



BRTSYS_AN_001

LDSBus Configuration Utility Guide
[Release v1.2.4.0]

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Table of Contents

1	Introduction	5
1.1	LDSU (LDS Unit) Project.....	5
1.2	LDSBus Project.....	5
1.3	What's New in Version 1.2.4.0?.....	5
1.4	Known Issues and Limitations.....	5
2	Hardware Setup Pre-requisites.....	6
2.1	LDSU (LDSBus Unit) Project	6
2.2	LDSBus Project.....	7
3	Installing LDSBus Configuration Utility	8
4	LDSBus Configuration Utility – GUI Overview	12
4.1	Default Menu bar.....	12
4.1.1	File Menu.....	12
4.1.2	Settings Menu / Interface	13
4.1.3	Additional Menu (based on the selected Project)	13
5	LDSU (LDSUnit) Project	14
5.1	Creating a New LDSU Project	14
5.2	Firmware Update.....	17
5.3	LDSU Command Interface	20
5.4	Saving LDSU (LDSUnit) Project	22
5.5	Opening a LDSU Project	24
6	Creating a New LDSBus Project	26
6.1	LDSBus Command Interface	28
6.2	Saving LDSBus Project	28
6.3	Opening a LDSBus Project	28
6.4	LDSBus Right Click Functions	29
6.5	LDSBus Firmware Update	30
7	Sensor Calibration Procedure	32
7.1	LDSBus pH Sensor Adapter Calibration.....	32
7.2	LDSBus EC/Salinity Sensor Adapter Calibration	39
7.3	LDSBus DO Sensor Adapter Calibration	46
7.4	LDSBus ORP Sensor Adapter Calibration	49

7.5	LDSBus CO2 Sensor Adapter Calibration.....	54
7.6	LDSBus Honde 2in1 Soil Sensor Calibration.....	57
8	Application Type Configuration.....	65
8.1	Relay Controller Application Type Configuration	65
8.2	IO Controller Application Type Configuration	67
8.3	Trailing Edge Dimmer Profile Setting.....	75
8.4	RFID Configuration Settings.....	77
8.5	LDSBus Modbus/SDI-12 Adapter Configuration Settings ..	78
8.6	LDSBus 4CH SSR Application Type Configuration	81
9	Contact Information	83
Appendix A – Command List		84
Commands with payload / response		84
READN.....		84
WRITEN		84
READ		85
ECHO.....		85
Commands without payload / response.....		86
RESET.....		86
IDENTIFY		86
I2CREGOFF.....		87
Commands with payload / without response		87
I2CREGON.....		87
SETI2CSPEED		88
WRITE.....		88
Commands without payload / with response		89
INFO		89
STATUS		89
GETUUID		90
Appendix B - References		91
Document References		91
Acronyms and Abbreviations.....		91
Appendix C – List of Figures & Tables		92
List of Figures		92
List of Tables.....		92



Appendix D – Revision History 93

1 Introduction

The Long-Distance Sensor Bus (LDSBus) Configuration Utility (v1.2.4.0) enables configuration of an LDSBus to be connected to an LDSBus host system.

The tool has two main menu functions:

- LDSU (LDS Unit) Project
- LDSBus Project

1.1 LDSU (LDS Unit) Project

An LDSU Project can be created to configure LDSBus Devices (Sensors/Actuators) before they are connected to the LDSBus. The LDSU (sensor or actuator) is attached to the LDSU port of the LDSBus USB Adapter. LDSU configuration, firmware update, calibration and communication tasks can be performed directly on the device.

1.2 LDSBus Project

The LDSBus Project is used when in-situ configuration, firmware update, calibration and communication tasks are to be performed on LDSUs. This mode is useful when devices have already been deployed in the field and removing them from the bus is not convenient or not possible. The LDSBus project provides an estimate of the total power consumed over the LDSBus, which is useful when considering the power limitations of the LDSBus Host to which the LDSBus is attached. It is possible to view the detailed information about any LDSBus device on the bus.

1.3 What's New in Version 1.2.4.0?

- Added support for the following devices –
 - LDSBus 4CH Solid State Relay (SSR)
 - LDSBus Air Quality Sensor (AQS)
 - LDSBus Gas and TrueVOC Sensor
 - LDSBus Modbus/SDI-12 adapter sensor
- The recovery of primary firmware corruption in LDSU Project
- Added ftd2xx.dll file to release package to resolve “unable to find ftd2xx.dll” error

1.4 Known Issues and Limitations

None. Please report any issues or feedback to support@brtsys.com

2 Hardware Setup Pre-requisites

The following components are required to create a LDSU or LDSBus Project:

- Windows based PC
- USB Type A to Type C Cable
- LDSBus USB Adapter
- LDSBus Device(s) using RJ12/11 cable(s) to RJ12/11 cable(s) **or** RJ12/11 cable(s) to JST 4/6 cable(s)

For LDSBus Project Only:

- LDSBus HVT Junction (s)
- CAT 5e RJ45 to RJ45 Cable (s)
- 24VDC/18W Power Adapter

2.1 LDSU (LDSBus Unit) Project

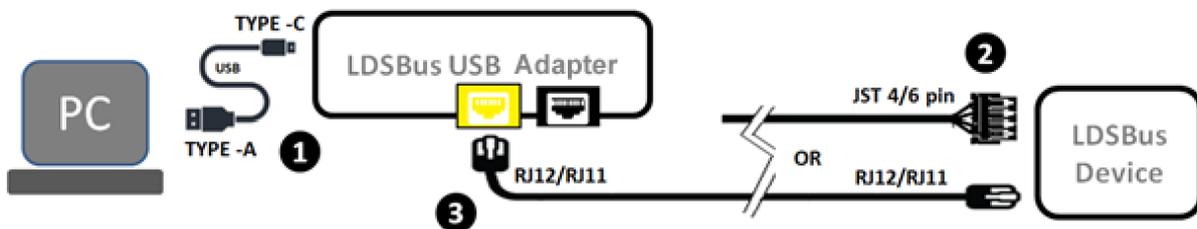


Figure 1 - LDSU Device (Sensors / Actuators) Connection Diagram

- Step 1:** Connect the LDSBus USB Adapter to the Windows PC using the USB-C to USB-A cable. (Or a USB-C to USB-C cable, if the PC has Type-C USB Ports)
- Step 2:** Connect the LDSBus Device to the cable at one end.
- Step 3:** Connect the other end of the cable to the LDSBus USB Adapter as shown in Figure 1.

For instructions on configuring the LDSBus device, refer to the Software section.

2.2 LDSBus Project

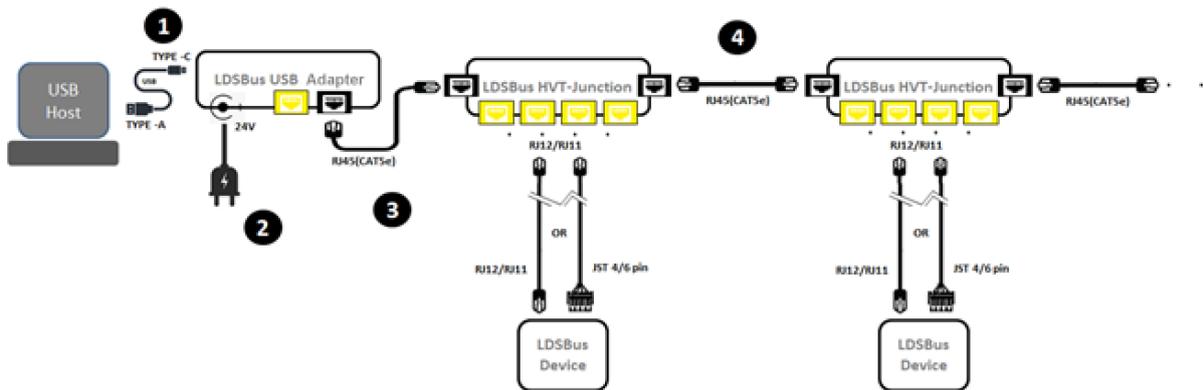


Figure 2 - LDS Bus - HVT Junction in LDSBus System - Connection Diagram

- Step 1:** Connect the LDSBus USB Adaptor to the Windows PC using the USB-C to USB-A cable (or a USB-C to USB-C cable if the PC has Type-C USB Ports).
- Step 2:** Connect a 24VDC/18W power adapter to the DC jack and turn it ON. The LDSBus and devices will be powered by software.
- Step 3:** Using an RJ45 (CAT5e) cable, connect the first HVT-Junction to the USB Adapter. LDSBus devices connected to the LDSBus HVT-Junction must be preconfigured through LDSU Project.
- Step 4:** In case of more than one LDSBus Quad-Junction, chain the connections together using RJ45 (CAT5e) cables. Ensure that termination is enabled for the last LDSBus device in the bus through the LDSU Project.

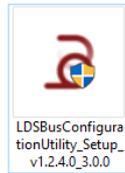
3 Installing LDSBus Configuration Utility

Following are the steps to install LDSBus Configuration Utility for the **first time** –

1. Download the installation package from BRTSys Website –

<https://brtsys.com/resources/software/brtsys-utility-tools>

2. Extract the Zip file and run the **Setup (.exe)** file provided with the installation package.



3. A Welcome message appears along with LDSBus Configuration Utility Installer Wizard. Click **[Next]**.



Figure 3 - Setup Wizard – Welcome Screen

4. A License Agreement is displayed. Click **[I Agree]** to proceed.

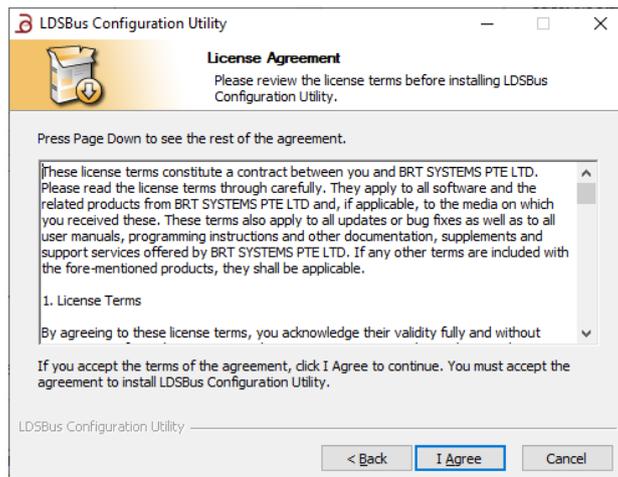


Figure 4 - Setup Wizard – License Agreement



NOTE:

At any point of time, during the installation, users may click [Back] to navigate to the previous window or click [Cancel] to abort the installation process.

5. Select or edit the Start Menu Folder Name. Click **[Next]**.

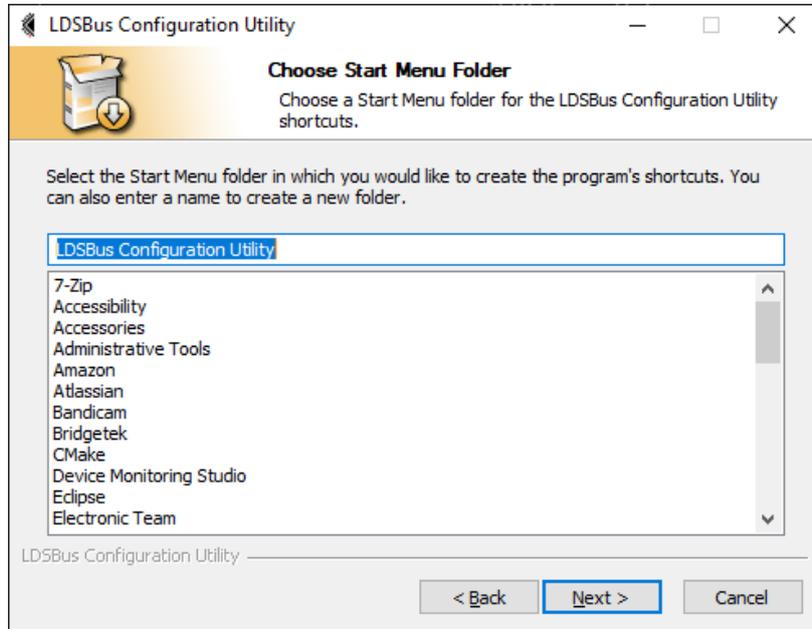


Figure 5 - Setup Wizard – Start Menu Folder Selection

6. Select a "Destination Folder" for installing the files. Accept the default folder or click **[Browse]** to specify a different location. Click **[Install]** to start the installation.

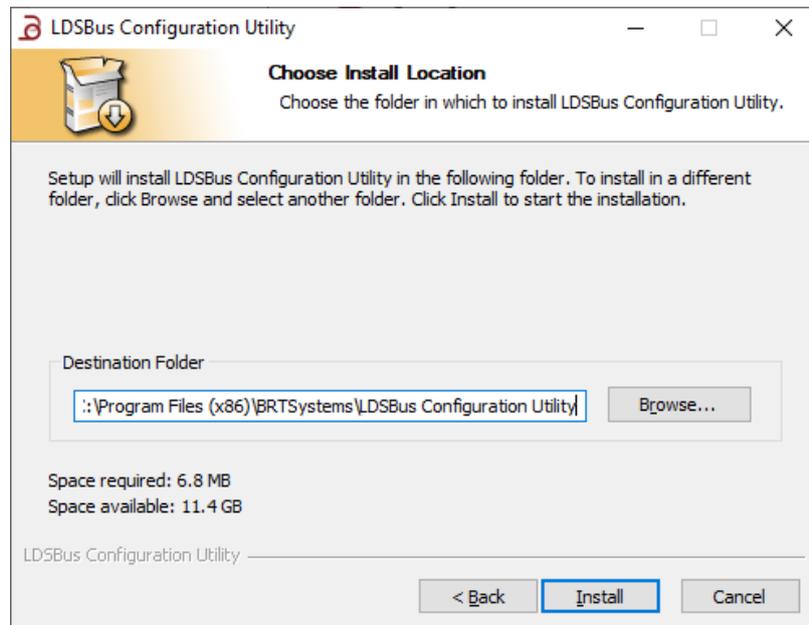


Figure 6 - Setup Wizard – Installation Location Selection

7. A progress bar indicates that the installation is in progress.

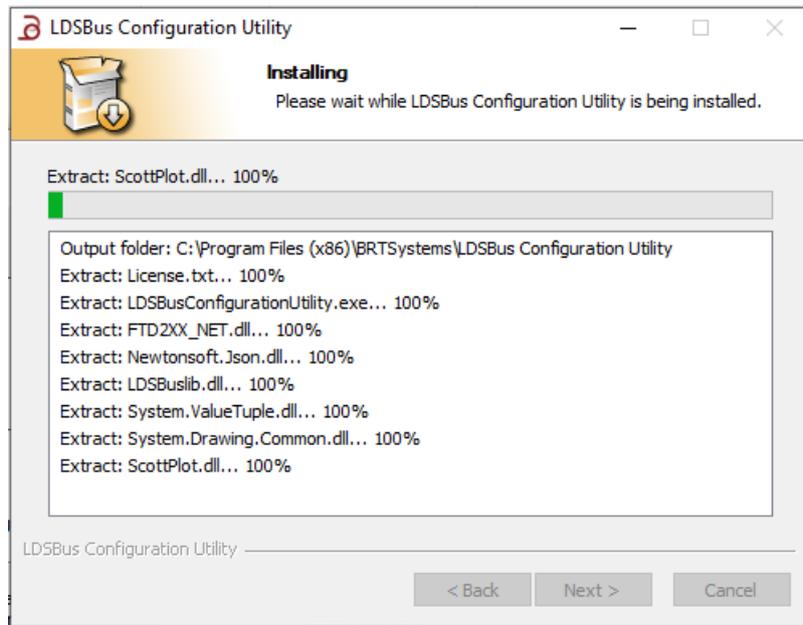


Figure 7 - Setup Wizard – Installation Progress

8. Upon successful installation, click **[Finish]** to close the setup. Select the check box to run the utility (optional).

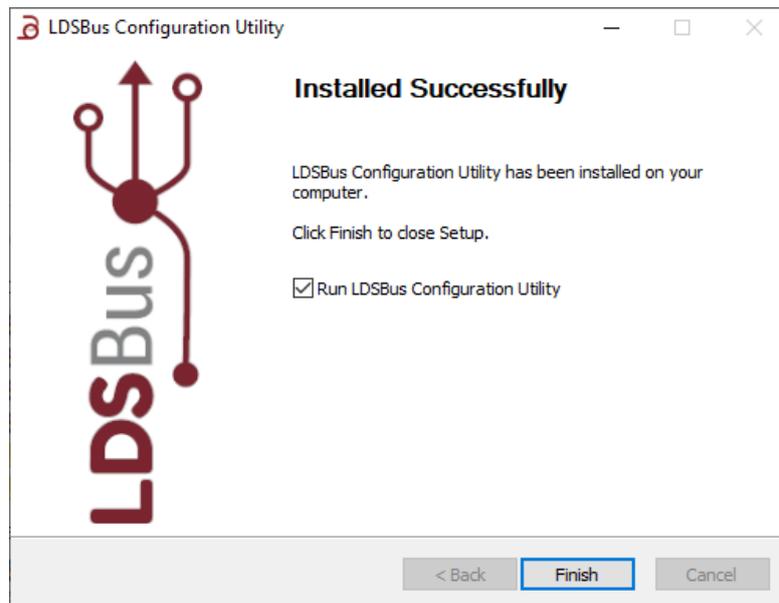


Figure 8 - Setup Wizard – Installation Complete

9. By default, the LDSBus Configuration Utility is installed in this path – “\Program Files (x86)\BRTSystems\LDSBus Configuration Utility.”

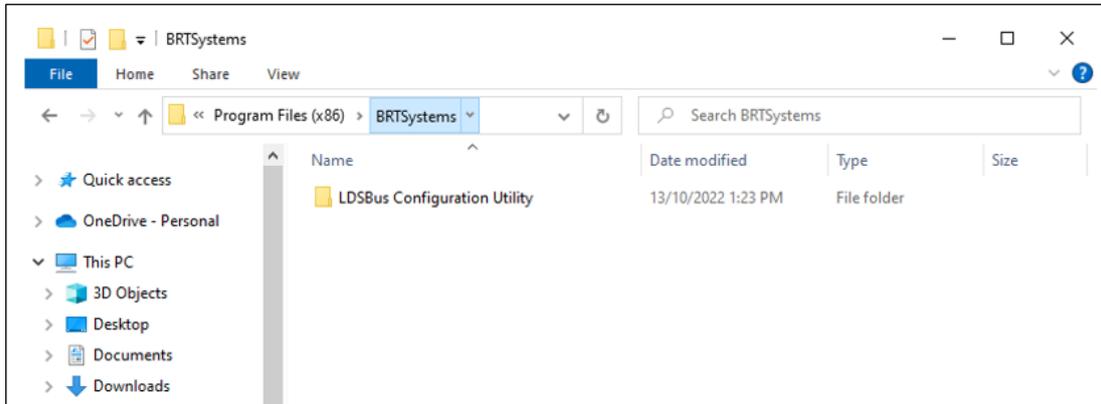


Figure 9 - LDSBus Configuration Utility Installation Folder location

10. The LDSBus Projects folder is the default folder that contains the projects saved by the utility.

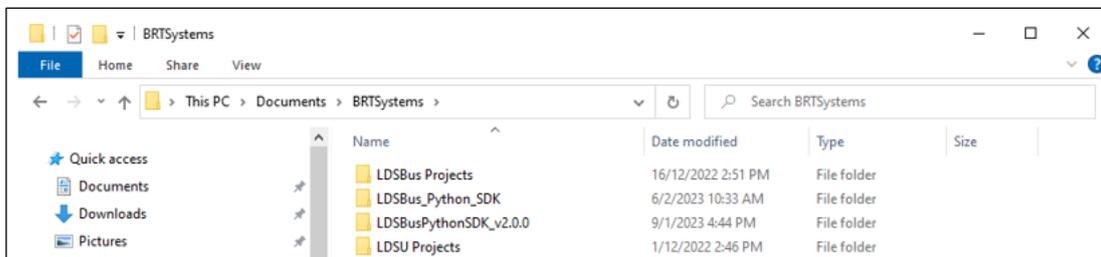


Figure 10 - LDSBus Projects Folder Location



NOTE:

To install an updated version of LDSBus Configuration Utility, download the installation package from <https://brtsys.com/resources/software/brtsys-utility-tools> and run the setup.exe file. An uninstaller will run and remove the previous package and information from the system. *First-time installation will not show the uninstaller.* Refer to Section [Error! Reference source not found.](#) for the installation steps.

4 LDSBus Configuration Utility – GUI Overview

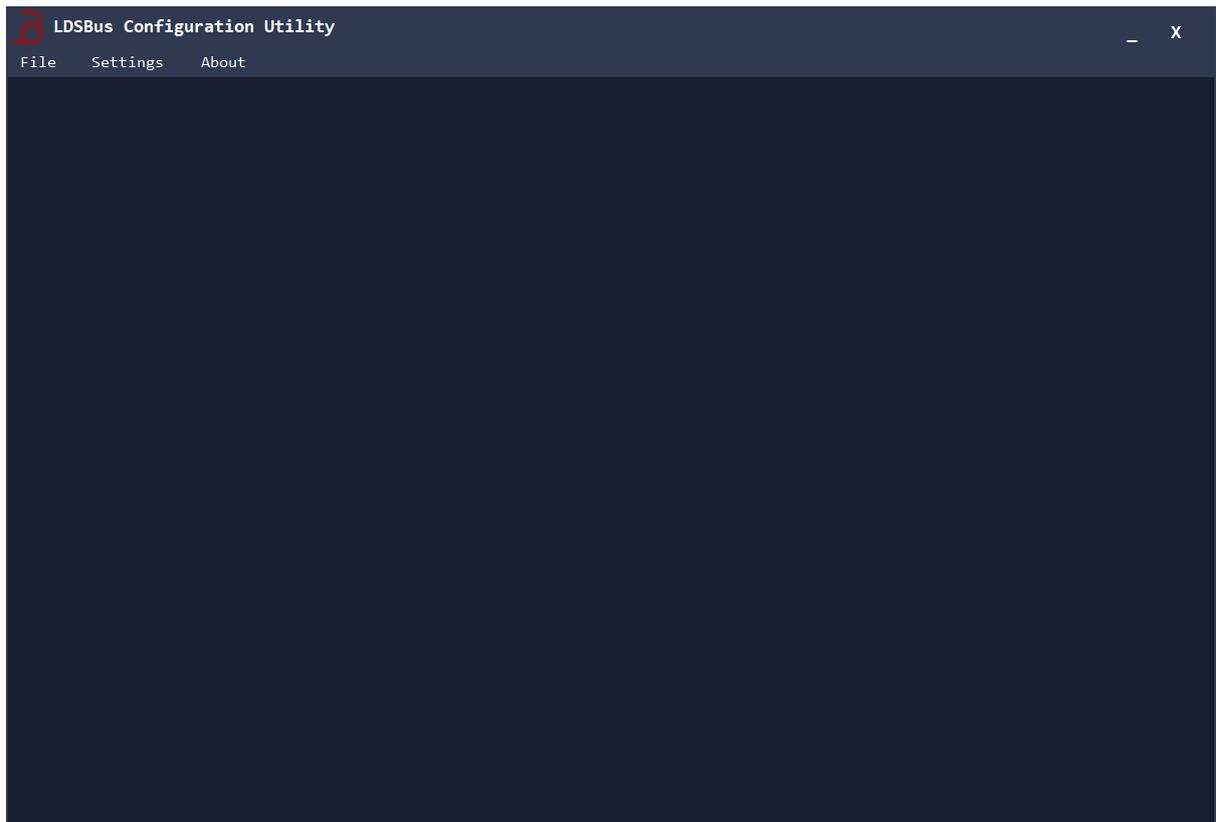
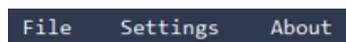


Figure 11 - LDSBus Configuration Utility User Interface

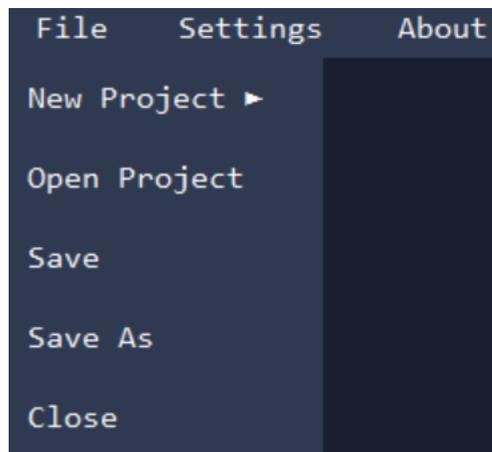
4.1 Default Menu bar

By default, the menu bar contains *File*, *Settings* and *About* menu options.



4.1.1 File Menu

In the menu bar, the first item is the *File* menu. It contains commands that are used to manage Projects, such as *New Project*, *Open Project*, and *Save Project* etc.



Menu Item	Description
New Project	To create a new LDSU / LDSBus projects
Open Project	To open or retrieve an existing LDSU / LDSBus project.
Save	To save the project. The file is saved with an ".ldsuproj" extension for LDSU projects and an ".ldsbusproj" extension for LDSBus projects.
Save As	To choose a different destination and file name to save the current project. The file is saved with the extension ".ese".
Close	To close the project

Table 1 - File Menu Items and Description

4.1.2 Settings Menu / Interface

From the menu, click the **Settings** option to access the Settings interface. The settings screen lists the available *LDSBus USB Adapter's* serial number. Click Refresh icon  to get the new devices (if any).

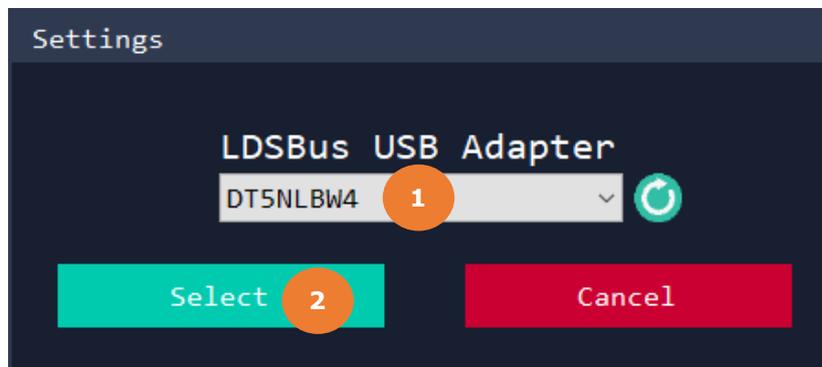


Figure 12 - Settings Interface

1. Select the required adapter from the dropdown list.
2. Upon selecting the adapter, click [**Select**] to use the adapter. Alternately, click [**Cancel**] to return to the previous screen.

4.1.3 Additional Menu (based on the selected Project)

LDSU Project



LDSBus Project



5 LDSU (LDSUnit) Project

5.1 Creating a New LDSU Project

To create an LDSU Project –

1. Choose the **LDSBus USB Adapter** from the **Settings** menu. Refer to Section 4.1.2.

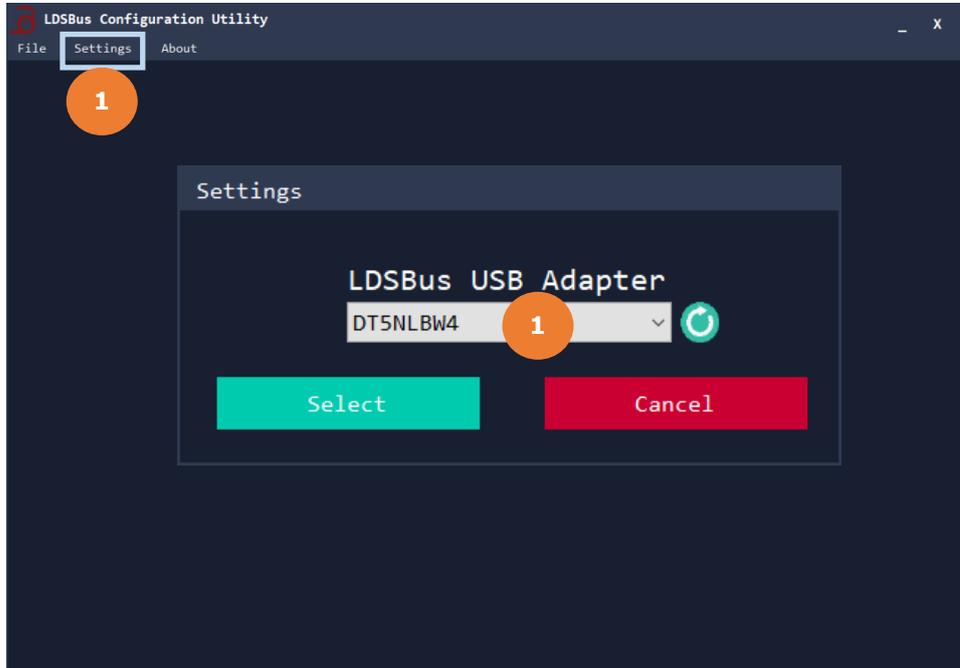


Figure 13 - LDSBus USB Adapter Selection

2. To create an LDSU project, click **File** → **New Project** → **LDSU Project**.

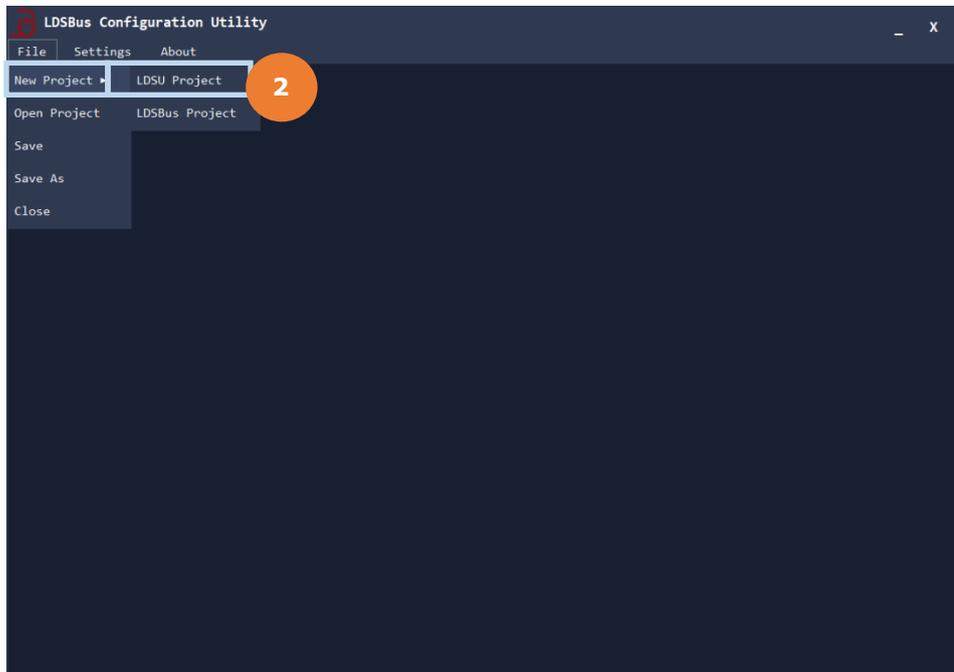


Figure 14 - Project Type Selection Menu

- Based on the selected project, the application title will be displayed. For example, if the selected project type is "LDSU Project," then the title displayed will be "LDSBus Configuration Utility – LDSU Project." **Enable** the LDSU port power on the LDSBus Device connected to the LDSBus USB Adapter. Click **[Scan]**.



Figure 15 - LDSU Project Interface

- Upon finding a device, the information related to the connected LDSBus Device will be displayed. The details of the sensor device are displayed at the bottom of the interface. Except for *LDSU ID*; *LDSU Termination Status* and *Nickname* all the other fields are *non-editable*.

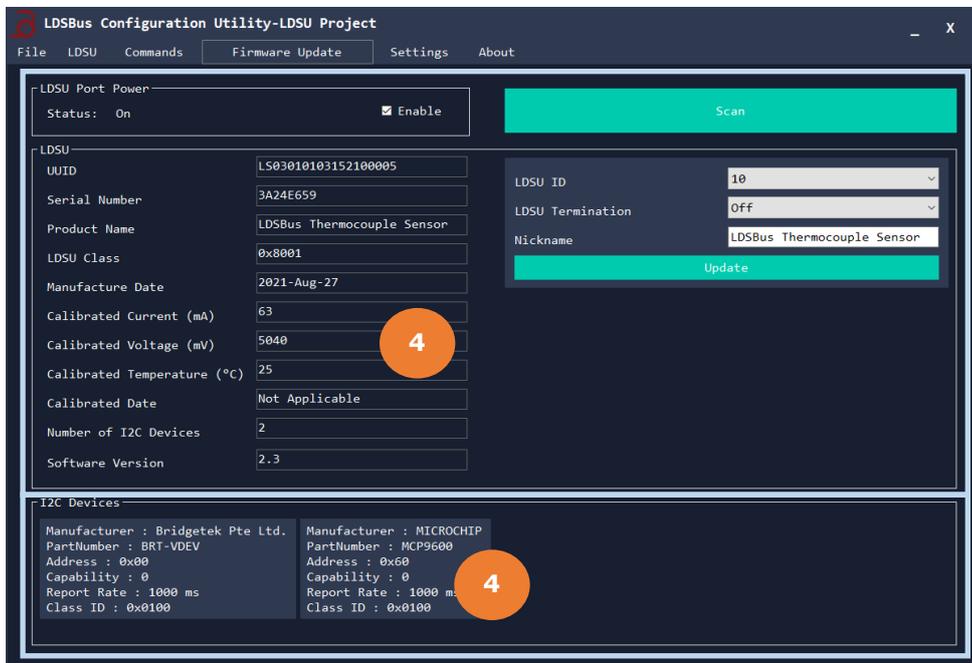


Figure 16 - LDSU Project Interface

5. Configure the following LDSU Device settings, if required:

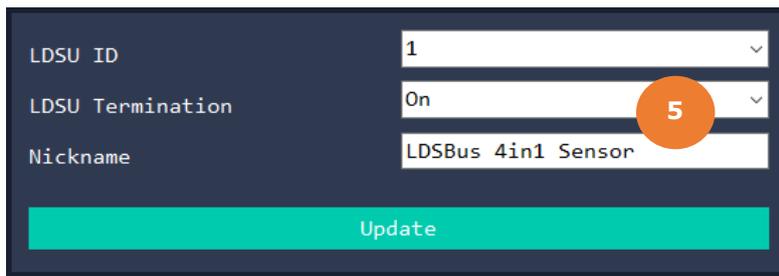


Figure 17 - LDSU Device Settings

LDSU ID: Default is set as '126'. Change the ID accordingly based on the number of devices that will be connected to the LDSBus. For example, if you will be connecting more than one LDSBus Device on the bus, configure the first device with an ID of '1', second device with an ID of '2' and so on. Each LDSBus Device must have a unique ID.

LDSU Termination: Default is set as 'Off.' Ensure termination for the last LDSBus Device on the bus is set as 'On.'

Nick Name: Default is set as the product name. Change the device name accordingly. The device name set will be reflected in the LDSBus Host System.

Click [**Update**] to save any changes.

Click [**Calibrate**] to start the calibration. Refer to [Section 7](#) for more information on the Calibration procedure.

6. If new firmware is available for update, a confirmation window is displayed Click [**Yes**] to proceed with the firmware update, refer to [Section 5.2](#) for more information on firmware update for LDSU project. Alternately, click [**No**] to cancel.

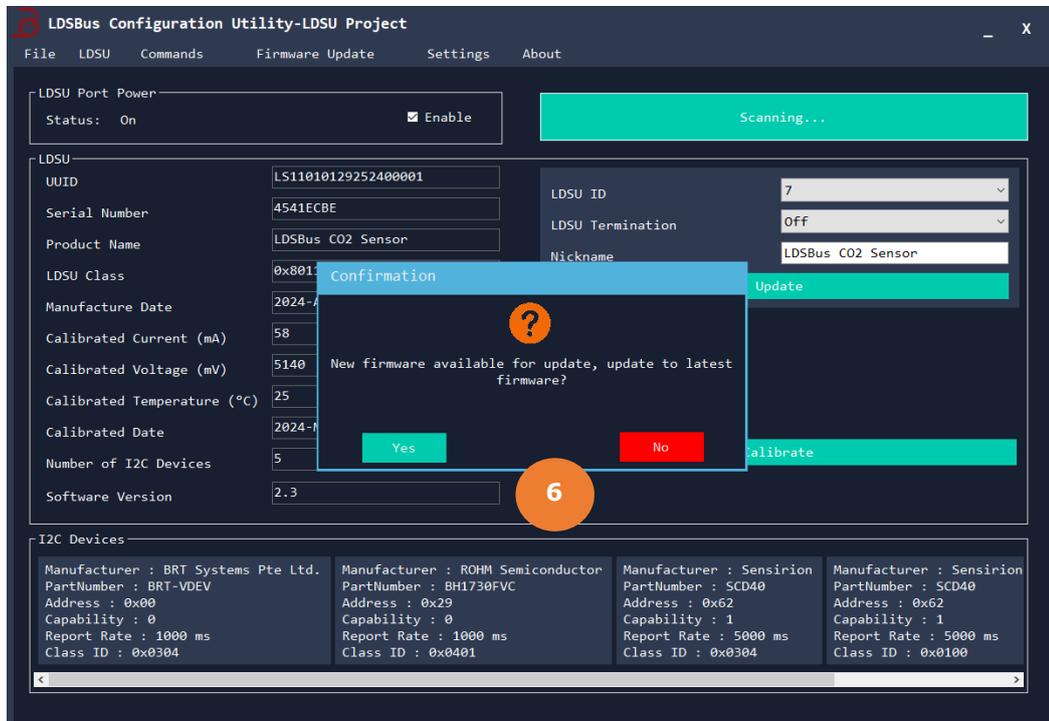


Figure 18 - Firmware Update - Confirmation

5.2 Firmware Update

This function allows users to update the device firmware. The Configuration Utility installer file will include all supported LDSU devices firmware; users cannot select their own firmware. To update firmware,

1. Select **Firmware Update** from the menu. a confirmation window is displayed. Click **[OK]** to proceed with the firmware update. Alternately, click **[Abort]** to cancel.

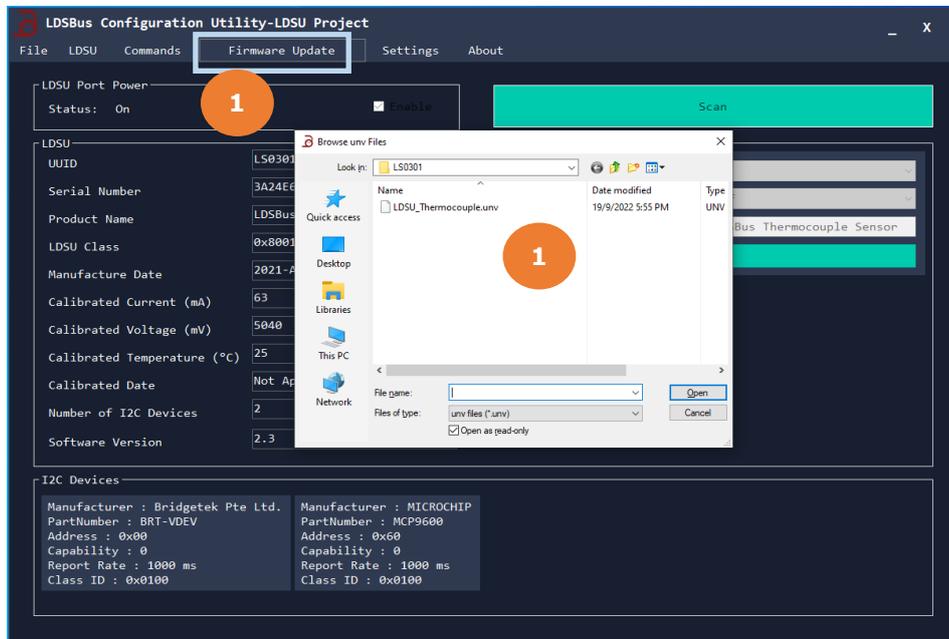


Figure 19 - Firmware Update / File Browser Interface

2. Upon selecting a valid firmware package, a confirmation window is displayed. Click **[OK]** to proceed with the firmware update. Alternately, click **[Abort]** to cancel.

