



Hero 9ch EEG

USER GUIDE

Model: SMT



V-E09-HERO-01-040326-EN

English

This is the user guide for the Hero 9ch EEG device from Bitbrain.

This document will provide information for the proper setup and usage of the system.

Contents

05	What is included?
07	Safety information
09	Conventions and symbols
10	Conditions for use
11	Disclaimer
12	Hero 9ch EEG
14	Technical specifications
15	Preparing the equipment
19	Preparing to record data
21	Placing the equipment

Contents

26 Obtaining a signal

28 Removing the equipment

29 Charging the battery

31 Maintenance

What is included?

The pack contains all the elements required to use the 10 dry-sensor EEG Hero device:

Item	Name and description	Quantity
	Hero • Includes 10 dry sensors for EEG recording. • Powered by a swappable battery.	1
	Foam adjusters • Adapts the equipment to different head sizes.	3 pairs
	Chin strap	1
	Band spacing ruler • For measuring distance between sensor bands, to place them in accordance with the international 10-10 EEG system.	1
	Spare sets of elastic straps • Each set consists of 3 units.	2
	Rechargeable battery with micro-USB port • Fenix 16340 ARB-L13-700U (700mAh)	2

What is included?

Item	Name /description	
	Cable USB type A - micro USB type B • Connects battery to a power source for recharging.	1
	8GB Class-10 MicroSD Card with SD Adaptor	1
	REF Sensor Elastic O-Ring Replacements (Clip) • Used to replace the elastic o-ring located on the REF sensor clip in case of breakage, wear, or loss.	4

Safety Information

Please read the safety information, conditions for use and instructions carefully before using the device. Failure to follow the instructions set out in these documents will lead to the nullification of the product warranty.

Careful usage and handling of the equipment

- Do not handle the device with wet hands, as this could cause a short circuit.
- Do not use the device for any purpose other than that for which it has been designed.
- Do not hit, throw, bite, open or burn the device.
- Avoid falls or collision with other objects.
- Remove the battery from the device if it is not going to be used for a long period of time.
- Keep the device in a dry place, and do not expose to extreme temperatures.
- This equipment is not suitable for use where children are likely to be present.

Warnings about the equipment

- DO NOT use the device while it is charging.
- DO NOT open the device. If your device does not work properly, contact support@bitbrain.com.
- DO NOT bring the device close to

electronic or electrical life support equipment.

- The handling and supervision of the equipment shall mandatorily be performed by an adult when the equipment is used to measure biometric data in children.
- If you notice that the device emits strange smells or noises, or that its temperature is excessive, leave it in a safe place and contact support@bitbrain.com.

Warnings about the batteries

- Do not connect the battery-charging cable while the battery is inside the equipment.
- Disconnect the charging cable once the battery is fully charged. Otherwise, the battery's life cycle could be reduced.
- If you are storing the device for long period of time (more than one week), it is recommended that the battery not be at 100% charge. This can degrade the battery and result in permanent capacity loss.

Safety Information

- Observe the battery's working and storage temperatures (see the section: Charging the battery – Usage temperatures).

Device disposal

Do not throw electrical and electronic devices in the trash! In accordance with European Directive 2012/19/UE on Waste Electrical and Electronic Equipment, they should be disposed of at suitable collection points for environmentally responsible recycling.

Before disposing of appliances at collection points, batteries should be removed and disposed of separately to be treated appropriately.



CE Marking and Conformity

This device is a radioelectrical IT equipment.

The CE marking indicates compliance with the essential requirements of the RED Directive (2014/53/EU).

The Bluetooth module it incorporates complies with this Directive. It is used according the requirements and instructions specified by its manufacturer.



Important

Hero is a device designed by Bitbrain to measure biometric data for research purposes.

Conventions and symbols

The Following Conventions and Symbols are Used in this Manual:

Conventions:

- **Note:** used to highlight relevant information.
- **Caution:** used to point out aspects that if not observed, may cause damage to the equipment, injury to persons or deviations in the operation of the equipment with respect to its specifications.
- **Warning:** used to inform of a specific action which, if not observed, may cause damage to the equipment, injury to persons or deviations in the operation of the equipment from its specifications

Symbols:

The following symbols are to be found both in this manual and on the labelling of the equipment or its packaging:



This product contains electrical and electronic components and must not be disposed of using the standard waste collection system. Please refer to your local regulations for the disposal of electrical and electronic equipment.



Product complies with CE Marking regulations. See instructions for use.



Direct current.



On.



Off.

