

Micro Environmental Recorder User's Guide

Device Overview

MER serves two important functions:

- as a dynamic data logger
- as a real-time static data readout device

I. As a dynamic data logger, the device simultaneously records all the environmental data channels from its internal DC accelerometers, pressure transducer, humidity sensor, and temperature sensor.

The device can be configured via the companion MER mobile app, allowing for control over zero point, sampling rate, recording duration, and file name, among others.

Time history of all the sensor outputs is stored onto the internal memory of the device and can be downloaded to a computer for subsequent data processing/reduction.

There are four ways to start the data recording:

1. Remote Start Mode
2. Threshold Start Mode
3. Scheduled Start Mode
4. Manual Start Mode (does not require the MER Mobile App to function)

Data files in the internal memory can be downloaded onto a desktop or laptop computer by using the supplied USB cable or other compatible data transfer cables. See User's Manual for data download instructions.

II. As a real-time static data readout device, the user can instantly see the data readout of the following measurement parameters from the MER Mobile App under TOOLS:

- Inclination (level indication)
- Static Acceleration in X Axis
- Static Acceleration in Y Axis
- Static Acceleration in Z Axis
- Ambient Temperature
- Barometric Pressure
- Relative Humidity

Battery Charging and Runtime

To charge the MER, connect the device to a power source using the supplied USB cable (or equivalent).

The recommended current rating for the charger is 1.0 A. Lower current can be used but will result in a longer charging time.

A red LED will turn on while a green LED will blink slowly to indicate the device is being charged. The green LED will eventually stop blinking due to inactivity and the device goes into sleep mode, leaving the red LED on (to indicate charging state). When the red LED turns off, the battery is fully charged.

Unplugging the MER from a power source triggers the device into awake mode, indicating by a slow green blink. If the device remains inactive for 90 seconds, it will enter sleep mode and the LED stops blinking.

The maximum recording duration when the battery is fully charged is about 5 hours. To extend runtime, an external battery source may be connected to the MER using the supplied USB cable. See the User's Manual for more information on suitable portable phone chargers/power banks.

Data Download & Management

When connected to a PC using the supplied USB cable and **DataView** software (available on our website), user can download the recorded data (.bin) files stored in the internal memory for viewing/inspection and for further analysis. Once the files have been saved and reviewed, they can be deleted from the MER internal memory while it is connected to the PC.

Note that whenever the USB cable linking the MER to the PC is disconnected, the disconnection introduces at that instance an unintended error message back to the MER, causing its Bluetooth communication to freeze temporarily, and therefore will not respond to new commands. Normal operation will resume automatically after 90 seconds.

MER Mobile App Operation

Launch the MER Mobile App. Tap the **SEARCH** button and make sure the device(s) are nearby and awake (push the center button on top of the device one time will put it into awake mode). The App automatically detects compatible devices and displays their ID's on a pop-up screen. Tap the desired device ID to connect. Once the communication is established, connected device's information will be displayed on top of the STATUS page.

The MER Mobile App can only connect to configure one device at a time. To connect to another device, tap SEARCH again. If it failed to find other device ID's, exit the App on your phone and relaunch the App again.

Note that with some brands of mobile phone, the connection between the MER and the

App will be lost once the phone goes to sleep. Relaunch the App and reconnect again. When the connection is lost, the last configuration will remain in the MER until they are changed by the user.

STATUS Page

Once a device is paired with the MER Mobile App, the user can query the Battery level, internal Memory usage status, and the following Device Info:

- **Device Label:** The label assigned to this device. Device label can be changed on the TOOLS page.
- **Serial #:** Serial number of the selected device.
- **Firmware:** Current firmware version

When multiple MER's are in used, it may be useful to visually verify the location of the selected device. Tap Visual Identification and the green LED on top of the device will blink five times in quick succession for easy identification.

Tap the RELOAD button refreshes the information stored in the paired device's memory.

When connection to the device is lost, it is best to quit/exit the App to clear the registers and relaunch it from your phone then tap SEARCH to reconnect with the specified device.

SETUP Page

Under the SETUP page, the user can confirm time synchronization with the phone, select language, choose the appropriate sampling rate in the DAQ, and most importantly, select the desired recording mode.

Under **Time Synchronized**, the time the device last synchronized with your phone will be displayed in YYYY-MM-DD-HH-MM-SS format. Clock synchronization occurs automatically when a selected device is paired with the App.

Tap **Language** and a dropdown menu will appear. Select the desired language and the selection will be displayed.

Tap **DAQ Sampling Rate** to select the desired sampling rate best suit for your application. For shock and vibration applications, it is recommended to select 16kHz or 20kHz to prevent aliasing problem. Tap the **RELOAD** button to set the selected sampling rate. Sampling rates for barometric pressure, temperature, relative humidity, tilt are fixed internally and cannot be changed.

