DC Current Transducers

CT-BOX

CT-BOX Viewer
User Interface Manual

PRECISION CURRENT TRANSDUCERS

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Document Revision	Date	Comment
1.0.0	July 21st 2015	First Release
1.1.0	November 2022	Redesigned GUI
2	August 7th 2024	Updated address and revision numbering
3	August 21th 2024	Redesigned GUI Add User calibration section
4	May 8th 2026	Redesigned GUI and reviewed manual. Quick Start Guide aligned with FW v3.0.00 and CT-BOX Viewer v2.0.00

1. Introduction and Installation

The ***CT-BOX Viewer*** provides easy remote control of the CT-BOX using a Graphical User Interface (GUI). It supports simultaneous control of one or more CT-BOX units at the same time, acquiring and plotting current (measured through a matched DCCT head) and temperature readings via the Ethernet interface.

The CT-BOX Viewer is available for both Windows and Linux platforms.

1.1 Windows

Run the installer *ct-box-viewer_x.x.x.exe* as Administrator and follow the on-screen procedure [see **Figure 1**]. To uninstall the software, use the standard procedure via ***Start>Settings>Apps***.

1.2 Linux

Before running the application, the *.AppImage* file must be made executable. This can be done in one of two ways:

- In the file manager, right-click the file, open ***Properties>Permissions***, and check "*Allows Executing file as program*"; or
- From a terminal, run: *chmod +x ct-box-viewer_x.x.x.AppImage*.

Once the file is executable, from the file directory, run the file as administrator via the command:

- sudo *./ct-box-viewer-js-x.x.x.AppImage*

and then follow the procedure [see **Figure 2**].

Clicking *'Run without installing'* will launch the app as a single instance [see **Figure 3**].

Clicking *'Install'* will install the application to the specified directory and add it to the launcher [see **Figure 4**].
If the application has already been installed, a version check will be performed; if the version differs from the one currently installed, the installation pop-up[**Figure 2**] will be displayed.

The first time the app is launched, the EULA will be displayed.

In this case, since the application is portable, it is not necessary a proper uninstallation. Anyway, if the user would like to completely remove it, remove the configuration folder *$HOME/.config/ct-box-viewer and remove the file ct-box-viewer.desktop from $HOME/.local/share/applications and remove $HOME/Applications/ct-box-viewer.AppImage*