Conditions for use

- Read the device safety information carefully and keep this manual for future reference.
- Read the “General Terms and Conditions of Sale and Use for Bitbrain Products” carefully. You can find the document at <https://downloads.bitbrain.com/documents/terms-and-conditions-eu>

Disclaimer

The Hardware equipment included in the Products (EEG, biosensors, indoor positioning systems, eye tracking) are not medical devices, have not been designed or manufactured to offer healthcare services, and are not sold for the purposes of diagnosis, treatment, palliation, medical advice or illness prevention, but for research purposes.

Read the “General Terms and Conditions of Sale and Use for Bitbrain products” before buying a product, in order to understand it fully. You can find the document at <https://downloads.bitbrain.com/documents/terms-and-conditions-eu>

Bitbrain reserves the right to revise this user guide and make any changes to its content that it considers relevant, at any moment and without obligation to notify any person or entity of the changes made. Despite the best efforts made to ensure the accuracy of the information contained within, this should not be interpreted as a commitment from Bitbrain. To ensure that you have the latest version, please visit the Downloads section on the product page at www.bitbrain.com.

Hero 9ch EEG

Hero is a 9-channel wearable and portable EEG device designed for real-world applications that require easy set up and high signal quality. The Hero system uses active shielding for robust EEG monitoring and mobility, and it is designed to address the fronto-central, central and centro-parietal brain areas.

Sensor Layout

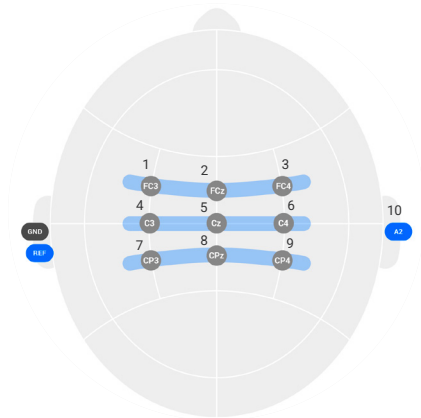
Hero contains 9 EEG sensors, 1 channel for linked ear reference (A2), Ground (GND) and Reference (REF).

The EEG sensors are located in positions FC3, FCz, FC4, C3, Cz, C4, CP3, CPz, CP4, in accordance with the international 10-10 EEG system.

The A2 channel for linked ear reference is located on the right clip, and GND and REF are found on the left clip.

The correspondence between channel numbers and sensors is as follows:

Channel 1: FC3	Channel 6: C4
Channel 2: FCz	Channel 7: CP3
Channel 3: FC4	Channel 8: CPz
Channel 4: C3	Channel 9: CP4
Channel 5: Cz	Channel 10: A2



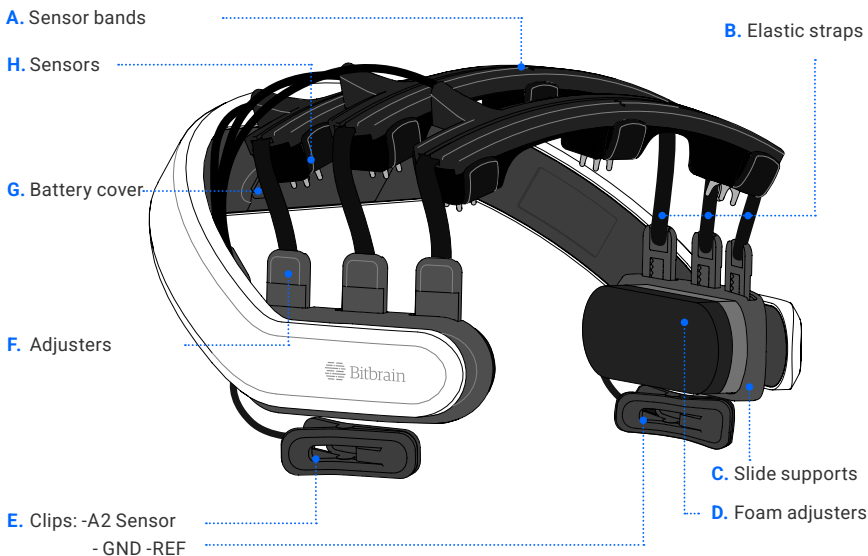
Manufacturer's Information

BIT&BRAIN TECHNOLOGIES, S.L.

