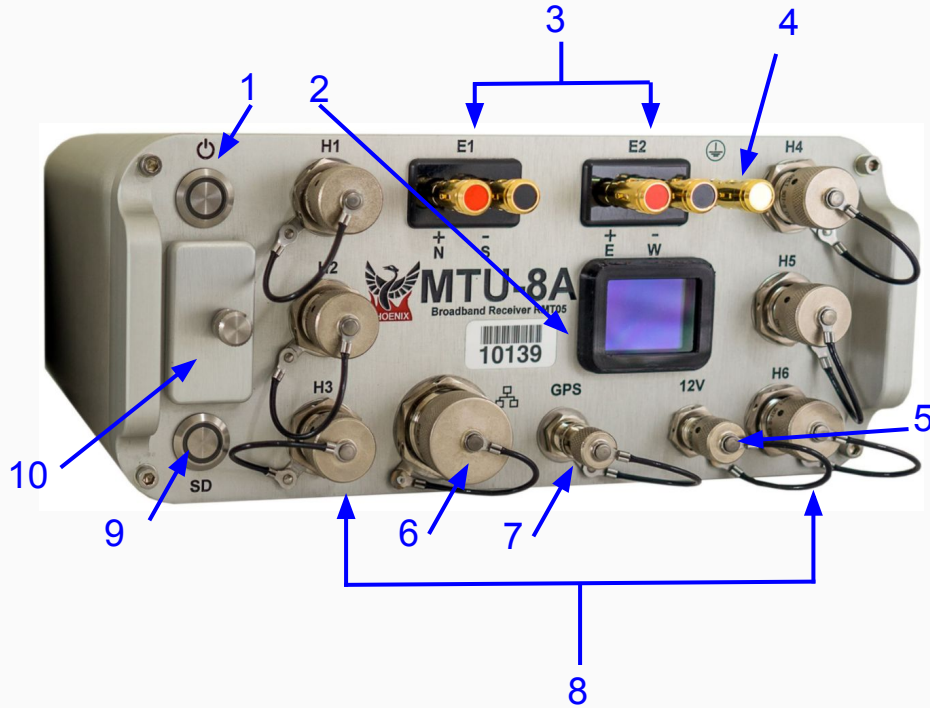


MTU-8A

Quick Start Guide for MT



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Components	
1	Power/Record button and indicator
2	Display
3	E1 (Ex) electrode connectors E2 (Ey) electrode connectors
4	Ground electrode connector
5	12V DC power input
6	LAN connector
7	GPS antenna connector
8	H1 - H4 (Hx) magnetic sensor connector H2 - H5 (Hy) magnetic sensor connector H3 - H6 (Hz) magnetic sensor connector
9	SD card button and indicator
10	SD card slot and cover

MTU-8A

The MTU-8A UMT (Ultra-Wideband MT) system, supersedes older separate AMT, MT, BMT and Long Period MT systems.

With 6 Magnetic channels, there is no longer any need for expensive, separate deployments of different systems to capture the necessary spectrum; simplifying and saving money on procurement, training, operation and maintenance.

Designed with versatility in mind, the 8-channel MTU-8A UMT receiver is compatible with all Phoenix magnetic sensors and common three-axis fluxgate sensors in the market.

This manual is intended for MT operations. The MTU-8A can also be used for CSAMT recordings. For more information on CSAMT consult the [CSAMT Operation manual](#) (DAA31).



Calibration - Config Files

Perform the Receiver and Sensors calibrations at start of each installation layout, to ensure the instruments are measuring correctly. Calibration verify the working state of the equipment and helps to improve the quality of the records and the reliability of the measurements.

Open **EMpower** and select the **Prepare** module

1. Sensor

- 1.1. Click the Sensor button and choose the magnetic channels that will be used
- 1.2. Select the **Sensor Type**
- 1.3. Type the **Serial number**, (*not needed for MTC-155/MTC-185 sensors*)
- 1.4. Or **Load** it from a previous config file
- 1.5. **Save** the configuration file (config.json) in the SD card (*see page 10*)

2. Receiver

- 2.1. Select the **Receiver Type** and click the **Receiver** button
- 2.2. **Save** the configuration file (config.json) in the root folder of the SD card (*see page 10*)

The screenshots illustrate the calibration process in EMpower software:

- EMpower Main Window:** The 'Prepare' button is highlighted (1.1).
- Prepare - EMpower Window:** The 'Receiver Type' is set to 'MTU-8A' (2.1). The 'Receiver' button is highlighted (2).
- Sensor configuration - EMpower Window:** A table of sensors is shown. All sensors (H1-H6) are set to 'MTC-155' with serial numbers '0' (1.2, 1.3). The 'Save' button is highlighted (1.4).
- Recording Folder - EMpower Window:** The file explorer shows the 'E:\' directory (1.5 / 2.2).

