



Biosignals **PRO**

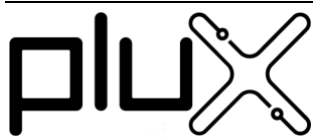
User Manual & Datasheet



www.pluxbiosignals.com

This product is intended solely for life sciences research and educational purposes. It is not a medical device and is not intended for diagnosis, treatment, or any form of medical use.

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Biosignals PRO

Designed & Made in Portugal

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Biosignals PRO

General Information

Biosignals PRO is a next-generation wireless data acquisition system designed for high-performance recording of multiple physiological and biomechanical signals.

It serves as the central hub for **PLUX Smart Sensors**, enabling synchronized, real-time capture of biosignals such as EMG, ECG, EDA, PPG, respiration, motion, and many more.

Compact, durable, and fully digital, Biosignals PRO is built for **life-science research, biomedical engineering, and educational environments**, providing researchers and students with a versatile platform for data collection and analysis under controlled laboratory or field conditions.

The system combines:

- Multi-channel analog front-end for up to 11 (10 external + 1 internal motion sensor) simultaneous Smart Sensors and analog sensors
- Integrated motion sensing (accelerometer and gyroscope)
- High-speed wireless transmission and onboard data logging
- Automatic sensor detection and configuration
- Compatibility with **Biosignals Studio** for data visualization and analysis

Datasheet

Overview

Table 1: General Sensor Information

Attribute	Information
Device	Biosignals PRO
Product Code (SKU)	840201001
Product Line	Biosignals PRO
Description	High-performance wireless biosignal acquisition hub supporting up to 10 Smart Sensors for simultaneous recording of physiological and biomechanical signals. Combines onboard data logging, wireless connectivity, and real-time signal streaming for research and educational use.
Features	<ul style="list-style-type: none"> - 10-port Smart Sensor interface (auto-detection) - Integrated Motion Sensor - Real-time wireless data streaming via Bluetooth - Internal memory for offline data recording - Multi-color LED status indicator - Automatic firmware updates via Biosignals Studio - Compact, lightweight, and rechargeable design
Use Case Applications	<ul style="list-style-type: none"> - Biomedical and life-science research - Human physiology and biomechanics studies - Sports and movement analysis - Teaching and laboratory education - Signal processing and algorithm development
Excluded Applications	This product is not a medical device and must not be used for diagnosis, treatment, or patient monitoring.
Compatible Systems	PLUX Smart Sensors and Biosignals Studio software biosignalsplux (analog sensors)

Device Specifications

Table 2: Device Specifications

Attribute	Information
Number of Ports	10 hybrid ports (analog and digital)
Number of Channels	Up to 128 per port
Internal Storage	Via microSD Card Shipped with 32 GB microSD card, supports up to 256 GB
Sampling Rates for Smart Sensors	Varies per sensors; see sensor documentation for details
Sampling Rates for Legacy Sensors (biosignalsplux sensors)	4.000 Hz 2.000 Hz 1.000 Hz 500 Hz 250 Hz 125 Hz
Sampling Resolution for Smart Sensors	Varies per sensors; see sensor documentation for details
Sampling Resolution for Analog & Legacy Sensors (biosignalsplux Sensors)	24-bit
# of Buttons	1 Power button

Communication Interfaces

Table 3: Communication interfaces

Attribute	Information
Wireless Communication	Bluetooth Low Energy (BLE 5.4) WiFi
Wired Communication	USB-C (through Biosignals PRO USB-C Adapter)
Communication Protocol	Proprietary PLUX protocol
Compatible Software	Biosignals Studio, PLUX SDK

Battery & Charging Specifications

Table 4: Battery & charging specifications

Attribute	Information
Battery Type	3.700 mAh LiPo Battery (integrated into the device)
Rechargeable	Yes
Replaceable	No
Charging Time	10 hours to full charge 7 hours to 80%
Charing Lifetime	Up to 10 hours streaming (BLE)
Auto Power-Off	After 5 min of inactivity

Physical Specifications

Table 5: Physical specifications

Attribute	Information
Dimensions	130 x 67 x 22 mm
Weight	152 g
Enclosure Material	ABS (Acrylonitrile Butadiene Styrene), impact-resistant thermoplastic with a matte finish
Color	Black
Mounting Options	Quad Lock™ Mounting System

Environmental Specifications

Table 6: Environmental specifications

Attribute	Information
Operating Temperature	-20 to 60 °C
Charging Temperature	0 to 45 °C
Short-Term Storage	-20 to 45 °C
Long-Term Storage	5 to 30 °C
Information for Battery Health	Storing battery for longer periods outside the recommended long-term storage temperature range may significantly impact your battery health.

Supported Sensors

Biosignals PRO supports all PLUX Smart Sensors and is backwards compatible with the majority of biosignalsplux analog sensors (Legacy Sensors) using the Biosignals PRO Legacy Sensor Adapter.

Table 7: List of supported sensors

Sensor Category	Sensors
Integrated Sensors	Motion Sensor (IMU) for Motion Score extraction based on Accelerometer & Gyroscope sensor data
Supported Smart Sensors (Biosignals PRO Product Line)	<ul style="list-style-type: none"> - Electrocardiography (ECG) - 1-Lead * - Electrocardiography (ECG) - 6-Lead - Electromyography (EMG) * - Electrooculography (EOG) * - Electrogastrography (EGG) * - Electroencephalography (EEG) * - Galvanic Skin Response (GSR) - Respiration (Inductive) - Inertial Measurement Unit (IMU) <p>* ExG sensor category</p>
Supported Legacy Sensors (biosignalsplux Product Line)	<p>Biosignals PRO supports analog sensors of PLUX's biosignalsplux Product line:</p> <ul style="list-style-type: none"> - Electromyography (EMG) - Electrocardiography (ECG) - Electrodermal Activity (EDA) - Electroencephalography (EEG) - Electrooculography (EOG) - Electrogastrography (EGG) - Blood Volume Pulse (BVP) / (PPG) - Respiration (Inductive) - Accelerometer - Acoustic (ACT) - Light (LUX) - Goniometer - Third-Party Analog Adapter
Not Supported Legacy Sensors (biosignalsplux Product Line)	<ul style="list-style-type: none"> - Force Platform - Load Cell - Force Sensitive Resistor (FSR) - Temperature - Breakout - Respiration (Piezo-Electric) - Blood Oxygen Saturation (SpO2) Pulse Wave - Functional Near-Infrared Spectroscopy (fNIRS)

Your Biosignals PRO

Your device comes with the following content:

- 1x Biosignals PRO device (hub)
- 1x Charger
- 1x USB Dongle

Biosignals PRO can be used with **Biosignals Studio** (Mobile or Desktop) or the PLUX SDK. The examples on the following pages use Biosignals Studio (Desktop).

For more information on how to get and use Biosignals Studio (Desktop), visit:

<https://support.pluxbiosignals.com/knowledge-base/biosignals-studio-desktop/>

Turning Your Device On & Off



Figure 1: Biosignals PRO status button color states

Biosignals PRO's power button includes a multi-color LED that provides visual feedback on the device's current state (example: idle or recording) based on LED color (see Figure 2) and blinking patterns.

Press the power button to turn the device on (light ring around the button lights up). Press again to turn it off (light ring turns off).

If the device does not turn on, it's likely due to an empty battery. Charge your device and try again.

Status LED Colors & Device States



Figure 2: Biosignals PRO status button color states

Biosignals PRO's power button includes a multi-color LED that provides visual feedback on the device's current state (example: idle or recording) based on LED color (see Figure 2) and blinking patterns.

The exact behavior in each state can be seen in Table 8: Biosignals PRO status LED colors and device states. on the next page.

Table 8: Biosignals PRO status LED colors and device states.

LED Color	Device Mode	Blinking Pattern	Description
Off	Device is off	-	-
Light blue	Standby	Slow (1x per second)	Ready to be paired to PC/Phone/Tablet
Green	Paired & idle	Slow (1x per second)	Ready for: <ul style="list-style-type: none"> - Recording sessions - Download sessions - Firmware updates
Dark Blue	Recording	Slow (1x per second)	In recording session but not actively recording (ex: paused)
		Normal (2x per second)	In recording session and actively recording / logging signals
	Post-Recording Recovery	Very Slow (2x seconds on, 1 second off)	Recordings ended, in 5 min window waiting for sending backed-up data
		Fast (5x per second)	Transferring backed-up data
Orange	Data Download	Normal (2x per second)	Transferring recording session from microSD
Pink	Firmware Update	Slow (1x per second)	Installing firmware update
Red + Any Color	Low Battery	Alternating Slow (1 per second)	Battery charging level < 20%
		Alternating Fast (5 per second)	Critical battery charging level < 5%
Charging	Device On	-	Matches the color of the current device mode but prolongs the intervals where the LED is 'on'
	Device Off	-	-

Connecting Sensors & Accessories

The Biosignals PRO has 10 ports that act as input and output ports for sensors and accessories. Each port supports analog (example: legacy biosignalsplux sensors) and digital inputs (example: Smart Sensors), as well as accessories and actuators.

