BME68x
Desktop Development 2.1 User Manual

BME68x User Manual

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1 About user manual

This manual describes the installation and usage of the Development Desktop 2.1 User Interface (DD2.1 UI); a Windows based PC software application and related embedded firmware/software developed by **Bosch Sensortec** for demonstration and evaluation of sensors.

1.1 Who should read this manual

This information is intended to users who wish to use the BME68x sensor alongside DD2.1 UI to graphically display the Indoor Air Quality (IAQ), relative humidity, altitude, and associated components.

1.2 DD2.1 UI Overview

DD2.1 UI is a PC based software used to read, capture, and display sensor data. To display the sensor data of BME68x on DD2.1 UI, mount the sensor on the **Bosch Sensortec** application board. This is a universal demonstration environment for **Bosch Sensortec** sensor products.

Bosch Sensortec sensors are mounted on sensor specific shuttle boards. All sensors shuttle boards have an identical footprint and can be plugged into the application board's shuttle board socket. DD2.1 UI automatically detects the sensor that has been plugged in and starts the corresponding software application.

1.3 Sensor Communication:

DD2.1 UI software supports both SPI and I^2C to communicate with the sensor.

1.4 Graphical display:

DD2.1 UI displays the sensor data and interrupts in different graphical formats.

1.5 Data logging:

DD2.1 UI offers data logging of the sensor data.

2 About the BME68x

The typical applications that use BME68x are:

- Indoor air quality
- Home automation and control
- Internet of things
- Weather forecast
- GPS enhancement (e.g. time to first fix improvement, dead reckoning, slope detection)
- Indoor navigation (change of floor detection, elevator detection)
- Outdoor navigation, leisure and sports applications
- Vertical velocity indication (rise/sink speed)

Table 1 : The technical specifications of the BME68x sensor

Parameter	Technical Data
Package Dimensions	8-Pin LGA with metal 3.0 x 3.0 x 0.93 mm³
Operation Change (full accuracy)	Pressure: 300...1100 hPa Humidity 0…100% Temperature: -40…85°C
Supply Voltage V_{DDIO} Supply Voltage V_{DD}	1.2 ... 3.6 V 1.71 ... 3.6 V
Interface	I²C and SPI
Average current consumption (1Hz data refresh rate)	2.1 µA at 1 Hz humidity and temperature 3.1 µA at 1 Hz pressure and temperature 3.7 µA at 1 Hz humidity, pressure and temperature 0.09–12 mA for p/h/T/gas depending on operation mode
Average current consumption in sleep mode	0.15 µA
Gas sensor: Response time (τ 33-63%) Sensor-to-sensor deviation Power consumption Output data processing	< 1 s (for new sensors) +/- 15% +/- 15 < 0.1 mA in ultra-low power mode direct output of IAQ: Index for Air Quality
Humidity sensor: Response time (τ0-63%) Accuracy tolerance Hysteresis	8 s ± 3 % relative humidity ≤ 1.5 % relative humidity
Pressure sensor: RMS Noise Sensitivity Error Temperature coefficient offset	0.12 Pa (equiv. to 1.7 cm) ± 0.25 % (equiv. to 1 m at 400 m height change) ±1.3 Pa/K (equiv. to ±10.9 cm at 1°C temperature change)

2.1 Modes

- BSEC Mode: DD2.1 UI fetches raw and compensated sensor data from the BSEC library, populates content, and displays it on the plotter.

  The values displayed by DD2.1 UI in BSEC mode include:

  - Compensated temperature

- Compensated humidity
- Raw pressure
- Raw gas
- IAQ

The BME68x BSEC mode supports two operation modes, the Low Power (LP) mode, and Ultra Low Power (ULP) mode.

▶ Sensor Mode: The different modes in sensor mode include:

- Sleep Mode
- Sequential Mode
- Parallel Mode
- Forced Mode

▶ These modes are explained in further detail in the following sections.

▶ The DD2.1 UI GUI always opens in BSEC mode, by default. To choose between modes, go to **Panels** -> **Mode Selection Settings**.

Refer to Mode Selection Settings.

2.2 Indoor Air Quality (IAQ)

IAQ is an index used to measure the air quality inside closed environments to estimate the well- being of the occupants. The presence of volatile organic compounds is indicated by the absolute IAQ values.
DD2.1 UI displays the IAQ and other environmental parameters like pressure, relative humidity, and temperature.

3 Getting Started

The below sections highlight the procedure to set up connections between BME68x, DD2.1 UI , and the PC.

3.1 Setting Up the board-PC connection

The procedure to connect sensor to PC via USB is as below:

▶ Install DD2.1 UI.

▶ Insert the shuttle board and application board.

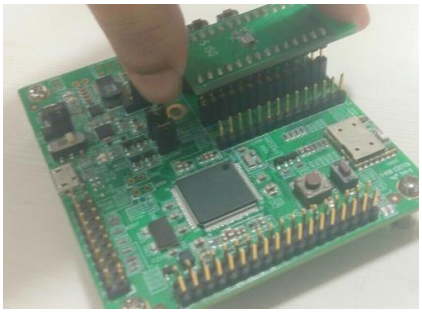


Figure 1 : Insert sensor for APP2.0

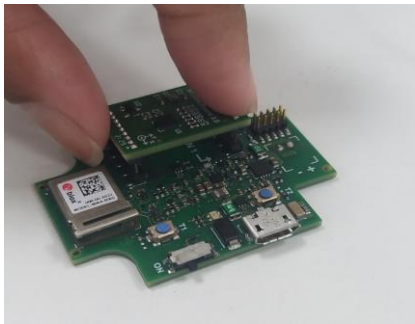


Figure 2 : Insert sensor for APP3.0

▶ Connect the board and PC using a USB cable/Bluetooth.

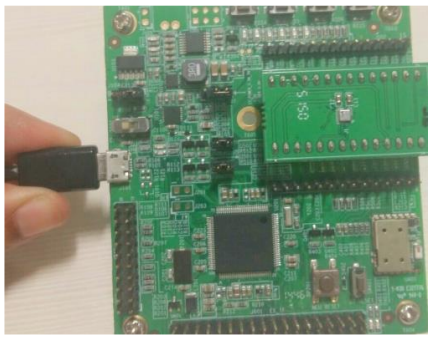


Figure 3 : Connect board and PC for APP2.0

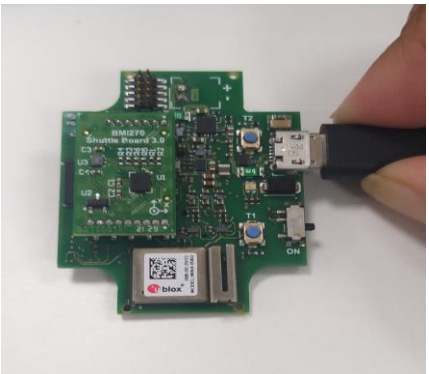


Figure 4 : Connect board and PC for APP3.0

▶ Turn the on/off switch **ON**. The LED glows.

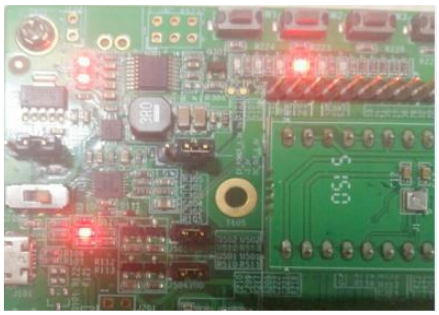


Figure 5 : Connection complete for APP2.0

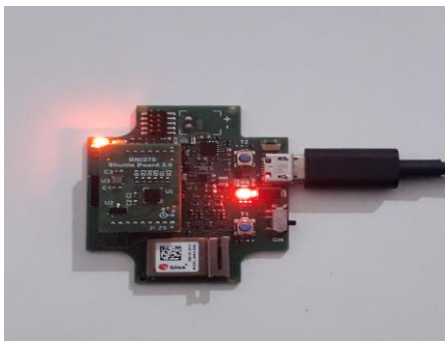


Figure 6 : Connection complete for APP3.0

To start the DD2.1 UI software:

- Click Start -> Programs -> Development Desktop 2.1.

  Or

- Double click the DD2.1 UI software icon on the desktop.

