



iCOMOX

User Manual

Release 2.7.0

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1. Introduction

The iCOMOX is an intelligent condition based monitoring box, used for monitoring industrial assets such as motors, pumps, gas pipes, conveyors and more. It enables displaying all data acquired by the board's sensors while performing a basic signal processing analysis. In addition, the iCOMOX Monitor GUI application displays data statistics and an acquisition plan.

The iCOMOX system (refer to Figure 1: The iCOMOX and the Monitor GUI) comprises the following components:

1. iCOMOX – Mounted on the monitored equipment.
2. USB Cable – Connects the iCOMOX to one of the USB ports of a PC for wired communication and power supply.
3. The iCOMOX Monitor GUI application – Installed and run on a PC, provides a Graphical User Interface (GUI) for communicating with the iCOMOX.

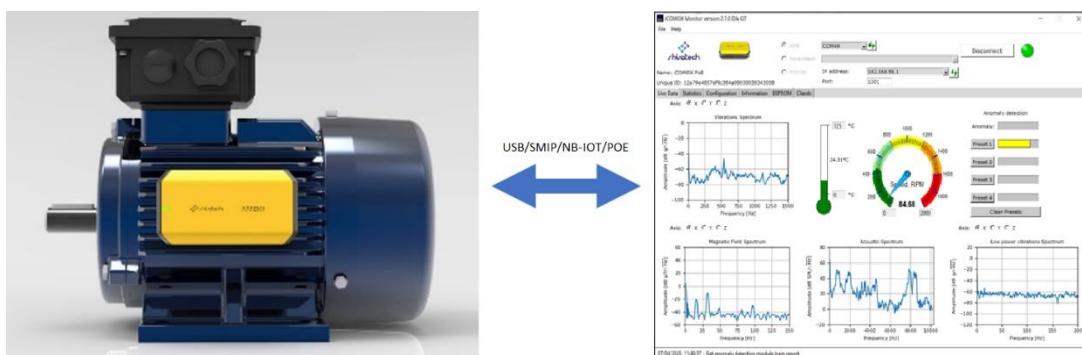


Figure 1: The iCOMOX and the Monitor GUI

After installing the iCOMOX Monitor and connecting the iCOMOX to the Monitor using the USB-C cable, live data from the sensors is streamed to the Monitor, processed using Fast Fourier Transform, and presented on the screen.

In the Statistics view, the moving average of each sensor is computed together with its standard deviation and its maximal and minimal value.

In the Configuration view, you can select the sensors whose data require being displayed. In addition, you can schedule the acquisition as either continuous, or at a specified frequency.

2. Overview

2.1 iCOMOX SMIP

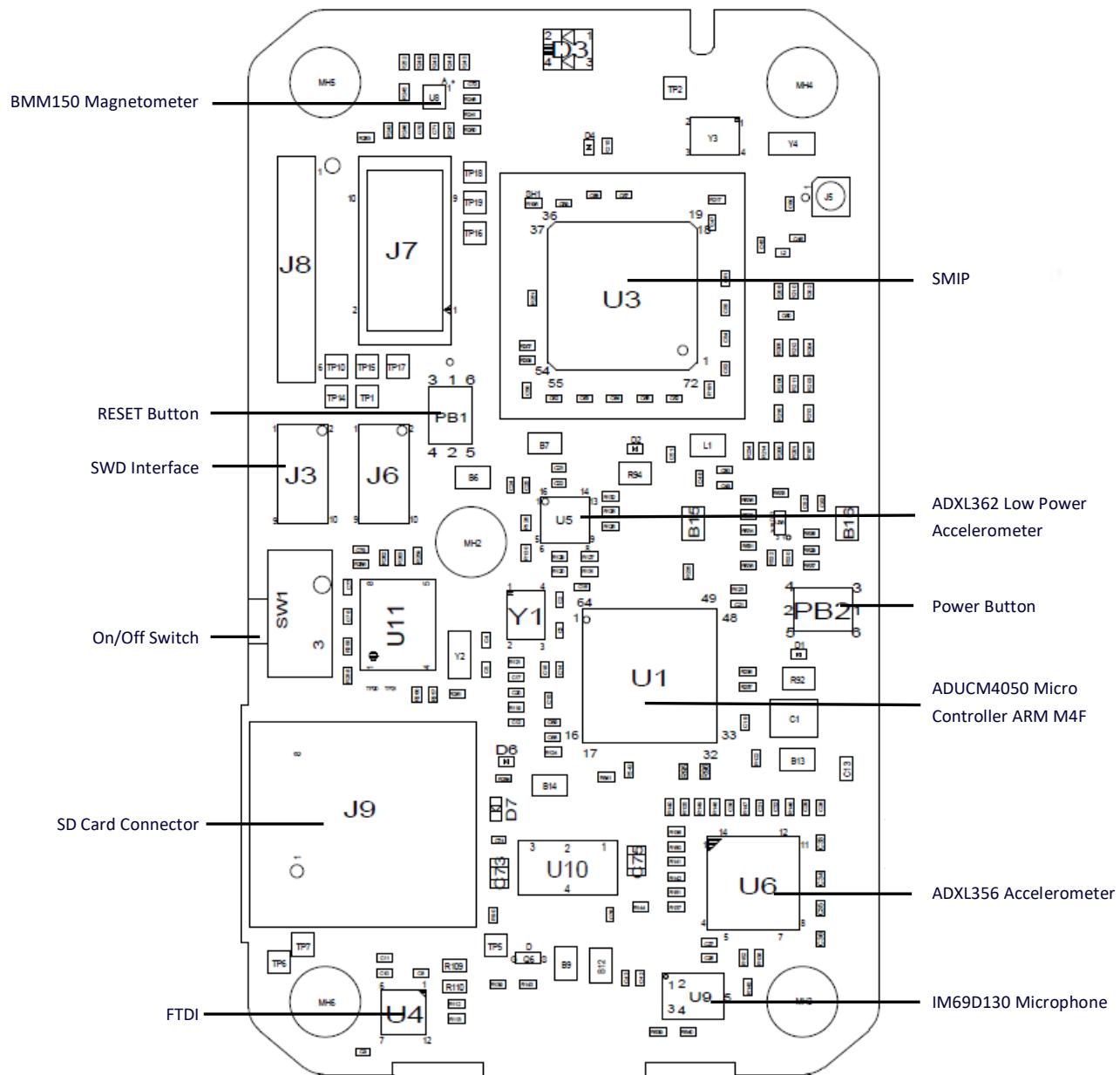


Figure 2: iCOMOX SMIP overview

2.2 iCOMOX NB-IOT

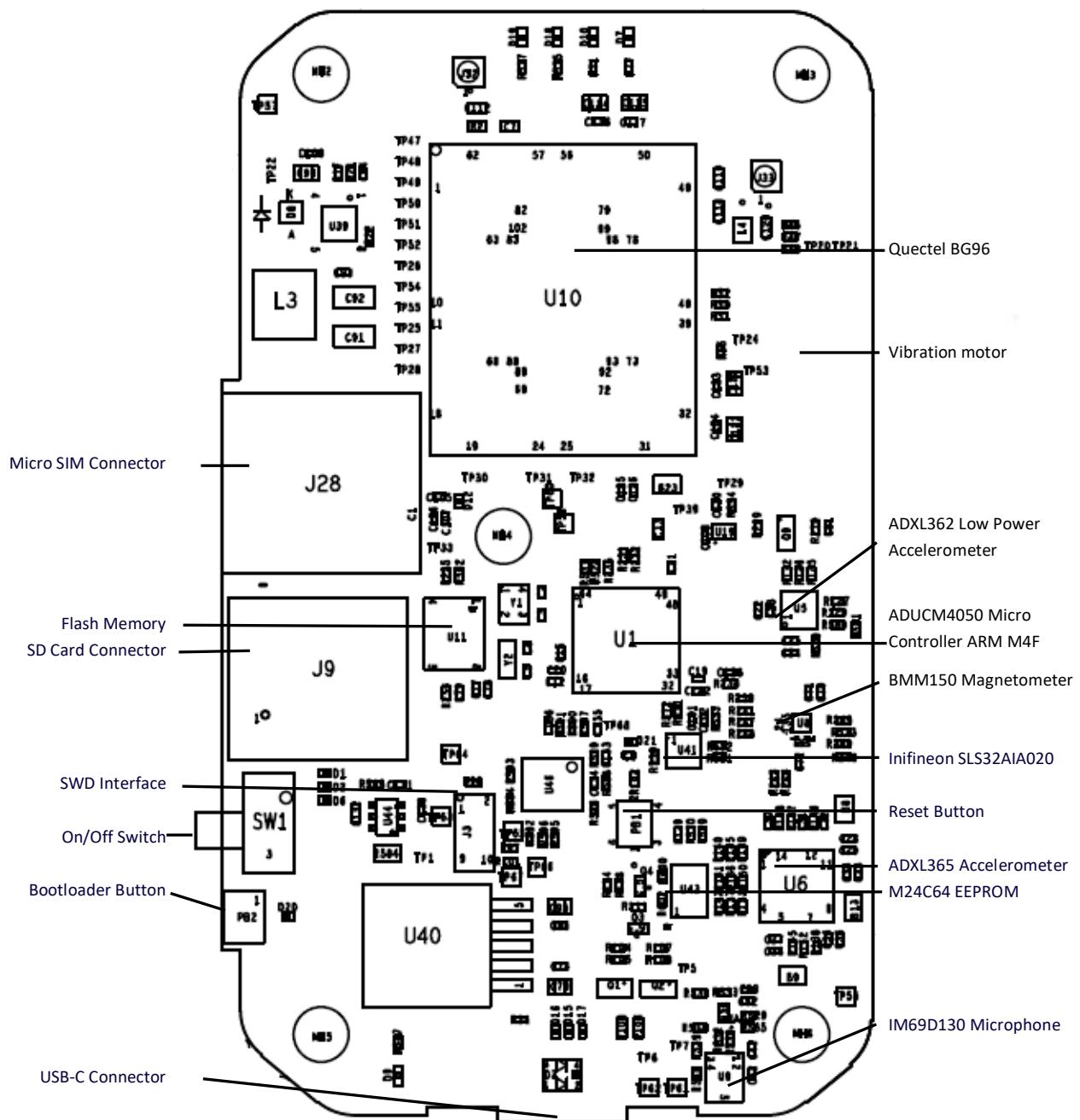


Figure 3: iCOMOX NB-IOT overview - front

2.3 iCOMOX POE

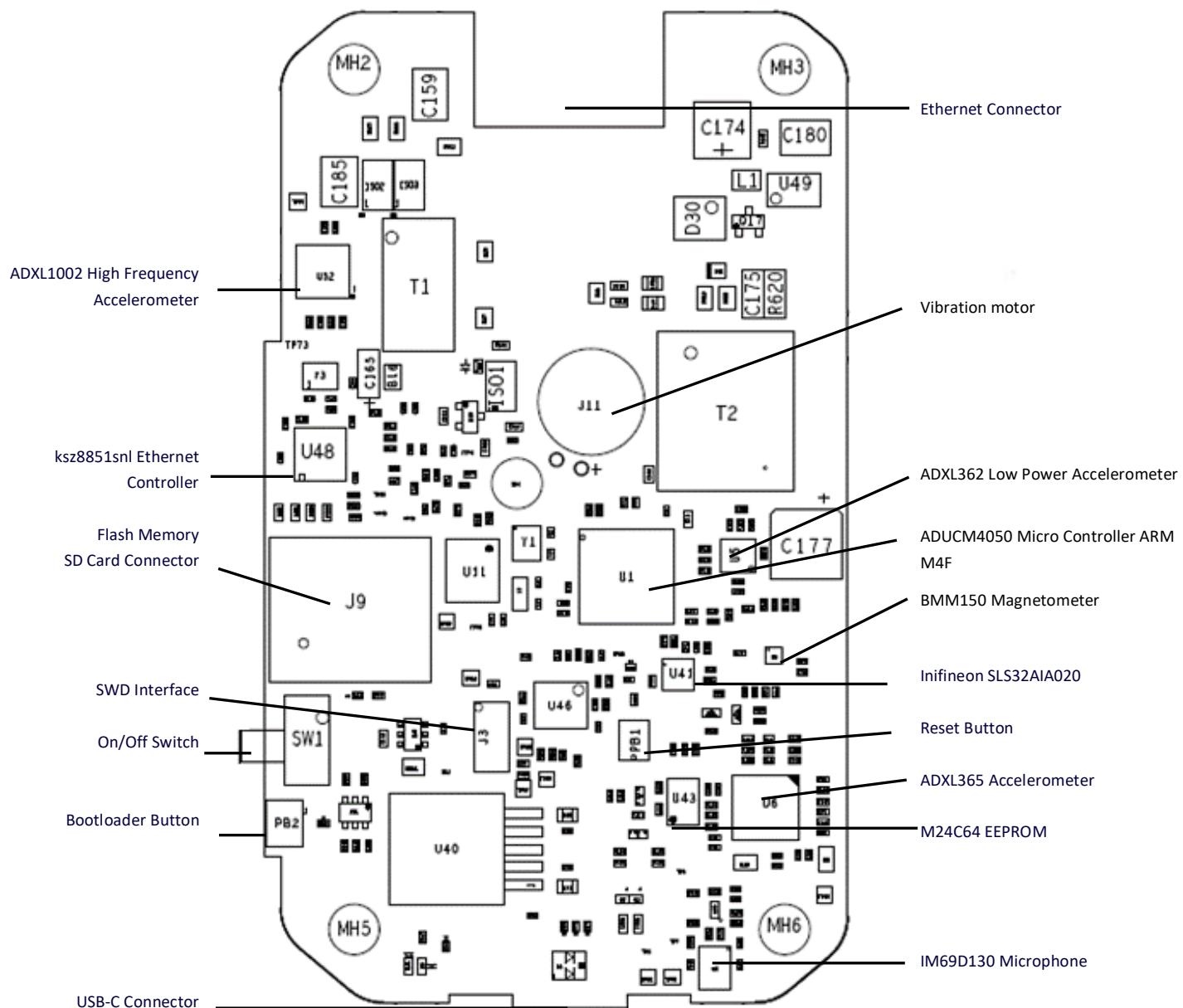
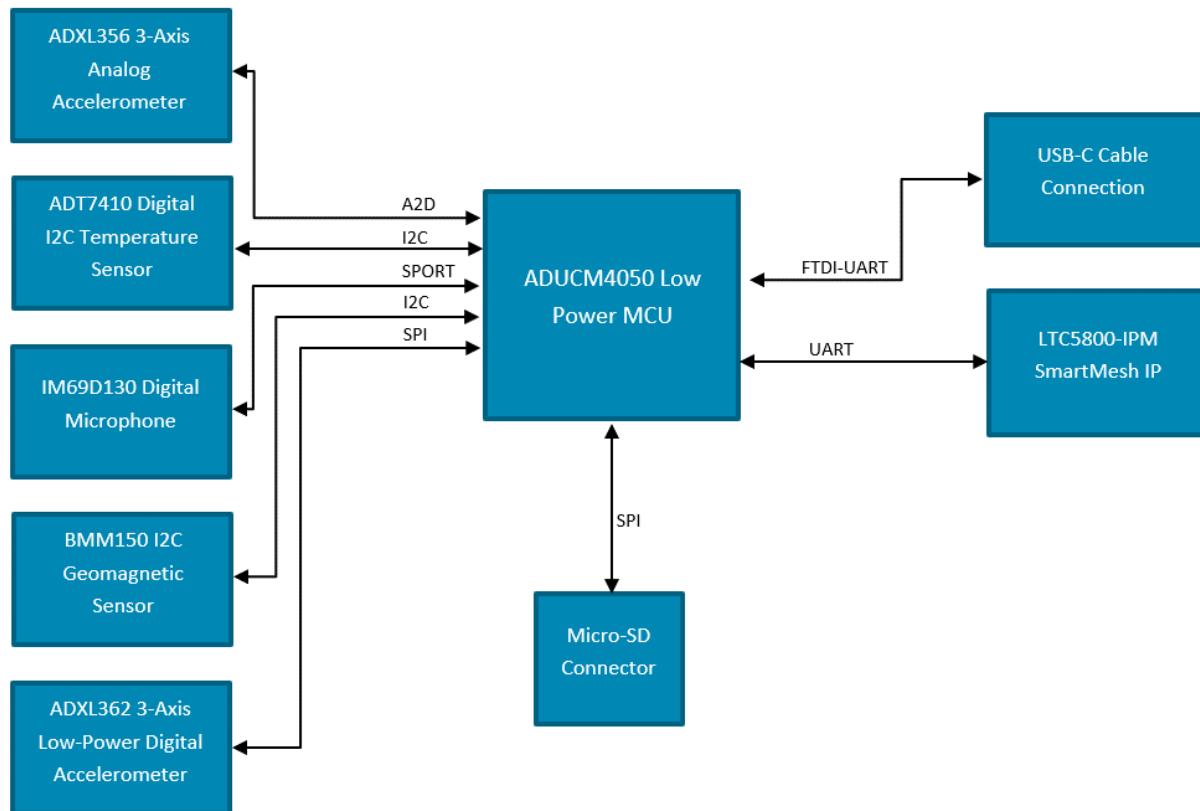


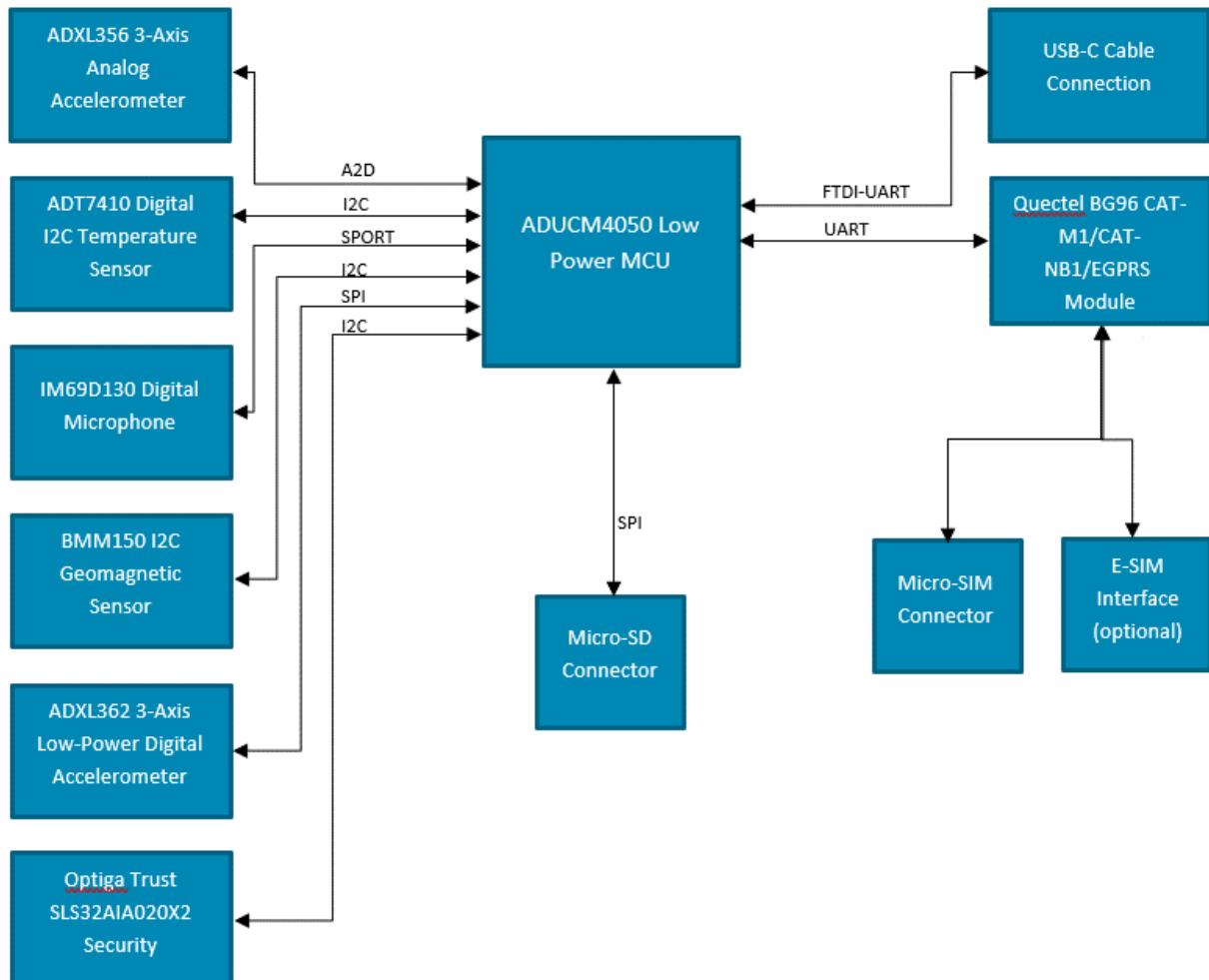
Figure 4: iCOMOX POE overview - front

3. Block Diagram

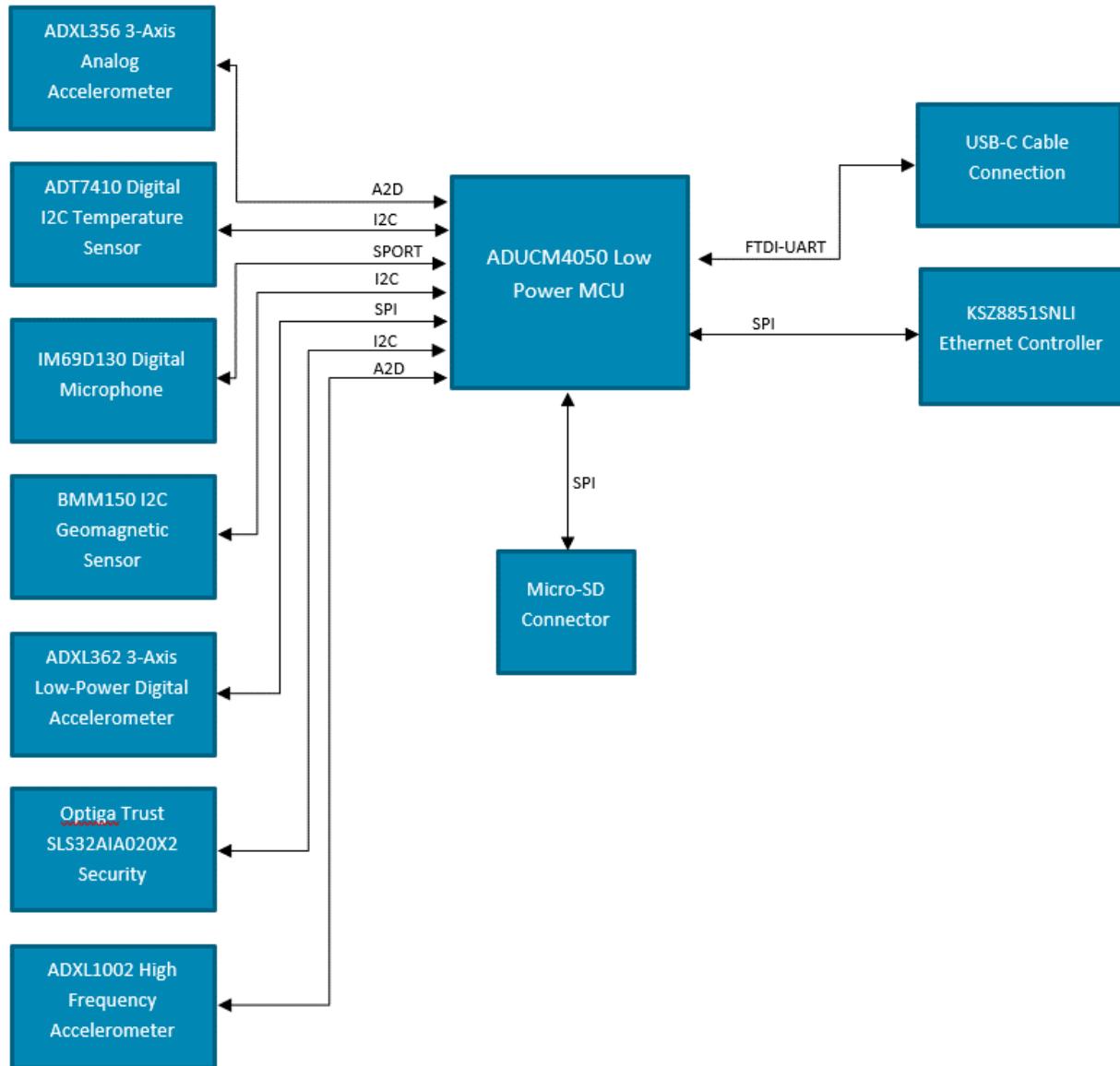
3.1 iCOMOX SMIP Block Diagram



3.2 iCOMOX NB-IOT Block Diagram



3.3 iCOMOX POE Block Diagram



4. Data Flow

Using iCOMOX SMIP requires the on-site installation of a SMIP gateway, performing SMIP manager functionality, and implementing the communication with the iCOMOX SMIP (mote functionality). The gateway sends the data to a local or remote server over TCP/IP.

