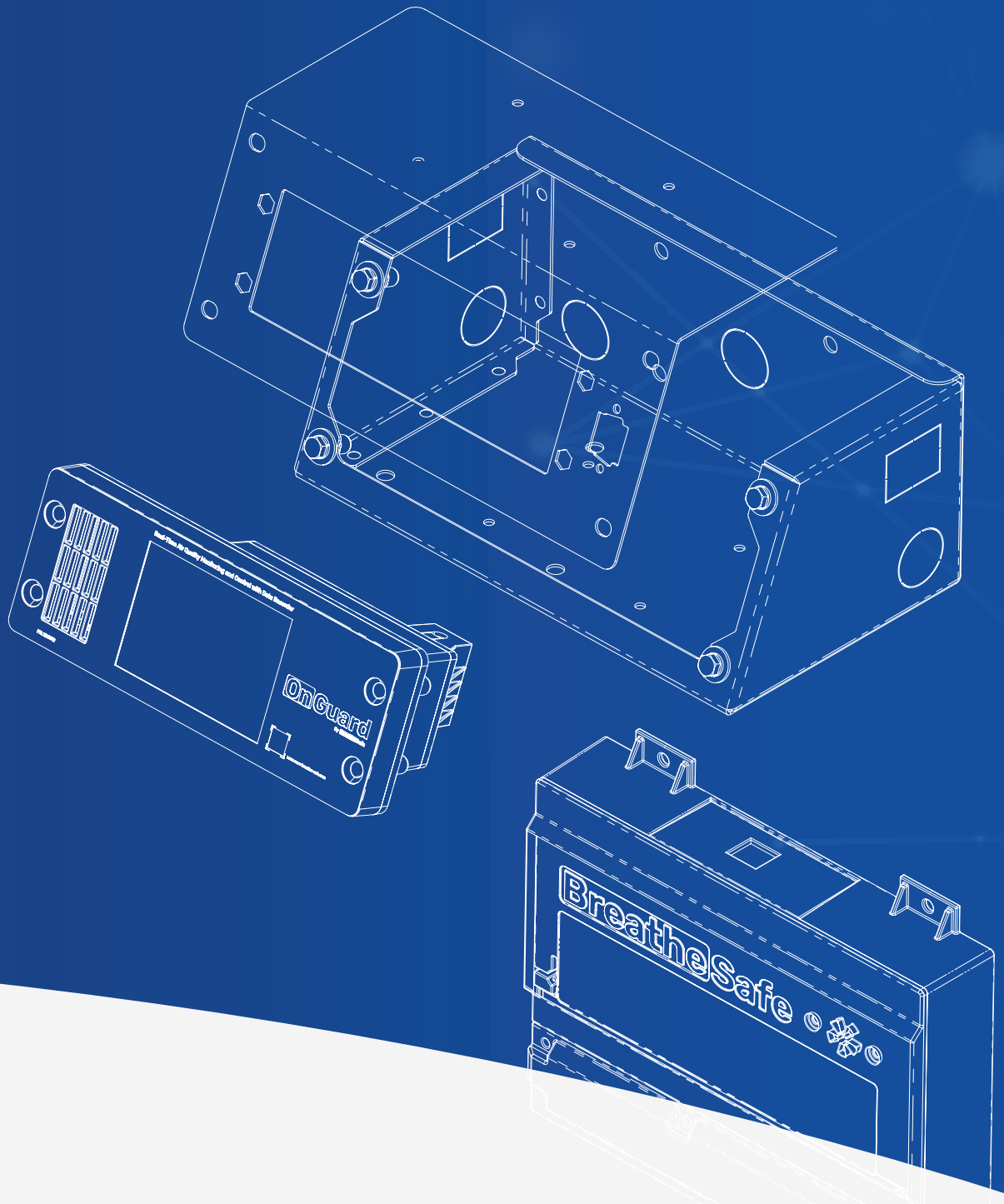
BreatheSafe

OnGuard™
User Manual



Contents

1.0 Information Sheet and Default Configuration

The OnGuard will arrive primed with a usable factory default configuration. For instance, a kit with multiple sensor zones will be primed to know what accessories should be connected and their assignment e.g., breathing zone sensor or return-air sensor.

The OnGuard kit contents, and zone assignments are shown on the information sheet provided with the kit. You can also observe all detected accessories and their zone assignments on the Web Interface (see 3.9 About), so as to verify all expected accessories are connected and working.

This configuration is set as the Factory Default and can be reverted to at any time by an Admin from the Web Interface or physical User-Interface (UI).

The provided information sheet will contain:

1.1 OnGuard Kit Contents

Description of parts included in OnGuard kit, their serial numbers and assignment.

Kit Contents
Your OnGuard kit is configured for 2 Sensor Zones, which requires that each sensor pod is installed in its assigned location. It is vital that all sensor pod serial numbers and installation locations are verified before completing the installation! If sensor pods are replaced, moved or swapped over, use the OnGuard Web Interface to correct the sensor zone assignments.

Main Unit: Serial Nr. 4
CO_2/PM Sensor: Serial Nr. 18, must be installed in Breathing Zone
CO_2/PM Sensor: Serial Nr. 19, must be installed in Return Air Zone
Display Pod: Serial Nr. 2

Figure 1: Excerpt from info sheet showing zone assignments

1.2 Default Access Credentials

Admin and Operator access credentials necessary for accessing user-specific functionality on the UI and Web Interface.

Default Access Credentials
The factory default configuration contains the following passwords, which can be changed in the OnGuard Web Interface (by the “admin” user). These credentials work for both the Display Pod and the Web Interface.

