Unpacking your BuiltAir© SensorNet

The quantity of parts depends on your order but for example, if you have a system with two IEQMonitors, then you should have received:

ITEM	QTY	NOTES
IEQ Monitor	2	Sensors, memory, battery, wireless comms, microprocessors
Border Router (BR)	1	Connects the Monitors via Thread to the Cloud via WiFi
Particle Monitor (PM)	2	Plugs into the Monitor for power and data transfer
Particle Monitor Plate	2	Slide the PM onto this Plate to ensure it remains upright
Logger Reset Tool	1	Push the Reset Button for ON/OFF and Shipping Mode
USB cable	1	A-to-C one meter cable

If you purchased ther tintegrated IEQ+PM then the PM plate is not included.

You must provide 5 VDC power to the Border Router (BR) (≥200mA) and each Monitor (≥250 mA). Phone AC adaptors for mobile phones are adequate for both Loggers and BR.

BuiltAir IEQ Monitor

The Monitor records readings from its sensors and sends the data up to the Cloud for calibration, data processing and storage. The data is transmitted wirelessly using the Border Router to the BuiltAir Cloud. You can also datalog offline and use the USB port to download data to a computer and then upload it to the Cloud using the BuiltAir App.

BuiltAir Particle Monitor (PM)

The Particle monitor measures PM_1, $PM_{2.5}$ and PM_{10}, as well as particle numbers (PNC). It plugs into the Mini-USB socket on the IEQ Monitor. The PM is remotely connected by cable to avoid generating heat inside the monitor. The IEQ Monitor can run without the PM and this will extend it's battery life. The PM is powered by IEQ Monitor and does not need a separate power supply. A baseplate can be fitted to ensure stability- the PM operates best when used vertically.

BuiltAir Integrated IEQ and PM

The IEQ Monitor and PM Monitor are combined into a single device. Although temperature performance is slightly degraded, both the Monitor and PM are more easily deployed. The IEQ Monitor can be removed from the integrated IEQ and redeployed as a separate device, a screwdriver is required.

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BuiltAir Border Router (BR)

The Border Router forms the wireless Open Thread mesh network that is used to transmit data from the Monitors to the Border Router. The Border Router can then forward this data to the *BuiltAir Cloud* via your local WiFi. As part of setting up your network, you will need to give your WiFi credentials to the Border Router. The alternative BR includes both WiFi and Ethernet POE connection See User Manual for more information.

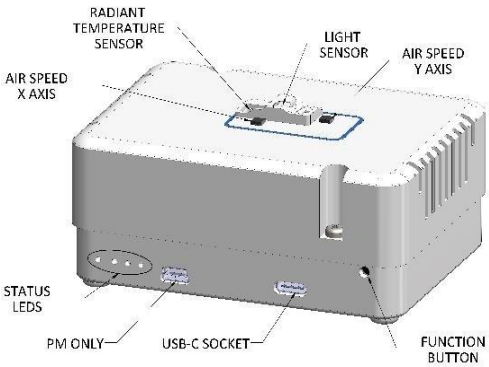
BuiltAir App

This USB Utility App will download the data stored in the Monitor as a .csv file. Both IOS and Windows versions of the App are available on the *BuiltAir Cloud*. You can either use the uncompensated data directly, or ask the *BuiltAir Cloud* to upload the file from your PC to calibrate, scale, store, and then download as a compensated .csv file.

