

Respimatic 100

An Affordable, Robust Emergency Respiration Assist Device



Web Applications Operating Manual

Table of Contents

Introduction.....	3
Setting up Wi-Fi credentials.....	3
Entering Patient Information	6
Launching the WEB Apps.....	8
WEB Dashboard.....	10
Dashboard Snapshots View	11
Dashboard Charts View	12
Dashboard Statistics View.....	14
Dashboard Alerts View.....	15
Dashboard Breath Shapes View	16
Dashboard Recording	17
WEB Analyzer.....	18
Analyzer Sidebar Menu	18
Analyzer Session Selector.....	19
Analyzer Range Slider.....	20
Analyzer Session Import Export.....	21
Analyzer Charts, Statistics, Breath Shapes and Alerts Views	21
FiO ₂ Calculator	22

Table of Figures

Figure 1: Enable/Disable Wi-Fi login	3
Figure 2: Wi-Fi Autoconnect.....	4
Figure 3: Connect to Respimatic W-Fi network.....	4
Figure 4: Wi-Fi Configuration Portal	5
Figure 5: Wi-Fi Login Successful	5
Figure 6: Connect to Respimatic Patient network.....	6
Figure 7: Respimatic Patient Portal.....	6
Figure 8: Web Apps Main Menu	8
Figure 9: Respimatic Systems Table	8
Figure 10: Respimatic Documentation.....	9
Figure 11: Dashboard Menu	10
Figure 12: Breath Range Selector.....	10
Figure 13: Dashboard Snapshots View.....	11
Figure 14: Dashboard Charts View.....	12
Figure 15: Charts Edit Menu.....	13
Figure 16: Dashboard Statistics View.....	14
Figure 17: Dashboard Alerts View.....	15
Figure 18: Breath Detailed Pressure Graphs.....	16
Figure 19: Breath Type Menu.....	16
Figure 20: Dashboard Recording View.....	17
Figure 21: Analyzer Sidebar Menu	18
Figure 22: Analyzer Selector Table.....	19
Figure 23: Selector Table after selection.....	20
Figure 24: Analyzer Range Slider	20
Figure 25: Analyzer Import View.....	21
Figure 26: FiO2 Calculator.....	22

Introduction

In addition to the front panel, Respimatic 100 provides the ability to remotely monitor all respiration sessions via a WEB dashboard. Doctors and technicians can use the dashboard to connect to any Respimatic system using a unique system ID embedded in each system. This feature is useful to enable a remote specialist to observe the key system and patient parameters during a session and suggest a course of action for the local practitioners.

A brief overview of the process is as follows.

1. There must be a Wi-Fi network at the site where the Respimatic system is deployed. If required, use a 4G/5G dongle to establish a Wi-Fi network. One dongle can serve multiple systems at the same site at the same time.
2. There must be Wi-Fi or wired internet at the monitoring site.
3. Enable WEB dashboard monitoring on the Respimatic system.
4. Allow the Respimatic system to log on to the Wi-Fi network.
5. Visit the provided URL at the monitoring site.
6. Pair the WEB dashboard at the monitoring site with the Respimatic at the deployment site using the Respimatic System Unique ID.
7. WEB Dashboard allows monitoring only. It does not permit remote control of the system.

A blue rectangular screen with white pixelated text that reads: "Enable Remote WEB Dashboard via Wi-Fi (YES or NO) ?".

Figure 1: Enable/Disable Wi-Fi login

During the start-up sequence, the system gives an option to enable or disable remote monitoring for the system. Once enabled, the system guides the user to set up the remote WEB Apps.

Setting up Wi-Fi credentials

Respimatic system remembers the history of prior Wi-Fi networks that have been used by the system. The user is provided with an option to either auto-connect to a previously known Wi-Fi network or to configure a new one. If desired, the recorded Wi-Fi history can be erased at this time.

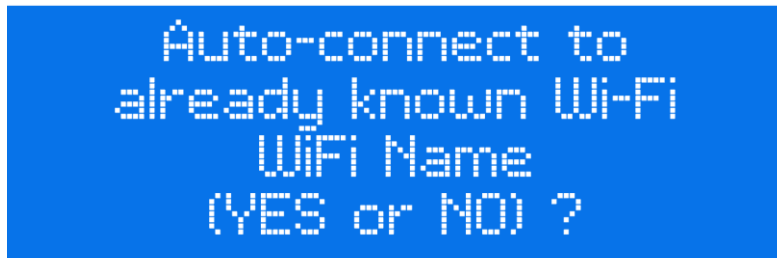


Figure 2: Wi-Fi Autoconnect

If Auto-connect is not enabled or if Auto-connect fails, the next option is to use a configuration portal to setup a new Wi-Fi network for the system to log in to. To enable login through a configuration portal, the system sets up a local, temporary Wi-Fi network named "Respimatic Wi-Fi". The user can choose to use either a wifi-enabled laptop or smartphone to log on to this network.

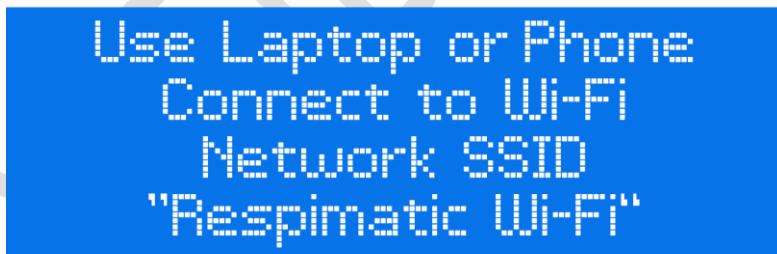
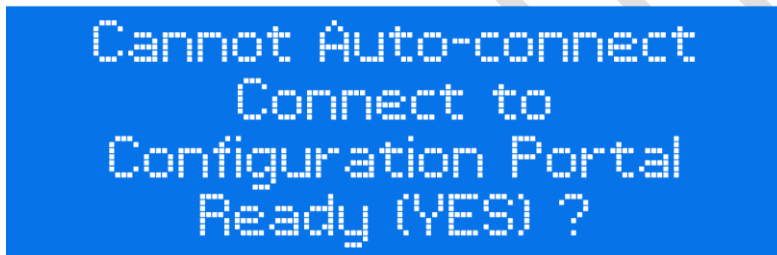
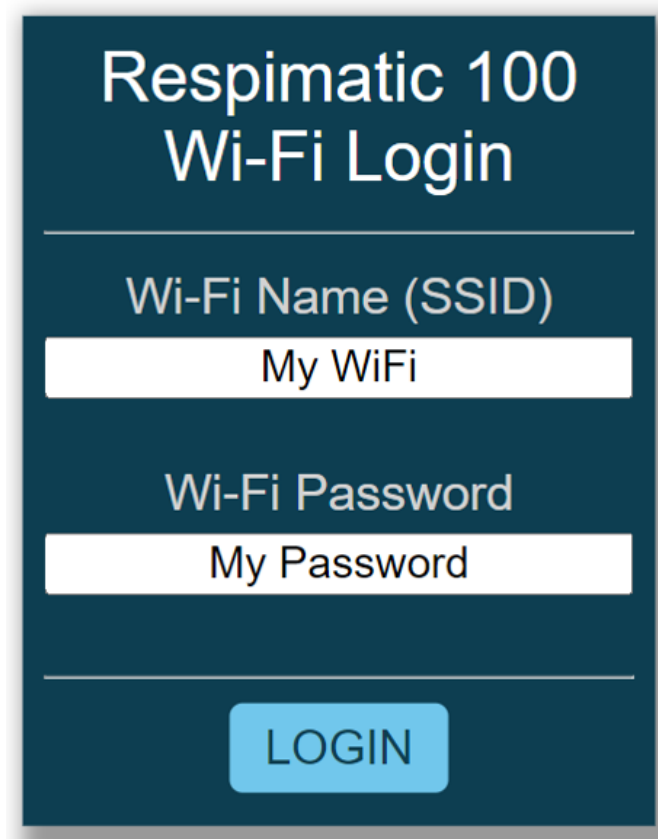


Figure 3: Connect to Respimatic W-Fi network

Upon login to this "Respimatic Wi-Fi" network, a portal screen is automatically presented on the laptop or the smartphone which guides the user step-by-step to enabling system to login to a desired Wi-Fi network. Choose from the list of available networks or manually enter the name of the network that the system should log in to. The portal time out in 3 minutes if unable to log on for whatever reason. If the system times out, the user can retry as many times as desired.