Minimal Privileges: Username “operator”, Password dr28
Full Privileges: Username “admin”, Password gn79

Web API, read-only: Username “api”, Password <Not Set, Inactive>

Figure 2: Excerpt from info sheet showing access credentials

1.3 Network Configuration

The OnGuard’s loaded network configuration.

Network Configuration
Your OnGuard unit supports Wired Ethernet and 2.4GHz WiFi, and currently the stand-alone WiFi Access Point connection is configured for automatic starting. You can change the network settings using the OnGuard Web Interface (or the Display Pod, which also lets you stop or start all connections).

WiFi Ethernet: Inactive
Address: Dynamic Address Assignment (DHCP)

WiFi Access Point: Autostarted at Boot
WiFi Net Name: bsafe_127a
WiFi Password: w94vhuuw
Address: Static Address 192.168.7.1, Netmask 255.255.255.0, No Gateway

WiFi Client: Inactive
WiFi Net Name: <Not Set, Inactive>
WiFi Password: <Not Set, Inactive>
Address: Dynamic Address Assignment (DHCP)

Figure 3: Excerpt from info sheet showing loaded Network Configuration

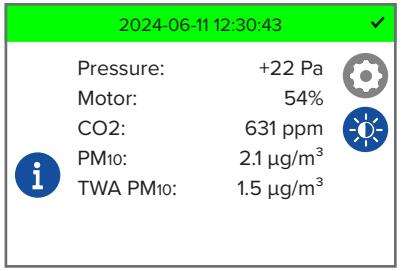
2.0 User Interface Instructions

2.1 Startup

While the OnGuard is initializing on startup, a loading bar will appear. This process should take 1-3 minutes.

2.2 Default Display

The OnGuard home screen displays sensor telemetry and control parameters. Access setting menus for configuration changes of the OnGuard.

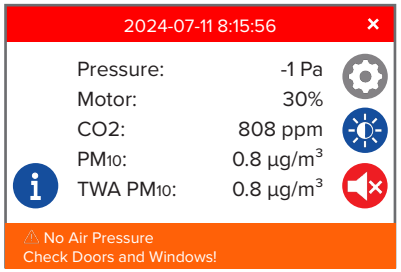


During normal operation, the OnGuard TS UI will display:

1. Cabin pressure (Pa)
2. Pressuriser motor speed (%)
3. Cabin CO2 concentration (PPM)
4. Cabin particulate matter (10 micron or less) mass concentration (µg/m3)
5. Time weighted average of the cabin PM10 mass concentration (µg/m3)

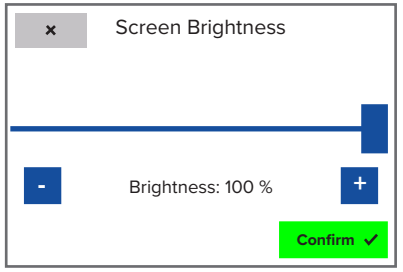
2.2.1 Alerts

While on the home screen, the OnGuard TS will have audio and visual alarms to alert users of events and exceedances that are detected by the monitoring system. During an event, a large field for the most critical alert will appear – colour coded with the severity level of alert. Current alert details can be viewed if the alert label is pressed. If there's an audio alert, a mute button will appear which will mute the alert. The top banner is also indicative of the status of the OnGuard.



2.3 Brightness

From the home display, the screen brightness menu can be access by pressing the brightness button. To increase the brightness, hold and slide the bar or use the + and – buttons to increase and decrease the screen brightness respectively.

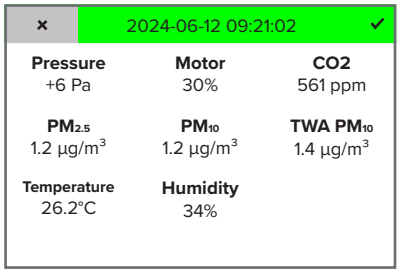


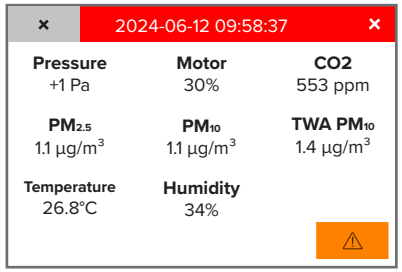
2.4 Full Information

The ‘Full Information’ button will direct the user to the dashboard page which will display full sensor information, providing more detailed telemetry than the default display.

The full telemetry page will display:

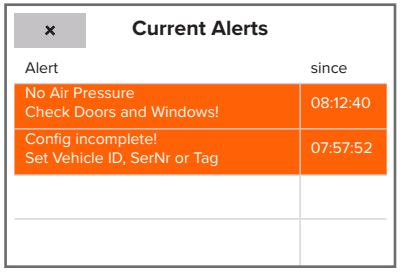
1. Cabin pressure (Pa)
2. Pressuriser motor speed (%)
3. Cabin CO2 concentration (PPM)
4. Cabin particulate matter (10 micron or less) mass concentration (µg/m3)
5. Cabin particulate matter (2.5 micron or less) mass concentration (µg/m3)
6. Time weighted average of the cabin PM10 mass concentration (µg/m3)
7. Temperature (°C)
8. Relative Humidity (%)





2.4.1 Current Alerts

The ‘Current Alerts’ page which will show current alerts, their details and start time. More details can be viewed by pressing on the alert label.