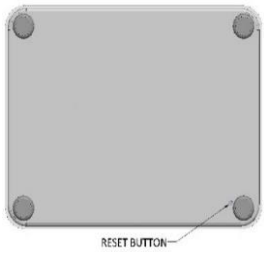
t_rad_c	rh_amb	pressure_hpa	CO2_ppm
24.94	47.4	998.26	694
24.96	47.4	998.27	703
25	47.5	998.28	714
24.92	47.4	998.24	699
24.99	47.5	998.27	733
24.95	47.4	998.25	711

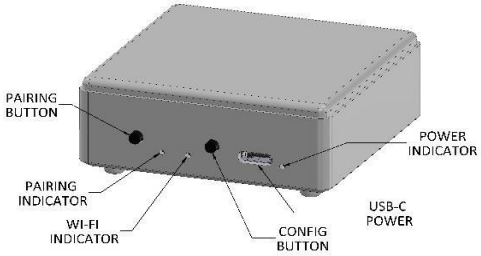
BuiltAir Cloud

The *BuiltAir Cloud* processes and stores the data sent by the Monitor via the network. Data downloaded through the *BuiltAir App* can also be uploaded direct to the Cloud for processing and storage. The Cloud includes a GUI to view the current status of your Monitors, program and change their settings, download data, get a quick time plots and analyse results.



IEQ Monitor.





Border Router

Interior of BuiltAir IEQ Monitor(A30xxx series)

Integrated IEQ Monitor and PM

Functions and LEDs are the same as the IEQ Monitor.

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How It Works

BuiltAir IEQ Monitor (Integrated with the PM or as a single IEQ Monitor)

The *BuiltAir IEQ Monitor* can operate in two modes, depending on your application:
Offline Mode: The Monitor stores up to 500,000 records with its onboard memory. Wireless communication is switched Off to extend battery life. Power can also be provided through the USB-C socket for long term data logging. and power banks can be used for extended remote powering, but require the *BuiltAir USB cable* to operate continuously. Data is downloaded through the USB socket using the *Builtair App*, taking up to 6 minutes for 500,000 records and can then be uploaded to the *BuiltAir Cloud* for compensation and data storage, then downloaded as compensated data to Windows or IOS PC as a .csv file. You must install the *USB Utility App* on your PC.

Network Mode: Monitors can operate as a time-synchronized mesh network with up to ten Monitors, using *OpenThread* for wireless communication. A Border Router (Thread-to-WiF or to Ethernet) Gateway connects the Monitor mesh and transmits data to the *BuiltAir Cloud*. *Thread* is a very low power system, used in *Alexa* and *Hey Google* for Smart Homes. Readings are transmitted through the Border Router to the Cloud or Ethernet as they are recorded in the Monitor, and the latest data can be checked at any time on your PC when connected to the *BuiltAir Cloud.* Unique features include: (patented) *FastLog* for capturing transients, synchronised timed logging across the network; user defined flexible logging parameters; continuous system health monitoring; multichannel-multimonitor data analysis; calculated thermal comfort parameters; Min/Max/Avg on all measurements.

Radiant temperature, light and the two airspeed sensors are located on the top PCB so they are exposed directly to the ambient air. Be careful- to not damage or spill liquids and **Do Not Touch**. If debris collects on these sensors use a vacuum cleaner to remove particles. Do not cover the sensor ventilation slot and-keep the vent slots clear. Do not place the Monitor near a heat source for best data quality, and beware of theft.

Border Router (BR) and network configuration

The Border Router is the Gateway between the *BuiltAir Cloud* using WiFi or Ethernet and the wireless Open *Thread* network that connects the Monitors together, creating a mesh network. The Ethernet PM version includes POE Ethernet connection as well as Wifi connection. Monitors are shipped in low power (“Sleepy”) mode which does not affect operation, but they are not able to act as a network extender. You can reassign a Monitor to be a Range Extender, effectively becoming another Router to include Monitors located much further from the BR. You can create a single network extending over an entire building, beyond the broadcasting range of the BR, but Monitors in Range Extender/ Router mode should be powered with an AC adaptor. Ensure you can provide at least 200mA at 5VDC to the USB-C socket. You can also power with a Power Bank for a limited time. See the User Manual.