In simple terms: simply connect your sensors, accessories, or actuators to any of the available input ports and your hub will set it up for you (or let you know if there are any incompatibilities).

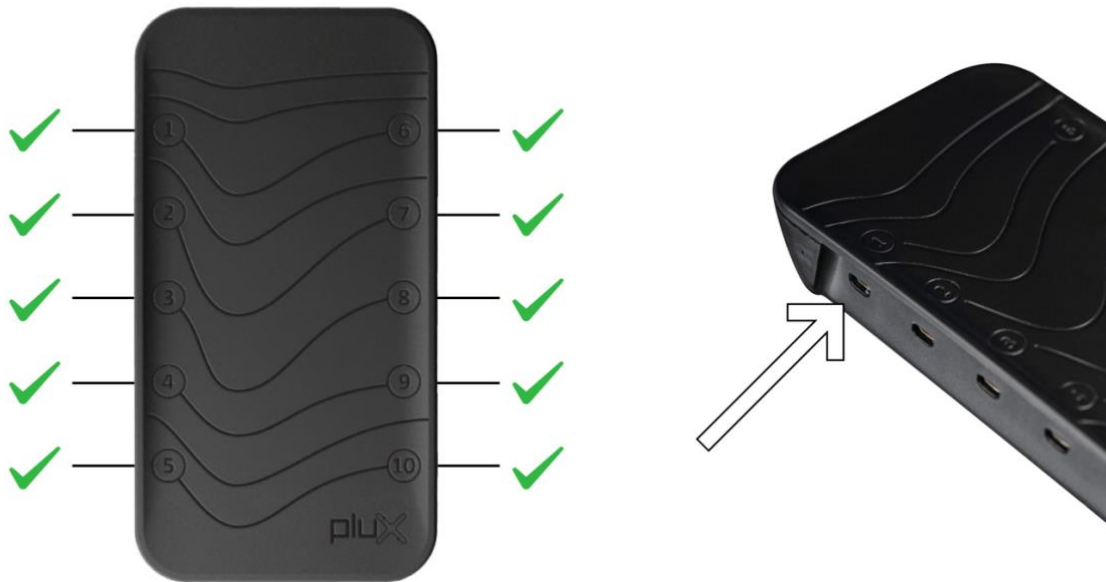


Figure 3: Compatible Biosignals PRO ports and example of Port 1.

Once connected, the hub will recognize the connected sensor or accessory and set it up for you. You can use Biosignals Studio as shown in the following example (here: SpO2 on Port 1)

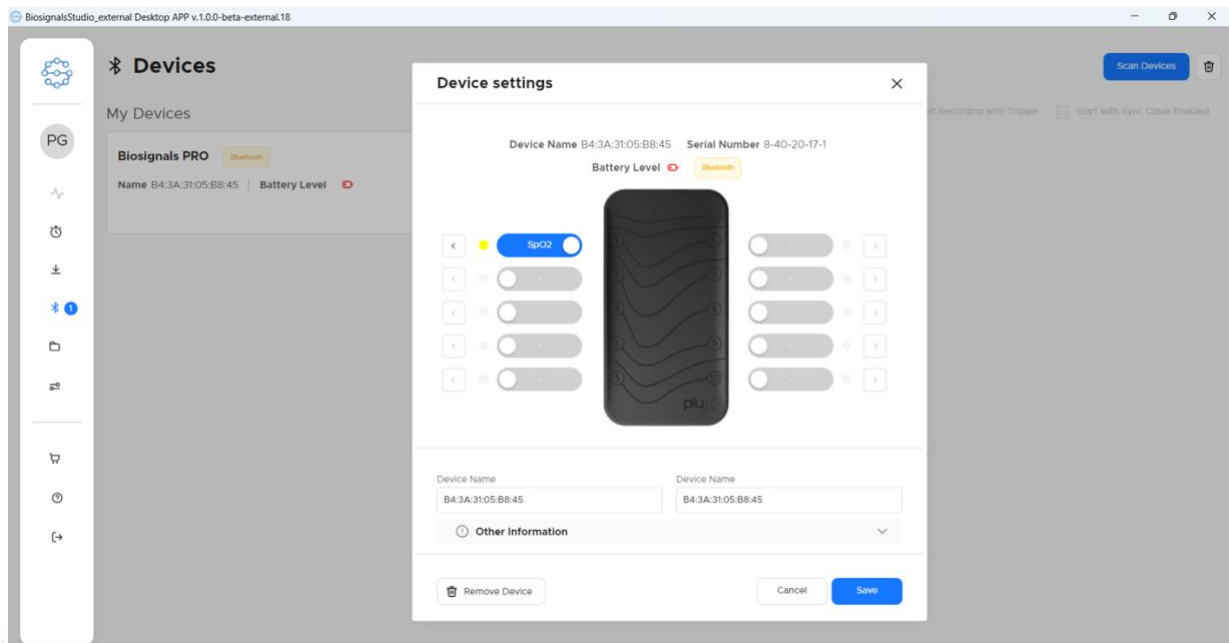


Figure 4: Reference Cable in the Biosignals PRO settings in Biosignals Studio

Notes on Using Legacy biosignalplux Sensors

Biosignals PRO is backwards compatible with legacy sensors from the biosignalplux product line.

This allows you to reuse your existing analog biosignalplux sensors alongside Smart Sensors, taking full advantage of the Biosignals PRO's advanced recording modes, backup features, and communication interfaces. Without needing to replace their entire sensor collection.

For the list of all supported sensors, see *Table 7: List of supported sensors*.

Legacy sensors cannot be connected directly to the hub's ports, as they require the use of the **Legacy Sensor Adapter**:



Figure 2: Legacy Sensor Adapter ports & connections

Connect your biosignalplux sensor to the female UC-E6 port of your Legacy Sensor Adapter. Once connected, connect the male UC-E6 adapter end any of the available **Biosignals PRO** ports.

Troubleshooting Legacy Sensors

Use Case: Legacy Sensor Adapter with no biosignalplux sensor

Connecting your Legacy Sensor Adapter to your **Biosignals PRO** without having any biosignalplux sensor connected to it has no effect. The empty Legacy Adapter will not be recognized nor appear in any device settings.

Use Case: biosignalplux Sensor with no Legacy Sensor Adapter

Connecting biosignalplux sensors directly to your **Biosignals PRO** device causes no harm to the **Biosignals PRO** but will not have any effect, nor will it be possible to use the connected sensor.

Biosignals Studio issues an error message indicating that no Legacy Sensor Adapter is used.



Figure 5: No Legacy Sensor Adapter connected error in Biosignals Studio

Disconnect your sensor and reconnect following the instructions above.

Charging your Device

Biosignals PRO comes with a charger (input voltage range: 100-240V~, 50-60 Hz) and three adapter types for power outlets in different regions (additional adapter types may be available upon request).



Type C

Europe, South America, and others



Type A

North/Central/South America, Japan, Taiwan and others



Type G

UK, Ireland, and others

Figure 5: Biosignals PRO charger outlet adapters

To charge **Biosignals PRO**, follow the steps below to ensure safe and proper operation:

1. Connect the adapter type of your power outlet to the
2. Plug the **official** Biosignals PRO into a standard power outlet
3. Connect the charger's cable to the Biosignals PRO charging port found at the bottom side
4. The device's LED indicator will illuminate, confirming that charging has begun
5. Once charging is complete, disconnect the charger from both the device and the outlet



Figure 6: Biosignals PRO's charging port

During charging mode, the blinking pattern of your device (when on) changes, keeping the status LED on for longer periods.