2.5 Action Menu

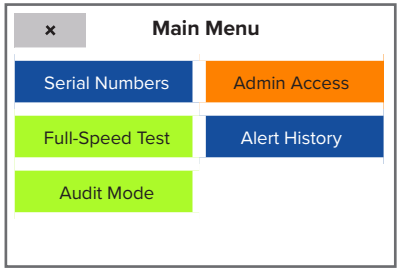
The action menu allows the user to gain access to the access-restricted menus by entering the admin/operator pin provided in the info sheet. Additionally, the action menu gives the user the options to:

- View serial numbers
- View complete alert history
- Perform the ‘Full-Speed Test’
- Enter the ‘Audit Mode’
- Access operator/admin menus
- Start/End shift for TWA

2.5.1 Access Operator / Admin Menus

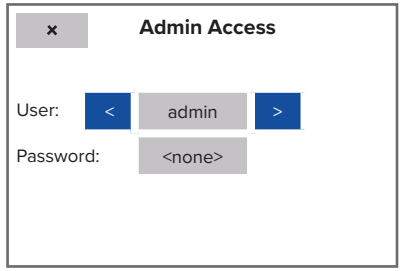
Press the ‘Admin Access’ button to enter the admin access menu. From here, select the ‘operator’ option to access the operator menu or, select the ‘admin’ option to access the admin menu. Once selected, enter the respective passwords for operator or admin access. While in the password entry screen, use the onscreen keyboard to enter the password and use the green enter button to confirm password.

Entering access credentials



Press the action menu button on the home screen.

Press the ‘Admin Access’ button.



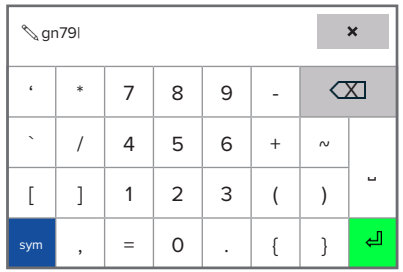
Select the respective credential level (admin or operator).
Press the input box beside ‘Password:’ and enter the respective access credentials. These are provided on the info sheet.

Default Access Credentials
The factory default configuration contains the following passwords, which can be changed in the OnGuard Web Interface (by the “admin” user). These credentials work for both the Display Pod and the Web Interface.

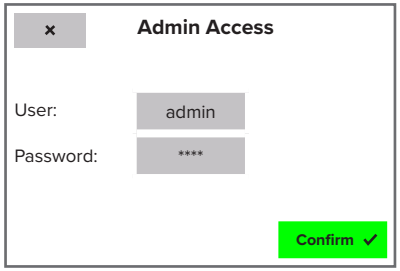
Minimal Privileges: Username “operator”, Password dr28
Full Privileges: Username “admin”, Password gn79

Web API, read-only: Username “api”, Password <Not Set, Inactive>

Figure 4: Excerpt from example information sheet showcasing access credentials



Press the enter button once the password has been entered.

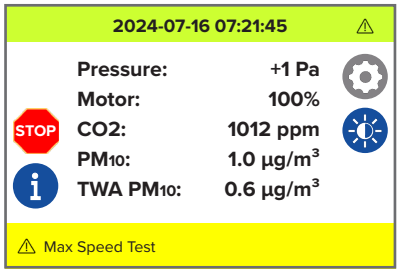


Press the ‘Confirm’ button to log in with the selected username and password.

2.5.2 Full-Speed Test

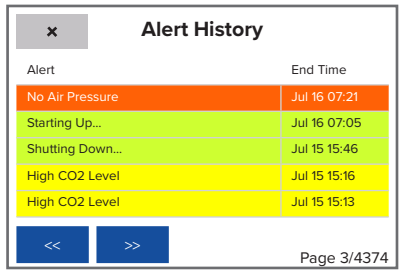
This test is primarily intended for commissioning purposes, as it allows the user to determine the maximum pressure that can be achieved in the cabin when the motor is running at 100% speed. Ensure the cabin door and windows are completely closed when running this test.

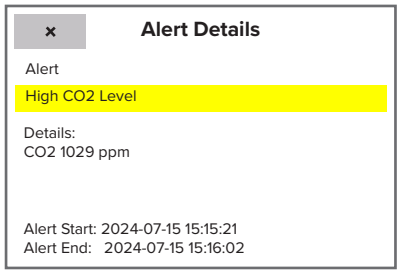
The test can be disabled by pressing the ‘stop test’ button on the home display.



2.5.3 Alert History

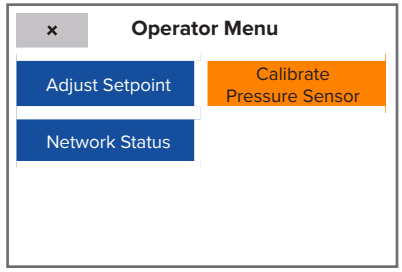
The alert history page displays all alerts that have occurred in the past and their end date/time - as well as ongoing alerts. Additional alert details can be viewed by pressing on the alert. The alerts are colour coded with severity level/type and can be configured on the web interface.





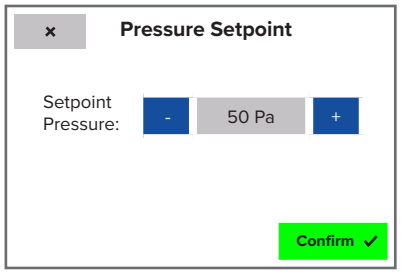
2.6 Operator Menu

When authenticated as 'operator', the user can adjust the pressure set point, recalibrate the pressure sensor and view the OnGuard's network status.



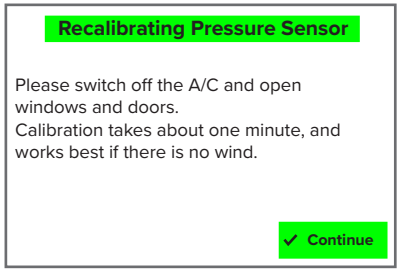
2.6.1 Adjust Setpoint

The 'Adjust Setpoint' menu allows the user to change the OnGuard's pressure setpoint. The setpoint defines the pressure that will be maintained by the OnGuard by adjusting the pressuriser motor speed. The default value for this is 50 Pa.