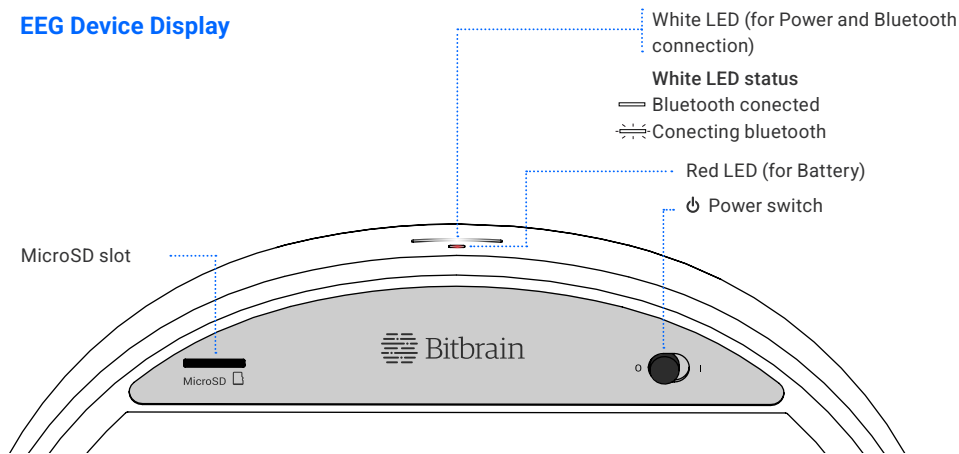
C/Sta Teresa de Jesús 32, 50006 Zaragoza, España.

Hero

EEG Device



EEG Device Display



Technical specifications

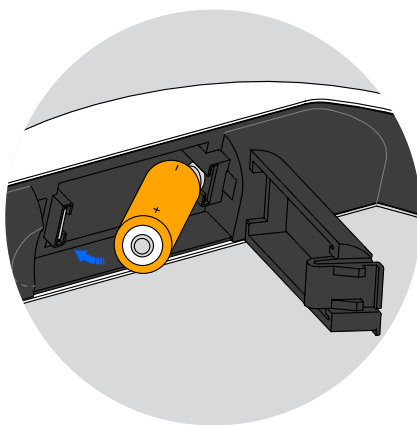
Rated voltage	3.6V
Rated power	720mW
Battery life	>3h
Charging time	≤3h (rechargeable and removable Li-ion battery)
Sampling rate	256 SPS at 24 bits
Data transmission and range	Bluetooth 2.1 + EDR with 10 meters in direct sight
Data backup	Yes (removable μSD card. Max 8 GB, class ≥10)
Dimensions	195x156x90mm
Weight	Device with battery: 250g
Integrated sensors	Integrated IMU (9 axes): accelerometer, gyroscope and magnetometer
Certifications	CE (Directive 2014/53)

Preparing the equipment

1

First insert the battery. The procedures for inserting and removing the battery are the same:

1. Ensure the equipment is switched off.
2. Open the battery cover (G). *Check page 12 to see which letters refer to which parts of the equipment.*
3. Insert the battery in the compartment. The negative pole (flat end) goes on the spring.
4. Close the battery cover (G).
5. To recharge the battery, please read the instructions on page 29: *Charging the battery.*



Preparing the equipment

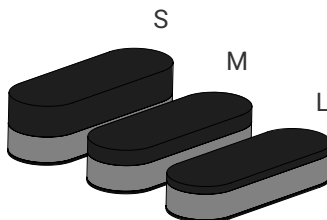
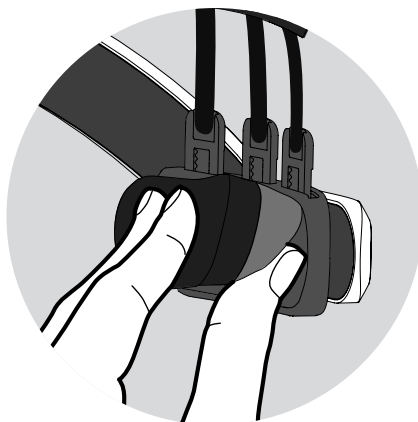
2

Select the appropriate foam adjusters (D) for the user's head. It is important to use the same size adjusters on both sides so the device will be placed symmetrically.

One foam adjuster will be fitted to each side support (C).

The foam has a side with Velcro. Attach the foam adjusters (D) with the Velcro to the inner side of the side supports (C).

The device should be steady on the head, and the user should feel comfortable with the size. See page 21: *Placement*.



Preparing the equipment

3

For comfort or stability if the participant is on motion, optionally attach the chin strap:

1. First attach the Velcro on the two triangular parts of the chinrest to the inner side of the arch, around the side support (C).