The Graphical User Interface (GUI) of the software is as seen below:

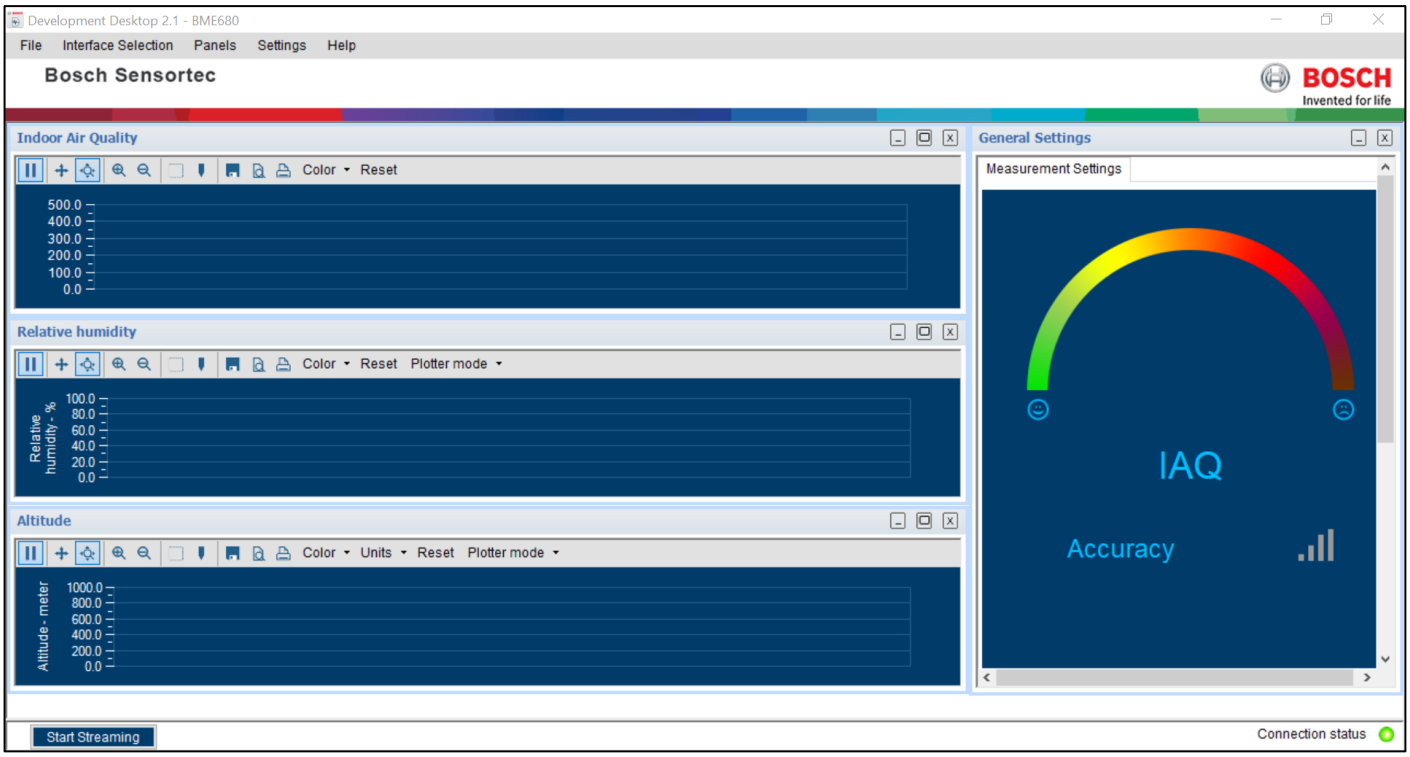


Figure 7 : DD2.1 UI Startup View

When the PC and board are connected, the Communication Status glows green as shown below:

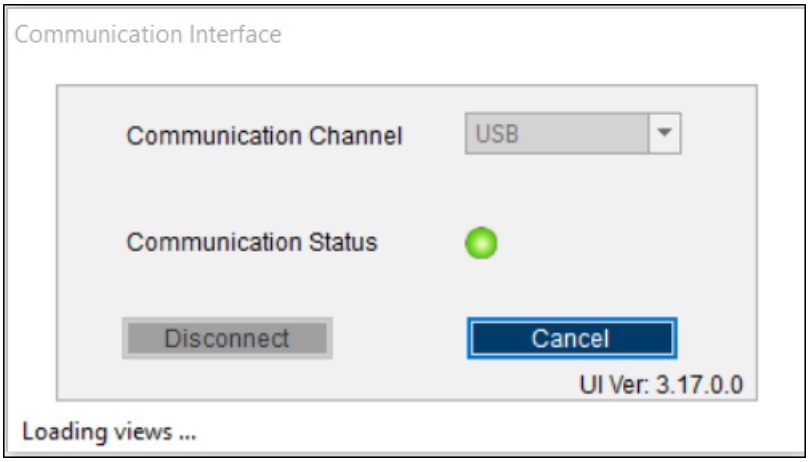


Figure 8 : Communication Status

- The communication status is also indicated at the bottom right of the GUI at all times:

  Connection status

- Other menu options include:
  - File
  - Interface Selection
  - Panels
  - Settings
  - Help

  These menu options are explained in detail in the following sections.

3.2 Upgrading Firmware

3.2.1 For App 2.0 Board:

To upgrade the firmware of DD2.1 UI to match the current version, follow the steps below:

1. Click **Menu -> Settings**-> **Firmware Upgrade.** The following window appears:
2. Click **Enter Boot mode**.

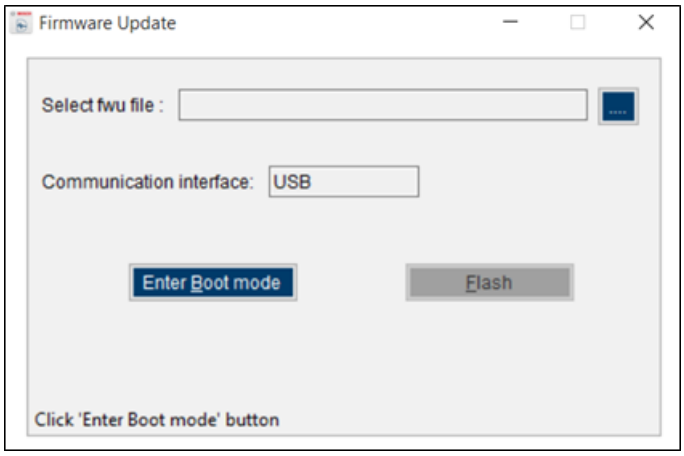


Figure 9 : Fireware upgrade window

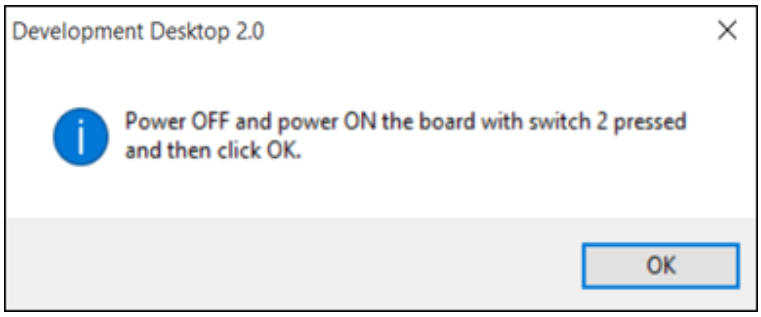


Figure 10 : Application Boot Loader

3. Switch off board, and press **Switch 2**.In Application board, all four LEDs will glow simultaneously.
4. Click **OK**.
5. All four LEDs will glow simultaneously.
6. Press **OK**.

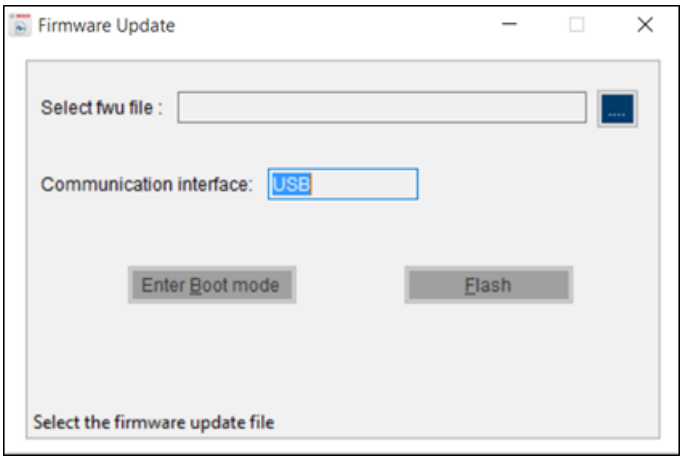


Figure 11 : Boot mode Detected

7. Select the default firmware update file (**.fwu2*) from the DD2.1 UI installation directory in the folder **Firmware**.
8. Click **Flash.**