A dark blue login screen for the Respimatic 100 device. At the top, the text 'Respimatic 100' and 'Wi-Fi Login' is displayed in white. Below this is a horizontal line. The next section is labeled 'Wi-Fi Name (SSID)' in white, followed by a white input field containing the text 'My WiFi'. Below that is another section labeled 'Wi-Fi Password' in white, followed by a white input field containing the text 'My Password'. At the bottom, there is a light blue button with the word 'LOGIN' in dark blue capital letters.

Respimatic 100
Wi-Fi Login

Wi-Fi Name (SSID)

My WiFi

Wi-Fi Password

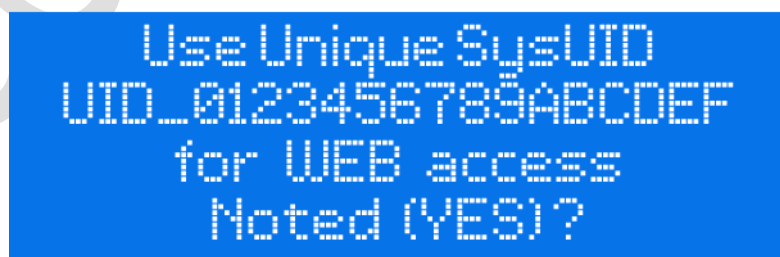
My Password

LOGIN

Figure 4: Wi-Fi Configuration Portal

If the Wi-Fi login was unsuccessful, the user can still continue without enabling a WEB dashboard.

Upon a successful Wi-Fi login, the system is now ready to be connected to the WEB Apps using the unique system id (SYSUID). The SYSUID is a 20 character string starting with the prefix "RSP_" followed by 16 hexadecimal digits.

A blue rectangular box with white text. The text is arranged in five lines: 'Use Unique SysUID', 'UID_0123456789ABCDEF', 'for WEB access', and 'Noted (YES)?'.

Use Unique SysUID
UID_0123456789ABCDEF
for WEB access
Noted (YES)?

Figure 5: Wi-Fi Login Successful

Entering Patient Information

After a successful Wi-Fi login, the user is presented an opportunity to enter patient information for record-keeping. This information is later prominently displayed on the WEB Dashboard.

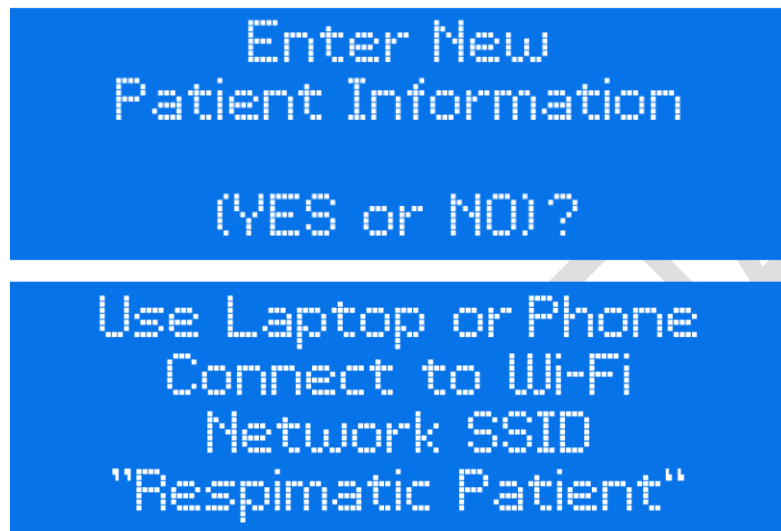


Figure 6: Connect to Respimatic Patient network

The image shows a dark blue mobile application interface for entering patient details. The form is titled 'ENTER PATIENT DETAILS' and contains three main sections. The first section, 'Patient name', has two input fields containing 'Jane' and 'Doe'. The second section, 'AGE (Years) & Gender', has a numeric input field with '68' and radio buttons for 'Male' and 'Female', with 'Female' selected. The third section, 'Patient ID TAG', has an input field containing 'JD-123'. At the bottom of the form is a light blue 'SUBMIT' button. A large, faint 'CONFIDENTIAL' watermark is visible across the background of the form.

Figure 7: Respimatic Patient Portal

To enter new patient information, the user must use a laptop or a smart phone to connect to a Wi-Fi network named "Respimatic Patient". Upon login to this network a patient information form is presented to fill out. The "Patient ID" field is a placeholder for whatever format the facility uses to identify patients. Respimatic system treats it as a simple string.

After form submission, the next browser screen presents an opportunity to confirm or edit again before the system saves the entered information as patient details. This patient information is available and used till the next time a new patient's details are entered.

CONFIDENTIAL

Launching the WEB Apps

<https://www.respimatic.com>

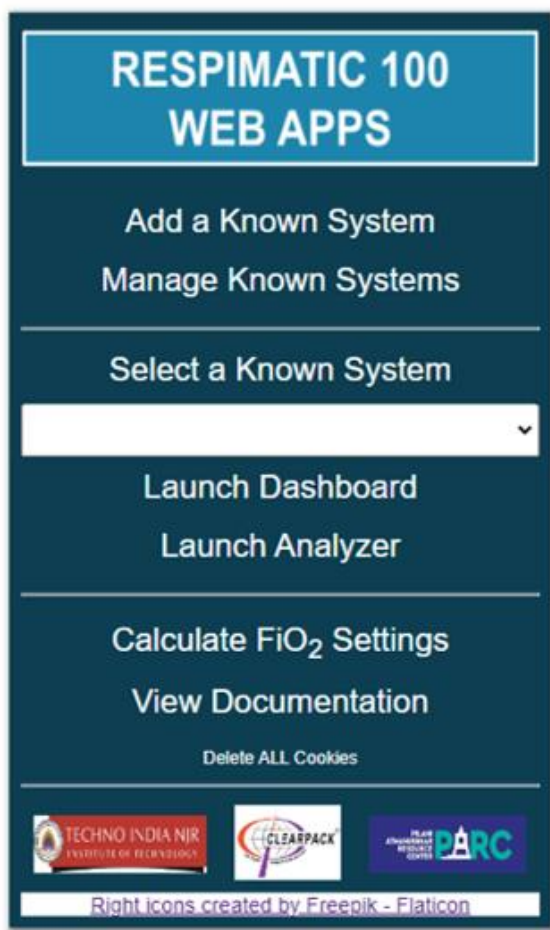


Figure 8: Web Apps Main Menu

System Tag	System UID	Actions
BANGALORE	UID_28615E07D6013C4A	✓
DELHI	UID_28CFE43C4D200184	✓
UDAIPUR	UID_28B1A879A2010387	✓

Figure 9: Respimatic Systems Table

IMPORTANT

Use CTRL key and +/- keys to zoom in/out
or hold down the CTRL key and use the mouse wheel to zoom in/out
till the content fits well in the browser screen.