Using iCOMOX NB-IOT requires the use of a SIM card with a data plan. The data is transmitted over TCP/IP to the remote server (port forwarding should be implemented on the remote network router).

iCOMOX POE connects to a local TCP/IP network using a standard POE switch. Connection to remote servers or cloud services requires a local TCP/IP gateway.

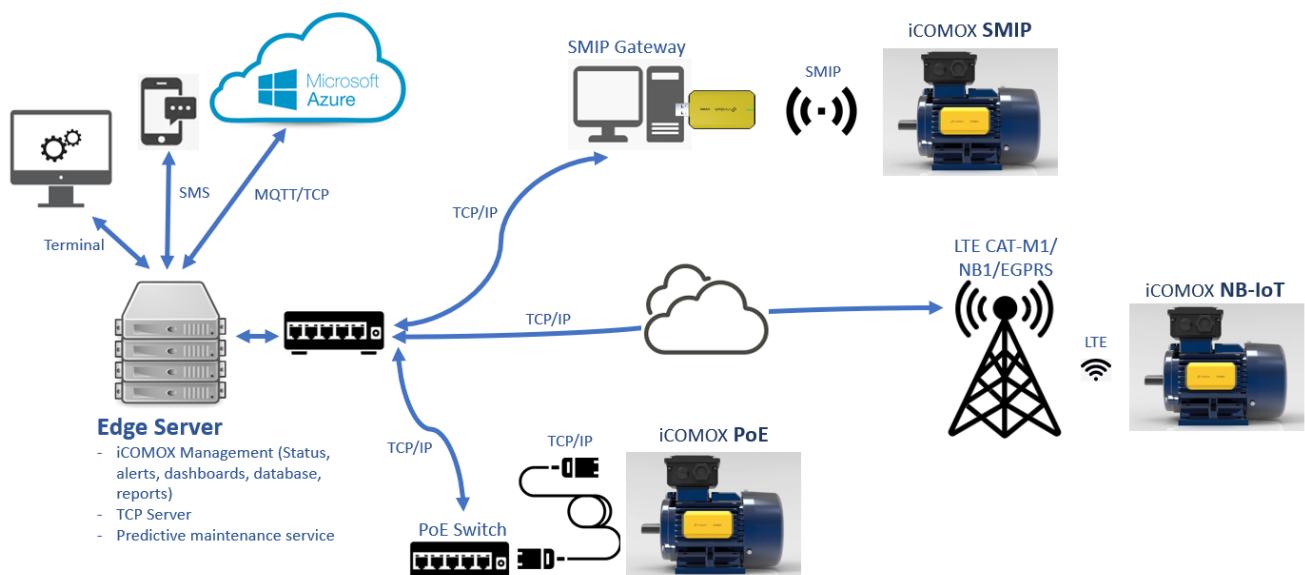


Figure 5: The iCOMOX data flow

5. Quick Start

In this Quick Start guide we will perform the following main phases:

1. Start with [downloading and flashing the latest firmware version](#).
2. [Install the iCOMOX Monitor](#) GUI software on your PC.
3. Connect to the iCOMOX using the [USB-C cable connection](#).



Note: The USB-C connection process is identical for all iCOMOX types.

4. Connect to the iCOMOX using the auxiliary connection channel:

- [SMIP](#)
- [TCP/IP over NB-IOT](#)
- [TCP/IP over Ethernet](#)



Note: For the PC to correctly recognize the iCOMOX, the FTDI driver must be installed. For FTDI driver installation instructions, refer to [Appendix A: FTDI D2XX Driver](#).

5.1 Connecting with the USB Cable

To connect with the USB cable, perform the following steps (identical to all iCOMOX types):

1. Connect the iCOMOX to the Windows PC using the USB-C cable.
2. Turn on the iCOMOX by sliding the slide switch on the iCOMOX (see chapter 6 -[Connecting the iCOMOX Kit](#)).
3. The iCOMOX LED will illuminate in orange and the board will vibrate for 2 seconds, indicating that the built-in test is in progress. Once completed, the iCOMOX LED will be illuminated in green, signaling that the iCOMOX has loaded successfully. If a hardware malfunction has been detected, the LED will illuminate in red (refer to the [Troubleshooting](#) section).
4. Launch the Device Manager and note which COM port represents the iCOMOX.
5. Launch the iCOMOX Monitor (when installation is required, refer to chapter 8.2 -[Monitor Installation Instructions](#)). Monitor Launch can take up to 40 seconds.
6. In the Communication panel, select the USB communication mode.
7. From the COM port drop-down menu, select the suitable COM port (refer to step 4).

 **Note:** If the COM port drop-down menu is empty, click on the refresh button next to the COM port drop-down list, and repeat from Step 6.

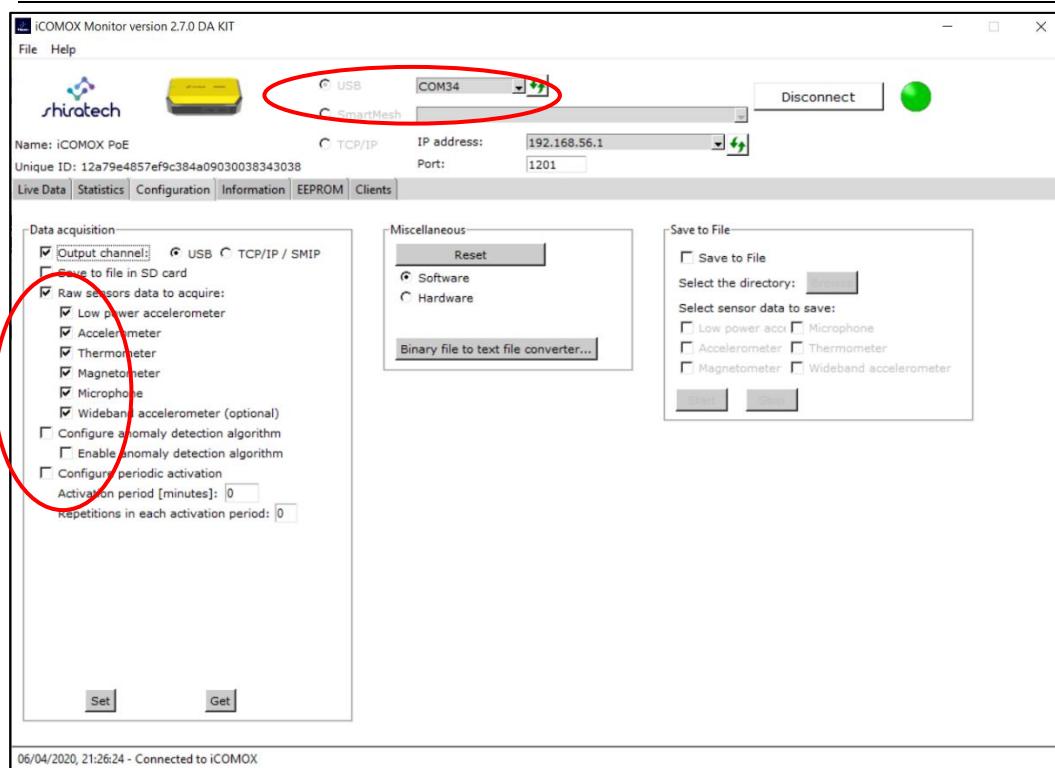


Figure 6: The iCOMOX Monitor Configuration tab

8. Click the Configuration tab and from the Configuration view, select the sensor data to be acquired, and select the USB sensors output channel.
9. Click Connect.



Note: After clicking the Connect button, the Monitor establishes communication with the iCOMOX. The Colored Status Indicator color changes, as described in the following table.

Status Indicator Color	Significance
Red	Disconnected
Yellow	Trying to establish wired communication with the iCOMOX.
Green	Wired communication established.

Table 1: The Colored Status Indicator color table – USB connection



Note: 5-10 seconds after the iCOMOX Monitor software Colored Status Indicator turns green, the signals from the sensors appear on the plots. The green LED on the iCOMOX device blinks repeatedly when data is transferred from the iCOMOX to the PC. When data is not transferred, the green iCOMOX LED does not blink.

10. Verify the following, which signifies that the connection has been established successfully:

- The Colored Status Indicator is green.
- The Status Bar displays the “Connected to iCOMOX” message.
- The iCOMOX green LED should repeatedly toggle on and off.



Figure 7: The iCOMOX Monitor Live Data tab

11. Verify that live data is displayed, in accordance with the sensors selected in Step 8.

5.2 Connecting to the iCOMOX SMIP using the SmartMesh

To connect with the SmartMesh, perform the following steps:

1. Connect the iCOMOX dongle (SMIP) to the PC to prepare for SmartMesh IP (SMIP) communication mode.
2. Turn on the iCOMOX by sliding the slide switch on the iCOMOX (see the [Connecting the iCOMOX Kit](#) chapter).
3. The iCOMOX LED will illuminate in orange and the board will vibrate for 2 seconds, indicating that the built-in test is in progress. Once completed, the iCOMOX LED will be illuminated in green, signaling that the iCOMOX has loaded successfully. If a hardware malfunction has been detected, the LED will illuminate in red (refer to the [Troubleshooting](#) section).
4. Launch the Device Manager. You should note four different and consecutive COM ports which represent the dongle.
5. Launch the iCOMOX Monitor (when installation is required, refer to the [Monitor Installation Instructions](#)). Monitor Launch can take up to 40 seconds.
6. In the Configuration view, select the sensor data to be acquired, and select the TCP/IP SMIP output channel.

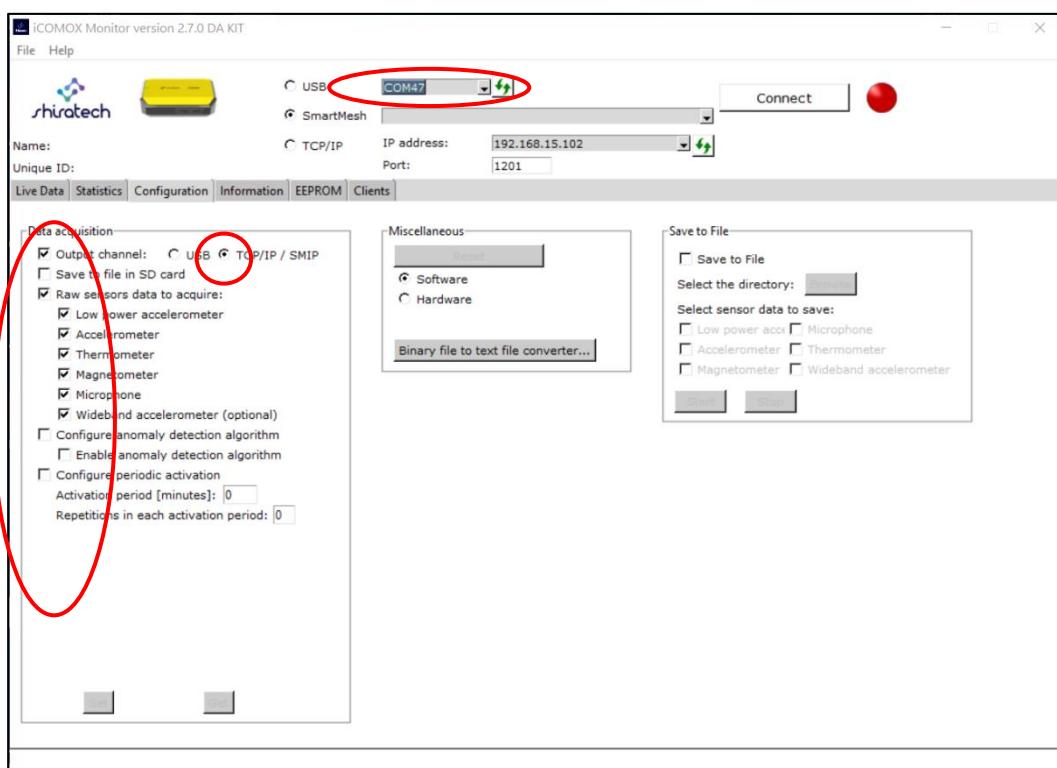


Figure 8: The iCOMOX Monitor Configuration tab

7. In the Communication panel, select the USB communication mode.
8. Open the drop-down menu. Four different COM ports should appear.
9. Select the highest numbered COM port.
10. In the Communication panel, select the SmartMesh option.



Figure 9: The iCOMOX Monitor Communication panel

11. Click Connect.



Note: After clicking the Connect button, an attempt to establish communication between the PC and the dongle will be initiated. The Colored Status Indicator color changes, as described in the following table.

Status Indicator Color	Significance
	Disconnected
	Communication is established between the PC and the dongle.
	Wireless communication with a recognized iCOMOX was established.

Table 2: The Colored Status Indicator color table – SMIP connection



Note: 5-10 seconds after the Colored Status Indicator turns green, the signals from the sensors appear on the plots. The green iCOMOX LED blinks repeatedly when data is transferred from the iCOMOX to the PC. When data is not transferred, the green iCOMOX LED does not blink.

12. Verify that the Status Bar informs that the dongle list was updated.

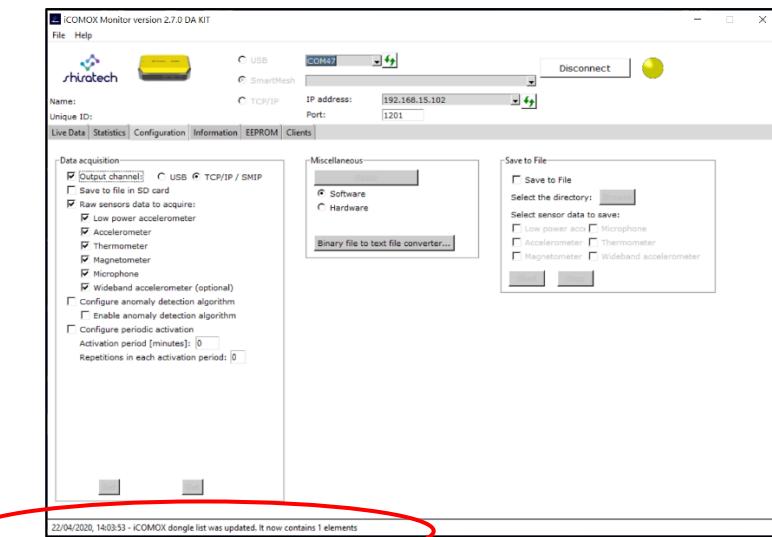


Figure 10: The dongle list was updated

Figure 8: The Monitor's Status Bar indication of the dongle recognizing the iCOMOX SMIP When the Status Bar displays "1 element", click the drop-down menu next to the SmartMesh button, and select the mote.



Note: After a dongle has been selected, data should start flowing to the Monitor. When a message from the iCOMOX SMIP is received by the dongle, the Colored Status Indicator turns green.

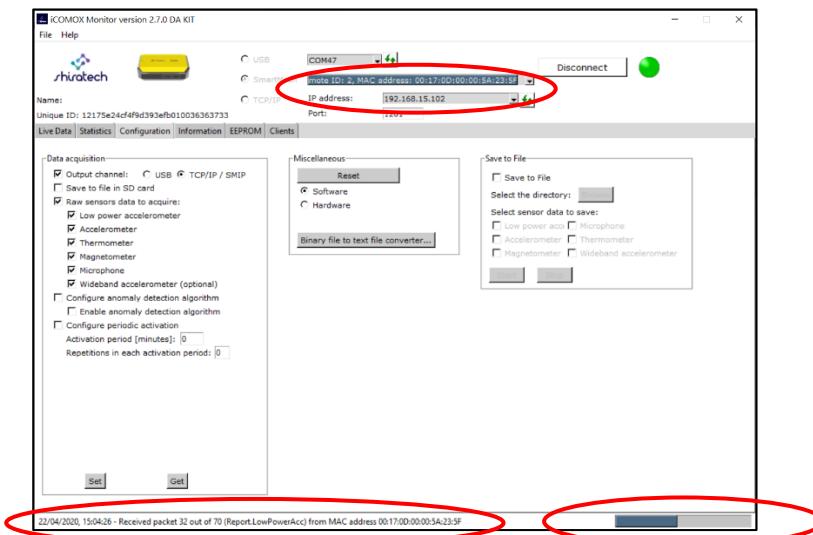


Figure 11: Mote selection and data transfer

13. Verify that the panels selected in the Configuration tab display the received data and the Status Bar informs as to the received data packets. Every green iCOMOX LED blink represents a data packet which has been sent.



Note: The LED's regular toggle rate can be as low as a single blink every 3 minutes, depending on the selected sensors configuration.

5.3 Connecting the iCOMOX NB-IOT to a TCP Server Over NB-IOT

To connect over TCP-IP, perform the following steps:



Note: The iCOMOX Monitor includes the TCP/IP server used to communicate with the iCOMOX NB-IOT over **NB-IOT TCP-IP connection**. Therefore, prior to starting the **NB-IOT TCP-IP connection** quick start chapter, **port forwarding** must be configured, to allow the iCOMOX NB-IOT to access the PC running the TCP/IP server, as part of the iCOMOX Monitor. Please consult your IT services provider to safely enable the iCOMOX NB-IOT to communicate with a machine located inside your Local Area Network.

1. On the TCP Server machine, Launch the iCOMOX Monitor (when installation is required, refer to the [Monitor Installation Instructions](#) chapter). Monitor Launch can take up to 40 seconds.
2. Program the APN settings, and the TCP server IP address and port to the iCOMOX NB-IOT EEPROM (see the [Programming the EEPROM](#) chapter).
3. If not already on, turn on the iCOMOX by sliding the slide switch on the iCOMOX (see the [Connecting the iCOMOX NB-IOT Kit](#) chapter).
4. The iCOMOX LED will illuminate in orange and the board will vibrate for 2 seconds, indicating that the built-in test is in progress. Once completed, the iCOMOX LED will be illuminated in green, signaling that the iCOMOX has loaded successfully. If a hardware malfunction has been detected, the LED will illuminate in red (refer to the [Troubleshooting](#) section).
5. In the Communication panel, select the TCP/IP communication mode.
6. Open the drop-down menu, and configure the server listening IP address, then type the server listening port number in the nearby text field.
7. Click Connect.



Note: After clicking the Connect button, the TCP/IP server is now listening for client connections. The Colored Status Indicator color changes, as described in the following table.

Status Indicator Color	Significance
	Disconnected
	Listening for client connections.
	TCP/IP communication established. At least one iCOMOX client is connected to the server.

Table 3: The Colored Status Indicator color table
– TCP/IP connection

8. When switched on, the iCOMOX NB-IOT is continuously attempting to connect to the server. It may take up to 3 minutes for a single TCP/IP connection attempt, depending on network conditions. In case that the iCOMOX-NBIOT client does not connect to the server after 6 minutes, please refer to the [Troubleshooting](#) section.

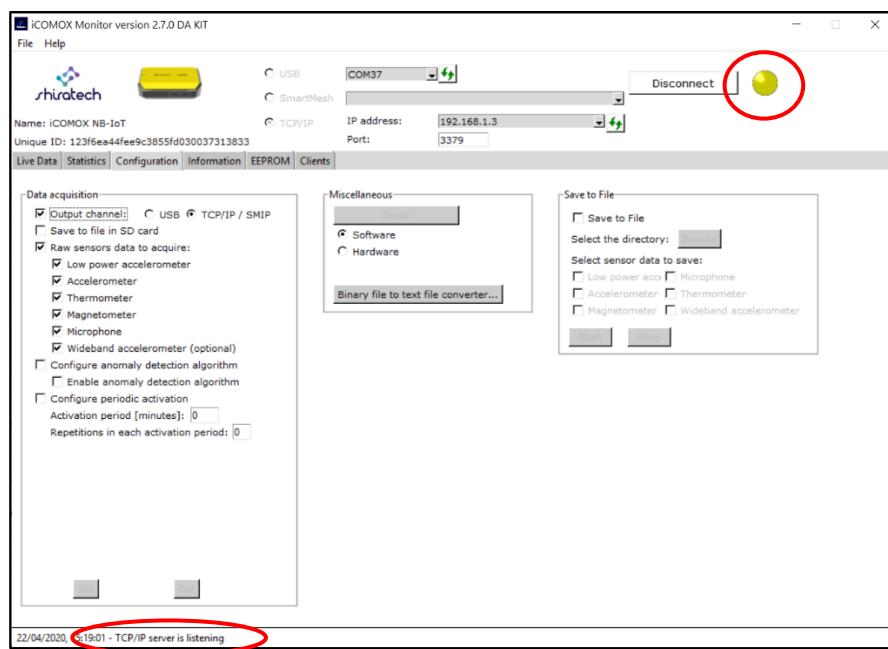


Figure 12: TCP/IP server is listening for client connections

9. When the iCOMOX NB-IOT client is connected, the Colored Status Indicator will change to green, the status bar will display 'iCOMOX connected via the TCP/IP socket' and a row will be added to the clients table in the Clients tab. Select the client from the Clients table.