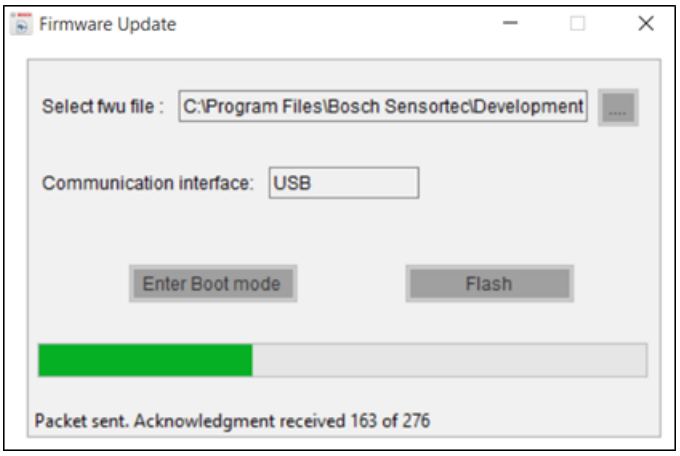


Figure 12 : Firmware upgrade completion

9. Once firmware upgrade is complete, restart the application board, and DD2.1 UI.

3.2.2 For App 3.0 Board:

To upgrade the firmware of DD2.1 UI to match the current version, follow the steps below:

10. Click **Menu -> Settings**-> **Firmware Upgrade.** The following window appears:

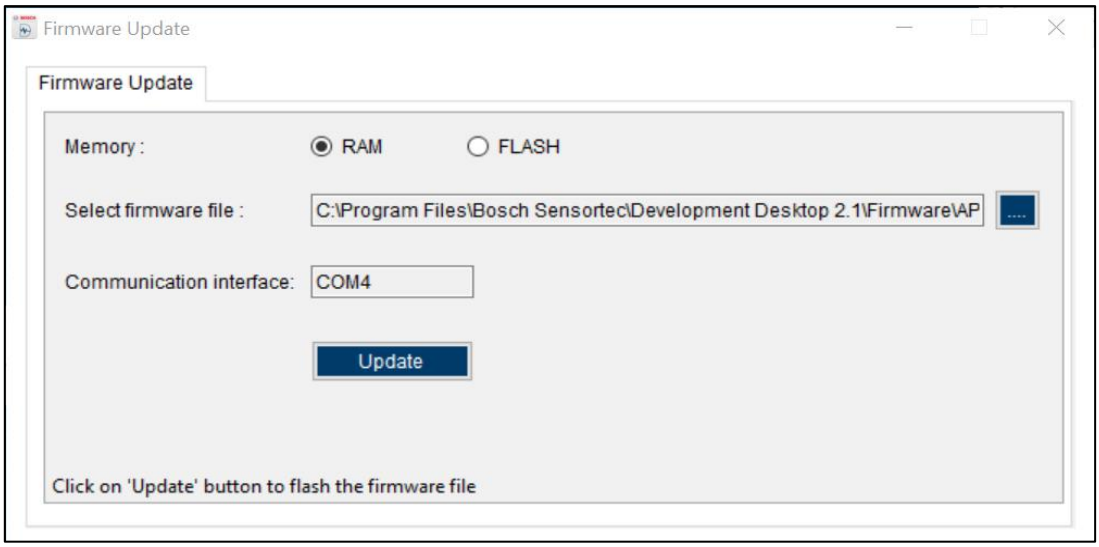


Figure 13 : Firmware upgrade window

Default firmware file (**.bin*) will be automatically chosen from the DD2.1 UI installation directory in the folder **Firmware\App3.0**.

11. Choose RAM or Memory option to flash the latest recommended firmware file.

12. The file path will get automatically chosen/selected in the select firmware file path textbox. User can also select the firmware as required.

13. Click on **Flash**.

14. DD2.1 recommended firmware is COINES_bridge firmware for App3.0 shuttle board. If the user chose to flash DD firmware, a popup message will be shown. User can still choose the DD firmware and proceed.

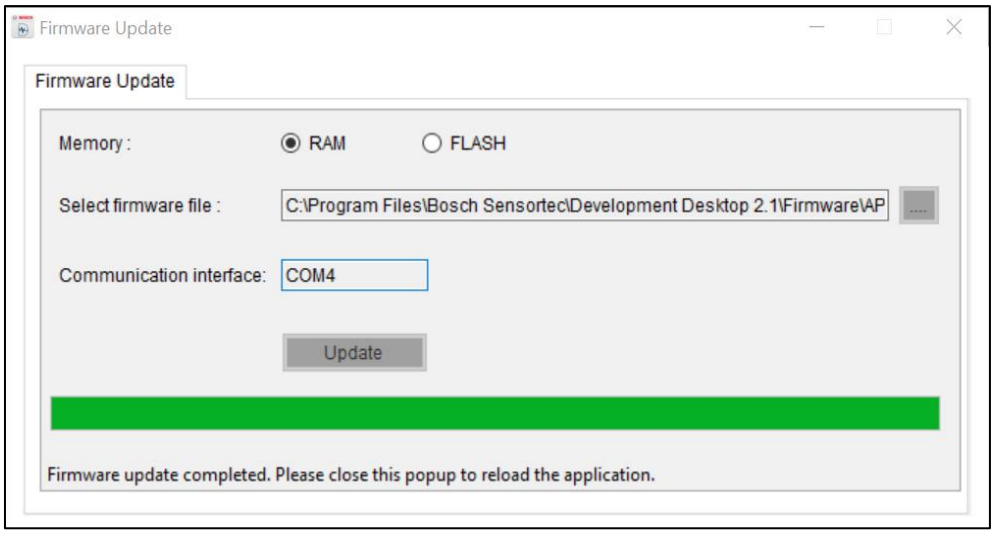


Figure 14 : Firmware upgrade completion

15. Once firmware update is completed, Please close the popup and DD 2.1 application will get automatically reloaded.

4 Working with DD2.1 UI

The functions of the BME68x sensor are discussed in details in the below sections.

4.1 BSEC Mode

BSEC Mode is a signal-processing mode that gives raw and compensated sensor values.

4.1.1 General Settings

The various general settings available in BME68x are discussed in the below sections:

4.1.1.1 Power ON (PO) Reset

The **Measurement Settings** window is as seen:

.

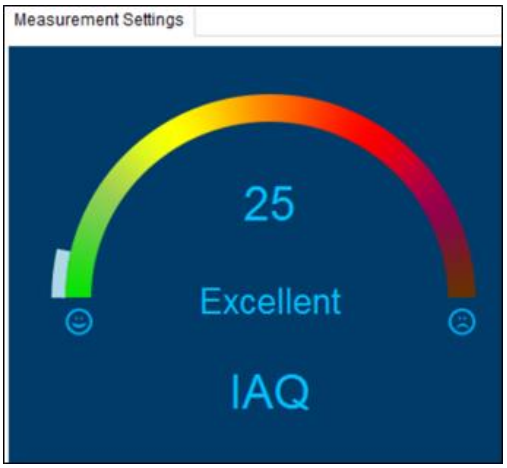


Figure 15 : IAQ Indicator

- While streaming data, this window indicates the IAQ value from **Excellent** to **Severely Polluted**.
- The IAQ scale ranges from 0 to 500.
- The IAQ index and its corresponding air quality is as seen in the below table:

IAQ Index	Air Quality
0-50	Excellent
51-100	Good
101-150	Lightly Polluted
151-200	Moderately Polluted
201-250	Heavily Polluted
251-350	Severly Polluted
351-500	Severely Polluted

IAQ Value and Color Code

Figure 16 : Data accuracy bar graph

- The bar graph glows green to indicate accuracy of data. The more number of green bars, higher the accuracy.
- The IAQ is also measured in the plotter as seen below. To view the IAQ in the plotter, go to **Panels -> IAQ**

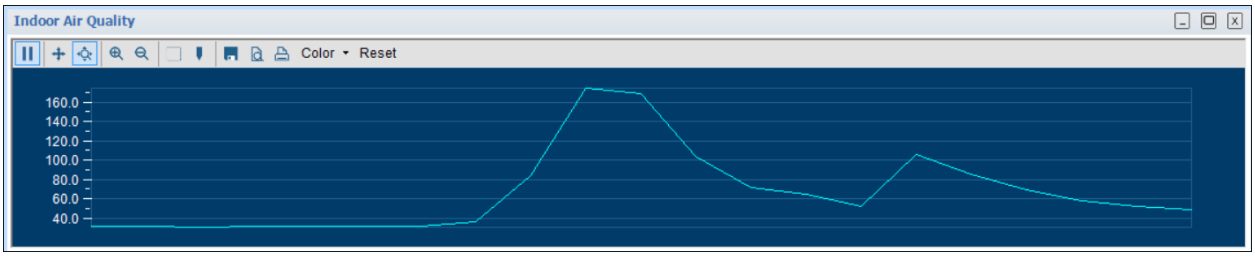


Figure 17 : IAQ Plotter

- Additionally, the following values are measured during streaming:

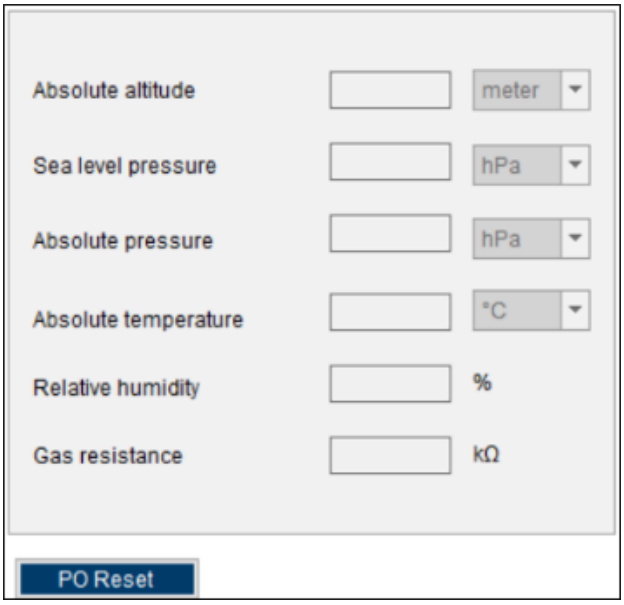


Figure 18 : Sensors Metrics

- Absolute Altitude – in meters (m)
- Sea Level Pressure – in hectopascal (hPa)
- Absolute Pressure – in hectopascal (hPa)
- Absolute Temperature – in degree Celsius (℃)
- Relative Humidity – in percentage (%)
- Gas Resistance – in kilo ohm (kΩ)

To set default sensor value, click **PO Reset**.

4.1.2 Panels/ Menu Options

Panels are the graphical representations of the different parameters measured by the BME68x.
The different panels and menu options available for BSEC mode are described in the following section

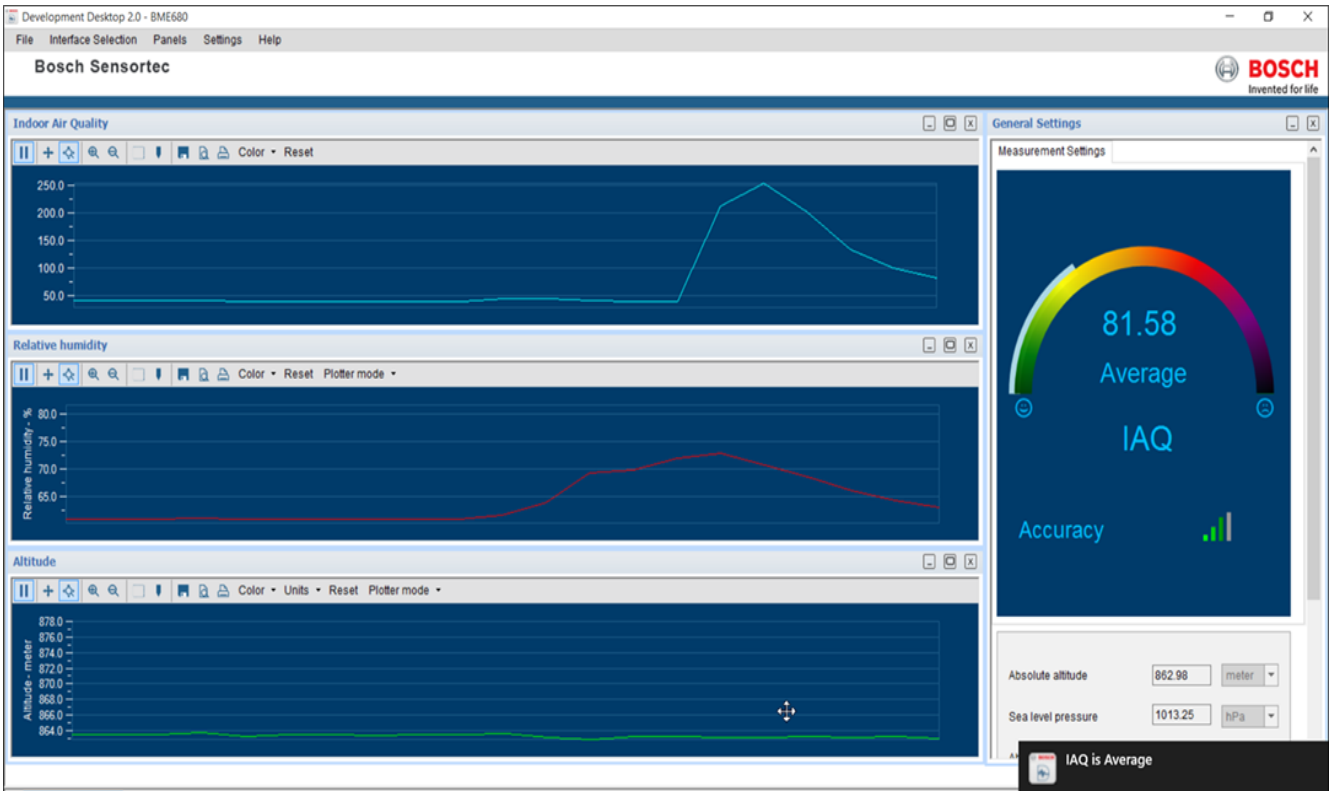


Figure 19 : Panels in DD2.1 UI(Part 1)

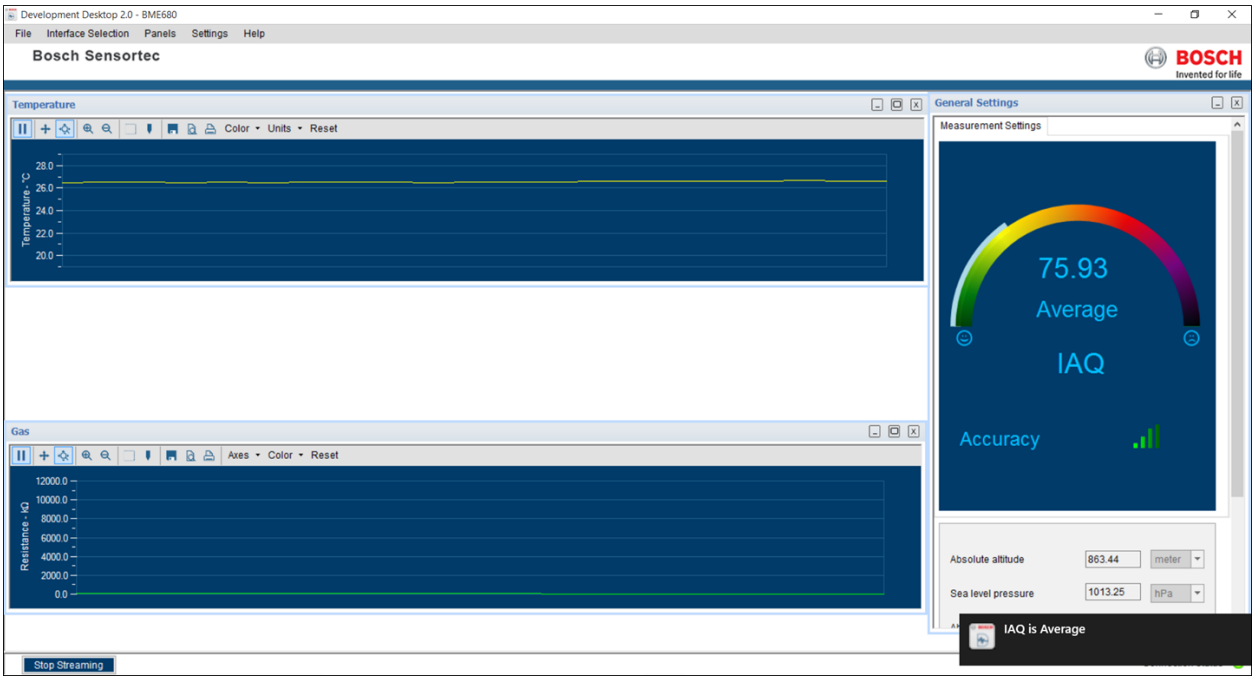


Figure 20 : Panels in DD2.1 UI(Part 2)