For more details consult [DAA22-Guide For MT Field Operations](#)

Creating a Configuration file - MT acquisition

1. Click **Prepare** and select the **Receiver type** as **MTU-8A** and click the **MT** button

2. Select the **Schedule**

2.1. **Manual** or **Automatic Start**

2.2. For a specific schedule, select **Single Shot**, **Daily** or **Weekly**, and set the desired time and date, and **Save**

- To add additional schedules, select **Add Schedule** and define the additional times and/or dates

3. **Ethernet port** (consult the [Remote Networking](#) manuals)

4. Define the **Channel Settings** (See pages 6 to 8)

5. Define the **Receiver Settings**

- **Sampling Mode**
 - *Continuous Sampling* (Applicable to research studies)
 - *Sparse high frequency sampling* (See [Sparse high frequency sampling page](#))
- **Sampling Rate**
- **Power Recovery**(consult the [Power Recovery](#) manuals)

6. **Configuration Layout**

1. Prepare button and Receiver Type: MTU-8A, MT button

2. Schedule menu: Manual (Ctrl+Alt+1), Automatic Start (Ctrl+Alt+2), Single Shot (Ctrl+Alt+3), Daily (Ctrl+Alt+4), Weekly (Ctrl+Alt+5), Add Schedule (Ctrl+A)

3. Channel Settings: Magnetic channel settings, Enabled, Sensor Type: MTC-155, Gain: Normal, Low Pass Filter: 10 kHz, Sensor S/H: 0

4. Receiver Settings: Sampling Mode: Sparse high frequency sampling, Sampling Rate: 24kps High, View graphic: 206.44 MB / Hour, Power Recovery: Enable

5. Configuration layout: Layout Geometry: Orthogonal, Survey Name: Test, Site Name, Operator(s), Company Name, Configuration Notes: Additional information

6. MTU-8A Geophysical Receiver

This section is used for inputting the parameters and instrument details that will be used for the recording

! To use the magnetic sensor data from a different recording or use a remote reference, all recordings **must** have a matching Sampling Mode and Sampling Rates. Otherwise, EMpower will not allow to process the data using borrowed channels or remote reference

Creating a Configuration File - Electric Channel Settings

1. Select the **Electric** channel

2. Enable **or Disable** channel(s)

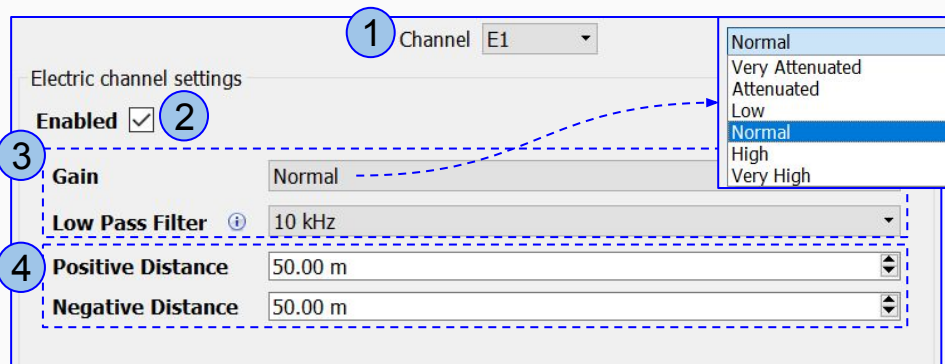
- Disable channels that you do not plan to use during the recording. This will save space on the SD card.

3. Select the desired **Gain** and **Low Pass Filter**

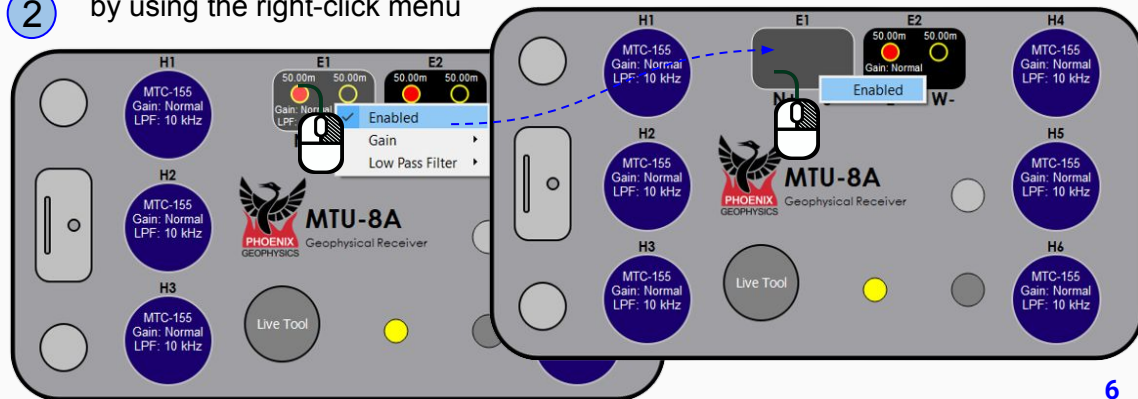
- For most applications, Normal Gain and 10 kHz LPF are best

4. Type **distances to the electrodes** of this channel if known

- If not, they will need to be corrected later before data processing



2 Some settings can be configured by using the right-click menu



Creating a Configuration File - Magnetic Channel Settings

1. Select a **Magnetic** channel

2. **Enable or Disable** channel(s)

- Disable channels that you do not plan to use during the recording. This will save space on the SD card.