The screenshot above on the left is the main menu while the screenshot on the right above is the Systems Table.

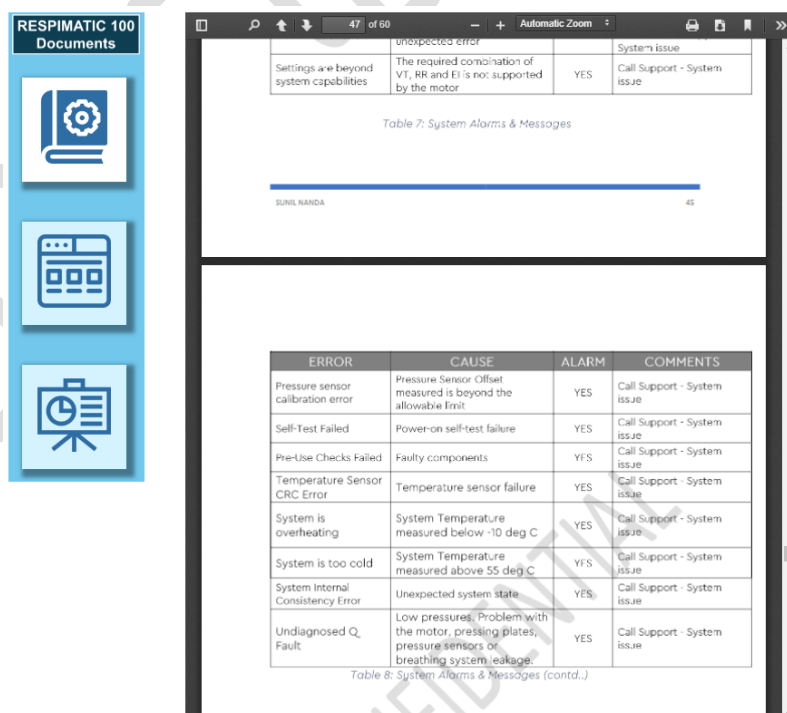
Each unique system id (SYSUID) of the Respimatic 100 systems can be associated with an easy to remember name tag. The browser remembers the history of all the SYSUIDs that have been used and presents them in the dropdown list in the main menu box above.

The table of name tags and associated SYSUID (Systems Table) is accessed through the "Manage Known Systems" button. The + menu button on the Systems Table adds a system. To select a system to communicate with either double click on the appropriate row or use the checkmark button against the row. A system can be removed from the table using the trash menu button in the appropriate row. The trash button on the top right removes all system information. The systems table can also be exported as a JSON xml file and can be imported from a JSON xml file by clicking the appropriate icons on the table banner.

Finally, the back arrow menu button on the top left can be used to navigate back to the main menu.

The following WebApps are available via the links on the main menu.

- **Launch Dashboard** - Monitor a session remotely. It requires a SysUID to be selected to determine the Respimatic system to connect to.
- **Launch Analyzer** - Analyse a previously recorded session. It requires a SysUID to be selected to determine the Respimatic system to connect to.
- **Calculate FiO2 Settings** - Calculate required Oxygen inflow rate. It does not require a SysUID.
- **View Documentation** - All the pdf documents are accessible through this link. It does not require a SysUID. If a "PDF Viewer" extension is loaded in your browser the documents can be read online or else, they can be downloaded. Figure below is a screenshot of the documents page/

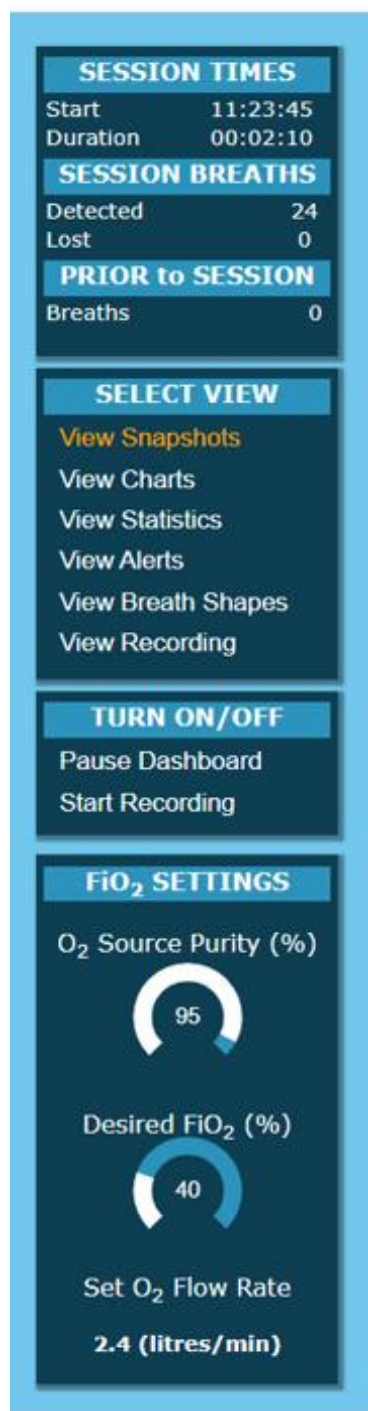


Respimatic 100 Operating Manual

Figure 10: Respimatic Documentation

WEB Dashboard

The live WEB dashboard, when connected, offers a choice of six different views. The user can switch between these views at any time. Figure below shows the sidebar for the dashboard.



The box on the top shows some relevant summary data for the current session.

The next box allows for selecting the type of view to display. Available views are as below.

1. Snapshots view
2. Charts view
3. Statistics view
4. Alerts view
5. Breath Shapes View
6. Recording View

The next box allows for turning on/off session recording and dashboard updates. Pausing dashboard updates only stops the display from updating, fresh data continues to get collected and will get displayed once the 'Pause Dashboard' is turned OFF.

The box at the bottom displays all FiO₂ related settings. These settings are only for monitoring, the user must use the physical system's control panel to change these settings like all other settings.

The Figure below shows a Slider that can be used to select the range of breath numbers to display the required data for. The breath number range can be selected by grabbing the slider handles and sliding then to the required breath numbers. The range can then be committed using the checkmark button. Once committed the display is frozen to the selected range. The rolling button on the extreme left discards the selected range and enables a fresh display update on each new breath. The double arrow button selects the entire range and freezes the display to that.

Figure 11: Dashboard Menu



Figure 12: Breath Range Selector

Dashboard Snapshots View

Below is a screenshot of the WEB Dashboard "Snapshots View". All the Respiratic parameters, both input and output, are presented on the dashboard for easy viewing as a cohesive whole.