Particle Monitor (PM)

The Particle Monitor (PM) Mini-USB cable plugs into the IEQ Monitor, chosen because Mini-USB is an unusual USB connector. DO NOT plug any other device into the PM socket. The mounting plate is is a useful addition to stabilise the PM. Slide the Particle Monitor (PM) onto the plate to improve mechanical stability for the PM: the PM must be in the vertical position to operate to performance specification. The integrated IEQ+PM ensures the correct orientation and the base plate is not required. Do not exhaust the PM outlet onto the Monitor vents: the higher temperature air will affect ambient temperature measurements.

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Connecting your BuiltAir SensorNet©

To get started you will need:

1. **Username and password** to log into the *BuiltAir SensorNet* Cloud.
   The Username and Password should have been sent to you by email when you received your shipment.
2. **BuiltAir IEQ Monotor(s), either as separate device or integrated with PM monitor**
   Monitors may be in Shipping Mode with a partially charged battery to comply with shipping safety regulations. We recommend that you connect an AC power supply to the Monitor C-USB socket. The power supply must be 5V and rated ≥250 mA. The red LED will flash momentarily, indicating that it is now externally powered. The battery will charge and the Monitor is out of Shipping Mode. Charging may take up to 24 hours, although you should be able to start logging after just a few minutes of charging. If you receive the Monitor in OFF Mode (not Shipping Mode) Simply press the *Function* Button once with a pen tip to switch it ON.
3. **Particle Monitor(s)**
   Plug the PM into the left (Mini-USB) socket on the IEQ Monitor (PM Only). You do not need to connect the Particle Monitor to start logging. The Integrated IEQ+PM is already connected.
4. **BuiltAir Border Router**
   Connect to a power supply capable of providing 200 mA at 5V. Use the USB A-to-C USB cable (provided) or similar USB cable. If you have the Ethernet POE version, then simply connect to your Ethernet socket (cable not included) for both power and communication.

NOTE:If you are only using the Monitor in Offline Mode, you still need to initially connect the Monitor to the *BuiltAir Cloud* to set the logging parameters and select Offline Mode.

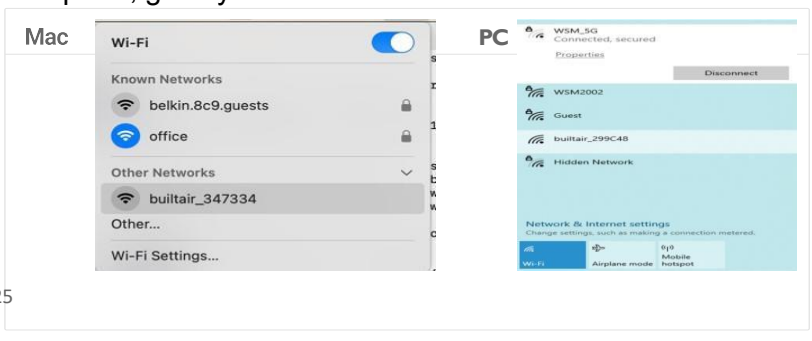
1 First set up the Border Router to connect with your WiFi

If you are connecting via Ethernet then skip this section.

The Border Router (BR) controls both the local area Thread network (LAN) for the Monitors and forwards data to the Cloud via wiFi (WAN). The BR needs to be connected to your local WiFi in order to access the internet. **NOTE: The BR operates at 2.4 GHz; if you are operating only at 5 GHz then contact NosmoTech.**