3. Select the correct **Sensor Type**

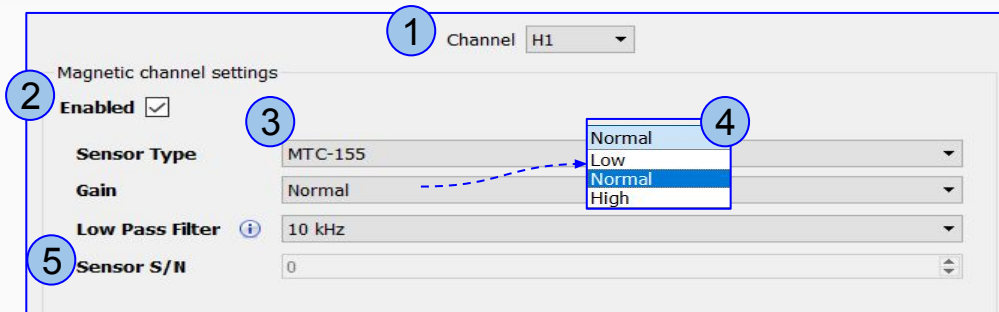
- If the sensor type is incorrect in the configuration file, the receiver will display a warning message. However, the recording will not be interrupted

4. Select the desired **Gain** and **LPF**

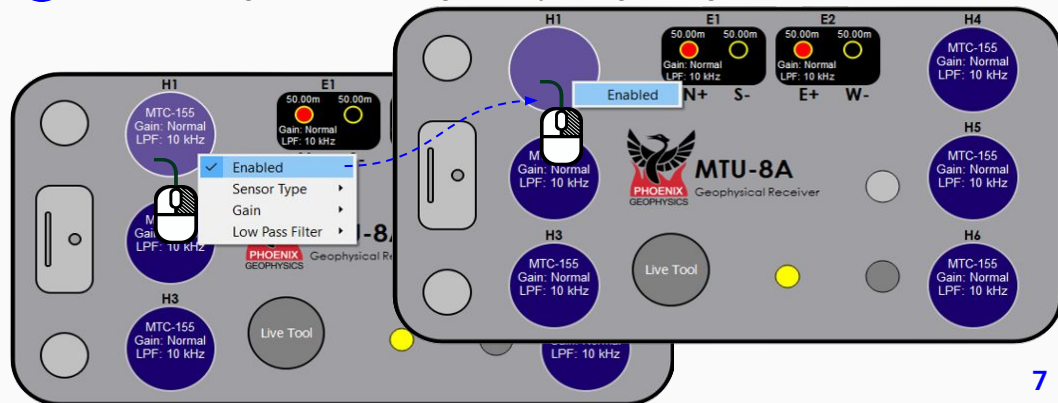
- For most broadband applications with MTC-100 series sensors, Normal Gain and 10 kHz LPF are best

5. Type the **Serial Number** of the sensor if required

- There is no need to type serial number for sensors MTC-155/MTC-185, since it will be automatically detected by the receiver.
- For older sensors, type the serial number of each sensor. If you don't know this information in advance, keep field notes to add this information later, after the recording is imported into EMapower



2 Some settings can be configured by using the right-click menu



Mixing Magnetic Sensor Types

EMpower allows to mix different sensor types, with sets divided into two groups of three, H1-H3 and H4-H6. It is possible to work with mixed groups of Phoenix's new generation, Phoenix legacy, Bartington, or Lemi sensors.

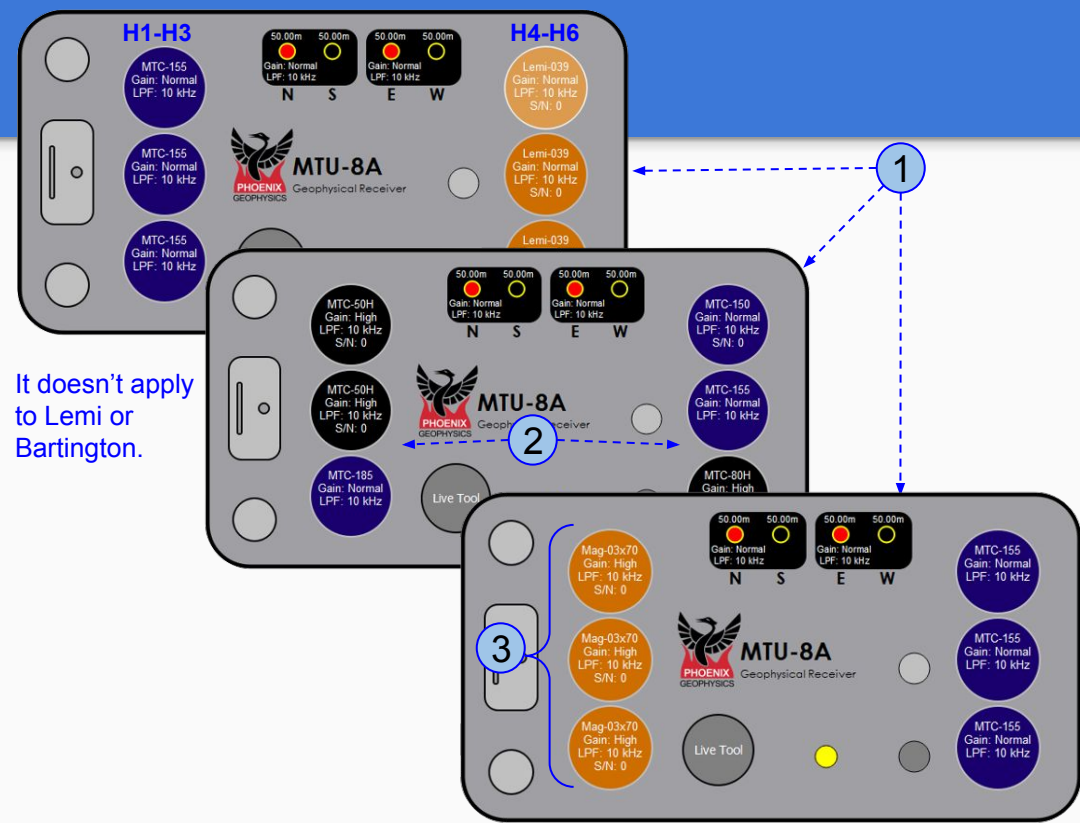
1. Select the sensor type for H1-H3 and H4-H6
2. It is possible to work with a combination of Phoenix's new generation and legacy for

