (only Premium Plus, Premium Plus Noise, Premium, Premium Noise and Basic Combo packages)

This data shows the Enviro Monitor's most recent temperature and humidity readings.

Air Pressure Gauge (only Premium Plus, Premium Plus Noise, Premium, Premium Noise and Basic Combo packages), Weather Forecast Icon (only Premium Plus, Premium Plus Noise, Premium, Premium Noise and Basic Combo packages) and Weather Forecast Text (only Premium Plus, Premium Plus Noise, Premium and Premium Noise packages)

Depending on the feed package, this data shows the current air pressure level, as well as an approximate weather forecast in an icon and/or text format, based on air pressure changes over the previous 3 hour period. ***The weather forecast is an estimate, solely based on air pressure changes and should not be relied upon for accurate weather forecasts.*** Only one gauge and forecast is provided per property, even if you have two linked Enviro Monitors at your property, since this data does not vary between indoor and outdoor locations.
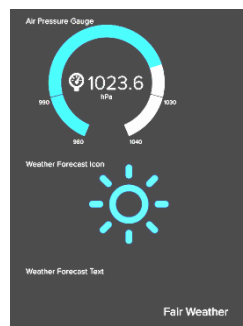
Air Quality Level Gauges/Charts (all packages) and Text (only Premium Plus, Premium Plus Noise, Premium, Premium Noise and Basic Air packages)

This data is identical to the air quality data shown in display mode #1 of the Enviro Monitor's display, where Level 0 is Great, Level 1 is OK, Level 2 is Alert, Level 3 is Poor and Level 4 is Bad and the text (when provided), identifies the air quality component that has triggered the level (refer to Screen Mode #2 for the codes).

The Air Quality Level Chart shows the Air Quality Level trend.
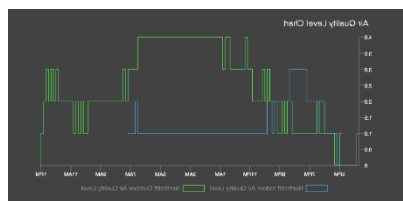
Air Particles Chart (only Premium Plus, Premium Plus Noise, Premium, Premium Noise and Basic Air packages)

This chart shows the trend of each air particle level in ug/m3.
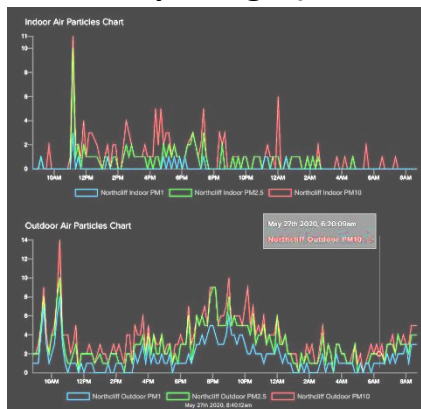
Gas Level Charts (only Premium Plus, Premium Plus Noise, Premium and Premium Noise packages)

These charts show the trend of each gas level (Reducing, Oxidising and Ammonia) in ppm. The gas ppm levels are approximations based on a number of gases*.

 (*Refer to https://www.sgxsensortech.com/content/uploads/2015/02/1143_Datasheet-MiCS-6814-rev-8.pdf for details)

Equivalent Carbon Dioxide and Total Volatile Organic Compounds Gauges and Charts (only Premium Plus and Premium Plus Noise with an Indoor Plus Enviro Monitor)

The gauges show the current equivalent CO2 and TVOC levels and the charts show the trend for those two readings.
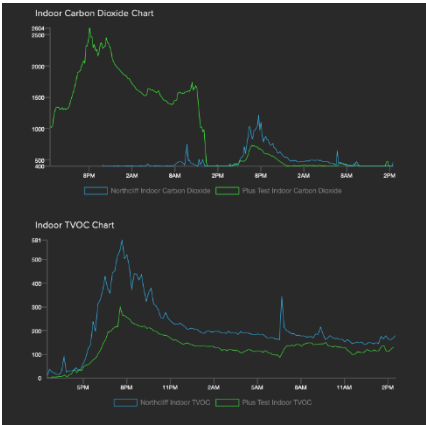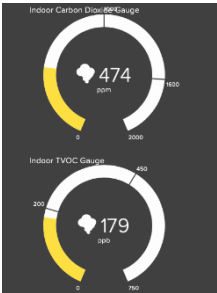
Temperature, Relative Humidity and Air Pressure Charts (only Premium Plus, Premium Plus Noise, Premium, Premium Noise packages and Basic Combo packages)

These charts show temperature, relative humidity and air pressure trends.
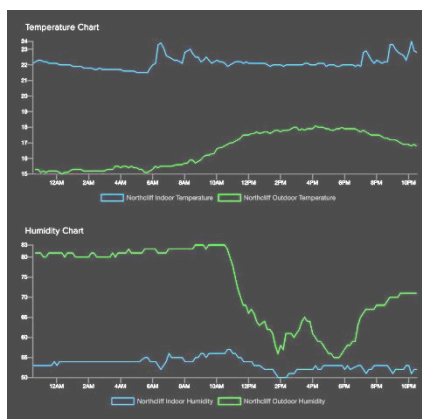
Only one Air Pressure Chart is provided per property, even if you have two linked Enviro Monitors at your property, since this data does not vary between indoor and outdoor locations.