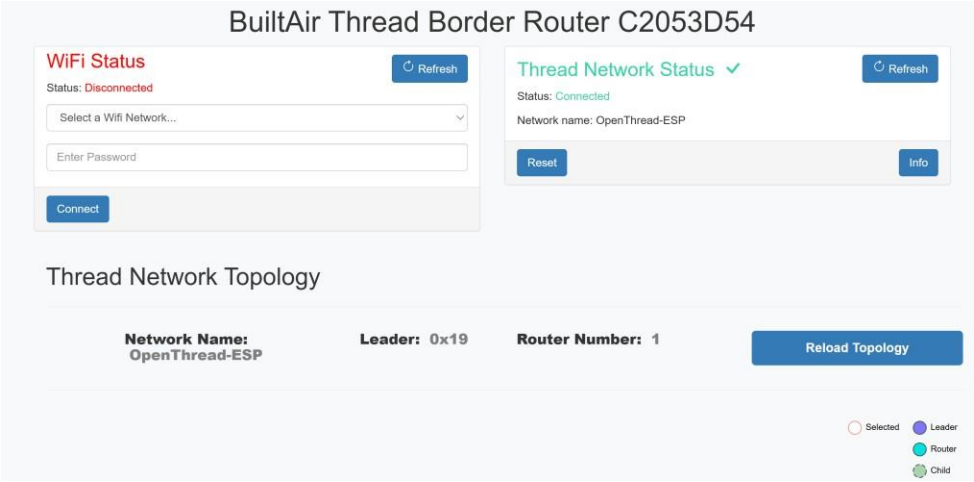
To connect the BR:

1. Provide 5V power to the BR through the USB socket. The **red LED** will light
2. Press the button next to USB socket- the **red LED** will flash, indicating that it is broadcasting, looking for a WiFi connection..
3. On your computer, go to your Wifi Network selection and look at the available

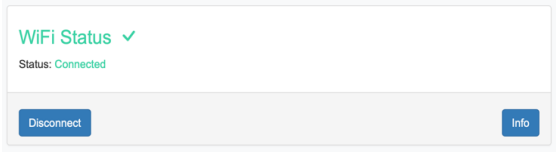


networks. This will vary with platform - see images below for PC and Mac.
Select *Builtair_XXXXXX* from your network's list -*XXXXxx* is the last 6 digits of the BR MAC code: unique to your BR. Allow a minute for this to appear.

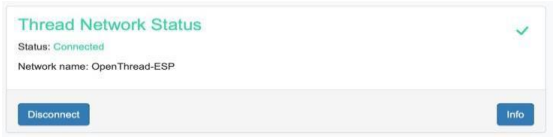
4. A screen is now displayed to show the status of the WiFi and Thread Networks.



5. Select your WiFi network from the dropdown list and enter the password for your WiFi network. Click *Connect*. After about 5 seconds, the WiFi Status will change to Connected. If you do not know the password, skip the password and you should still be able to connect.



5. By default, a new Thread Network is created and the Thread Network Status is also Connected. If it does not show *Connected* then click *Refresh* to update.



Your BR now knows how to connect to your Wifi so you can switch back to your normal Wifi network. The window will close and the **green LED** on the BR will light.

NOTE: if your Browser does not connect to the *BuiltAir_XXXXXX* network then either:
enter the IP address 192.168.4.1 in your browser Search Box or scan this QR:

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2 Now start your Monitor

The **blue LED** on the Monitor indicates the state of the connection to BR and the Cloud.

Slow Pulse- Ready to pair with the BR

Single Flash - Connected to the BR but not to the Cloud

Fast Double Flash- the Monitor is trying to pair with the BR

Slower Double Flash- Connected to both the BR and the Cloud

If no LEDs are flashing, then the Monitor is OFF.

To turn ON the Monitor - press the FUNCTION button once (use the tip of a pen/ pencil or the Reset Tool). Hold for about 1 second until the **Red LED** flashes.

To turn OFF the Monitor - Press the FUNCTION Button three times rapidly. The **Red LED** will light for about 2 seconds then all LEDs will turn OFF.

3 Connect your Monitor to the BR

1 Press the BR *Pairing button* (furthest from the USB socket) and the BR **Blue LED** will start flashing.

2 Now press the *Function button* on each Monitor and the pairing process will start. Within 30 seconds the **blue LED** on each Monitor will start to double flash, indicating that it is connected to the BR and Cloud and you can now program your IEQ Monitor and view data.