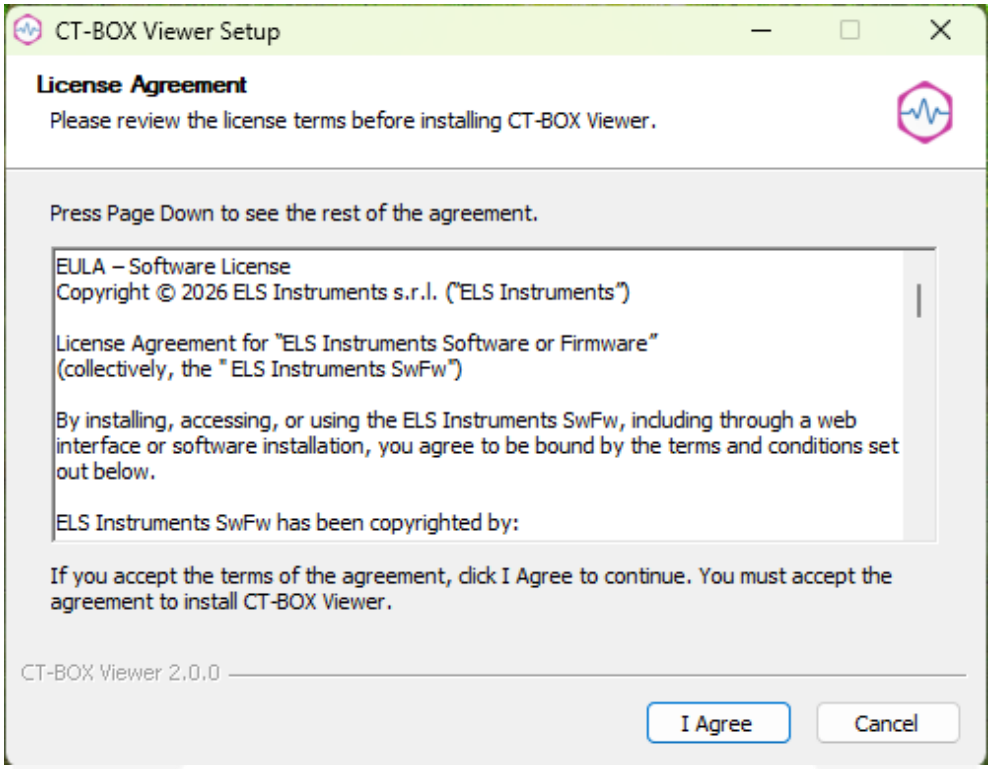

Figure 1: CT-BOX Viewer Setup for Windows

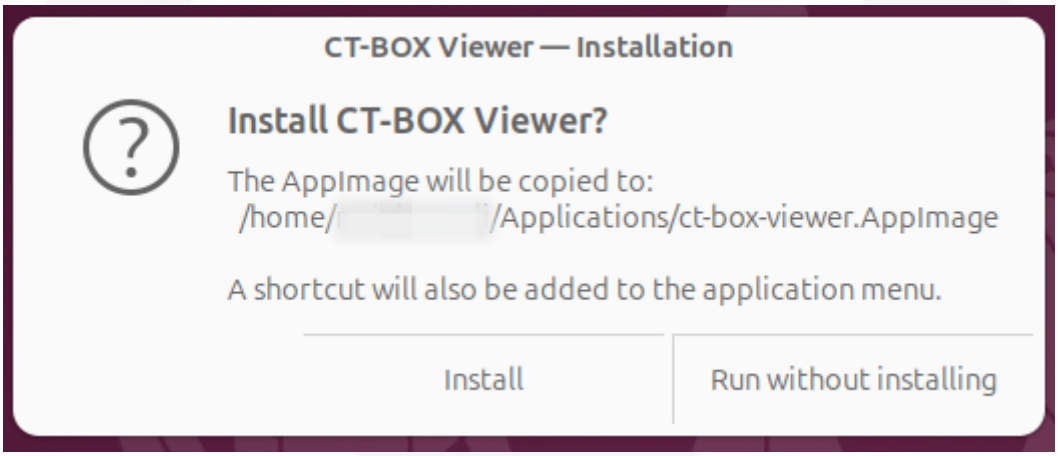

Figure 2: Popup installation for Linux

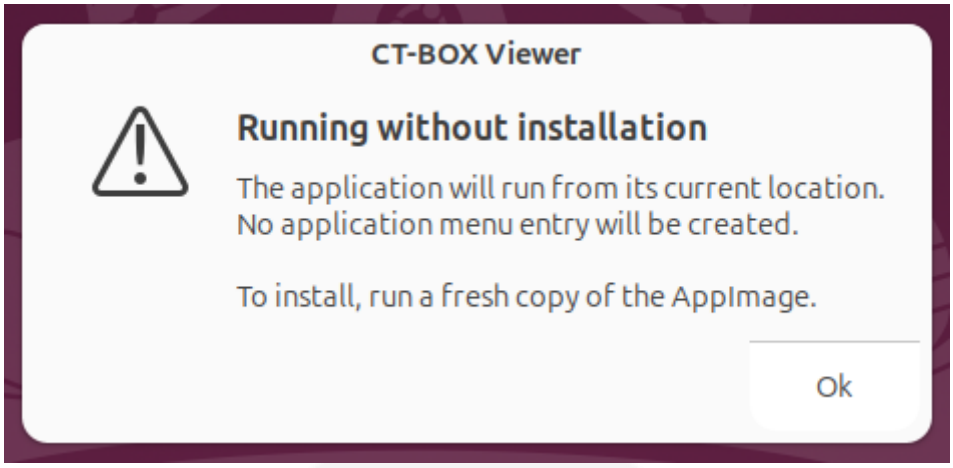

Figure 3: Popup running without installation for Linux

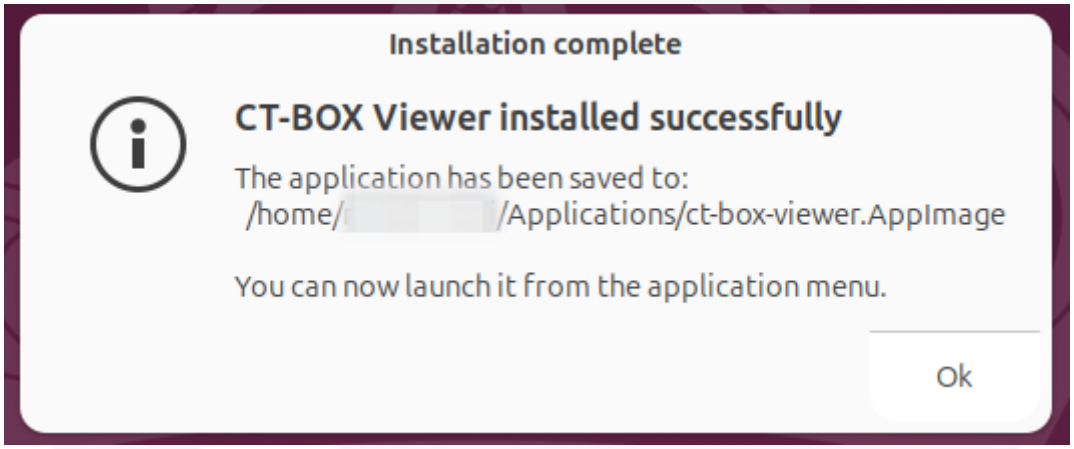

Figure 4: Popup installed successfully CT-BOX Viewer for Linux

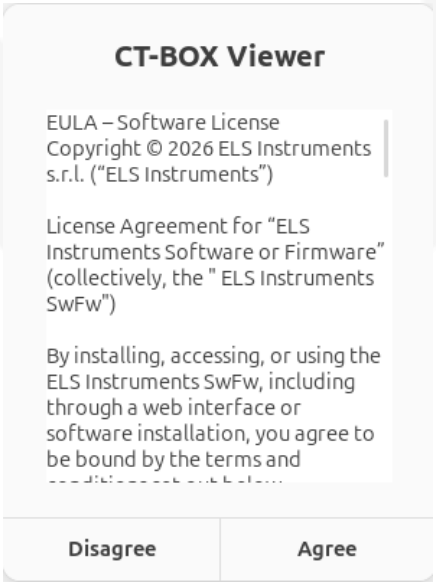

Figure 5: CT-BOX Viewer EULA for Linux.

2. Quick Start

2.1 Establishing a connection

The CT-BOX communicates remotely via a 10/100 auto-negotiating Ethernet socket located on the front panel of the unit.

The **CT-BOX Viewer** main window (see **Figure 6**) is organized around a **left sidebar**, which allows managing one or more CT-BOX devices. From the top-left section of the sidebar, it is possible to switch between the two available view modes: **Data Logger** (default) and **Oscilloscope**.

The lower section varies depending on the active mode: in *Data Logger* mode (see **2.6.1**) provides controls to set the current and temperature graph limits; in *Oscilloscope* mode (see **2.6.2**) it displays the Channel and Trigger options.

To connect to a CT-BOX unit, select the desired device from the list in the left sidebar and click on *Connect*.

Figure 6: CT-BOX Viewer Main window

2.2 Device Card List

The left sidebar allows the user to manage and establish communication with the CT-BOX units.