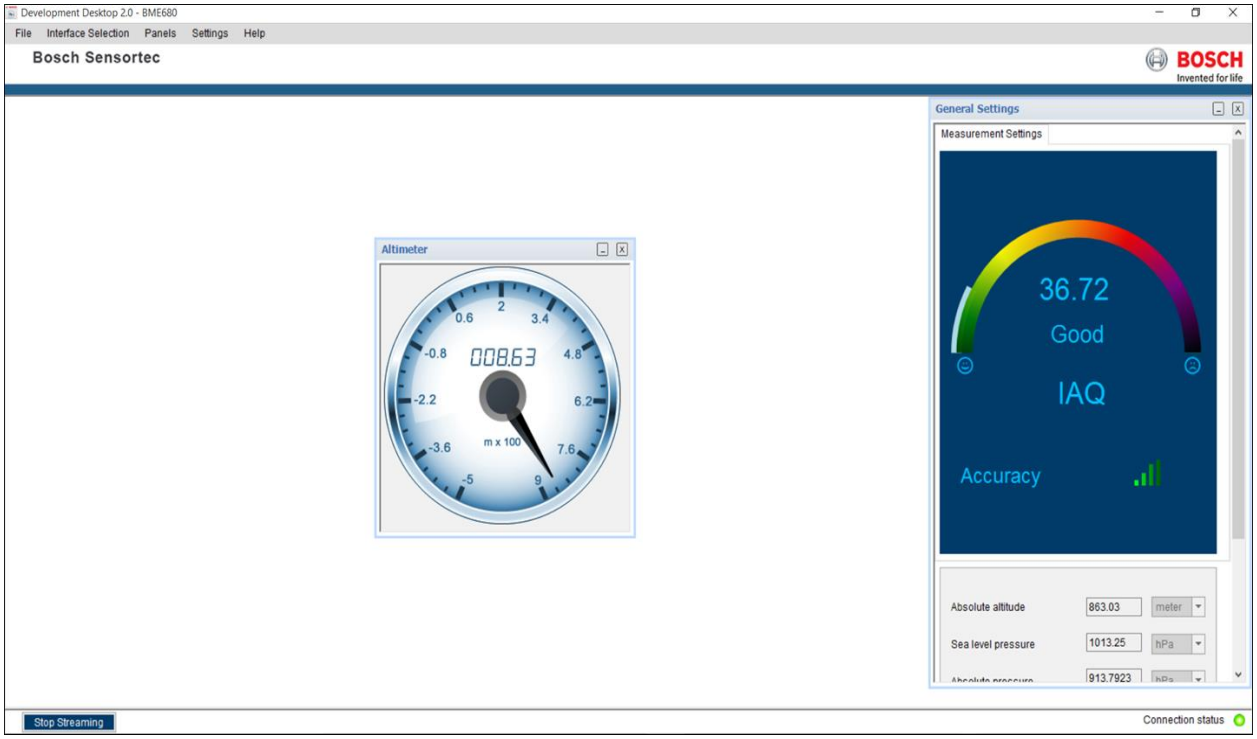


Figure 21 : Panels in DD2.1 UI(Part 3)

The different buttons on the DD2.1 UI GUI plotter denote the following functions:

- Click on **Pause** ( ) to stop plotting of sensor data.
- Click on **Play** ( ) to resume plotting of sensor data.
- Click on **Scroll** to scroll along the plotter in vertical direction (up and down).
- Click on **Zoom In Zoom Out** ( ) to control the speed of plotting.
- Click on **Zoom In** ( ) to zoom into the plotter.
- Click on **Zoom Out** ( ) to zoom out of the plotter.
- Click on **Zoom into particular view** ( ) to zoom into a specific section of the plotter.
- Click on **View** ( ) to view the plotted sensor data.
- Click on **Save** ( ) to save the plotted sensor data.
- Click on **Print Preview** ( ) to view a preview of the print output.
- Click on **Print** ( ) to print the plotted sensor data.
- Click on **Color** (Color) to select the plotting color from an available list of drop down options.
- Click on **Reset** (Reset) to reset the plotting to initial configuration.
- Click on **Plotter mode** (Plotter mode) to select the plotter mode (applicable in **Relative Humidity** and **Altitude** panels only).
- Click on **Units** (Units) to select the measurement units from an available list of drop down options (applicable in **Altitude** and **Temperature** panels **only**).

- Click on Axes (Axes) to select the required axis from an available list of drop down options (applicable in the **Gas** panel only).

Altitude

- To view altitude on the plotter, go to **Panels** -> **Altitude**, or click **Ctrl+P.**
- The altitude can be seen in either the altitude panel, or altimeter dial display.
- To see variations in the altitude data, move the sensor up and down vertically.
- Units of measurement include:
    - Meter
    - Feet
- The different plotter modes in altitude include:
    - Altimeter: Displays altitude in the plotter and dial
    - Barometer: Displays sea level pressure in the plotter
    - Manometer: Displays absolute pressure in the plotter

Relative Humidity

- To view relative humidity data on the plotter, go to **Panels -> Relative Humidity**, or click **Ctrl+H**.
- To see variations in humidity data, introduce elements of different humidity/ moisture levels over the sensor.
- The different plotter modes in relative humidity include:
    - Relative Humidity
    - Absolute Humidity
    - Dew Point

Temperature

- To view temperature data on the plotter, go to **Panels -> Temperature,** or click **Ctrl+T.**
- To see variations in temperature data, introduce elements of different temperature levels over the sensor.
- DD2.1 UI is equipped to display temperature data in the following units of measurement:
    - ℃
    - ℉
    - K

Gas

To know more about displaying gas on the plotter, refer to Run Gas.

IAQ

- To view the Indoor Air Quality (IAQ) data on the plotter, go to **Panels -> IAQ**, or click **Ctrl+I** (To know more about IAQ, refer to Indoor Air Quality).
- IAQ can be seen in both the IAQ panel, or in the **General Settings** window (Refer General Settings).
- To see variations in the IAQ, introduce elements of different gas density levels over the sensor (perfume, marker, etc.).

Altimeter

To know more about displaying altitude data on the altimeter, Refer to Altitude.

Mode Selection Settings

To switch between BSEC mode and Sensor mode, go to **Panels -> Mode Selection Settings**, or click **Ctrl+S.**

Default View

To reset the DD2.1 UI homepage to its default view, go to **Panels->Default View**, or click **Ctrl+V.**

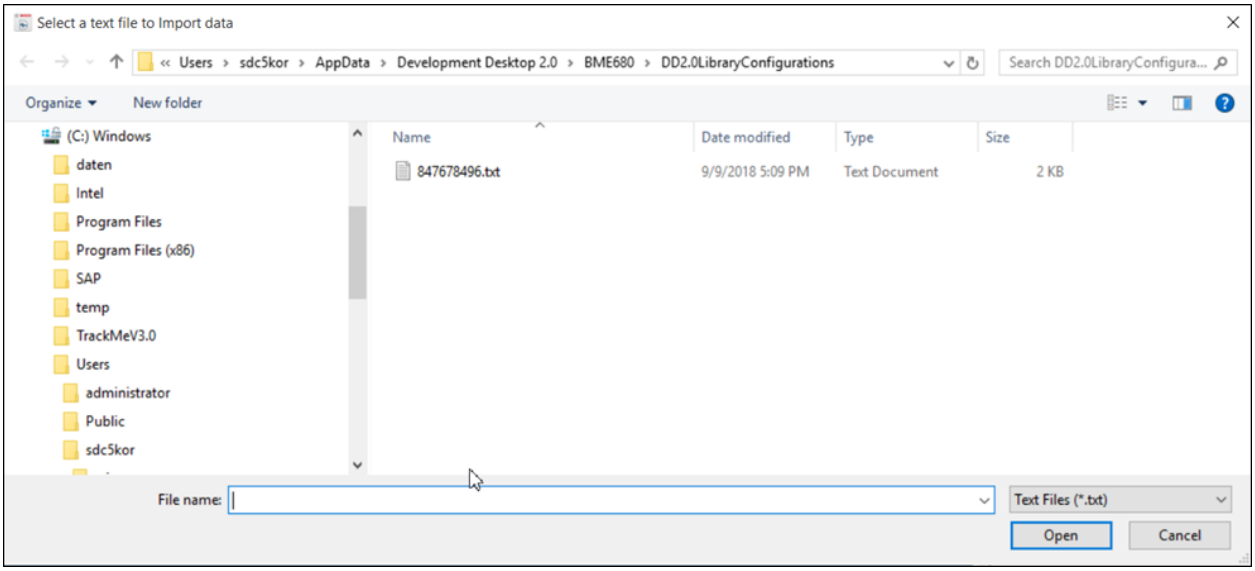


Figure 22 : Load BSEC State

Load BSEC State

To load the default BSEC State, go to **Panels -> Load BSEC State**, or click **Ctrl+Alt+L**. The following screen appears:

- Select relevant file and click **Open.**

Note: This option is disabled when the sensor is streaming data.

Save BSEC State

- To save the existing BSEC State as default, go to **Panels -> Save BSEC State**, or click **Ctrl+Alt+S.**
- Select required destination folder and save the BSEC state.

Note: This option is disabled when the sensor is streaming data.