The Velcro should be hidden behind the arch, as shown in the image.

Never detach the supports (C) from the arch.



Preparing the equipment

2. Thread the chin strap through the buckles on the triangles which are already attached

The end of the strap should be threaded from the inside out of the upper opening, and then inserted downward through the second opening.

It is important to thread it as shown in the image, so that the strap will slide correctly.

3. The chin strap is prepared.
4. Once the equipment has been placed on the user, after step 2 of Placement (page 21), the chin strap can be adjusted to the user:

Pull both sides of the strap at the same time so that the chin support is properly centered.



Preparing to record data

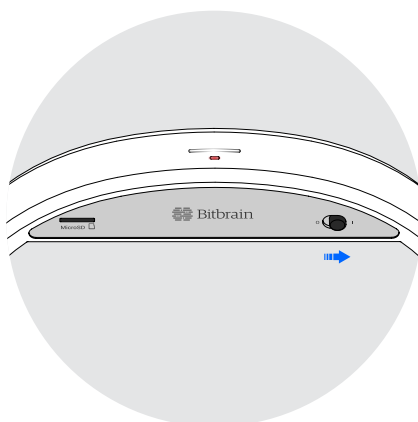
1

Switch on the device by sliding the Power switch to the right (I). The white Wireless Connection LED will flash until a connection is established with the software, at which point the light will be steady.

When the device has low battery, the red Battery LED will light up. To recharge the battery, see the instructions in the Charging the battery section.

IMPORTANT:

It is not recommended to start recording with a low battery. This can affect the quality of the recorded data. Do not use the equipment while it is charging or charge the battery while it is installed.



Preparing to record data

2

This equipment sends data using Bluetooth wireless technology.

The data can be saved on:

- **The computer with which the device is paired.** Please bear in mind that if the device loses Bluetooth connection with the computer, this can lead to a loss of data.
- **MicroSD Card.** In this mode, the wireless signal will continue being sent, so data can still be seen and recorded in real time on the computer while simultaneously being saved on the memory card.

Pairing

Be sure the computer has a Bluetooth adapter capable of version 2.1 or higher. The first time you use the device, you will need to pair it. This can be done from “Settings > Devices” on Windows.

The name of the device in the list of Bluetooth interfaces corresponds to the serial number (S/N), which you can find printed on the label on the Hero amplifier.

Data backup with MicroSD

1. Insert the microSD card provided into the slot on the display.
2. Enable the “SD card record” option on the software to save data to the card.

The files saved are recorded in .sdf format. To convert them to .csv format, use the “Import record” function on the software.

IMPORTANT:

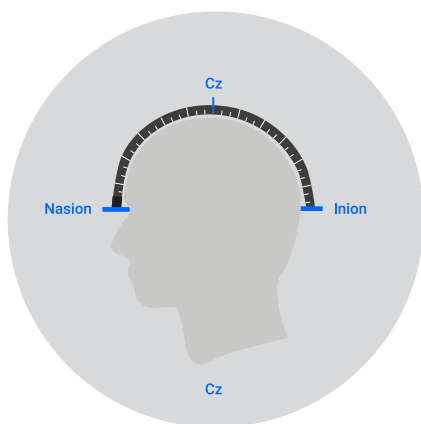
We recommend using a Class 10 or above Micro SD card with capacity of 8GB. Using another type of memory card that does not meet these specifications could cause the loss of data stored on it.

Placement of the equipment

How to place Hero on the user's head.

1

- Use the measuring tape to measure the user's nasion-inion distance (see image), and locate the position of Sensor Cz, which is halfway between these two points.
- Ensure the proper location of the Cz point, as it is the key to placing the equipment correctly and to obtaining a high quality signal.



Nasion: The depression formed where the frontal bone and the bridge of the nose meet.

Inion: The inion is the highest point of the external occipital protuberance, which coincides with the beginning of the trapezius muscle and the nuchal ligament.

Placement of the equipment

2

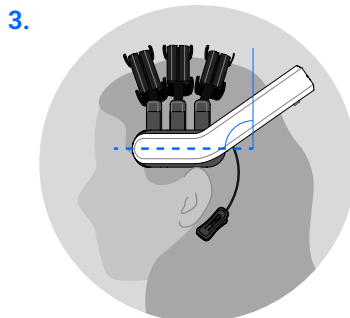
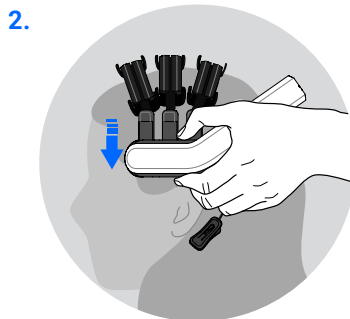
1. Fully open the six adjusters (F).