There are two buttons on the top on device card list (see **Figure 7**):

- **Scan Devices:** This button initiates an automatic network scan to discover available CT-BOX units in the subnetwork. Once found, the devices will appear in the list with their respective IP addresses.
- **Add Device:** This button allows for the manual addition of a specific CT-BOX unit by entering its IP address (see **Figure 8**).

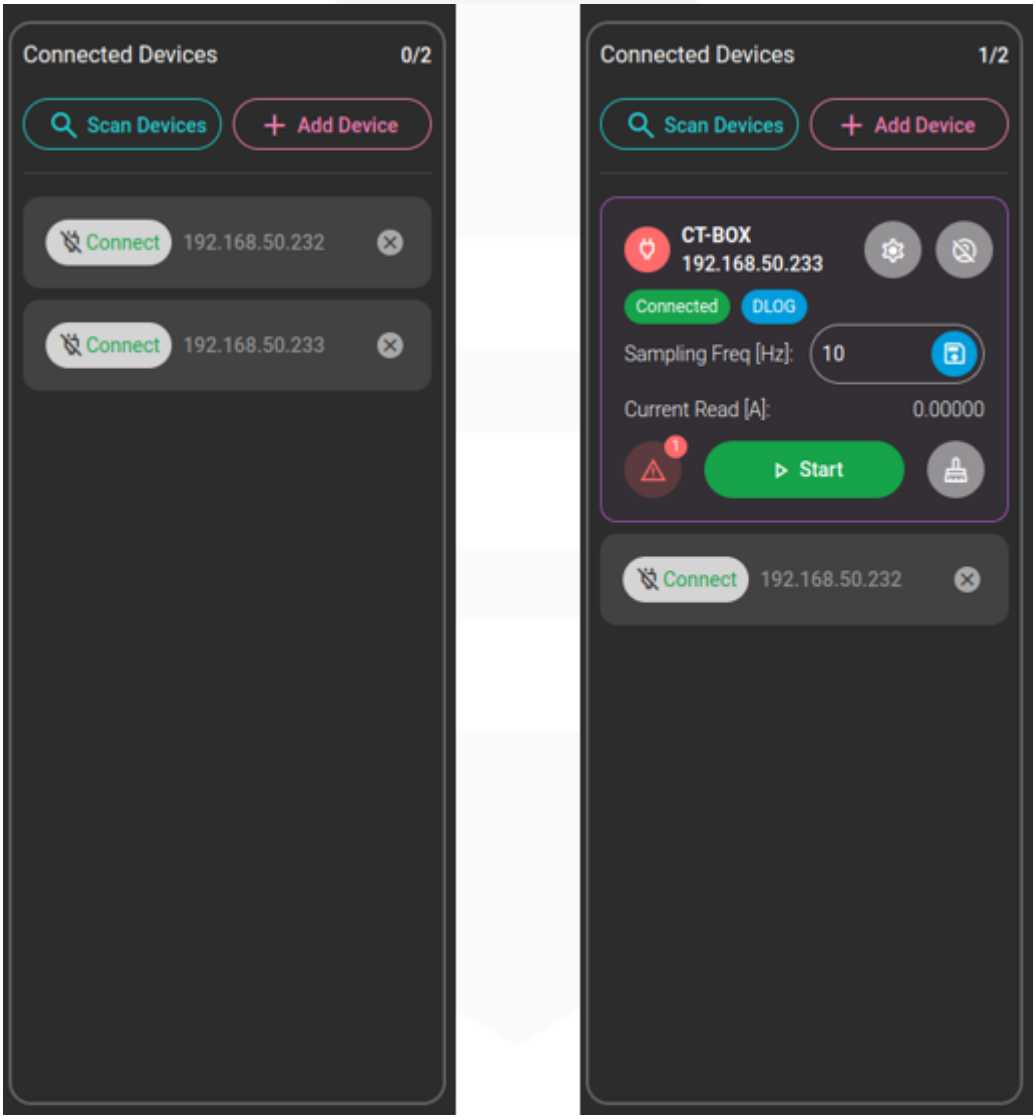

Figure 7: Device Card List.

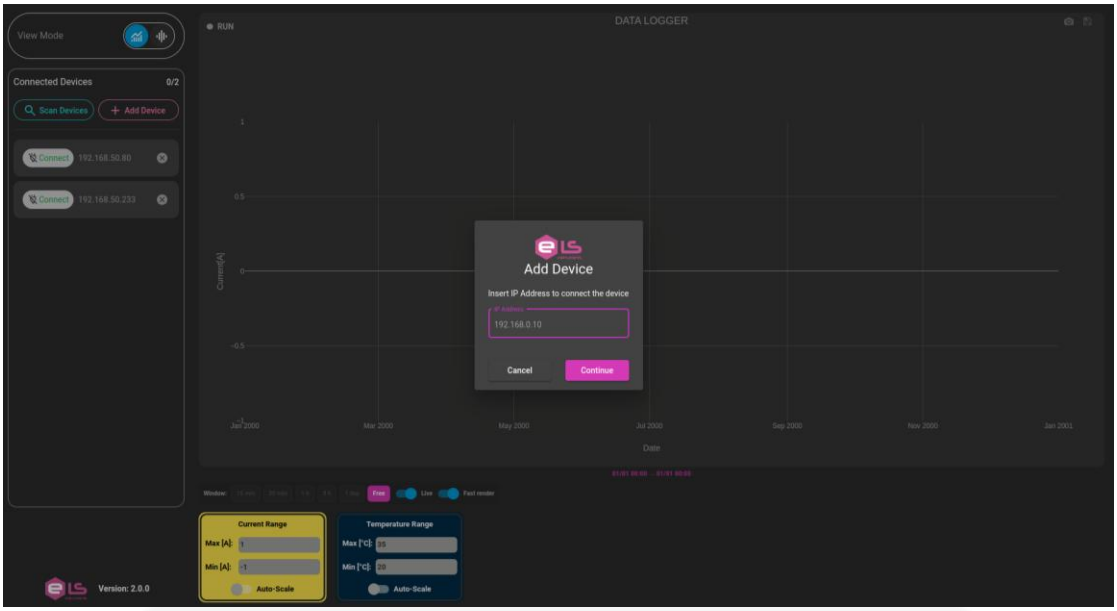

Figure 8: *Add Device* popup.