4.1.3 Load Config State

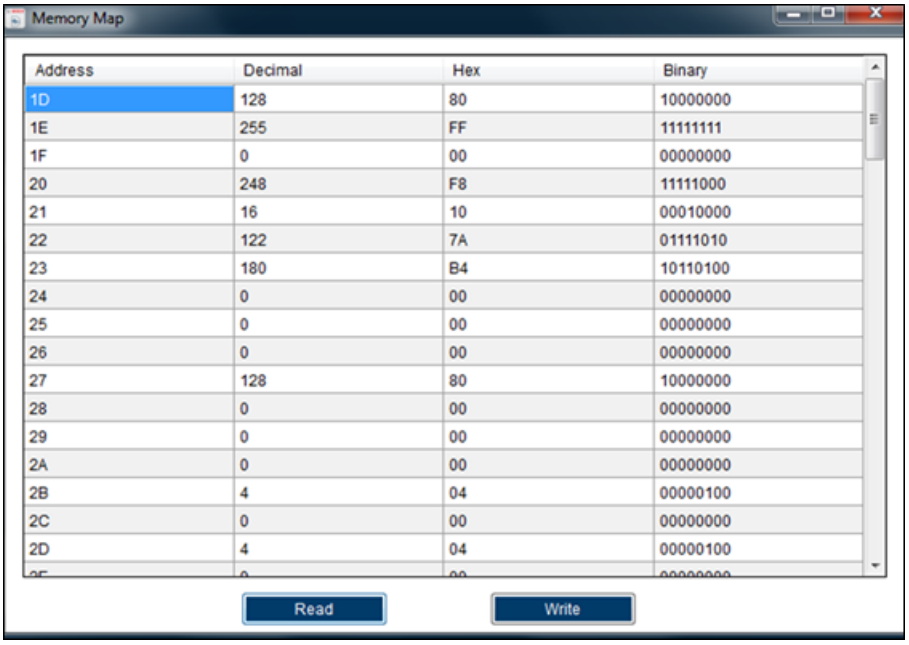
- To load the configuration string file from a destination folder, go to **Panels -> Load Config State**, or click **Ctrl+Alt+C.**

Note: This option is disabled when the sensor is streaming data.

4.1.4 Memory Map

- Memory map is used to launch the binary view of the sensor.
- This view contains information on all sensors and their respective addresses.
- To launch Memory Map, go to **Panels -> Memory Map**, or click **Ctrl+M.** The following window appears:
- To configure sensor values, click **Write**.
- To read the current register settings on the sensors, click **Read**.

Note: This option is disabled when the sensor is streaming data.



Address	Decimal	Hex	Binary
1D	128	80	10000000
1E	255	FF	11111111
1F	0	00	00000000
20	248	F8	11111000
21	16	10	00010000
22	122	7A	01111010
23	180	B4	10110100
24	0	00	00000000
25	0	00	00000000
26	0	00	00000000
27	128	80	10000000
28	0	00	00000000
29	0	00	00000000
2A	0	00	00000000
2B	4	04	00000100
2C	0	00	00000000
2D	4	04	00000100

Figure 23 : Memory Map

4.1.5 Roger

- Roger is a panel that demonstrates the changes in different environmental parameters by modifying the features of an image of a boy (Roger).
- To use the panel, go to **Panels -> Roger**, or click **Ctrl+Alt+R.**

Note: Roger is available only in BSEC mode.

- Some common features of **Roger** are:
  - When ambient environmental parameters undergo change, the image of Roger or his background will change.
  - The panel settings can be customized as per geographical region to demonstrate changes more accurately.
  - The real time values of pressure, temperature, humidity, and IAQ are displayed in the top left corner of the panel as seen below:

Figure 24 : Roger

- The different parameters that are captured and displayed by **Roger** are:
    - IAQ
    - Relative humidity
    - Temperature
    - Pressure
- How **Roger** functions with changes in these parameters are explained in further detail in the below sections
- To change settings of the parameters or view existing settings, click **Settings** ()
- The settings window appears with existing settings as seen below:

Roger and IAQ

- The changes in IAQ are indicated by the changes in **Emotion** and **Skin Color** of Roger.
- Keeping the settings in the changes in IAQ are reflected in **Emotion** as follows:

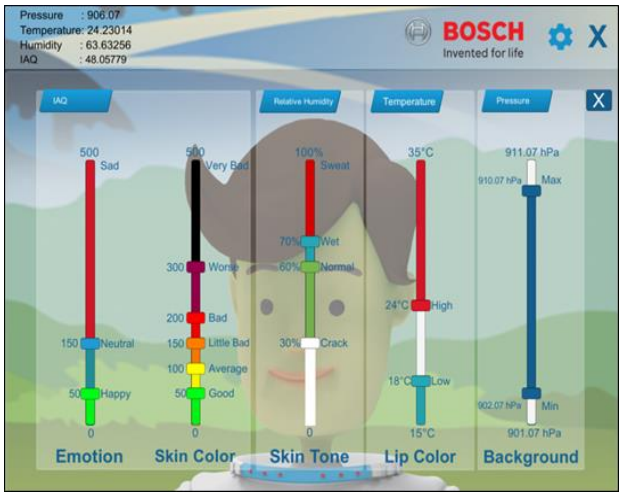


Figure 25 : Roger Setting

Range	0-50	50-150	150-500
Name	Happy	Neutral	Sad
Color			
IAQ	Roger is smiling.	Roger's face is neutral, and he is not smiling.	Roger is frowning.

- Keeping the settings the changes in IAQ are reflected in Skin as follows:

Figure 26 : Roger Settings

Range	0-50	50-100	100-150	150-200	200-300	300-500
Name	Good	Average	Little Bad	Bad	Worse	Very Bad

Color						
IAQ	The IAQ is good, and Roger's skin is of natural color.	The IAQ is average, and Roger's skin color changes to yellow.	The IAQ is little bad, and Roger's skin color changes to orange.	The IAQ is bad, and Roger's skin color changes to red.	The IAQ is worse, and Roger's skin color changes to dark purple.	The IAQ is very bad, and Roger's skin color changes to black.

- Roger's emotion and skin color based on bad IAQ is as seen below:

Figure 27 : Bad IAQ in Roger

Roger and Relative Humidity

- The changes in relative humidity are indicated by the changes in **Skin Tone** of Roger.
- Keeping the settings in relative humidity are reflected as follows:

Range	0%-30%	30%-60%	60%-70%	70%-100%
Name	Crack	Normal	Wet	Sweat
Color				
Relative Humidity	The relative humidity is very low, and Roger's skin is cracked.	The relative humidity is at optimum level, Roger's skin is normal.	The relative humidity is a little high, and Roger's skin is wet.	The relative humidity is very high, and Roger is sweating.

- Roger's skin tone on very high relative humidity is as seen below:

Figure 28 : Very high relative humidity in Roger

Roger and Temperature

- The changes in relative humidity are indicated by the changes in the **Lip Color** of Roger.
- Keeping the settings, the changes in temperature are reflected as follows:

Range	0℃-18℃	18℃-24℃	24℃-35℃
Name	Low	High	Very High
Color			
Temperature	The temperature is very low, and there is no change in lip color.	The temperature is optimum, and there is no change in lip color.	The temperature is very high, and Roger's lip color is red.

Note: DD2.1 UI can only temperature ranging from 0℃ to 35℃.

- Roger's lip color at very high temperature is as seen below:

Roger and Pressure

- Change in background in the Roger panel indicates the changes in pressure.
- Keeping the settings in the changes in pressure are reflected as follows:

Figure 29 : Very high temperature in Roger

Table 2 : Temperature Range details

Range	902.07hPa – 910.07 hPa	901.07 hPa-902.06 hPa and 910.08 hPa– 911.07 hPa
Name	Min-Max	Outside user-defined range (as per settings in Fig 21)
Color		
Temperature	The pressure is within the user-defined range and the background remains the same.	• When the pressure is between 901.07 hPa and 902.05 hPa, the image background image moves downwards. • When the pressure is between 910.08 hPa and 911.07 hPa, the image background image moves upwards.

Note: DD2.1 UI can only measure pressure ranging from 901.07 hPa to 911.07 hPa.

- The Roger panel's background at in-range pressure (between 902.07 hPa and 910.07 hPa) is as seen below:

Figure 30 : In-range pressure in Roger

4.2 Sensor Mode

- The different power modes available under sensor mode are:
  - Sleep mode
  - Sequential mode
  - Parallel mode
  - Forced mode

4.2.1 General Settings:

- The two different settings windows in sensor mode include:

  Measurement Settings

- The following values are measured during streaming:

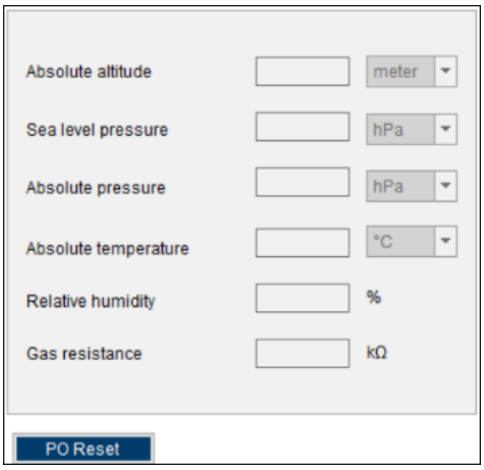


Figure 31: Sensor Metrics

  - Absolute Altitude – in meters (m)
  - Sea Level Pressure – in hectopascal (hPa)
  - Absolute Pressure – in hectopascal (hPa)
  - Absolute Temperature – in degree Celsius (℃)
  - Relative Humidity – in percentage (%)
  - Gas Resistance – in kilo ohm (kΩ)

- To set default sensor value, click **PO Reset**.