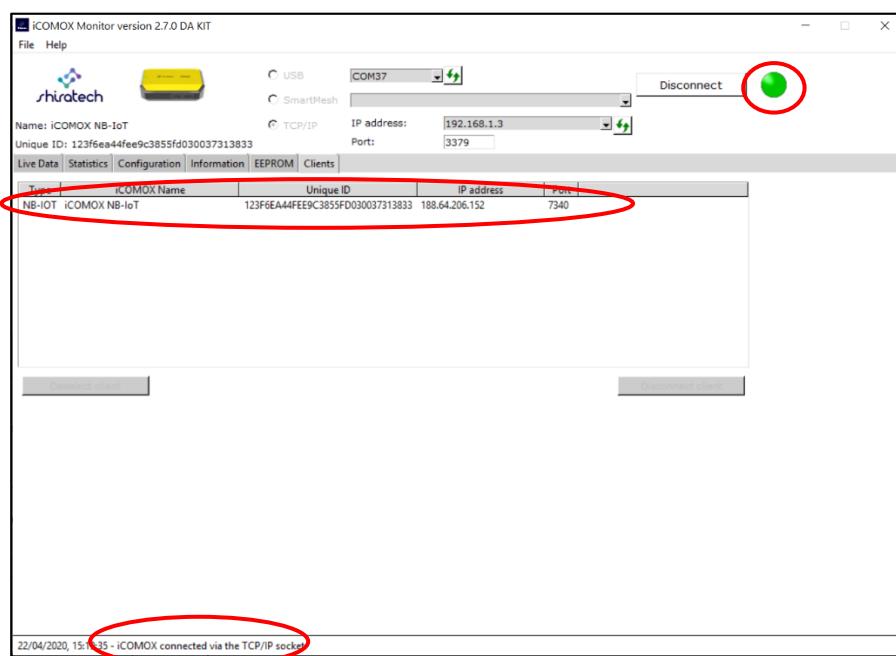


Figure 13: An iCOMOX NB-IOT client appears on the clients table

10. Switch to the iCOMOX Monitor's Configuration view, select the sensor data to be acquired, select the TCP/IP sensors output channel, and click on the 'Set' button.

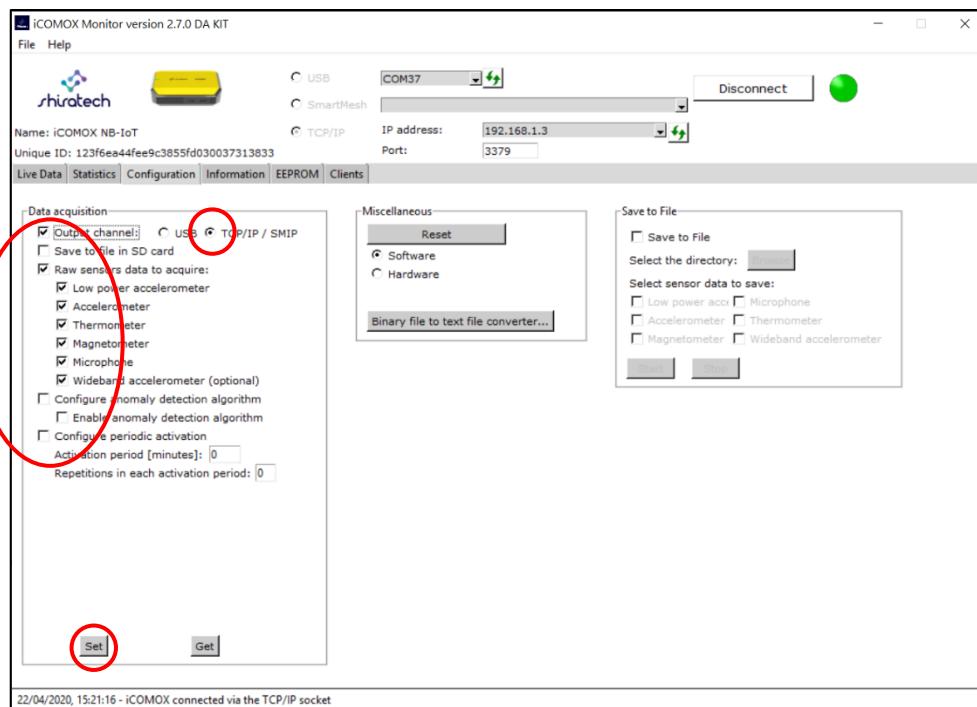


Figure 14: The Monitor Configuration tab

11. Verify that live data is displayed, in accordance with the sensors selected in the previous step.



Note:

- In case no SD card is inserted to the iCOMOX, make sure to un-check the 'Save to file in SD card' checkbox. Leaving the checkbox checked will stop sensor data from being sent.
- The green iCOMOX LED blinks repeatedly when data is transferred from the iCOMOX to the server. When data is not transferred, the green iCOMOX LED does not blink.

5.4 Connecting the iCOMOX POE to a TCP Server Using TCP Over Ethernet

To connect over TCP-IP, perform the following steps:

1. On the TCP Server machine, Launch the iCOMOX Monitor (when installation is required, refer to the [Monitor Installation Instructions](#) chapter). Monitor Launch can take up to 40 seconds.
2. Program the required network settings to the EEPROM (see the [Programming the EEPROM](#) chapter).
3. If not already on, turn on the iCOMOX by sliding the slide switch on the iCOMOX (see the [Connecting the iCOMOX POE Kit](#) chapter).
4. The iCOMOX LED will illuminate in orange and the board will vibrate for 2 seconds, indicating that the built-in test is in progress. Once completed, the iCOMOX LED will be illuminated in green, signaling that the iCOMOX has loaded successfully. If a hardware malfunction has been detected, the LED will illuminate in red (refer to the [Troubleshooting](#) section).
5. In the Communication panel, select the TCP/IP communication mode.
6. Open the drop-down menu, and configure the server listening IP address, then type the server listening port number in the nearby text field.



Note: In case the iCOMOX POE is connected to a network external to your Local Area Network, the IP address and port must be accessible from outside your server's Local Area Network, using port forwarding. Firewall settings should also be configured to enable communication through the selected port.

7. Click Connect.



Note: After clicking the Connect button, the TCP/IP server is now listening for client connections. The Colored Status Indicator color changes, as described in the following table.

Status Indicator Color	Significance
	Disconnected
	Listening for client connections.
	TCP/IP communication established. At least one iCOMOX client is connected to the server.

Table 4: The Colored Status Indicator color table
– TCP/IP connection

8. When switched on, the iCOMOX POE is continuously attempting to connect to the server. It may take up to 10 seconds for a single TCP/IP connection attempt, depending on network conditions. In case that the iCOMOX POE client does not connect to the server after 30 seconds, please refer to the [Troubleshooting](#) section.



Figure 15: TCP/IP server is listening for client connections

9. When the iCOMOX POE client is connected, the Colored Status Indicator will change to green, the status bar will display ‘iCOMOX connected via the TCP/IP socket’ and a row will be added to the clients table in the Clients tab. Select the client from the Clients table.

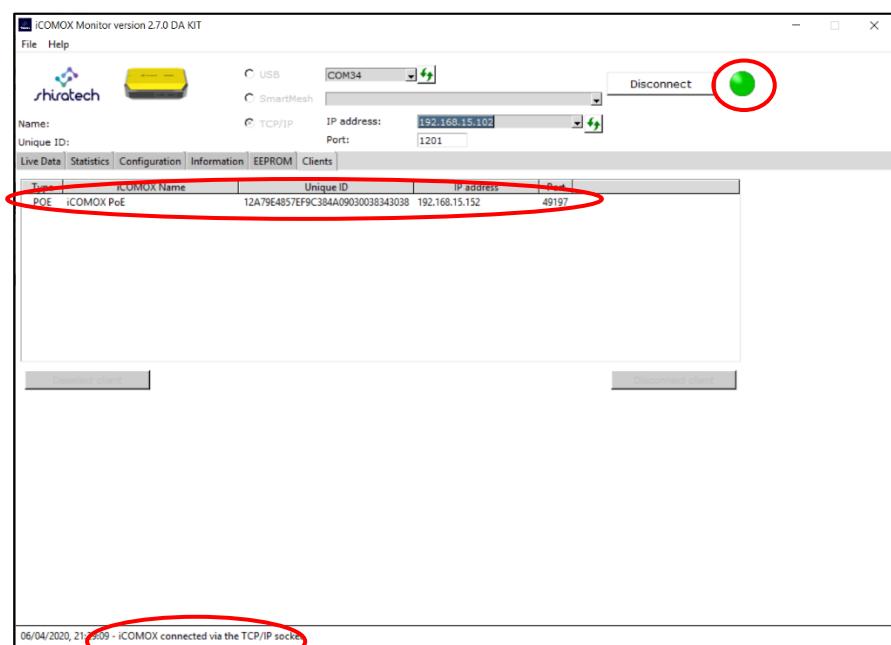


Figure 16: An iCOMOX POE client appears on the clients table

10. Switch to the iCOMOX Monitor's Configuration view, select the sensor data to be acquired, select the TCP/IP sensors output channel, and click on the 'Set' button.

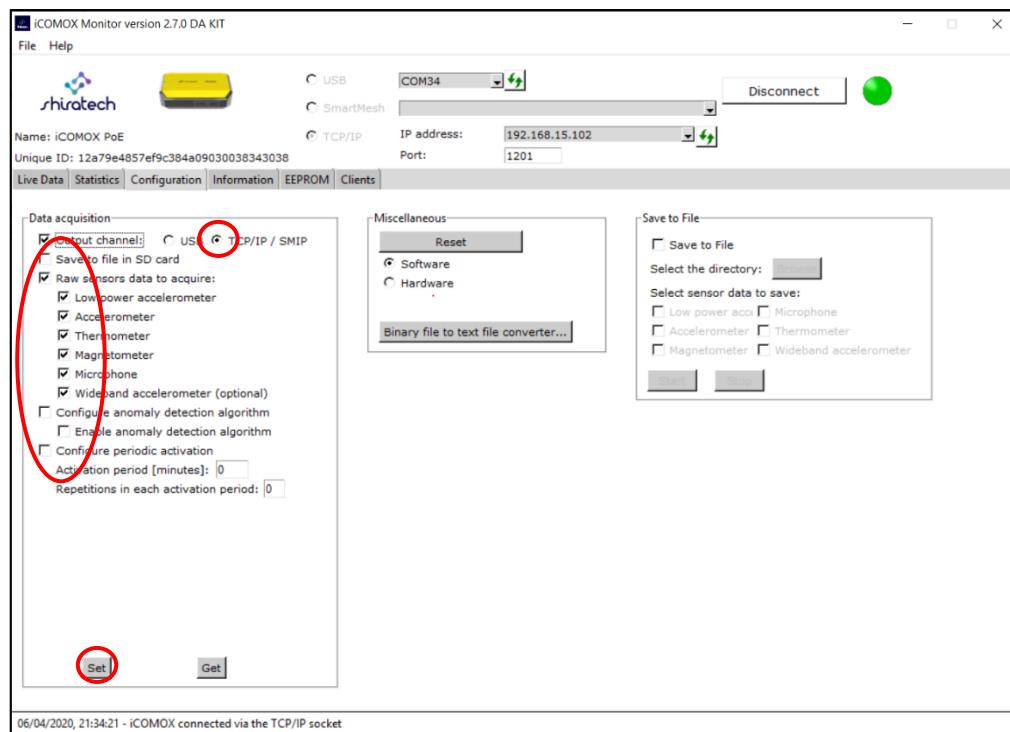


Figure 17: The Monitor Configuration tab

11. Verify that live data is displayed, in accordance with the sensors selected in the previous step.



Note:

- In case no SD card is inserted to the iCOMOX, make sure to un-check the 'Save to file in SD card' checkbox. Leaving the checkbox checked will stop sensor data from being sent.
- The green iCOMOX LED blinks repeatedly when data is transferred from the iCOMOX to the server. When data is not transferred, the green iCOMOX LED does not blink.
- In case the iCOMOX POE and the Monitor TCP /IP Server do not reside on the same Local Area Network, **port forwarding** must be configured, to allow the iCOMOX POE to access the PC running the TCP/IP server, as part of the iCOMOX Monitor. Please consult your IT services provider to safely enable the remote iCOMOX POE to communicate with a machine located inside your Local Area Network.

6. Anomaly Detection

Anomaly detection algorithm allows the user to configure up to 4 different preset states to be learned by the algorithm, then consequently receive reports on anomalies which are displayed as relative deviations from these preset states.

Once one or more preset states are configured, the bars next to each preset state display the relative similarity of the current sensor data state to the corresponding preset state.

To configure and use the anomaly detection algorithm, follow this example:

1. Connect and start running your device in either USB or TCP/IP over Ethernet mode sending a set configuration command with the ‘Configure anomaly detection algorithm’ and the ‘Enable anomaly detection algorithm’ checkboxes checked.
2. In case you would not wish to send a new set configuration command, you may click on the ‘Clear Presets’ button in order to initialize the anomaly detection module. A ‘Get anomaly detection module report error 3’ error message will appear in the status bar – this is normal and indicates that no state has yet been trained.
3. Bring your monitored equipment to a regular work state. In this example we will use a simple 3-phase motor. We bring our motor to 85rpm.
4. To allow the algorithm to learn the current motor state, click on the ‘Preset 1’ button. The bar next to the button will start to fill up in yellow, and ‘Get anomaly detection module train report’ will appear in the status panel, indicating that the learning is currently in progress.



Figure 18: Preset Training in Progress

5. Once learning of the state is completed, we expect to see a full green bar next to preset 1, indicating that the current sensor data state resembles preset 1 in 100% (relative to the other presets. Since there are no other presets, there is a 100% resemblance), and an empty anomaly bar, indicating that no anomaly is currently detected.
6. Next, we will increase the speed to 155 rpm. The Anomaly bar will fill up in red, indicating that a deviation from the preset was detected:

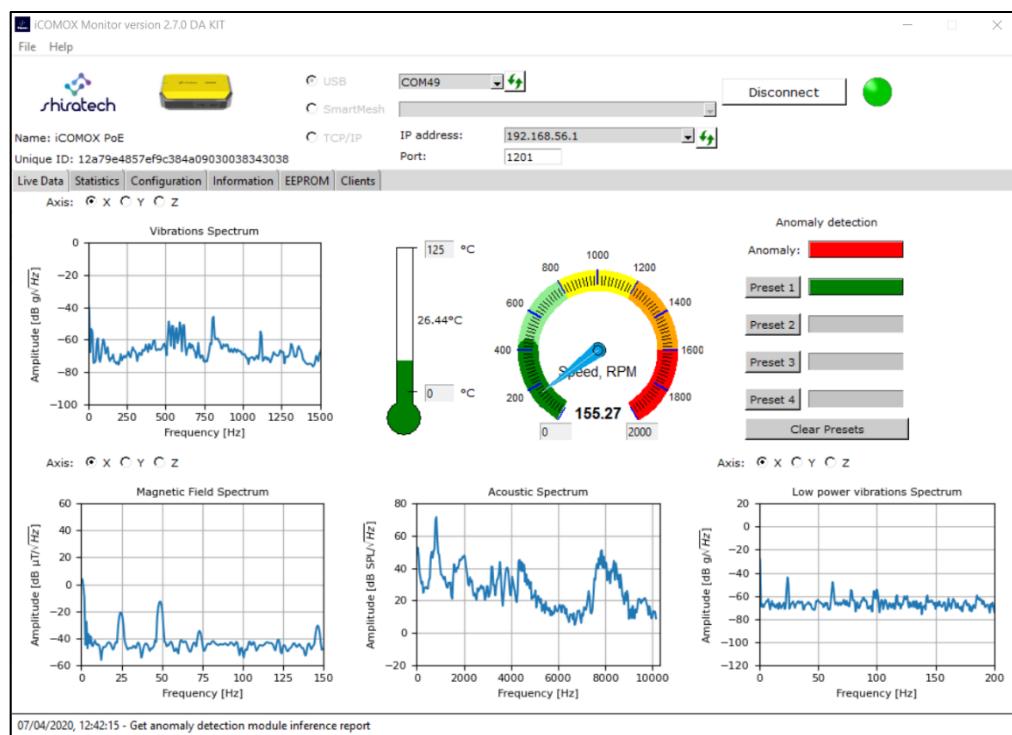


Figure 19: Anomaly Detected

7. Assuming that the preset state defined is described as 'normal operation' state, and assuming that 155 rpm is also a part of the normal state, we can define it as such by clicking again on the preset 1 button.
 8. After training is completed, we expect the bar next to preset 1 to be green, and the anomaly bar to be empty. Now both of the two working states (85 rpm and 155 rpm) are associated with preset 1.
 9. You may use the 3 other presets to define additional working modes for your equipment (for example, driving a different load).
 10. To stop using the module, go to the configuration tab, check the 'Configure anomaly detection algorithm' checkbox, and un-check the 'Enable anomaly detection algorithm' checkbox, then click on 'Set'.
- Clicking on 'Clear Presets' does not stop the module's operation. It clears all trained presets and re-initializes the module.

7. Saving Data to SD Card

7.1 Supported SD Card Formats

- The iCOMOX Supports VBR (Volume Boot Record).
- FAT and FAT32 (rev 0.0) file systems are supported.
- Sector sizes of 512 1024 2048 and 4096 bytes are supported.
- Minimum supported volume size: 128 sectors
- Maximum volume size: 4294967295 ($2^{32} - 1$) sectors for FAT and FAT32.

7.2 Save Instructions

- Back-up any information of any importance located on the SD card, as it may be overwritten.
- Navigate to the configuration tab, and select the “Save to file in SD card” check-box.
- Connect to the iCOMOX, to start acquiring data (for detailed instructions on connecting the iCOMOX, please refer to the [Quick Start](#) chapter).
- In case a binary file cannot be created, the iCOMOX will not send any reports, and an error message will appear in the status bar: “Error in saving file to SD card”.

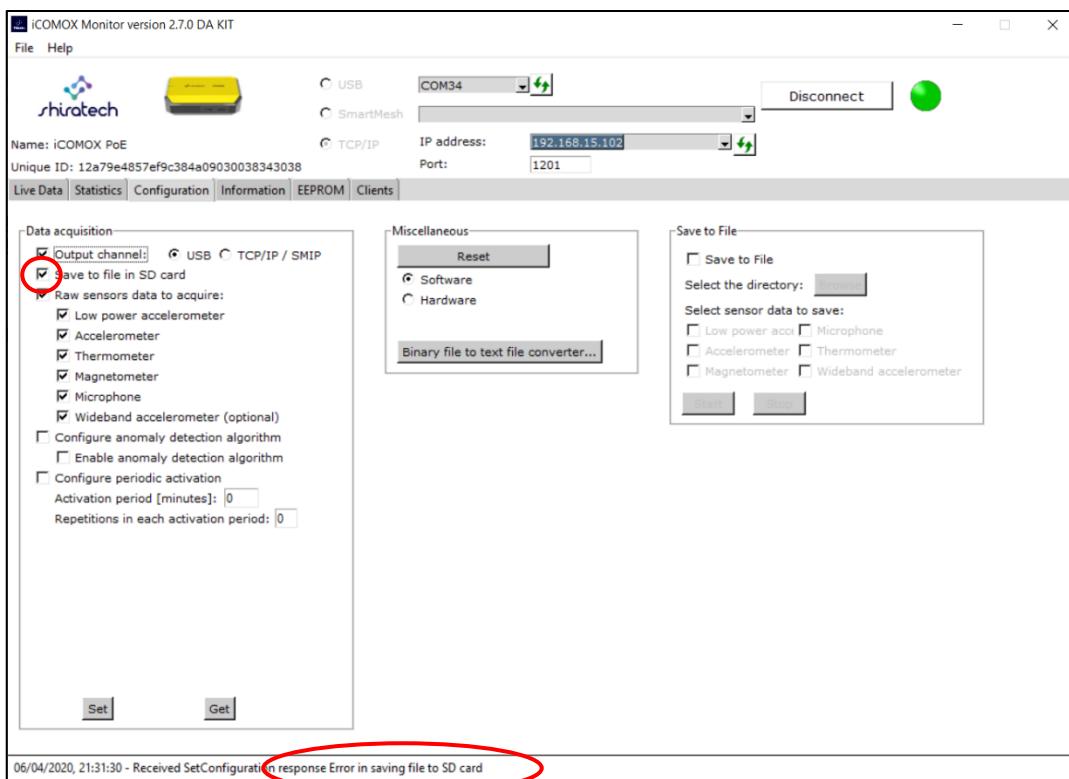


Figure 20: Save to file in SD card, and error message.

- Please refer to the [troubleshooting](#) section to resolve the cause of the error, then, after the error is resolved, click Disconnect and then Connect, to resume acquiring data.
- To finish saving the data to SD card, uncheck the ‘Save to file in SD card’ checkbox and click ‘Set’.

7.3 Binary File Format

The binary file header contains the following information:

- binary file type format
- iCOMOX board type (SMIP/NB-IOT/POE)
- iCOMOX board version
- MCU serial number
- Firmware release version
- Firmware build version

The rest of the file contains the various sensors' binary report messages, without modification, as received by the Monitor.

7.4 Conversion to Text Format

1. Switch to the Configuration tab, uncheck the 'Save to file in SD card' checkbox and click 'Set' to finish acquiring data.
2. Extract the SD card from the iCOMOX, and insert it to the PC.



Note: A 'Set' command with an un-checked 'Save to file in SD card' checkbox must be sent prior to extracting the SD card from the iCOMOX. Extracting the SD card from the iCOMOX without performing this action first will result in undefined behavior.