The software supports multiple CT-BOX units, which can be managed and configured simultaneously using their dedicated cards or popup menus. The software supports simultaneously four CT-BOX units in *Data Logger* mode and one in *Oscilloscope* mode.

2.3 Device Card

Upon connecting a CT-BOX, the **device card** populates with the operational interface shown below, consisting of functional buttons, input fields, and status indicators:

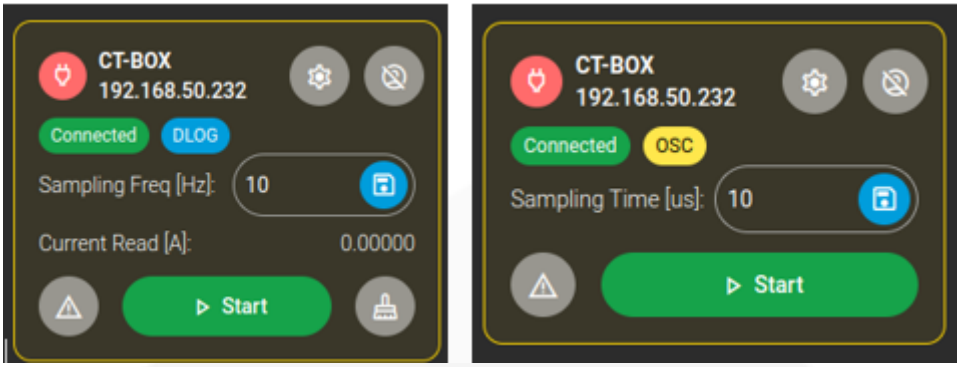

Figure 9: Device card menu for CT-BOX connected.

- **DISCONNECT** : Stops communication and closes connection with the unit.
- **SETTINGS MENU**: Access device settings menu (see **2.4**).
- **LOGIN WITH PRIVILEGES**: Manage user access levels.
- **STATUS CONNECTION:** Displays the device connection status (Connected or Offline).
- **DLOG/OSC:** Shows the acquisition mode (Blue background: **Data Logger**; Yellow background: **Oscilloscope**).
- **SAMPLING FREQ:** Displays the Data Logger sampling frequency. Use the **Save** icon to apply the value entered in the input field. *(Data Logger mode only)*.
- **SAMPLING TIME:** Displays the Oscilloscope sampling time. Use the **Save** icon to apply the value entered in the input field. *(Oscilloscope mode only)*.
- **CURRENT READ:** Displays the latest current reading from the CT-BOX. *(Data Logger mode only)*.
- **FAULT STATUS**: Shows device status and any active faults (see **2.5**)
- **START/STOP:** Starts or stops data acquisition in the current mode (Data Logger or Oscilloscope).
- **CLEAR**: Clears the device traces from the graph. *(Data Logger mode only)*.

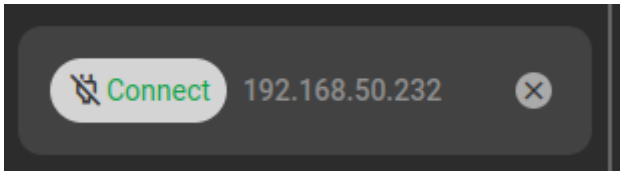

Figure 10 Device card for CT-BOX disconnected.

- **CONNECT** : Starts communication with the selected unit
- **CLOSE** ✕ : Removes the device card from the list.

2.4 Device Popup Menu

2.4.1 GENERAL

In the GENERAL tab (see **Figure 11**), you can view the CT-BOX serial number, the firmware version, and the **matched head** (the specific DCCT head required for current sensing).

At the bottom, three editable fields are available:

- **Device ID:** Name of CT-BOX
- **Device Date** (format: dd/mm/yyyy): Date of CT-BOX
- **Device Time** (format: hh:mm:ss): Time of CT-BOX

Note: Each of these three fields can be saved individually using its respective save button.

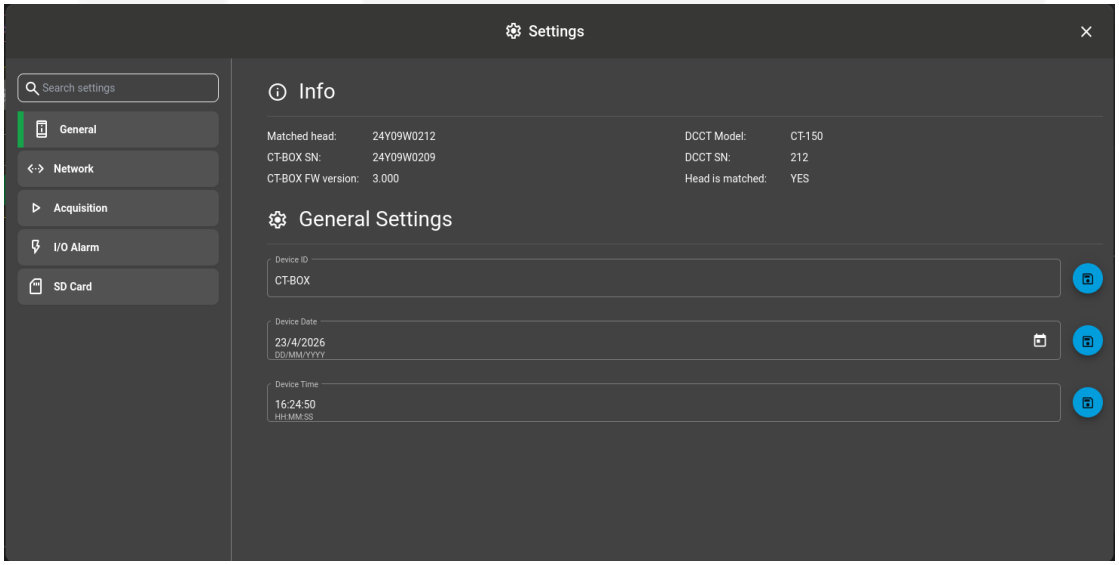

Figure 11 General settings tab.