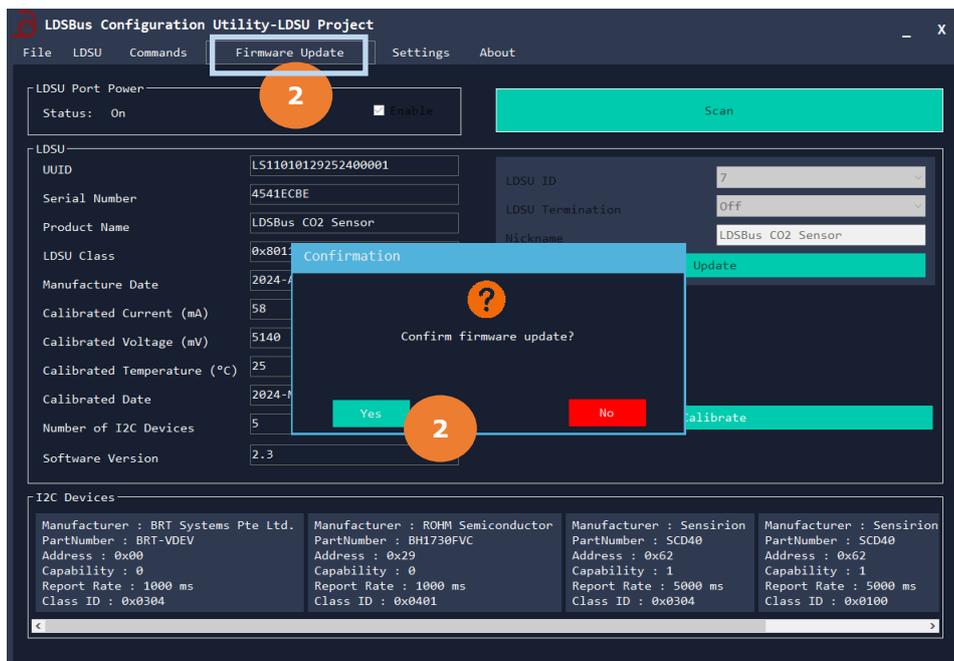


Figure 20 - Firmware Update Confirmation Window

OR

If the device is already updated with the latest firmware, an appropriate warning message is displayed. Click **[Yes]** to overwrite the existing version or **[No]** to cancel the firmware update.

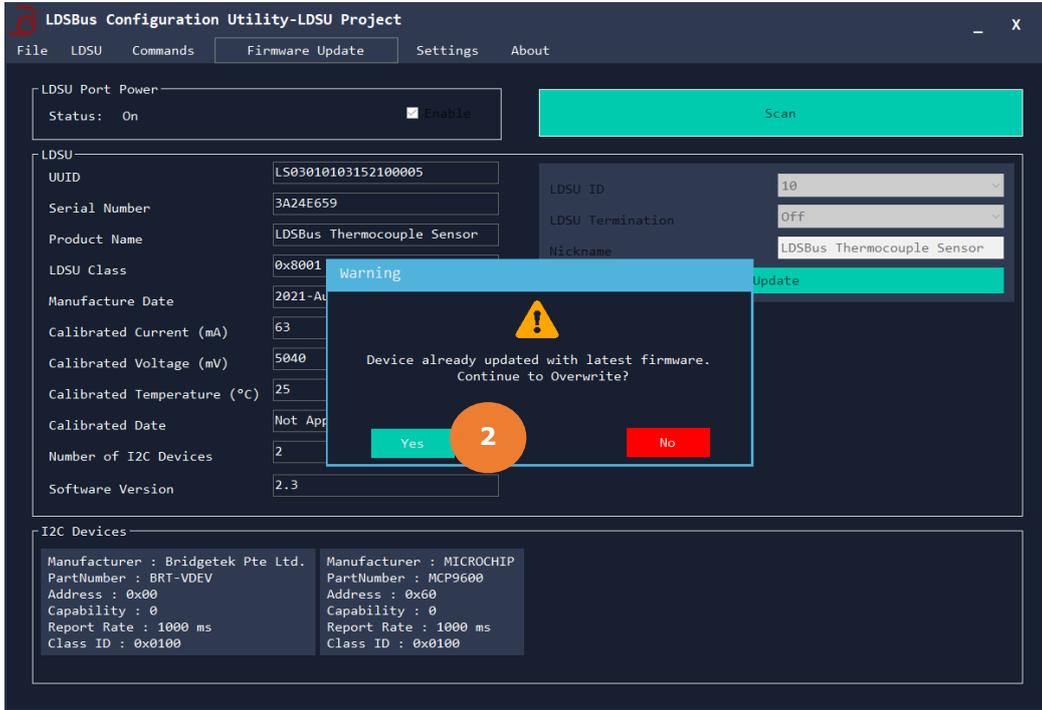


Figure 21 - Firmware Overwrite Alert Window

3. A dialog window with the information about the current firmware version and the new firmware version that will be installed, is displayed. Click **[OK]** to proceed.

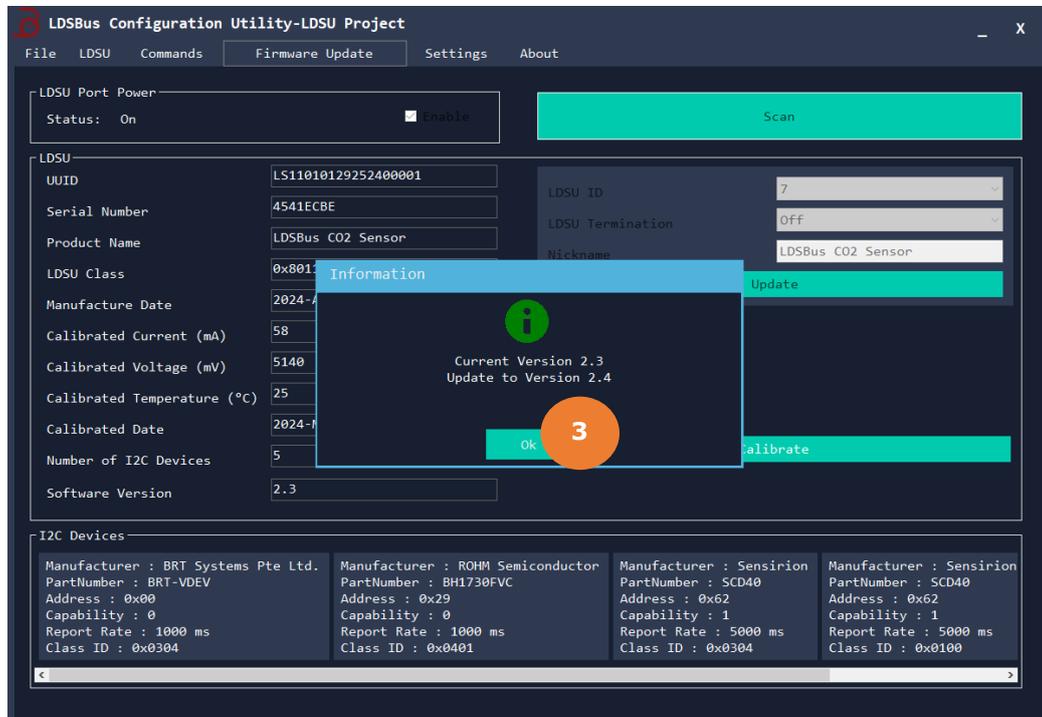


Figure 22 – Firmware Version Information

4. A firmware has release note (if any) will pop up. Click [OK] to proceed with the firmware update.

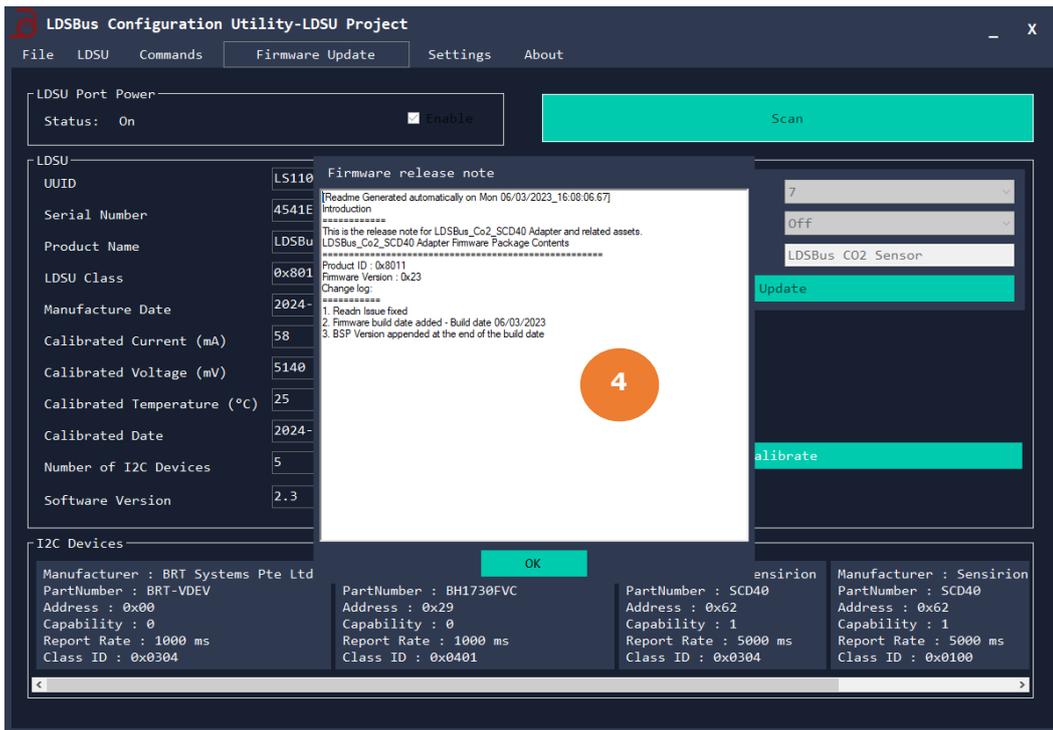


Figure 23 - Firmware Release Note

5. Depending upon the status of the firmware update, an appropriate message indicating the same is displayed. Click [OK] to close the window.

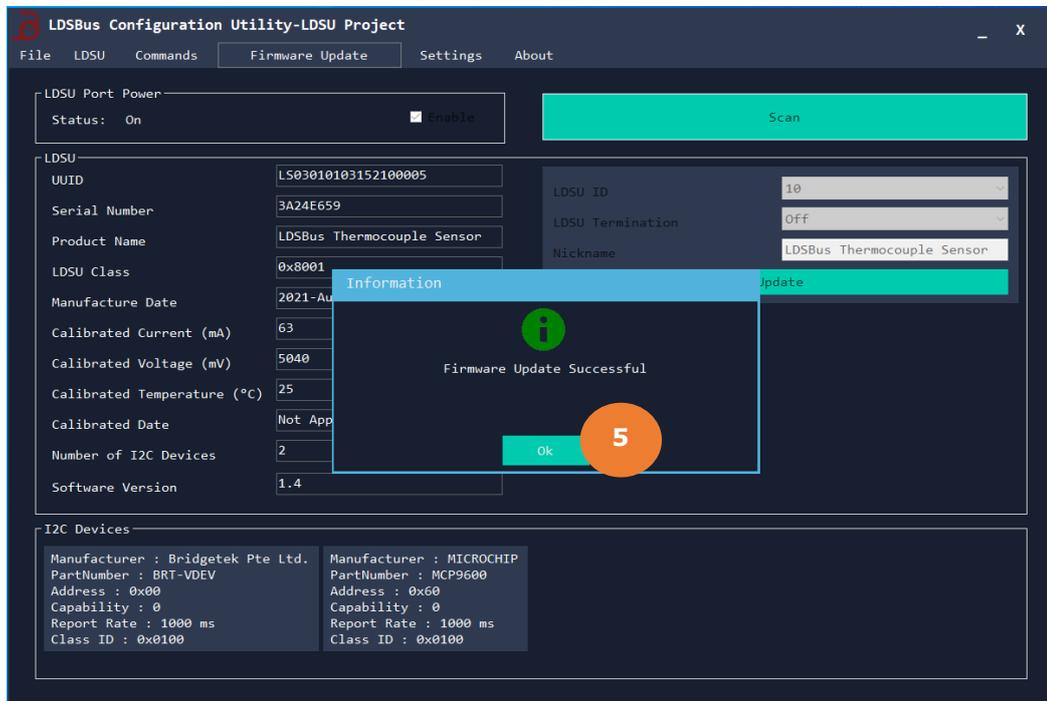


Figure 24 - Firmware Update Successful Message Window

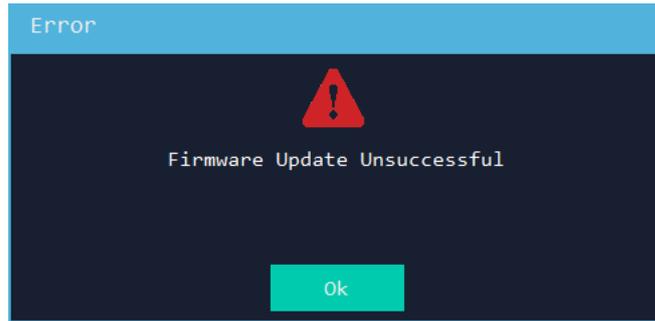


Figure 25 - Firmware Update Unsuccessful Message Window

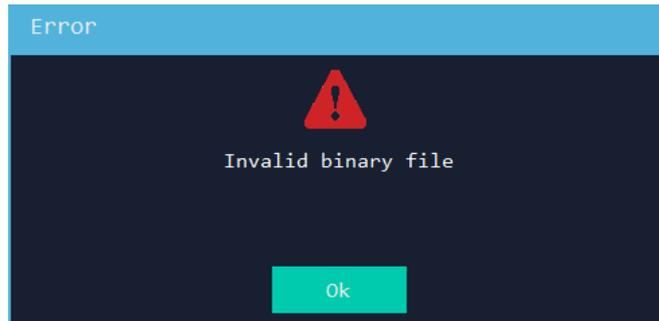


Figure 26 - Firmware Update Error Message Window

5.3 LDSU Command Interface

The LDSU command interface is used to communicate with the LDSU module by selecting the command from the list of support commands. The command settings are available only if the device is found on the bus. To access the Commands window,

1. Select **Commands** from the menu.

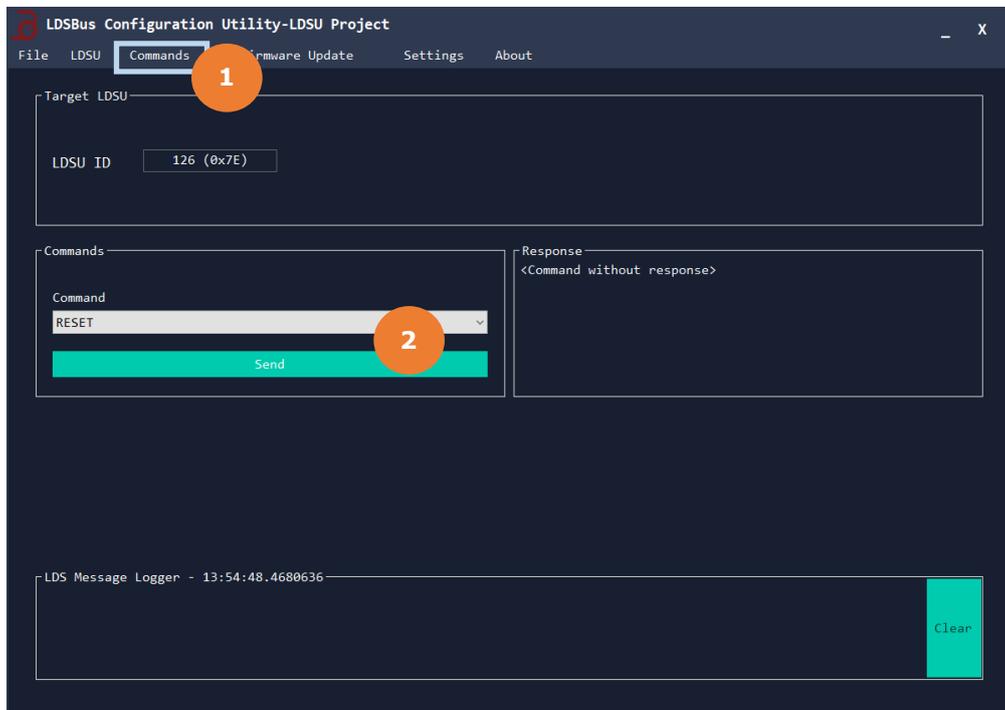


Figure 27 - LDSU Project - Commands Interface

2. The Commands interface is displayed.

LDSU ID – Displays the selected Device ID

Command – Displays a list of LDS Commands in a drop-down box

Response – Upon selecting a command and clicking **[Send]**, the device response will extract the packets and display them in the response box. Refer to Table 2 for the list of commands with response and without response. Refer to Figure 29 for a sample command with response. Refer to Figure 30 for a sample command without response.

LDS Message Logger – Displays the query and response logger.

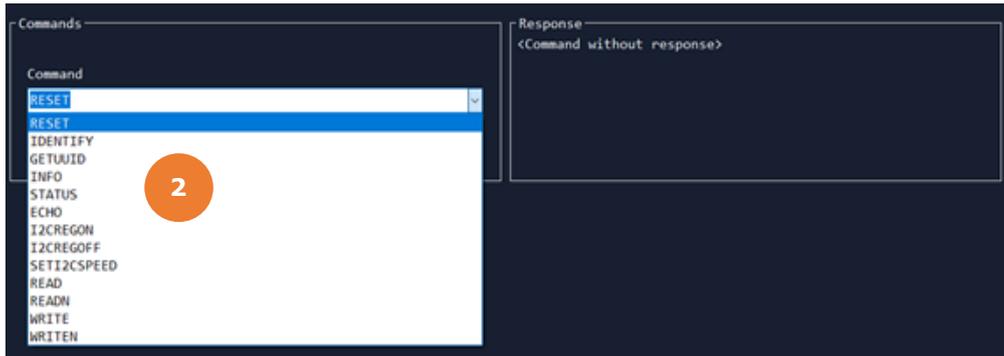


Figure 28 - LDSU Project – Commands List

Refer to Table 2 for the list of commands.

Commands with payload and response	READN ; WRITEN ; READ ; ECHO
Commands without payload and no response (Same UI)	RESET ; IDENTIFY ; I2CREGOFF
Commands with payload and no response	I2CREGON ; SETI2CSPEED ; WRITE
Commands without payload and with response	INFO ; STATUS ; GETUUID

Table 2 - List of Commands

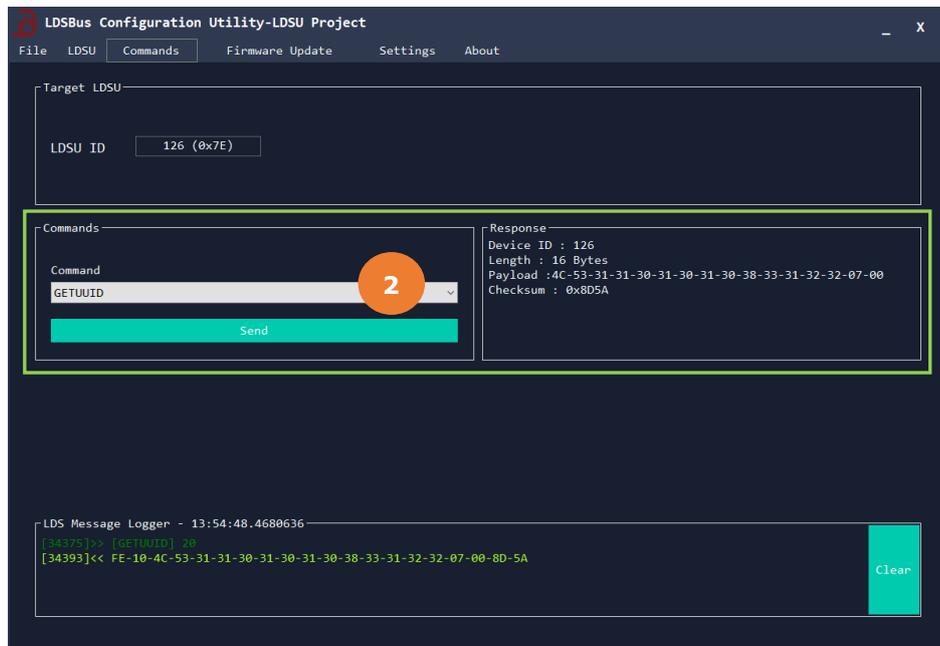


Figure 29 - Sample Command with Response

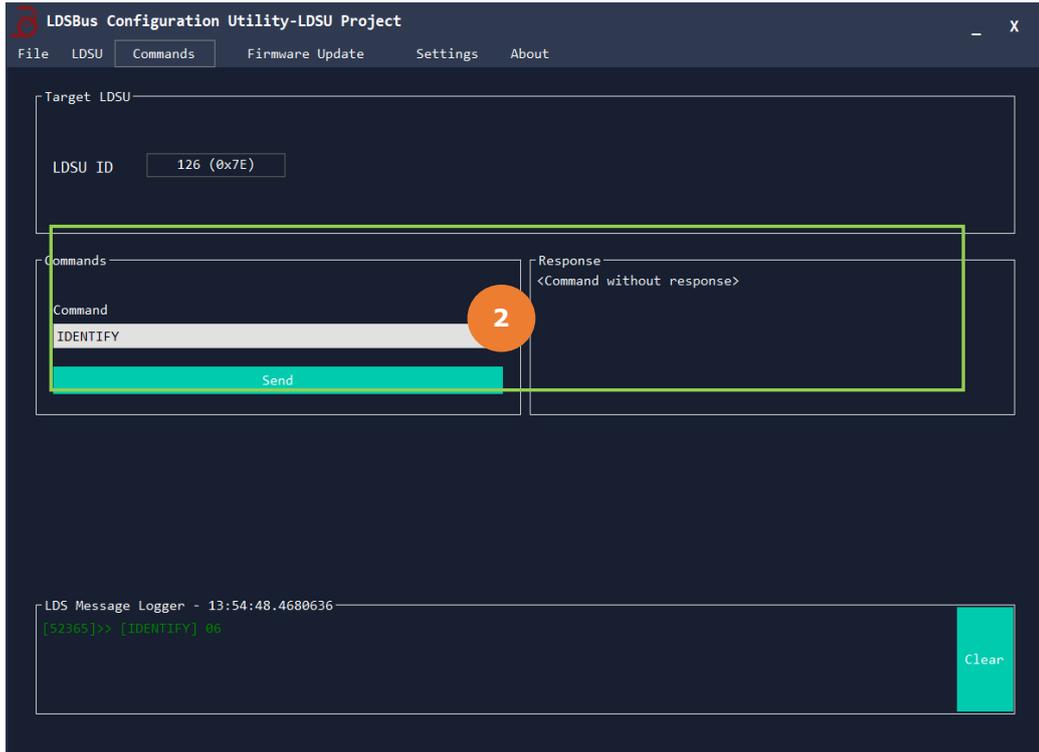


Figure 30 - Sample Command without Response

5.4 Saving LDSU (LDSUnit) Project

Upon creating an LDSU Project, users may save the project. To save a project –

1. Click **File** → **Save**.

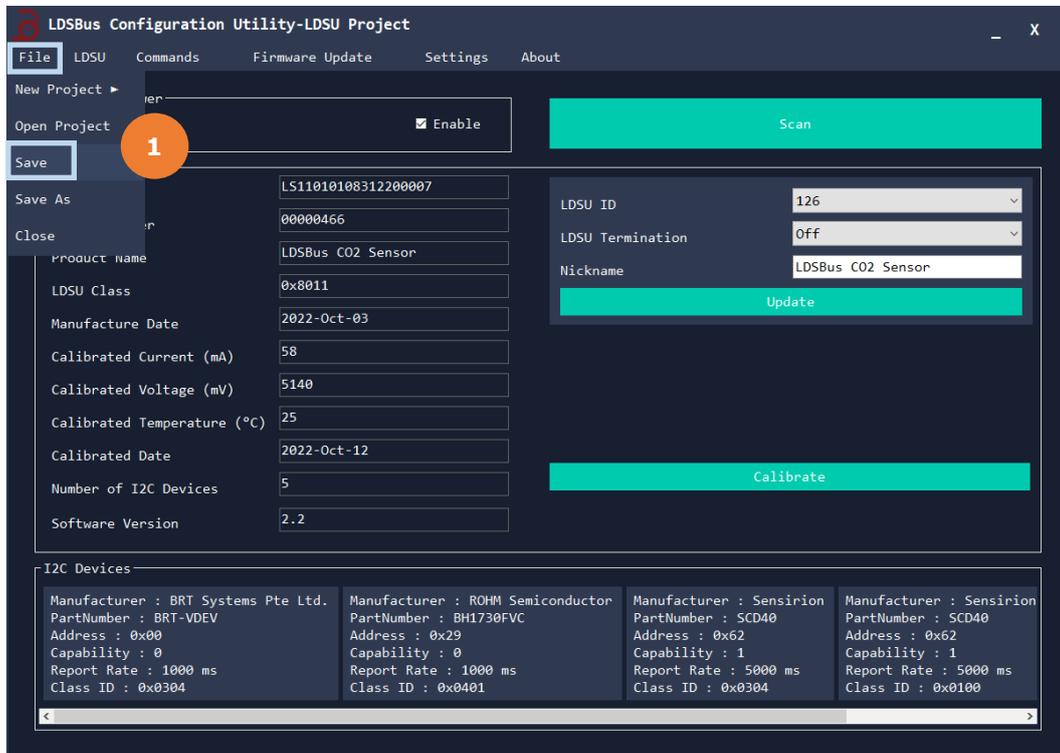


Figure 31 - Save LDSU Project

- By default, the project will be saved under this location - */My Documents/BRTSystems/LDSBus Projects*. However, users may select a preferred location to save the project. The LDSU project will be saved with a file extension - **.ldsuproj**.

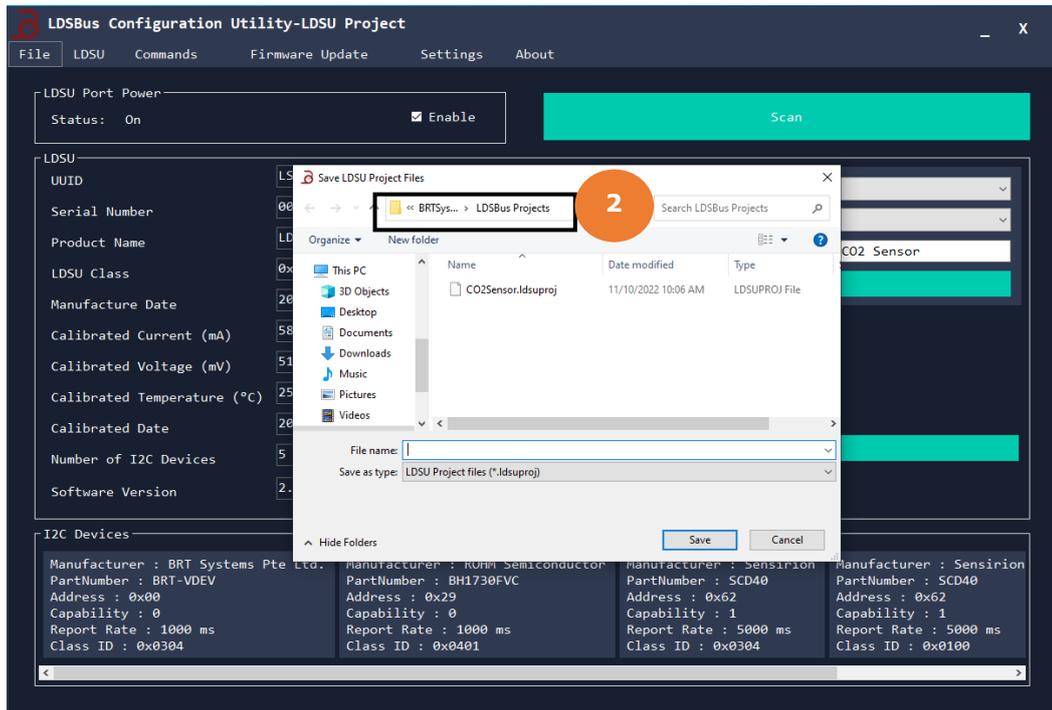


Figure 32 - Default Location to Save LDSU Project

- The picture below shows a sample LDSU Project saved under the default location.

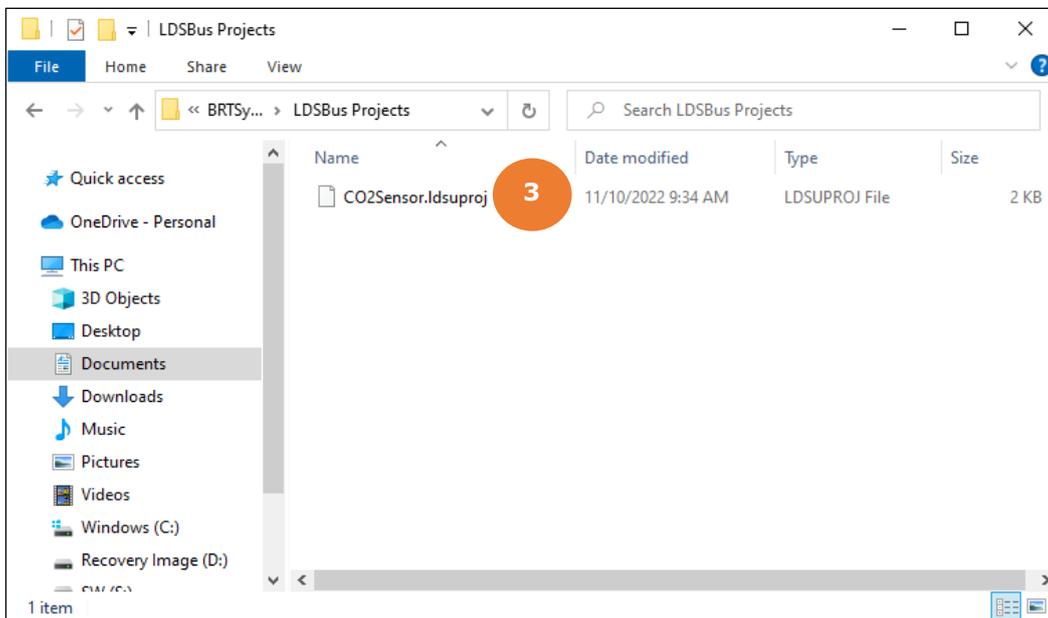


Figure 33 - Sample LDSU Project Saved under default location



NOTE:

A copy of the file can be made in a different folder or with a different name by clicking the File → Save As.

5.5 Opening a LDSU Project

To open an existing LDSU Project,

1. Click **File** → **Open Project**.

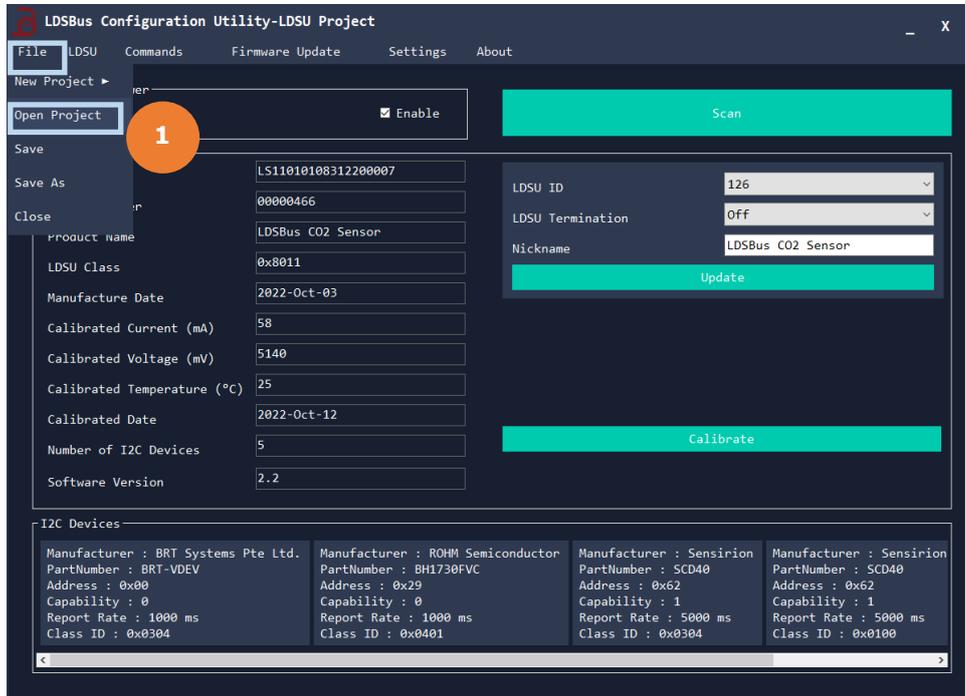
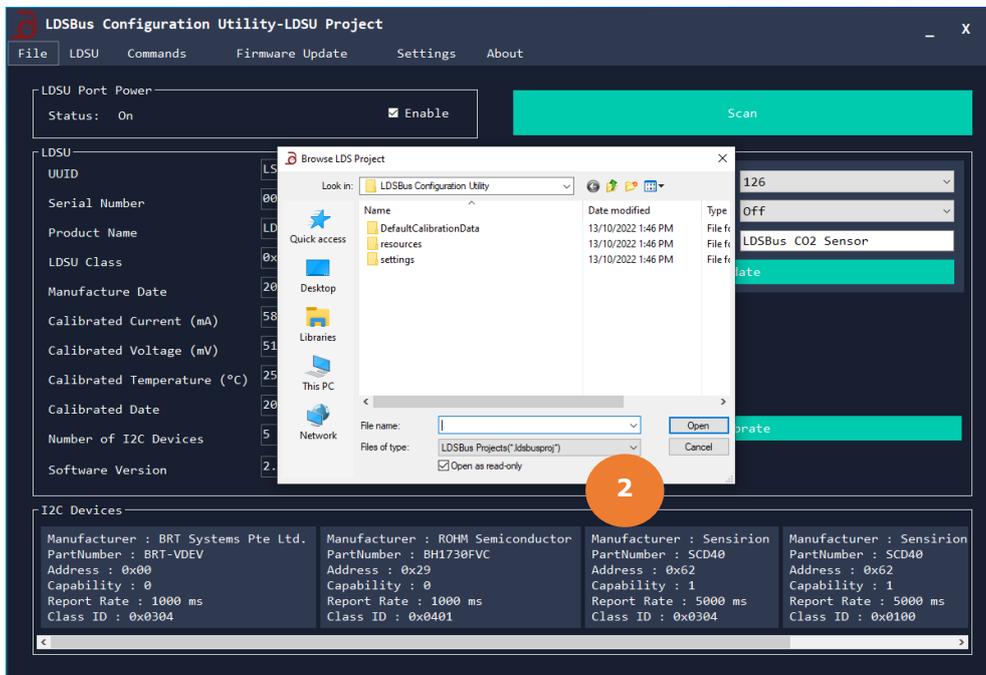


Figure 34 - File - Open Project Menu

2. Browse for the project in the File browser and select the LDSU Project. By default, the *Files of type* filter box display LDSBus Projects (*.ldsbusproj). Click the box and select a LDSU Project. Click and open the LDSU Project.



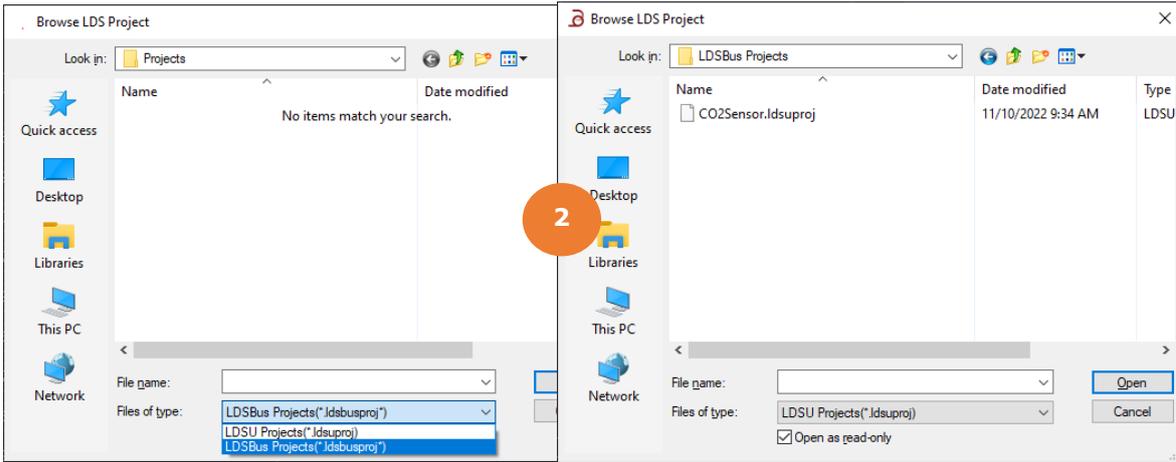


Figure 35 - File Browser - LDSU Project Selection

- The LDSU project is opened in the project window.

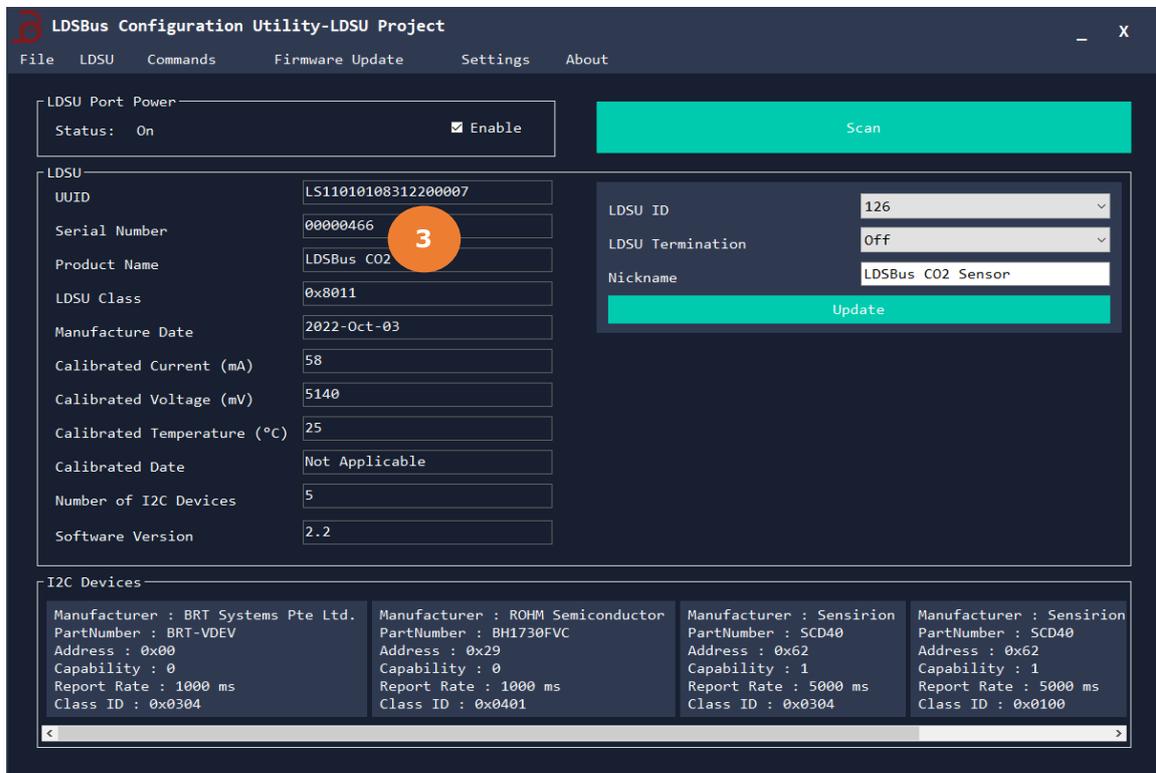


Figure 36 - LDSU Project Window

Refer to [Section 5.1](#) for more information on creating the LDSU project.

6 Creating a New LDSBus Project

To create an LDSBus Project –

1. Click **File** → **New Project** → **LDSBus Project**.



Figure 37 - Project Type Selection Menu

2. Based on the selected project, the application title will be displayed. For example, if the selected project type is "LDSBus Project," then the title displayed will be "LDSBus Configuration Utility – LDSBus Project." **Enable** the LDSU port power on the LDSBus Device connected to the LDSBus USB Adapter. Click **[Scan]** to scan the devices in the bus.

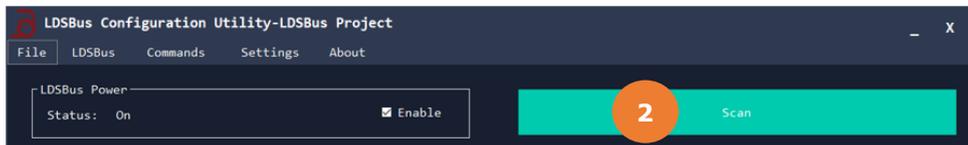


Figure 38 - LDSBus Project Interface

3. Upon finding the device(s), information related to LDSBus Device will be displayed. There are two view options available, namely **LDSU IDs** View and **LDSU List** View. By default, LDSU IDs view is displayed.