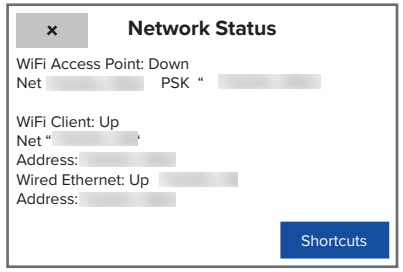
2.6.2 Calibrate Pressure Sensor

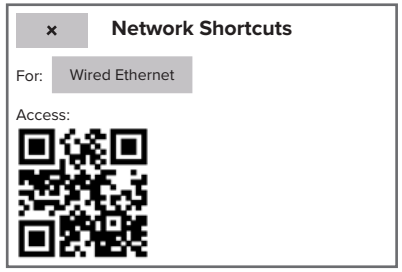
Activating the 'Calibrate Pressure Sensor' function will re-zero the pressure sensor to adjust for sensor drift over time and other factors that may have affected its zero point. It is critically important that the cabin door/windows are open when this function is activated, because finding the sensor offset requires the inside and outside pressure to be the same. Once completed, the pressure sensor will be re-calibrated and should show roughly zero Pa when the doors/windows are open.



2.6.3 Network Status

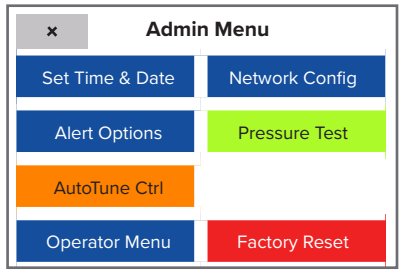
The ‘Net Status’ menu allows the operator to view which of the OnGuard’s network interfaces are connected and their configuration. This includes the Wi-Fi AP network name, password, and IP address (if Wi-Fi is supported), the Wi-Fi network name and assigned IP address if the Wi-Fi client is active, and the wired Ethernet network status and assigned IP address if it is active. Additionally, if the ‘Shortcuts’ button is pressed, QR codes of the active networks and their IP addresses are displayed. To cycle through the QR codes, press the button beside ‘For:’.





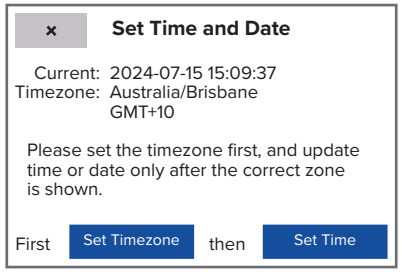
2.7 Admin Menu

When authenticated as `admin’, the UI allows the user to run ‘Autotune’ and ‘Pressure Test’ functions, configure the UI’s alerts, buzzer volume and types, access the operator menu and reset the OnGuard unit to factory defaults.



2.7.1 Set Time and Date

Allows the Admin to choose a time zone based on country and city, further configuration of the date and time can be chosen as well. Note, the OnGuard system will not overwrite already recorded data under any circumstances. If the time is adjusted backwards to a time where data has already been recorded, no new data will be recorded until the newly set time exceeds the timestamp of the newest record already in the database. For example, if you rewind the clock by one week, no new data will be recorded for one week.

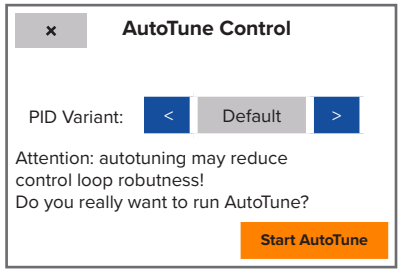


2.7.2 Auto-Tune Control

Auto tuning is an advanced feature that will only need to be used in special circumstances. Do not use unless instructed to by BreatheSafe support.

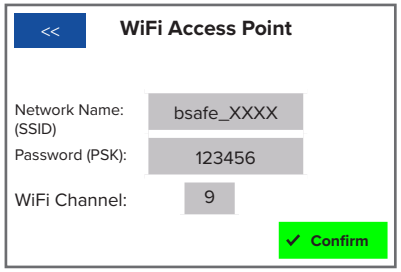
The OnGuard uses a PID control loop to adjust the motor speed to reach and maintain the setpoint pressure. This allows the OnGuard to be extremely reactive to pressure changes. The PID control loop’s effectiveness is dependent on the cabin size, leakage, and other parameters.

If the OnGuard’s motor adjustment is not working properly (for example, if the pressure and motor speeds fluctuate all the time), then using the ‘AutoTune’ function may be used to optimise the PID control loop. The ‘AutoTune’ function will run a pressure test to determine a relationship between speed and pressure, then produce a number of oscillation cycles to record the dynamic behaviour of the control loop and adjust the control parameters for your specific situation. It is critically important that the cabin door and windows are fully closed for the entire duration of the AutoTune operation.

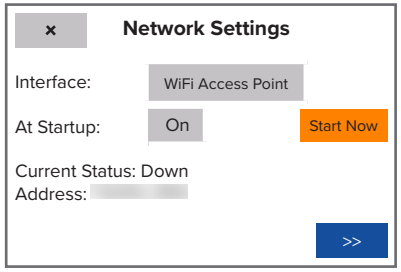


2.7.3 Network Config

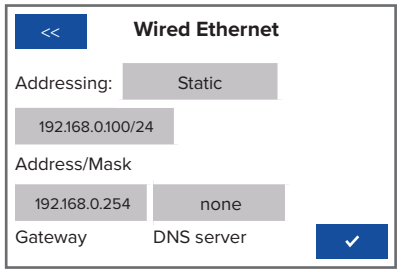
Allows the Admin to view which of the OnGuard's network interfaces are connected and their configuration. The Admin can also change the OnGuard's network configuration from this menu. Note all permanent changes to the network configuration won't be saved unless pressing 'Confirm' at the end of the configuration page.