Example

H1-H3 MTC-50H+MTC-50H+MTC-185

H4-H6 MTC-150+MTC-155+MTC-80H

3. Lemi and Bartington works in groups of three sensors at the time, can't be mixed within the same group



Sparse high frequency sampling- MT acquisition

Sparse high frequency sampling combined with varying **Sampling Rates** is used for common industrial applications such as oil and gas exploration, geothermal exploration, reservoir monitoring, and geotechnical studies.

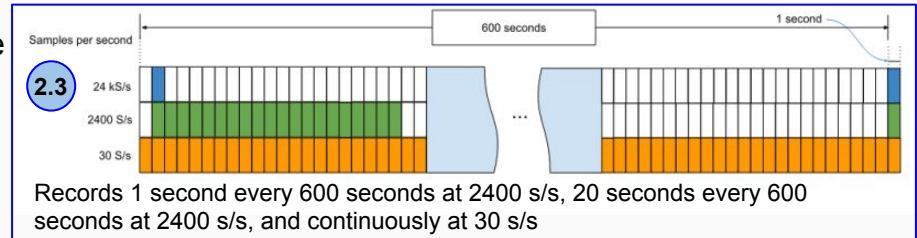
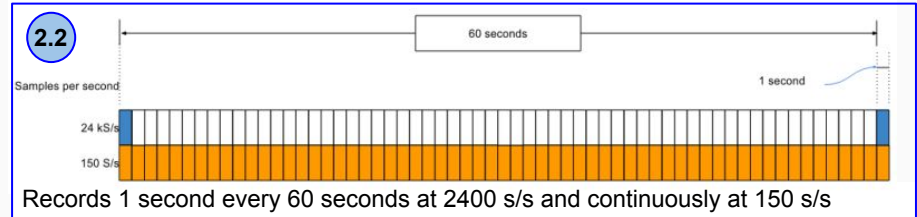
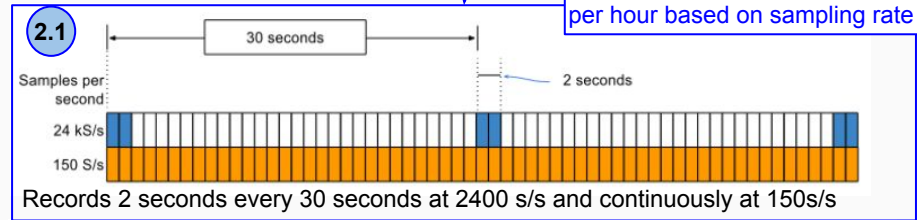
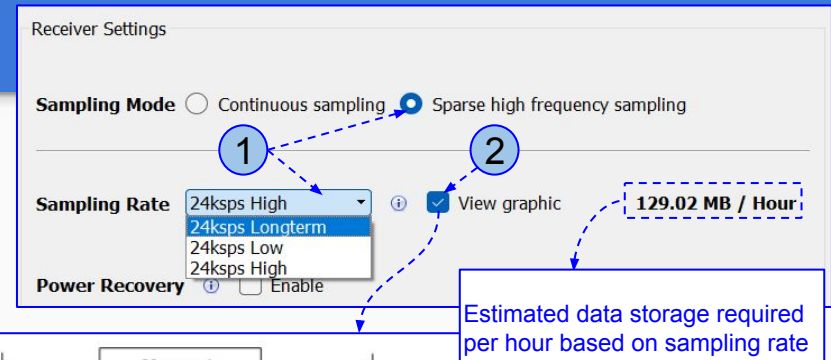
1. Select **Sparse high frequency sampling** and choose the **Sampling Rate**

2. Enable the **View graphic** to visualize on the left side how the Sampling Rate options work

2.1. **24 ksps High**, use this option for environments with varying or moderate noise levels (*overnight recordings*)

2.2. **24 ksps Low**, use this option for areas where noise levels are consistently low (*overnight recordings*)