3. In the Configuration tab, click on "Binary file to text file converter...".
4. Navigate to the SD card, and select the desired .bin file.
5. A message would appear on the screen, detailing the number of report messages received and saved to the SD card. Click OK.
6. Using the Windows File Explorer, navigate to the SD card. A .txt file with the same name as the selected .bin file will appear in the folder. The data is now visible using any common text editor.

7.5 Binary Files Naming System

The binary file created by the iCOMOX naming format is of the form "iCOMOX-YYYY-MM-DD_HH-MM-SS.bin".



CAUTION: Make sure to back up previous information saved on the SD card before re-inserting the card to the iCOMOX, as files with identical file names will be overwritten.

8. Programming the EEPROM



Note:

- The iCOMOX SMIP does not have an EEPROM component installed. The SMIP-EEPROM tab is intentionally greyed out.
- It is recommended to go through the [USB cable connection section of the quick-start guide](#) before moving forward to the next steps.

8.1 Programming the EEPROM for the First Time on the iCOMOX NB-IOT

To program the EEPROM for the first time, perform the following steps.

- Connect the iCOMOX POE to the PC using the USB-C cable and switch the iCOMOX on using the slide switch.
- Launch the iCOMOX Monitor.
- Open the configuration tab, and un-check all check-boxes in the Data Acquisition section.

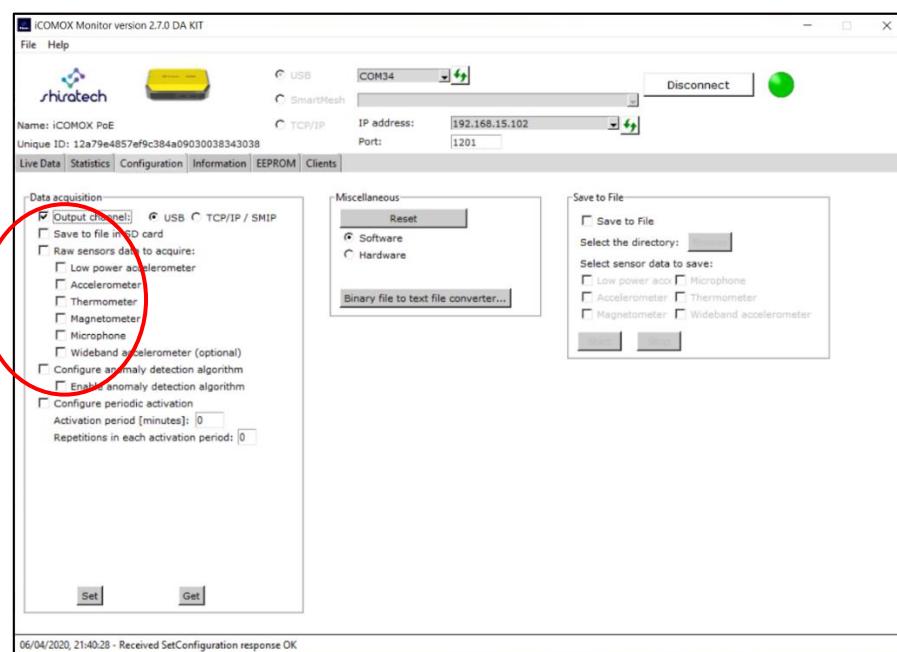


Figure 21: Un-check sensor data checkboxes

- Select USB mode, select the suitable COM port, and click on the Connect button. (Please refer to the [Connecting with the USB Cable](#) chapter).



- Note:** Though not recommended, it is possible to program the EEPROM via TCP/IP connection. In any case where a wrong IP address and port are configured and programmed, TCP/IP connection with the iCOMOX-POE will be lost, and can only be restored by physically accessing the iCOMOX device, connecting via USB cable and re-programming the EEPROM.

5. Once connection with the iCOMOX NB-IOT has been successfully established, open the EEPROM tab.
6. Enter the iCOMOX name (maximum length: 32 characters). For example, “iCOMOX-NBIOT 3 phase Motor #421”.
7. Enter the TCP/IP server IP address and port, and the cellular carrier’s APN settings (APN settings fields maximum length: 32 characters).
8. To program the EEPROM with the selected configurations, click on the Program EEPROM button. The green bar will be filled from left to right, and “Programming succeeded” will appear in the status bar.

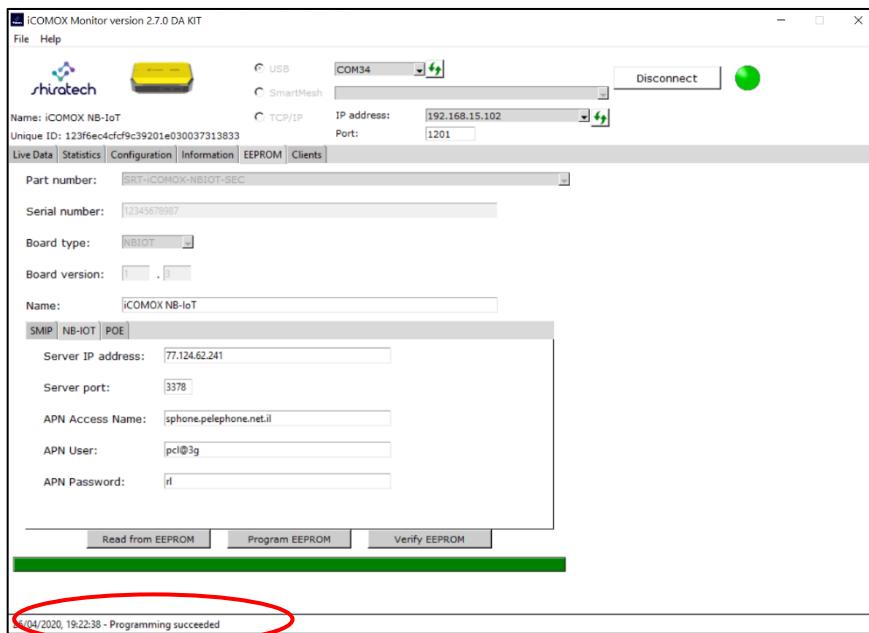


Figure 22: Programming succeeded

9. In case of error, “Programming failed” will appear in the status bar. Please see the [Troubleshooting](#) section for further details.
10. To read or verify the configurations already programmed on the EEPROM:
 - Click the “Read from EEPROM button”. The green bar will be filled from left to right, and “Reading succeeded” will appear in the status bar. The EEPROM tab fields will be updated with the data that is currently programmed to the EEPROM.
 - The Verify EEPROM button allows you to verify whether the exact configurations you have entered in the EEPROM tab are already programmed on the iCOMOX EEPROM. To verify, first enter the desired configurations, then click on the “Verify EEPROM” button.
 - In case the verifying has succeeded (the configuration data in the Monitor EEPROM tab matches the configurations programmed on the iCOMOX EEPROM) the green bar will

be completely filled from left to right, and “Verifying succeeded” will appear in the status bar.

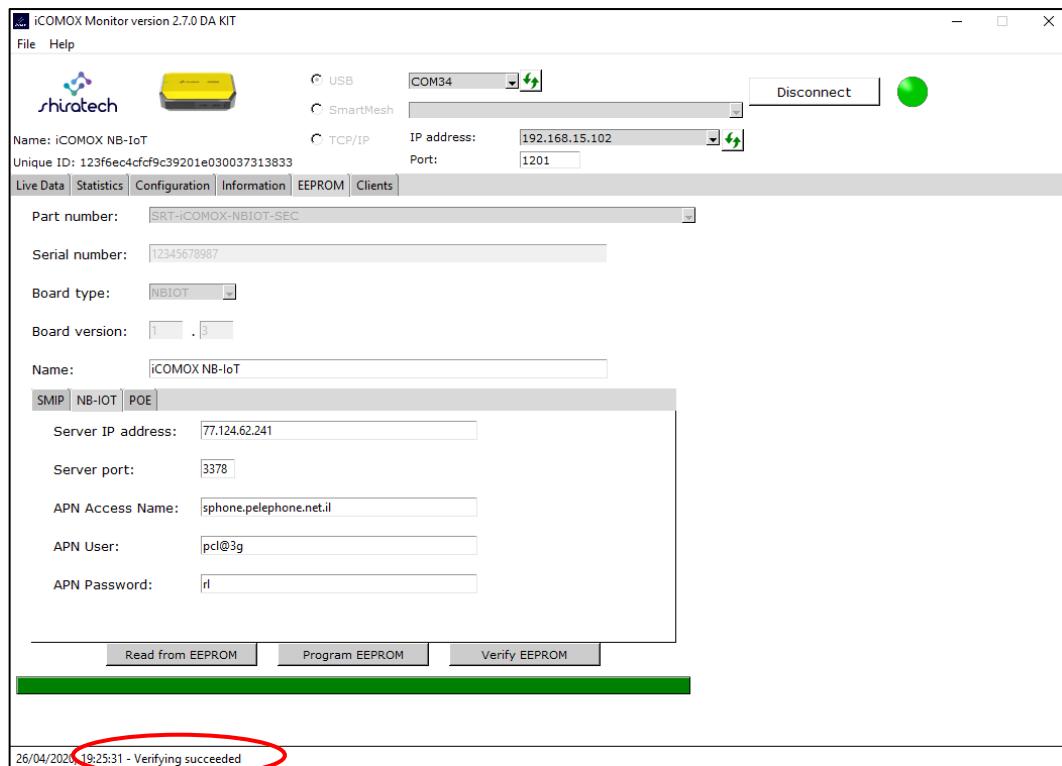


Figure 23: Verifying succeeded.

- In case the verifying has failed (the configuration data in the Monitor EEPROM tab does not exactly match the configurations programmed on the iCOMOX EEPROM) the green bar will be partially filled, and “Verifying failed” will appear in the status bar.

8.1 Programming the EEPROM for the First Time on the iCOMOX POE

To program the EEPROM for the first time, perform the following steps.

1. Connect the iCOMOX POE to the PC using the USB-C cable and switch the iCOMOX on using the slide switch.
2. Launch the iCOMOX Monitor.
3. Open the configuration tab, and un-check all check-boxes in the Data Acquisition section.

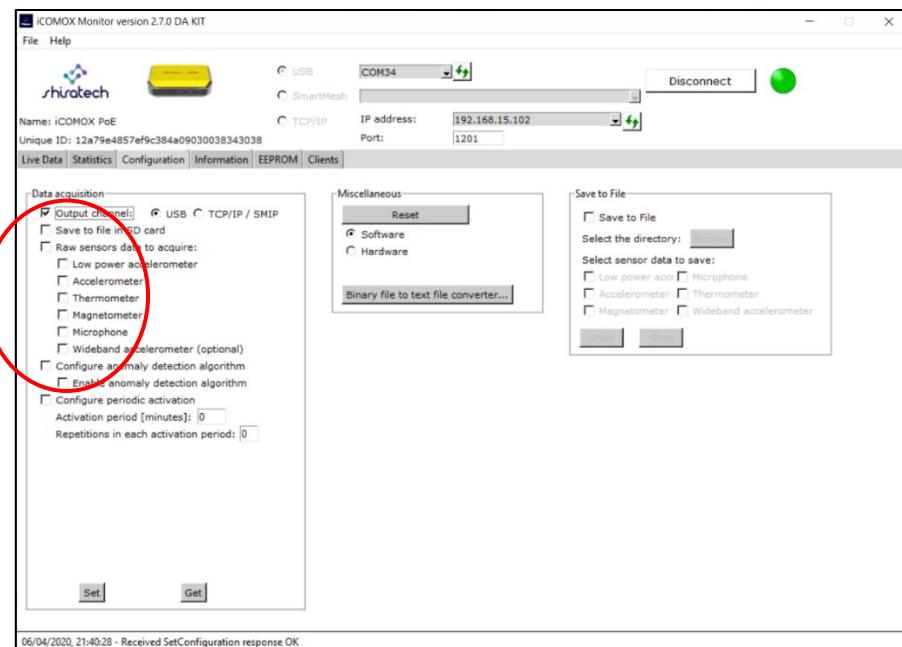


Figure 24: Un-check sensor data checkboxes.

4. Select USB mode, select the suitable COM port, and click on the Connect button. (Please refer to the [Connecting with the USB Cable](#) chapter).



Note: Though not recommended, it is possible to program the EEPROM via TCP/IP connection. In any case where a wrong IP address and port are configured and programmed, TCP/IP connection with the iCOMOX-POE will be lost, and can only be restored by physically accessing the iCOMOX device, connecting via USB cable and re-programming the flash.

5. Once connection with the iCOMOX POE has been successfully established, open the EEPROM tab, then select the POE tab.
6. Enter the iCOMOX name (maximum length: 32 characters). For example, “iCOMOX-POE 3 phase Motor #421”.
7. Select a static IP address for the client, and enter it.

**Note:**

- The client's IP address must be unique. Make sure that no other client or machine on the network is using the same IP address.
- Unless intentionally configured otherwise, verify that the client's IP address has the same network fields (i.e. only the last rightmost field should contain different numbers).

8. Configure the Mask Address field (should typically be 255.255.255.0).
9. Configure the Default gateway field. You may follow these steps to obtain the correct value to be configured:
 - a. On the bottom right corner of the screen, right click on the network icon and choose 'Open Network & Internet Settings' to open the Network Status menu.
 - b. From the Network Status menu, choose 'Change Adapter Settings'.
 - c. Right click on the 'Ethernet' icon, and choose 'properties'.
 - d. From the properties tab, select the 'Internet Protocol Version 4 (TCP/IPv4)' line, and click on 'Properties'.
 - e. Copy the IP address which appears in the 'Default Gateway' field, and paste it to the corresponding field in the iCOMOX Monitor EEPROM tab.
10. Insert the Server IP address and port. Make sure that these are the same IP address and port that the TCP-IP server is listening on, which appear next to the Monitor's TCP/IP radio button.
11. You may want to select the DHCP check-box (optional), to have the network's DHCP server automatically assign an IP address, mask address and default gateway to the iCOMOX POE client.



Note: Checking the DHCP check-box will make the 'Client static IP address' field meaningless, as the client's IP will be assigned by the DHCP.

12. In case the iCOMOX connection with the server is interrupted, the iCOMOX will try to re-establish it. In order to prevent network overloading with multiple clients reconnection attempts, configure the "Delay before connecting" field, to have the iCOMOX wait a configurable number of seconds before each reconnection attempt.
13. To program the EEPROM with the selected configurations, click on the Program EEPROM button. The green bar will be filled from left to right, and "Programming succeeded" will appear in the status bar.

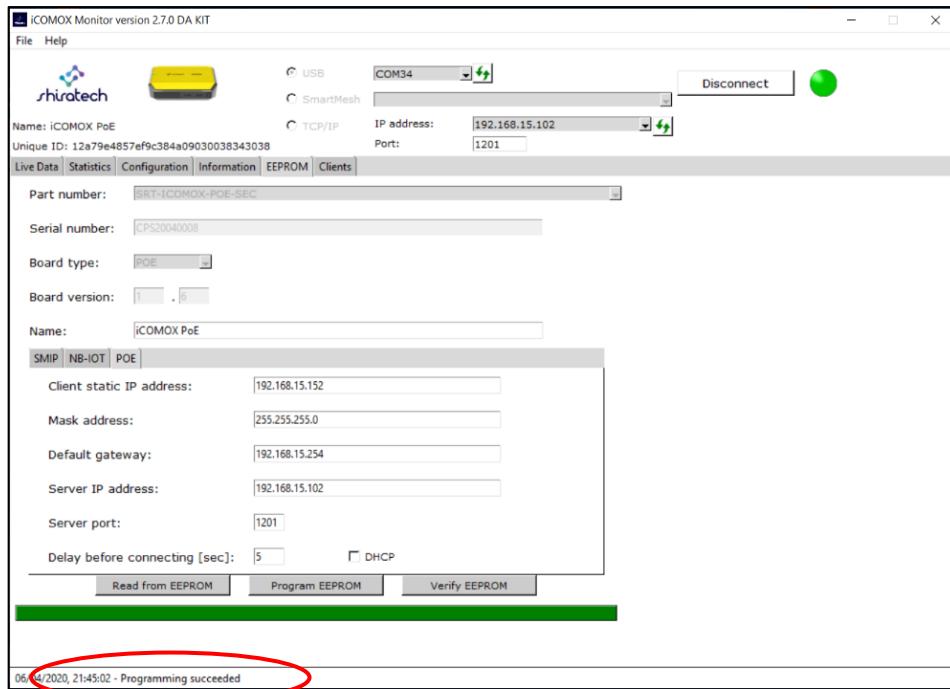


Figure 25: Programming succeeded

14. In case of error, “Programming failed” will appear in the status bar. Please see the [Troubleshooting](#) section for further details.
15. To read or verify the configurations already programmed on the EEPROM:
 - a. Click the “Read from EEPROM” button. The green bar will be filled from left to right, and “Reading succeeded” will appear in the status bar. The EEPROM tab fields will be updated with the data that is currently programmed to the EEPROM.
 - b. The Verify EEPROM button allows you to verify whether the exact configurations you have entered in the EEPROM tab are already programmed on the iCOMOX EEPROM. To verify, first enter the desired configurations, then click on the “Verify EEPROM” button.
 - c. In case the verifying has succeeded (the configuration data in the Monitor EEPROM tab matches the configurations programmed on the iCOMOX EEPROM) the green bar will be completely filled from left to right, and “Verifying succeeded” will appear in the status bar.
 - d. In case the verifying has failed (the configuration data in the Monitor EEPROM tab does not exactly match the configurations programmed on the iCOMOX EEPROM) the green bar will be partially filled, and “Verifying failed” will appear in the status bar.

9. Connecting the iCOMOX Kit

9.1 Prerequisites

- An iCOMOX Kit (SMIP/NB-IOT/POE).
- A PC running Windows 10.

9.2 USB-C Cable connection



Note: USB Cable connection instructions are identical for all iCOMOX types.

To connect the iCOMOX to the PC using the USB-C cable, perform the following steps.

1. Connect the iCOMOX POE to the PC using the USB-C cable.



Figure 26: USB-C cable connection



Note: It is recommended to fasten the screws of the USB-C cable to the iCOMOX.

2. Turn on the iCOMOX by sliding the slide switch on the iCOMOX to the direction opposing the USB-C cable (see figure 14).



Figure 27: Switching the iCOMOX on

3. Verify that the green iCOMOX LED is illuminated.



Figure 28: The green LED is illuminated

9.3 SMIP connection

To connect the iCOMOX to the PC using SMIP, perform the following steps.

1. Connect the Dongle (if SmartMesh communication is required) to one of the USB ports on the PC.



Figure 29: Connecting the dongle

2. Turn on the iCOMOX by sliding the slide switch on the iCOMOX in the direction of the LED - the opposite direction of the USB-C cable (see Figure 27: Switching the iCOMOX on).
3. Verify that the green iCOMOX LED is illuminated (see Figure 28: The green LED is illuminated).



Note: The iCOMOX is equipped with batteries. When the USB cable is disconnected, the iCOMOX, when turned on, is powered by the batteries instead of by the USB-C cable. When not in use, make sure that the iCOMOX is off when the USB-C cable is disconnected.

9.4 TCP/IP over NB-IOT connection

To connect the iCOMOX NB-IOT to the PC using TCP/IP over NB-IOT, perform the following steps.

1. Turn on the iCOMOX NB-IOT by sliding the slide switch on the iCOMOX NB-IOT in the direction opposing the USB-C cable (see Figure 27: Switching the iCOMOX on). The iCOMOX NB-IOT may be powered by the USB-C cable. The internal batteries are only a power supply backup.
2. Verify that the green iCOMOX NB-IOT LED is illuminated (see Figure 28: The green LED is illuminated).



Note: The iCOMOX is equipped with batteries. When the USB cable is disconnected, the iCOMOX, when turned on, is powered by the batteries instead of by the USB-C cable. When not in use, make sure that the iCOMOX is off when the USB-C cable is disconnected.

9.5 TCP/IP over Ethernet connection

To connect the iCOMOX POE to the PC using TCP/IP, perform the following steps.

1. Connect the iCOMOX POE to your Local Area Network using an Ethernet cable.
2. Turn on the iCOMOX POE by sliding the slide switch on the iCOMOX POE in the direction opposing the USB-C cable (see Figure 27: Switching the iCOMOX on). The iCOMOX POE may be powered by the USB-C cable.
3. Verify that the green iCOMOX POE LED is illuminated (see Figure 28: The green LED is illuminated).



Note: In any case where the Ethernet cable does not provide power supply, the iCOMOX can be powered by the USB-C cable while working in TCP/IP over Ethernet mode. When connected, the USB power supply has priority over the POE's power supply.