Important Safety Notes on Charging

- Only use the **official PLUX charger and cable**. Using third-party chargers may damage the device or battery
- **Do not use or record** with the device while it is charging
- **Stop charging immediately** if the device or charger becomes unusually **hot** or emits an odor, and contact **PLUX Technical Support**
- Charge the device only within the recommended **temperature range (0 °C - 45 °C)** and keep it on a **dry, stable surface**
- Avoid leaving the device connected to power for extended periods after it is fully charged

microSD Card

Biosignals PRO features a spring-loaded microSD card slot adjacent to the power adapter.

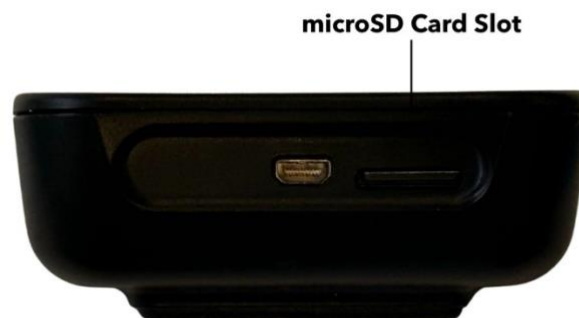


Figure 7: Biosignals PRO's microSD card slot.

To insert a microSD card, gently slide the card into the slot **with the metal contacts facing down and toward the device**, until it clicks into place. Ensure the card is fully seated before starting a recording.

To remove it, **press the card lightly** until it releases, then pull it out carefully. Always remove or insert the card **only when the device is powered off or idle** to prevent data loss or card corruption.

Resetting Your Hardware

In the event of hardware issues, you can reset the hardware to restore it to its factory settings. **Press and hold the power button for 10 seconds** until the power button's light ring turns off.



Figure 8: Resetting your Biosignals PRO

Press the power button again to restart your device. The device will proceed with a flashing sequence of the light ring, completing the reset, and enter the standby mode.

Quad Lock Mounting System

Biosignals PRO is fully compatible with the **Quad Lock® mounting system**, enabling secure, flexible attachment for both stationary and mobile recording setups.

The device enclosure features a Quad Lock-compatible interface on its back surface, enabling direct connection to standard Quad Lock mounts without the need for additional adapters. This makes it ideal for research scenarios that require consistent positioning, mobility, or field deployment.

- **Secure Fit:** Locks the device firmly into place with a simple twist.
- **Quick Release:** Detaches instantly with the Quad Lock release mechanism.
- **Versatile Mounting:** Compatible with a wide range of Quad Lock bases – including desk mounts, tripods, straps, and arm mounts.
- **Repeatable Positioning:** Ensures consistent orientation between sessions, improving setup reproducibility.

For optimal stability, ensure that the Quad Lock mount is fixed to a clean, flat surface and that the locking mechanism clicks securely into position before each use. See the instructions of your Quad Lock mount for further details and only use official **Quad Lock® accessories** or PLUX-approved mounts.



Figure 9: Quad Lock mount options

More options available on www.pluxbiosignals.com or www.quadlockcase.eu.

Quickstart Guide with Biosignals Studio

Download and install **Biosignals Studio** and log in to your PLUX biosignals account. You can find full details here:

<https://support.pluxbiosignals.com/knowledge-base/biosignals-studio-desktop/>

Connect & Pair

Turn your device on. In **Biosignals Studio**, start by pairing your device by entering the device manager using the *Devices* option in the main menu.

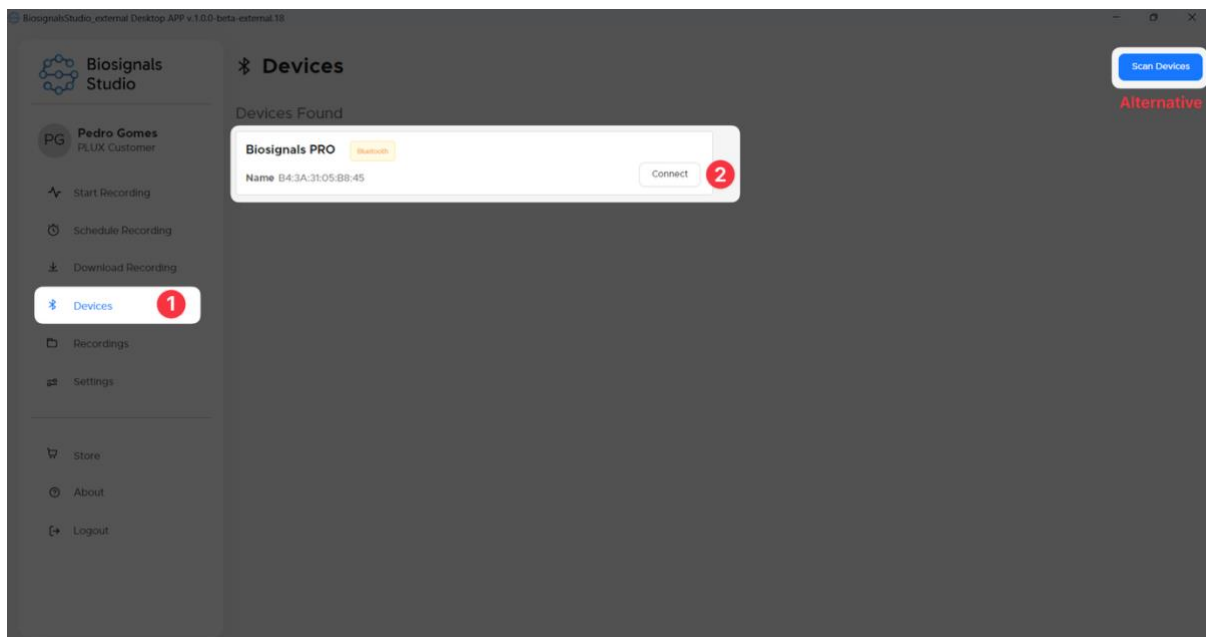


Figure 10: Biosignals Studio's device manager

Biosignals Studio automatically starts searching for available devices and lists them in the *Devices Found* section. Alternatively, if your device is not listed, ensure it's turned on and click the *Scan Devices* button to search again.

Click the *Connect* button to pair your Biosignals PRO device. Once connected, a notification pops up to confirm the connection.

Configure Your Sensors

The device automatically configures all connected sensors for you using pre-configured settings. Click the settings icon in the top right corner of the device container.

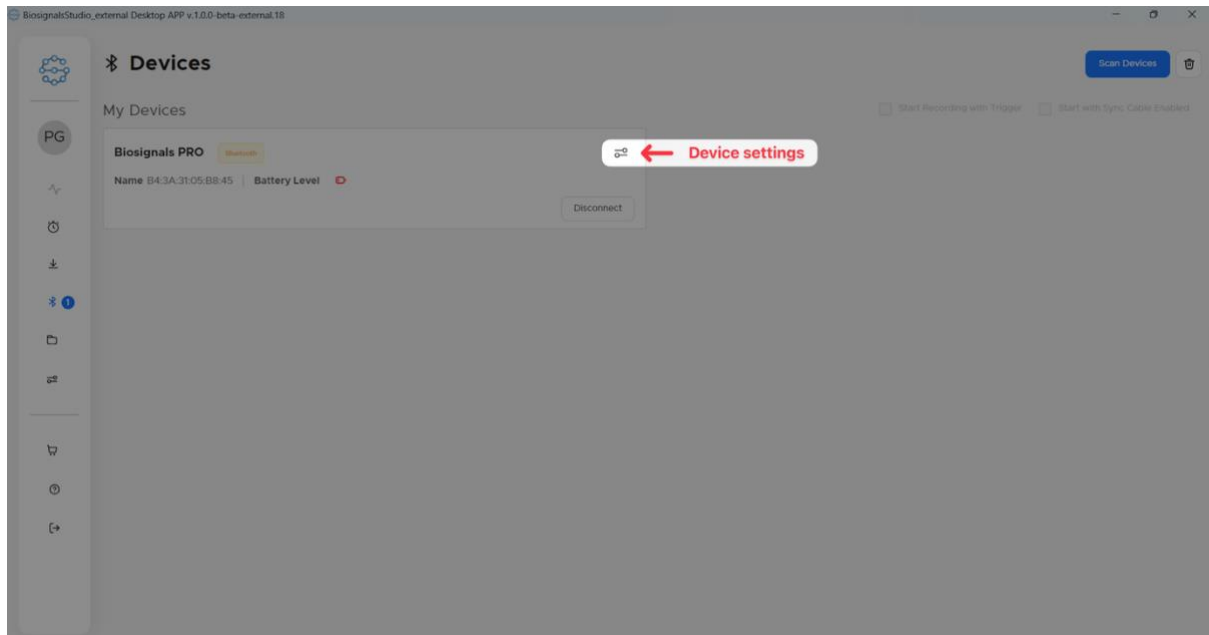


Figure 11: Access device settings

You can edit each sensor's individual settings, such as turning on or off sub-sensors or metrics, by clicking the arrow next to your SpO2 sensor to access the sensor configurations.