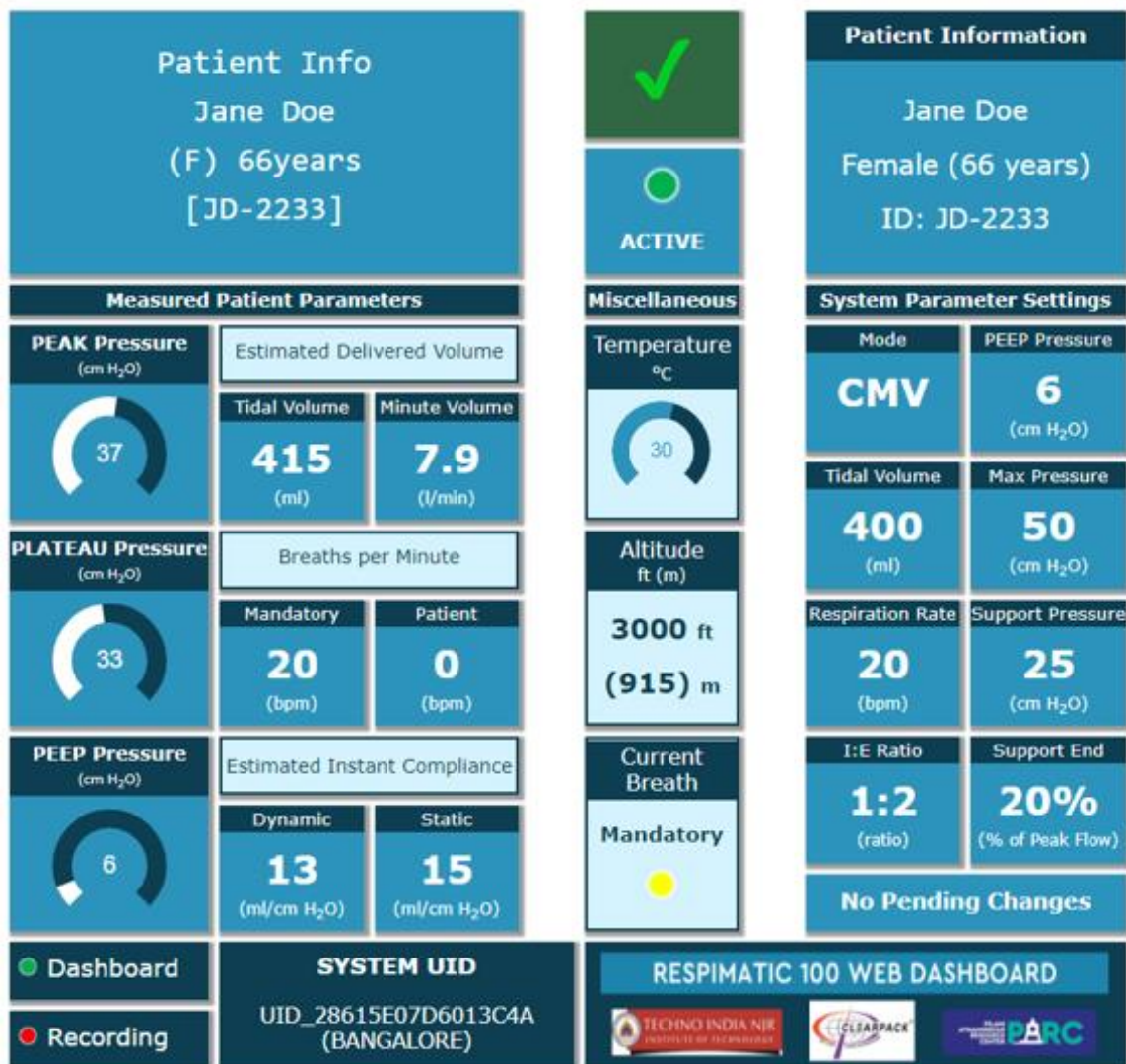


Figure 13: Dashboard Snapshots View

Note that for safety reasons, the Dashboard only allows monitoring of a remote system. The dashboard cannot be used to control the remote system. That must be done using the front panel of the physical Respimatic system.

Dashboard Charts View

The Dashboard also provides an option for a "Charts View". A screenshot of the charts view is shown below. This screenshot shows three chart boxes. A chart box can be added at any time using the + menu button on the top left of the chart box. Use the trash menu button on the top right to delete a chart box.

The parameters to chart can be selected using the checkboxes on the edit menu. The edit menu button is also on the top right of each chart box. The charts are updated after every breath. The X-axis can be selected as breath number or as elapsed time between breaths.

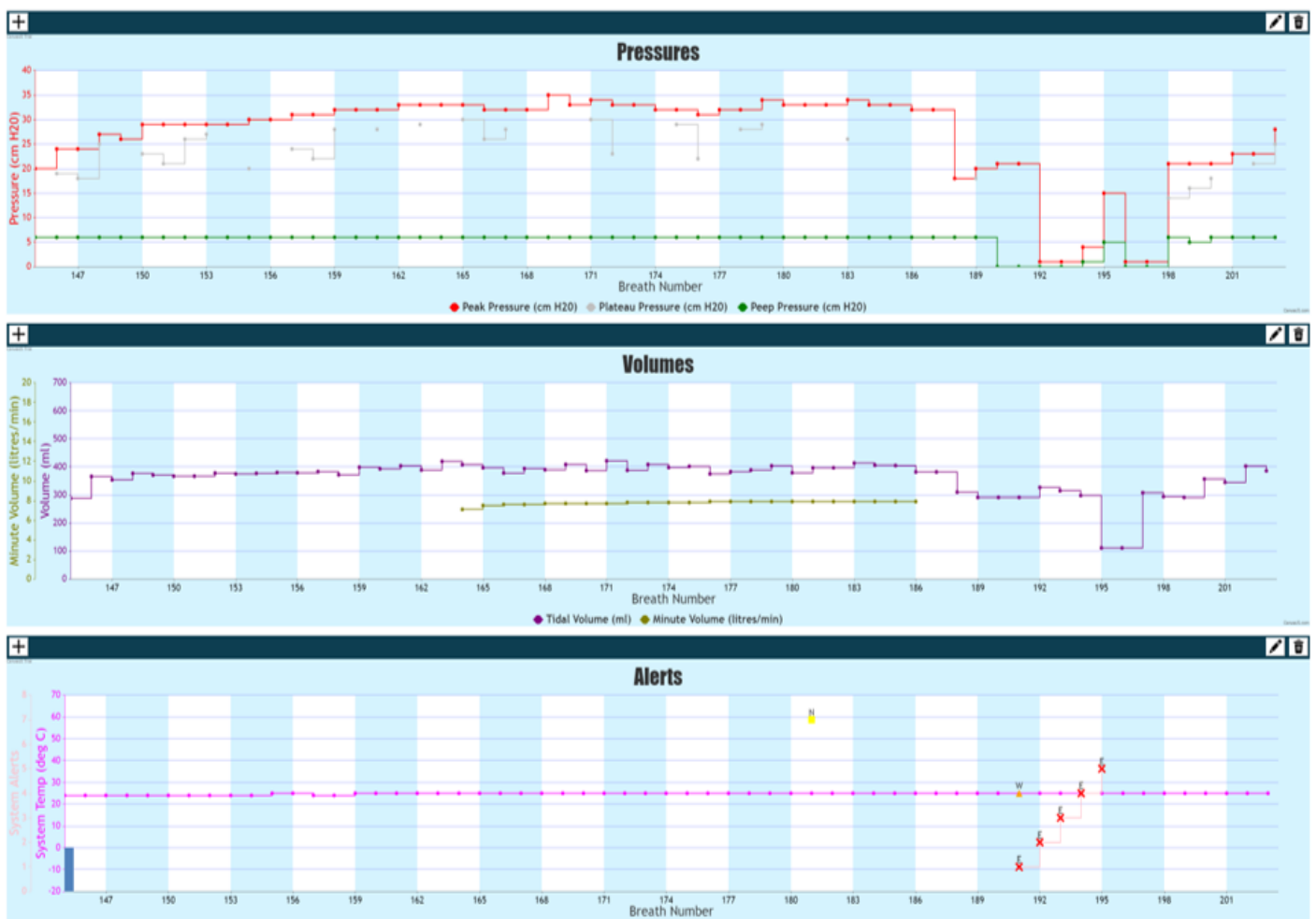


Figure 14: Dashboard Charts View

By default, the system charts the selected parameters for the past 60 breaths on a rolling basis, the charts are updated after each breath.

There is a Range Slider above the chart boxes to pan or zoom to any desired range of breath numbers. Use the handles on the Slider to select a particular range. If a particular

range is selected, further chart updates are disabled till the range is reset using the RESET button on the range slider, the new parameter values are still stored for later display. Upon RESET, the chart boxes return to their default display mode.