2.4.2 NETWORK

In the NETWORK tab (see **Figure 12**), you can modify *the IP address*, *Netmask*, and *Gateway* of the CT-BOX.

Important: If any changes are made:

- The CT-BOX will perform a software reboot automatically to apply the new settings.
- A manual power cycle (turning the hardware off and on) is not required.
- After the reboot, you must reconnect the device in the viewer by following the initial procedure.

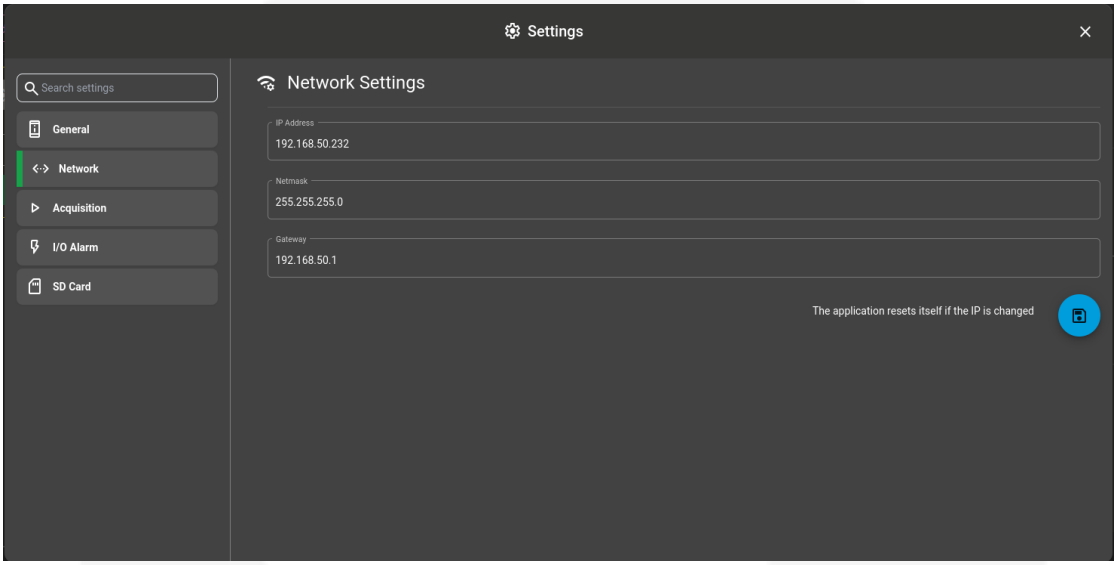

Figure 12 : Network settings tab.

2.4.3 ACQUISITION

In the ACQUISITION tab (see **Figure 13**), you can select the operation mode and configure the following parameters:

Data-Logger Mode:

- **Acquisition Frequency:** Set the frequency in Hz (0.1 Hz resolution).
- **SD Card Storage:** Enables data logging to an SD card. To mount the card, refer to sec 2.4.5.

Note: If logging is enabled without a mounted SD card, the acquisition will stop immediately upon starting as data cannot be saved.

Oscilloscope Mode:

- **Sampling Time:** Set the sampling interval in ms (10 ms resolution).

Configuration (Both Modes):

- **Ip-turns:** Set the primary current scaling factor based on the number of conductor windings passing through the DCCT head.
- **Average Current** : Use it to read the current.
- **Zero Offset** : Click to clear any offset.

IMPORTANT: The Zero Offset procedure must be performed only when no primary current is flowing.

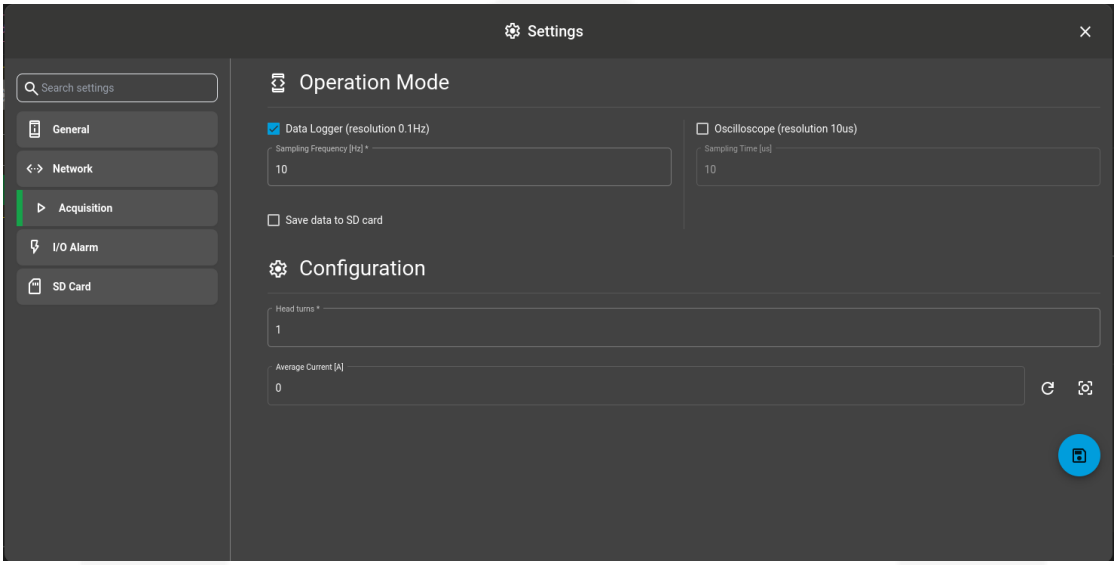

Figure 13: Acquisition tab settings.