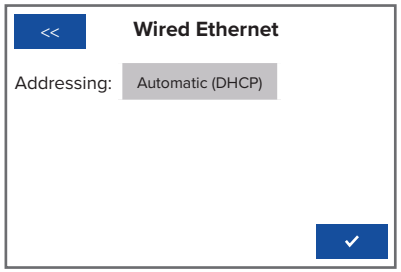


- Edit Wi-Fi Embedded Access Point (AP) network name, password and channel.
- Using the 'Start Now' function will cause the OnGuard to restart the Wi-Fi AP network.

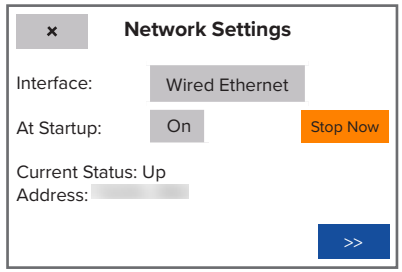


- Toggling 'At Startup' will disable/enable automatic start at boot for the Wi-Fi AP network.

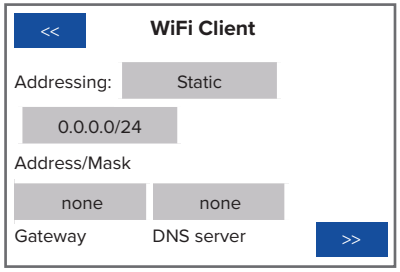


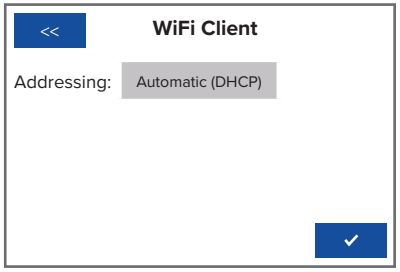


- Edit Wired Ethernet IP address/mask, gateway address and DNS server if static addressing is selected.

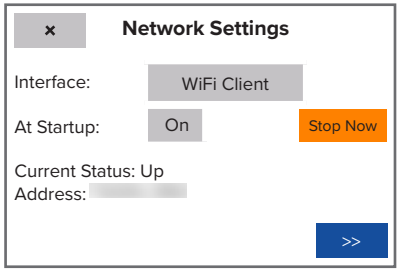


- Using the ‘Start Now’ function will cause the OnGuard to restart the wired Ethernet network.





- Toggling ‘At Startup’ will disable/enable automatic start at boot for the wired Ethernet network.
- Edit Wi-Fi Client IP address/mask, gateway address and DNS server if static addressing is selected.
- Using the ‘Start Now’ or ‘Stop Now’ function will cause the OnGuard to restart the connection to the Wi-Fi client or stop the network connection respectively.
- Toggling ‘At Startup’ will disable/enable automatic start at boot for the Wi-Fi STA network.

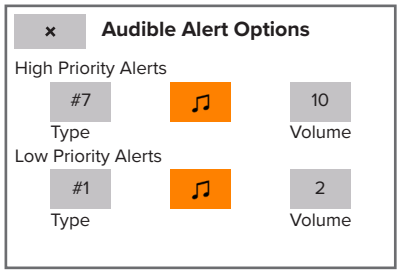


2.7.4 Pressure Test

The ‘Pressure Test’ function is used to determine if the cabin sealing is adequate. The motor is set to the minimum speed and stepped up periodically until either the Test Pressure is reached, or until the motor reaches full speed. If the Minimum Pressure percentage is not reached, a Test Failure alert is raised. By default, the pressure test will attempt to reach 250 Pa. This test will also run on every OnGuard startup.

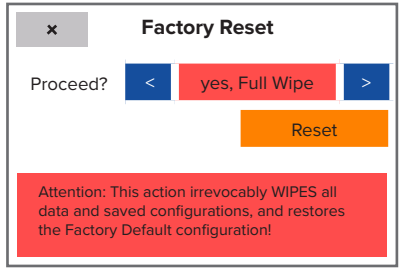
2.7.5 Alert Options

The ‘Alert Options’ menu allows the user to adjust the buzzer volume and buzzer type for Low Priority Alerts and High Priority Alerts, respectively. The selected buzzer type and volume can be played by pressing the orange note and muted by pressing it again.



2.7.6 Factory Reset

Activating ‘Factory Reset’ will wipe all recorded data and restore the OnGuard’s configuration to the factory defaults. This function will ask the user to confirm their choice before activating, by toggling from ‘no’ to ‘yes, Full Wipe’ and then confirming the action again by pressing the ‘Reset’ button, all recorded data is deleted, and all configuration adjustments are lost once a Factory Reset has been performed.



3.0 Web Interface

The OnGuard's web interface allows users to graphically view and download data, view the live status of the monitored cabin conditions and adjust the unit's configuration settings.
The web interface exposes the same settings as the UI and allows much more extensive (and comfortable) configuration of the OnGuard unit.

3.1 Permissions

Access to the Web interface will only be granted to a client that has provided a valid username and password. The credentials for accessing the web interface are the same as those for accessing the Operator and Admin menus on the UI, and 'admin' or 'operator' must be entered as the username and the respective pin must be entered as the password.

Access credentials (username and password) are discussed in section 1.

3.1.1 Operator

When authenticated as 'Operator', the client will only be able to access a limited amount of the OnGuard's telemetry. Specifically, the operator can only access charts of the last 7 days' of data (on the 'Live Charts' page) and view the unit's current status (on the 'Dashboard' page).