10. Mechanical Structure

10.1 The Sensor Pack

10.1.1 The iCOMOX SMIP Sensor Pack

The iCOMOX SMIP Sensor Pack comprises the following equipment:

- LED indicators (1)
- Case (2)
- SD and on/off switch cover (3)
- Gasket (4)
- Case cover (5)
- Electronic card (6)
- Case - Cover connection screws (7)
- Case – Electronic card connection screw (8)

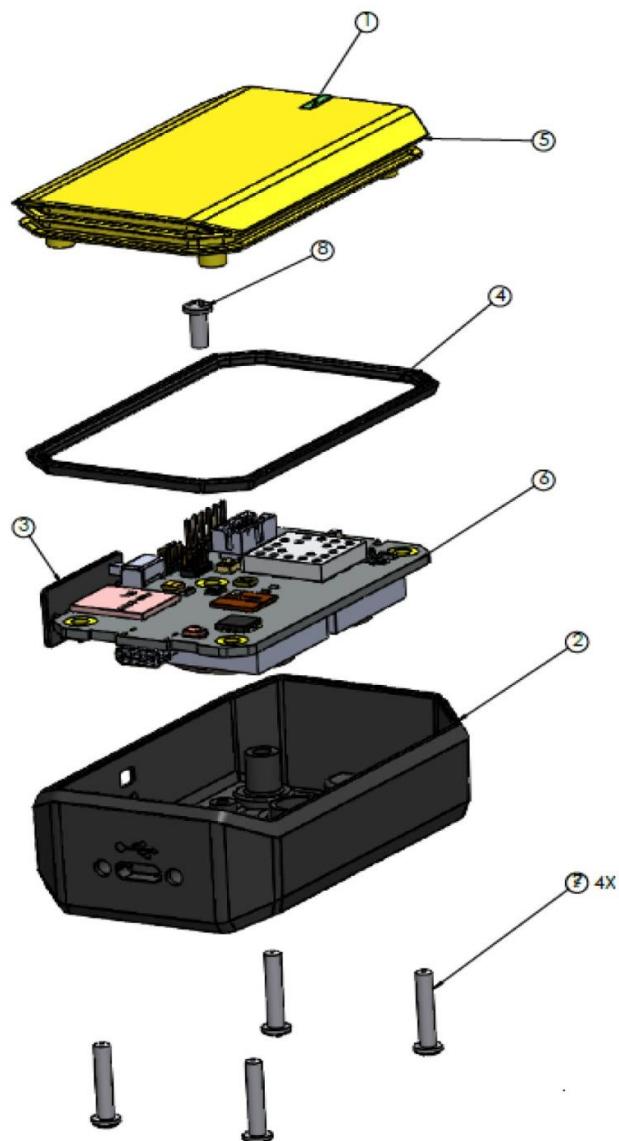


Figure 30: iCOMOX SMIP mechanical structure

10.1.2 The iCOMOX NB-IOT Sensor Pack

The iCOMOX NB-IOT Sensor Pack comprises the following equipment:

- Case (1)
- Cover (2)
- Electronic card (3)
- Screws (4) (5)

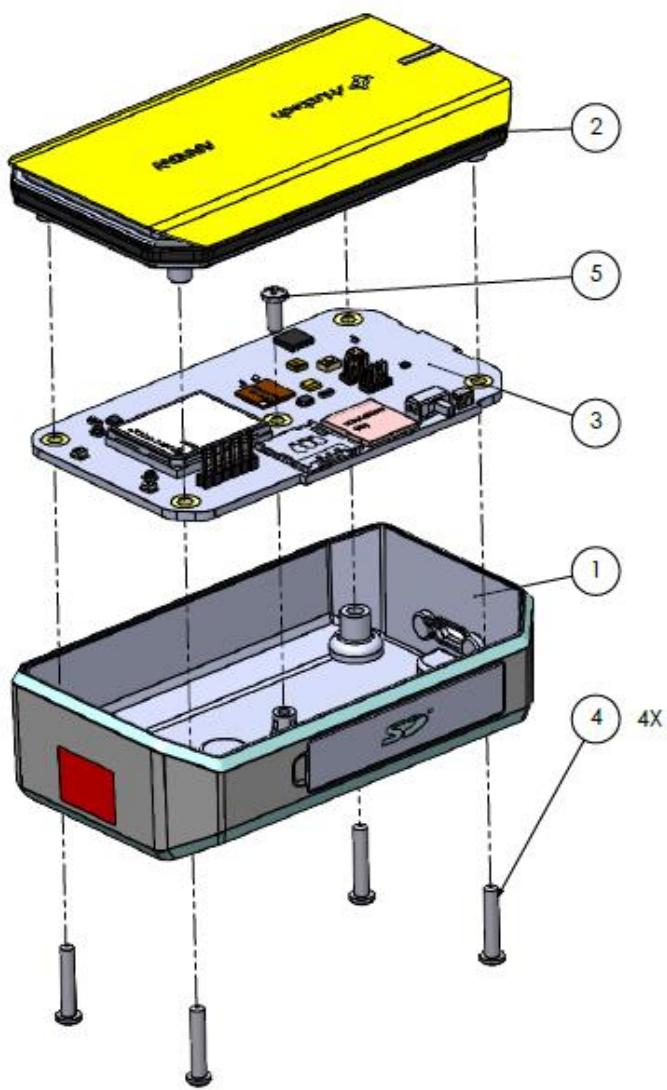


Figure 31: iCOMOX NB-IOT mechanical structure

10.1.3 The iCOMOX POE Sensor Pack

The iCOMOX POE Sensor Pack comprises the following equipment:

- Case (1)
- Cover (2)
- Electronic card (3)
- Screws (4) (5)
- Sealing (6)

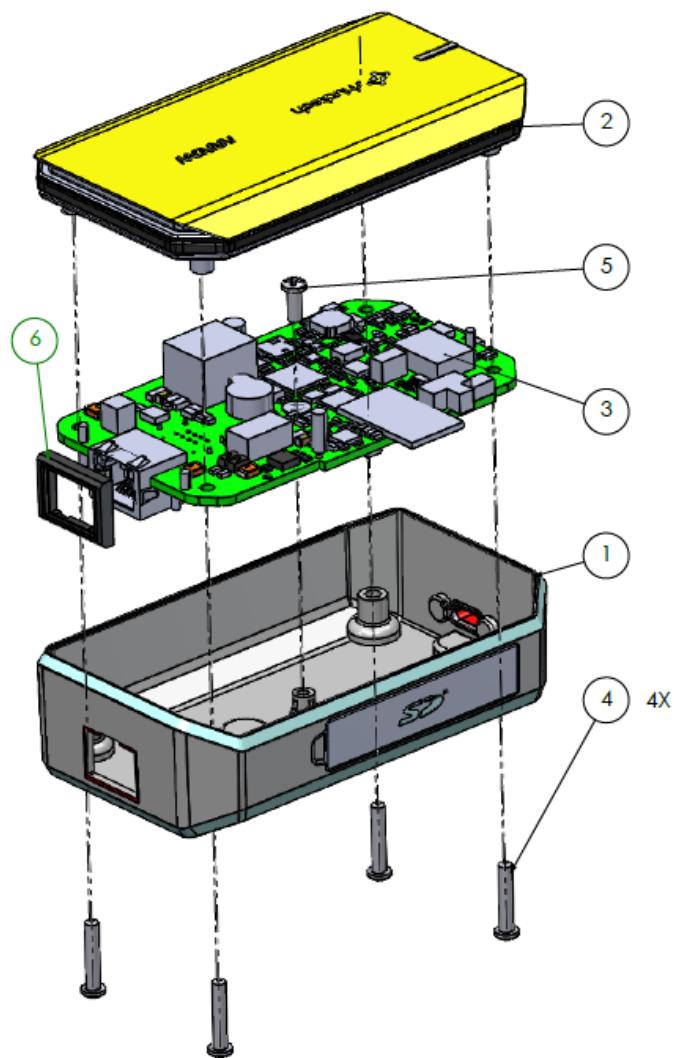


Figure 32: iCOMOX POE mechanical structure

10.2 The Mounting Kit

10.2.1 The iCOMOX SMIP Mounting Kit

The Mounting Kit (Figure 33: iCOMOX SMIP Mounting Kit Adaptors) provides a versatile solution for mounting the iCOMOX SMIP sensor pack onto the monitored equipment.

The Mounting Kit includes the following two adaptors:

1. Two-screw Adaptor (3) – secures to the iCOMOX SMIP sensor pack with two screws (4). This adaptor has a hole at each end, which can enable fitting to such motors as the three-phase, Size 63 Induction Motor.
2. Slot Adaptor (1) – designed with slots instead of holes, providing additional versatility. If the Two-screw Adaptor (3) fits your equipment, you do not require the Slot Adaptor (1).

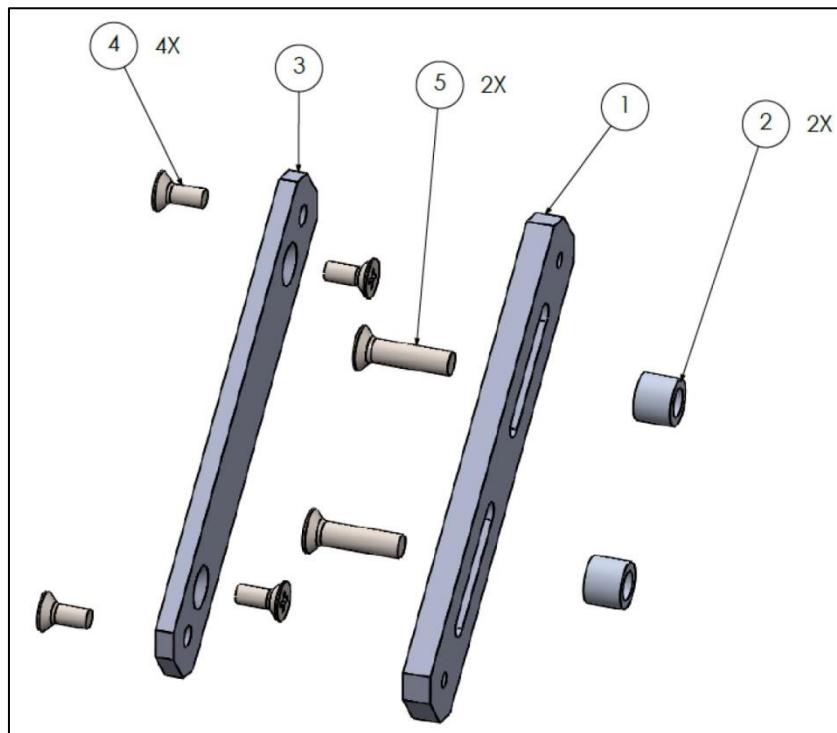


Figure 33: iCOMOX SMIP Mounting Kit Adaptors

Item No.	Part Number	Description	Qty
1	0009-00-00-0004		1
2	0009-00-00-0001		2
3	0009-00-00-0008		1
4	DIN EN ISO 7046-1- M4 x 10 - Z - 10N		4
5	DIN EN ISO 7046-1- M4 x 20 - Z - 20N		2

Table 5: iCOMOX SMIP Mounting Kit Components

10.2.2 The iCOMOX POE/NB-IOT Mounting Kit

The Mounting Kit (Figure 34: iCOMOX POE/NB-IOT Mounting Kit Adaptors) provides a versatile solution for mounting the iCOMOX sensor pack onto the monitored equipment.

The Mounting Kit includes the following two adaptors:

3. Two-screw Adaptor (3) – secures to the iCOMOX sensor pack with two screws (4).
This adaptor has a hole at each end, which can enable fitting to such motors as the three-phase, Size 63 Induction Motor.
4. Slot Adaptor (3) – designed with slots instead of holes, providing additional versatility.
If the Two-screw Adaptor (3) fits your equipment, you do not require the Slot Adaptor (3).

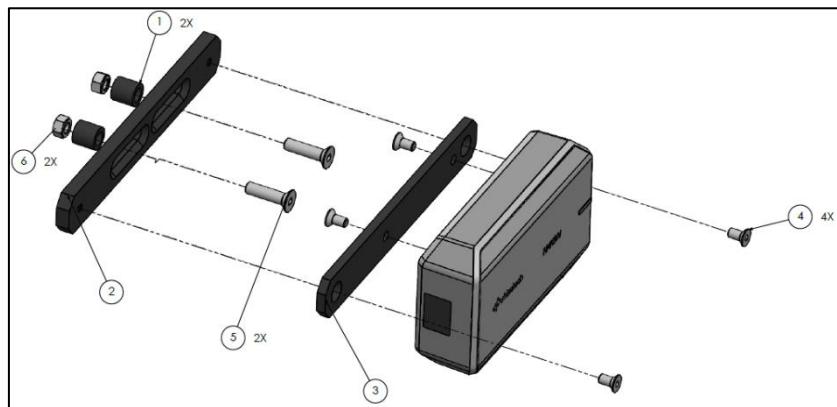


Figure 34: iCOMOX POE/NB-IOT Mounting Kit Adaptors

Item No.	Part Number	Description	Qty
1	MK-03-R02	SPACER	2
2	MK-02-R02	MOTOR PLATE	1
3	MK-01-R02	NBIOT/POE PLATE	1
4	DIN 965 – M4 x 6	FH SCREW PH M4X6, BLACK OXIDE	4
5	DIN 965 – M5 x 25	FH SCREW PH M5X25, BLACK OXIDE	2
6	Hexagon Nut ISO 4032 – M5	HEX NUT M5, BLACK OXIDE	2

Table 6: iCOMOX POE/NB-IOT Mounting Kit Components

10.3 Creating an Adaptor

When the supplied adaptors do not fit your equipment, you can produce an adaptor according to the dimensions of the supplied adaptor in the following figures.

For more information/support, contact support@shiratech-solutions.com.

10.3.1 Creating an Adaptor for iCOMOX SMIP



Note: Only the 73mm distance holes are to be considered during the design. These holes are made to accommodate m4 screws.

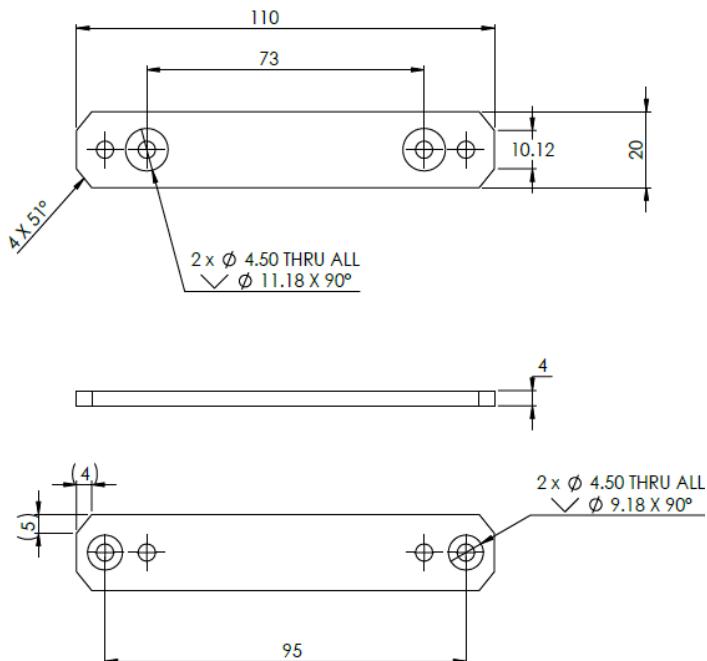


Figure 35: The mounting adaptor - iCOMOX SMIP

10.3.2 Creating an Adaptor for iCOMOX POE/NB-IOT



Note: Only the 61.25mm distance holes are to be considered during the design. These holes are made to accommodate m4 screws.

For more information/support, contact support@shiratech-solutions.com.

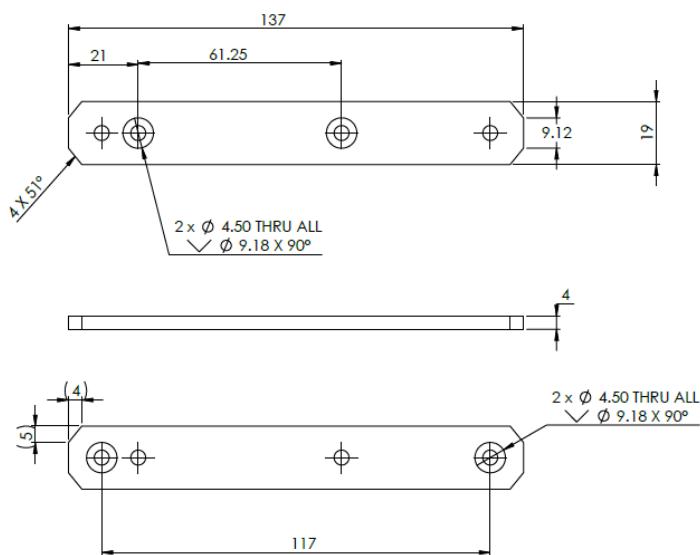


Figure 36: The mounting adaptor – POE/ iCOMOX NB-IOT

11. Replacing the Batteries

The iCOMOX SMIP contains two CR2450N batteries. To replace the batteries, perform the following steps:

1. Disconnect the USB cable from the iCOMOX SMIP.
2. Using a Phillips screwdriver, dismount the iCOMOX SMIP from the motor.



Figure 37: Loosen the Screws to Detach the iCOMOX SMIP

3. Carefully remove the thermal conductor.



Figure 38: Removing the Thermal Conductor

4. Remove the mounting element from the back-side of the iCOMOX SMIP.

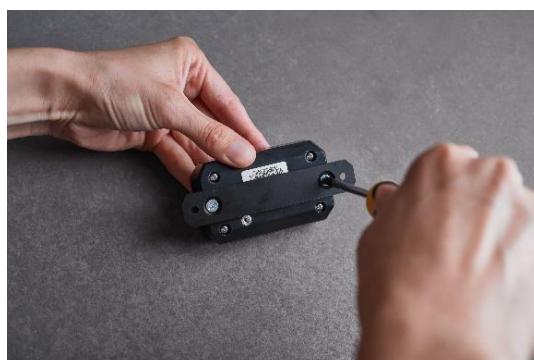


Figure 39: Removing the Mounting Adaptor

5. Remove the four screws at the back side of the iCOMOX SMIP.



Figure 40: Loosen the screws to Open the iCOMOX SMIP

6. Remove the yellow cover.



Caution: Do not detach the SmartMesh antenna that is connected to the card.



Figure 41: Opening the iCOMOX SMIP yellow cover

7. Remove the screw at the middle of the electronic card to disconnect the electronic card from the cover.

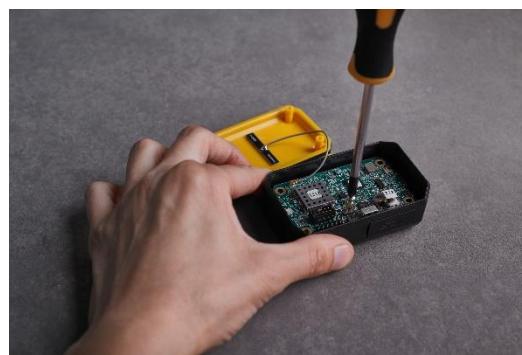


Figure 42: Removing the iCOMOX SMIP from the cover

8. Replace the two batteries with new CR2450N batteries.

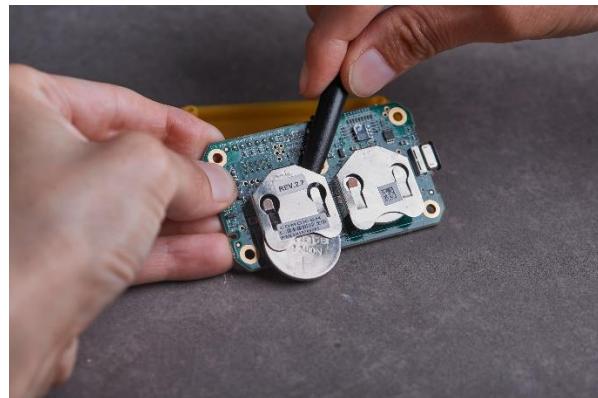


Figure 43: Removing the batteries

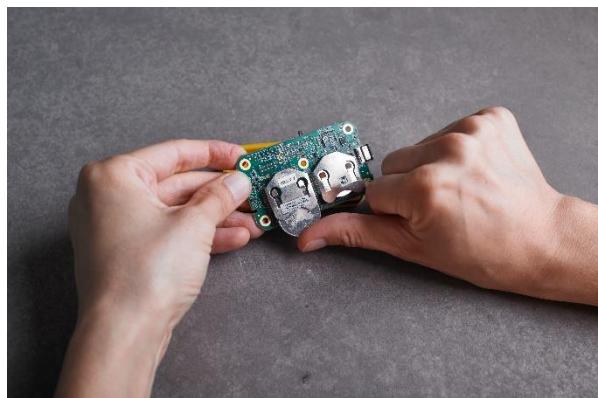


Figure 44: Inserting new batteries

9. Assemble the iCOMOX SMIP and then reinstall the iCOMOX SMIP onto the motor.

12.Flash Programmer

The iCOMOX Flash Programmer is a Windows utility for programming the flash memory of the iCOMOX via the USB-C port. It is based on the CrossCore Serial Flash Programmer™ by Analog Devices.

12.1 Installing the iCOMOX Flash Programmer

To install the iCOMOX Flash Programmer, perform the following steps:

1. Download and run the latest version of the *iCOMOX Flash Programmer* from:

<https://www.shiratech-solutions.com/products/icomox/>

The iCOMOX Flash Programmer Setup Wizard opens.



Figure 45: iCOMOX Flash Programmer installer

2. Click Next. The Setup Type window opens.

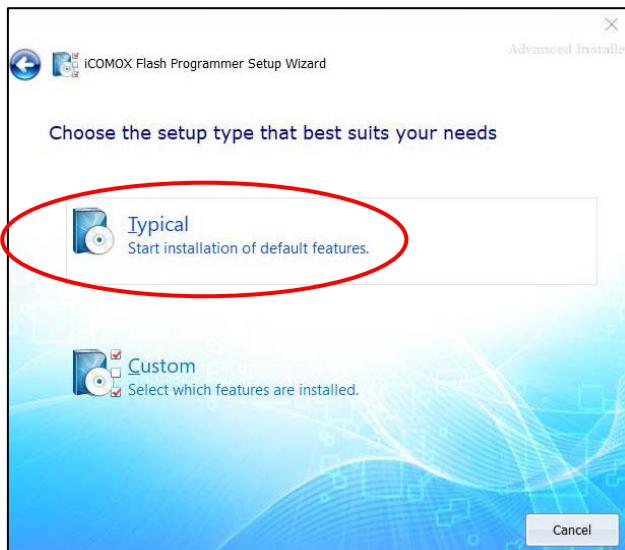


Figure 46: iCOMOX Flash Programmer installer

3. Click Typical. The Select Installation Folder window opens.

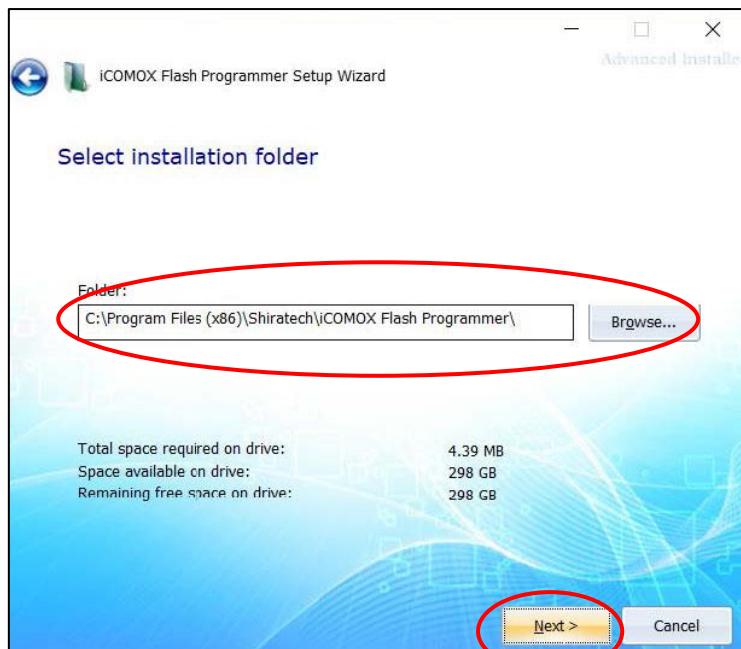


Figure 47: iCOMOX Flash Programmer installer

4. Browse to the installation path on your PC and click Next. The Begin Installation window opens.



Figure 48: iCOMOX Flash Programmer installer

5. Click Install to begin installation. The License Terms window appears.

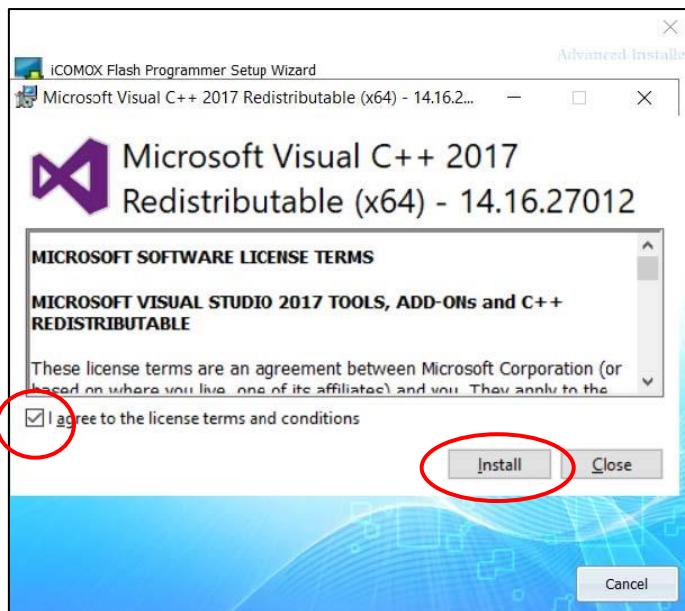


Figure 49: iCOMOX Flash Programmer installer

6. When additional installations are required:
- Follow the relevant instructions.
 - Select the 'I agree to the license terms and conditions' checkbox.
 - Click Install, restart the PC and repeat the installation process from Step 1.
7. When additional installations are not required:
- Select the 'I agree to the license terms and conditions' checkbox.
 - Click Install. The Successfully Installed window appears.