2.4.4 I/O ALARM

In the **I/O ALARM** tab (see **Figure 14**), you can configure the trigger sources and alarm thresholds:

- **Trigger Source Settings:** Enable the I/O Trigger checkbox to choose between:
  - **Output Trigger Generation:** The device generates a trigger signal.
  - **External Trigger:** Use an external signal to start the acquisition.
- **Alarm Settings:** Enable the Alarm checkbox to set *Upper* and *Lower* current limits (in [A]).

If an alarm limit is exceeded, a warning is generated. This is indicated on the **device card** by a **warning icon** showing the total number of active alarms, if you need detailed information available on sec 2.5.

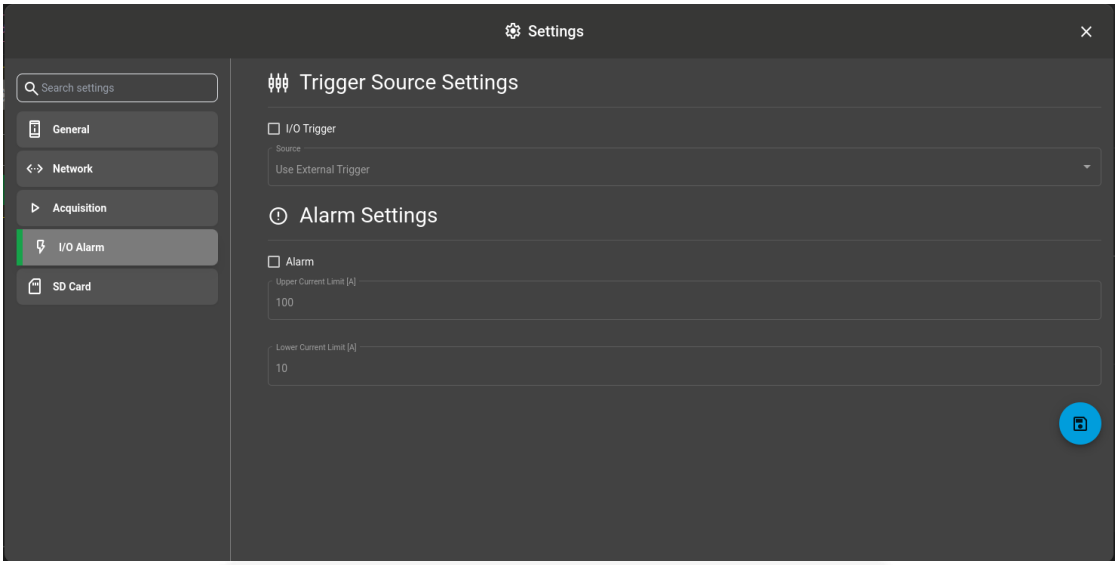

Figure 14 I/O Alarm tab settings.

2.4.5 SD CARD MANAGER

The **SD CARD MANAGER** tab (see **Figure 15**) features three main controls: *Save*, *Delete*, and *Mount/Unmount.* The **Save** and **Delete** buttons remain disabled until the SD card is successfully mounted.

Once the SD card is mounted, you can:

- **Save:** Export file data in .txt format.
- **Delete:** Remove selected files from the SD card.
- **Search:** Use the input field to filter and find files by name.

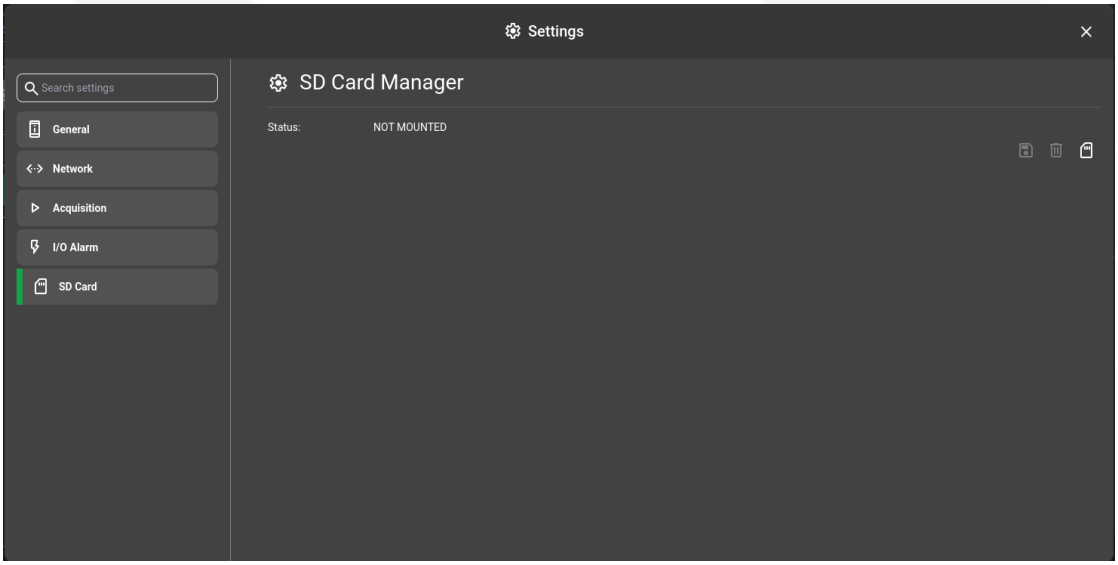

Figure 15: SD Card Manager tab settings

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2.5 FAULT ⚠

The **FAULT icon** changes color based on the device status (see **Figure 16**):

- **Grey:** No faults or alarms detected.
- **Yellow: Active Alarm** conditions (current outside limits) (see 2.4.4)
- **Red: Active Fault** condition (system error).