The chart box edit menu is shown below. Any collection of the shown parameters can be displayed in any chart box or in multiple chart boxes.

Title

Y-axis Parameters

- ☐ Pressures
 - ☐ Peak Pressure
 - ☐ Plateau Pressure
 - ☐ PEEP Pressure
- ☐ Volumes
 - ☐ Tidal Volume
 - ☐ Minute Volume
- ☐ Breaths Information
 - ☐ Mandatory BPM
 - ☐ Spontaneous BPM
 - ☐ Mandatory/Spontaneous/Error
- ☐ Instant Lung Compliances
 - ☐ Instant Dynamic Lung Compliance
 - ☐ Instant Static Lung Compliance
- ☐ Oxygen Related
 - ☐ FiO2
 - ☐ Incoming Oxygen Flow Required
 - ☐ Incoming Oxygen Purity
- ☐ Miscellaneous
 - ☐ System Errors
 - ☐ System Warnings
 - ☐ System Notifications
 - ☐ System Temperature

X-axis Units

☒ Breath Number ☐ Breath Times

Figure 15: Charts Edit Menu

Dashboard Statistics View

The Dashboard also provides an option for a "Statistics View". A screenshot of the statistics view is shown below.

The statistics are collected for the entire range updated after every breath by default. The range slider can be used to gather statistics for any range of breath numbers. The RESET menu button on the range slider causes the updates and display to go back to their default mode.

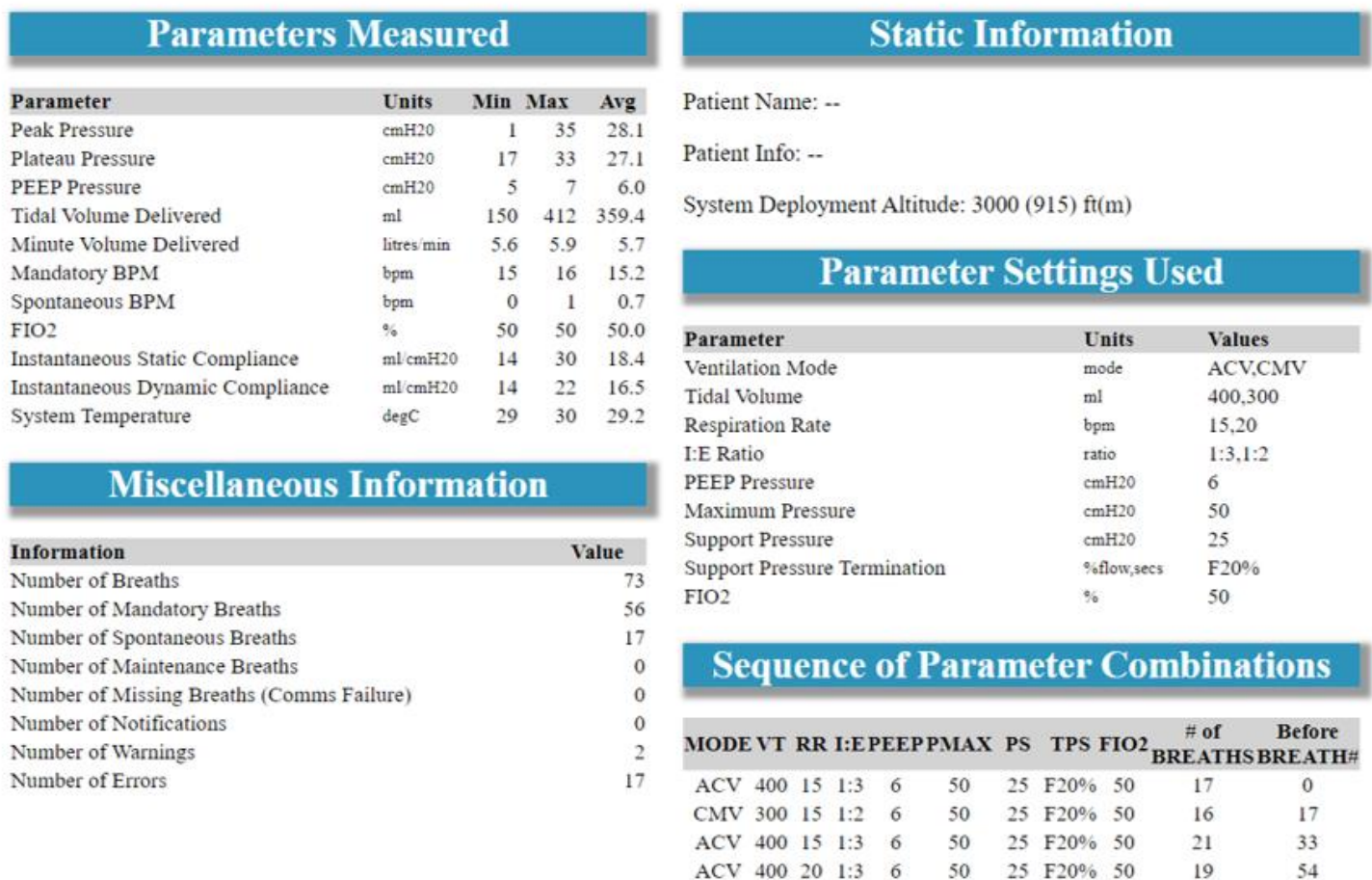
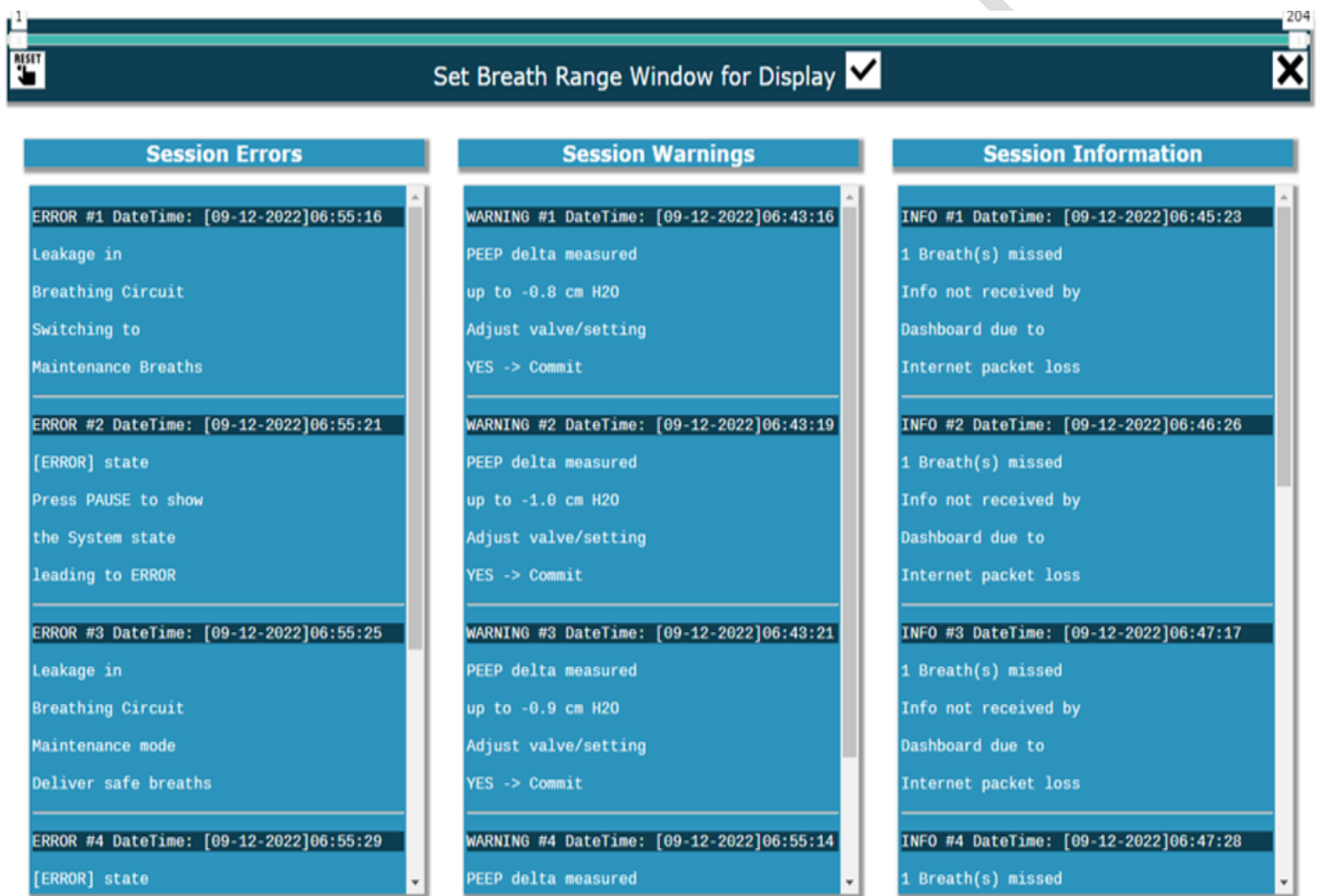