- Once you click **PO Reset**, the following window appears.

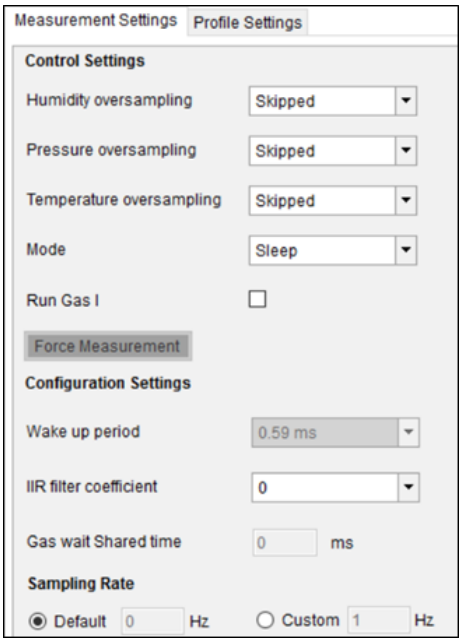


Figure 32 : Measurement Settings

- Pressure, temperature and humidity measurement depends on its corresponding oversampling selection.
- To skip measurement, set all three oversampling values to **Skipped**.
- To initiate measurement, set appropriate oversampling values from the drop down menu.
- To measure Gas data, check the box **Run Gas**.
- To select **Wake up period**, choose appropriate option from the drop-down menu. Wake up period is applicable only in sequential mode.
- **IIR filter coefficient** feature is used to suppress unwanted disturbances without causing additional interface traffic and process load. It effectively reduces the bandwidth of the output signals. To select **IIR filter coefficient**, choose appropriate option from the drop-down menu.
- To use **Gas wait shared time** to measure the different parameters, select appropriate value from the drop down list. **Gas wait shared time** is applicable only in parallel mode.
- The sampling rate is the rate at which the data will be read from the sensor.
- While streaming, data is sampled keeping the default sampling rate values as base (based on the sensor configuration settings).

Profile Settings

▶ The Profile Settings window is as seen:

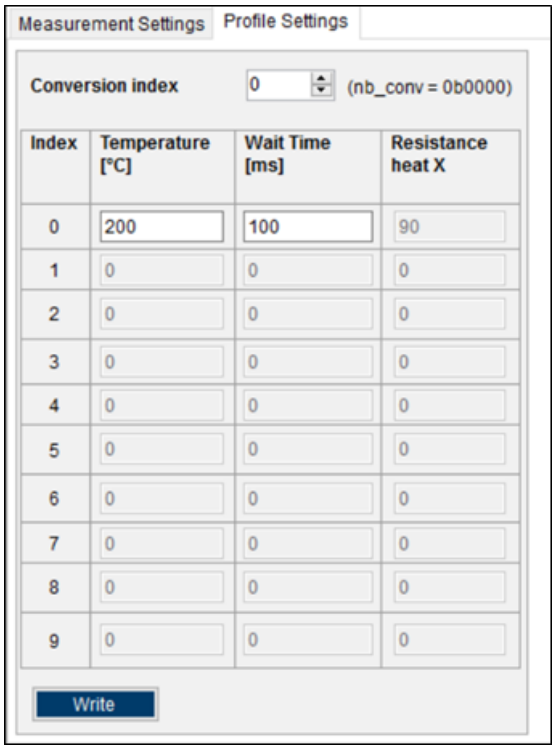


Figure 33 : Profile Settings (Sensor Mode)

- Gas data is measured based on the target temperature and wait time. User can select their own required number of gas profiles under number of conversions numeric up/down combo box.
    - Number of conversion range for sequential and parallel modes - 1 to 10.
    - Number of conversion range for forced mode - 0 to 9.

Note: In forced mode, only one profile can be selected at any point in time.

- To calculate gas data, click **Write**.

4.3 Data Export/ Log

- To save the output values plotted by DD2.1 UI , go to **Panels -> Data Export**, or click **Alt+D.**
- By default, the data values are logged into a text (*.txt*) file in the destination folder of DD2.1 UI .
- The steps to follow data logging are as seen:

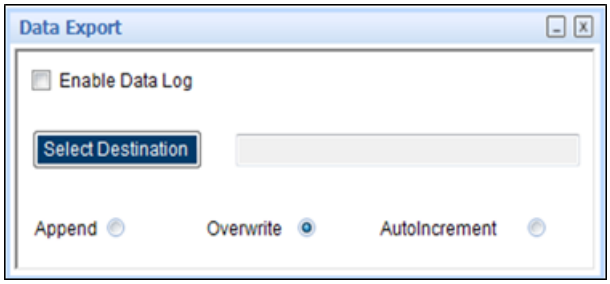


Figure 34 : Data Export

1. Go to **Panels-> Data Export**, or click **ALT + D.**
2. Click **Select Destination**, and select required destination folder.
3. To log new data into the selected file, click **Append.**
   Or
   To erase old data from the selected file and log new data in its place, click **Overwrite.**
4. Check **Enable Data log**.
5. Click **Start streaming** button to plot the sensor data in the plotter.
6. Click **Stop streaming** to end the plotting of the sensor data. The output of the sensor data is saved in the desired destination path.

4.4 Self-Test View

- To conduct a self-test of the components Pressure, temperature, gas, and humidity, go to **Panels -> Self-test**, or click **Ctrl+Shift+S.** The following screen appears:
-

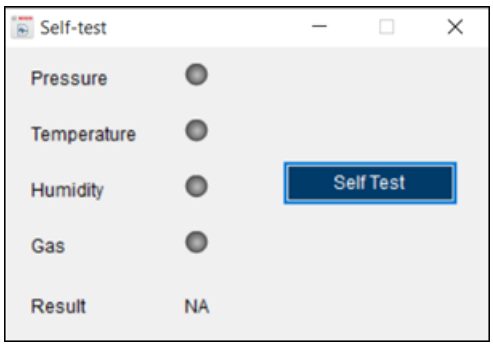


Figure 35 : Self-test window

- Click **Self-Test.**
- Once the self-test is complete, the test results are displayed in the same window as seen:

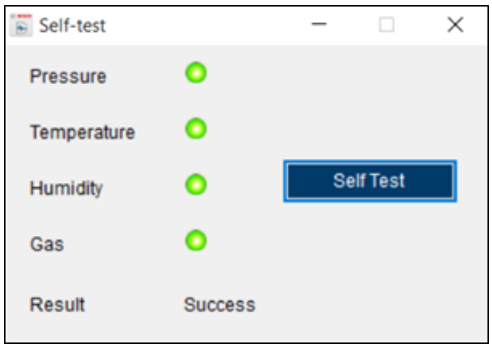


Figure 36 : Self-test results window

5 Demonstration

1. Establish connection between board and PC via USB.
2. Switch on the application board.
3. To open the DD2.1 UI application, go to **Start -> Programs -> DD2.1 UI** , or open the DD2.1 UI icon () on the desktop.
4. A pop up appears as seen:

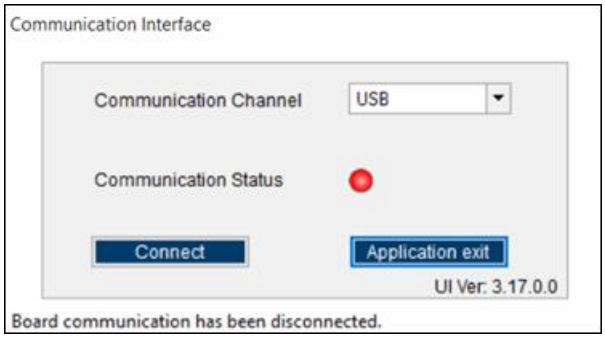


Figure 37 : Communication Status

5. Click **Connect**. The board and PC are now connected.
6. To plot data in BSEC mode, follow the steps below:
   - To initiate streaming, click **Start Streaming.**
   - To stop streaming, click **Stop Streaming**.

Note: By default, BSEC data is plotted in Low-Power mode.
Refer to General Settings for more information.
To change from BSEC mode to sensor mode, refer to Mode Selection Settings.

7. To plot data in sensor mode, make the below changes in General Settings:
   - Set **Humidity oversampling** value from the given drop down.
   - Set **Pressure oversampling** value from the given drop down.
   - Set **Temperature oversampling** value from the given drop down.
   - Check the **Run Gas** checkbox to enable measurement of gas sensor data.
   - Configure the appropriate gas parameters in **Profile Settings.**
8. Once these changes are made,
   - To initiate streaming, click **Start Streaming.**
   - To stop streaming, click **Stop Streaming**.