2. Holding the device by the arch supports (C), open it slightly and place it on the user's head.

The side supports (C) should be as low as possible, **touching the top of the user's ears.**

3. The sides should be **horizontal**, and the tips of the arch should be as close as possible to the user's face.

Note: If you have chosen to use the chin strap, connect and adjust it now. See page 17.



Placement of the equipment

3

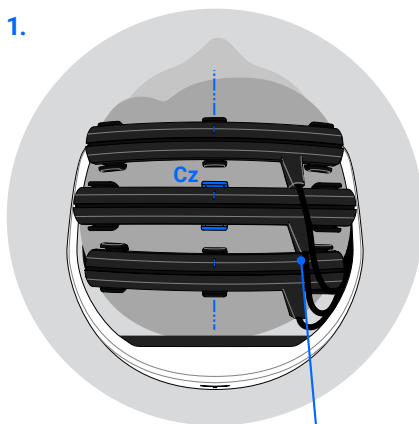
To position the three sensor bands (A), follow these steps:

1. Match the Cz position on the head, obtained in Step 1 of Placement (see page 21) with the central sensor of the second band.

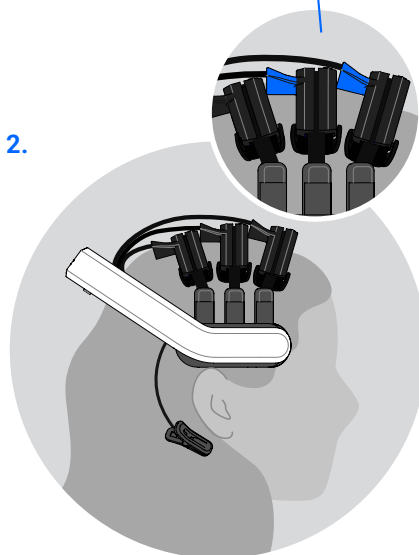
Place the bands (A) so that their center markings are aligned with each other

2. To place the bands at the correct distance, ensure that the far right sides of the bands are touching the outputs for the cables, as shown in the image.

1.



2.



Placement of the equipment

3. Once the right-hand side of the bands is in position, now establish the distance between the bands at their center.

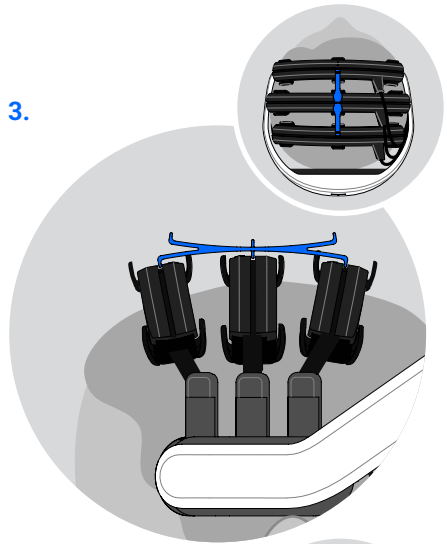
Place the longest side of the spacing ruler perpendicular to the bands, with Cz in the center of the second band, as shown in the image.

Adjust the first and third bands (A) if necessary, so that the center of the bands (A) matches the distance shown on the spacing ruler.

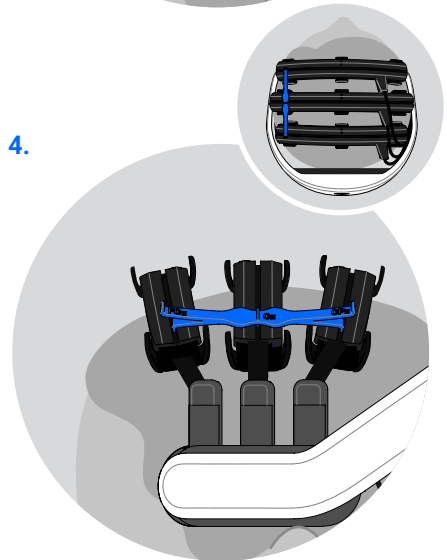
4. Finally, flip the spacing ruler the other way, and perform the same operation as before on the left, fixing the center of the ruler on Sensor C3, and adjusting FC3 and CP3 as required.