2.3. For remote sites requiring extensive recordings, use the **24 ksps Longterm** option to enable weekly or monthly log recordings while minimizing SD card space usage
**Recommended for working with network remote access.*



Saving a Configuration File

1. Insert the SD Card

- The computer must be equipped with an SD card slot or use a USB card reader

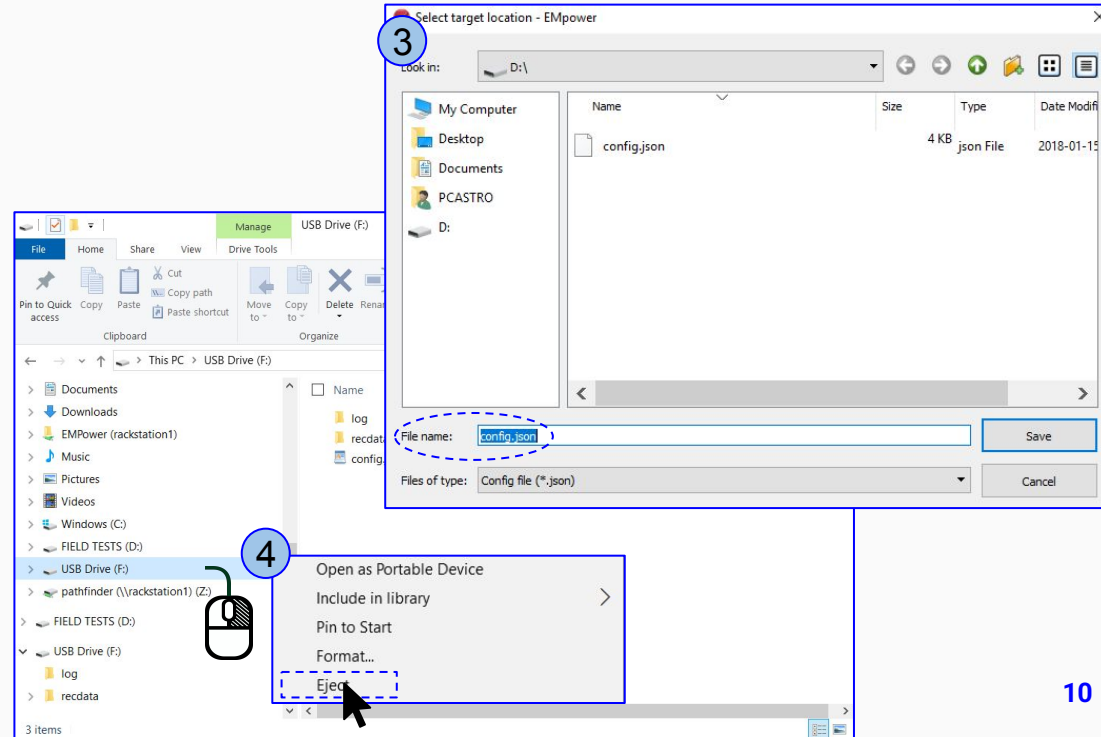
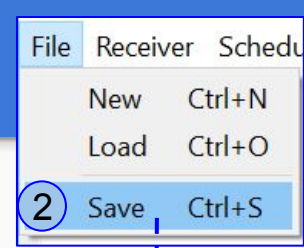
2. Click the **File** menu

- Save or **Ctrl+S**
- Select the SD card
- **EMpower** will automatically create the file "**config.json**"

3. Save the configuration file (*config.json*) in the root folder of the **SD card**

4. Open the file explorer

- Right click **SD card** drive
- **Select Eject option**
- **Pull out the SD Card**



MTU-8A

Connections - Single site MT

Start by connecting:

1. Ground electrode
2. Electrodes to channel **E1**(Ex) (N+, S-) and channel **E2**(Ey) (E+, W-)
3. Magnetic sensors to channels **H1**(Hx), **H2**(Hy), **H3**(Hz), **H4**(Hx), **H5**(Hy), and **H6**(Hz) as required
4. GPS antenna
5. 12V DC Power Source
6. Network connector



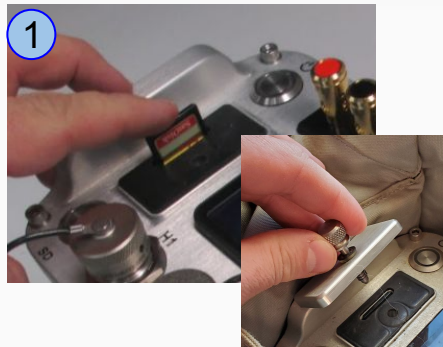
 In the field, it is often most efficient to connect the components to the receiver following the order on the right

Start the Recording

Before starting a recording, execute the calibration of the receiver and sensors to verify the operating status of the equipment and ensure the quality of the recordings and the reliability of the measurements.

*For more details consult [DAA22- Guide For MT Field Operations](#)

1. Insert the **SD card** and close the cap
2. To turn on the receiver, press the **Power** button briefly, wait until both **LEDs** are solid blue
 - 2.1. LED pattern for **Automatic Start** recording
3. If the schedule type was configured as **Manual**, press the **Power** button briefly and release to start recording



**For any problems with the SD Card, check the [DAA24 System Troubleshooting manual](#)*



The receiver auto-detects serial and model for magnetic sensors of the new generation (MTC-155/185). The information about the sensor is updated on the receiver screen only at power on and right after each recording starts.