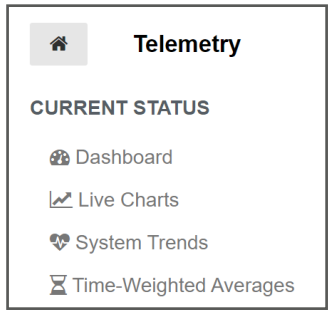


Figure 5: Excerpt from Operator's options on Web Interface

3.1.2 Admin

When authenticated as 'Admin', the client will be able to edit the OnGuard unit's configuration, restore the OnGuard to previous configurations (including the Factory Default), view the unit's status on the dashboard, view charts of all of the unit's recorded data without time restrictions and download any of the unit's recorded data and in various types of formats.

3.2 Connecting to the Web Interface

3.2.1 Network Connection

The OnGuard web interface is accessed via a network connection and works with any normal kind of web browser. The OnGuard supports 3 types of network connections; wired Ethernet, 2.4GHz Wi-Fi and can host a stand-alone Wi-Fi Access Point (AP).

Please refer to the 'OnGuard Network Description' document for a detailed description on how to connect to the OnGuard and configure its network settings. Examples of how to connect to the OnGuard AP and configuring the OnGuard to connect to site Wi-Fi are provided below.

3.2.2 How to Access the Web Interface using the Wi-Fi Access Point (AP)

1. Open any Web Browser from a 2.4GHz Wi-Fi capable device
2. On the device, connect to the Wi-Fi network being hosted by the OnGuard. The details of the OnGuard's AP are found on the Info sheet (example shown below). These details are also shown in 'Net Config' in the Admin menu on the OnGuard UI.

Network Configuration
Your OnGuard unit supports Wired Ethernet and 2.4GHz WiFi, and currently the stand-alone WiFi Access Point connection is configured for automatic starting. You can change the network settings using the OnGuard Web Interface (or the Display Pod, which also lets you stop or start all connections).

WiFi Ethernet: Inactive
Address: Dynamic Address Assignment (DHCP)

WiFi Access Point: Autostarted at Boot
WiFi Net Name: bsafe_127a
WiFi Password: w94vhuuw
Address: Static Address 192.168.7.1, Netmask 255.255.255.0, No Gateway

192.168.7.1

Figure 6: Excerpt from info sheet showing OnGuard's AP

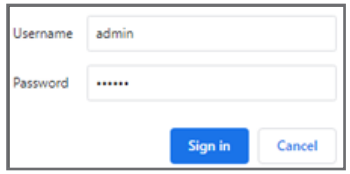
1. Enter the IP address of the OnGuard AP, 192.168.7.1, the AP address is the same for all OnGuard kits.
2. The client will be prompted to enter a username and password. These are the same access credentials as for the OnGuard UI. 'Admin' or 'operator' must be entered as the username and the respective pin must be entered as the password.

Default Access Credentials
The factory default configuration contains the following passwords, which can be changed in the OnGuard Web Interface (by the "admin" user). These credentials work for both the Display Pod and the Web Interface.

Minimal Privileges: Username "operator", Password dr28
Full Privileges: Username "admin", Password gn79

Web API, read-only: Username "api", Password <Not Set, Inactive>

Figure 7: Excerpt from info sheet showing access credentials



3.3 Live Charts

Live Charts is the OnGuard Web Interface's most powerful tool. It allows the user to graphically chart any of the data recorded by the OnGuard in any time period.

The 'Live Charts' page is accessed from the Home Page, under the 'Current Status' heading.

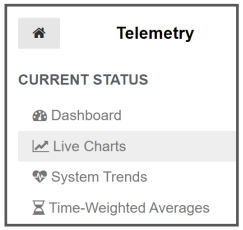


Figure 8: Excerpt from live charts on Web Interface

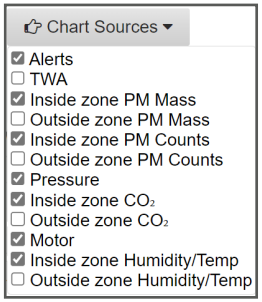
3.3.1 Data Sources

The Live Chart default setting is to display:

1. Pressure
2. Motor Load
3. Primary Sensor Pod Data (typically 'Breathing Zone')
4. Particulate Matter (PM) Concentration
5. PM Particle Counts
6. Humidity and Temperature

To change the selection of data sources, hover over 'Chart Sources' to see a pop-up menu with all available data sources, e.g. Particulate Matter (PM) Concentration, PM Particle Counts, Humidity and Temperature readings from the Return Air Sensor Pod.

If the OnGuard is configured for multiple Sensor Zones, the 'Chart Sources' menu will include options for each zone's sensor pods.



Once the preferred sources have been selected, click on the chart icon (top right) to refresh the charts display.

3.3.2 Adjusting Time Period of Charted Data

The period for which the data is charted can be selected using the date and time drop down on the top left of the page; by default, the charts span the last hour, and the maximum chartable period is two weeks.