The bands are now in their correct positions. These positions should be kept throughout the recording.

3.



4.

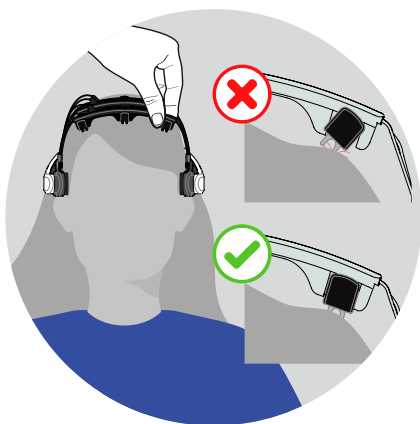


Placement of the equipment

4

Before lowering the adjusters (F), move the sensors (H) by rocking them backward and forward, without moving the bands (A), to ensure that they all have all four pads in contact with the skin.

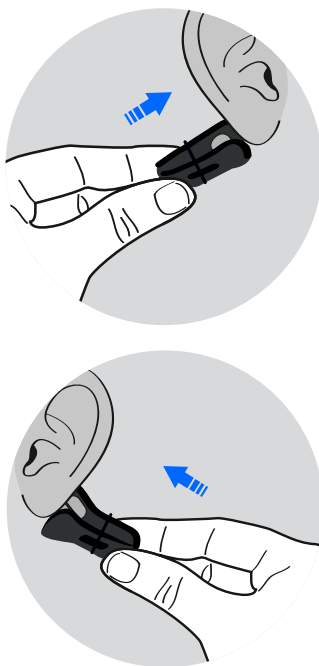
Note: At this stage, it is not necessary to check the quality of the signal recorded.



5

Attach the two clips (E) to the user's earlobes.

Sensors must be in contact with the inner part of the earlobe.

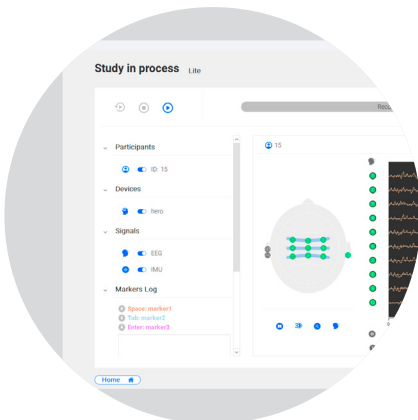


Obtaining a signal

1

The software screen shows the EEG signal captured by the device in real time.

The color of the sensors indicates the impedance, or the quality of the contact with the skin. Quality depends directly on placement.



2

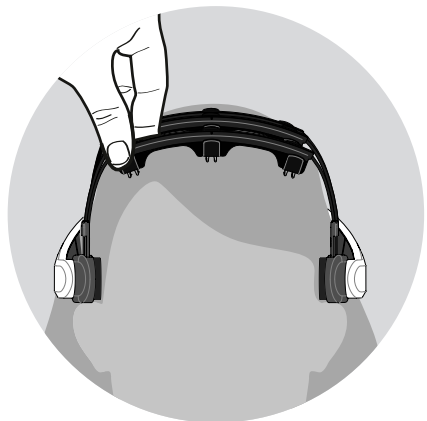
If any sensor is not working properly:

Repeat the following **two** steps until a good signal is detected:

1. Gently rock the sensor in question backward and forward, without moving the bands, until the pads of the sensor slide through the hair and manage to contact the skin.



Wait a few seconds for the signal to settle.



Obtaining a signal

2. If you notice that the sensor is too far away from the head, slide the adjuster (F) downward in order to bring it closer to the scalp. The height of the adjusters can be regulated if required.

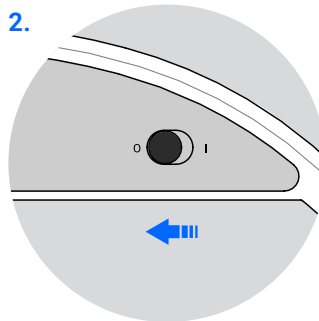
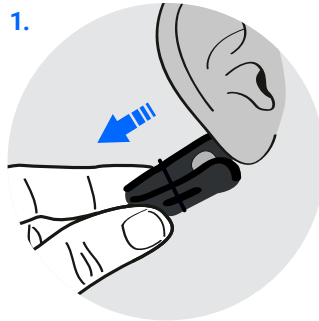
Note: If you are having problems obtaining a good signal, the chin strap may help.



Removing the equipment

Follow these steps to remove the equipment from the participant's head.