- 2 Briefly press and release the power button

	Starting	Acquiring GPS	Ready
Power			
SD			

2.1 Automatic Start

The recording starts automatically according to the schedule

	Sensor Detection	Recording
Power		
SD		

- 3 Briefly press and release the power button

	Ready	Channels Detection	Recording
Power			
SD			

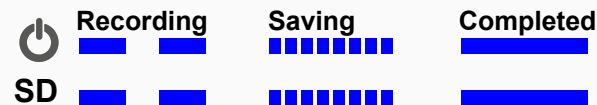
Indicators

Slow, equal pulses
 Solid color / Off

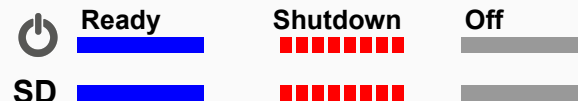
Stopping a recording

1. Press the **Power** button briefly and release to stop recording
 - Wait until both **LEDs** are steady blue
2. Turn off the receiver by pressing the **Power** button for a few seconds, until the **LEDs** will flash red
 - Wait until both **LEDs** turn off
3. Eject the **SD card**
 - Press the **SD card** and release, pull the **SD card**

- 1 Press the **Power** button briefly and release



- 2 Keep pressing the power button 3 sec and release



- 3

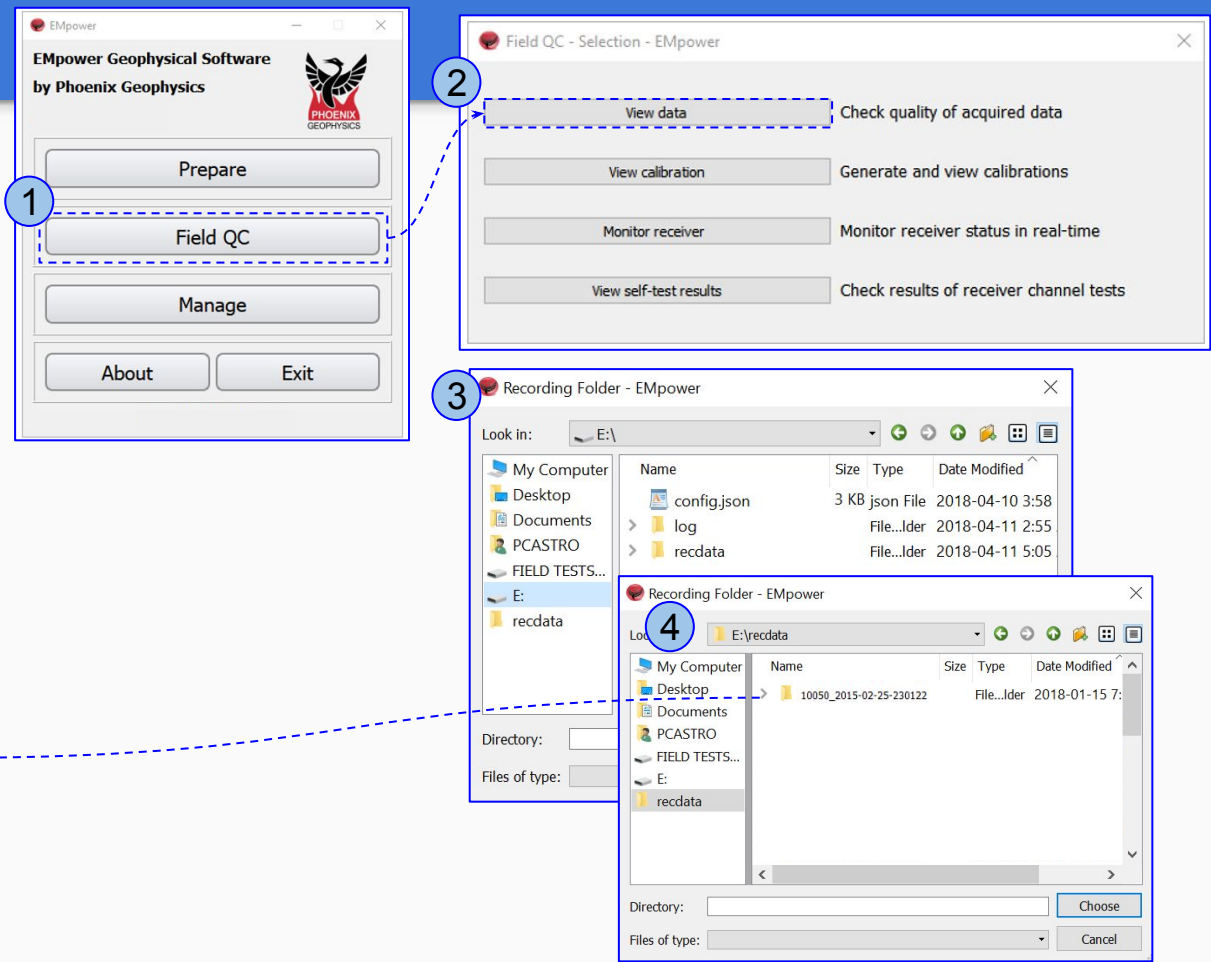


Indicators

 *Rapid, equal pulses*
 *Solid color / Off*

Importing - Field QC

- 1. Click the **Field QC** button
- 2. Select **View data**
- 3. Select the **SD card**
 - o The recording creates two folders, log and recdata
- 4. Open the **recdata** folder
 - o Select the recording file
 - o Click **Choose**