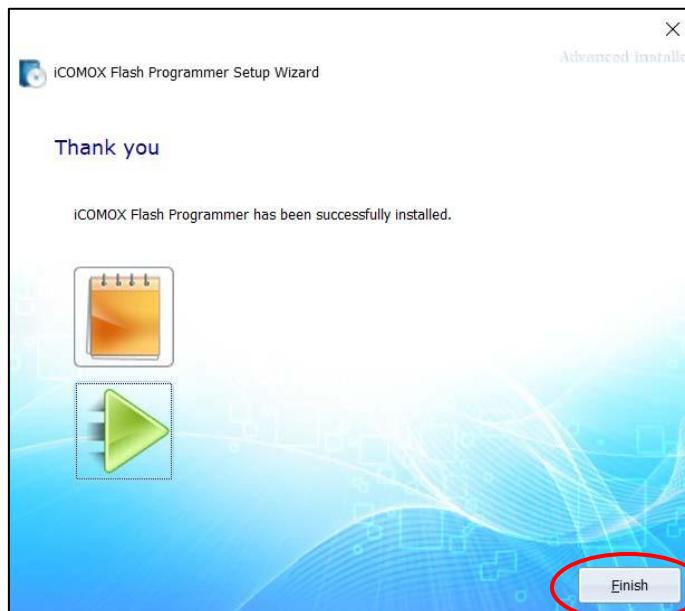


Figure 50: iCOMOX Flash Programmer installer

8. Click Finish to complete the installation process.

12.2 Flashing

12.2.1 Flashing the iCOMOX SMIP

To program the Flash, perform the following steps:

1. Disconnect the USB cable from the iCOMOX SMIP.



Note: After disconnecting the USB cable, make sure that the switch is off, to prevent the iCOMOX SMIP from consuming the batteries.

2. Detach the iCOMOX SMIP from the motor, by removing the mounting element from the back side of the iCOMOX SMIP.
3. Remove the 4 screws on the back of the iCOMOX SMIP to remove the iCOMOX SMIP cover.



Note: For more detailed instructions regarding the unmounting and opening of the iCOMOX, refer to the [Replacing the Batteries](#) section.



Figure 51: Removing the iCOMOX cover

4. Launch the iCOMOX Flash Programmer.
5. Click the Browse button to select the .hex file to be programmed.

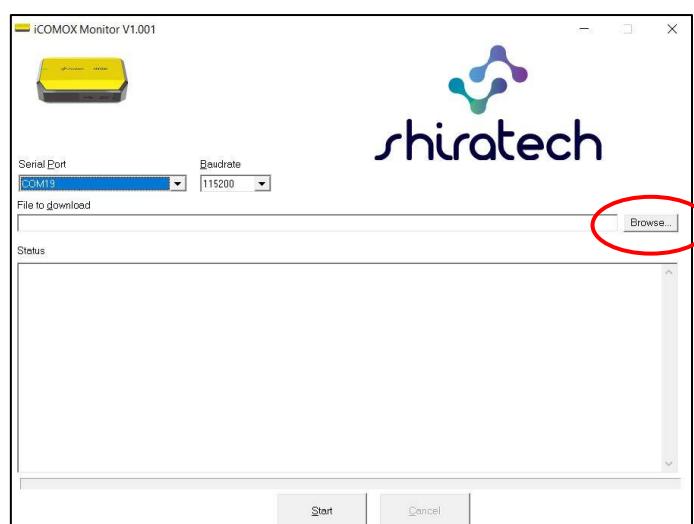


Figure 52: iCOMOX Flash Programmer



Note: For the PC to correctly recognize the iCOMOX, the FTDI driver must be installed.
For installation instructions, refer to [appendix A](#).

6. Connect the iCOMOX SMIP to the PC using the USB-C cable and turn the iCOMOX SMIP on by sliding the slide switch on the iCOMOX SMIP in the direction of the LED (the direction opposing the USB-C cable).



Figure 53: Switching the iCOMOX on.

7. Locate the BOOT and RESET buttons on the iCOMOX SMIP and perform the following sequence:
 - c. Hold down both the BOOT and the RESET buttons.
 - d. Release the RESET button
 - e. Release the BOOT button.

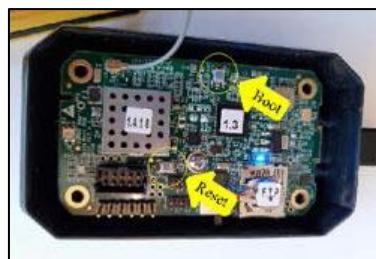


Figure 54: The BOOT and the RESET buttons.

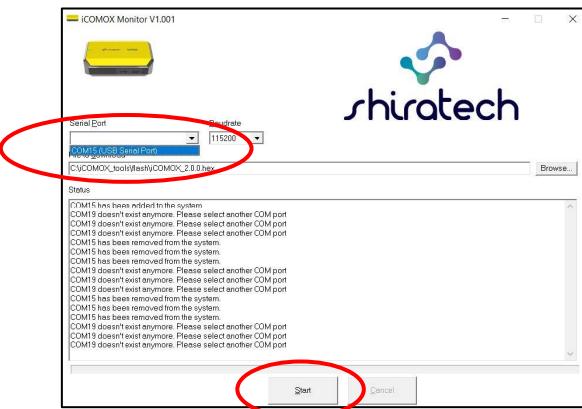


Figure 55: The Serial Port drop-down menu.



CAUTION: While programming of the flash is in progress, do not stop the programming process or disconnect the USB cable, as it may result in permanent and irreversible damage to the flash.

8. Select the suitable COM port (USB Serial Port) from the drop-down menu and click Start.
Flashing should begin.



Note: You can launch the Device Manager prior to performing this step, to verify which COM port to choose in later steps.

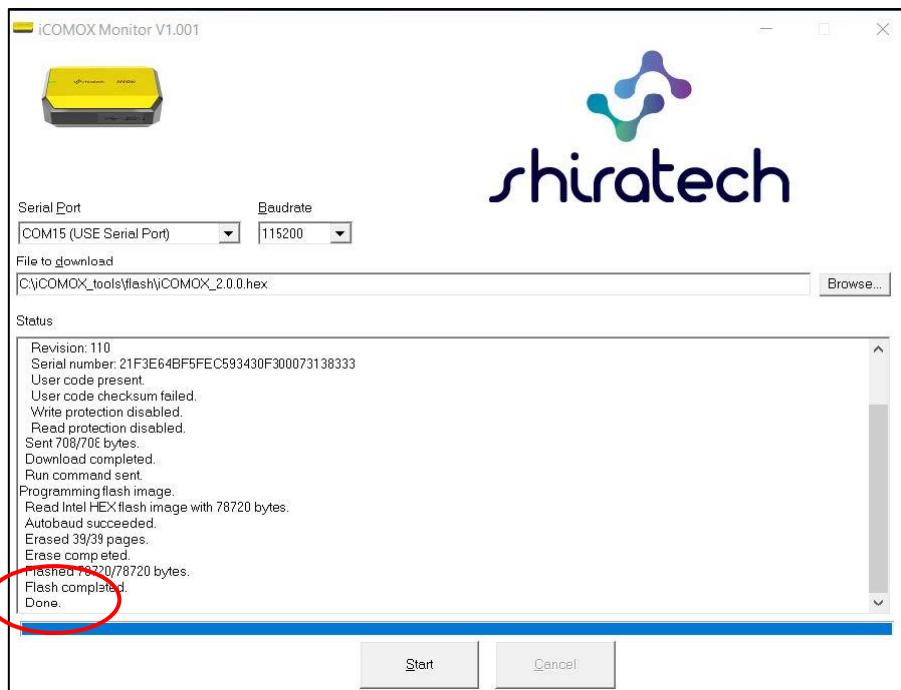


Figure 56: "Done"

9. Verify that "Done" appears at the end of the status report, indicating that flashing was successful.
10. Restart the iCOMOX by clicking the RESET button (see image 34) on the iCOMOX, or by disconnecting the USB cable and switching the iCOMOX switch off and then back on.
11. Launch the iCOMOX Monitor, connect to the iCOMOX using the USB cable, then navigate to the Information tab. To verify that the flashing was successful, verify that the Information tab displays the correct firmware version.



Note: In case that the Information tab does not display the iCOMOX firmware version, please first try reconnecting by using the Disconnect/Connect button.

12.2.2 Flashing the iCOMOX NB-IOT/POE

To program the Flash, perform the following steps:



CAUTION: While programming of the flash is in progress, do not stop the programming process or disconnect the USB cable, as it may result in permanent and irreversible damage to the flash.

1. Launch the iCOMOX Flash Programmer.
2. Click the Browse button to select the .hex file to be programmed.

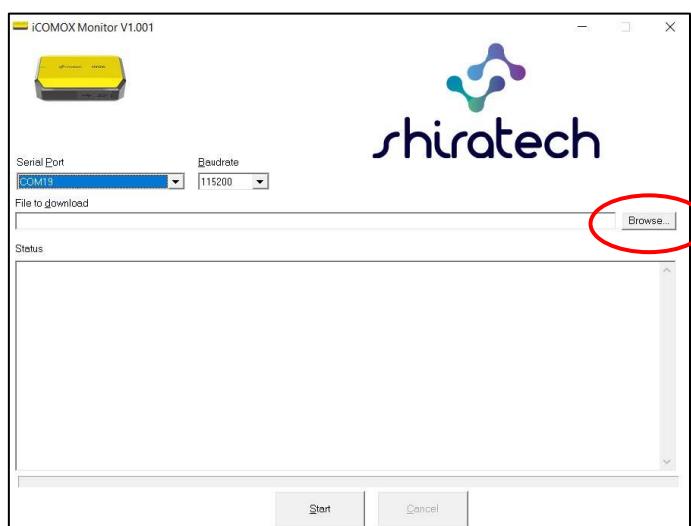


Figure 57: iCOMOX Flash Programmer



Note: For the PC to correctly recognize the iCOMOX, the FTDI driver must be installed.
For installation instructions, refer to [appendix A](#).

3. Perform the following sequence:
 - A. Connect the iCOMOX to the PC using the USB-C cable.
 - B. hold down the Bootloader button (the button next to the power switch).
 - C. Turn the iCOMOX on by sliding the slide switch on the iCOMOX in the direction opposing the USB-C cable.
 - D. Release the Bootloader button.



Figure 58: Switching the iCOMOX on.

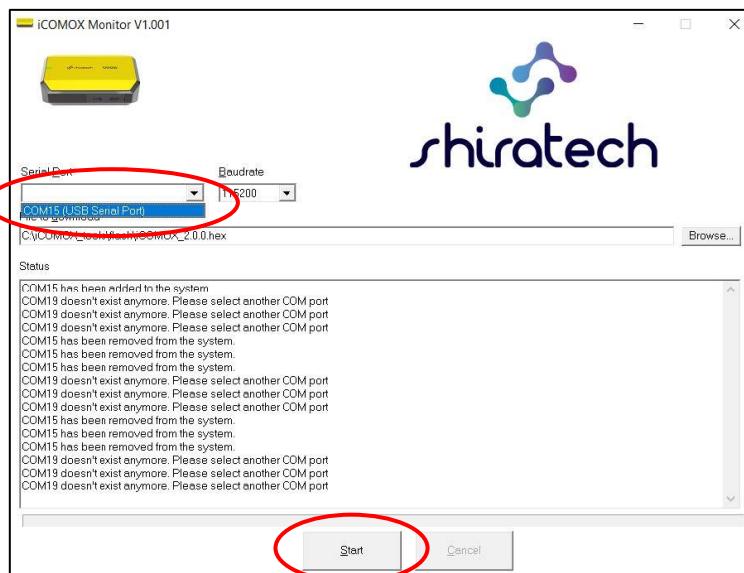


Figure 59: The Serial Port drop-down menu.

Select the suitable COM port (USB Serial Port) from the drop-down menu and click Start. Flashing should begin.



Note: You can launch the Device Manager prior to performing this step, to verify which COM port to choose in later steps.

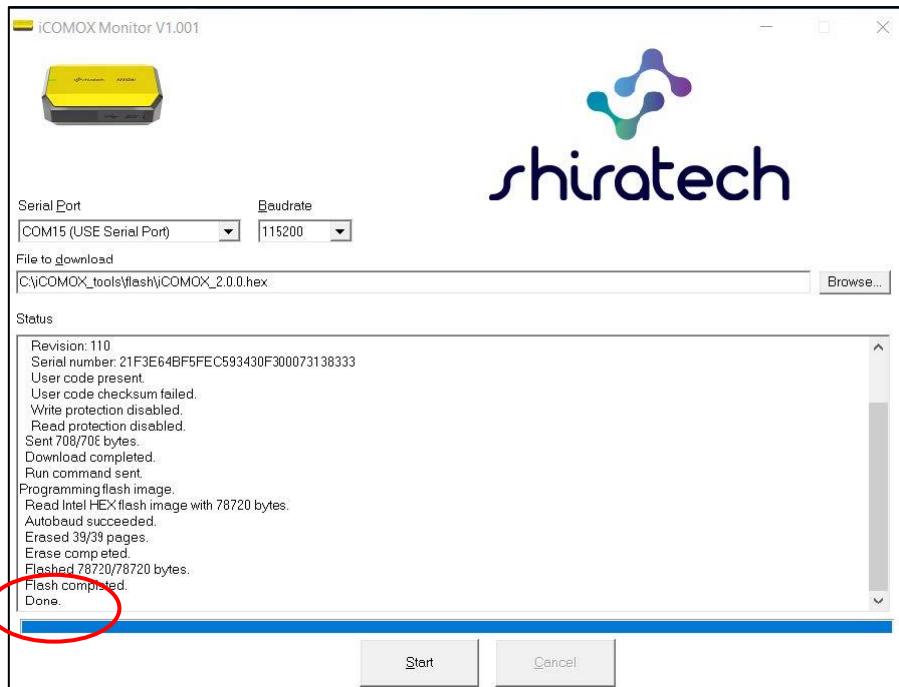


Figure 60: "Done"

4. Verify that "Done" appears at the end of the status report, indicating that flashing was successful.
5. Restart the iCOMOX by switching the iCOMOX switch off and then back on.
6. Launch the iCOMOX Monitor, connect to the iCOMOX using the USB cable, then navigate to the Information tab. To verify that the flashing was successful, verify that the Information tab displays the correct firmware version.



Note: In case that the Information tab does not display the iCOMOX firmware version, please first try reconnecting by using the Disconnect/Connect button.