Figure 16: Dashboard Statistics View

Dashboard Alerts View

The Dashboard also provides an option for a "Alerts View". A screenshot of the alerts view is shown below.

By default, it displays the complete history of errors and warnings encountered in the current session. The range slider on top can be used to see the alerts for any range of breath numbers. The RESET menu button causes the updates to go back to their default mode.



Session Errors

- ERROR #1 DateTime: [09-12-2022]06:55:16
Leakage in Breathing Circuit
Switching to Maintenance Breaths
- ERROR #2 DateTime: [09-12-2022]06:55:21
[ERROR] state
Press PAUSE to show the System state leading to ERROR
- ERROR #3 DateTime: [09-12-2022]06:55:25
Leakage in Breathing Circuit
Maintenance mode
Deliver safe breaths
- ERROR #4 DateTime: [09-12-2022]06:55:29
[ERROR] state

Session Warnings

- WARNING #1 DateTime: [09-12-2022]06:43:16
PEEP delta measured
up to -0.8 cm H2O
Adjust valve/setting
YES -> Commit
- WARNING #2 DateTime: [09-12-2022]06:43:19
PEEP delta measured
up to -1.0 cm H2O
Adjust valve/setting
YES -> Commit
- WARNING #3 DateTime: [09-12-2022]06:43:21
PEEP delta measured
up to -0.9 cm H2O
Adjust valve/setting
YES -> Commit
- WARNING #4 DateTime: [09-12-2022]06:55:14
PEEP delta measured

Session Information

- INFO #1 DateTime: [09-12-2022]06:45:23
1 Breath(s) missed
Info not received by Dashboard due to Internet packet loss
- INFO #2 DateTime: [09-12-2022]06:46:26
1 Breath(s) missed
Info not received by Dashboard due to Internet packet loss
- INFO #3 DateTime: [09-12-2022]06:47:17
1 Breath(s) missed
Info not received by Dashboard due to Internet packet loss
- INFO #4 DateTime: [09-12-2022]06:47:28
1 Breath(s) missed

Figure 17: Dashboard Alerts View

Dashboard Breath Shapes View

The Dashboard also provides an option to view the detailed pressure graphs for selected breaths. Figure below shows a sample of such a view.

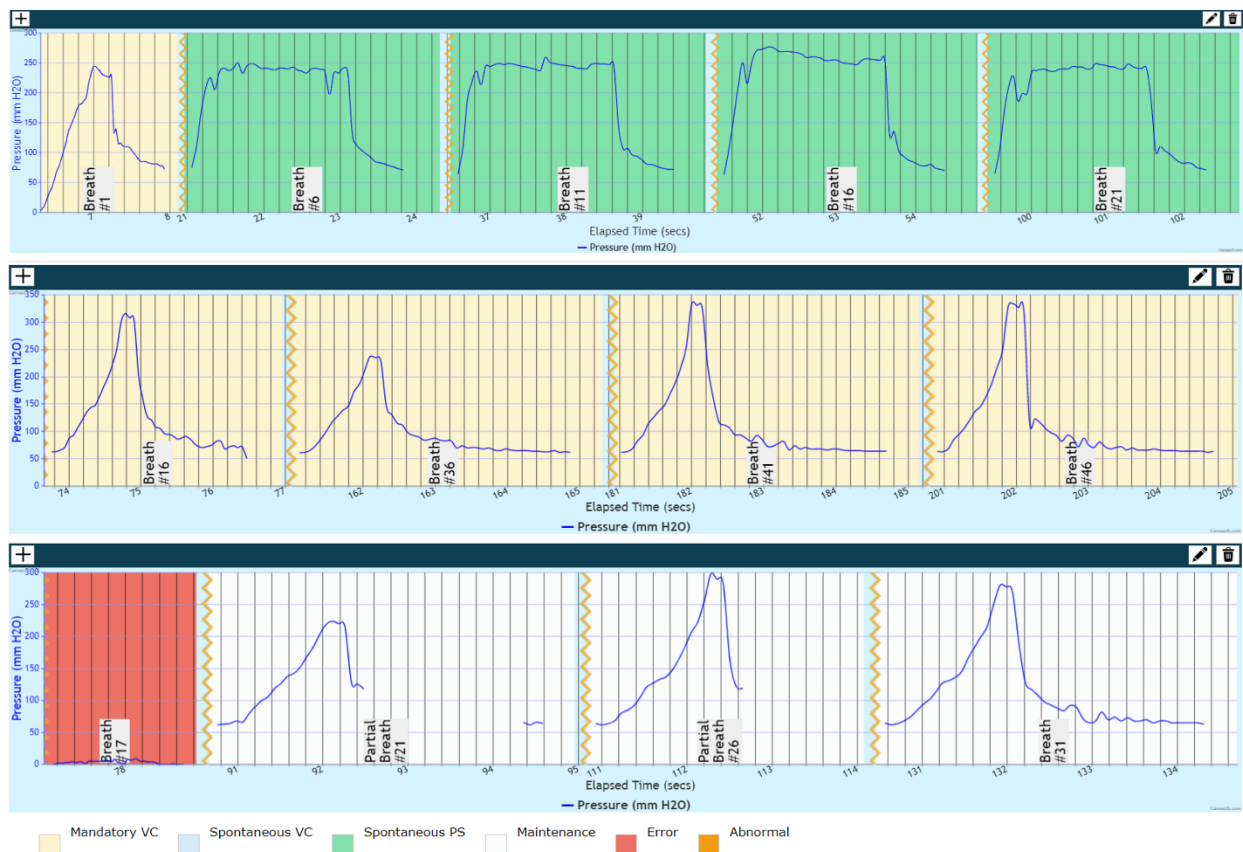


Figure 18: Breath Detailed Pressure Graphs

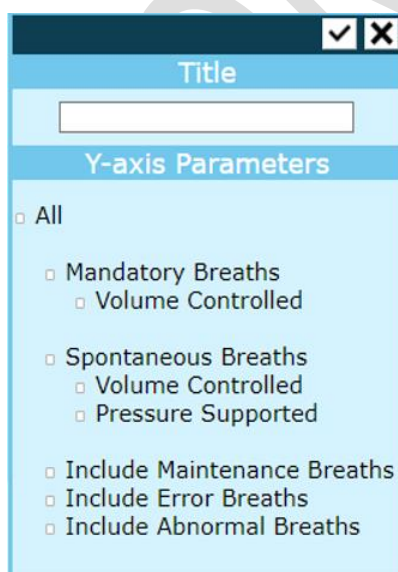


Figure 19: Breath Type Menu

The EDIT icon on each box allows the selection of the kinds of breaths to display. The graphs are color coded as per the legend at the bottom of the page. The breath selection menu is shown in the Figure on the left.

