## Empatica E4 - use

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# Purpose

This protocol describes the setup and use of the Empatica E4 realtime monitor for the collection of physiological data.

# Device features

The Empatica E4 is a smartwatch-like wearable that continuously monitors:

* Electrodermal activity (EDA, a proxy for sympathetic nervous arousal, stress, etc.)
* 3-axis accelerometry
* Body temperature through infrared thermopile
* Blood Volume Pulse (BVP, or the phasic change in blood volume per heartbeat, derived from photoplethysmographic sensor. Can be used to calculate heart rate, heart rate variability, etc.)

The Empatica can stream data directly to a Bluetooth-enabled phone or tablet, or otherwise record data passively for later upload. When streaming, battery life is 20 hours, which increases to 36 hours in passive recording mode.

Data is output as a package of .CSV files for each sensor stream, in simple format (one numeric value per timepoint).

A principal operator should be assigned for the maintenance, setup and data- retrieval on each E4.

Operator(s):  
Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Init\_\_\_\_\_\_ Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Init\_\_\_\_\_\_

# Required equipment and supplies

* Empatica E4 physiological monitor
* EmpaticaRT app for tablet or smartphone, available on the Google Play store.
* Account login information for [Empatica Connect web-service](https://www.empatica.com/connect/)
* [Empatica Manager desktop app](https://www.empatica.com/product-e4-download)
* USB Micro B transfer cable (provided)
* Charging cradle (provided)

# Methods and procedures

## Recording

Subjects should be instructed to wear the fully charged E4 on their non-dominant wrist, behind the wristbone, with the button on the inside (towards the body). The strap should be snug without being uncomfortable to maximize electrode contact.

To beging a recording session, hold the button down for 2 seconds (but not longer, or you may reset the monitor) until the light begins to blink green.

At this point, if you wish to stream the data to a device, quickly open the “EmpaticaRT” app on that device and press the “Start a new session” button. Hold the E4 near the device to allow discovery to occur. From the menu that appears, select, “Empatica E4 – (followed by a serial number)”. After a moment, real-time streaming of physiological data will begin.

If you do not begin streaming to a device within a few seconds after recording starts, the E4 will go into passive recording mode. This will preserve battery life, but if you want to live-stream again you will have to end the current session and start a new one.

To stop recording in either case (streaming or passive), hold the button for 2 seconds.

# Schedule of repeating tasks

## Maintenance

* **Charging:** Connect the charging cradle to the USB Micro-B cable, and then connect the cable to a computer or wall charger. Place the E4 in the cradle. Charge time is less than 2 hours and charging should be done daily.

# Data retrieval

Once a live-streamed recording session finishes, if the Bluetooth-connected device has an internet connection, it will automatically sync to the web service. If you are operating the E4 in passive recording mode, use the [Empatica Manager](https://www.empatica.com/product-e4-download) desktop app to sync data from the band to the web service.

To view the data after syncing, log into the [Empatica Connect web-service](https://www.empatica.com/connect/). Click on "Sessions" at the top of the page to view sessions by date. You can view the traces for each sensor by clicking on "View" or download the package of per-sensor .CSV files by clicking on "Download".

# Revisions

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| --- | --- | --- |
| **SOP Revision #** | **Date** | **Description of change(s)** |
| 171114 | 11/14/2017 | First version |