1. Remove the clips (E) from the user's ears.
2. Switch off the device.
3. Raise the adjusters (F) and take the device off the user's head.



Charging the battery

The battery provided with the equipment, Fenix ARB-L16-700U, is a rechargeable battery with an integrated micro USB port.

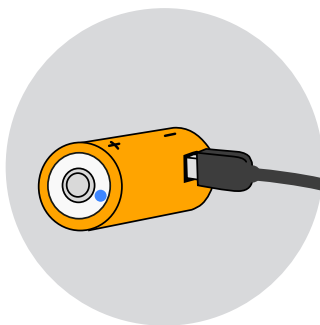
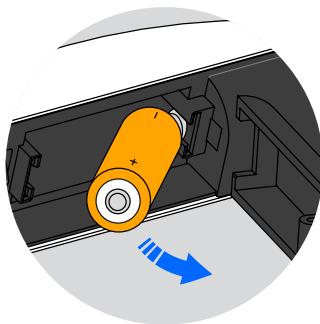
1. Open the battery cover (G).
2. Remove the battery from the equipment and connect it to a power source with 5V output, using the USB - micro USB cable provided, or similar.

Ensure the power source complies with the UNE-EN60950-1:2007 standard. Using another kind of power source could damage the battery.

3. The LED on the battery shows the status of the charge. It will turn blue when charging is complete.

IMPORTANT:

- Do not connect the charging cable to the battery while installed in the equipment.



Charging the battery

- Disconnect the charging cable once the battery is fully charged. Otherwise, the battery life cycle could be reduced.
- If you are storing the device for long period of time (more than one week), it is recommended that the battery not be at 100% charge. This can degrade the battery and result in permanent capacity loss.
- To charge the battery of the device follow the manufacturer's recommendations. (Limit of 0,5 A)
- Using a higher amperage charger may seriously damage the battery.

USAGE TEMPERATURES:

Working temperature: 0°C~45°C

Storage temperature:

- Up to 1 month: -20°C~60°C.
- Up to 6 months: -20°C~30°C.

ATTENTION

The Fenix ARB-L16-700U rechargeable battery used by Hero has a limited life cycle. Over time, their capacity and performance are reduced, and replacement will be necessary.



Should you need to replace the batteries, only use the Bitbrain-approved model:

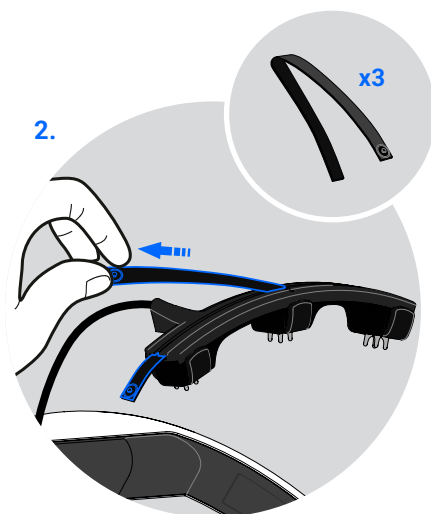
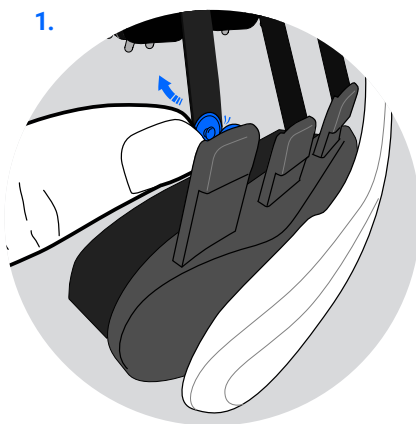
- Fenix ARB-L16-700U USB rechargeable Li-ion 16340.

The use of different kinds of batteries could cause a malfunction, and even the risk of fire or explosion.

Maintenance

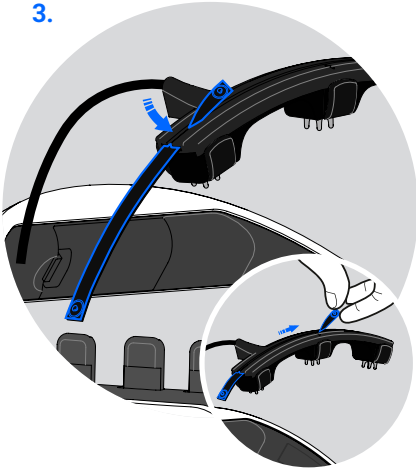
Replacing the elastic straps

1. First, loosen the clips which attach the elastic straps (B) to the adjusters (F).
2. Remove the elastic straps (B) from inside the sensor bands (A), through the upper opening.