- If the Monitor **Blue LED** is only single flashing, this suggests the BR has not successfully connected via WiFi and you may need to repeat Step 1.
- If the Monitor **Blue LED** is only slow pulsing then press the Monitor *Function* button and hold for about 15 seconds until the **Green LED** flashes. This resets Thread in the Monitor. Release the button then press it again to start pairing.
- The BR **Blue LED** flashes for a few minutes to allow pairing. If the BR **Blue LED** is steady ON then press the *Pairing button* again to continue BR pairing.

4 Log on to the *BuiltAir© Cloud* to view your data

You can use the QR code on your Monitor to go straight to the page for this Monitor or log in to https://builtair.purit.ie

To download the complete User Manual go to builtair.purit.ie/download_userguide/

You can also find more information on the Cloud site.

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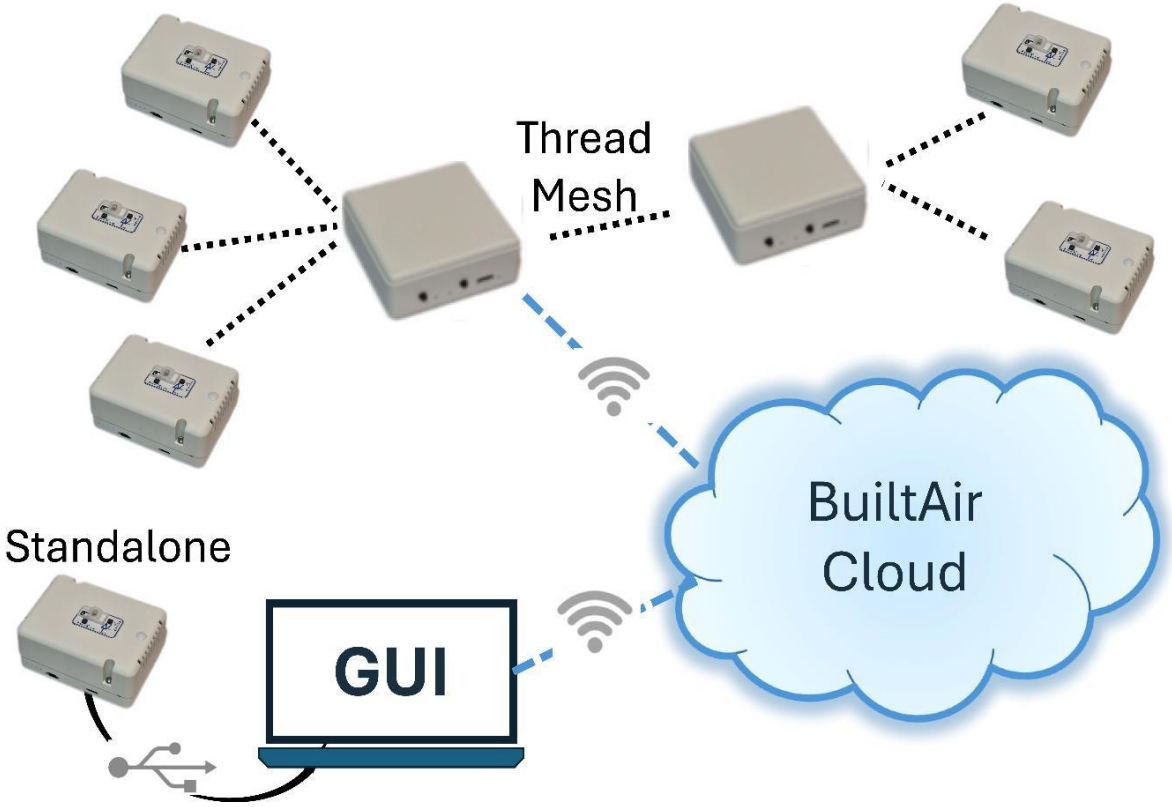
BuiltAir© Network



Thread Network or as Standalone Monitor