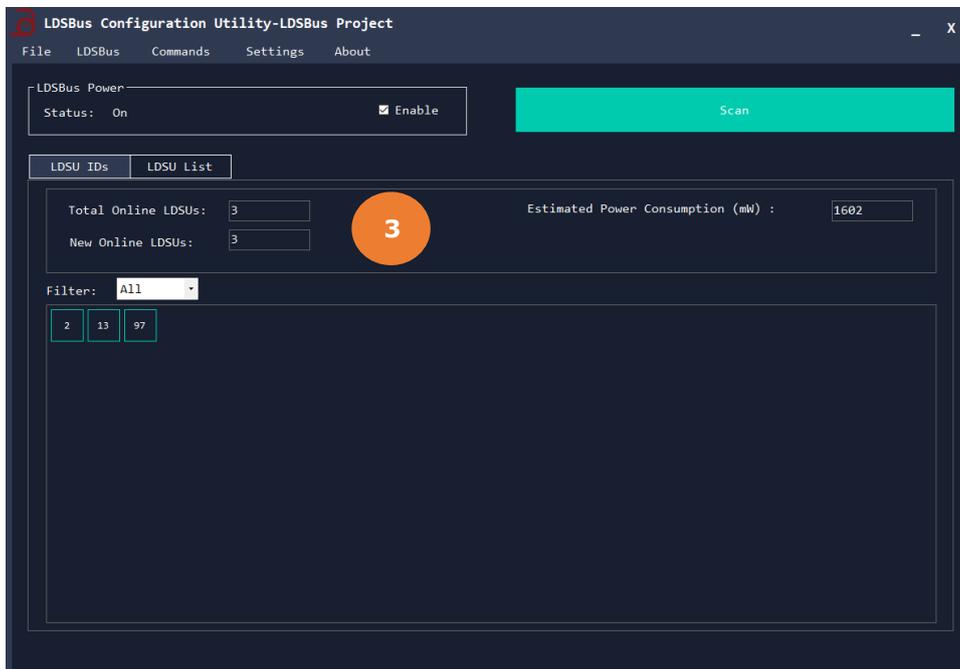


Figure 39 - LDSBus Project Interface (LDSU IDs View)

4. The following details are displayed as part of the LDSU IDs view –

- *Total number online LDSU devices:* Displays the total number of LDSBus Devices which are physically connected and detected on the bus.
- *New online LDSU devices:* Displays the total number of new LDSBus Devices which are physically connected and detected on the bus.
- *Estimated Port Power Consumption:* Displays the estimated total power consumed by the bus
- *Online/Offline Device Filter:* To filter all, online, offline, or new online LDSBus Devices. LDSBus Devices ID displayed based on filtering results.



5. Switch to LDSU List to view the basic device information. The list view displays all the LDSBus Devices connected in the bus with some device information. The LDSU List view displays the following information – *Device UUID; Device’s Nickname; Date on which the device was last calibrated; Termination Status (ON / OFF).*

Click **Details** to view the detailed information about the device.

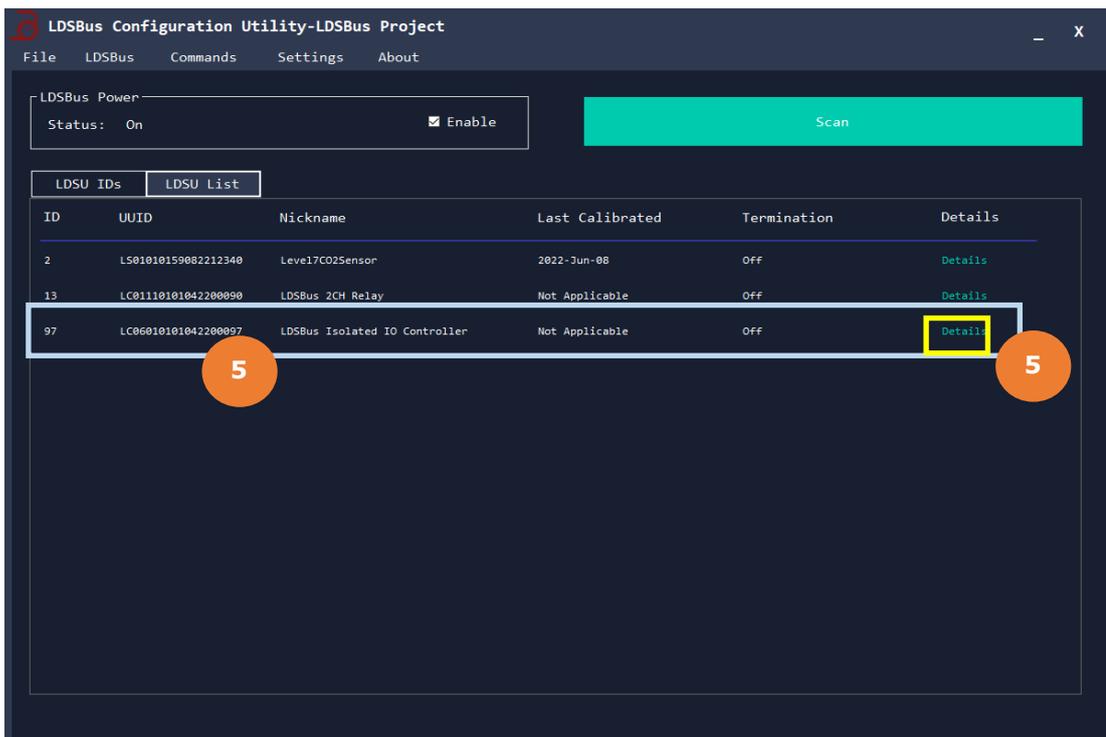


Figure 40 - LDSU List Interface

6. Upon clicking the **Details** link, the detailed LDSU information is displayed.

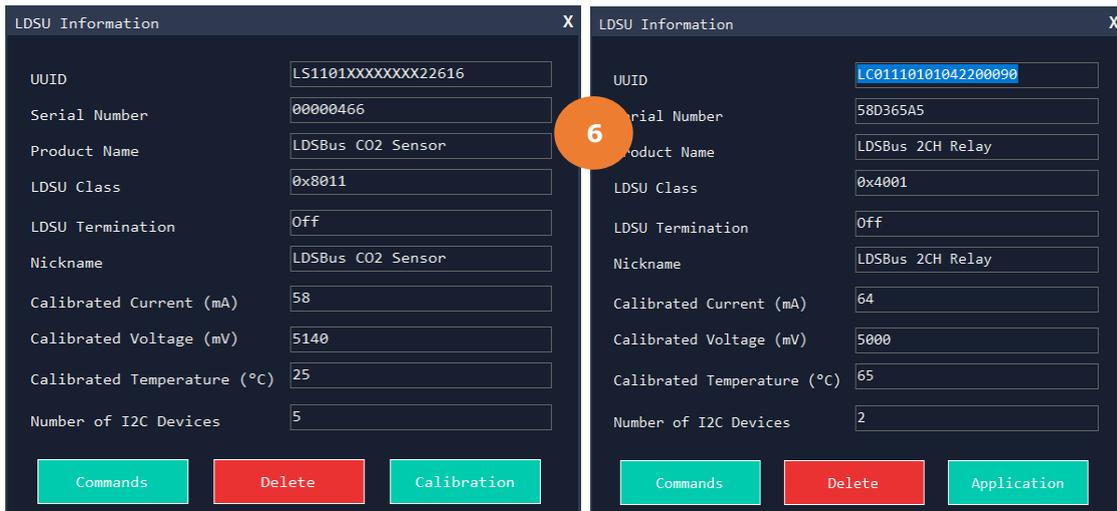


Figure 41 - LDSU Information

Click [\[Commands\]](#) to access the command interface.

Click [\[Delete\]](#) to remove any of the device from the list.

Click [\[Calibration\]](#) to start the calibration process.

Click [\[Application\]](#) to configure the application types.

6.1 LDSBus Command Interface

The LDSBus command interface is used to communicate with the LDSBus module by selecting the command from the list of supported commands. The command settings are available only if the device is found on the bus. Refer to [Section 5.3](#) for more information.

6.2 Saving LDSBus Project

Upon creating an LDSBus Project, users may save the project. The steps for saving a LDSU Project and LDSBus Project is the same. Refer to [Section 5.4](#) for more information.

6.3 Opening a LDSBus Project

The steps for opening a LDSU Project and LDSU Project is the same. Refer to [Section 5.5](#) for more information.

6.4 LDSBus Right Click Functions

To access the dropdown menu of the device under LDSBus project.

1. Right click the device green square box.

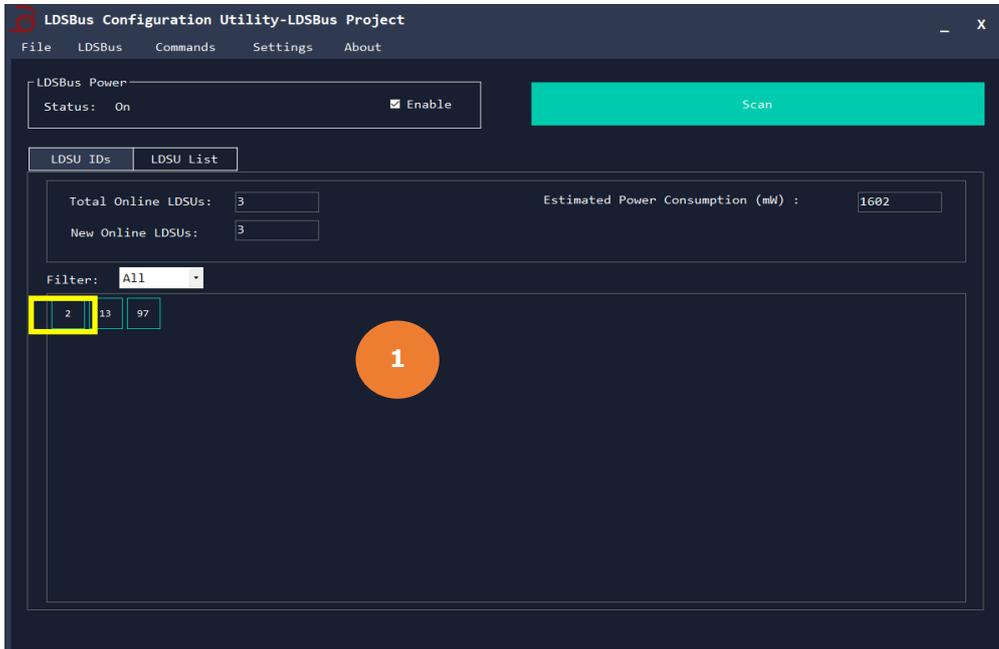


Figure 42 - LDSBus Project - LDSU IDs

2. The dropdown menu will be displayed.

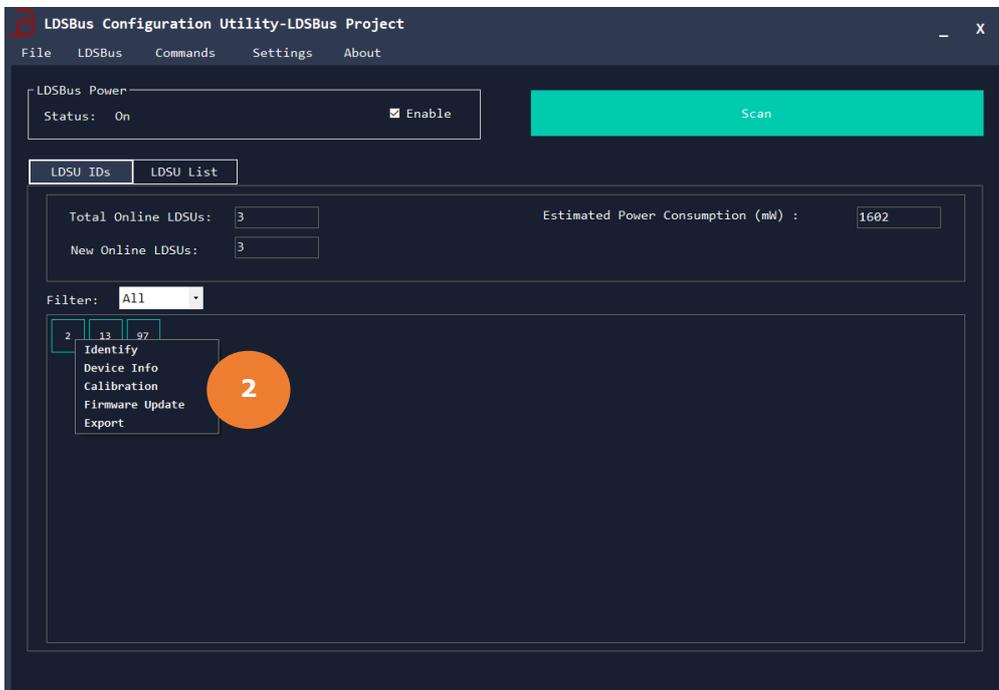


Figure 43 - LDSBus Right Click Drop Down Menu

Common items shown in the dropdown menu are "Identify," "Device Info," "Firmware Update," "Export," "Calibration," "Application Setting," "Profile Setting," "RFID Setting" and "Sensor Configuration" are device related.

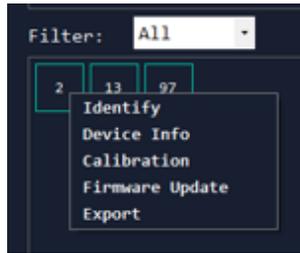


Figure 44 - LDSBus Dropdown Menu

Identify – To send identify command.

Device Info – To view the LDSU device as shown in **Figure 41**.

Firmware Update – To update device firmware. Refer to [Section 6.5](#) for more details. On firmware update.

Export – To save the selected unit's data to LDSU project file.

Calibration – To perform calibration. Refer to [Section 7](#) for more details on calibration procedure.

Application Setting – To configure application Type. Refer to [Section 8](#) for more information related to application type configuration.

Profile Setting – To configure profile setting. Refer to [Section 8.3](#) for more information on Profile Setting.

RFID Setting – To configure RFID Setting. Refer to [Section 8.4](#) for more information on Configuring RFID Setting.

Sensor Configuration – To configure Sensor Setting. Refer to [Section 8.5](#) for more information on Sensor Configuration Setting.

6.5 LDSBus Firmware Update

To update device's firmware under LDSBus project –

1. Right click and select the device for which the firmware needs to be updated; From the resulting drop-down menu, click on **"Firmware Update"** to start the firmware update process.

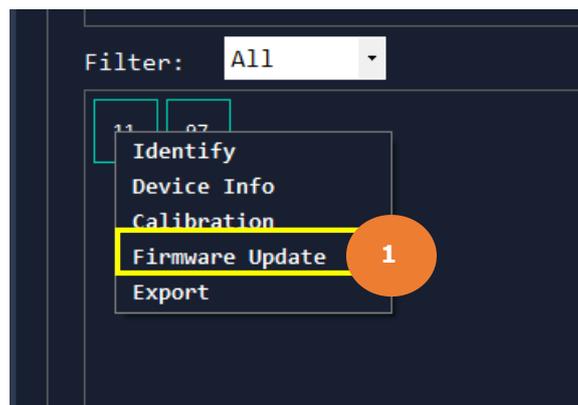
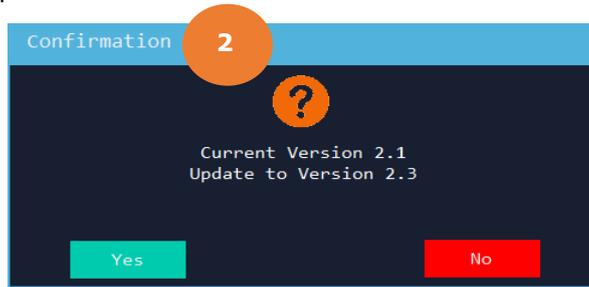
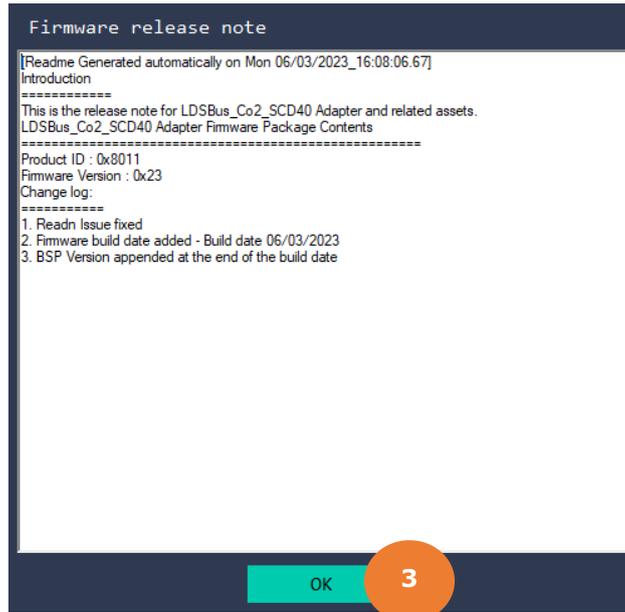


Figure 45 - Drop Down Menu - Firmware Update

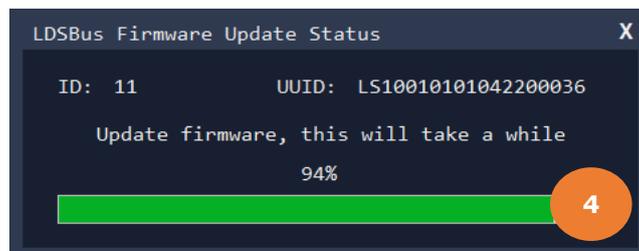
2. A confirmation window will pop up. Click **[Yes]** to confirm the firmware update operation or click **[No]** to cancel the update.



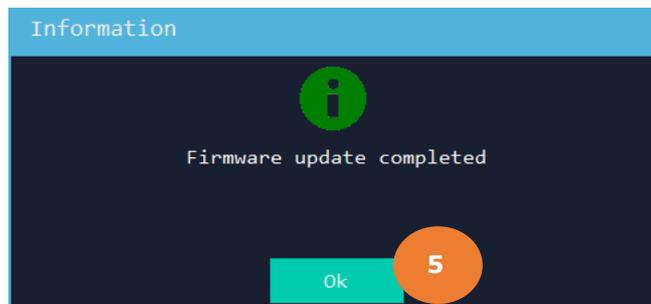
3. If firmware has release note, firmware release note will pop up. Click **[OK]** to continue start the firmware update.



4. LDSBus Firmware update status window will pop up to show the progress of the firmware update.



5. Upon successful completion of update, an appropriate message indicating the same will be displayed. Click **[OK]** to return back LDSBus Project window.



7 Sensor Calibration Procedure

Sensor calibration is the process of aligning the sensor's output to known reference values to ensure accurate and consistent measurement performance. It is recommended to follow the calibration procedure before taking measurements to ensure accurate results. Before starting the calibration procedure, ensure that the required equipment and buffer solution are prepared.

Note : For pH, Electrical Conductivity (EC), Salinity, and ORP sensors, calibration must be performed using certified buffer or standard solutions of known reference values.

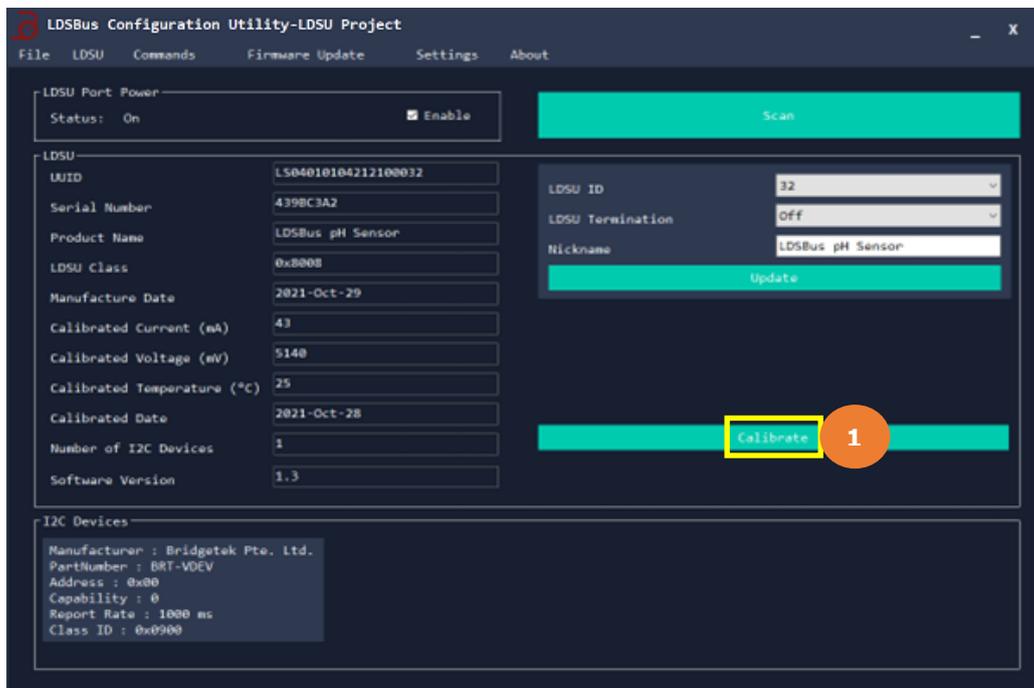
- pH calibration requires **two-point** using the below buffer solutions:
 - **pH 4.01** – Acidic range
 - **pH 7.00** – Neutral (mandatory reference point)
- EC calibration requires **two-point** using the below buffer solutions:
 - **1413 µS/cm** – General-purpose calibration
 - **12.88 mS/cm** – High conductivity range
- ORP calibration requires **single-point** calibration using standard ORP reference solutions:
 - **225 mV** – Reducing range

From V1.2.2 of the configuration utility, sensor calibration may be performed in-situ on the LDSBus, i.e. the sensor adapter and probe need not be removed from the bus and prevents any disruption to the existing setup in the field. For in-situ calibration, detach the RJ-45 cable from the gateway LDSBus Port and attach it to the RJ-45 interface of the LDSBus USB Adapter and open an LDSBus Project in the utility, instead.

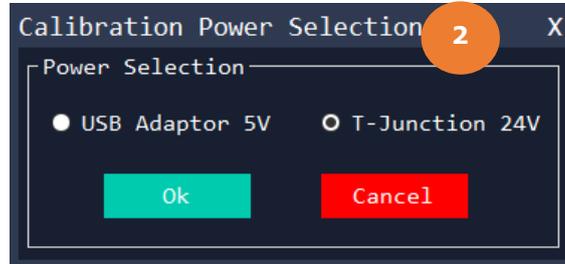
7.1 LDSBus pH Sensor Adapter Calibration

To calibrate pH Sensor Adapter, follow these steps –

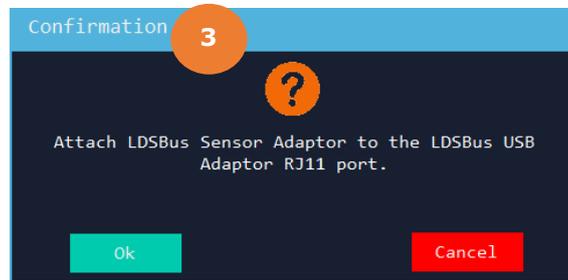
1. Click [**Calibrate**] from the LDSU / LDSBus Project interface.



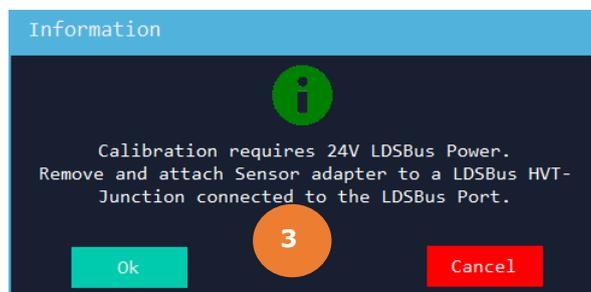
- An information window prompting the users for Power Selection is displayed. If users want to continue calibration with USB Adaptor 5V, just select "USB Adaptor 5V" option. Alternately, if users want to switch to T-Junction to calibrate sensor, they just select "T-Junction 24V" option. We strongly recommend user to use T-Junction for sensor calibration to achieve better accuracy. After selecting the power selection, click **[OK]** to continue or click **[Cancel]** to cancel the calibration process.



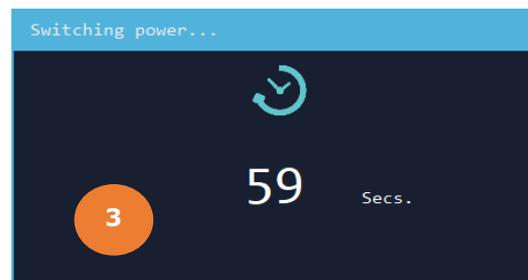
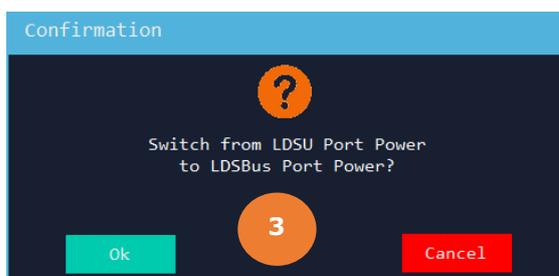
- If "USB Adaptor 5V" selected, a confirmation window will pop up to confirm user connect the sensor to the USB Adaptor RJ11 port. click **[OK]** to continue or click **[Cancel]** to cancel the calibration process.



If "T-Junction 24V" selected. LDSU Calibration requires 24V Power supply. Remove the sensor module and attach to the HVT-Junction connected to the LDSBus Port. Click **[Ok]** to continue or **[Cancel]** to quit the calibration process.

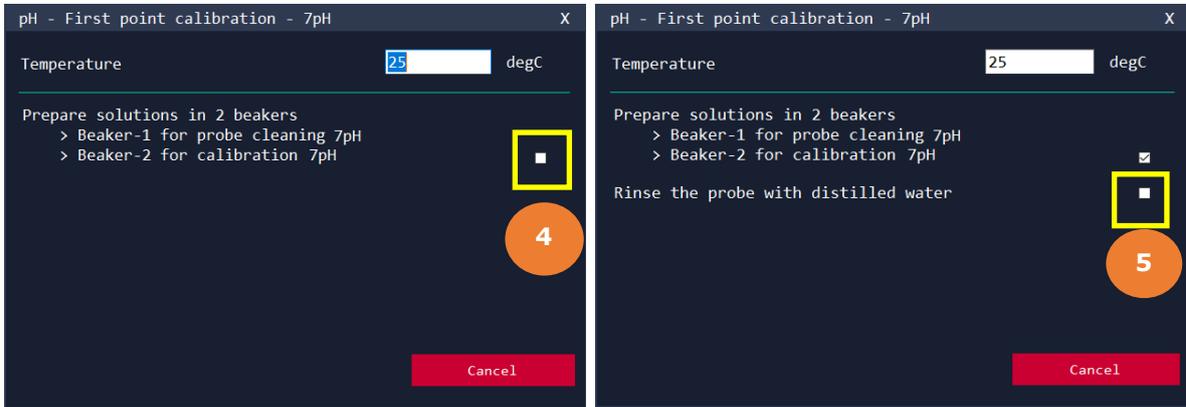


Upon clicking **[Ok]**, a confirmation window prompting the user to switch from LDSU Port Power to LDSBus Port Power is displayed. Click **[Ok]** to switch. Alternately, click **[Cancel]** to exit the calibration process. Upon clicking **[Ok]**, the project window will be in disabled mode and the countdown timer starts.

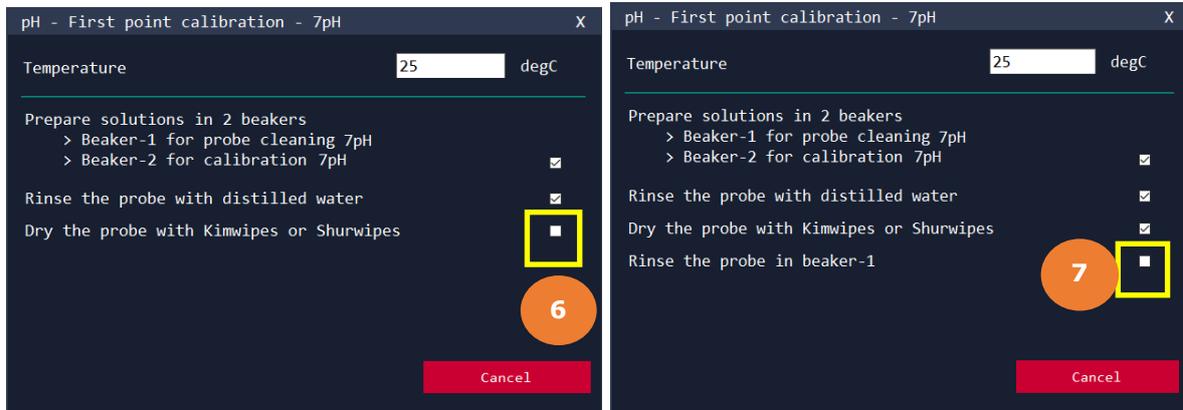


First Point Calibration

- Upon successful power switch, system will prompt the users to start the calibration. Click **[OK]**. The interface for the First point calibration for 7pH is displayed. Prepare Buffer solution (7pH and one more optional). There should be two sets of beakers for each solution. Beaker 1 is used to clean the probe before a calibration and Beaker 2 is used for the actual calibration measurement. *Temperature* can be edited if required. Upon preparing the solutions, click on the *Beaker-2 for Calibration 7pH* checkbox.

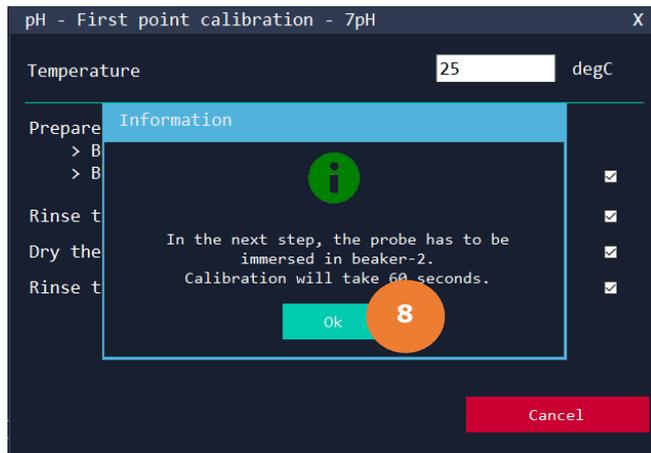


- Remove the electrode from its storage solution and rinse it with distilled water in an empty waste beaker. Upon rinsing the probe with distilled water, click on the *Rinse the probe with distilled water* check box.
- After rinsing, wipe dry with Kimwipes or Shurwipes and click on the *Dry the probe with Kimwipes or Shurwipes* checkbox. (Avoid rubbing the electrode because it has a sensitive membrane).

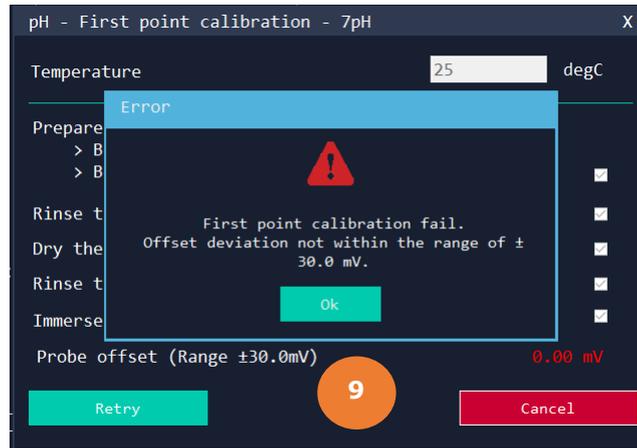


- Use Beaker 1 (7pH) to rinse the electrode. Use Beaker 2 (7pH) to place the electrode to start the calibration. Rinse the probe in beaker 1 (7pH), then click the *Rinse the probe in beaker-1* checkbox.

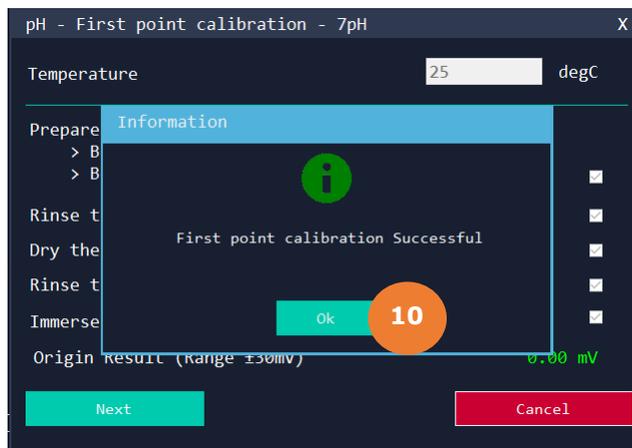
- An information window will appear. Click **[Ok]** to proceed. The calibration window will be in disabled mode and the countdown timer starts as shown in the picture. Wait for 60 seconds to stabilize the readings.



- Check the result. If the first point calibration is unsuccessful, an error message is displayed. Click **[Retry]** to start the first point calibration again (Repeat Steps 5 – 10 until the first point calibration is successful).

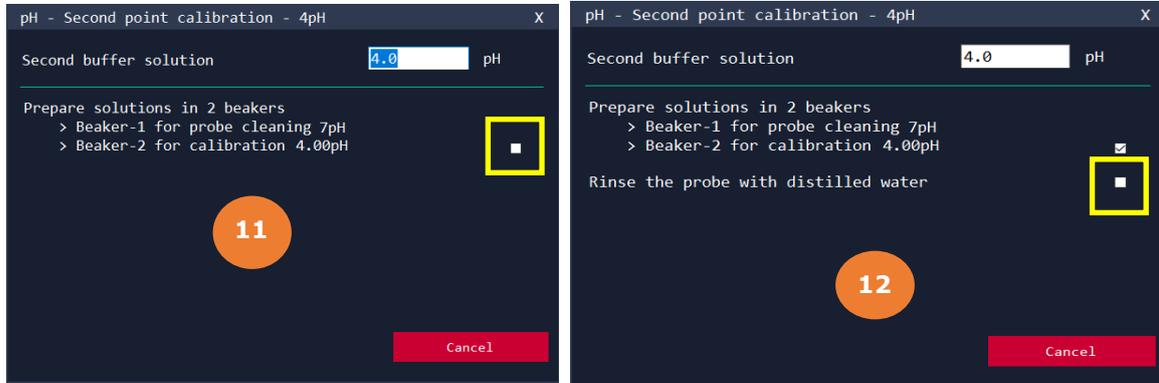


- Upon successful calibration, an appropriate message indicating the same is displayed. Click **[Ok]** to continue. The Calibration result will be displayed. Click **[Next]** to proceed with the Second point calibration.

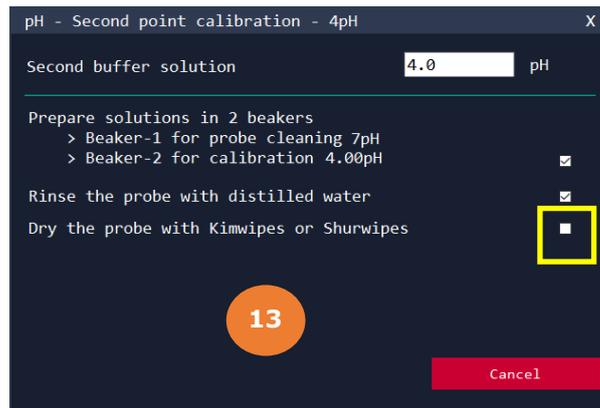


Second Point Calibration

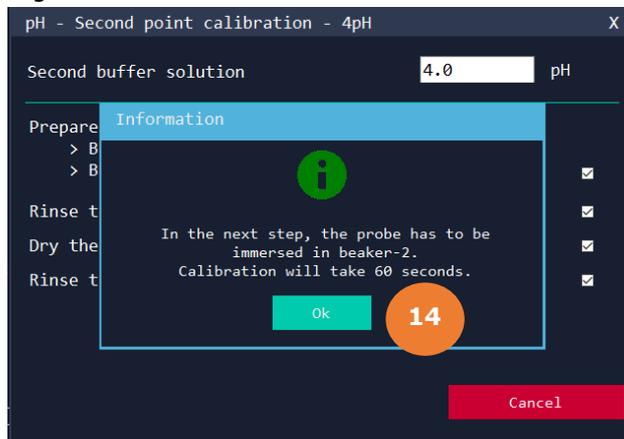
- Upon successfully completing the First Point Calibration, the Second Point Calibration interface is displayed. Prepare Second buffer solution. There should be two sets of beakers for each solution. Beaker 1 is used to clean the probe before a calibration and Beaker 2 is used for the actual calibration measurement. Upon preparing the solutions, click on the *Beaker-2 for Calibration 4.00pH* checkbox.



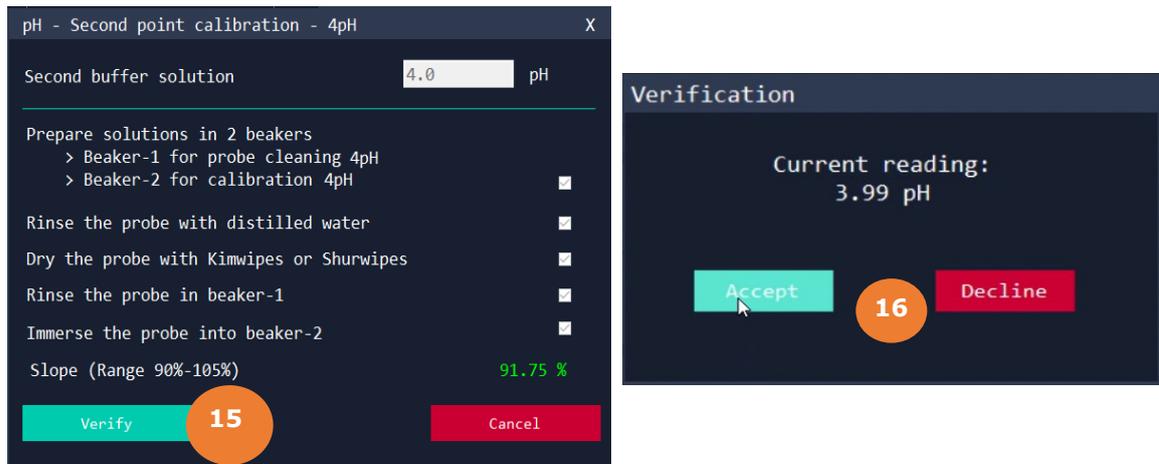
- Remove the electrode from its storage solution and rinse it with distilled water in an empty waste beaker. Upon rinsing the probe with distilled water, click on the *Rinse the probe with distilled water* check box.
- After rinsing, wipe dry with Kimwipes or Shurwipes and click on the *Dry the probe with Kimwipes or Shurwipes* checkbox.



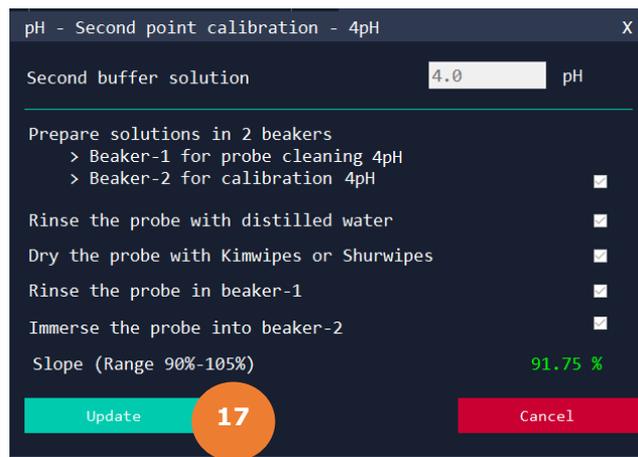
- An information window will appear. Click **[Ok]** to proceed. The calibration window will be in disabled mode and the countdown timer starts as shown in the picture. Waiting for 60 seconds to stabilize the readings.



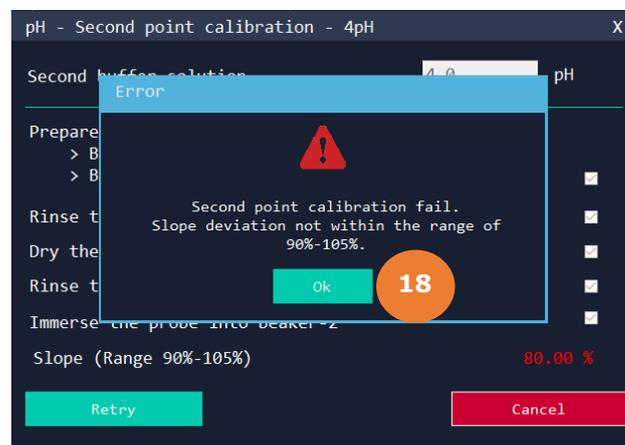
15. Check the result. Upon successful calibration, an appropriate message indicating the same is displayed. Click **[Ok]** to continue. The Calibration result will be displayed. Do not remove probe from beaker, click **[Verify]** to verify the calibration result against the solution.



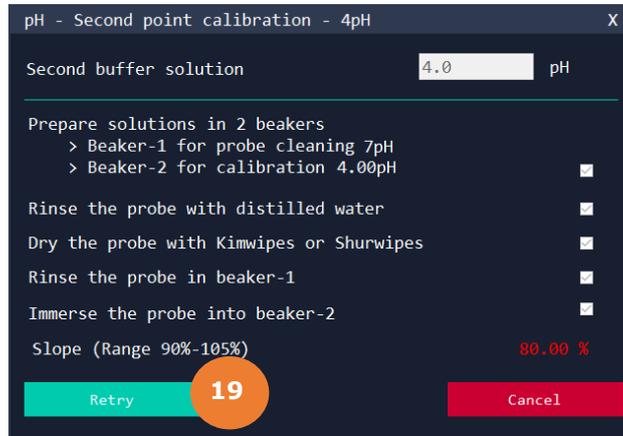
16. The verification window will display the current reading. Click **[Accept]** if the current reading is with reasonable range, click **[Decline]** if current reading is not acceptable and you can recalibrate the device again.
17. Click **[Update]** to flash the calibration data into the device. System will switch power from LDSBus Port to LDSU Port.



