
User manual Emitter EMET-HD

ETISENSE SAS



Jacketed monitoring for life sciences

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1 Important Safety Instructions

1.1 Warning

If the operator uses the equipment in a manner not specified by the manufacturer, the protection provided by equipment may be compromised.

Caution: the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



Follow the warnings given below to avoid accidents such as fire or explosion..

Observe the following instructions to avoid any material or personal injury.

- Keep the device away from water, fire, moisture or hot environments
- Do not attempt to open, repair, or modify the device
- Do not use a damaged usb charger or cable to charge the device

- Use approved batteries, accessories, and supplies.
- Use only a SELV USB charger with a nominal voltage of 5V DC - 500mA with limited energy corresponding to paragraph 9.4 of standard IEC 61010-1
- If any part of the device is cracked or broken, or if the device becomes hot, stop use it immediately.
- Do not turn on the device or use it if the battery compartment is exposed to the air.

2 Correct disposal of the device



The symbol indicates that the product should not be discarded as unsorted waste but must be sent to separate collection facilities for recovery and recycling.



The symbol indicates that the battery should not be discarded as unsorted waste but must be sent to separate collection facilities for recovery and recycling.

3 Using the emitter EMET-HD

The EMET-HD emitter is an instrument for measuring cardiac, respiratory and activity physiological signals. The function of the device is to acquire these signals then to transmit them via a radio link (BLE 4.0) during acquisitions that can last from a few minutes up to 24 hours.

It is intended for use in a laboratory environment for preclinical and clinical research purposes.

When in use, this emitter connects to various sensors integrated into a vest worn by the subject as well as to electrodes allowing the recording of biopotentials.

3.1 Precautions for use

- When not using the EMET-HD emitter for an extended period of time, remove the battery.
- The EMET-HD emitter operates under the following environmental conditions:

- Indoor use
- Altitude between 0 and 2000m
- Temperature between 5°C and 40°C
- Pollution Degree 2
- Humidity between 10% and 90%

3.2 Material list

3.2.1 Bluetooth Low Energy emitter

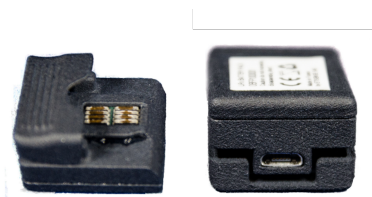
The Bluetooth emitter is placed into the jacket backpack. It acquires data from the ECG and RIP sensors. Each emitter is identified by a unique number starting with **0E** indicated on the label.



DECRO Bluetooth emitter

3.2.2 Battery pack

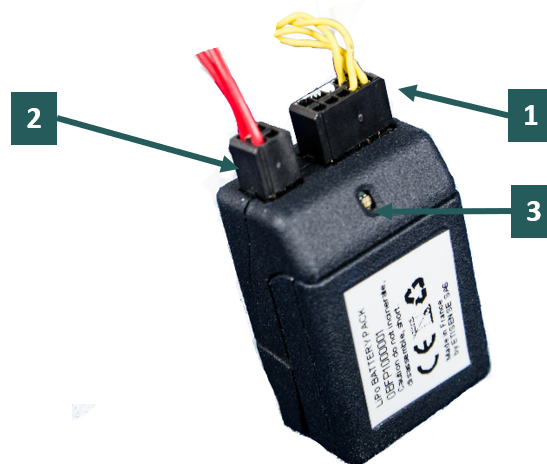
The emitter is powered by a battery pack with a capacity of 250mAh. The battery pack is removable and rechargeable by a USB cable plugged into the acquisition server, a PC or any phone charger.



Battery of DECRO emitter

3.3 Using the DECRO emitter

The DECRO emitter has different connectors which are detailed in the table below. Depending on the experimental setup, not all of them will necessarily be used



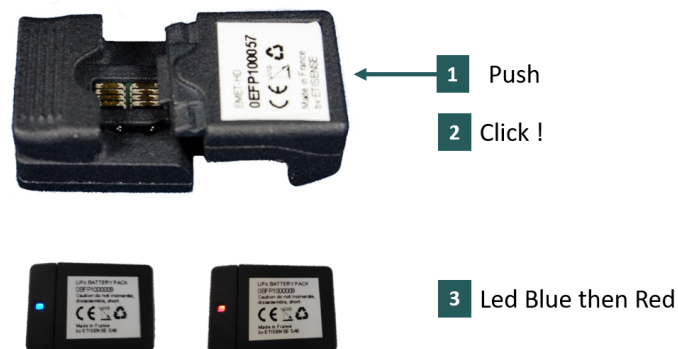
DECRO emitter seen from the side

1. Connector to the jacket: Inductance Respiratory Plethysmography sensors
2. Connector for ECG surface electrodes
3. Emitter status LED1

3.4 Power on, power off, charge

3.4.1 Power on

1. Insert the charged battery pack into the slot provided for this purpose

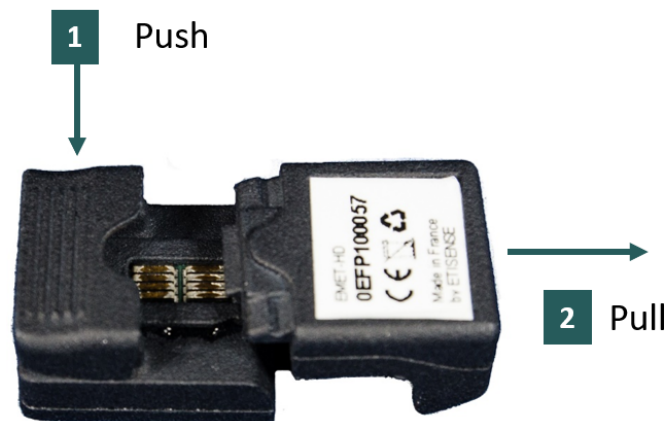


2. The diode (3) briefly flashes Blue then Red and turns off. This means that the emitter is powered and ready for connection

3.4.2 Power off and storage

When storing, the battery should be removed from the emitter so that it does not discharge before the next use.