Maintenance

3.



3. Insert the new elastic straps into the sensor bands (A) through the upper opening. Ensure the clips are facing upward, as shown in the image.

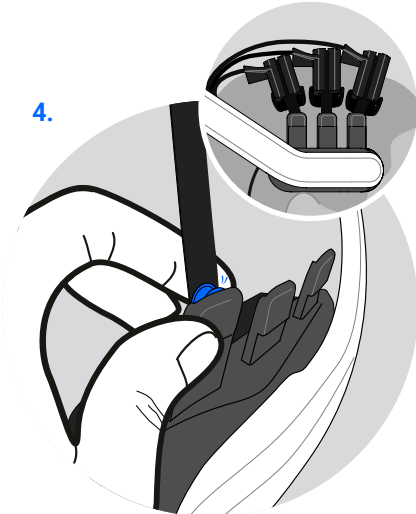
To do this more easily, insert a piece of the strap one centimeter from the clip, leaving the clip free, as shown in the image. Then slide the strap toward the other end to insert the rest.

4. Attach the six clips on the new elastic straps (B) to the clips on the adjusters (F).

Place the bands in the same order they were in previously.

The cable of the first band should be above the other two bands, and the cable of the second should be above that of the third.

4.



Maintenance

Disinfecting and cleaning the equipment

- To disinfect the device, we recommend using Clinell Universal Wipes.
 1. Use the wipes in such a way that all surfaces of the equipment stay damp for 1 minute. Wipe gently without applying excessive pressure – this could release liquid that could cause internal damage to the device.
 2. In the area of the sensors, always wipe with them face-down.
- Clean and dry the device frequently, especially the sensors. We recommend to slightly dampen a cloth with water.

Very important

- Do not use strong or abrasive disinfectants to clean the product. When selecting a disinfectant or cleaning product, confirm its effectiveness and compatibility with the material.

Disinfectant product clarification

- If you wish to disinfect the device, use ONLY Clinell® Universal Wipes .
- DO NOT USE! Any other cleaning product or disinfectant not validated by Bitbrain. The use of any other cleaning product not validated by Bitbrain could deteriorate the equipment and affect the signal obtained.

Storage

- Try to keep the product in its original packaging while it is not in use.
- Remove the battery from the device if it is not going to be used for a long period of time.
- If you are storing the device for long period of time (more than one week), it is recommended that the battery not be at 100% charge. This can degrade the battery and result in permanent capacity loss.
- Store the device in a dry place, and do not expose to extreme temperatures (see the *Charging the battery – Usage temperatures* section).

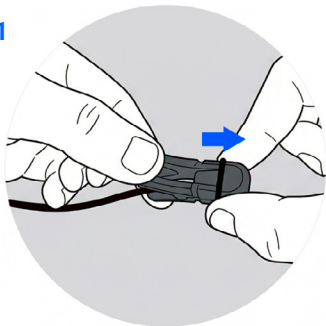
Replacing the REF Sensor Elastic O-Ring

In the event of loss, breakage, or visible signs of wear of the elastic O-ring that secures the REF sensor clip, it can be easily replaced using one of the spare bands included with the device.

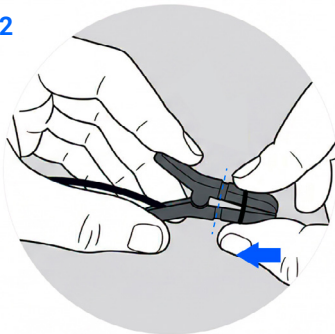
To do so, remove the old O-ring by sliding it outward and insert a new one (with the clip in the closed position) until it is properly seated in the corresponding groove, as shown in the image.

Ensure that the clip opens and closes normally.

1



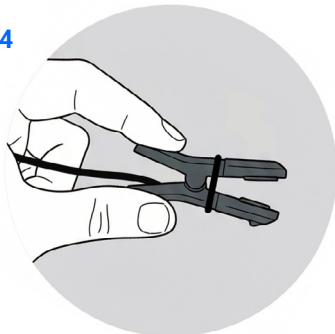
2



3



4





Europe

Zaragoza, Spain

C. Sta Teresa de Jesús, 32, 50006

Zaragoza

+34 931 444 823



More info

Email

info@bitbrain.com

Help Center

help.bitbrain.com