Recording Start Time
(GPS timezone)

> 10050_2015-02-25-230122

Receiver
Serial
Number

Recording
Date

1. Review the **Recording Information**

2. Review the Electrode **Resistance** values and make the necessary corrections

- Electrode **Distance (m) to GND**
- **Polarity**
- **E Azimuth**
- **External Filter**

3. Ensure that the magnetic sensors were detected and make the necessary corrections

- **Serial #**
- **Polarity**
- **H1-H3 Azimuth**
- **H4-H6 Azimuth**

4. View Recording Details (see page 17)

5. After reviewing the information, **Process** the data



The warning icon indicates that something might be wrong with the recording, review the recording information and make necessary changes if needed. Hover mouse pointer over the warning icon for more information.

Field QC - EMpower

RD2 10050 Schedule Decimated + Raw AMTC-30 + MTC-50HL (8h 58m 39s)

Status: ☒ Approved ☐ Unapproved ☐ Rejected

Tools: Time Series Spectra **Process (Orthogonal)**

1

Recording Information

Recording ID: 10050_2015-02-25-230122

⚠️ There were warnings detected in H1, H4, H5, H6
View warning icons for more details

Start time: Feb 25 2015 15:01:23 (Local) Eastern Standard Time (GPS -08:00)

Duration: 8h 58m 39s

Survey name: Nevada February 2015 Milestone v0.18

Station name: RD2 10050 Schedule Decimated + Raw AMTC-30 + MTC-50HL

Operator(s): SW

Company name:

Layout Geometry: Orthogonal

Declination: 0.00°

Notes:

2

Electric Channels

Channel	Distance (m) to GND		Polarity	Resistance (Ω)		Gain	LPF [Hz]	DC [V]
	(+) N / E	(-) S / W		(+) N / E	(-) S / W			
E1	50.00	50.00	☐ Inverted	229.325	224.290	4 x 4 = x16	10000	-0.00023
E2	50.00	50.00	☐ Inverted	219.059	226.341	4 x 4 = x16	10000	0.019

E Azimuth: 0.00° External Filter: None

3

Magnetic Channels

Channel	Sensor	Detected	Serial #	Polarity	Gain	LPF [Hz]	DC [V]
H1	MTC-155	Not Present	0	☐ Inverted	x4	10000	0.0058
H2	MTC-155	MTC-155	57404	☐ Inverted	x4	10000	0.0043
H3	MTC-155	MTC-155	57408	☐ Inverted	x4	10000	0.0079
H1-H3 Azimuth: 0.00°							
H4	MTC-50H	MTC-50	0	☐ Inverted	x4	1000	-0.0079
H5	MTC-50H	MTC-50	2683	☐ Inverted	x4	1000	0.058
H6	MTC-50H	MTC-50	0	☐ Inverted	x4	1000	0.038
H4-H6 Azimuth: 0.0°							

4

View Recording Details

5

This section can also be used to input additional field information if desired

Process Data

6. Select the local **Reference type** for the channels
7. Select the default group of magnetic channels to be used for processing
 - 7.1. Or use the **Select Manually** button to choose specific channels, this can be done for both magnetic and electric channels
8. Define the segment of time series to be processed, select the **Start** and **End** date/time, or use the arrows to define the time period
9. Select the **electric power grid filter** that corresponds to the frequency carried by the power lines in the survey area (50Hz, 60Hz, or None)
10. Click the **Process** button
11. A live display of the resistivity curve will appear after a few seconds

TestSensorDetect Serial 10024 - EMpower

Magnetic Channels

Hx = H1 MTC-155 0
Hy = H2 MTC-155 0
Hz = H3 MTC-155 0

Hx = H4 MTC-50H 0
Hy = H5 MTC-50H 0
Hz = H6 MTC-50H 0

Reference type: Magnetic

Electric Channels

Use the following
Ex = E1
Ey = E2

Processing timeframe

Time zone
GPS
Site time zone: America/Toronto (GPS-04:00)

Start: 2022-07-08 15:07:25 End: 2022-07-08 16:16:32
Sunrise: 05:43 Sunset: 21:01
Duration: 1h 9m 7s

Electric power grid filter
50 Hz 60 Hz None

Cancel Process

Magenetics Selection - EMpower

Hx: TestSensorDetect - 10024 - H2 Hy: TestSensorDetect - 10024 - H3 Hz: TestSensorDetect - 10024 - H5

Ok

TestSensorDetect Serial 10024 - EMpower

Magnetic Channels

Hx = H1 MTC-155 0
Hy = H2 MTC-155 0
Hz = H3 MTC-155 0

Reference type: Magnetic

Select Manually

Channel Selection - ...