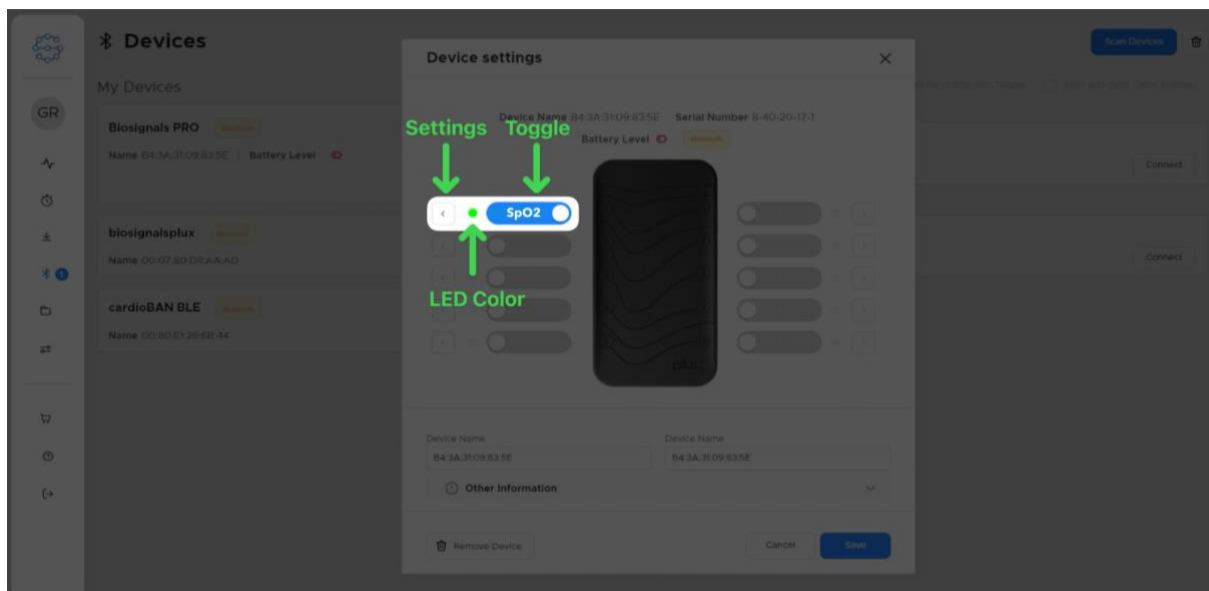


Figure 12: Access sensor settings

For detailed information on each sensor's individual settings, refer to the sensor's user manual.

Start a Recording



These settings are for a simple start-stop recording. For instructions on how to configure more complex recording sessions see:

<https://support.pluxbiosignals.com/knowledge-base/biosignals-pro-recording-sessions-in-biosignals-studio/>

Select *Start Recording* in the main menu. Select your device for recording (must be in the *My Devices* section). If you have only one device paired with Biosignals Studio, it will be automatically listed for recording. Press *Next*.

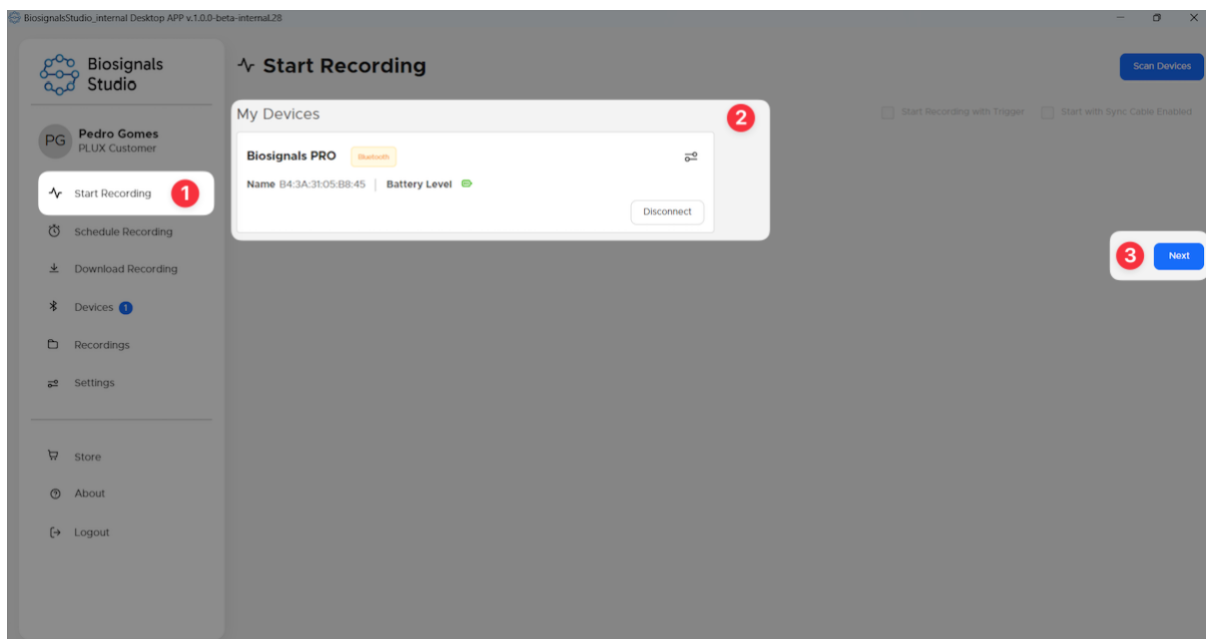


Figure 13: Select device for recording

In the next screen, you can select what channels you want to preview during the recording and choose file prefix, file save locations, among other available features. Press *Start Recording* to start recording data.

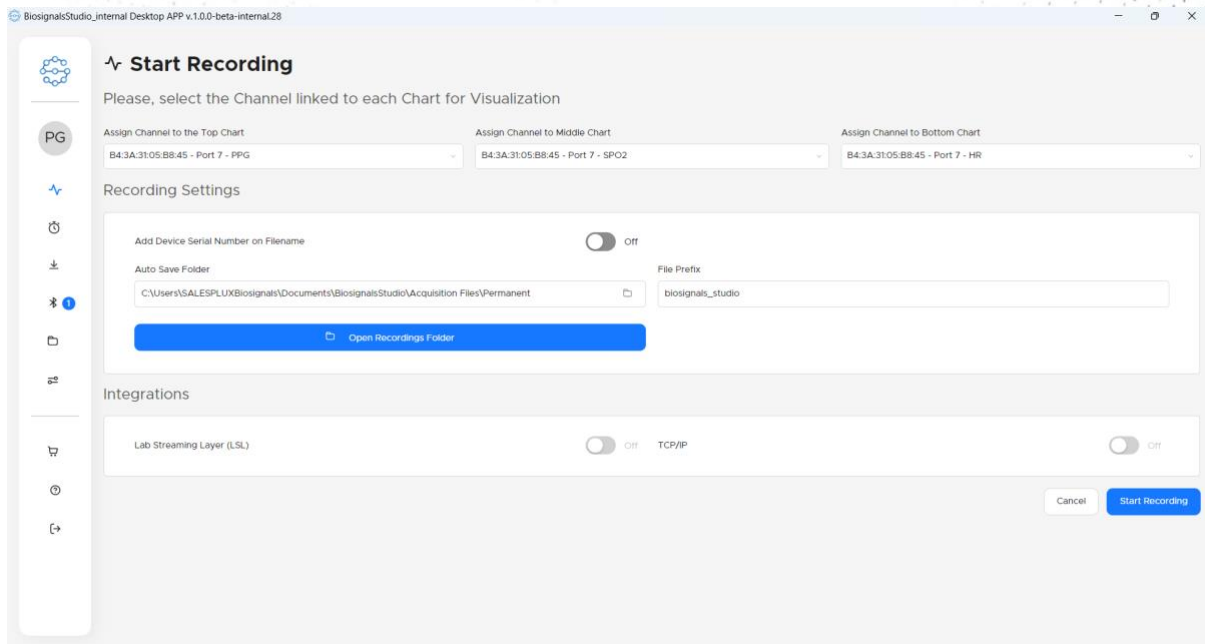


Figure 14: Pre-recording screen

Open a Recording

Select the *Recordings* option from the main menu. Biosignals Studio offers multiple options to open and load your recordings:

- Option 1: Browse and open files using the *Open File* button
- Option 2: Browse and open files using the file import container **or** Drag and drop files from your File Explorer or Finder into the file import container
- Option 3: Select a recording from the list of *Recent Recordings*

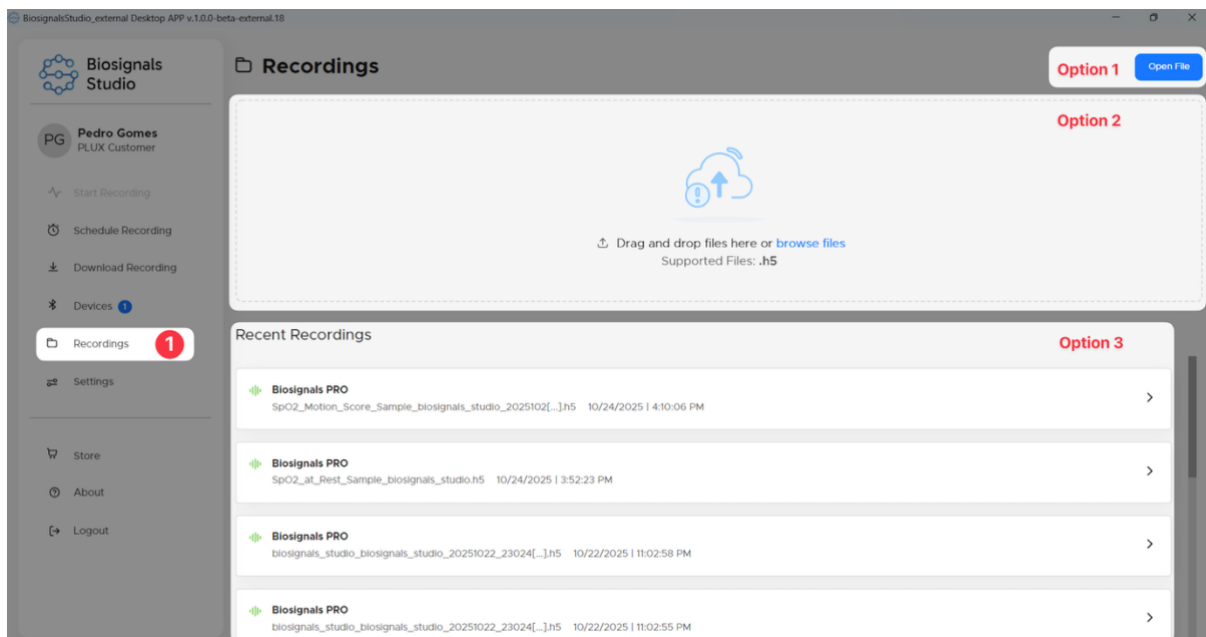


Figure 15: Multiple options to open a recording file in Biosignals Studio

Once you've selected a file, Biosignals Studio will load and visualize the signals.

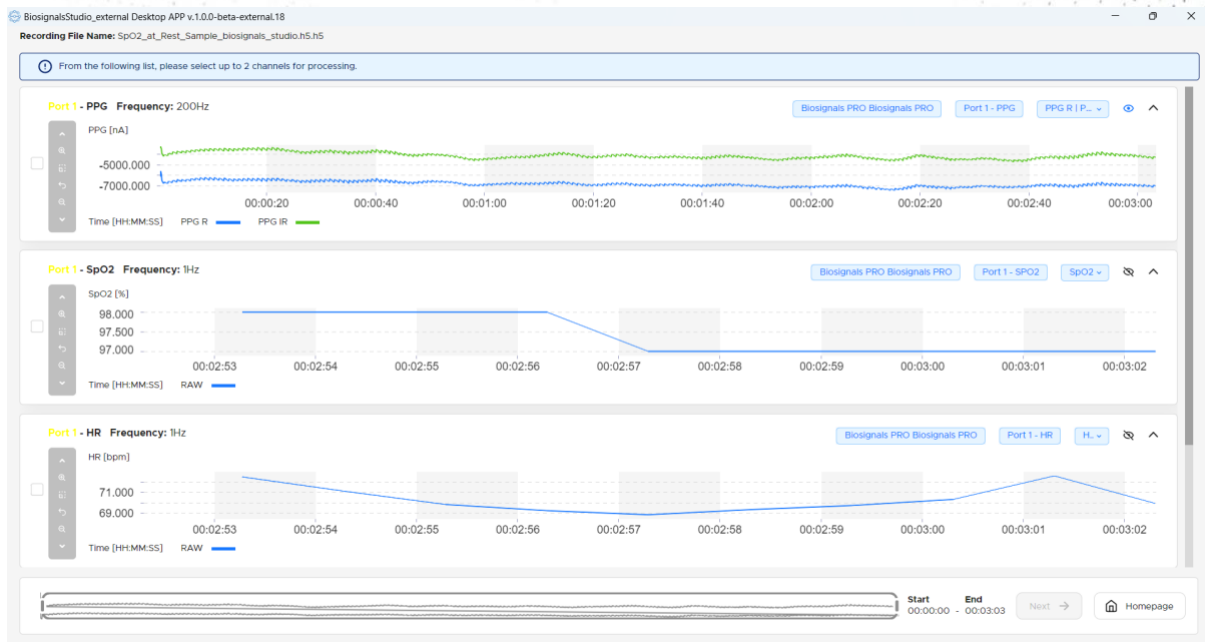


Figure 16: Example recording

Recording Modes

Biosignals PRO supports multiple recording modes to adapt to different research workflows and data collection needs.

Each mode defines how the device handles acquisition, storage, and communication with **Biosignals Studio** or other compatible software.

Note that not all recording modes may be fully available in the Biosignals Studio software at the time of reading. Review the software documentation for full compatibility.

Real-Time Streaming Mode

In Real-Time Streaming Mode, **Biosignals PRO** streams all connected and active sensor data live to **Biosignals Studio** (or PLUX SDK) via Bluetooth or Wi-Fi for immediate visualization and analysis.

If a microSD card is inserted, the system automatically activates Backup Logging, saving a backup of signal samples should the communication be temporarily interrupted during the streaming. This backup data is recovered at the end of the recording.

For real-time streaming mode, start the recording via the *Start Recording* option in the Biosignals Studio main menu.

Data Logging Mode

In **Data Logging Mode**, Biosignals PRO records all sensor data directly to the internal microSD card, eliminating the need for a wireless connection during the recording. This fully autonomous mode is designed for long-term or remote data collection or other setups where a wireless connection is not desired.

Acquisition parameters are configured in **Biosignals Studio** before starting the recording using Recording Sessions. Multiple session configurations can be stored on the **Biosignals PRO** itself (storage space for 1 session settings) and on the microSD card (storage space for up to 3 session settings). See the *Recording Sessions* section for further information.

In this mode, the recording data is stored directly onto the microSD card in structured files that contain both metadata and binary signal files.

You can download these files through Biosignals Studio or by plugging your microSD card into your computer and dragging and dropping a recording from the microSD card directly into Biosignals Studio (recommended for larger recordings).

Recording Sessions

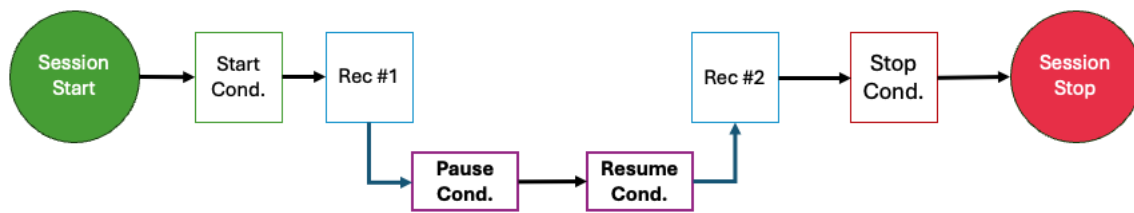


Figure 17: Recording session concept

Biosignals PRO introduces a new, flexible way to define when and how recordings begin, pause, and end.

Unlike previous systems, where a recording simply started and stopped on command, **recording sessions** in Biosignals PRO can react dynamically to events such as time schedules, sensor thresholds, or user actions.

