

Mentalab Explore+

Quick Start Guide



Thank you for purchasing Mentalab **Explore+**

Building upon years of experience designing ExG systems, Mentalab Explore+ represents the height of mobile EEG design.

Providing exceptional data quality, fast set-up times, remote updates, internal memory, open-source APIs, and much more, Explore+ was designed from the ground up to meet the needs of researchers.



It's Explore Plus

- 32 channels
- 1kHz streaming
- 2kHz offline recording
- μ S precision
- Triggers via USB-C
- Remote updates
- Internal memory

Getting started

This guide contains basic information to help you start streaming and recording data with your **Mentalab Explore+ amplifier**.

For more extensive information regarding safety and usage, please refer to the user manual. Further guidelines and instructional videos can be found at wiki.mentalab.com.

Typical package contents

- Mentalab Explore+ amplifier
- Electrodes of your choice
- Cap of your choice
- Shockproof case
- USB-C cable
- Elastic cap
- Electrode gel
- Bluetooth dongle
- Cleaning set

Bluetooth ID

To locate your amplifier's MAC address – its Bluetooth ID – look at the label on the back of the amplifier. The last four digits on the label are the amplifier's Bluetooth ID.

Getting started

Bluetooth ID cont.

For example, the label below corresponds to an amplifier whose Bluetooth ID (MAC address) is Explore_1438:



| | | Explore+ 8 | Explore+ 16 | Explore+ 32 |
|----------|--------------------------|---------------|-------------|-------------|
| | No. channels | 8 | 16 | 32 |
| SPS (Hz) | Offline | Up to 2k | | Up to 1k |
| | Online | Up to 1k | 250 | |
| | Weight (g) | 27 | 36 | |
| | Battery life (hrs) | 4 – 10 | | |
| | Diff. input range (mVPP) | 800 (±400 mV) | | |
| | Input impedance (GΩ) | 1 | | |
| | Resolution (bits) | 24 | | |
| | RMS noise (μV) | <1 | | |
| | Interface | USB-C | | |
| | Flash memory (MB) | 512 | 4000 | |
| | Bluetooth range (m) | ~10 | | |

Getting started

Start-up and data collection

1. Charge your amplifier via USB. A green LED indicates sufficient battery. Disconnect from the power source prior to use.
2. Position the electrodes in the cap, attach cables to dry electrodes, and connect the cable set to the amplifier. Each channel records against a unipolar reference electrode. Use Velcro to secure your amplifier to an EEG cap.
3. Push the power button to start the amplifier. It will now record data to internal memory.
4. Two blue blinks per second indicate that the amplifier is advertising via Bluetooth, MAC address Explore_XXXX.
5. Once a Bluetooth connection to the host machine has been established (see Section: API), your Explore+ amplifier will start transferring data via Bluetooth. Use Explore's open-source APIs to access impedance values, visualize the signal stream, change device settings, and more.
6. Press the amplifier's button once to set an event marker. A pink LED signal indicates that a marker has been set.
7. Turn off the amplifier after use. To do this, hold down the amplifier's button for three seconds until the LED blinks red three times. Always shut down your Explore+ amplifier before connecting it to a host machine via USB.

Instructions

The following table describes Explore+'s LED light codes.

| LED color | Blinking pattern | Indicates |
|------------------------|---------------------|--------------------------------------------------------------------------------------------|
| Red Yellow Green | Solid at start-up | Start-up in progress. Color indicates battery level. (green: > 60%, yellow: > 30%) |
| Blue | Solid at start-up | Start-up in progress. |
| Blue | Blinking 2x / sec | Bluetooth visible and advertising. |
| Blue | Blinking 1x / sec | Bluetooth visible and connected to host machine. Online mode in progress. |
| Green | Blinking 1x / 3 sec | Bluetooth is inactive. Offline mode in progress. |
| Pink | Blinking 1x / sec | Not enough space in memory. Press the button three times to free up space. |
| Light pink | One-time flash | Button pressed. Marker with timestamp corresponding to button event stored and transmitted |
| Red | Flash 3x | Amplifier shut down. |

Instructions

Connection

To pair your Explore+ amplifier with a mobile or computer, use your host machine's standard Bluetooth menu. Explore+ transfers data online as soon as a Bluetooth connection is established.

If the connection is lost, Explore+ will revert to advertising mode, ready to reconnect. Explore+ will remain in this mode for four minutes before moving to offline mode.

Data

Explore+ samples ExG data at 250 Hz (default) with a 24-bit resolution. The amplifier also records and transmits temperature, battery voltage, accelerometer, gyroscope, and magnetometer data. This means you can derive the absolute orientation and status of your amplifier at all times.

Explore+ stores data in binary files (.BIN suffix). To retrieve your data, connect your amplifier to a computer via USB. To delete files, format the memory using our open-source APIs. Please refer to the user manual or website for more details.

Software

Capture and visualize data using Explore's APIs written in Python, Java, and MATLAB. Everything is open-source.

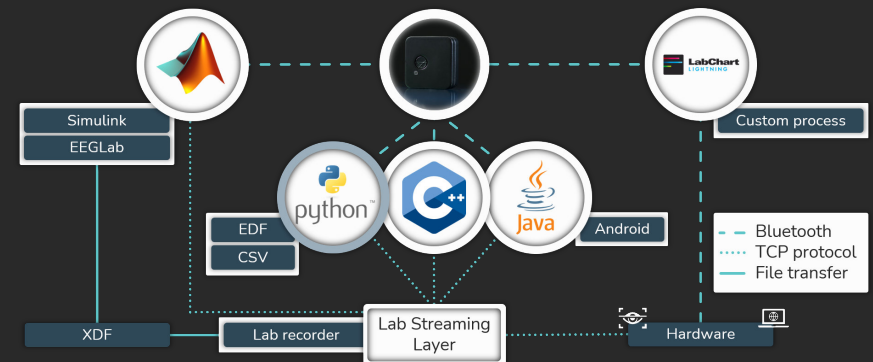
explorepy, written in Python, is our most mature API. It provides an extensive set of tools that allow you to build customized biosignal applications.

Instructions

Software cont.

For detailed instructions on how to install and use explorepy, see: <https://explorepy.readthedocs.io>.

Explore Desktop provides a user-friendly graphical interface for explorepy. It allows you to measure impedances, visualize data, push to LSL, and set event markers.



Event triggers

Explore+ supports three kinds of event triggers.

1. Amplifier button press.
2. TTL pulse: Requires a USB TTL pulse generator (Mentalab trigger stick), a trigger isolator, and a USB to USB-C cable. Generates minimal latency event markers.
3. Software markers: Use Mentalab APIs or external software like LSL and OpenViBE to generate programmatic markers.

Contact

Mentalab is a biomedical technology company from Munich, Germany. Mentalab Explore+ is a high-end, mobile measurement device for biosignal applications.

Mentalab Explore+ is used by researchers and scientists around the world in applications ranging from brain-computer interfaces to sleep and neuropsychology research.

Mentalab Explore+ is not designed for medical use. It should not be used for diagnosis or treatment in a medical context.

Our team is always happy to support you in developing your own innovative solutions.

contact@mentalab.com

<https://mentalab.com>

<https://github.com/Mentalab-hub>

<https://explorepy.readthedocs.io>

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