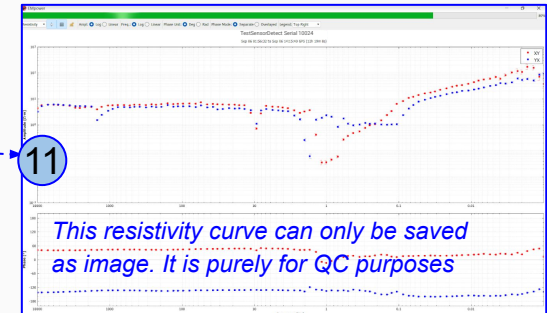
Ex Ey
E1 E1
E2 E2

Ok Cancel

EMpower will process only 3 magnetic channels at the time



For more details about the use of the parameters requested for the Field QC, consult the Data Management manual (DAA15).



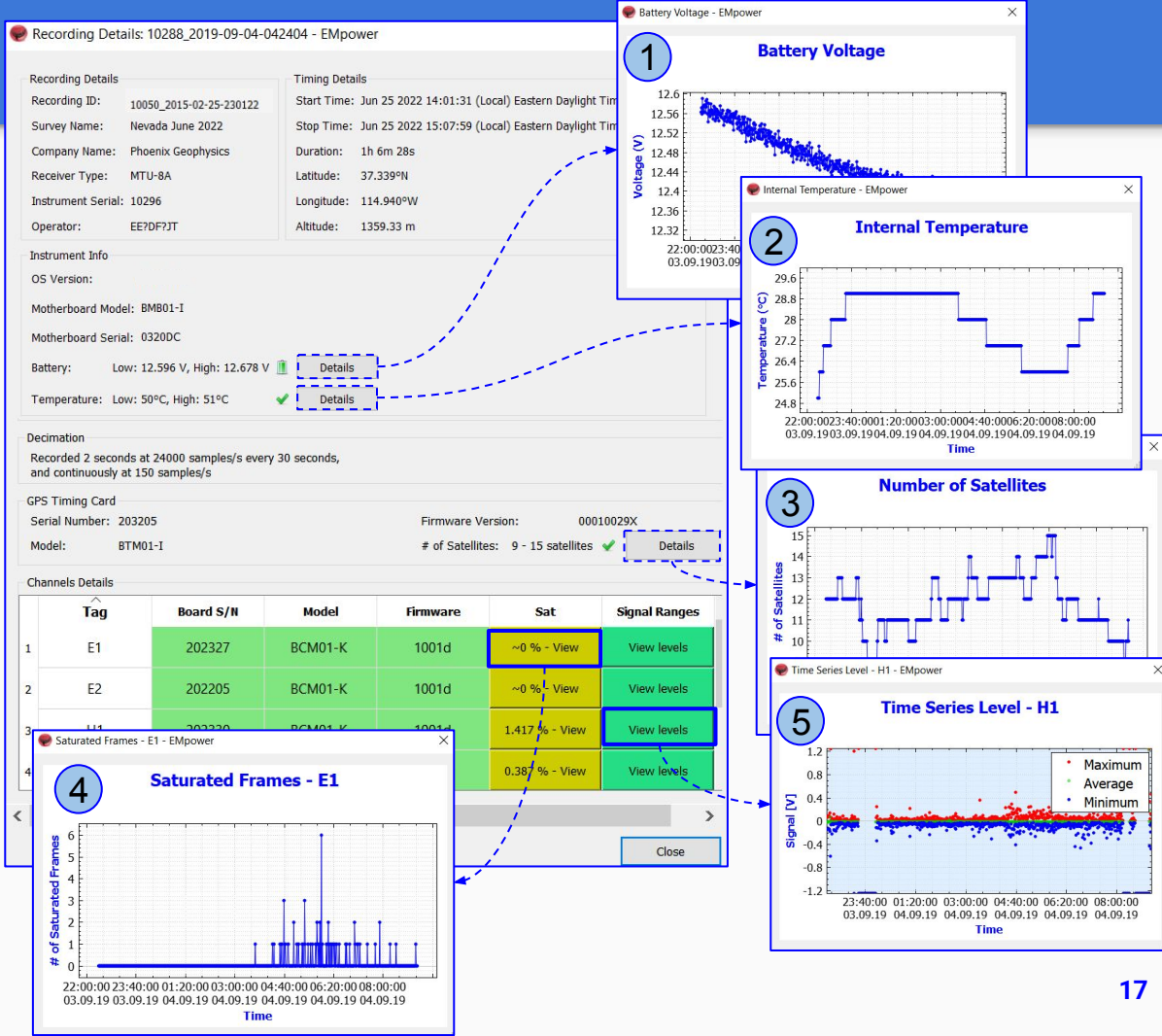
View Recording Details

Review that the following levels are within valid limits for quality control:

- 1. Battery Voltage
- 2. Internal Temperature
- 3. Number of Satellites

- 4. Saturated Frames
 - If saturation is not close to ~0%, review the channel configuration (see pages 6 - 8), the channel gain might be too high and/or there is artificial noise on your site

- 5. Time Series Level





Please check out the [FAQs](#)

<https://phoenixgeophysics.freshdesk.com/>

Or email us at: support@phoenix-geophysics.com