Each session defines the **logical framework** for one or more recordings and ensures that all data and events are stored in a consistent, structured format. For instance, a session is the overall container that defines:

- When recordings can start and stop
- Under what conditions they pause or resume
- When data backups are transferable or not

A session can contain multiple recordings, each controlled by its own start, stop, pause, and resume events.

Example

A researcher configures a session that starts automatically at 8:00 AM and records ECG whenever the heart rate exceeds 100 BPM, pausing when it drops below that threshold. The session ends in any case tonight at 8:00 PM.

Types of Conditions

Recording sessions in **Biosignals PRO** use a flexible event-based system that reacts to specific **condition types**. These conditions define how a session behaves (when to start, pause, resume, or stop recording) and can be freely combined to fit each experiment.

Figure 18: Types of session conditions

Event Type	Descriptions & Examples
Time Event	<p>Session condition linked to a defined time or duration.</p> <p>Examples:</p> <ul style="list-style-type: none"> - Start recording at 2:00 pm - Stop recording after 10 min
Sensor Event	<p>Session conditions linked to a specific sensor signal (example: value drops below / rises above a threshold) or the sensor triggers a non-signal-based event (example: electrode disconnected)</p> <p>Examples:</p> <ul style="list-style-type: none"> - Start recording if heart rate > 80 bpm - Stop recording if electrode disconnects
Device Command	<p>User stops the recording via the hub's power button or hub triggers an event (example: battery critically low)</p> <p>Examples:</p> <ul style="list-style-type: none"> - User presses the power button - Stop when battery is critically low (<5%)
PC Command	<p>Recording is controlled manually via Biosignals Studio or PLUX SDK.</p> <p>Examples:</p> <ul style="list-style-type: none"> - Start via Biosignals Studio - Stop via Biosignals Studio

Note:

Each session's start, stop, or pause can include multiple conditions, but **Session Stop Conditions** are uniquely reserved and cannot be reused for start, stop, or pause conditions to prevent conflicting triggers. Some commands, such as **stop** via Biosignals Studio or PLUX SDK, are also uniquely reserved for Session Stop Conditions.

Session Start & End

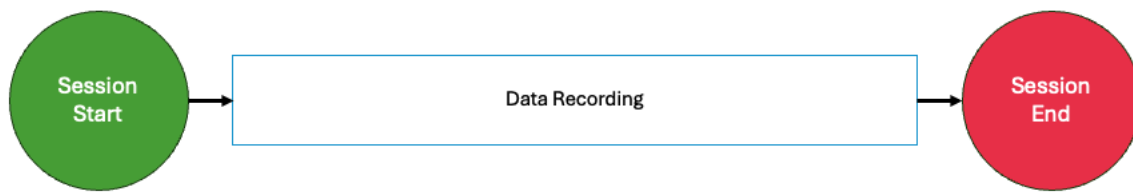


Figure 19: Session start & end

A **Session Start** marks the initialization of the recording environment. When a session starts, the device:

- Loads all pre-configured settings (sensor setup, sampling rates, and event conditions).
- Activates communication interfaces (Bluetooth, Wi-Fi, USB).
- Waits for the defined **Start Condition(s)** to begin actual data recording.

At this stage, no data are yet being acquired. The session is ready to record once the first start condition is met.

Session Start Example

A session is scheduled to start at 08:00 AM but will only begin recording when the participant's heart rate exceeds 100 BPM.

Between 08:00 and that trigger, the device remains in recording mode yet idles and is not actively recording sensor data.

A **Session End** finalizes all ongoing recordings and prepares the device to return to Idle Mode. When all **Stop Conditions** have been met:

- The device saves all active recordings
- Buffered and backup data are synchronized with **Biosignals Studio** (if connected)
- Temporary files (e.g., backup data on SD card) are cleared

If no new session is scheduled, **Biosignals PRO** remains in **Idle Mode** until turned off or configured for a new recording.

Session Stop Example

A session is scheduled to start at 08:00 AM but will only begin recording when the participant's heart rate exceeds 100 BPM.

Between 08:00 and that trigger, the device remains in recording mode yet idles and is not actively recording sensor data.

Recording Conditions

Recording conditions define when, during an active session, sensor data is actively recorded, streamed, or stored on the microSD card.

Recordings can start, pause, resume, and stop, depending on the defined conditions for each action in the session settings.

Recording Start & Stop Conditions

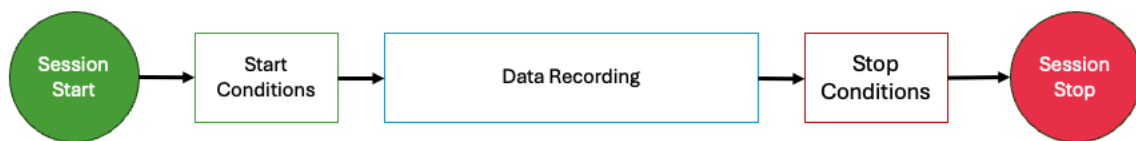


Figure 20: Recording start & stop conditions

All sessions contain start and stop conditions that define when a recording starts and stops during an active session. This is the most used format for recordings, and is used, for instance, in the **Biosignal Studio** real-time recording mode.

Here, **Biosignals PRO** starts a recording when start conditions are met (example: Biosignals Studio 'Start' button press) and stops when stop conditions are met (example: Biosignals Studio 'Stop Recording' button press).

Table 9: Recording start & stop conditions

Event Type	Descriptions & Examples
Start Condition	Defines when the recording begins. The session is armed until this condition is met. Examples by condition type: <ul style="list-style-type: none"> - Time: Today at 9:00 AM - Sensor Event: Heart rate > 80 bpm - Device Command: If battery non-critical - PC Command: Biosignals Studio 'Start' button pressed
Stop Condition	Ends the recording and finalizes the session. Must always be unique to avoid conflicts. Examples by condition type: <ul style="list-style-type: none"> - Time: Today at 08:00 PM - Sensor Event: Heart rate < 80 bpm - Device Command: If battery critical - PC Command: Biosignals Studio 'Stop button pressed

Recording Pause & Resume Conditions

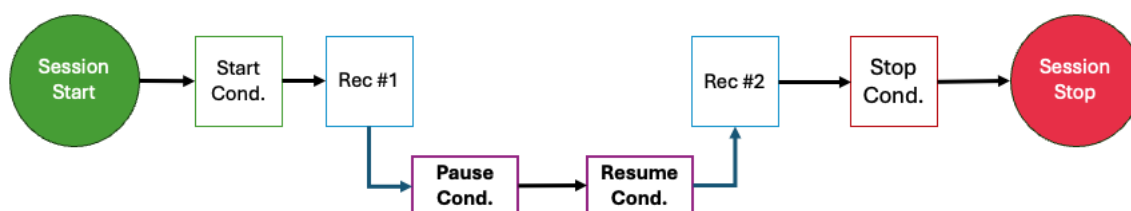


Figure 21: Pause & resume recordings

In addition to start and stop, sessions can also include **pause** and **resume** conditions.

These allow temporary interruptions within the same session without creating new files, ensuring continuity while excluding undesired signal segments, for example, periods with excessive movement or signal noise, or pausing the recording when an electrode is disconnected and proceeding once it's connected again.

When a **pause condition** is met, Biosignals PRO suspends data acquisition while keeping the session active.

Once the **resume condition** is met, recording automatically continues under the same session and file structure.

Table 10: Pause & resume recordings conditions

Event Type	Descriptions & Examples
Pause Condition	Temporarily suspends recording within an active session until the resume condition is met. Examples by condition type: <ul style="list-style-type: none"> - Time: Pause every 5 min - Sensor Event: Electrode disconnected - Device Command: Device button short press - PC Command: Biosignals Studio 'Pause' button pressed
Resume Condition	Restarts a paused recording, continuing within the same session and data file. Examples by condition type: <ul style="list-style-type: none"> - Time: Resume after 2 min - Sensor Event: Electrode reconnected - Device Command: Device button long press - PC Command: Biosignals Studio 'Resume' button pressed

Pause and resume conditions are *optional* but especially useful in long or event-driven recordings. They help focus on relevant data while preserving complete timing information within a single session.

Note:

If a recording session contains multiple recording segments, split by pause-resume conditions that took place, then the recording file contains multiple individual recordings that start and stop when the pause-resume conditions were met. There is no time vector with empty signals or anything similar during the pause interval.