Dashboard Recording

The Dashboard also provides an option to record any part of the current session using the "Start Recording" menu button on the sidebar menu. The recording can be paused at any time causing that paused window to not be recorded. The Recording at the bottom left of the Snapshots view indicates whether the recording is currently active.

The recording is stored in a JSON database on the disk of the laptop or the desktop that the browser is running on. This recording can be analysed at any future time using the Analyzer WebApp. A screenshot of the recording view is shown below.

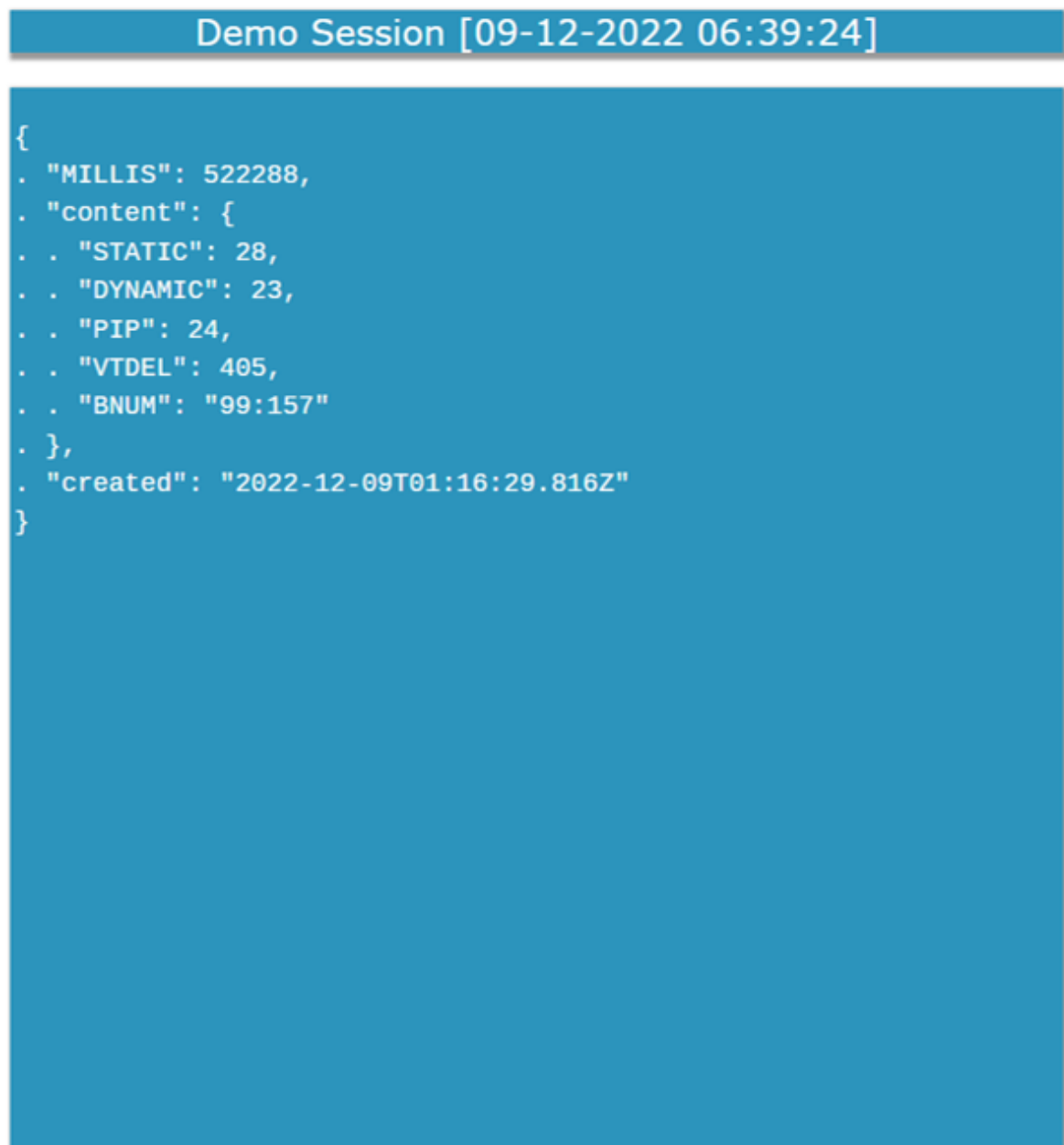
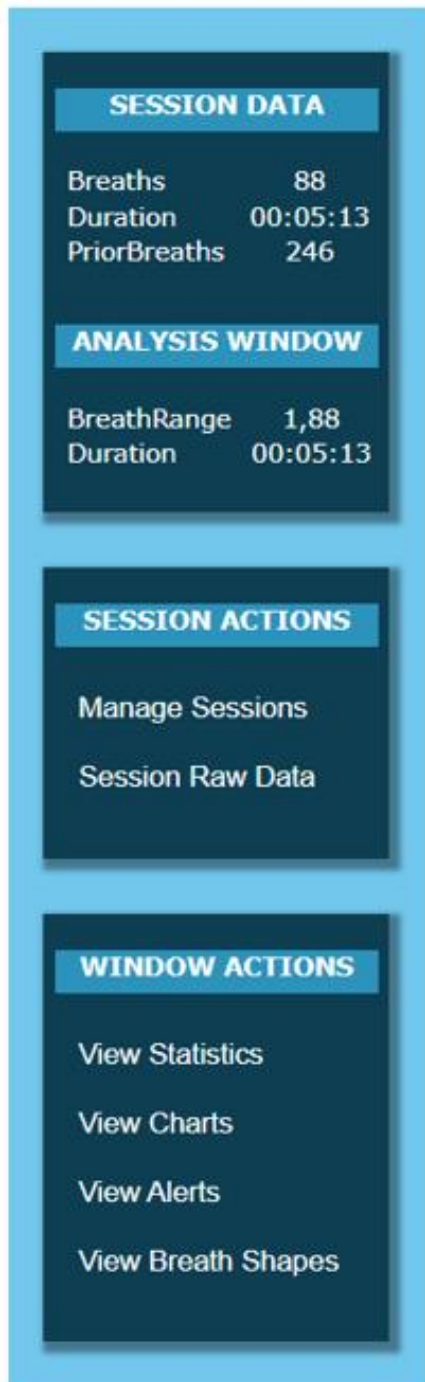


Figure 20: Dashboard Recording View

WEB Analyzer

The Analyzer enables the analysis of a previously recorded session with a patient. The process starts with selecting a session to analyse.



Analyzer Sidebar Menu

The main menu for the Analyzer is presented as a sidebar menu as shown in the Figure on the left.

The box on the top provides a summary of the currently selected session for analysis.

The "Session Actions" box lists the actions that work on the entire session regardless of the breath range (analysis window) selected.

Finally, the "Window Actions" box lists all the possible views of the session data filtered by the selected analysis window.

Figure 21: Analyzer Sidebar Menu

Analyzer Session Selector

Each previously recorded session is presented in a Selector table. Select a session for analysis either by double-clicking on a row or using the appropriate checkmark menu button. Below is a screenshot before any session is selected.