18. If the calibration fails, then appropriate error message is displayed. Click **[Ok]**.

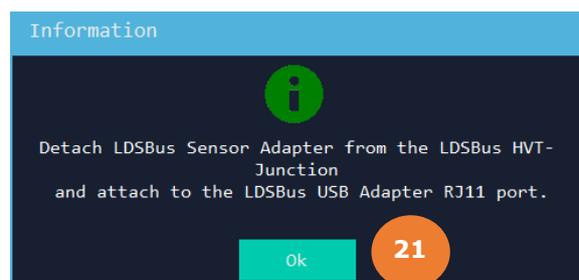
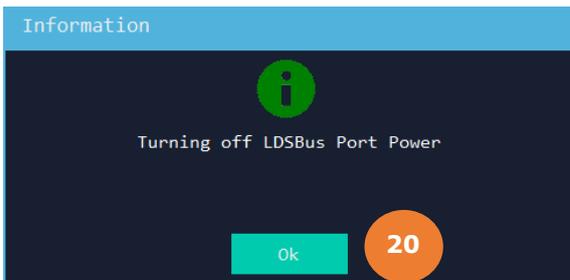


- Click **[Retry]** to do the second point calibration again. (**Repeat Steps 13 – 19 until the calibration is successful**) or click **[Cancel]** to exit the calibration process. Upon cancelling the calibration process, system will switch power from LDSBus Port to LDSU Port.

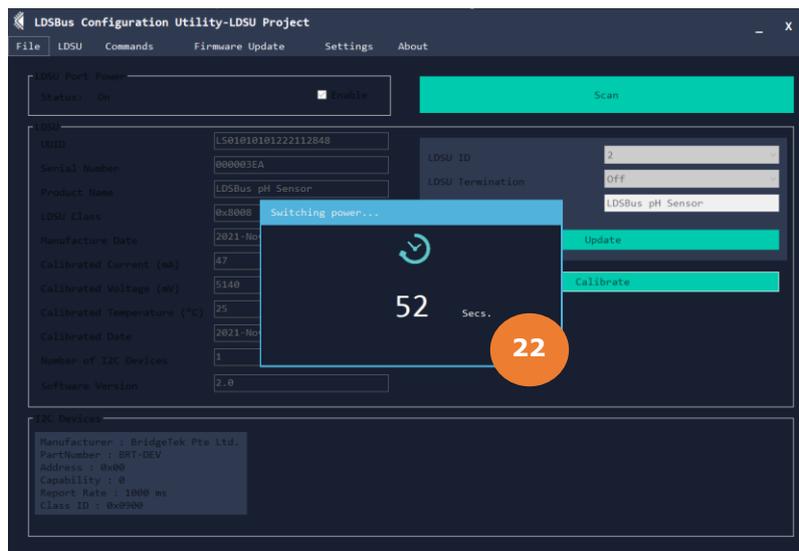


Post Completion or Cancellation of Calibration Process

- Upon successful completion or cancellation of calibration process, system will switch power from LDSBus Port to LDSU Port.



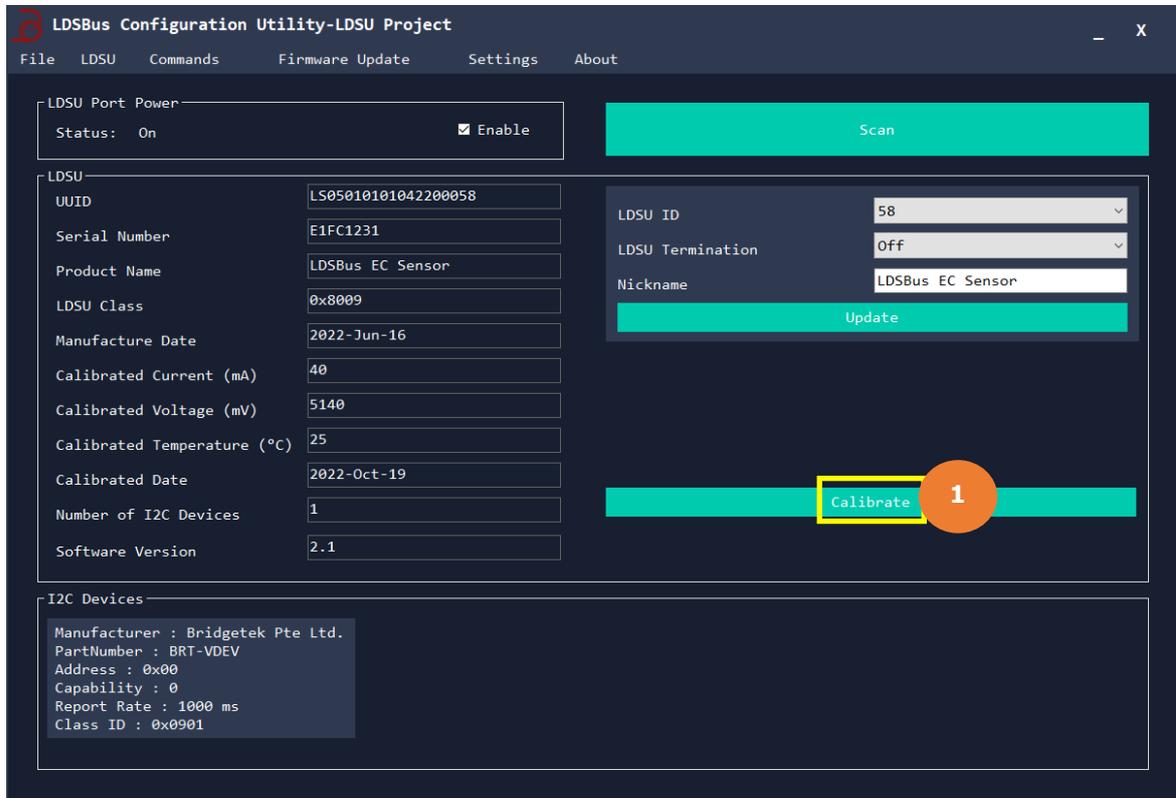
- An information window prompting the users to detach the LDSBus pH Sensor Adapter from the LDSBus HVT-Junction and attach to the LDSBus USB Adapter RJ11 Port is displayed. Click **[OK]**.
- Upon clicking **[OK]**, the project window will be in disabled mode and the countdown timer starts as shown in the picture indicating that the power switching is in progress.



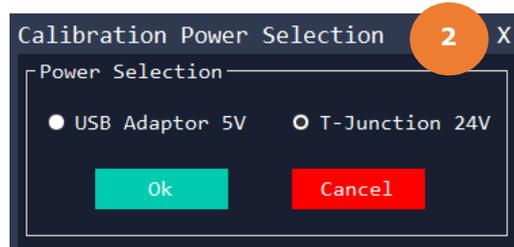
7.2 LDSBus EC/Salinity Sensor Adapter Calibration

To calibrate EC / Salinity Sensor Adapter, follow these steps –

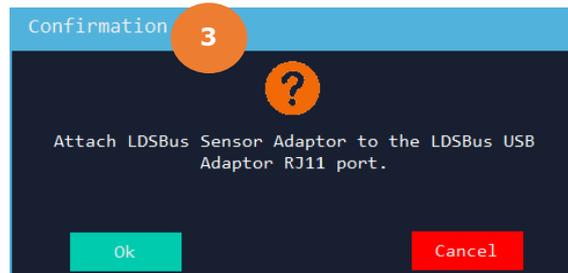
1. Click **[Calibrate]** from the LDSU / LDSBus Project interface to start the calibration.



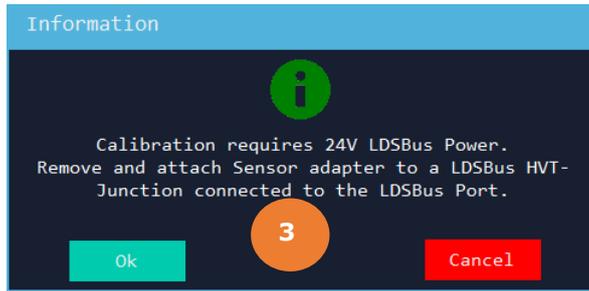
2. An information window prompting the users for Power Selection is displayed. If you want to continue calibration with USB Adaptor 5V, just select "USB Adaptor 5V" option. But if you want to switch to T-Junction to calibrate your sensor, just select "T-Junction 24V" option, we strongly recommend user to use T-Junction for sensor calibration to achieve better accuracy. After selecting power selection, click **[OK]** to continue or click **[Cancel]** to cancel the calibration process.



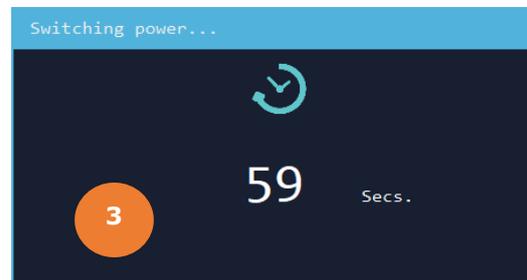
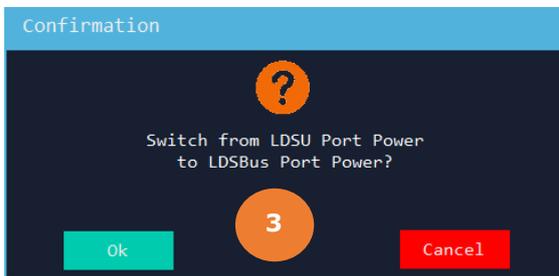
3. If "USB Adaptor 5V" selected, a confirmation window will pop up to confirm user connect the sensor to the USB Adaptor RJ11 port. click **[OK]** to continue or click **[Cancel]** to cancel the calibration process.



If "T-Junction 24V" selected. LDSU Calibration requires 24V Power supply. Remove the sensor module and attach to the HVT-Junction connected to the LDSBus Port. Click **[Ok]** to continue or **[Cancel]** to quit the calibration process.

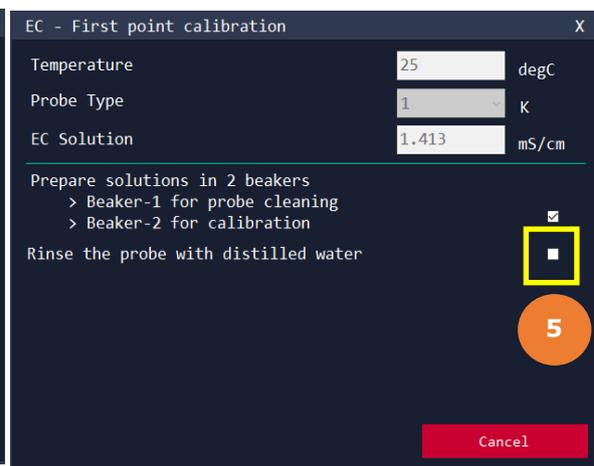
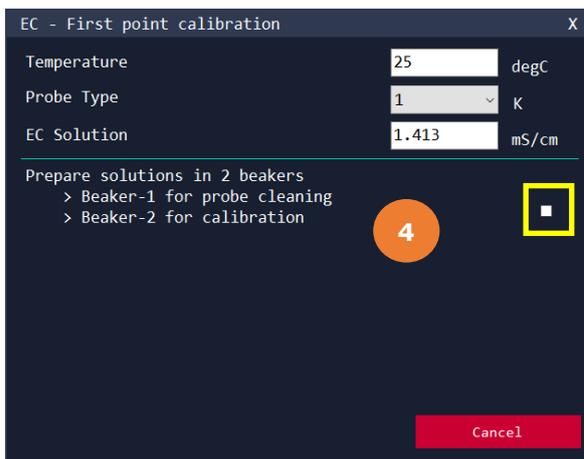


Upon clicking **[Ok]**, a confirmation window prompting the user to switch from LDSU Port Power to LDSBus Port Power is displayed. Click **[Ok]** to switch. Alternately, click **[Cancel]** to exit the calibration process. Upon clicking **[Ok]**, the project window will be in disabled mode and the countdown timer starts.



First Point Calibration

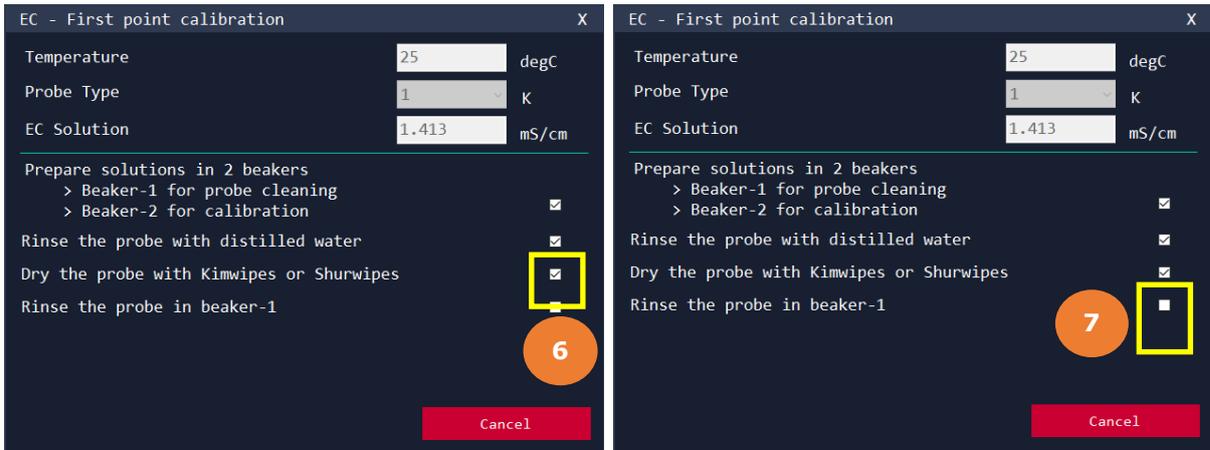
4. Upon successful power switch, system will prompt the users to start the calibration. Click **[Ok]**. The interface for the First point calibration for EC Sensor is displayed. Prepare Buffer solution (EC Sensor and one more optional). There should be two sets of beakers for each solution. Beaker 1 is used to clean the probe before a calibration and Beaker 2 is used for the actual calibration measurement.



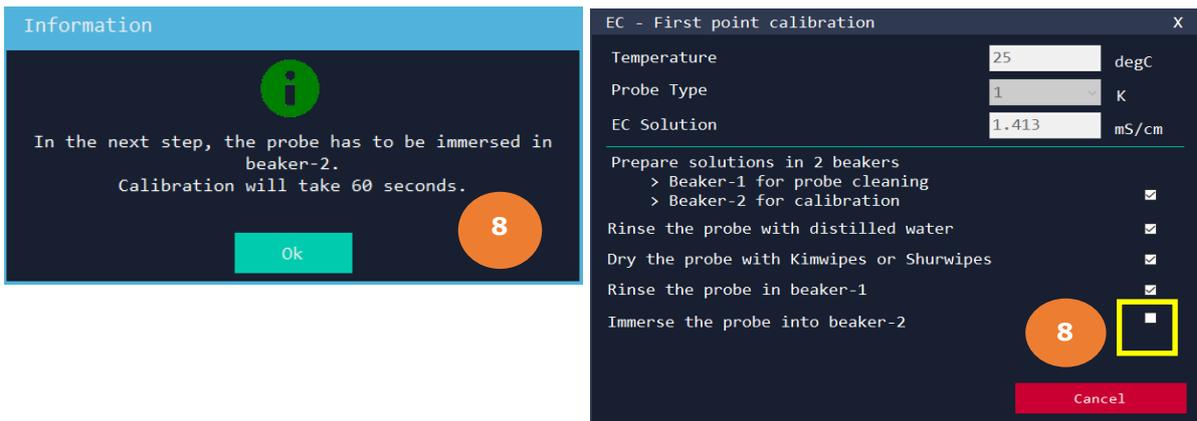
Temperature/Probe Type/EC Solution can be edited if required. Upon preparing the solutions, click on the *Beaker-2 for Calibration* checkbox.

5. Remove the electrode from its storage solution and rinse it with distilled water in an empty waste beaker. Upon rinsing the probe with distilled water, click on the *Rinse the probe with distilled water* check box.

- After rinsing, wipe dry with Kimwipes or Shurwipes and click on the *Dry the probe with Kimwipes or Shurwipes* checkbox. (Avoid rubbing the electrode because it has a sensitive membrane).

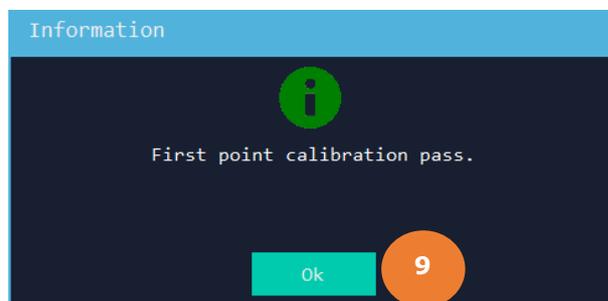


- Use Beaker 1 to rinse the electrode. Use Beaker 2 to place the electrode to start the calibration. Rinse the probe in beaker 1, then click the *Rinse the probe in beaker-1* checkbox.
- An information window will appear prompting for immersing the probe in beaker 2. Click **[Ok]** to proceed.



Upon immersing the probe, click on the corresponding checkbox. Wait for 60 seconds to stabilize the readings.

- Upon successful calibration, an appropriate message indicating the same is displayed. Click **[Ok]** to continue. The Calibration result will be displayed.

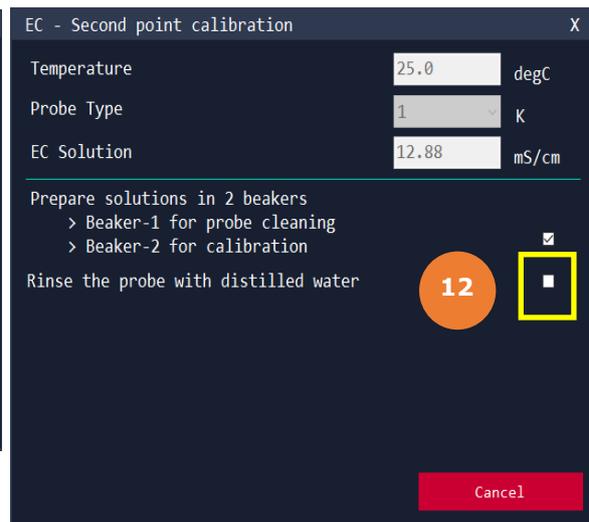
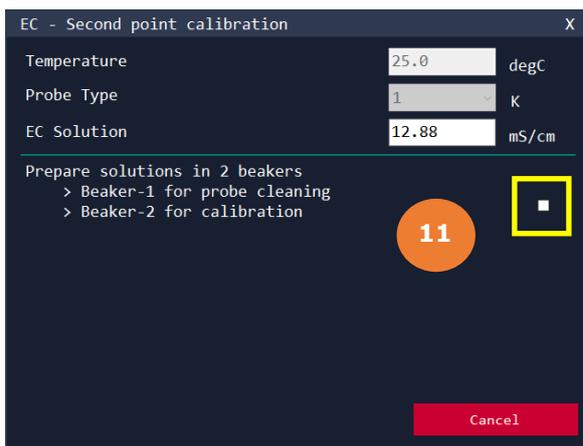


10. Click **[Next]** to proceed with the Second point calibration.



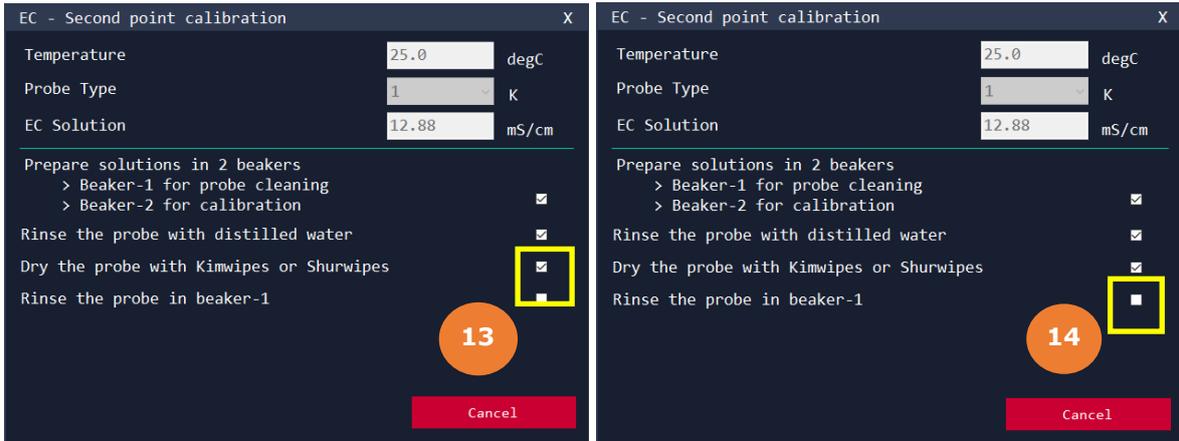
Second Point Calibration

11. Upon successfully completing the First Point Calibration, the Second Point Calibration interface is displayed. Prepare Second buffer solution. There should be two sets of beakers for each solution. Beaker 1 is used to clean the probe before a calibration and Beaker 2 is used for the actual calibration measurement. Upon preparing the solutions, click on the *Beaker-2 for Calibration* checkbox.



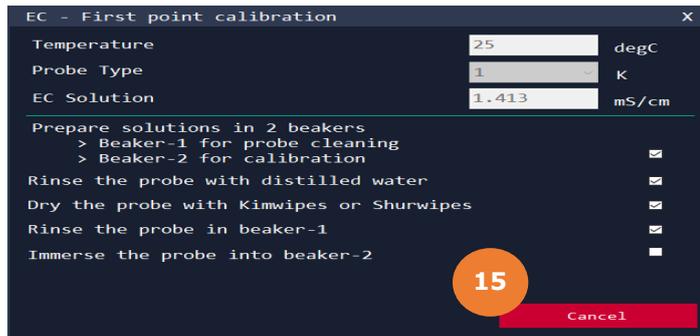
12. Remove the electrode from its storage solution and rinse it with distilled water in an empty waste beaker. Upon rinsing the probe with distilled water, click on the *Rinse the probe with distilled water* check box.

13. After rinsing, wipe dry with Kimwipes or Shurwipes and click on the *Dry the probe with Kimwipes or Shurwipes* checkbox.

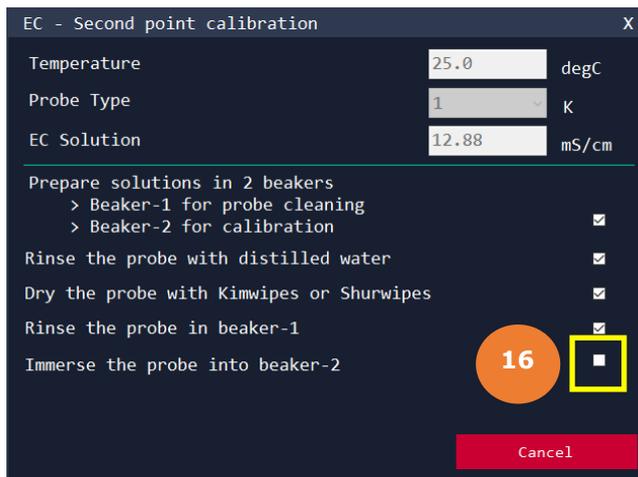


14. Rinse the probe in beaker solution. Once done, click on the Rinse the probe in beaker-1 checkbox.

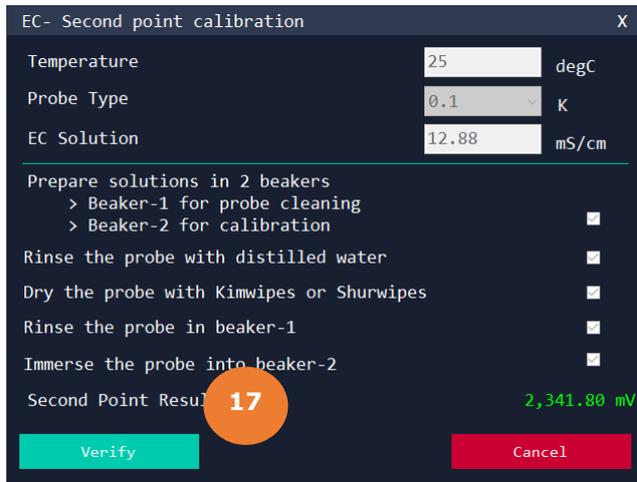
15. An information window will appear prompting for immersing the probe in beaker 2. Click **[Ok]** to proceed.



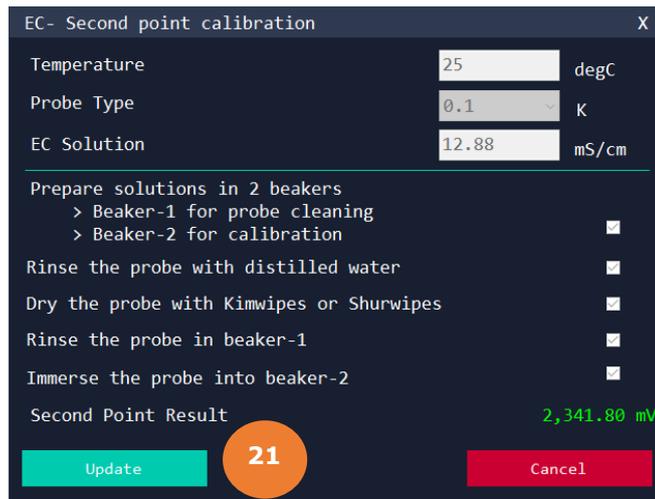
16. Upon immersing the probe, click on the corresponding checkbox. Wait for 60 seconds to stabilize the readings.



17. Upon successful calibration, an appropriate message indicating the same is displayed. Click **[Ok]** to continue. The second point calibration result will be displayed. Do not remove the probe from beaker, click **[Verify]** to verify the calibration or click **[Cancel]** to cancel the calibration.

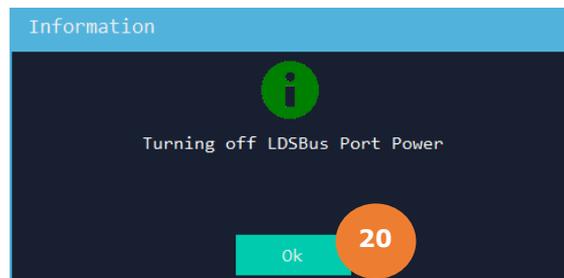


18. The verification window will display the current reading. Click **[Accept]** if the current reading is with reasonable range, click **[Decline]** if current reading is not acceptable and you can recalibrate the device again.
19. Click **[Update]** to flash calibration data into EEPROM or click **[Cancel]** to avoid saving data.

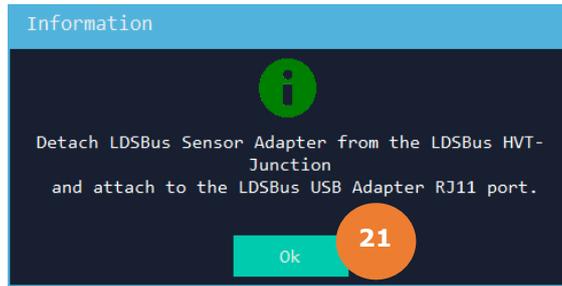


Post Completion or Cancellation of Calibration Process

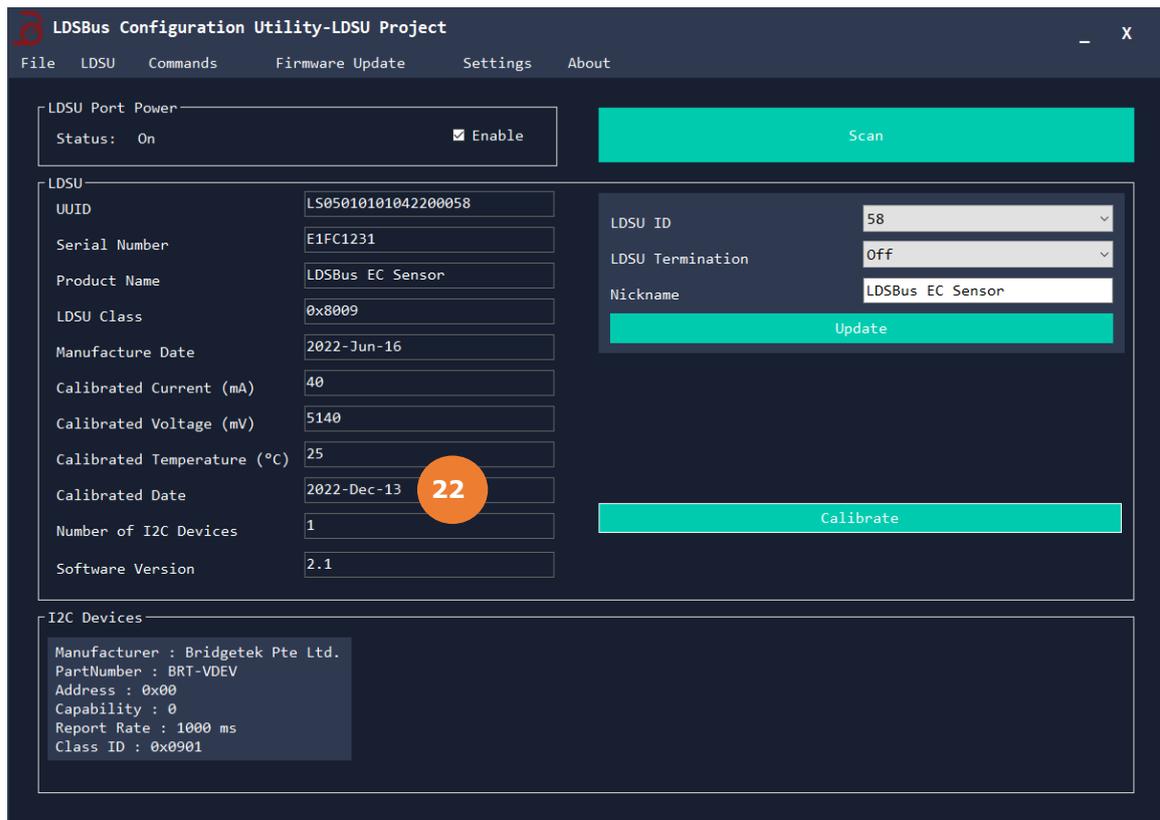
20. Upon successful completion or cancellation of calibration process, system will switch power from LDSBus Port to LDSU Port.



21. An information window prompting the users to detach the LDSBus pH Sensor Adapter from the LDSBus HVT-Junction and attach to the LDSBus USB Adapter RJ11 Port is displayed Connect the sensor back to the USB adapter after removing it from the Quad T-junction, and then click **[Ok]**.



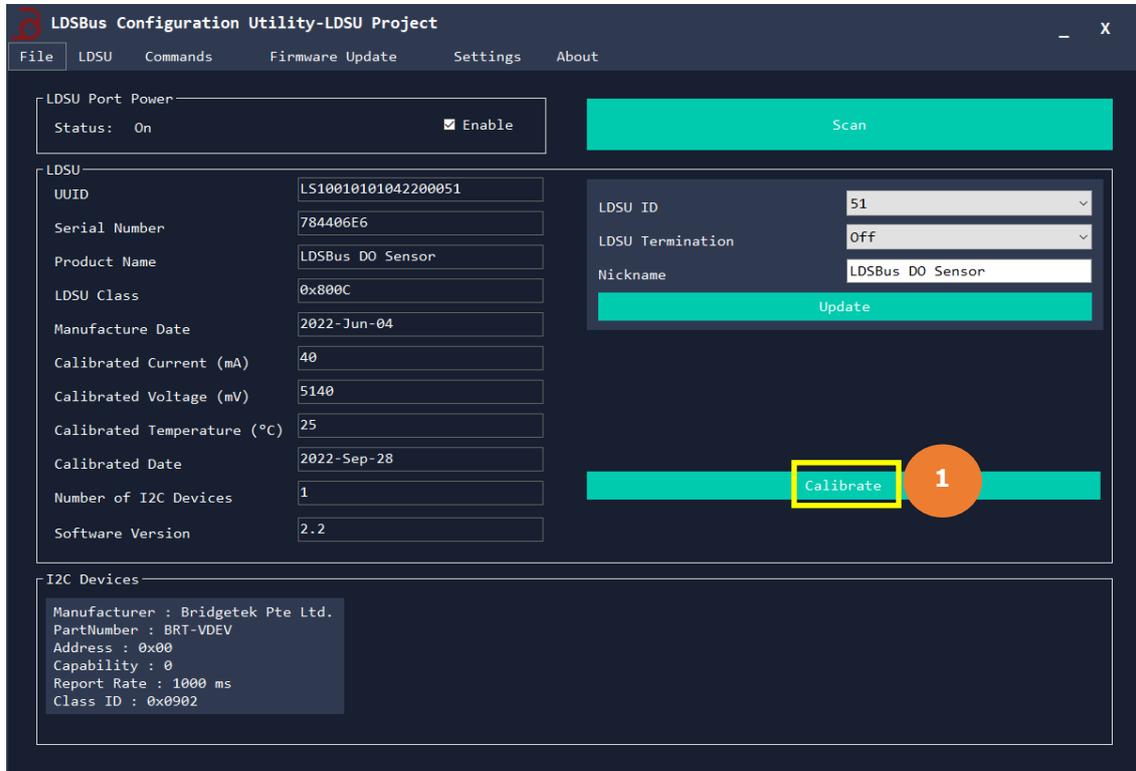
22. In the main window, the calibration date will be updated after the utility scans the device again.



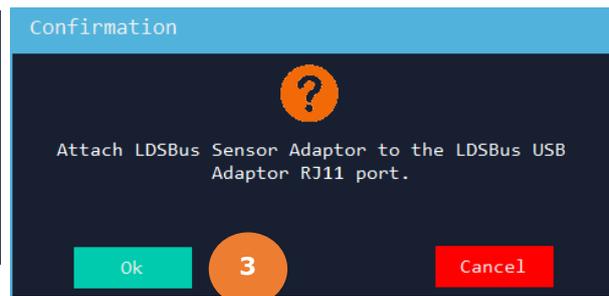
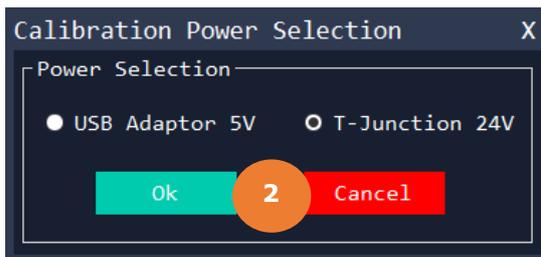
7.3 LDSBus DO Sensor Adapter Calibration

To calibrate DO Sensor Adapter, follow these steps –

1. Click **[Calibrate]** from the LDSU / LDSBus Project interface to start the calibration.

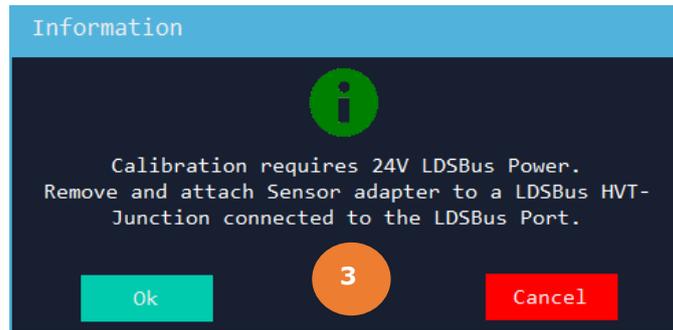


2. An information window prompting the users for Power Selection is displayed. If you want to continue calibration with USB Adaptor 5V, just select "USB Adaptor 5V" option. But if you want to switch to T-Junction to calibrate your sensor, just select "T-Junction 24V" option, we strongly recommend user to use T-Junction for sensor calibration to achieve better accuracy. After selecting power selection, click **[OK]** to continue or click **[Cancel]** to cancel the calibration process.

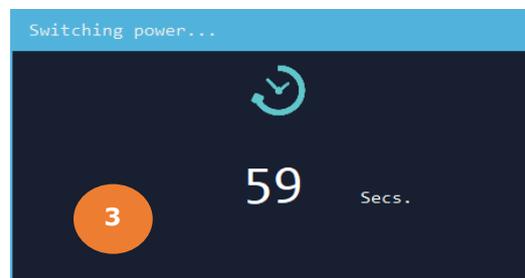
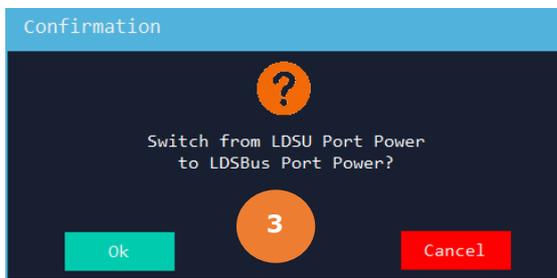


3. If "USB Adaptor 5V" selected, a confirmation window will pop up to confirm user connect the sensor to the USB Adaptor RJ11 port. click **[OK]** to continue or click **[Cancel]** to cancel the calibration process.

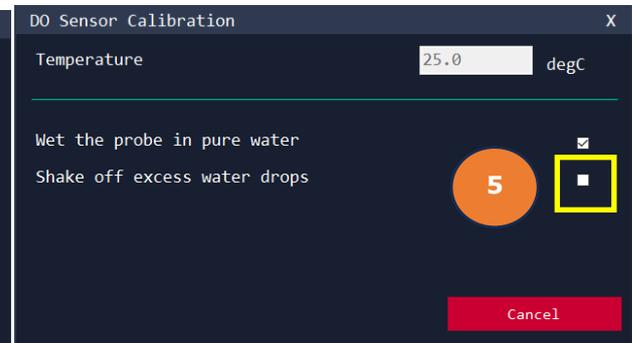
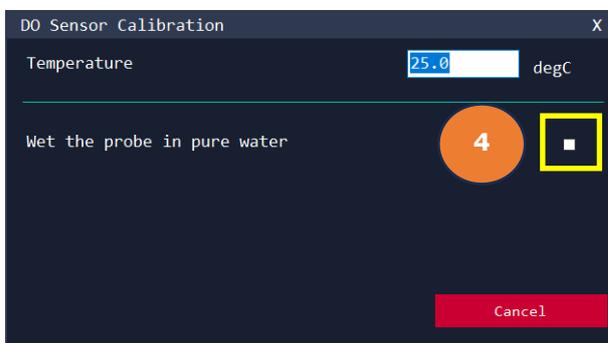
If "T-Junction 24V" selected. LDSU Calibration requires 24V Power supply. Remove the sensor module and attach to the HVT-Junction connected to the LDSBus Port. Click **[Ok]** to continue or **[Cancel]** to quit the calibration process.



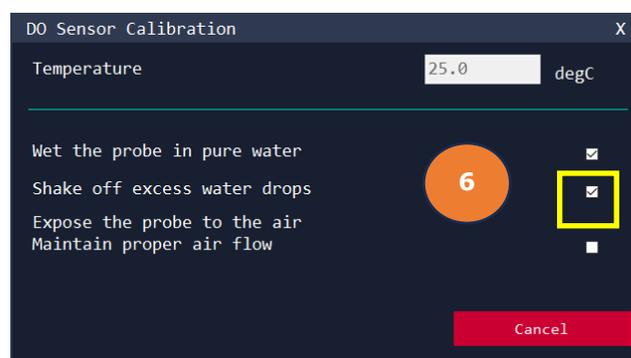
Upon clicking **[Ok]**, a confirmation window prompting the user to switch from LDSU Port Power to LDSBus Port Power is displayed. Click **[Ok]** to switch. Alternately, click **[Cancel]** to exit the calibration process. Upon clicking **[Ok]**, the project window will be in disabled mode and the countdown timer starts.



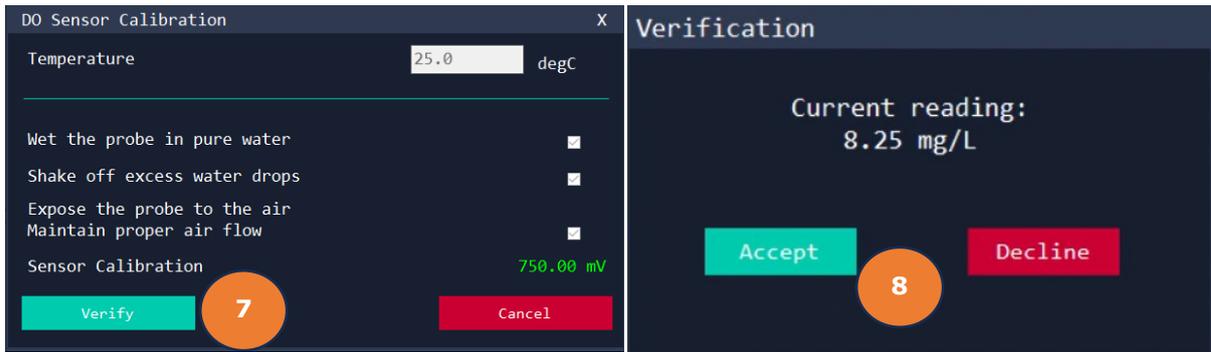
4. Upon successful power switch, system will prompt the users to start the calibration. Click **[Ok]**. Using pure water, wet the probe and click on the checkbox accordingly.