Backup Recovery Mode

After the **unique stop conditions** are met, **Biosignals PRO** enters a short **Backup Recovery window** (up to **5 minutes**) before returning to Idle Mode.

During this time, any data recorded locally on the **microSD card** can be automatically downloaded to **Biosignals Studio** to complete the session.

If the data are successfully downloaded within this window, the hub finalizes the transfer and returns to **Idle Mode**.

If no download occurs within 5 minutes, the temporary backup data are **automatically deleted** to free reserved memory.

Device Events

Biosignals PRO automatically generates device events to report system activity, hardware changes, or user interactions (e.g., low battery, mode changes, button presses).

They provide feedback on the hub's state and are logged even when no sensors are recording. In Biosignals Studio, events appear as notifications or are stored on the device's microSD card for later review.

Each event is categorized by severity level, with **information** for regular operation, a **warning** for minor issues, and an **error** for critical faults that require immediate action.

Table 11: Severity levels of device events

Severity Level	Description
0 - Information	Normal operation or status notification Example: Connection established
1 - Warning	Non-critical condition that may require user attention Example: Low battery
2 - Error	Critical fault that interrupts operation or requires user intervention Example: SD card malfunction



While Biosignals PRO can generate all listed device events, their visibility and configuration options may vary depending on the software used (e.g., **Biosignals Studio** or **Developer Tools**).

Refer to your software documentation for a list of supported event types.

General Device Events

System-level events reflecting overall device operation and internal state transitions.

Table 12: General device events

Events	Information	
1	Connection Established	Indicates that a Bluetooth, Wi-Fi, or USB connection has been successfully established.
2	State Change	Logged when the acquisition state changes (e.g., Standby → Idle, Idle → Recording).
3	Internal Error	Triggered when the system encounters an unexpected internal condition. Persistent errors should be reported to PLUX Support.

Sensor & Ports Events

Reports connection changes or communication issues on individual sensor ports.

Table 13: Sensor & port events

Events	Information	
1	Sensor Connected / Disconnected	Indicates when a sensor is attached to or removed from a port, including port number information.
2	Port Change	Reports a change in port status (e.g., connected, disconnected, or power fault).
3	Overcurrent Detected	Triggered when excessive current is detected on a port. The affected port is automatically disabled for protection.
4	Communication or Configuration Error	Covers failed port communication, unsupported configurations, or invalid sensor settings. These may prevent recording or sensor detection.

Some port events may include additional information, such as whether a newly connected sensor is powered or not.

For instance, removing and reconnecting a sensor in standby or idle mode will provide power to the sensor. However, removing and reconnecting during an active recording session will not power the sensor, and it remains turned off even when connected to the hub.

In this case, the port update event will provide additional context highlighting that the reconnected sensor is not being powered. The sensor can be turned on again after the recording session.

Recording Sessions

Defines and validates how recording sessions are started, managed, or stopped.

Table 14: Recording session events

Events		Information
1	Failed Port Start / Stop	Triggered when a recording port cannot start or stop acquisition correctly.
2	Settings Validation	Confirms that all session configuration parameters are valid before recording starts.
3	Invalid Setting / Invalid Data Rate	Triggered when an invalid configuration or unsupported sampling rate is selected.
4	Invalid Session Condition	Occurs when session start, stop, pause, or resume conditions are duplicated or logically conflicting.
5	Schedule Validation	Confirms that the defined schedule and timing parameters are valid before execution.
5	Snapshot Data	Indicates that snapshot data packets are being transmitted to Biosignals Studio.
6	Snapshot End	Marks the completion of snapshot transmission.

Memory & Storage (microSD Card)

Reports the status and health of the internal microSD card used for data logging.

Table 15: Memory & storage events

Events	Information	
1	microSD Card Inserted / Removed	Triggered when a microSD card is inserted or removed from the device.
2	SD Card Ready	Indicates that the card has been successfully mounted and is ready for data storage.
3	SD Card Malfunction	Triggered when the SD card cannot be accessed or a read/write error occurs.
4	Acquisition Time Available	Displays the remaining recording time based on available SD card capacity.

Power Management

Reports connection changes or communication issues on individual sensor ports.

Table 16: Power management events

Events	Information	
1	Low Battery / Discharged Battery	Battery level dropped below a critical threshold (10% or lower). Device may shut down automatically if not charged.
2	Battery Charging / Charging Complete	Indicates that charging is active or has finished successfully.
3	Charger Connected / Disconnected	Triggered when the charger is plugged in or removed.
4	Charger Fault	Reports an error in the charging circuit (e.g., NTC, battery, or boost fault).

5	Charging-Level Low / Critical	Battery level below 10% or 5% while charging.
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Sensor Events

Both internal and external sensors can generate their own asynchronous events that are passed through **Biosignals PRO**.

These events vary by sensor type (e.g., electrode disconnection, signal threshold crossings, or signal quality alerts), as each sensor defines its own set of events.

For details and available sensor-specific events, refer to the corresponding sensor user manuals. Biosignals PRO includes an onboard motion sensor that computes a Motion Intensity (Motion Score) metric.

As an alternative to recording the continuous Motion Score signal, you can configure motion-related events that trigger automatically when predefined thresholds or conditions are met – for example, detecting transitions between low and high movement intensity.

Table 17: Sensor events

Events		Information
1	Rising Edge Threshold	Triggered when Motion Score exceeds the upper threshold (default: 70%), marking a transition to high motion.
2	Falling Edge Threshold	Triggered when Motion Score drops below the lower threshold (default: 60%), marking a return to low motion.
3	Tolerance Margin (Hysteresis)	Adds a small gap between activation and deactivation points to prevent retriggering. Example: If motion activates above 70% and deactivates below 60%, small fluctuations between 65-70% won't repeatedly start/stop events.

Customer Support

For guides, tutorials, and troubleshooting, visit support.pluxbiosignals.com – our knowledge base with hundreds of free articles.

You can also submit a support request there for personalized help.

To speed up assistance, include your device details when contacting us. In Biosignals Studio, open your device *Device Settings* → *Other Information* → *Export Device Information*, then share the exported data with our support team.

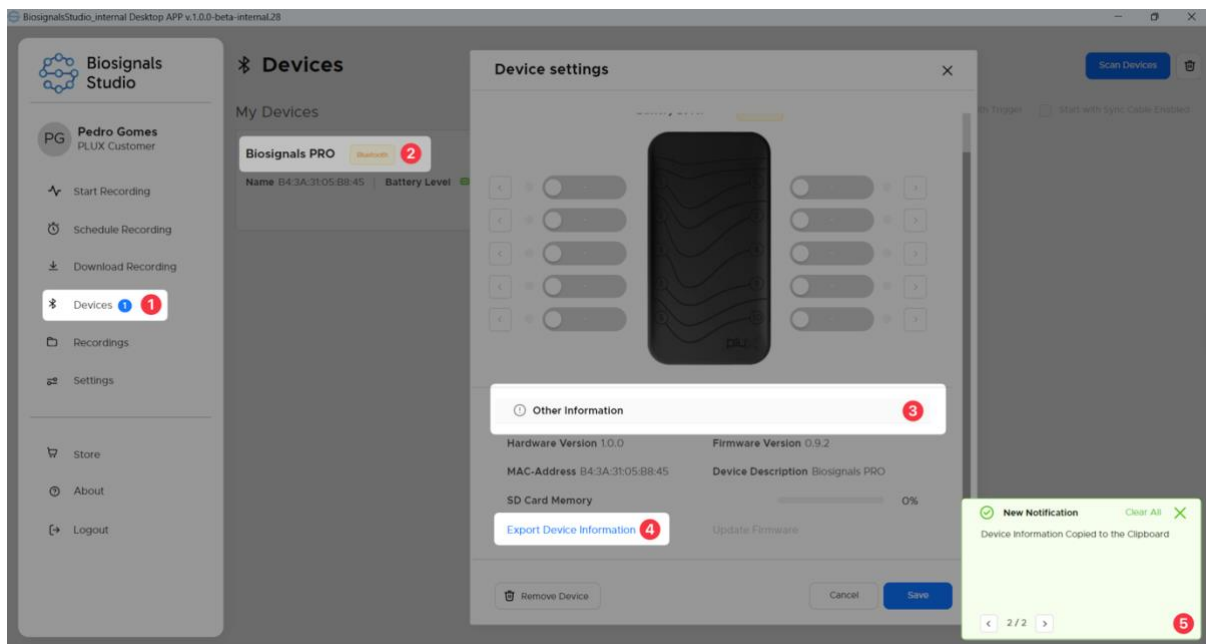


Figure 22: Exporting essential device information from Biosignals PRO.