Note: If both a fault and an alarm occur simultaneously, the icon will turn **Red** to prioritize the fault notification.

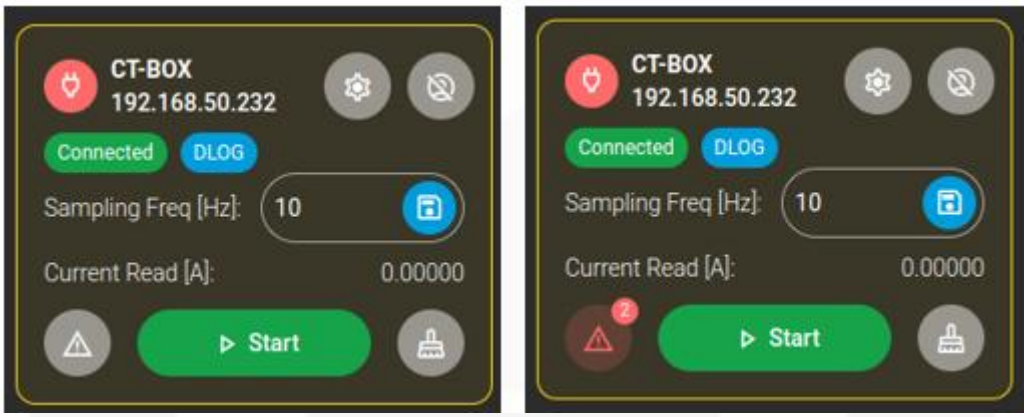

Figure 16:No-Fault/ Fault icon colour status on device card.

Clicking the icon opens a popup (see **Figure 17**) showing:

- **Errors (Left Column):** System-level hardware or communication errors.
- **Alarms (Right Column):** Triggered based on the **I/O ALARM** setting

The **Reset Faults** button on the Status window allows you to reset the Alarm and Error conditions of the CT-BOX.

The **Reset Faults** button is always visible. If the CT-BOX is currently acquiring data, the reset process follows a two-step logic:

1. **First Click:** At this stage, a warning is implied: *resetting the faults will stop the ongoing acquisition*
2. **Second Click:** Upon clicking again ("*Reset Faults*"), the acquisition is immediately stopped, and faults are resetted.

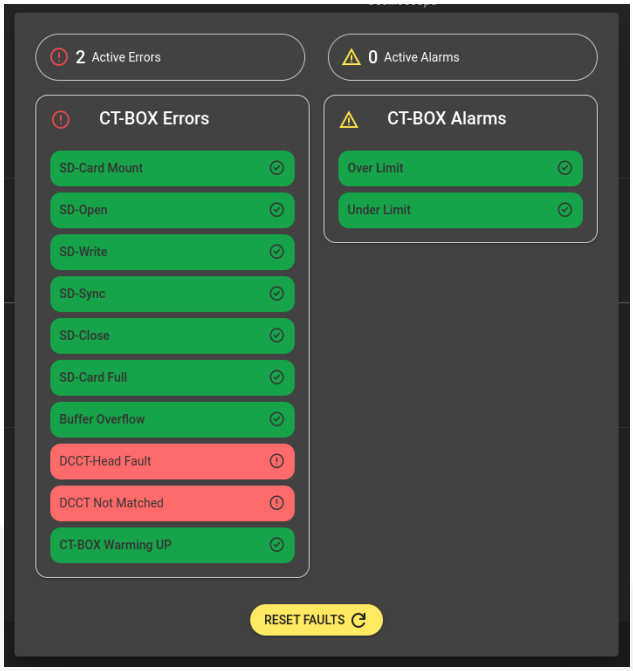

Figure 17 Errors and Alarms that can occur during the CT-BOX operation.

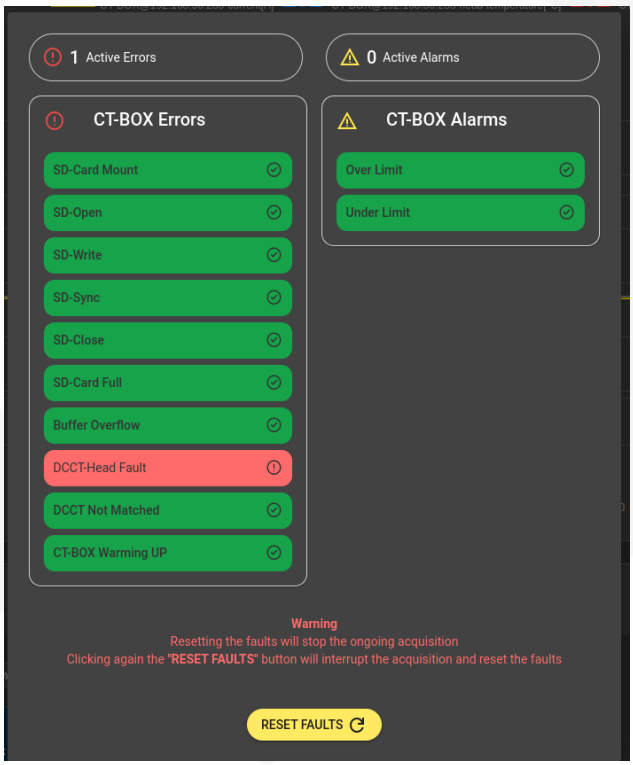

Figure 18: Errors and Alarms that can occur during acquisition after first click on CT-BOX operation.