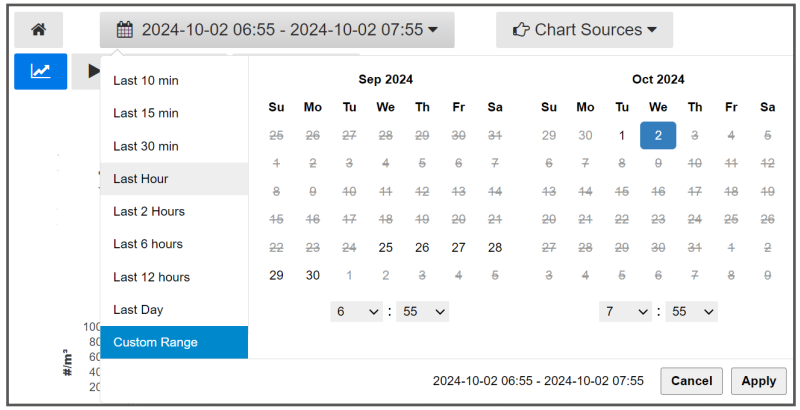


Figure 9: Adjusting the date and time on live charts on Web Interface

3.3.3 Live Display

Live Display can be toggled on and off using the play and stop buttons respectively.

In Live Display mode the chart of the selected data sources is refreshed periodically to show the latest data as it is recorded. Live Display mode is available for chart periods up to and including the last 2 hours.

3.4 Configuration: Admin Only

When authenticated as 'Admin', the client will be able to view and edit the unit's current configuration, save the current or previous configurations externally by downloading them, or restore the unit to a previous configuration (including the original factory default) by clicking 'Restore' next to the chosen configuration. Additionally, the client can wipe all recorded data from the unit and restore it to factory defaults by clicking 'Wipe and Factory Reset'.

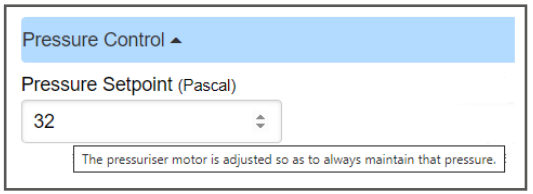
Warning: Clicking 'Wipe and Factory Reset' will **permanently** delete all data stored on the OnGuard unit.

Figure 10: Excerpt from Web Interface as Admin

Clicking on 'Edit' under 'Current Configuration' will allow the user to make changes to the unit's configuration. The available options are:

1. Connected Accessories: Rename, tag and/or reassign connect accessories (e.g. the sensors and UI).
2. Pressure Control: Adjust pressure set point.
3. Pressure Loss Alert: Adjust timing for pressure alarm.
4. CO_2 sensors: Enable alert and adjust thresholds for sensor.
5. Particulate Matter Sensor: Enable alert and adjust thresholds for sensor.
6. Audible Alert Options: Adjust alert types and volume.
7. Access Control: Change Operator pin, Admin pin and web API password.
8. Wi-Fi Embedded Access Point (AP): Configure the network name, password and other options for the AP hosted by the OnGuard.
9. Wi-Fi, Client Mode: Configure the OnGuard to join an external Wi-Fi network.
10. Ethernet: Configure the OnGuard's connection to a network via Ethernet (must be plugged in already).

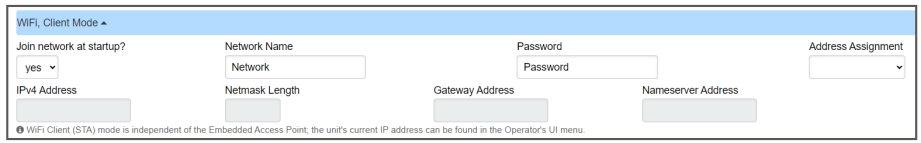
Note: Hovering the cursor over any adjustable parameter in the configuration will bring up a description of the parameter being edited.



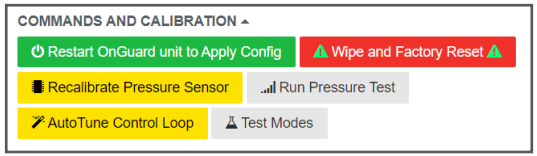
3.4.1 How to Configure the OnGuard to Connect to a Wi-Fi Network via the Web Interface

1. Connect to the web interface via the Access Point (See section 2.0).
2. Ensure client is logged in as 'Admin'.
3. Click 'Edit' under 'Current Configuration' heading.

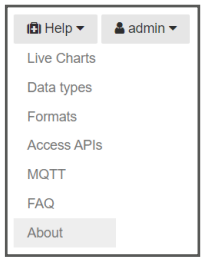
4. Scroll down to 'Wi-Fi, Client Mode'.



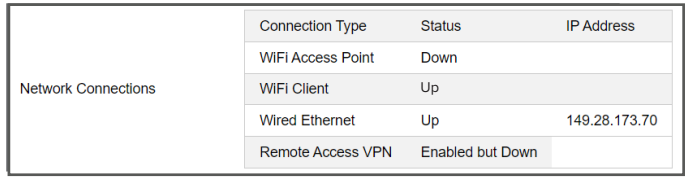
1. Enter the details of the network that the OnGuard will connect to under ‘Network Name’ and ‘Password’.



2. Click ‘Save Changes’.
3. Click ‘Restart OnGuard unit to Apply Config’.



4. Once the OnGuard has restarted, reconnect to the web interface via the AP.
5. Navigate to ‘Help’ -> ‘About’.
6. Verify the OnGuard has successfully connected to the Wi-Fi network by checking that ‘Wi-Fi’ Client’ is ‘Up’ and has an IP Address assigned. If the status of the Wi-Fi is ‘Down’, manually restart the OnGuard Main Unit by powering it off and then powering it back on after 10 seconds.
7. The OnGuard web interface can now be accessed on this network by navigating to the IP address displayed next to ‘Wi-Fi Client’ (as below example) on any normal web browser.