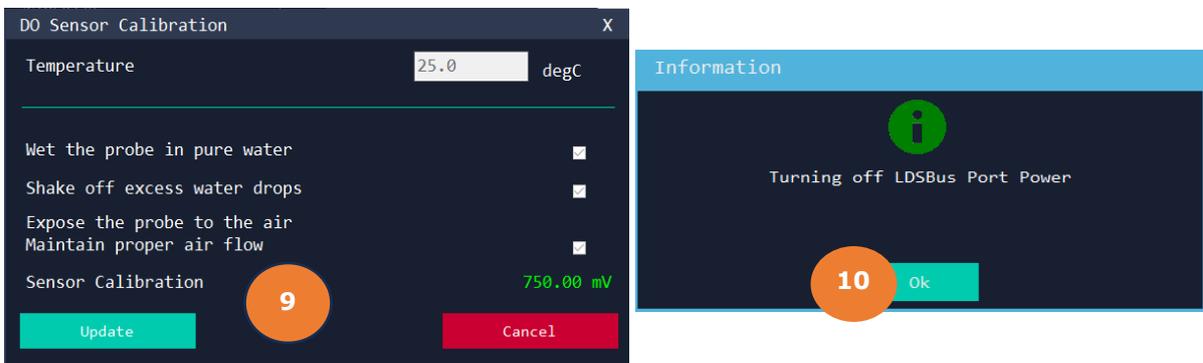
5. After shaking off excess water, click the check box.
6. Make sure the probe is exposed to the air, then click the check box.



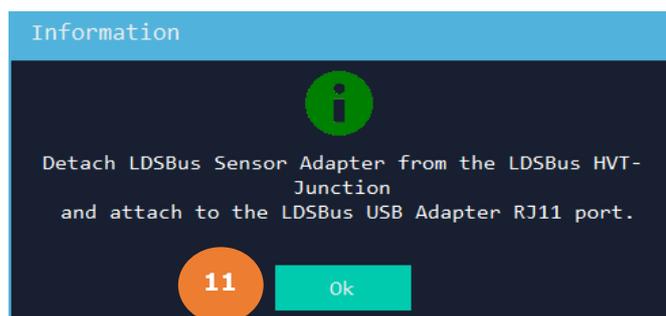
- Upon successful calibration, an appropriate message indicating the same is displayed. Click **[Ok]** to continue. The calibration result will be displayed. Click **[Verify]** to verify the calibration data or click **[Cancel]** to cancel the calibration.



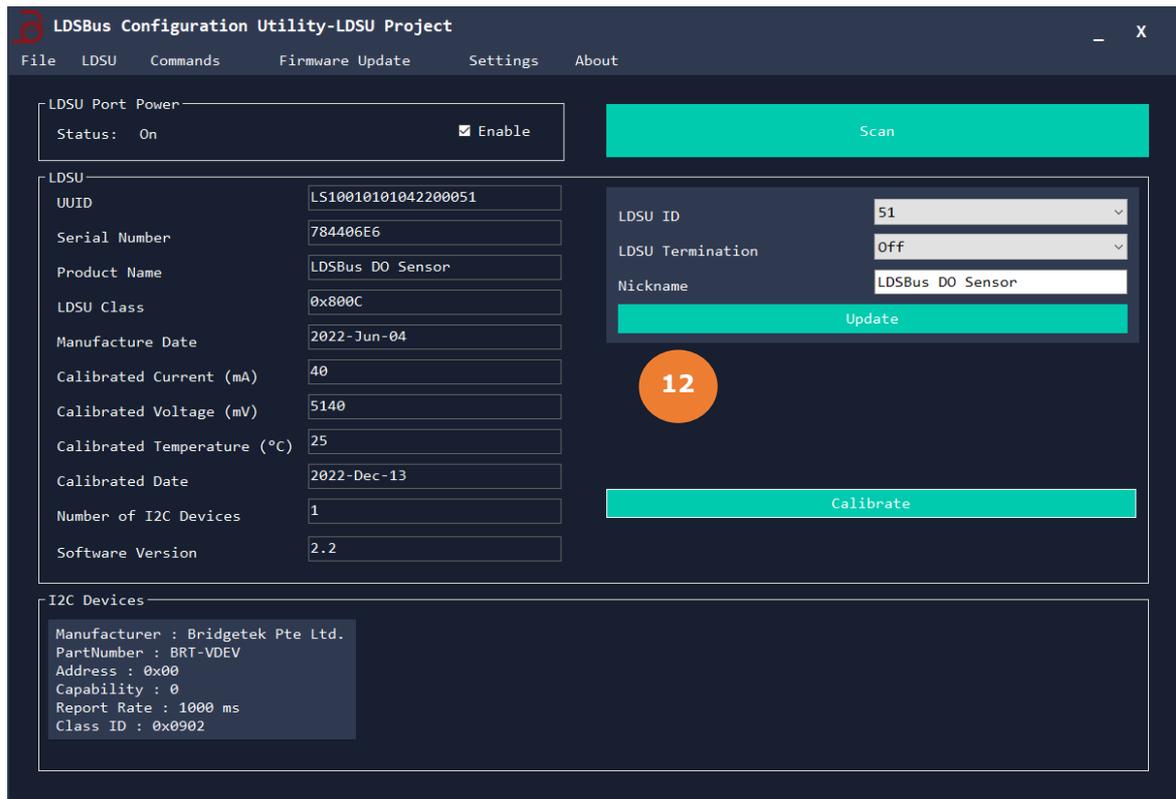
- The verification window will display the current reading. Click **[Accept]** if the current reading is with reasonable range, click **[Decline]** if current reading is not acceptable and you can recalibrate the device again.
- Click **[Update]** to flash the calibration data into the device.



- Upon successful update, an appropriate message indicating the same is displayed. The LDSBus Power will be switched off.
- Connect the sensor back to the USB adapter after removing it from the HVT junction, and then click **[Ok]**. For power switching, wait 60 seconds.



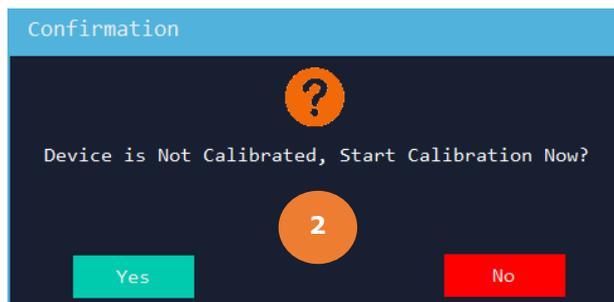
12. In the main window, the calibration date will be updated after the utility scans the device again.



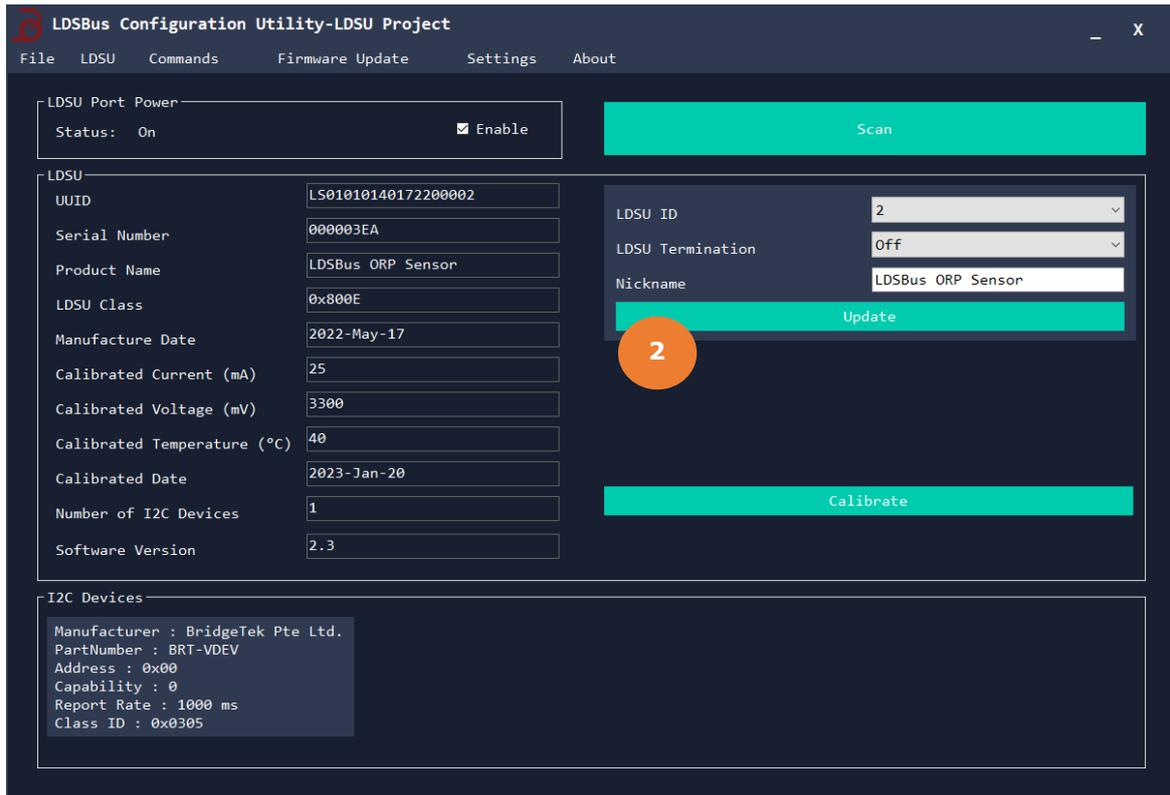
7.4 LDSBus ORP Sensor Adapter Calibration

To calibrate ORP Sensor Adapter, follow these steps –

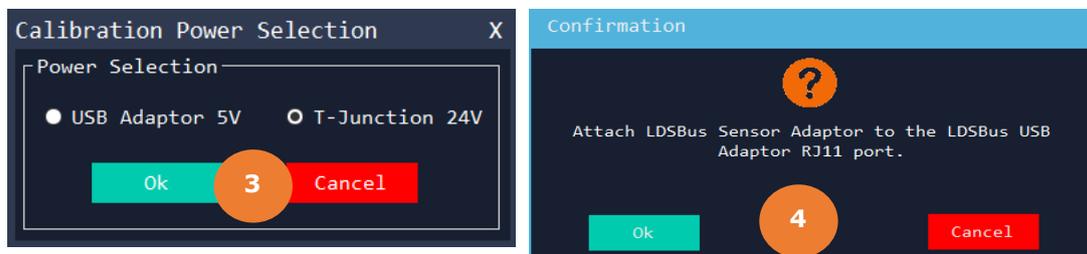
1. Make one beaker of pure water and connect an ORP sensor to a USB adapter.
2. To scan the ORP sensor, click **[Scan]**, if the sensor has not been calibrated, an alert will appear asking whether to calibrate. Click **[Yes]** to start the calibration process.



Clicking **[No]** will display the same calibration data screen as the sensor. Click **[Calibrate]** to start the calibration.

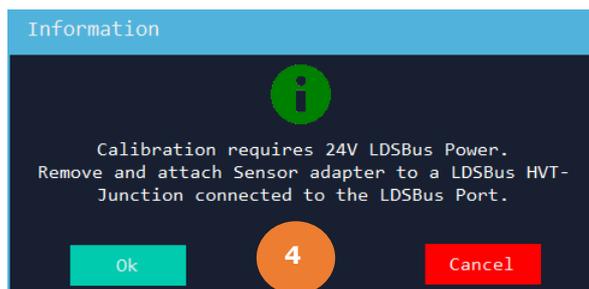


- An information window prompting the users for Power Selection is displayed. If you want to continue calibration with USB Adaptor 5V, just select "USB Adaptor 5V" option. But if you want to switch to T-Junction to calibrate your sensor, just select "T-Junction 24V" option, we strongly recommend user to use T-Junction for sensor calibration to achieve better accuracy. After selecting power selection, click **[OK]** to continue or click **[Cancel]** to cancel the calibration process.



- If "USB Adaptor 5V" selected, a confirmation window will pop up to confirm user connect the sensor to the USB Adaptor RJ11 port. click **[OK]** to continue or click **[Cancel]** to cancel the calibration process.

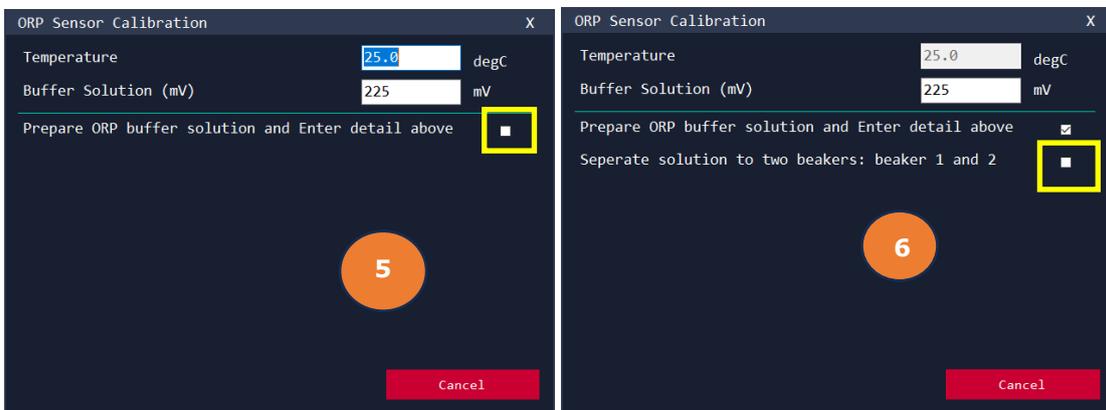
If "T-Junction 24V" selected. LDSU Calibration requires 24V Power supply. Remove the sensor module and attach to the HVT-Junction connected to the LDSBus Port. Click **[Ok]** to continue or **[Cancel]** to quit the calibration process.



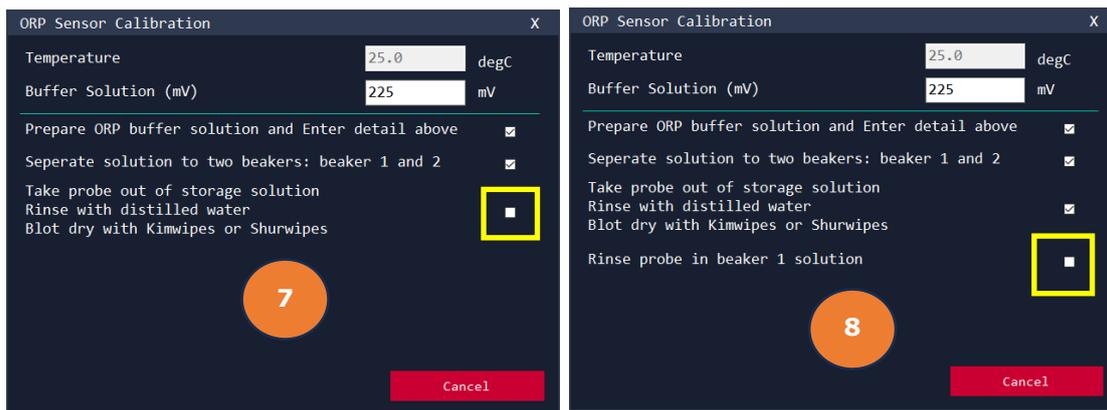
Upon clicking **[Ok]**, a confirmation window prompting the user to switch from LDSU Port Power to LDSBus Port Power is displayed. Click **[Ok]** to switch. Alternately, click **[Cancel]** to exit the calibration process. Upon clicking **[Ok]**, the project window will be in disabled mode and the countdown timer starts.



5. Upon successful power switch, system will prompt the users to start the calibration. Click **[Ok]**. Calibration interface for ORP Sensor is displayed. Enter the correct calibration *temperature* and *buffer solution*. Prepare the ORP buffer solution and click on the checkbox accordingly.

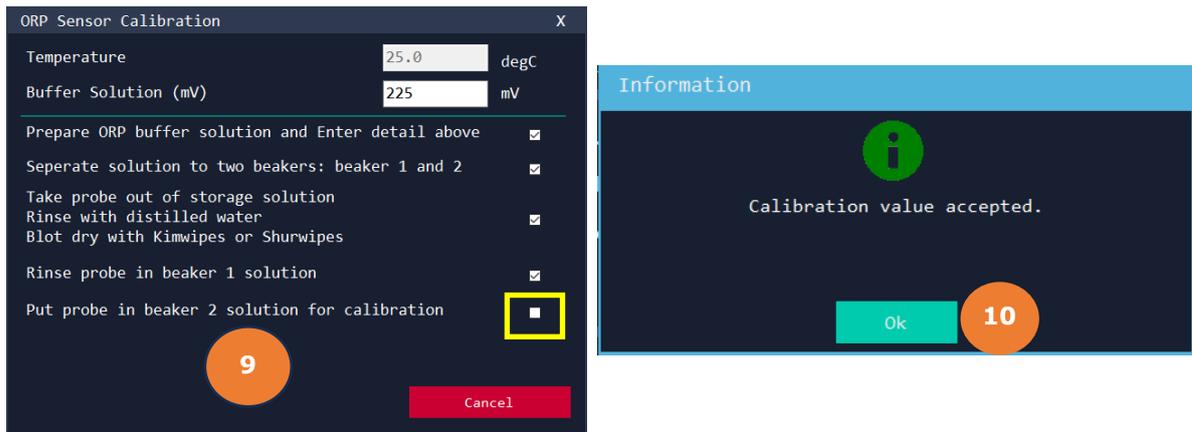


6. Separate buffer solutions into two beakers, beaker 1 and beaker 2 and click on the checkbox accordingly.
7. Remove the probe from its storage solution, rinse with distilled water, and blot dry with Kimwipes or Shurwipes. Upon doing so, click the check box.

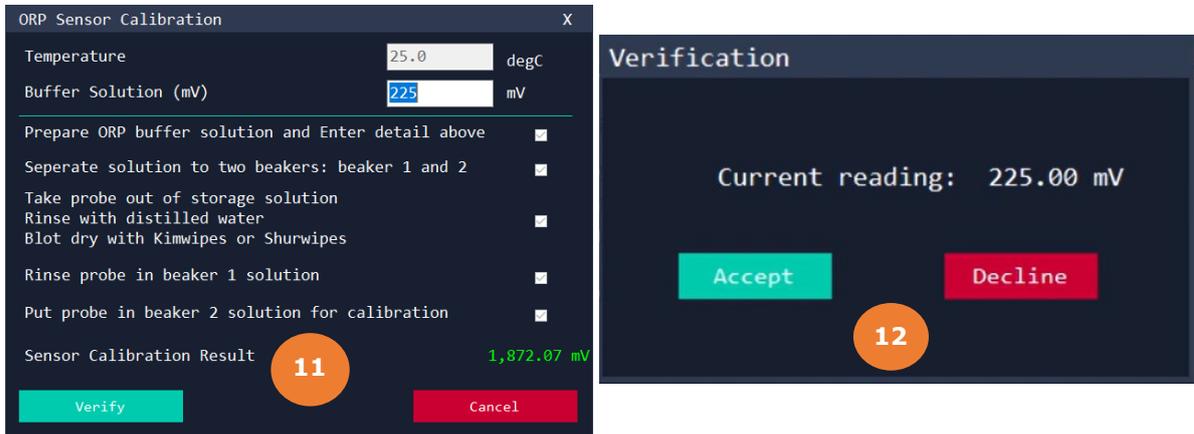


8. Rinse the probe with solution from beaker 1 and click on the check box.

- Calibrate the probe by putting it in beaker 2 solution and click on the check box.



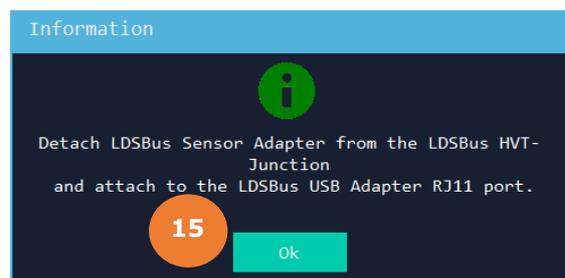
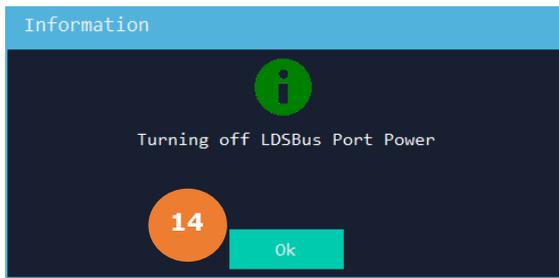
- Upon successful calibration, an appropriate message indicating the same is displayed. Click **[Ok]** to continue.
- The calibration result will be displayed. Click **[Verify]** to verify the calibration data or click **[Cancel]** to cancel the calibration.



- The verification window will display the current reading. Click **[Accept]** if the current reading is with reasonable range, click **[Decline]** if current reading is not acceptable and you can recalibrate the device again.
- Click **[Update]** to flash the calibration data into the device.

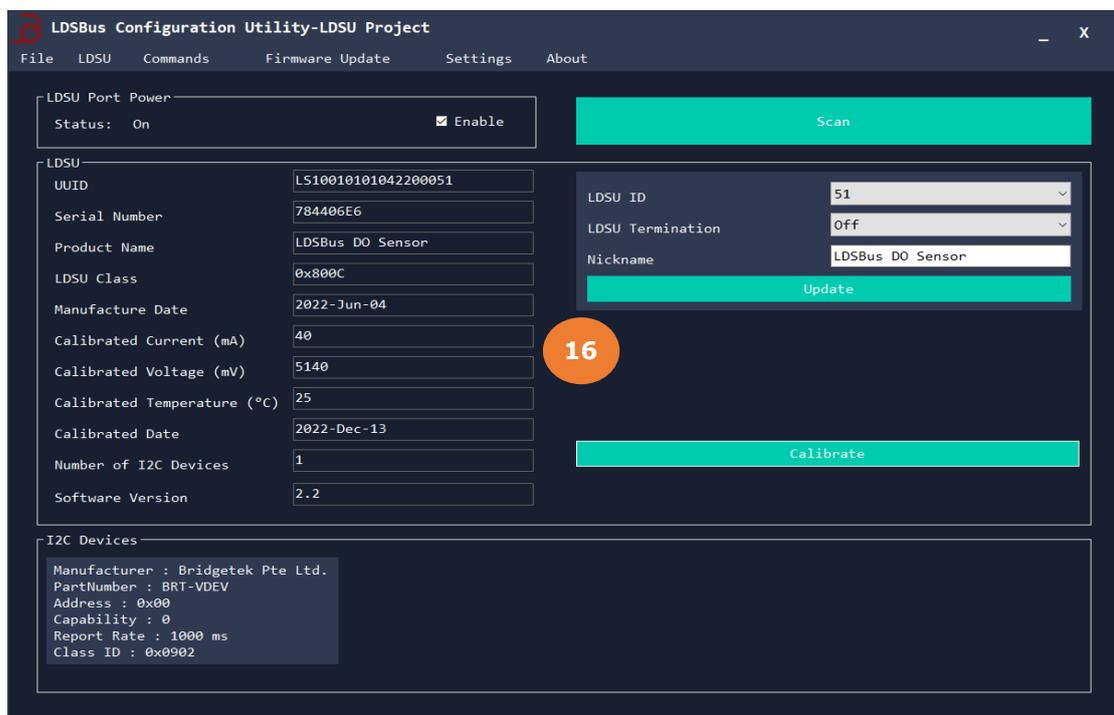


- Upon successful update, an appropriate message indicating the same is displayed. LDSBus Power will be switched off.



- Connect the sensor back to the USB adapter after removing it from the HVT junction, and then click **[Ok]**. For power switching, wait 60 seconds.

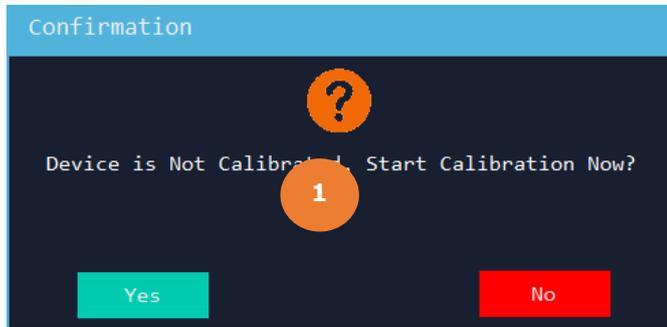
- In the main window, the calibration date will be updated after the utility scans the device again.



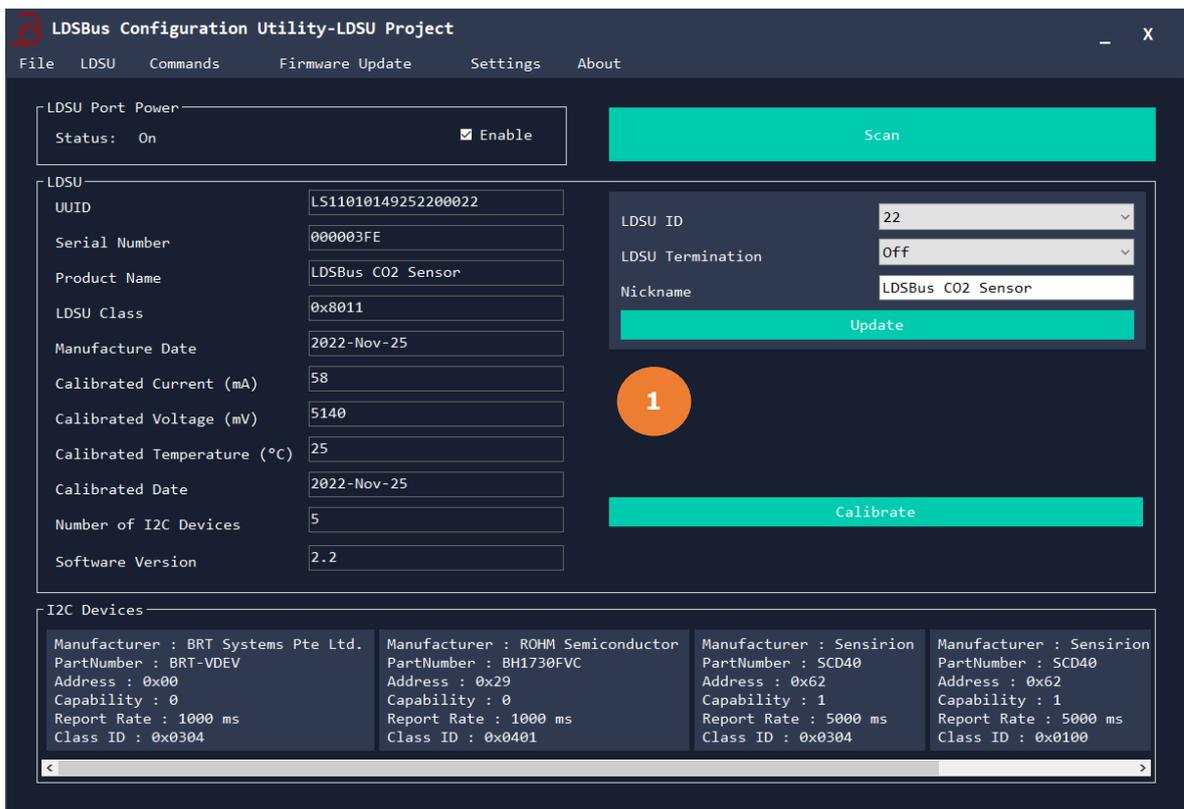
7.5 LDSBus CO2 Sensor Adapter Calibration

To calibrate CO2 Sensor Adapter, follow these steps –

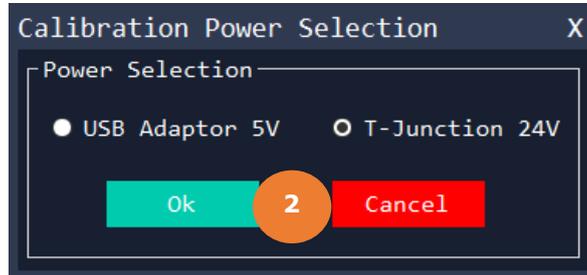
1. Prepare the reference CO2 meter and connect it to the USB adapter to achieve better accuracy. Make sure that the reading of the environment CO2 is greater than 400ppm. To scan the CO2 sensor, click **[Scan]**, if the sensor has not been calibrated, an alert will appear asking whether to calibrate. Click **[Yes]** to start the calibration process.



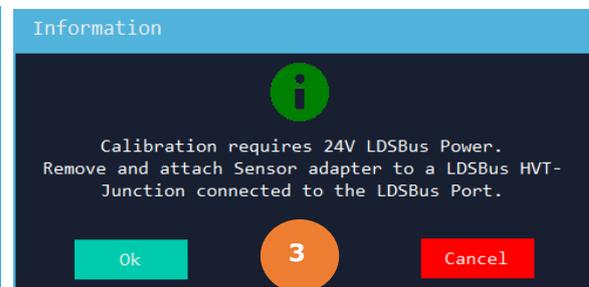
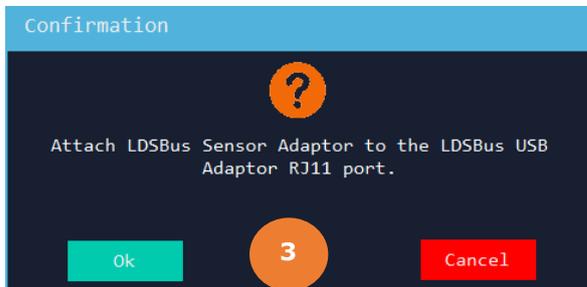
Clicking **[No]** will display the same calibration data screen as the sensor. Click **[Calibrate]** to start the calibration.



- An information window prompting the users for Power Selection is displayed. If you want to continue calibration with USB Adaptor 5V, just select "USB Adaptor 5V" option. But if you want to switch to T-Junction to calibrate your sensor, just select "T-Junction 24V" option, we strongly recommend user to use T-Junction for sensor calibration to achieve better accuracy. After selecting your power selection, click **[OK]** to continue or click **[Cancel]** to cancel the calibration process.

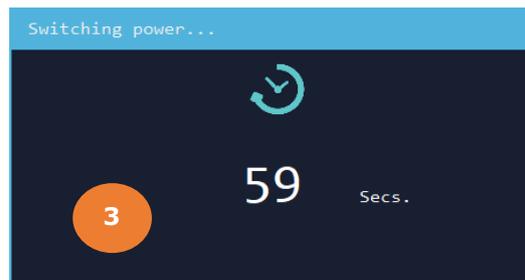
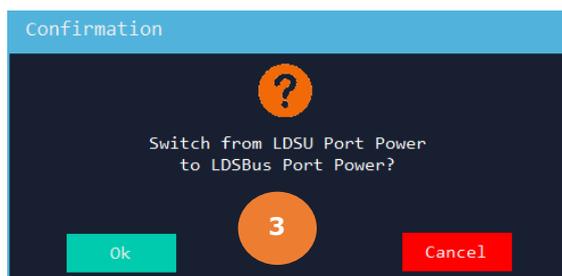


- If "USB Adaptor 5V" selected, a confirmation window will pop up to confirm user connect the sensor to the USB Adaptor RJ11 port. click **[OK]** to continue or click **[Cancel]** to cancel the calibration process.

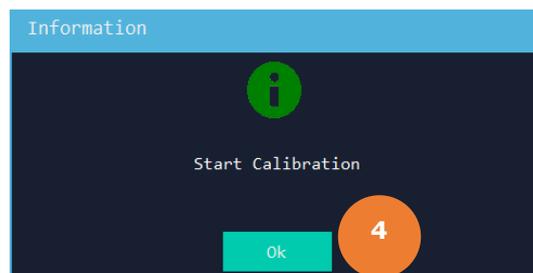


If "T-Junction 24V" selected. LDSU Calibration requires 24V Power supply. Remove the sensor module and attach to the HVT-Junction connected to the LDSBus Port. Click **[Ok]** to continue or **[Cancel]** to quit the calibration process.

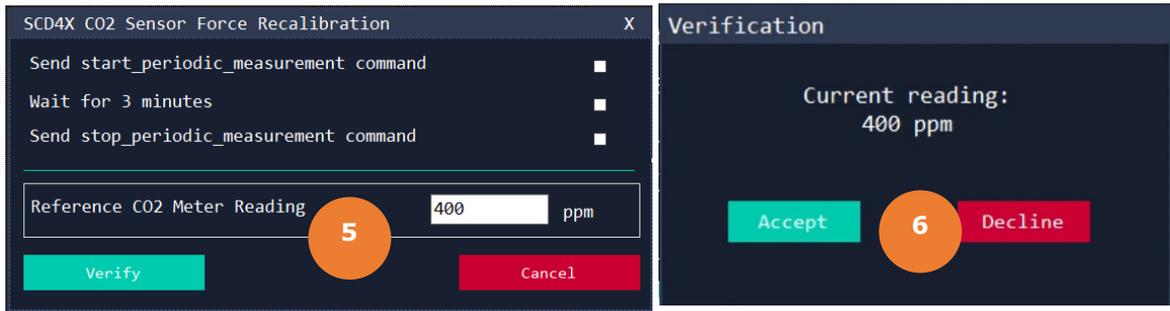
Upon clicking **[Ok]**, a confirmation window prompting the user to switch from LDSU Port Power to LDSBus Port Power is displayed. Click **[Ok]** to switch. Alternately, click **[Cancel]** to exit the calibration process. Upon clicking **[Ok]**, the project window will be in disabled mode and the countdown timer starts.



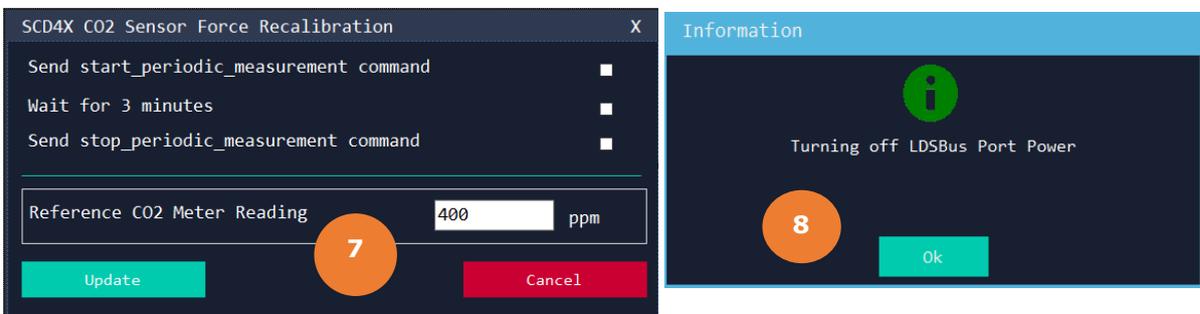
- Upon successful power switch, system will prompt the users to start the calibration. Click **[Ok]**. Wait for 180 seconds for CO2 reading to stabilize.



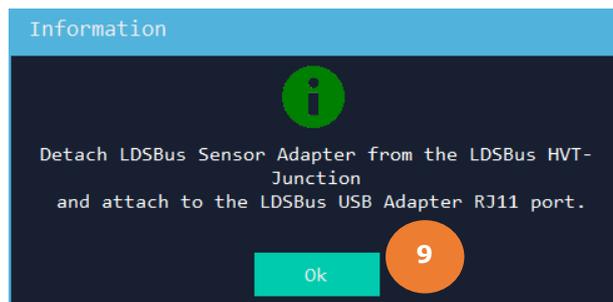
- The calibration result will be displayed. Enter the CO2 reading from CO2 reference meter. Click **[Verify]** to verify the calibration data or click **[Cancel]** to cancel the calibration.



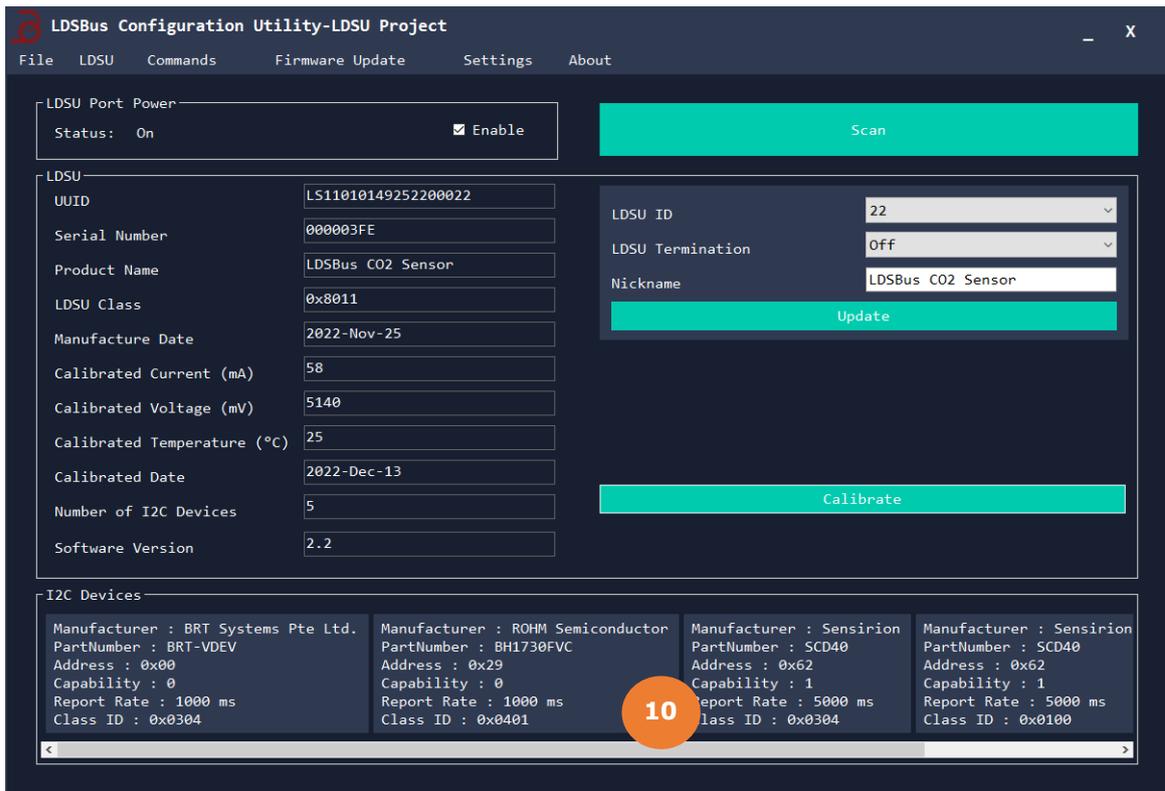
- The verification window will display the current reading. Click **[Accept]** if the current reading is with reasonable range, click **[Decline]** if current reading is not acceptable and you can recalibrate the device again.
- Click **[Update]** to flash the calibration data into the device or click **[Cancel]** to avoid save calibration data.



- Upon successful update, an appropriate message indicating the same is displayed. LDSBus Power will be switched off.
- Connect the sensor back to the USB adapter after removing it from the HVT junction, and then click **[Ok]**. For power switching, wait 60 seconds.



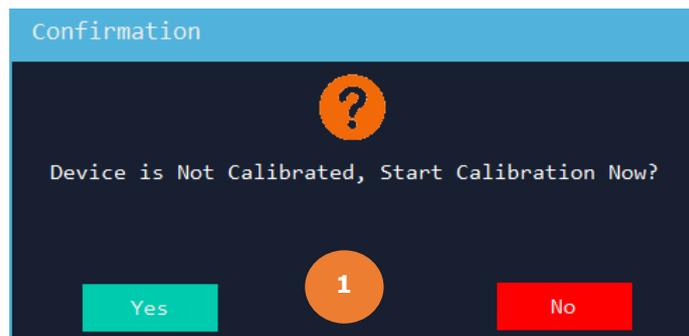
10. In the main window, the calibration date will be updated after the utility scans the device again.