No Selected Session







RESPIMATIC-100 Session Databases		
Session Name	Created	Actions
Demo Session	09-12-2022 06:39:24	<input checked="" type="checkbox"/>  
New Session	29-11-2022 09:08:55	<input checked="" type="checkbox"/>  
Demo	29-11-2022 07:51:30	<input checked="" type="checkbox"/>  

Figure 22: Analyzer Selector Table

After a database is selected, a summary of the database data is displayed in the top box of the sidebar and the selected table row is highlighted as in the screenshot below.

Demo Session [09-12-2022 06:39:24]

RESPIMATIC-100 Session Databases		
Session Name	Created	Actions
Demo Session	09-12-2022 06:39:24	✓ ↗ 🗑️
New Session	29-11-2022 09:08:55	✓ ↗ 🗑️
Demo	29-11-2022 07:51:30	✓ ↗ 🗑️

Figure 23: Selector Table after selection

Analyzer Range Slider

By default, the analysis window is the entire session. To select a particular breath number range to analyse, use the handles of the Range Slider shown below to zero in on the interval of interest. All Analysis actions use the currently selected analysis range. The range selector works in the same fashion as described earlier in the Dashboard section.



Figure 24: Analyzer Range Slider

Analyzer Session Import Export

The EXPORT menu button on each row enables the user to export the database to a text file that can be sent to others for analysis. The + button on the top left allows the user to import a previously exported text file as a new session available for analysis. Below is a screenshot of the Import screen.

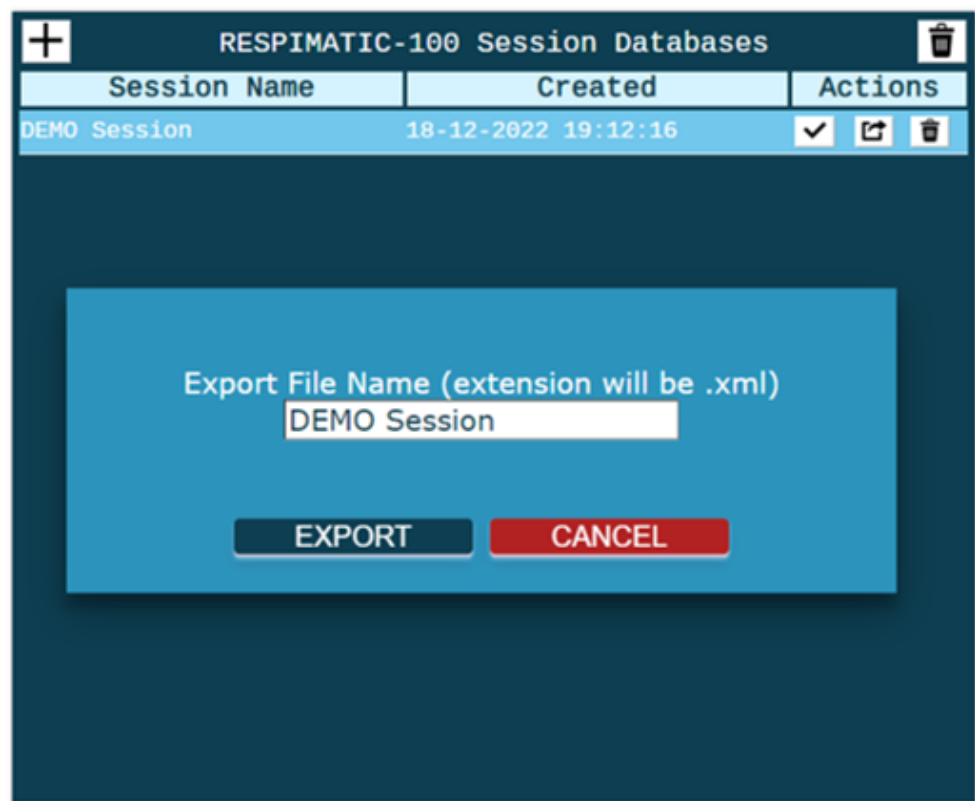


Figure 25: Analyzer Import View

Analyzer Charts, Statistics, Breath Shapes and Alerts Views

Finally, the Charts, Statistics, Breath Shapes and Alerts views work in the same fashion as described in the Dashboard section above.

FiO₂ Calculator

FiO₂ is controlled externally by setting an appropriate Oxygen input flow rate from the external Oxygen source.

This stand-alone calculator enables calculating the required Oxygen flow rate given the following parameters.

- Deployment Altitude
- Desired FiO₂
- Purity of the Oxygen Source
- Tidal Volume
- Respiration Rate

Simply position the mouse over any gauge and turn the scroll wheel to change its value. Else, the required value can be typed in the center of each gauge.

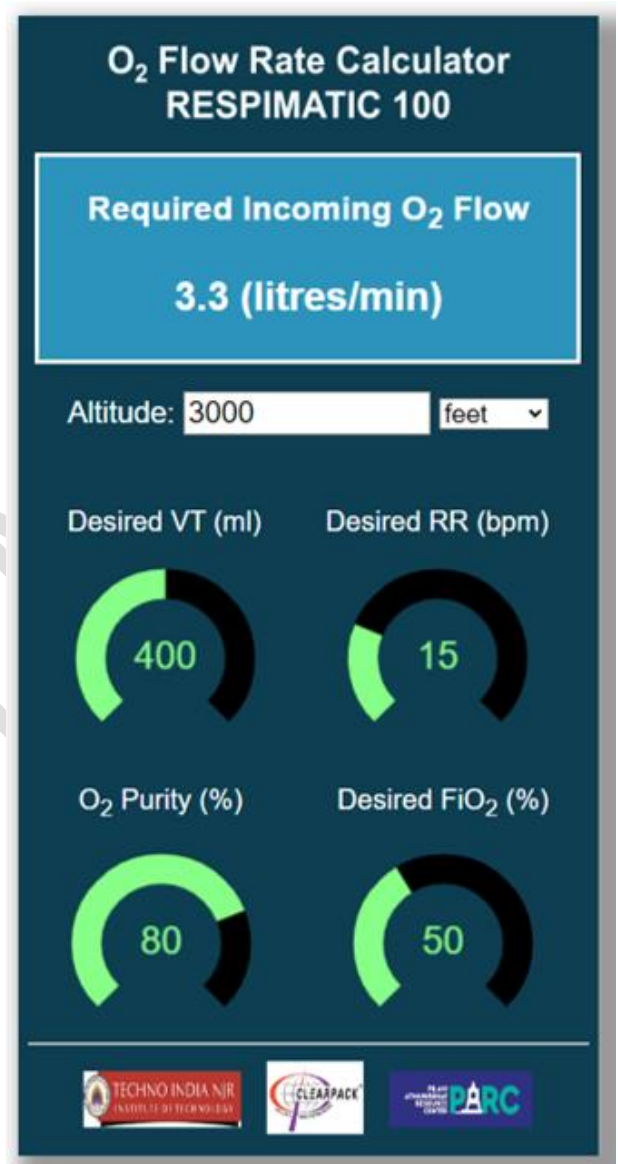


Figure 26: FiO₂ Calculator

Index Table

4G/5G dongle.....	3	portal time out.....	4
Alerts View.....	16	Range Slider	13, 21
auto-connect.....	3	recording	18
Charts View	13	Respimatic Patient	8
configuration portal	4	Respimatic Wi-Fi	4
detailed pressure graphs.....	17	Selector table.....	20
export	22	Snapshots View	12
FiO2	10, 23	Statistics View	15
import	22	Systems Table.....	10
JSON.....	10, 18	SYSUID.....	6, 9
main menu	9	X-axis.....	13
patient information.....	7	xml.....	10