Network Connections

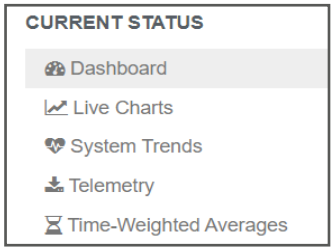
Connection Type	Status	IP Address
WiFi Access Point	Down	
WiFi Client	Up	
Wired Ethernet	Up	149.28.173.70
Remote Access VPN	Enabled but Down	

Troubleshooting

1. If the network status in step 10 shows ‘Wi-Fi Client: Down’, the OnGuard has not successfully connected to the network.
2. Verify all network details were entered correctly in step 5.
3. Restart the OnGuard by powering off the Main Unit for 10 seconds.
4. Once the OnGuard has restarted, return to step 10.

3.5 Dashboard

The ‘Dashboard’ page is accessed from the Home Page, under the ‘Current Status’ heading.
The dashboard displays the live status of all key parameters that the OnGuard is monitoring. This interface allows the user to check the state of the unit, the environment and be alerted of any threshold exceedances or system faults, at a single glance: The dashboard uses a traffic light system to indicate the status of each parameter. Green indicates the parameter is within the defined thresholds, amber indicates the parameter is trending towards an alert, and red indicates an active alert. Warnings and Alerts (amber and red) usually will be displayed with a brief message that describes the cause of the warning.



3.6 Telemetry: Admin Only

The telemetry page allows an 'Admin' authenticated user to download data recorded by the unit in various formats.

Figure 11: Dashboard excerpt from Web Interface

Figure 12: Telemetry page from Web Interface

3.6.1 Current Status

Dashboard: Takes user to the dashboard (see 3.3 Dashboard).
Live Charts: Takes user to the data charting page (see 3.5 Live Charts)

3.6.2 Complete Data

Complete SQLite Database: Downloads the latest recorded complete SQLite Database. This function will serve the most recent 1GB of data recorded.

- Complete Long-Term SQLite Database: Downloads complete SQLite Database from all time.
- Board and Sensor IDS (CSV): Downloads historic identifier data in CSV format.
- Alerts (CSV): Downloads historic alert data in CSV format.
- Commands and Activities (CSV): Downloads historic commands and activity data in CSV format.
- See 'Help' -> 'Formats' for more information about the data formats used.

3.6.3 Last Hour, Last Day, Last Week, Last Fortnight, Last Month

The rightmost section of the telemetry page allows the user to download data according to their category (Particulate matter, pressure etc.) in discrete time slots of the last hour, last day and last week of recorded data. For example, clicking 'Pressure and Motor Load' under 'Last Day' will download a .CSV file containing all recorded pressure and motor load data over the last 24 hours.

Additionally, the user has the option to download all recorded in the last day, last week, last fortnight or last month in SQLite Database format.

3.7 Using SQLite Database Files: OnGuard Online Visualisation Tool

BreatheSafe hosts a free online service built for visualising data downloaded from OnGuard units. https://view.breathe-safe.com/

This service allows anyone to upload SQLite database files downloaded from any OnGuard and visualise the uploaded data in the same format as the 'Live Charts' page on the OnGuard Web Interface (See Section 3.3).

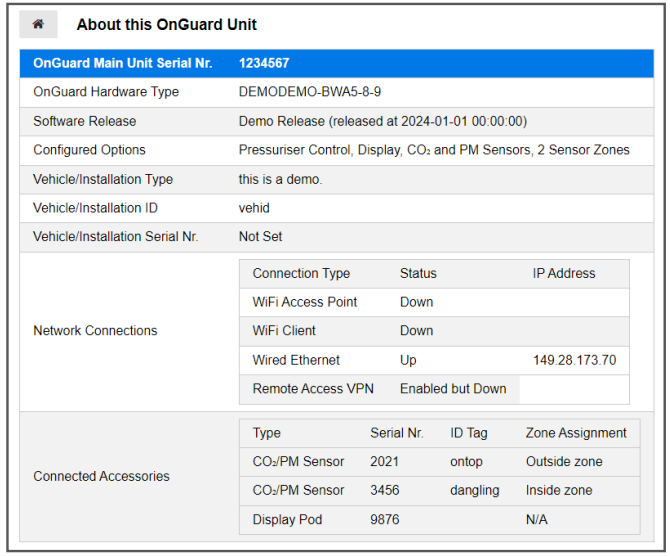
The user is provided with a unique page address for each uploaded database, allowing them to share the visualised data with anyone, anywhere.

3.8 Data Types and Measurement Details

Navigating to ‘Help’ -> ‘Data Types’ will provide the user with a detailed description of every data type collected by the OnGuard. This page is especially helpful if downloading data in .CSV format, as it will help the user find the identifier used for every data type and their description.

3.9 About

Navigating to ‘Help’ -> ‘About’ will provide the user with information specific to the particular OnGuard’s hardware and configuration. This page can assist in the post-installation/initial start-up of an OnGuard, as it lets the user verify that all expected peripherals are connected properly and are reporting data to the OnGuard.



About this OnGuard Unit

OnGuard Main Unit Serial Nr.	**1234567**
OnGuard Hardware Type	DEMODEMO-BWA5-8-9
Software Release	Demo Release (released at 2024-01-01 00:00:00)
Configured Options	Pressuriser Control, Display, CO_2 and PM Sensors, 2 Sensor Zones
Vehicle/Installation Type	this is a demo.
Vehicle/Installation ID	vehid
Vehicle/Installation Serial Nr.	Not Set

Network Connections

Connection Type	Status	IP Address
WiFi Access Point	Down	
WiFi Client	Down	
Wired Ethernet	Up	149.28.173.70
Remote Access VPN	Enabled but Down	

Connected Accessories

Type	Serial Nr.	ID Tag	Zone Assignment
CO_2/PM Sensor	2021	ontop	Outside zone
CO_2/PM Sensor	3456	dangling	Inside zone
Display Pod	9876		N/A

Figure 13: About page from Web Interface