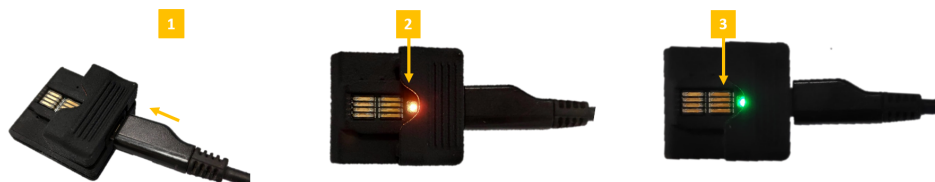
1. Press the lock
2. Pull the battery out to remove it from its slot.



3.4.3 Charging the batteries

The batteries are charged using a USB cable plugged into the USB port of a PC, the acquisition server or a smartphone-type USB charger.

Here are the steps to follow: 1. Insert the USB cable; 2. The LED is orange while charging; 3. The LED turns green when the battery is fully charged. Full charge takes about 3 hours when the battery is empty



4 Emitter specification EMET-HD

4.1 Technical characteristics

Environmental and physical specifications

- Dimensions: 39mm x 26.7mm 18.6mm
- Weight: 15g
- Radio Frequencies: 2.402 GHz - 2.48 GHz
- Radio range: ≥ 10 m in free field
- Battery Type: Lithium LiPo (250mAh - 3.7V)
- Power supply: 5V - 500mA continuous (USB)
- Autonomy in continuous recording: 12 hours

Biosignals

- x1 Biopotential 24 bits 500 Hz
- x2 32-bit inductance plethysmography
- x3 Acceleration (x,y,z) 12 bits at 12.5Hz

4.2 Applicable standards and operating environment

The EMET-HD emitter complies with the following standards:

4.2.1 CE

Electro Magnetic Compatibility tested according to standards:

- ETSI EN 301 489-1 V2.2.3
- ETSI EN 301 489-17 V3.2.4
- EN 61326-1 (2013)

Electromagnetic compatibility and Radio spectrum Matters (ERM) tested according to the standards:

- ETSI EN 300 328 V2.2.2 (Full Program)

Electromagnetic compatibility, Electromagnetic Field (EMF) tested according to standards: * EN 62311 (2008)

4.2.2 FCC Compliance:

FCC ID: 2A3MD-GC930058

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception which can be determined by turning the equipment off and on, the user is encouraged to try to correct interference by one or more of the following measures: - Reorient or relocate the receiving antenna. - Increase the separation between the equipment and receiver. - Connect the equipment into an outlet on circuit different from that to which the receiver is connected. - Consult the dealer or an experienced radio/TV technician for help.

FCC radiation exposure

This device complies with FCC RF radiation exposure limits set forth for general population. This device must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or emitter.

4.3 Environment of use and definition of the level of performance

Environment of use: The device is intended for use in a laboratory which constitutes an industrial electromagnetic environment for its immunity and its ElectroMagnetic Compatibility (EMC) have been tested according to standard EN-61326-1

Performance level of the sensors: For the sensors, the performance of the device is evaluated according to its signal-to-noise ratio defined as follows and for a measurement duration of one second

$$SNR = LOG10 \left(\frac{A_{SIGNAL}}{A_{NOISE}} \right)^2$$

Figure 1: Definition of SNR

The device is considered to be in default if the performance threshold is crossed more than 3 times in a row. The thresholds retained for the tests are indicated in the table below.

Sensor	SNR threshold (dB)	Number of faults observed
ECG	2	0
RIP ABD et THX	1.4	0
ACC X,Y,Z	1.4	0

Radio link performance level: The performance of the device is defined as the absence of loss of connection. **No disconnection was observed during immunity testing.** The device is faulty if it cannot reconnect automatically.

4.4 Cleaning

To avoid any risk of damage to the Emitter {{hw-ref}}:

- Remove the battery from the emitter before cleaning the device.
- do not immerse the battery or the emitter in water.
- It can be cleaned with laboratory detergents: Alcoholic solutions or solutions without Alcohols based on Aldehydes (ie Didecyltrimethylammonium chloride) in the form of a spray or wipes.

4.4.1 Cleaning the device

1. Spray a cloth with the previous solution
2. Rub the emitter and the battery with the cloth soaked in the solution
3. Reuse the battery and emitter once they are completely dry.

5 Legal Notice

ETISENSE SAS, Bioparc, Bat LAENNEC, 60A av ROCKEFELLER, 69008 LYON.

R.C.S LYON : 838 517 431

Contacts :

- Site web : www.etisense.com/contact-us/
- Email : sav@etisense.com
- Standard : +334 37 53 96 18