To select one of the available recording modes, tap **Recording Mode** to see the dropdown menu. Before making a selection, however, it is important to first remove previous settings by tapping **Remove Scheduled Settings** under the dropdown to clear all existing configuration. Now, you are ready to select a recording mode.

In **Remote Start** mode, the user specifies the recording duration by entering HH and MM under Recording Duration. The recording starts as soon as the CONFIRM & ARMED button is tapped. Data collection will end automatically when the specified duration has expired.

Once the device is in this recording mode (after **CONFIRM & ARMED** is tapped), Bluetooth communication between the device and mobile phone is disabled, and the MER will not be able to receive additional command until the recording is over. Should you wish to abort the recording, hold down the center button on top of the MER manually for 5 seconds.

In **Threshold Start** mode, the user can add trigger conditions for signal Polarity, G Level, and specify the trigger Channel(s). All three trigger conditions must be specified.

1. Choose either Positive, Negative, or Bidirectional trigger polarity
2. Enter the trigger levels in G's for upper bound and lower bound thresholds. This specified trigger level applies to whichever polarity direction chosen above. 3g to 5g is considered the minimum effective trigger level due to the effect of gravity offset (which is mounting orientation dependent) as well as noise level in the measurement environment.
3. Choose which channel (X, Y, or Z) to be used as trigger. If unsure, choose Either.
4. Specify Recording Duration in (HH, MM)

By selecting **Threshold Start** mode, the device is armed and enters into a continuous monitoring state as soon as the **CONFIRM & ARMED** button is tapped. Only when the device detects acceleration signals in the specified axis and in the specified polarity that exceeded the G threshold will the data collection begin. It stops collecting data when the specified time duration under Recording Duration has expired. Once the device is in this recording mode (after **CONFIRM & ARMED** is tapped), Bluetooth communication between the device and mobile phone is disabled, and the MER will not be able to receive additional command until the recording is over. Should you wish to abort the recording or clear the Threshold Start settings, hold down the center button on top of the MER manually for 5 seconds.

WARNING: In applications where the user is not familiar with the test environments, it is suggested NOT to select the Threshold Start mode to prevent missing the recording accidentally due to incorrect threshold settings.

In the **Scheduled Start** mode, specify the Start Time and End Time of the recording (YYYY_MM_DD_HH_MM_SS) and tap the **CONFIRM & ARMED** button. The device starts and ends the recording according to the set time. When programming the start time way in advance of actual recording, the device should be connected to the charger or external power source and disconnected from it prior to the start, extending its effective runtime. Should you wish to abort the scheduled recording or change the time settings, tap the **Remove Scheduled Settings** button and it will be reset.

There is also a **Manual Quick Start** mode which is the quickest way to start a recording when you are in a hurry. This recording mode allows the user to start taking data without using the MER Mobile App.

To use the Manual Quick Start mode, the device needs to be first awakened from its sleep mode by pushing the center button one time on top of the MER. The red LED on top of the device blinks once followed by the slow blinking of a green LED, indicating that the device is awake. While the device is awake, the user can start the recording process by pressing and holding down the center button on the device for more than 5 seconds. The green LED starts to blink in quick succession to indicate that the recording session is in progress. Data

recording will stop when the device has either:

- o run out of battery capacity
- o run out of memory
- o or the center button was held down for >5 seconds

TOOLS Page

Under **Real-Time Query**, the following parameters will be displayed:

- Inclination in the X and Y plane in degrees (leveling indication)
- Ambient Temperature in Celsius
- Relative Humidity in percent
- Barometric Pressure in bar
- Static Acceleration in X Axis in g's
- Static Acceleration in Y Axis in g's
- Static Acceleration in Z Axis in g's

When using the MER device as a real-time static data readout device, the user should refresh sensor data by tapping the **RELOAD** button right before reading.

Under **Filename Prefix**, the user can add a prefix to the filename by entering the description and tap **CONFIRM MODIFICATIONS**.

Under **Device Label**, enter a short description in the box and tap **CONFIRM MODIFICATIONS**.

Under **Sensor Offset Adjustments**, the user can perform zero calibration of the precision triaxial accelerometer array as needed.

To perform the adjustment, tap Sensor Offset Adjustments and follow the instructions on the sub-page that follows.

Tap **About MER** to learn more about MER on our website

Tap **User's Guide** to bring up the User's Guide

Tap **Documents Downloads** to open the URL for downloading User's Guide

Factory Access can only be accessed with a passcode.

FCC Warning Statement:

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 instructions, 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 the 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 a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

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.

The device has been evaluated to meet general RF exposure requirement.