13. Monitor

13.1 Overview

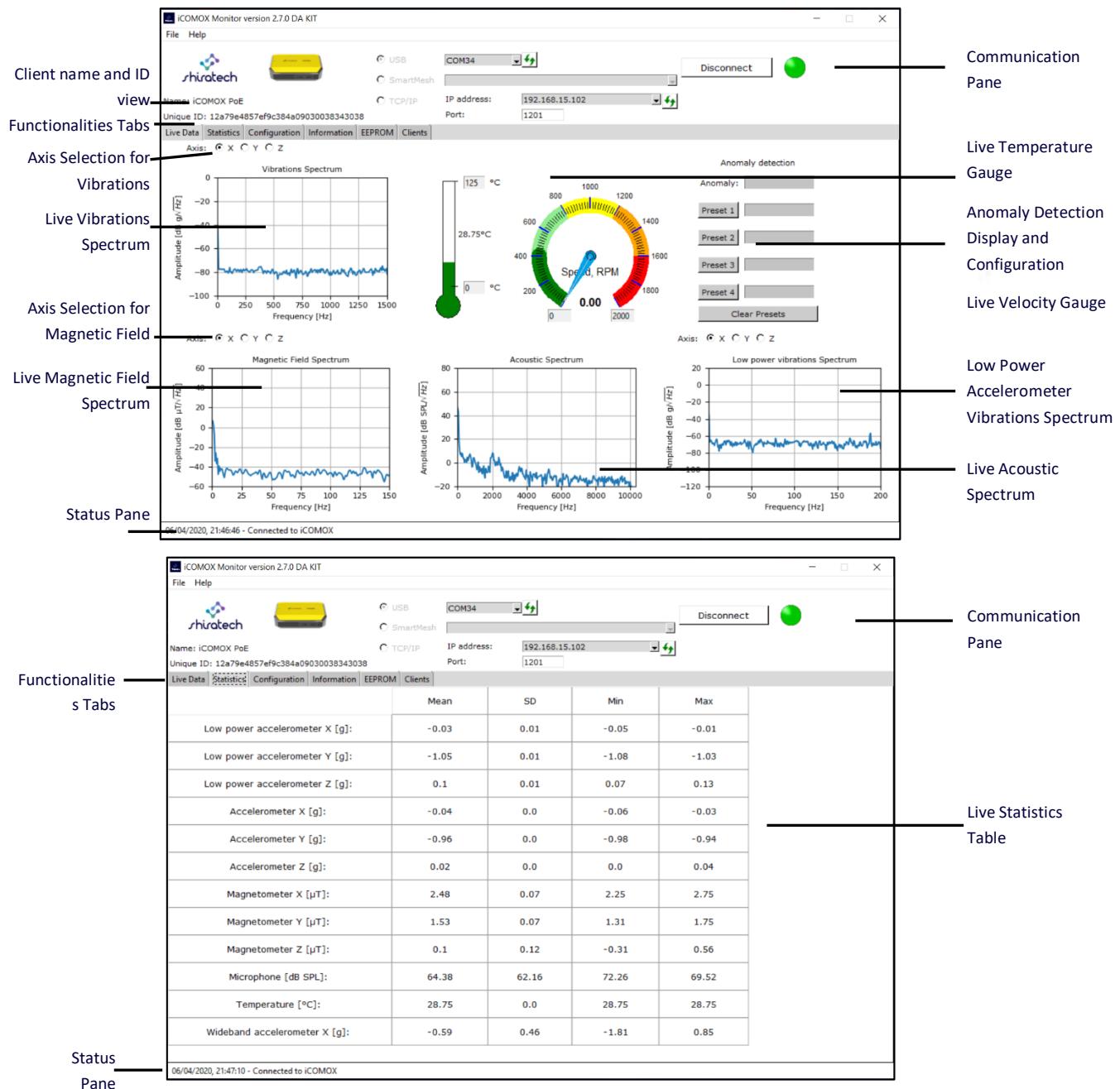


Figure 61: Monitor overview

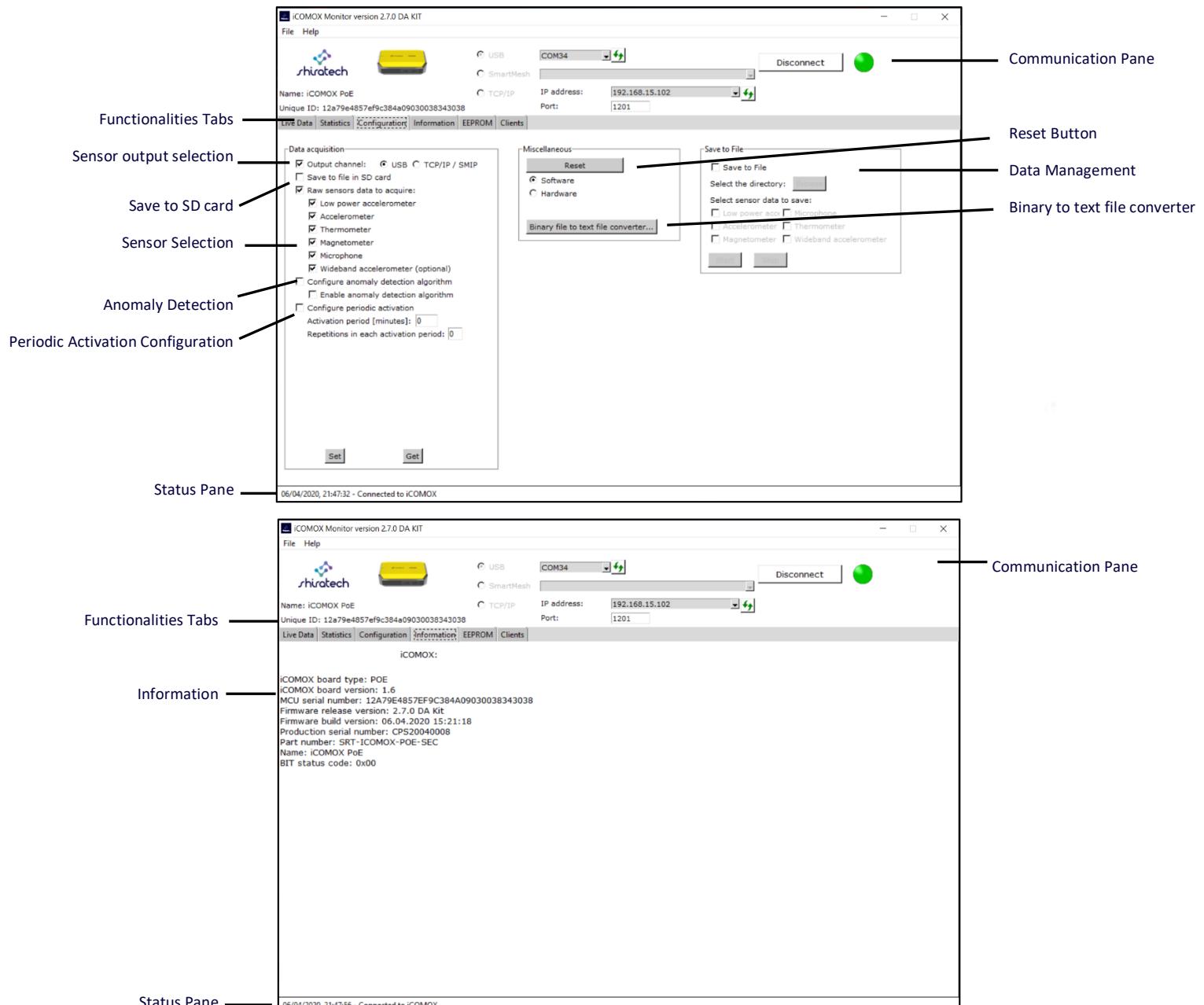


Figure 62: Monitor overview



Figure 63: Monitor overview

13.2 Main Window

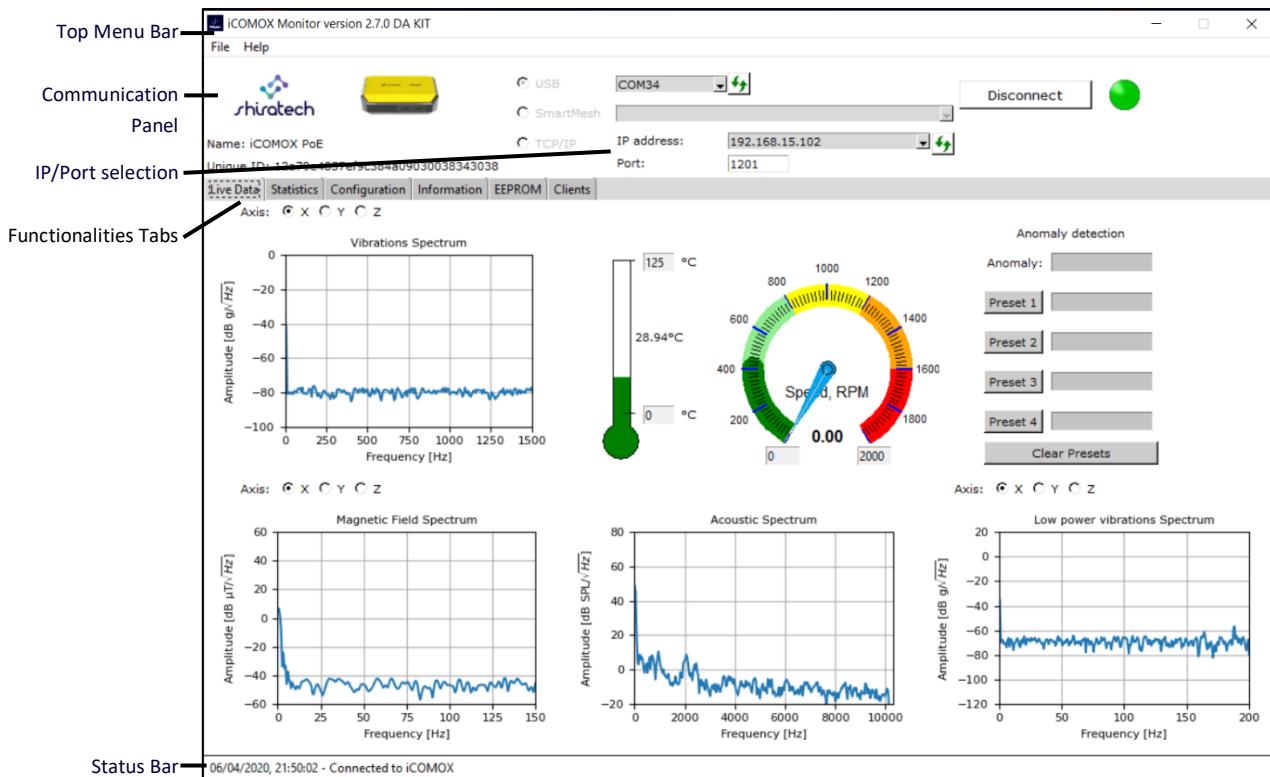


Figure 64: Monitor Main window

Main Window comprises the following components:

- Top Menu Bar – Displays the File – Exit and Help – About tabs.
- Communication Panel - contains the following features:
 - USB/SMIP/TCP-IP communication selection (1).
 - Drop down menu for the COM port selection of the iCOMOX USB Manager (2).
 - Drop down menu the SmartMesh (SMIP) mote selection (3).
 - Connect/Disconnect button to enable/disable communication (4).
 - Colored Status Indicator (5).
 - Drop down menu and text field for the TCP server IP address and port (6).
 - Connected client name and ID (7).

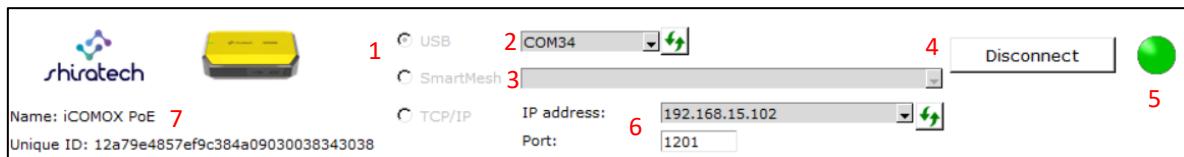


Figure 65: Communication panel

- Status Bar - Displays connection status, errors and SMIP data packets numbering.

13.2.1 Tab Views

The Main Window provides the following six tab views:

- Live Data
- Statistic
- Configuration
- Information
- EEPROM
- Clients

13.2.1.1 Live Data View

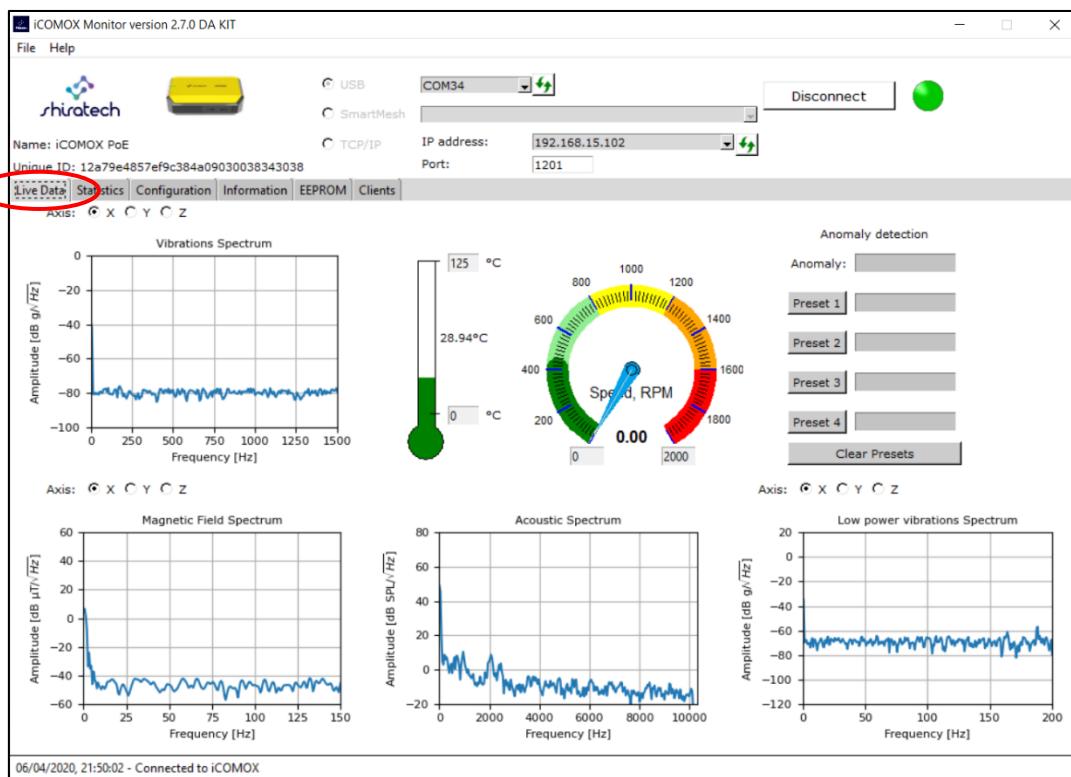


Figure 66: Monitor Live Data View

The Live Data view provides a live display of the collected data as well as anomaly detection algorithm configuration and display. The following data are displayed:

- Axis selection
- Vibrations Spectrum (from both analog and low power accelerometers)
- Magnetic Field Spectrum
- Tachometer - Displays the motor speed, calculated by sensing the variations in the motor's magnetic field
- Acoustic Spectrum

13.2.1.2 Statistics View

The Statistics view displays live statistical information extracted from the acquired sensor data. The information for each axis is presented separately.

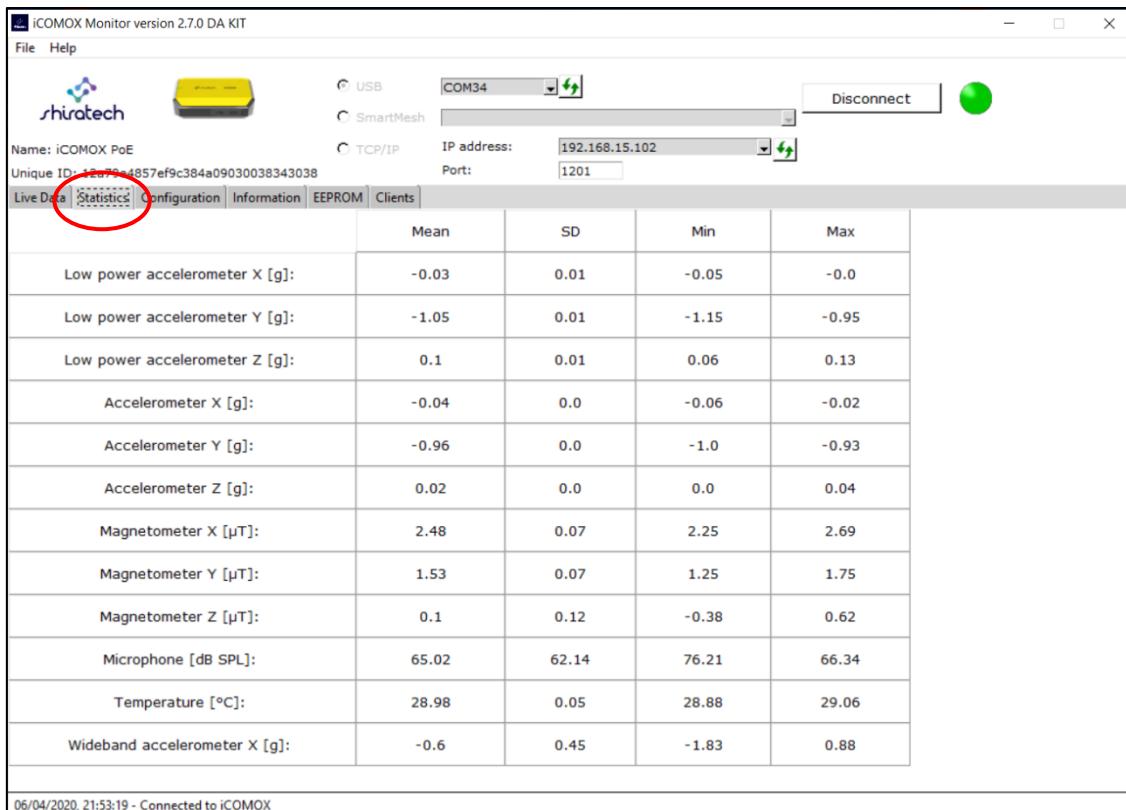


Figure 67: Monitor Statistics View

13.2.1.3 Configuration View

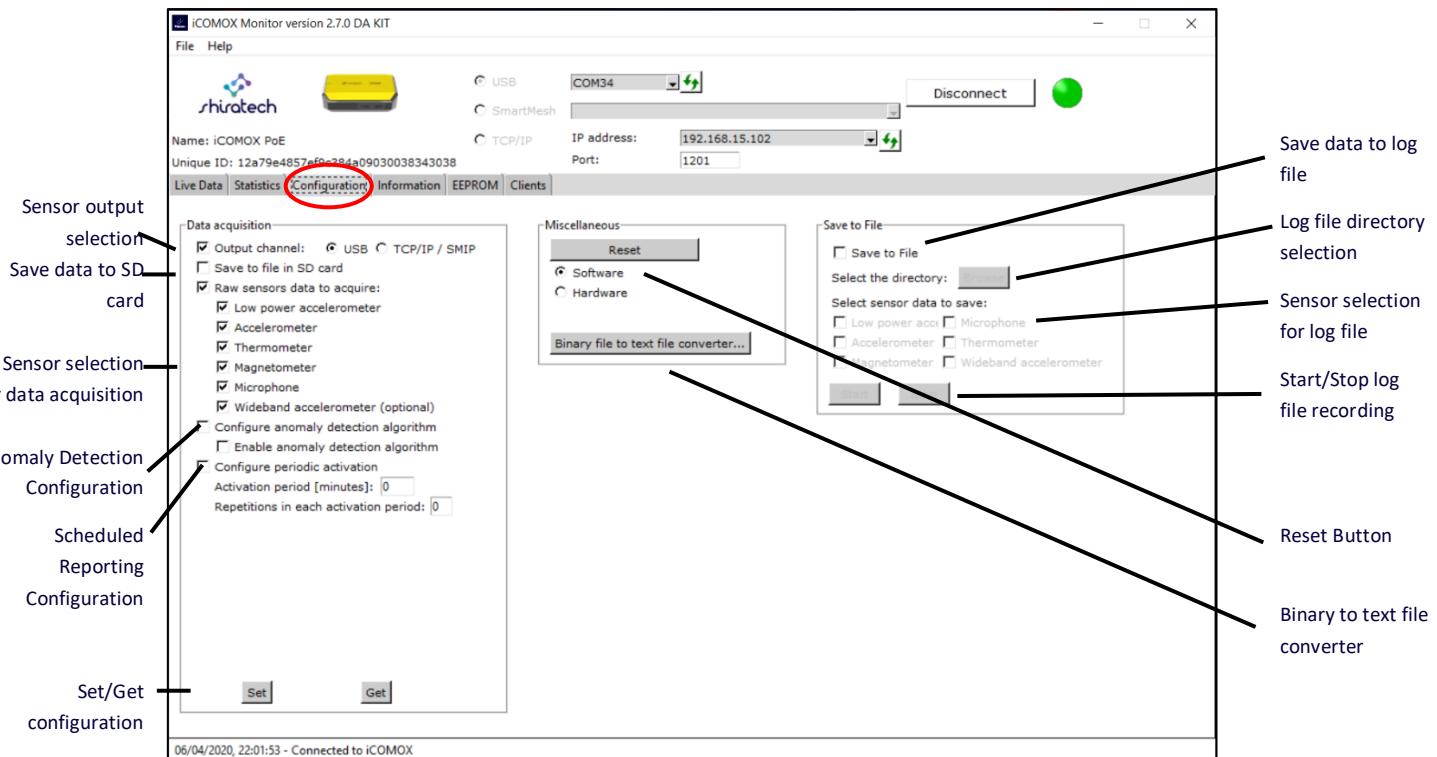


Figure 68: Monitor Configuration View

The Configuration View displays the following three main functional areas:

- Data Acquisition:
 - Output channel selection – USB or Auxiliary (TCP/IP / SMIP).
 - Raw data mode sensor selection for data acquisition and display in the Main Window.
 - Save data to SD card – Refer to the [SD Card chapter](#).
 - Anomaly detection – enables the use of anomaly detection algorithm (configured and displayed in the Live Data tab) – Refer to the [Anomaly Detection chapter](#).
 - Configure periodic scheduled reporting – Set the iCOMOX POE to transmit a fixed amount (repetitions) of selected sensors samples, every certain amount of minutes (activation period).
 - Set – Send a set configuration command to the iCOMOX, to have it configured in accordance with the selected checkboxes.
 - Get – Read and display the iCOMOX current configuration.
- Save to File - Enables saving currently acquired live sensor data into a log “xlsx” file.
 - Select the directory – choose the path on your PC for the data file to be saved.
 - Select sensor data to save - Select which sensors data should be saved to the data file.
 - Start/stop log file recording.



Note: After selecting the Save to File option, the directory for file storage must be specified by clicking Browse button. Afterwards, the required sensor data to be saved into the log file must be selected. Once this has been done, the user can click the “Start” button at any time, while the iCOMOX is connected, to start the data recording. When the user presses the “Stop” button, the system stops recording the data and saves the log file in the specified directory.

- Miscellaneous:

- Reset – sends a hardware or software reset command to the iCOMOX. Software reset resets the iCOMOX by performing a soft reset to the ADUCM4050 MCU. Hardware reset shuts down the circuit’s input voltage, then starts it again.



Note: After resetting the iCOMOX using the Monitor Reset button, to complete the reset action it is necessary to:

- In USB mode - click ‘Disconnect’ and then ‘Connect’.
 - In TCP/IP mode – re-select the iCOMOX POE client from the client table.

- Binary file to text file conversion – [Converts the binary data file to readable text format.](#)

13.2.1.4 Information View

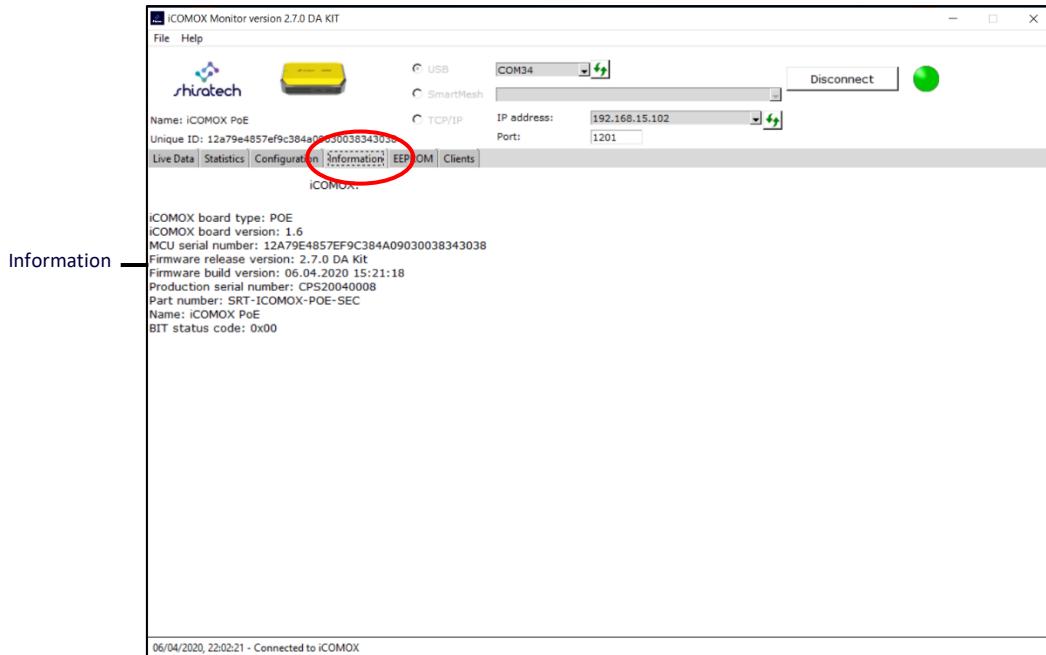


Figure 69: Monitor Information View

The Information View displays the following data:

- iCOMOX hardware information:
 - Type/Edition.
 - Board revision.
 - MCU serial number.
- iCOMOX firmware information:
 - Firmware release version.
 - Firmware build version.
 - Production serial number.
 - Part number.
- Name – User configurable string, describing the iCOMOX client.
- BIT status code – Built-in test result.
 - 0x00 means that all components passed the test successfully. Other status codes represent sensors that did not pass the test (in such case, please refer to the [Troubleshooting](#) section).