2.6 CT-BOX Viewer Main Window

Once at least one unit has been selected from the **View Mode** you must select the appropriate viewer mode: *Data-Logger* or *Oscilloscope*.

Important: The mode selected on main viewer must match the operation mode previously configured in the ACQUISITION tab of the Settings menu Data-Logger Mode (sec **2.4.3**)

When the CT-BOX is connected and configured in **Data-Logger** mode, the main chart displays the acquired current (left Y-axis) and temperatures (right Y-axis).

2.6.1 Data Logger Mode

CHART NAVIGATION & SCALING

- **Manual Scaling:** Set current limits in the *yellow box* and temperature limits in the *blue box* at the bottom of the window.
- **Auto-Scaling:** Double-click anywhere on the chart to apply automatic scaling. Double-click again to return to the previous view.
- **Trace Management:** Single-click a legend item to *Hide/Show*; double-click to **Isolate**.

TIME WINDOW BUTTON & RANGE SLIDER

- **Time Range:** Select a *Window* button (15 min, 30 min, 1h, 8h, Free) to set the visible time span. Use the *Range Slider* at the top to navigate along the X-axis.
- **Live Toggle:**
  - **ON:** Displays data in real-time.
  - **OFF:** The chart freezes, showing data relative to the timestamp when the window button was clicked.

FAST RENDER

The *Fast Render* toggle is enabled by default to optimize performance.
Adaptive Decimation: When the plotted points exceed 200,000, the software automatically reduces the visual density to maintain responsiveness.
Disabled: If turned off, all data points are rendered.

CAUTION: Disabling Fast Render is not recommended as it may significantly slow down or cause the CT-BOX Viewer to hang.

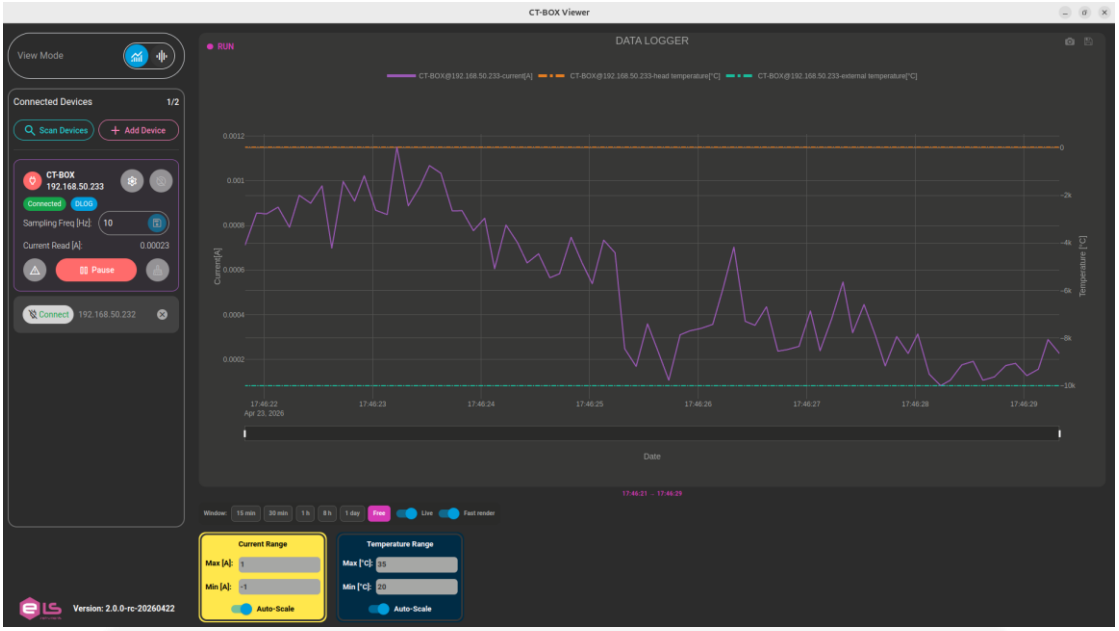

Figure 19: Example of acquisition in Data-Logger mode

2.6.2 Oscilloscope Mode

When the CT-BOX is configured in **Oscilloscope** mode, the main plotter displays the acquired current in Amperes **[A]**.

Trigger Toolbar (Top): Use the toolbar at the top of the window to configure the trigger options and common options.

Channel Settings (Bottom): A dedicated control area at the bottom allows you to manage the acquisition channel settings, including:

- **Gain:** change the multiplication scaling factor (*Scale*, expressed in [1/A])
- **Offset**
- **AC:** Enable this toggle to filter out the DC component from the signal

TOOLBAR

TRIGGER OPTIONS

Once the trigger is enabled, the following parameters can be configured:
Source: Select the trigger source from the connected CT-BOX units.
Edge: Choose the trigger slope (**Positive**, **Negative**, or **Both**).
Level [A]: Set the current threshold for the trigger event.
Position [sec]: Adjust the horizontal position of the trigger event on the time axis.

TRIGGER MODE

The system supports four distinct trigger modes to capture waveforms:

- **NORMAL:** it plots the signal any time the trigger condition is met, otherwise it does not update the waveform;
- **AUTO:** it automatically sets a trigger configuration in order to meet the condition;
- **SINGLE:** it plots the signal only the first time the trigger condition is met, then it stops the window updating;
- **STOP:** it forces the stop of the window updating

TIME WINDOW

Time Window [s]: Defines the total time duration displayed on the X-axis.

Figure 20: Example of a window acquisition in Oscilloscope mode.

VIEW SETTINS

Use the **Select** dropdown menu to switch the plotter between time-domain and frequency-domain analysis

- **TRACES:** Displays current as a function of time.
- **FFT (Magnitude Spectrum):** Displays the magnitude as a function of frequency.

Figure 21: Oscilloscope view with all options.