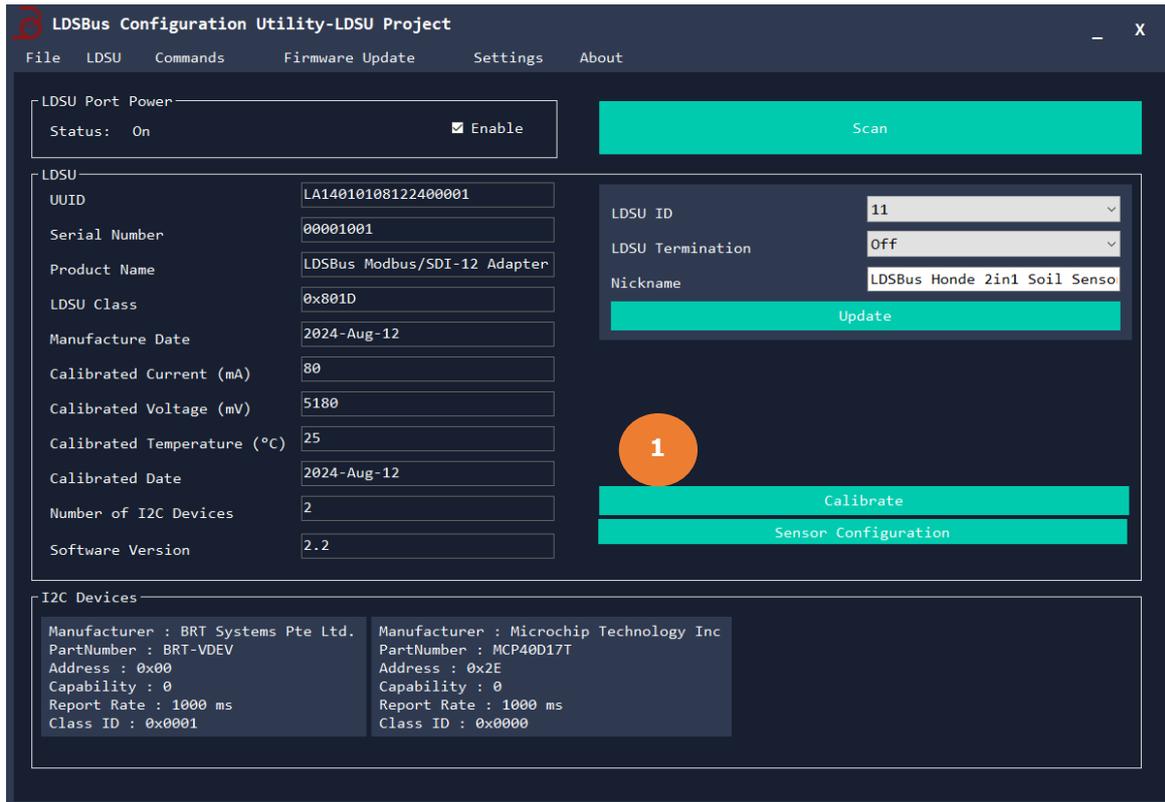
7.6 LDSBus Honde 2in1 Soil Sensor Calibration

To calibrate Honde 2in1 Soil Sensor, follow these steps –

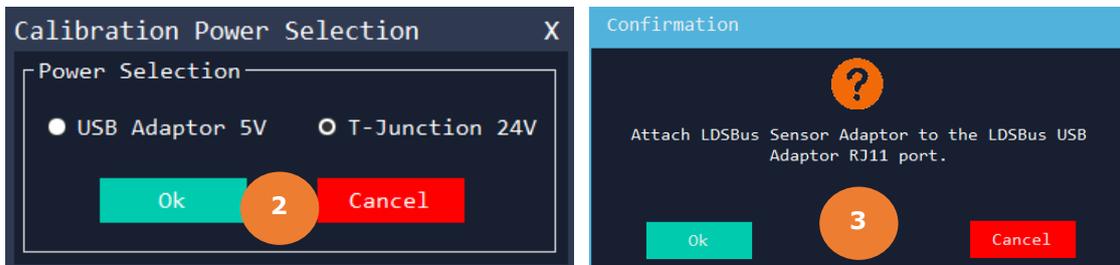
1. Connect Honde 2in1 Soil Sensor to the USB adaptor. To scan the Honde 2in1 Soil Sensor, click **[Scan]**, if the sensor has not been calibrated, an alert will appear asking whether to calibrate. Click **[Yes]** to start the calibration process.



Clicking **[No]** will display the same calibration data screen as the sensor. Click **[Calibrate]** to start the calibration.

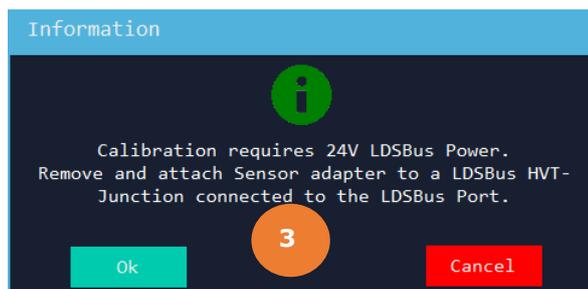


2. An information window prompting the users for Power Selection is displayed. If you want to continue calibration with USB Adaptor 5V, just select "USB Adaptor 5V" option. But if you want to switch to T-Junction to calibrate your sensor, just select "T-Junction 24V" option, we strongly recommend user to use T-Junction for sensor calibration to achieve better accuracy. After selecting your power selection, click **[OK]** to continue or click **[Cancel]** to cancel the calibration process.



3. If "USB Adaptor 5V" selected, a confirmation window will pop up to confirm user connect the sensor to the USB Adaptor RJ11 port. click **[OK]** to continue or click **[Cancel]** to cancel the calibration process.

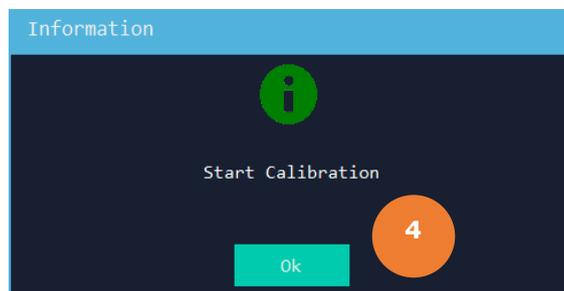
If "T-Junction 24V" selected. LDSU Calibration requires 24V Power supply. Remove the sensor module and attach to the HVT-Junction connected to the LDSBus Port. Click **[Ok]** to continue or **[Cancel]** to quit the calibration process.



Upon clicking **[Ok]**, a confirmation window prompting the user to switch from LDSU Port Power to LDSBus Port Power is displayed. Click **[Ok]** to switch. Alternately, click **[Cancel]** to exit the calibration process. Upon clicking **[Ok]**, the project window will be in disabled mode and the countdown timer starts.

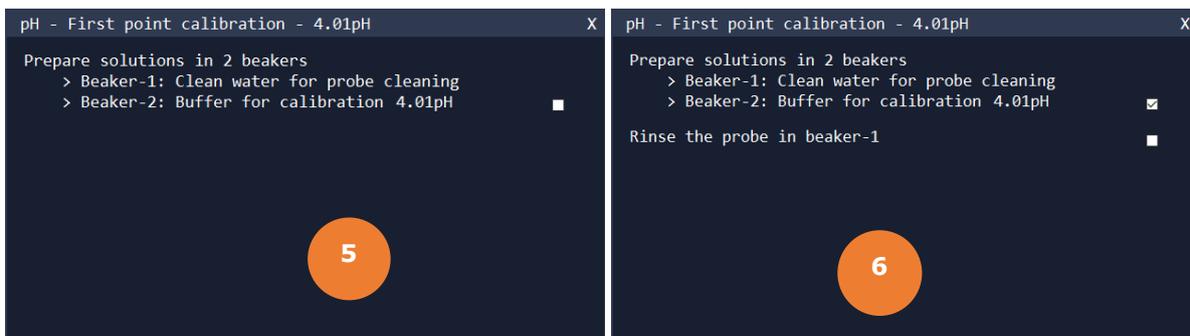


- Upon successful power switch, system will prompt the users to start the calibration. Click **[Ok]** to start calibration.



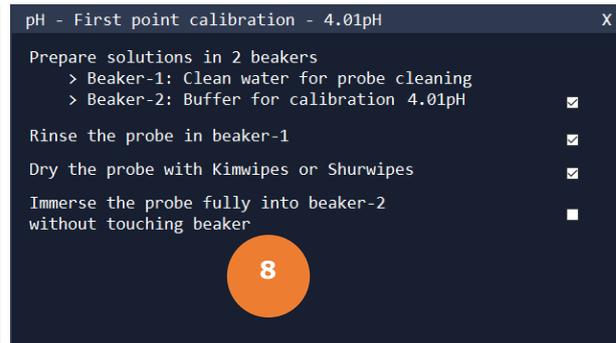
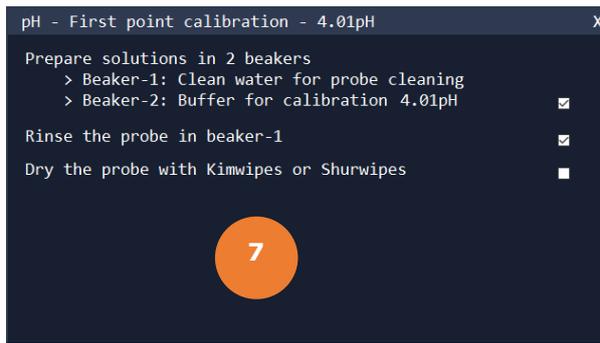
First Point Calibration

- The interface for the First point calibration for 4.01pH is displayed. Prepare Buffer solution (4.01pH). There should be two sets of beakers for each solution. Beaker 1 is the clean water which is used to clean the probe before a calibration and Beaker 2 is used for the actual calibration measurement. Upon preparing the solutions, click on the Beaker-2 for Calibration 4.01pH checkbox.

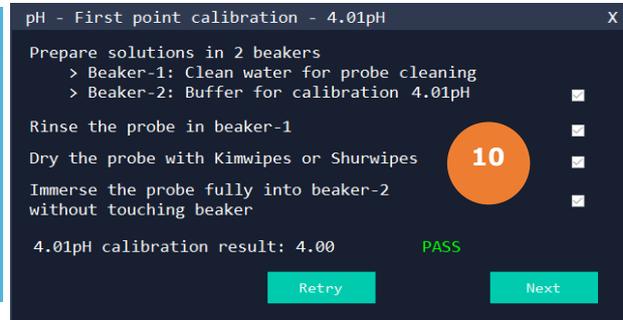
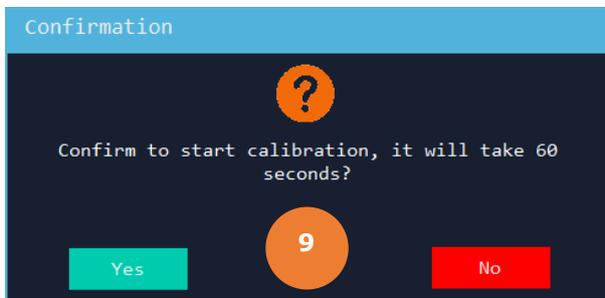


- Remove the electrode from its storage solution and rinse it with distilled water in an empty waste beaker. Upon rinsing the probe with distilled water, click on the Rinse the probe in beaker-1 check box.

- After rinsing, wipe dry with Kimwipes or Shurwipes and click on the Dry the probe with Kimwipes or Shurwipes checkbox. (Avoid rubbing the electrode because it has a sensitive membrane).



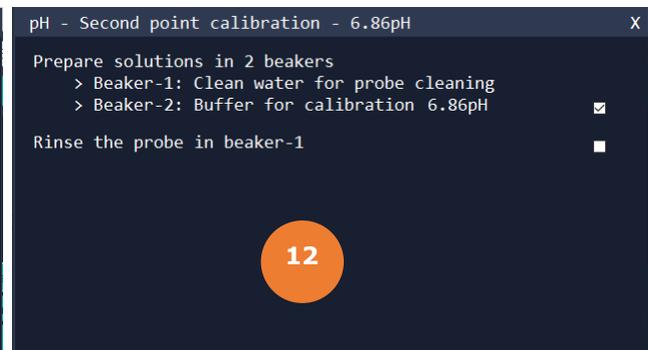
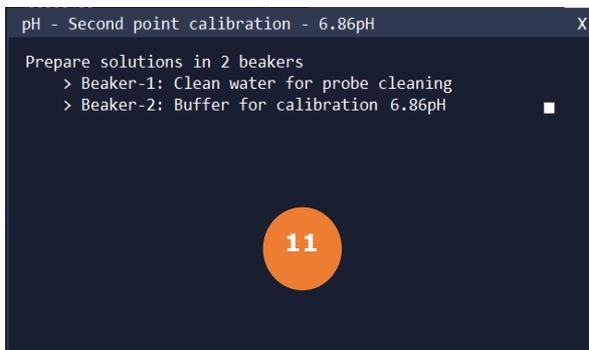
- Immerse the probe into Beaker 2 (4.01pH) to start the calibration. then click Immerse the probe fully into beaker-2 without touching beaker checkbox.
- An information window will appear. Click [Ok] to proceed. The calibration window will be in disabled mode and the countdown timer starts as shown in the picture. Wait for 60 seconds to stabilize the readings.



- Check the result. If the first point calibration is unsuccessful, an error message is displayed. Click [Retry] to start the first point calibration again (Repeat Steps 5 – 10 until the first point calibration is successful). Upon successful calibration, The Calibration result will be displayed. Click [Next] to proceed with the Second point calibration.

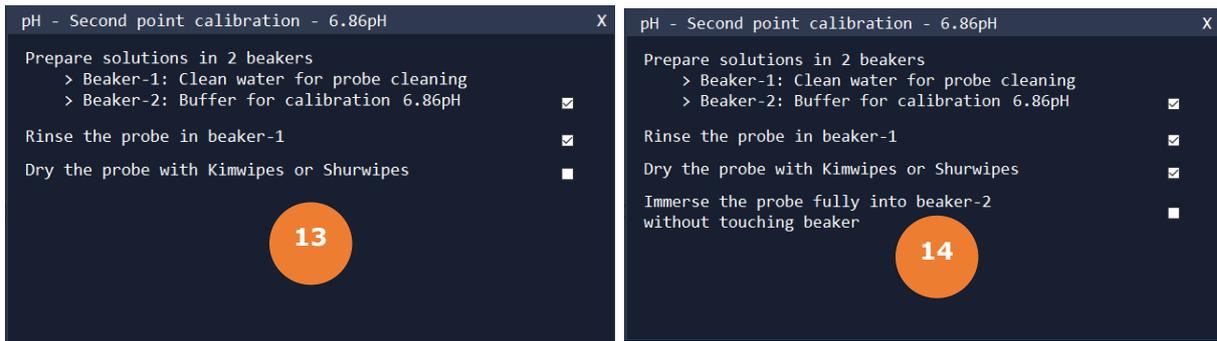
Second Point Calibration

- Upon successfully completing the First Point Calibration, the Second Point Calibration interface is displayed. Prepare Second buffer solution. There should be two sets of beakers for each solution. Beaker 1 is clean water which is used to clean the probe before a calibration and Beaker 2 is used for the actual calibration measurement. Upon preparing the solutions, click on the Beaker-2 for Calibration 6.86pH checkbox.



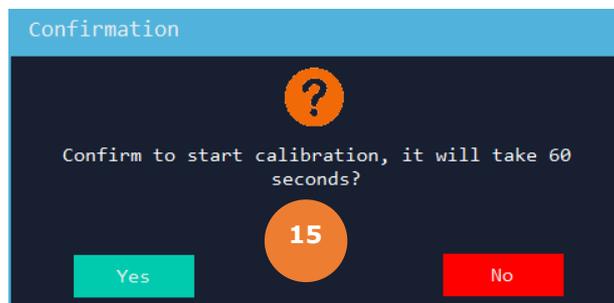
- Remove the electrode from its storage solution and rinse it with distilled water in an empty waste beaker. Upon rinsing the probe with distilled water, click on the Rinse the probe in beaker-1 check box.

13. After rinsing, wipe dry with Kimwipes or Shurwipes and click on the Dry the probe with Kimwipes or Shurwipes checkbox.

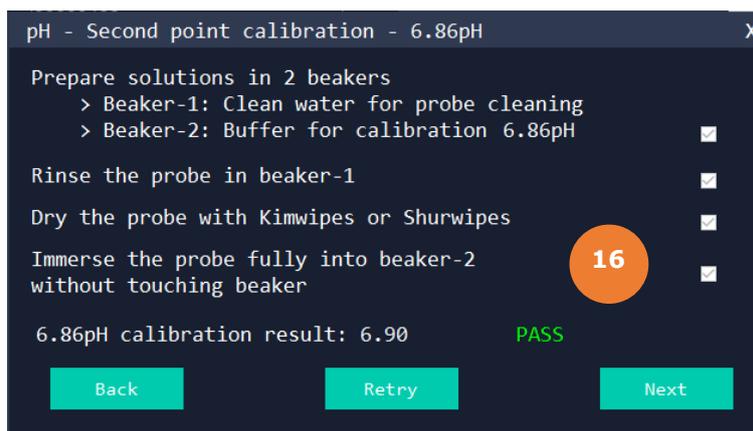


14. Immerse the probe into Beaker 2 (6.86pH) to start the calibration. then click Immerse the probe fully into beaker-2 without touching beaker checkbox.

15. An information window will appear. Click **[Ok]** to proceed. The calibration window will be in disabled mode and the countdown timer starts as shown in the picture. Wait for 60 seconds to stabilize the readings.

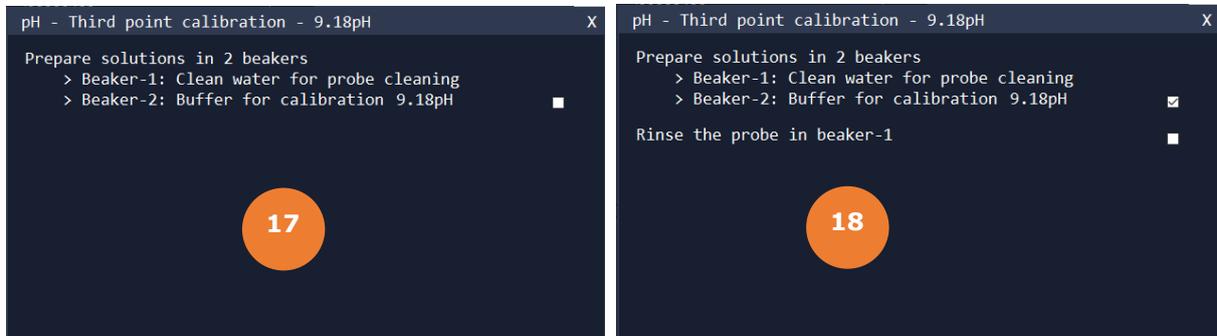


16. Check the result. If the second point calibration is unsuccessful, an error message is displayed. Click **[Retry]** to start the second point calibration again (Repeat Steps 12 – 16 until the second point calibration is successful). Upon successful calibration, The Calibration result will be displayed. Click **[Next]** to proceed with the Third point calibration.



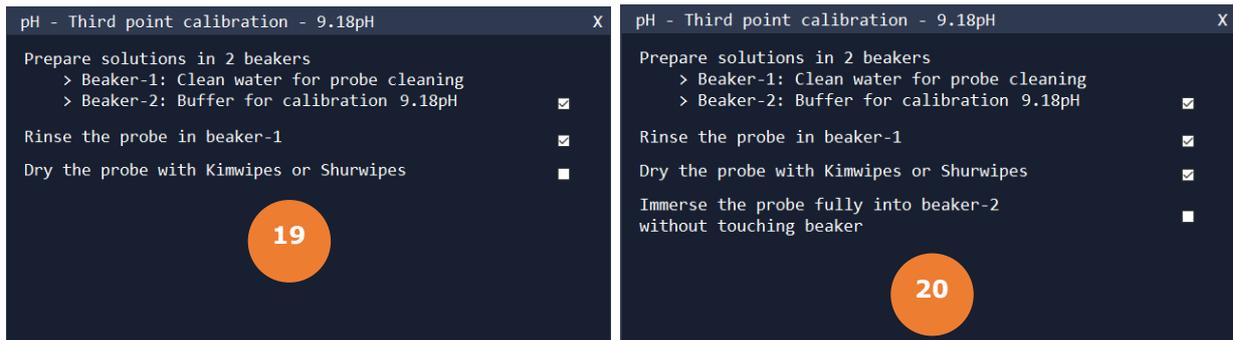
Third Point Calibration

17. Upon successfully completing the Second Point Calibration, the Third Point Calibration interface is displayed. Prepare Second buffer solution. There should be two sets of beakers for each solution. Beaker 1 is clean water which is used to clean the probe before a calibration and Beaker 2 is used for the actual calibration measurement. Upon preparing the solutions, click on the Beaker-2 for Calibration 9.18pH checkbox.



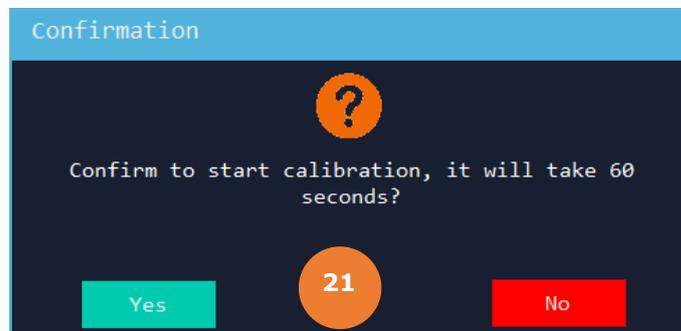
18. Remove the electrode from its storage solution and rinse it with distilled water in an empty waste beaker. Upon rinsing the probe with distilled water, click on the Rinse the probe in beaker-1 check box.

19. After rinsing, wipe dry with Kimwipes or Shurwipes and click on the Dry the probe with Kimwipes or Shurwipes checkbox.

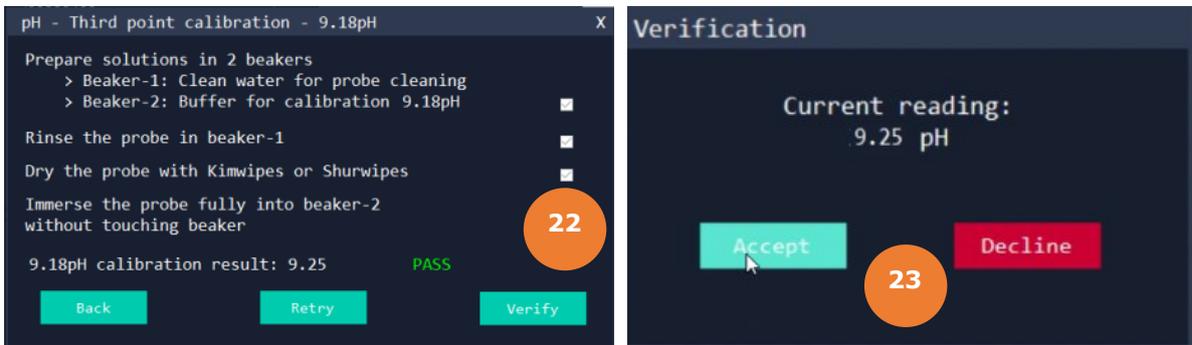


20. Immerse the probe into Beaker 2 (9.18pH) to start the calibration. then click Immerse the probe fully into beaker-2 without touching beaker checkbox.

21. An information window will appear. Click **[Ok]** to proceed. The calibration window will be in disabled mode and the countdown timer starts as shown in the picture. Wait for 60 seconds to stabilize the readings.

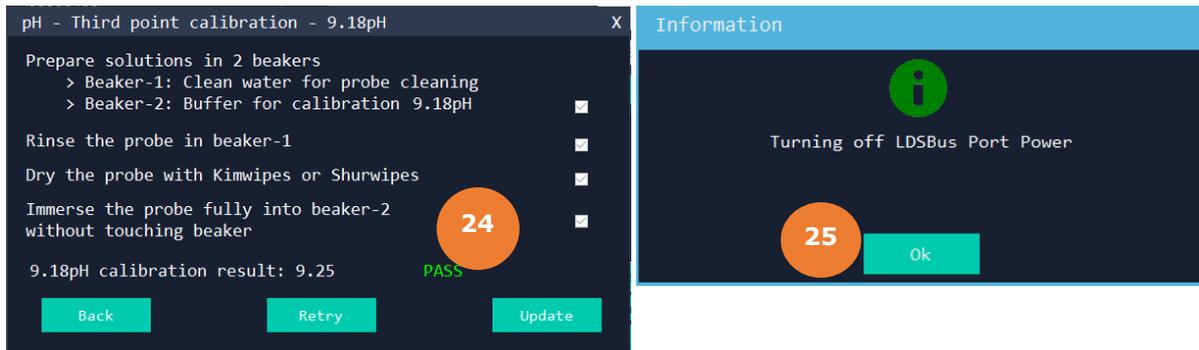


22. Check the result. If the third point calibration is unsuccessful, an error message is displayed. Click **[Retry]** to start the third point calibration again (Repeat Steps 18 – 22 until the third point calibration is successful). Upon successful calibration, The Calibration result will be displayed. Click **[Verify]** to proceed with calibration verification.



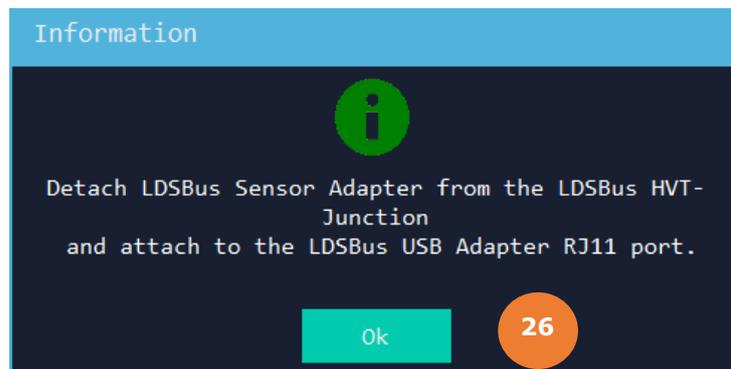
23. The verification window will display the current reading. Click **[Accept]** if the current reading is with reasonable range, click **[Decline]** if current reading is not acceptable and you can recalibrate the device again.

24. Click **[Update]** to flash the calibration data into the device.

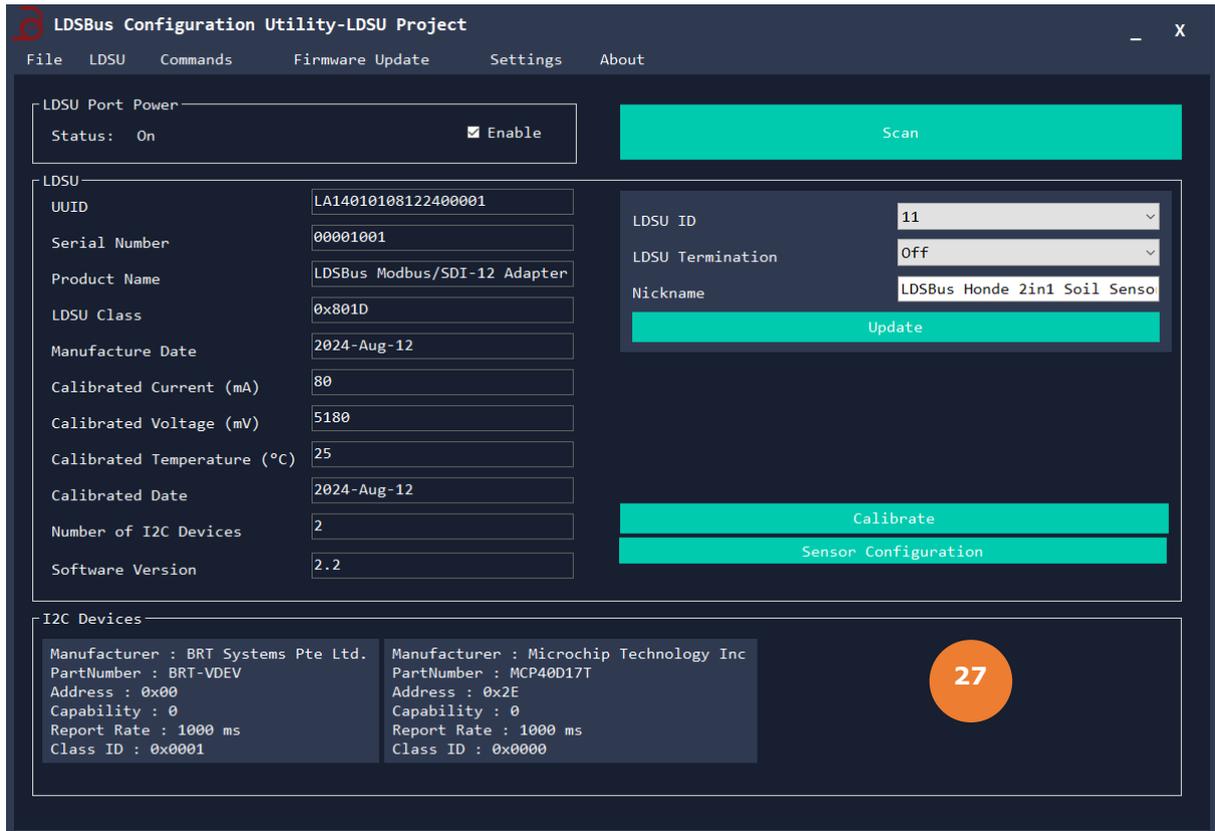


25. Upon successful update, an appropriate message indicating the same is displayed. LDSBus Power will be switched off.

26. Connect the sensor back to the USB adapter after removing it from the HVT junction, and then click **[Ok]**. For power switching, wait 60 seconds.



27. In the main window, the calibration date will be updated after the utility scans the device again.

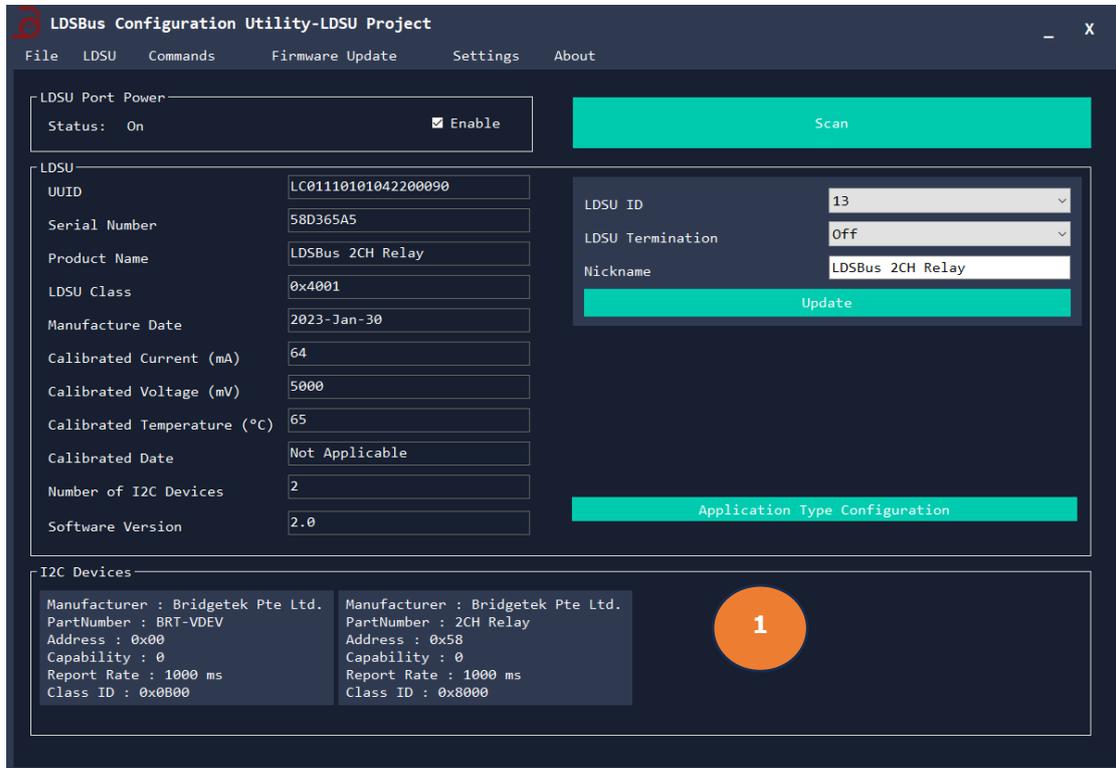


8 Application Type Configuration

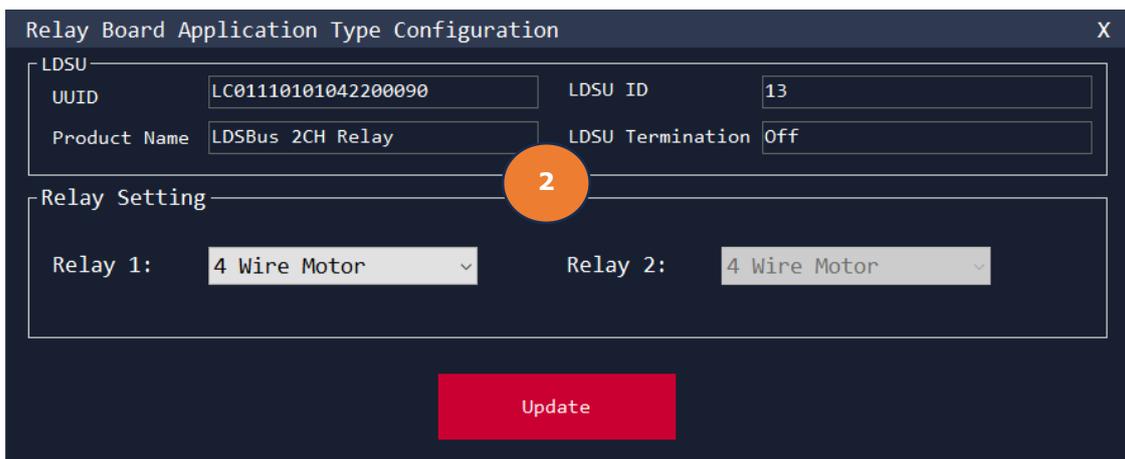
8.1 Relay Controller Application Type Configuration

To configure application type for Relay Controller –

1. Click **[Application Type Configuration]**.



2. The Relay Controller Application Type configuration window is displayed.



3. Select the setting for each relay from the drop-down box. There are different input windows for the different relay settings. For example, for 4 wire motor, the setting input will look like the one shown in the picture.
 - a. The settings shown in the 4-wire Motor Setting, indicate that the motor is powered via the COM-NO contacts of Relay 1, i.e., when Relay 1's contacts are in COM-NC, the power is OFF.
 - b. Similarly, when Relay 2's COM-NO contacts are closed, the motor is driven in the forward (FWD) direction and when COM-NC contacts are closed, the motor is driven in the reverse (REV) direction. The user shall determine the forward and reverse directions of the motor.

Relay Board Application Type Configuration

LDSU

UUID: LC011101042200090 LDSU ID: 13

Product Name: LDSBus 2CH Relay LDSU Termination: Off

Relay Setting

Relay 1: 4 Wire Motor (dropdown menu open showing: None, Generic DOUT, 4 Wire Motor)

Relay 2: 4 Wire Motor

Update

4-Wire Motor Setting

Settings

Relay 1: Power

Relay 2: Direction

Power: NO = ON, NC = OFF

Direction: NO = FWD, NC = REV

Timer: Not timed

Time_onoff (secs): 65535

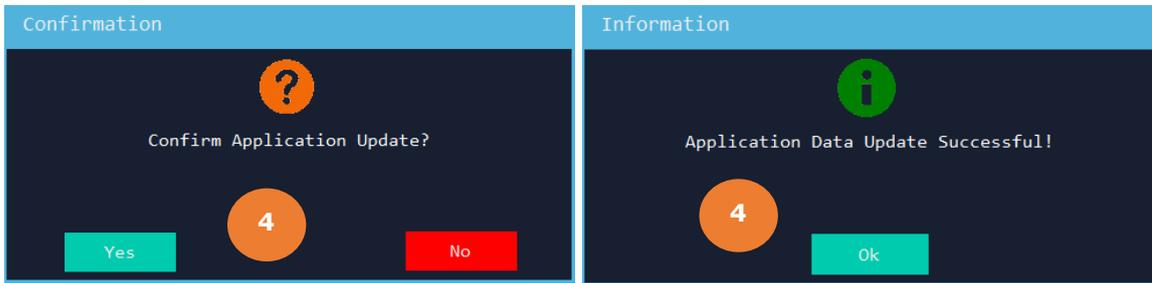
Grd_Time_OnOff (secs): 0

Grd_Time_OffOn (secs): 0

■ Set Application Reference?

Set Data

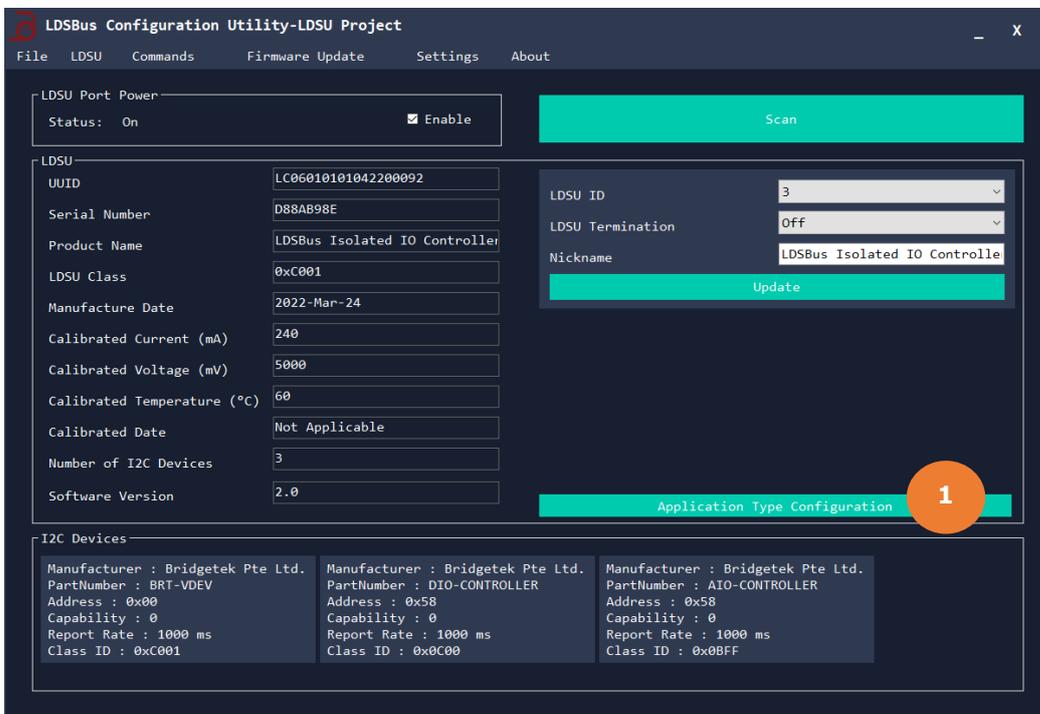
- Once all relays are configured, click **[Update]** to save the settings to the device's EEPROM. A confirmation window will be displayed whether to update the application. Click **[Yes]** to update; **[No]** to cancel the update. Upon successful update, an appropriate message indicating the same will be displayed.



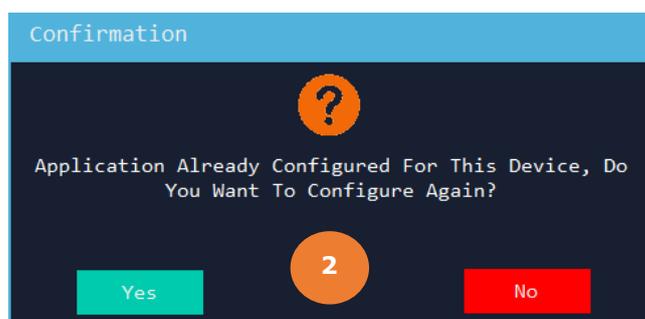
8.2 IO Controller Application Type Configuration

To configure application type for IO Controller Module –

- Click **[Application Type Configuration]**.



- A window will appear asking for a new configuration if the IO controller board was configured previously. Click **[Yes]** to change the setting; **[No]** to not change the setting.



Alternatively, if the IO controller has not been configured previously, this window will not appear.

Click **[Yes]** to configure the IO controller application type. If no configuration is done on the board, the following window will appear.

In total, there are 8 channels that can be configured. Below is a list of the input definitions of all channels.

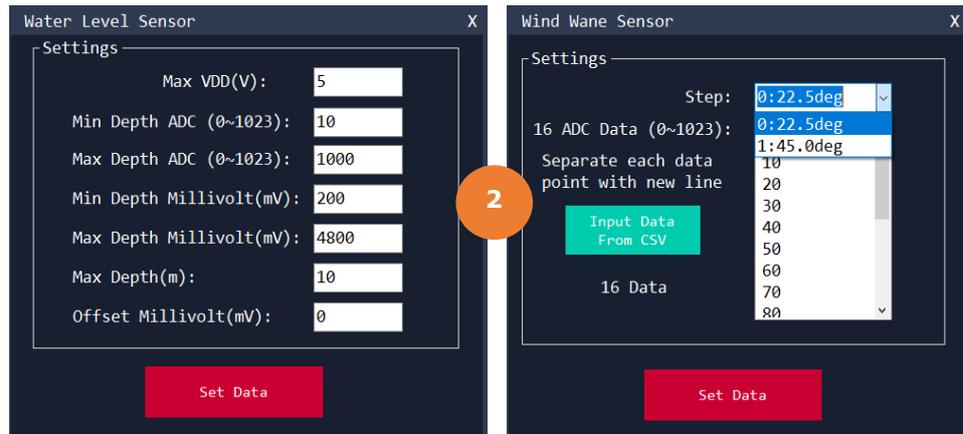
- AIN1 – Analog input channel 1
- AIN2 – Analog input channel 2
- DIN1 – Digital input channel 1
- DIN2 – Digital input channel 2
- AOUT1 – Analog output channel 1
- AOUT2 – Analog output channel 2
- DOUT1 – Digital output channel 1
- DOUT2 – Digital output channel 2

AIN 1 & AIN 2 Channels

Both AIN1 and AIN2 have the same drop-down options –

- *None - Not Configured*
- *Generic AIN - General Analog input configuration*
- *Water Level – To configure water level sensor*
- *Wind Vane – To configure Wind Vane*
- *Hot Wire Wind Speed – To configure Hot Wire wind speed connection*
- *Water Level Sensor / Wind Vane Sensor*

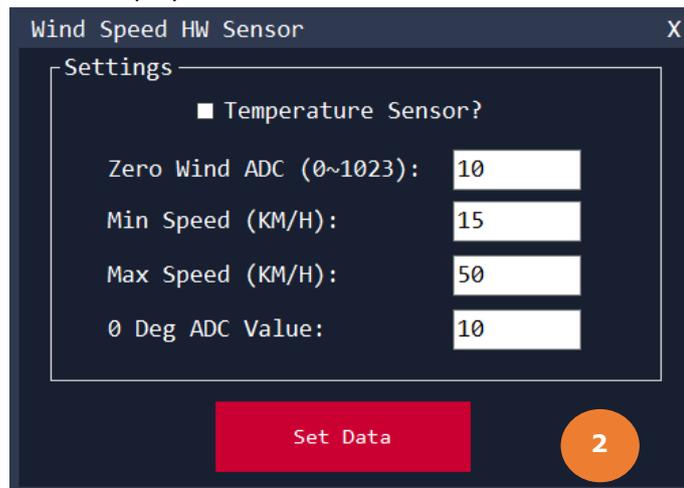
- Upon selecting *Water Level / Wind Vane* option, the respective configuration interface is displayed.