13.2.1.5 EEPROM View

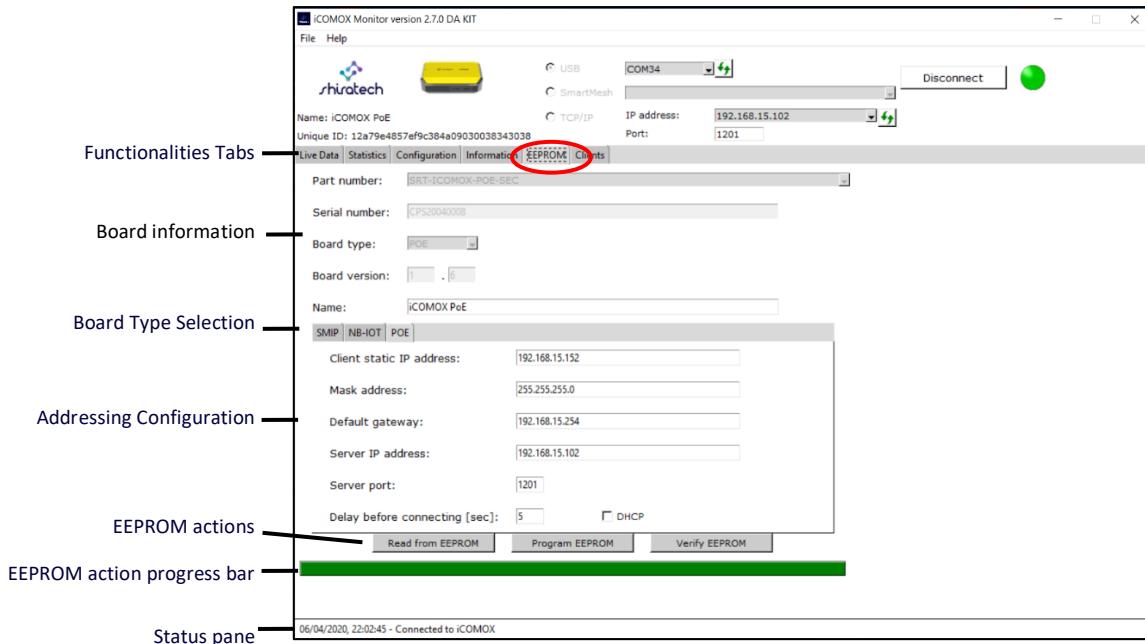


Figure 70: Monitor EEPROM View

The Configuration View displays the following functionalities:

- Part number text field (read only) – displays the part number.
- Serial number (read only) – displays the connected iCOMOX POE unique serial number.
- Name (r/w) – Allows the user to set the iCOMOX with a custom identification string (for example, “Water pump A floor 2”).
- Board type (read only) – displays the iCOMOX board type: NBIOT/SMIP/POE.
- Board revision (read only) – displays the board revision.
- Client static IP address – Configures a static IP for the iCOMOX client within the LAN.
- Mask address – The mask address of the LAN in which the iCOMOX and the PC running the iCOMOX Monitor resides.
- Default gateway – The default gateway of the LAN in which the iCOMOX and the PC running the iCOMOX Monitor resides.
- Server IP address (r/w) – The IP address of the machine running the iCOMOX Monitor.
- Server port (r/w) – The port number representing the machine running the iCOMOX Monitor.
- Delay before connecting [sec] – A delay in seconds between each re-connection attempt.
- Read EEPROM button – Clicking this button will display the settings already programmed to the EEPROM in the text corresponding text fields.
- Program EEPROM button – Clicking this button will result in programming the settings inserted in the text fields to the EEPROM.

- Verify EEPROM button – Clicking this button will perform a comparison between the settings written in the text fields, and the settings programmed to the EEPROM, and display success/failure in the status bar.

13.2.1.6 Clients View

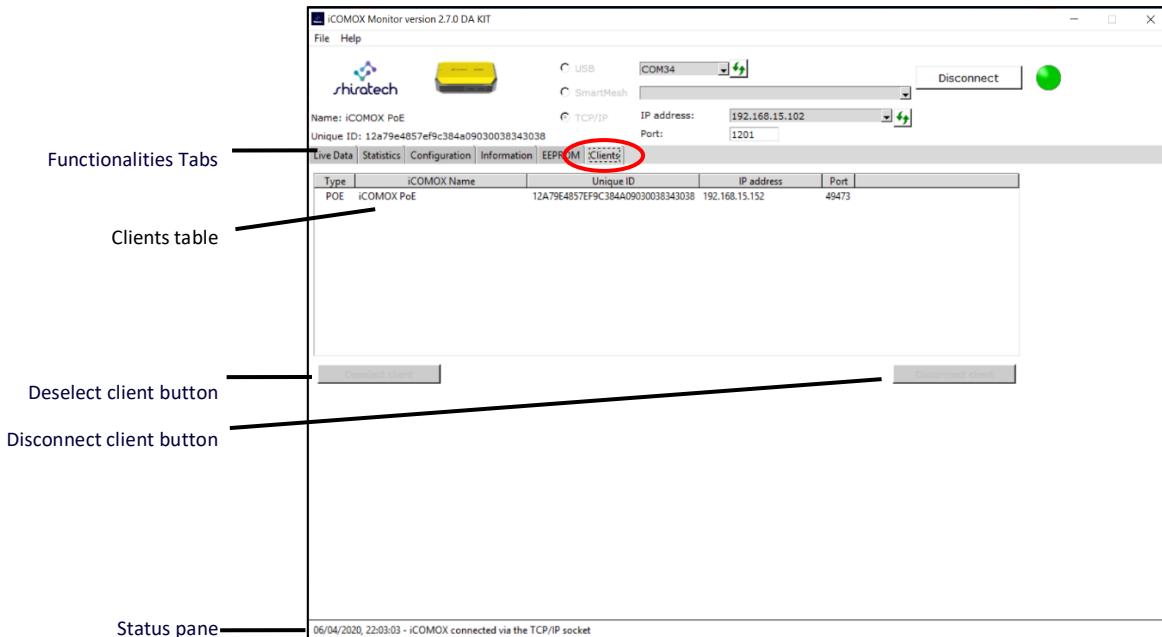


Figure 71: Monitor Clients View

- Client table – Displays the list of iCOMOX clients currently connected to the TCP/IP server.
 - Type – SMIP/NB-IOT/POE
 - iCOMOX Name – User configurable string, for example: “POE Roof, Antenna motor”
 - Unique ID – A factory programmed ID, unique to each individual iCOMOX board.
 - IP address + Port – Shows the remote IP address and port of an iCOMOX client.
- Deselect client button – Stops the selected iCOMOX live data from being displayed in the Live Data view. Once clicked, get/set commands from the configuration tab will no longer apply.
- Disconnect client button – Disconnects the iCOMOX client from the TCP/IP server. Has the same implications as the Deselect buttons with the addition of causing the iCOMOX to re-connect to the TCP/IP server.

13.3 Installing the iCOMOX Monitor

To install the iCOMOX Monitor, perform the following steps:

1. Download the iCOMOX installer file from:
<https://www.shiratech-solutions.com/icomox/>
2. Run the installer file (the ‘iCOMOX Monitor 2.7.0.msi’ file) to launch the installer. The Setup Wizard opens.

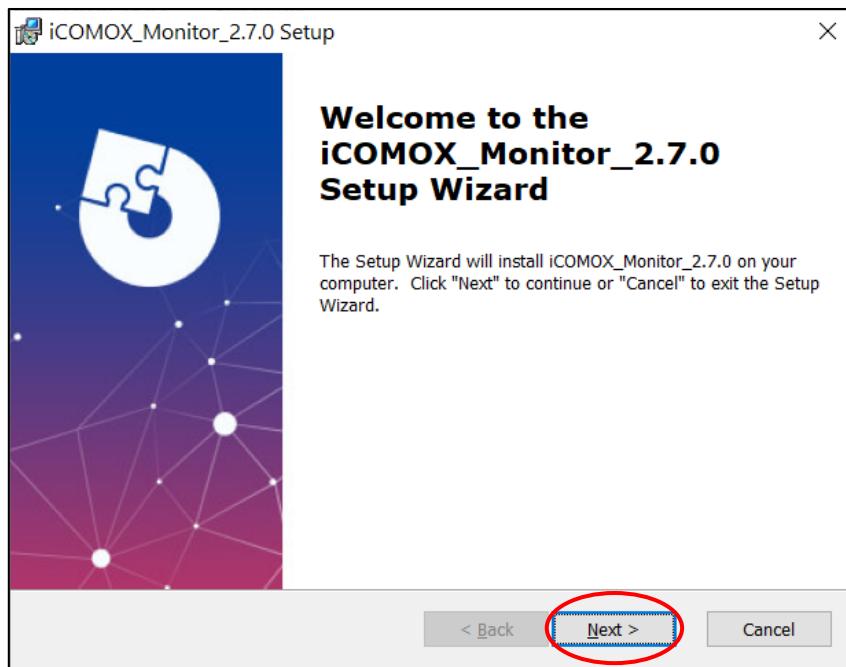


Figure 72: iCOMOX Monitor Installer

3. Click Next, and follow the installation instructions.

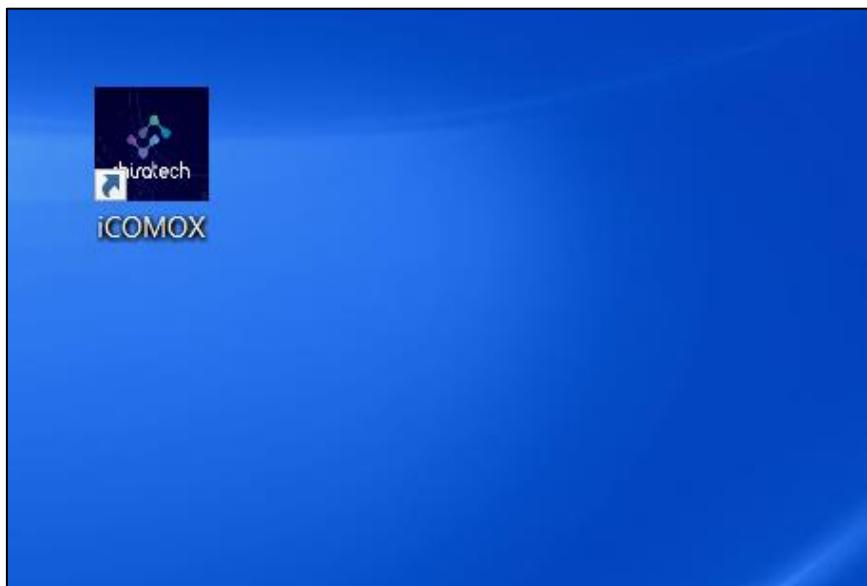


Figure 73: iCOMOX Monitor Desktop icon

14.Troubleshooting

Problem	Possible Reason	Solution
On USB connection , PC does not recognize the iCOMOX	Missing driver for the FTDI.	Follow the instructions in Appendix A: FTDI D2XX Driver .
On USB connection , Monitor does not connect to the iCOMOX. The Colored Status Indicator on the Monitor appears red instead of green after clicking the Connect button.	iCOMOX is not operating.	<ol style="list-style-type: none"> 1. Turn the iCOMOX off and on again. 2. Verify that the Colored Status Indicator on the Monitor is green.
	USB cable is not connected properly.	<ol style="list-style-type: none"> 1. Verify that the USB is connected properly. 2. Close the Monitor, turn the iCOMOX off and on again. 3. Re-launch the Monitor.
	USB cable is damaged.	<ol style="list-style-type: none"> 1. Replace the USB cable. 2. Close the Monitor and turn the iCOMOX off and on again. 3. Verify that the LED is flashing. 4. Re-launch the Monitor.
	Firmware version and Monitor version are not compatible.	<ol style="list-style-type: none"> 1. Download and flash the latest firmware version to the iCOMOX. 2. Download and run the latest iCOMOX Monitor version.
On USB connection , the plots on the Monitor are not updated.	Communication is lost.	<ol style="list-style-type: none"> 1. Try to reconnect by clicking the Disconnect button and then the Connect button on the Monitor. 2. Re-launch the Monitor. 3. If communication is still not re-established, close the Monitor and turn the iCOMOX off and on again.
	Save File to SD Card is checked while no SD card is inserted.	Click disconnect, un-check the Save File to SD Card checkbox, then reconnect.

Monitor does not appear on the screen.	The Monitor requires a great deal of memory.	Wait for the Monitor to appear. It can take up to 40 seconds to appear for the first time.
Monitor COM port drop-down menu is empty. (And the refresh button doesn't help)	USB connection was not recognized by the operating system.	Close the iCOMOX Monitor window, turn the iCOMOX off and then on again.
Monitor Reset button does not reset the connection.	Connection has to be reset manually.	Click the Monitor's 'Disconnect' button, then click 'Connect'.
iCOMOX LED illuminates in red.	Built-in test detected a hardware malfunction. Each bit in the status code represents a different sensor.	Contact technical support.
BIT status code different than 0x00		
Monitor Information tab does not display the firmware version.	iCOMOX started transmitting information before actually connecting.	<ol style="list-style-type: none"> 1) In the Monitor, click 'Disconnect' and then 'Connect'. 2) Restart the iCOMOX by switching the iCOMOX off and back on.
Error in saving file to SD card.	SD card bad format, or no format at all.	<ol style="list-style-type: none"> 1) Save any existing data on the SD card. 2) reformat the SD card. 3) Re-insert the SD card to the iCOMOX.
	SD card is not inserted.	Insert the SD card.
	Not enough available space on the SD card.	<ol style="list-style-type: none"> 1) Save the information on the SD card. 2) Clean the SD card. 3) Re-insert the SD card to the iCOMOX.
	Read only SD card.	Remove write protection from SD card, or get another SD card.
Program EEPROM failed.	Slow program rate due to sensor data, or SD card checked but no SD card inserted.	Un-check all checkboxes in the configuration tab and try again.

<p>On TCP over NB-IOT connection, Monitor is listening for client connections, iCOMOX NB-IOT is switched on, but connection is not established.</p>	<p>Wrong IP address and port are programmed to the EEPROM.</p>	<p>Connect using the USB-C cable, read the settings programmed to the EEPROM and:</p> <ol style="list-style-type: none"> 1. Verify that the IP address and port are indeed the server's public IP address, and the port configured for port forwarding in the server's router. 2. Verify that the port was configured for port forwarding in the server's router.
	<p>Wrong IP address and port are selected in the Monitor.</p>	<p>Verify that the IP address and port selected in the Monitor drop-down menu are the same IP address and port configured for port forwarding.</p>
	<p>Port forwarding is not configured in the server's router/NAT device.</p>	<p>Consult your IT services provider and implement port forwarding.</p>
	<p>Wrong APN Settings are programmed to the EEPROM</p>	<p>Connect using the USB-C cable read the settings programmed to the EEPROM and:</p> <ol style="list-style-type: none"> 1. Verify that the settings were correctly programmed. 2. Consult your service provider to verify the correctness of the APN settings.
	<p>Varying network conditions and signal quality.</p>	<p>Under certain network conditions, it may take up to 6 minutes for the iCOMOX NB-IOT to connect.</p>

<p>On TCP over NB-IOT connection, iCOMOX NB-IOT client is connected via TCP/IP connection, but the plots in the Live Data view are not updated.</p>	<p>Client is not selected in the clients table.</p>	<ol style="list-style-type: none"> 1. Open the Clients tab, and select the client from the clients table, then go to the Configuration tab, select the desired sensors and click on ‘Set’. 2. In case the client does not appear in the list, it is possible that the client got disconnected due to network conditions. Please wait for 6 minutes for the client to re-appear on the clients tab.
	<p>Wrong sensors output channel is selected.</p>	<p>In the configuration tab, in the Data Acquisition view, verify that TCP/IP / SMIP radio button is selected under ‘Sensors output channel’.</p>
	<p>Save File to SD Card is checked while no SD card is inserted.</p>	<p>Un-check the Save File to SD Card checkbox, then send another ‘Set’ command.</p>
	<p>An unexpected error occurred. Undefined state.</p>	<ol style="list-style-type: none"> 1. Select the iCOMOX NB-IOT client in the client list and click on the ‘Disconnect client’ button. 2. Wait for the iCOMOX NB-IOT to re-connect (may take up to 6 minutes). 3. If possible, shut down the TCP server for 2 minutes, then re-launch it and bring it to ‘listening for client connections’ state, then wait for the iCOMOX to reconnect.

	<p>Wrong IP address and port are programmed to the EEPROM.</p>	<p>Connect using the USB-C cable, read the settings programmed to the EEPROM and:</p> <ol style="list-style-type: none"> 3. Verify that the IP address and port are indeed the server's public IP address, and the port configured for port forwarding in the server's router.
	<p>Wrong IP address and port are selected in the Monitor.</p>	<p>Verify that the IP address and port selected in the Monitor drop-down menu are the same IP address and port configured for port forwarding.</p>
<p>On TCP over Ethernet connection, Monitor is listening for client connections, iCOMOX POE is switched on, but connection is not established.</p>	<p>iCOMOX is connected on a network external to the Monitor PC's LAN. Port forwarding is not configured in the server's router/NAT device.</p>	<p>Consult your IT services provider and implement port forwarding.</p>
	<p>Wrong subnet mask or default gateway.</p>	<p>Consult your IT services provider</p>
	<p>Another client in the LAN is already using the IP address which was defined as the iCOMOX POE's client's static IP address</p>	<ol style="list-style-type: none"> 1. Try using a different static IP address for the iCOMOX. 2. Try checking the DHCP checkbox in the EEPROM tab, program the EEPROM and reset the iCOMOX, to have the DHCP server assign an IP address to the iCOMOX (consult with your IT services provider to verify that DHCP is properly configured in your LAN).

	<p>Client is not selected in the clients table.</p>	<ol style="list-style-type: none"> 3. Open the Clients tab, and select the client from the clients table, then go to the Configuration tab, select the desired sensors and click on 'Set'. 4. In case the client does not appear in the list, it is possible that the client got disconnected due to network conditions. Please wait for 6 minutes for the client to re-appear on the clients tab.
<p>iCOMOX POE client is connected via TCP/IP connection, but the plots in the Live Data view are not updated.</p>	<p>Wrong sensors output channel is selected.</p>	<p>In the configuration tab, in the Data Acquisition view, verify that TCP/IP / SMIP radio button is selected under 'Sensors output channel'.</p>
	<p>Save File to SD Card is checked while no SD card is inserted.</p>	<p>Un-check the Save File to SD Card checkbox, then send another 'Set' command.</p>
	<p>An unexpected error occurred. Undefined state.</p>	<ol style="list-style-type: none"> 4. Select the iCOMOX POE client in the client list and click on the 'Disconnect client' button. 5. Wait for the iCOMOX POE to re-connect (may take up to 6 minutes). 6. If possible, shut down the TCP server for 2 minutes, then re-launch it and bring it to 'listening for client connections' state, then wait for the iCOMOX to reconnect.

It is not possible to flash the iCOMOX using the flash programmer.	Some unexpected error occurred during the previous flashing (for example, the cable got disconnected while flashing).	<ol style="list-style-type: none">1. Go back to the flashing instructions chapter and verify that you have followed the instructions in a precise manner.2. Verify that the USB cable you are using is not damaged.3. Perform the instructions in Appendix B – Erasing the flash.4. Flash the iCOMOX again with the latest firmware according to the instructions.
In SMIP mode, mote does not get recognized by the Monitor for more than one minute.	Possible jamming due to conflicting transmission sources	Verify that no 2.4Ghz transmission sources are near the dongle or the iCOMOX.

15.Appendix A: FTDI D2XX Driver

D2XX drivers allow the iCOMOX monitor (and other applications as well) direct access to the USB device through a DLL.

To install the driver from FTDI website:

1. Go to <https://www.ftdichip.com/Drivers/D2XX.htm>.
2. Press the setup executable which is often found on the top-right side of the table (see Figure).

Currently Supported D2XX Drivers:							
Operating System	Release Date	Processor Architecture					
		x86 (32-bit)	x64 (64-bit)	ARM	MIPS	SH4	Comments
Windows*	2017-08-30	2.12.28	2.12.28	-	-	-	WHQL Certified for Windows VCP® and D2XX. Available as a setup executable. Please read the Release Notes and Installation Guides.
Windows RT	2014-07-04	1.0.2	-	1.0.2	-	-	A guide to support the driver (AN_271) is available here
Linux	2018-06-22	1.4.8	1.4.8	1.4.8 ARMv5 soft-float 1.4.8 ARMv5 soft-float uclibc 1.4.8 ARMv6 hard-float (suits Raspberry Pi) 1.4.8 ARMv7 hard-float 1.4.8 ARMv8 hard-float	1.4.8 MIPS32 soft-float 1.4.8 MIPS32 hard-float 1.4.8 MIPS openwrt-uclibc	-	If unsure which ARM version to use, compare the output of <code>readelf -f file</code> commands on a system binary with the content of <code>release/build/libfd2xx.txt</code> in each package. ReadMe Video Install Guide NEW
Mac OS X							If using a device with standard FTDI vendor and product identifiers, install <code>D2xxHelper</code> to prevent OS X 10.11 (El Capitan) claiming the device as a serial port (locking out D2XX programs).

Figure 53: Setup executable FTDI D2XX driver

16.Appendix B: Erasing the Flash

In case, for some reason, it is no longer possible to flash the iCOMOX, as a last resort, you may attempt to erase the flash.



Note: Before moving forward to erasing the flash, be sure to have carefully read the regular [flashing instructions](#), and verify that you have correctly followed these instructions.

1. Download the CrossCore Serial Flash Programmer utility from this [link](#).
2. Install and run the CrossCore Serial Flash Programmer utility.
3. Select the same settings as in the below screenshot:

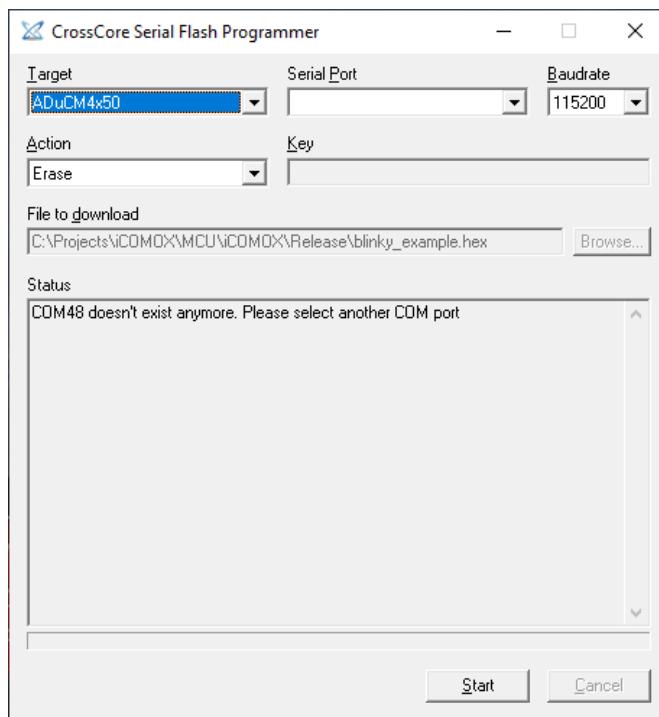


Figure 54: CrossCore Serial Flash Programmer settings selection.

4. Make sure to select the correct Serial Port which the iCOMOX is connected to.
5. Perform the same button pressing sequence described in the [flashing instructions](#).
6. Perform the erasing action by pressing 'Start'.
7. Once erasing is completed, you are ready to flash the iCOMOX again with the latest firmware.

17. Document Revision History

Revision	Date	Author	Status and Description
2.0	30.07.2019		Initial version
2.0	30.08.2019	M Elias	Revision
3.0	12.09.2019	Ori Makover	Re-organization
3.0	15.09.2019	M Elias	Revision
3.1	06.10.2019	Ori Makover	New software release - update
3.2	28.10.2019	Ori Makover	New software release – update
3.3	20.11.2019	Ori Makover	New software release - update
3.4	19.01.2020	Ori Makover	NB-IoT
3.5	07.04.2020	Ori Makover	POE
3.6	22.04.2020	Ori Makover	Unified doc – SMIP/NB-IOT/POE

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