Refer to General Settings for more information.

6 General Troubleshooting

Follow below guidelines while working with DD2.1 UI:

- Ensure that the shuttle board (with a valid sensor) is seated properly in the application board.
- Ensure that the PC-board connection is properly established.
- When switching on/ off DD2.1 UI, close and restart DD2.1 UI .
- Ensure that at least one channel is selected.

Follow these steps to check the USB connection:

1. Click **My Computer -> Manage** -> **Computer Management.**
2. Go to **System Tools** -> **Device Manager**.
3. Click on BST board and check for the USB connection.

Sometimes, data transfer between PC and application board does not work despite the USB device being properly enumerated in the Device Manager.
This could be because the application board is older or that the USB PID and VID have been used with that computer before. In this case, Windows is unable to install the required drivers automatically.
Follow these steps to check the USB connection:

1. Right-click on the USB-device corresponding to your application board (if you are not sure which device corresponds to your application Board, unplug all other USB devices like keyboard and mouse temporarily).

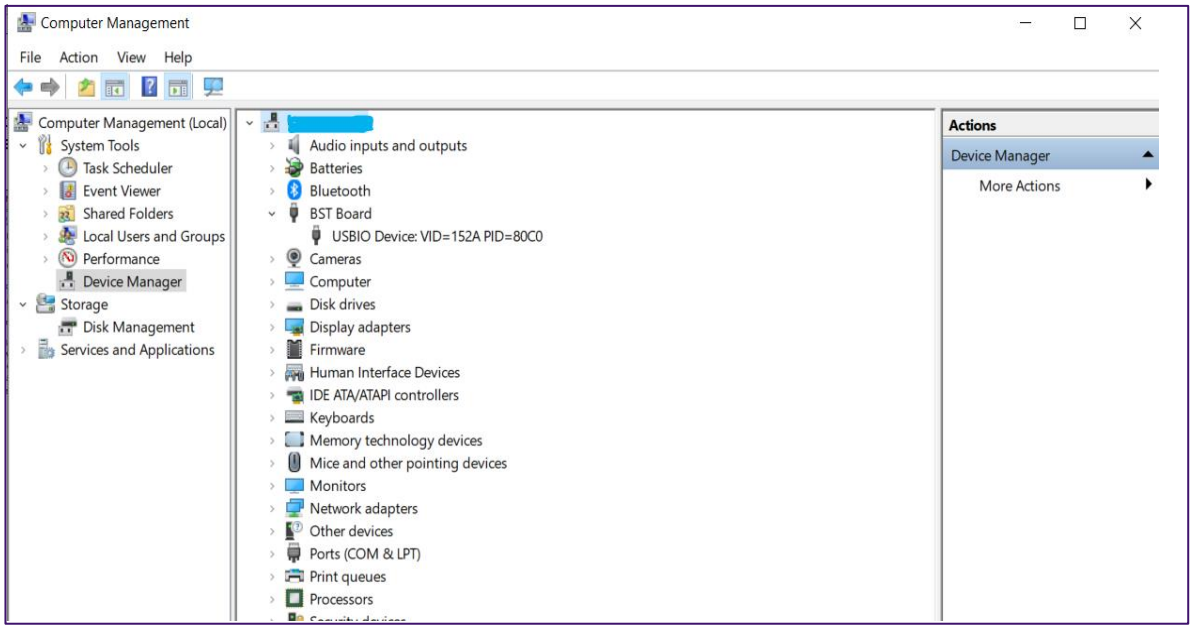


Figure 38 : Selecting USB device corresponding to application board

2. Click **Action** -> **Scan for hardware changes**. The new USB driver is installed automatically. Thereafter, the device communication will function properly.

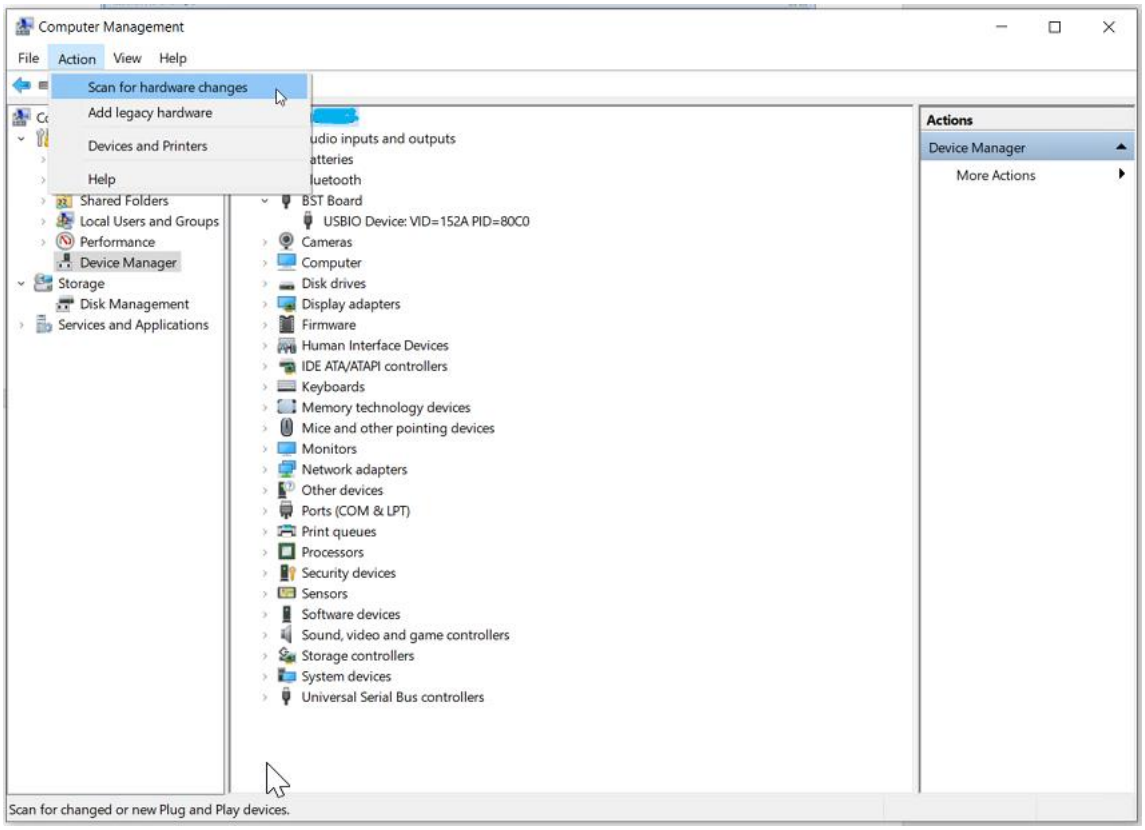


Figure 39 : USB driver installation

The following table lists some of the possible faults that you might encounter and the troubleshooting method.

Table 3 : General TroubeShoot

Condition	Possible cause	Solution
If **Communication Status** remains grey red after checking the **Start** Button.	Application Board is turned off.	**Power on** the application Board and restart the DD2.1 UI application. If the board is powered by rechargeable battery, ensure that the battery is charged.
Unable to locate the data logged file.	Destination path not properly defined.	Locate the file in the setup path of Development Desktop**.**
Error message **Please connect application Board** is displayed.	Application Board is not connected properly.	Ensure that the PC is connected with the application Board properly. If the board is powered by rechargeable battery, ensure that the battery is charged.
Error message **Please connect Shuttle Board** is displayed.	Shuttle Board is not fixed properly.	Ensure that the Shuttle Board is correctly fixed in the Development Board.
Error message **Please select a path or file for logging** is displayed.	Destination path for saving the logged data is not defined.	Select the **Data Export** option in the file menu and specify the destination path.

Error message **Please select File from File Menu → Data Export option to proceed** is displayed.	Destination path not selected.	In the file menu, select the **Data Export** option and select the destination path.
Error message **Please Connect Valid Sensor** is displayed.	Wrong sensor fixed on the application Board.	Ensure that correct sensor is fixed on the application Board.
Graph for x, y, z channel not plotted.	Channel x, y, z not checked.	Ensure that x, y, z channels are checked.

7 Legal disclaimer

i. Engineering samples

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iii. Application examples and hints

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8 Document history and modification

Rev. No	Chapter	Description of modification/changes	Date
1.0	BME680 User Manual	Initial release	September 2018
1.1	BME680 User Manual	Adopt New Format	August 2020
1.2	BME68x User Manual	Modified the sensor name, as this user manual is common for BME680 and its variants	Feb 2021
1.3	BME68x User Manual	Updated DD application version	Mar 2023

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