- Change the settings as required. **For Wind Wane Sensor**, to input 16 ADC data points, choose 0:22.5deg and enter the information either line-by-line or using a .csv file. Otherwise, if 1:45.0deg is selected, then 8 ADC data points is required as input.
- Upon changing the settings (if any), click **[Set Data]** to save the settings.

Hot Wire Wind Speed

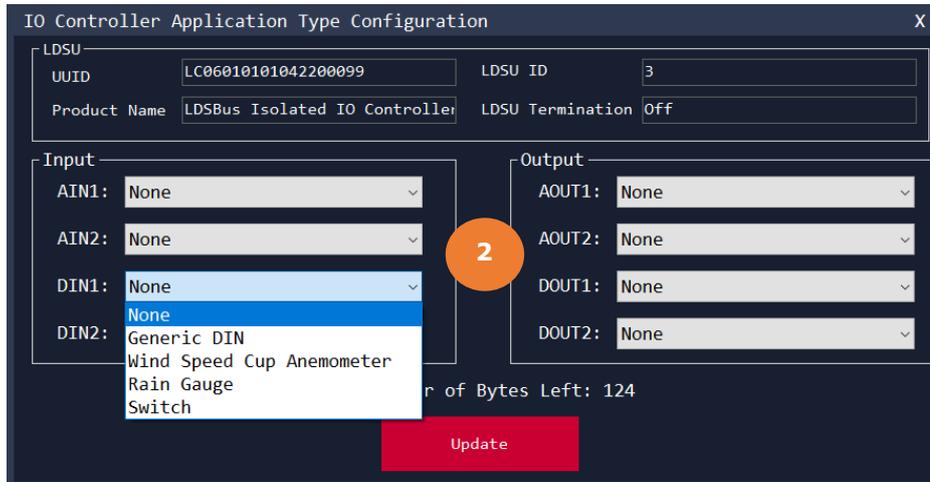
- Upon selecting *Hot Wire Wind Speed* option, the respective configuration interface is displayed.



- Change the settings as required. Wind speed hot wire sensor may use both analog input channel. One channel for wind speed and another channel for temperature. If you check "Temperature Sensor" checkbox, this channel will be use as wind speed configuration and another channel will be use as temperature sensor configuration, please connect the hardware accordingly.
- Upon changing the settings (if any), click **[Set Data]** to save the settings.

DIN 1 & DIN 2 Channels

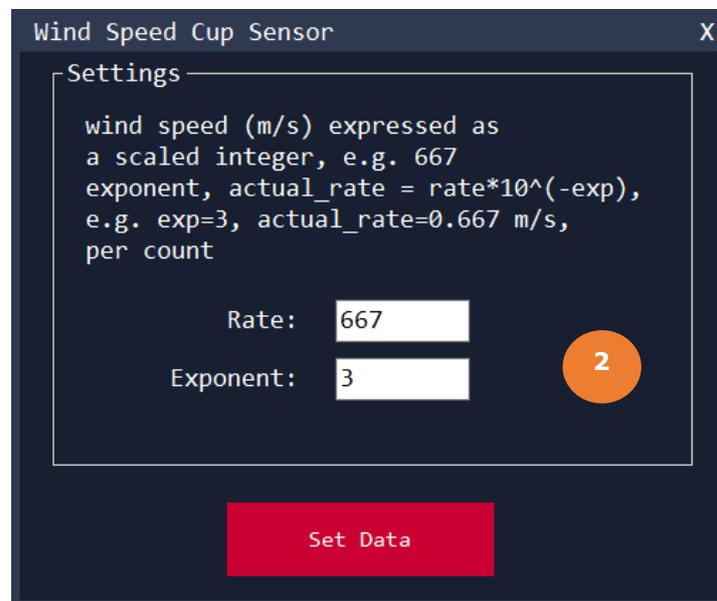
Both DIN1 and DIN2 have the same drop-down options –



- *None - Not Configured*
- *Generic DIN - General Digital input configuration*
- *Wind Speed Cup Anemometer – To configure Wind Speed Cup Anemometer*
- *Rain Gauge – To configure Rain gauge*
- *Switch – To configure Switch*

Wind Speed Cup Anemometer

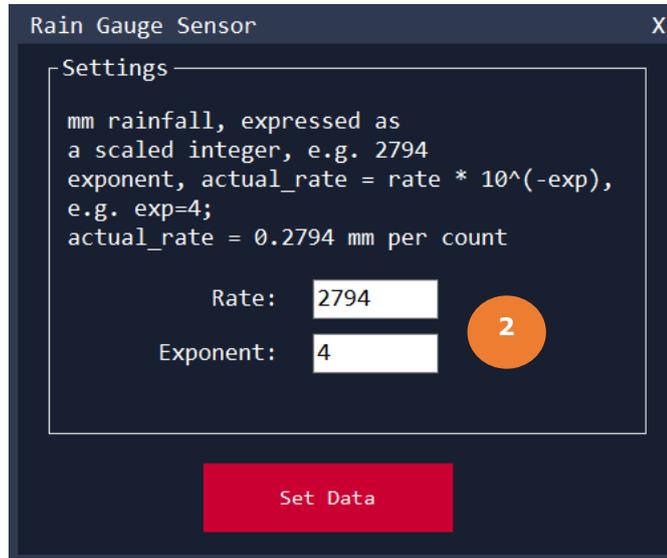
- Upon selecting *Wind Speed Cup Anemometer* option, the respective configuration interface is displayed.



- Upon changing the settings (if any), click **[Set Data]** to save the settings.
- As *Wind Speed Cup Anemometer* option request IO controller with actuator firmware, if IO controller is not programmed with actuator firmware, firmware update window will prompt up after click **[Update]** to save the settings to EEPROM.

Rain Gauge

- Upon selecting *Rain Gauge* option, the respective configuration interface is displayed.



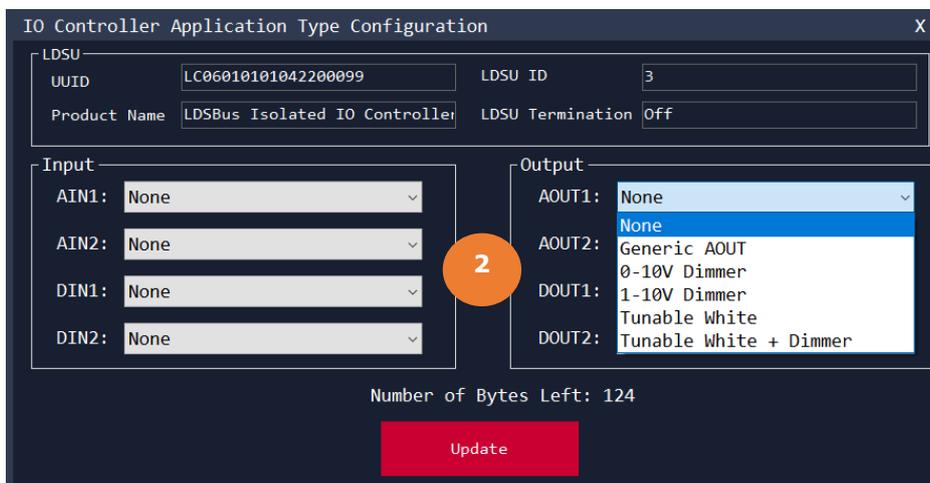
- Upon changing the settings (if any), click **[Set Data]** to save the settings.
- As *Rain Gauge option* request IO controller with counter firmware, if IO controller is not programmed with counter firmware, firmware update window will prompt up after click **[Update]** to save the settings to EEPROM.

Switch

- Upon selecting *Switch* option, no configuration interface will be prompt up as no special data needed for input.
- As *Switch option* request IO controller with switch firmware, if IO controller is not programmed with switch firmware, firmware update window will prompt up after click **[Update]** to save the settings to EEPROM.

AOUT 1 & AOUT 2 Channels

Both AOUT1 and AOUT2 have the same drop-down options –



- *None - Not Configured*

- *Generic AOUT - General Analog Output configuration*
- *0-10V Dimmer – To configure 0-10V Dimmer*
- *1-10V Dimmer – To configure 1-10V Dimmer*
- *Tunable White – To configure Tunable White*
- *Tunable White + Dimmer – To configure Tunable White + Dimmer*

0-10V Dimmer / 1-10V Dimmer

- The LDSBus Isolated IO Controller supports 0-10V and 1-10V application types. Upon selecting *0-10V / 1-10V Dimmer*, the respective configuration interface is displayed.



The user has to input a brightness curve. A brightness curve attempts to compensate for the non-linearities of the lighting element (e.g., incandescent bulb, CCFL, LED). There are 2 steps to perform. In the first step, the user has to obtain the brightness curve from the manufacturer. This brightness curve shall provide information for Luminance (Brightness) in units of Lux versus the 0-10V or 1-10V input. In the second step, the user shall then divide the Brightness range (0 Lux to Maximum Lux) into 21 or 22 equal points. For each point the corresponding voltage may be picked from the brightness curve. Then this voltage (Analog_Voltage) shall be converted into an ADC value through the following formulae:

- a. 0-10V:
ADC value = Analog_Voltage/10 * 1023
- b. 1-10V:
ADC value = Analog_Voltage/9 * 1023

For example, if the brightness curve of a 0-10V light has example value pairs as follows:

- a. 0 Lux, 0V
- b. 10 Lux, 1V
- c. 50 Lux, 2V
- d. 100 Lux, 3V
- e. 200 Lux, 4V
- f. 400 Lux, 5V
- g. 400 Lux, 6V
- h. 400 Lux, 7V
- i. 400 Lux, 8V
- j. 400 Lux, 9V
- k. 400 Lux, 10V

Then the brightness range is between 0-400Lux and the 21 Lux points will each have a step of 20 Lux (400Lux/20). For each Lux point, the analog input voltage can be interpolated from the above table. For e.g. At 50% brightness, the Lux value is 200 and this corresponds to 4V. The corresponding ADC value is:

$$\text{ADC} = 4/10 * 1023 = 409 \text{ (rounded to the nearest integer)}$$

For example, if the brightness curve of a 1-10V light has example value pairs as follows:

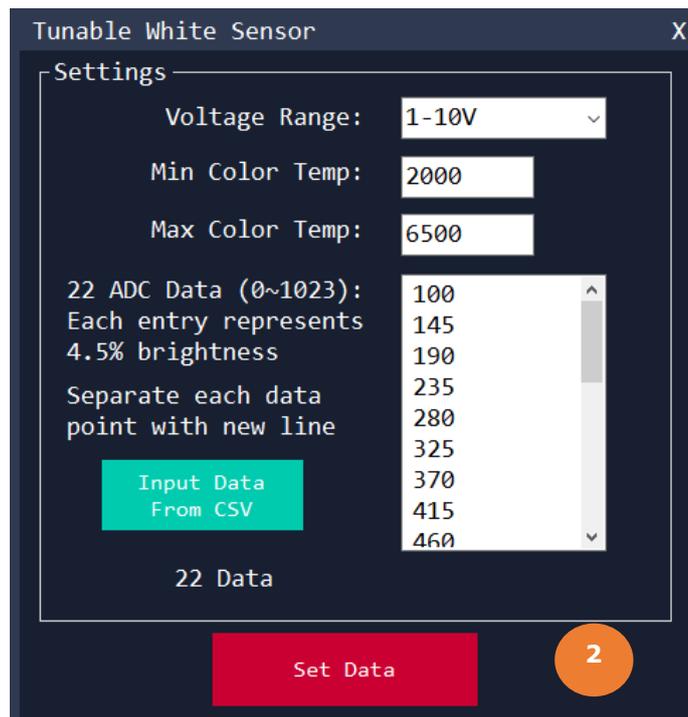
- a. 0 Lux, 1V
- b. 10 Lux, 2V
- c. 50 Lux, 3V
- d. 100 Lux, 4V
- e. 200 Lux, 5V
- f. 400 Lux, 6V
- g. 400 Lux, 7V
- h. 400 Lux, 8V
- i. 400 Lux, 9V
- j. 400 Lux, 10V

Then the brightness range is between 0-400Lux and the 22 Lux points will each have a step of 19 Lux (400Lux/21). For each Lux point, the analog input voltage can be interpolated from the above table. For e.g. At 75% brightness, the Lux value is 300 (linear interpolation) and this corresponds to 5.5V. The corresponding ADC value is:

$$\text{ADC} = 5.5/9 * 1023 = 625 \text{ (rounded to the nearest integer)}$$

Tunable White

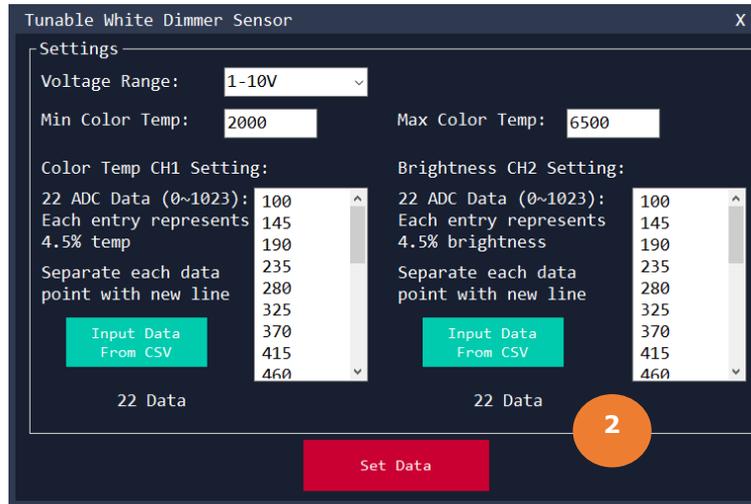
- Upon selecting *Tunable White*, the respective configuration interface is displayed.



- The LDSBus Isolated IO Controller supports 0-10V and 1-10V voltage range, you can refer [0-10V Dimmer / 1-10V Dimmer](#) configuration for detailed explanation.
- Upon changing the settings (if any), click **[Set Data]** to save the settings.

Tunable White + Dimmer

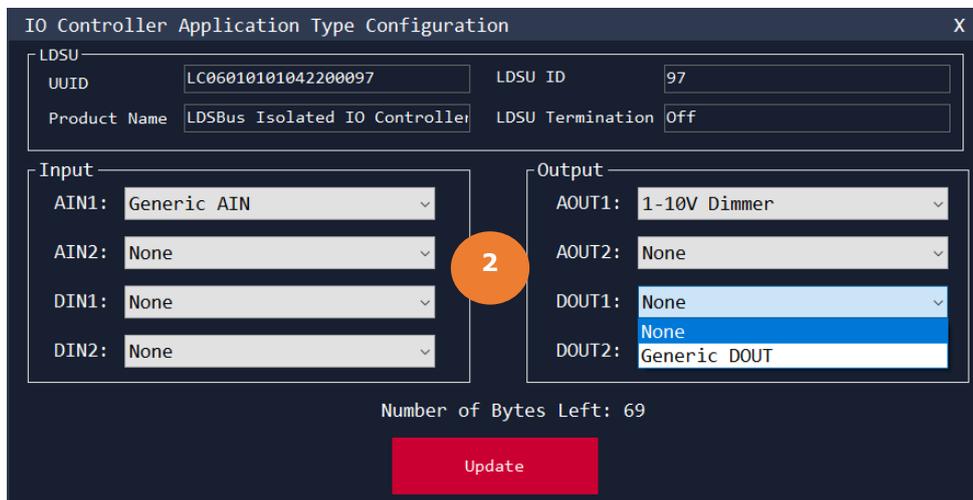
- Upon selecting *Tunable White + Dimmer*, the respective configuration interface is displayed.



- The LDSBus Isolated IO Controller supports 0-10V and 1-10V voltage range, you can refer [0-10V Dimmer](#) / [1-10V Dimmer](#) configuration for detailed explanation.
- *Tunable White + Dimmer* required to use both Analog output channels, channel 1 is for colour temperature setting and channel 2 is for brightness setting. Please input the data correctly.
- Upon changing the settings (if any), click **[Set Data]** to save the settings.

DOUT 1 & DOUT 2 Channels

Both DOUT1 and DOUT2 have the same drop-down options –



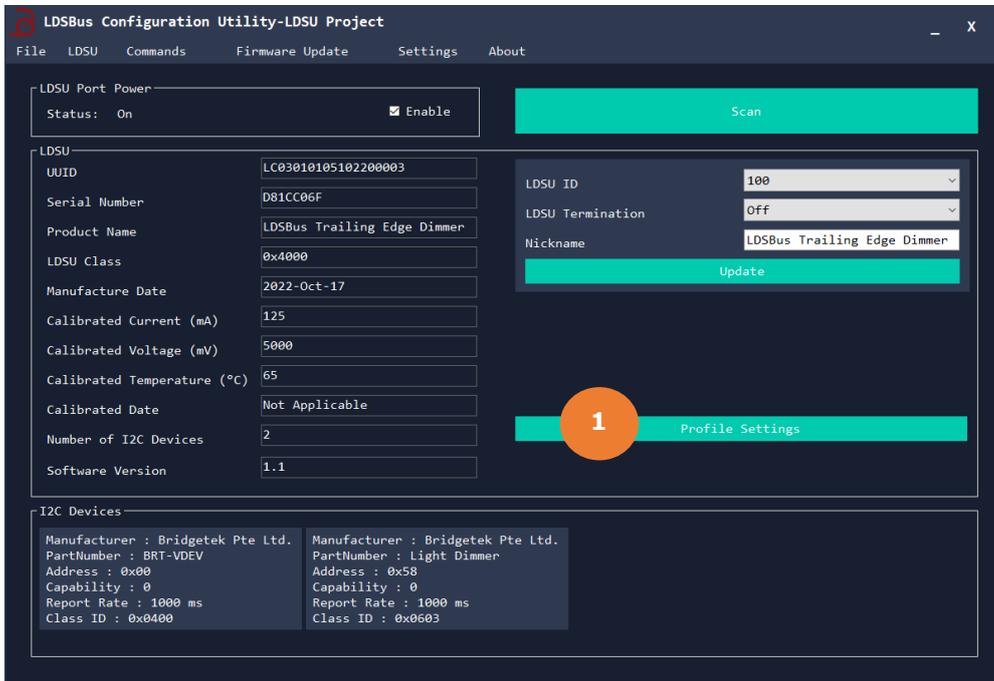
- *None - Not Configured*
- *Generic DOUT - General Digital Output configuration*

In the event that the configuration space is limited, an appropriate message will be displayed to indicate that there is not enough EEPROM space to configure the application type.

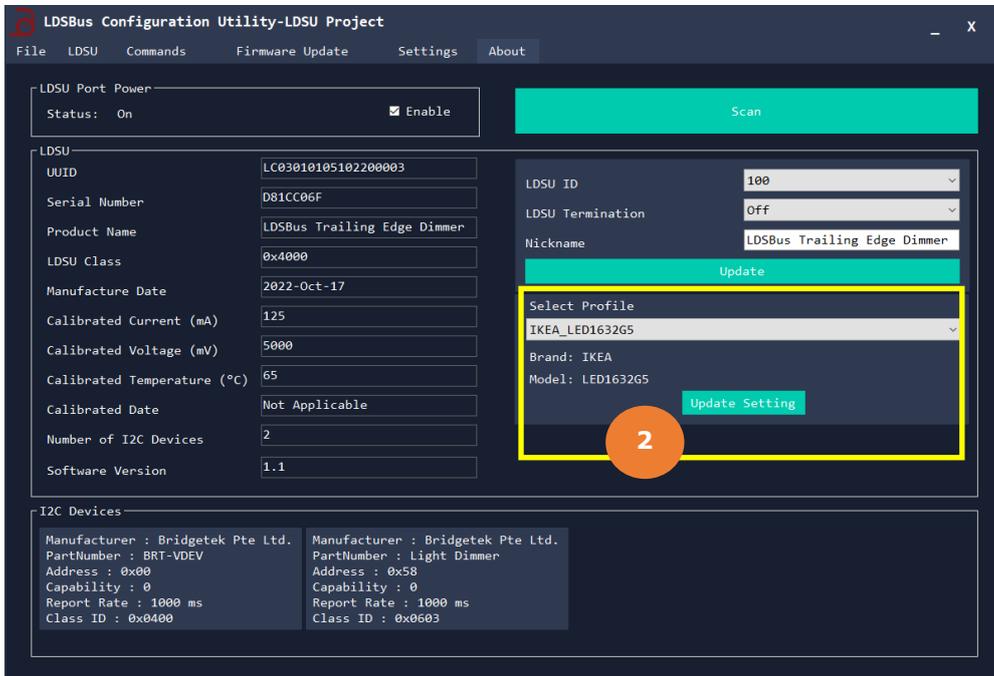
8.3 Trailing Edge Dimmer Profile Setting

To configure profile setting for LDSBus Trailing Edge Dimmer –

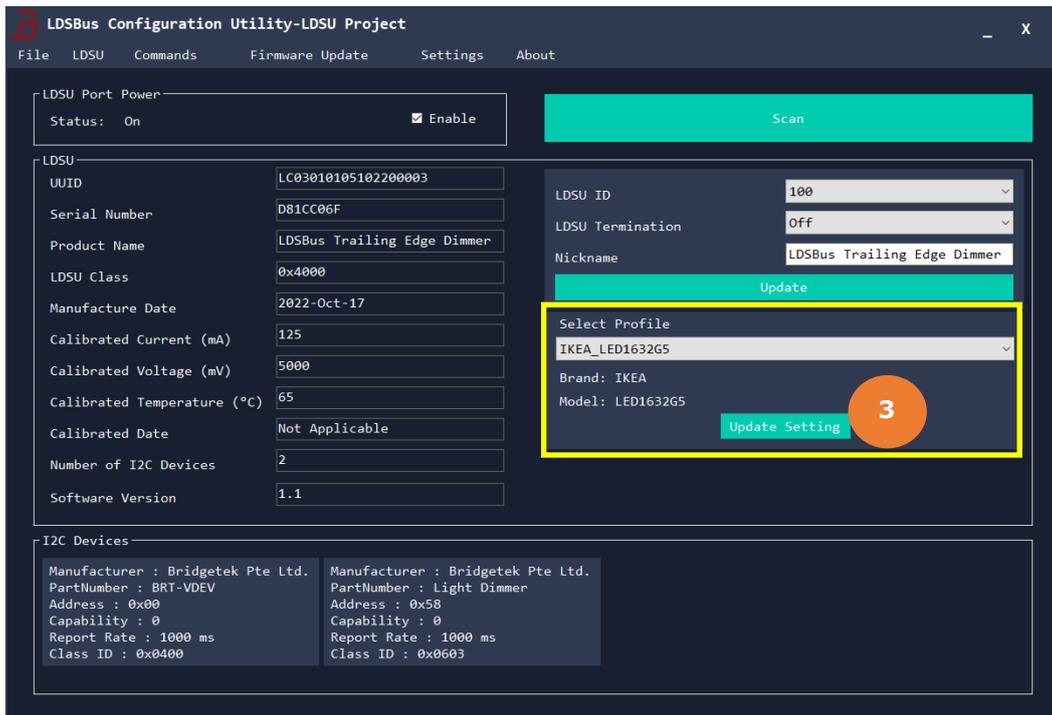
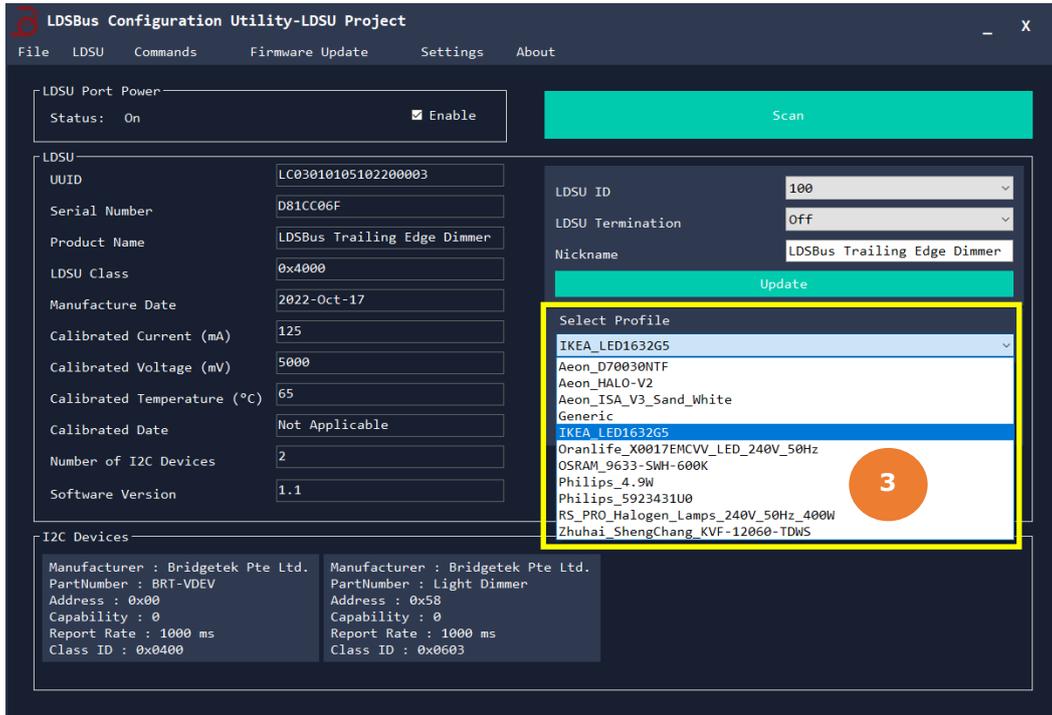
1. Click **[Profile Settings]**.



2. The profile selection panel will appear and the current setting will be displayed.



- Click on the *Select Profile* drop down box and select a different default profile. Depending upon the selected profile, the details are displayed. For example, if the selected profile is *IKEA_LED1632G5*, then the *brand name* and *model* is displayed.

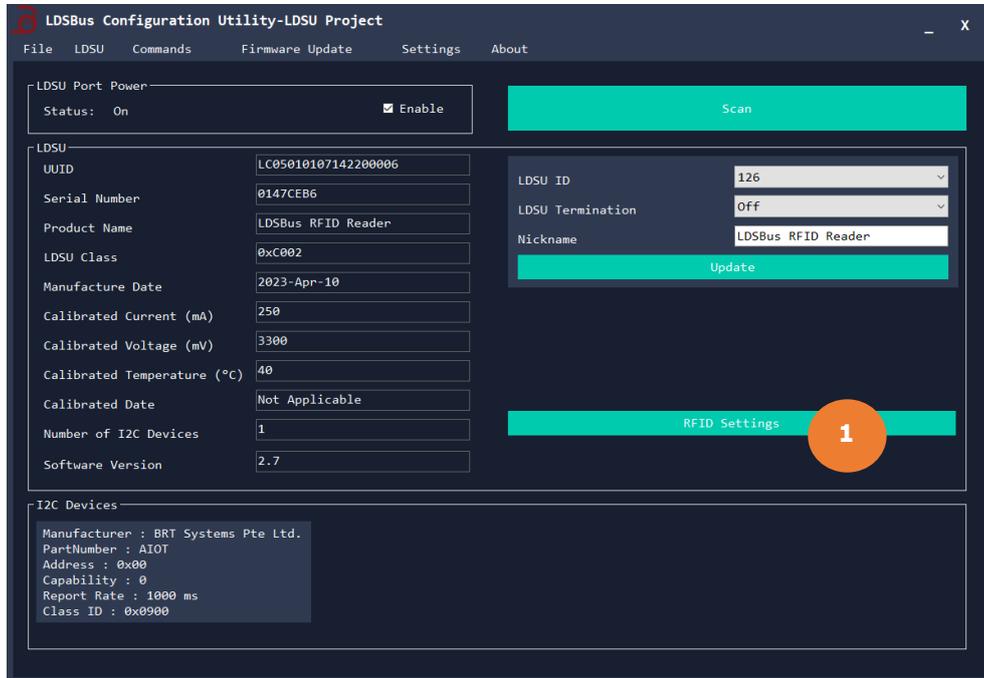


Upon selecting the profile, click [**Update Setting**] to update the profile to the EEPROM. Once the profile has been successfully updated, the utility will return to the main window.

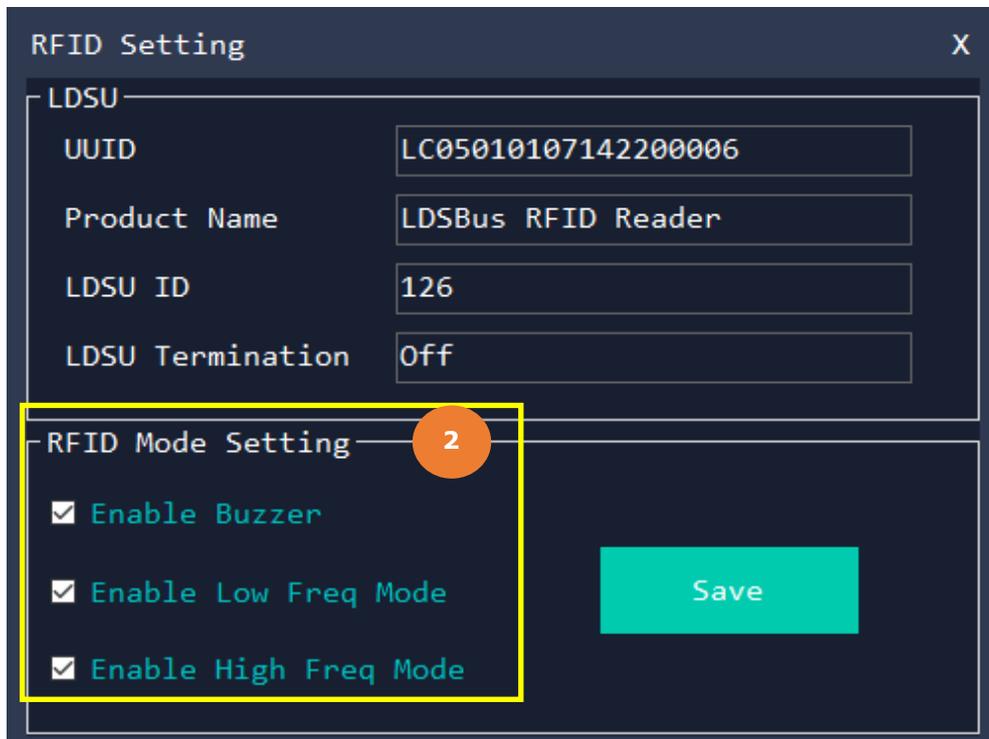
8.4 RFID Configuration Settings

To configure RFID setting for LDSBus RFID Reader –

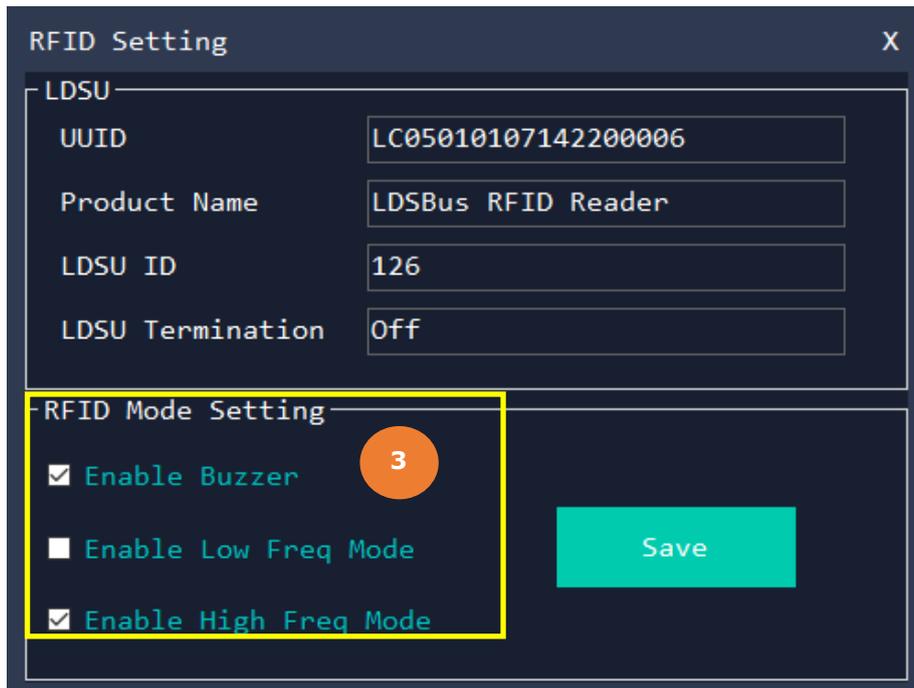
1. Click **[RFID Settings]**.



2. The RFID setting window will pop up with the current settings as shown in the picture below.



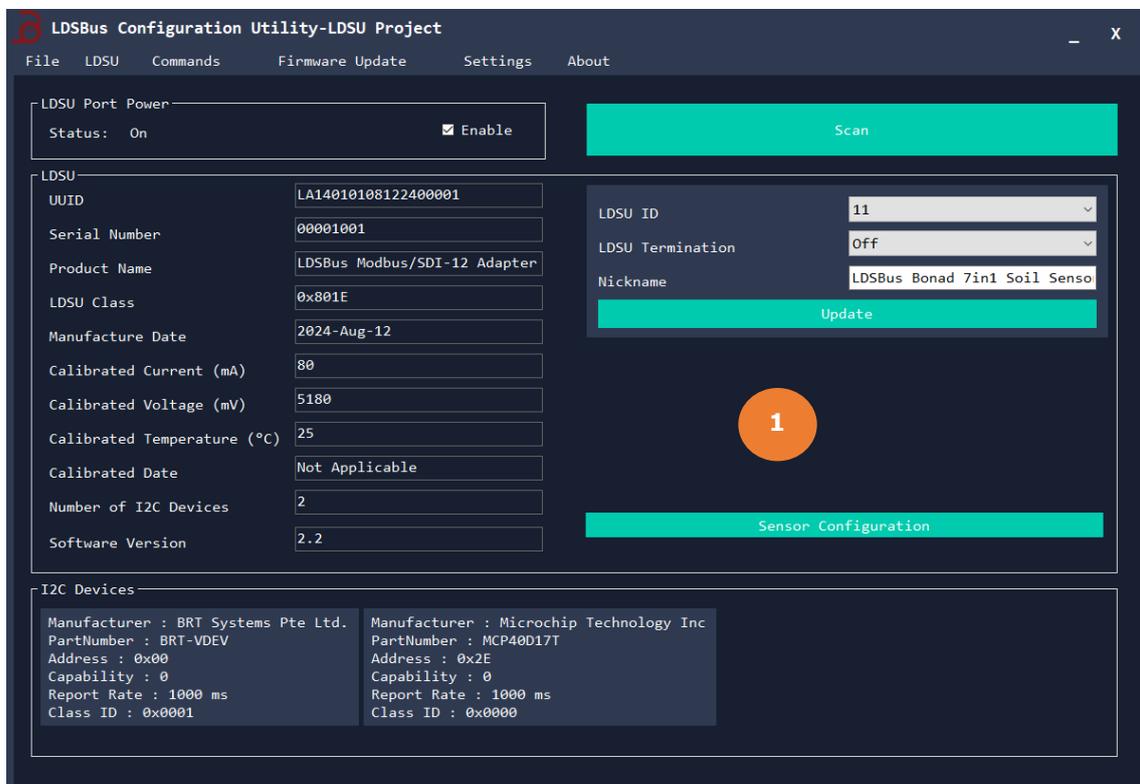
3. Change the settings by clicking on the checkbox to enable or disable buzzer, low freq. mode and high freq. mode; Click **[Save]** to save the new settings to the device (if any).



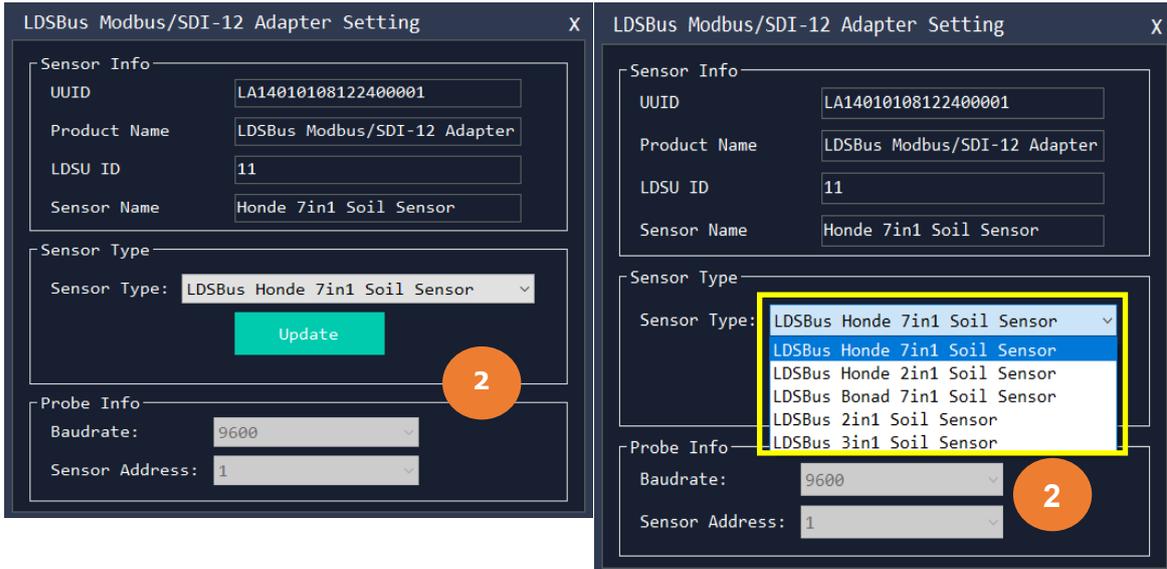
8.5 LDSBus Modbus/SDI-12 Adapter Configuration Settings

To configure LDSBus Modbus/SDI-12 adapter to specific sensors –

1. Click **[Sensor Configuration]**.

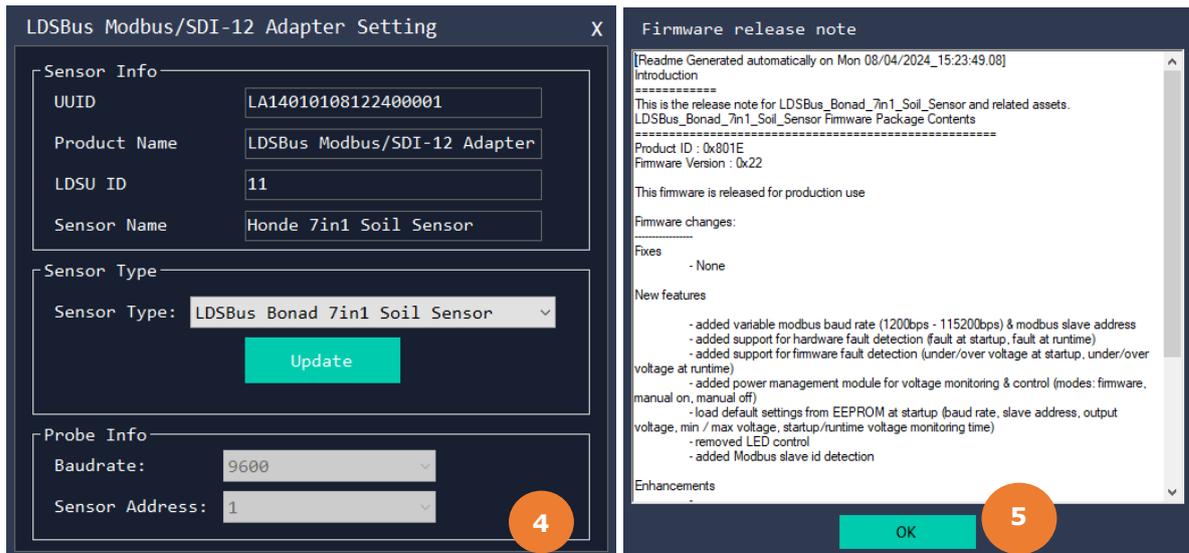


2. The setting window will pop up.



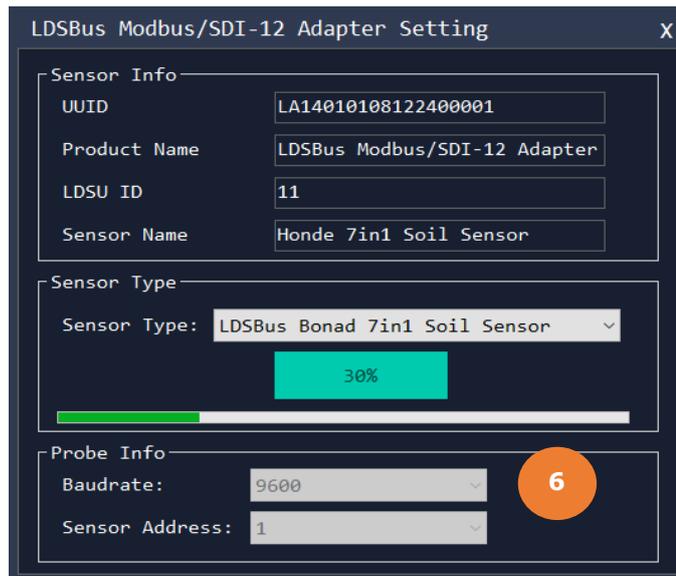
3. Click on the *Sensor Type* drop down box and select a different type of sensor configuration.