Light Level Chart (only Premium Plus, Premium Plus Noise, Premium and Premium Noise packages)

This chart shows the light level trend in Lux. Note that this data will be affected if you fit the optional weather cover to your Enviro Monitor.
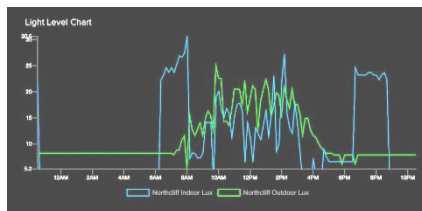
Noise Level Chart (only Premium Plus Noise and Premium Noise packages with noise measurements set up and activated)

This chart shows noise level trend in approximate dB(A). There will be three lines that show the maximum, minimum and mean sound levels recorded between feed updates.
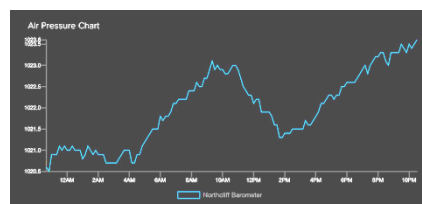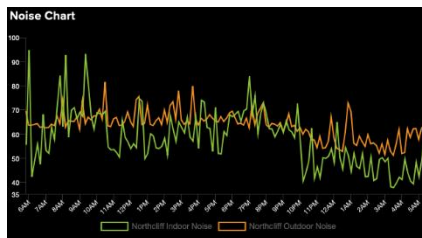

e) Data Alerts

The Enviro Monitor can support remote data alerts on your mobile device or tablet via IFTTT and Pushover, if remote data access is enabled. This requires an IFTTT account that is linked to the Adafruit IO account and a Pushover account that's linked to the IFTTT account.

f) Home Automation System Integration

This can be enabled via mqtt messages to record and log the Enviro Monitor's readings and to take automated actions based on those readings. It also allows the Enviro Monitor to use external temperature, humidity and air pressure sensors.

g) Location Customisation

This allows customisation for your local time zone, altitude and whether the Enviro Monitor is indoors or outdoors.

h) Data Logging

This allows data logging for calibration and for historical data collection.

These options can be configured remotely and downloaded into your Enviro Monitor upon request. Software updates can also be provided remotely.

Appendix 1 Indicator Thresholds and Readings

The following two tables show the graph colours, text colours or the Icon Display text thresholds for each Enviro Monitor reading. A reading displays its corresponding colour or Icon Display Text when it is greater than the threshold shown in the table and less than or equal to the subsequent threshold. It's important to note that this is a consumer grade device. The Enviro Monitor's threshold and reading measurements are only guidelines and should not be relied upon for decisions affecting health, financial or other wellbeing.

Climate Readings

Reading	Blue Very Low DRY~	Green Low GOOD~	Yellow Moderate GOOD~	Orange High WET~	Red Very High WET~
Temperature (Temp)°C	<=10	10	18	25	32
Relative Humidity (Hum) %	<=30	30	50	75	90
Relative Air Pressure (Bar) hPa	<=980	980	990	1030	1040
Light Level (Lux) Lux	<=100	100	1000	12000	30000

Air Quality Readings

Reading	Blue GREAT	Green OK	Yellow ALERT	Orange POOR	Red BAD
P1 ug/m3	<=6	6	17	27	35
P2.5 ug/m3	<=11	11	35	53	70
P10 ug/m3	<=16	16	50	75	100
Oxidising (Oxi) ppm*	<=0.2	0.2	0.4	0.8	1
Reducing (Red) ppm*	<=6	6	10	50	75
Ammonia (NH3) ppm*	<=1	1	2	10	15
Equivalent Carbon Dioxide (CO2) ppm*	<=500	500	1000	1600	2000
Total Volatile Organic Chemicals (VOC) ppb*	<=120	120	220	660	2200

Notes:

~ Threshold Note:

   Represents the Icon Display Humidity Text for each Relative Humidity threshold

* Gas Level Notes

1. The gas ppm levels are approximations based on a number of gases (Refer to https://www.sgxsensortech.com/content/uploads/2015/02/1143_Datasheet-MiCS-6814-rev-8.pdf for details). The typical readings for air are: Oxidising: 0.15ppm, Reducing: 5.5ppm and Ammonia 0.55ppm.

2. Equivalent Carbon Dioxide and Total Volatile Organic Chemical readings can only be performed by an Enviro Monitor that is fitted with the Indoor Plus option. The Equivalent Carbon Dioxide reading is made by a Sensiron SGP30, using an algorithm based on Hydrogen ion levels, rather than actual Carbon Dioxide measurements. The Equivalent Carbon Dioxide reading will never go below 400ppm. For more information on Equivalent Carbon Dioxide, see https://www.sensirion.com/en/environmental-sensors/gas-sensors/multi-pixel-gas-sensors/). For more information on Total Volatile Organic Chemicals, see https://www.sensirion.com/fileadmin/user_upload/customers/sensirion/Dokumente/9_Gas_Sensors/Sensirion_Gas_Sensors_IAQ-VOC_Product_Brochure_EN.pdf