Alternatively, share the log files found on your devices microSD card for further technical details.

Safety & Maintenance

Please read the following safety instructions before using your **Biosignals PRO** system. Failure to follow these guidelines may result in degraded signal quality, or damage to the device and accessories, or, in the worst case, user.

General Safety

- ! Keep the device and all accessories dry.
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- ! Do not immerse the device or sensors in water or clean with liquids or abrasives.
- ! Do not expose the device to fire, heat sources, or explosive environments (e.g., flammable gases).
- ! Do not place the device in a microwave oven or similar appliance.
- ! Do not use the device near or inside MRI systems or other strong magnetic fields.
- ! Do not insert objects into any openings of the device.
- ! Do not attempt to open, modify, or repair the device. Repairs must only be performed by authorized PLUX personnel.
- ! Handle the device carefully and avoid drops, shocks, or excessive vibration.
- ! Keep cables organized to avoid tripping hazards and risk of strangulation.
- ! Maintain a safe distance between Biosignals PRO and other wireless or electronic devices to minimize interference.
- ! Do not use the device in environments with strong electromagnetic noise (e.g., near microwaves).
- ! Do not connect third-party sensors or accessories to Biosignals PRO.
- ! Use only the charger provided with the system or an official PLUX charger.
- ! Stop using the device immediately if you or a subject experience discomfort, irritation, or a skin reaction.
- ! Do not use on individuals with implanted electronic devices (e.g., pacemakers, defibrillators, stimulators, infusion pumps).
- ! Do not apply electrodes to damaged or irritated skin.
- ! For long-term recordings, use suitable long-term or disposable electrodes designed for extended wear.
- ! Use only approved accessories and sensors from PLUX or authorized distributors.

- ! Dispose of single-use electrodes after each session. Reusable electrodes should only be reused by the same user.
- ! Do not use the device while charging.
- ! If the device or accessories become unusually warm, turn it off immediately and contact PLUX Technical Support (helpdesk@pluxbiosignals.com).

Transportation and Storage

Follow these recommendations to ensure long-term performance and safety of your **Biosignals PRO** and sensors:

- Store the device and sensors in their original packaging, in a **dry environment**.
- Relative humidity: up to **95%** (non-condensing)
- Temperature: **5°C to 30°C**
- Atmospheric pressure: **500-1060 hPa**

Use the original packaging or PLUX provided alternatives (example: carrying case) when transporting the system to protect against shocks and vibrations. Avoid dropping or subjecting the device to sudden acceleration or impact.

Cleaning

This device should be cleaned/sanitized between uses of different users to ensure a hygienic and safe use of your setup. The instructions below provide information on how to clean your PLUX products without damaging them.

- Do not apply the alcohol solution directly on your product;
- Proceed with a visible inspection of your product(s) to identify mechanical damages (e.g., broken cable, damaged casing). Should you determine any damage, please contact our support before proceeding with the cleaning process);
- Use an alcohol-water solution with an alcohol content of up to 70%;
- Apply a bit of your alcohol solution on a cotton pad and clean your product with the cotton pad;
- Let your product fully dry after the cleaning process, before turning it on and using it again.
- Use only alcohol-water solutions and refrain from using other alcohol products (e.g., nail polish remover) as they may contain other components that can damage your product.

Do not:

- Cleaning your products with water, detergent, or any other cleaning liquid not listed in the instructions above;

- Cleaning products with visible mechanical damage as the cleaning process may further damage your product risking its safe use and reliability;
- Do not clean or re-use disposable electrodes, as they are only suitable for single use and should be disposed of after use;
- Cleaning your products without following the instructions and limits listed on this page may void your products' warranty.

For more up-to-date information, visit

<https://support.pluxbiosignals.com/knowledge-base/how-do-i-clean-my-plux-products/>

Regulatory & Legal

Intended Use & Disclaimer

PLUX products are **intended for use in life science education and research applications; they are not medical devices nor are they intended for medical diagnosis, cure, mitigation, treatment or prevention of disease.**

We expressly disclaim any liability whatsoever for any direct, indirect, consequential, incidental or special damages, including, without limitation, lost revenues, lost profits, losses resulting from business interruption or loss of data, regardless of the form of action or legal theory under which the liability may be asserted, even if advised of the possibility of such damages.

Guarantee of Quality & Warranty

Biosignals PRO is covered by PLUX's standard warranty terms of 2 years, which define coverage periods, exclusions, and replacement procedures.

Full details are available at:

Standard Warranty Terms

<https://support.pluxbiosignals.com/knowledge-base/what-are-the-standard-warranty-terms/>

Additional resources:

What will void my warranty?

<https://support.pluxbiosignals.com/knowledge-base/what-will-void-my-warranty/>

How do I report a warranty, replacement or repair case?

<https://support.pluxbiosignals.com/knowledge-base/how-can-i-report-a-warranty-or-replacement-case/>

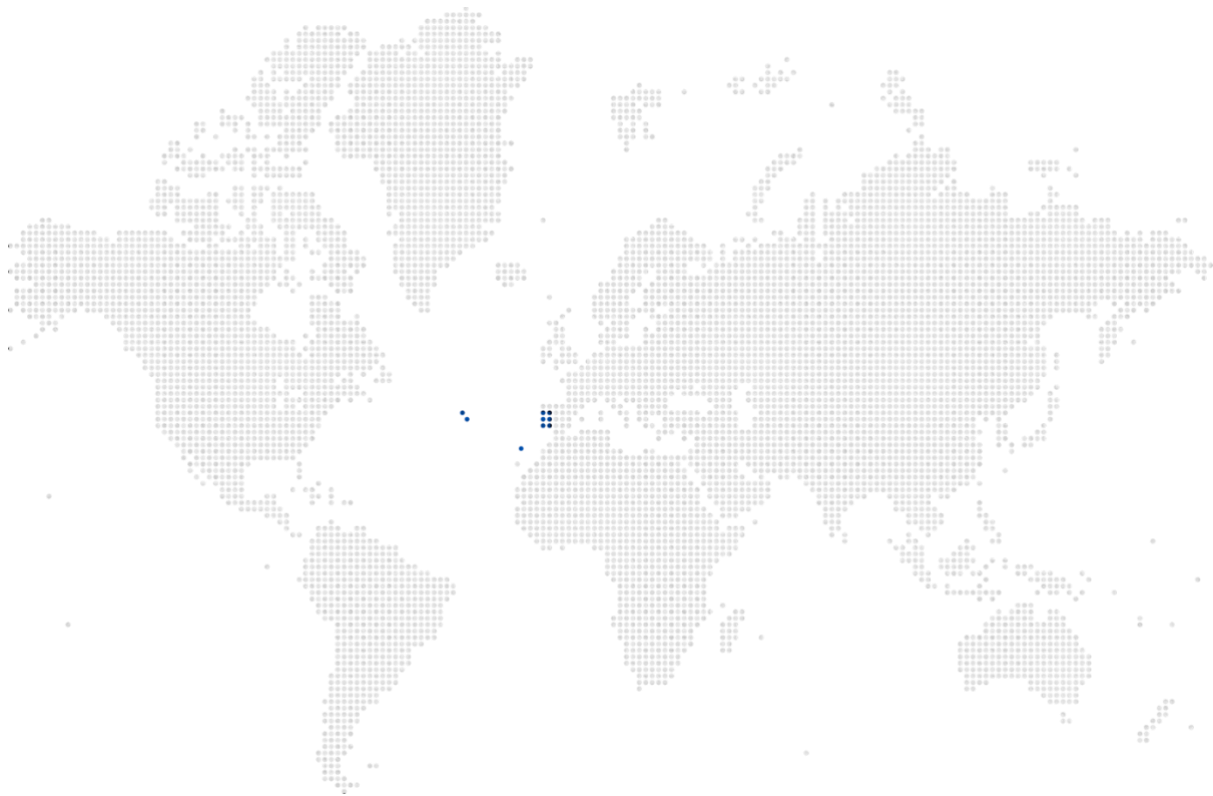
In accordance with Portuguese consumer law, all products sold in Portugal are covered by a 3-year legal guarantee.

CE Marking

[To be added soon]

Document Version & Revision History

Version #	Date	Description / Changes
1.0	27/10/2025	First version



Designed & Made in Portugal

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