4. Upon selecting the Sensor configuration, click **[Update]** to update the new setting to the sensor. Confirmation window will pop up for user input, click **[Yes]** update the configuration. Alternatively, click **[No]** to cancel the update.

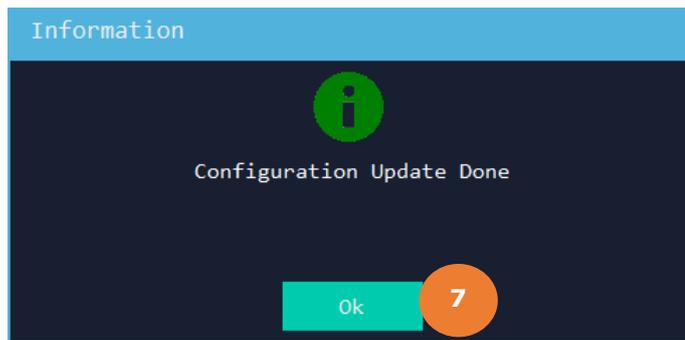


5. If firmware has release note, firmware release note will pop up. Click **[OK]** to continue.

- A progress bar indicating that the update has started is displayed.



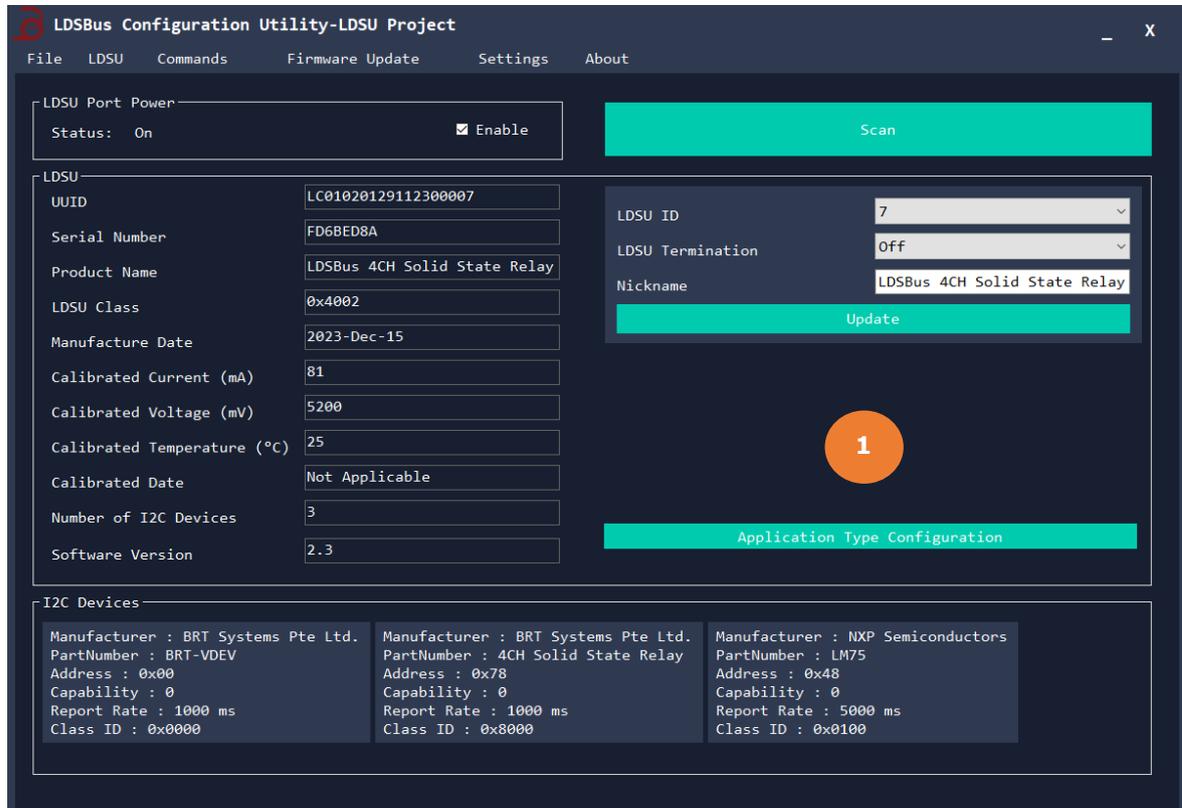
- Upon successful completion of the update, an appropriate message indicating the same will be displayed. Click **[Ok]** to return to soil sensor setting window.



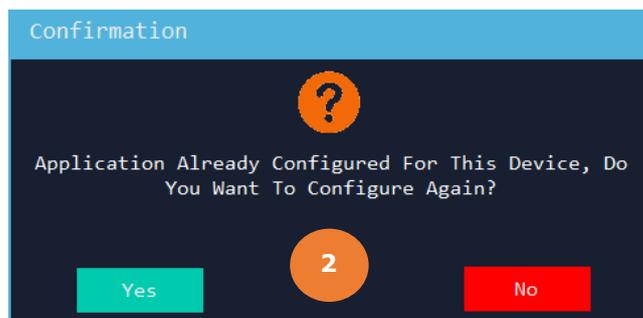
8.6 LDSBus 4CH SSR Application Type Configuration

To configure application type for 4CH SSR Module –

1. Click **[Application Type Configuration]**.



2. A window will appear asking for a new configuration if the 4CH SSR board was configured previously. Click **[Yes]** to change the setting; **[No]** to not change the setting.



Alternatively, if the 4CH SSR has not been configured previously, this window will not appear.

Click **[Yes]** to configure the 4CH SSR application type. If no configuration is done on the board, the following window will appear.

3. The Relay Controller Application Type configuration window is displayed.

4 Channel Solid State Relay Board Application Configuration

LDSU

UUID: LC01020129112300007 LDSU ID: 7

Product Name: LDSBus 4CH Solid State Relay LDSU Termination: Off

Relay Setting

Channel 1: None Channel 2: None

Channel 3: None Channel 4: None

Update

Only "Generic DOUT" selection is supported for the channels. Other selections are deprecated and not supported. Select 'Yes' to save the selection and the utility will show the data update is successful.



9 Contact Information

Refer to <https://brtsys.com/contact-us/> for contact information.

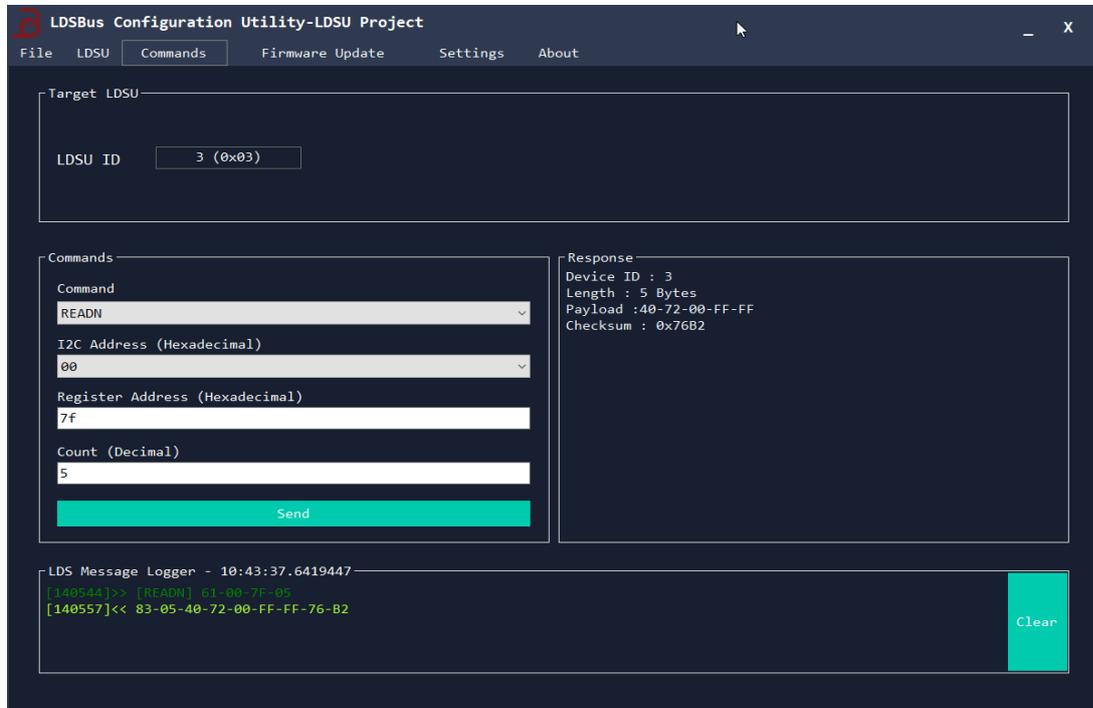
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Appendix A – Command List

Commands with payload / response

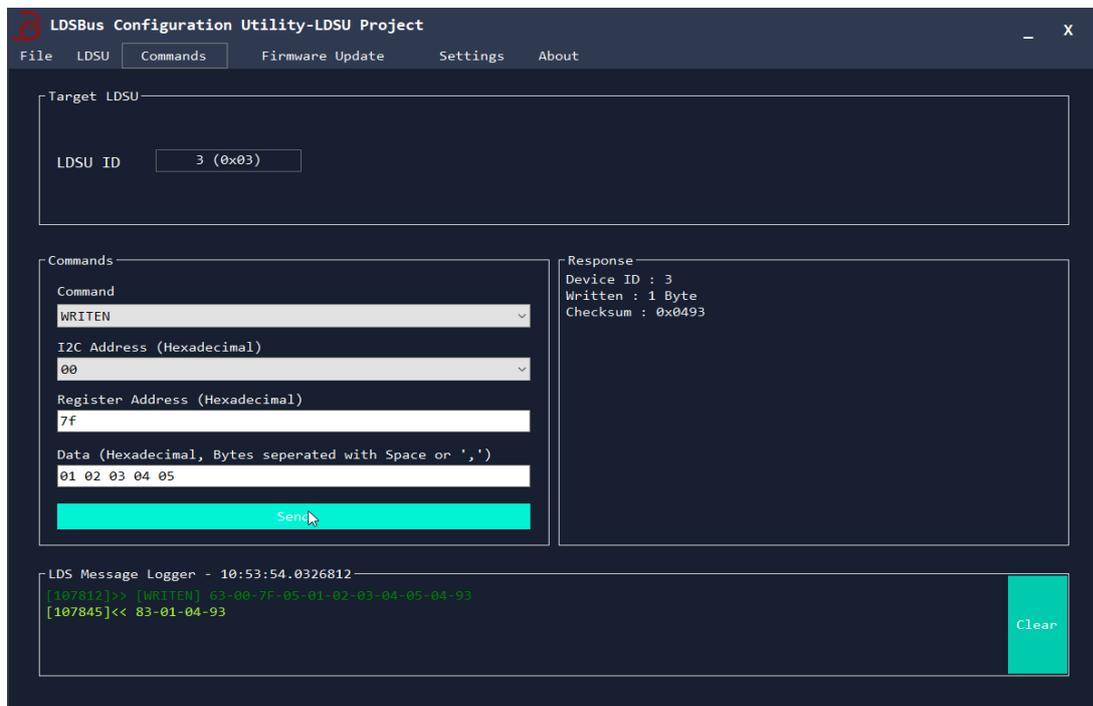
READN

This command is used to read multiple consecutive bytes from an I2C device.



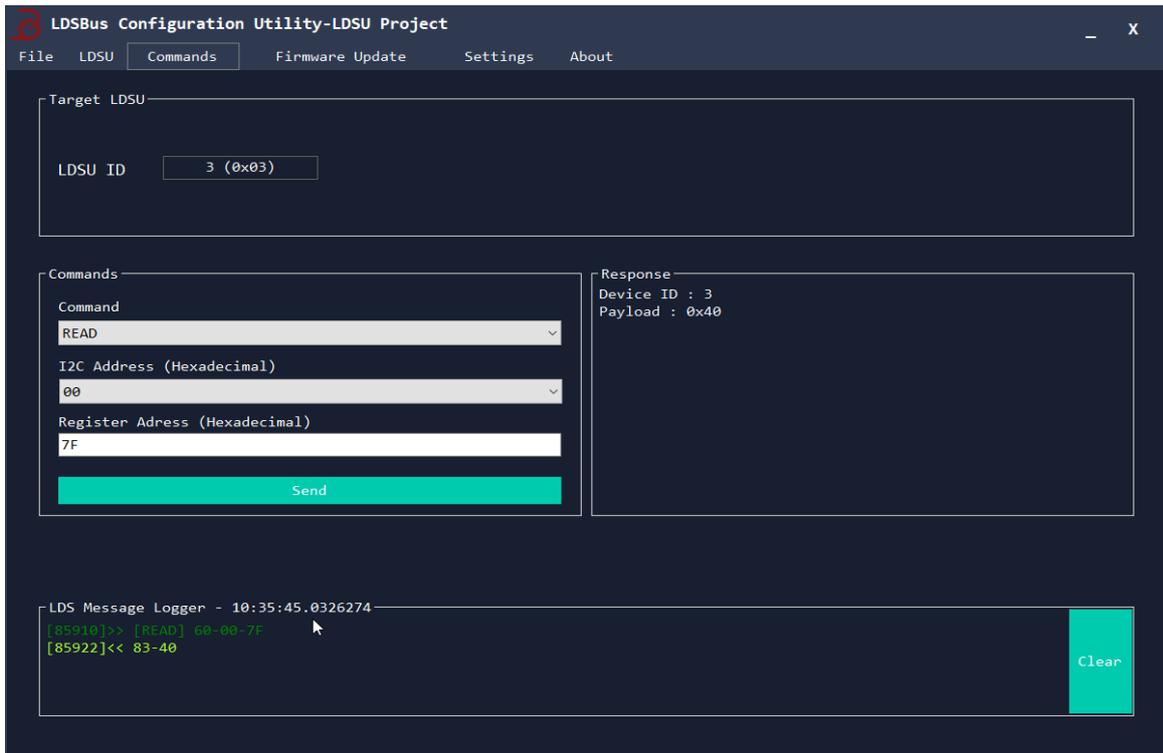
WRITEN

This command is used to write multiple consecutive register locations in an I2C device.



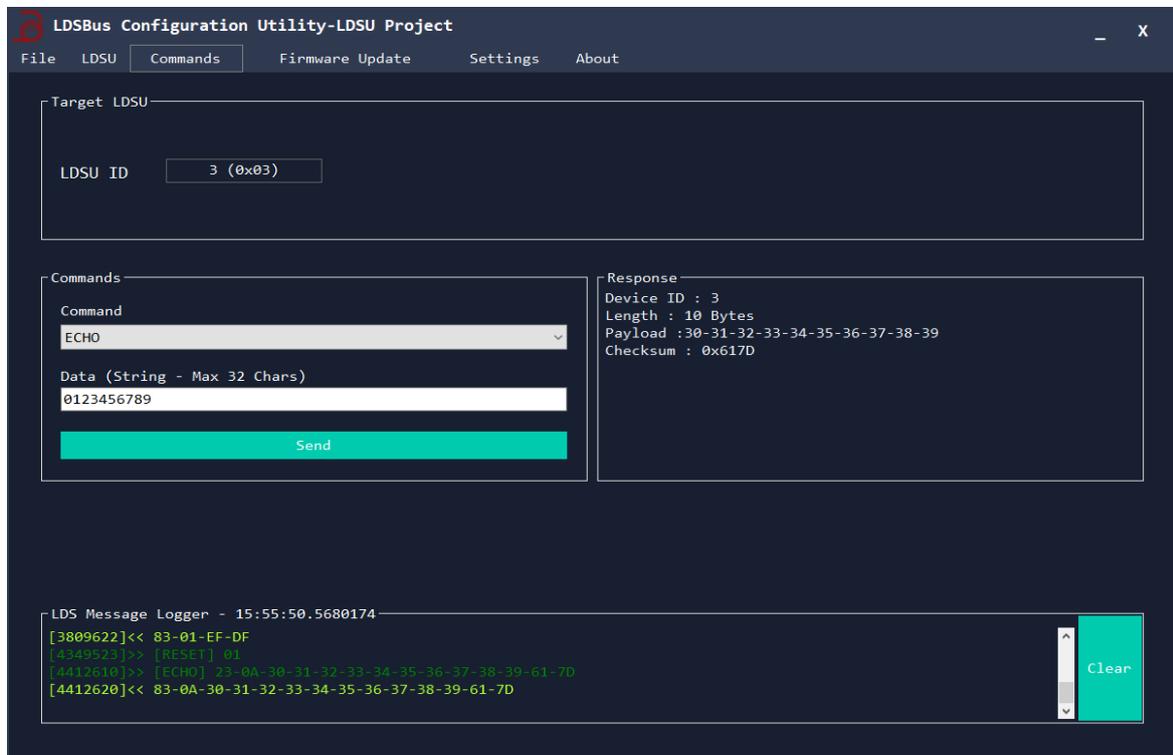
READ

This command is used to read an I2C device register.



ECHO

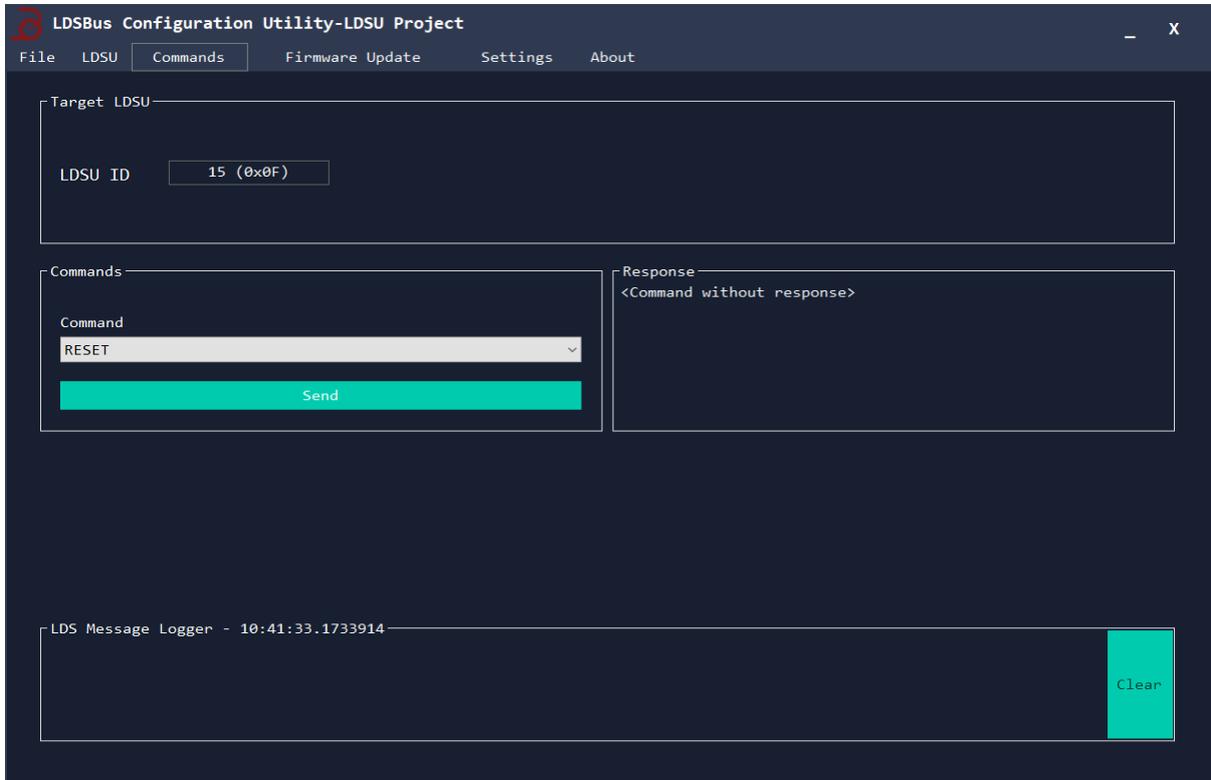
The addressed device, if present, shall echo the bytes from the host controller. This command is a special command to check the communication.



Commands without payload / response

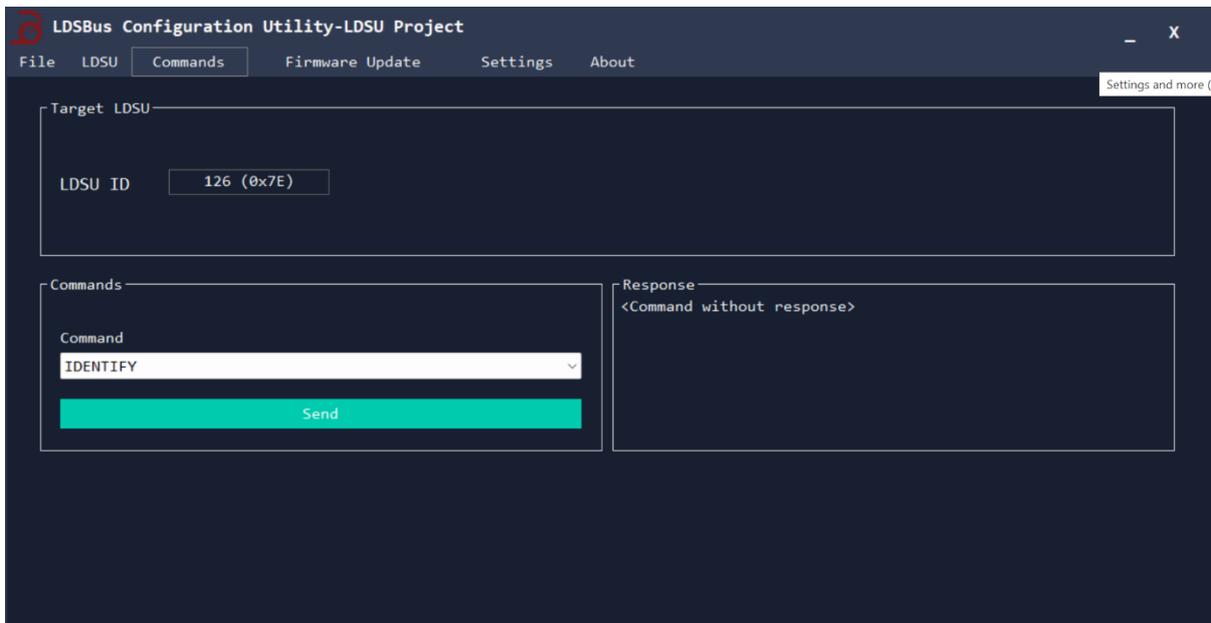
RESET

This command will reset the LDSU module.



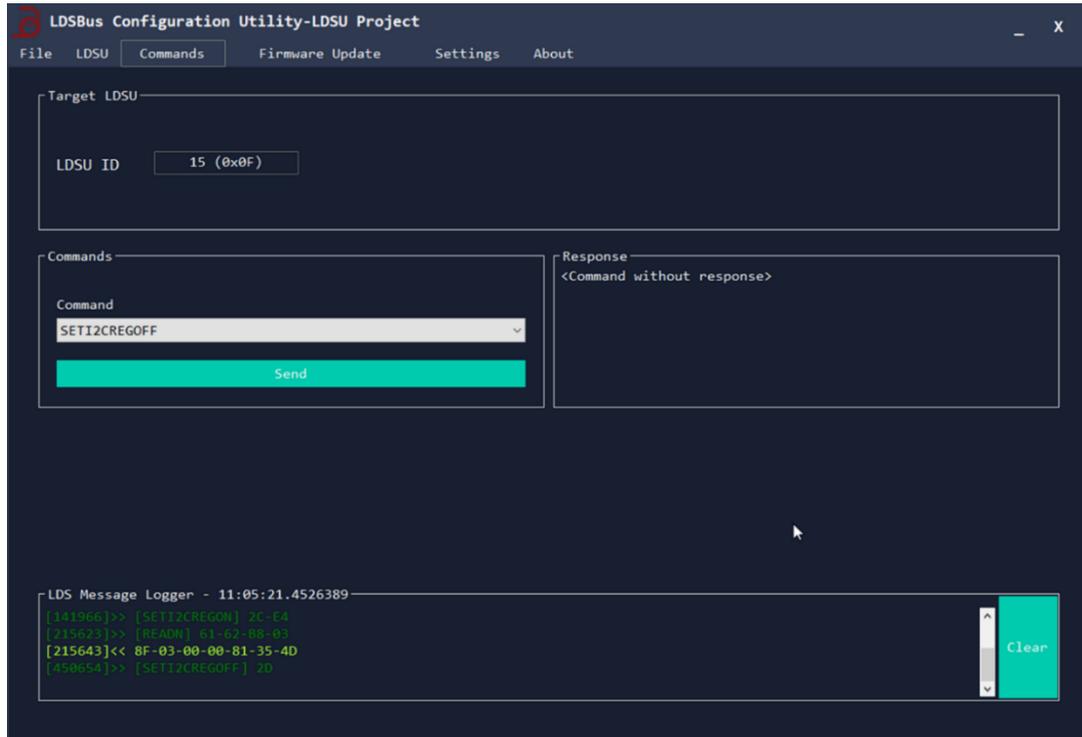
IDENTIFY

This command will trigger the LED in the LDSU Device.



I2CREGOFF

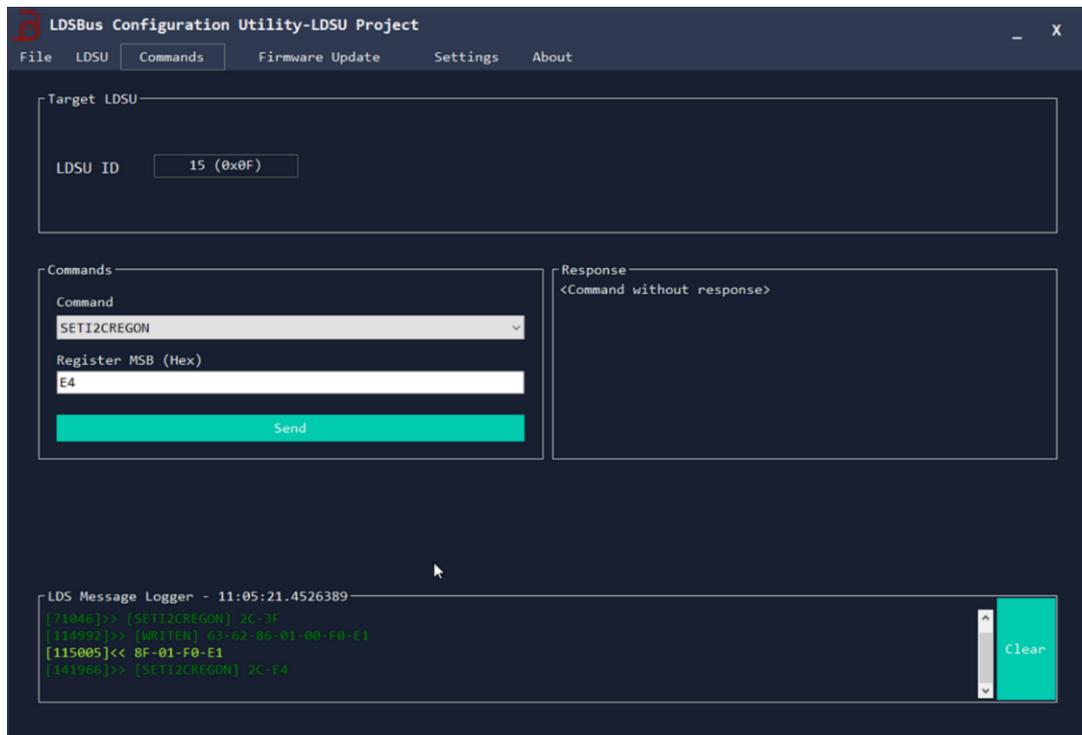
This command will turn off the 16bit register access



Commands with payload / without response

I2CREGON

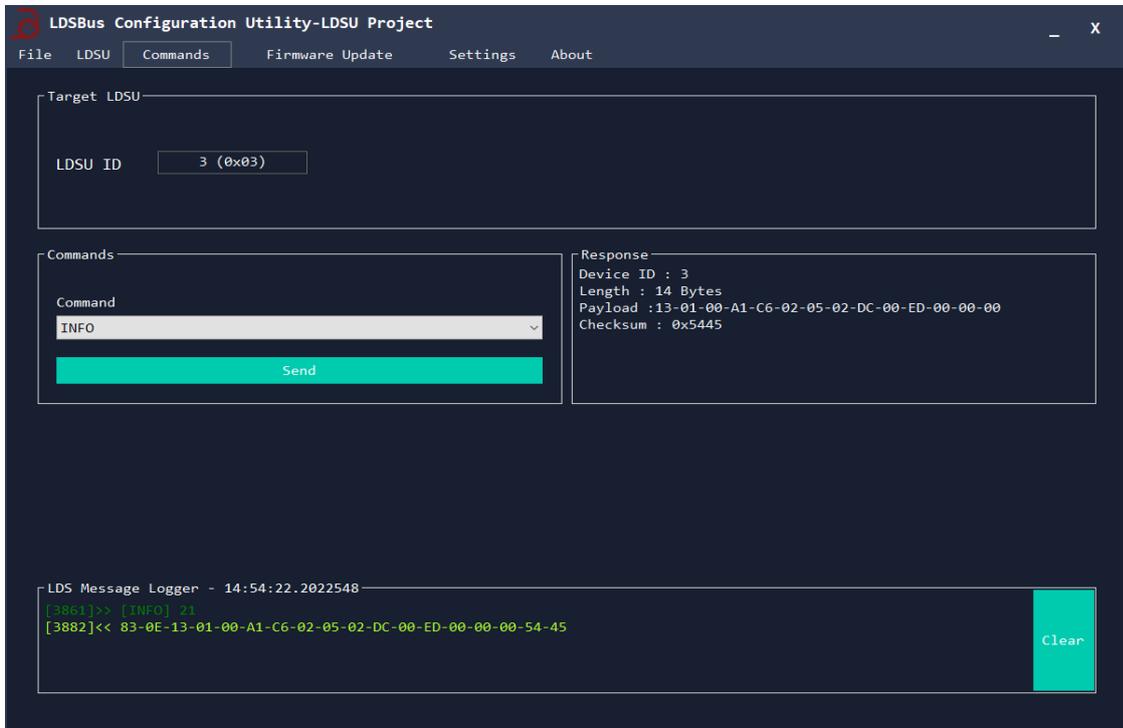
This command sets the I2C register addressing to 16-bit mode.



Commands without payload / with response

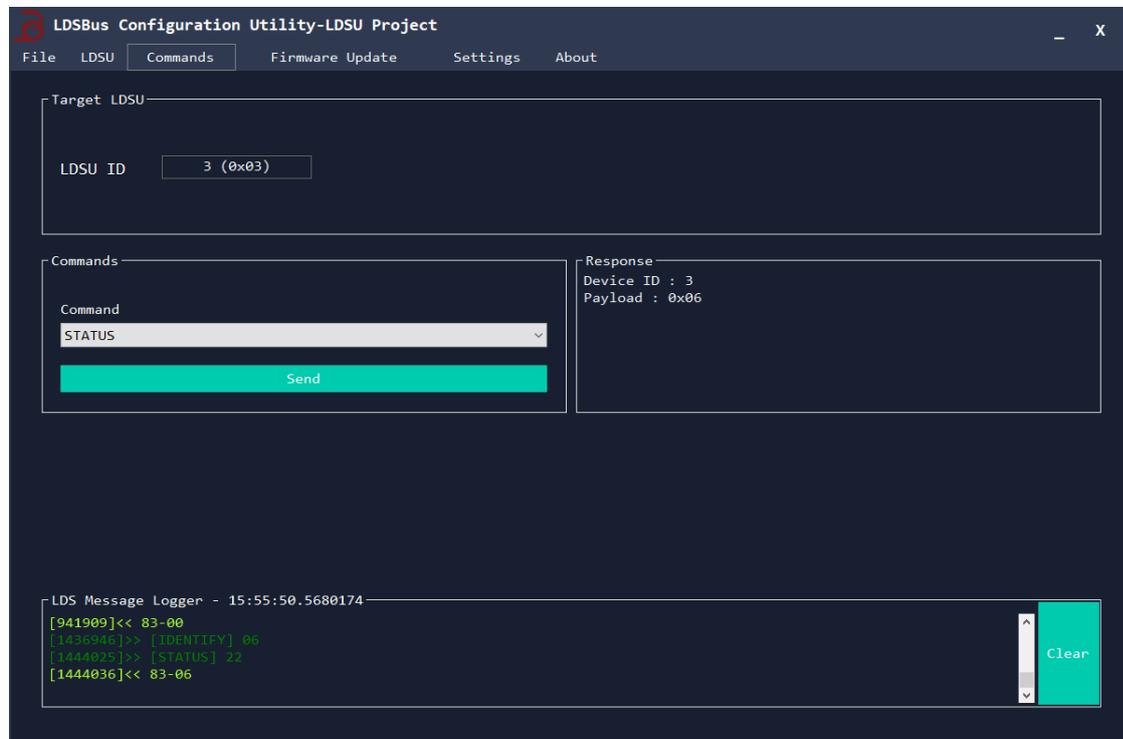
INFO

This command will get the information about the LDSU Module.



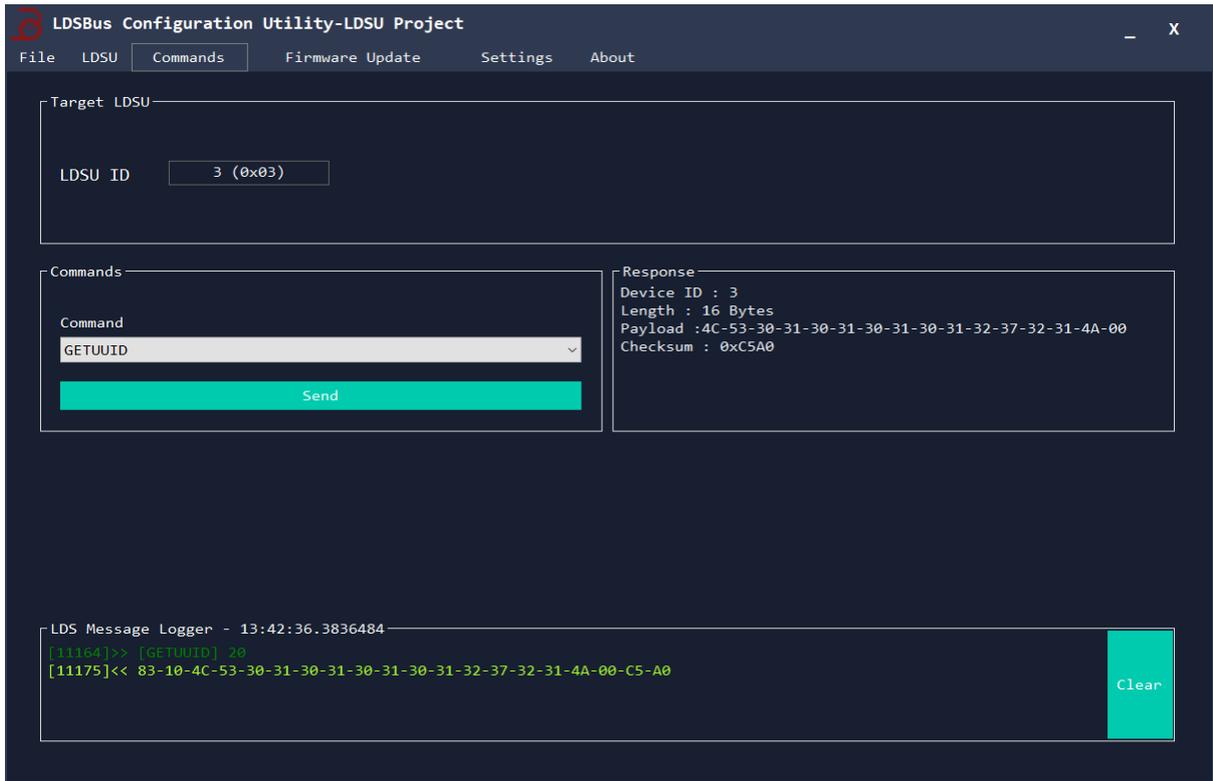
STATUS

This command will get the last sent command status.



GETUUID

This command will get the device's unique UID.



The screenshot displays the 'LDSBus Configuration Utility-LDSU Project' application window. The 'Commands' tab is active, showing a 'Target LDSU' section with 'LDSU ID' set to '3 (0x03)'. Below this, the 'Commands' section has a dropdown menu with 'GETUUID' selected and a 'Send' button. The 'Response' section shows the following output: 'Device ID : 3', 'Length : 16 Bytes', 'Payload : 4C-53-30-31-30-31-30-31-30-31-32-37-32-31-4A-00', and 'Checksum : 0xC5A0'. At the bottom, the 'LDS Message Logger' shows the command '[11164]>> [GETUUID] 20' and the response '[11175]<< 83-10-4C-53-30-31-30-31-30-31-30-31-32-37-32-31-4A-00-C5-A0'. A 'Clear' button is located to the right of the message log.

Appendix B - References

Document References

[LDSBus Configuration Utility User Guide](#)

[LDSBus Python SDK on IDM2040 User Guide](#)

Acronyms and Abbreviations

Terms	Description
LDSU	LDSBus Units
LDSBus	Long Distance Sensor Bus
USB	Universal Serial Bus

Appendix C – List of Figures & Tables

List of Figures

Figure 1 - LDSU Device (Sensors / Actuators) Connection Diagram	6
Figure 2 - LDS Bus - HVT Junction in LDSBus System - Connection Diagram	7
Figure 3 - Setup Wizard – Welcome Screen	8
Figure 4 - Setup Wizard – License Agreement	8
Figure 5 - Setup Wizard – Start Menu Folder Selection	9
Figure 6 - Setup Wizard – Installation Location Selection	9
Figure 7 - Setup Wizard – Installation Progress	10
Figure 8 - Setup Wizard – Installation Complete	10
Figure 9 - LDSBus Configuration Utility Installation Folder location	11
Figure 10 - LDSBus Projects Folder Location	11
Figure 11 - LDSBus Configuration Utility User Interface	12
Figure 12 - Settings Interface	13
Figure 13 - LDSBus USB Adapter Selection	14
Figure 14 - Project Type Selection Menu	14
Figure 15 - LDSU Project Interface	15
Figure 16 - LDSU Project Interface	15
Figure 17 - LDSU Device Settings	16
Figure 18 - Firmware Update - Confirmation	16
Figure 19 - Firmware Update / File Browser Interface	17
Figure 20 - Firmware Update Confirmation Window	17
Figure 21 - Firmware Overwrite Alert Window	18
Figure 22 – Firmware Version Information	18
Figure 23 - Firmware Release Note	19
Figure 24 - Firmware Update Successful Message Window	19
Figure 25 - Firmware Update Unsuccessful Message Window	20
Figure 26 - Firmware Update Error Message Window	20
Figure 27 - LDSU Project - Commands Interface	20
Figure 28 - LDSU Project – Commands List	21
Figure 29 - Sample Command with Response	21
Figure 30 - Sample Command without Response	22
Figure 31 - Save LDSU Project	22
Figure 32 - Default Location to Save LDSU Project	23
Figure 33 - Sample LDSU Project Saved under default location	23
Figure 34 - File - Open Project Menu	24
Figure 35 - File Browser - LDSU Project Selection	25
Figure 36 - LDSU Project Window	25
Figure 37 - Project Type Selection Menu	26
Figure 38 - LDSBus Project Interface	26
Figure 39 - LDSBus Project Interface (LDSU IDs View)	26
Figure 40 - LDSU List Interface	27
Figure 41 - LDSU Information	28
Figure 42 - LDSBus Project - LDSU IDs	29
Figure 43 - LDSBus Right Click Drop Down Menu	29
Figure 44 - LDSBus Dropdown Menu	30
Figure 45 - Drop Down Menu - Firmware Update	30

List of Tables

Table 1 - File Menu Items and Description	13
Table 2 - List of Commands	21

Appendix D – Revision History

Document Title: BRTSYS_AN_001 LDSBus Configuration Utility Guide
 Document Reference No.: BRTSYS_000014
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 Product Page: <https://brtsys.com/resources/software/brtsys-utility-tools>
 Document Feedback: [Send Feedback](#)

Revision	Changes	Date
1.0	Initial release	29-11-2021
1.1	Updated release under BRTSys	27-04-2023
1.2	Updated the document as per version LDSBus Configuration Utility 1.2.0 (Section 6.4 - Added LDSBus right click dropdown menu; Section 6.5 - LDSBus Firmware Upgrade; Section 8.4 - RFID Configuration Setting; Section 8.5 - Soil Sensor Configuration Setting)	29-09-2023
1.3	Updated the document as per version LDSBus Configuration Utility Ver.1.2.1 (Section 8.2 – IO Controller Application Type Configuration – Removed references related to Water Level, Windvane options from AIN; Anemometer and Rain Guage options from DIN; Updated screenshots)	30-11-2023
1.4	Updated release for LDSBus Configuration Utility Ver.1.2.2	08-07-2024
1.5	Updated release for LDSBus Configuration Utility Ver.1.2.4.0	29-12-2025